

SUMX Mixing sets

Application of Mixing Sets

SUMX mixing sets ensure continuous output control (proportional control using an analogue voltage signal of 0-10 V) and protection of the water heater. Output control is ensured by a change in the water output temperature at constant water discharge. A mixing set connected to the control unit and antifreeze protection system components can effectively protect the heater against freezing followed by its destruction. The below-mentioned information can also be suitably used for integration of the mixing sets into a cooling system equipped with a water heat exchanger.

Operating Conditions

The water running through the mixing set must not contain impurities, solids or chemicals aggressive to copper, brass, stainless steel, zinc, plastics, rubber or cast iron.

The heating system inlet branch must always be equipped with a **sludge** and **cleaning filter**. The mixing set must not be operated without this filter.

The permissible ambient temperature is 0 °C to 70 °C for the media temperature of 105 °C (for the media temperature of 110 °C the max. ambient temperature is 35 °C / 55 °C for SUMX 1–16). Minimum media temperature is +2 °C. Maximum allowed operating parameters of heating water:

- Maximum allowed water temperature: **+110 °C (+95 °C pro SUMX 10 až SUMX 16)**
- Max water pressure for SUMX 1–25: **1 MPa**
- Maximum water pressure for SUMX 28-90: **0,6 MPa**

For installations using hot water up to 130 °C, it is possible to use the so-called inverted (reverse) mixing set configuration with a pump situated in the return water branch to ensure the required water temperature of 110 °C in the heater outlet. The designation of the inverted mixing set is **SUMX..i**.

Sealing of a corresponding quality must be used for the installation. It is advisable to consult the manufacturer.

- If water is used as the heating medium, the mixing set can only be situated in an indoor environment where the temperature never falls below freezing point.
- Outdoor installation is acceptable only if glycol antifreeze solution is used as the heating medium. Salt brine solutions are not recommended, see the chapter "Water Heaters".
- In applications in which it is necessary to avoid primary circuit water cooling or in applications in which it is necessary to avoid interference from the primary and secondary circuit pumps (undesirable heating water flow direction through the heater), it is possible to equip the primary circuit with a bypass (respectively with a thermo-hydraulic separator). The bypass should be situated as close as possible to the mixing set connection point. The heating water bypassing increases the return water temperature therefore, the bypass (thermo-hydraulic separator) must not be used in association with modern condensing boilers. The same applies if the heating water supplier does not allow the cooled water to be returned to the system.

⚠s the mixing set pump overcomes only the secondary circuit (the heater circuit) pressure losses, the primary circuit pump must be designed to cover all pressure losses up to

the mixing set at the nominal water discharge which has been determined by the water heater design.

The primary circuit pump must not affect the mixing set pump, i.e. the mixing set must not be loaded by the pressure from the primary circuit. It is not advisable to include other consumers in the heater's circuit. Further, it is necessary to equip the primary circuit inlet and outlet branch with ball closing valves and the inlet branch with a sludge and cleaning filter (which should also be separated by a closing valve).

- The mixing set must not be operated without a sludge and cleaning filter.
- **Components of the primary circuit are not the subject of the delivery from REMAK a.s.**

Position and Location

When projecting the layout of the mixing set location, we recommend observing the following principles:

- The mixing set must be mounted so that the shaft of the circular pump motor will always be in the horizontal position!
- The mixing set must be situated so that air-venting will be possible.
- If the mixing set is covered by a ceiling, it is necessary to ensure access to the entire set to enable maintenance.
- The mixing set is connected to the heater via corrosion-proof hoses while the flange assembly should be mounted using standard heat-engineering techniques as close as possible to the heater. It is advisable to minimize the length of the hoses so that the control response will not be unnecessarily delayed.
- The mixing set is mounted using an integrated holder, respectively, tube clamps can be used, if necessary. The weight of the mixing set must never be transferred onto the heat exchanger. The flange-connected mixing sets are delivered disassembled. The connecting hoses are not included in the delivery.

