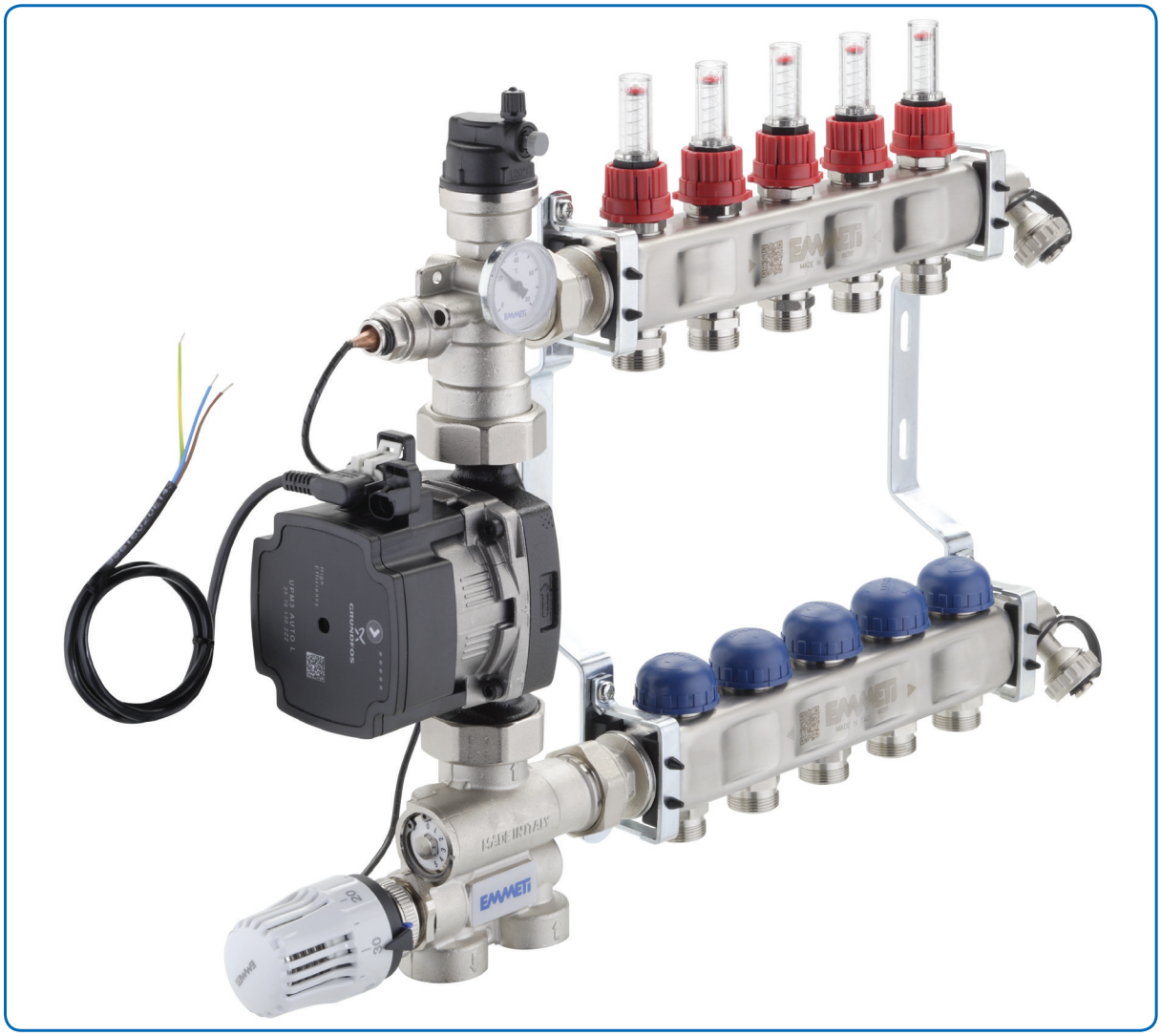

Installation and Commissioning Instructions

FMU3 Floor Mixing Unit with Grundfos UPM3 Pump

- Reduced Installation time
- Minimal tooling required
- High quality raw materials
- Stable material costs
- Precision regulation
- 100% tested prior to packaging
- 20-65°C Temperature regulation
- Cost effective solution

