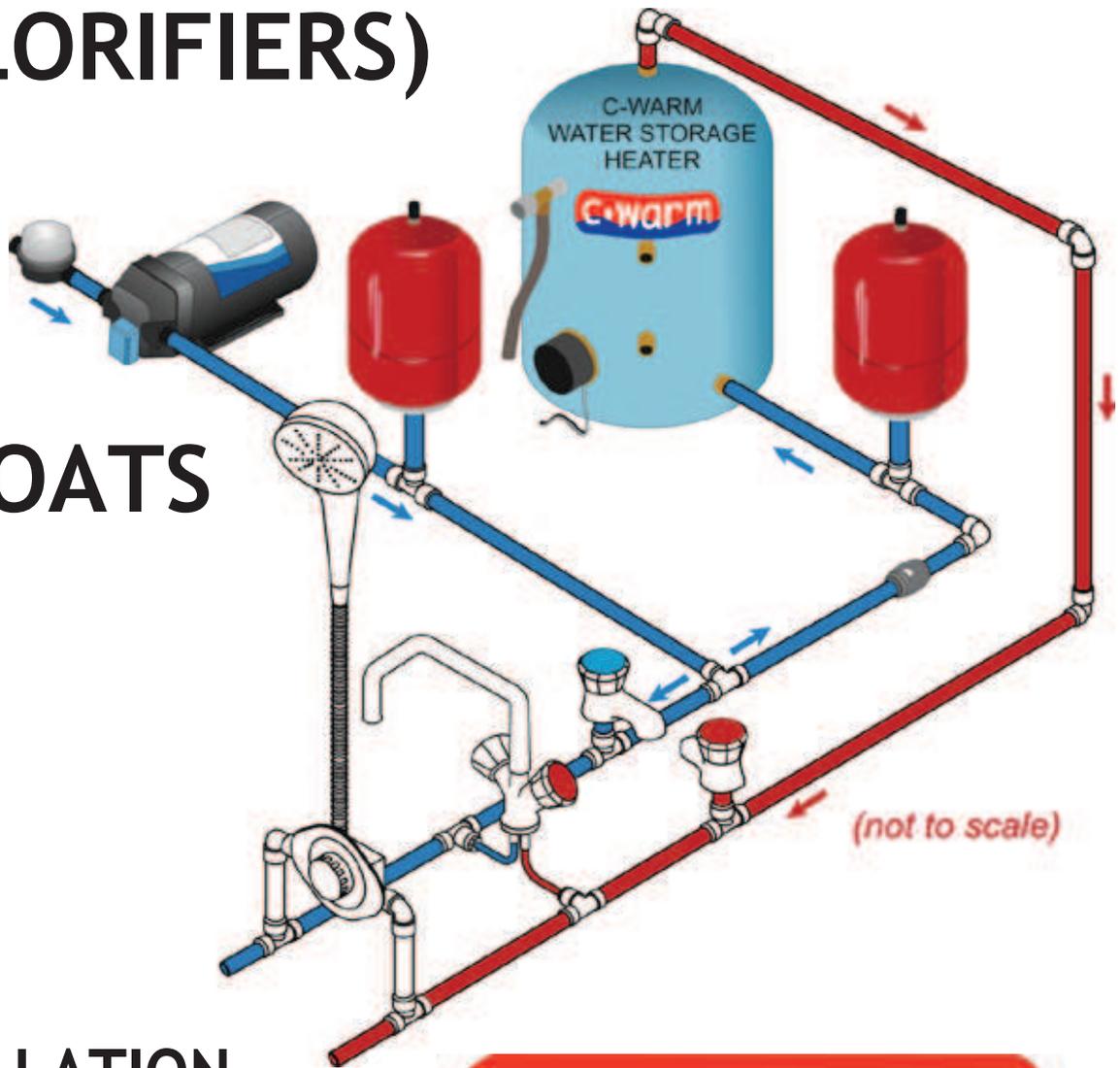


# WATER STORAGE HEATERS (CALORIFIERS)

for **BOATS**



INSTALLATION,  
OPERATING  
AND SAFETY



# INSTRUCTIONS

To obtain the best performance from your C-Warm water storage heater please read these instructions carefully. Failure to observe the recommended procedures may result in damage to equipment or in personal injury, and may invalidate the supplier's warranty.

<b>CONTENTS</b>	<b>Page no.</b>
Introducing your C-Warm water storage heater .....	3
Safety.....	4
Adapting the engine cooling circuit.....	5
Before you start: pre-installation checks.....	6
Location .....	6
How to fit an auxiliary header tank if necessary .....	7
Fixing the heater in place .....	8
Connecting the pipework.....	10
Fitting the temperature/pressure relief valve.....	11
Fitting an electric immersion heater .....	12
Regulating the temperature of engine-heated stored water .....	14
Hot water expansion.....	15
Regulating the cold water inlet pressure.....	15
Using the heater .....	16
Maintenance .....	16
Winter precautions .....	16
Problem solving.....	17
Table of connections and fitting sizes .....	18
Warranty .....	21

***Calorifiers and Water Storage Heaters – what’s the difference?***

None. ‘Calorifier’ is a word borrowed from industrial process heating, meaning a water vessel containing a heat exchanger (such as a coiled pipe) through which steam or hot water passes, giving up its heat to the water contained in the vessel.

# C-Warm WATER STORAGE HEATERS for boats



## INTRODUCING YOUR C-WARM WATER STORAGE HEATER (CALORIFIER)

A C-Warm water storage heater offers a simple and convenient means of enjoying the benefits of stored hot water on board your vessel, at no extra cost in fuel.

Installation is straightforward. Provided a few simple rules are obeyed, your heater will give you lengthy service with virtually no maintenance.

C-Warm storage heaters are designed for use with INDIRECT MARINE ENGINE COOLING SYSTEMS using a closed loop of hot water circulating through the engine heat exchanger. Twin coil models may also be used with a second engine or with gas or diesel burners. A mains voltage a.c. immersion heater can be fitted.

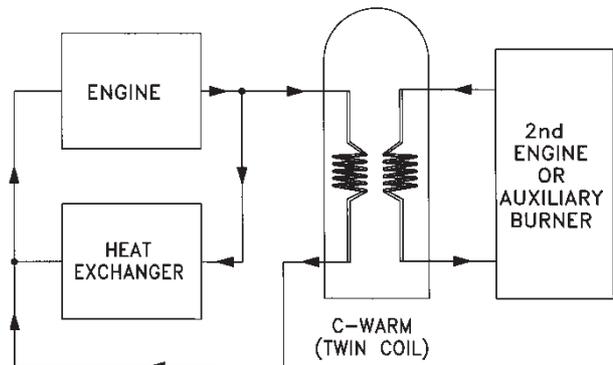
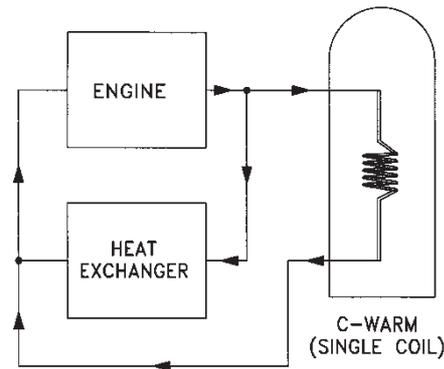
If an auxiliary burner is used follow the fitting and operating instructions supplied with it.

With water entering the coil at 82°C, a C-Warm heater is designed to provide a full charge of hot water at 60°C within 15 to 25 minutes. The larger heaters have more coil turns, so heating time is virtually independent of the volume of water contained in the storage heater.

