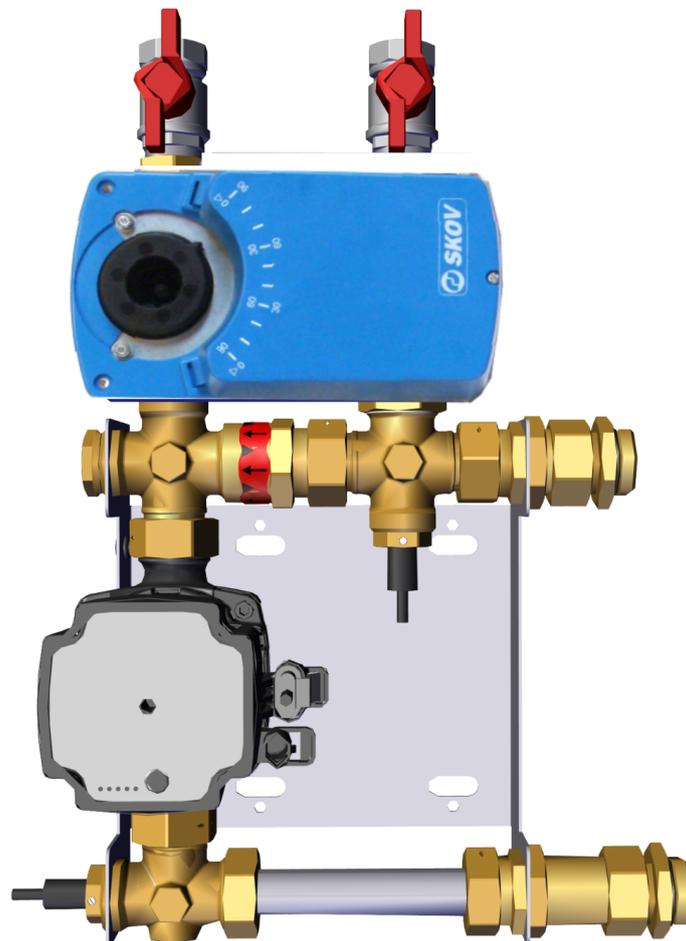


# Floor Heating System

## Technical User Guide



**English** For other language variants of this document we refer to:

**Español** Para otras variantes del idioma de este documento, visite:

**Français** Pour les versions dans d'autres langues de ce document veuillez consulter:

<http://docs.skov.com/1226>



### **Product and Documentation Changes**

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The date of change appears from the front and back page.

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## 1 Product description

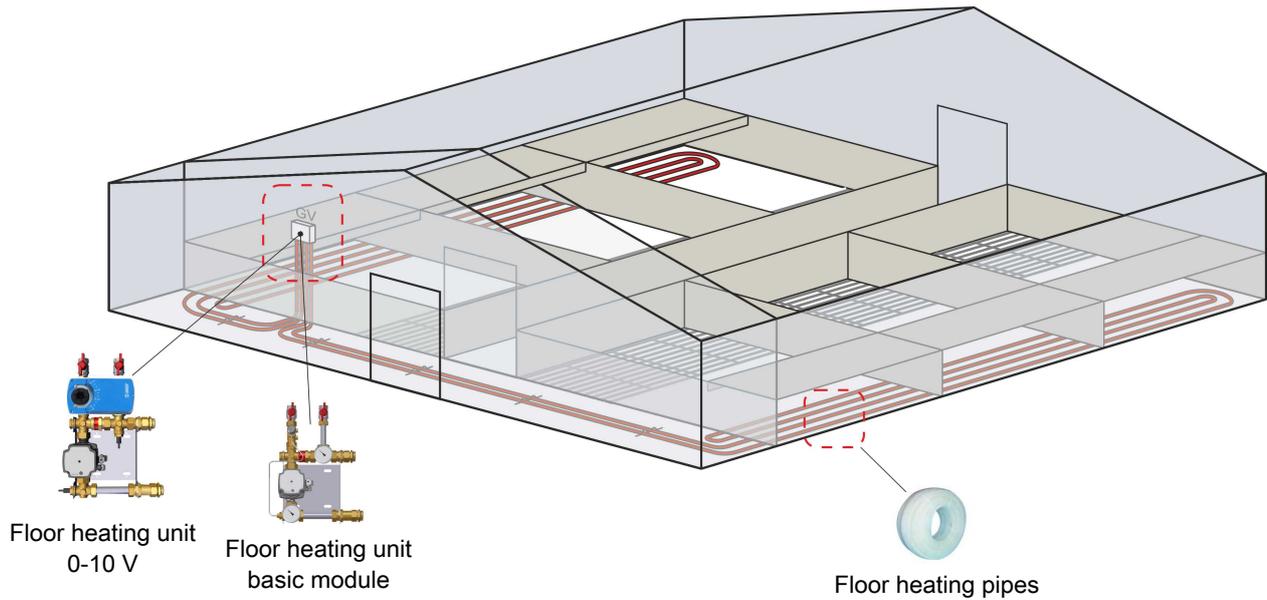
Floor heating systems are water-based on section level.

Floor heating unit 0-10 V can be controlled via the house controller.

Floor heating unit basic module is controlled by manual thermostat. The pump can be switched on and off as required by a relay in the house controller.

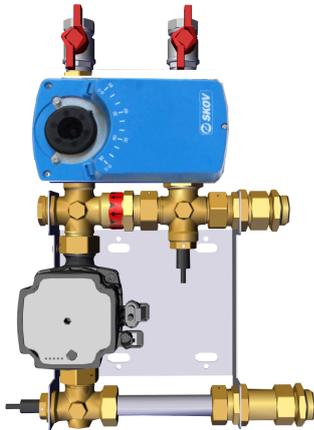
The heating system in the individual section typically includes some or all components mentioned below:

Floor heating unit (heater regulation/mixing loop), manifold, insulation, etc.



## 2 Product survey

### 2.1 Floor heating



#### 439334 DA 4100 floor heating unit 0-10 V

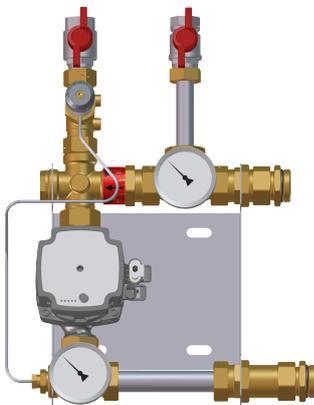
DA 4100 floor heating unit 0-10 V is used for adjustment of floor heating.

DA 4100 floor heating unit 0-10 V is mounted on a stainless plate and contains circulation pump, 0-10 V actuator, 2-way control valve (Cv. 1.6), non-return and shut-off valves and temperature sensor (DOL 12) on supply and return flow.

The DA 4100 floor heating unit 0-10 V is stepless. The motor-operated valve is controlled by a 0-10 V control signal from the SKOV house controller with software version 6.6 or newer.

The DA 4100 floor heating unit 0-10 V must be used together with the manifold kits 1+1 to 10+10. See below.

When using a 2-house controller, temperature sensor 1 must be a DOL 114 in both houses.



#### 439335 Floor heating unit basic module UPM3 15-70

Floor heating unit basic module including temperature control valve. Temperature control valve Cv. 2.1 / regulating range: 20-70 °C.

Including non-return valve, thermometer on supply and return flow, circulation pump and control valve.

The capillary tube between valve and temperature sensor is corrosion-resistant and suitable for use in livestock houses.

The basic module is to be used together with the manifold kits 1+1 to 10+10. See below.



