POTTERTON HOT WATER

Calorifier

Installation, Operation & Maintenance Manual

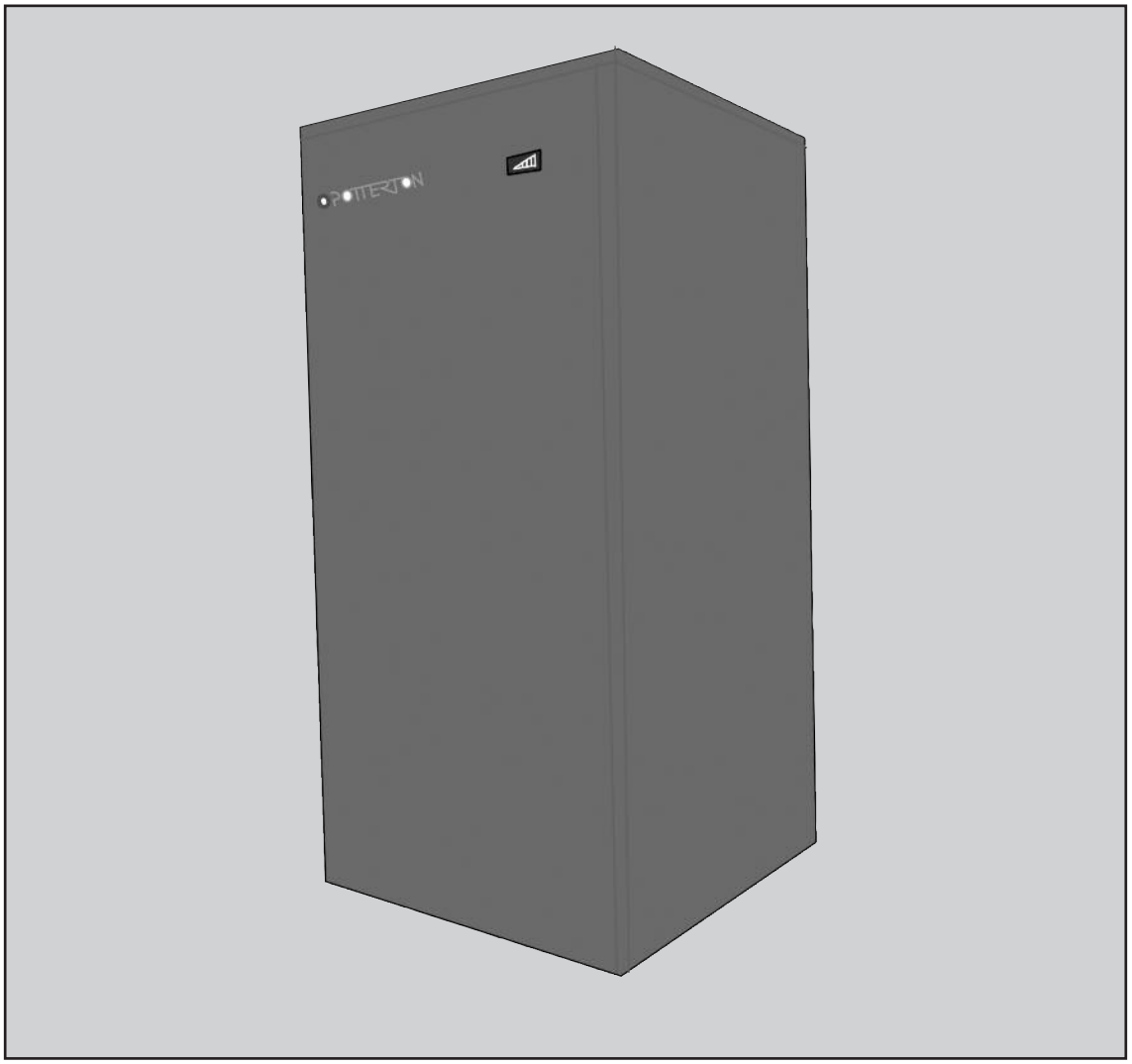

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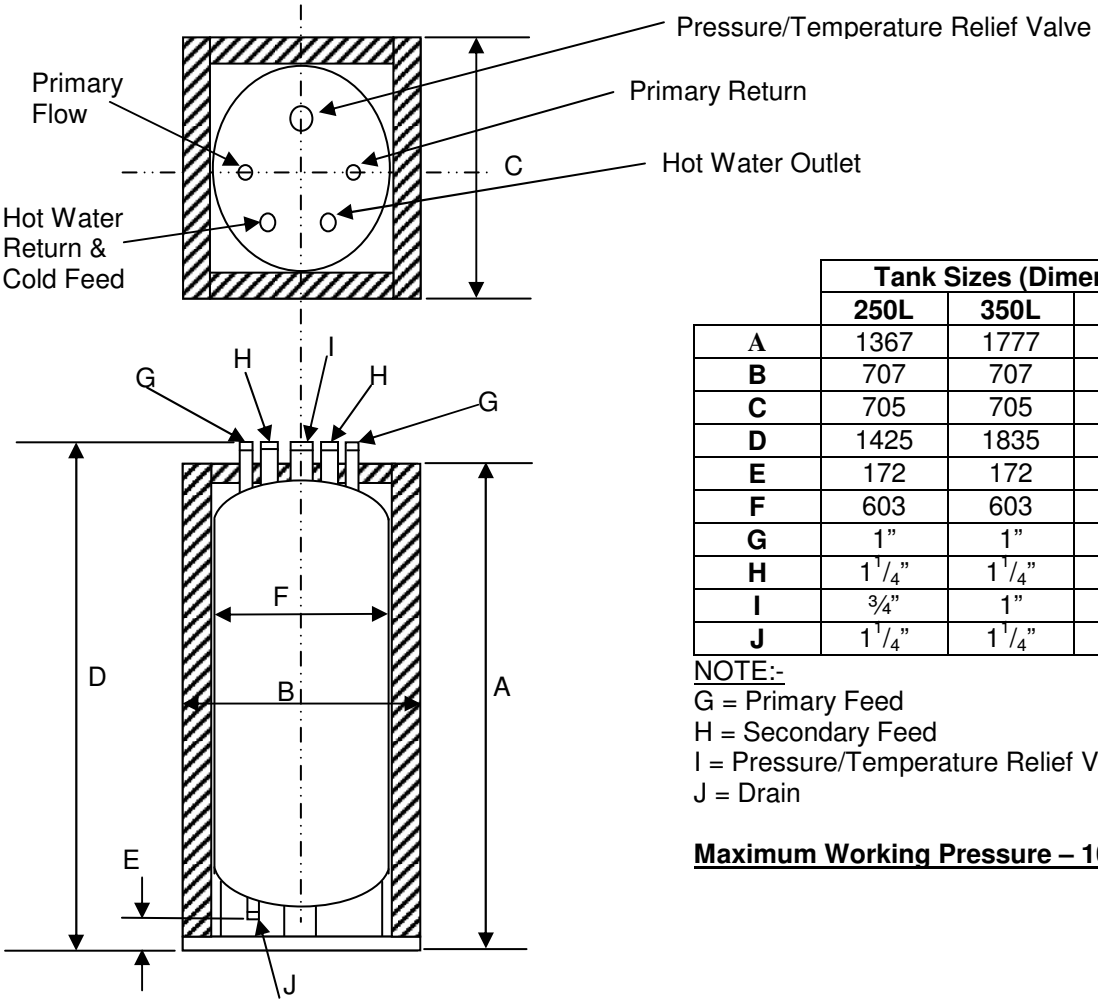
Fig.1 - Overall Dimensions



	Tank Sizes (Dimensions in mm)			
	250L	**350L**	**500L**	**800L**
A	1367	1777	1777	1777
B	707	707	807	1007
C	705	705	805	1005
D	1425	1835	1835	1835
E	172	172	172	172
F	603	603	702	900
G	1"	1"	1"	1"
H	$1^1/_4$"	$1^1/_4$"	$1^1/_4$"	$1^1/_4$"
I	¾"	1"	$1^1/_4$"	$1^1/_2$"
J	$1^1/_4$"	$1^1/_4$"	$1^1/_4$"	$1^1/_4$"

NOTE:-
G = Primary Feed
H = Secondary Feed
I = Pressure/Temperature Relief Valve
J = Drain

