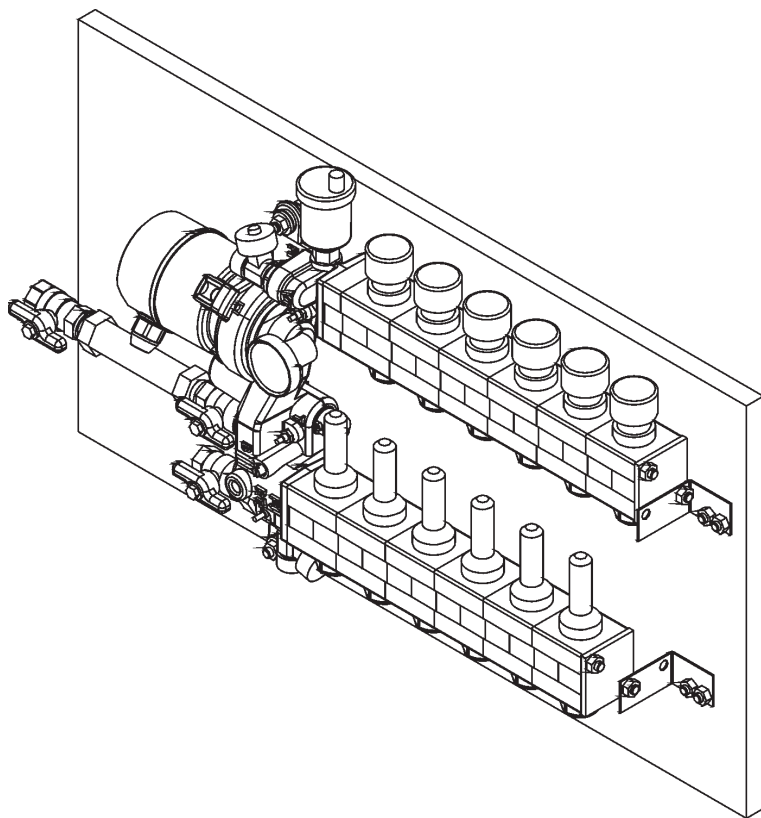


# Installation and operation manual for mixing module BM 2



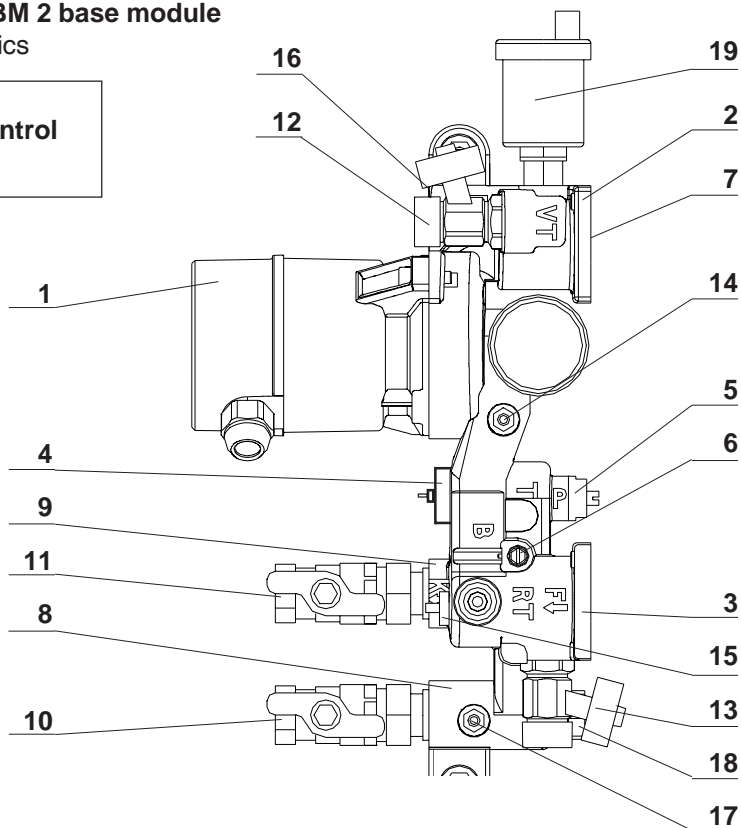
**LAING**

einfach · gut · aus prinzip

# Installation manual for Laing mixing module BM2

## Design BM 2 base module

### Schematics



- |    |                                                |    |                                                           |
|----|------------------------------------------------|----|-----------------------------------------------------------|
| 1  | circulator pump                                | 11 | ball valve boiler loop return side                        |
| 2  | floor heating loop feed side                   | 12 | fill valve                                                |
| 3  | floor heating loop return side                 | 13 | drain valve                                               |
| 4  | control valve                                  | 14 | sensor position for floor heating loop feed temperature   |
| 5  | presetting knob for control valve              | 15 | sensor position for floor heating loop return temperature |
| 6  | bypass valve                                   | 16 | sensor position for safety temperature                    |
| 7  | check valve for filling of floor heating loops | 17 | sensor position for boiler feed temperature               |
| 8  | boiler loop feed side                          | 18 | plug for calorimeter dip tube                             |
| 9  | boiler loop return side                        | 19 | automatic air purger                                      |
| 10 | ball valve boiler loop feed side               |    |                                                           |

# Installation manual for Laing mixing module BM2

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# Installation manual for Laing mixing module BM2

## Application of the BM 2 mixing module

Connection of low temperature heating systems to the boiler loop, for example

- Floor heating systems
- Wall heating systems

## Installation of the BM 2 is possible in the manifold cabinet, because

- It is very compact
- It operates very quietly
- In multifamily dwellings, the feed temperature for the low temperature loop can be selected individually for each apartment.