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FMU3 Floor Mixing Unit 3

1. Construction

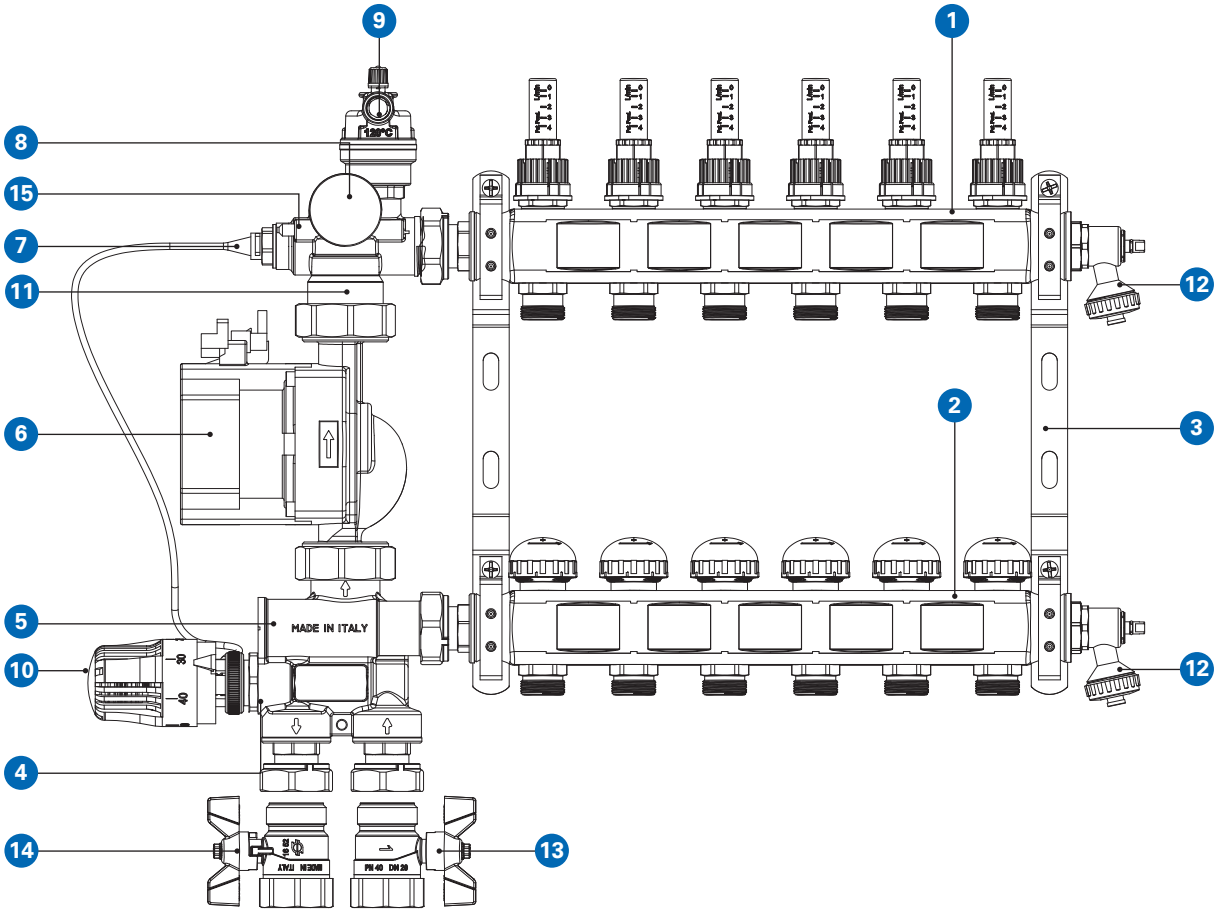


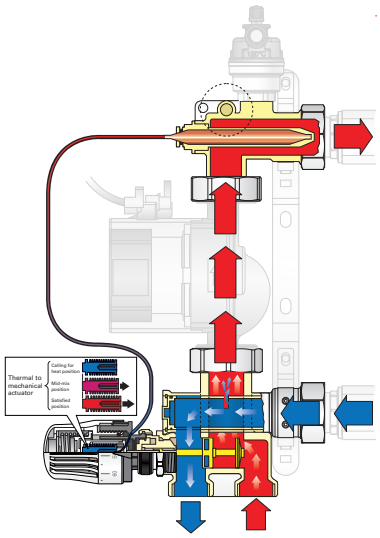
Fig. 1

1. Underfloor heating manifold flow rail fitted with flowmeters
2. Underfloor heating manifold return rail designed to be fitted with electrothermic heads
3. Manifold mounting bracket - 210mm
4. Mixing valve body with M30x1.5 thread for fixing the thermostatic head, supplied separately
5. Flow increase valve (thermostatic model only)
6. Grundfos UPM3 Auto L 25-70
7. Thermostatic sensor phial located in pocket
8. Mixed flow temperature gauge, 0°C to 80°C
9. Automatic air vent
10. Mixing valve thermostatic head with remote sensor, adjustable from 20°C to 65°C with M30 x 1.5 securing ring
11. Non-return valve
12. Fill and drain valves
13. Primary flow connection, 1"Female BSP
14. Primary return connection, 1" Female BSP
15. Safety thermostat pocket