Table 8 – Mixing Set Types

Type	Pump	3-way valve	Push height	Actuator
A design with screwed components				
SUMX 1	UPM3 25-70	VRG131 15-1	7 m	HTYD24-SR
SUMX 1,6	UPM3 25-70	VRG131 15-1,6	7 m	HTYD24-SR
SUMX 2,5	UPM3 25-70	VRG131 15-2,5	7 m	HTYD24-SR
SUMX 4	UPM3 25-70	VRG131 20-4	7 m	HTYD24-SR
SUMX 6,3	UPM3 25-70	VRG131 20-6,3	7 m	HTYD24-SR
SUMX 10	UPML 25-95	VRG131 25-10	9,5 m	HTYD24-SR
SUMX 16	UPML 25-95	VRG131 32-16	9,5 m	HTYD24-SR
SUMX 25	Magna1 32-80	VRG131 40-25	8 m	HTYD24-SR
A design with flanged components				
SUMX 28	Magna1 40-60	3F 32	6 m	HTYD24-SR
SUMX 44	Magna1 40-60	3F 40	6 m	HTYD24-SR
SUMX 60	Magna1 65-60	3F 50	6 m	HTYD24-SR
SUMX 90	Magna1 65-60	3F 65	6 m	HTY24-SR

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Dimensional Range and Design

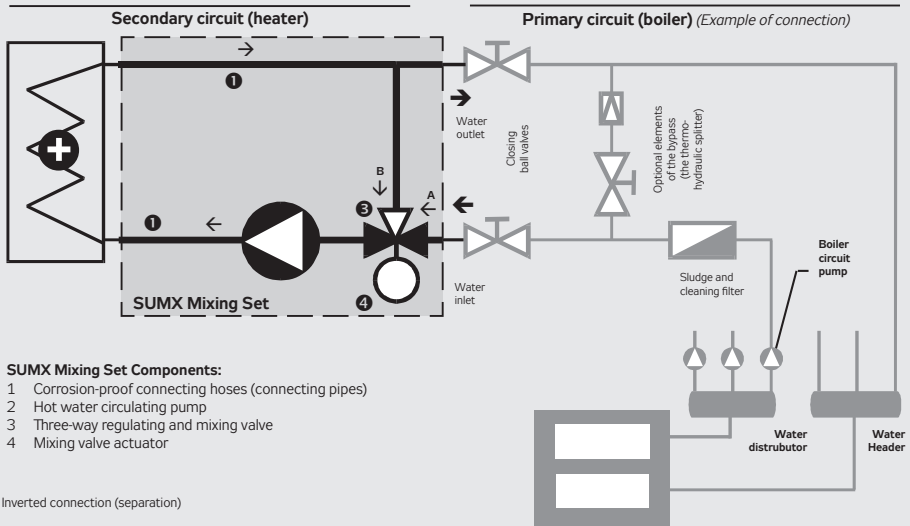
The mixing sets are delivered in 12 output types. Eight of them are equipped with screw couplings including connecting hoses, and four of them are equipped with flange connections without connecting hoses. The flange-connected mixing sets are delivered unassembled. The connecting hoses are not included in the delivery.

Mixing Set Type

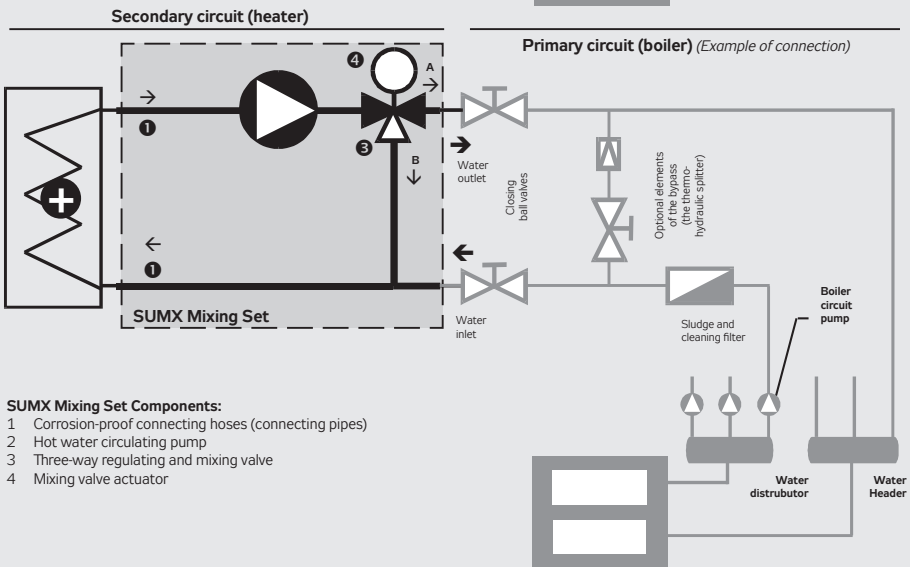
The rate of flow and pressure of the heating, respectively, cooling medium in the mixing set is given by the size of the pump and three-way mixing valve with Kv value from 1.0 to 90 according to table # 8. The mixing set type selection and allocation to the heater is performed automatically by the AeroCAD design software.

