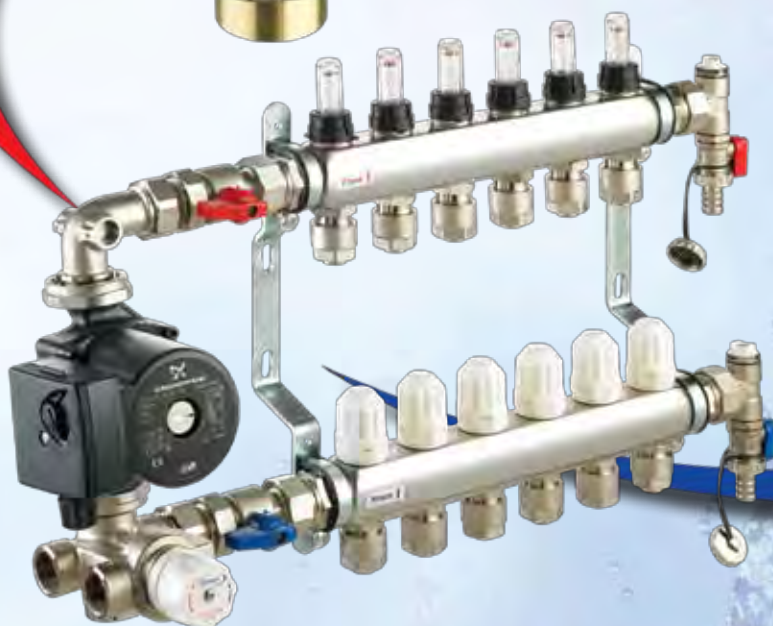


UNDERFLOOR HEATING CONTROLS



The Safety Valve Specialist

Reliance Water Controls Ltd

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Reliance Water Controls became involved in underfloor heating systems in the 1980's when underfloor heating installers started to use Reliance products such as thermostatic control valves and manifolds. Over ten years later, it became apparent that the use of thermostatic valves to control the circulation temperature in underfloor heating systems in the UK was increasing at a dramatic rate. By this time a variation of Reliance's highest selling thermostatic mixing valve, the Heatguard® Highflow, was being sold to a specialist distributor in Canada to control circulation temperatures in heating systems – a very similar application. It was then that Reliance Water Controls decided to look at what was happening and to devote the experiences it had gained worldwide as a leader in thermostatic valve technology to develop control solutions for this rapidly growing market.



Hypocaust at Bignor Roman Villa in Sussex.
Image used by courtesy of the Tupper family.

History

Underfloor heating is not a new idea; over 2000 years ago the Romans developed warm air underfloor heating systems known as hypocausts, taking their name from the Greek meaning 'heat from below'. These were built so widely that original examples (not still working) can be found at sites all over the former Roman Empire even today. The floor was raised above the ground by pillars so that hot air and smoke from furnaces could pass through these enclosed areas and heat the room above.

In the early 1980's there were still examples of the modern warm air systems in use but these were going out of fashion and were being replaced with wet radiator systems.

At the same time electric underfloor systems, installed in the 1960's, were also going out of favour because of running cost and practical control problems. The running cost problems often arose as a result of the way they were run and the generally poor levels of home insulation. The availability of more sophisticated types of control and improved levels of insulation have helped to encourage the current growth in underfloor heating systems.