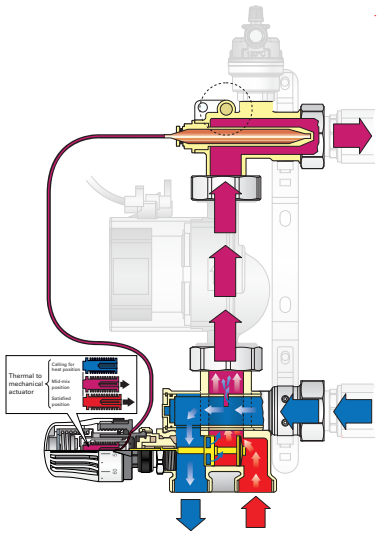
FMU3 Floor Mixing Unit 3

2. Operation

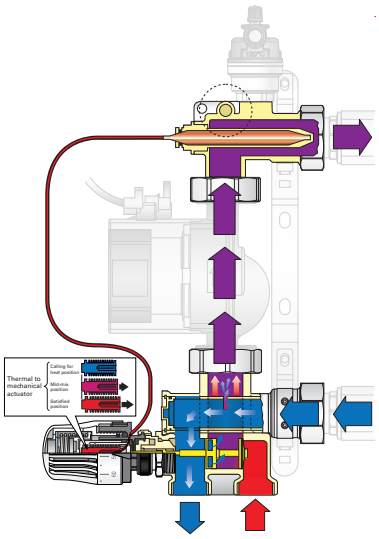
The FMU3 Floor Mixing Unit offers a time saving pre-assembled mixing unit and manifold. At its heart is the TM3-R Thermostatic Mixing Control Group which has an Emmeti designed mixing valve to ensure accurate temperature control of underfloor heating. The unique design of the internal mixing valve components ensures that hot water from the heat source and return water from the underfloor circuit are mixed together in the valve body to produce a range of temperatures from 20°C to 65°C. This range of temperatures suits the whole field of underfloor heating applications, from commissioning new floor screeds to operating with very thick floor screeds in commercial applications. The illustrations below show how the mixing valve operates through its remote sensing thermostatic head:



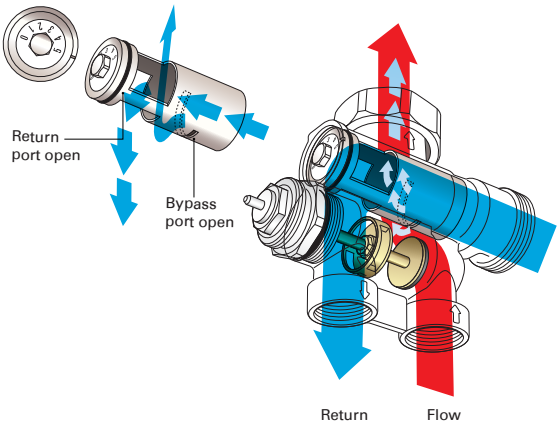
Initially the cool liquid in the remote sensing probe, allows almost all of the primary hot water from the heat source through the valve. Gradually the temperature of the probe rises as the underfloor circuits begin to warm up.



Depending on the temperature setting of the thermostatic head, as the temperature of the probe rises, the shuttle starts to close off the primary hot water allowing return water to maintain the temperature set on the head, up to 70°C if required.



Once the temperature set on the head has been reached at the probe, the shuttle balances the right amount of primary hot water and secondary return water to maintain this temperature. Depending on the thermostat setting, the hot water could be almost completely closed off allowing very low temperatures suitable for commissioning screed floors right down to 20°C if required.



The thermostatic mixing valve has a flow increase valve which allows return water to flow directly into the mixed water outlet. This cools the mixed water temperature sensed by the remote phial and causes the mixing valve to open allowing more primary hot water through the mixing chamber and raises the temperature to the setting on the head.

The other part of this powerful combination is Emmeti's reliable, tried and tested underfloor heating manifold. Fitted with double regulating flowmeters or lockshields and electrothermic valves, the manifold complements the TM3-R thermostatic mixing unit to create the perfect combination for today's generation of underfloor heating systems

FMU3 Floor Mixing Unit 3

3. Technical Data

FMU3 Floor Mixing Unit

Primary circuit maximum temperature:	90°C
Maximum pressure:	10 bar
Primary circuit max ΔP:	1 bar
Secondary control range: (thermostatic regulation)	20°C - 65°C
Heating capacity that can be exchanged at ΔT 7°C, ΔP available 0.25 bar :	
Thermostatic regulation:	10 kW by-pass pos. 0
Thermostatic regulation:	12.5 kW by-pass pos. 5
Climatic regulation:	11.5 kW
Mixing valve pressure drop (thermostatic regulation)	Kv 3
Pressure drops with open bypass valve (thermostatic regulation)	Kvmax 4.8
Thermometer scale:	0°C - 80°C
Mixing unit inlet connections:	1" BSP female
Manifold outlet connections:	DN24 x 19tpi
Grundfos UPM3 circulator connections:	1"1/2 BSP male union

Grundfos UPM3 Auto L 25-70

Motor design:	Speed-controlled, high efficiency circulator fitted with electronically commutated motor (EMC) with permanent-magnet rotor and frequency converter
Max. system pressure	10 bar
Electric connection	230V +10% / -15%, 50 Hz
Power consumption	Grundfos UPM3 Auto L 25-70: 52W
Accepted liquids	Heating water VDI 2035 Water/Glycol mixtures
Magnetite resistance	Double de-blocking system
Accepted temperature range	2°C - 110°C (cast iron housing)
Energy efficiency	EEI ≤ 0,20, ErP 2015 ready
Enclosure class	IP 44
Insulation class	F (EN 60335-1)
Power cable length	2m

