CONTROL UNIT GUIDE

Control Unit for Fresh Water Heating

Oventrop
REGTRONIC PQ

Microcontroller-based temperature controller for use in fresh water stations

IMPORTANT!

PLEASE READ THE INSTRUCTIONS CAREFULLY BEFORE INSTALLING AND OPERATING THE UNIT!

FAILURE TO DO THIS CAN VOID PRODUCT WARRANTY!
PLEASE KEEP THE INSTRUCTIONS IN A SAFE PLACE!

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1 General / Introduction

The fresh water controller permits hygienic and energy-saving heating of fresh water via heat exchangers.

The controller has the following basic functions:

Controller functions

- Controlling a constant hot water delivery temperature
- Control of the circulation function
- Reheating of the storage tank by conventional heating
- Disinfection with heating demand or multi-function regulator

Measuring functions

- Measuring of temperatures
- Measuring of water discharge volume in l/min
- Measuring of hot water consumption and energy consumption

Outputs

- Control of primary pump heat exchanger
- Control of pump circulation
- Control of reheating function for storage tank or multi-function regulator
- Controller valve for temperature-dependant reservoir return flow discharge
- Control of a floating NO contact for safety shut-off

2 Assembly

2.1 Safety instructions

You must isolate the control unit from mains power before carrying out any assembly or wiring work.
The connection and start-up of the control unit should only be carried out by qualified technical personnel. All work must comply with the applicable national and local safety regulations.

- Always ensure that you isolate the device from the mains power supply before starting installation or wiring work on its electrical components.
  Make sure that you never confuse the SELV (safety extra low voltage) connectors (sensor, flow transmitter) with the 230 V connectors: This may produce life-threatening current and cause irreparable damage to the device, attached sensors and equipment.
- The system may reach high temperatures. There is therefore a risk of burn injuries! Exercise caution when installing the temperature sensors!
- When this function is selected, there is a risk of scalding during and up to approx. 1 hour after the disinfection process! Arrange the function time such that no unsupervised water delivery occurs! Set the hot water limit during disinfection to the maximum admissible pipeline temperature of the existing installation.
- When installing sensors, avoid locations (such as heat sources) that generate temperatures outside the equipment's maximum range (>50 °C).
- The control unit is not splash- or drip-proof. The control unit must be installed in a dry place.
- For safety reasons, the system should only be operated manually during testing. In this operational mode, the system does not monitor maximum temperatures or sensor functions.
- Do not operate the system if there is recognisable damage to the controller, cables or the connected pumps and valves.
- Before using piping or installation materials, or attaching pumps and valves, check that these are suitable for the temperature levels generated by the system.

2.2 Securing the casing

Open the casing

- No tools are required to open the casing. The casing upper section engages in the lower section. The casing upper section can be easily released and then raised by pulling lightly on the side tabs.
- Raise the casing upper section until it engages.

2.3 Input / outputs, general:

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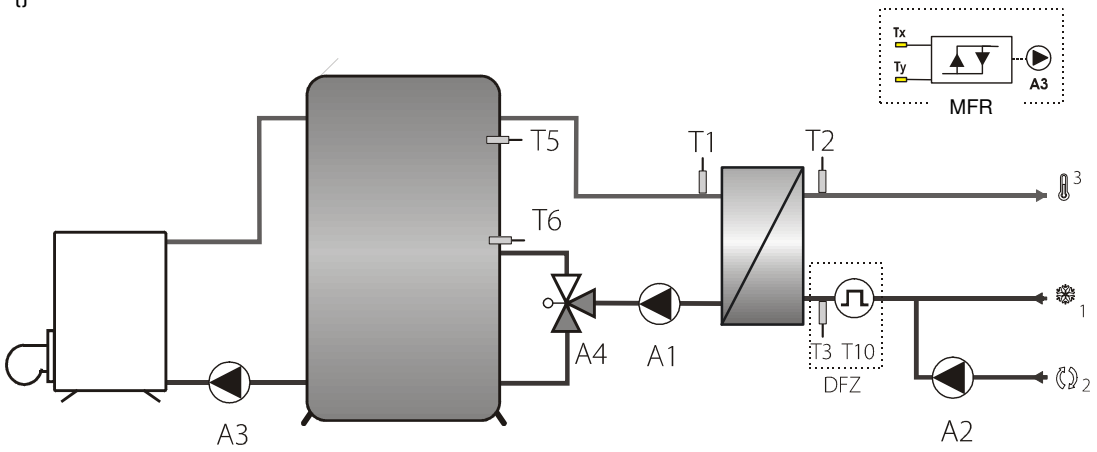
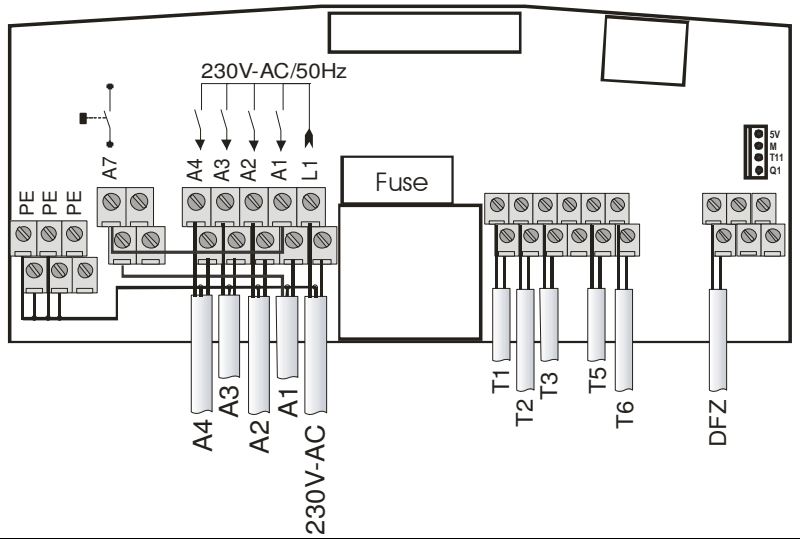


