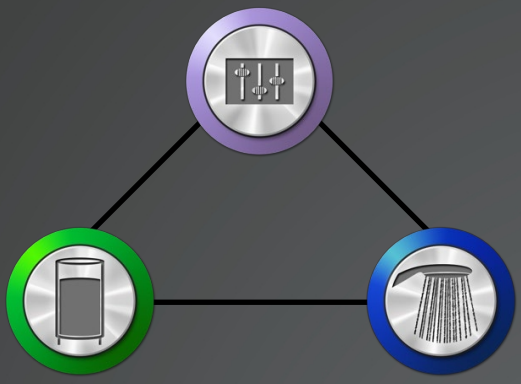


Original operating instructions

As of 13 June 2024

ratiotherm
Smart Energy Systems

INFORMATION

These operating instructions are part of the technical documentation for the device in accordance with:

- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of Member States relating to the making available on the market of pressure equipment

These operating instructions are intended for the operator, who must hand them over to the personnel who come into contact with the device. The operator must ensure that the information contained in the operating instructions and the accompanying documents has been read and understood.

NOTE: If in any doubt, consult the operating instructions, which must be kept in a known and easily accessible place. The manufacturer accepts no liability for damage to persons, animals or property, or to the device itself, resulting from improper use, failure to observe or insufficient observance of the safety criteria contained in these operating instructions, or from modification of the device or the use of unsuitable spare parts. The copyright for these operating instructions is held exclusively by the company:

ratiotherm

Smart Energy Systems

ratiotherm GmbH & Co. KG
Wellheimer Straße 34
91795 Dollnstein Germany

Status: 07.11.2022

TABLE OF CONTENTS

1. INFORMATION ABOUT THE DOCUMENT

The following notes serve as a guide through the entire documentation. Other documents are also valid in conjunction with these operating instructions. These operating instructions for specialist tradesmen are an integral part of the ratiotherm fresh water system. The ratiotherm fresh water system must not be operated without these operating instructions.
The operating instructions must be made available to the operator and the specialist tradesman for information at all times. If the ratiotherm fresh water system is sold, the instructions must be included with the delivery. We accept no liability for damage caused by failure to observe these instructions.

1.1 SAFETY AND WARNING NOTICES

Signal words and colours

The following signal words are based on DIN ISO 3864-2 and are used in this documentation. The safety colours have been adopted from the ISO 3864-1 standard. The design complies with DIN EN 82079-1 and ANSI Z 535.4.

Signal word	Explanation
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury. .
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury. .
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor injury or property damage. damage.
NOTE	Indicates operating instructions and cross-references. A note indicates a risk of property damage or risk of injury.

1.2 SAFETY SIGNS

1.2.1 OTHER SYMBOLS ACCORDING TO DIN ISO 7010

Some of the following special safety signs according to DIN EN ISO 7010 and DIN ISO 3864 are used at the relevant points in this operating manual and require special attention depending on the combination of signal word and graphic symbol. Please note the distinction between:

- Mandatory signs – prescribe an action (e.g. use eye protection).
- Warning sign – depicts a source of danger and supplements a warning notice.
- Prohibition signs – prohibit certain actions.

Symbol	Explanation	Symbol	Explanation
	General warning sign		Warning of flammable substances
	Warning of electrical voltage		General prohibition sign
	Warning of hot surfaces		No entry

Symbol	Explanation	Symbol	Explanation
	Follow instructions		General command sign
	De-energise before maintenance or repair		Use hand protection

1.2.2 OTHER SIGNS ACCORDING TO DIN ISO 7000

Symbol	Explanation	Symbol	Explanation
	Observe the operating manual (instructions for use)		Service indicator, Refer to the operating manual (instructions for use)
	Instructions for use/operating instructions (operating manual)		

1.2.3 OTHER SYMBOLS

Symbol	Explanation	Symbol	Explanation
	Recycling		Dispose of packaging material in accordance with regulations

2. IDENTIFICATION AND NOTES

2.1 PRODUCT

Device designation: Fresh water system
Type: FWS 200/400
Year of manufacture: See type plate
Country of origin: Germany

2.2 INTENDED USE

The FWS 200/400 device is intended for use in hot water preparation. Any other or extended use of the device is considered improper and therefore inappropriate. In this case, the safety and protective functions of the device may be impaired. ratiotherm GmbH & Co. KG is not liable for any damage resulting from this. Intended use also includes:

- Compliance with all instructions in this operating manual,
- Observing all warnings and
- Compliance with the inspection and maintenance conditions.

The FWS 200/400 system is built in accordance with the latest technology and recognised safety regulations. The device is intended exclusively for domestic and/or commercial use for hot water preparation (service water).
Improper or unintended use may result in danger to the life and limb of the user or third parties. In addition, damage to the device and other property may occur. The FWS 200/400 system is not intended for use by persons (including children) with limited physical, sensory or mental abilities, or by persons with insufficient experience and/or knowledge. The risk is borne solely by the operator and user.

2.3 TARGET GROUPS

For safety reasons, the design of the device does not allow it to be used by persons with disabilities (e.g. with visual impairments). **⚠ DANGER!** Only perform tasks for which you are authorised.

2.3.1 TARGET GROUP MATRIX

Tasks	Operators and users	Specialist personnel
Transport/Storage		X
Assembly/installation		X
Commissioning/adjustment		X
Automatic operation (control)	X	X
Set-up/conversion/technical modification		X
Maintenance/inspections/repairs		X
Cleaning	X	X
Troubleshooting and fault rectification		X
Decommissioning/dismantling/disposal		X

2.3.2 TARGET GROUP DEFINITION

Operators and users

A person who has purchased the device for use in an existing syster for direct heating support and hot water preparation. The person must have knowledge of the necessary protective devices and protective measures.

Qualification of operators and users:

- Of legal age and physically/mentally capable of performing work on the device.
- Knowledge of how to operate the product, imparted by specialist personnel and the operating instructions.

Specialist personnel

A person from a qualified specialist company for heating and hot water systems. The specialist personnel must have acquired special knowledge and experience through professional training. The person must have knowledge of relevant standards, be able to assess the work assigned to them (e.g. instruction of personnel, switching on, programmes and switching off) and be able to identify possible hazardous situations.

Qualification of qualified personnel:

- Of legal age and physically/mentally capable of performing work on the device.
- Knowledge: several years of experience working on heating systems and hot water preparation

2.4 MISUSE

2.4.1 REASONABLY FORESEEABLE MISUSE

Reasonably foreseeable misuse that poses a risk to personnel, third parties or the device includes the following for all operating modes:

- Using the device contrary to its intended use.
- Supplying components that are not certified by the manufacturer.
- Operating the device outside its physical operating limits.
- Modifying the control software without prior consultation with ratiotherm GmbH & Co. KG.
- Modifications to the device as well as additions and conversions without prior consultation with ratiotherm GmbH & Co. KG.
- Operation of the device contrary to the provisions of the risk assessment.
- Bypassing or deactivating protective and safety devices.
- Operating the device with obvious faults.
- Operation of the device by persons (including children) with limited physical, sensory or mental abilities.

⚠ DANGER

Unauthorised modifications to the device

Unauthorised modifications pose a risk of death or injury. **Do not make any unauthorised modifications to the device without the prior approval of ratiotherm GmbH & Co. KG.**

2.4.2 UNFORESEEABLE MISUSE/ABUSE

Unforeseeable misuse may occur due to:

- Disasters,
- the impact of foreign objects and/or
- force majeure.

2.5 WARRANTY, LIABILITY, GUIDELINES, STANDARDS AND LAWS

The "General Terms and Conditions of Sale and Delivery" of ratiotherm GmbH & Co. KG apply in principle. The "General Terms and Conditions of Sale and Delivery" have been available to the operator since the conclusion of the contract at the latest. Warranty and liability claims for personal injury and property damage are excluded if the damage is attributable to one or more of the following causes:

- Improper use of the device,
- Improper handling of the device,
- Operation of the device with defective protective devices,
- Failure to observe the safety and warning instructions in the operating manual,
- Unauthorised structural modifications to the device,
- Inadequate implementation of the specified maintenance measures and
- disasters involving foreign objects or force majeure.

The operating instructions must be read before handling the device. The operating instructions familiarise personnel with the handling of the device and provide information on all phases of the device's life cycle.
The operating instructions must be accessible to personnel at all times. The safety and warning instructions in the operating instructions and on the device must be observed and complied with. If you have any further questions that go beyond the scope of these operating instructions, please contact ratiotherm GmbH & Co. KG.