Figure 32 – Connecting scheme of the heater and mixing set in a heating system

a) Standard connection (mixing)



b) Inverted connection (separation)



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Dimensions and Performance

The basic specifications can be found in pictures #33a to #34 and in table #9. The types are listed in table #1. The pump and actuator specifications and electrical parameters are included in table #10 and #11.

Table 9 – pump parameters

Pump	Input power	Current max.	Supply voltage	Protection
	W	A	V	
25-70	52	0.52	1 x 230 AC	IP 44
25-95	140	1.1		IP 2xD
40-60 F	194	1.56		IP x4D
65-60 F	365	1.64		IP x4D

Table 10 – actuator parameters

Supply voltage	V	HTYD24-SR	HTY24-SR
		24 AC / DC	24 AC / DC
Degree of protection	IP	40	40
Input power	W	1.5	2.5
Dimensioning	VA	3	4
Rotation angle	°	max. 90	max. 90
Rotation time	sec	35	35
Torque	Nm	5	10
Control signal	V	DC 0-10	DC 0-10

Table 11 – dimensions, weight

Type	Width A * (mm)	Length B * (mm)	Connecting dimension	m (kg)
SUMX 1	90	860	G1	7
SUMX 1,6	90	860	G1	7.5
SUMX 2,5	90	860	G1	7.5
SUMX 4	90	860	G1	7.5
SUMX 6,3	90	860	G1	7.5
SUMX 10	90	810	G1	7
SUMX 16	100	830	G1 1/4	7
SUMX 25	110	870	G1 1/4	9.5
SUMX 28	350	630	DN 40	29
SUMX 44	350	540	DN 40	27
SUMX 60	350	875	DN 65	49
SUMX 90	350	710	DN 65	46

* ± 20 mm

Materials

Common heat-engineering materials and components are used to manufacture the mixing set. The mixing sets are made of brass, stainless steel, respectively, cast iron and in smaller scale, of galvanized steel and steel. The sealing components are made of rubber or plastic.

Figure 33a – Basic layout of mixing sets

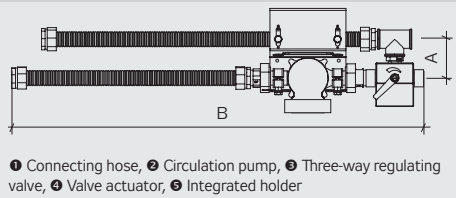


Figure 33b – Basic layout of mixing sets

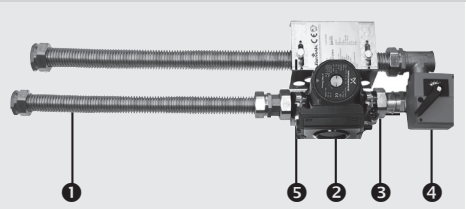


Figure 34a – Basic layout of mixing sets

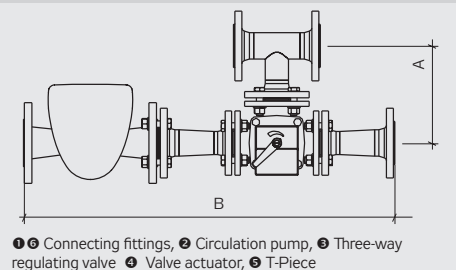
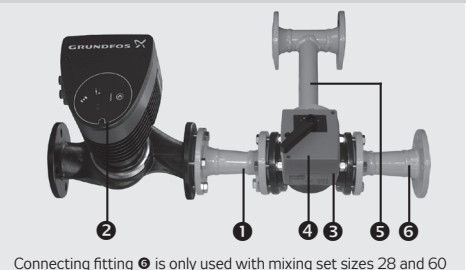