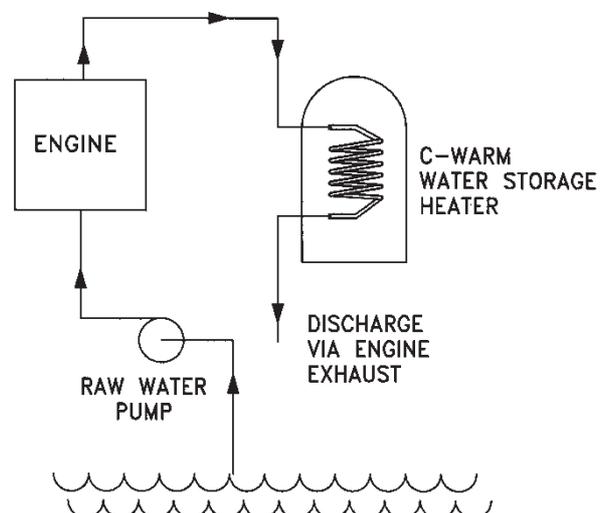
With DIRECT COOLED ENGINES, the temperature of the water leaving the engine is more variable. For effective use of a storage heater, the temperature of the water entering the coil should be at least 50°C.

**Before you adapt a new engine's cooling circuit to take a water storage heater, check with your engine supplier to ensure that you do not invalidate the engine's warranty.**

### INDIRECT COOLED ENGINE



### DIRECT COOLED ENGINE



# C-Warm WATER STORAGE HEATERS

f o r b o a t s



## SAFETY

Your C-Warm water storage heater is part of an unvented ('closed') pressurised water system. Most domestic systems in the UK are vented to atmosphere ('open'). In continental Europe and elsewhere unvented domestic systems are the normal type.

With proper protection against overheating, unvented systems present no hazard to the user. Safety

precautions are required by law for unvented systems installed in houses in the UK. The requirements are set out in Building Regulations and local Bye-laws. Although no such regulations exist (at the time of printing) for unvented systems in boats, these instructions describe and recommend precautions that comply with UK law for domestic systems.

## WATER QUALITY

C-Warm heaters are designed for use with clean, fresh, drinkable water. Salty or heavily chlorinated water is more

corrosive than pure water, and the working life of the heater and its fittings may be shortened.

## CAN I USE A C-WARM STORAGE HEATER TO HEAT SEA WATER?

Copper is moderately resistant to corrosion in hot sea water, so the heater itself can be used with sea water, though its working life may be

shortened. Because the temp/pressure relief valve may corrode, C-Warm is **not recommended for sea water use with an electric immersion heater.**

## ESSENTIAL PRECAUTIONS

- Fit a C-Warm double-protected electric immersion heater. See page 12
- The temperature/pressure relief valve supplied with your C-Warm water storage heater **MUST** be fitted in the heater.
  - in the event of overheating due to thermostat failure in an electric immersion heater, the relief valve will open before the water can boil, eliminating the risk of a sudden release of large amounts of scalding water and steam.
  - the relief valve protects the storage heater itself from excessive pressure and possible damage caused by hot water expansion or by failure of the pressure switch on the pump.

Some additional precautions are noted in the text. These precautions are marked as shown:



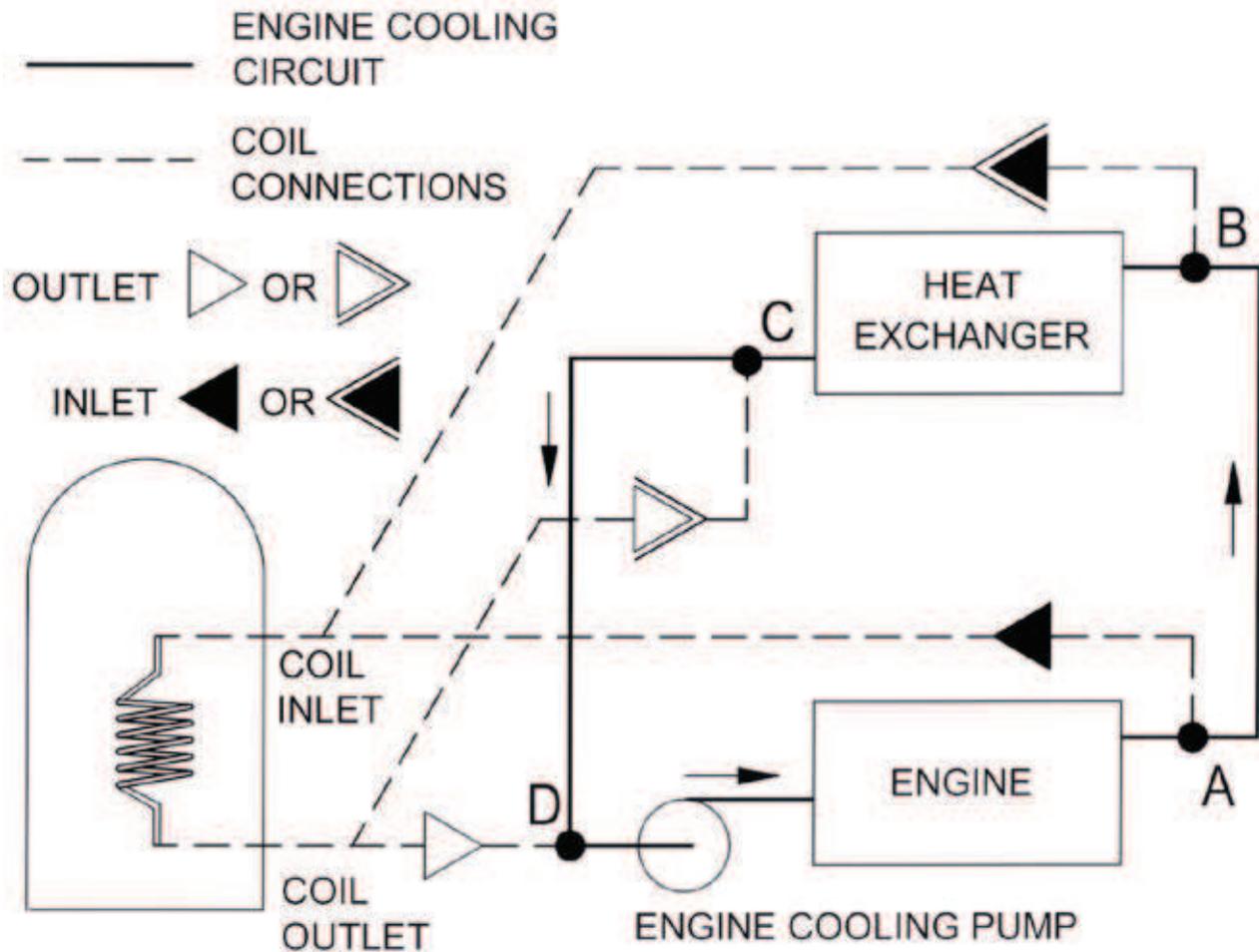
# C-Warm WATER STORAGE HEATERS for boats



## ADAPTING THE ENGINE COOLING CIRCUIT

The schematic diagram shows the installation principle. Contact your engine supplier for advice about the recommended connection points on your engine.

### INDIRECT COOLED ENGINE



For maximum flow through the coil, the inlet connection should be close to the engine (A) and the discharge connection should be close to the circulation pump (D). Somewhat less flow through the coil can be attained, if

required, by taking off hot water from a point (B) downstream of (A) and returning it to point (C) upstream of (D), so that the pressure difference between the coil take-off and return is a little less.