Maximum Working Pressure – 10 Bar

Fig.2 - Modular Header Kit Assembly Dimensions

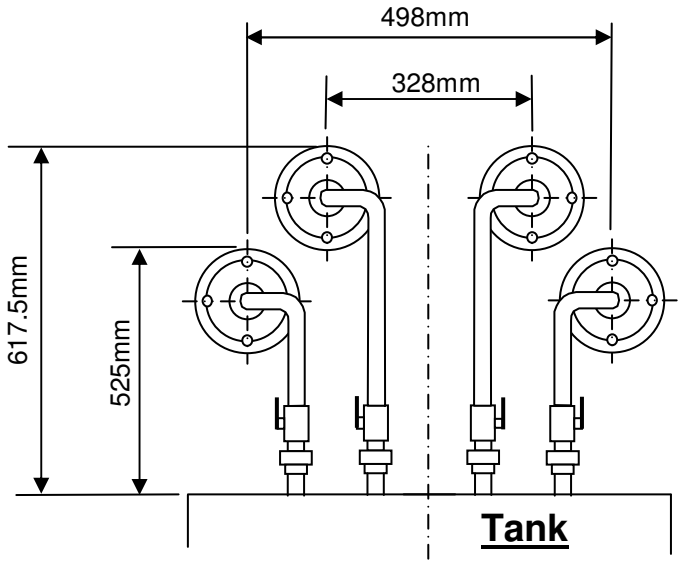
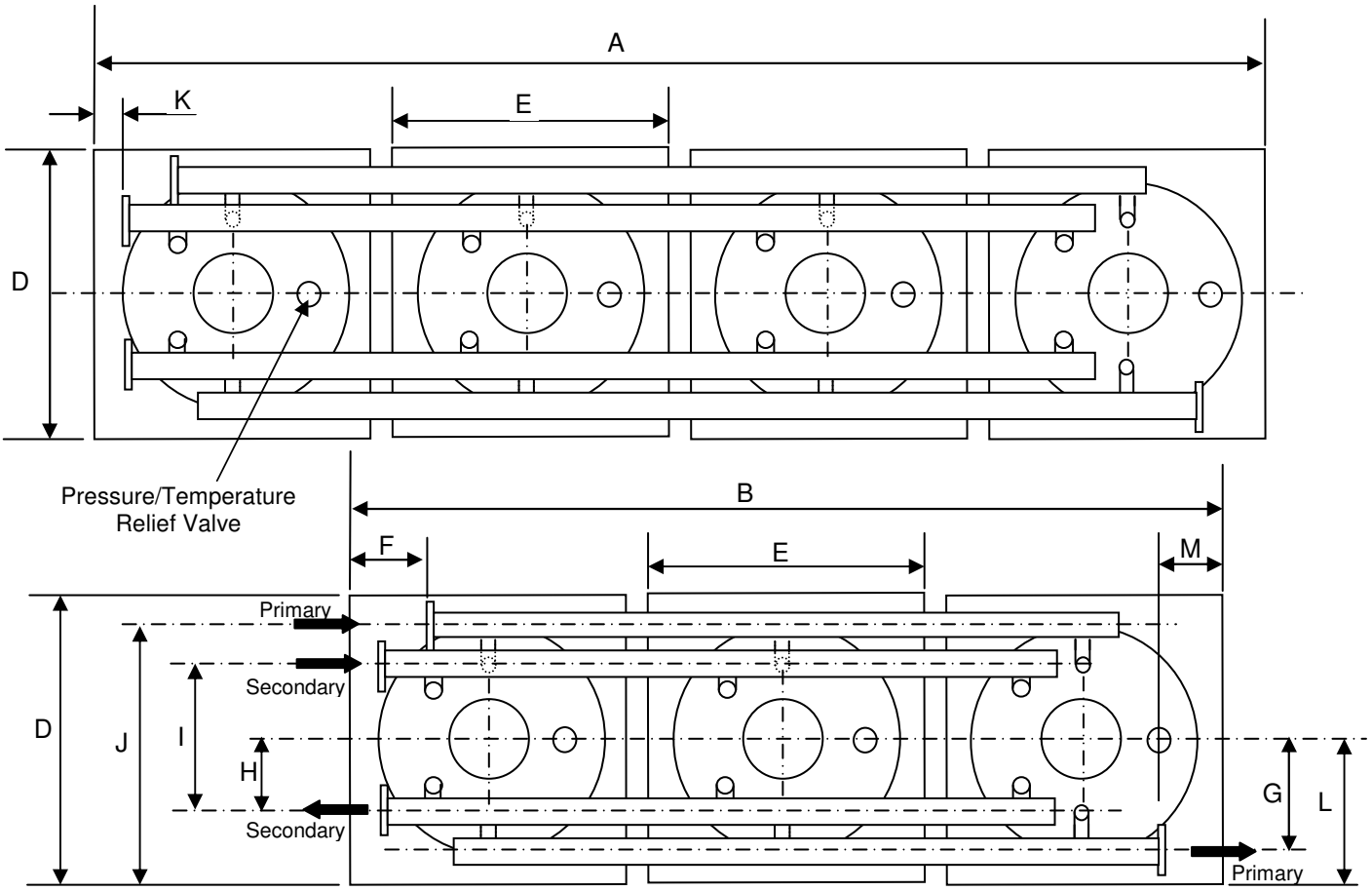
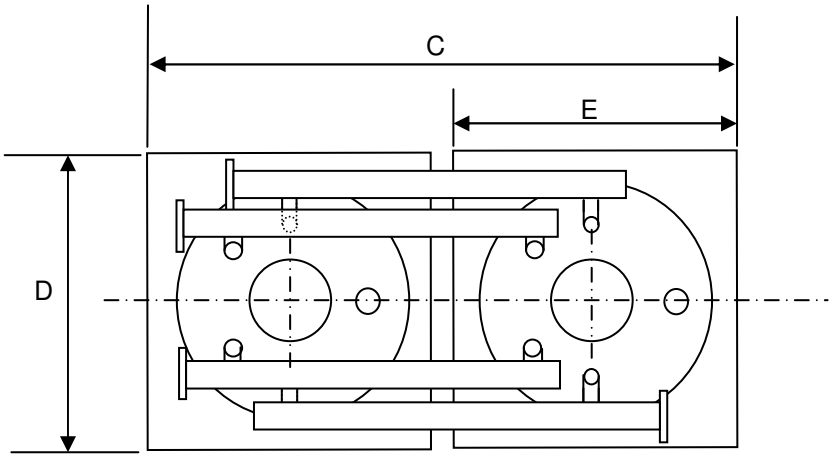


Fig.2 - Modular Header Kit Assembly Dimensions (cont….)



	Module Sizes (mm)			
	250L	350L	500L	800L
A	4005		4105	4305
B	2905		3005	3205
C	1805		1905	2105
D	707		807	1007
E	705		805	1005
F	172		222	322
G	248			
H	163			
I	326			
J	411			
K	3		52	152
L	354		404	504
M	183		203	293



Note:-
All flanges are DN65 PN16

Table 1A - Technical Data - Direct Distribution - domestic hot water storage at 60°C – cold water feed at 10°C

Calorifier Size	Capacity (litres)	Primary Pump Flow for 11°C ΔT (lit/sec)	Primary Side Pressure Drop (meters water column)	Primary 90°C			
				Peak Draw (lit/10min)	Hourly Production (lit/hr)	D.H.W. Pressure Drop (meters water column)	Power Used (kW)
250	250	1.56	2.0	389	1240	0.020	72
2 x 250	500	3.13	2.5	778	2480	0.095	144
3 x 250	750	4.69	2.6	1167	3720	0.080	216
4 x 250	1000	6.25	4.8	1556	4960	0.040	288
350	350	1.91	2.4	520	1516	0.025	88
2 x 350	700	3.82	2.5	1040	3032	0.116	176
3 x 350	1050	5.71	2.6	1560	4548	0.106	263
4 x 350	1400	7.62	2.8	2080	6064	0.061	351
500	500	2.19	4.2	695	1739	0.030	101
2 x 500	1000	4.39	4.3	1390	3478	0.153	202
3 x 500	1500	6.60	4.5	2085	5217	0.140	304
4 x 500	2000	8.79	4.9	2780	6956	0.080	405
800	800	3.47	8.5	1110	2756	0.040	160
2 x 800	1600	6.95	8.6	2220	5512	0.224	320
3 x 800	2400	10.42	8.7	3330	8268	0.210	480
4 x 800	3200	13.90	8.9	4440	11024	0.090	640

Table 1B - Technical Data - Direct Distribution - domestic hot water storage at 60°C – cold water feed at 10°C

Calorifier Size	Capacity (litres)	Primary Pump Flow for 11°C ΔT (lit/sec)	Primary Side Pressure Drop (meters water column)	Primary 80°C			
				Peak Draw (lit/10min)	Hourly Production (lit/hr)	D.H.W. Pressure Drop (meters water column)	Power Used (kW)
250	250	1.15	2.0	353	913	0.010	53
2 x 250	500	2.30	2.5	706	1826	0.047	106
3 x 250	750	3.45	2.6	1056	2739	0.040	159
4 x 250	1000	4.60	4.8	1412	3652	0.020	212
350	350	1.41	2.4	476	1120	0.015	65
2 x 350	700	2.80	2.5	952	2240	0.077	129
3 x 350	1050	4.21	2.6	1428	3360	0.060	194
4 x 350	1400	5.60	2.8	1904	4480	0.033	258
500	500	1.67	4.2	649	1326	0.017	77
2 x 500	1000	3.34	4.3	1298	2652	0.100	154
3 x 500	1500	4.97	4.5	1947	3978	0.075	229
4 x 500	2000	6.67	4.9	1940	5304	0.050	307
800	800	2.65	8.5	1036	2102	0.023	122
2 x 800	1600	5.30	8.6	2072	4204	0.130	244
3 x 800	2400	7.95	8.7	3108	6306	0.093	365
4 x 800	3200	10.60	8.9	4144	8408	0.070	488

Table 1C - Technical Data - Direct Distribution - domestic hot water storage at 60°C – cold water feed at 10°C

