



Tel: 01482 325456 Fax: 01482 212869

Email sales@morcoproducts.co.uk

Web www.morcoproducts.co.uk

Winterisation of Holiday Homes

General

Fresh water freezes at 0 degrees Celsius and expands by 9% with a significant force that will destroy:

- Pipe work
- Boiler components,
- Taps, and shower valves.

Frost and Ice causes damage by two methods:

1. Water freezing within the home in appliances, pipes taps or TMV2 valves
2. Water pressure increasing within the entire system caused by water freezing outside of the home

Method 1 is usually a problem when the home is left empty and this can only be addressed by a Drain Down – see below

Method 2 can occur when owners are using the home during a cold period and have the central heating operating. See Water Pressure Damage on Page 3.

DRAIN DOWN

If you leave fresh water in your caravan system over the winter you will run the risk of damage. This can only be avoided by removing the fresh water from the system – we call this a “drain down”. You may wish to drain down the fresh water system yourself using the procedure in the next section but we **STRONGLY RECOMMEND** that you have this carried out by an experienced engineer as many caravan systems can only be completely drained by blowing the water out and this requires specialist equipment. View the £50-£60 charge for a drain down as a mini insurance policy and always ask the engineer if he has equipment to blow the water out and a refractometer to check the anti-freeze level. The two most common parts to be damaged by frost are the shower valve and the hydraulic assembly in a combi and the costs to replace these are around £100 and £200 respectively.

Drain Down Procedure

- Disconnect the fresh water feed outside the home if possible as this protects from flooding due to stop cock failure
- Turn off the fresh water supply stop cock outside the Holiday home

- Open all hot and cold taps and shower valves and place the shower head in the tray
- Use the Holiday Home Owner’s Handbook to locate the fresh water drain cocks under the van
- Open these drain cocks – if you have a centrally heated home DO NOT open all the drain cocks directly under the combination boiler as this will drain the sealed system and this should be protected by antifreeze – see details in “Additional Information for Combi Boilers”



The above photo shows the plumbing under a home directly under a combination boiler. The two outer drain cocks are for the sealed central heating system and the two inner drain cocks are for the fresh water. Only open those for fresh water.



This manufacturer has helpfully labelled the central heating system drain cocks to avoid them being incorrectly used.

This procedure does not guarantee that all the fresh water will leave the system. Most modern homes have check valves in the shower mixers and these trap fresh water.

Shower mixer valves have double check valves fitted that stop the flow of water around the system once the drain cocks and taps are open. It may appear that all the water has left the system, but beware! This pitfall can be avoided by removing the shower mixer valve/valves from the system after the cold water supply has been switched off and the drain cocks opened. Many manufacturers provide access panels and these may make the removal of shower mixers easier. Removal of some shower mixers requires the use of special tools.

In addition pipe work layouts can cause air locks leaving water inside vulnerable components such as the boiler.

Re-commissioning the home in spring is a reverse of the above procedure (see page 9).

Water Pressure Damage

During the last winter Morco had many examples of boilers and mixer taps being damaged overnight even though the owners/customers were staying in the home and had the central heating on. This phenomenon has been known to Morco for some years but the lack of a really cold winter meant we never saw the theory in action with our current range of GB combi boilers. What actually happens is that the home, including the boiler cupboard, remains warm due to the central heating being on. Obviously no damage due to ice formation can occur in these circumstances. However, nearly all holiday homes have the hot and cold water pipes hung underneath the home. These pipes are lagged in line with the National Caravan Council standards but they will only protect the water within the pipes from freezing for a period of time in cold conditions. While the home owners are sleeping in a lovely warm bed with the combi boiler circulating the antifreeze/water mix in the sealed heating circuit around the radiators, the mains water inside the hot and cold pipes under the home is turning to ice. This has the effect of compressing the water that is still unfrozen elsewhere in the system. This water may be in the pipes under the van, inside the boiler, in the pipes inside the home and in the shower mixers or mixer taps. As the ice continues to form, the pressure increases. Combi boilers are usually specified to cope with mains water pressures up to 10 bar, TMV2 shower mixers will generally be in trouble at pressures below 10 bar. The hot and cold water pipes under the typical home has a capacity of 3.6 litres. As ice forms, that volume increases to 3.925 litres and, as water is pretty much incompressible, this extra 0.325 litres needs to go somewhere. Depending on where the water turns to ice in the pipe, it may push apart a pipe fitting under the van or it may blow O ring seals out of the boiler heat exchanger or cause irreparable internal damage to shower mixer valves.

