The FLOOR HEATING WAREHOUSE .co.uk

Water Underfloor Heating Guide & Installation Instructions

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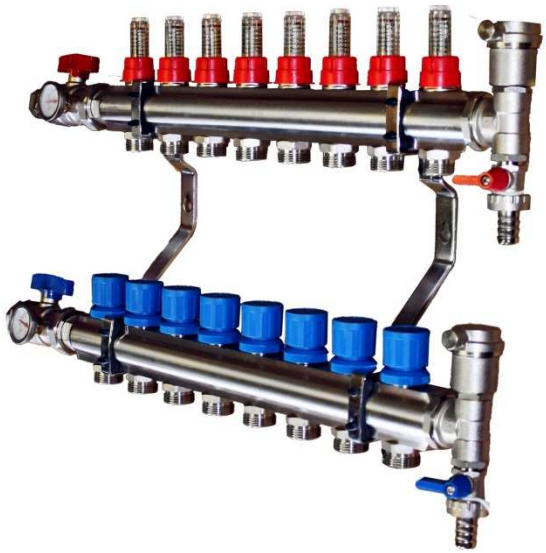


1. Planning

System Design – We can supply a complete CAD design (no additional charge) with all systems if required. However for your assistance we have listed below some of the main considerations to take into account when planning your underfloor heating system.

- **Manifold Location** - a primary consideration at planning stage of your underfloor heating solution should be the ideal location for the manifold. All flow and return underfloor heating pipes will travel to and from the manifold and therefore it should be ideally located centrally between all rooms to be heated. The pump/temperature control unit fits directly to our manifolds and the wiring centre is installed alongside the manifold.
- **Type of Pipe** – a multilayer pipe with an aluminium core (either Pex-Al-Pex or Pert-Al-Pert) is ideal for modern underfloor heating systems as it ensures maximum heat transfer, balanced with the assurance of a very strong and robust pipe. **WRAS approved** pipe has the added advantage that it offers an assurance that it has been through a rigorous testing procedure to ensure it is suitable for use with drinking water in the United Kingdom. Our 16mm underfloor heating pipe is UK WRAS approved and certified. Therefore in addition to underfloor heating it can be used for plumbing for which we also stock a full range of fittings (any excess pipe from underfloor heating can be used for plumbing).
  Pex-Al-Pex and Pert-Al-Pert pipes have the added advantage of having a bend memory and will not try to revert back to their coil shape when being installed and do not need bend formers like some older type pipes.
- **Pipe Spacing** - as a guide, for properties insulated to current building standards and with a supply water temperature from the boiler of at least 50 degrees Centigrade, pipe spacing will normally be 200mm centre to centre. However factors such as high glazing content, poor insulation values, lower water supply temperatures (such as from some heatpumps), can effect the required pipe spacing and mean a closer spacing is required.
- **Pipe Loop Length** – maximum pipe loop length should be 100 linear metres. This 100 metres includes the run too/from the manifold.
- **Quantity of Pipe** - 100 metres of pipe will cover a room of 20.0m² at 200mm pipe spacing, assuming the manifold is within that room. For larger rooms multiple loops of pipe are used and connected to multiple ports of the manifold. Our pipe is marked every metre and therefore very easy to monitor your loop length as you install.
- **Pipe Installation** – Pipe is installed to within 100mm of the room perimeter walls. Pipe is fixed to insulation with supplied pipe clips at a rate of approximately 1 clip every 50 to 100cm. We also have fixing options such as grip rails (1.0metre long interlocking rails that fix to the insulation and the pipe clips into the rail) for ease of installation if preferred. You would not normally install below kitchen units.