Calorifier Size	Capacity (litres)	Primary Pump Flow for 11°C ΔT (lit/sec)	Primary Side Pressure Drop (meters water column)	Primary 70°C			
				Peak Draw (lit/10min)	Hourly Production (lit/hr)	D.H.W. Pressure Drop (meters water column)	Power Used (kW)
250	250	0.70	2.0	312	551	0.006	32
2 x 250	500	1.39	2.5	624	1102	0.015	64
3 x 250	750	2.08	2.6	936	1653	0.025	96
4 x 250	1000	2.78	4.8	1248	2204	0.009	128
350	350	0.91	2.4	431	724	0.008	42
2 x 350	700	1.84	2.5	862	1448	0.020	85
3 x 350	1050	2.76	2.6	1293	2172	0.025	127
4 x 350	1400	3.69	2.8	1724	2896	0.015	170
500	500	1.13	4.2	601	896	0.010	52
2 x 500	1000	2.28	4.3	1202	1792	0.035	105
3 x 500	1500	3.41	4.5	1803	2688	0.025	157
4 x 500	2000	4.54	4.9	2404	3584	0.022	209
800	800	1.78	8.5	959	1413	0.020	82
2 x 800	1600	3.56	8.6	1912	2826	0.056	164
3 x 800	2400	5.34	8.7	2868	4239	0.021	246
4 x 800	3200	7.12	8.9	3824	5652	0.040	328

Maximum mains pressure = 10 bar
Operating pressure = 7 bar
Thermal cut-out = 98°C
Pressure / temperature relief valve = 95°C

Table 2 - Recovery Time from 10°C to 60°C

PIM Model	Primary at 90°C	Primary at 80°C	Primary at 70°C
250L	18 min	26 min	40 min
350L	17 min	25 min	38 min
500L	15 min	22 min	33 min
800L	14 min	20 min	31 min

Table 3 - Maintenance Consumption

PIM Model	Consumption / kWh / 24 hours (tank at 60°C + room temp 20°C)
250L	1.8 kWh
350L	2.1 kWh
500L	2.8 kWh
800L	3.9 kWh

General

The Potterton glass-lined HWS PIM calorifier is available in 250L, 350L, 500L & 800L units. All units can be installed in modules of 2 to 4 units, to satisfy the needs of an individual dwelling or collective buildings such as hotels, retirement homes, hospitals, sports facilities, office blocks, etc, up to 200 dwellings or equivalent.

The calorifier caters for very high peak loads and large hourly requirements by installing banks of three or four units in series.

With a total height of 2.395m (including the header) for the biggest unit, the calorifier can be installed in most boiler houses. It is also designed to make transportation and installation in the boiler plant as easy as possible, (see packaging table below).

The calorifier is glass-lined (enameled). Enameling is a very hygienic coating, which is very resistant to corrosion and scale, and allows operation with hard or chlorinated water.

A magnesium anode provides additional cathodic protection and can easily be checked and replaced.

The calorifier is insulated by 50mm thick, glass fibre insulation around the tank and on the top. When several units are used in combination a steel manifold is provided for the primary heating side and a stainless steel manifold for the domestic hot water side.

There are a number of kits available for different installations and each unit is provided with isolating valves so that the hot water services can be isolated. There is also a temperature/pressure relief valve that is fitted to unvented installations only.

Each assembly is provided with a storage thermometer and there is provision for a control thermostat which should be wired in series with a thermal cut out and a 3 port motorized valve fitted in the primary flow (for wiring diagram see Fig.9).

At the bottom of the calorifier there is a 1 ¼" BSP drain connection.

Details of Calorifier and Kits

The calorifier is delivered in two packs and details can be seen below.

The tank will be delivered for either vented or unvented applications and the correct application needs to be specified at the time of ordering.

Table 4 - Delivery Configuration

	Pack Contents	Weight in kg			
		250L	350L	500L	800L
Tank Pack	Tank + top and bottom inspection cover + anode + base panel	146	193	245	340
Casing Pack	Red powder coated case (comprising two sides, front, back and top panels) + glass wool insulation material + DHW thermometer + control blanking plate + either a vented or unvented kit (see details below)	70	84	103	127

Plus

Vented Kit	$1^{1}/_{4}$ BSP three way vent valve

Or

Unvented Kit - 250L	¾" BSP Pressure/Temperature relief valve
Unvented Kit - 350L	1" BSP Pressure/Temperature relief valve
Unvented Kit - 500L	1 ¼" BSP Pressure/Temperature relief valve
Unvented Kit - 800L	1 ½" BSP Pressure/Temperature relief valve

There are also a number of optional kits that are available and these are detailed below.

Table 5 - Optional Kits

	Pack Contents
Header Kit - 2 tanks	Primary Feed & DHW Manifold with DN65 PN16 Connection Flange + 8 x $1^1/_4$ " Isolating Valves
Header Kit - 3 tanks	Primary Feed & DHW Manifold with DN65 PN16 Connection Flange + 12 x $1^1/_4$ " Isolating Valves
Header Kit - 4 tanks	Primary Feed & DHW Manifold with DN65 PN16 Connection Flange + 16 x $1^1/_4$ " Isolating Valves

Control Thermostat Kit	DHW thermostat, on/off switch and power supply cable plus pump connection

Motorised Valve Kit No.2A	1" BSP motorised valve
Motorised Valve Kit No.2B	$1^1/_4$" BSP motorised valve
Motorised Valve Kit No.2C	$1^1/_2$" BSP motorised valve
Motorised Valve Kit No.2D	2" BSP motorised valve
Motorised Valve Kit No.2E	$2^1/_2$" BSP motorised valve

Unvented Mains Kit No.3A	¾" pressure reducing valve, ¾" non-return valve, 25 lit expansion vessel & ¾" pressure relief valve
Unvented Mains Kit No.3B	1" pressure reducing valve, 1" non-return valve, 40 lit expansion vessel & 1" pressure relief valve
Unvented Mains Kit No.3C	$1^1/_4$" pressure reducing valve, $1^1/_4$" non-return valve, 80 lit expansion vessel & 1" pressure relief valve
Unvented Mains Kit No.3D	$1^1/_2$" pressure reducing valve, $1^1/_2$" non-return valve, 120 lit expansion vessel & 1" pressure relief valve
Unvented Mains Kit No.3E	2 " pressure reducing valve, 2" non-return valve, 180 lit expansion vessel & 1 ¼" pressure relief valve
Unvented Mains Kit No.3F	2 x $1^1/_2$" pressure reducing valve, 2 x $1^1/_2$" non-return valve, 220 lit expansion vessel & 1 ¼" pressure relief valve

Strap on Thermal Cut-Out Kit No.5	Strap on manually re-settable thermal cut out set to 95°C

There are a number of thermal cutout and unvented mains kits and the table below details which tanks they are used for.

Table 6 - Configuration of Thermal Cut-Out & Unvented Mains Kits

	Kit Number															
	250L				350L				500L				800L			
No of Tanks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Motorised Valve Kit	2A	2B	2C	2D	2A	2C	2D	2D	2A	2C	2D	2D	2B	2C	2D	2E
Unvented Mains Kit	3A	3B	3C	3D	3B	3C	3D	3E	3B	3C	3D	3E	3C	3D	3E	3F

Sizing Procedure

There are two methods for sizing and they are detailed below:

Quick & Approximate Method Based on the Number of Dwellings

1. The number of dwelling equivalents is based on a dwelling inhabited by 3.5 people and offers one bath + washbasin + bidet + sink. Therefore the number of dwelling equivalents to be used in the design of an installation will be calculated using Table 6.

Table 7 - Dwelling Equivalents

Type	Equipment	Number of Dwelling Equivalents
1	Shower + hand basin + sink	0.79
2	Bath + hand basin + sink	0.88
3	Large bath + hand basin + sink	1.14
4	Bath + hand basin + bidet + sink (BASE)	1
5	Large bath + hand basin + bidet + sink	1.26
6	Bath + 2 hand basins + bidet + sink	1.12
7	Bath + 2 hand basins + bidet + sink + shower	1.40
8	Bath + 2 hand basins + 2 bidets + sink + shower	1.52
9	2 baths + 2 hand basins + 2 bidets + sink	1.62
10	2 large baths + 2 hand basins + 2 bidets + sink	2.13

The notes below are to be read in conjunction with Table 7.

2. Power rating necessary when the boiler serves PIM Calorifier only (includes 10% for losses due to circulation and scaling).
3. Extra load to be added to the basic heating rate to take care of HWS power needs at the required load discharge + circulation losses + allowance for scaling. This additional amount varies according to insulation in the dwelling and is based on individual dwelling need of 10 Kw.
4. One meter water column = 100 mbars.