### DIRECT COOLED ENGINE

Some direct-cooled engines provide for a relatively high engine block temperature. The recommended connection points for the C-Warm

heating coil will vary according to the engine design. Check your engine manual and if necessary contact your engine supplier for advice

# C-Warm WATER STORAGE HEATERS for boats



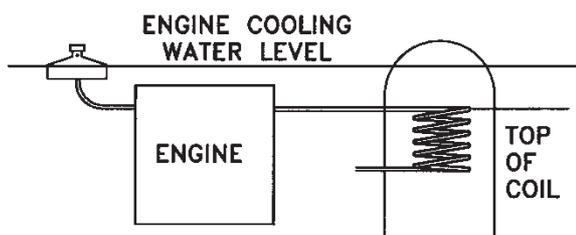
## BEFORE YOU START

- I. Check that you have received the correct C-Warm heater and accessories. Check immersion heater power and voltage. Report any damage or discrepancies to your supplier without delay.
- II. Check the dimensions of the heater and recheck the dimensions of the space for its installation in your boat.
- III. Read through these instructions carefully, noting additional items required for installation.

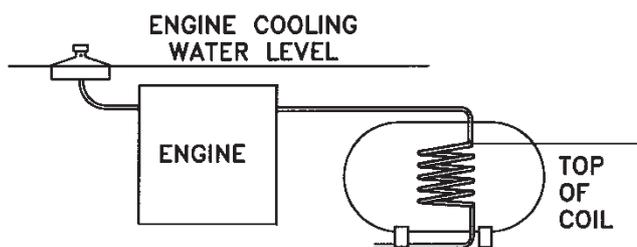
## LOCATION

Your C-Warm water storage heater may be located in any convenient and accessible position subject to the following considerations:

- I. With pumped cooling water circulation, the storage heater can be located above or below engine level. For best circulation, natural convection should assist the pumped flow.
- II. There must be no air locks in the cooling water circuit. Either locate the water storage heater with its upper coil connection below the engine's water filling point, or fit an auxiliary header/filler tank above the highest point in the cooling water circuit. See page 7.



VERTICAL MODELS



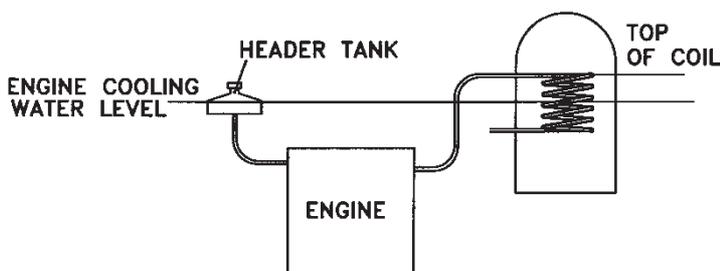
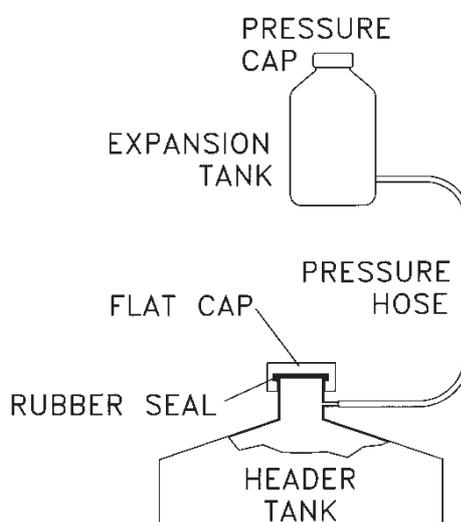
HORIZONTAL MODELS

- III. The longer the pipe run between water storage heater and engine, the more work the engine's cooling water circulation pump has to do. Minimise the reduction in water flow rate by locating the storage heater near the engine.
- IV. Vertical C-Warm storage heaters MUST be mounted vertically, horizontal heaters MUST be mounted horizontally.

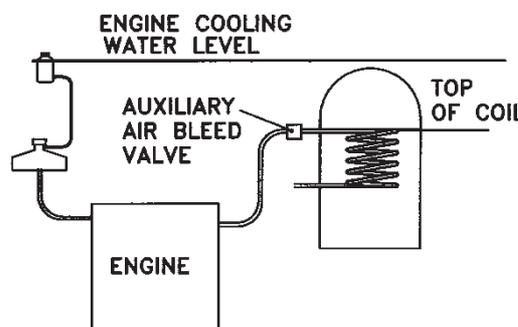
## How to fit an auxiliary header tank if necessary

For installations where the upper coil connection is above the level of the engine's water filling point.

1. Blank the existing header tank by using a flat cap that does not obstruct the overflow pipe.
2. Fit a new expansion tank nearby, at a height just above the top of the C-Warm water storage heater coil. Connect it to the overflow outlet on the original header tank, using a suitable pressure hose (see diagram) The expansion tank for a car radiator is suitable for engine cooling systems up to about 200 litres in total volume.
3. Fit an air bleed close to the top coil connection of the water storage heater. On filling the system with water, ensure that all the air in the cooling circuit escapes via this bleed or from the engine.
4. On starting the engine check for loss of liquid and for air locks in the extended cooling circuit.



6



4

## FIXING THE WATER STORAGE HEATER IN PLACE

When full of water the heater has a substantial mass. It must be secured firmly in place to prevent damage to the heater and pipework or to the supporting structure, from the effects of rough weather or other shocks of marine use.

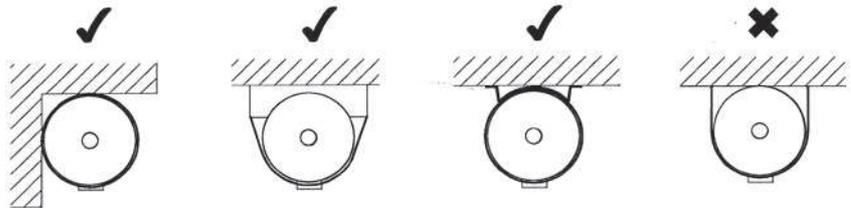
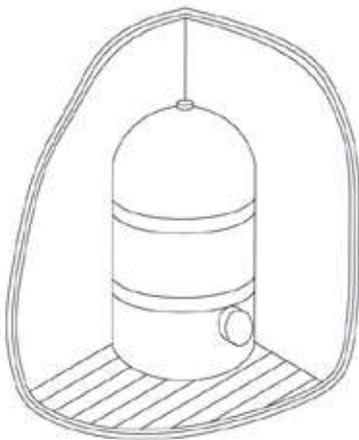
1. Support the WEIGHT on a strong base
2. Support the MASS against horizontal forces

1 litre of water weighs 1 kg

The exact method you use to hold the heater in place will depend on the construction of the vessel and on the available space.

Some suggested installation methods are indicated below.

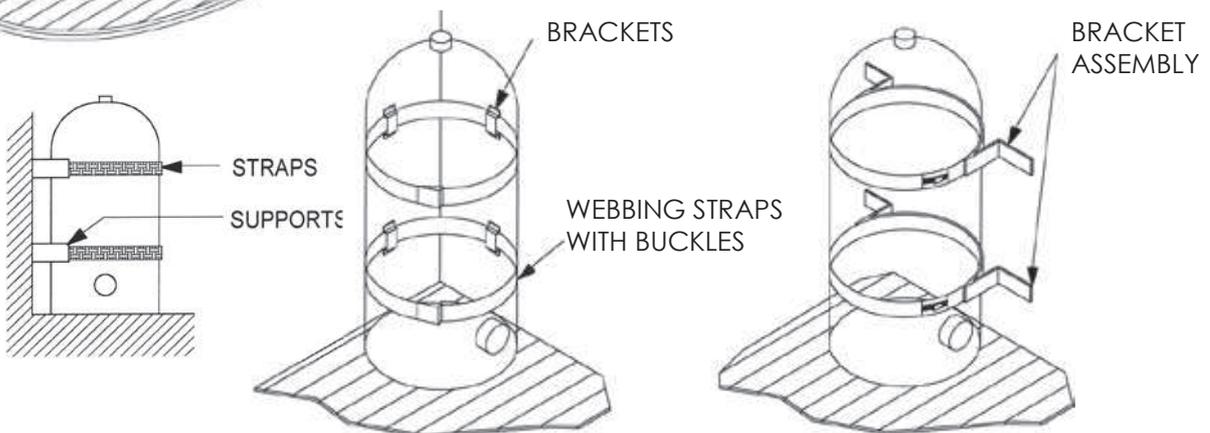
### VERTICAL MODELS



Locate the heater on a firm level base strong enough to support at least twice the weight of the (full) heater

Either: construct suitable supports to hold the heater in place

or: use one or more restraining straps as shown below



Use...