The following guidelines, standards and laws must be observed when using the device in Germany:

- VDE and EVU regulations and provisions (in particular VDE 0100)
- Regulations and provisions of local utility companies
- DVGW worksheet W 382 "Installation and operation of pressure reducers in drinking water consumption systems"
- DIN 1988 – TRWI Technical rules for drinking water installations
- DIN 4753 – Water heating systems for drinking and service water
- DIN 8947 – Ready-to-connect heat pumps for water heating with electrically driven compressors
- Accident prevention regulations VGB 20 Accident prevention regulations "Refrigeration systems" with implementation instructions
- Energy Saving Ordinance EnEV – Ordinance on energy-saving thermal insulation and energy-saving system technology in buildings from 2009

NOTE

Guidelines, standards and laws

Additional local guidelines, standards and laws, e.g. building regulations, may apply. **As a general rule, the applicable legal guidelines, standards and laws in the respective country must be observed.**

3. SAFETY INSTRUCTIONS

DANGER! Read and observe the operating instructions before working on and with the device.
Despite all precautions taken, there may still be some residual risks that are not immediately apparent. You can reduce the existing residual risks by observing and complying with the general safety instructions and warnings as well as the intended use.

3.1 GENERAL SAFETY INSTRUCTIONS

Observe the following general safety instructions:

- The volume of water increases during the heating process. Therefore, never close the blow-off pipe of the safety valve.
- Please note that hot water may escape from the blow-off pipe.
- If there are leaks in the area of the appliance, switch off the appliance and shut off the connection to the rest of the heating system. The leaks must then be repaired immediately.
- Do not use the following products to prevent corrosion on the device: sprays, solvents, chlorinated cleaning agents, paints, adhesives, etc.
- Components that have not been tested with the device may cause damage to the device or impair its functions. Only use original spare parts and original wear parts.
- Only allow qualified personnel to carry out the assembly/installation/commissioning/adjustment of the device.
- Observe the existing regulations, rules and guidelines as well as the local installation requirements.
- To avoid injuries of any kind, the general accident prevention regulations must be observed under all circumstances and appropriate personal protective equipment must be used.
- Technical modifications to the system are not permitted. This also applies to the retrofitting of safety devices and welding on load-bearing parts.
  Safety devices must not be taken out of service. Only original spare parts and original accessories from the manufacturer may be used.

3.2 ADDITIONAL INFORMATION

Local accident prevention regulations apply to all work on the device. Please also observe the

- Applicable binding regulations on accident prevention,
- Recognised technical rules for safe and professional work,
- Existing regulations on environmental protection and
- Other applicable regulations.
- The outlet temperature at the hot water taps can be up to 70 °C. Carefully check the water temperature at the hot water taps before placing your hands completely under the water jet.
- Do not make any changes to the components:
  - To the fresh water system and the water and electricity pipes;
  - To the safety valve;
  - Structural conditions that may affect the operational safety of the device;
  - Structural conditions in the vicinity of the device, insofar as these may affect the operational safety of the device.

3.3 RESIDUAL RISK

⚠ WARNING

Measures/work carried out by unauthorised/unqualified personnel

Measures/work carried out on the device and/or its components and connections by unauthorised/unqualified personnel pose a serious risk of injury.

In the event of malfunctions, only allow qualified personnel to carry out measures/work on the device and/or its components and connections.

⚠ WARNING

Damaged insulation

Damaged insulation poses a serious risk of burns on hot and/or cold surfaces.

Protect yourself with suitable PPE (e.g. heat- and cold-resistant protective gloves).

Allow hot or cold surfaces to cool down or warm up before starting work. Replace damaged insulation.

⚠ WARNING

Ignition sources in the danger zone

Ignition sources in the danger zone can cause flammable substances to ignite and/or explode.

Keep ignition sources away from the danger zone.

4. DESIGN AND FUNCTION

4.1 TECHNICAL

FWS	200	400	Unit
Device data			
Nominal volume	200	400	litres
Actual volume approx.	202	400	litres
Total height with insulation	1900		mm
Height including adjustable feet	1900 to 1930		mm
Diameter without insulation	40	550	mm
Diameter with insulation	560	710	mm
Depth + TW station	560 + 250	710 + 250	mm
Width with WE connections	610	760	mm
Weight without insulation approx.	48	60	kg
Maximum operating pressure	3		bar
Maximum operating temperature	95		°C
Max. volume flow rate	1.0		m^3
Pressure loss TWK	0.1		mWS
Pressure loss HWS	0.1		mWS
Storage connections	4xDN25 1"		RAG
Vent connection	1/2"		RIG
Container material	ST37-2		
Nut for E-rod	1 1/2"		RIG
TWK connections	1		RIG

4.2 FUNCTION DESCRIPTION

Our FWS combines the advantages of fresh water technology in terms of hygiene and comfort with the advantages of a larger buffer volume for the heating system, as the boiler needs to start up much less frequently and therefore requires less fuel. In addition, the buffer tank can be equipped with a heating rod. This heating rod communicates with the supplied smart meter either via radio or a control line and can thus convert up to 3 kW of PV electricity 1:1 into heat in a fully modulating manner.

ADVANTAGES

- Compact unit, fully assembled and insulated, for minimal losses
- Extremely short response time when fresh water is required
- Constant power control even with fluctuating consumption
- Heats quickly and reliably exactly as much water as is needed

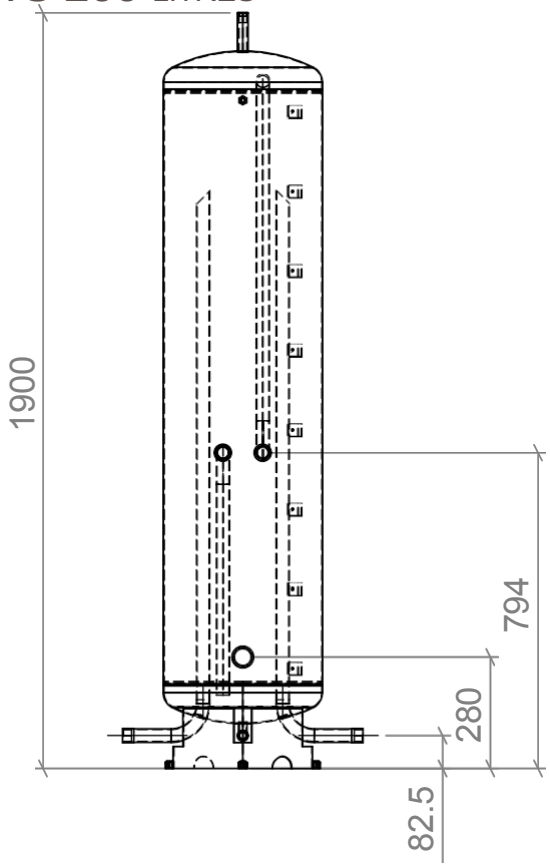
5. TRANSPORT, ASSEMBLY AND INSTALLATION

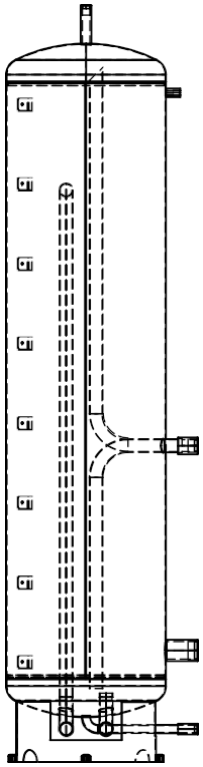
5.1 TRANSPORT AND UNPACKING

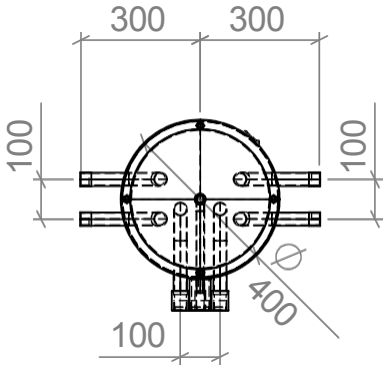
The following instructions for transporting the device must be observed:

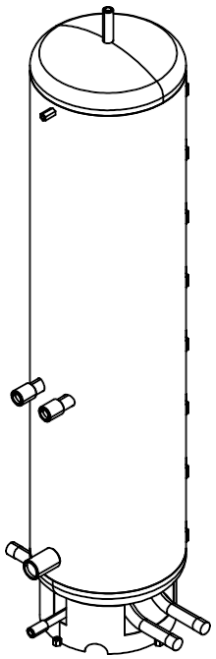
- Only allow qualified personnel to carry out transport.
- Protect yourself with PPE (e.g. safety shoes, etc.).
- Take the weight of the device (approx. 48 kg or 60 kg) into account when selecting the appropriate lifting equipment (forklift, pallet truck, etc.).
- Take note of the device's centre of gravity.
- Remove all packaging materials.
  NOTE: Do not damage the device when removing the packaging materials.
- When disposing of the transport and storage packaging, comply with local disposal regulations and applicable environmental protection laws.
- When unpacking the device, please check that the delivery is complete.
- Use the delivery notes and packing lists provided to check the contents.