Figure 34b – Basic layout of mixing sets



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Heater Output Control

Pump ② ensures the constant water flow (circulation) through the water heater. Three-way mixing valve ③ controlled by actuator ① controls the heater's output by mixing the return water from the heater and heating water from the boiler. If the control system requires full output of the heater, the water will flow in the so-called big circuit, i.e. from the boiler through the heating water distributor, sludge and cleaning filter, service and closing valve, SUMX intake, three-way mixing valve ③ (only A direction), pump ②, water heater, SUMX water outlet, service and closing valve in to the heating water heater. If full output of the is not required, three-way valve ③ will start letting through some quantity of the water from the B direction, and thus decreasing the water temperature flowing through the heater. If no heating output is required, the water will only circulate within the heater circuit, i.e. three-way mixing valve ③ will only let the water through in the B direction. The same applies for the inverted connection (distribution function of the three-way valve).

Installation

- SUMX 1-25 mixing sets are connected directly to the heater via corrosion-proof hoses. If needed, the hoses can be cut to the desired length before installation.
- The mixing set must not be exposed to any strain or torsion caused by the connected pipe line.
- The mixing sets can be mounted on separate suspensions using an integrated holder, or using clamps (figure #40).
- If the mixing set is covered by a ceiling, it is necessary to ensure access to the entire mixing set to enable electric

Figure 35 – Installation using suspension rods

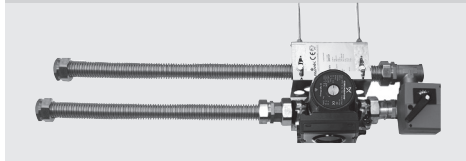
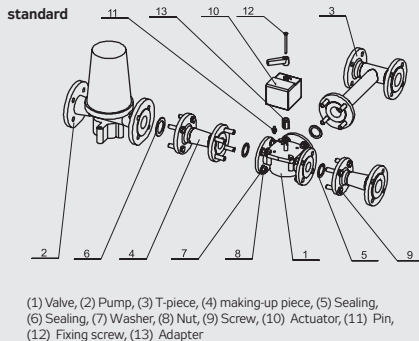


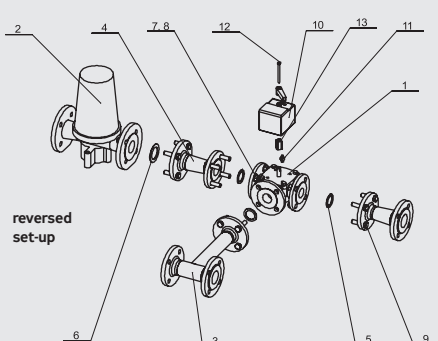
Figure 36 – Exploded view of the mixing set



cable connections, checking and maintenance.

- SUMX 28 - 90 flange-connected mixing sets can be connected to heat exchangers using standard heating engineering procedures; among others, it is necessary to ensure adaptation to threaded connections of the heat exchangers - refer to the heat exchanger technical details. It is advisable to use clamps to connect the flange-connected mixing sets to the suspensions or supporting brackets.
- The mixing set must be installed in such a way that the air in the piping will be able to run to the air-venting valves of the heater or boiler piping. Especially the connecting corrosion-proof hoses must be shaped after installation so as not to create an air trap.
- The mixing set must be positioned so that the shaft of the circular pump will always be in the horizontal position!
- The circular pump must be vented after the system has been filled with water in accordance with the manufacturer's instructions.
- When connecting the mixing set, it is necessary to check the correctness of the adjustment of the three-way valve and actuator. One way of the three-way valve, to which the bevelled spot on the valve shaft points, is always closed (figure # 41 shows the three-way valve's function).
- Flanged mixing sets are delivered disassembled, assembly must be performed in accordance with Figure 36.
- When the actuator rotates incorrectly, it is only needed to adjust rotational direction switch S1 to the second position. The switch is accessible after removing the actuator cover, see Fig. 47.

Figure 37 – Pump Speed Settings (curves)



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Pump Curve Settings

■ The speed of the circular pump is indicated in the project after the type designation of the mixing set. For example, the mixing set SUM 6,3 (3) is equipped with the UPM3 25-70 pump which is set to speed 3, the number in parentheses (3). The speed of the pump can be adjusted by the button on the pump during installation (fig. 37).