**STRAP KIT**  
**CWA-STRKIT**  
 contains:  
 2 webbing straps  
 4 stainless steel brackets  
 Instructions for use

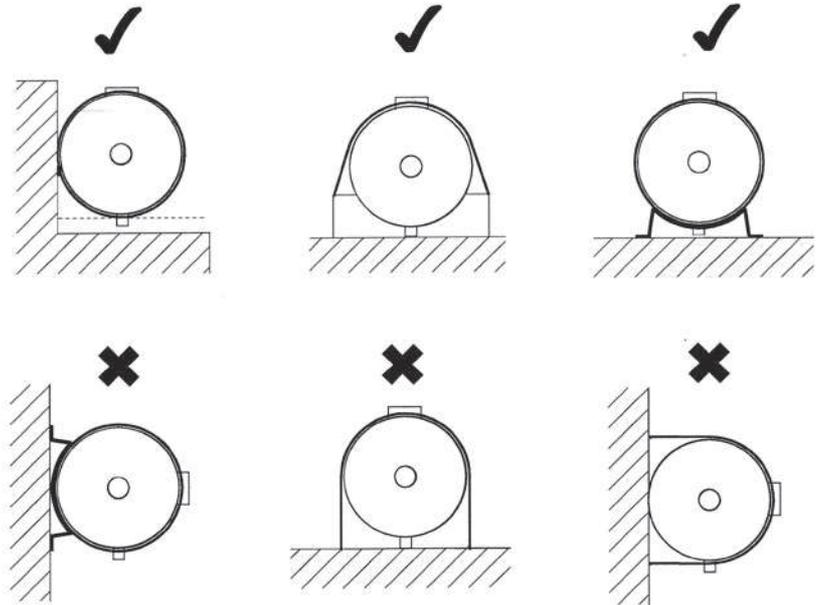
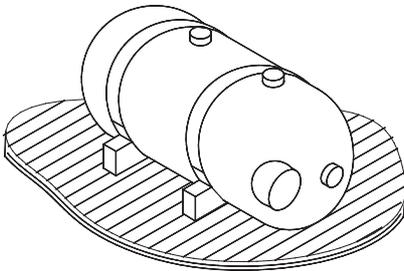
or...

**BRACKET KIT**  
**CWAB-V series**  
 contains:  
 1 bracket assembly

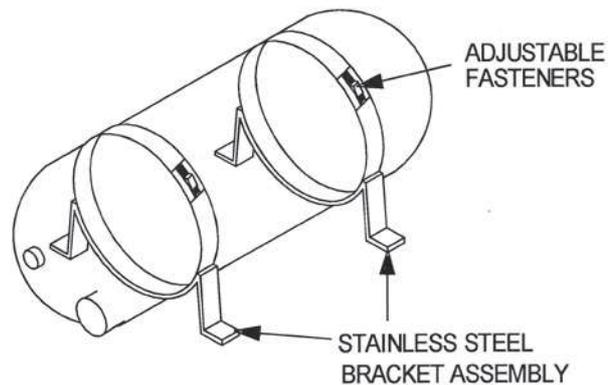
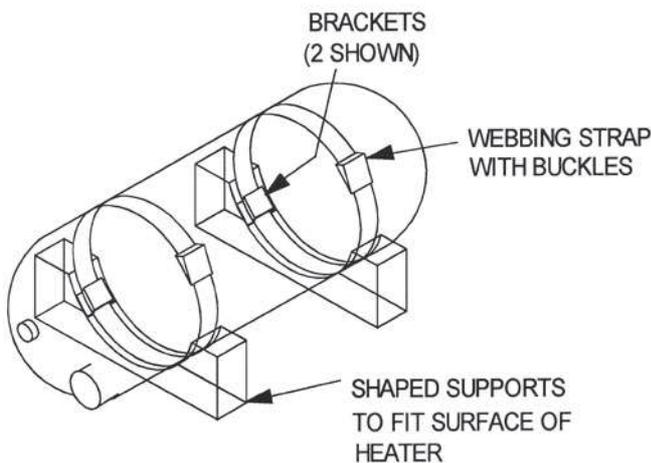
# C-Warm WATER STORAGE HEATERS for boats



## HORIZONTAL MODELS



Either a C-Warm Strap Kit or a C-Warm Bracket Kit (H-series) can be used to secure the heater in place. Leave space under the heater for pipe connections on some models. See dimensions page 23.



Use...

**STRAP KIT**  
**CWA-STRKIT**  
contains:  
2 webbing straps  
4 stainless steel brackets  
Instructions for use

or...

**BRACKET KIT**  
**CWAB-H series**  
contains:  
2 bracket assemblies



## CONNECTING THE PIPEWORK

C-Warm heaters may be connected into the engine cooling and pressurised water systems with any suitable pipe material. Most commonly used are:

### Hep<sub>2</sub>O push-fit piping system

Hep<sub>2</sub>O CONNECTION KITS are available for all C-Warm heaters. See C-Warm Selection guide for details. The kit contains Hep<sub>2</sub>O fittings for the pressurised water connections and brass hose connections to the heating coil.

### Copper pipe

If copper pipework is preferred for the pressurised water connections, suitable adapters and compression fittings should be used. These may be obtained from a plumber's merchant or from most 'Do-it-Yourself' stores. See pages 18 - 20 for connection sizes. The pipework connections to the heater must not be stressed. Make sure that the copper pipework is fully supported

### Flexible hose

If flexible hose is preferred for the pressurised hot and cold water connections, suitable connectors will be required. Use opaque hose (to discourage algal growth) and stainless steel hose clips. See pages 18 - 20 for connection sizes.

## Connecting the coil into the engine cooling circuit

Use ½" or ¾" bore rubber (car or lorry) heater hose, obtainable from vehicle accessory suppliers. This will minimise the engine vibration reaching the heater.

Connect the coil into the engine cooling circuit and/or auxiliary heater. Fasten the hose securely to the connectors using stainless steel hose clips. Do not allow loops of hose to form air locks.



Do not over-tighten the coil connections. Over-tightening may distort the copper wall of the storage heater, causing immediate or eventual leakage. Max. torque should not exceed 70Nm (50lb.ft)

- The heating coil may safely remain incorporated into the engine cooling circuit whether the heater itself is full of water, partly full or empty.
- The coils in a twin-coil C-Warm heater are completely independent in operation. The water storage heater will work satisfactorily with either coil alone or with both coils together in use.

# C-Warm WATER STORAGE HEATERS

f o r b o a t s



Connecting the cold water inlet and the hot water outlet into your pressurised water system

C-Warm heaters with ½" BSP connections require 15mm bore pipework; models with ¾" BSP connections require 22mm pipework. See page 18 - 20 for connection sizes.

Fitting the temperature-and-pressure relief valve

See pages 18 to 20 for the correct location of the relief valve on your heater.