The Basic Idea

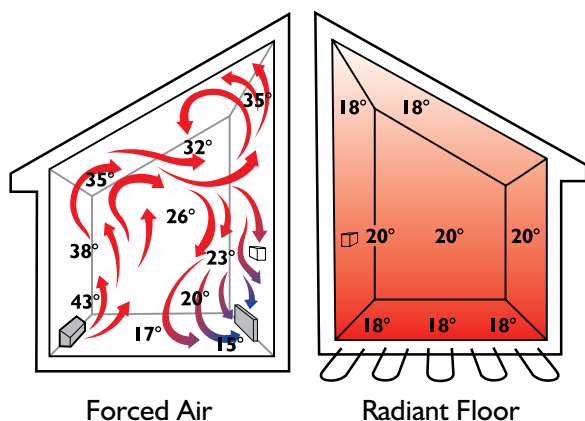
The ground floor in many houses is made up of a large slab of concrete or is constructed with wooden joists and plywood floors. The basic idea is to use this floor area as a radiator. The surface temperature required to produce a comfortable temperature in this application is much lower than in a conventional wet radiator system, and the heat is produced where it is most needed. Time control is also important, because one of the shortcomings of the 1960's electric systems was that, to use cheap electricity, the floor area was heated between midnight and early morning. This produced floors that were too hot first thing in the morning and too cold in the evening when people wanted to sit down and relax. To overcome this problem the system could be switched on again to give an early evening boost, and whilst this solved in part the comfort problem, it did not do a great deal for the economy of the system.

How the system works in comparison to a wet radiator system



A conventional radiator system uses one or more heat surfaces within a room. These heat the air in their immediate vicinity by radiation and convection air currents around the room then distribute this air. Doorways and windows, which





Forced Air

Radiant Floor

create their own airflows, will also affect the heat distribution. This results in the colder air being at the floor level and much warmer air at ceiling level. Some products advertised as 'saving wasted heat' or even 'using free heat' use this effect. These consist of a de-stratification fan that takes the warmer air at ceiling level and discharges it at floor level. Even with extra air circulation the room will have hot and cold spots within it. A further disadvantage of air circulation is that it will distribute dust as well as the heat. A modern underfloor heating system works almost completely by radiating heat. Furniture will reflect and absorb this radiated heat. By absorbing heat they also become secondary heat emitters. This results in a much more even heat distribution, and the air at floor level being warmer than that near the ceiling. This type of heat distribution is also more comfortable for the people using the room. People often say that if their feet are comfortable then they are more likely to be comfortable in themselves. However it is important that one's feet do not get too hot.

Health & Safety Implications

If an underfloor heating system is run so that the floor surface temperature goes above 29°C then there is a greater chance of thrombosis, but there is no danger of being burnt on a high temperature surface. With wet radiator systems the radiator surface temperature is the same as the circulating heated water. This can be as high as 80-85°C, but lower surface temperature radiators are available which protect the room users from contact with high temperature surfaces. The fact that there is much lower air movement with underfloor heating systems has already been mentioned, as well as the resultant effect on dust distribution. This can be very

important for people who have some of the more common dust allergies. Underfloor heating also has the major advantage of depriving the common house dust mite of the one thing it needs to survive and reproduce - "moisture". Without moisture the house dust mite will simply die. Underfloor heating maintains a much higher relative temperature in carpets and consequently reduces the amount of moisture available.

The Control System

All underfloor heating systems work on a lower temperature than a radiator system. Normally a radiator system will have 82°C hot water for the flow, the underfloor heating will run at much lower temperatures in the region of 35 to 60°C, depending on the floor construction and the building. The tempering or blending valve is the heart of an underfloor heating system. It blends colder water from the underfloor heating system return with hot water from the heat source to supply the correct temperature of water to the underfloor pipework. The required temperature will vary depending on the type of flooring and the sub-floor structure but as these valves are adjustable the correct temperature can be easily obtained. Reliance has been supplying a version of the Heatguard® TMV2, called Heatguard® UFH, for use in underfloor heating systems for some time. As the floor area served in domestic applications has increased so the required flow rate has also increased. To keep the physical size of the control assembly within reason, Reliance has developed a new valve with a shorter fitting dimension yet 50% more flow. The 28mm Heatguard® UFH is able to supply a 250m² system against a 150m² system with the basic 22mm valve.

Reliance has an active interest in the fitting dimensions of these valves as they are now supplied in pre-plumbed kits. Reliance currently supplies to the underfloor heating industry several different underfloor heating packs, details of most of these can be found in this guide. In addition Reliance has developed for many years a range of bespoke valves for specific OEM customers to sell on as part of their own product range.

Thermomix® UFH Control Pack

A Manifold Control Pack for providing temperature controlled mixed water to an underfloor heating system with a heat output up to 14kW.