- 439400 Manifold kit 1+1
- 439410 Manifold kit 2+2
- 439420 Manifold kit 3+3
- 439430 Manifold kit 4+4
- 439300 Manifold kit 5+5
- 439310 Manifold kit 6+6
- 439440 Manifold kit 7+7
- 439290 Manifold kit 8+8
- 439320 Manifold kit 9+9
- 439450 Manifold kit 10+10

The manifold kit is used together with the floor heating unit basic module mentioned above.

The figures specify how many supply flows + return flows can be connected. Each floor heating circuit is equipped with supply and return flow; the floor heating circuits thus require a manifold kit 4+4.

Is delivered complete with connection set and automatic air vent (see photo).

## 2.2 Accessories



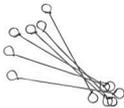
- 439471** Floor h. pipe 20mmPn6 incl./oxygen b.120Mtr./rl. 95gr
- 439476** Floor h. pipe 20mmPn6 incl./oxygen b. 240Mtr./rl. 95gr
- 439491** Floor h. pipe 20mmPn6 incl./oxygen b. 480 Mtr./rl.95gr
- 439501** Altech XL-flex20mm fl. H. pipe Pn 6 600 m.

Floor heating pipes for laying and casting in concrete floor.



### **439975 Tubolit pipe coil 22mm 13mm Insulation 2m**

Foam insulation for insulation of floor heating pipe in areas where there is no requirement for heating of floor/heat loss. E.g. passages or under the sows in the farrowing sections.



### **439991 Cable tie for floor h. pipe (250 pcs.)**

Cable ties for fixing floor heating pipe to the concrete iron/wire mesh reinforcement before concreting. Use one cable tie for each 0.3m pipe.



### **570473 Tool f. binding wire**

Tools for fixing floor heating pipes by means of cable ties.



### **439940 Bending fittings T/pex pipe 20mm**

Bracket for fixing bends of the floor heating pipe.

Bending radius = 150mm.

Secures the bend in a 90° position and prevents breakage of the pipe.



### **439944 Cable cover strip 1m EG**

Protection rail for floor heating pipes above floor level.

Screws and plugs are not included.



### **439995 Flashing for floor heating – start**

Protection rail for floor heating pipes above floor level.

Use one as shield of up to two circuits (up to 2+2).



### **439996 Flashing for floor heating - next**

Is used together with 439995.

Use one per commenced two circuits, in addition to the two circuits which are covered by the start module.

## 3 Mounting guide

### 3.1 Recommended tools

A list of the recommended tools for mounting purposes can be seen below.

Item	Description
	Cordless drill
	Screwdriver bits
	Drill kit
	Utility knife
	Marker pens
	Tape measure
	Hacksaw
	Pipe wrench
	Side cutter
	Impact drill
	Adjustable spanner
	Water pump pliers
	Spirit level

### 3.2 Mounting floor heating unit

Before installing the heating system.

Check that all ordered parts are present and undamaged prior to starting the work.

Read the guide carefully before starting the installation.

Use packing twine and joint paste for all joints.

The floor heating pipes must be protected with flashing for floor heating.

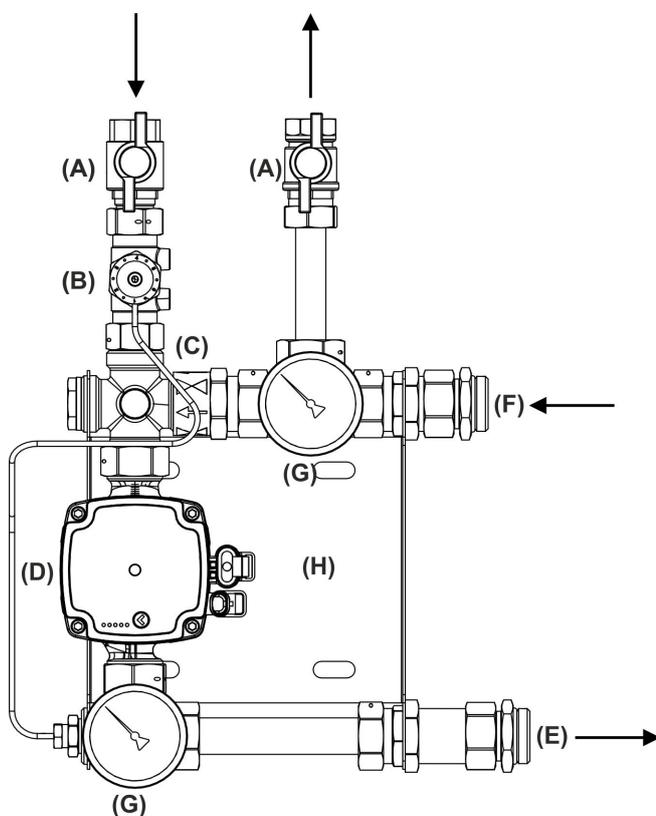
The installation must be carried out by a specialist and according to current national and EU regulations.



Before start-up of the floor heating unit, fill up the system with water.

Flush all supply pipes before they are connected to the floor heating unit.

#### 3.2.1 Floor heating unit basic module



(A) Block valves supply flow/return flow, primary side.  
(For mounting of supply flow and return flow).

(B) Temperature control valve

(C) Non-return valve

(D) Circulation pump

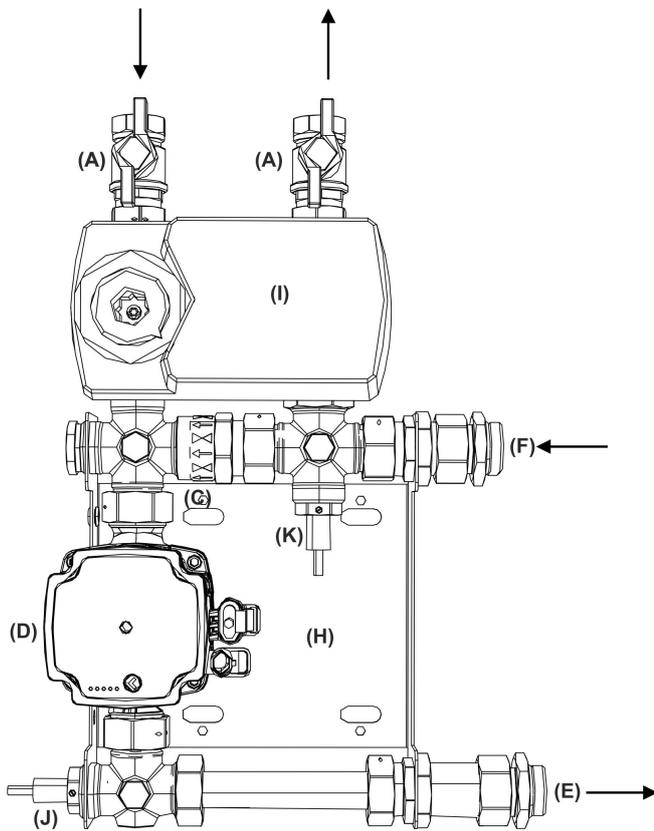
(E) Mixing loop supply flow

(F) Mixing loop return flow

(G) Thermometer face

(H) Mounting plate

### 3.2.2 Floor heating unit 0-10 V



(A) Block valves supply flow/return flow, primary side.  
(For mounting of supply flow and return flow).

(C) Non-return valve

(D) Circulation pump

(E) Mixing loop supply flow

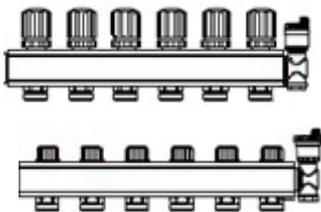
(F) Mixing loop return flow

(H) Mounting plate

(I) 0-10 V actuator and 2-way control valve

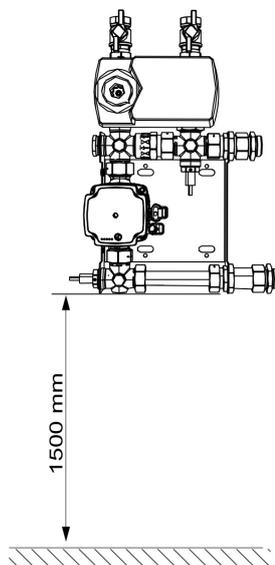
(J) DOL 12 temperature sensor supply flow

(K) DOL 12 temperature sensor return flow



The manifold is mounted on the mixing loop, supply flow/return flow (E-F).