Ensure that the coloured knob on the valve is in an accessible position. **The discharge port of the valve must point downwards, with a suitable hose to allow hot water or steam to escape safely to the bilge or another suitable area.**

The relief valve supplied with the heater is non-adjustable and is pre-set to lift at 3bar (44psi) or at 90°C.

Marine pressurised water pumps normally have pressure switches set to cut out below 2.5bar (36psi). Check that your pressure switch cuts out at or below this pressure. Use of a pressure switch cutting out at or close to 3bar (44psi) could lead to continuous discharge of water through the relief valve.

C-Warm CONNECTION KITS contain connectors suitable for Hep<sub>2</sub>o (ACORN) push-fit pipework.

- The cold water inlet line should be fitted with a drain cock, close to the heater, to allow drainage if maintenance becomes necessary, and to avoid the risk of freezing in the winter.

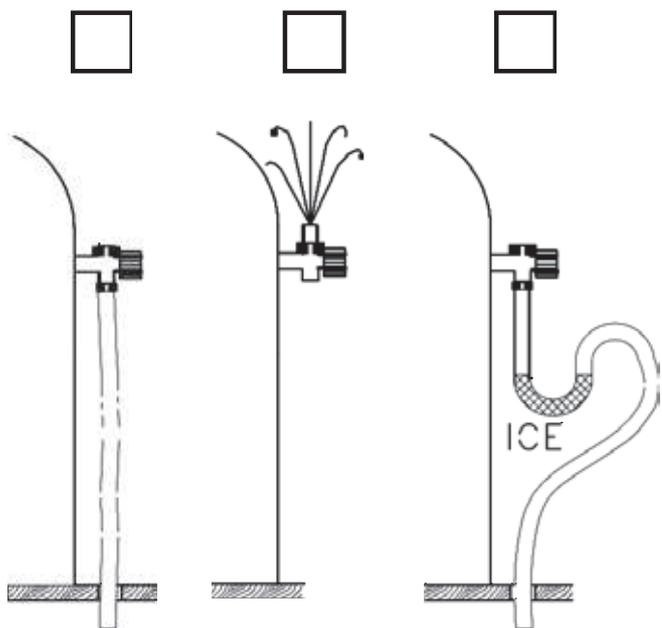


WARNING



*The temperature-and-pressure-relief valve is essential for the safe operation of your C-Warm heater.*

Failure to fit the relief valve, or any alteration to or interference with its function, or fitting of any valve other than that supplied with the heater, carries a risk of serious personal injury or death in the event of overheating. It will also invalidate the supplier's warranty.



# C·warm WATER STORAGE HEATERS

f o r b o a t s



## FITTING AN ELECTRIC IMMERSION HEATER

Before fitting the immersion heater, check that your a.c. supply voltage corresponds to that indicated on the immersion heater. Remove the dummy boss from the calorifier.

AVOID LEAKS - make sure all surfaces are clean! Clean the seating surface on the calorifier boss, and the screw threads on the boss and the immersion heater. Lightly coat the 'O' ring and

threads on the calorifier and immersion heater with silicone grease.

Screw in the heater. Remove the heater cover, bend the cable to one side, fit a 2¼" box spanner over the hexagonal base of the heater, and tighten carefully.

To make the electrical connections, follow the wiring instructions on page 13.



**The use of a standard domestic immersion heater with a single thermostat is not recommended.**



A Cleghorn Waring double-protected immersion heater, fitted with a high-temperature cut-out in addition to the control thermostat, is strongly recommended. Should the control thermostat fail, the high-temperature cut-out will isolate the immersion heater when the water temperature reaches 90°C.

### Thermostat Settings

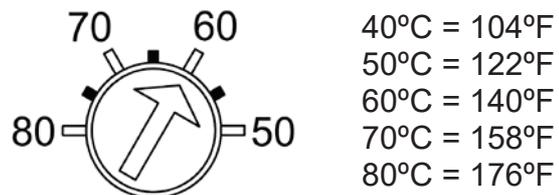
The **control thermostat** on the immersion heater is pre-set to cut out when the water temperature reaches 60°C. This is ample for domestic use. *In an attempt to reduce the likelihood of scalding, we recommend that the control thermostat is set no higher than 65°C*

The **high temperature cut-out thermostat** is adjustable up to a maximum of 85°C. It is pre-set to 85°C.

**Check the thermostat settings before using your immersion heater for the first time.** Isolate the immersion heater from its power supply before removing the cover. If necessary adjust the control thermostat setting by turning the dial with a screwdriver blade until the arrow points to the desired temperature.

**DO NOT** set the high temperature cut-out to operate below the cut-out temperature of the control thermostat.

### CONTROL THERMOSTAT DIAL

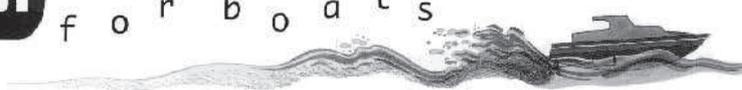


Screwdriver Slot

In the event of a high temperature cut-out the system should be thoroughly checked before the manual re-set button is pushed. It is advisable to replace the control thermostat before the immersion heater is used again. Contact your supplier for a replacement thermostat.

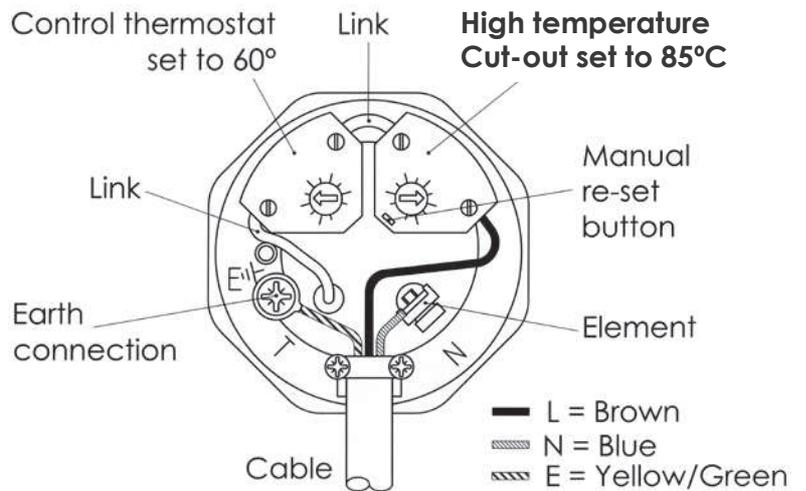
# C·warm WATER STORAGE HEATERS

f o r b o a t s



## Wiring Instructions

1. It is essential that the correct size of fuse or circuit breaker be fitted.
2. Check that the mains supply voltage corresponds with the voltage indicated on the heater.
3. Isolate the electrical supply to the cable.
4. Make the supply cable connections as follows.  
Standard colours in the UK are:  
Brown = Live  
Blue = Neutral  
Green/Yellow = Earth



### Wiring diagram for a Cleghorn Waring double-protected Immersion Heater

#### Model Number CW279

2kW  
Voltage = 220-240 v a.c.  
Recommended fuse: 10 amp

#### Model Number CW278

1.25kW  
Voltage = 220-240 v a.c.  
Recommended fuse: 5 amp

#### Model Number CW240

0.75kW  
Voltage = 220-240 v a.c.  
Recommended fuse: 3 amp

#### Model Number CW239

1kW  
Voltage = 110-115 v a.c.  
Recommended fuse: 10 amp



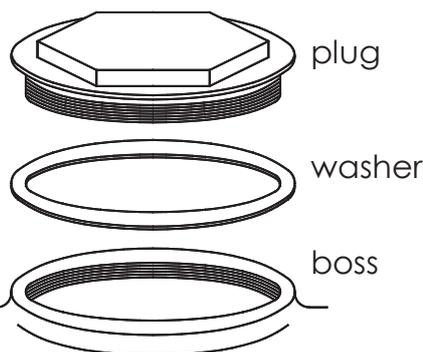
### THE IMMERSION HEATER MUST BE EARTHED

Before you switch on the immersion heater, check that the water storage heater is full of water, and that the temperature-and-pressure relief valve has been properly fitted.

