Translation from Romanian

DATA SHEET

NEOTER IBO 130 MM MIX KIT

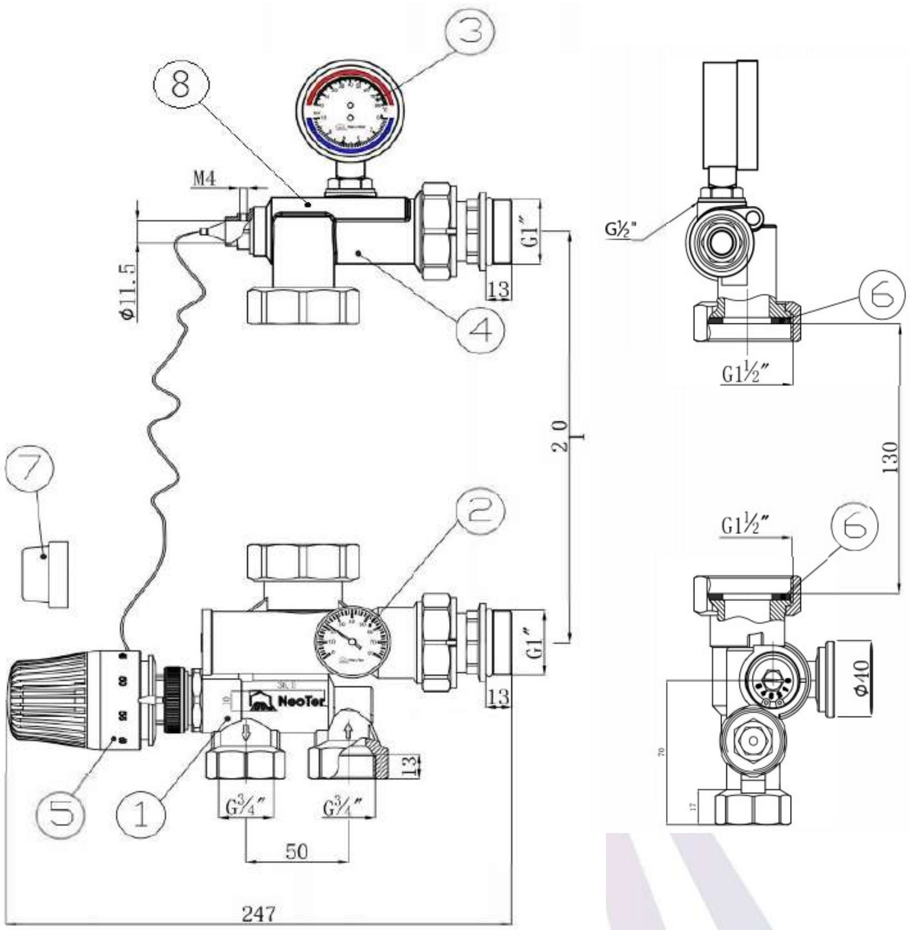
Internal code: NEOKITIBO

1. DESCRIPTION AND USE

The mix kit is used in underfloor heating systems, and it can also be used in combined systems (underfloor heating/radiators). It mainly acts to regulate the temperature and also allows the temperature adjustment in the 20 °C - 70 °C range.

2. TECHNICAL CHARACTERISTICS

2.1 Mixing valve



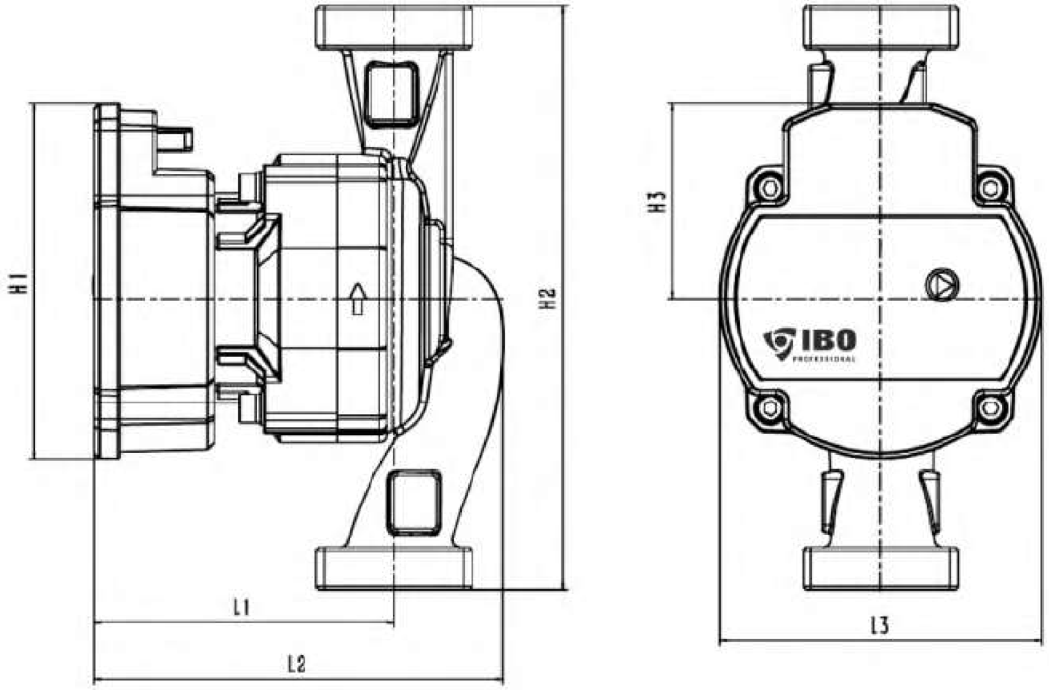
1. Mixing valve body with M30x1.5 thread for securing the thermostatic head
2. 0 °C - 80 °C thermometer
3. 0 °C - 120 °C/0 bar-10 bar temperature and pressure gauge
4. Body for the insertion of the immersion sensor of the thermostatic head
5. Thermostatic head with remote immersion sensor.
6. Pump quick coupling
7. Protective cover
8. Additional sleeve for the insertion of the safety thermostat sensor