Table 8A - Quick & Approximate Sizing Method (90°C Primary Temperature)

Number of Dwelling Equiv.	Requirements of 60°C HWS		Primary Temperature of 90°C						
	10 Min. Draw litres	Hourly Demand Litres	Tank Size	Output at 60°C (cold feed 10°C) 10 Min. Output litres	Output at 60°C (cold feed 10°C) Hourly Output litres	Primary Pump Flow Rate lit/sec	Primary Pressure Drop in metres of water column	HWS Pressure Drop in metres of water column	Boiler Rating kW
5	260	425	250	389	1240	1.56	2.0	0.020	72
10	335	660	250	389	1240	1.56	2.0	0.020	72
15	415	885	350	520	1516	1.91	2.4	0.025	88
20	475	1075	350	520	1516	1.91	2.4	0.025	88
25	525	1255	500	695	1739	2.19	4.2	0.030	101
30	580	1430	500	695	1739	2.19	4.2	0.030	101
35	630	1615	500	695	1739	2.19	4.2	0.030	101
40	675	1790	800	1110	2756	3.47	8.5	0.040	160
45	720	1950	2 x 250	778	2480	3.13	2.45	0.095	144
50	755	2100	2 x 250	778	2480	3.13	2.5	0.095	144
60	840	2425	2 x 350	1040	3032	3.82	2.5	0.116	176

Table 8A (Continued)

Number of Dwelling Equiv.	Requirements of 60℃ DHW		Primary Temperature of 90℃						
	10 Min. Draw	Hourly Demand	Tank Size	Output at 60℃ (cold feed 10℃)		Primary Pump Flow Rate	Primary Pressure Drop in metres of water column	DHW Pressure Drop in metres of water column	Boiler Rating
				10 Min. Output	Hourly Output				
	litres	Litres		litres	Litres	lit/sec			kW
70	915	2725	2 x 350	1040	3032	3.82	2.5	0.116	176
80	1000	3015	3 x 250	1167	3750	4.69	2.6	0.080	216
90	1065	3355	3 x 250	1167	3750	4.69	2.6	0.080	216
100	1140	3600	3 x 250	1167	3750	4.69	2.6	0.080	216
110	1225	3920	3 x 350	1560	4548	5.71	2.6	0.106	263
120	1300	4230	3 x 350	1560	4548	5.71	2.6	0.106	263
130	1375	4530	3 x 500	2085	5217	6.60	4.5	0.140	304
140	1475	4830	4 x 250	1560	4960	6.25	4.8	0.040	288
150	1575	5120	3 x 500	2085	5217	6.60	4.5	0.140	304
160	1660	5410	2 x 800	2220	5512	6.95	8.6	0.224	320
170	1765	5700	4 x 500	2780	6956	8.79	4.9	0.080	405
180	1870	6020	4 x 500	2780	6956	8.79	4.9	0.080	405
190	1975	6260	3 x 800	3330	8268	10.42	8.7	0.210	480
200	2020	6600	3 x 800	3330	8268	10.42	8.9	0.210	480

Table 8B - Quick & Approximate Sizing Method (80℃ Primary Temperature)

Number of Dwelling Equiv:	Requirements of 60℃ HWS		Primary Temperature of 80℃						
	10 Min. Draw	Hourly Demand	Tank Size	Output at 60℃ (cold feed 10℃)		Primary Pump Flow Rate	Primary Pressure Drop in metres of water column	HWS Pressure Drop in metres of water column	Boiler Rating
				10 Min. Output	Hourly Output				
	litres	litres		litres	Litres	lit/sec			kW
5	260	425	250	353	913	1.15	2.0	0.010	53
10	335	660	250	353	913	1.15	2.0	0.010	53
15	415	885	350	520	1516	1.41	2.4	0.015	65
20	475	1075	350	520	1516	1.41	2.4	0.015	65
25	525	1255	500	695	1739	1.67	4.2	0.017	77
30	580	1430	500	695	1739	1.67	4.2	0.017	77
35	630	1615	500	695	1739	1.67	4.2	0.017	77
40	675	1790	2 x 250	706	1826	2.30	2.5	0.047	106
45	720	1950	800	1036	2102	2.65	8.5	0.023	122
50	755	2100	2 x 350	952	2240	2.80	2.5	0.077	129
60	840	2425	3 x 250	1056	2739	2.30	2.6	0.040	159
70	915	2725	3 x 250	1056	2739	2.30	2.6	0.040	159
80	1000	3015	3 x 350	1428	3360	2.80	2.6	0.060	194
90	1065	3355	3 x 350	1428	3360	2.80	2.6	0.060	194
100	1140	3600	4 x 250	1412	3652	4.60	5.6	0.020	212
110	1225	3920	3 x 500	1947	3978	4.97	4.5	0.075	229
120	1300	4230	4 x 350	1904	4480	5.60	2.8	0.033	258

Table 8B (Continued)

Number of Dwelling Equiv:	Requirements of 60°C HWS		Primary Temperature of 80°C						
	10 Min. Draw	Hourly Demand	Tank Size	Output at 60°C (cold feed 10°C)		Primary Pump Flow Rate	Primary Pressure Drop in metres of water column	HWS Pressure Drop in metres of water column	Boiler Rating
				10 Min. Output litres	Hourly Output Litres				
	litres	Litres				lit/sec			kW
130	1375	4530	4 x 500	1940	5304	6.67	4.9	0.050	307
140	1475	4830	4 x 500	1940	5304	6.67	4.9	0.050	307
150	1575	5120	4 x 500	1640	5304	6.67	4.9	0.050	307
160	1660	5410	3 x 800	3108	6306	7.95	8.7	0.093	365
170	1765	5700	3 x 800	3108	6306	7.95	8.7	0.093	365
180	1870	6020	3 x 800	3108	6306	7.95	8.7	0.093	365
190	1975	6260	3 x 800	3108	6306	7.95	8.7	0.093	365
200	2020	6600	4 x 800	4144	8408	10.60	8.9	0.070	488

Example of Quick & Approximate Size Selection for PIM Calorifier

The building consists of:

28 dwellings with 1 x bath + 1 x hand basin + 1 x sink (type 2)
42 dwellings with 1 x bath + 1 x hand basin + 1 x sink + 1 x bidet (type 4)
20 dwellings with 1 x bath + 2 x hand basin + 1 x sink + 1 x shower + 1 x bidet (type 7)
HWS temperature 60°C - primary temperature 90°C

Actual type and number of dwellings	Number of Dwelling Equivalents (from above table)
28 x type 2	28 x 0.88 = 25
42 x type 4	42 x 1.0 =42
20 x type 7	20 x 1.4 =28
Total = 90	Total = 95

Search for the nearest number of dwelling equivalents above 95 in the first column of Table 8. This gives 100 equivalent dwellings and a demand of 3600 lit/hr. The selected units are 3 x 350L, (for different primary temperatures and HWS temperatures consult the appropriate table under Table 8).

Accurate Method Based on Load & Consumption

There are two main types of building which are a) normal requirements (which could be small hotels, convalescent homes, etc), and, b) those considered to have large requirements (which could be large hotels, hospitals, industrial premises, etc).

Tables 9 and 10 below specify the number of main outlets operating simultaneously during the 10-minute peak period and the number of main outlets used in one hour.

Table 9 - Normal Requirements

Total Number of Main Outlets	5	10	20	30	40	50	60	70	80	90	100	150	200
Load Factor Nb of Main Outlets Operating Simultaneously for 10 minutes	2	3	5	6	8	9	11	13	14	16	17	25	32
Number of Main Outlets Used in One Hour	4	7	12	17	21	26	30	35	40	45	50	74	96

Table 10 - Large Requirements

Total Number of Main Outlets	5	10	20	30	40	50	60	70	80	90	100	150	200
Load Factor Nb of Main Outlets Operating Simultaneously for 10 minutes	3	4	7	10	12	15	17	20	22	25	27	39	50
Number of Main Outlets Used in One Hour	5	9	18	26	33	41	49	57	65	73	80	117	154

NOTE: By using the following formula if the ratio is less than 3 then use the appropriate table above.

Number of beds / number of main outlets = < 3

But if the ratio is greater than 3 it will be assumed that all the main outlets are used during the 10 minute peak period and 4 times per hour.

The following will be considered as main outlets in a bedroom:- a bathroom, or,
a shower + hand basin, or,
a hand basin if it is alone

Table 11 - Hot Water Demand at 60°C (Mean usage time for 10 minute peak period)

Usage	Demand in Litres/min		
	Minimum	Mean	Maximum
Bath	8	10	15
Shower	3	4	5
Hand Basin	2	3	6
Shower (school)	1.5	2	3
Round Basin (6/10 people)	15	20	25
Restaurants	10/meal	15/meal	20/meal

Kitchens & Restaurants

The formula below is a guide for kitchens and restaurants but requirements do not normally intervene during bathroom requirements and may not be taken into account in the PIM selection. However, some consideration should be made to ensure that the needs of the kitchen and restaurant are met.

$$\text{HOURLY DEMAND} = \frac{\text{NUMBER OF MEALS} \times 15 \text{ litres}}{4 \text{ HOURS OF USE}}$$

The following three examples are a guide to the sizing procedure laid down in this section. (**NOTE**: The following examples are given for guidance only. Buildings present special cases and each requirement should be analysed in detail).

EXAMPLE 1: Small Hotel 30 single bedrooms with hand basin
6 separate bathrooms
Kitchen and restaurant
Hot water 60°C & primary 90°C

a) Hand basins = 30 (number of beds ÷30 (number of main outlets) = 1

Table 10 indicates simultaneous operation of 6 hand basins for 10 minutes and 17 hand basins for one hour and from Table 10 the mean demand for a hand basin is 3 lit/min.

6 hand basins x 3 lit/min for 10 minutes = 180 lit/10 minutes
17 hand basins x 3 lit/min for 10 minutes = 510 lit/hr

b) Bathrooms = 30 (number of beds) ÷ 6 (number of outlets) = 5

In this case because the number is >3 (6 bathrooms should be considered to be used 4 times per hour)

6 bathrooms x 10 lit/min for 10 minutes = 600 lit/10 minutes.
6 bathrooms x 10 lit/min for 10 minutes x 4 times = 2400 lit/hr

Therefore the total demand is:- Total 10 minute demand = 180 + 600 = 780 lit/10 minutes
Total hourly demand = 510 + 2400 = 2910 lit/hr

Unit selected from Table 1 is **PIM Calorifier 350L x 2**

EXAMPLE 2: Large Hotel 50 double bedrooms with bathroom
Kitchen and restaurant
Hot water 60°C & primary 90°C

a) 100 (number of beds) ÷ 50 (number of main outlets) = 2

Table 10 indicates simultaneous operation of 15 bathrooms for 10 minutes and 41 bathrooms for one hour and from Table 10 the mean demand for a bathroom is 10 lit/min.

