3 Water pipework

General guidelines

In order to obtain the best performance from the system, restrictions in the water flow should be kept to a minimum. The use of right angle bends and large variations in height should be avoided where possible. Ideally, the Hydronic should be mounted as low as possible in regard to the other water components in the system. This will minimise the possibility of air collecting in the Hydronic heater and assist with initial air purging. The above is especially important when an expansion header tank based system is used.

The use of flexible water pipework such as rubber or polybutylene is recommended, as this is easier to install in the boat and allows for vibration and movement. The preferred pipework circuit configuration is a two pipe, flow and return system as shown in Figure 5. This will ensure equal water flow (regulating valves may be required for selected components) to all the water components resulting in even heat distribution regardless of the distance and order that the matrix or radiator is from the heater.

Single pipe systems (Figure 4), that connect radiators or matrices in a loop, one after another, should be used with caution as they give priority to the first components on the system. As a result the water temperature reduces as it passes and is extracted through each subsequent radiator or matrix. This will therefore make attaining an even temperature throughout the boat difficult to achieve, with the furthest cabin from the heater receiving the least heat, as well as increasing the restriction on the water flow returning to the heater.

However, if the water system contains only a small amount of pipework and one or two components (as shown in Figure 4), then a single pipe circuit can be adopted as long as the internal diameter of the components used do not restrict the water flow of the heater (18 - 20mm). In addition bypass valves should be fitted to reduce possible restrictions in the water flow as well assisting to a degree in balancing the system. Full heating systems with several matrices or radiators on systems using larger amounts of pipework should not be piped using this type of system.

Hydronic D4 / D5 heaters are to be piped using 18mm rubber hose or 22mm polypipe to a length of 20 metres total (supply and return pipe added together), use 15mm pipe to connect to components (maximum 10 metres).

Types of water systems

There are generally two types of water systems that can be used. The most common type is the expansion header tank system as shown in Figure 4/5. This type of system uses an expansion tank situated at the highest part of the system. This ensures the system always has a head of water and allows for the expansion of the water as it rises in temperature.

Pressurised or sealed systems use a pressure vessel and gauge as shown in Figure 6, and can be filled and topped up by a filling loop.

For ease of installation and simplicity an expansion header tank system is preferable as long as a suitable high position for the tank can be found. A pressurised/ sealed system does not have this problem although it is initially more complex to install. This type of system is less affected by the height variations of the system water components.