Figure 1

Primary circuit maximum temperature:	90 °C	Climate control:	11.5 kW
Maximum pressure:	10 bar	Mixing valve pressure drop (thermostatic control):	Kv3
Primary circuit ΔP max:	1 bar		
Secondary control range: (thermostatic control)	20 °C - 70 °C	Pressure drops with open bypass valve (thermostatic control):	Kvmax4.8
		Thermometer scale	0 °C - 80 °C
Heating capacity changeable to ΔT 7˚C, ΔP available 0.25 bar		Mix kit distributor-manifold input connections:	1”
Thermostatic control :	10 kW bypass pos. 0	Heat carrier outlet connections (primary)	3/4”

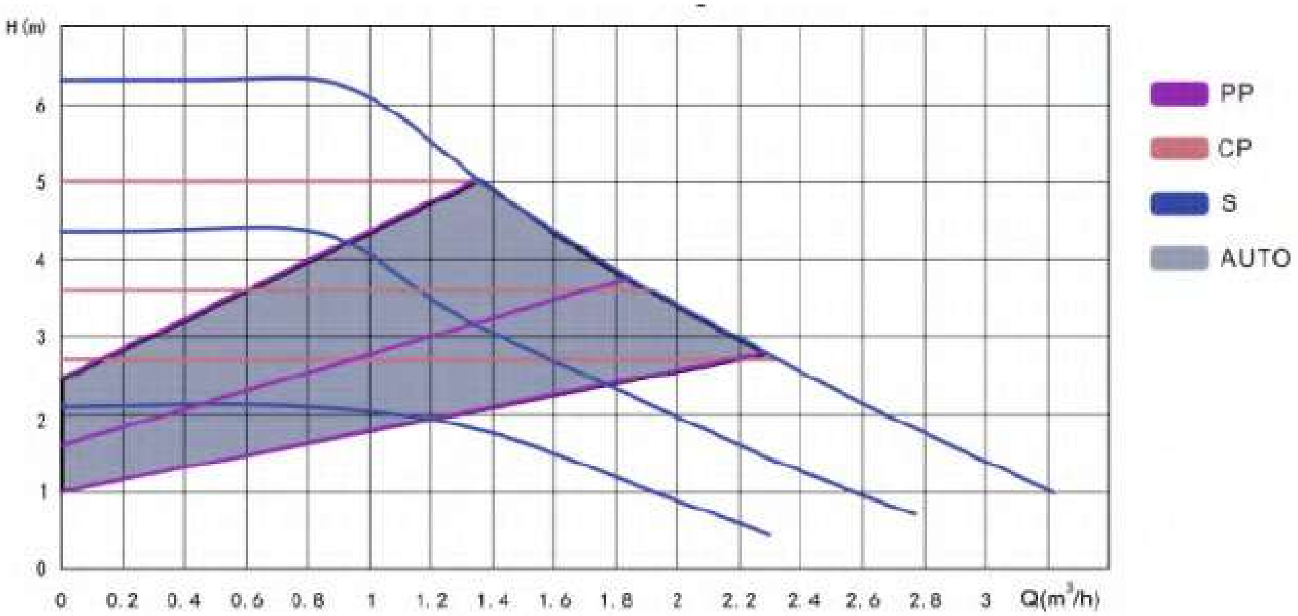
Thermostatic control:	12.5 kW bypass pos. 5	Connections to the pump	1 ½”

2.2 IBO pump



Dimensions (mm)					
L1	L2	L3	H1	H2	H3
93	126	99	110	130	60

Technical parameters				
Connectors (mm)	Max. flowrate	H max	Power	Current
25	3.2	6 m	45 W	0.5 A



PP - Proportional pressure curve;

CP - Constant pressure curve;