Product Features and Benefits

- Compact bolt on unit providing quick and simple installation
- To provide controlled mixed temperature water to underfloor heating systems with a heat output up to 14kW
- Easy set up within the adjustable range of 35°C to 65°C
- Controls flow temperature to $\pm 2^{\circ}\text{C}$ even with changing boiler flow and return temperatures
- Nickel plated control pack also available, to match stainless steel manifold
- Blanking cap and pump union can be interchanged, so the pack can be reversed

Description

A compact, modular control pack for underfloor heating systems up to 14kW. Designed to be lightweight and compact in order to connect directly onto a standard manifold without the need for extra brackets or support. The control pack consists of a mixing valve, circulating pump, return elbow, manifold adaptor and all necessary seals.

Product Range

UFHC 970 200

Thermomix® UFH Control Pack

UFHC 970 250

Nickel Thermomix® UFH Control Pack

GAGE 970 200

Temperature gauge

BVAL 900 001

$\frac{3}{4}$ " Isolating Ball Valve

Materials

Valve body:

Gunmetal

Seals:

PTFE

O-Rings:

Silicone rubber

Spring:

Stainless steel

Specifications

Maximum static pressure

16 bar

Maximum temperature

90°C

Adjustable control range

35°C - 65°C

Factory pre-set

35°C (minimum)

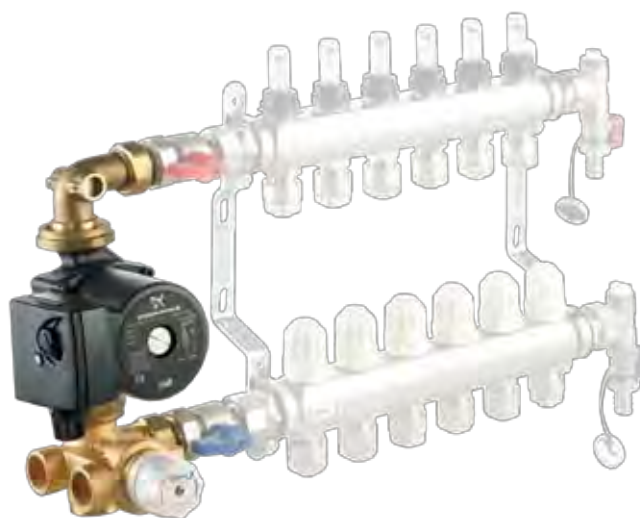
Connection sizes

$\frac{3}{4}$ " FBSP (mixer)

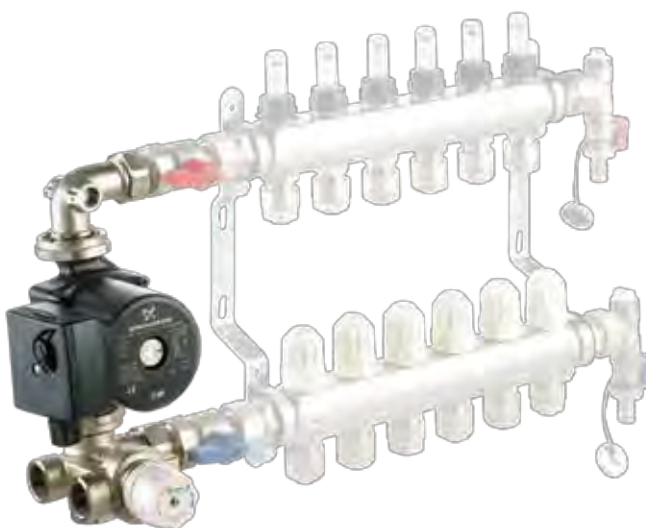
1" MBSP (manifold)