### 3.2.3 Mounting height



Place the floor heating unit 1500 mm above the floor.

### 3.2.4 Adjusting the manifolds

LONGEST FLOOR HEATING CIRCUIT													
OTHER CIRCUITS	m	120	110	100	90	80	70	60	50	40	30	20	
	120	4.0											
	110	3.4	4.0										
	100	2.0	3.3	4.0									
	90	1.6	2.0	3.2	4.0								
	80	1.3	1.6	1.9	3.1	4.0							
	70	1.1	1.3	1.5	1.9	3.0	4.0						
	60	1.0	1.1	1.3	1.5	1.8	2.8	4.0					
	50	0.9	0.9	1.0	1.2	1.4	1.8	2.7	4.0				
	40	0.8	0.8	0.9	1.0	1.1	1.3	1.7	2.5	4.0			
	30	0.7	0.7	0.8	0.8	0.9	1.0	1.2	1.5	2.3	4.0		
	20	0.6	0.6	0.7	0.7	0.7	0.8	0.9	1.0	1.3	2.0	4.0	
	10	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	1.0	1.5	

1. Open the longest circuit completely.
2. Select the column containing the longest circuit.
3. Find the row for the circuit to be adjusted.
4. Read in the column for the longest circuit, how many rotations the circuit should be set to.

Example:

Longest circuit = 80 m

Circuit 2 = 50 m

Circuit 3 = 20 m

In the column for 80 m and the row for 50 m, the cell with setting for circuit 2 to states 1.4 revolutions.

In the column for 80 m and the row for 20 m, the cell with setting for circuit 3 to states 0.7 revolutions.

LONGEST FLOOR HEATING CIRCUIT													
OTHER CIRCUITS	m	120	110	100	90	80	70	60	50	40	30	20	
	120	4.0											
	110	3.4	4.0										
	100	2.0	3.3	4.0									
	90	1.6	2.0	3.2	4.0								
	80	1.3	1.6	1.9	3.1	4.0							
	70	1.1	1.3	1.5	1.9	3.0	4.0						
	60	1.0	1.1	1.3	1.5	1.8	2.8	4.0					
	50	<del>0.9</del>	0.9	1.0	1.2	1.4	1.8	2.7	4.0				
	40	0.8	0.8	0.9	1.0	1.1	1.3	1.7	2.5	4.0			
	30	0.7	0.7	0.8	0.8	0.9	1.0	1.2	1.5	2.3	4.0		
	20	<del>0.6</del>	0.6	0.7	0.7	0.7	0.8	0.9	1.0	1.3	2.0	4.0	
	10	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	1.0	1.5	

## 4 Installation guide

### 4.1 Electrical connection

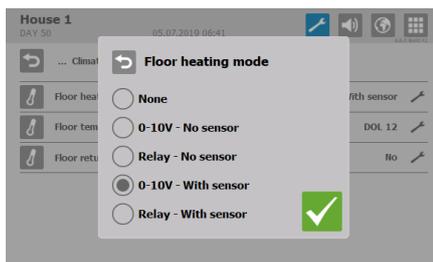


Installation, servicing and troubleshooting of all electrical equipment must be carried out by qualified personnel in compliance with the applicable national and international standard EN 60204-1 and any other EU standards that are applicable in Europe.

The installation of a power supply isolator is needed for each motor and power supply to facilitate voltage-free work on the electrical equipment. The power supply isolator is not included.

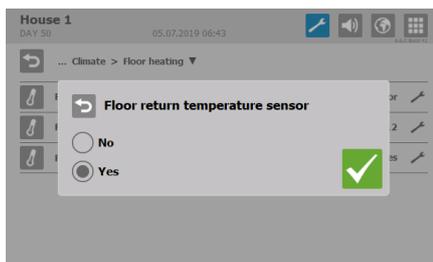
#### 4.1.1 Floor heating unit 0-10 V

##### 4.1.1.1 Settings in 1-house controller



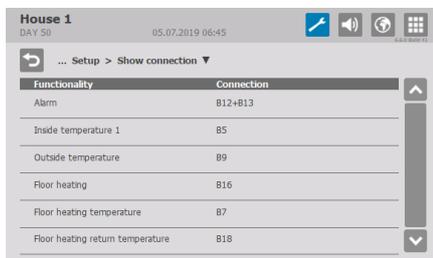
**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Relay - No sensor**

Select 0-10 V with sensor.



**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Floor heating return sensor**

Select floor heating return sensor Yes.



For correct connection of floor heating, floor heating temperature and floor heating return temperature, see the menu

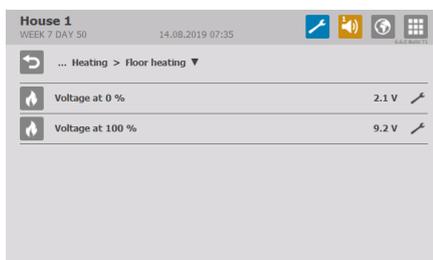
**Technical | Setup | Show connection**

*Example of terminal connection.*

**Floor heating B16** = 0-10 V analog out.

**Floor heating temperature B7** = 0-10 V analog in signal from floor heating temperature sensor.

**Floor heating return temperature B18** = 0-10 V analog in signal from return temperature sensor.



**Technical | Service | Settings | Climate | Heating | Floor heating**

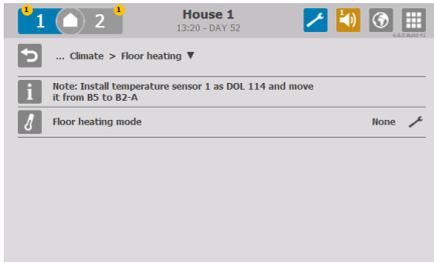
Check the supply

0% open = 2.1 V

100% open = 9.2 V

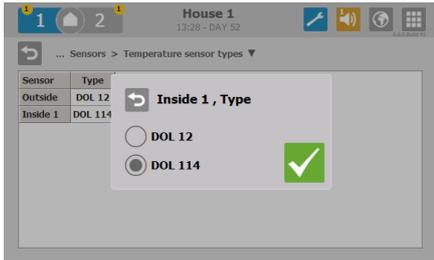
## 4.1.1.2 Settings in 2-house controller

### 4.1.1.2.1 House 1



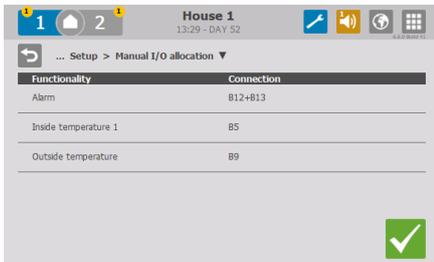
**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode**

When making settings in a 2-house climate controller (a note appears) that temperature sensor 1 must be replaced with and installed as DOL 114 sensor and moved from B5 to B2-A.



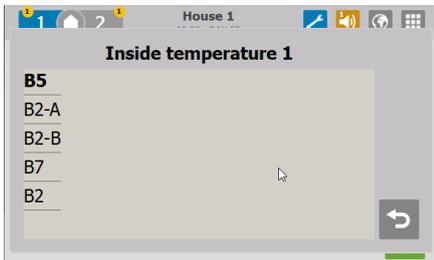
**Technical | Setup | Installation | Climate | Sensors | Temperature sensor types**

Select DOL 114 as temperature sensor 1.