S - constant rotation speed curves

AUTO - Highest to lowest proportional pressure characteristic curve

System technical data and dimensions

To protect the control panel and pump stator against condensation generated by steam, always maintain the temperature of the heat carrier above the ambient temperature.		
Ambient temperature (ºC)	Heat carrier temperature (°C)	
	Minimum (ºC)	Maximum (ºC)
0	2	110
10	10	105
20	20	100
30	30	95
35	35	90
40	40	70
If the pump is used in the domestic hot water system, the water temperature should be reduced below 65 ºC		

Power supply	1 x 230 V + 6%/-10%, 50 Hz, PE	
Motor protection	No additional motor protection is required	
Protection rating	IP 44	
Insulation rating	E	
Maximum relative humidity	≤ 95%	
Maximum pressure inside the central heating system	IP 44	
Minimum suction inlet pressure as a function of the heat carrier temperature	Heat carrier temperature	Minimum inlet pressure
	≤ 75 ºC ≤ 90 ºC ≤ 110 ºC	0.005 MPa 0.028 MPa 1.080 MPa

Pump noise in operation	43 dB (A)
Allowable ambient temperature	0 ~ + 40 ºC
Maximum heat carrier temperature	Tmax 110
Pump surface heating maximum temperature	≤ 125 ºC
Pumped fluid temperature range	0 ~ +110 ºC

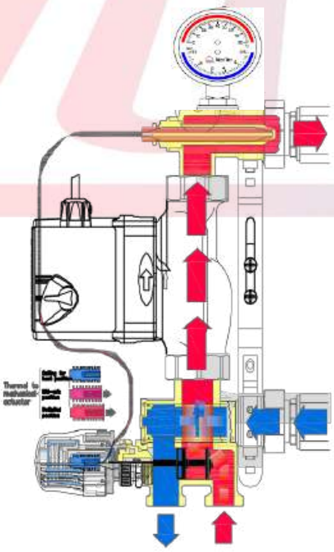
Use conditions:

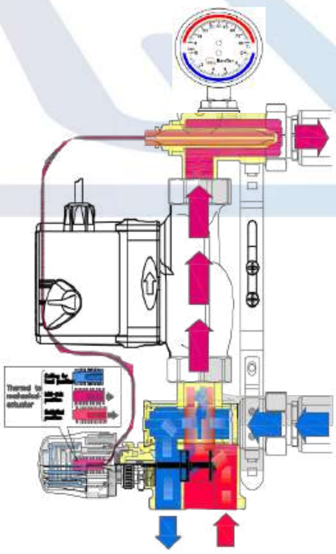
- Maximum allowed relative humidity (RH): 95%.
- Allowed heat carrier temperature: +2 ºC ~ 95 ºC. In order to prevent condensation on the control panel and stator, the temperature of the heat carrier circulating through the pump must always be higher than the ambient temperature.
- Pumped water pH: 6.5 – 8.5.

3. OPERATION

3.1 Mixing valve

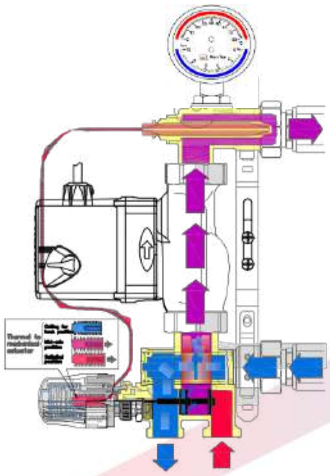
The control group is built around a mixing valve, ensuring precise temperature control for underfloor heating. Due to the unique design of the internal components of the mixing valve, the hot water from the heat source and the return water from the floor circuit are mixed together in the valve body to produce a temperature range of 20 °C to 70 °C. This temperature range suits the entire field of underfloor heating applications, from the commissioning of new floor screeds to very thick floor screeds in commercial applications. The pictures below show how the mixing valve works via the thermostatic head with remote detection of the temperature:

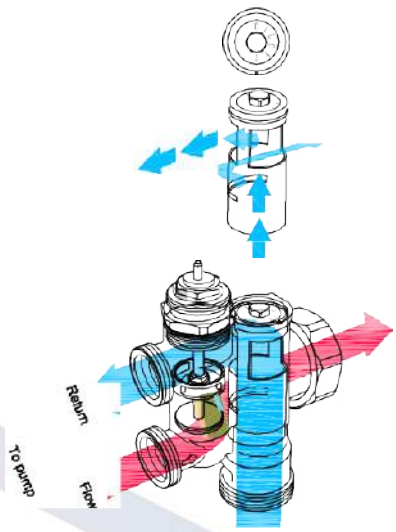




At first, the cold fluid in the remote immersion sensor area allows almost the entire amount of primary hot water from the heat source to pass through the valve. Gradually, the temperature of the probe rises as the floor circuits begin to heat up.

Depending on the set temperature of the thermostatic head, as the temperature rises in the immersion sensor area, the mixing valve starts to shut off the hot primary water, allowing the return water temperature to maintain its temperature set on the head of up to 70 °C if required.