Grundfos UPM3 Auto

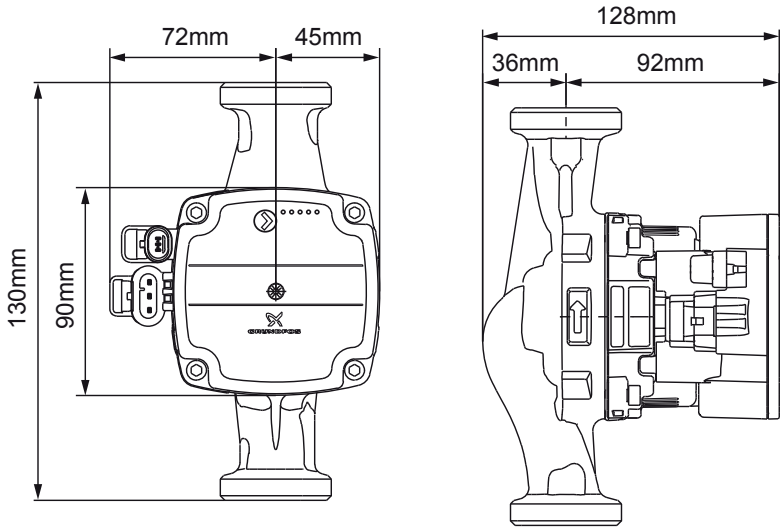


Fig. 2

FMU3 Floor Mixing Unit 3

4. Installation

4.1 Installing the FMU3 Floor Mixing Unit

The FMU3 Floor Mixing Unit can be installed directly on the wall or a suitable mounting board by securing its brackets with suitable fixings (depending on the kind of wall). These need to be inserted into the designated holes shown or in an Emmeti manifold cabinet suitable for 120 mm minimum depth partitions.

Where the FMU3 unit is to be wall-mounted, then the mounting surface should be flat and vertical. The space necessary for the FMU3 can be determined from the table and drawing below.

Ensure that there is room for the isolating valves and fittings below the mixing unit inlet connections and leave at least 300mm from the lower manifold rail to the floor to prevent damage to the pipes where they enter the floor.

The mounting bracket holes can be used to mark the fixing positions and the mixing unit and manifold assembly screwed to the wall/ mounting surface using suitable fixings ensuring that the assembly is level. The pump should be turned to face forwards to avoid fouling the wall/ mounting surface

Where the FMU3 mixing unit is to be mounted in a cabinet, check the overall dimensions of the FMU3 Floor Mixing Unit using the table and drawing below.

Type	2 ways	3 ways	4 ways	5 ways	6 ways	7 ways	8 ways	9 ways	10 ways	11 ways	12 ways
L mm	380	430	480	530	580	630	680	730	780	830	880

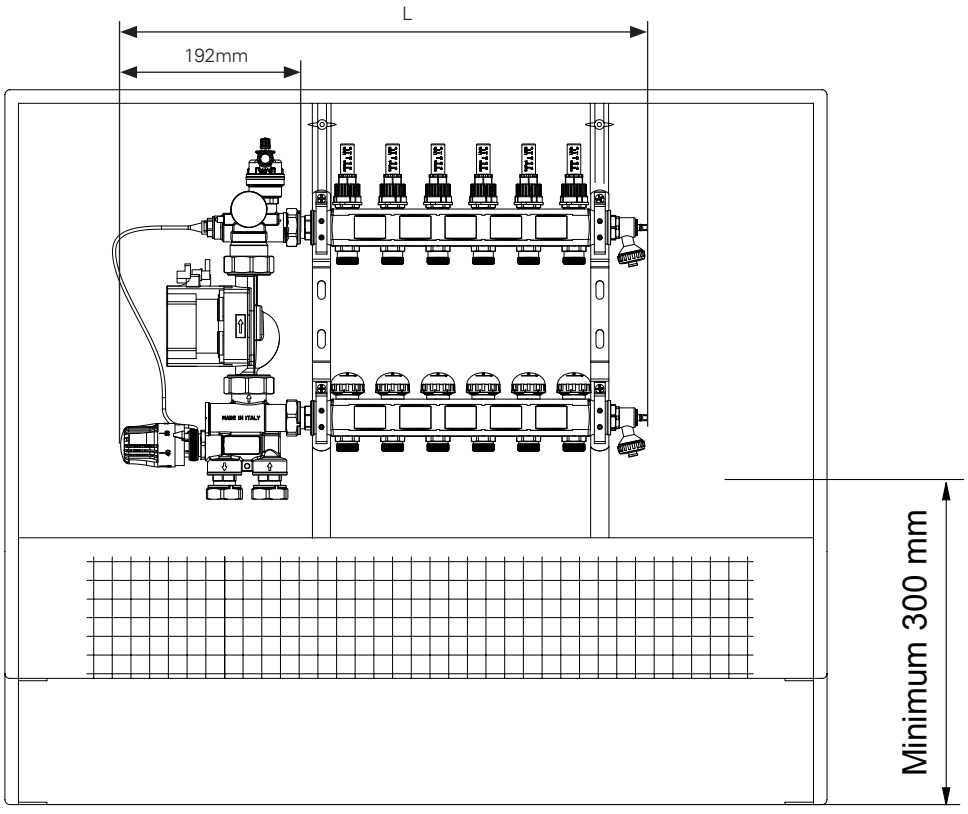


Fig. 3

Secure the mixing unit and manifold assembly inside the cabinet. Ensure that there is room for the isolating valves and fittings below the mixing unit inlet connections and leave at least 300mm from the lower manifold rail to the floor to prevent damage to the pipes where they enter the floor.

Emmeti cabinets have movable internal mounting rails which allow the pump to be turned sideways to minimise the depth (see Fig.1 Page 2 and Fig. 3) and enable the assembly to fit inside the cabinet.

FMU3 Floor Mixing Unit 3

4. Installation

Adjust the cabinet feet with the 2 wing screws at each side, so that there is at least 300mm between the lower manifold rail and the floor. See Fig. 4.