## Construction

**The Laing mixing module BM 2 consist of a bronze cast main body, which contains [see schematics on page 2]**

- Connections for feed and return of the boiler loop
- Connections for feed and return of the low temperature loop
- Circulator
- Control valve
- Presetting knob for control valve
- Air purger as well as fill and drain valves
- Connections for all necessary sensors
- Bypass valve

## Function

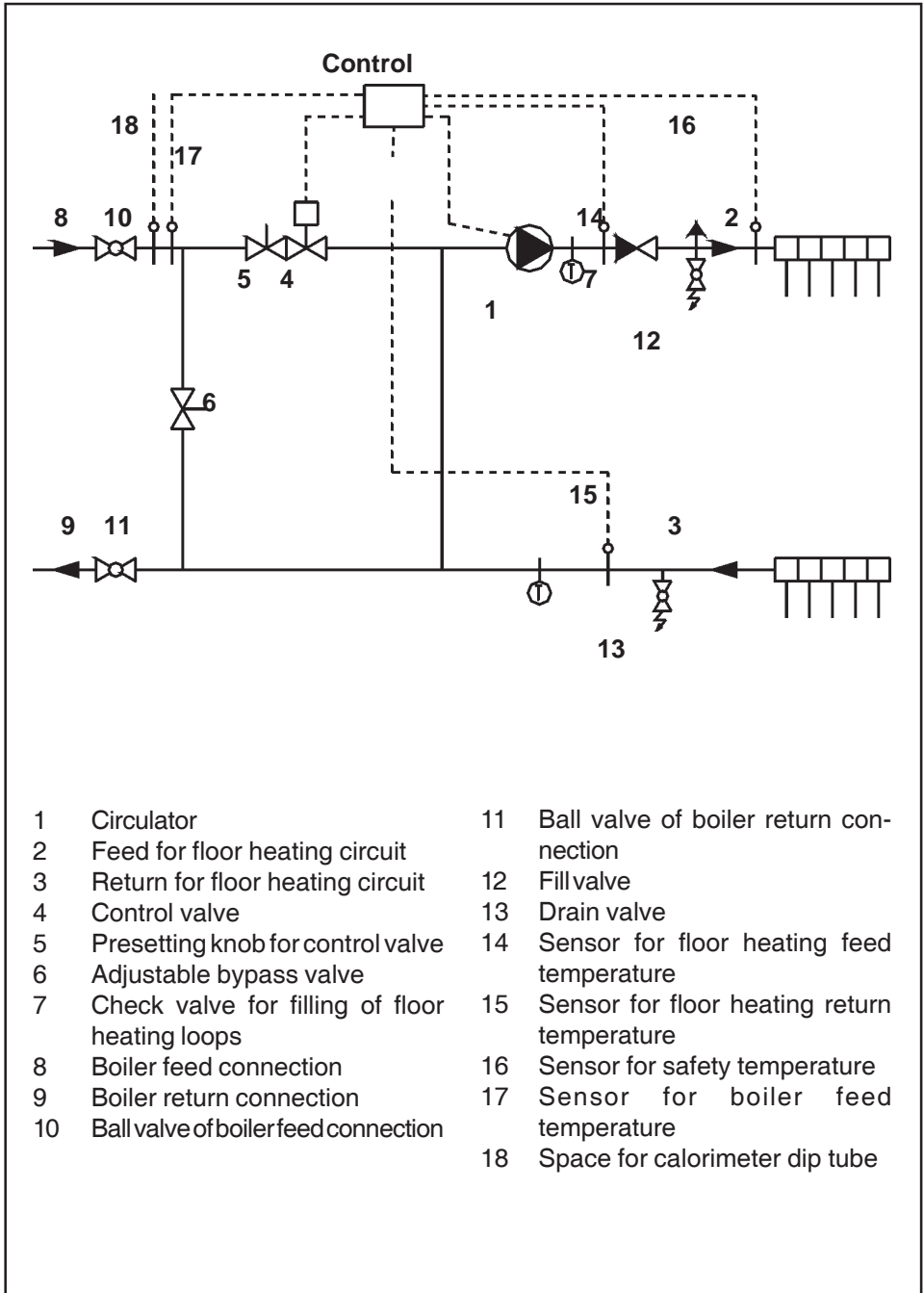
### Floor heating loop

- The circulator 1 circulates the water through the floor heating feed connection and the floor heating loops to the floor heating return connection.

### Mixing

- When the mixing valve 4 opens, boiler loop feed water 8 is mixed to the floor heating loop feed side and the same amount of water is returned from the floor heating return side 3 to the boiler loop return side 9.
- The mixing valve adjusts the quantity of water coming from the boiler loop to control the desired floor heating feed temperature.

# Installation manual for Laing mixing module BM2



# Installation manual for Laing mixing module BM2

## Presetting knob for control valve

- The control valve is equipped with a presetting knob 5, with which the maximum amount of water from the boiler loop can be reduced. The unit is shipped with the presetting knob completely open.

## Bypass for step-down control

- If the bypass valve 6 is opened, a small quantity of boiler feed water will run constantly through the mixing module. This is necessary for a step-down control, which derives its outside temperature information from the boiler feed temperature. The unit is shipped with the bypass valve opened 1/2 turn.

## Fill and drain valves

- If you fill the system from the fill valve 12, the check valve 7 will close. In this way, the water will flow through the floor heating loops and not through the mixing module. Excess water drains through the drain valve 13.