Figure 4
Single Pipe System

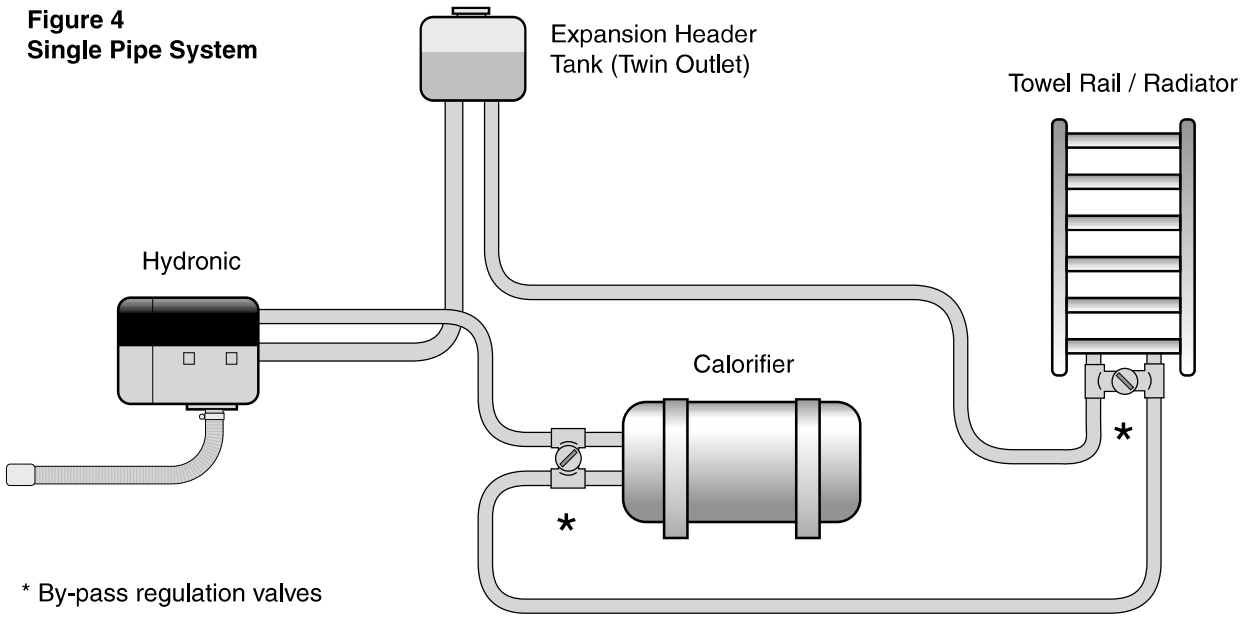
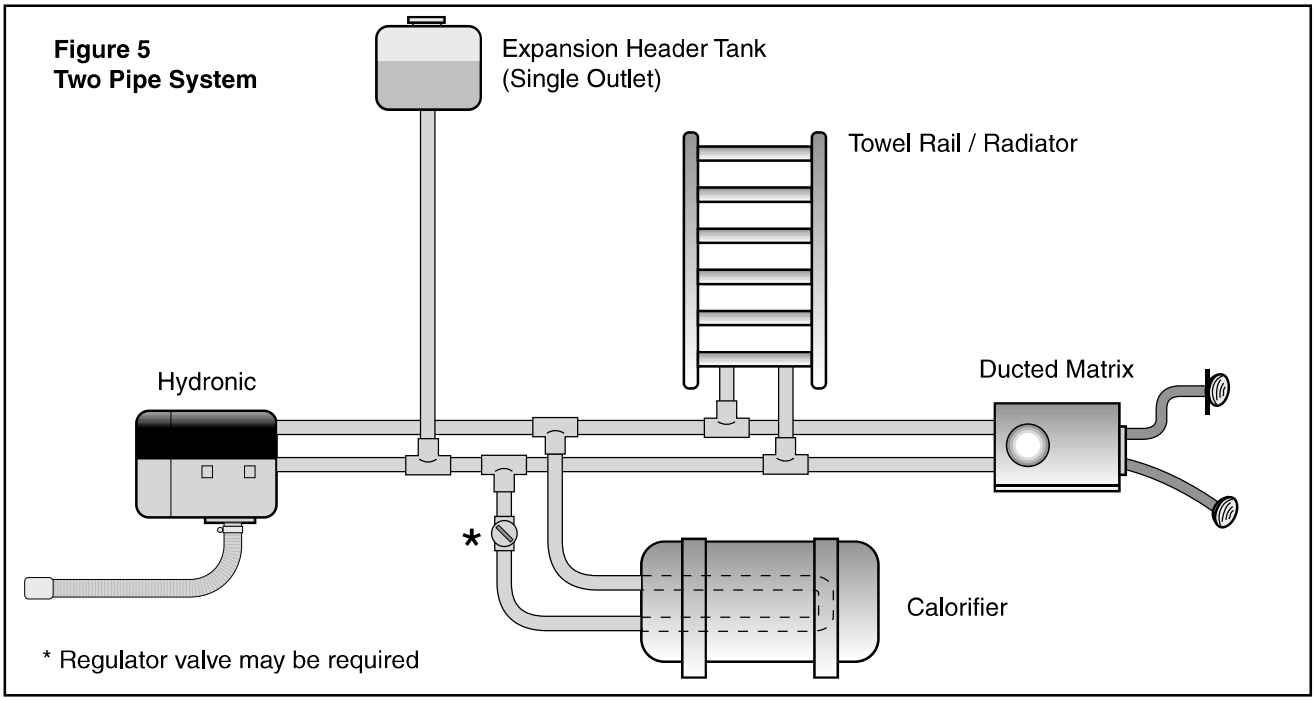