Floor area

140m²



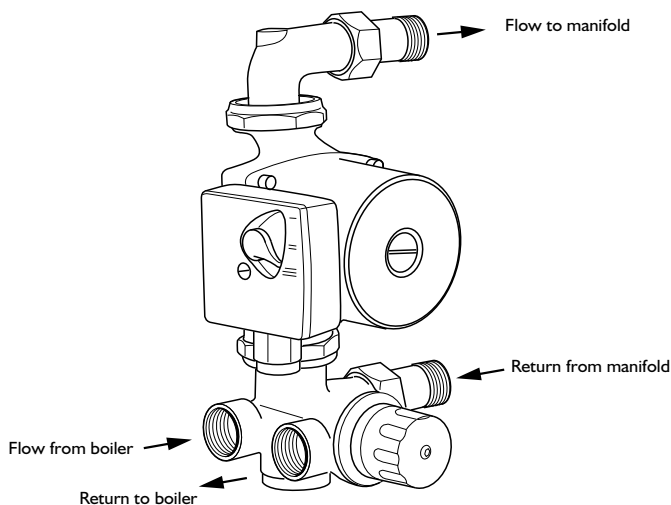
Thermomix® UFH Control Pack
Manifold supplied separately



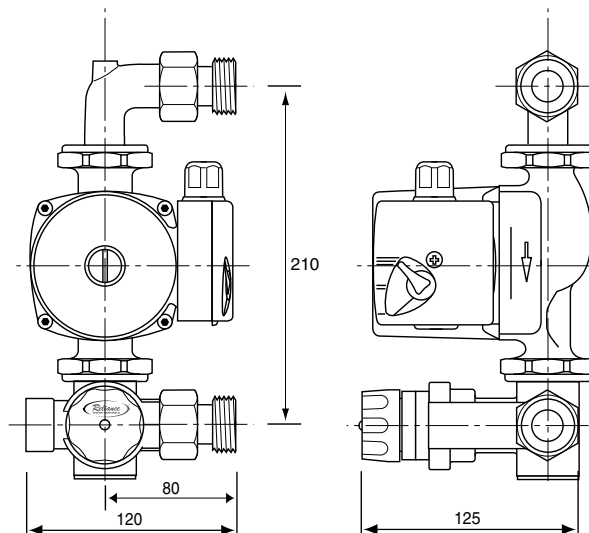
Nickel Thermomix® UFH Control Pack
Manifold supplied separately



Connection layout

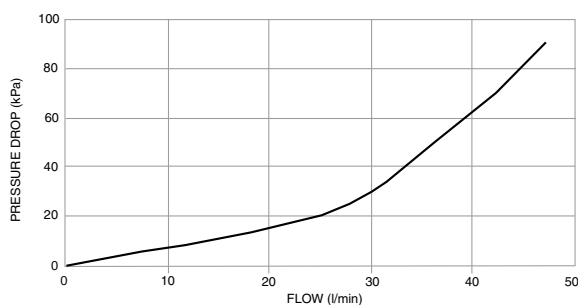


Dimensions



All dimensions in mm unless stated otherwise

Pressure Drop Graph



Single Room UFH Control Pack

UFH Control Pack for providing temperature controlled mixed water in single room applications to an underfloor heating system with a heat output up to 3kW.

Product Features and Benefits

- Compact bolt on unit providing quick and simple installation
- To provide controlled mixed temperature water to underfloor heating systems with a heat output up to 3kW
- Easy set up within the adjustable range of 35°C to 65°C
- Controls flow temperature to $\pm 2^{\circ}\text{C}$ even with changing boiler flow and return temperatures

Description

A compact, modular control pack for underfloor heating systems up to 3kW. Designed to be lightweight and compact in order to connect directly onto pipework without the need for extra brackets or support. The control pack consists of a mixing valve, circulating pump, isolating valves, flow and return connections and fixing kit.



Single Room UFH Control Pack continued

Product Range

UFHC 980 020

Single Room UFH Control Pack

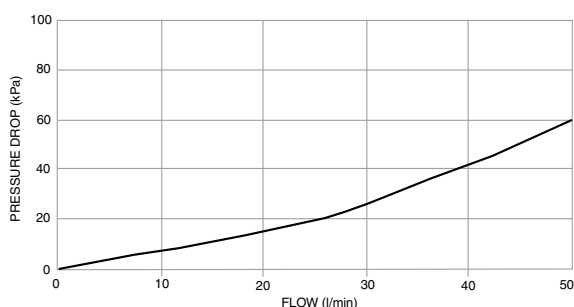
Materials

Valve body:	Gunmetal
Seals:	PTFE
O-Rings:	Silicone rubber
Spring:	Stainless steel