## Sensor positions integrated in the base module

- Floor heating feed temperature **14**
- Floor heating return temperature **15**
- Safety temperature **16**
- Boiler feed temperature **17**
- Dip tube for calorimeter sensor **18**

## Attaching a manifold to the BM to base module

### Attaching a Laing segmented plastic manifold

- Attach the manifolds before mounting the module.
- Attach manifolds directly to the flanges of the BM 2
- Adjusts the length of the threaded rods according to the number of zones
- Screw the threaded rods into the BM 2
- If the manifolds should be offset, use one or two 20 mm spacers on the feed or return side
- **Insert the red segments on the feed side [top], the blue segments on the return side (bottom) onto the threaded rods.** Caution: make sure that the seal surfaces and seal rings are free of dirt.
- **Close manifolds with end plate** (caution: plastic cover must face the water) **and tighten the nuts evenly.**

# Installation manual for Laing mixing module BM2

## Attaching other kinds of manifolds

- The flanges contain a 1" female thread to enable connection of other kinds of manifolds. Attach the manifolds here using a proper pipe thread sealant
- If the manifolds should be offset, use a spacer or a longer insert.
- We recommend to use a union connection between the manifolds and the base module. This facilitates disassembly in case of repairs.

## Changing the number of loops of the segmented plastic manifold

- Make sure to adjust the number of loops before installing the module in a manifold cabinet, since it may be impossible to remove the threaded rods with the unit mounted in a cabinet.

### Reduce number of loops, disassembly

- Remove both nuts at the end plate
- Remove end plate and unneeded manifold segments
- Cut the threaded rods to proper length [55 mm for every segment removed].  
Caution: take care not to damage the thread or the seal surface of the last segment.
- If the threaded rods cannot be cut in place, remove them and shorten them elsewhere. **Caution:** take care not to damage threads.

### Increase number of loops, disassembly

- Remove both nuts at the end plate
- Remove the end plate
- Remove both threaded rods
- Install new threaded rods with the appropriate length [additional 55 mm for every segment]. Caution: take care not to damage the thread.
- Install additional segments

### Reassembly of manifold

- **Caution:** if manifolds have been in operation, it is necessary to clean carefully the seal rings and the seal surfaces of each segment as well as the end plates.
- Reinstall the end plates and tighten the nuts equally.

# Installation manual for Laing mixing module BM2

## Installation of the BM 2 station

### Installation options

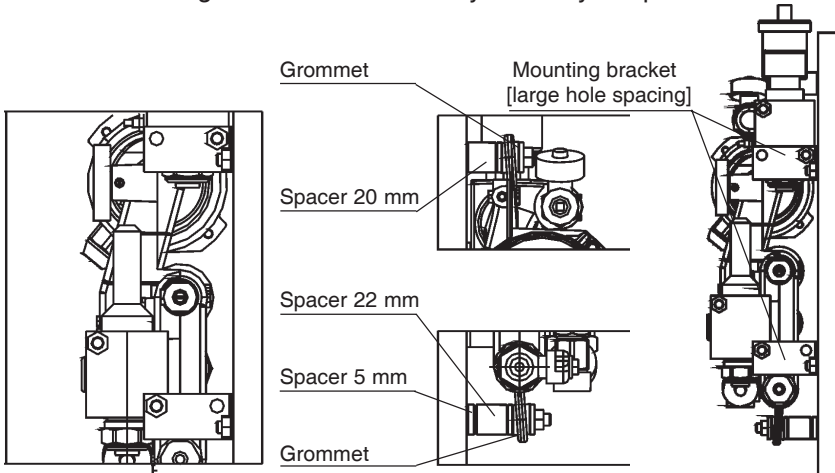
The BM 2 station can be installed in two different ways. The mounting hardware required for both ways is included with the station.

- **Parallel installation:** the floor heating pipes are guided parallel to the wall. At the place where the pipes leave the floor, they have to be fastened to ensure that they come straight up into the manifold.
- **Angled installation:** in this case the BM 2 unit is installed at an angle of approximately eight degrees, so that the floor heating pipes are guided to the wall at that angle and enter the floor directly at the wall.

### Parallel installation

The picture below shows the parallel installation with the mounting hardware attached accordingly.

- Use the 20 mm spacer at the upper mounting eyelet
- Use the 22 mm and the 5 mm spacer at the lower mounting eyelet.
- Turn the rubber grommets in such a way that they are parallel to the wall.



[The part of the grommets facing the wall has to have its thickest part facing downward]

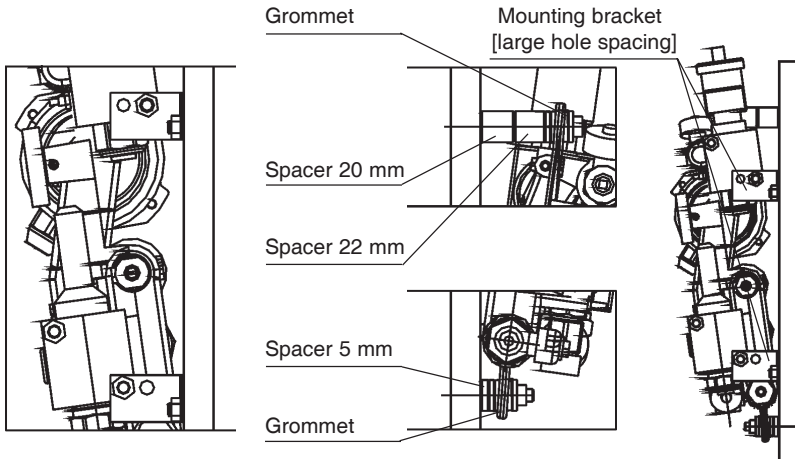
- Fix the manifold by attaching the side of the mounting bracket with the large hole spacing to the manifold.