15 bathrooms x 10 lit/min for 10 minutes = 1500 lit/10 minutes
41 bathrooms x 10 lit/min for 10 minutes = 4100 lit/hr

Unit selected from Table 1 is **PIM Calorifier 350L x 3**

EXAMPLE 3: Nursing Home 60 single beds with 60 wash basins
20 common shower cubicles
10 hand basins for a staff of 20 people
Kitchen and restaurant

a) Hand basins = 60 (beds) + 20 (employees) ÷ 60 + 10 (number of main outlets) = 1.1

Table 10 indicates simultaneous operation of 20 hand basins for 10 minutes and 57 hand basins per hour.

20 hand basins x 3 lit/min for 10 minutes = 600 lit/10 minutes
57 hand basins x 3 lit/min for 10 minutes = 1710 lit/hr

b) Showers = 60 (number of beds) ÷ 20 (number of main outlets) = 3

Table 10 indicates simultaneous operation of 7 showers for 10 minutes and 18 showers per hour

7 showers x 4 lit/min for 10 minutes = 280 lit/10 minutes
18 showers x 4 lit/min for 10 minutes = 720 lit/hr

Therefore the total demand is:- Total 10 minute demand = 600 + 280 = 880 lit/10 minutes
Total hourly demand = 1710 + 720 = 2430 lit/hr

Unit selected from Table 1 is **PIM Calorifier 350L x 2**

WARNING: When calculating heat absorption **DO NOT** forget to allow for losses in circulation loop (+10% to 20% dependent on cases).

Table 12 - Average HWS Requirements for Various Consumers:

Standard apartment building	Approx 40 to 60 litres per person per day
Retirement home	Approx 40 to 60 litres per person per day
Hospitals (no laundry)	Approx 80 to 160 litres per person per day
Restaurant	10 to 20 litres per meal distributed over about 4 hours
4 Star Hotel	Approx 120 to 300 litres per bed
3 Star Hotel	Approx 120 to 150 litres per bed
2 Star Hotel	Approx 70 to 100 litres per bed
Other Categories	Approx 50 to 90 litres per bed

WARNING: The above values should not be multiplied directly by the number of outlets, load factors should be taken into consideration. Always consider the peak load especially where hot water is used intermittently.

Fig.4 - Vented HWS Circuit

KEY

1	Isolating Valve
2	3-Way Vent Valve
3	Pump
4	Non-Return Valve

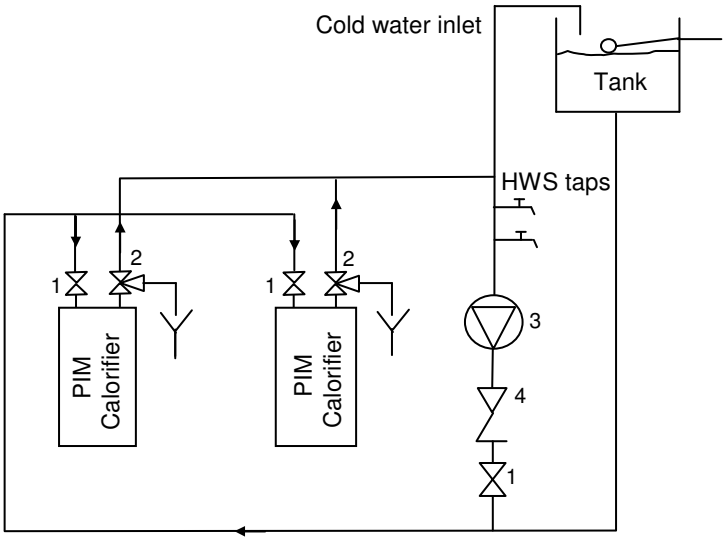
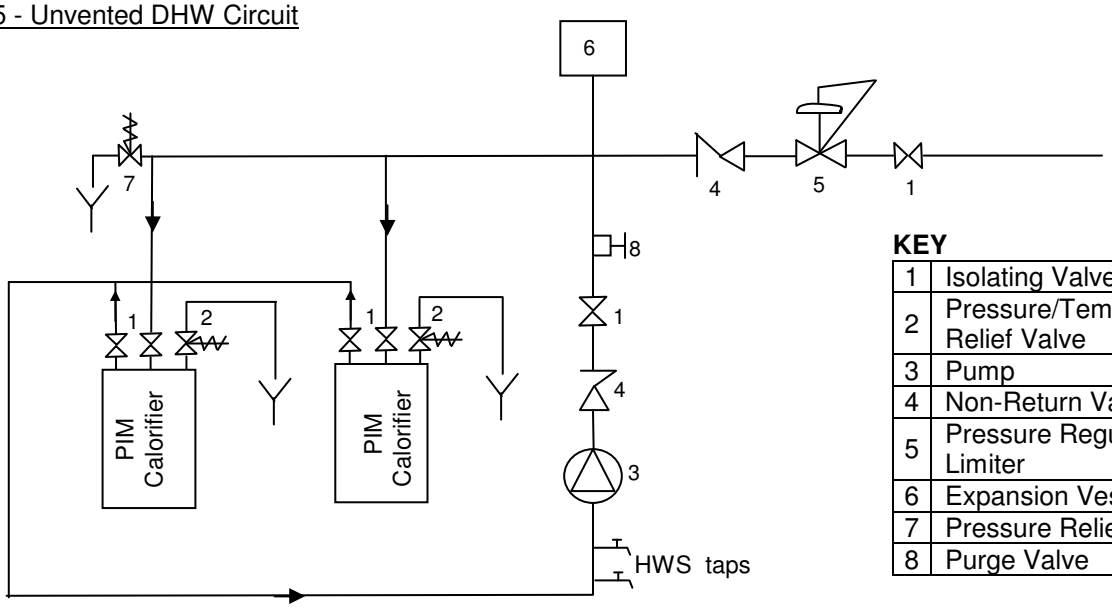


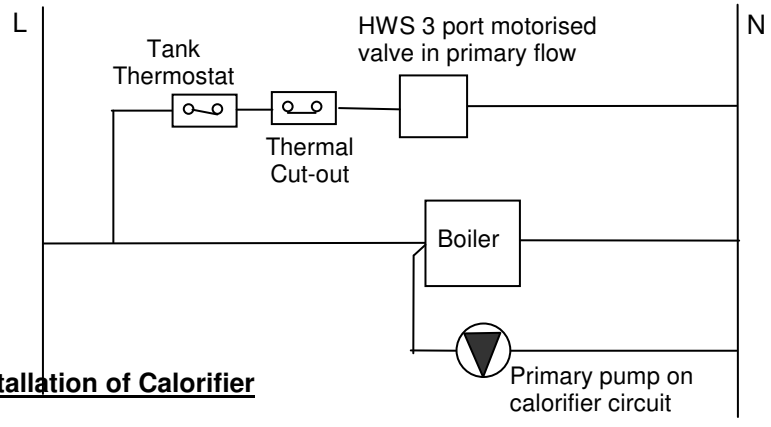
Fig.5 - Unvented DHW Circuit



KEY

1	Isolating Valve
2	Pressure/Temperature Relief Valve
3	Pump
4	Non-Return Valve
5	Pressure Regulator / Limiter
6	Expansion Vessel
7	Pressure Relief Valve
8	Purge Valve