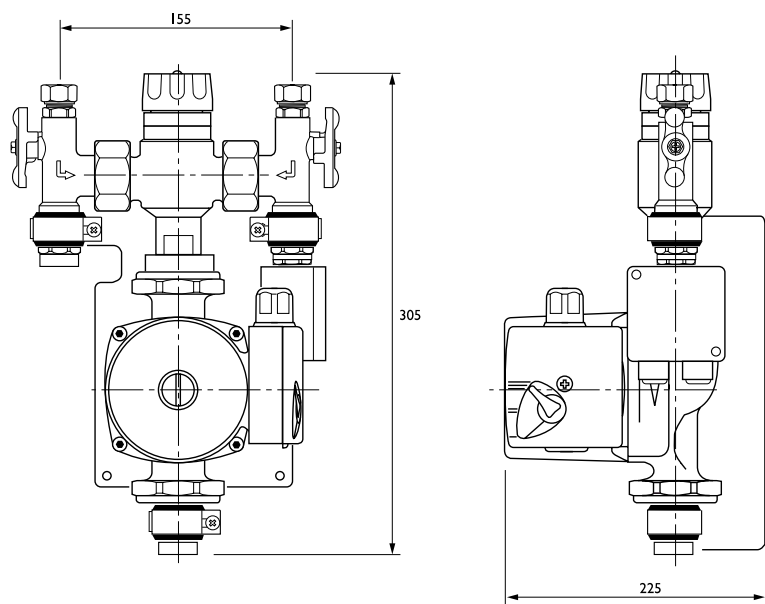
Specifications

Maximum static pressure	10 bar
Maximum temperature	90°C
Adjustable control range	35°C - 65°C
Factory pre-set	35°C (minimum)
Connection sizes	15mm compression (inlet) ½" FBSP (outlets and return)
Floor area	40m ²

Flow Performance



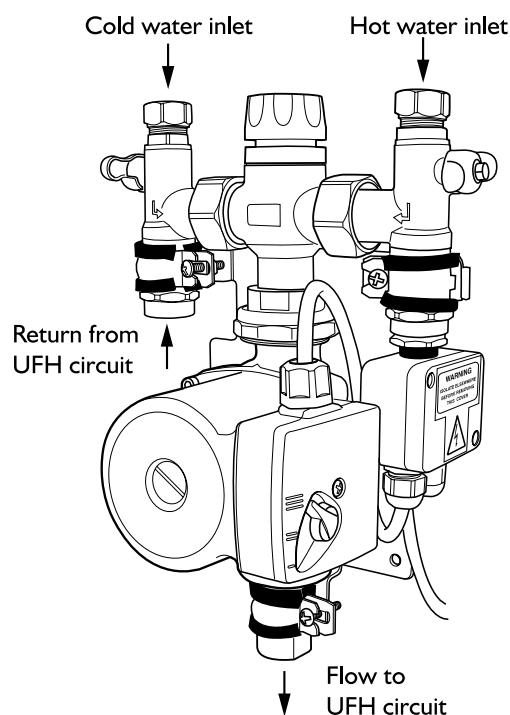
Dimensions



All dimensions in mm unless stated otherwise



Connection layout



Heatguard® UFH Blending Valve - 22mm

Highflow thermostatic blending valve for underfloor heating applications.

Product Features and Benefits

- High flow rates - suitable for systems up to 150sqm
- Superb temperature control
- Quick reaction to supply temperature changes
- User adjustable between 35°C to 65°C
- Compression type connections for ease of installation
- Lockable temperature adjustment mechanism



Description

Thermostatic blending valve available with 22mm connections. Reliance wax capsule technology ensures stable mixed water temperature. Suitable for blending the flow and return to achieve a stable system temperature in underfloor heating systems up to 150 square metres.