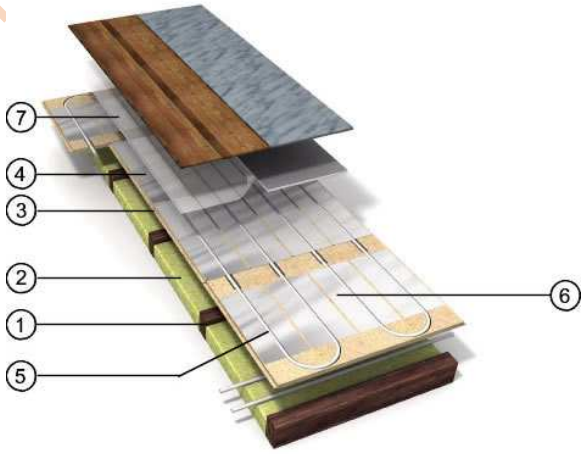
2. Types of Underfloor Heating

- **Screed Floor Systems**– Ideally the pipes should be laid onto an insulation board such as Kingspan or Recticel prior to screeding. A minimum insulation depth of 50mm is ideal but as a general rule, the more insulation you can accommodate, the more efficient a system will become. The pipes are clipped to this insulation using the clips provided with our systems. Once the pipes are clipped to the insulation board, the screed is then laid on top. For general sand and cement screeds this screed depth is normally a minimum 65mm, however for some pumped type screeds this can be reduced to approximately 50mm. Note: these comments on Screed are general and not specific to any particular build and therefore should be used for guidance only. As the screed is also a structural part of the build, its type, depth and design is important and should be specified/approved for each particular build, by an architect/structural engineer prior to installation.

- **Joisted Floor Systems** – We have several optional installation methods for joisted floors dependent on requirement.

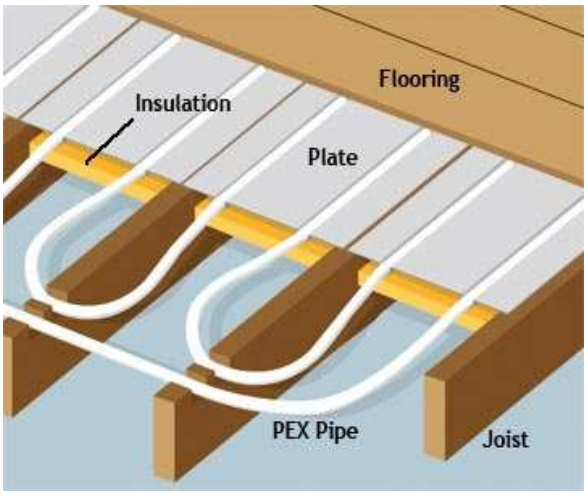
- **1. Heatboard System** –

1. Floor joists
2. Insulation
3. HeatBoard
4. Heat Distribution Plate
5. Pipe
6. HeatBoard Slotted Turning Board
7. Vapour Barrier



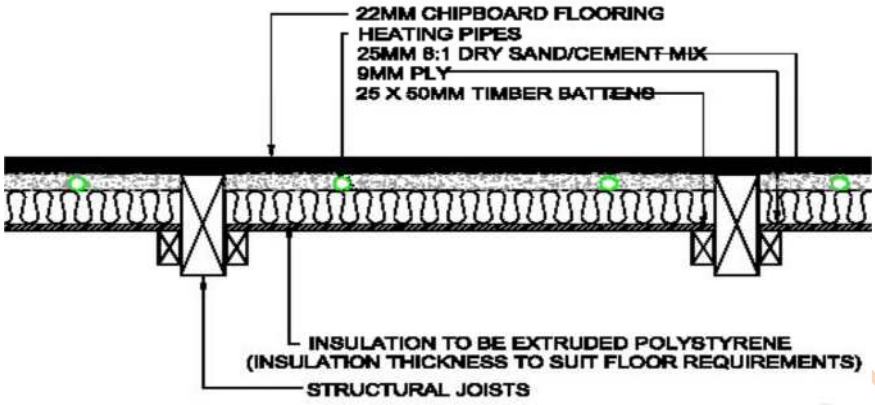
The Heatboard System consists of a flooring grade chipboard (22mm) designed to be a full load bearing floor installed directly on top of the floor joists - Pre-grooved for the underfloor heating system to be installed quickly and easily, directly into the floor board. Consisting of both Slotted and Turning boards, the system is intended for installation on standard wooden joist floors with joists spaced at 600 mm max. The construction consists of a load bearing slotted 22 mm chipboard floor, which replaces the standard board in floor constructions. The Aluminium plates are then installed into the grooves on the board, with the pipe then installed within the grooves of the plates.