# Installation manual for Laing mixing module BM2

## Angled installation

The picture below shows the angled installation with the mounting hardware attached accordingly

- Use the 20 mm and the 22 mm spacer at the upper mounting eyelet



- Use the 5 mm spacer at the lower mounting eyelet
- Turn the rubber grommets in such a way that they are parallel to the wall.
- Fix the manifold by attaching the side of the mounting bracket with the **small** hole spacing to the manifold.

## If you purchased the base module without manifold

- Attach the manifold [see previous chapter]
- Install the station directly on the wall or in a sufficiently large cabinet
- Use the two eyelets of the base module for installation
- Use the spacers, the grommets and the washers.
- In addition, attach the manifolds. (For the Laing segmented plastic manifold, special attachment hardware is available)

## Important advice for avoiding noise problems

- Avoid any metal contact between the base module and the wall
- Avoid any metal contact between the manifold and the wall
- Use rubber grommets at all mounting points on both sides to avoid metal contact between the mounting screws and base module or manifold [the rubber grommets and washers for the mounting eyelets of the BM 2 are supplied with the station].

# Installation manual for Laing mixing module BM2

## **If you purchased the station on mounting rails**

- Attach the station directly to the wall
- Observe the above advice for avoiding noise problems
- You can use the mounting rails to mark the mounting holes before drilling

## **If you purchased the station with cabinet**

- Remove the front cover of the cabinet
- Install the station in the appropriate niche in the wall and attach it there
- Cover the station with plastic film to keep dirt out
- Use plaster to fill the space between the niche and the cabinet
- Reattach the front cover so that the cover is flush with the plaster surface

## **Calorimeter**

- A parts kit for the attachment of a calorimeter can be ordered as an option
- Leave enough space in the return of the boiler loop for installation
- There is no need for a sensor fitting on the feed side. The feed side temperature sensor can be installed directly in the base module

## **Hydraulic connection**

### **General guideline**

- Attach the pipes taking care to avoid too much stress on the module
- To avoid noise, the station must not touch the wall or the mounting fittings. Use rubber grommets.
- The boiler loop pipes must be insulated inside the wall to avoid noise.

### **Connection**

- First connect the boiler loop return side to the BM2. If necessary, install a calorimeter here.
- Next, attach the boiler feed side to the BM 2.
- Attach the low temperature heating loops using compression fittings starting from the left side. When using plastic tubes, observe the instructions of the system manufacturer.

### **Connection of calorimeter sensor**

- The base module has a 1/2" connection for the dip tube of the calorimeter next to the boiler feed connection.
- Install the dip tube of the calorimeter here.

# Installation manual for Laing mixing module BM2

## Connection of the controls

For the connection of controls, the BM2 base module has 4 positions for thermal sensors [see sketch on page 2]

- Floor heating feed temperature for control and display [wet sensor]
- Floor heating feed temperature for safety control [dry sensor]
- Floor heating return temperature [wet sensor]
- Boiler feed temperature [wet sensor]

## Installation of wet sensors

- The sensors are directly in contact with the water. This results in fast reaction and accurate temperature sensing.
- Installs the wet sensors before filling the system.
- Insert the sensors and tighten them with the compression fitting.

## Installation of dry sensors

- The temperature is read through the wall of the base unit.
- Insert the sensors in the appropriate sensor holes
- Make sure that the sensors are held securely in place. If necessary, use silicone grease or heat conducting paste to fix them.
- Do not squeeze the sensors under any circumstances.

## Electrical connection of thermal drives, sensors and circulator

- If you ordered your station with controls, the electrical installation will have been completed already.
- If the control has been ordered separately, the sensors and the thermoelectric drive will already be connected to the control. Only the pump will have to be wired. Observe the installation manual of the control.
- Route all wires to avoid mechanical stress and ensure that they will be out of the way of anyone operating the station.

## Bypass valve 6

### Application

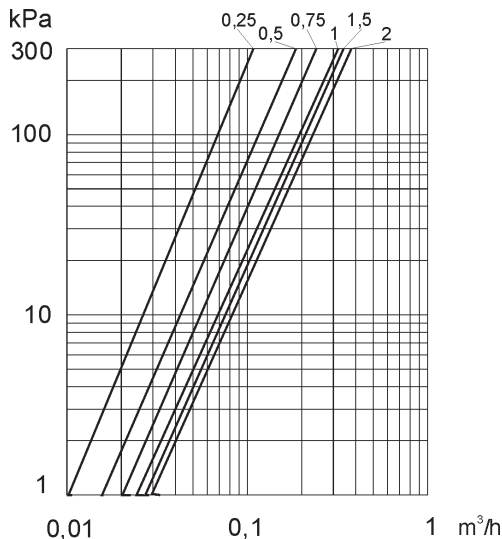
- The bypass valve is only needed when the mixing module BM 2 is operated in conjunction with a step-down control, since the step-down control derives its outside temperature information from the boiler feed temperature.
- For all other control methods, this valve remains closed. [Turn clockwise to full stop]
- The bypass forms of small connection between the boiler feed and return.

# Installation manual for Laing mixing module BM2

With the help of this bypass, the boiler feed temperature can be sensed at the boiler feed connection even when the control valve is closed.