The fundamental system layout serves only to illustrate the system function and contains no additional (safety) components
1 – Cold water; 2 – Circulation return; 3 – Hot water = Circulation flow



2.3.1 Definition of inputs

Measuring points	
T1:	Heat exchanger temperature – primary side, flow
T2:	Heat exchanger temperature – secondary side, hot water delivery
T3:	Heat exchanger temperature – secondary side, hot water delivery Return temperature – circulation line
T5:	Temperature – upper buffer accumulator Is required for the auxiliary function "Reheating". Sensor not included in scope of supply!
T6:	Temperature - buffer accumulator centre. Is required for the auxiliary function “back layering". Sensor not included in scope of supply!
T1…T6:	Sensors used with MFR (multi-function regulator)
DFZ:	Digital signal from flow transmitter.

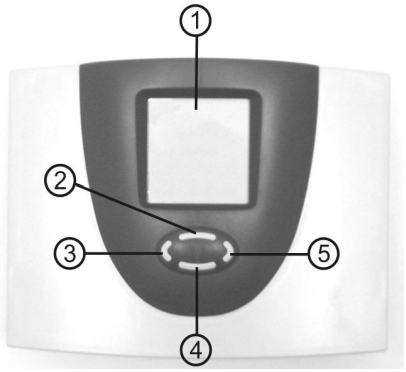
2.3.2 Definition of outputs

Measuring points	
A1:	Primary-side circulation pump for heat exchanger
A2:	Circulation pump for circulation line
A3:	Demand signal for storage tank reheating function or output of multi-function regulator
A4:	Controller valve for temperature-dependant reservoir return flow discharge
A7:	Floating NO contact. Output for safety shut-off

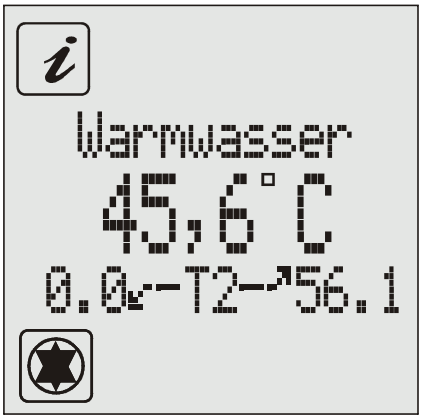
All outputs (except A7) are designed as electronically switched 230V outputs.

If a floating switching contact is required for the reheating function, this must be implemented via an external relay.

3 Overview of display and control buttons



Number	Description
1	Display with icons
2	Page up / **+** control button
3	Quit / cancel control button
4	Page down / **-** control button
5	Select / confirm control button



The symbol indicates the active menu

Measuring point reference: e.g. hot water

Displays the current reading: here 45.6°C

Display of the minimum and maximum values reached

Display of status symbols

3.1 Explanation of icons

Icon	Menu	Functions contained
	"Info" menu	Main menu for the automatic control • Displays of the current readings • Display of the operational status • Display of error messages
	"Programming" menu	Changing and setting parameters
	"Manual operation" menu	Manual switching on/off of the outputs
	"System Settings" menu	Information about system settings controlling the system functionality. **Please note:** Settings and changes should only be carried out by **experienced users**. Changes can compromise system functionality

4 Operating menu

The complete operating menu is listed below. Depending of the selection or deselection of auxiliary functions, only some of the points in the controller are displayed.