- **2. Aluminium Plates System–**



Specifically designed to sit between standard joists to hold pipes and spread the heat in a joisted floor installation.
Each plate has either 2 or 3 channels (Depending on output required), designed to locate 15 & 16mm heating pipes.
The plates are designed to fit inside standard 400mm centre to centre joist spacings.
Then a traditional Plywood or Chipboard floor base is laid on top.

- **3. Grooved Insulation Boards** - System designed for standard joisted floors with joists spaced at 400mm centres (350mm space between joists). Simply lay the panels between joists, install the pipe and cover with an interlocking plywood or chipboard floor. 1200 x 350mm Panel with either 2 or 3 grooves (dependent on output required). Available in standard 40mm depth or high performance 50mm depth. Effectively four products in one, these Insulation Panels comprise a rigid thermal insulation material with radiused grooves positioned in the upper surface. The upper surface has a metallized foil bonded to it, following into the grooves, which acts as a radiant surface improving heat transfer and reducing system start up times.
The grooves in the insulation securely retain our 16mm Pex-Al-Pex pipe in the correct position, eliminating the need for supplementary fixings.

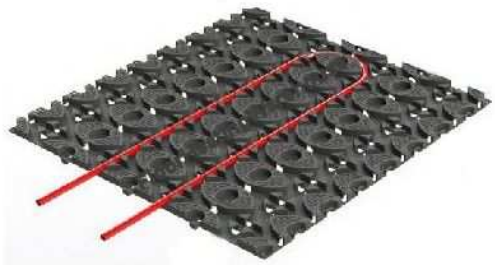


- **4. Dry Mix System**

  – Designed to provide a good heat output and operate much like a traditional screed system. Insulation board such as Kingspan or Recitel is installed between the joist, to finish 25mm below the top of joist level. The underfloor heating pipe is then clipped to the joist in the same way as in a screed system. A Dry Screed mix made up of 8 parts dry sand and 1 part cement (no water) is then installed on top of the pipes, to finish flush with the top of the joists. Then a traditional Plywood or Chipboard floor base is laid on top.

- **Retrofit / Overlay Systems** – We have several optional installation methods for existing floors dependent on requirement.

- **1. 15mm Profix Low Profile System -** The Profix™ Panel is a revolutionary pipe retention and installation system which provides a very quick to install and simple to use solution for underfloor heating applications.
  The Profix System has very high heat outputs compared to some other retrofit systems.
  The system is very low profile - only 15mm depth - and once the pipes are encapsulated in the thin self levelling layer, Tiles, Wood Floor or Carpet, can be installed directly on top of the system. Or for some floor finishes no self levelling layer is required and the system can be installed as a dry system.
  Designed for use with our 12mm pipe, spaced at 150mm pipe centres, this system is a very efficient, high heat output system.



2. Dry Screed/Cement Board System

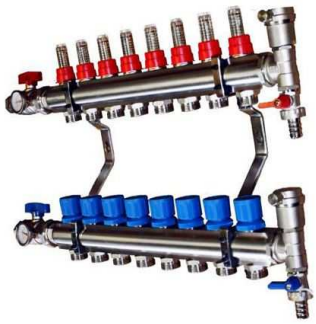
Our High density overlay floor boards are ideally suited for underfloor heating and feature a tongue and groove edge detail (no screws) and benefit from high impact resistance. These boards increase the efficiency of an under floor heating board system due to their low thermal resistance and rapid heat transfer characteristics. The boards are available in 2 options, as a flat smooth board - The ideal product for use directly onto our Grooved Insulation Boards to give a solid base for tiling on top. They are also available as a pre-grooved cement board that can be laid directly onto an existing screed or solid wood base, with the pipe then installed within the grooves of the cement board. Our screed boards enable underfloor heating, boilers, ground water heat pumps and heat recovery systems to work at maximum efficiency and deliver comfortable, controllable heat to the occupant quicker than traditional floor finishes. These boards are designed to sit onto a solid screed or wood base and not directly onto joists (a flooring grade wood floor must be installed onto joists prior to the cement boards being laid).

