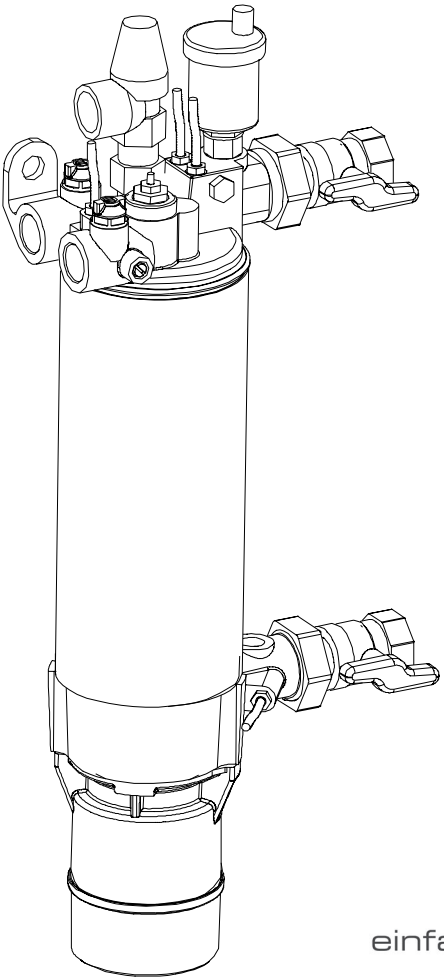
Installation and Operating Manual for Heat Exchanger Pump
FP 12
FP 15



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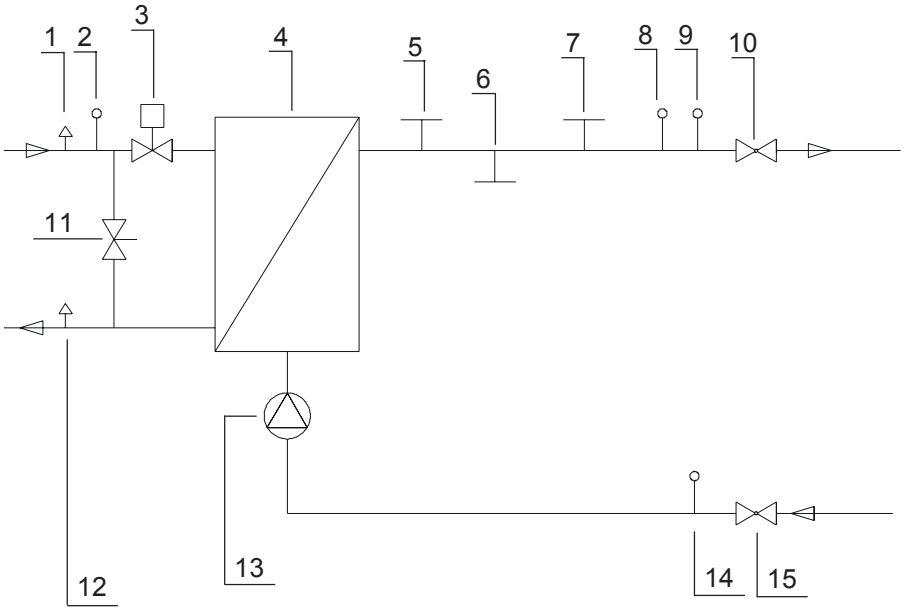
Schematic Hydraulic Diagram



Legend

1. Manual air purger boiler feed side
2. Temperature sensor boiler feed side
3. Control valve for primary side flow rate
4. Heat exchanger
5. Connection for pressure relief valve
6. Connection for pressure gauge
7. Connection for automatic air purger
8. Feed temperature sensor for secondary side
9. Safety temperature sensor for secondary side feed temperature
10. Ball valve
11. Bypass valve
12. Manual air purger boiler return side
13. Pump
14. Return temperature sensor
15. Ball valve

Table of contents

Schematic Hydraulic Diagram 2
Application 4
Basic design FP 12, FP 15 4
Technical Data 6
Pressure loss diagram 6
Dimensional drawing (dimensions are in mm) 7
Available models 10
Planning a floor heating system with heat exchanger pump 11
Table for heat exchanger pump FP 12 12
Table for heat exchanger pump FP 15 13
Installation 14
Hydraulic connection 14
Electrical connection 15
Overheating Protection 15
Control of the heat exchanger 15
Advice for retrofit installation 16
Sensor Installation 18
Sensor installation for remote controls 20
Installation of thermoelectric drive 21
Filling of the System 21
Pressure and leakage test 22
Startup 22
Setting the Bypass Valve 23
Laing Plastic Manifold Segments 23
Important Remarks Regarding the Control of the Heat 24
exchanger 24
Important Advice when Using the Heat exchanger Pump for
System Separation 25
Important Advice for Using Heat exchanger Pumps for 25
retrofit System Separation 25
Important Advice to Avoid or eliminate Noise Problems 26
Important Advice for changing the circulator pump 26

Application

The heat exchanger pumps are used wherever a pump is needed in addition to a heat exchanger. One of the main applications is the system connection for floor heating systems.

The heat exchanger pump in this application is used for

- the mixing function for the floor heating loop and –
- the separation of the floor heating loops from the boiler loop.

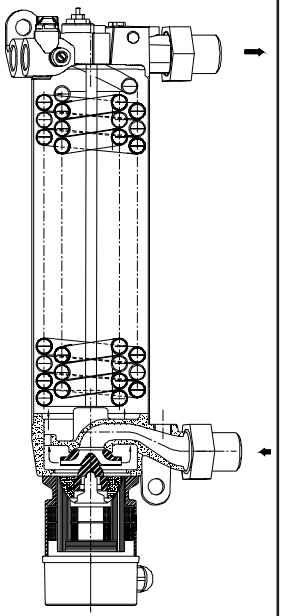
Further applications are:

- outsideside surface heating whereby the heat exchanger pump separates the part filled with antifreeze from the boiler loop
- solar installations where the heat exchanger pump separates the secondary water loop from the boiler loop or from the collector loop filled with antifreeze.

District heating systems where the heat exchanger pumps separates the district heating loop from the loop inside the house.

Basic design FP 12, FP 15

- The heat exchanger pump is a combination of a circulator pump and a copper tube heat exchanger.
- A spherical motor circulator pump is mounted underneath the heat exchanger. The pump has a very low noise level which does not increase over time.
- The mounting of the pump underneath the heat exchanger ensures that the swivel of the pump can extend into the heat exchange area. This results in a very good heat transfer performance that results in compact dimensions.
- The water for the secondary side is drawn in by the pump at the bottom, pumped across the copper heat exchanger and exits the heat exchanger at the top.
- The water of the boiler loop enters through the connection at the top part of the heat exchanger pump, goes through the copper coil and exits again from the top part.