The likely time line is as follows:

6pm – you watch Michael Fish inform you it is going to be a freezing night on the weather report.

10pm – you check the heating is set to keep the inside of the home warm all night.

3am – ice starts to form in the pipes under the home increasing the pressure in the unfrozen water inside the home.

4am – the pressure inside the mains water part of the warm combi boiler exceeds its 10 bar design specification. The shower mixers have already exceeded their 6 bar maximum and been damaged.

4.30am – the O ring seals in the boiler give way – minimal water leaves the boiler as the mains water supply to the home is frozen solid.

8.30am – you wake up after a warm night in bed and find that you cannot fill the kettle or take a shower as the pipes under the van are frozen. You look inside the boiler cupboard and utter a sigh of relief as there is no water on the floor and so assume no damage has occurred.

1pm – the bright sunny winter’s day causes the frozen water in the pipes under the home to thaw. The good news is that you can now fill the kettle, the bad news is that mains pressure water pours past the displaced and damaged O rings in the boiler, filling the boiler cupboard with water.

1.05pm – you hurry to turn the stop tap off to avoid further damage.

5pm – an engineer calls Morco from the home to be advised that the problem they are describing is frost damage and is therefore not covered by warranty.

5.01pm – the home owner understandably reacts with frustration and disbelief. Only when the whole process is explained do they start to understand that their unfortunate situation is due to frost.

3 days later – the boiler is now repaired – further frustration can occur when the water delivery for their first shower in days is luke warm and variable in delivery! The immediate conclusion is that the boiler is broken, again! In reality it is the internal damage caused to the shower mixer due to exceeding its operating pressure. This device will not leak water when damaged but will cause the hot water delivery at all showers and taps to be compromised until it is replaced.

Timing of and Solutions to Water Pressure Damage

The problem is caused by the expansion of ice compressing water within a sealed supply. There are 2 reasons why the problem is largely caused overnight:

- Temperatures are lower at night
- The hot and cold water outlets are not used as the owner and their family are asleep. Continually using hot and cold water during the day draws through the water that is about to freeze under the home and replaces it with water from pipes that are buried underground that may be 5-10°C warmer

There are a number of solutions:

- The holiday home could have trace heating fitted to all 35-40m of hot and cold pipes under the home. This can often be specified when the home is being manufactured – see heading 3 below
- Some lodges and most park homes have the pipework under the home sealed inside a “box floor”. This protects the pipes far better than tubes of insulation but is expensive to include in a design
- Alternatively, when Michael Fish gives out the bad news:
 - Fill the kettle and take a shower
 - Turn off the cold water supply to the home at the external stop cock
 - Leave the combi boiler in heating mode as it does not need mains water to keep providing heat throughout the night - this is because it continues to circulate the antifreeze rich sealed system that carries the heat to the radiators
 - Open all the hot and cold water outlets in the home – for mixer taps put them in the mid position to allow both hot and cold water to leave the pipes
 - If the water now freezes in the pipes the increase in pressure will force a small amount of water through the outlets and avoid damage. There may still be some damage to pipework under the home but this is easily fixed and does not run the risk of flooding the home
 - After a good night’s sleep - use the water in the kettle for a cuppa prior to turning off all internal outlets and then turning the water on at the external stop cock.

Additional Information for Water Heaters

All Morco water heaters including the D51/61, G11E and F11E have a drain plug which is located at the bottom of the boiler and is shown in the pictures overleaf. This should be removed after all the drain down procedure has been carried out and the plug placed safe for use after the winter.



The finger is pointing at the drain plug in the brass body of the cold water inlet at the bottom of the boiler. This drain plug should be removed taking care to retrieve the plastic washer.



The drain plug has been removed but the washer is still adhered to the brass body.

Additional Information for Combi Boilers

If your home has radiators it will have a combination boiler. These have 2 water circuits:

1. One which has fresh water passing through it
2. A second which is sealed and has a water/antifreeze mix passing around the radiators.

To drain the fresh water circuit, follow the above drain down procedure while carefully noting that this WILL NOT GUARANTEE a successful drain down. For this you need to use an experienced engineer with the specialist equipment needed to blow all the fresh water out of the system.