## Setting [only in conjunction with a step down control]

- Open the bypass valve sufficiently to allow correct sensing of the boiler feed temperature even when the control valve is closed. The setting depends on the length of the boiler feed pipe, the insulation and the differential pressure of the boiler loop.
- For short boiler feed pipe lengths, is usually sufficient to open the bypass valve 1/2 turn counter clockwise.
- For long pipe runs between the boiler and the BM 2, the bypass needs to be opened further. When the control valve is closed, enough water has to circulate through the bypass so that the correct boiler feed temperature can be sensed at the boiler feed connection of the BM 2.
- Use the following diagram to set the valve correctly. It shows the flow rate through the bypass valve depending on various differential pressures in the boiler loop.
- To set the valve correctly, close it completely and then turn it counter clockwise the indicated number of turns.



Flow rate bypass valve

# Installation manual for Laing mixing module BM2

## Presetting knob for control valve 5

### Application

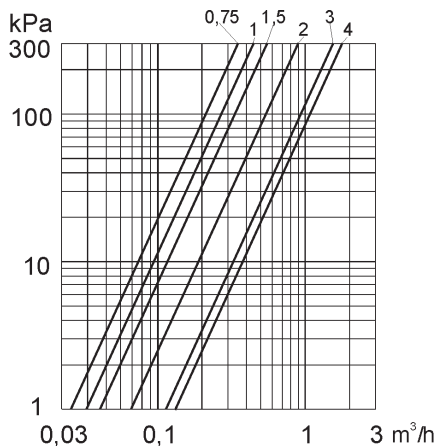
- With this knob you can adjust the resistance value of the BM 2 control valve.
- This controls the maximum amount of water which enters the BM 2 from the boiler loop with the control valve fully open.
- Use this knob to adapt the BM 2 to the heating system and to optimize the control characteristics.
- It is especially important to adjust the presetting knob correctly if several BM 2 stations are attached to one boiler loop. This ensures that all stations will get a sufficient amount of water from the boiler loop.

### Setting

- Use the diagram below for setting the presetting knob correctly. It shows the differential pressure vs. flow rate for the boiler side of the BM 2 including control valve.
- First, determine the amount of boiler water needed during peak heat demand.

Using this amount of water and the differential pressure available during peak heat demand, you find the appropriate setting of the knob in the diagram.

- Close the presetting knob completely [turn right until full stop]. Open counter clockwise the number of turns shown in the diagram.



*Resistance curve presetting knob*

# Installation manual for Laing mixing module BM2

## Filling the system

### Preparation

- Close the ball valves **10** and **11** at the boiler feed and return of the BM2 mixing module.
- Open the feed valve and return flow adjuster of the left most floor heating loop directly adjacent to the fill- and drain valves **12** and **13**
- Close the feed valves and return flow adjusters of all other floor heating loops.

### Filling of the boiler loop

- Fill the boiler loop as usual. No special precautions are necessary.

### Filling of floor heating loops

- Connect the fill hose to the upper fill valve **12**.
- Connect the drain hose to the lower drain valve **13**.
- In this way, the built in check valve **7** at the floor heating feed side will close and the water will run through the floor heating loops.
- Flush the first loop until it is completely free of air.
- Close the first loop and open the next loop going from left to right.  
Repeat until all loops have been flushed.

### After filling

- Open the valves **10** and **11** of the boiler loop
- Open all floor heating loops

### Verification of proper filling

- Shut down the heating system or set the boiler temperature to ambient
- Switch on the boiler circulator and the circulator of the mixing module
- Open the control valve. Remove the valve cover to do so if necessary.
- You should hear very few air noises, which should get less over time.
- If the air noises do not decrease but persist or even increase, is necessary to repeat the air purging as described above.

## Pressure test

### Preparation

- Open all feed valves of the floor heating loops.
- Close the ball valves **10** and **11** [which connect the module to the boiler loop]
- Close all return flow adjusters of the floor heating loops.
- Connect the pressure hose to the fill valve **12**.

# Installation manual for Laing mixing module BM2

## Pressure test

- Pressurize the pressure hose
- Now all heating loops including the compression fittings are being pressure tested.

## Start-up

### Preconditions:

- **The system boiler loop must be filled properly.**
- **The floor heating system must be filled properly**
- **A suitable control** for the BM 2 module must be in place. **Caution:** operation without a suitable control can result in overheating of the floor heating system.
- The bypass valve must be set in accordance with the control method selected and the system parameters.
- The presetting knob must be set correctly for the system.
- The heating loops must be open.
- The connection to the boiler loop [ball valves 10 and 11] must be open.

### Start-up

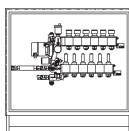
- If the preconditions are met, the system can be started up.
- First switch on the control.
- The first heating up of a floor heating system can take a **long** time since the floor can absorb a lot of heat. Additionally, in new construction, the high humidity in the slab can delay the heat up process.

