



Cal-Pro Installation & Operations Guide



Installation & Maintenance Guide

Operation

The CAL-PRO range of Expansion Vessels is specifically designed for domestic and commercial unvented central heating systems.

The purpose of these vessels is to accommodate the increased liquid volume which occurs during system heating in an Unvented Circuit. A pressurised membrane allows ingress/egress of the liquid only during periods of heating / cooling.

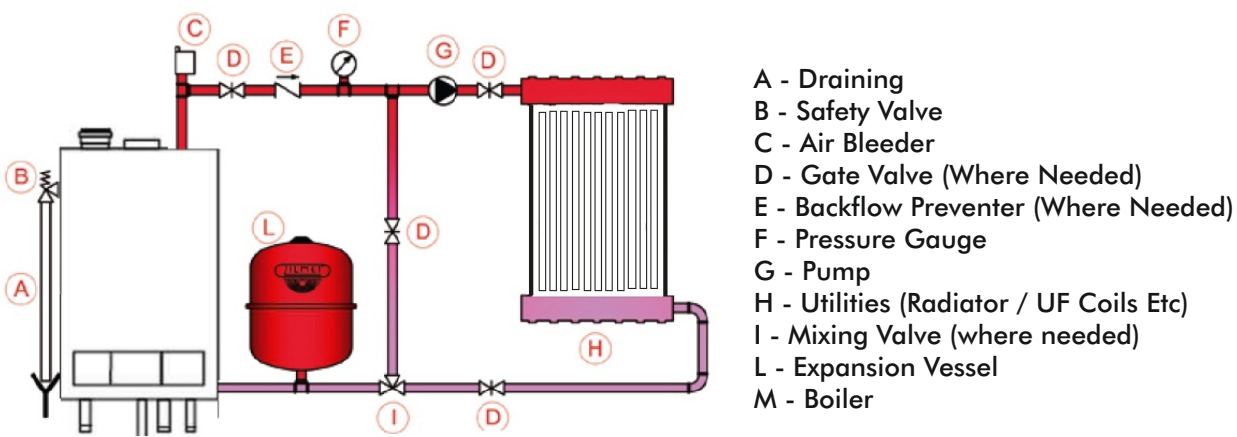
The correct size of vessel must be considered prior to installation and installed by appropriately trained engineers.

Installation Siting

The Expansion Vessel must be fitted to the Return Side of the Central Heating System and in such a way that there can at no time be an obstruction between the vessel and the system.

The orientation of the expansion vessels Water Connection should be downwards to avoid risk of sediment ingress or other debris from the system. Some provision for the prevention of air ingress into the vessel must also be made as this will degrade the vessel very quickly.

Adequate provision for the mounting of the expansion vessel must be made by the installer and a suitable bracket or other mounting method used. A range of suitable brackets are available as accessories.





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Sizing

The appropriate sizing of an expansion vessel must be undertaken by qualified or appropriately trained engineers.

$$V = \frac{e \times C}{1 - P_i/P_f}$$

V = Expansion Vessel Size

e = Expansion Co-efficient corresponding to the difference between the cold water system temperature and the maximum working pressure.

In standard plants:-

$$e = 0.04318 (T_{max} 99^{\circ}C - T_{min} = 10^{\circ}C)$$

C = Total Water Capacity of the system in Litres (as a general approximation, C is between 10 & 20 Litres for every 1000kcal/hour of boiler output).

860kcal/hour = 1 Kilowatt

P_i = Initial charge pressure (Absolute) - this pressure must not be less than the minimum head pressure required by the system OR the Boiler (Whichever is greater).

P_f = Maximum operating pressure (Absolute) of the Safety Relief Valve, taking into account any differences in height between the vessel and the safety relief valve.

Temp	e Value
0	0.00013
10	0.00025
20	0.00174
30	0.00426
40	0.00782
50	0.01207
55	0.01450
60	0.01704
65	0.01980
70	0.02269
75	0.02580
80	0.02899
85	0.03240
90	0.03590
95	0.03960
100	0.04343

Example

C = 500 Litres

P_i = 1.5 Bar (2.5 Bar atmospheric)

P_f = 3 Bar (4 Bar Atmospheric)

$$V = \frac{0.04326 \times 500}{1 - (2.5 / 4)}$$

V = 57.57

Nearest vessel size with this capacity = 80 Litres

Maintenance

The vessel requires inspection at least once a year (or as and when a drop in performance is noted from the system). The vessel must be visibly inspected for pinholes in the metal body of the vessel and the air pressure must be checked against the required pre-charge. Some pressure loss is to be expected and should be rectified to within 20% accuracy but a significant drop in air pressure may signify that the vessel is nearing the end of it's life span and may require replacement or more detailed inspection.

The air pressure may only be inspected when the vessel is either detached completely from the system or when the system itself is de-pressurised to atmospheric pressure.