After the probe reaches the temperature set on the head, the slide valve balances out the right amount of primary hot water and secondary return water to maintain this temperature. According to the thermostat setting, the hot water could be almost completely shut off, allowing very low temperatures suitable for screed commissioning down to 20 °C if required.

The thermostatic mixing valve is provided with a flow increase valve that allows the return water to flow directly into the mixed water intake. This cools the remotely sensed mixing water temperature and causes the mixing valve to open, allowing more primary hot water to enter through the mixing chamber and raising the temperature to the one set on the head

3.2 IBO pump

LED indicator

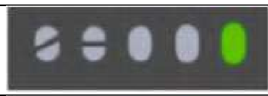
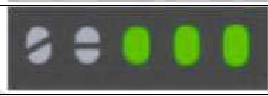
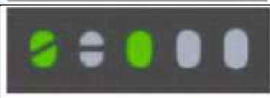
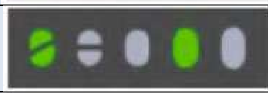
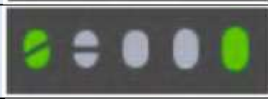
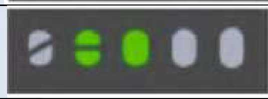
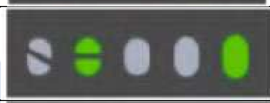
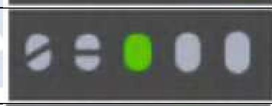
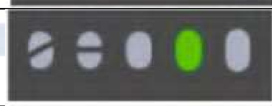
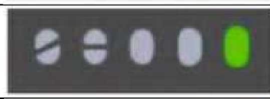
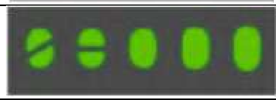
Button for changing the operating mode

Error codes displayed

After turning on the power supply, all displays light up, and the pump enters the operating mode it was in before shutdown. Press the main power button once to change the operating mode in the following order: **AUTO, PP I, PP II, PP III, CP 1, CP II, CP III, CS I, CS II, CS III.**

For example, if the pump is operating in the CP I mode, press the button once and it will switch to the next operating mode in the list, i.e. CP 2. The switching to a certain operating mode is indicated by the lighting of the corresponding light indicator on the panel.

CONTROL PANEL
Control panel elements

Number of presses	Design	Description	Display
0	CS III (Factory settings)	Constant curve, speed III	
1	AUTO	Adaptive mode	
2	PP I	Proportional pressure curve, speed I	
3	PP II	Proportional pressure curve, speed II	
4	PP III	Proportional pressure curve, speed III	
5	CP I	Constant pressure curve, speed I	
6	CP II	Constant pressure curve, speed II	
7	CP III	Constant pressure curve, speed III	
8	CS I	Constant curve, speed I	
9	CS II	Constant curve, speed II	
10	CS II	Constant curve, speed III	
/	PWM	External motor speed control	

The interdependence between the pump settings and its operating parameters

Mode	Pump performance curve	Mode

AUTO	Highest to lowest proportional pressure characteristic curve	- The AUTO function automatically controls the efficiency of the pump within the specified range; - This adjusts the pump efficiency based on system size; - This adjusts the pump efficiency according to the change in load over a certain period of time; - In the AUTO mode, the pump is set for proportional pressure control mode.
PP: I, II, III	Proportional pressure curves	The operating point moves up and down along the proportional pressure curve depending on the flow requirement of the system: when the flow requirement decreases, the water pump pressure decreases, and when the power requirement increases – the water pump pressure also increases.
CP: I, II, III	Constant pressure curves	The operating point of the pump moves back and forth in relation to the constant pressure curve according to the system demand. The water pump pressure remains constant, it does not depend on the flow demand.
S: I/II/III (S III - factory setting)	Constant rotation speed curves	HS (1-3). The pump is set for the maximum curve under all operating conditions. If the pump is set to the HS3 mode, the pump will recirculate the heat carrier fast.

EFFICIENCY CURVE
Indications relating to the efficiency curve
Any pump setting will have a corresponding efficiency curve (Q/H curve). The AUTO (self-adaptive) mode covers the area of interest in terms of efficiency. The input power curve (P1 curve) belongs to each Q/H curve. The power curve is the power consumption of the pump (P1) in Watts for the given Q/H curve.