- At the suction side of the floor heating loop a 3/8” connection is provided for the connection of an expansion tank.
- Integrated into the top part of the heat exchanger pump are:
  - At the exit into the floor heating loop a half inch connection for air venting
  - additionally a half inch port for the connection of a pressure relief valve
  - for the primary side a preadjustable control valve which controls the flow through the heat exchange coil
  - manual air vents for feed and return side of the primary loop
  - a manually adjustable bypass valve which connects the feed at return side of the boiler loop. This bypass allows monitoring of the boiler feed temperature even with closed control valve. This function is needed if a step down control is to be used.

- The heat exchanger pumps have the following sensor connections:
  In the top part:
  - feed temperature sensor for the floor heating loops
  - safety temperature sensor for the feed temperature of the floor heating loops
  - sensor for the feed temperature of the boiler loops

  In the bottom part:
  - sensor for the return temperature of the floor heating loops
- At the top and the bottom of the heat exchanger pump mounting eyelets are provided.
- The heat exchanger pumps FP 12 and FP 15 have different types of heat exchangers.
  - The heat exchanger of the FP 12 consists of two coils which are arranged one inside the other, so that they fill the space as best as possible.
  - If the temperature difference between primary side and secondary side is small (condensing boilers, district heat) the FP 15 offers

advantages. The FP 15 is a counterflow heat exchanger which is advantageous when the temperature differences are small. The FP 15, however, is 200 mm longer than the FP 12.

Technical Data

	FP 12	FP 15
heat transfer capacity	see table A	see table B
max. primary side pressure	10 bar	
max. secondary side pressure	6 bar	
max.primary side temperature	110°C	
max. secondary side temperature	110°C	
primary side connections	3/4" IG	
secondary side connections	1" IG	
weight	8,8 kg	9,5 kg

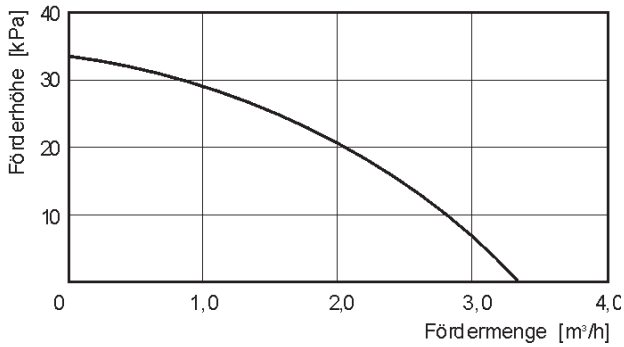
pump

max. pump head	32 kPa
max. flow rate	3,4 m^3/h

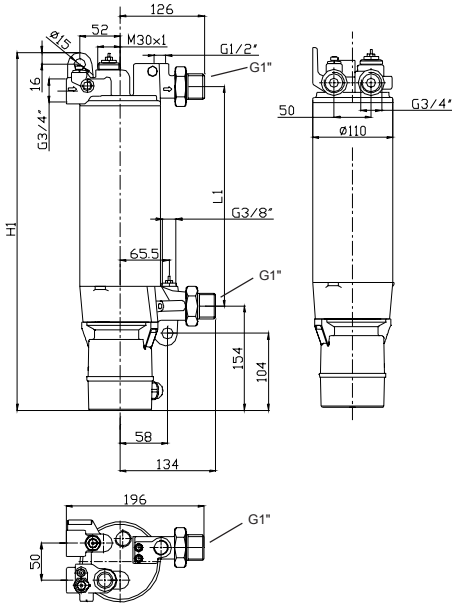
motor

design spherical motor	
power consumption	99 W
mechanical power	35 W
voltage	230 V
current	0,49 A

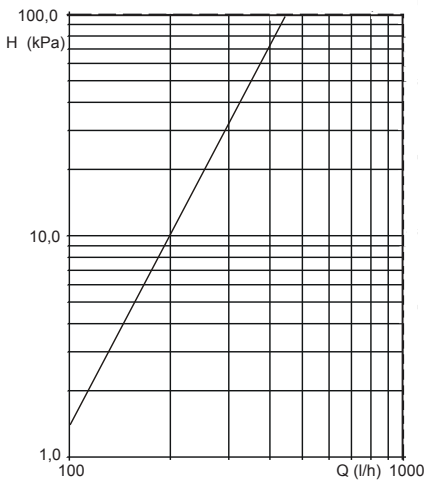
Pressure loss diagram



Dimensional drawing (dimensions are in mm)

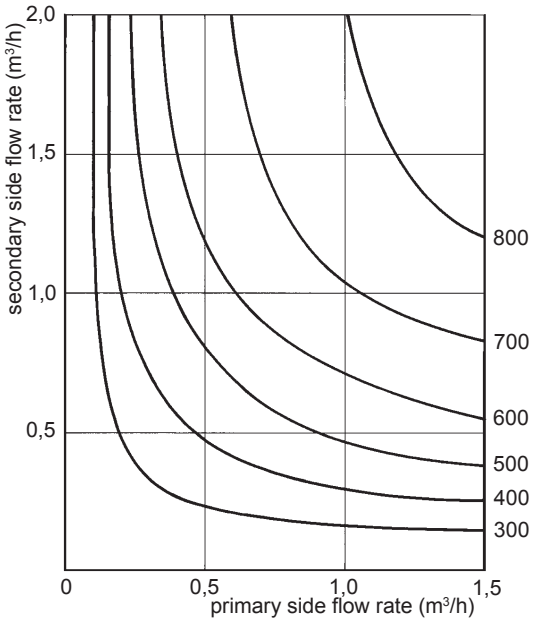


Pressure loss diagram for the primary side of heat exchanger pumps FP 12 and FP 15 pressure loss in the diagram includes the heat exchanger and the integrated control valve.