IF YOU ARE IN ANY DOUBT ABOUT FITTING THE IMMERSION HEATER, OBTAIN THE SERVICES OF A QUALIFIED ELECTRICIAN.

## IF AN ELECTRIC IMMERSION HEATER IS NOT FITTED

1. Before you install and fill the heater...unscrew the plug from the immersion heater boss
2. Check that the faces of the plug, the boss and the sealing washer are clean and undamaged. Apply a small quantity of silicone grease to each face



3. Screw the boss firmly into position. Do not over tighten. (Max torque =70Nm)

# C-Warm WATER STORAGE HEATERS for boats

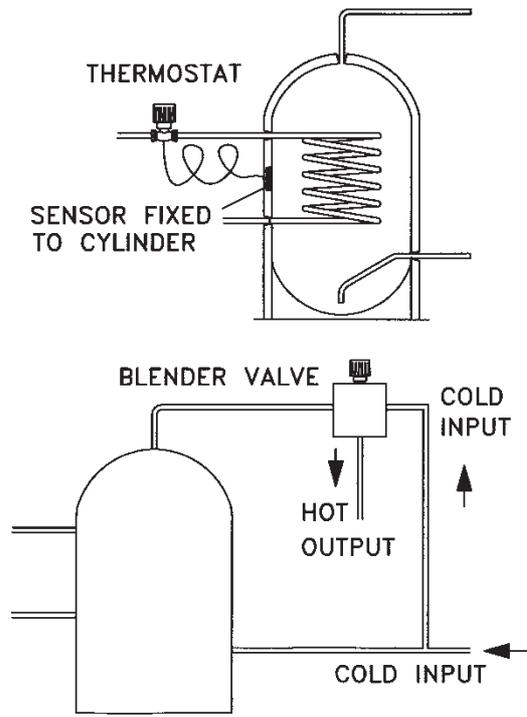


## REGULATING THE TEMPERATURE OF THE ENGINE HEATED WATER

C-Warm storage heaters are highly efficient, and the stored water can reach almost the same temperature as the water in the engine cooling circuit. (90°-95°C). Domestic hot water is not normally hotter than 60°C.

You can limit the temperature of the hot water supply by:

- fitting a C-Warm adjustable thermostat, model CW276A. This also avoids the possibility of tripping the high temperature cut-out in a C-Warm double-protected electric immersion heater if the stored water temperature reaches 90°C. Do not use on direct cooled engines
- fitting a blender valve in the hot water discharge line, to add a controllable proportion of cold water. This method has the potential advantage of extending the capacity of the C-Warm heater (X litres of water at 85°C plus Y litres of cold water = X + Y litres of water at 55°C)



## MAKING SURE YOUR WATER STAYS HOT

C-Warm's efficient insulation will keep your stored water hot for many hours after the engine has stopped

- Long pipe runs can delay the arrival of hot water at the hot taps, wasting water. Heat loss can be minimised by insulating the hot water pipes.
- Occasionally a thermo-syphon will start of its own accord in the engine cooling circuit, silently extracting heat from your stored water and warming the (stationary) engine! This is an unlikely event, but if it does happen, contact your C-Warm supplier for advice.

## TOO HOT? TOO COLD? A HEALTH NOTE

*Legionella* bacteria occur naturally in many water systems. People exposed to them can develop Legionnaire's disease.

Water temperature	Risk
Above 60°C	Can scald, but <i>Legionella</i> bacteria cannot survive
20° to 45°C	<i>Legionella</i> multiply
Below 20°C	<i>Legionella</i> will not multiply but remain a potential threat

Store hot water at 60° or above. Use a **blender valve** in the hot water supply line to add cold water in controlled amounts.

# C-Warm WATER STORAGE HEATERS for boats

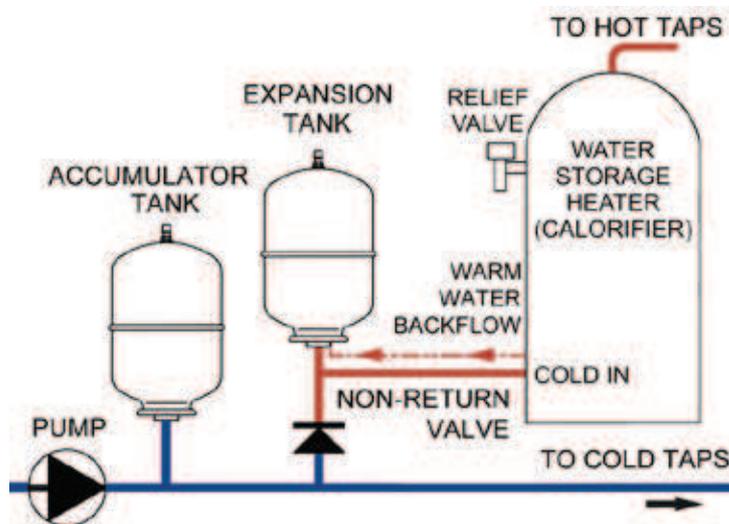


## HOT WATER EXPANSION

The water in your C-Warm storage heater expands as it heats up. Provided your pressurised system incorporates an accumulator tank, this expansion will be absorbed as it takes place. In the process, a small amount of hot water may flow back into the cold water line. If hot water backflow cannot be tolerated, fit a non-return valve and a separate expansion tank in the cold water supply line to the heater.

Set the gas pressure in the expansion tank to the cut-out pressure of the pump.

If your system has no accumulator or expansion tank, thermal expansion will cause the temperature-and-pressure relief valve to discharge a little hot water every time the stored water is heated. The valve includes a hose connector to allow this water to be drained into the bilge. Eventually, a deposit of scale may build up in the relief valve, preventing it from closing fully. **An expansion tank is recommended for this reason.**



## REGULATING THE COLD WATER INLET PRESSURE

Where the cut-out pressure of the pressure system pump exceeds or is close to the pressure of the temperature-and-pressure relief valve (TPRV), a PRESSURE REDUCING VALVE is required in the cold water inlet to the water storage heater

### Expansion tank

When a Pressure-Reducing Valve is fitted, it is necessary to fit an expansion tank (Why? See above). The gas pressure in the expansion tank should be the same as the setting of the Pressure-Reducing Valve. This should be done before the system is pressurised by the pump.

### Selecting a Pressure-Reducing Valve and an Expansion Tank

Please contact Cleghorn Waring to establish the correct size of expansion tank and the correct pressure setting for the Pressure-Reducing Valve. You will need to know the capacity of your water storage heater and the pressure rating of the TPRV.