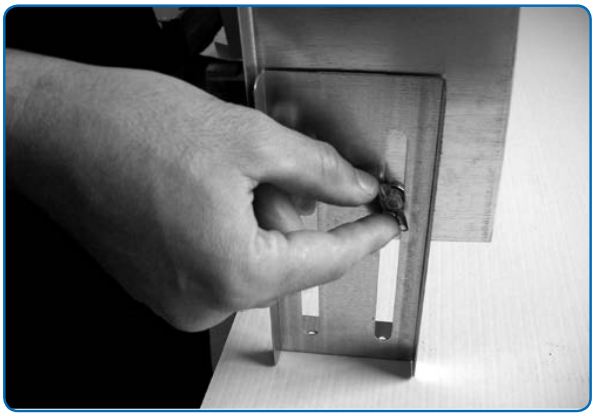


Fig. 4

Secure the casing to the wall with suitable fixings and fill any gaps around the case with cement mortar or other suitable filler. A cardboard protector is provided with Emmeti cabinets to prevent the mortar entering the case.

Connect the flow and return pipes for the underfloor heating system circuits with a Monoblocco connector selected from the Emmeti range for the type of pipe being installed.

4.2 Installation of the thermostatic head and remote sensor for thermostatic regulation

For thermostatic regulation, a thermostatic head, supplied as a separate item, code 90046750, must be used. Set the thermostatic head to the maximum setting then position the head on the thermostatic valve body (see Fig. 1, item 11) with the index marker facing to the front. Then attach the head to the valve body using the securing ring on the head, tightening the ring lightly: do not over tighten.

4.3 Electrical Connections

The Domestic Building Services Compliance Guide recommends the use of a separate flow temperature high limit thermostat for systems connected to a high temperature water supply (i.e. more than 60°C) to ensure that the water temperature in an underfloor heating system does not rise above the temperature recommended for the floor. Emmeti UK offer a thermostat for this purpose, code: 28130632. Emmeti UK also offer EWC-1 and EWC-2 wiring centres designed specifically for the connection of electrical components in underfloor heating systems:

Code U9360010
EWC-1 230V 8-way wiring centre with on-off switch

Code U9360020
EWC-1 24V 8-way wiring centre with on-off switch

Code U9370001
EWC-2 230v 8-way wiring centre

Code U9370002
EWC-2 230v 12-way wiring centre

Code U9380001
EWC-4 230V 4-way wiring centre

This allows the connection of the mains power supply, thermostats and actuators with electrical interlock terminals for the boiler and manifold pump as required by Building Regulations. Full instructions are provided with all four items. Please ensure that the electrical wiring of the installation and connections to and from electrical system components are in accordance with BS 7671, the latest edition of the IET Wiring Regulations.

Over temperature thermostats, codes: U9132330, U9132340

2 over temperature protective thermostats are available. High temperature (40-70°C) U91322340 for direct manifold protection and Low temperature (20-40°C) U9132330 for overall floor protection. These are designed to be connected in series to the circulating pump, zone valve or heat source to 'lock out' in the event of an over temperature situation.

The sensing element should be fitted in the designated pocket on the TM3-R Plus mixer assembly. Fig 1. 15 Maximum suggested thermostat setting: 45/50 °C for cement slabs; for other materials refer to the maximum values as stated by the supplier, and not more than 55 °C (EN 1264-4).

EWC-1 wiring centre, codes: U9360010, U9360020
EWC-2 wiring centre, codes: U9370001, U9370002
EWC-4 wiring centre, code: U9380001

Wall mounting – Install the wiring centre adjacent to the FMU3 manifold so that the electrical cables from the electrothermic heads can reach the wiring centre, ideally on the lower face of the centre, then fix the centre to the wall using the fixings.

Cabinet mounting – where the FMU3 manifold is installed in an Emmeti manifold cabinet, the wiring centre can be installed above or to one side of the manifold providing all electrothermic head cables can reach the centre. Make the electrical connections to the centre as shown in the installation leaflet. Take extra care to ensure that EWC wiring centre is kept away from water.

4.4 Hydraulic Connections

Connect the flow and return pipes to the G1 female inlet connections on the mixing unit. Emmeti recommend installing a suitable isolating valve for connection to the G1 inlet connections:

Code 01306708, Straight Progress valve kit with 1" male connections

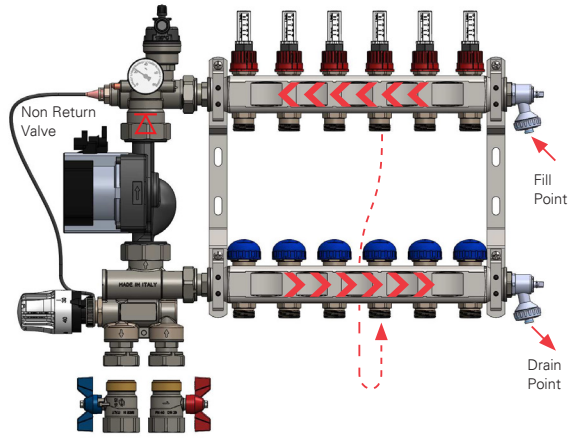
The use of jointing paste and hemp or similar sealing materials is not recommended as this may interfere with the correct operation of the mixing valve and manifold.