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Materials

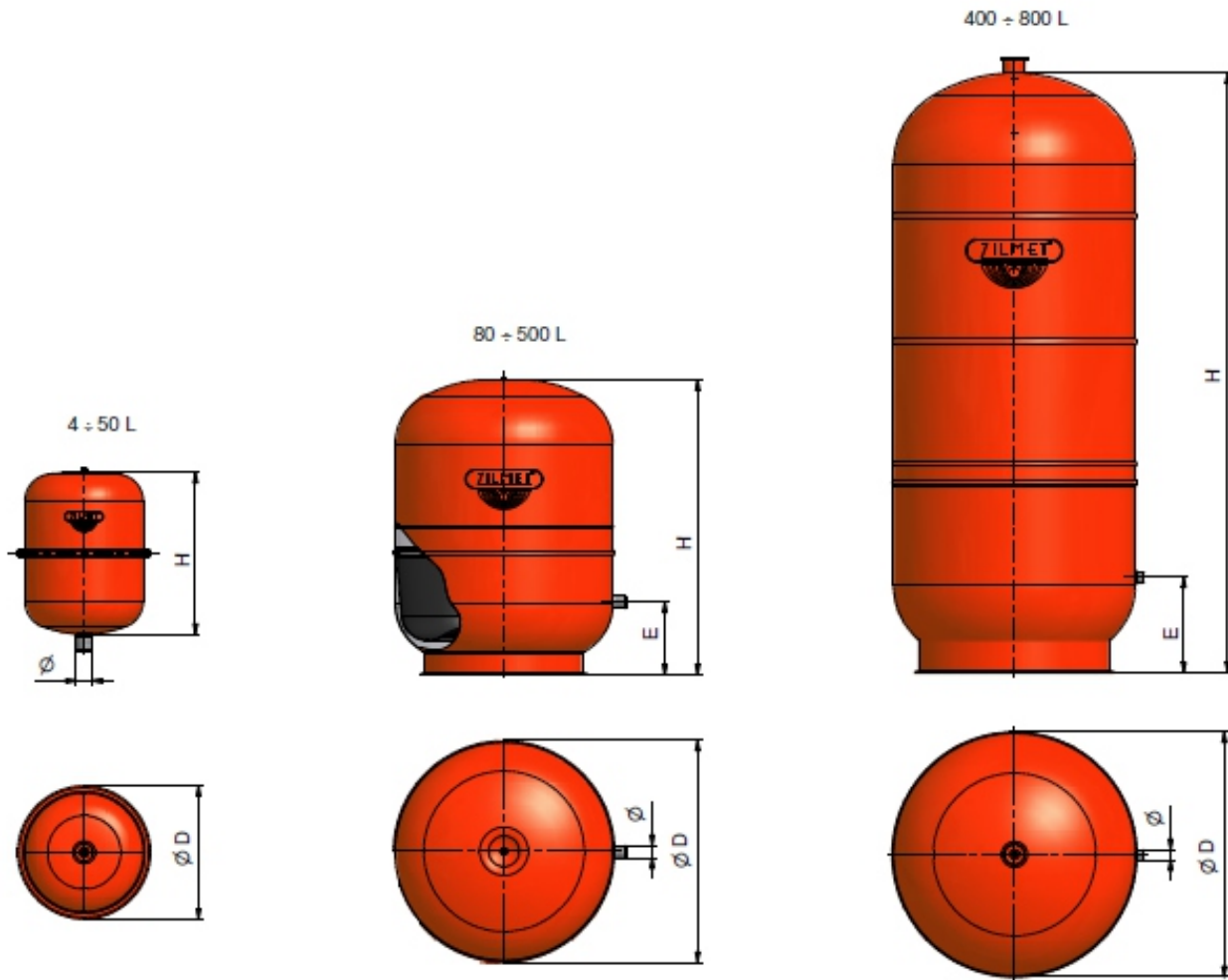
Shell: Carbon Steel
 Water Connections: Carbon Steel
 Membrane: Synthetic Butyl Rubber (SBR)
 Colour: Red

Dimensions

Code	Capacity	Diameter	Height	Connection Height "E"	Pmax	Pre charge	Connection
	(Litres)	(mm)	(mm)	(mm)	(Bar)	(Bar)	(BSP)
130000400B	4	225	195	-	5	1.5	3/4" G
130000800B	8	220	295	-	5	1.5	3/4" G
130001200B	12	294	281	-	4	2	3/4" G
130001800B	18	290	400	-	4	2	3/4" G
130002400B	24	324	415	-	4	2	3/4" G
130003500	35	404	408	-	4	2	3/4" G
130003503	35	404	387	119	4	2	3/4" G
130005000	50	407	530	-	4	2	3/4" G
130005003	50	407	507	157	4	2	3/4" G
130008000	80	450	608	150	6	2.5	3/4" G
130010500	105	500	665	165	6	2.5	3/4" G
130015000	150	500	897	216	6	2.5	3/4" G
130020000	200	600	812	225	6	2.5	3/4" G
130025000	250	630	957	245	6	2.5	3/4" G
130030000	300	630	1105	245	6	2.5	3/4" G
130040000	400	630	1450	245	6	2.5	1" G
130050000	500	750	1340	290	6	2.5	1" G
130060000	600	750	1555	290	6	2.5	1" G
130070000	700	750	1755	290	6	2.5	1" G
130080000	800	750	1855	290	6	2.5	1" G
130090000	900	750	2105	290	6	2.5	1" G