Conditions for obtaining the curve
The description below refers to the efficiency curves of the AMG series pumps:
- Pumped medium: airless water.
- The water density for which the curves were created was **ρ** = 983.2 kg/m^3, temperature: +60 ºC.
- All values expressed using curves are average values and cannot be considered as guaranteed curves. If a specific value of the specified efficiency is required, make a separate measurement for the specified pump.
- The curves were created using the kinematic viscosity of the pumped water **μ** = 0.474 mm^2/s (0.474 CcST)

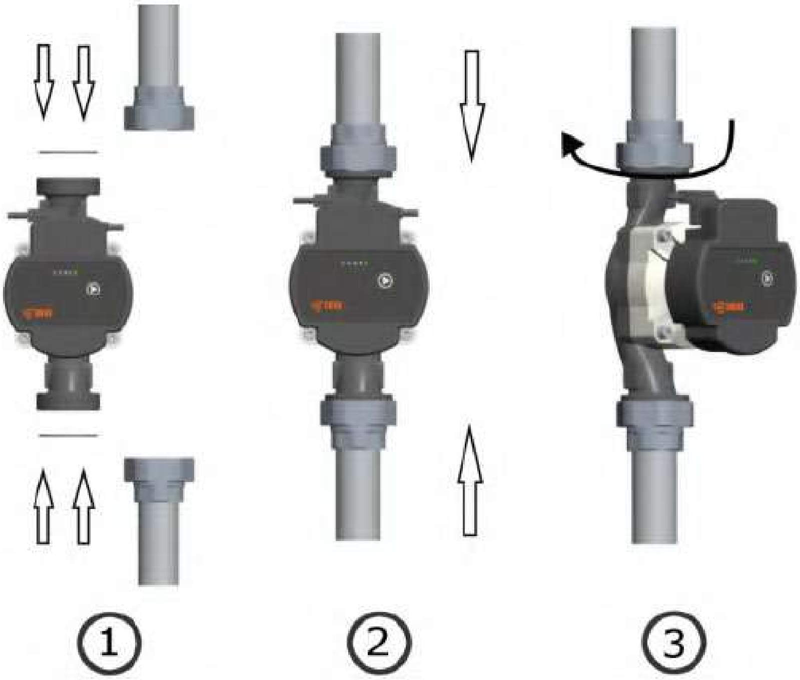
The benchmark for most energy efficient recirculation pumps is EEI ≤ 0.20. For the AMG pump, EEI ≤ 0.20, meaning that the AMG pump is an energy efficient pump.

4. INSTALLATION

4.1 Installation of the recirculation pump

During the installation, please consider the flow direction of the heat carrier. An arrow on the pump body indicates the direction of flow forced by the pump. This direction must match the direction of circulation of the heat carrier in the system.

- During the installation, please use the nuts and gaskets included in the set.
- The pump must be installed so as the pump shaft is horizontal.



Allowed positioning of the pump

4.2 Installation of the mix kit

The space required for the mix kit, distributor/manifold kit and D1" union cocks can be determined from the table and drawing below. Check if there is room for the isolation valves and fittings under the inlet connections of the mix kit and leave at least 300 mm from the bottom bar of the manifold to the floor, to prevent any damage to the pipes where they penetrate the floor.

Assemble the mix kit with the manifold using the FE D 1" connections at the top and bottom bar of the manifold, making sure the assembly is horizontal.

Type	2-way	3-way	4-way	5-way	6-way	7-way	8-way	9-way	10-way	11-way	12-way
L mm	500	550	600	650	700	750	800	850	900	950	1000