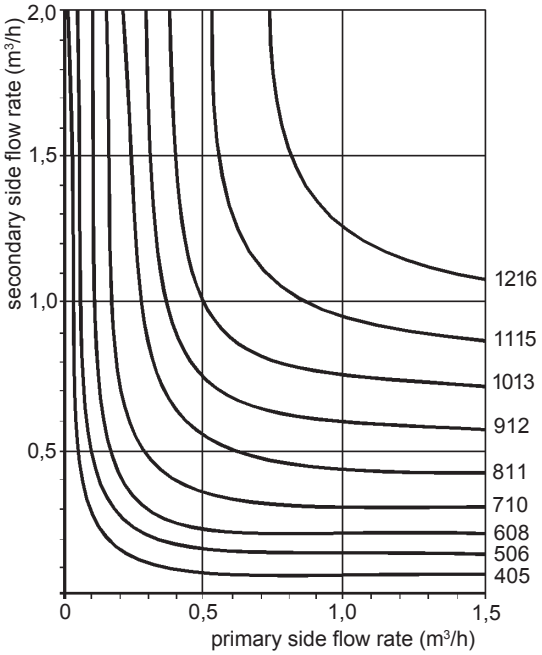


Typ	L1
H1	
FP 12	300
499	
FP 15	500
699	

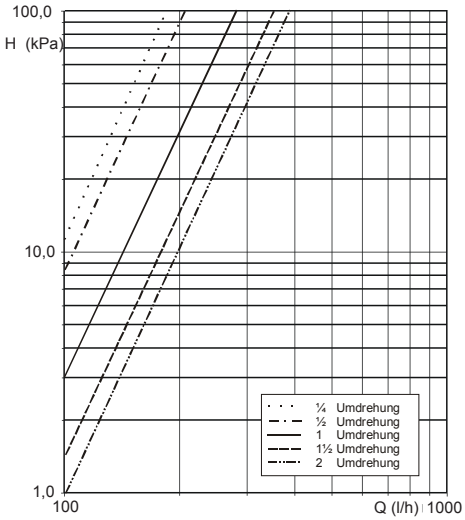
Heat transfer diagram
for the heat exchanger pump FP 12 (heat transfer of the heat exchanger per degree K temperature difference in relation to primary and secondary side flow rates).



Heat transfer diagram
for the heat exchanger pump FP 15 (heat transfer of the heat exchanger per degree K temperature difference in relation to primary and secondary side flow rates).



Pressure loss of the bypass valve in the primary side depending on the number of turns which the valve is opened.



Available models

Individual units
Heat exchanger FP
Heat exchanger with integrated circulator pump; primary side control valve; manually adjustable bypass for step down control, corrosion proof, primary side connection 3/4" female thread, secondary side union connection with ball valve 1" female thread.

model	part number	heat transfer
FP12	35 00 000	ca. 12 kW
FP15	35 00 120	ca. 15 kW

Central station without manifolds
Heat exchanger central station with pressurized expansion tank on mounting plate FP Z
Heat exchanger with integrated circulator pump; primary side control valve; manually adjustable bypass for step down control; pressurized expansion tank (6 l); safety valve; pressure gauge; mounting plate; corrosion resistant; connection primary side ¾" female thread, secondary side union connection with ball valve 1" female thread

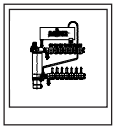
model	part number	heat transfer
FP12 Z	46 00 000	ca. 12 kW
FP15 Z	46 00 200	ca. 15 kW

Substation with manifolds
Heat exchanger substation
Heat exchanger with integrated circulator pump; primary side control valve; manually adjustable bypass for step down control; temperature gauge for feed and return temperature; fill and drain valve; check valve; primary side connection ¾" female thread; plastic manifolds including flow adjusters, flow meters and connections, corrosion resistant.

FP 12/15 with pressureless expansion tank

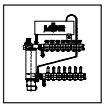
model	part number
FP 12 S .. [1]	45 00 000 [2]

(in wall mount cabinet)



FP 12 X .. [1]	45 00 500 [2]

(on mounting rails/wooden board for transport)



FP 15 X .. [1]	45 00 520 [2]

(on mounting rails/wooden board for transport)

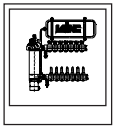
FP 12/15 with pressurized expansion tank

model	part number
FP 12 SD .. [1]	45 00 050 [2]

(in wall mount cabinet)

FP 15 SD .. [1]	45 00 070 [2]

(in wall mount cabinet)



FP 12 XD .. [1]	45 00 550 [2]

(on mounting rails/wooden board for transport)

FP 15 XD .. [1]	45 00 570 [2]

(on mounting rails/wooden board for transport)

[1] add the number of loops to the model

[2] add the number of loops of the manifold to the part number

Accessories for Heat exchanger

model	part number	description
A5-400	95 00 093	replacement pump for FP 12/15 (without switch/with external capacitor)

Controls
See Laing Controls brochure.

Planning a floor heating system with heat exchanger pump

Planning the floor heating system

- When planning a floor heating system with a Laing heat exchanger pump you have to consider that the pump performance of the secondary side is fixed with the integrated circulating pump. The remainder is the same as with non separated systems. The system separation only changes the required boiler feed temperature. Since the heat exchanger has a certain temperature drop, the boiler feed temperature needs to be a few degrees higher than for direct connection of the floor heating system. The heat exchange does not result in energy loss.

Determination of feed and return temperatures of primary side (boiler loop)

- first the floor heating system is calculated without considering system separation.
- from this calculation the following data are obtained:
  - heat requirement Q in kW
  - feed temperature t_{vs} in °C
  - return temperature t_{rs} in °C
  - necessary differential pressure DP_P in kPa
- These in turn determine:
  - temperature difference Dt_s in K
  - flow rate V_s in l/h
- In the table in the first column the performance is listed.
- Locate the appropriate performance, then locate the feed and return temperatures in columns 2 and 3.
- Column 4 shows the resulting flow rate.
- Column 5 shows the pump head at this flow rate
- Check whether the available pump head is larger than the largest required differential pressure for the floor heating system. If this is the case, the performance of the integrated circulated pump is sufficient. If not, increase the temperature difference or modify the distribution of heating loops in such a way that the pump performance is sufficient.
- Next the primary side temperatures are determined. For this, the differential pressure of the primary side circulator pump is necessary. Locating the appropriate column corresponding to this differential pressure, the primary side feed and return temperatures can be found. Verify that the temperatures found there are less or equal the boiler feed temperature. If this is not the case, and if the boiler feed temperature can not be increased, the primary side pump pressure needs to be increased or the feed and return temperatures of the floor heating side need to be reduced. It is not necessary to check the primary side return temperature.