# Installation manual for Laing mixing module BM2

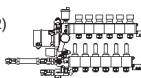
## Product line

Model                      part number

BM2 S...<sup>1)</sup>    49 00 202<sup>2)</sup>  
[With cabinets]



BM2 X...<sup>1)</sup>    49 00 602<sup>2)</sup>  
[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

BM 2 base module [with circulator]  
BM2-GM                      49 00 910

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/adjuster

VSRA                      95 00 115

Flow meter/adjuster insert

D180                      95 00 212

Compression fitting for plastic or copper pipes

KV K/S oder M                      95 00 xxx

calorimeter fit kit with spacer

BM-WMZ                      95 00 971

Thermometer

TH14                      95 00 215

Cabinet for installation inside wall [zinc plated] H 680, W 600, D 110-175 mm

BM2-S4                      95 00 980

Cabinet for installation inside wall [zinc plated] H 680, W 900, D 110-175 mm

BM2-S7                      95 00 981

Cabinet for installation inside wall [zinc plated] H 680, W 1200, D 110-175 mm

BM2-S10                      95 00 982

Cabinet for installation inside wall [zinc plated] H 680, W 1200, D 110-175 mm

BM2-S12                      95 00 983

Additional cost for front cover and door painted white

BM2-SW                      95 00 985

Additional cost for safety lock [for BM 2 - S12, two locks are required]

BM-KEY                      95 00 979

1" connection for manifold expansion

AEB 1"                      95 00 265

# Installation manual for Laing mixing module BM2

## Technical data

Maximum pressure 10 bar [150 psi]

### Floor heating loop

Circulator see diagram

Maximum temperature 60 degrees C [140 degrees F]

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

### Boiler loop

Maximum temperature 105 degrees C [220 degrees F]

Feed connection 3/4" female thread in ball valve

Return connection...

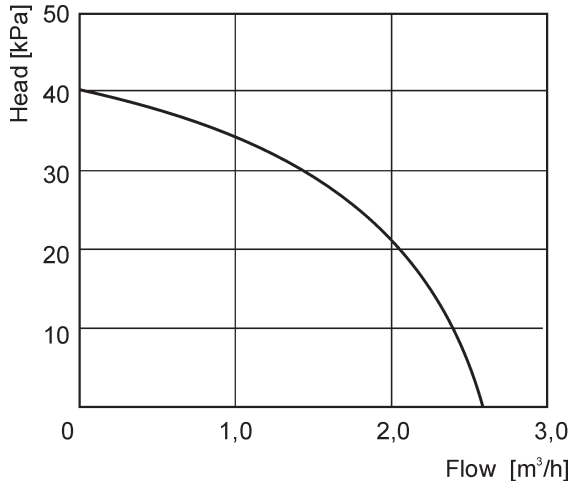
## Heating performance of BM 2 module

- The heating performance of the BM 2 module is dependent on
  - Hydraulic characteristic of the floor heating system
  - Differential pressure between boiler feed and return
  - Temperature difference between boiler loop and floor heating loop
- Example
  - Floor heating feed temperature 50 degrees C [120 degrees F]
  - Floor heating return temperature 42 degrees C [108 degrees F]
  - Pressure drop in floor heating loops including manifolds 23 kPa
  - The pump curve yields for this differential pressure a flow rate of the integrated circulator of 1.7 m<sup>3</sup>/h.
  - This means that the BM 2 module can distribute 15.8 kW. in the floor heating system.
  - With an assumed delta T in the boiler loop of 25 K. [45 degrees F], the boiler loop needs to furnish 0.5 m<sup>3</sup>/h at peak heat demand
  - Since the boiler return temperature is equal to or larger than the floor heating return temperature, the minimum boiler feed temperature at peak heat demand is 67 degrees C [150 degrees F]
  - The diagram for the presetting knob which adjusts the boiler side differential pressure shows that for this flow rate, the differential pressure in the boiler loop needs to be at least 20 kPa.

# Installation manual for Laing mixing module BM2

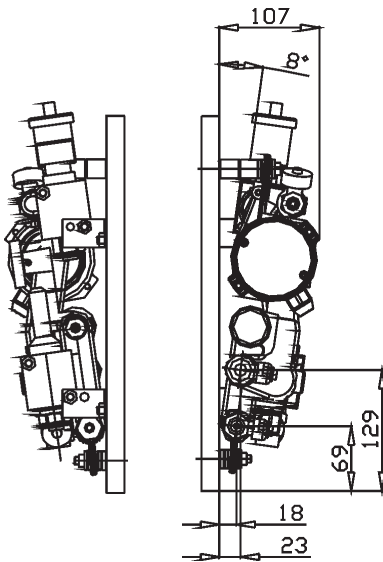
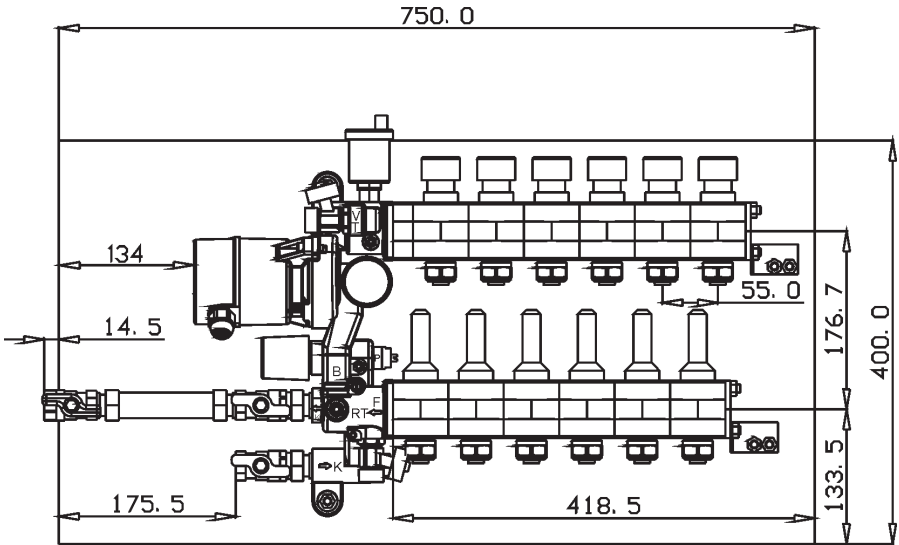
## Pump curve