FMU3 Floor Mixing Unit 3

5. Commissioning

5.1 Filling and Testing

The FMU3 Mixer Control Group has a built-in non return valve to ensure that the underfloor heating circuits can be simply filled from the drain and fill valves fitted to Emmeti manifolds. To use the non-return valve the underfloor heating circuits must be filled using the drain and fill valve fitted to the upper rail only – it will not work if the lower drain and fill valve is used to fill the circuits.



The control group, manifold and underfloor circuits can now be filled and commissioned in accordance with the manifold instructions. Prior to filling, a final check of all joints should be made to ensure no connections have loosened during transit

(For details of the recommended commissioning procedure please refer to the Emmeti literature for the manifold).

Emmeti manifolds are provided with two stage regulating valves supplied fitted with flowmeters as standard.

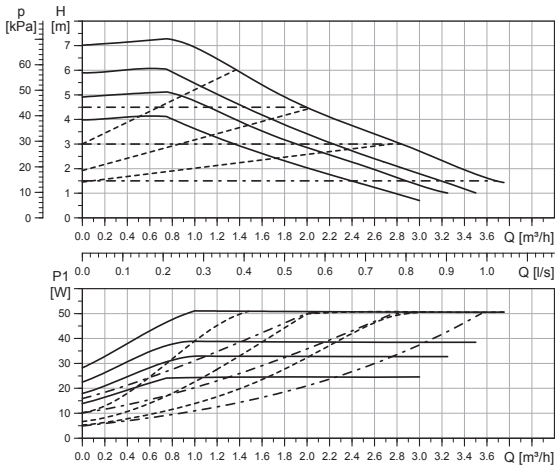
We recommend filling each circuit separately, opening the relative electrothermic valves and two stage flowmeters each time and closing them again when the operation is completed. Once filled the system should be pressure tested in accordance with EN1264-4:2009 for UFH (between 4 and 6 bar for 24 hours) or EN 14336:2006 for radiator systems (30% greater than working pressure for a minimum of 2 hours).

5.2 Grundfos UPM3 Auto L 25-70

The pump is supplied with a 1m open ended 3 core lead with plug ready for connection to the UPM3 and an underfloor wiring centre (EWC) which should be supplied from a suitable switched fused connection unit. Once all electrical connections are complete, ensure the underfloor system is filled and vented. UPM3 pumps are self venting and must not be vented before startup.

Operate the underfloor heating control system to ensure the UPM3 operates correctly. The UPM3 will start on a factory set speed (eg. ppc3) Adjust the speed setting to suit the installation. A constant pressure setting is recommended for UFH applications.

Grundfos UPM3 Performance Curves



Line type	Description
———	Constant Curve
- - - - - - - - - -	Proportional Pressure
– · – · – · –	Constant Pressure

Fig. 5

5.3 Grundfos UPM3 User Interface

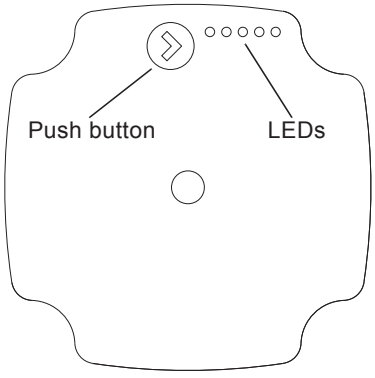


Fig. 6

The UPM3 user interface has a single push button, one red/ green LED and four yellow LEDs.

Performance view:
During normal operation the display is in performance view: LED 1 is green, the 4 yellow LEDs indicate power consumption.

Display	Indication	performance in % of P1 MAX
1 green LED (flashing)	Standby	0
1 green LED + 1 yellow LED	Low performance	0 - 25
1 green LED + 2 yellow LEDs	Medium low performance	25 - 50
1 green LED + 3 yellow LEDs	Medium high performance	50 - 75
1 green LED + 4 yellow LEDs	High performance	75 - 100

FMU3 Floor Mixing Unit 3

5. Commissioning

Settings View:
To switch between performance view and settings view press the push button. The LEDs now indicate the actual pump setting.

Key Lock:
Pressing the push button for longer than 10 seconds enables or disables the key lock function. All LEDs except for the red LED will flash for a second indicating that lock is toggled.

Settings Selection:
If you press the button for 2 to 10 seconds, the user interface switches to setting selection if the user interface is unlocked. You can change the settings as they appear. The settings appear in a particular order, when the button is released the last setting is stored.

Proportional Pressure	LED1 green	LED2 Yellow	LED3 Yellow	LED4 Yellow	LED5 Yellow
PP1	•	•			
PP2	•	•		•	
PP3	•	•		•	•
Constant Pressure	**LED1 green**	**LED2 Yellow**	**LED3 Yellow**	**LED4 Yellow**	**LED5 Yellow**
CP1	•		•		
CP2	•		•	•	
CP3	•		•	•	•
Constant Curve	**LED1 green**	**LED2 Yellow**	**LED3 Yellow**	**LED4 Yellow**	**LED5 Yellow**
CC1	•	•	•		
CC2	•	•	•	•	
CC3	•	•	•	•	•
CC4 (max.)	•	•	•		•

5.4 Setting the Flow Increase Valve

Once the total flow rate of the system has been calculated:

Qip = total underfloor system flow-rate = (P [W] x 0.86) / (ΔTip)

Where P is the total calculated heat demand in Watts and ΔTip is the calculated temperature difference across the underfloor system

the pressure drop for the mixing unit can be read off on the graph Fig. 7. The mixing unit pressure drop curves show the Flow Increase Valve settings from fully closed to fully open and allow the installer/ designer to choose a suitable flow rate and pressure drop to suit the system. Together with the calculated pressure drop of the underfloor system and manifold, the pump setting can then be chosen.