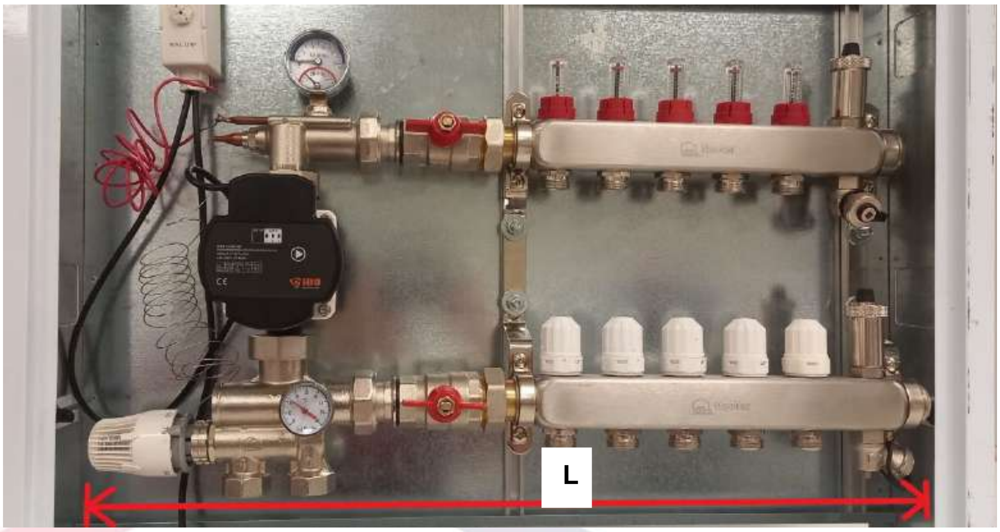


Figure 2.1

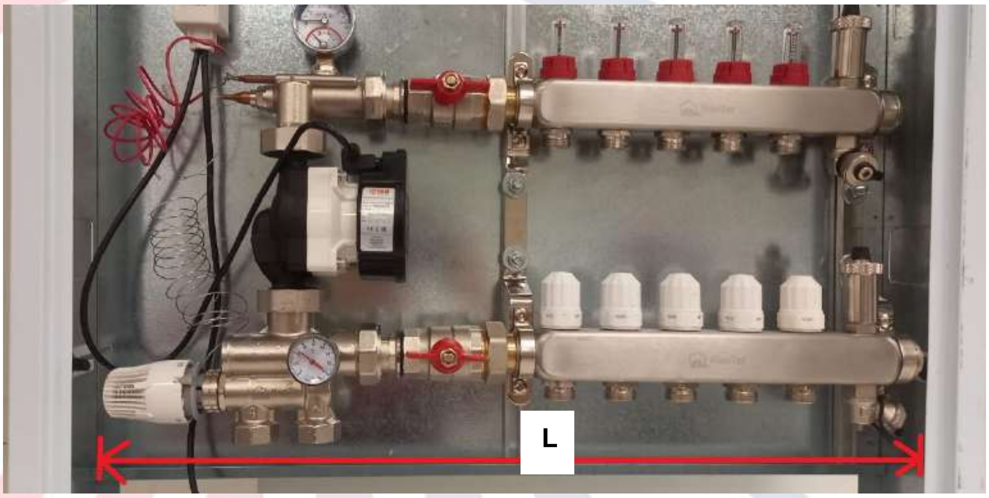


Figure 2.2

Secure the assembly consisting of the mix kit, union cocks and the distributor/manifold kit in the metal box. Check if there is room for the isolation valves under the inlet connections of the mix kit and leave at least 300 mm from the bottom bar of the manifold to the floor, to prevent any damage to the pipes when going through the floor. The metal box is depth adjustable and allows the pump to fit into the box. If seeking to minimise the total depth, the front of the pump can be turned towards the right side of the system. Adjust the legs of the metal box using 2 screws on each side so that the distance between the lower manifold rail and the floor is of at least 300 mm.

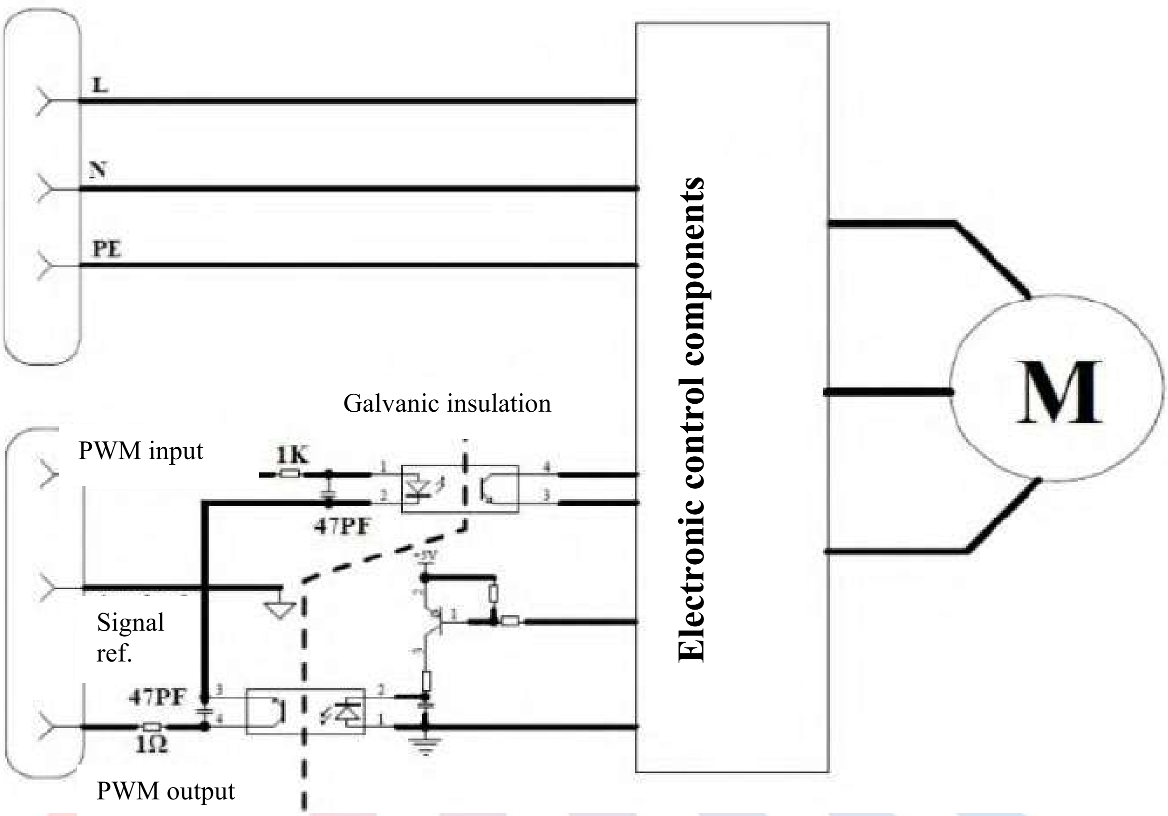
Secure the metal box to the wall using suitable fasteners and fill all voids around the housing with cement mortar or any other suitable filler. Connect the flow and return pipes of the underfloor heating system using a eurocone connector selected according to the range and type of the pipes installed.