5.2 FWS 200 LITRES

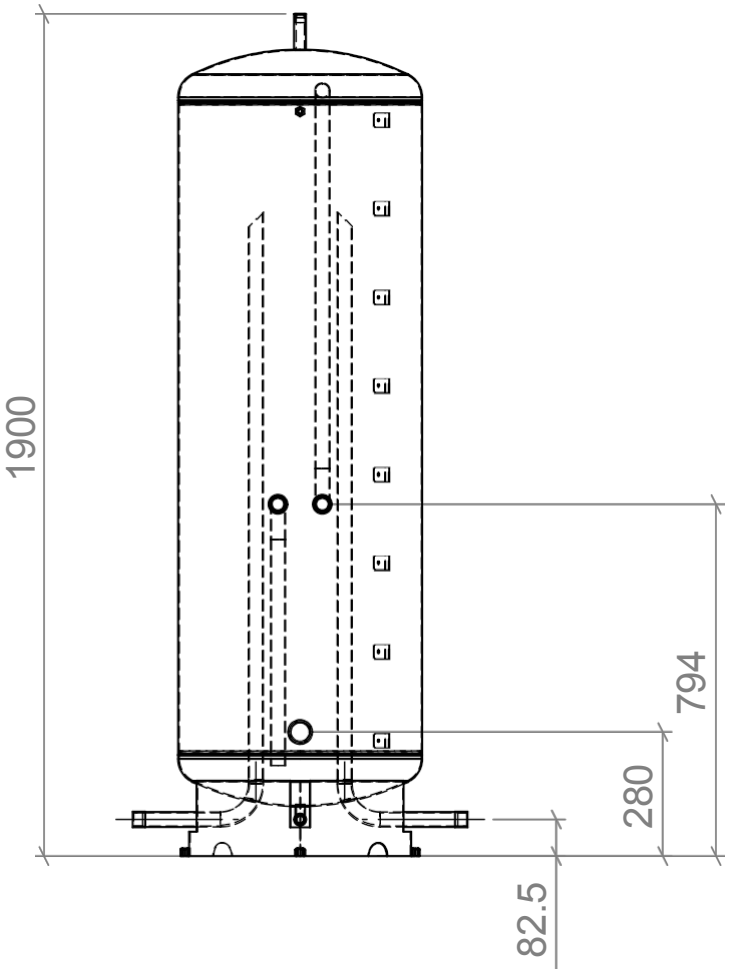


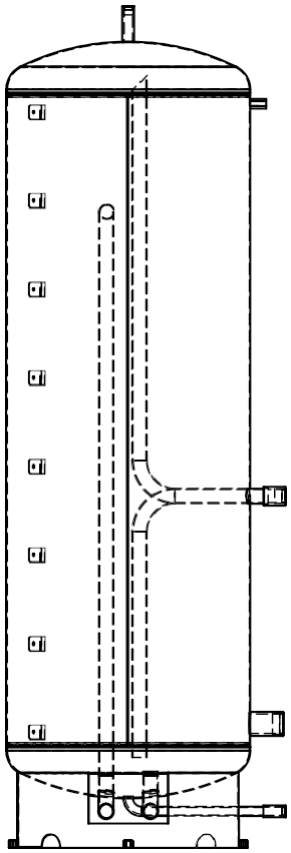


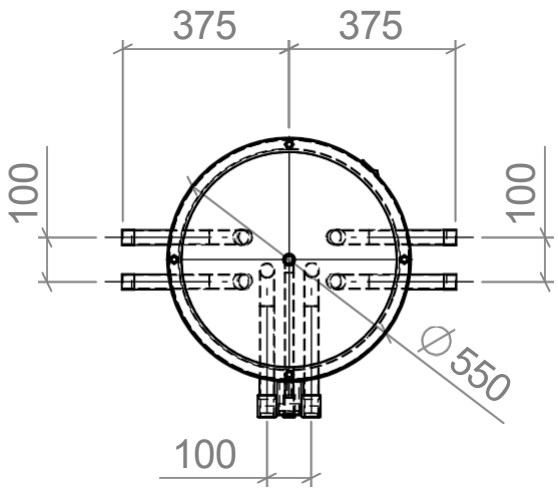


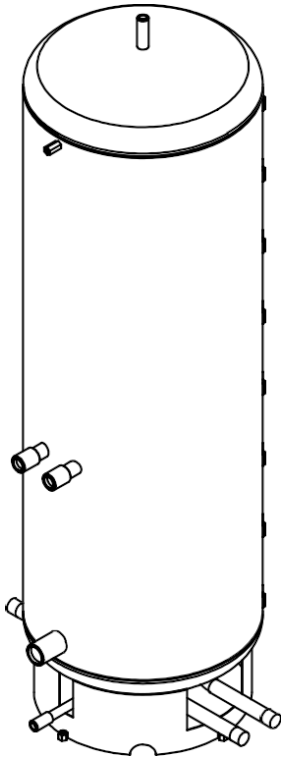


5.3 FWS 400 LITRES



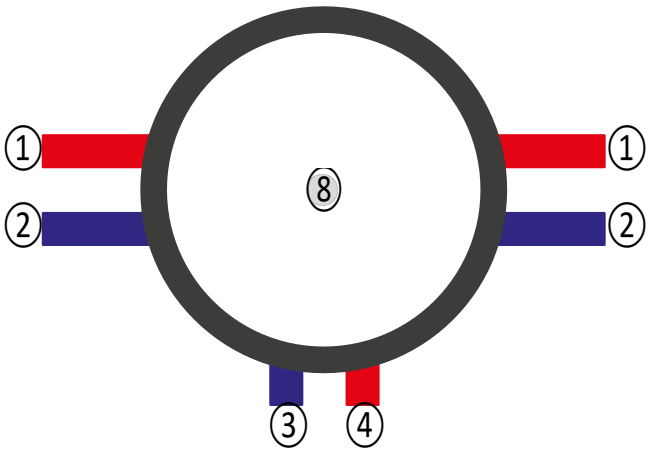


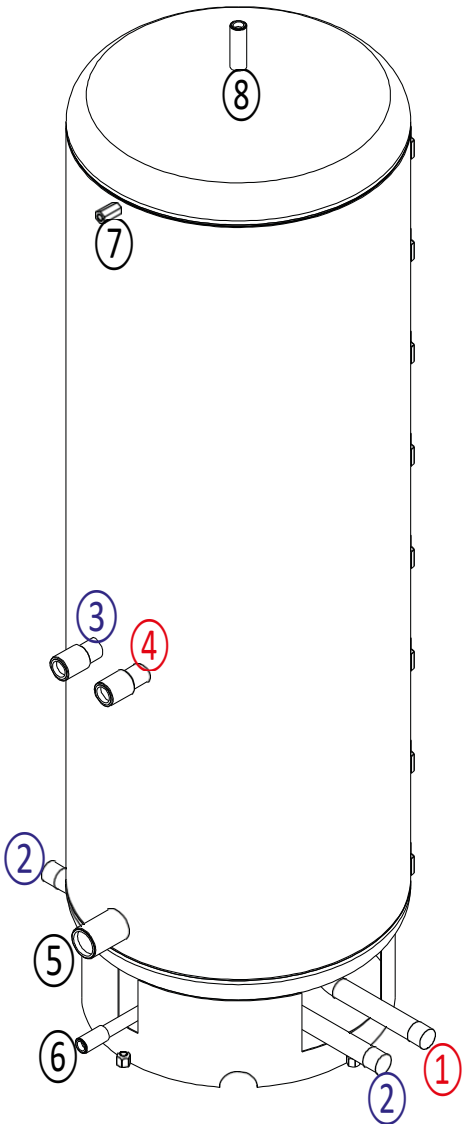




5.4 MEMORY PORTS

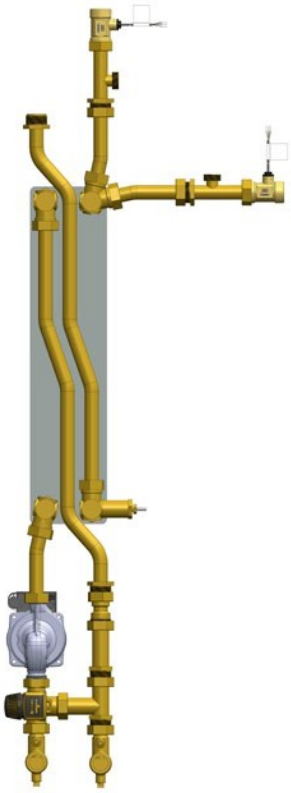
Numbering	Connection designation	Connection DN	Connection size	Thread type
No. 1	Heat generator VL	DN 25	1"	RAG
No. 2	Heat generator RL	DN 25	1	RAG
No. 3	Drinking water station RL	DN 25	1	RIG
No.	Drinking water station VL	DN 25	1	RIG
No. 5	Sleeve for heating rod, e.g. Aton	DN 40	1½"	RIG
No. 6	Drain	DN 20	½	RIG
No. 7	Bracket for TWK	DN 20	½	RIG
No. 8	Vent	DN 20	½	RIG