The tables, Fig. 8, show two examples of required system output against the Flow Increase Valve setting based on assumed values of underfloor flow temperature, temperature drop and pressure drop for the underfloor system for guidance.

If necessary, adjust the Flow Increase Valve as follows:

– Excessively high temperature drop.

Insufficient flow rate - gradually open the Valve until you reach the required temperature drop.

– Flow temperature below the required value.

Gradually close the Valve until the required temperature is reached, allowing time for the system temperature to stabilise.

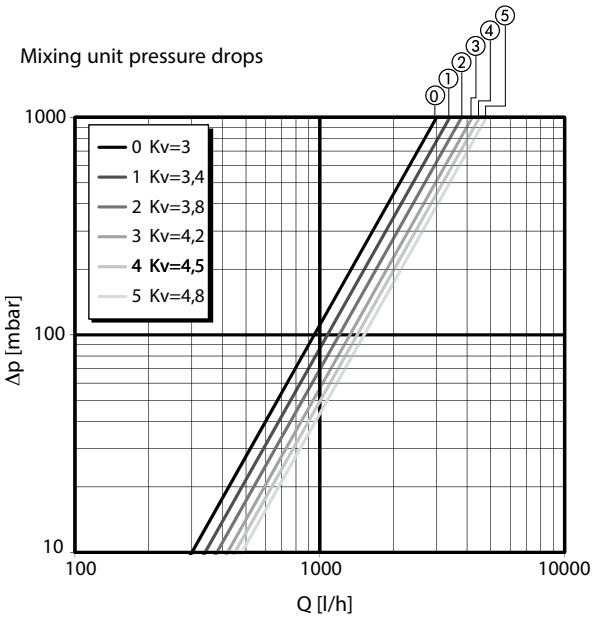


Fig. 7

FMU3 Floor Mixing Unit 3

5. Commissioning

ΔTip = 10 °C T Boiler = 70 °C Tip = 45 °C ΔPip = 0,25 bar

Capacity (W)	Circulator Setting	Valve Setting
18000	maximum	5
17000	maximum	3 - 4
16000	maximum	2
15000	maximum	1
14000	maximum	0
13000	average	5
12000	average	4
11000	average	2 - 3
10000	average	1

ΔTip = 5 °C T Boiler = 70 °C Tip = 45 °C ΔPip = 0,25 bar

Capacity (W)	Circulator Setting	Valve Setting
9000	maximum	5
8000	maximum	2 - 3
7000	maximum	0
6000	average	5
5000	average	2 - 3
4000	average	0

Fig. 8

ΔTip – temperature difference on UFH circuits
TBoiler – primary flow temperature
Tip –secondary flow temperature
ΔPip – underfloor circuit pressure drop

5.5 Setting the thermostatic head

Once the system has been filled and pressure tested, the individual underfloor circuits can be balanced. As part of this process the mixed flow temperature must be adjusted to the correct level for the system design. To achieve this, the thermostatic mixing valve can be set on the thermostatic head (No. 11, Fig 1), from 20 to 65°C as follows:

1. Turn the knob of the thermostatic head, to set the required underfloor flow temperature
2. Allow sufficient time for the temperature to stabilise, then check the setting against the temperature reading on the mixed flow temperature gauge fitted to the control group (No. 9, Fig. 1).

Temperature setting lock

The thermostatic head is provided with two setting pins, one red and the other blue. These pins are provided to lock the temperature setting as follows:

1. Set the required temperature as described above
2. Locate the black dot - see Fig. 9 - and insert one pin on each side of the dot
3. The head can not now be rotated.

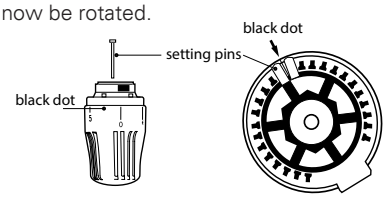
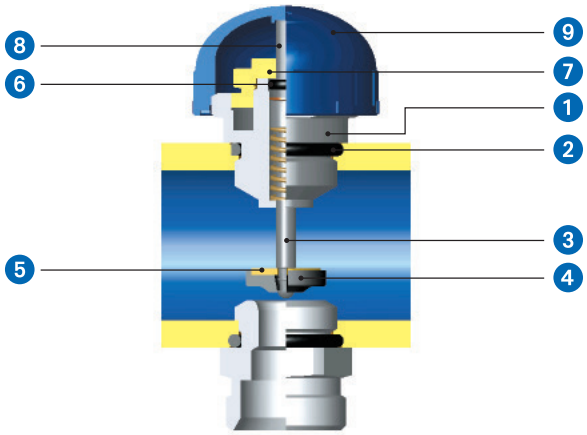


Fig. 9

5.6 Electrothermic Body (for electro-thermic heads)



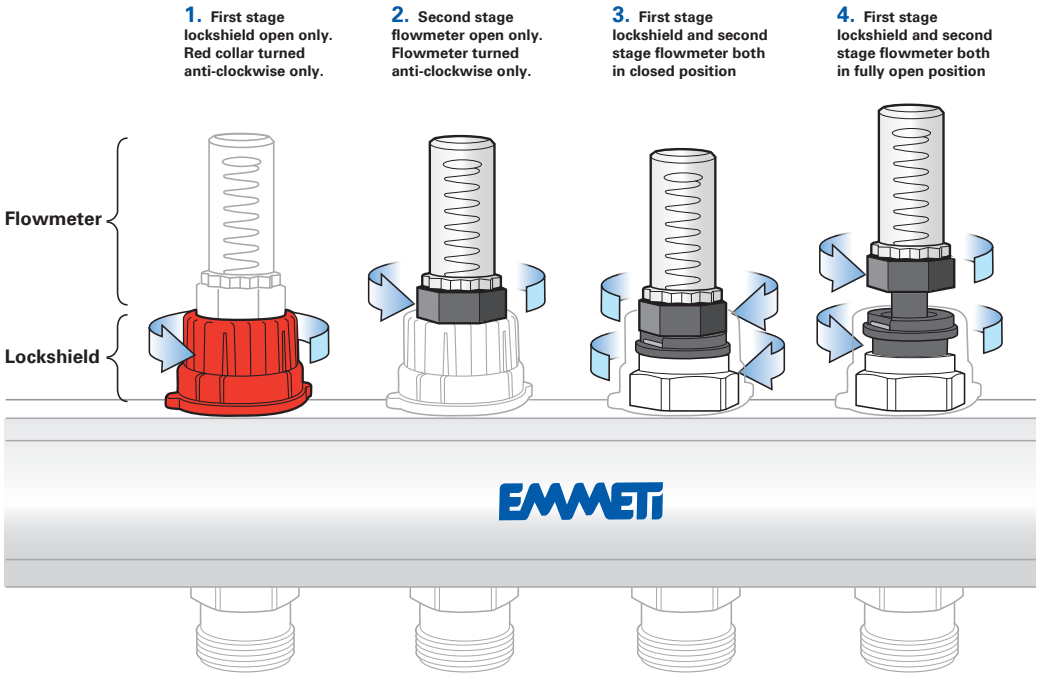
1. Shutter in brass EN 12164 CW614N
2. EPDM o-ring
3. Bolt in brass EN 12164 CW614N
4. Gasket in EPDM
5. Brass gasket EN 12164 CW614N
6. O-ring for shutter EPDM
7. Collar in brass EN 12164 CW614N with nickel finish
8. Bolt in stainless steel AISI 304
9. Cap in blue ABS (RAL 5005)

The blue cap is designed to be used for installation and commissioning, not for permanent isolation if you are not replacing the cap with an electrothermic head. Please use code 01306112, Topway hand wheel for manual control

FMU3 Floor Mixing Unit 3

5. Commissioning

5.7 Flowmeter adjustment



The combined lockshield and flowmeter is a two stage device. The lockshield provides individual port isolation and the flowmeter regulates flow rate.

To fully open the port for filling and flushing:

First stage: to open the lockshield rotate the collar anticlockwise approx. 3.5 turns.

Second stage: rotate the black nut on the flowmeter anticlockwise approx. 3 turns.

Locking the flow rate:

Once the manifold flow rates have been set, pop up the collar to lock the setting.

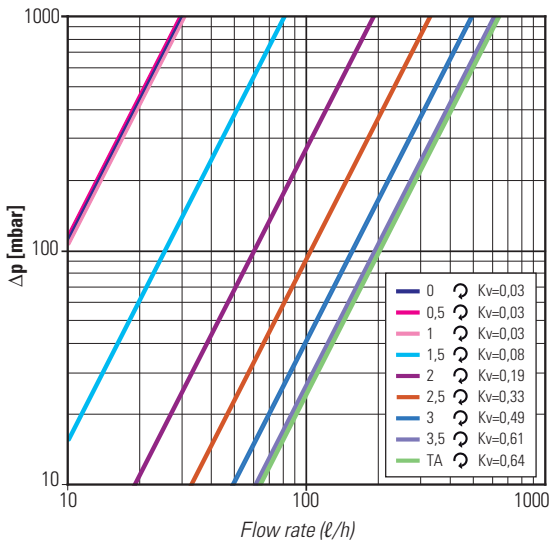
Range of measurement	0-4 l/min
Maximum operating pressure	6 bars
Max. operating temperature	90 °C
Kv = 0.15 (1 l/min) -0.55 (4 l/min)	
Kv max off scale	= 0.9
Precision	±10% **fs**

fs= Bottom of scale

Cleaning the flowmeter tube

Turn the red collar (1) clockwise, until the isolating function is fully closed. Remove the flowmeter tube by securing the black spanner flats, then using either hand pressure or a 17mm ring spanner, gently unscrew the flowmeter tube anticlockwise. Clean the tube and screw it back on. Turn the red collar (1) anticlockwise until the isolating valve is fully open again.

Flowmeter pressure drop with return electro-thermic body fully open



no. of turns for opening adjustment device (2)

TA = All open. The above values refer to water temperature 15 °C.;

Δp = Δp flow + Δp return;

Fig. 10

Notes

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