MANIFOLDS & WATER TEMPERATURE CONTROL

Overview

Water based underfloor heating (UFH) systems work by turning the entire floor into one large low temperature radiator which is heated via a network of pipes that are embedded within the floor. Since the floor (the 'radiator') is so large it only needs to run at a low temperature to heat your room. This means that the water that flows around the floor needs to be at a far lower temperature than a traditional radiator system.

A range of factors will determine the water temperature required for an underfloor heating system; these will include:

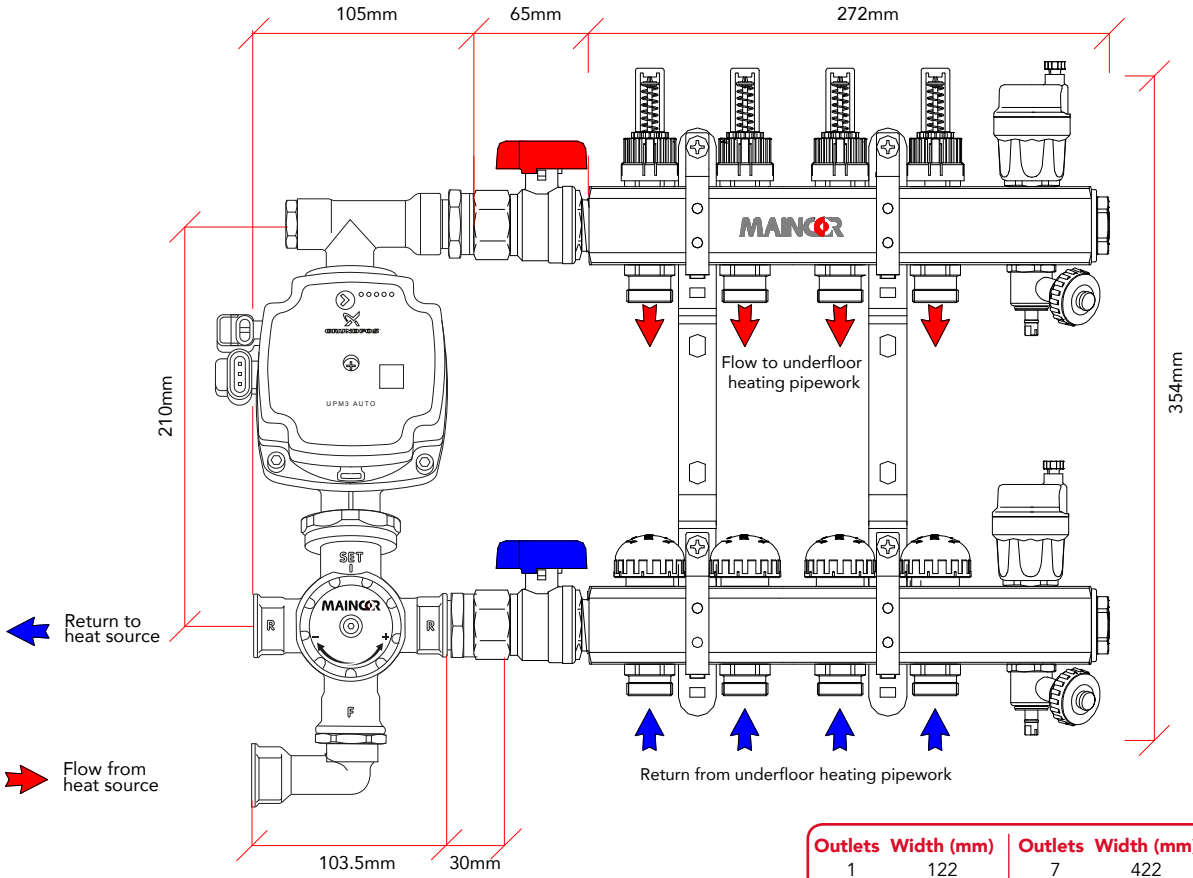
- The floor construction.
- The heat requirement of the space.
- The floor coverings.
- The pipe diameter and pipe centres that are used.