4.1 "Info" menu

All the measured values and operational statuses are displayed in this menu.
Min. or max. values of temperature sensors can be reset as follows:

➲ Select the value with buttons and

➲ To reset the value, use button

➲ Confirm message "OK?", using for "No" or for "Yes"

Term	Comment
Hot water	Current, min., max.
Cold water	Current, min., max.
Heat exchanger (HE) – flow	Current, min., max.
Upper storage tank	Current, min., max. (only with Reheating function active)
Flow rate	in L/min
Circulation	Current, min., max. (only with active circulation function)
Hot water (HW) – Consumption	in m^3 (only with active consumption recording)
Energy consumptions	in kWh (only with active consumption recording)
Status	Main function fresh water control + Auxiliary functions Circulation / Reheating
Message	Various error messages

4.2 "Programming" menu

This menu can be used to check and, where necessary, change all configurable parameters. As a rule, the factory settings configure the parameters so as to guarantee the smooth operation of the system.
The number of values displayed depends on the operational mode. Only the values required for the unit are displayed:

Sub-menu	Reference	Comment
Hot water	Nominal temperature	Setpoint for water heating
	HE operational mode	Operational mode selection for the heat exchanger charge
	Time 1: Start	Time window for timer-controlled heat exchanger charging Charging active Time window 1 Start.
	Time 1: Stop	Charging active Time window 1 Stop.
	Time 2: Start	Charging active Time window 2 Start.
	Time 2: Stop	Charging active Time window 2 Stop.
	Time 3: Start	Charging active Time window 3 Start.
	Time 3: Stop	Charging active Time window 3 Stop.
	HE setpoint	Setpoint when HE operational mode = Hot + timer-controlled
	HE hysteresis	Hysteresis when HE operational mode = Hot + timer-controlled
	HW peak value time	Error generation after exceeding time with excessive hot water temperatures. After 3 errors the controller is automatically switched off.
Circulation	Flow setpoint temperature	Setpoint for the feeding of the pipeline during circulation
	Input of weekly schedule	Sub-menus for 3 time windows per weekday. Values entered in the master day are adopted for all weekdays!
Reheating	SP Setpoint temperature	Setpoint for start heating function for the storage tank
Time	Set time	Increase or decrease the time or date in steps with the buttons "Up" or "Down".
Date	Set date	
Weekday	Set weekday	
Time setting	Automatic changeover ON/OFF	Time changeover summer/winter time

4.3 "Manual operation" menu

All outputs can be operated manually for service and test purposes. This also lets you switch the 230 V switched output ON/OFF. No automated control of the system is available during manual operation. To prevent system instability, the system switches back to "Info" mode after approx. 8 hours in manual mode, re-activating automated control.

Term	Comment
Output 1	ON / OFF (output 7 is also switched)
Output 2	ON / OFF
Output 3	ON / OFF
Output 4	ON / OFF
Output 7	ON / OFF (only when output 1 is switched off)
System adjustment	Adjust characteristic Running/OFF
Circulation adjustment	Determine circulation flow rate Running/OFF

4.4 "System Settings" menu

The functionalities and settings of the controller can be changed in the system settings menu.
During normal operation, the "System Settings" menu only displays parameters and does not allow them to be altered. This prevents accidental changes. To change parameters, this menu must be selected within one minute of switching on the unit. This permits changes to be made with no time limit. **The System Settings menu "locks" itself automatically one minute after the unit has been switched on or one minute after the user has exited the menu.**

Sub-menu	Reference	Comment
Information	System number	Number of the system layout
	System vers.	Version number of the system layout
	Software No.	Software package number
	Software Ver.	Version number for software package
Controller (visible only after enabling Service)	ON	Controller ON / OFF
	HW –max	Value for HW maximum temperature
	VL DeltaT	Controller start at Tvl with at least "VL_DeltaT" higher setpoint temperature
	P10-P60	Control parameter
Characteristic	Flow rate min	Flow rate for definition point: Lower characteristic
	Output min	Pump output for definition point: Lower characteristic
	Flow rate mid	Flow rate for definition point: Middle characteristic
	Output mid	Pump output for definition point: Middle characteristic
	Flow rate max	Flow rate for definition point: Upper characteristic
	Output max	Pump output for definition point: Upper characteristic
	Correction	Correction value for pump output with deviation in VL or CW temperature
	Adj. T hot water	Adjustment value for storage tank flow temperature
	Adj. T cold water	Adjustment value for cold water flow temperature
	Adj. Setpoint	Adjustment value for hot water delivery temperature
	Control percentage	Relationship between controller percentage-characteristic percentage
Controller mode	Normal / Sliding temp./ Heat pump	Selection of a controller type for hot water control
Circulation	ON	Switching function ON / OFF
	Operational mode	Choice of 5 operational modes. See function description "Circulation"
	Run time	Run time of the circulation pump on supply demand
	Rest time	Rest or barred time of the circulation pump
	Shut off difference	Difference between set circulation flow setpoint and minimum temperature to be reached at the return flow sensor
Function selection A3	Heating / MFR	Function selection – function not selected is no longer displayed
Reheating	ON	Switching function ON / OFF
	SP setpoint	Absolute = Fixed temperature Relative = Sliding value over HW setpoint or over disinfection setpoint
Back-layering	ON	Temperature-dependant re-routing of the reservoir return flow
Consumption recording	ON	Switch on the consumption displays (calculations run constantly)
	Display	Reset the totals displays (e.g. after annual reading)
Disinfection	ON	Switch on the automatic disinfection of the circulation pipework to prevent legionella (can only be activated when circulation line is installed and circulation is switched on!)
	Setpoint	Setpoint temperature input for thermal disinfection
	Run time	Effective run time of the disinfection process