Curve Settings for UPM3 FLEX AS 25-70

- Press the button for $t > 2$ s, the pump enters the settings mode.
- Each pressing of the button changes the settings (fig. 38).
- To lock/unlock the pump settings, press and hold the button for $t > 10$ s

Figure 38 – Settings Menu

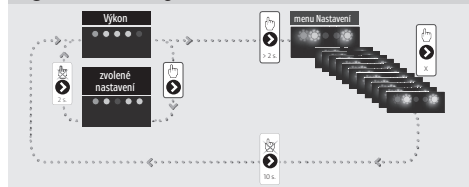


Figure 39 – Curve Settings



Figure 40 – Pump Settings Lock

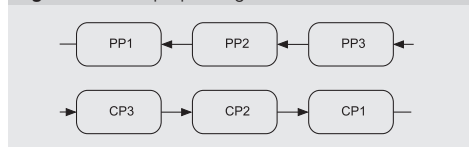


UPML 25-95 AUTO Pump Settings

The user interface allows the selection of six control curves in two control modes:

- Three proportional curves (PP)
- Three constant pressure/output curves (CP)

Figure 41 – Pump Operating Modes



- Press and hold the button for $t > 2$ s, the pump enters the settings mode. LED will start to flash.
- Each pressing of the button changes the settings:

● The Mode is flashing:

- Quickly: Proportional pressure
- Slowly: Constant pressure/Output

● If the button is not pressed for ten seconds:

- UPML 25-95 AUTO pump settings will be changed.
- The pump will enter the operating mode.

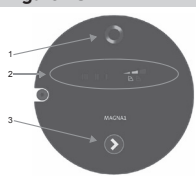
● LED 1 or 2 or 3 is permanently on.

- The pump runs according to the selected curve and mode.

Figure 42 – Pump Settings Display

III II I	Flashing quickly	PP1
III II I	Flashing quickly	PP2
III II I	Flashing quickly	PP3
III II I	Flashing slowly	CP1
III II I	Flashing slowly	CP2
III II I	Flashing slowly	CP3

Figure 43



MAGNA1 Pump Curve Settings

- Operation and Failure Signalling
- Indication of the set pump operating mode
- The button is used to set the pump operating mode (fig. 43).

- Number of the button (3) pressings corresponds to the set pump operating mode, see fig. 44

Figure 44 – Pump Operating Mode Settings

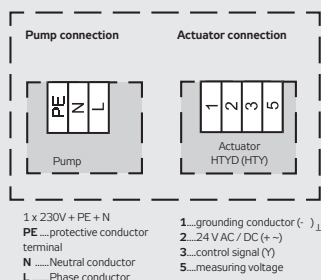
Button presses	Light signalling	Mode/Description/Designation
0	— ■ ■ ■ ■ ■	Advanced/proportional pressure / PP2
1	— ■ ■ ■ ■ ■	The highest/Proportional pressure / PP3
2	— ■ ■ ■ ■ ■	The highest/Constant pressure / CP1
3	— ■ ■ ■ ■ ■	Advanced/Constant pressure / CP2
4	— ■ ■ ■ ■ ■	The highest/Constant pressure / CP3
5	III	Constant curve/Constant speed III
6	II	Constant curve/Constant speed II
7	I	Constant curve/Constant speed I
8	— ■ ■ ■ ■ ■	The lowest/Proportional pressure / PP1

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Wiring

- The wiring can be performed only by a qualified worker licensed in accordance with national regulations.
- The pump must be connected via the terminal box in accordance with the manual. The actuator is equipped with a cable which must be connected in a wiring box (not included in the delivery).
- The mixing set pump and actuator are supplied and controlled by the control unit.
- For the mixing set wiring diagram, refer to figure # 45.

Figure 45 – Mixing set wiring diagram



- The principle diagram of the mixing set connection to the control unit is shown in figure # 46.
- After connecting the mixing set, it is necessary to check the correctness of the actuator function depending on the control signal (heating / no heating).
- After turning the pump on, it is necessary to measure the feed current, which must not exceed the allowed current I_{max} stated on the pump rating plate.