The sealed pressurised central heating circuit should NOT be drained down and should have sufficient antifreeze in it to protect to -15 deg Celsius (additional anti freeze can be added to protect down to -22 °C).

As part of the winterisation process an experienced engineer should use a refractometer (see below) to determine the level of protection. If it is too low, he will refill the sealed system to the required level.

THIS CIRCUIT CAN LEAK under the van and cause low system pressure (see the factsheet for low central heating system pressure). If this is then topped up with fresh water via the filling loop beneath the combi boiler the antifreeze is diluted and the protection reduced. A sealed system with insufficient antifreeze will result in damaged radiators, combination boilers and pipe work.



This is Morco's refractometer PPCRHA200ATC which can be purchased from our website for £46.50 plus VAT.

If an engineer does not have one of these then you should question their ability to winterise your home

Below is a table showing the approximate total volume of a system and the volume of 100% antifreeze needed to protect that volume. If a system is found to contain less than 30% antifreeze/inhibitor, the easiest and safest way to rectify this is to drop the entire contents of the sealed system and refill using 30% pre-mix. The solution must be pre-mixed or there is a danger that by filling the system partially with fresh water and then adding neat antifreeze/inhibitor, insufficient mixing will occur.

Morco only recommend the use of Fernox Alphi 11 or Sentinel X500 antifreeze/inhibitor.

Size of Holiday Home	Approx. total volume of sealed system	Volume of 100% antifreeze/inhibitor needed for 30% or -17°C**
28 x 10 2 bed	15 litres	4.5 litres
35 x 12 2 bed	17.5 litres	5.25 litres
36 x 12 3 bed	20 litres	6.67 litres
Twin units*	25 -100 litres	8.33 - 30 litres

* Contact unit manufacturer for total volume
 **Based on the use of Fernox Alphi 11 antifreeze/inhibitor

Frost Protection Systems (Frost Stats)

Frost protection systems (sometimes called frost stats) are fitted to many combination boilers. For the GB24 and GB30 combis they offer protection against frost for the SEALED SYSTEM WITHIN THE BOILER ONLY, radiators and pipe work are not protected. On earlier combis they offer some protection to the entire central heating circuit including radiators and pipework. In order for these systems to work the boiler must be

connected to a gas AND electric supply THROUGHOUT the winter and have the controls set to the correct position. Below is a photo of the correct position for the FEB24E, FEB24ED and FEB24ED3* boilers.



Below is a photo of the correct position for the GB24 and GB30 range of boilers.



For Morco combination boilers the control knobs need setting to the off position which is fully anticlockwise*. If the boiler experiences any problems during the winter such as low system pressure or a component failure, the frost protection system will not operate. A frost protection system WILL NOT protect the fresh water circuit and will only give partial protection to the sealed circuit. For these reasons it should be used ONLY as a back up to a full drain down and an antifreeze check-up.

*For the FEB20E combi boiler the frost protection system will only work with the middle control knob in the summer setting and with gas and electric connected.

Additional Information for Condensing Combination Boilers

Historically condensing boilers have been fitted to residential park homes but within the last year all combination boilers supplied in caravan holiday homes have been of the condensing type. As part of the condensing process a liquid condensate is produced that leaves the boiler via a condensate trap and flows into the waste water drain under the holiday home. In certain circumstances this condensate can freeze and block the passage of newly generated condensate that in turn extinguishes the boiler and displays a fault code.

There are four ways of mitigating this problem:

1. The condensate trap used should be siphonic. It will store approximately 150ml of warm condensate inside the boiler and release it all at once making freezing within the pipe below less likely. Morco's GB range of condensing boilers features a siphonic trap.
2. Condensate traps can be removed from the boiler when it is not in use to avoid being damaged by frost. They must be replaced prior to turning the boiler on as they are an important feature of the boiler's operation (see photo). The colour of the condensate is not green as in the photo but clear. The Morco trap in the GB24 boiler has been frost tested and has not failed so removing it is a belt and braces approach rather than a necessity.



3. Ensure that the pipe that takes the condensate from the boiler to the drain is at least 22mm. Most installations will feature a 22mm pipe changing to a 32mm pipe before it passes through the floor.
4. The condensate pipe work should, wherever possible, be vertical until it reaches the main 110mm waste pipe under the home. This way the condensate has the easiest possible journey. Horizontal condensate pipes will trap fluid and may freeze.