Example

- For a floor heating system the following data were calculated:
  - heat requirement Q = 11 kW
  - feed temperature t_{vs} = 45 °C
  - return temperature t_{rs} = 37 °C
  - differential pressure at manifolds DP_S = 27 KPa
  - differential pressure of boiler side circulator pump DP_P = 23 kPa

Question

- Is the integrated circulator in the heat exchanger pump sufficient?
- Which temperatures are required on the primary side to achieve this heat capacity?

Answer

- the table does not show a performance of 11 kW. To be on the safe side, select the next higher performance, in this case 12 kW.
- from the secondary side feed and return temperatures a flow rate of 1290 l/h and a resulting pump head of 27 kPa result. These values are greater than the maximum differential pressure required for the floor heating system. The circulator pump therefore is sufficient in performance.
- if the primary side differential pressure is not listed in the table, choose the column for the next smaller differential pressure. In this case we select 20 kPa. The primary side flow rate therefore is 550 l/h.
- The table shows us that the primary side boiler temperature has to be at least 71°C. The return temperature is 53°C.

Table for heat exchanger pump FP 12

Secondary side (floor heating)					Primary side (boiler loop)					
data calculated for the floor heating system					heat requirement for floor heating					
[kW]	Floor Heating Feed Temperature [°C]	Floor Heating Return Temperature [°C]	Floor Heating Flow rate [l/h]	Differental Pressure for Floor Heating loops [kPa]	10 kPa	15 kPa	20 kPa	25 kPa	30 kPa	35 kPa
					resulting primary side flow rate					
					390 l/h	500 l/h	550 l/h	650 l/h	710 l/h	800 l/h
					necessary primary side feed temperature/ resulting return temperature [°C]					
6	50	40	516	32	68 / 55	66 / 55	65 / 55	63 / 55	62 / 55	62 / 55
	50	42	645	32	69 / 56	65 / 55	64 / 55	63 / 55	62 / 55	61 / 55
	45	35	516	32	63 / 50	61 / 50	60 / 50	58 / 50	57 / 50	57 / 50
	45	37	645	32	64 / 51	60 / 50	59 / 50	58 / 50	57 / 50	56 / 50
	45	40	1032	29	63 / 49	59 / 49	59 / 49	57 / 49	57 / 49	56 / 49
	40	32	645	32	59 / 46	55 / 45	54 / 45	53 / 45	52 / 45	51 / 45
	40	35	1032	29	58 / 44	54 / 44	54 / 44	52 / 44	52 / 44	51 / 44
	35	30	1032	29	53 / 39	49 / 39	49 / 39	47 / 39	47 / 39	46 / 39
8	50	40	688	31	75 / 57	71 / 57	69 / 57	67 / 57	66 / 57	65 / 57
	50	42	860	30	74 / 56	70 / 56	69 / 56	67 / 56	66 / 56	64 / 56
	45	35	688	31	70 / 52	66 / 52	64 / 52	62 / 52	61 / 52	60 / 52
	45	37	860	30	69 / 51	65 / 51	64 / 51	62 / 51	61 / 51	59 / 51
	45	40	1376	26,5	67 / 50	64 / 50	63 / 50	61 / 50	60 / 50	59 / 50
	40	32	860	30	64 / 46	60 / 46	59 / 46	57 / 46	56 / 46	54 / 46
	40	35	1376	26,5	62 / 45	59 / 45	58 / 45	56 / 45	55 / 45	54 / 45
	35	30	1376	26,5	57 / 40	54 / 40	53 / 40	51 / 40	50 / 40	49 / 40
10	50	40	860	30	80 / 58	75 / 58	74 / 58	71 / 58	70 / 57	68 / 57
	50	42	1075	28	79 / 57	74 / 57	73 / 57	70 / 57	69 / 57	68 / 57
	45	35	860	30	75 / 53	70 / 53	69 / 53	66 / 53	65 / 52	63 / 52
	45	37	1075	28	74 / 52	69 / 52	68 / 52	65 / 52	64 / 52	63 / 52
	45	40	1720	24	73 / 51	69 / 52	67 / 52	65 / 51	64 / 52	63 / 52
	40	32	1075	28	69 / 47	64 / 47	63 / 47	60 / 47	59 / 47	58 / 47
	40	35	1720	24	68 / 46	64 / 47	62 / 47	60 / 46	59 / 47	58 / 47
	35	30	1720	24	63 / 41	59 / 42	57 / 42	55 / 41	54 / 42	53 / 42
12	50	40	1032	29	85 / 59	79 / 58	77 / 58	74 / 58	73 / 59	71 / 59
	50	42	1290	27	84 / 57	78 / 58	76 / 58	74 / 58	73 / 58	71 / 58
	45	35	1032	29	80 / 54	74 / 53	72 / 53	69 / 53	68 / 54	66 / 54
	45	37	1290	27	79 / 52	73 / 53	71 / 53	68 / 53	68 / 53	66 / 53
	45	40	2064	20	79 / 53	73 / 53	71 / 52	69 / 53	68 / 53	66 / 53
	40	32	1290	27	74 / 47	68 / 48	66 / 48	64 / 48	63 / 48	61 / 48
	40	35	2064	20	74 / 48	68 / 48	66 / 47	64 / 48	63 / 48	61 / 48
	35	30	2064	20	69 / 43	63 / 43	61 / 42	59 / 43	58 / 43	56 / 43
15	50	40	1290	27	92 / 59	85 / 60	83 / 60	80 / 60	78 / 60	76 / 60
	50	42	1612	25	92 / 59	85 / 59	83 / 60	79 / 59	78 / 60	76 / 60
	45	35	1290	27	87 / 54	80 / 55	78 / 55	75 / 55	73 / 55	71 / 55
	45	37	1612	25	87 / 54	80 / 54	78 / 55	74 / 54	73 / 55	71 / 55
	45	40	2580	15	88 / 55	81 / 55	78 / 55	75 / 55	74 / 55	72 / 56
	40	32	1612	25	82 / 49	75 / 49	73 / 50	69 / 49	68 / 50	66 / 50
	40	35	2580	15	83 / 50	76 / 50	73 / 50	70 / 50	69 / 50	67 / 51
	35	30	2580	15	78 / 45	71 / 45	68 / 45	65 / 45	64 / 45	62 / 46
18	50	40	1548	25	100 / 61	92 / 61	90 / 62	85 / 62	83 / 61	81 / 62
	50	42	1935	21,5	101 / 61	92 / 61	89 / 61	85 / 62	84 / 62	82 / 62
	45	35	1548	25	95 / 56	87 / 56	85 / 57	80 / 57	78 / 56	76 / 57
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	50	42	2257	18,5	110 / 63	100 / 64	96 / 63	92 / 64	90 / 64	87 / 65
	45	35	1806	22,5	104 / 58	95 / 58	91 / 58	86 / 58	84 / 59	82 / 59
	45	37	2257	18,5	105 / 58	95 / 59	91 / 58	87 / 59	85 / 59	82 / 60
	43	35	2257	18,5	103 / 56	93 / 57	89 / 56	85 / 57	83 / 57	80 / 58
	40	32	2257	18,5	100 / 53	90 / 54	86 / 53	82 / 54	80 / 54	77 / 55