Figure 46 – Mixing set connection

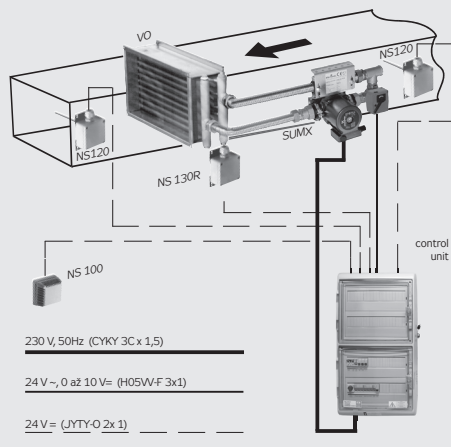


Figure 47 – Switching the actuator turning direction

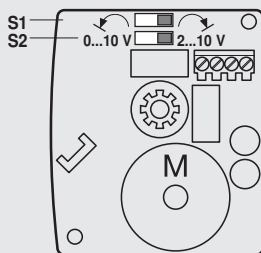
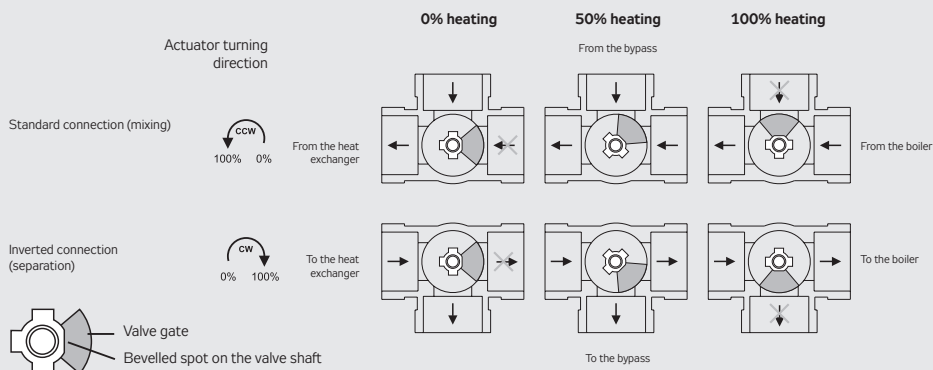


Figure 48 – Three-way valve function



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Operation, Maintenance and Service

- The mixing set requires regular maintenance at least at the beginning and end of the heating season.
- During operation, it is necessary to check the system for proper air venting and water leakage. It is necessary to supervise proper operation of the pump and actuator, and keep the filters in front of the mixing set clean. If the air-handling system is stopped due to the action of the antifreeze protection, the reason must be found and removed, refer to the chapter "Troubleshooting".

All important system protection functions, including antifreeze protection of the mixing sets and heaters, must be permanently controlled by the control unit.

Attention! During the winter season, the control unit must not be disconnected from the power supply for too long! Power supply failure during air-handling system operation is especially dangerous!

Troubleshooting

When activating the air-handling system, you can face some undesirable situations. The following text includes the most common problems and their removal:

- **Permanently low output air temperature**
 - Low hot water flow or pressure in the boiler piping
 - Low water temperature in the boiler piping
 - Low air temperature adjusted on the control unit
 - Low speed of the pump in the SUMX mixing set
 - Clogged screen in the SUMX mixing set
 - Wrong adjustment of the three-way valve and actuator
 - Aerated pump (resp. whole system)
 - Wrong design of the VO and SUMX assembly
- **Permanently high output air temperature**
 - Too high water flow and pressure in the boiler piping
 - Too high air temperature adjusted on the control unit
 - Wrong adjustment of the three-way valve and actuator
 - Wrong design of the VO and SUMX assembly
- **The output air temperature fluctuates**
 - Too high water flow and pressure in the boiler
 - Wrong adjustment of the three-way valve and actuator
 - Wrong design of the VO and SUMX assembly
- **Repeated activation of an antifreeze protection**
 - Low hot water flow or pressure in the boiler piping
 - Low water temperature in the boiler piping
 - Low air temperature adjusted on the control unit
 - Low speed of the pump in the SUMX mixing set
 - Clogged screen of the SUMX mixing set
 - Wrong adjustment of the three-way valve and actuator
 - Aerated pump (resp. whole system)
 - Wrong design of the VO and SUMX assembly

Repeated activation of the antifreeze protection can also be caused by too high temperature amplitudes. The reasons are listed in the paragraph above.

If the output water temperature is permanently above +30°C, the problem can be caused by failure of the control system or sensor.