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

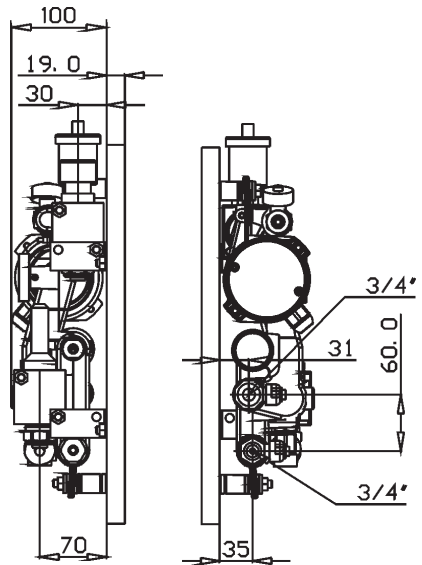


# Installation manual for Laing mixing module BM2

## Dimensions



Side view for angled installation



Side view for parallel installation

## Changing out the circulator

### Preparation

- **Caution:** only a properly licensed electrician should disconnect and reconnect the circulator.
- Remove electrical power even if you only want to clean the circulator and not remove it.
- Close the ball valves 10 and 11 on the boiler feed and return side
- Connect the drain hose to the lower drain valve 13. In this way, the check valve 7 will close automatically and the manifold will not drain completely.
- Make sure that the drain hose can drain below the level of the circulator pump

### Draining of the water

- Open the drain valve 13
- When all water has drained, loosen the upper pump mounting screw to allow air entry.
- Drain an additional 1/4 liter.
- Now the water should be below the level of the pump

### Changing the circulator

- Remove both pump mounting screws.
- Take care when removing the pump since the rotor is only sitting loosely on the ceramic ball and can fall out. Tilt the wiring end downward slightly to prevent this.
- After removing the drive unit you can remove the rotor and clean it if necessary.
- If the rotor have scratches in the lower part, the bearing has run out and a new drive unit needs to be installed
- Have a properly licensed electrician disconnect the old circulator and reconnect a new one.
- Before reassembly, carefully clean the seal ring and the housing.
- Reinsert the drive unit and tighten the two pump mounting screws

### Restarting the system

- Refill unit by connecting the drain hose to a faucet. The air will bleed through the automatic air purger.
- Open the valves on the boiler feed and return side

# Installation manual for Laing mixing module BM2

- Re-energize the unit
- The unit should be ready for operation

## Troubleshooting

- If you use Laing controls, you'll get error messages for many typical errors. You find the explanation of these error messages in the manual of the control. In many cases, this will help to correct the error.

- 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:

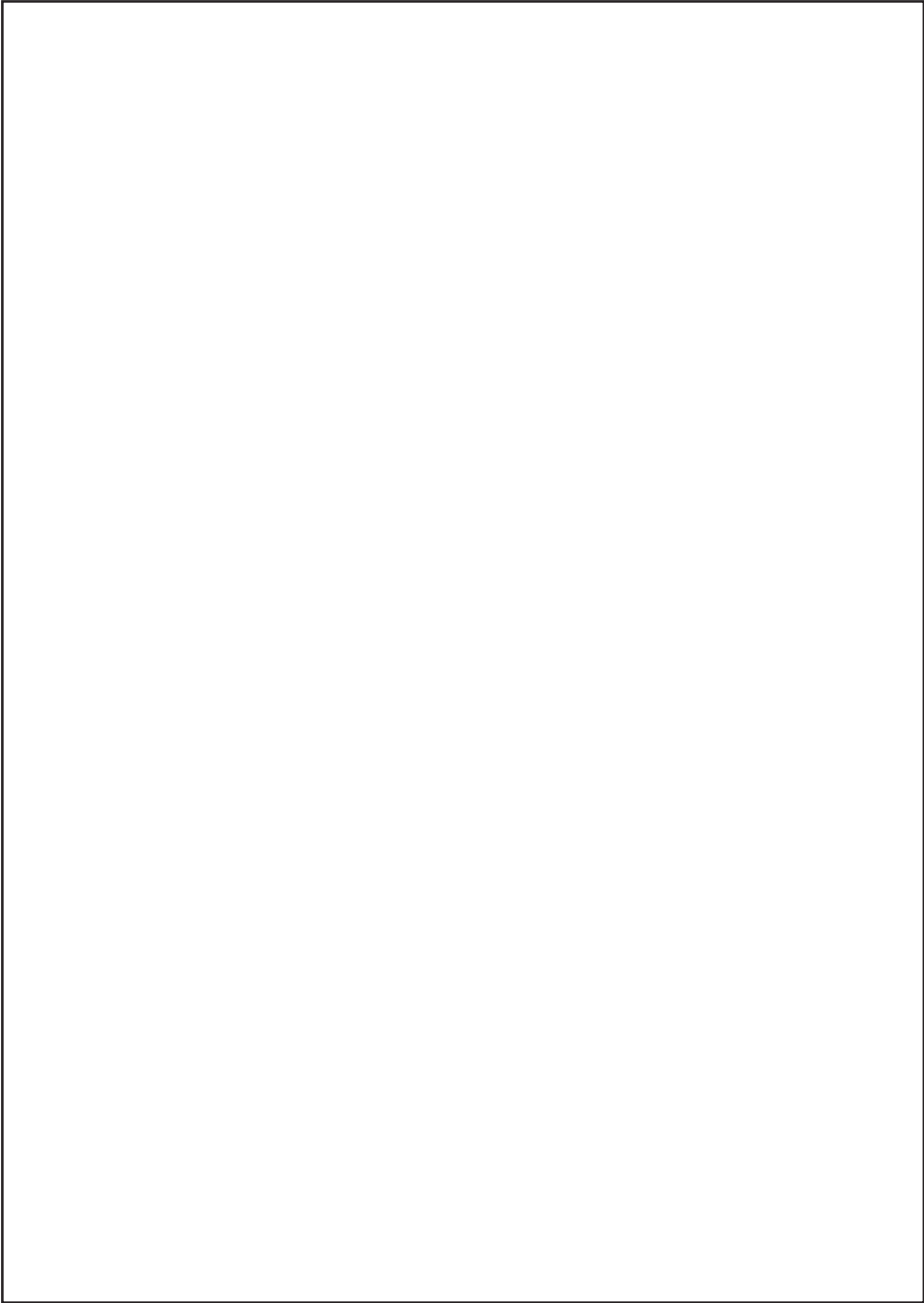
- The presetting valve is opened too far, therefore too much boiler water is entering the floor heating loop. Adjust the presetting valve according to the appropriate instruction.
- If the heating load is very small, for example, if only one short loop is open, an oscillation of the feed temperature is normal.