- **3. 18mm Grooved Insulation Boards** - 18mm Floating Floor System. Simply lay the panels onto your existing screed/floor boards, install the pipe and cover with an interlocking plywood or chipboard floor. These panels are used in conjunction with our 12mm Pex-Al-Pex Pipe. Ideally suited to existing floors where screed is already laid and a low height water system is required - Our grooved foil covered insulation panels are of a unique design and provide many advantages over other insulation products when used with our 12mm pipe warm water underfloor heating systems.

  Effectively four products in one, these Insulation Panels comprise a rigid thermal insulation material with radiused grooves positioned in the upper surface. The upper surface has a metallized foil bonded to it, following into the grooves, which acts as a radiant surface improving heat transfer and reducing system start up times.

  The grooves in the insulation securely retain our 12mm Pex-Al-Pex pipe in the correct position, eliminating the need for supplementary fixings.

3. Installation


If we have supplied you with a pipe layout design, read and do follow this during your installation process, in conjunction with the points detailed below where appropriate.

Manifold – your manifold is supplied pre-installed to a fixing bracket. Screw the bracket to the wall leaving the bottom of the manifold approximately 400mm above floor level. Ensure you allow at least 200mm to the right side of the manifold to allow for the connection of the pump/temperature control unit.

Pump & Temperature Control Unit – The pump unit is supplied with all fixings to screw directly to the left side of the manifold. The unit is designed to fit to the manifold and will line up directly to the manifold fittings and no other seals or sealants are required.

Pipe – Pipe is easiest installed by 2 people – one person rolling out the coil and one person following behind pushing the clips in. Alternatively installation can be eased by using one of our Pipe Decoilers to hold the pipe and our clipgun to insert the clips. If manually rolling out the pipe coils it is best practice to hold the coil between your legs and roll it out in front of you as you go, whilst your colleague follows behind fixing the pipe to the insulation with clips.

If we have supplied a CAD pipe layout then follow this layout paying attention to number, direction, lengths and pipe spacing of loops.

If you are laying to your own design then the main points to consider are detailed below:

- Pipe spacing is normally a maximum of 200mm centre to centre. However factors such as high glazing content, poor insulation values, lower water supply temperatures (such as from some heatpumps), can effect the required pipe spacing and mean a closer spacing is required.
- When installing at a closer pipe spacing than 200mm (to achieve greater outputs) the bend should be shallowed out to form a 'C' shape (light bulb shape), thus ensuring the bend radius is no tighter than that achieved with a 200mm spacing. Please note that the minimum bend radius is 5 times the diameter of the pipe.
- Ordinarily no pipe would be installed below Kitchen Units.
- Ensure you label each end of the pipe to easily identify its flow and its return ends and to identify which rooms it feeds.

Fixing Pipe to manifold – Once your pipe is laid onto the floor you can connect both ends to the manifold. The Flow manifold is the top section manifold (Red colour) and the

Return manifold is the bottom section (Blue colour) All pipe connectors (Connector Cores) are included with your manifold.