Fig.6 - Wiring Diagram for Thermostat, Thermal Cut-Out & Motorised Valve



Assembly & Installation of Calorifier

Fig.4 - Vented HWS Circuit

KEY

1	Isolating Valve
2	3-Way Vent Valve
3	Pump
4	Non-Return Valve

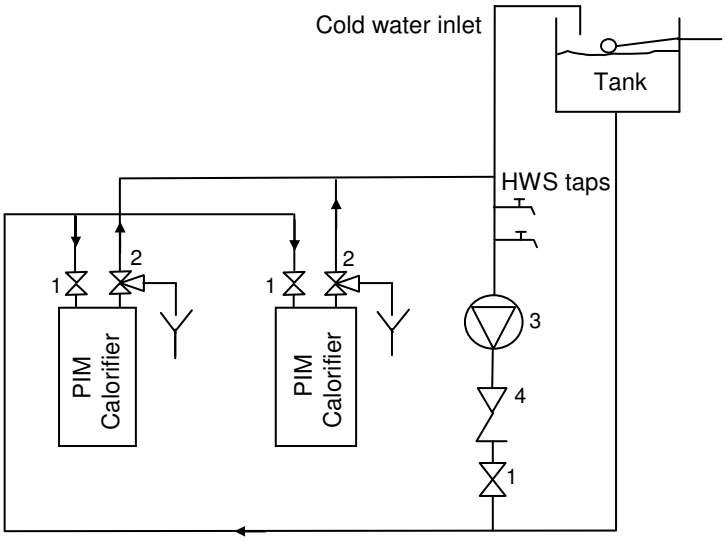
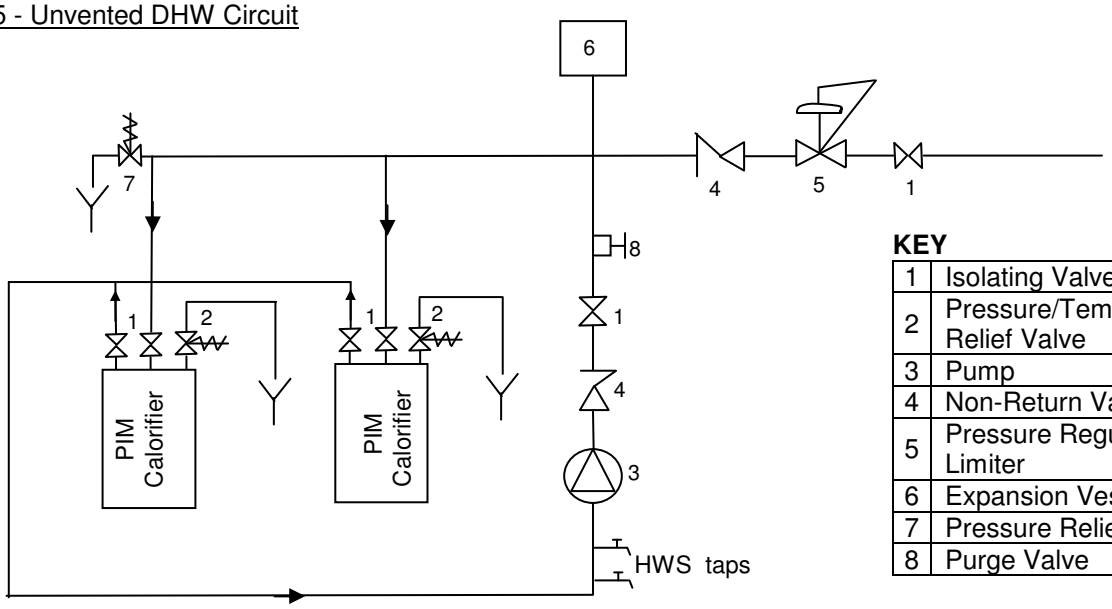


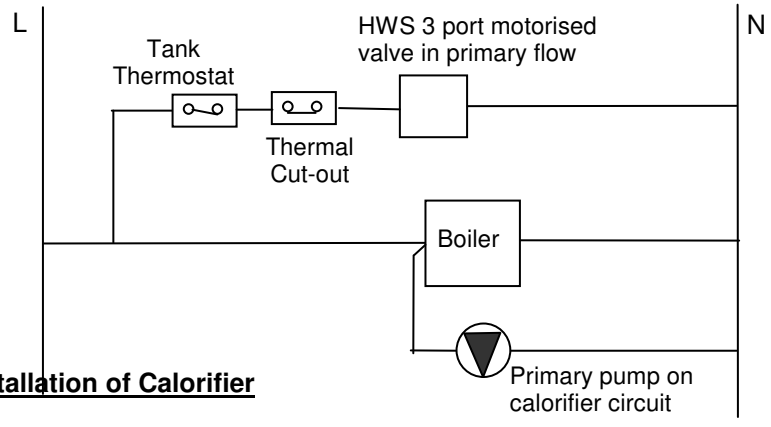
Fig.5 - Unvented DHW Circuit



KEY

1	Isolating Valve
2	Pressure/Temperature Relief Valve
3	Pump
4	Non-Return Valve
5	Pressure Regulator / Limiter
6	Expansion Vessel
7	Pressure Relief Valve
8	Purge Valve

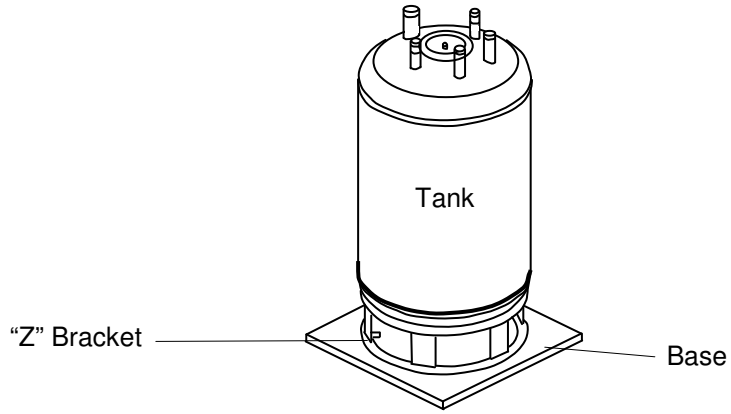
Fig.6 - Wiring Diagram for Thermostat, Thermal Cut-Out & Motorised Valve



Assembly & Installation of Calorifier

1. Fit the leveling feet to the base then position the base of the calorifier in a suitable location and locate the tank on the base and secure it to the base by means of the 4 “Z” brackets provided (see Fig.8). Before proceeding ensure that the base is level.

Fig.7 - Positioning of Calorifier



2. Wrap the glass fibre insulation around the tank then fit the left and right hand side panels in place and secure to the base with screws provided (see Fig.8).

3. Fit the back panel in place and secure it to the base and side panels with the screws provided.

4. Fit the thermostat to the front case with the screws provided, push the thermometer into the hole above and then hang the front panel on the side panels and secure the front case panel to the base panel with the screws provided (see Fig.9).

Fig.8 – Insulation & Case Assembly

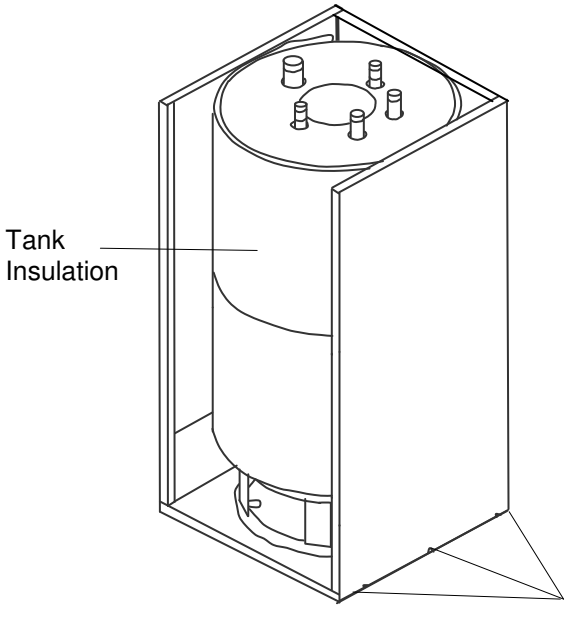
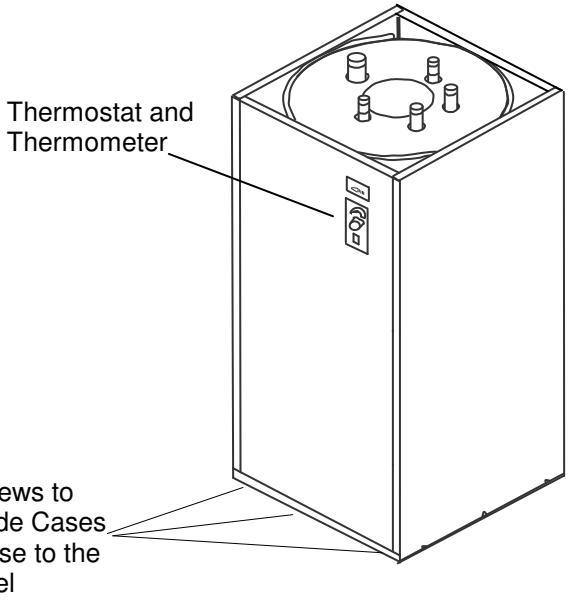


Fig.9 – Fitting Front Panel



5. NOTE:- The side and front panels are supplied with insulation fixed on the inside of the panels.

6. The thermostat on the tank must be wired up as shown in Fig.10, also, make sure that the thermostat and thermometer sensing phials are pushed into the appropriate phial pocket see Fig.11.