Generally, underfloor heating systems will run at temperatures ranging from 35°C - 50°C. If the boiler or heat source cannot supply the water at the required temperature, either thermostatic or actuated blending controls can be supplied. Typically, a secondary circulating pump would also be required.

Underfloor heating requires a low flow temperature, at design conditions there will be approximately a 7°C temperature drop through the underfloor heating circuits. Maincor usually supply blending valves to blend the primary flow from the boiler to mix with the underfloor heating return water to maintain the required temperature for the underfloor heating system. A pre-assembled thermostatic mixing valve and pumping unit which fits directly onto the Maincor underfloor heating manifold can also be supplied - a control pack.

An alternative method of blending the water is to use an actuated blending valve and weather compensation controller. This is generally a slightly more expensive way of controlling an underfloor heating system, however, it does offer a more efficient way of controlling the water temperature. As the outside temperature decreases, the heating requirement of the building will increase, hence the amount of energy that has to be put back into the building will also increase to ensure comfort conditions are to be maintained.

The arrangement below acts as a blending, circulating and distribution point for your UFH system:



Primary pipework can be fed into the Control Pack from the side (as per the illustration) or from below by moving the position of the 90°elbow supplied with the kit.

Outlets	Width (mm)	Outlets	Width (mm)
1	122	7	422
2	172	8	472
3	222	9	522
4	272	10	572
5	322	11	622
6	372	12	672

MANIFOLDS & WATER TEMPERATURE CONTROL

Key Components

UFH Manifold with Flowmeters

Maincor 1 - 12 port UFH Manifolds are supplied complete with flowmeters for ease of commissioning. Also included within the manifold arrangement are fill and drain ports, automatic air vents and fixing brackets. Requires pipe connectors and ball valves, both are sold separately.

UFH Control Pack

Maincor UFH Control Packs are pre-assembled units which bolt directly (via ball valves) onto the manifold and are used to blend and circulate the water around the underfloor heating system.

Large Control Pack

The Maincor Large Control Packs include a blending valve, an 'A' rated energy efficient pump and an temperature controller complete with temperature sensor.

Weather Compensated Control Pack

The Maincor Weather Compensated Control Pack modulates the flow temperature to the system requirements depending on outdoor weather conditions.

Heat Pump Pack

The Maincor Heat Pump pack is for use when water blending controls are not required. The unit is pre-assembled and is designed to be fitted on to either side of the manifold. A high limit shut off is included and pre-set to 60°C.

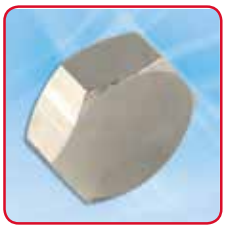
Thermostatic Manual Mixing Valve

Maincor Thermostatic Manual Mixing Valve for blending water to meet design temperature. May be used as an alternative to a control pack in applications where there are restraints on space.

Manifold Pipe Connector

Maincor Manifold Pipe Connectors join 12, 16 and 20 pipework to the Underfloor manifold. (Other sizes available upon request).

Blanking Plug - Outlets



Maincor Blanking Plugs are used to blank-off outlets on the Underfloor Heating Manifolds.

Straight Ball Valve

Maincor Straight Ball Valves are used to provide isolation of the flow and return pipework connected onto the Underfloor Heating Manifolds. This allows manifolds to be isolated both for filling the system, or draining down, without the risk of air ingression.

Electro-Thermic Head

The manifolds are supplied with blue caps on the return manifold (bottom header) which isolate the return water. The blue caps can be removed to allow for either 24 or 240V electro-thermic heads to be fitted which open and close to control the flow of water around the heating circuits.

Recommended Additional Components

Automatic Bypass

Maincor recommend fitting an automatic bypass (supplied by others) on the primary flow prior to the 2 port motorised zone valve.