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Dimensions - Continued



Materials

Shell: Carbon Steel

Water Connections: Carbon Steel

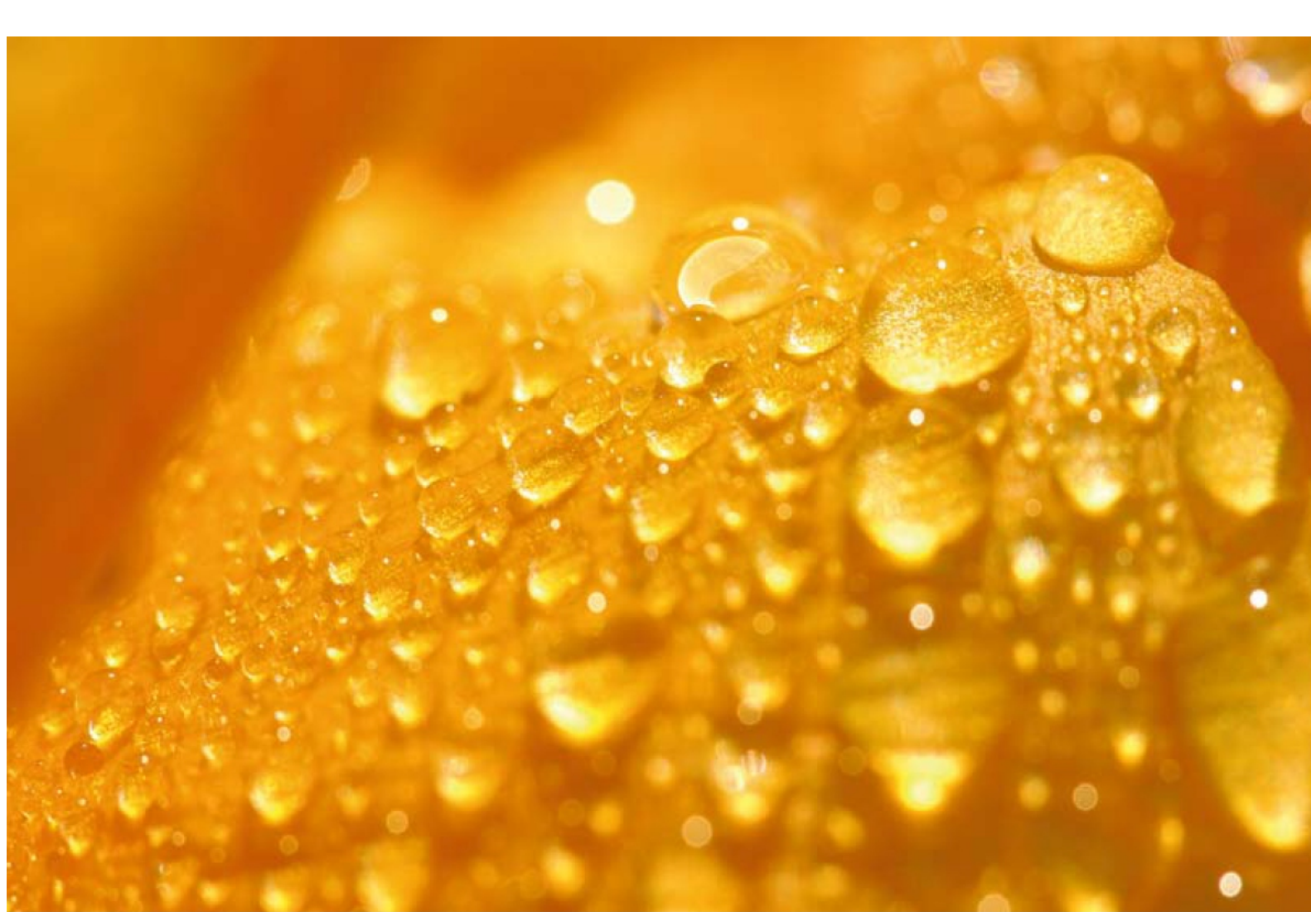
Membrane: Synthetic Butyl Rubber (SBR)

Colour: Red



Notes

08/2012



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