	Starting day	Selection of the scheduled day for the disinfection
	Start time	Selection of the scheduled time for the disinfection
Multi-function regulator (MFR)	ON	Switching function ON / OFF When the function is active, 230 V is switched on at output A3!
	Heating	Thermostat function "Heating" – independent control loop.
	Cooling	Thermostat function "Cooling" – independent control loop.
	Alarm	The alarm function of the multi-function regulator
Factory settings	Factory settings	Activate factory settings
	Enable	Enable service menus
	Output monitoring	ON: For connection assembly with feedback of output status A1 OFF: For connection assembly without feedback function
	Parameters	Backup parameters from controller to DataStick Load parameters from DataStick to the controller
System selection	OFF	Function selection (with multifunction systems only)

5 Controller functions

5.1 Function: Water heating via heat exchanger

5.1.1 Description of function

The function of a fresh water station is controlled.
This serves to heat water with the most uniform possible water outlet temperature.
Energy supplier is a buffer storage tank with the most constant possible temperature, typically 60 - 85°C, but at least 3K above the hot water setpoint temperature.
As an option, a variable buffer storage tank temperature should also be assumed. The storage tank can be heated by a heater or by a solar power system.
The speed of the primary pump is controlled such that the desired hot water temperature is held constant. As a rule, a precision of +/- 2K from the setpoint is maintained *.

Even with fluctuating water deliveries, special algorithms ensure that the setpoints are reached in a minimum of time.
At the start of delivery with cold pipework, the primary pump is driven at 100% for a calculated time. The time is calculated from the deviation in the current HW temperature at sensor T2.
If an adequate flow temperature is not available, a corresponding message is displayed in the error menu after 5 minutes.
The pump output of the primary pump is controlled at 100% in heat pump mode, in normal and sliding temperature mode at a pump output proportional to the water delivery.

*** Restrictions with respect to the control precision and stability apply at low flow rates below approx. 15% of the max. flow rate. Larger deviations are to be expected there for physical reasons**.

5.1.2 Control methods

5.1.2.1 Standard control (normal)

With this control method, the system is controlled in relation to the set nominal hot water temperature.
The flow temperature must be the value set for "VL_DeltaT" higher for the control (Factory setting 3K).

If the flow temperature drops below this value, the primary pump will be driven with a pump output dependent on the water delivery. After 5 minutes the error signal "!" appears and in the Info menu under point

"Messages" the error is defined in more detail: "Flow too low".

5.1.2.2 Sliding temperature control

If the flow temperature drops below the limit necessary for control: *HWsetp + VL_DeltaT*, the hot water control temperature will be lowered. A constant difference between VL_DeltaT and the flow temperature is maintained. The temperature is no longer reduced only when a control temperature of 37°C is reached. The pump output is then oriented to the water delivery again. Only then is the error message "VL too low" displayed after 5 minutes.

5.1.2.3 Heat pump control

The special feature of this operational mode is that with water delivery with a set hot water setpoint temperature less than 45°C and insufficient flow temperature, the primary pump is driven for a short time (control parameter P41: delay time) with an output corresponding to the water delivery, and is then driven with full power again.

Maximum charging is ended when water delivery or when an adequate flow temperature is reached again. In this case the normal hot water control starts.

The "**Reheating**" function should be switched on here and the setpoint setting for the storage tank temperature adjusted to suit the requirements.

5.1.3 Operational modes for heat exchanger charging

5.1.3.1 Heat exchanger - cold:

The heat exchanger remains cold when at rest.
A1 is only activated when water delivery occurs on the secondary side.

5.1.3.2 Heat exchanger - hot:

The heat exchanger is permanently kept at a constant operating temperature. If the
HE setpoint minus hysteresis
is undershot, A1 is activated with an output of 25% until the variable setpoint for the heat exchanger is reached.

The controller (hot water delivery) can immediately operated with the calculated pump output A1.
Sensor T1 is used as reference temperature.

5.1.3.3 Heat exchanger - timer-controlled:

This operational mode corresponds to the mode Heat exchanger - hot, but is limited to the 3 time windows which can only be set in this operational mode.

5.1.4 System adjustment

With the normal design of the whole hydraulic system, the controller can meet the demands for water heating with the factory settings.
With different designs, e.g. smaller cross-sections of the primary-side storage tank lines, widely fluctuating tank and cold water temperatures, the controller can be optimised for the respective system by means of a system adjustment.
The adjustment is performed by determining the pump output at three working points.