Fig.10 - Thermostat Wiring Diagram

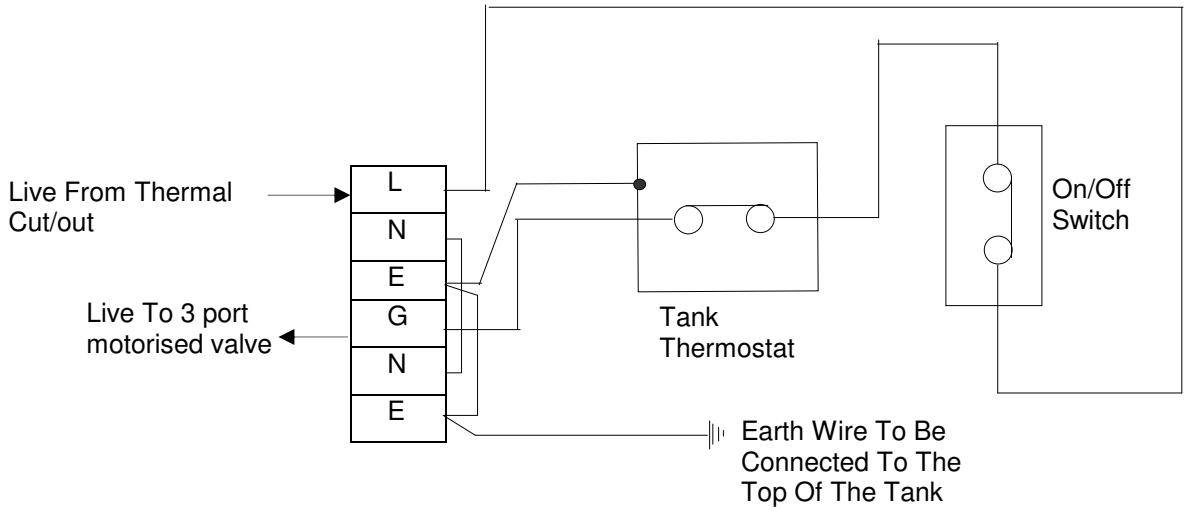
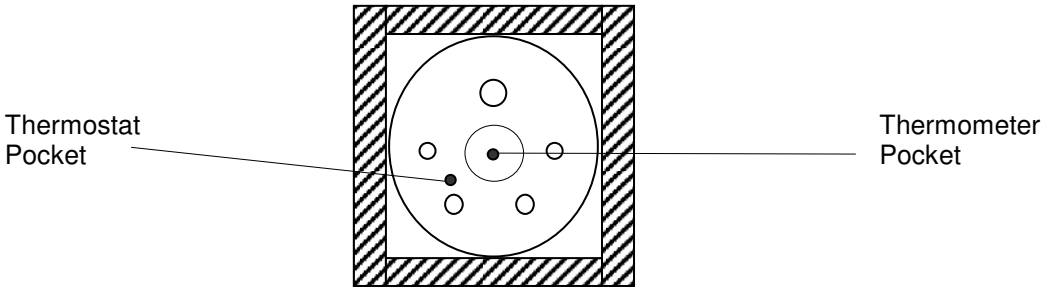


Fig.11 - Thermostat & Thermometer Pocket Positions



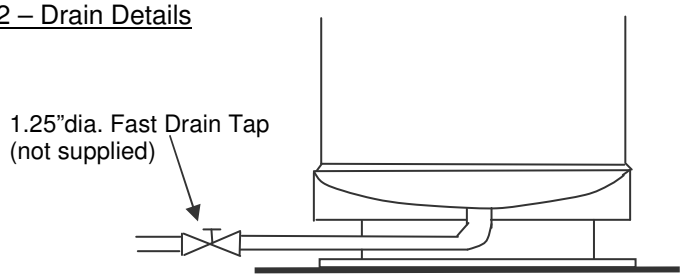
7. Fit the top insulation then fit the top panel and secure with screws provided.

8. Depending if it is a vented or unvented system connect the appropriate valves to the tank connections as detailed in the diagrams above (Fig.4 or Fig.5).

   (If you are connecting to an unvented system make sure you have fitted the pressure / temperature relief valve).

9. At the base of each calorifier there is a 1.25" BSP drain tapping which needs to be connected to a fast drain tap (see Fig.12).

Fig.12 – Drain Details



10. If the DHW system is unvented then an expansion vessel must be fitted. The expansion vessel must comply with BS4814 and BS7074 sized to accommodate the expansion of the HWS between 0°C and the temperature of the thermostat fitted to the calorifier.

MAINTENANCE & FAULT FINDING

- Check the anode condition at least once a year and replace it whenever necessary. If rapid deterioration is taking place check the system water for quality problems.

  The anode may be checked as follows:-

  Disconnect the earth lead to the anode and connect a multimeter between anode and earth (the internal resistance of the multimeter must be <10Ω). The general condition of the anode can be ascertained from the following current measurements.

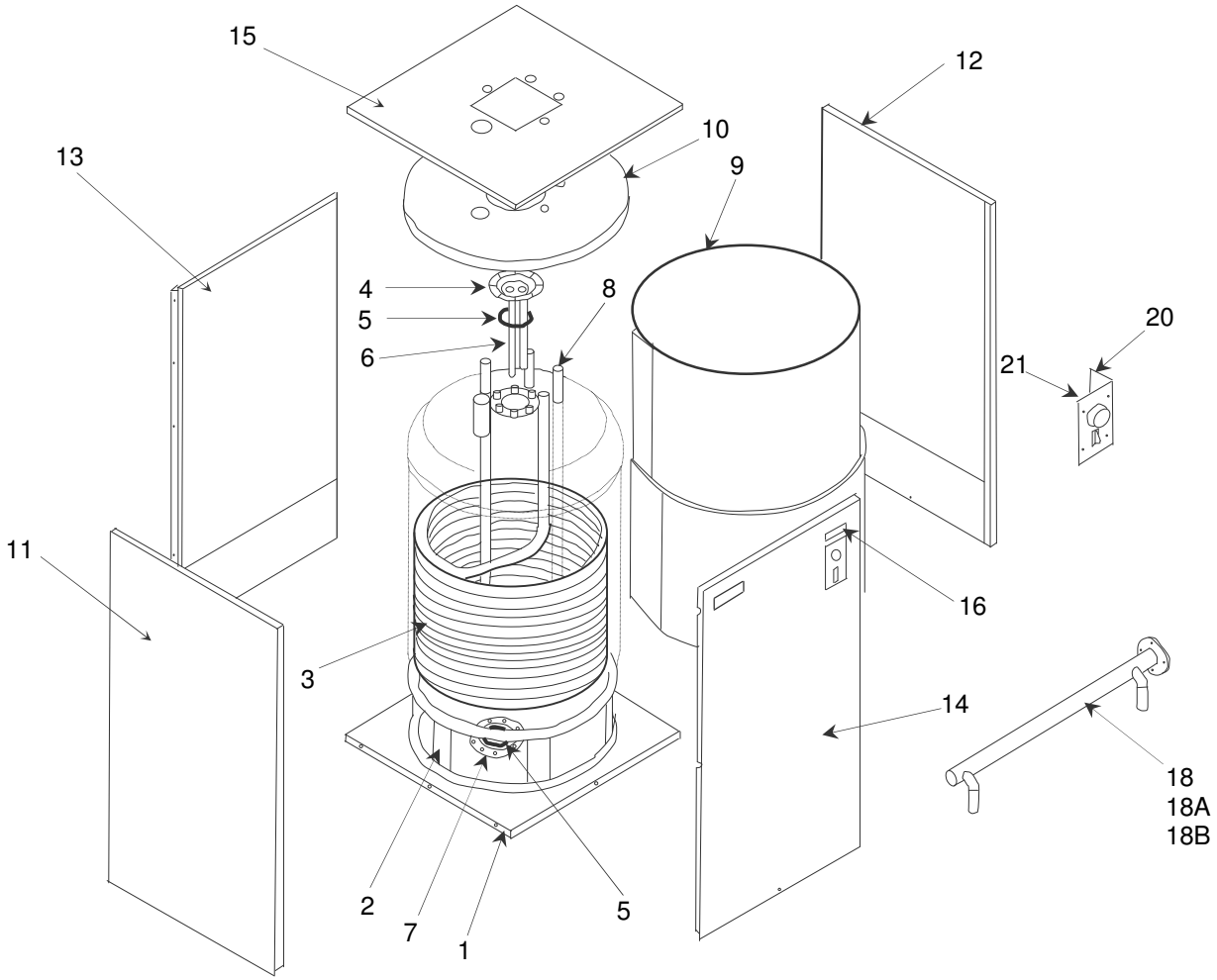
  >1mA the anode is good
  < 1mA the anode must be check more regularly
  < 0.1mA the anode must be changed

FAULT	POSSIBLE CAUSES	REMEDY
No HWS Flow	1. Mains cold water supply shut off. 2. Header tank empty.	1. Check and open isolating valves. 2. Check ball valve on header tank and replace if necessary.
Low HWS Flow Rate	1. Low mains water pressure. 2. Deposits within the tank. 3. Size of service pipe too small.	1. Check water pressure and consult local water authority if necessary. 2. Check the strainer is not blocked. If problem still persist flush the tank. 3. Check size and increase if necessary.
Water From Taps Is Cold	1. Boiler is not functioning. 2. Thermal cut-out has operated. 3. Motorized valve jammed or not wired correctly.	1. Check boiler operation and control programming. 2. Check thermostat and boiler operations / settings. Reset cut-out. 3. Check wiring and operation of motorised valve and replace as necessary.
Discharge From Pressure / Temperature Relief Valve	1. Pressure above 5 bar or temperature above 95°C failure of relief valve.	1. Shut down boiler. Check temperature / pressure relief valve and replace if necessary. 2. Check expansion vessel size and condition and rectify any faults.