Table for heat exchanger pump FP 15

Secondary side (floor heating)					Primary side (boiler loop)					
data calculated for the floor heating system					heat requirement for floor heating					
[kW]	Floor Heating Feed Temperature [°C]	Floor Heating Return Temperature [°C]	Floor Heating Flow rate [l/h]	Differental Pressure for Floor Heating loops [kPa]	10 kPa	15 kPa	20 kPa	25 kPa	30 kPa	35 kPa
					resulting primary side flow rate					
					390 l/h	500 l/h	550 l/h	650 l/h	710 l/h	800 l/h
					necessary primary side feed temperature/ resulting return temperature [°C]					
6	50	40	516	32	64 / 51	61 / 51	60 / 51	59 / 51	58 / 51	58 / 51
	50	42	645	32	64 / 51	61 / 51	60 / 51	59 / 51	58 / 51	58 / 51
	45	35	516	32	59 / 46	56 / 43	55 / 46	54 / 46	53 / 46	53 / 46
	45	37	645	32	59 / 46	56 / 43	55 / 46	54 / 46	53 / 46	53 / 46
	45	40	1032	29	59 / 45	56 / 43	55 / 46	54 / 46	53 / 46	52 / 46
	40	32	645	32	54 / 41	51 / 41	50 / 41	49 / 41	48 / 41	48 / 41
	40	35	1032	29	54 / 40	51 / 41	50 / 41	49 / 41	48 / 41	47 / 41
	35	30	1032	29	49 / 35	46 / 36	45 / 36	44 / 36	43 / 36	42 / 36
8	50	40	688	31	68 / 51	65 / 51	64 / 51	62 / 51	61 / 51	60 / 52
	50	42	860	30	68 / 51	65 / 51	64 / 51	62 / 51	61 / 51	60 / 52
	45	35	688	31	63 / 46	60 / 46	59 / 46	57 / 46	56 / 46	55 / 47
	45	37	860	30	63 / 46	60 / 46	59 / 46	57 / 46	56 / 46	55 / 46
	45	40	1376	26,5	63 / 46	60 / 46	59 / 46	57 / 46	56 / 46	55 / 46
	40	32	860	30	58 / 41	55 / 41	54 / 41	52 / 41	51 / 41	50 / 42
	40	35	1376	26,5	58 / 41	55 / 41	54 / 41	52 / 41	51 / 41	50 / 41
	35	30	1376	26,5	53 / 36	50 / 36	49 / 35	47 / 36	46 / 36	45 / 36
10	50	40	860	30	73 / 51	68 / 51	67 / 51	65 / 51	64 / 52	63 / 52
	50	42	1075	28	73 / 51	68 / 51	67 / 51	65 / 51	64 / 52	63 / 52
	45	35	860	30	68 / 46	63 / 46	62 / 46	60 / 46	59 / 47	58 / 47
	45	37	1075	28	68 / 46	63 / 46	62 / 46	60 / 46	59 / 47	58 / 47
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12	50	40	1032	29	78 / 51	72 / 51	70 / 51	68 / 52	66 / 52	65 / 52
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15	50	40	1290	27	84 / 51	78 / 52	75 / 52	72 / 52	71 / 52	69 / 53
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	45	37	1612	25	80 / 47	73 / 47	71 / 47	67 / 47	66 / 48	64 / 48
	45	40	2580	15	81 / 48	74 / 48	72 / 48	68 / 48	67 / 49	65 / 49
	40	32	1612	25	75 / 42	68 / 42	66 / 42	62 / 43	61 / 43	59 / 43
	40	35	2580	15	76 / 43	69 / 43	67 / 43	63 / 43	62 / 44	60 / 44
	35	30	2580	15	71 / 38	64 / 38	62 / 38	58 / 38	57 / 39	55 / 39
18	50	40	1548	25	92 / 52	83 / 52	81 / 53	77 / 53	75 / 53	75 / 53
	50	42	1935	21,5	92 / 52	83 / 52	81 / 53	77 / 53	75 / 53	75 / 53
	45	35	1548	25	87 / 42	78 / 47	76 / 48	72 / 49	70 / 49	68 / 48
	45	37	1935	21,5	87 / 42	78 / 47	76 / 48	72 / 49	70 / 49	68 / 48
	43	35	1935	21,5	85 / 45	77 / 46	74 / 46	70 / 47	68 / 47	66 / 47
	40	32	1935	21,5	82 / 42	74 / 43	71 / 43	67 / 44	65 / 44	63 / 44
21	50	40	1806	22,5	99 / 53	89 / 53	86 / 53	82 / 54	80 / 54	77 / 54
	50	42	2257	18,5	99 / 53	90 / 54	87 / 54	82 / 54	80 / 54	77 / 54
	45	35	1806	22,5	94 / 48	84 / 48	81 / 48	77 / 49	75 / 49	72 / 49
	45	37	2257	18,5	94 / 48	85 / 49	82 / 49	77 / 49	75 / 49	72 / 49
	43	35	2257	18,5	92 / 46	83 / 47	80 / 47	75 / 47	73 / 48	71 / 48
	40	32	2257	18,5	89 / 43	80 / 44	77 / 44	72 / 44	70 / 45	68 / 45

Installation

The heat exchanger pump must be mounted with the pump facing downwards.

For mounting, eyelets are provided in the top and bottom castings. To avoid vibration noise, rubber grommets should be used in both eyelets. These rubber grommets are supplied with the heat exchanger pump and have to be installed in such a way that no metal contact between the casting and the mounting surface is present. The heat exchanger pump also should not touch the wall at any other place, for example the shell or the pump. When installing the heat exchanger pump, please note that approximately 60 mm space should be left beneath the circulator pump for changing the circulator.