MANIFOLDS & WATER TEMPERATURE CONTROL

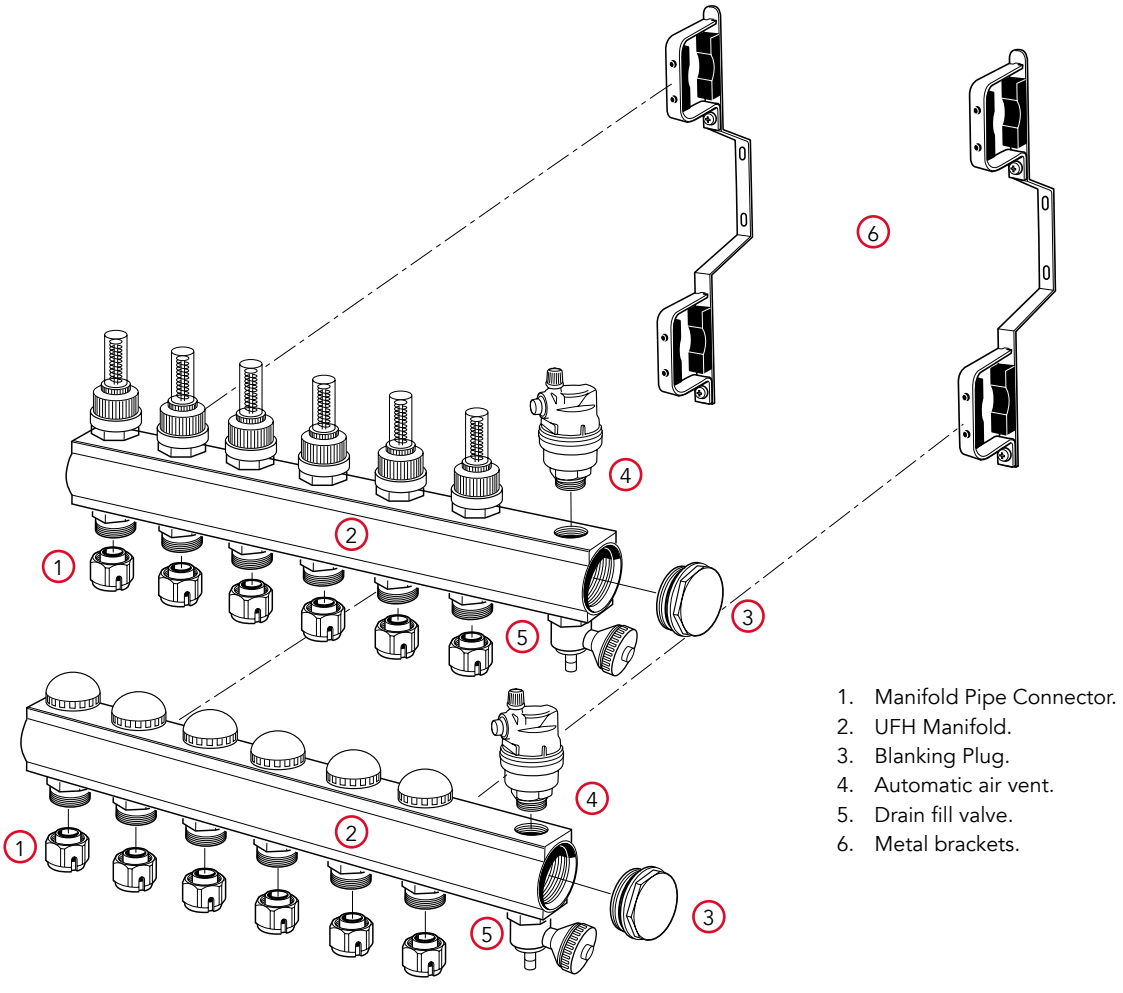
Manifolds

Essentially the manifold allows for every loop of UFH pipe in a building to be connected to and from the manifold in a single continuous length with no fittings in between, completely removing the possibility of joint leaks. If there is a fault with an individual circuit or maintenance is required that circuit can simply be turned 'off'.