The pump is not running:

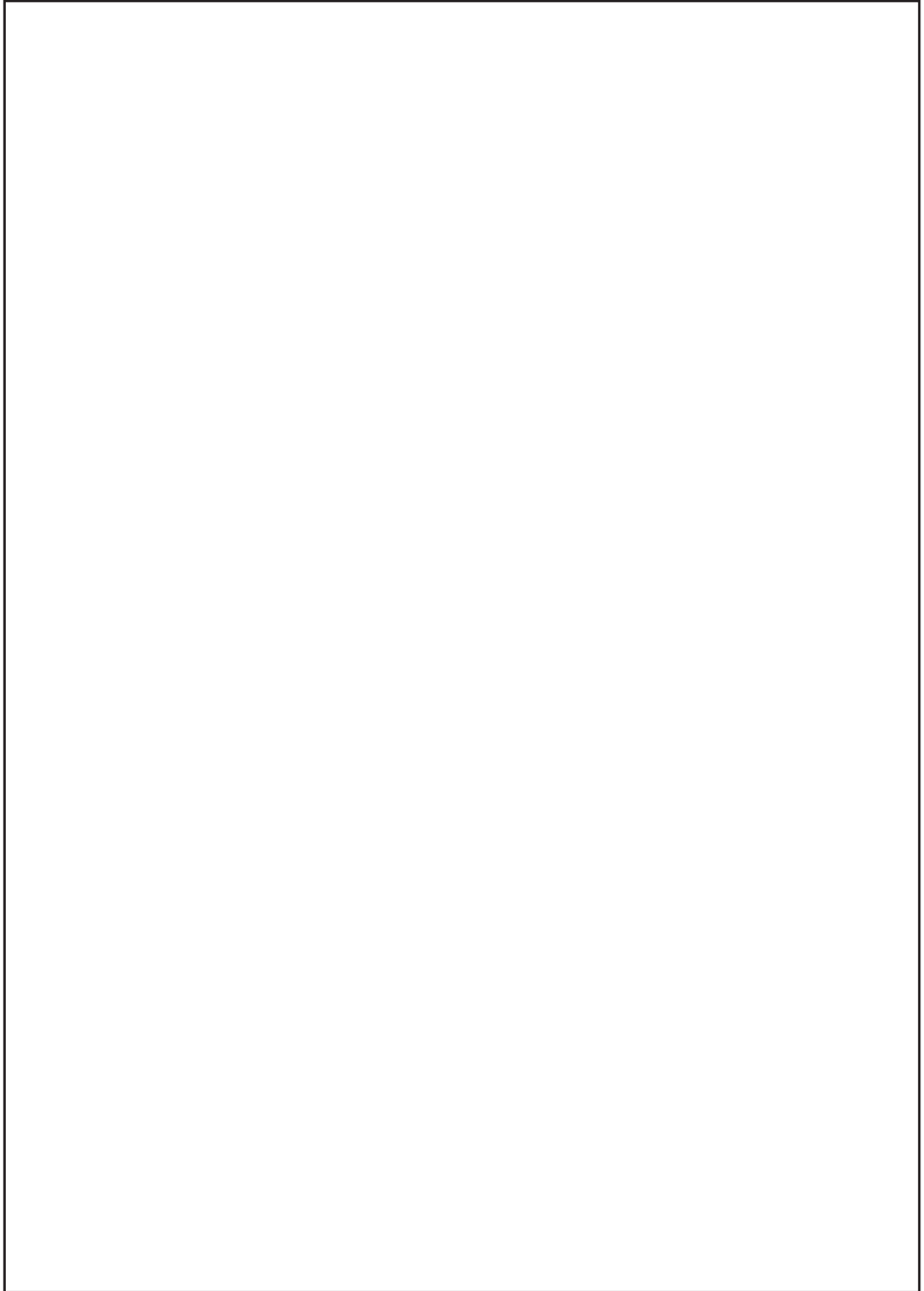
- Possibly the over temperature protection has tripped and shut off the pump.
- If not, the pump may be clogged by dirt. Remove the circulator to inspect it.

Heating performance is insufficient:

- The presetting knob is turned in too far
- The bypass valve is opened too far
- The system is just being put into service, in which case it may take longer to heat the floor for the first time. As long as the floor heating return temperature is still cold, the feed temperature also cannot increase independently since most of the feed water comes from the floor heating return and only a small portion is boiler water.



# Installation manual for Laing mixing module BM2



## 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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