**Technical | Setup | Manual I/O allocation**

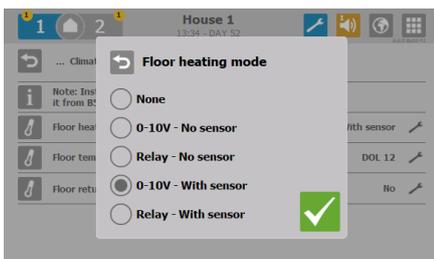
Press inside temperature B5.



Select B2-A.



B2-A is now selected.



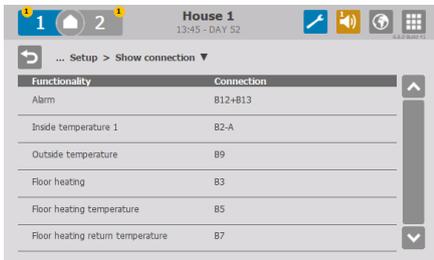
**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Relay - No sensor**

Select 0-10 V with sensor.



**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Floor heating return sensor**

Select floor heating return sensor Yes.



For correct connection of floor heating, floor heating temperature and floor heating return temperature, see the menu

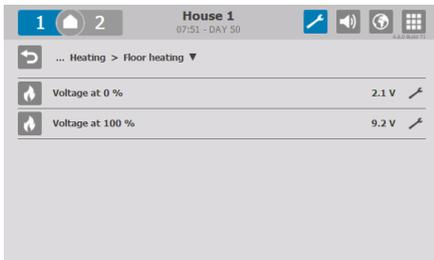
**Technical | Setup | Show connections**

*Example of terminal connections.*

**Floor heating B3** = 0-10 V analog out.

**Floor heating temperature B5** = 0-10 V analog in signal from floor heating temperature sensor.

**Floor heating return temperature B7** = 0-10 V analog in signal from return temperature sensor.



**Technical | Service | Settings | Climate | Heating | Floor heating**

Check the supply

0% open = 2.1 V

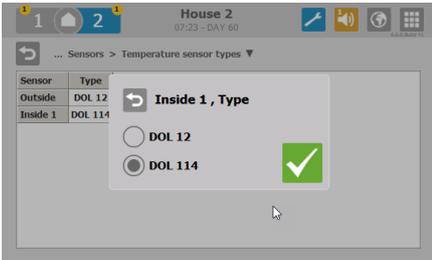
100% open = 9.2 V

4.1.1.2.2 House 2



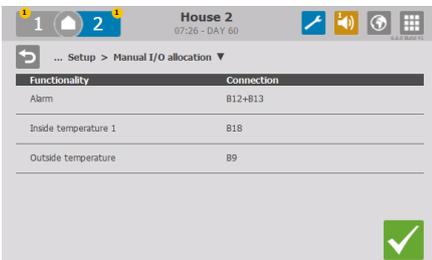
**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode**

When making settings in a 2-house climate controller (a note appears stating that) temperature sensor 1 must be replaced with and installed as DOL 114 sensor and moved from B18 to B15-A.



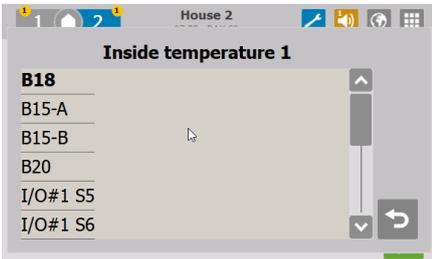
**Technical | Setup | Installation | Climate | Sensors | Temperature sensor types**

Select DOL 114 as temperature sensor 1.

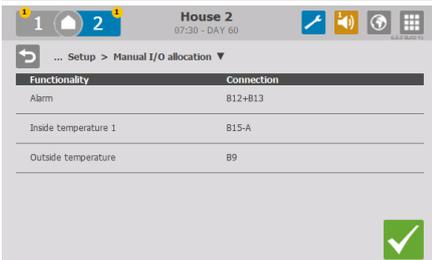


**Technical | Setup | Manual I/O allocation**

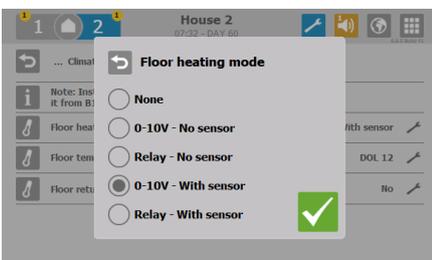
Press inside temperature B18.



Select B15-A.

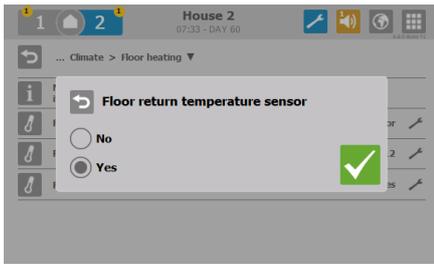


B15-A is now selected.



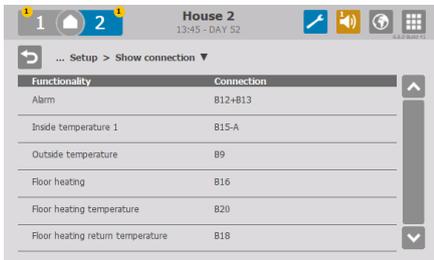
**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Relay - No sensor**

Select 0-10 V with sensor.



**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Floor heating return sensor**

Select floor heating return sensor Yes.



For correct connection of floor heating, floor heating temperature and floor heating return temperature, see the menu

**Technical | Setup | Show connection**

*Example of terminal connections.*

**Floor heating B16** = 0-10 V analog out.

**Floor heating temperature B20** = 0-10 V analog in signal from floor heating temperature sensor.

**Floor heating return temperature B18** = 0-10 V analog in signal from return temperature sensor.



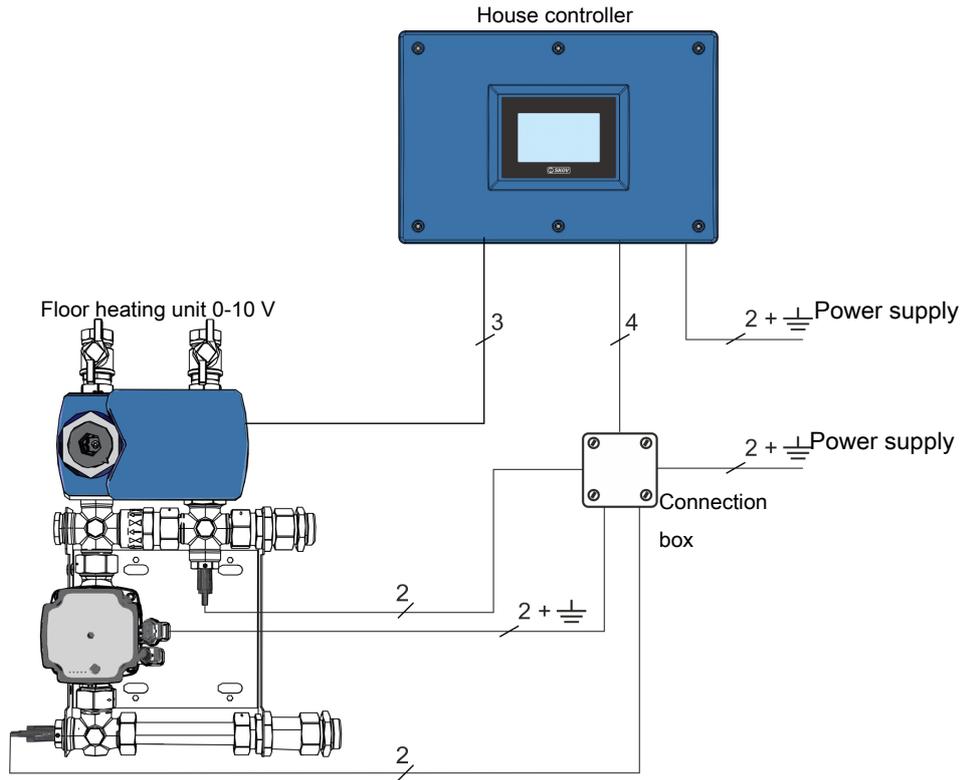
**Technical | Service | Settings | Climate | Heating | Floor heating**