The Maincor UFH manifolds are available in various sizes which range from 1 to 12 ports. The manifolds have 1" connections on the main in/outlets and have 24/19 connections for the UFH Pipe. The flow manifold (top header) includes balancing and isolation valves. Depending on the position of the white locking cap, when adjusted, it will either regulate the flow (you will see the flow change in the glass window) or isolate the circuit. If ever the need arises, system maintenance can take place without losing the regulated flow which is determined at commissioning stage, hence the system will never need to be re-commissioned after the initial commissioning process. The manifold also includes fill and drain points and automatic air vents to aid installation.

A two port manifold is 172mm wide and for every additional port above this size add on 50mm to the width.

Inlet size:	1"
Outlet connectors:	Manifold Pipe Connector (options for 12, 16 & 20mm MLCP)
Outlet centres:	50mm
Ports:	Options for 1 to 12 ports
Isolation:	Each port has an isolation tap
Maximum operating pressure:	10 bar
Maximum operating temperature:	95°C



1. Manifold Pipe Connector.
2. UFH Manifold.
3. Blanking Plug.
4. Automatic air vent.
5. Drain fill valve.
6. Metal brackets.

MANIFOLDS & WATER TEMPERATURE CONTROL

Underfloor Heating Manifold Locations

Manifolds should be located centrally in the building if possible. It is important to ensure that there is good access for maintenance or in the event of a problem. In domestic situations good locations would be underneath stairs, at the back of a kitchen cupboard, or in an airing cupboard on the first floor. If there is a requirement to hide them away, then Manifolds can be located inside stud walls behind an access hatch, or inside a dedicated cabinet.

When locating a manifold consideration needs to be given to minimise the amount of uncontrolled heating from pipes passing through rooms en route to other areas.

Connecting a Manifold

The manifolds have 1" connections on the main in/outlets and have 24/19 connections for the UFH Pipe.

Prior to fitting the connectors to the manifold the pipe is to be bevelled by inserting the bevelling tool and rotating the tool three full turns. This will put a 45° chamber on the pipe and the pipe will be ready to take the fitting.

When installing underfloor heating systems ensure that all relevant health and safety legislation and local site regulations are fully adhered to at all times.