4.3 ELECTRICAL CONNECTION

The electric pump must be connected to the grounding conductor. The pump must be connected to the external switch of the power supply. The minimum distance between the switch pins must be 3 mm.

Basic control principles

When the PWM signal is connected, the operation of the circulation pump is controlled by the PWM signal. If there is no PWM signal, the operation of the circulation pump is controlled by the internal control logic.



PWM input signal

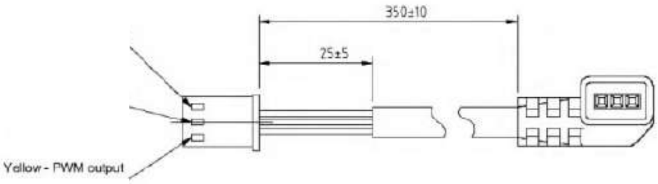
At high percentages (duty cycles) of the PWM signal, a hysteresis prevents the circulation pump from turning on and off if the input signal fluctuates around the switching point. At low percentages of the PWM signal, the circulation pump speed is high for safety reasons. In the event of a cable break within a gas boiler system, the circulation pump will continue to operate at full speed to transfer heat from the primary heat exchanger

Signal connection

Black - grounding wire

Yellow - PWM output

Red - PWM input



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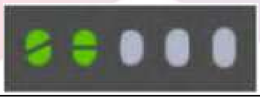
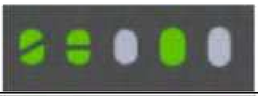
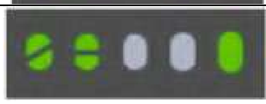
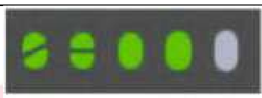
In case of faults, the electrical control will react to some of the errors and protect the pump. The protection (error) codes on the display panel will as specified in the table below:

Protection type	Display	Probable causes	Actions required
Blocked rotor protection		The rotor is blocked	Disassemble the motor and check if the rotor can rotate normally. If not, remove all impurities and make the rotor side rotate easily.
Overvoltage/undervoltage protection		The input voltage is too high or too low	Check if the voltage is within the normal range. If not, adjust to normal voltage.
Open phase protection		One or more phases in the internal connection circuit is disconnected	Replace the pump
Overcurrent protection		Short circuit in the internal connection circuit	Replace the pump

TROUBLESHOOTING

Warning: Before carrying out any maintenance or repair work, make sure that the power supply is switched off and that the power cannot be switched on accidentally.

Problem:	Possible cause:	Solution:
The pump does not start	Blown fuse	Check the cause, replace the fuse
	Circuit breaker disconnected at overcurrent	Turn on the switch
	Damaged pump	Replace the pump
	Voltage too low	Check if the mains voltage is in accordance with the supplier's specifications
	Blocked pump rotor	Unlock the rotor
Noisy system operation	Air in the system	Bleed the air from the system
	Too high flowrate	Reduce the inlet pressure at the pump inlet
Noisy pump operation or the pump is running but cannot reach the required pressure	Air in the pump	Bleed the air out of it
	Inlet pressure too low – cavitation	Increase the inlet pressure at the pump inlet
	The pump parameters are too low	If possible, increase the operating mode of the pump to a more efficient mode or install a more powerful pump.

4.5 Installation of the thermostatic head and of the remote sensor

A thermostatic head should be used for the thermostatic control. Set the thermostatic head to the maximum setting and position the head on the thermostatic valve body (see Figure 1, item 5) with the marking facing forward. Then attach the head to the valve body using the retaining ring on the head, gently tightening the ring. Do not overtighten.

Upper limit thermostat - Safety thermostat

The mix kit is provided with an additional sleeve for inserting the safety thermostat sensor (see Figure 1, item 8). It protects the screed and the finished surface of the floor against cracks that may occur as a result of excessive temperatures in the underfloor heating system. The thermostat should be set at no more than: 45/50 °C in the case of cement slabs; for other materials, see the maximum value specified by the supplier, but it should not exceed 55 °C (EN 1264-4).

Hydraulic connections

Connect the distributor/manifold kit to the G1 male inlet connections fitted on the mix kit. A 1” x 1” FI-FE insulating union ball valve should be used to connect to the G1 connections. Jointing compounds or sealing hemp or other sealing materials should not be used as they could prevent the proper operation of the mixing valve and manifold.

5. COMMISSIONING

5.1 Filling and testing

Fill the mix kit using the filling cock incorporated in the flow bar of the distributor/manifold kit, which is fitted with flowmeters. The drain cock incorporated in the return bar of the distributor/manifold kit cannot be used to fill the circuits - see Figure 3. Before filling, perform a final check of all joints to ensure that no connections have loosened during transit (for details on the recommended commissioning procedure, please refer to the literature on manifolds).