The following preconditions must be satisfied for a good adjustment:

- Temperature of the storage tank at the level to be used later
- CW inlet temperature constant. Allow to run for a time first, if necessary.
- All shut-off valves, etc. must be in the later operating position.
- The selection switch for the circulation pump output must be set to the required value, leave step switch always in position 3.

Procedure for automatic adjustment

1. Select the "Manual operation" menu
2. Select "Characteristic adjustment"
3. Switch on the menu item
4. Follow the menu instructions.
5. When the message "Done" appears, the measurement has been completed. The measured values are stored in the menu "System Settings/Characteristic".
6. Quit the menu with the "ESC" button (left button)

The time required for the adjustment depends on the prevailing conditions and can take several minutes.
A correction mechanism has been installed in order to achieve an optimum result (with changing conditions). An optimum result is thus achieved even under changing conditions.

5.2 Function: Circulation

5.2.1 Description of function

In addition to water heating, 5 circulation functions can also be selected.

The "System Settings" menu offers the following selection:
(within/outside time window)*
OFF: No circulation
Continuous/OFF: Continuous operation/no circulation
Continuous/demand: Continuous operation/demand-controlled
Temp/OFF: Temp-controlled/no circulation
Temp/demand: Temp-controlled/demand-controlled

If the function is activated in the "System Settings" menu, 3 time windows per day can be defined in the "Programming" menu.
The start and end time can be defined for each switching window.
In "Temperature-controlled", the circulation pump is switched ON when the temperature and the circulation return flow sensor drops by 3K below the switching threshold calculated from
flow setpoint minus switching difference.
When the temperature exceeds the switching at the sensor, the function is terminated again.
If hot water delivery is detected in "**Demand-controlled**" mode, the circulation pump switches on for the programmed time ("System settings" menu: Circulation / Pump run time).

In **Continuous operation** mode, the circulation pump is switched on for the duration of an active time window.

Water delivery during circulation or errors occurring interrupt the circulation function!

The circulation flow temperature at the hot water outlet can be set in the "Programming" menu with the parameter Circulation VL-setpoint. This parameter is linked to the parameter "Hot water setpoint" and if changed, the circulation flow value changes in the same way while maintaining the previously set difference.

* Within a time window means: The current time is within a start and stop window.

5.2.1.1 Inputs used

Measuring points	
T2:	Heat exchanger temperature secondary side, hot water delivery
T3:	Circulation temperature and cold water inlet temperature sensor
DFZ:	Digital signal from flow transmitter

5.2.1.2 Outputs used

Output	
A1:	Controller for HE circulation pump primary side
A2:	Controller for circulation pump

5.2.1.3 Water heating + circulation

If a circulation line / pump is installed and the function "Circulation" is activated in the “System settings” menu, the circulation runs in "Temperature-controlled" mode according to time set in the weekly schedule (3 time windows are available per day) until the calculated threshold of circulation flow temperature and shutoff temperature is reached.
This ensures that even with a small hot water delivery, hot water at the desired temperature is transported to the delivery point as quickly as possible.
In "Demand" mode which is generally active outside the time window, a demand-driven circulation can be created by briefly opening and closing a tap (1-3 seconds).
Renewed activation of the circulation is only possible on expiry of the rest time.
In "Continuous" mode, the circulation is only interrupted by a water delivery.

5.2.2 Circulation adjustment

In order to be able to measure the water delivery, the controller has to know the circulation capacity of the circulation pump.

A teach-in of the circulation capacity is therefore necessary with the circulation pump.
A precondition for the adjustment is that all the delivery points are closed.

Procedure:

1. Select the "Manual operation" menu
2. Select: Menu item "Circulation adjustment".
3. Switch on the menu item
4. Follow the menu instructions.
5. When the message "Done" appears, the measurement has been completed.
   The measured value is displayed and stored.
6. Quit the menu with the "ESC" button (left button)

5.3 Back-layering function

5.3.1 Description of function

The auxiliary function “back-layering" can be activated in the “System settings” menu.
With this function, a 3-way bypass valve is triggered depending on:
- Temperature of the circulation return flow
- Temperature at the upper back-layering input (storage tank centre)
- Status of the circulation pump.

The valve is triggered so that feed-in takes place in the central area of the storage tank when the temperature of the circulation return flow is at least equal to the temperature at the “storage tank centre” sensor and the circulation pump is switched on.
If the temperature of the circulation return flow exceeds the “storage tank centre” temperature by 1K, or the circulation pump is off, the valve is triggered and leads the return flow into the lower area of the storage tank.