To fix the pipe to the manifold do the following: Flow (top Section) manifold first-

- firstly cut the pipe square and to the correct length by lining it up to the manifold connector port.
- Insert the pipe reaming tool into the cut end of the pipe and rotate it 2-3 times. This ensures the pipe is rounded and chamfered and also removes any sharp burrs from the pipe. Note – not using the pipe reaming tool may result in damage to the connector seals and ultimately a leak at this point of the system.
- Slide firstly the nut section then the olive section of the supplied Pipe Connector Core over the cut end of the pipe. Then push the "male" end of the supplied pipe Connector Core into the cut end of the pipe. Now move the pipe into position of the manifold port and push the end of the pipe with the Connector Core fitted, into the connection port of the manifold. Slide the Olive and Nut up the pipe and screw onto the manifold. Use a spanner to tighten.
- Now do the same procedure to connect the other end of the pipe to the Return (Bottom Section) manifold.
- NOTE: ensure all loops of pipe are connected to the same corresponding port of each part of the manifold. Ie connect the first loop to port 1 of the flow manifold and Port 1 of the return manifold.
- Complete this procedure for all pipes.

4. Filling The System

1 At the manifold, remove the Red shrouds from the flow meters by sliding them up and off the clear plastic flow meters.
2 Shut all circuits fully by firstly closing all Flow meters (Wind them all down clockwise at the black cap until closed)
3 Then shut all return valves by winding the Blue caps clockwise so that they wind downwards and close the pin completely.
4 Shut the main large blue ball valve located to the left of the return manifold
5 Connect a hose to the drain valve on the right side of the return manifold – other end of the hose should be routed downhill to an outlet drain or similar. Water will now only flow in from the red ball valve on the top manifold.
6 Now open ONLY one flow meter fully by rotating the black cap anti clockwise until approximately 5mm of black plastic thread can be seen rising up from the brass coloured hexagonal nut on top of the manifold. .
7 Open ONLY the return valve of the same circuit number that you have just opened on the top manifold circuit, fully by rotating the blue cap on the return manifold anti-clockwise (eg. If you open the first circuit on the flow manifold, then open the first circuit on the return manifold)
8 Open the small blue ball valve located just above the drain valve on the right side of the return manifold.
9 Turn on the water supply feeding the manifold. Run the system like this for a few minutes to ensure a full flow of fresh water has passed though the circuit. This will purge all air from the system and expel any foreign objects.
10 Complete this procedure for all other circuits individually.

The manifold is fitted with automatic air vents which will ensure any small pockets of air that somehow remain in the system are purged from the manifold as they pass through it – however

these air vents are designed for small air pockets and should not be relied upon as an alternative to bleeding the air at the filling stage as described above.
Any noise during the initial running of the system may be caused by small pockets of trapped air and should subside once the air has escaped via the automatic air vents.

Pressure test the filled system to 5 Bar.

5. Controlling the System

- Simple Radiator Extension Systems

If your connecting your underfloor heating to an existing radiator run (ie you are going to remove a radiator then connect the Underfloor Heating to the 2 radiator pipes), then the system will operate at the same time as the radiators are programmed to operate. We have 2 optional systems for this type of install.
Option 1 is a simple radiator extension system – this system relies on your existing pump to circulate the water and is supplied with a Danfos TRV type valve to control the water flow through the system. There is no room thermostat as temperature is controlled via the TRV valve (much like the valve on the side of a radiator). Maximum coverage is 15.0m². See link below:
http://www.thefloorheatingwarehouse.co.uk/acatalog/Small_Room_Radiator_Add-on_System.html

Option 2 gives superior water and room temperature control and is supplied with its own pump, blending valve and room thermostat. Whilst this system still relies on your radiators operating to enable it to heat the floor (as it is still connected to radiator pipes), the supplied room thermostat allows you to control the room temperature effectively (switching the system off when room temperature is achieved) whilst not effecting the radiator supply. Maximum coverage is 28.0m². See link below:
http://www.thefloorheatingwarehouse.co.uk/acatalog/Single_Zone_Underfloor_Heating.html

- Larger and Multi Room Systems

For larger rooms and multiple rooms, it is advisable to run a new flow and return from your boiler, out to the point where the underfloor heating pump and manifold will be installed. This install will enable you to control your underfloor heating totally independently to any existing radiator circuits.