Hydraulic connection

Primary side

The primary side connection is done at the two ¾ „ connections in the top casting. The feed side should be connected to the front connection, the return to the connection closer to the wall. To allow servicing of heat exchanger pump, ball valves should be installed in the boiler feed and return side. The integrated control valve is needed to control the temperature. It will be equipped with a thermoelectric drive.

Secondary side

The connection on the secondary side is done with the 1” connections of the ball valves included with the heat exchanger pump. The feed side is on top, the return on the bottom. The 3/8” connection on the return side of the heating loop is for an open or close expansion tank. If the expansion tank can not be connected to this place, it can be connected anywhere on the return side, but not on the feed side. The ½” connection at the feed exit of the top casting is for an automatic air purger for the heating loops. The second ½” connection is for a pressure relief valve if a pressurized expansion tank is to be used.

Hydraulic connection FP series

Electrical connection

Caution: Electrical work must be performed by a properly licensed electrician.

The pump must not be operated without water. If the electrical connection is done before the system is filled, the pump may only be run for a few seconds since otherwise the bearing may get damaged.

To connect the system electrically, only the pump needs to be connected to the mains voltage supply. Please note that the pump should run continuously during the heating period. Outside the heating period the pump must be switched off. A switch needs to be installed for this. If a Laing control is used, the pump is wired directly to the control. This control also will shut down the pump for summer.

Overheating Protection

When using the heat exchanger pump in floor heating systems, it is recommended to use over temperature protection to avoid over temperature damage. All Laing controls include such over temperature protection.

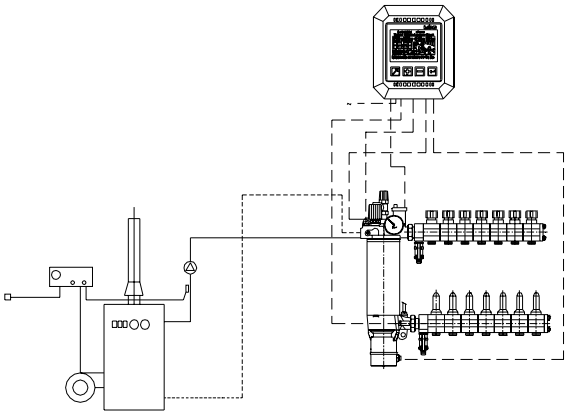
Control of the heat exchanger

The design of the Laing heat exchanger pump allows the use of simple control elements whereby the heat exchanger pump functions like a mixing valve. To control the secondary side feed temperature of the heat exchange pump, that is, the feed temperature of the floor heating system, no mixing valve is needed on the primary side.
The valve integrated in the top part of the heat exchanger pump controls the flow rate on the primary side of the heat exchanger in such a way that the feed temperature on the secondary side corresponds to the temperature required

by the control. This results in significant savings on the system. No mixing valve is necessary, no second set of pipes from the boiler to the floor heating manifold cabinet is needed. The temperature required for the floor heating system is provided directly in the manifold cabinet. In principle, the control is done exactly like a three-way mixing valve.The circulator pump integrated in the heat exchanger pump keeps the secondary side flow rate constant. The primary side control valve adjusts the primary side flow rate to the actual heat demand. To control the heat exchanger, a variety of systems are available (see Laing control program).

Advice for retrofit installation

When separating a floor heating system which has been in use for some time, it is in most cases the easiest solution to keep the existing control and to control the heat exchanger with a Laing series MR control in such a way that the outside temperature information is derived from the boiler feed temperature. For this, the manual bypass valve in the heat exchanger pump needs to be opened enough to allow the determination of the boiler feed temperature even when the control valve is closed. The MR control then takes the feed temperature of the boiler loop and derives from it the outside temperature so that the control valve can provide the correct feed temperature for the secondary side. The steepness of the old control needs to be increased by a value of approximately 0,3 to 0,5 to compensate for the temperature drop in the heat exchanger and the MR control is set to compensate for this increase. In this way, the old control provides the primary side sensor with information regarding the outside temperature and the MR control reduces the heating temperature to the value needed for the floor heating system. It is not important whether the temperature drop of the heat exchanger is 20 K if all loops are operating or 2 K if only a bathroom loop is open. In both cases the temperature is controlled by the existing control through the temperature information provided.



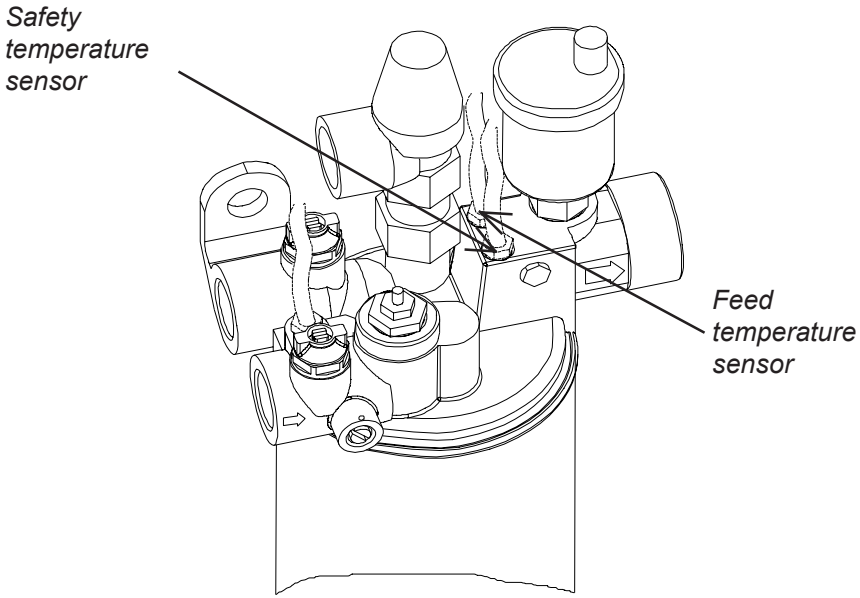
Sensor Installation

Basic remarks regarding sensor installation

The heat exchange pump is supplied without sensors. The sensors are included with the Laing controls and are prewired to these controls. The sensors are wet sensors which are in direct contact with the liquid. Therefore the sensors have to be installed before the system (primary and secondary side) is filled with water. When mounting the sensors, make sure that the seal surfaces are clean so that the O-rings can seal properly.