Product Range

HEAT 219 058

22mm Heatguard®
UFH Blending Valve

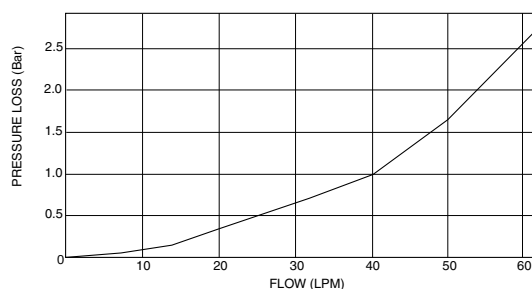
Materials

Body:	Cast gunmetal, nickel plated
Internal brass components:	DZR brass
Seals:	Nitrile elastomer
Spring:	Stainless steel
Piston:	Polysulfone polymer
Fittings:	DZR brass

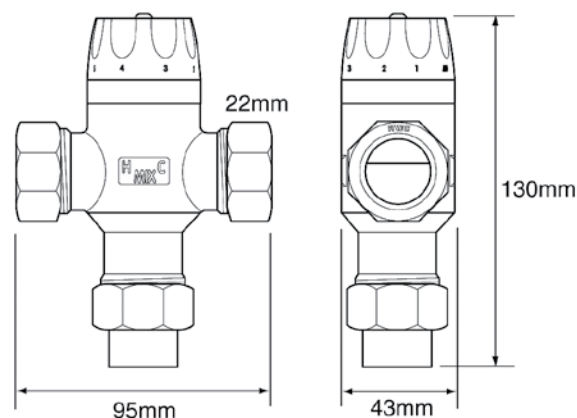
Specifications

Temperature setting range	35°C - 60°C
Flow supply temperature	85°C max
Return supply temperature	5°C - 75°C
Temperature stability	± 2°C
Working pressure, static	10 bar max
Working pressure, dynamic	6 bar max
	0.2 bar min
Floor area	150m ²

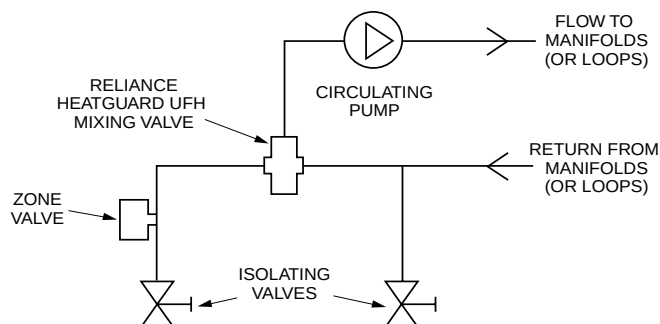
Performance



Dimensions



Typical Installation



Heatguard® UFH Blending Valve - 28mm

Highflow thermostatic blending valve for underfloor heating applications.

Product Features and Benefits

- Set temperature indicated on the cap for easy adjustment
- High flow rates - suitable for systems up to 250sqm
- Superb temperature control
- Quick reaction to supply temperature changes
- User adjustable between 35°C and 60°C
- Compression type connections for ease of installation



Description

Thermostatic blending valve available with 28mm connections. Reliance wax capsule technology ensures stable mixed water temperature. Suitable for blending the flow and return to achieve a stable system temperature in underfloor heating systems up to 250 square metres.

Product Range

HEAT 115 002

28mm Heatguard®
UFH Blending Valve

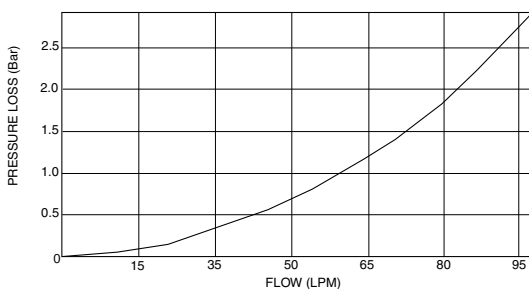
Materials

Body:	Cast gunmetal
Internal brass components:	DZR brass
Seals:	Nitrile elastomer
Spring:	Stainless steel
Piston:	Polysulfone polymer
Fittings:	DZR brass