Check the supply

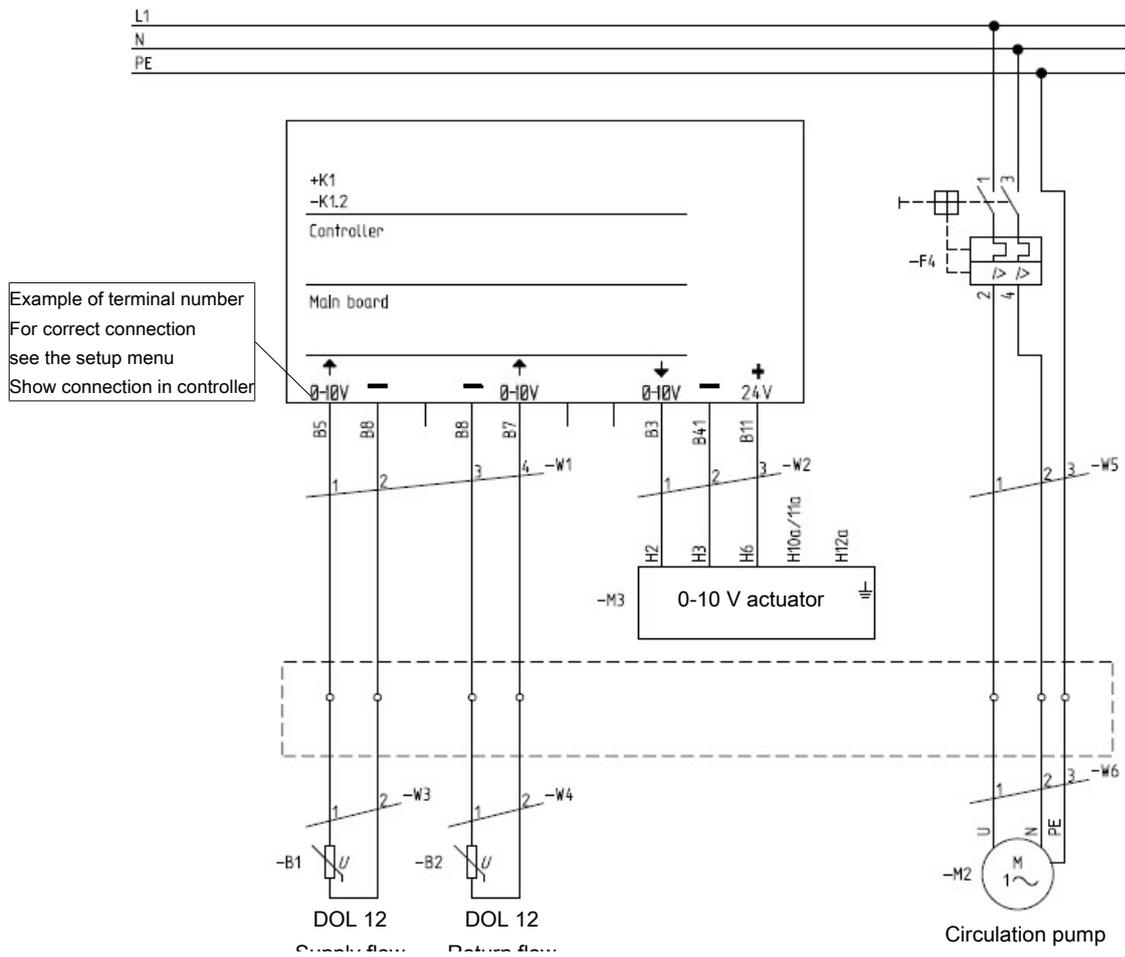
0% open = 2.1 V

100% open = 9.2 V

### 4.1.1.3 Cable plan



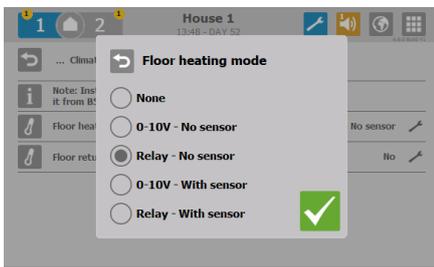
### 4.1.1.4 Circuit diagram



## 4.1.2 Floor heating unit basic module

### 4.1.2.1 Setup in house controller

If the house controller should start and stop the circulation pump via a relay.



**Technical | Setup | Installation | Climate | Floor heating | Floor heating mode | Relay - No sensor**

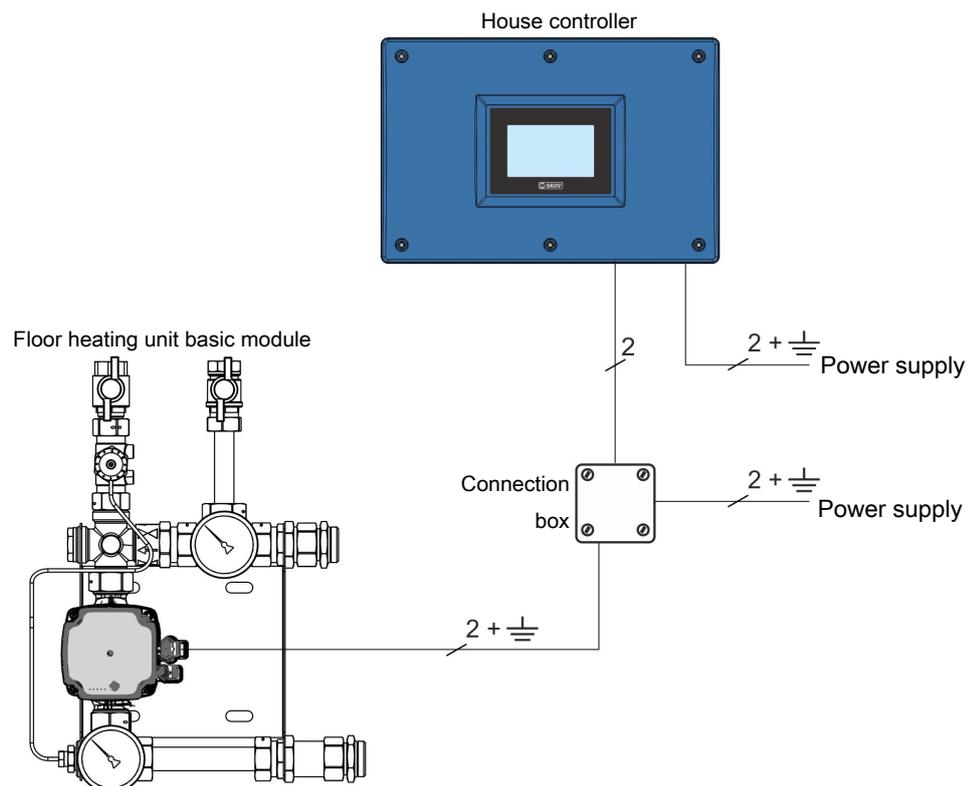
Select relay - no sensor.