To enable this optimum control over each zone or pipe run, actuators are installed on the manifold (they screw straight on). The manifold port actuators are controlled by a thermostat (singly or in multiples). For maximum control a separate room thermostat can be installed within each room to control each port / zone, by opening/closing the relevant actuator/s as required.
Thermostat options range from a standard dial type thermostat, through to digital programmable, Wireless and App Controllable (useable on smart phones) choices.
For wired systems a 3 core and earth cable will need to be run from the manifolds to thermostats. Usually the cabling is run from a wiring centre (our 4 zone or 8 zone options are standard) which is ideally installed alongside the manifold. The wiring centre then becomes the hub of the control system – the pump, actuators, thermostats and boiler are all easily connected to this. The wiring centre then operates the underfloor heating

system by switching on/off the relevant zones, pump and boiler, as and when called for by the relevant thermostats.

6. Commissioning the System

- Switch on the power supply to the wiring centre (or thermostat if no wiring centre is installed)
- Ensuring all thermostats are switched off, in turn switch on 1 thermostat (turn it up so that it calls for heat). Ensure that the turning on of each thermostat, triggers the pump to start up, and begins circulation of water through the loops. The boiler should also start up although this is dependent on water temperature and may not be immediate.
- In turn ensure that the operation of each thermostat triggers the appropriate manifold actuator (if fitted) to open. Note that the actuators are designed to open slowly and take approximately 3 minutes to fully open and therefore function is not immediately obvious - these are not instant on /off switches so give them time to perform their duties.
  Actuators MUST be screwed on tightly to ensure the ports are closed fully when required.
- The thermostatic mixer blends the flow with the return to moderate the heat in the pipes and is adjustable to increase or decrease overall output too. Initially the setting for the mixing valve should be set to 35 degrees C and slowly increased by 2 degrees C per day, up to a maximum 50 degrees running temperature.

Just like radiators can be adjusted, the flow through each loop of underfloor pipe can be adjusted (at the manifold) to balance the system. The flow gauges give an indication of the rate of flow through each port. The length of each run of pipe will effect what flow of water should be put through it in order to balance it with other runs of differing lengths.

The flow rates should be adjusted in the following way:
- Fully open all Blue coloured valves located on each port of the return (Bottom) section manifold, by winding them anti-clockwise
- Remove the Red coloured plastic shrouds that sit over the clear plastic flow meters on the top section manifold by pulling them straight upwards.
- In turn open all flow meters to maximum flow by turning the flow meters anti-clockwise (grip them between your fingers from the base of the flow meter).Once fully open they will have risen upwards to a point where approximately 5mm of plastic thread has unwound and risen up from the manifold body.
- Once fully open, the lengths of each loop of pipe will need to be established (by looking at the markings indicating the meterage, on the side of the pipe.
- The flow through each individual loop should now be adjusted as detailed in the table below. Turning the flow meter clockwise will reduce flow and anti-clockwise will increase flow through the underfloor heating loops:

Loop Length	Flow Meter Percentage Open
0 to 25 metres	25% Open
25 to 60 metres	50% Open
60 to 85 metres	75% Open
85 to 100 metres	100% Open

Note: The above table is intended for guidance only. Balancing of the flow is not an exact science as the flows are constantly changing on an underfloor heating system. If 1 room reaches temperature, it will switch flow off to the corresponding loops, thus increasing flow through the loops which are still open.
When adjusting, remember that underfloor heating changes temperature more slowly than radiators and you should make small adjustments each time.

The sign of a good underfloor system is that you forget it's there, and that you don't have to mess around with the stat all the time, if you try to push too much heat into the floor you will be getting up to turn the stat down, if you push too little the room will never be warm regardless of what you do with the stat. Of course its harder to get a good set up right in the middle of summer or a heat wave, some times you need to wait till it gets cooler to get it just right. With under floor small steps and patience will be the most productive way of finding the perfect balance.