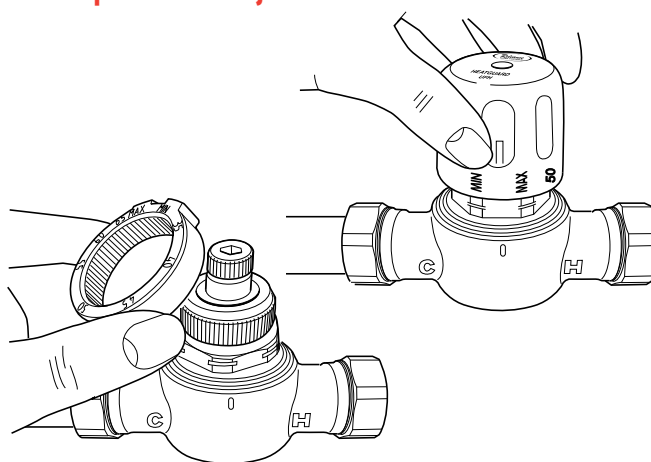
Specifications

Temperature setting range	35°C - 60°C
Flow supply temperature	85°C max
Return supply temperature	5°C - 75°C
Temperature stability	± 2°C
Working pressure, static	10 bar max
Working pressure, dynamic	6 bar max
	0.2 bar min
Floor area	250m ²

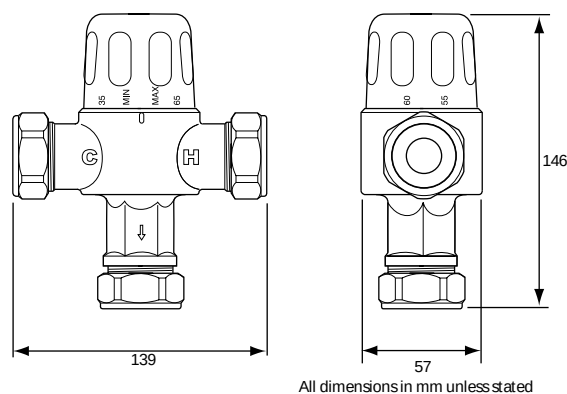
Performance



Temperature Adjustment

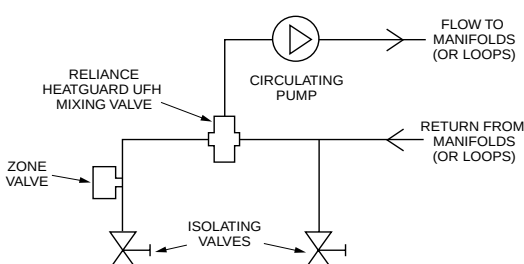


Dimensions



All dimensions in mm unless stated

Typical Installation



Underfloor Heating Manifolds

Stainless steel manifolds for underfloor heating applications.

Product Features and Benefits

- Supplied pre-mounted on installation brackets
- Valves on return manifold accept a thermoelectric type head for remote control of each zone
- Full bore 1" ball valves, and filling and drain-off points are included
- Connections are Euroconus and a range of fittings are available to suit most UK pipe sizes



Description

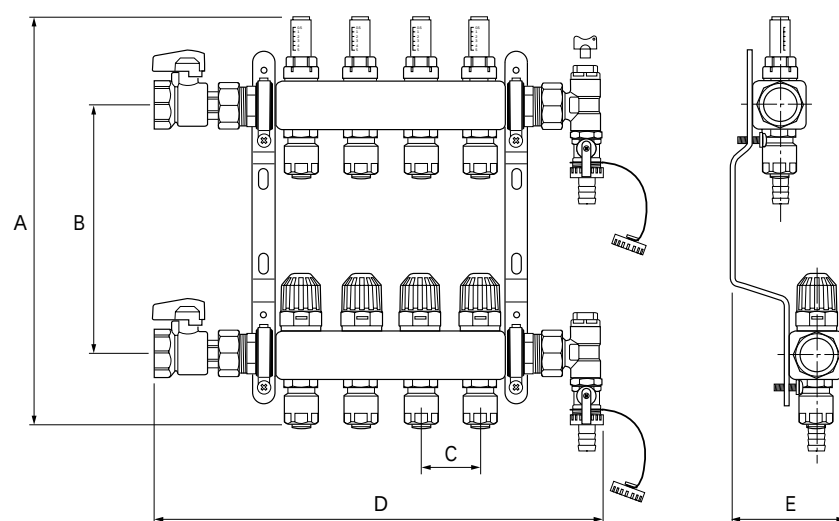
Stainless steel manifolds for use on underfloor heating systems. These consist of two manifold bars, one for the flow and one for the return, complete with ball valves and drain/filling valves. On the flow bar each port has a flow indicator including an easy-to-read gauge-glass. Each port on the return bar is equipped with an integral control valve and protection cap which allows the user to adjust the volume of water.