Figure 5
Two Pipe System



Expansion tank based systems

Positioning the expansion tank

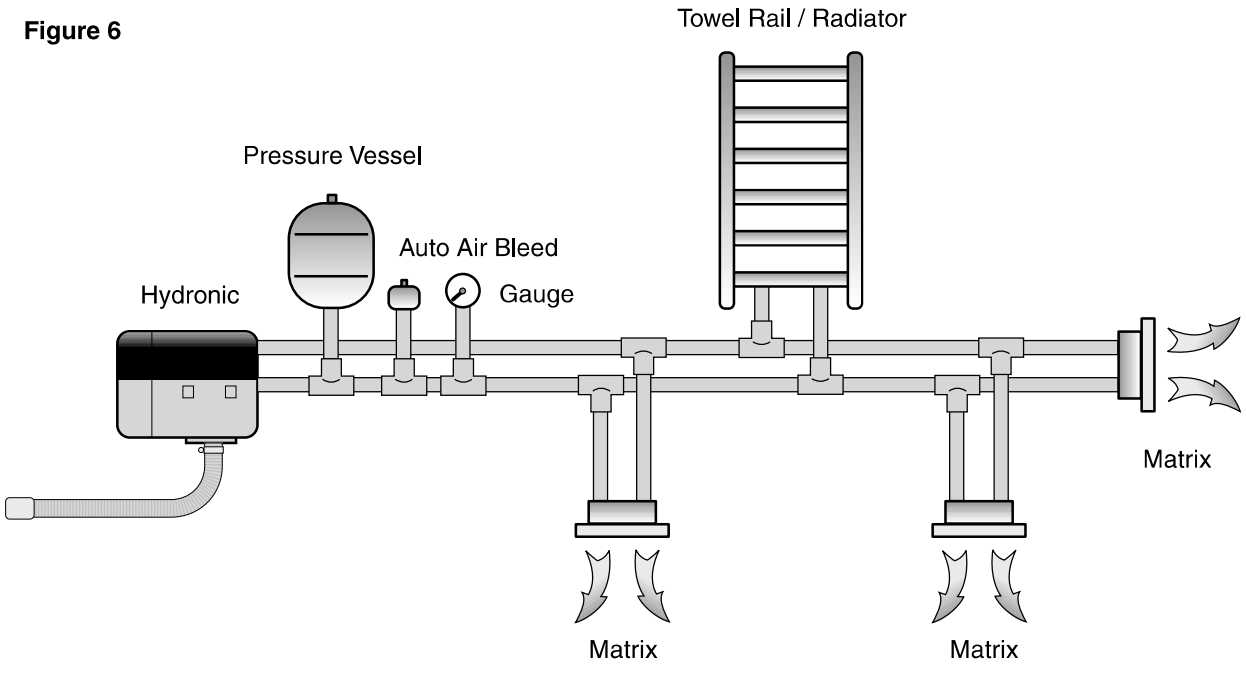
The expansion tank must be positioned above the highest water component in the system and in a location that allows it to be topped up and the level checked periodically. Caution should be taken when considering installing the tank above any accommodation area where people, animals or materials could be affected by potential coolant leak or accidental spillage when filling.

Pressure based systems

If a pressure-based system is to be used, it must not be pressurised so that it exceeds the maximum permitted pressure of 2 bar at maximum operating temperature (85° C).

Additionally, if the coolant system is to be filled or topped up from a feed connected to the boat's domestic water supply, a suitable non-return device must be fitted to prevent the heater's anti-freeze coolant mixture and the boat's domestic water supply cross contaminating.

Figure 6



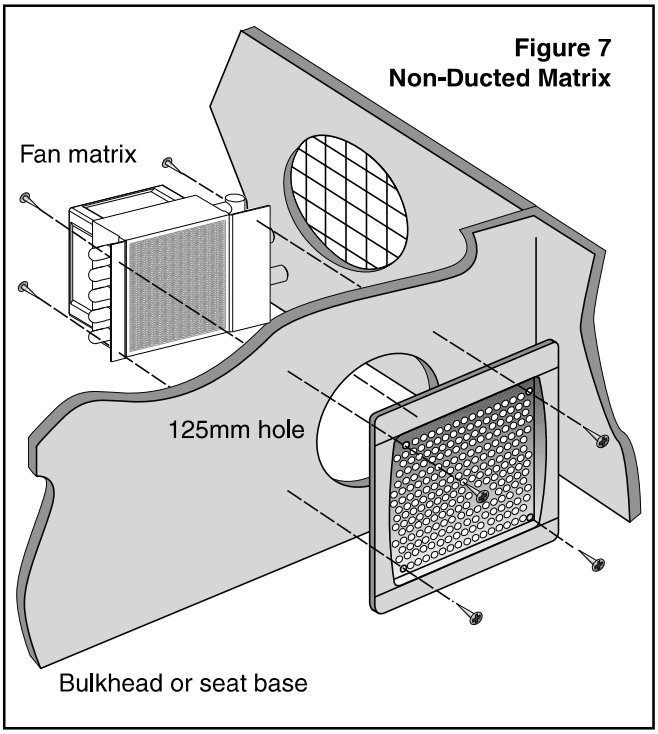


Figure 7
Non-Ducted Matrix

Installing fan matrix units

Eberspächer fan matrix units are available in both non-ducted and ducted versions.

Our non-ducted units feature very low power consumption fans that gives their maximum performance when able to allow air to flow with minimal restriction. Therefore, matrices should be mounted as close to the area that requires heating as possible. The areas that the matrices are located must be well ventilated otherwise the matrix performance will be reduced resulting in poor airflow and heat output.

Ideal mounting locations are directly behind cabin seat bases and bunks or the base of hanging lockers. The chosen location must be dry and free from possible unpleasant odours that could be distributed by the matrices into the accommodation.

Ducted units can be mounted remote from the area to be heated but it is advisable to keep the duct lengths to the outlets as short as possible to ensure the minimum heat loss. Again where they are located must be dry and odour free as well as adequately vented, otherwise airflow and heat output will be affected.