5.3.1.1 Inputs used

Measuring points	
T3:	Circulation return flow temperature
T6:	Central storage tank temperature

5.3.1.2 Outputs used

outlet	
A4:	Controller for 3-way valve for return flow re-routing

5.4 Function: Consumption recording

5.4.1 Description of function

The auxiliary function "**Consumption recording**" can be activated in the "System settings" menu.
The calculations for the hot water delivery and its energy run continuously, the display is only activated in the "Info" menu. The display shows the total and daily consumption of hot water in m3 or the total and daily consumption of energy in kWh referred to the delivered volume of hot water.
The respective daily consumption is reset when the internal clock moves from 23:59 to 00:00, the total consumption can be reset in the "System settings" menu e.g. after the annual reading of the meter (observe interlock).
The measurement range is up to 655 m^3 or 6553 kWh. The measuring accuracy is approx. 5% due to the scatter from temperature sensor and flow rate sensor.
The devices are not calibrated and must not be used for the calculation of rental ancillary costs or similar charges! The display is intended only for orientation.

5.5 Disinfection function

Warning: When this function is selected, there is a risk of scalding during and up to approx. 1 hour after the disinfection process! Arrange the function time such that no unsupervised water delivery occurs!
Set the hot water limit during disinfection to the maximum admissible pipeline temperature of the existing installation!

5.5.1 Description of function

The auxiliary function "**Disinfection**" can be switched on in the "System settings" menu, but only when a circulation grid is installed and the "**Circulation**" is activated.
The desired temperature for the thermal disinfection, its duration and starting time can then be set.
The starting day can be set to a particular day of the week or "daily" can be selected.
The crucial criterion for the function is the circulation return temperature measured at sensor T3.
This temperature must be reached for the set period of time. Brief drops below this temperature are ignored, only the effective time for which the setpoint temperature is reached is counted.
The hot water temperature for the disinfection is automatically controlled, but can be limited to a maximum value! If there

is a possibility of activating a burner to heat the storage tank (function "Reheating" set to "ON", operational mode: "relative"), this function can be activated a set time before the start of disinfection. This function monitors the storage tank and heats it, if necessary, to the disinfection setpoint temperature + flow increase (value from shutoff difference in circulation) + spread (reheating setting).

If the flow temperature for the control is not reached, a corresponding error message appears after 5 minutes: “T-VL too low” in the “Info” menu. This error message stops the disinfection for 15 minutes, but activates the function again if a sufficient flow temperature is reached, but not later than after 1 hour! (The error message is then also deleted)
If the water taps are opened during disinfection in order to disinfect the delivery points, the water heating system continues to maintain the water at the disinfection temperature. The time recording for the disinfection time continues to run as long as the water temperature does not drop below the necessary disinfection temperature at the hot water outlet.
The disinfection function continues to run for a further 10 minutes after reaching the set disinfection time and then ends.
Or if the function is switched off in the “System settings” menu. A maximum period of 120 minutes is available for the disinfection. If, with an adequate flow temperature, the set disinfection temperature is not reached for the effective time by the end of this period, the error message "T-VL disinfect" would be displayed in the “Info” menu.
The message can be cancelled by pressing the right button!

5.6 Function changeover for output 3

The function assignment of output 3 can be changed in the software.
The function whose result switches output 3 can be selected in the “System settings” menu under "Function output 3". "Heating" (reheating function) or "Free controller" (multi-function regulator) can be selected.
The menu items of the function not selected are then no longer displayed!

5.6.1 Function: Reheating

The auxiliary function "**Reheating**" can be activated in the “System settings” menu.
With this function, a variable setpoint is compared with the temperature at the buffer sensor and a voltage signal is sent to output A3 which can be used to switch on an external heat source which reheats the buffer storage tank to the nominal level. A precondition for this is that the heat source can actually provide the desired temperature level.
The setpoint for the storage tank temperature can be defined as an absolute value (variable fixed value) or relative value (hot water setpoint + variable spread).
If actual temperature drops below the set or calculated setpoint by 3K, the external heat source is activated until the setpoint is reached again.

If the "**Disinfection**" function (see section 5.5) is activated, a reheating demand can be started (setting "Preheating time" in the "Disinfection" menu) before the start of disinfection so that the buffer storage tank can supply an adequate flow temperature for thermal disinfection.

Inputs used

Measuring points	
T5:	Upper storage tank temperature

A normal immersion sensor can be used as a PT1000 sensor at measuring point T5. Sensor not included in scope of supply! (Only in conjunction with the "Reheating" function.)

Outputs used

Output	
A3:	230V demand signal for the Reheating function

5.6.2 Multi-function regulator

This function uses the same output A3 as the reheating function. The function to be used is selected in the “System settings“ menu. The function not activated is not displayed.

The multi-function regulator (MultiReg or MFR) permits the operator to carry out a variety of different functions at an assigned switched output on the control unit.
This possibility offers a very high degree of flexibility for performing additional system functions.