Materials

Body: Stainless Steel

Specifications

Connection Size 1" FBSP
Working Pressure 0-10 bar
Maximum Temperature 120°C



Underfloor Heating Manifold Range

Product Code	Product	Size
MANA 450 002	2 circuit UFH manifold kit	1"
MANA 450 003	3 circuit UFH manifold kit	1"
MANA 450 004	4 circuit UFH manifold kit	1"
MANA 450 005	5 circuit UFH manifold kit	1"
MANA 450 006	6 circuit UFH manifold kit	1"
MANA 450 007	7 circuit UFH manifold kit	1"
MANA 450 008	8 circuit UFH manifold kit	1"
MANA 450 009	9 circuit UFH manifold kit	1"
MANA 450 010	10 circuit UFH manifold kit	1"
MANA 450 011	11 circuit UFH manifold kit	1"
MANA 450 012	12 circuit UFH manifold kit	1"

Dimensions

A	B	C	D	E
342	210	50	276	90
342	210	50	326	90
342	210	50	376	90
342	210	50	426	90
342	210	50	476	90
342	210	50	526	90
342	210	50	576	90
342	210	50	626	90
342	210	50	676	90
342	210	50	726	90
342	210	50	776	90

All dimensions in mm unless stated otherwise

Manifold Spares

SKIT 450 001	Manifold Ball Valve – Red
SKIT 450 002	Manifold Ball Valve – Blue
SKIT 450 003	Manifold Bleed Valve, includes Key
SKIT 450 004	Drain/Filling Valve – Red
SKIT 450 005	Drain/Filling Valve – Blue
SKIT 450 006	Manifold Tee Piece ½" x 1" x ½"
SKIT 450 007	Manifold Flow Meter
SKIT 450 008	Manifold Circulating Isolating Valve
SKIT 450 009	Manifold Blanking Cap
SKIT 450 010	Manifold Thermoelectric Head



Manifold Ball Valves



Manifold Bleed Valve and Key



Drain/Filling Valves



Manifold Tee Piece



Manifold Thermoelectric Head



Manifold Flow Meter



Manifold Circuit Isolating Valve

Manifold Connections

MFIT 100 001	Euroconus Fittings PEX 15x2.0
MFIT 100 002	Euroconus Fittings PEX 16x1.5
MFIT 100 003	Euroconus Fittings PEX 16x2.0
MFIT 100 004	Euroconus Fittings PEX 16x2.2
MFIT 100 005	Euroconus Fittings PEX 17x2.0
MFIT 100 050	Euroconus Fittings MULTI 14x2.0
MFIT 100 051	Euroconus Fittings MULTI 16x2.0
MFIT 100 052	Euroconus Fittings MULTI 16x2.25
MFIT 100 053	Euroconus Fittings MULTI 17x2.0

Other heating system products available from Reliance include:

- **Easifit® sealed heating system connection kits**, including a filling hose, isolator, double check valve, expansion vessel, and pressure relief valve
- **Differential by-pass valves** for maintaining circulation in sealed heating systems
- **Electronic zone valves** for isolating zones or systems from one another to prevent cross flow
- **Air separators** to remove air trapped within sealed systems and to ensure optimum efficiency
- A full range of heating system **expansion vessels**



Easifit® sealed heating system connection kit



Differential by-pass valves



Air separators



Expansion vessels

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