### Using a Pressure-Reducing Valve in conjunction with a Blender Valve

If a blender valve is to be fitted, its cold water inlet should be connected into the pipework between the Pressure-Reducing Valve and the cold inlet fitting on your hot water storage tank

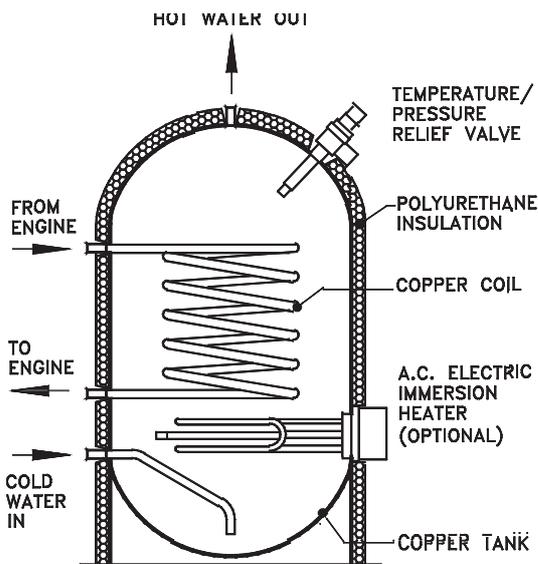
# C-Warm WATER STORAGE HEATERS

f o r b o a t s



## USING THE HEATER

- 1 Check that the pipework is complete and fully connected.
- 2 If necessary, refill the engine cooling system with the recommended coolant.
- 3 To fill your pressurised water system, including your C-Warm heater, with water proceed as follows:
  - check that the pipe work is complete and fully connected
  - open all the hot and cold outlets
  - fill the cold water supply tank
  - open the isolating valve from the water supply tank to the pressurised system



- start the pump, which should prime itself in a few seconds. The system will begin to fill with water. As the system fills up, the taps will start to discharge air and water. Close each tap slowly, until only one hot tap remains open. When this tap stops discharging air, the C-Warm heater is full. Close the tap. The pump will stop within a short time.
- check all the fittings and connections thoroughly for leaks

- test the temperature-and-pressure relief valve by rotating the coloured knob one full turn anticlockwise; water should flow freely from the valve discharge
  - refill your water storage tank
  - check all the connections once more when the water is heated for the first time.
4. Your pressurised system and C-Warm heater are now ready for use.
  5. Your engine cooling circuit will heat the stored fresh water in your C-Warm heater automatically, whenever you run the engine. The engine cannot overheat C-Warm: once the stored water has reached its maximum temperature, no added heat is absorbed from the engine cooling circuit.
  6. C-Warm's efficient installation will keep the stored water hot for many hours after you have stopped the engine
  7. If the stored water is too hot, check the C-Warm Instructions to find out how to limit its temperature
  8. An electric immersion heater will switch itself on and off automatically, just as in a domestic water tank. Reset the main thermostat in the immersion heater if necessary (factory setting is 60°C). **Do not** adjust the high temperature cut-out thermostat (factory setting is 85°C).
  9. Use your hot and cold water outlets just as you would at home.
  10. Apart from checking the operation of the temperature-and-pressure relief valve once a week (see instructions) your C-Warm storage heater needs no regular **maintenance**. Don't forget to drain it when you store the boat for the **winter!**

# C-Warm WATER STORAGE HEATERS

f o r b o a t s



## PROBLEM SOLVING

PROBLEM	POSSIBLE CAUSE	ACTION
Water not hot enough	<p>Coil inlet temperature too low</p> <p>Air lock(s) in engine cooling circuit</p> <p>Top of storage heater above engine cooling header tank</p> <p>Thermostat in engine cooling circuit not adjusted correctly</p> <p>Thermo-syphon in coil circuit when engine is not running</p>	<p>Check coil inlet water temperature and correct if necessary</p> <p>Check for air locks</p> <p>Raise header tank</p> <p>Check setting on thermostat</p> <p>Contact your supplier for advice</p>
Water too hot	<p>Engine cooling circuit water too hot</p> <p>Immersion heater control thermostat set too high</p> <p>Immersion heater control thermostat has failed</p>	<p>Fit thermostat CW276A or blender valve CW268 OR CW272B</p> <p>Adjust immersion heater control thermostat</p> <p>Check control thermostat. Do not reset high temperature cut-out until the cause of the overheating has been established</p>
Water discharges continuously through temperature/pressure relief valve	<p>Pump pressure switch cut-out setting is higher than relief valve setting.</p> <p>Pressure switch has failed</p> <p>Stored water too hot</p> <p>Immersion heater control thermostat set too high or has failed.</p> <p>Temperature/pressure relief valve has failed</p>	<p>Check cut-out setting. Adjust or replace switch, or fit pressure-reducing valve</p> <p>Replace pressure switch</p> <p>Fit thermostat CW276A</p> <p>Adjust or replace control and high temp. thermostats</p> <p>Replace temperature/pressure relief valve</p>
Hot water flows back into cold water line	<p>Thermal expansion</p>	<p>Fit non-return valve and expansion tank, as outlined in these instructions</p>
Immersion heater does not operate	<p>Electric supply failure</p> <p>Control thermostat temperature set too low.</p> <p>High temperature cut-out has operated</p>	<p>Restore electric supply.</p> <p>Check control thermostat and correct if necessary.</p> <p>Check control thermostat and replace if necessary. Inspect system before using heater again.</p> <p>Check that high temperature cut-out setting is above control thermostat setting; reset at 90°C</p>

# C-Warm WATER STORAGE HEATERS

f o r b o a t s



## CONNECTIONS

C-Warm Model No <i>H= horizontal V= vertical T= twin coil</i>	Capacity litres	A	B	C	D1	D2	E1	E2	F
		Hot water outlet BSP (gas) thread ext.	cold water inlet BSP (gas) thread ext.	relief valve BSP (gas) thread int.	coil inlet BSP (gas) thread ext.	coil outlet BSP (gas) thread ext.	2nd coil inlet BSP (gas) thread ext.	2nd coil outlet BSP (gas) thread ext.	Imm. heater BSP (gas) thread int.
<b>CWM18-H3</b>	18	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM21-V3</b>	20	1/2" int.	1/2" int.	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM29-V3</b>	29	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM29-VT3</b>	29	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM32-H3</b>	32	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM40-V3</b>	40	1/2" int.	1/2" int.	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM41-H3</b>	40	1/2" int.	1/2" int.	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM41-HT3</b>	40	1/2" int.	1/2" int.	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM45-H3</b>	45	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM50-V3</b>	50	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM50-VT3</b>	50	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM50-H3</b>	50	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM50-HT3</b>	50	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM53-H3</b>	53	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM53-HT3</b>	53	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM53-V3</b>	53	1/2"	1/2"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM53-VT3</b>	53	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM64-H3</b>	67	3/4" int.	3/4" int.	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM64-HT3</b>	67	3/4" int.	3/4" int.	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM67-V3</b>	67	3/4"	3/4"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM67-VT3</b>	67	3/4"	3/4"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM73-H3</b>	73	3/4" int.	3/4" int.	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM73-HT3</b>	73	3/4" int.	3/4" int.	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM78-V3</b>	78	3/4"	3/4"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM78VT3</b>	78	3/4"	3/4"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM93-V3</b>	93	3/4"	3/4"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM93-VT3</b>	93	3/4"	3/4"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"
<b>CWM141-V3</b>	141	3/4"	3/4"	1/2"	3/4"	3/4"	-	-	2 1/4"
<b>CWM141-VT3</b>	141	3/4"	3/4"	1/2"	3/4"	3/4"	3/4"	3/4"	2 1/4"



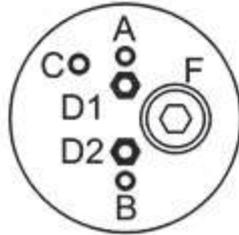
# WATER STORAGE HEATERS for boats



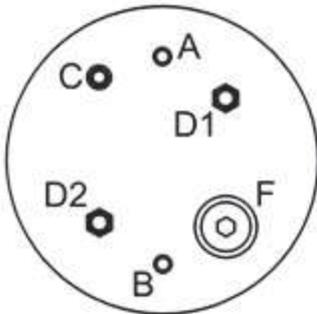
## HORIZONTAL MODELS

See Table, page 18

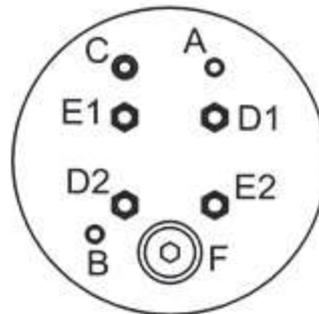
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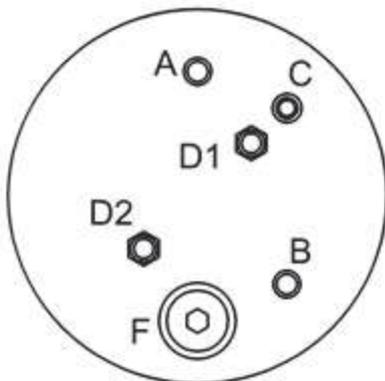
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CWM45-H3