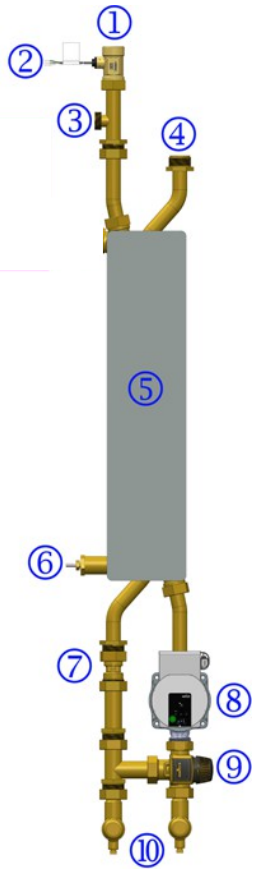


5.5 COMPACT DRINKING WATER STATION

Compact drinking water station					Unit
Performance data					
Heat output	80	98	70	78	kW
Heating water inlet	70	70	60	60	°C
Heating water outlet	24	14	21	15	°C
Cold water inlet	10	10	10	10	°C
Hot water outlet	60	40	50	40	°C
Hot water volume	23	47	25	37	l/min
Pressure loss WW	7.9	29.0	8.5	19.5	kPa

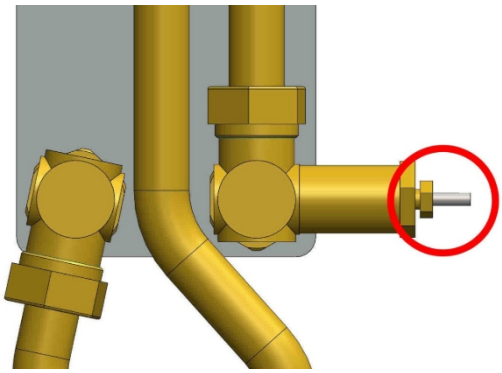


Compact drinking water station	Numbering
Cold water inlet connection	1
Turbine flow sensor VTY 20	2
Circulation connection	3
Hot water outlet connection	4
Plate heat exchanger	5
Connection for ultra-fast sensor S2	6
Gravity brake with manual adjustment	7
Circulation pump Wilo Para STG 15/6-43	8
Heating water mixing valve VTA378 30-70°C	9
Angle valves for storage tank connection RL/VL	10



5.5.1 INSTALLATION OF ULTRA-FAST SENSOR S6

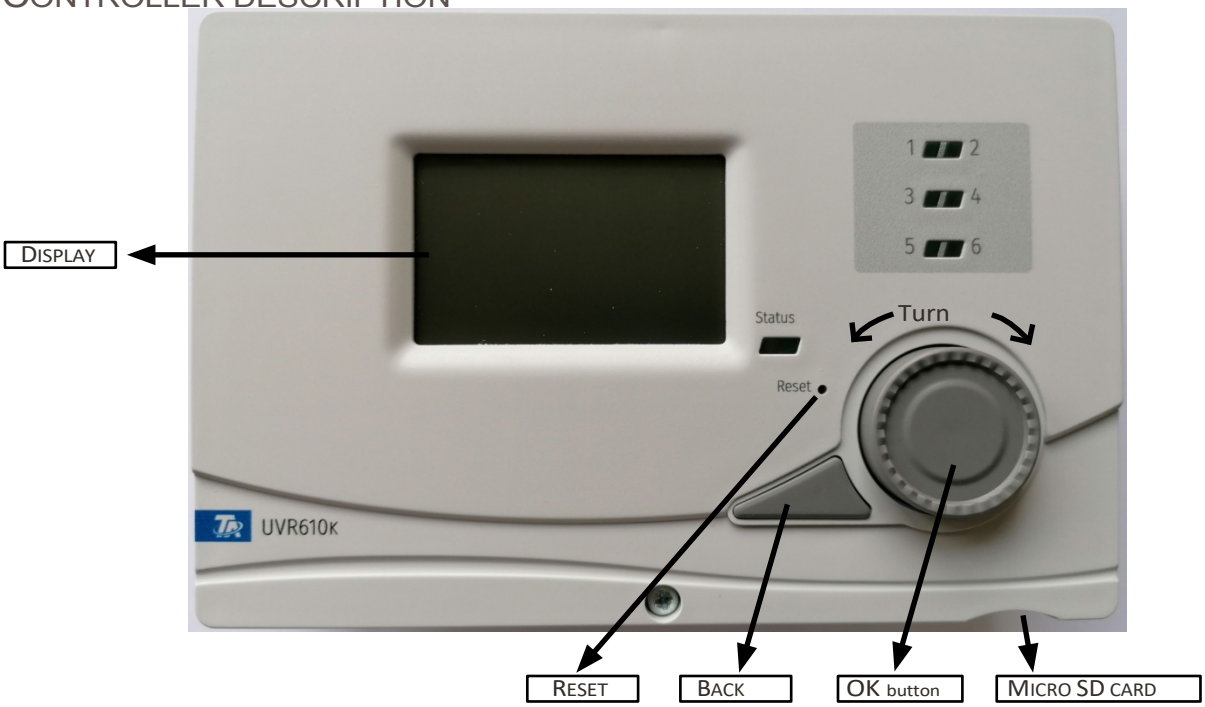
The correct sensor position is achieved by pushing the ultra-fast sensor in as far as it will go and then pulling it back 10 mm.