Radiator Valves

Most central heating systems have thermostatic radiator valves and these have a frost setting marked as “*”. This setting is not relevant to the protection of your caravan holiday home from frost.

Summary

The only way to guarantee protection for the fresh water circuit in your holiday home is to ask an experienced engineer to carry out a drain down using a system capable of blowing water out. The only way to guarantee

protection for the sealed central heating circuit (if fitted) is to check with a refractometer that the system has sufficient antifreeze to withstand the temperatures it is likely to encounter during the winter.

Doing your own drain down and using a boiler frost protection system (where fitted) will offer some protection but frost damage is still a possibility due to the reasons outlined in the preceding sections.

Re-commissioning the Home

When you return to the home in the Spring, you may experience a problem with the combination boiler that is easy to resolve. The problem is the pump that circulates water around the boiler in both hot water and central heating mode has become stuck. This happens occasionally when the pump has been inactive for a long period and when there has been no mains electric power to the home. If the home is connected to mains throughout the year the pump will switch on for a short period every day (independent of hot water or heating duties) to stop it sticking.

If your pump has stuck the boiler will lock out and display a fault code:

- For the FEB24 range of boilers the fault code varies:
 - A6UA. This means “water” in Spanish and is telling you that water in the primary circuit cannot circulate
 - Three flashing lights – FEB24E see manual
 - F4 on the FEB24ED and FEB24ED3*
- For the GB range of boilers the Fault code is L1 but you may also get a C displayed permanently after a momentary blue burner light and this is telling you that the boiler has overheated as there is no water circulation.

As the pump is only stuck and not permanently damaged, the problem can be resolved:

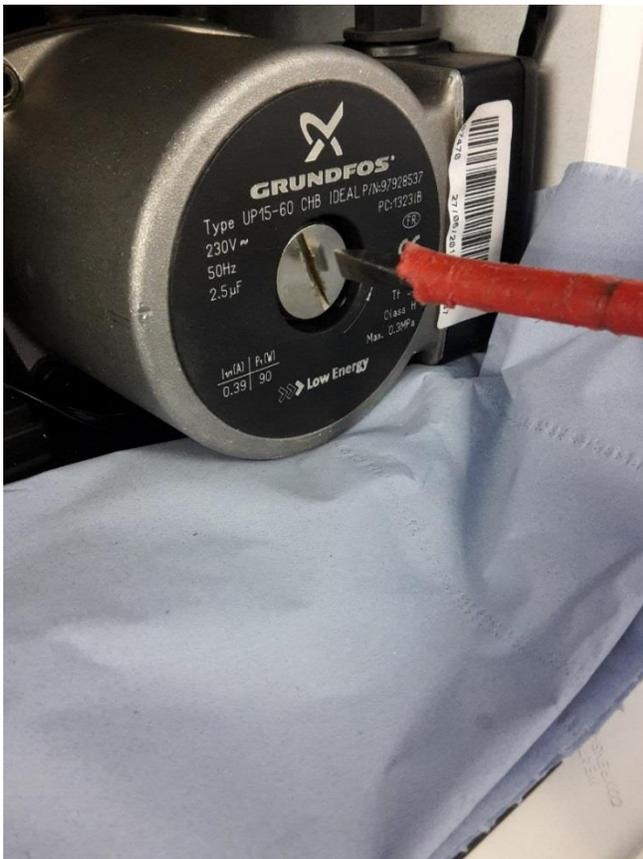
- Turn the electric supply to the boiler off
- For the FEB24 range, prise off the boiler white front cover (it has 2 pop studs on each side) and drop the plastic lower panel by removing 2 cross head screws on the front of the panel and 2 on the underside. For the GB range the process is much simpler – there is a flap between the plastic lower cover and the metal cover – simply open the flap, undo the 2 cross head screws, clip the flap closed to retain the screws. The whole plastic cover will drop down on a hinge.
- Now the pump will be visible and you will need to insert a screwdriver into the front of the pump and turn a few times to free the pump spindle.

In the case of the earlier ranges of boilers you will first need to remove a blanking nut and a small amount of water may leak out so have a cloth placed underneath the pump as shown below. Either a flat bladed screwdriver or an allen key will be needed to turn the spindle.

FEB24 Range



Early GB range



Later GB Series II

In the case of the later GB boilers this requires a Philips screwdriver and is easy as shown below:

