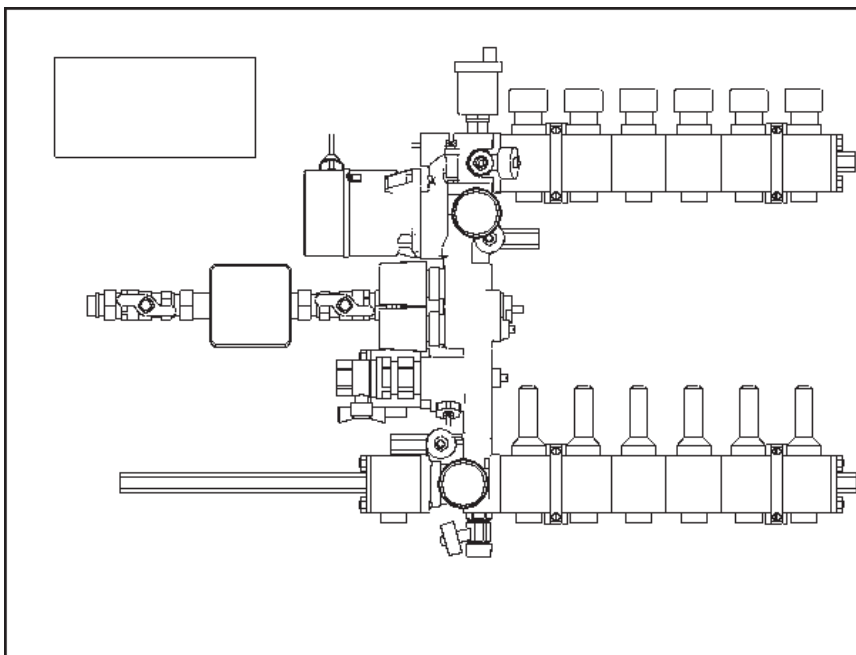


Installation and operation instruction manual for mixing module BM1

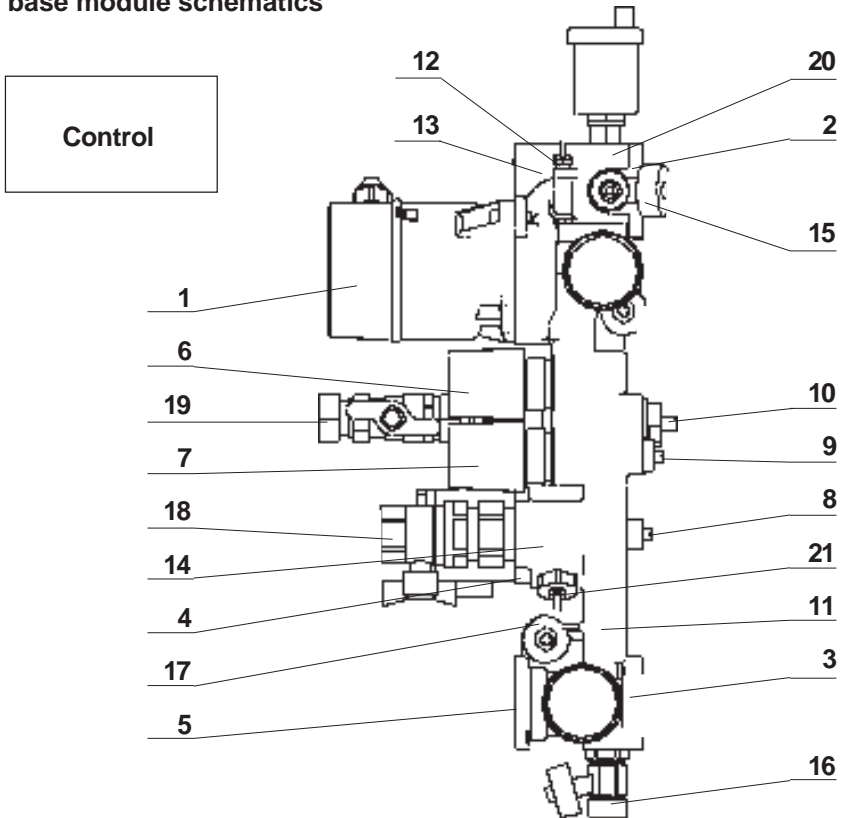


LAING

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Installation manual for Laing mixing module BM1

BM1 base module schematics



- | | | | |
|----|---|----|--|
| 1 | circulator | 12 | sensor for floor heating feed temperature |
| 2 | feed for floor heating circuit | 13 | sensor for safety temperature |
| 3 | return for floor heating circuit | 14 | sensor for boiler feed temperature |
| 4 | feed for radiator circuit | 15 | drain valve |
| 5 | return for radiator circuit | 16 | fill valve |
| 6 | control valve with thermoelectric drive | 17 | mounting eyelets |
| 7 | safety valve with thermoelectric drive | 18 | boiler feed connection |
| 8 | bypass adjustment knob | 19 | boiler return connection |
| 9 | presetting knob for control valve | 20 | check valve for filling of floor heating loops |
| 10 | adjustment valve | 21 | space for calorimeter dip tube |
| 11 | sensor for floor heating return temperature | | |

Installation manual for Laing mixing module BM1

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Installation manual for Laing mixing module BM1

Application

The Laing BM1 mixing module provides an easy method for the connection of a floor heating system or other low temperature heating system to the boiler loop inside the manifold cabinet. The built-in mixing function allows the control of the feed temperature for the floor heating loop according to the heat demand. The compact construction and the fact that radiators can be connected in addition to the floor heating loop make the mixing module universally applicable. This is true both in installations with one floor heating system and in installations with many attached floor heating systems.

Construction

The Laing mixing module BM1 consists of a bronze cast main body which contains all necessary functions and connections. It has connections for the boiler loop, the floor heating manifold and the manifold for radiators.

In addition, the circulator pump for the floor heating system, the control valve and the safety valve, several adjusters and fill and drain valves are integrated in the base module.

The water from the boiler loop is reduced to a temperature suitable for floor heating by the mixing function and the circulator pump in the floor heating loop. The radiator loop on the other hand gets the boiler water directly.

This makes it possible to use one calorimeter, which can be attached directly to the base module, to measure both the heat provided to the floor heating system and to the radiators.

Safety functions, fill functions

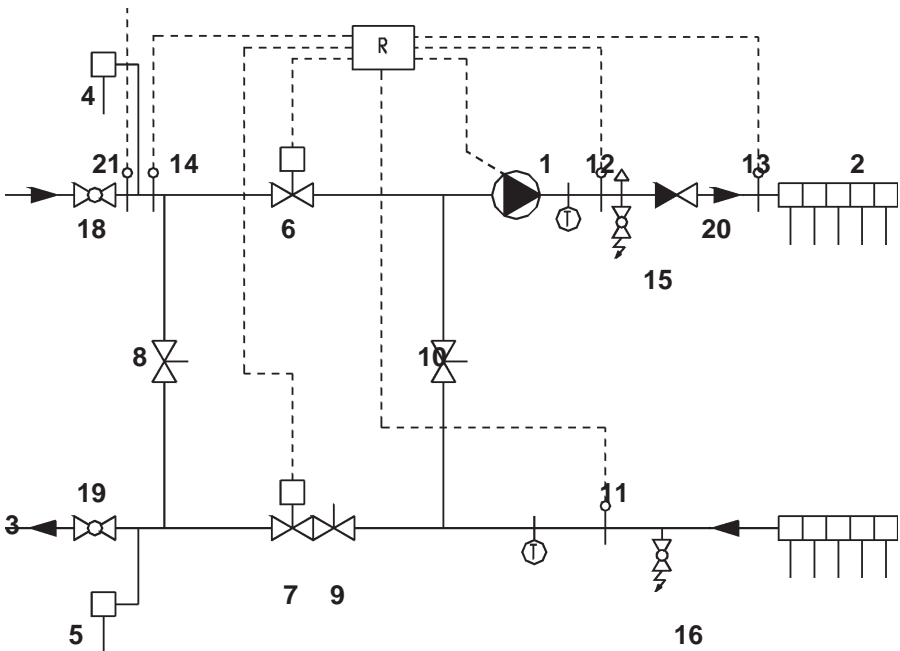
Function

The feed water coming from the boiler on one side goes directly to the feed for the radiator loop and on the other side is mixed with return water from the floor heating system in accordance with the heating demands.

The mixing is done by the mixing valve **RV**, which is opened more or less depending on the feed temperature of the floor heating loop. The circulation of the floor heating loops is done by the circulator pump **P**, which is mounted above the boiler feed and return connection. When boiler feed water is mixed into the floor heating loop, an equivalent amount of floor heating return water is returned through the boiler return **KR** together with the return water from the radiator loop.

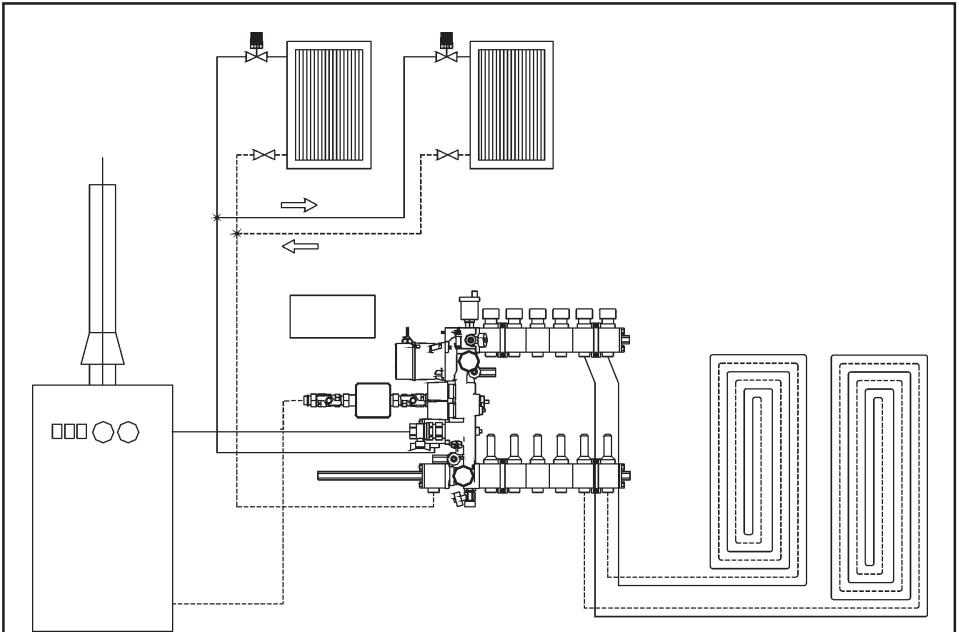
To prevent overheating of the floor in case of a failure of the control valve, a safety valve **SV**, which closes in such cases, is installed between the floor heating return and the boiler return. This valve prevents water from returning through the boiler return, thereby automatically blocking boiler feed water from entering the floor heating loop.

Installation manual for Laing mixing module BM1



- | | | | |
|----|---|----|--|
| 1 | circulator | 12 | sensor for floor heating feed temperature |
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| 10 | adjustment valve | | |
| 11 | sensor for floor heating return temperature | | |

Installation manual for Laing mixing module BM1



The boiler return **KR** can be equipped with a calorimeter which will measure the heat usage of the radiator loop and the floor heating system. The feed temperature sensor of the calorimeter is mounted at the location **S5**.

The return of the floor heating system has an adjuster valve mounted between the boiler return and the boiler feed. This adjuster valve can provide a certain differential pressure between the boiler feed and boiler return, which can be used to increase the boiler loop flow rate if needed. This adjuster valve is useful for balancing systems with several mixing stations.

Attaching a manifold to the BM1 base module

If the BM1 has been purchased as base module only, is necessary to attach manifolds for the floor heating and radiator loops to the base module before installation. All other components are factory installed in the base module.

The connections for the floor heating and radiator manifolds on the BM1 are identical. They consist of a 1" female thread and a flange for the direct connection of the Laing segmented plastic manifold, of which either one can be used. Since the base module contains fill and drain valves for the floor heating loops, it is not necessary to include shut off valves for the manifolds.

If manifolds are to be attached to the 1" thread, they need to be sealed using a suitable pipe thread sealant. If the feed and return manifold should be offset, a suitable nipple needs to be used.

Installation manual for Laing mixing module BM1

If the segmented plastic manifold is to be used, first the threaded rods need to be cut to length. If the manifolds should be offset, a 20 mm spacer should be considered in determining the length of the threaded rods. Then the threaded rods are screwed into the base module, the segments are threaded onto the rods and finally the end plate with the plastic cover is put in place. Make sure that the plastic cover contains an O-ring. Thereafter, the nuts are put on and tightened equally. Manifolds for floor heating loops use segments with integrated valve and flow meter/adjuster while manifolds for radiators use segments with only a threaded connection. The segments for the feed side are red, while the return side segments are blue.

Expanding the manifold

To increase or decrease the number of loops in the radiator or floor heating manifold, first loosen and remove the nuts of the end plate. Then remove the end plate and the unneeded manifold segments, if any. Remove the threaded rods taking care to avoid damaging the threaded ends.

Next, shorten the rods to the necessary length if you want to remove segments, or prepare new threaded rods of the appropriate length if you want to add segments. Next, screw the threaded rods back into the base module. If the installation has been in operation, clean both seal surfaces of each segment carefully to avoid leakage after reassembly.

Keep in mind that it may not be possible to remove the threaded rods inside the manifold cabinet. Therefore, any adaptation of the manifolds should be done before the module is installed.

Installation of the BM1 station

If the station was purchased without a cabinet or mounting rails or if you assembled the station yourself, attach it to the wall or inside a cabinet of appropriate size. Attach the base module using the two eyelets with the spacers provided. Additionally, the floor heating manifolds need to be attached at the far end with appropriate mounting brackets. Manifolds with more than 10 loops preferably should get additional mounting brackets in the middle. Suitable mounting brackets for the segmented plastic manifolds are available as accessories.

In mounting the module, take care to avoid direct metallic contact between the base module or the manifolds and the cabinet or the wall. The mounting eyelets of the BM1 base module are equipped with suitable rubber grommets which must be installed above and below the eyelets. On top of the grommets, washers which have been provided with the base module are placed. This way, you can ensure that the mounting screws themselves don't create metallic

Installation manual for Laing mixing module BM1

contact to the base module.

If the station was purchased on mounting rails, the station can either be removed from the mounting rails and attached as described above, or the station is attached to the wall with the mounting rails.

If a station has been purchased with a cabinet, the cabinet is installed inside a wall or placed inside a recess. To attach the cabinet, remove the front cover. After the cabinet has been installed, reattach the front cover until it is flush with the wall.

If the station contains a calorimeter, make sure to leave enough space during the installation for the calorimeter in the return loop to the boiler.

Hydraulic connection

After installation, the station is connected hydraulically. When attaching the pipes, take care not to exert too much stress on the module and keep the pipes away from the wall or the cabinet. The pipes have to be insulated to avoid noise transduction.

First the boiler return is connected to the base module. If a calorimeter is to be installed, install it in this line. Next, the boiler feed line is installed. Thereafter, the radiators are connected to the radiator manifold with compression fittings. Next, the floor heating loops are installed from left to right. When installing the floor heating loops, observe the instructions of the floor heating system manufacturer.

Connection of the controls

For the connection of controls, the BM1 base module has five positions for thermal sensors. Since three of those sensor positions are dip tube type sensors, in which the dip tube is installed in the water stream, it is important to install the sensors before filling the system. The floor heating feed side has a threaded hole in which the feed temperature sensor is inserted. To install it properly, insert the sensor in the hole and tighten the clamping nut. In the same place, there is a hole for the over temperature sensor, which is simply inserted into it.

The floor heating return has a similar threaded hole for the return temperature sensor. Next to the 3/4" connection above the boiler feed there is a further threaded hole for the boiler feed temperature sensor. Here, too, the sensor needs to be inserted in the hole and secured with a clamping nut.

Near the boiler feed there is a 1/2" thread for the dip tube of the calorimeter feed temperature sensor.

After installing the sensors, they need to be wired to the control. Additionally, the thermoelectric drives and the circulator need to be wired. Observe the installation manual of the control.

Installation manual for Laing mixing module BM1

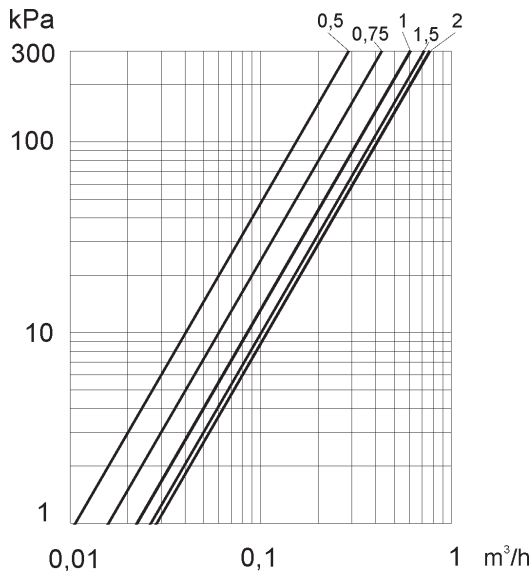
Bypass valve

The bypass valve is needed when the mixing module BM1 is operated in conjunction with a step-down control, since the step-down control derives its outside temperature information from the boiler feed temperature. For all other controls, the bypass valve should be closed completely by turning it clockwise as far as possible.

The bypass valve connects the boiler feed to the boiler return. If the bypass valve is open, a certain amount of water continuously is fed from the boiler feed to the return. The amount of water is dependent on the position of the bypass valve and the pressure difference between boiler feed and return. Adjust the bypass valve in such away that the boiler feed temperature sensor integrated in the mixing module BM1 shows the correct boiler feed temperature even when the control valve is closed.

If the station is installed very far away from the boiler, the valve needs to be opened considerably, while opening it very slightly is sufficient when the station is installed close to the boiler room.

The flow through the bypass valve should be adjusted in such a way that the water coming from the boiler only loses a few degrees of temperature due to the thermal losses of the feed line. Observe the diagram below for the proper setting. To set the bypass valve, close it clockwise completely and then open it the indicated number of turns.



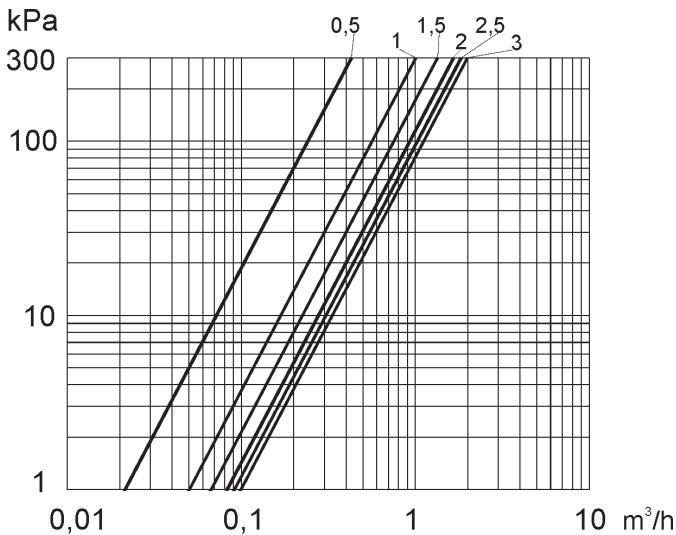
Resistance curve of bypass valve

Installation manual for Laing mixing module BM1

Presetting valve

To adapt the mixing module to varying hydraulic conditions, it is equipped with a presetting valve. This valve influences the resistance curve of the control valve. The presetting valve should be set in such a way that during peak heating demand the control valve is continuously open. This results in the best control characteristics. To do this, first extract the amount of boiler feed water needed during peak heating demand from the diagram below. The diagram below shows the resistance value for the boiler side of the mixing module BM1. Take the setting of the presetting valve using the amount of water and the differential pressure during peak heating demand. Adjust the presetting valve by turning it clockwise to full stop and then opening it the number of turns indicated in the diagram.

Adjusting the presetting valve is especially important in installations with several mixing modules. Proper setting ensures that all mixing modules will have sufficient amounts of boiler feed water.



Pressure drop curve of presetting valve

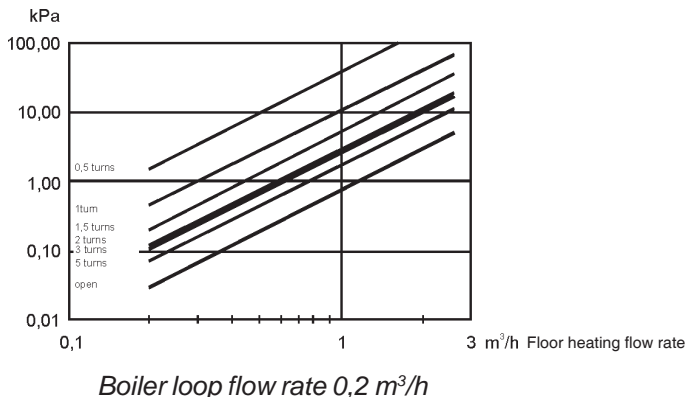
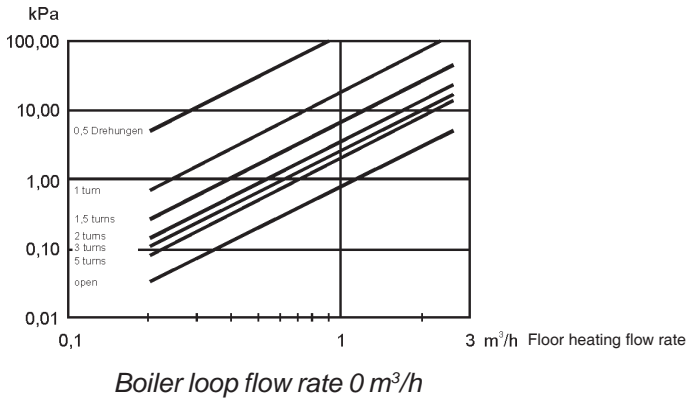
Installation manual for Laing mixing module BM1

Adjustment valve

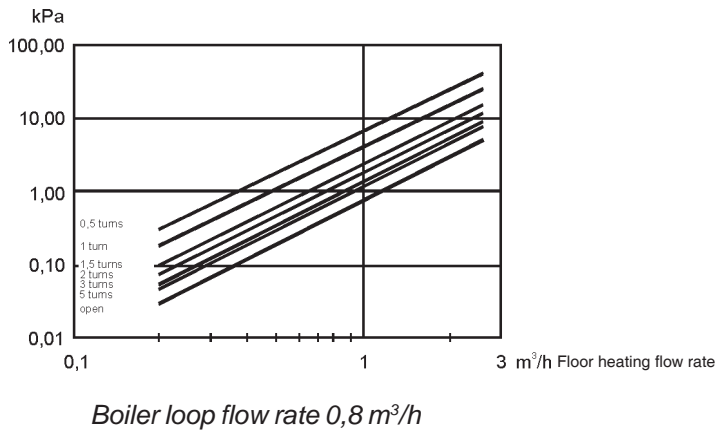
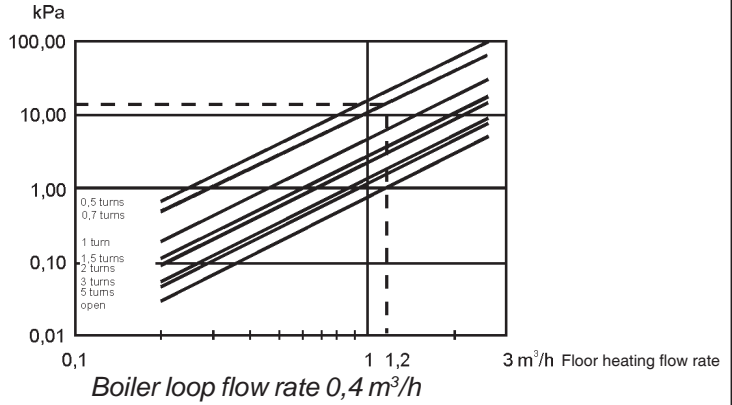
The adjustment valve enables the creation of a certain differential pressure between the boiler feed and return. This differential pressure will draw water from the boiler feed into the floor heating feed side. This is useful when the circulator in the boiler loop is not creating enough differential pressure.

If a station is mounted at the end of a long supply line and is not receiving sufficient amounts of boiler water, the adjustment valve can be used to draw more boiler water from the boiler feed line. It should be noted that this will reduce the hydraulic performance of the floor heating loop. Therefore it is recommended to use the adjustment valve in cases where remote stations are not getting enough heat, but not to factor it in during the design stage.

The diagram shows the relationship between the position of the adjustment valve and the differential pressure created on the boiler side for various floor heating flow rates.



Installation manual for Laing mixing module BM1



Installation manual for Laing mixing module BM1

Filling the system

Before filling the system, shut off the electrical power to the control. This will close both the control valve and the safety valve. If it is not possible to shut off electrical power, the thermoelectric drives can be taken off and manual covers can be installed that close both valves. The ball valves connecting the station to the boiler feed and return must be open.

Then the boiler loop can be filled in the same way as in a system without mixing module. To fill the heating loops, connect a pressure hose to the upper fill valve and a bleed hose to the lower drain valve. The check valve mounted between the circulator and the fill valve will prevent water from flowing through the mixing module, so that the water will flow through the heating loops.

Close all feed and return valves of the floor heating loops. Start now from left to right to open one loop at a time and to flush it thoroughly until all the air has been purged. After purging, close the loop and open the next one. Continue until all loops are purged.

After filling the floor heating loops, the control valve and the safety valve need to be re-activated. This completes the filling of the system.

Pressure test

To pressure test the floor heating loops, open all feed valves and close all return valves on the manifold. Then connect a pressure hose to the fill valve on the feed manifold. This pressurizes all heating loops and the connections between the PIPes and the manifold.

Keep in mind that the control valve and the safety valve have a maximum closing pressure of approximately 2 bars (30 psi). If you therefore apply the test pressure to the drain valve, you will pressurize the radiator loop, too. This is true despite the fact that the ball valves to the primary side may be shut off.

Start-up

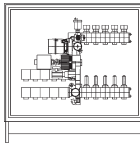
Before starting up the station, make sure that both the boiler and the floor heating side have been filled with water. Additionally, make sure that the mixing module BM1 is equipped with an appropriate control, since without such a control the floor heating loops may be overheated. Verify that the bypass valve and the presetting valve have been set and that the adjustment valve is fully open. Now you can start the station.

Installation manual for Laing mixing module BM1

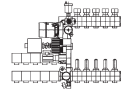
Product line

Model part number

BM1 S...¹⁾ 49 00 000²⁾
(with cabinet)



BM1 X...¹⁾ 49 00 500²⁾
(on mounting rails)



- 1) Add the number of heating loops (02 to 12) to the model designation.
- 2) Replace the last two zeros in the part number with the appropriate number of heating loops (02 to 12).

Accessories, Spare and replacement parts

Model part number

BM1 base module (with circulator)	
BM1-GM	49 00 901
Replacement circulator with rotor and gasket	
A5-396	95 00 098
Manifold segment for feed side with valve	
VSVA	95 00 113
Manifold segment for return side with flow meter/adjustor	
VSR	95 00 115
Flow meter/adjustor insert	
D240	95 00 213
Compression fitting for plastic or copper pipes	
KVER	95 00 xxx

Model part number

Calorimeter fit kit with spacer 110 mm x R 3/4"

BM1-WMZ	95 00 971
Radiator fit kit with compression fittings	
BM1-HK	95 00 972
Fit kit for additional radiator loop	
BM1-HKA	95 00 973

Thermometer

TH14	95 00 215
Cabinet for installation inside wall (door and cover painted white) H 870 W 750 D 110-170 mm	

BM1-S4	95 00 974
Cabinet for installation inside wall (door and cover painted white) H 870 W 900 D 110-170 mm	

BM1-S7	95 00 975
Cabinet for installation inside wall (door and cover painted white) H 870 W 1200 D 110-170mm	

BM1-S12	95 00 976
Safety lock (2 are required for BM1-S12)	
BM1-KEY	95 00 979

Installation manual for Laing mixing module BM1

Technical data

Max pressure 6 bars (90 psi)
Max temperature 90 degrees C (194 degrees F)

floor heating loop

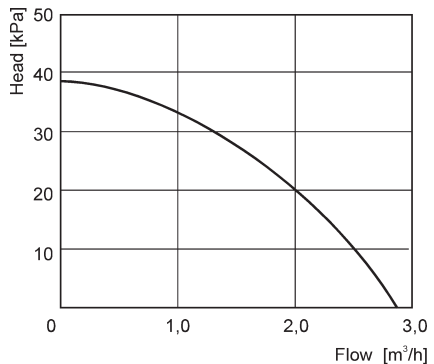
Circulator see diagram
Feed connection 1" female thread/flange for segmented plastic manifold
Return connection 1" female thread/flange for segmented plastic manifold

radiator loop

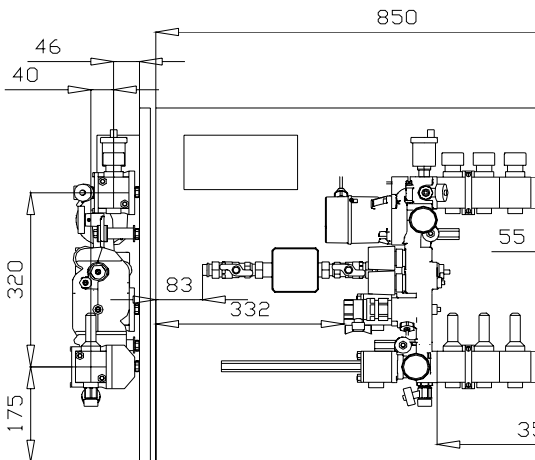
Feed connection 1" female thread/flange for segmented plastic manifold
Return connection 1" female thread/flange for segmented plastic manifold

Pump curve

The pump curve shows the hydraulic performance available at the manifold connections.



Dimensions



Changing out the circulator

To change out the circulator, first close the ball valves of the boiler feed and return. Then close the control and safety valves by deenergizing the controls.

Then drain the BM1 module through the drain valve. Make sure that the drain hose is below the level of the circulator pump. Draining the return side closes the check valve on the feed side and prevents water from coming from the feed side of the floor heating loops. When the air purger above the feed side starts to draw air, about a quarter liter more should be drained to get the water level just below the pump.

Thereafter, remove the drive unit by removing the two hex screws with a 5 mm Allen wrench. Upon removal, point the motor slightly downward to avoid that the rotor falls out of the drive unit.

After removing the drive unit, take the rotor out of the drive unit and inspect it. If the rotor has scratches in the lower part, the bearing has run out and a new drive unit needs to be installed. If the rotor is clogged, it can be cleaned and reused. Before the installation, carefully clean the seal ring between the drive unit and the housing.

After reassembly, refill the unit through the drain valve. The air should be purged through the automatic air purger. Thereafter, reopen the ball valves and reactivate the control.

Troubleshooting

Step-down control doesn't work: - The sensors for boiler feed temperature and floor heating feed temperature have not been connected properly. Connect sensors according to the appropriate instruction.

- The bypass valve is closed or opened insufficiently. Open the bypass valve according to the appropriate instruction.

The feed temperature is oscillating significantly:

- The presetting valve is opened too far, therefore too much boiler water is entering the floor heating loop. Adjust the presetting valve according to the appropriate instruction.

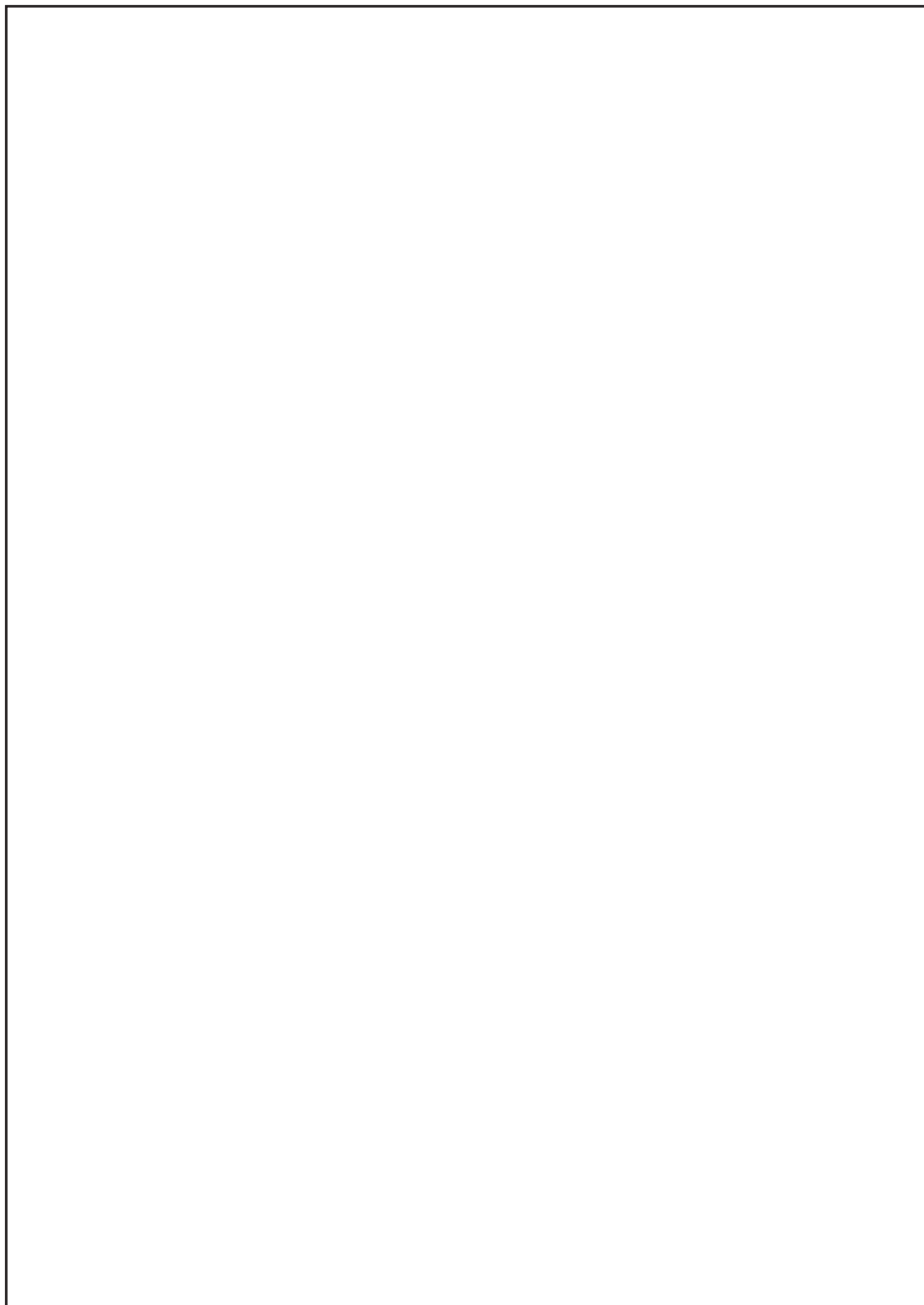
- If the heating load is very small, for example, if only one short loop is open, an oscillation of the feed temperature is normal.

Installation manual for Laing mixing module BM1

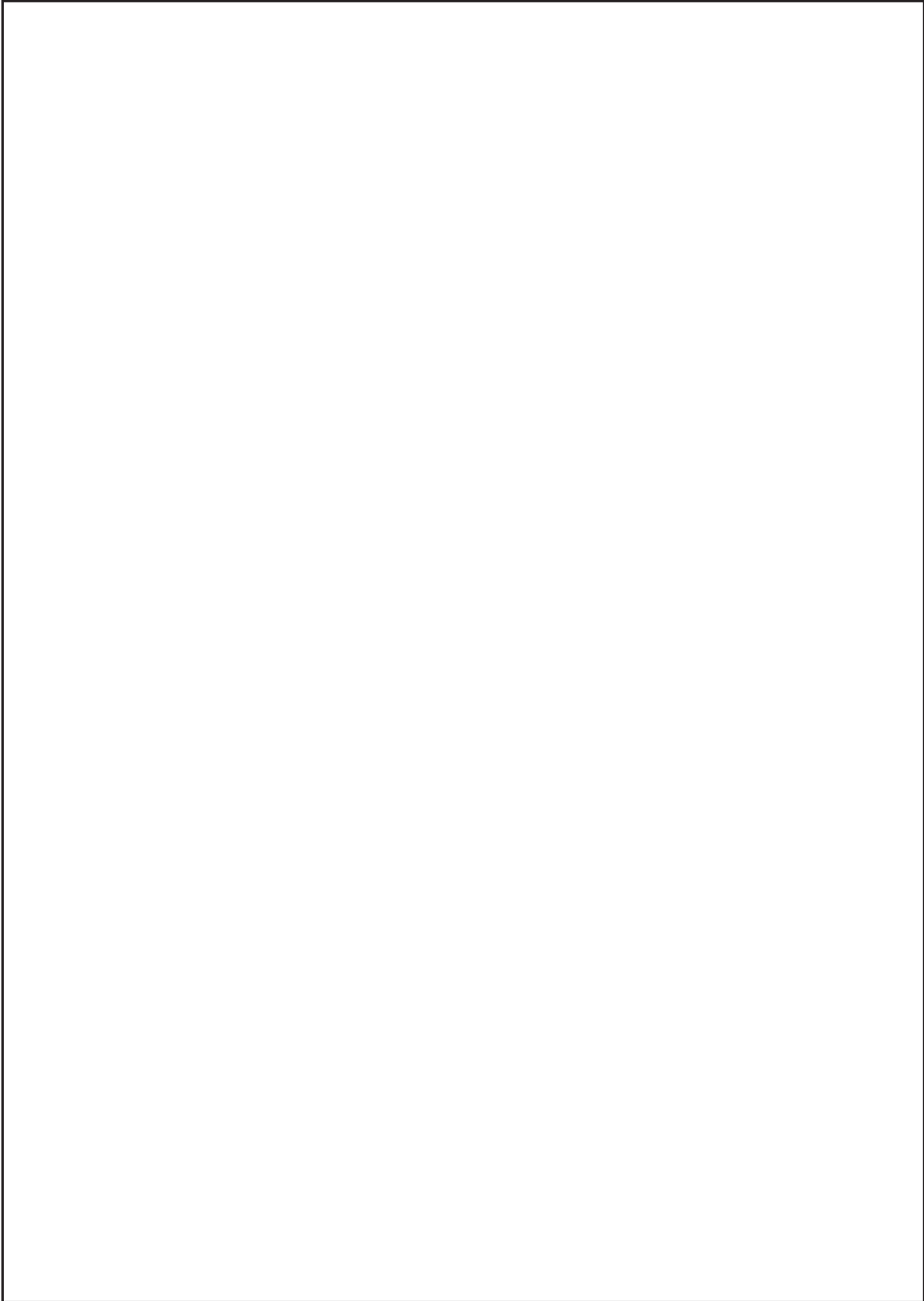
The pump is not running:

- Possibly the over temperature protection has tripped and shut off the pump.
- If not, the pump may be clogged by dirt. Remove the circulator to inspect it.

Installation manual for Laing mixing module BM1



Installation manual for Laing mixing module BM1



About us

Since the 1950s we at Laing have worked in the areas of research, development and production of pumps and heating products. More than 1000 patents worldwide resulted from this work. The original R&D institute located in Southern Germany has over the years evolved into an international company with additional locations in the US, Japan and Hungary and with more than 400 employees. Today, our program consists of:

- Pumps (Shaftless spherical motor pumps)
- Floor heating system connection
- Special products
- Heating controls
- Electrical heaters

We are a flexible and competent partner in the area of pumping and heating. We invite you to try our high quality, economic products.

The logo for Laing GmbH, featuring the word "LAING" in a bold, sans-serif font. The letter "I" is stylized with a white semi-circle on its right side.

Laing GmbH · Systeme für Wärmetechnik

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