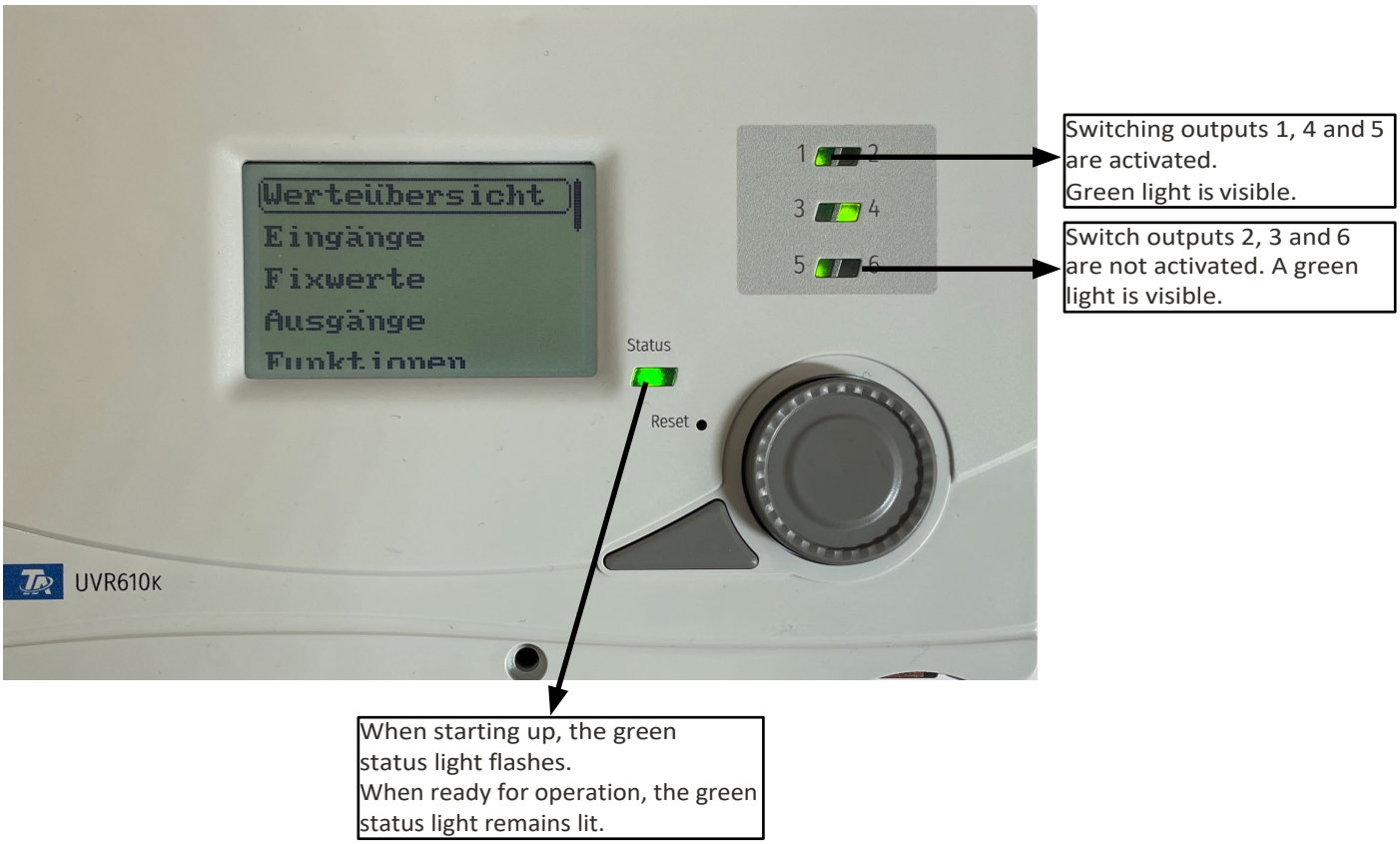


NOTE: The lock nut for the O-ring seal of the sensor element must be tightened properly so that the sensor cannot be pushed out by the internal water pressure!

6. FRESH WATER CONTROLLER

6.1 CONTROLLER DESCRIPTION





6.2 FUNCTION DESCRIPTION

The **display** is used to navigate the controller in order to program functions, read values, access other devices, etc.

The **wheel** to the right of the display is used for navigation; turning it clockwise navigates down the menu, turning it anticlockwise navigates up.

Pressing the wheel opens the selected menu/allows you to change the selected value/parameter. (= Enter key)

Pressing the **back button** on the left below the wheel exits a menu.

Pressing the "Enter" or "Back" button confirms the value/menu item framed on the display.

The output LEDs arranged one above the other and next to each other to the right of the display are indicators for the operation of the switching outputs. A green LED indicates an active output.

The single **status LED** to the right of the display provides information about the system controller status.
A green flashing light means that the controller is starting up. A steady green light indicates normal operation. Orange means that there is a "message", such as a collector overtemperature shutdown. Red means an "error", such as the failure of a DL sensor.

Pressing the **reset button** briefly, located between the status LED and the wheel, restarts the device. For a total reset, the button must be held down until the status LED stops flashing orange rapidly and begins to flash slowly.

The **micro SD card** supplied is used for managing function data and firmware.

7. TERMINAL DIAGRAM

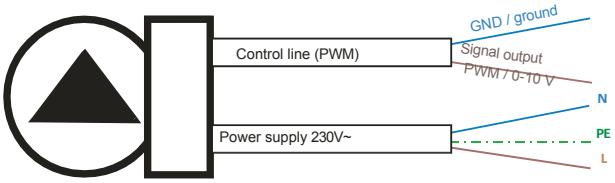
7.1 TERMINAL ASSIGNMENT

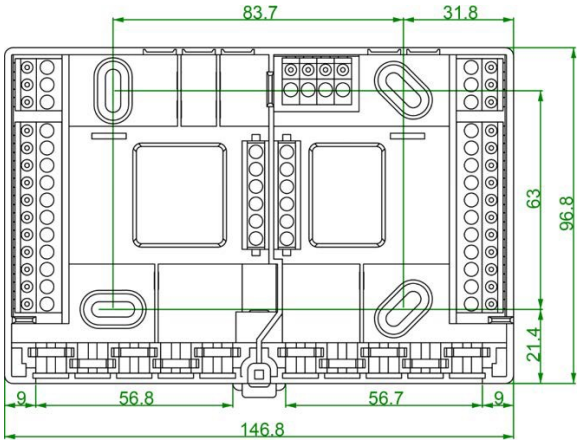
!!!! Note on pump connection !!!!

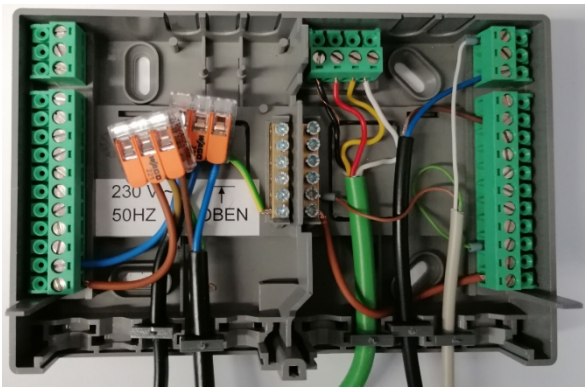
The **2-wire cable** is for connecting the PWM control line (out/⊥)

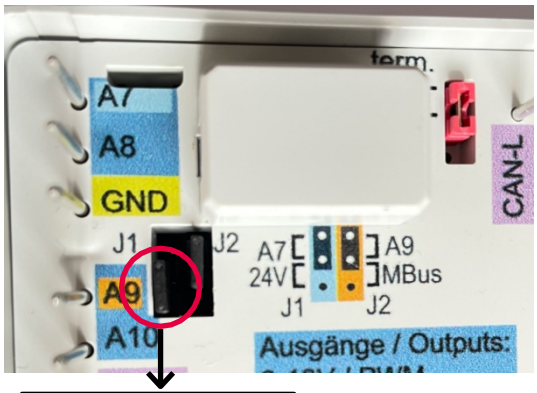
The **3-core cable** is for connection to the 230V ~ mains L, N, PE
(continuous voltage)

!!!! Mixing them up can destroy the pump !!!! Pump signal: green "flashing" = standby mode (230 volts applied) Pump signal: green steady LED = PWM signal has switched on the pump

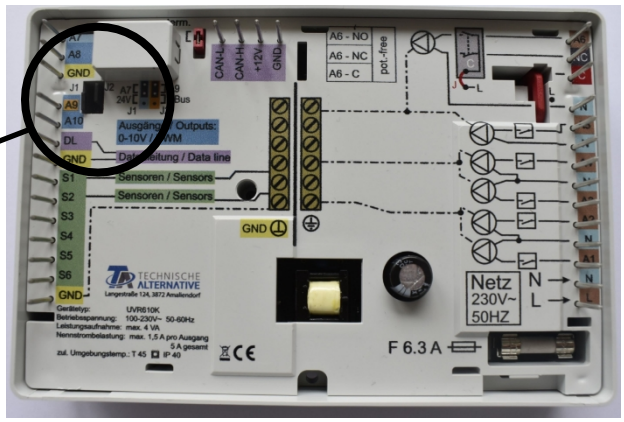






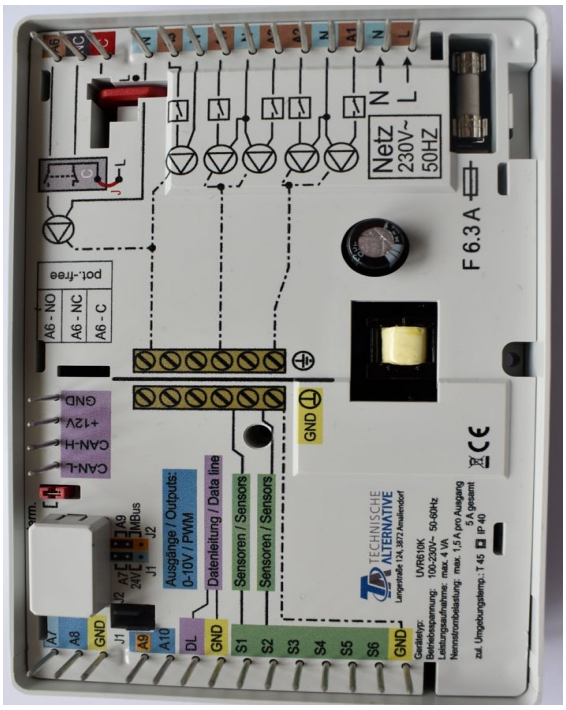


The jumper must be plugged in at 24V.