SPARE PARTS LIST (See Fig.13)

Item N°	Description	Potterton Part Number			
		250L	350L	500L	800L
1	Base panel	COMV130936	COMV130936	COMV131426	COMV131675
2	Tank Support	COMV130937	COMV130937	COMV131428	COMV131676
3	Coil	COMV131132	COMV131131	COMV131427	COMV131657
4	Top Cover Plate	COMV131299	COMV131299	COMV131299	COMV131299
5	Cover Plate Gasket	COMV15638005	COMV15638005	COMV15638005	COMV15638005
6	Anode	COMV17020091	COMV17020091	COMV17020091	COMV17020091
7	Bottom Cover Plate	COMV17001112	COMV17001112	COMV17001112	COMV17001112
8	DWH Feed Pipe	COMV17009650	COMV17009651	COMV17009652	COMV17009653
9	Tank Insulation	COMV131114	COMV131114	COMV131450	COMV131663
10	Top Insulation	COMV131127	COMV131127	COMV131449	COMV131668
11	Left Hand Side Case Panel	COMV131117	COMV131118	COMV131438	COMV131660
12	Right Hand Side Case Panel	COMV131136	COMV131137	COMV131441	COMV131659
13	Rear Case Panel	COMV131125	COMV131126	COMV131435	COMV131658
14	Front Case Panel	COMV131123	COMV131124	COMV131443	COMV131655
15	Top Case Panel	COMV131140	COMV131140	COMV131446	COMV131662
16	Thermometer	COMV17007061	COMV17007061	COMV17007061	COMV17007061
18	Secondary Header For 2 Tanks - Hot Water Out	COMV131928	COMV131928	COMV131928	COMV131928
18	Secondary Header For 3 Tanks - Hot Water Out	COMV131929	COMV131929	COMV131929	COMV131929
18	Secondary Header For 4 Tanks - Hot Water Out	COMV131930	COMV131930	COMV131930	COMV131930
18A	Secondary Header For 2 Tanks - Cold Water In	COMV131924	COMV131924	COMV131924	COMV131924
18A	Secondary Header For 3 Tanks - Cold Water In	COMV131925	COMV131925	COMV131925	COMV131925
18A	Secondary Header For 4 Tanks - Cold Water In	COMV131926	COMV131926	COMV131926	COMV131926
18B	Primary Header For 2 Tanks	COMV131855	COMV131855	COMV131855	COMV131855
18B	Primary Header For 3 Tanks	COMV131856	COMV131856	COMV131856	COMV131856
18B	Primary Header For 4 Tanks	COMV131857	COMV131857	COMV131857	COMV131857
20	Thermostat Mounting Plate	COMV17402015	COMV17402015	COMV17402015	COMV17402015
21	Thermostat & switch assembly	COMV17007004	COMV17007004	COMV17007004	COMV17007004

Fig.13 - Exploded View of Calorifier



POTTERTON
COMMERCIAL
Wood Lane, Erdington, Birmingham B24 9QP
Tel: 0845 070 1055 Fax: 0845 070 1059

REPORT SENT TO INSTALLER:	YES		NO	
SITE VISIT		COMMISSIONING		

Date:.....
Signature: .....

REPORT No:.....
SITE ADDRESS: .....
.....
.....
.....
.....

INSTALLER NAME & ADDRESS: .....
.....
.....
.....
.....
VISIT/COMMISSIONING DATE: .....

1.0	HOT WATER CALORIFIER							
1.1	Model:		No of Tanks:					
1.2	No/Position:		RH		LH		Centre	
1.3	Serial No:							
1.4	System:	Direct			Indirect			
2.0	PRE COMMISSIONING CHECKS							
2.1	Is calorifier connected as per manual? YES / NO							
2.2	Is electrical supply fused, isolated & earth wire attached? YES / NO							
2.3	Check all controls allow operation YES / NO							
2.4	Check system flooded and pumps Operational and any isolation valves Left open YES / NO							
3.0	OPERATIONAL SAFETY CHECKS							
3.1	Check control thermostat operation							
3.2	Check thermal cut-out operation							
4.0	TANK/SYSTEM CHECK LIST							
4.1	Control thermostat set at							
4.2	Thermal cut-out settings							
4.3	Maximum tank temperature recorded							
4.4	System water pressure							
4.5	Are pipework connections as per manual?							
4.6	Is safety/pressure relief valve fitted (unvented systems)? YES / NO If YES, SIZE _____ PRESSURE RATING _____							
4.7	Is temperature/pressure relief valve Fitted to tank (unvented systems)? YES / NO If YES, SIZE _____ PRESSURE RATING _____							
4.8	Are water isolating valves fitted? YES / NO							
4.9	Are water flow switches fitted? YES / NO							
4.10	Are return water shut off/diverter valves fitted? YES / NO							
4.11	Any evidence of water leakage? YES / NO							
4.12	Has tank been built & cased correctly? YES / NO							

5.0	NOTES & COMMENTS BY COMMISSIONING ENGINEER

FINDINGS	YES	NO
Is the installation safe for use?		
If NO, has a warning label been raised?		
Is any remedial work required?		
Have warning labels been fitted?		
Has RIDDOR form been raised?		

Customer Signature:

Print Name:

Date:

ENGINEER DETAILS
NAME
COMPANY
SIGNATURE
DATE

NOTE: It is the installers responsibility to ensure that the boiler is correctly commissioned by a competent engineer and that this report is completed and kept as a record. A commissioning service is available from Potterton at the address listed on the back page of this manual. When a Potterton engineer commissions, this completed report will be sent to the installer. It is the installers responsibility to action any points arising. Commissioning by Potterton engineers is restricted to equipment of our supply. No responsibility is accepted for the on site assembly or installation of the equipment unless specifically carried out by Potterton. The installer must ensure that the boiler is installed in accordance with the manufacturers instructions and all relevant BS Codes of Practice and Regulations (see manufacturers instructions for full details). Items 4.1 to 4.6 are related to the boiler installation and as such these pre-commissioning checks should be carried out in the presence of the installer.

CONVERSION TABLE

	IMPERIAL TO METRIC		METRIC TO IMPERIAL	
HEAT **1 Therm = 100,00 Btu/hr**	1 Btu/hr 1 Btu 1 Btu/hr	= 0.291 W = 1055 J = 0.252 kcal/hr	1 KW 1 J 1 kcal/hr	= 3412Btu/hr = 0.0009478 Btu = 3.968 Btu/hr
FUEL CONSUMPTION **1 dm^3 = 1 LITRE** **1,000 dm^3 = 1 m^3**	1 ft^3 1 UK Gall 1 UK Gall	= 28.317 dm^3 (litre) = 4.546 litre = 1.2 U.S. Gallon	1 m^3 1 litre 1 U.S. Gallon	= 35.3147 ft^3 = 0.2199 Imp = 0.83 UK Gallon
PRESSURE **1 PSI = 2.307 FT** **1 kPa = 1000 Pa** **1 bar = 1000 mbar = 100 kPa**	1 lb/in^2 1 lb/in^2 1 in.w.g 1 in.w.g 1 in.w.g	= 6895 Pa = 68.95 mbar = 249.1 Pa = 2.491 mbar = 25.4 mm.w.g	1 bar 1 kPa 1 bar 1 Pa 1 mm.w.g 1 mm.w.g	= 33.45 ft.w.g = 0.3345 ft.w.g = 14.5 lb/in^2 = 0.358 in.w.g = 0.0394 in.w.g = 9.8 Pa
LENGTH **1m = 1000mm**	1 inch 1 ft 1 yard 1 mile	= 25.4 mm = 0.3048 m = 0.9144 m = 1.609 km	1 mm 1 m 1 m 1 km	= 0.03937 in = 3.281 ft = 1.094 yard = 06214 mile
VOLUME	1 ft^3 1 ft^3	= 0.02832 m^3 = 28.32 litre	1 m^3 1 litre	35.3147 ft^3 = 0.03531 ft^3
AREA	1 in^2 1 in^2 1 ft^2 1 ft^2	= 645.2 mm^2 = 6.452 cm^2 = 929 cm^2 = 0.0929 m^2	1 mm^2 1 cm^2 1 m^2 1 m^2	= 0.00155 in^2 = 0.155 in^2 = 1550 in^2 = 10.76 ft^2
FLOW RATE **1 kg/sec = 1 lit/sec @ 0°C** **Reference temperature**	1 gall/min 1 ft^3/min 1 ft^3/min	= 0.7577 lit/sec = 0.4719 lit/sec = 0.00047 m^3/sec	1 lit/sec 1 lit/sec 1 m^3/sec	= 13.2 gall/min = 2.119 ft^3/min = 2119 ft^3/min
TEMPERATURE	°F to °C = ("X"°F-32) x 0.5556		°C to °F = ("X"°C x 1.8) + 32	
TEMPERATURE DIFFERENCE **1°C = 1°K**	"X"°F x 0.5556 = °C		"X"°C x 1.8 = °F	
WEIGHT	1 lb 1 cwt 1 ton	= 0.4536 kg = 50.8 kg = 1016 kg	1 kg 1 tonne 1 tonne	= 2.205 lb = 0.9842 ton = 2204.6 lb

Commercial Sales
Technical and Service Enquiries

Potterton Commercial

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Service Hotline: (0845) 070 1058
Service Fax: (0845) 070 1059

e-mail: potterton.commercial@baxigroup.com
web site: www.pottertoncommercial.co.uk

Spares

Potterton Commercial spares are available nationwide through the **Interpart** network of approved stockists. Alternatively please contact:

Interpart
Brooks House
Coventry Road
Warwick
CV34 4LL

Tel: (08706) 000454
Fax: (08706) 000545

Applications and Installations

Our experienced technical and applications team are available to offer advice on any aspect of heating system design and boiler installation.

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Our service organisation covers the whole of the U.K. to look after your needs for all Potterton Commercial products. We are also able to offer our services for other manufacturers products.

Our service department offers a wide range of specialised services including:

- Boiler Site Assembly
- Burner Commissioning for all Fuels
- Boiler Maintenance & Maintenance Contracts
- Breakdown & Repair Services
- Boiler Dismantling & Re-Jointing
- Burner & Boiler Replacement
- Oil/Gas Conversions
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- Water Treatment & Descaling
- Packaged Units

POTTERTON COMMERCIAL

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