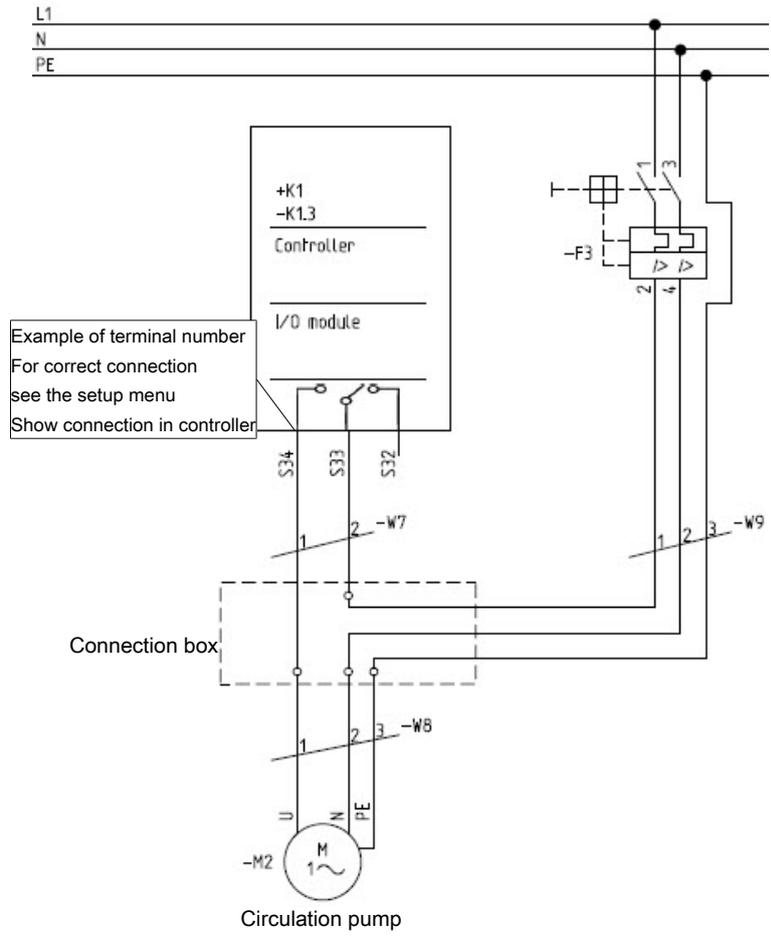
For correct connection of the circulation pump and the floor heating return temperature, see the menu: **Technical | Setup | Show connection**

**Floor heating relay I/O#2 S33+S34** = Relay for start and stop of circulation pump.

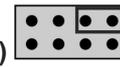
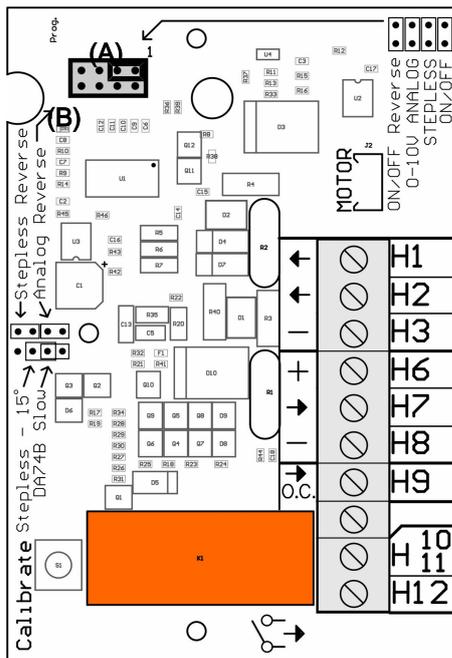
### 4.1.2.2 Cable plan



### 4.1.2.3 Circuit diagram



## 4.2 Actuator



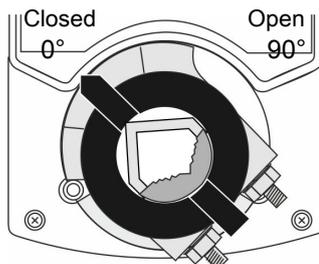
On the actuator pcb the jumper (A) is set to 0-10 V analog reverse from the factory.

LED light (B):

OK = slow flashing

Calibration = constant light

Error = fast flashing

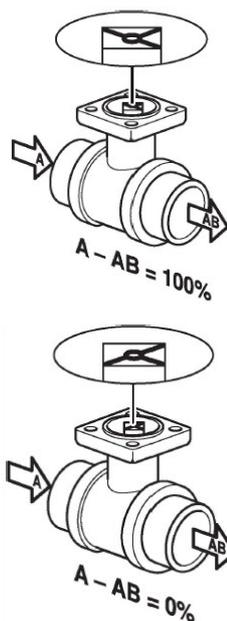


The actuator is factory set to:

0° = 0 V

90° = 10 V

## 4.3 Control valve



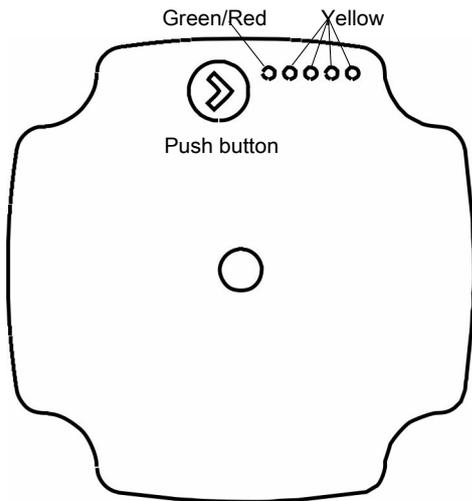
The flow direction shown with an arrow on the pump house must be observed.

Check that the ball is in the correct position (see the mark on the spindle).

Control valve 100% = Open

Control valve 0% = Closed

## 4.4 Setting the circulation pump



Constant pressure step 1-4 is used when there are animals in the livestock house.

Select a step which allows for a maximum difference of 2-4 °C between the supply flow temperature and the return temperature.

To see the current pump setting, press the push button shortly (0-2 sec.). After 2 seconds, the display will once again show the power consumption.

To change the setting of constant pressure,

1. press on the push button for 2-10 seconds.
2. The LED lamps will all start to flash.
3. Change between the settings by pressing briefly on the push button.
4. Release the push button and the setting is saved.
5. See the table below for settings.

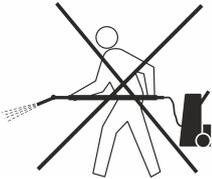
Indication of constant pressure					
	LED 1 Green	LED 2 Yellow	LED 3 Yellow	LED 4 Yellow	LED 5 Yellow
Step 1	X	X	X		
Step 2	X	X	X	X	
Step 3	X	X	X	X	X
Step 4	X	X	X		X

In the event of error, LED 1 will light red.

## 5 Cleaning



Be aware that the pipes must be cold before cleaning, otherwise the dirt will stick to them.



Clean the product with a cloth that has been wrung out almost dry in water and avoid using:

- high-pressure cleaner
- solvents
- corrosive/caustic agents

### 5.1 Recycling/Disposal



Products suitable for recycling are marked with a pictogram.

It must be possible for customers to deliver the products to local collection sites/recycling stations in accordance with local instructions. The recycling station will then arrange for further transport to a certified plant for reuse, recovery and recycling.

## 6 Troubleshooting guide

Symptom	Cause	Solution
No heat	Heat source defective.	Check the reason for the defect.
	Shut-off valves are closed.	Open the shut-off valve.
	Defective circulation pump.	Call SKOV Service or a local plumber for replacement.
	The system lacks water.	Fill up with water.
	Supply flow temperature set incorrectly.	Adjust to correct temperature.
	Defective actuator or solenoid valve.	Call SKOV Service or a local electrician for replacement.
Heating does not turn off.	Lacks signal either from controller, defective actuator or solenoid valve.	Call SKOV Service or a local plumber/electrician for replacement.
The temperature rises slowly.	The heating system has not reached maximum capacity.	Check out why the heating system does not give off heat.
	The house is very cold at start-up.	Give the heating system time to warm up the cold house.
Alarm for floor heating sensor for floor heating unit 0-10 V in house controller.	Defective floor heating sensor.	Check the connections to the sensors or mount a new sensor.