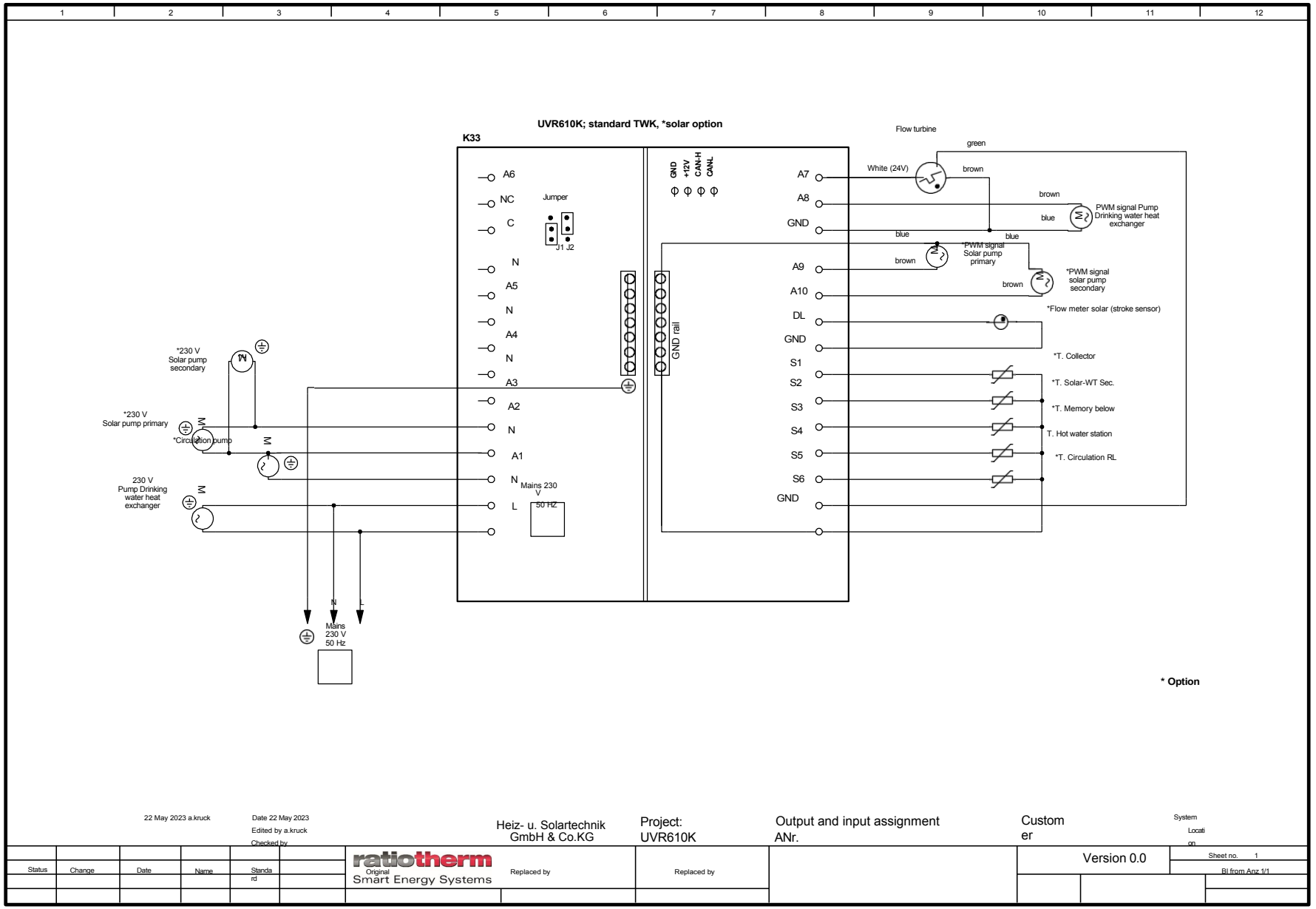


7.2 OUTPUT AND INPUT ASSIGNMENT

Ausgänge	UVR610	Signal
A6		230V/pot.f.
		N
A5		230V
		N
A4		230V
		N
A3		230V
A2	Solar pump	230V
		N
A1	Circulation pump	230V
		N
		L

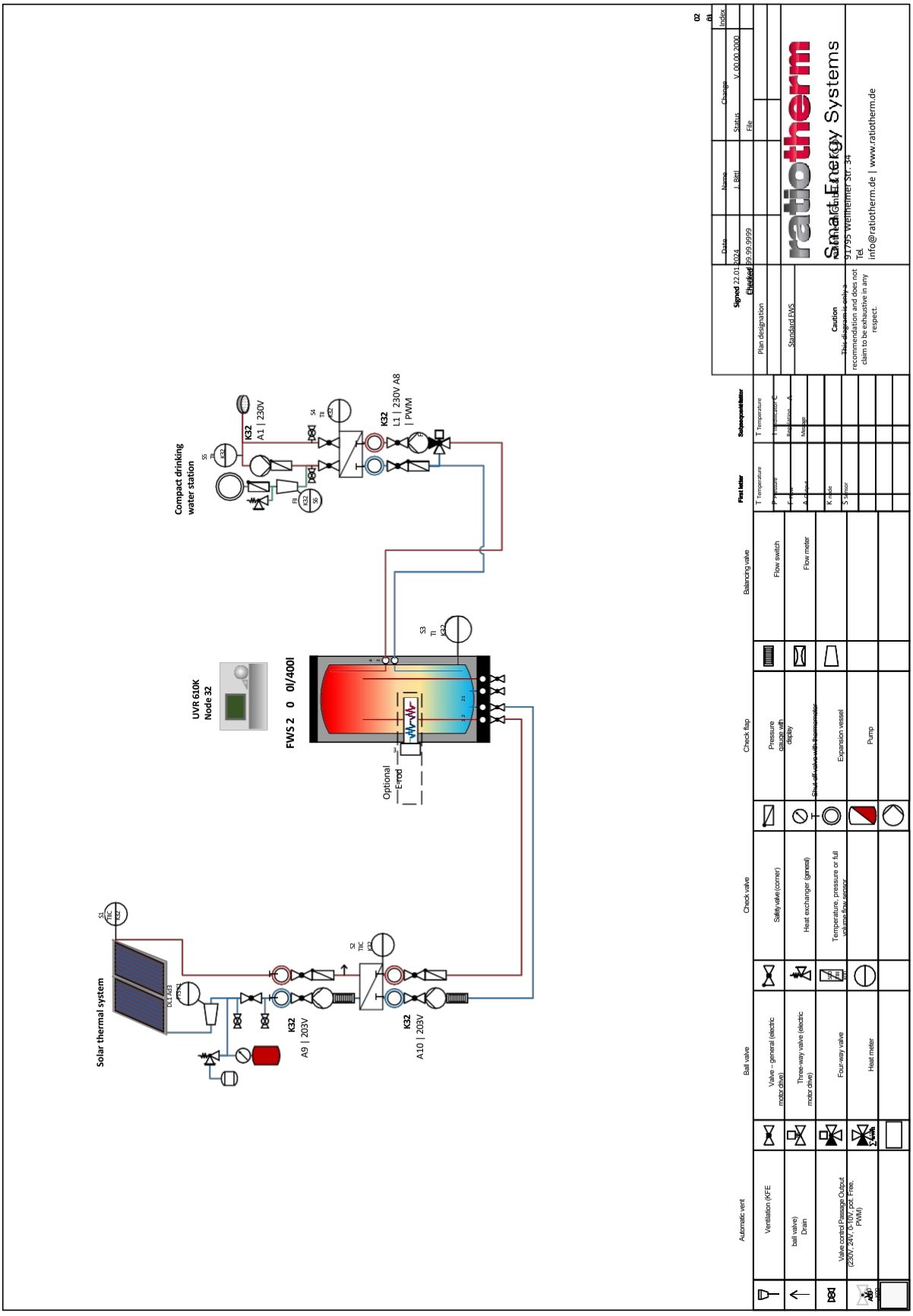


Ein-/Ausgänge	UVR610	Signal
A7	Power supply Flow turbine kW	0-10V / PWM / 24V
A8	Hot water charging pump	0-10V / PWM
GND		
A9	Solar primary pump Solar	0-10V / PWM / MB-Bus
A10	secondary pump	0-10V / PWM
DL	FTS solar (Ad. 3)	
GND		
S1	T. Collector	PT1000
S2	T. Secondary heat exchanger	PT1000
S3	T. Storage tank bottom	PT1000
S4	T.Hot water	PT1000
S5	T. Circulation RL Cold	PT1000
S6	water flow	PT1000/Imp.
GND		