- The temperature sensors for the heat source and heat consumer can be freely selected (T1 to T6)
- Functional variation by selecting the function required
- Control procedure can be executed within multiple time frames
- RPM control option (depending on function)

This function is set to output 3 and can be configured for the following functionality.
- Cooling
- Heating
- Difference regulator
- Alarm

The following describes the individual functions of the MFR:

5.6.2.1 Heating

The function is activated or deactivated as a multi-function regulator in the "System Settings" menu.
If the temperature measured drops below the setpoint, output A3 is activated until the temperature measured reaches the *target value minus hysteresis*.

Inputs/outputs

Measuring points	Output
Upper storage tank temperature	A3

Data input / parameters

	Term	Comment
Values displayed	Info: Heating	
	Function active: Heating	
Programmable values	MultiReg: Heating	
	Time 1: Start	
	Time 1: Stop	
	Time 2: Start	
	Time 2: Stop	
	Time 3: Start	
	Time 3: Stop	
	Start	
	Stop	
System Settings	MultiReg function: Heating	
Internal parameters	--	

5.6.2.2 Cooling

The function is activated or deactivated as a multi-function regulator in the "System Settings" menu. If the temperature measured exceeds the target value, then output A3 is activated until the temperature measured drops below the *target value minus hysteresis*.

Inputs/outputs

Measuring points	Output
Upper storage tank temperature	A3

Data input / parameters

	Term	Comment
Values displayed	Info: Cooling	
	Function active: Cooling	
Programmable values	MultiReg: Cooling	
	Start	
	Stop	
System Settings	MultiReg function: Cooling	
Internal parameters	--	

5.6.2.3 Difference regulator

The temperature difference regulator can be configured as required in terms of inputs and parameters.
The output is fixed. Free temperature difference regulator for minimum and maximum temperature limiting possible.

If the difference between both measurement points exceeds the hysteresis set, then A3 is activated. In addition, one may also define a maximum temperature for the energy consumer and a minimum temperature for the energy source.

Inputs/outputs

Measuring points	Output
2 temperature sensors, assigned as required	A3

Data input / parameters

	Term	Comment
Values displayed	Info: Diff. regl. ▲	
	Info: Diff. regl. ▼	
	Function active: Diff. regl	
Programmable values	MultiReg: Diff. regl	
	maximum	Maximum consumer temperature
	minimum	Minimum source temperature
	dTmax	
	dTmin	
	Time 1: Start	
	Time 1: Stop	
	Time 2: Start	
	Time 2: Stop	
	Time 3: Start	
	Time 3: Stop	
System Settings	MultiReg function: Diff. regl	
	Diff. regl Source sensor ▲	
	Diff. regl Consumer sensor ▼	
Internal parameters	--	

5.6.2.4 Alarm

The alarm function is activated or deactivated as an MFR in the "System Settings" menu. If the system under control triggers an error condition – e.g. sensor short-circuit or sensor disruption – and the alarm function is switched on, this activates output A3. If required, this signal can be detected and displayed by a building control system.

Inputs/outputs

Measuring points	Outputs
--	A3 - 230 V output, e.g. for siren, flashing light

Data input / parameters

	Term	Comment
Values displayed	Function active: Alarm	
Programmable values	MultiReg: Alarm	
	Signal	duration, interval
	Time 1: Start	
	Time 1: Stop	
	Time 2: Start	
	Time 2: Stop	
	Time 3: Start	
	Time 3: Stop	
System Settings	MultiReg function: Alarm	
Internal parameters	--	

5.7 Emergency shutoff

The special wiring of the primary pump (pump voltage runs additionally via relay contact A7) provides additional protection against overheating of the heat exchanger in the event of a fault in electronic output A1.
During normal operation, only output A1 and output A7 are activated simultaneously when the pump is driven.

The inserted emergency shutoff is activated if the temperature at the hot water output exceeds the setpoint set in the "Programming" menu by 10K (7K with HWsetp > 55°C)!
If the hot water temperature is permanently above the set setpoint temperature, a flag is set after the time set in the "Programming" menu for the peak value. After 3 events, the safety output is permanently deactivated.
The output is activated again only at midnight or if the controller is disconnected for the power supply for at least 5 seconds.

5.7.1.1 Outputs used

Output	
A7:	Safety shutoff

5.8 Emergency mode

In the event that sensors should fail and the hot water control no longer functions correctly, the heat exchanger can be charged in emergency mode.
Emergency mode is activated by briefly pressing the right and left button simultaneously.
The software then opens the menu item in which the pump output can be raised or lowered manually by pressing the "up" or "down" buttons.
Pressing the left button quits the menu item again and the pump output is reset.

Warning!
In this operational mode, measures must be taken to limit the flow temperature!

6 Troubleshooting

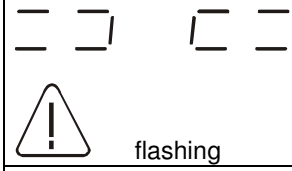
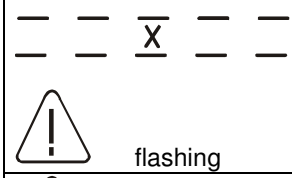
In principle, all system errors can be placed in one of two categories:

- faults that are recognised by the control unit itself, and which it can therefore report.