1. *Cut the pipe at a 90° angle.*

2. *Bevel the cut end of the pipe.*

3. *Check to ensure there are no burrs.*

4. *Place the nut and olive onto the pipe.*

5. *Push the fitting into the bevelled end of the pipe.*

6. *Tighten the fitting onto the manifold outlet using a manifold spanner.*

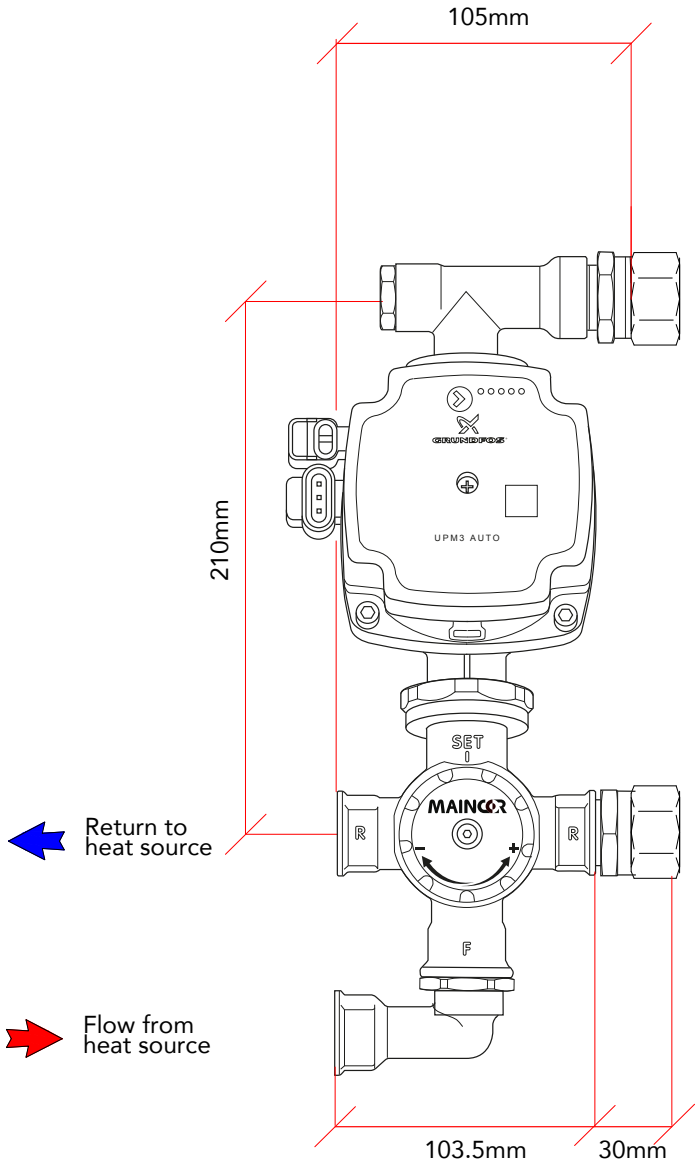
MANIFOLDS & WATER TEMPERATURE CONTROL

Control Packs

The Maincor Control Pack is a preassembled unit designed to be easily fixed (via the ball valves) to the UFH Manifold. The unit will blend the primary hot water with the return water from the UFH to the temperature that is determined by the control valve. An A rated pump is used to circulate the water around the secondary UFH system.

The blending valve is factory set at 45°C but can easily be adjusted (range 25-60°C) via the control head below the pump. The unit has a maximum output of 14kW and we recommend that in the majority of instances you do not exceed a floor area of 150m² or a manifold size of 10 ports. It is good practice to fit a 2 port motorised zone valve on the primary flow to manifold and Maincor will usually supply one. We recommend fitting an automatic bypass (supplied by others) on the primary flow prior to the 2 port motorised zone valve.

The unit is designed to be fitted on either the left or right hand side of the manifold. Primary pipework can be fed into the Control Pack from the side (as per the illustration below) or from below by moving the position of the 90° elbow supplied with the kit. Reference installation information is supplied with each unit.



Specifications

- Hot temperature supply range: 60°C - 85°C.
- Adjustable temperature range: 25°C - 60°C.
- Maximum supply pressure: 10 bar.
- Factory pre-set : 45°C (Control knob is in the adjustable position).
- Temperature stability: +/- 2°C.
- Connections: Mixing valve inlets 3/4" FBSP .
- Manifold connections 1" MBSP.

Materials

- Body Nickel Plated Brass.
- Seals Fibre.
- O-Rings Viton
- Spring Stainless Steel

MANIFOLDS & WATER TEMPERATURE CONTROL

Large Control Pack (CP250)

The Control Pack CP250 is a pre-assembled water blending and pumping unit which is designed to be connected, via ball valves, to the UFH manifold. The pack is suitable for use with floor areas of up to 250m² or a maximum output of 20kW. It is good practice to fit a 2 port motorised zone valve on the primary flow to manifold and Maincor will usually supply one.

We recommend fitting an automatic bypass (supplied by others) on the primary flow prior to the 2 port motorised zone valve.

- Blending valve and 'A' rated energy efficient pump.
- Ideal for large area UFH systems.
- Supplied complete with high quality actuator.
- Left-hand and right-hand configurations available.
- Temperature controller complete with sensor.
- Quick and easy to set up - saving time on site.

Large Control Pack (CP250) - Installation

Fitting the Actuator

The valve needs to be in its mid position (with the red indicator pointing between 3 and 6 o'clock, as is supplied - see fig 1) before the actuator is fitted. Pull off the black dial from the valve spindle to prepare for the fitting of the actuator, so that you can see the black actuator mounting ring (note; this should not be removed as it is required to ensure the valve stem retaining ring is held in position).

The actuator is supplied in mid position and is factory ready to be fitted onto the blending valve (fig 2). To enable the actuator to lock onto the valve spindle, there is a white hexagonal drive coupling included. On one side of the drive coupling, there's a deep groove that needs to be aligned with the shoe, at the mid position between 3 and 6 o'clock (as per fig 3).

