Hydraulic balancing of FLEXIRO floor, wall and ceiling heating systems

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1 Hydraulic balancing: regulations and benefits

Hydraulic balancing of heating systems is carried out so that all heating surfaces are evenly supplied with the amount of heating energy that is to be supplied to the rooms according to the system design during operation of the system.

Hydraulic balancing of all heating surfaces in relation to each other alone can ensure that in branched pipework installations, individual heating surfaces are not undersupplied while others are oversupplied, thereby negatively affecting the overall system temperatures.

Hydraulic balancing ensures optimum operation of the heating system, improves energy efficiency and thus saves heating costs.

Therefore, since 1 October 2024, hydronic balancing has been a legal requirement for every newly installed heating system, regardless of the energy source (§ 60c GEG, Building Energy Act, see also DIN 18380).

Optimisation deadlines also apply to older heating systems in residential buildings with at least 6 units of use. In these cases, hydronic balancing is required no later than 15 years after commissioning (systems installed after 30 September 2009) or by 30 September 2027 (for older systems, Section 60b GEG).

For residential buildings that do not fall under the GEG, i.e. have fewer than 6 utilisation units, funding from BAFA or KfW is possible. Hydraulic balancing must also be carried out for all publicly subsidised construction projects.

Only HVAC installation companies, chimney sweeps or authorised energy consultants can issue recognised, binding proof of hydronic balancing.

If you carry out hydronic balancing yourself, it can help to avoid problems with the heating system when distributing heat to several rooms, but is not recognised as proof to tenants or authorities. Hydronic balancing can save up to 15% of energy costs.

The technical prerequisite for carrying out a generally recognised hydronic balancing is that all heating surfaces or radiators have flow-adjustable valves or presettable thermostatic valves.

To optimise energy efficiency, however, it can already help to adjust the flow rate of the heating circuits or radiators that have corresponding valves.

The FLEXIRO Multibox 4K RTL has a presettable thermostatic valve. A self-regulating RTL valve has been installed in the FLEXIRO Kompabox.

2 Determining the setting values

The first step in carrying out hydronic balancing is to determine the exact heating loads of the individual rooms.

Each heating surface or radiator has a specific heating output depending on the specified system temperatures. This heating output requires a certain, continuous volume flow of heating water, which must flow through the consumer.

During hydronic balancing, this flow rate must be preset at the valve of the consumer.

The specific setting values of the pre-settable thermostatic valves depending on the heating output and/or volume flow and the temperature difference between the heating water flow and heating water return can be found in the manufacturer's specifications.

The specific heating outputs for the FLEXIRO panel heating sets are shown in the technical data sheets.

3 Setting on the RTL Multibox

The FLEXIRO Multibox regulates the heating output of the heating surface both via the return temperature of the heating circuit according to the RTL principle (Return Temperature Limiter) and depending on the room temperature via the thermostatic head.

The return temperature of the heating water from the heating circuit specified by the system is set at the RTL valve inside the Multibox.

The required flow volume of the heating surface is then set. To do this, the total heating capacity of the FLEXIRO heating surface must first be determined.

The total heating capacity of the heating surface is determined by multiplying the area of the set by the heating capacity at the specified system temperatures and the design of the heating surface.

Heating capacity [W/m²]

Average heating water temperature*	32°C		37°C		42°C	
Room temperature	20°C	24°C	20°C	24°C	20°C	24°C
Heating capacity [W/m²]	35	23	50	38	66	53

Example FLEXIRO wall heating drywall construction:

The wall heating drywall construction set 9.6m2 has a total heating output of 9.6m2 x 66 W/m2 = 634 W at an average heating water temperature of 42°C and a room temperature of 20°C.

The Multibox 4K-RTL is equipped with the IMI Heimeier Eclipse thermostatic valve.

Once the thermostatic head K has been removed, the setting scale with values from 1 to 15 is visible on the lower part of the valve. The required flow rate is set by turning the scale.

Durchflusseinstellung mit **Multibox** Eclipse

Einstellskala	1	I	I	I	5	I	I	I	I	10	I	I	I	I	15
l/h	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Einstellwerte bei unterschiedlicher Heizleistung und Systemspreizung

Q [W]	200	250	300	400	500	600	700	800	900	1000
Δt [K]	l/h									
5	3	4	5	7	9	10	12	14		
8	2	3	3	4	5	7	8	9	10	11
10	2	2	3	3	4	5	6	7	8	9
15	1	1	2	2	3	3	4	5	5	6

Q = Heizleistung
Δt = Systemspreizung
Δp = Differenzdruck

Δp min. 10 - 100 l/h= 10 kPa
Δp max. 100 - 150 l/h = 15 kPa

This means for the example of the 9.6 m² FLEXIRO wall heating: Q = 634 W, flow temperature of the heating 46°C and return temperature 38°C, i.e. Δt= 8K, i.e. average heating water temperature 42°C, the default setting must be set to the setting value 7.