  The symbol ⚠ functions as a general error indicator.

- Faults that cannot be reported by the controller

6.1 Faults with error message

Error displayed on-screen	Possible causes	Action to take
 flashing	• Disruption to sensor cable • Sensor defective	➜ Check cable ➜ Check sensor resistance, replace sensor if necessary
 flashing	• Short-circuit in sensor cable • Sensor defective	➜ Check cable ➜ Check sensor resistance, replace sensor if necessary
flashing Error text in “Info” menu: "Sensor" "Output 1" "T-VL disinfect" "Flow too low" "Pump fault"	• Sensor defective • Fault in the pump control output • Flow temperature too low for disinfection • Flow temperature too low • Primary pump or controller output defective	➜ Check sensor lead ➜ Have control module replaced ➜ Reheat storage tank ➜ Reheat storage tank ➜ Check output 1 and pump - Have control module replaced

6.2 Faults without error message

For faults and malfunctions that cannot be displayed, you can use the following table to identify them, plus evaluate the possible causes and sources of such errors. If you cannot rectify the fault by using the description below, you will need to contact your supplier or installer.

Any faults involving the 230 V AC mains power supply may only be rectified by a qualified electrician!

Error display	Possible causes	Action to take
No display possible	• 230 V mains power supply unavailable	➜ Switch on or connect up control unit ➜ Check fuses for building power supply
	• Fuse inside unit defective	➜ Check fuse, replace if necessary with new 2A (T) fuse. ➜ Check 230 V components for short-circuits
	• Unit defective	➜ Contact your supplier
Control unit inoperative	• Unit is in manual operation mode • Switch-on condition not yet achieved.	➜ Exit "Manual Operation" menu. ➜ Wait until switch-on condition achieved
"Pump" icon turns, but pump is not working	• Disruption to pump connection. • Pump has seized up. • Switched output has no current.	➜ Check cable to pump ➜ Ensure pump can run smoothly ➜ Contact your supplier.
Temperature display fluctuates strongly at short intervals	• Sensor cabling has been laid near to 230 V cables • Long sensor cables extended using unshielded leads • Unit defective	➜ Reposition sensor cabling, shield sensor leads ➜ Shield sensor leads ➜ Contact your supplier

To soft reset the controller just press the Left and Right keys simultaneously and after that the left key. The programmed values will remain unchanged.

7 Technical data

Casing	
Material	100% recyclable ABS casing for wall mounting
Dimensions (L x W x H) in mm, weight	175 x 134 x 56; approx. 360 g
Protection class	IP20 to VDE 0470 for vertical operating position
Electrical specifications	
Supply voltage	AC 230 V/50 Hz, -10...+15%
Radio interference class	N (as defined by VDE 0875)
Max. cable cross-section, 230 V connections	2.5 mm² fine-/single-wire
Temperature sensor	PT1000 (1 kΩ at 0°C)
Measuring range	– 30°C to +250°C
Test voltage	4 kV 1 min (VDE 0631)
Switching voltage Power per switched output Total power for all outputs	230 V / 1 A / approx. 230 VA for cos φ = 0.7-1.0 4 A / approx. 900 VA maximum
Fuses	Fine-wire fuses, 5 x 20 mm, 4 A (T) (4 amps, time delay)
Other	
Recommended flow transmitters	PVM 1.5/90 1500 l/h, Tmax >= 90 °C, 40pulse/litre
Operating temperature	0 ... + 50°C
Storage temperature	-10 ... + 65 °C

8 PT1000 resistance table

Temperature sensors can be checked for proper function by using an ohmmeter and consulting the following temperature resistance table:

Temperature in °C	Resistance in ohms	Temperature in °C	Resistance in ohms
-10	960	60	1232
0	1000	70	1271
10	1039	80	1309
20	1077	90	1347
30	1116	100	1385
40	1155	120	1461
50	1194	140	1535

9 Declaration of conformity

We, Prozeda GmbH, hereby declare in sole responsibility that the product Regtronic PQ complies with the following directives:
• Electromagnetic compatibility (2004/108/EC)
• Electrical equipment designed for use within certain voltage limits (2006/95/EC)
• CE marking (93/68/EEC).
Standards that were used:
• DIN EN 60730-1
• DIN EN 61326-1
• DIN EN 61326-2-2

10 Liability disclaimer

The manufacturer and distributor of the controller decline all liability for damage caused as a result of errors in installation, setting or operation.
In this context we would refer you to the provisions of the DVGW (Deutsche Vereinigung des Gas- und Wasserfaches e.V.) in code of practice W551 concerning the planning, demands and operation of drinking water heating and pipework systems.