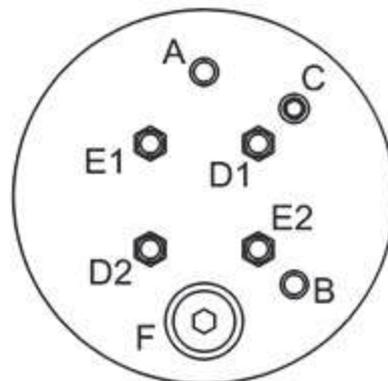
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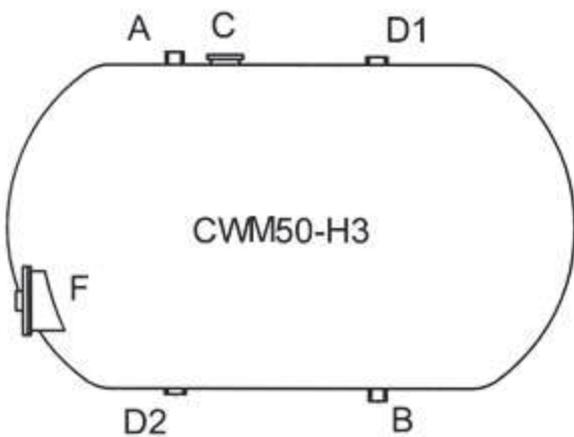
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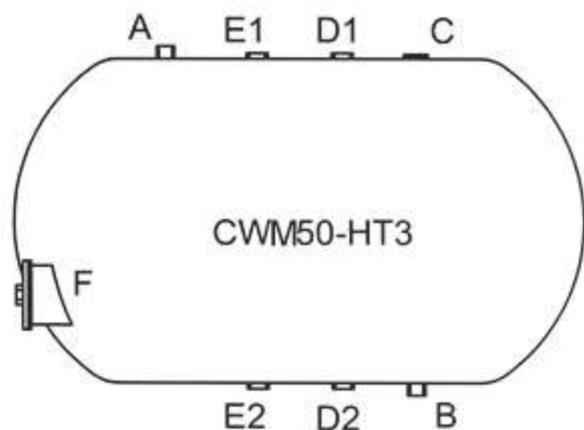
CWM41-H3  
CWM64-H3  
CWM73-H3



CWM41-HT3  
CWM64-HT3  
CWM73-HT3



CWM50-H3



CWM50-HT3



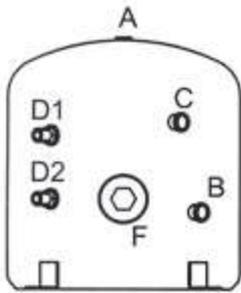
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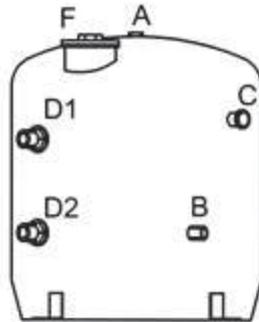
## VERTICAL MODELS

See Table, page 18

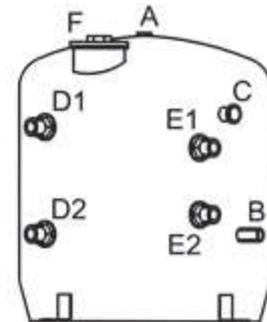
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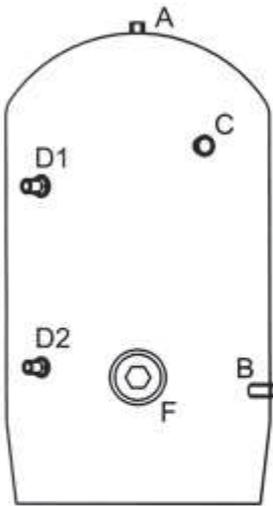
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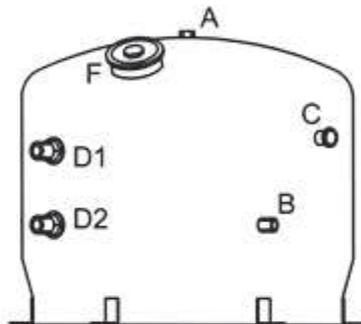
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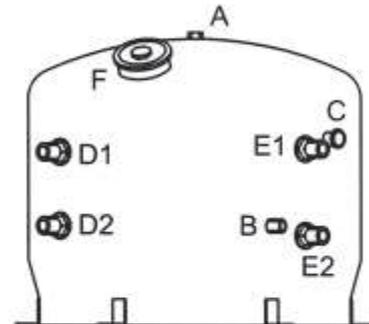
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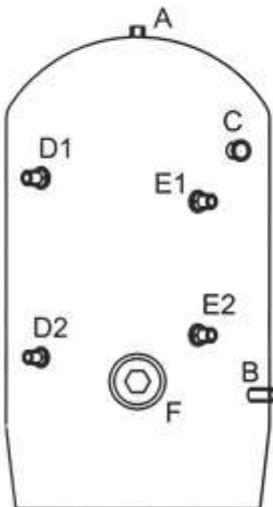
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CWM78-V3  
CWM93-V3



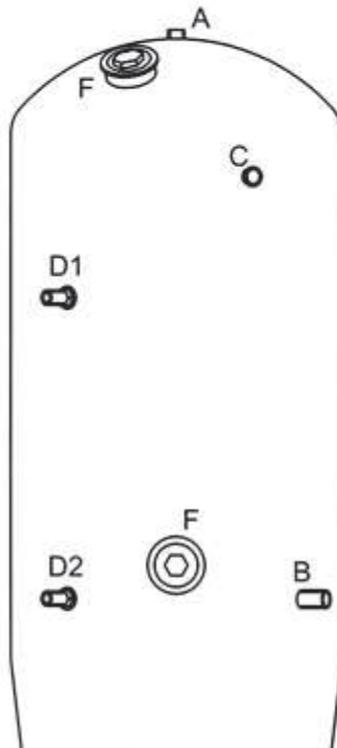
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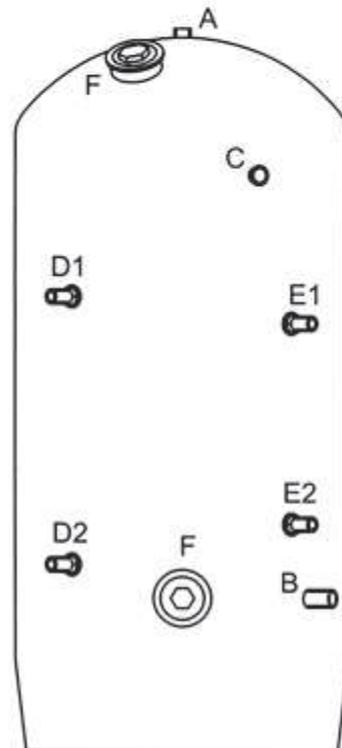
CWM50-VT3



CWM53-VT3  
CWM67-VT3  
CWM78-VT3  
CWM93-VT3



CWM141-V3



CWM141-VT3