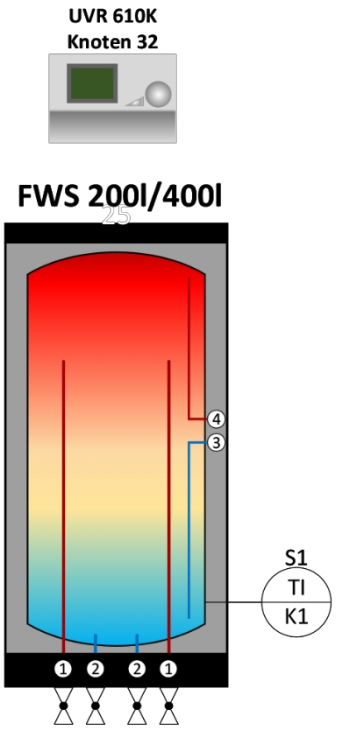
22 May 2023 a.kruck		Date 22 May 2023 Edited by a.kruck Checked by			Heiz- u. Solartechnik GmbH & Co.KG	Project: UVR610K	Output and input assignment ANr.	Custom er	System Location		
Status	Change	Date	Name	Standard	ratiotherm Original Smart Energy Systems	Replaced by	Replaced by		Version 0.0	Sheet no. 1	BI from Anz 1/1

8. STANDARD SCHEME



9. ASSEMBLIES

9.1 SENSOR IN STRATIFIED STORAGE TANK FWS 200/400L

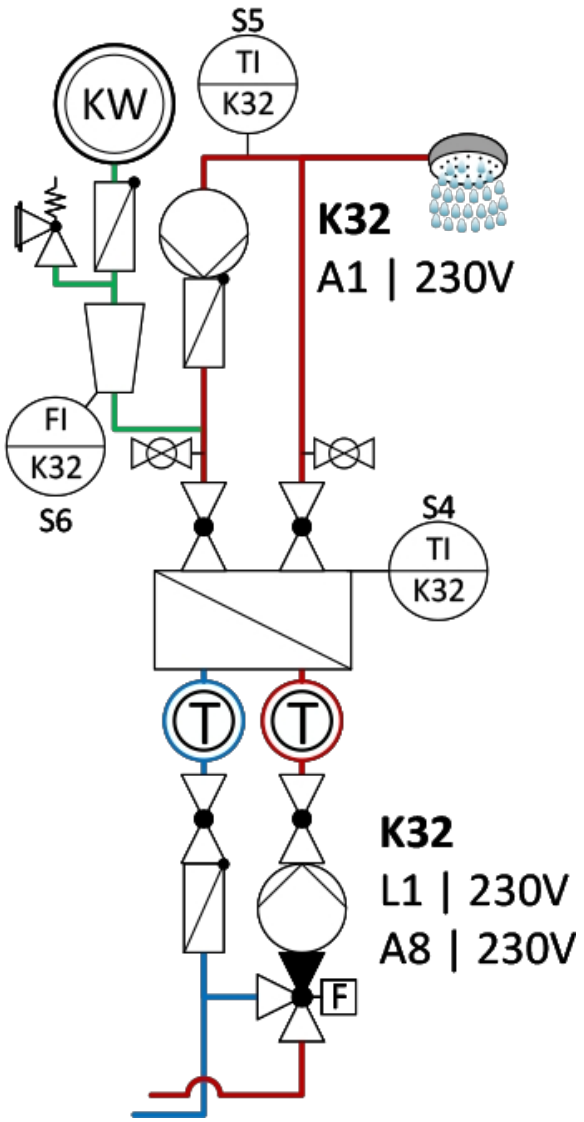


A1	N	PE	1.5 A	Pump Circulation
A2	N	PE	1.5 A	Pump (2x) Solar standby voltage
A3	N	PE	1.5 A	
A4	N	PE	1.5 A	
A5	N			
A6	C	NC	1.5 A	
A7	GND		24V	
A8	GND	PWM		Pump WT hot water
A9	GND	PWM		Pump Solar PRIMARY
A10	GND	PWM		Pump Solar SECONDARY
A11				
A12				
S1	K32		PT 1000	Temperature sensor collector
S2	K32		PT 1000	Temperature sensor for heat sink secondary side
S3	K32		PT 1000	Insertion sensor at bottom of storage tank Positioning according to table Hot water cushion maximum
S4			PT 1000	Ultra-fast sensor DHW outlet temperature
S5			PT 1000	Contact sensor Circulation return temperature
S6	K32		VTC	Flow sensor Cold water

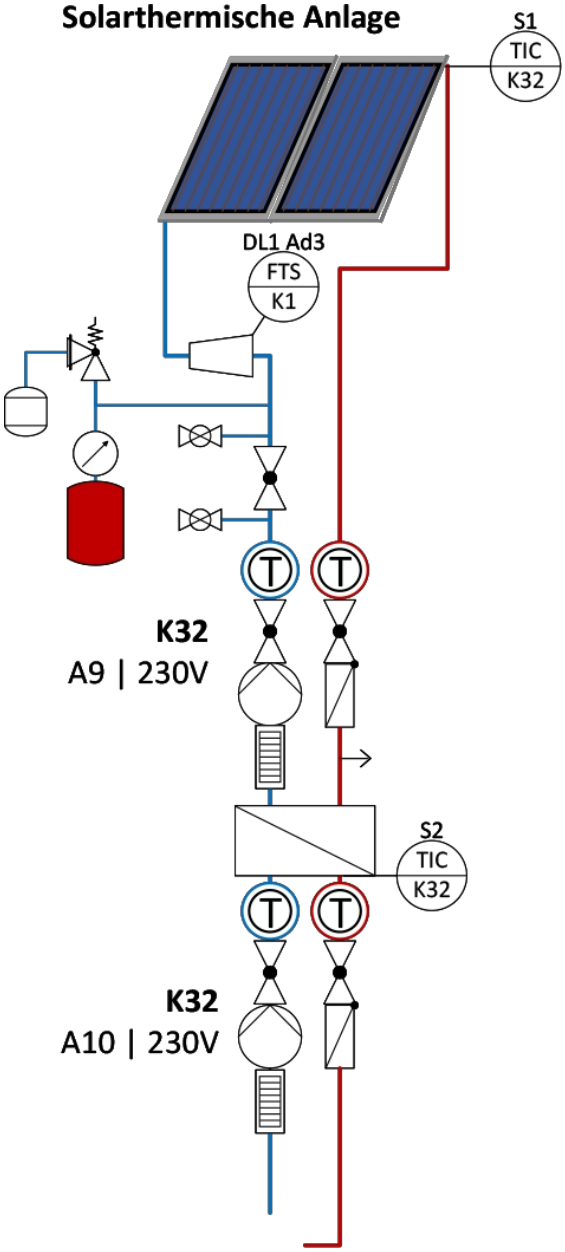
9.2 COMPACT DRINKING WATER STATION

9.3 SOLAR COMPACT STATION

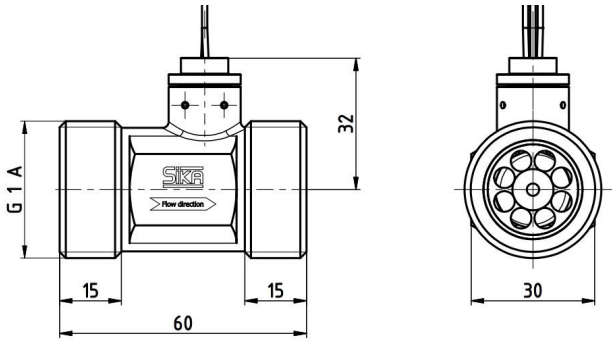
Trinkwasser-kompaktstation



Solarthermische Anlage



9.4 TURBINE FLOW SENSOR VTY

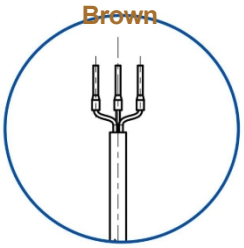


ra/13245

Low wear and extremely long service life thanks to high-quality bearings.
Virtually no series variation due to fixed pulse rate. Wide measuring range (up to 1:60), insensitive to pressure surges, proven in numerous large-scale applications. High measuring accuracy, largely independent of installation position due to integrated flow rectifiers.