Feed temperature and safety temperature sensor installation

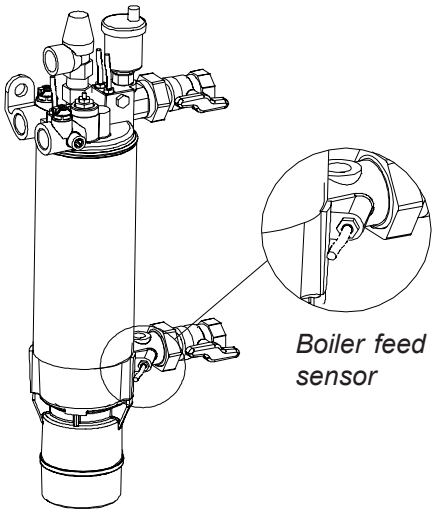
The feed temperature and safety temperature sensors are used to measure the feed temperature of the floor heating loop. They are installed on the feed side of the floor heating loop. Remove the plugs, install the sensor and tighten the nuts.



Return temperature sensor installation

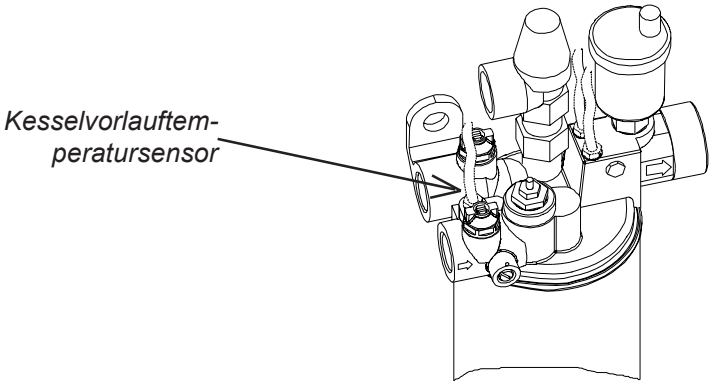
- The return temperature sensor is used to measure the return temperature of the floor heating loop.
- It is installed in the heat exchanger pump in the appropriate hole of the pump housing.
- Remove the plug, insert the sensor and tighten the nut.

Boiler feed temperature sensor installation



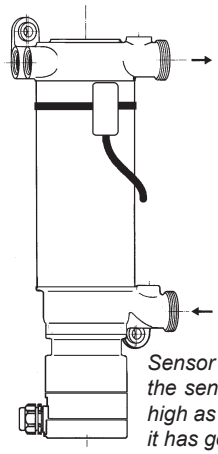
Boiler feed temperature sensor

- The boiler feed temperature sensor is used to measure the boiler feed temperature.
- This sensor is used when a step down control is used which derives the outside temperature from the boiler feed temperature.
- The sensor is installed at the top part of the heat exchanger at the boiler feed side.
- Remove the plug, insert the sensor and tighten the nut.

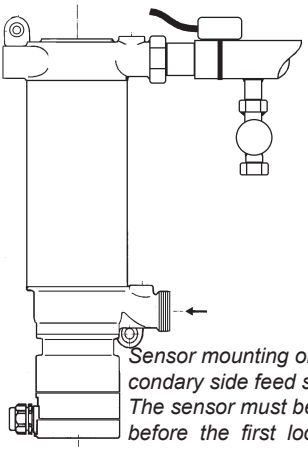


Sensor installation for remote controls

- The sensor of the boiler control (feed temperature for boiler control = component of an external control) is used when the heat exchanger pump is to be controlled by an external control, for example a boiler control.
- The heat exchanger pump is connected to this control with the Laing remote control module.
- The safety sensor of the remote control is installed as described above at the feed side of the floor heating loop.



Sensor installation on the shell: the sensor must be mounted as high as possible. Make sure that it has good thermal contact.



Sensor mounting on these-condary side feed side: The sensor must be positioned before the first loop and with good thermal contact

- The feed temperature sensor of the boiler control is attached to the shell of the heat exchanger pump for the secondary side feed side as described in the pictures.

Installation of thermoelectric drive

- The thermoelectric drive for the control valve is included with the Laing controls.
- It is installed on the control valve integrated in the top part of the heat exchanger and fixed by tightening the ring nut.

Filling of the System

- When filling the system, as with every heating system, take care to fill the system completely.
- Since the heating system is divided into a primary and a secondary loop, both loops need to be filled.
- If the heat exchanger pump is used to connect the floor heating system, the secondary side must never be filled with water from the primary side, since otherwise corrosion products can be washed into the floor heating loop which can cause damage in the otherwise completely corrosion resistant loops an can cause malfunction.
- When the heating loop is filled with fresh water, the pressure of the water is decreased and the temperature increased. Both leads to the creation of air bubbles. This is the same effect as when you open a bottle of soda water. If you fill a floor heating system with a heat exchanger pump, please observe that the air bubbles can not accumulate in radiators like it would happen in systems without separate loops.
- This leads to air circulating in the heating loops, whereby the pump may cease operation due to airlock and the bearing may get damaged.
- Therefore take care to remove the air for a period up to two weeks after filling and replenish the water accordingly.
- If a Laing substation with heat exchanger pump is employed, observe the filling instruction included with the station.

Pressure and leakage test

- For pressure and leakage test, observe that the expansion tank, the pressure relief valve and the pressure gauge usually can not withstand the pressure necessary for these tests.
- Therefore, remove these parts before the pressure test and close the connection ports.
- If a Laing substation with pressureless expansion tank is to be pressure tested, the pressure hose is connected to the fill valve on the top manifold . The return flow adjusters (flow meters) of the lower manifold must all be closed. Then the loops can be pressure tested without problems.

Startup

- The system can be started up after it has been completely filled, the pump and control has been wired and the control has been set.
- Check whether the feed temperature sensor of the control has been installed at the secondary side feed side.
- If this is correct, you can start up the pump.
- Due to remaining air in the system some flow noises may initially occur.
- If these don't subside after a few minutes, or if the pump is not circulating properly, the air can be purged faster by switching off and on the pump several times (on for approximately 20 sec., off for approximately 10 sec.).
- If this is unsuccessful for 10 minutes, the system needs to be filled again, since too large amounts of air have remained in the system.
- The pump should never run longer than a few minutes in a system with air, since the bearing may get damaged.
- After the pump has been successfully started, it is recommended to run the system for 24 hours without heating to facilitate the removal of remaining air in the system.
- Thereafter, the system should slowly be heated up. This can be done automatically using the floor drying program of the MR 10V or MR 20V controls.
- During the startup, it is necessary to frequently check and replenish the water since air removal will lead to decreasing levels.

- If this is not observed, the pump may start running dry and interrupt the circulation.
- This may lead to damage of the pump bearing.