The actuator can be mounted in any of four 90° positions. Pull the manual override dial off the actuator (fig 4), fit the actuator onto the valve over the drive coupling, and secure through the middle of the actuator with the supplied retaining screw (take care not to overtighten as this will start to rotate the valve). Replace the manual override dial ensuring its fully engaged. There should be no visual red between the actuator and the dial. If there is 5mm of red showing between the actuator and the dial then it is in manual mode and needs to be moved slightly left or right so that it can fully engage.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

MANIFOLDS & WATER TEMPERATURE CONTROL

Mounting the Sensor

The sensor that is pre-fitted to the actuator, is to be mounted on the flow manifold (top bar) and secured using the reflective tape supplied with the unit.

The actuator is factory set and configured for the correct orientation, however actuator settings will vary, therefore these parameters are to be set at installation.

Power should be applied to the unit using the included power supply.

Installation - Pump

The pump comes with a flying lead with live (brown), neutral (blue) and earth wires (green/yellow) . Typically these are to be connected to the wiring centre where a relay is housed that will control the operation of the pump. The pump should be set to the "constant differential pressure mode" (via the red dial) for underfloor heating systems:

1. Pump.
2. Connection to Return Manifold.
3. Connection to Flow Manifold.
4. Pump Power Lead.
5. Power Unit for Actuator.
6. Actuator Motor.
7. Temperature Sensor.

Water Temperature

There are a range of factors which influence the system temperature requirement. The floor structure, pipe centres, the floor covering and the buildings' heat-loss will all influence the temperature requirement.

When a building is insulated to comply with current Building Regulations and pipes are laid at 200mm centres within a screed floor, the flow temperature should be set between 40-45°C. Where a suspended or floating floor is utilised, the typical settings are slightly higher, between 45-50°C. Please contact the Maincor technical office for further details if required.

1) Set the Upper Limit – This is the maximum limit the set point (mixed flow) can be set to and should be used to protect floors against overheat

   Press and hold down the thumb wheel for 5 seconds. The small upwards arrow will flash to indicate you are in the upper limit settings. There should be a small spanner icon to indicate set up mode.

   Press the thumb wheel. The temperature will now flash and the up arrow will constantly be on.

   Use the thumb wheel to scroll left and right to set the required upper limit (note, this should be a minimum of 10°C above the set point).

   Press the thumb wheel in again so that the up arrow is again flashing.

2) Set the Lower Limit – This is the minimum temperature that the set point can be adjusted to and can be used to protect sensitive equipment.

   You should have the upper arrow flashing. Turn the thumb wheel to the left. You should now have the down arrow flashing. (Again there should be a small spanner icon to indicate set up mode).

   Press the thumb wheel. The temperature will now flash and the down arrow will constantly be on.

   Use the thumb wheel to scroll left and right to set the required lower limit (10°C below the set point).

   Leave the unit for approx. 20 seconds and it will revert back to showing the temperature that the sensor is currently reading.

3) Set the required Flow Temperature – This MUST be within the range you've specified above from setting the upper and lower limits.

   Press the thumb wheel briefly. You should see the temperature flashing and a small spanner icon to indicate set up mode.

   Use the thumb wheel to scroll left and right to set the required flow temperature which must be within the parameters set during stage 1 & 2.

   Leave the unit for approx. 20 seconds and it will revert back to showing the temperature that the sensor is currently reading.

MANIFOLDS & WATER TEMPERATURE CONTROL

Heat Pump Pack (HP250)

The Maincor Heat Pump pack HP250 is for use in applications when water blending controls are not required. Ideal for use with heat pumps installations or other renewable technologies that deliver heating water at a lower temperature than conventional gas boilers. The pack is suitable for use with floor areas of up to 250m^2 or a maximum output of 20kW.

It is good practice to fit a 2 port motorised zone valve on the primary flow to manifold and Maincor will usually supply one. We recommend fitting an automatic bypass (supplied by others) on the primary flow prior to the 2 port motorised zone valve.