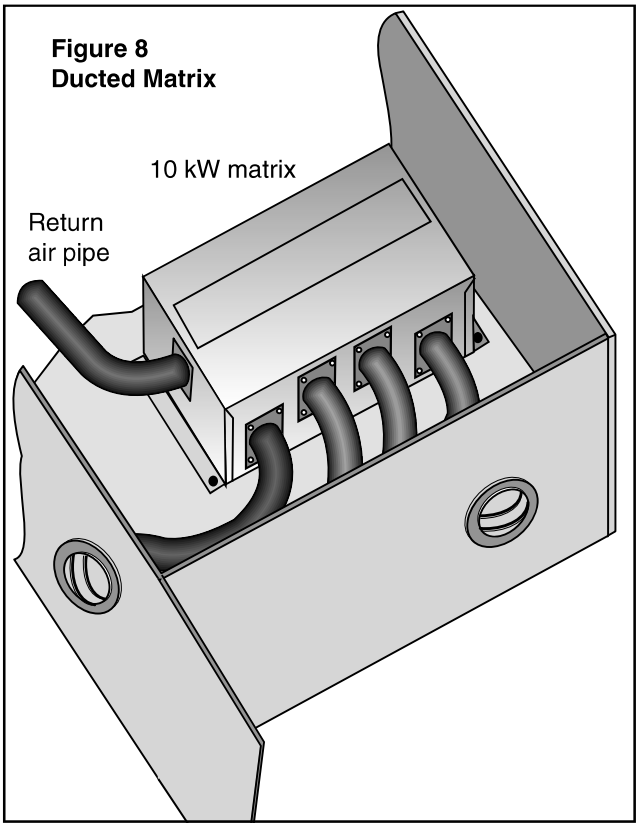


Figure 8
Ducted Matrix

Controlling the matrices

Matrix units can either be wired or controlled directly from the Hydronic, or switched individually. Individual control of each matrix is recommended, as this enables a greater level of controllability for guests and/or each area of the boat.

Each individual matrix must be fuse or circuit breaker protected to the correct rating (which will be dependant on the model of matrix used).

Connecting to a calorifier

General guide

There are several methods of connecting the Hydronic into a calorifier and the way this is carried out will depend on various factors.

- How any existing calorifier is connected.
- Is the calorifier single or twin coil?

3 Water pipework

The majority of boats will probably have a calorifier already installed, which is usually connected to the engine and/or a mains AC supply.

If the existing single coil calorifier is used with the Hydronic heater, it is strongly recommended that the engine is disconnected from the calorifier. Suitable blanking fittings will be required - contact engine manufacturer.

The use of a twin coil calorifier will allow the engine and Hydronic heater to independently heat the domestic hot water.

 **Danger!**

Risk of burning and injuries!

- The calorifier must be fitted with a device such as a blender/thermostatic valve to limit the temperature of the water that can be used for washing, bathing, etc. to a safe temperature.

Connecting into and engine circuit

It is not generally considered advisable to maintain a static engine at its operating temperature for long periods of time. This is because lubricating oils can drain from the upper parts of the engine, causing increased friction and therefore increased mechanical wear upon starting.

In connecting the heating system to the engine, it will increase the water content of the coolant system which increases the volume of water that expands as the coolant rises in temperature. The expansion/header tank fitted to the engine may not be able to accommodate such expansion.

Additionally, the engine expansion/header tank may need re-siting to ensure it is the highest component of the combined circuit.

For this reason, caution is advised if considering incorporating the boat engine into the heating/hot water circuit and advice should be taken from the engine/boat manufacturer before commencing. The terms of your boat /engine warranties may also be affected by such modifications.

 **Danger!**

Risk of burning and injuries!

- The water pipework must be routed and fastened in such a way that there is no risk to people, animals or materials that are sensitive to temperature from radiation or contact or blown hot air from matrx units.
- If necessary cover or protect exposed pipe work or deflect hot air from any matrix that poses a potential risk.
- High temperatures occur during and after heater operation. Avoid working in the heater vicinity while it is in operation. Switch the heater off and allow it to cool before commencing work. Wear safety gloves if necessary.
- The heater system pipework must not be connected to the engine circuit in any way that would allow coolant from the heating system to be released when the engine coolant pressure cap is removed. i.e. All the heater system water components must be installed below the level of the engine coolant pressure cap.

 **Caution!**

- The heater air intake must not be positioned in such a way that any exhaust gases can be drawn directly into the heater under normal circumstances.
- Fan matrix units must not be located in areas that can allow fumes, gases etc to be drawn into the accommodation area.
- In the event of overheating, the heater or exposed pipework surface temperatures can reach 100°C. Only use the temperature resistant water hoses of the correct specification.