Setting the Bypass Valve

- Important: The bypass valve is only needed when the heat exchanger pump is controlled with a step down control (Laing MR control with operating mode UR). For all other controls, the valve should stay closed.
- The bypass valve allows monitoring of the primary side feed temperature even when the control valve is closed.
- The bypass valve returns an adjustable quantity of water from the boiler feed side to the boiler return side independent of the control valve position.
- Open the control valve far enough to allow measuring of the proper boiler feed temperature at the heat exchanger pump.
- If the heat exchanger pump is mounted close to a main riser, a small amount of water through the bypass will be sufficient. If it is mounted far away from the boiler, the flow rate must be larger so that the water will not cool down too much during the time it takes to reach the heat exchanger pump when the control valve is closed.
- The diagram of the bypass valve flow rate is included.

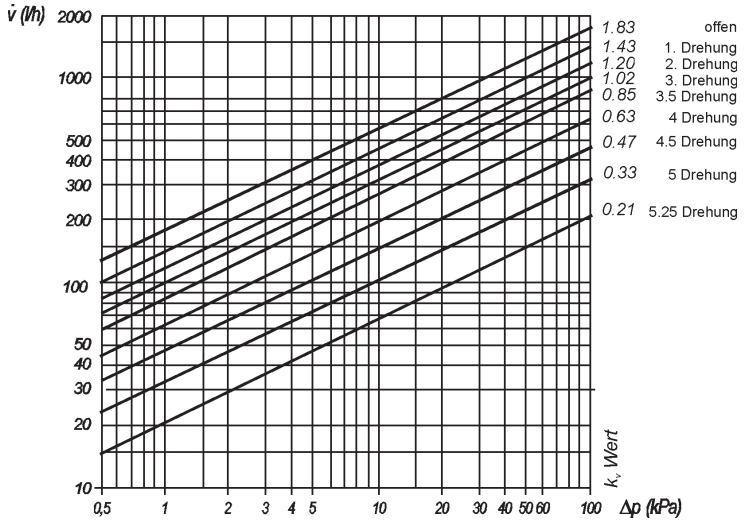
Laing Plastic Manifold Segments

- The Laing substations with manifolds are equipped with plastic manifold segments which make it easy to add or remove loops.
- The return segments are equipped with manual flow adjusters, which can be used to easily adjust the hydraulic characteristics.
- To adjust the flow rate, turn the transparent shell of the flow meter until the flow meter shows the correct value.
- The feed side segments contain valve inserts with a plastic control knob which can be removed and replaced with a thermoelectric drive (Laing model TEA). In this way, zone control can be achieved.

Flow resistance for one loop, feed side completely open, return side preadjusted

Example:

Pump pressure or pressure loss	0,1 bar (10 kPa),
Desired flow rate	150 l/h
Setting	4,5 turns right from the full open posi tion of the return flow adjuster



Important Remarks Regarding the Control of the Heat exchanger

- The heat exchanger pump must have a proper control for the feed temperature of the secondary side.
- The control of the primary side is not sufficient. If this is not observed, over temperature damage may occur in floor heating systems.
- To control the feed temperature of the heat exchanger pump, the feed temperature of the secondary side loop must be monitored. The control of this temperature is done by adjusting the flow rate of the primary side with the integrated control valve. When using a step down control, the integrated manual bypass must be opened far enough to allow monitoring of the

primary side feed temperature even when the control valve is closed.

Important Advice when Using the Heat exchanger Pump for

- Using the heat exchanger pump for system separation, a maximum of safety and longevity can be obtained by the following simple rule.
- On the secondary side of the heat exchanger pump, no corrosive materials must be used at any time. This includes all elements installed in the

- If only a very small part is corrosive, this part acts as sacrificial anode for the complete floor heating system, on which the corrosive action of the whole floor heating system is concentrated.
- Correspondingly, such a part will corrode very quickly, resulting in very aggressive rust sludge which may cause failure of valves or pumps.

Important Advice for Using Heat exchanger Pumps for retrofit System Separation

- By using a heat exchanger pump for retrofit system separation, it is possible to repair a problematic installation with a maximum of safety and longevity.
- The following advice needs to be observed:
  - On the secondary side of the heat exchanger pump (floor heating system separated from the boiler loop), no corrosive material must be used (see „important advice when using the heat exchanger pump for system sepa- ration").
  - This also includes riser pipes, manifolds and possibly radiators connected to the existing manifold.
  - If the riser pipes are of corrosive material, the system separation must be done directly before or in the manifold cabinet, so that the water of the floor heating loops does not come in contact with the corrosive riser pipes.
  - If this condition can not be met, the safest option not to separate the systems at all.
  - Additionally, it is necessary to flush out all the corrosive deposits from the floor heating system before the separation.
  - Usually it is not sufficient to flush the loops with water.
  - The deposits can only be removed using chemical additives.

- To achieve this, a pump with a container should be connected to the heating loops and, depending on the degree of dirt, cleaning liquid should be circulated for several days until all the deposits have been washed out of the system (see instructions of corresponding vendors).

Important Advice to Avoid or eliminate Noise Problems

- Since the heat exchanger pump is often installed inside the house or apartment, it is very important to avoid noise problems.
- One important point is that the heat exchanger pump and the pipes connected to it have to be mounted with rubber grommets so that sound conduction is avoided. This also has to be observed for the pipes leading to the heat exchanger pump.
- If there is direct mechanical contact, for example by an incomplete insulation, this can have a big influence on noise.
- In installations with few or short loops, or in other installations in which for whatever reason flow noises are present, the noise can be reduced by using the pump speed control integrated in all Laing controls.

Important Advice for changing the circulator pump

- If for whatever reason it is necessary to change or service the circulator pump, first disconnect the unit from the electrical supply and drain the heat exchanger pump.
- To do this with a heat exchange substation with manifold, close all flow adjusters on the return side and connect a hose to the drain valve on the return manifold. When opening the valve, approximately 4 to 8 l water will drain.
- With a heat exchanger pump without manifold, close feed and return side and drain the water by loosening the two mounting screws of the pump.
- Then remove the pump by opening the two mounting screws. Take care when removing the pump to not tilt it too much since otherwise the rotor may fall out.
- After removal of the pump, take out the rotor by pulling it upwards and check it for deposits or dirt, if necessary.
- When reinstalling the pump, make sure to first place the rotor in the pump and then the gasket since otherwise the rotor may get damaged.
- Before starting up the system again make sure to fill the secondary side and to purge the air properly.

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.

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