- 'A' rated energy efficient pump.
- Ideal for large area UFH systems.
- Fully pre-assembled and designed to be fitted on to either side of the manifold.
- Tailored solution for heat pumps – no need for a blending valve and actuator.
- A high limit shut off is included and pre-set to 60°C.
- Quick and easy to set up - saving time on site.

High Limit Thermostat

The unit has a High Limit Thermostat that is pre-wired to stop the pump if the water supplied to the unit exceeds 60°C.

The High Limit Thermostat comes with a flying lead with live (brown), neutral (blue) and earth wires (green/yellow). Typically, these are to be connected to the wiring centre where a relay is housed that will control the operation of the pump. The pump should be set to the "constant differential pressure mode" (via the red dial) for underfloor heating systems:

1. Pump.
2. Connection to Return Manifold.
3. Connection to Flow Manifold.
4. High Limit Thermostat.

MANIFOLDS & WATER TEMPERATURE CONTROL

Weather Compensated Control Pack (WC250)

The Weather Compensated Control Pack WC250 is a pre-assembled water blending and pumping unit which is designed to be connected, via ball valves, to the UFH manifold. The unit modulates the flow temperature to the system requirements depending on outdoor weather conditions.

The pack is suitable for use with floor areas of up to 250m^2 or a maximum output of 20kW. It is good practice to fit a 2 port motorised zone valve on the primary flow to manifold and Maincor will usually supply one. We recommend fitting an automatic bypass (supplied by others) on the primary flow prior to the 2 port motorised zone valve. Temperature controller complete with outdoor sensor

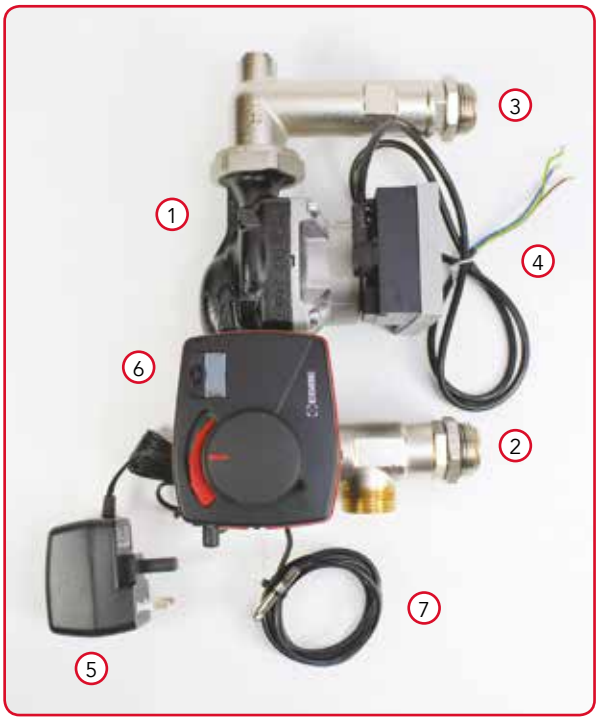
- Outdoor sensor with 20m cable supplied.
- Blending valve and 'A' rated energy efficient pump.
- Ideal for large area UFH systems.
- Supplied complete with high quality actuator.
- Left-hand and right-hand configurations available.

Weather Compensation

Including weather compensation in the underfloor heating system design provides substantial benefits to the owner or building occupier in terms of comfort and increased energy efficiency. With the system able to take the outside temperature into account

via an external sensor it is better able to predict the changes in indoor temperature requirements and make adjustments accordingly. This ability to predict user heating requirements makes the system more responsive in getting up to temperature if the weather turns unseasonably cold, or turn the temperature down if it's an unexpectedly warm day for example. Including weather compensation further optimises the underfloor heating system design and helps to create a superb indoor environment in terms of occupier comfort in changeable weather conditions like we have here in the UK.