### 6.1 Service and maintenance of the system

In case of malfunctioning of the unit or the heating system, please follow the instructions below.

#### Floor heating unit 0-10 V



Closed

1. Check for a output signal from the house controller, see the menu **Technical | Service | Settings | Climate | Heating | Floor heating**
2. Check that the actuator is closed at 2.1 V and open at 9.2 V



Open

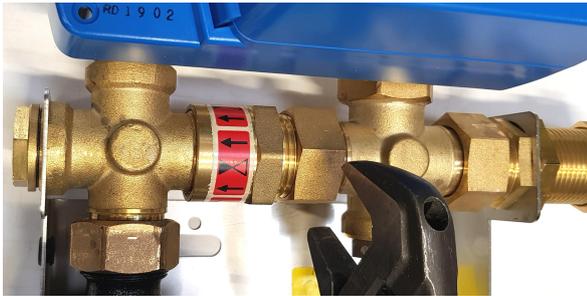
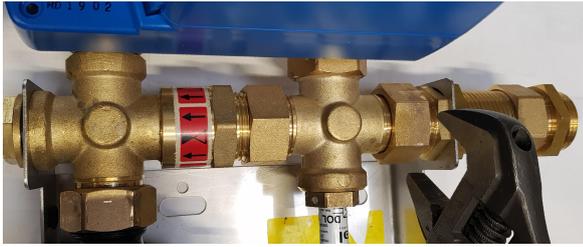
## Floor heating unit basic module



If the thermostat needs re-calibration.

1. Loosen the screw on the control handle with a 2 mm Allen key.
2. Turn the gray control handle 1/4 turn anticlockwise.
3. Tighten the screw with the 2 mm Allen key.
4. Adjust to the desired temperature on the gray control handle.

## Floor heating system



If the shut-off valve of both the supply and return flow are equally hot, the shut-off valve is most likely blocked by impurities from the pipe system.

1. Check that the non-return valve functions properly.
2. Turn off the power to the circulation pump.
3. Close the two shut-off valves.
4. Dismount the non-return valve by loosening the nuts on both sides of the non-return valve.



● Be careful! Hot water.



Check and if required, clean the non-return valve.

1. Reinstall the non-return valve after checking and possible cleaning.
2. Carefully open the shut-off valves.
3. Restart the pump.



If the supply flow on the primary side is hot, but the secondary side is cold, you have to check the function of the circulation pump.

1. Does the pump run?
2. If not, check the power supply and/or make sure the right LEDs on the front of the pump are on – if not, see the section Setting the circulation pump [▶ 20].
3. Replace the pump, if it still does not run.
4. If the power supply is okay, decrease the speed on the circulation pump 1 step and wait for a few minutes. Repeat this if the secondary temperature is still not rising.

If this still does not help, there are problems on the primary side before the circulation pump.

1. Check the heating system for water pressure (normally at the boiler).
2. Add water to the system, if necessary.
3. Check for air locks in the system (automatic air outlets could be faulty - manual air outlets have to be opened manually to let out the air).
4. Check the main circulation pump (normally positioned at the boiler) – make sure it runs and has the right speed.



Check filters, string and flow regulation valves on the main distribution system and boiler.

## 7 Technical data

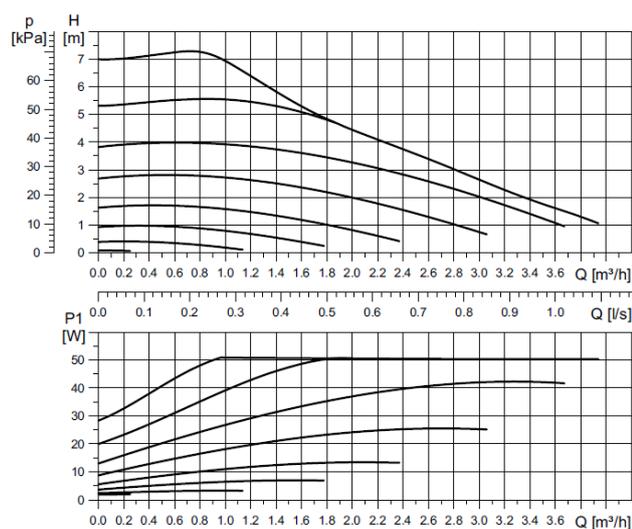
### 7.1 Actuator

		Actuator
<b>Electrical</b>		
Rated voltage	V DC	24
Operating voltage	V DC	19 - 28
Max. power consumption	A	0.14
Effect	W	3
Control signal H2	V DC	0 - 10
<b>Relay switch H10a/11a, H12a</b>		
Max. current	A	3
Max. voltage	V	230
<b>Mechanical</b>		
Torque	Nm	24
Run time	Sec.	70 - 90
Angle of rotation		
Working angle	°	90
Relay activated at	°	>3
Cable flanges		2 x M16 (max. Ø 7.5 mm cable)
<b>Environment</b>		
Operating temperature	°C (°F)	-20 to +50 (-4 to 122)
Storage temperature	°C (°F)	-30 to +60 (-22 to +140)
Relative humidity, operation	% RH	10 - 95
Protection class	IP	54
<b>Shipment</b>		
Dimensions (H x W x D)	mm	180 x 100 x 95
Dimensions crated H x W x D	mm	200 x 110 x 80
Weight	g	1200
Shipping weight	g	1410

## 7.2 Circulation pump UPM3

Circulation pump UPM3		
<b>Electrical</b>		
Rated voltage	V AC	230
Operating voltage	V AC	196 – 253
Frequency	Hz	50
Max. Initial fuse	A	13
Max. power consumption	A	0.52
Effect	W	52
Control signal	V DC	0 - 10
<b>Water</b>		
Max. pass-through Q 1-2-3	m <sup>3</sup> /h	4
Max. total head H	m	7
Max. water pressure	bar	10
Water temperature	°C	+2 to +110
<b>Mechanical</b>		
Material		Cast iron GG15, EN-GJL150
L x H1+H2 x W1+W2 [mm]	mm	130 - 128 - 117
Thread	"	1
<b>Environment</b>		
Operating temperature	°C (°F)	Max. 70 (158)
Storage temperature	°C (°F)	-40 to +75 (-40 to +167)
Media temperature	°C (°F)	95 (203)
Protection class	IP	44
Noise level	dB	43
Approval		VDE, CE

### 7.2.1 Performance diagram for pump



UPM3 15-70

## 7.3 Temperature control valve

Floor heating unit base module temperature control valve		
<b>Materials</b>		
Valve housing		Dezincification resistant brass
Valve seat/cone/spindle		Stainless, acid-proof steel
Impulse tube		Stainless steel
Sensors		Stainless steel
<b>Pressure, temperatures, Cv</b>		
Pressure stage		PN 16
21 bar	bar	6
Max. temp. (primary)	°C	120
Setting range	°C	20 - 70
Cv value		2.1
<b>Dimensions</b>		
Connection		$\frac{3}{4}$ " pipe thread valve housing (ex. screw joint)
Sensor wire, length	mm	380
Sensor orientation		Random / universal

## 7.4 Control valve

Floor heating unit 0-10 V control valve		
<b>Materials</b>		
Valve housing		Nickel-plated brass
<b>Pressure, temperatures, Cv</b>		
Pressure stage		PN 16
Max. temp. (primary)	°C	6 to 120
Cv value		1.6
<b>Dimensions</b>		
Connection		$\frac{3}{4}$ " pipe thread valve housing (ex. screw joint)