Once filled, pressure test the system in accordance with EN 1264.

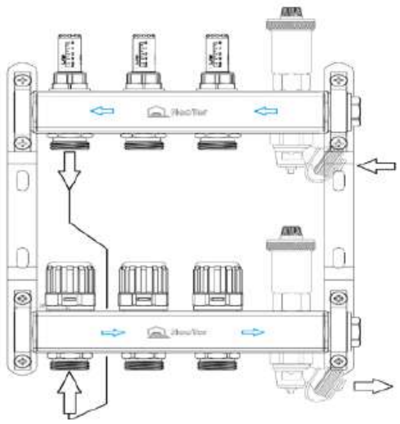


Figure 3

5.2 Setting the flow increase valve

ΔTIp = 10 °C T Boiler =70 °C Tip = 45 °C ΔPIp = 0.25 bar

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

ΔTIp = 5 °C T Boiler =70 °C Tip = 45 °C ΔPIp = 0.25 bar

Capacity (w)	Circulator setting	Valve setting
9000	maximum	5
8000	maximum	**2-3**
7000	maximum	0
6000	average	5
5000	average	**2-3**
4000	average	0

Figure 5

Mixing unit pressure drop

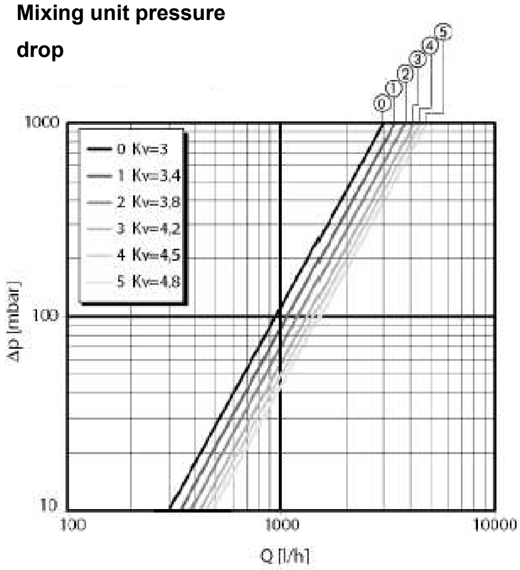


Figure 4

ΔTIp - temperature difference on the circuits

TBoiler - primary flow temperature

Tip - secondary flow temperature

ΔPIp - circuit pressure drop under the floor

After calculating the total flow of the system:

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

Where P is the total heat demand calculated in Watts and ΔTip is the calculated temperature difference for the floor system.

The pressure drop for the mix kit can be read from the graph in Figure 4. The pressure drop curves on the mix kit show the settings of the flow increase valve from fully closed to fully open and allow the plant designer to select a flow value and a pressure drop which are appropriate for the system. Together with the pressure drop calculated for the underfloor system and the manifold, the pump setting can also be selected. The tables, Figure 5, illustrate two examples of the required system output as a function of the flow increase valve setting, based on guidance values estimated for the underfloor flow temperature, as well as underfloor system temperature and pressure drops.

If necessary, adjust the valve to increase the flow as follows:

- **Excessive temperature drop**.

Insufficient flow – gradually open the valve until the desired temperature is reached.

- **Flow temperature below the required value**.

Gradually close the valve until the desired temperature is reached, allowing time for the system temperature to stabilise.

5.3 Setting the thermostatic head

Once the system is filled and pressure tested, the individual floor circuits can be balanced. As part of this process, the mixture temperature must be adjusted to the correct level provided in the system design. To achieve this, the thermostatic mixing valve can be set on the thermostatic head. (refer to No. 8. Figure 1).

Locking the temperature setting

The thermostatic head is fitted with two control pins, a red one and a blue one. These pins are provided to lock the temperature settings as follows:

1. Set the required temperature as presented above.
2. Find the black dot - see Figure 6 - and insert a pin on either side of the dot.
3. The head can no longer be rotated.

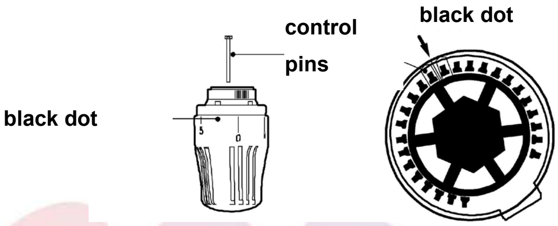


Figure 6

5.4 Starting the pump

Before starting the pump, make sure that the system is filled with fluid (heat carrier), that the air was properly bled out from the system and that the pump inlet pressure has reached the minimum required value.

Air bleeding

Before the first start-up and before each season in which heating is required, the air from the pump must be bled out. This can be done by starting the pump in high speed 3 and unscrewing the connecting elements for air bleeding. If no air comes out of the resulting hole and only water flows into the hole, screw the cover with the seal on it.

7. WARRANTY PERIOD

The warranty period is 24 months from the date of delivery, provided that the customer/user fully complies with the handling, storage and transport rules.