1. Pump.
2. Connection to Return Manifold.
3. Connection to Flow Manifold.
4. Pump Power Lead.
5. Power Unit for Actuator.
6. Actuator Motor.
7. Temperature Sensor.



MANIFOLDS & WATER TEMPERATURE CONTROL

Weather Compensated Control Pack (WC250) - Installation

Fitting the Outdoor Sensor

The Sensor is to be connected to the supplied 20m cable and is to be mounted on the north side of the building under the eaves. This will protect the outdoor sensor from direct sunlight and rain. Connect the cable plug into the actuator.

Mounting the Flow Sensor

The Flow Sensor which is pre-fitted to the actuator, is to be mounted on the flow manifold (top bar) and secured using the reflective tape supplied with the unit.

Fitting the Actuator

The valve needs to be in its mid position (with the red indicator pointing between 3 and 6 o'clock, as is supplied - see fig 1) before the actuator is fitted. Pull off the black dial from the valve spindle to prepare for the fitting of the actuator, so that you can see the black actuator mounting ring (note; this should not be removed as it is required to ensure the valve stem retaining ring is held in position).

The actuator is supplied in mid position and is factory ready to be fitted onto the blending valve (fig 2).

To enable the actuator to lock onto the valve spindle, there is a white hexagonal drive coupling included. On one side of the drive coupling, there's a deep groove that needs to be aligned with the shoe at the mid position between 3 and 6 o'clock (as per fig 3).

The actuator can be mounted in any of four 90° positions. Pull the manual override dial off the actuator (fig 4), fit the actuator onto the valve over the drive coupling, and secure through the middle of the actuator with the supplied retaining screw (take care not to overtighten as this will start to rotate the valve). Replace the manual override dial ensuring its fully engaged. There should be no visual red between the actuator and the dial. If there is 5mm of red showing between the actuator and the dial then it is in manual mode and needs to be moved slightly left or right so that it can fully engage.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

Installation - Pump

The pump comes with a flying lead with live (brown), neutral (blue) and earth wires (green/yellow). Typically these are to be connected to the wiring centre where a relay is housed that will control the operation of the pump. The pump should be set to the "constant differential pressure mode" (via the red dial) for underfloor heating systems:

1) Set the Upper Limit – This is the maximum limit the set point (mixed flow) can be set to and should be used to protect floors against overheat.

Press and hold down the thumb wheel for 5 seconds. The small upwards arrow will flash to indicate you are in the upper limit settings. There should be a small spanner icon to indicate set up mode.

Press the thumb wheel. The temperature will now flash and the up arrow will constantly be on.

Use the thumb wheel to scroll left and right to set the required upper limit which is typically 50°C.

Press the thumb wheel in again so that the up arrow is again flashing.

2) Set the Lower Limit – This is the minimum temperature that the set point can be adjusted to and can be used to protect sensitive equipment.

You should have the upper arrow flashing. Turn the thumb wheel to the left. You should now have the down arrow flashing. (Again, there should be a small spanner icon to indicate set up mode.)

Press the thumb wheel. The temperature will now flash and the down arrow will constantly be on.

Use the thumb wheel to scroll left and right to set the required lower limit which is typically 25°C.

Press down the thumb wheel for 5 seconds to return to the main menu.

3) Adjust the Offset.

The unit is to be configured for the UK climate to suit the floor construction of the underfloor heating.

Press and hold down the thumb wheel for 5 seconds. There should be a small spanner icon to indicate you are in set up mode.

Use the thumb where to scroll left until "OFS" is displayed.

Press the thumb wheel. The Offset temperature is set at 0°C and this needs to be adjusted via the thumb wheel to 8°C for a screed floor or 13°C for a timber or floating floor.

Press down the thumb wheel for 5 seconds to return to the main menu.

Viewing the Outdoor Temperature

Press and hold down the thumb wheel for 5 seconds. There should be a small spanner icon to indicate you are in set up mode.

Use the thumb wheel to scroll left until OUT is displayed.

Press the thumb wheel. The outdoor temperature is now displayed.

Press down the thumb wheel for 5 seconds to return to the main menu.