4 Setting on the Kompabox RTL

The control valve of the Kompabox also works according to the RTL principle (Return Temperature Limiter).

The RTL valve detects the return temperature flowing from the heating circuit of the panel heating.

If this exceeds the maximum permissible value of 45°C, the control valve automatically closes the heating circuit and no further heating water with a flow temperature can flow into the heating circuit. The heating water in the heating circuit gives off heat to the surface and cools down in the process.

The maximum desired return temperature can also be individually adjusted to the desired room temperature on the thermostatic head of the valve. The RTL valve then adjusts the heating circuit temperature according to the new control variable.

Additional hydronic balancing is not absolutely necessary with the Kompabox if the heating circuits have comparable lengths. The RTL valve only allows enough flow through the heating circuit to ensure that the permissible heating circuit temperature and therefore the heat output are not disproportionately high.

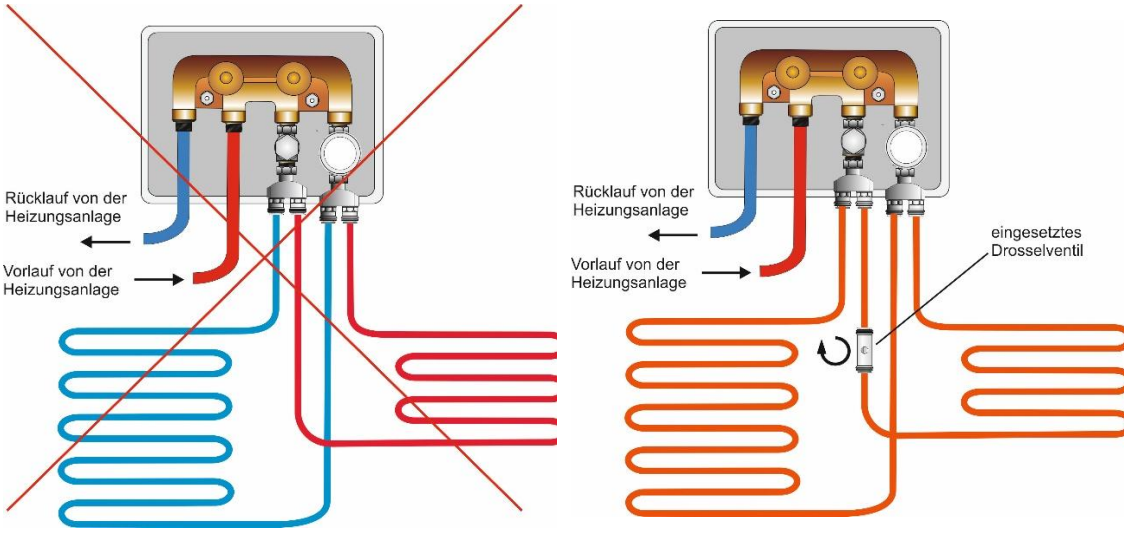
5 Hydraulic balancing in the case of different pipe lengths of the heating circuits

If the heating circuit furthest away from the RTL valve does not emit enough heat, it may be because the connection pipe lengths of the heating circuits closer to the box have been shortened too far.

To ensure that the hydraulic equalisation between the heating circuits is not impaired, the pipe lengths of the circuits must not differ by more than 1/3.

If the pipe lengths of the heating circuits are unequal, the installation of a manually operated throttle valve can provide a remedy and enable hydraulic equalisation.

The throttle valve is simply inserted into the flow or return of the heating circuit with the shortest pipe length. To do this, the heating pipe is cut and both pipe ends are inserted into the throttle valve.



Turning the adjusting screw in the throttle valve increases the pressure resistance in the shortest heating circuit and the volume flow of heating water in the longer heating circuits increases accordingly.

An exact setting can be achieved by measuring the surface temperature during operation of the panel heating.

Throttle valve at the FLEXIRO Shop:
https://flexiro.de/en/product/d/241/throttle-valve/