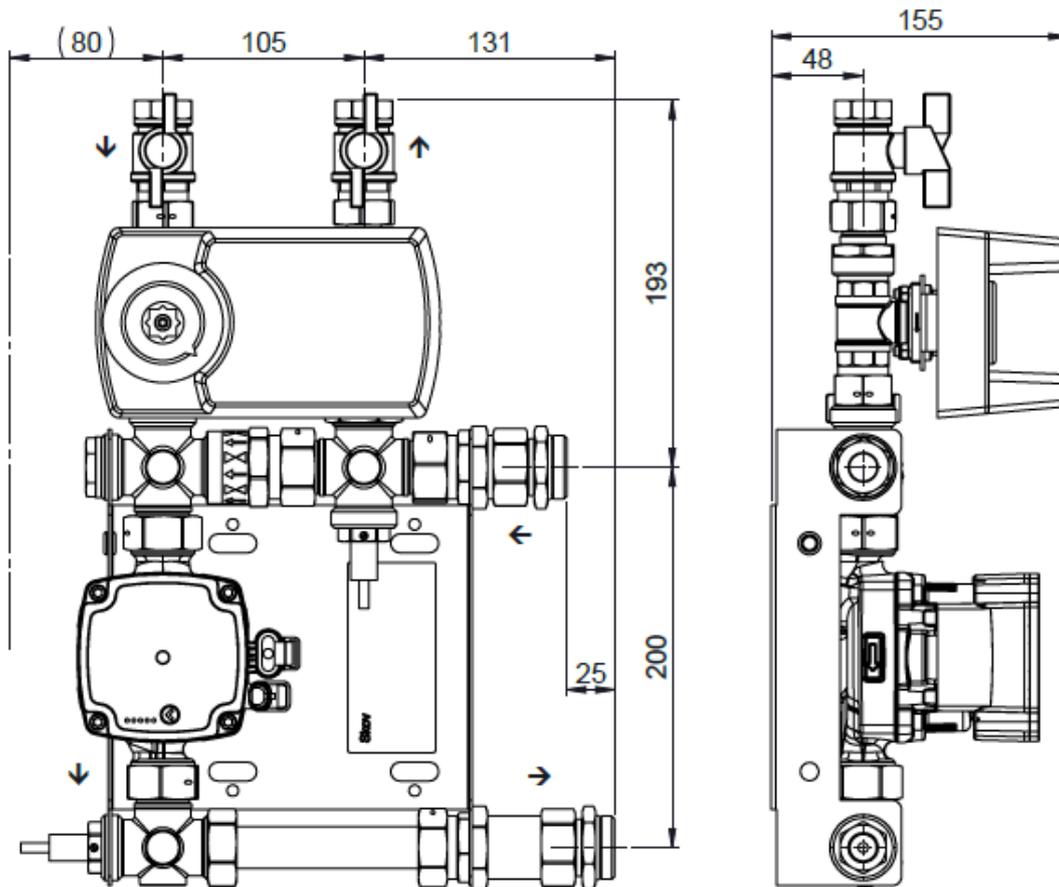
## 7.5 Shipping data

		Floor heating unit basic module	Floor heating unit 0-10 V
<b>Shipment</b>			
Dimensions (H x W x D)	mm	407 x 312 x 158	393 x 316 x 155
Packing dimensions H x W x D	mm	505 x 400 x 245	505 x 400 x 245
Weight	g	6700	6956
Shipping weight	g	7500	8082

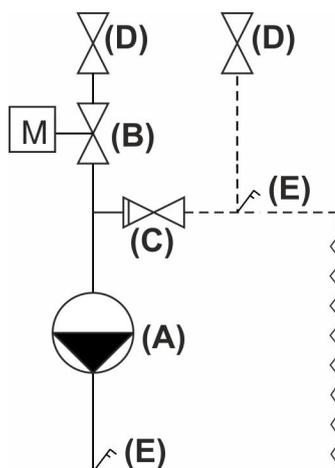
## 7.6 Dimension sketch and flow diagram

### 7.6.1 Floor heating unit 0-10 V

Dimensions are in mm.



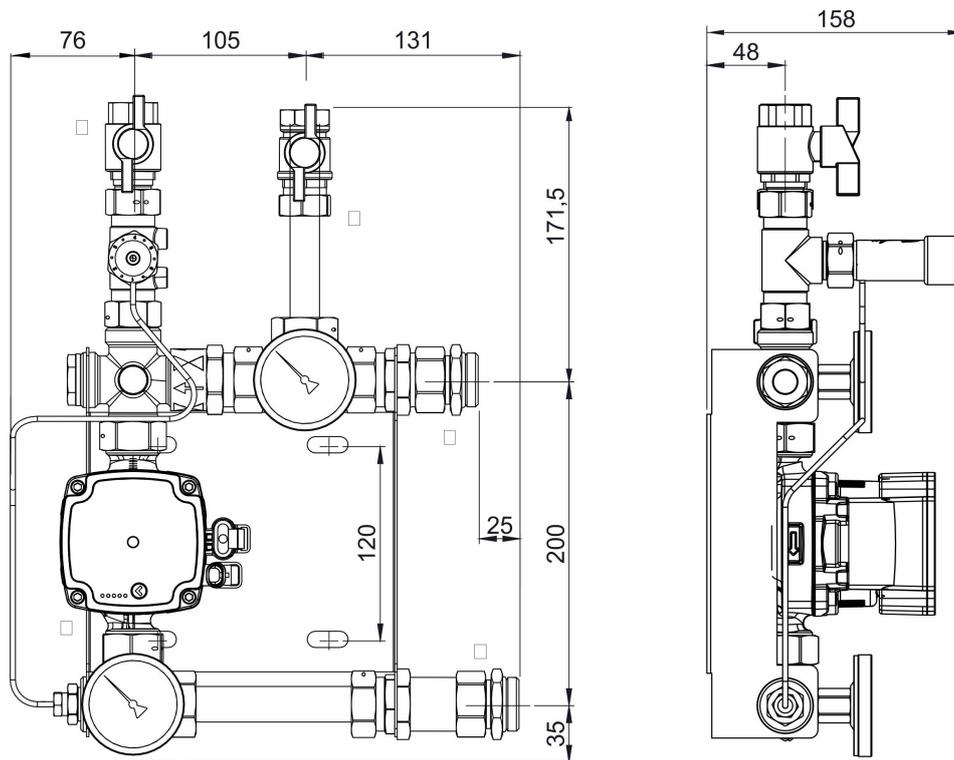
Flow diagram



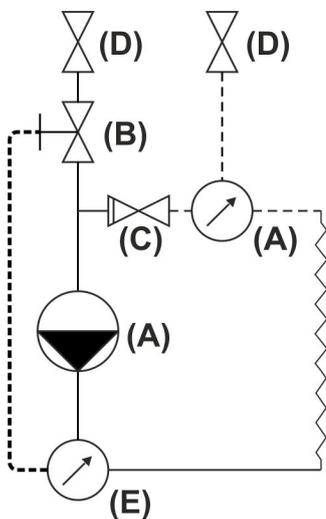
- (A) Grundfos UMP3 15-70
- (B) Control valve with actuator
- (C) Non-return valve
- (D) Shut-off valve DN20(3/4")
- (E) DOL 12 temperature sensor

### 7.6.2 Floor heating unit basic module

Dimensions are in mm.



Flow diagram



- (A) Grundfos UMP3 15-70
- (B) Temperature control valve 20-70°C
- (C) Non-return valve
- (D) Shut-off valve DN20(3/4")
- (E) Thermometer 0-120°C



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