Colour code for stranded cables

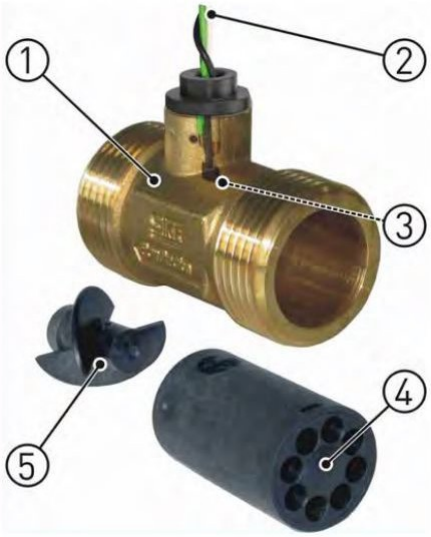
	+24V
Green	Sensor 6 (cold water flow)
Brown	GND (⊥)



Electrical connection 80 mm single wires with 0.5 m PVC cable

Technical data:

Material: brass pipe section Measuring range: 1 to 60 l/min
Measuring accuracy: ±1% of the measuring range end value ±1% of the measured value
Repeatability: ±1% Signal output from: 0.8 l/min Media temperature 0 to 90°C Ambient temperature: 0 to 70°C Nominal pressure: PN 16
Nominal diameter: DN 20
Process connection: G 1 external thread
Measuring sensor: Hall effect sensor
Output signal: Square wave frequency signal, NPN open collector
Duty cycle: 50:50 Pulse rate / K factor: 119 pulses/litre
Supply voltage: 4.5 to 24 VDC Pressure loss: 0.33 bar (at Q = 60 l/min)



Technical data:

The fluid flowing into the VTY causes the rotor ⑤ to rotate. The forces generated during rotation are largely cancelled out by the symmetrical shape of the rotor, reducing wear to a minimum.

The rotor ⑤ of the VTY is equipped with a magnet.

A Hall effect sensor ③ detects the rotation of the rotor and converts it into a frequency signal (square wave signal) proportional to the flow rate.

The extremely hard bearing materials, sapphire and carbide, also guarantee an exceptionally long service life.

!! Be sure to hold it in place !!

Caution! Material damage!:

Observe maximum torque. When tightening the union nut on the turbine body of the device
Hold it in place! Failure to hold it in place may result in damage to the VTY.

Tighten the two union nuts. Hold the turbine body of the device in place with an open-end wrench (SW19 / SW30).

Maximum torque/spanner size

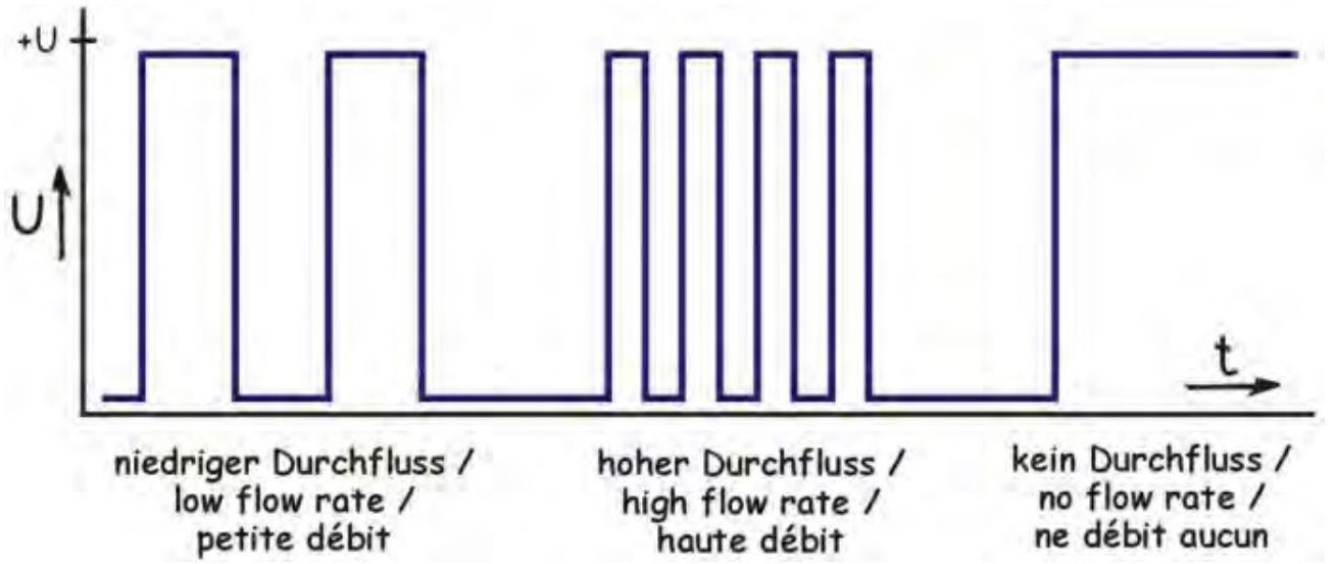
VTY • G½	VTY10K • G¾	**VTY20MA • G1**
20 Nm	8	**20 Nm**
SW19	SW19	**SW30**

Commissioning:

Check that
- the VTY has been installed correctly and all screw connections are tight.
- the electrical connections have been made correctly.
- the measuring system has been vented by flushing.

- The VTY has no switch and cannot be switched on or off independently.
- It is switched on and off via the connected supply voltage.
- Switch on the supply voltage.
- The VTY is ready for operation and switches to measurement mode.

In measurement mode, the VTY delivers an NPN square wave signal proportional to the flow rate. The frequency of the output signal changes according to the flow rate.



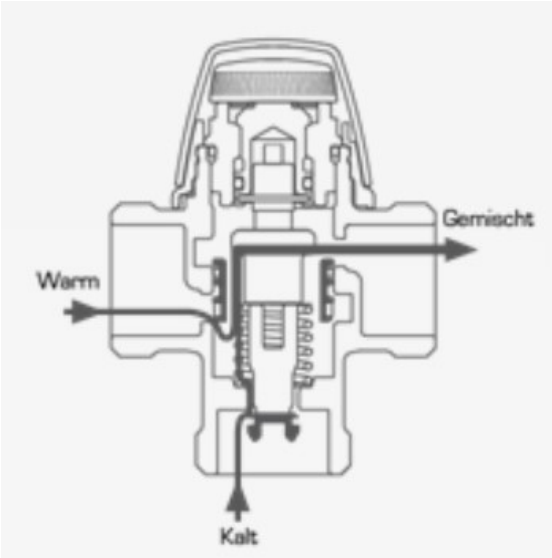
9.5 HEATING WATER MIXING VALVE VTA378 30-70°C

Protection against excessive temperatures

Thermal mixing valve series VTA "Basic" made of dezincification-resistant brass. For a constant mixing temperature in smaller circulating water systems with a glycol content of up to 50% or hot water systems (PHW). Asymmetrical flow pattern, scald protection function, pressure rating PN 10,
max. continuous media temperature 95°C, UBA-compliant, adjustment range 30-70°C, external thread G1", DN 20 Kvs 1.6 m³/h, temperature stability ±2°C according to technical data sheet.

Function

The VTA370 series of thermal mixing valves has a high Kvs value and therefore low pressure loss.
This makes them particularly suitable for heating applications.
They feature an asymmetrical flow pattern and a scald protection function. The mixing temperature itself is determined by a heat-sensitive wax element. The wax element moves an internal cylinder that regulates the "hot" and "cold" flow rates.



Technical data

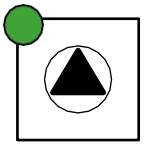
Pressure rating:	PN 10
Operating pressure:	1.0 MPa (10 bar)
Differential pressure, mixing:	
VTA570	max. 0.3 MPa (3 bar)
VTA370	max. 0.1 MPa (1 bar)
Max. medium temperature:	
Temperature range 10-30°C	60°C Temperature
range 20-55, 30-70°C	Continuous 95°C
	Temporary 100°C
Min. medium temperature:	0°C
Temperature stability:	
Temperature range 10-30°C	±2°C
Temperature range 20-55, 30-70°C	±3°C
Connection:	External thread (G), ISO 228/1

Material
Valve housing and other metal parts in contact with liquid:
Dezincification-resistant brass DZR

9.6 WILO PARA STG 15/6-43/IPWM2

Technical data:

Connection voltage: 1~230V +10%/-15%, 50/60Hz
Protection class: IP X4D
Energy efficiency EEI: see type plate Medium temperatures
at max. ambient temperature:
-20°C to +95°C (heating/GT)
-10°C to +110°C (ST)
Ambient temperature: 0°C to +70°C
Max. operating pressure: 10 bar (1,000
kPa)
Minimum inlet pressure at +95°C/+110°C: 0.5 bar/1.0 bar (50 kPa/100 kPa)
Delivery head/volume: 3 metres 7 1.2 m^3/h
Max. delivery volume: 95°C
System temperature: -10°C to 95°C (non-freezing)



LED indicator lights

Signal indicator

- LED lights up green during normal operation
- LED lights up/flashes in case of malfunction

iPWM 2 mode:

In iPWM 2 mode, the pump speed is controlled depending on the PWM input signal.

Behaviour in the event of a cable break:
If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump stops.

PWM signal input [%]

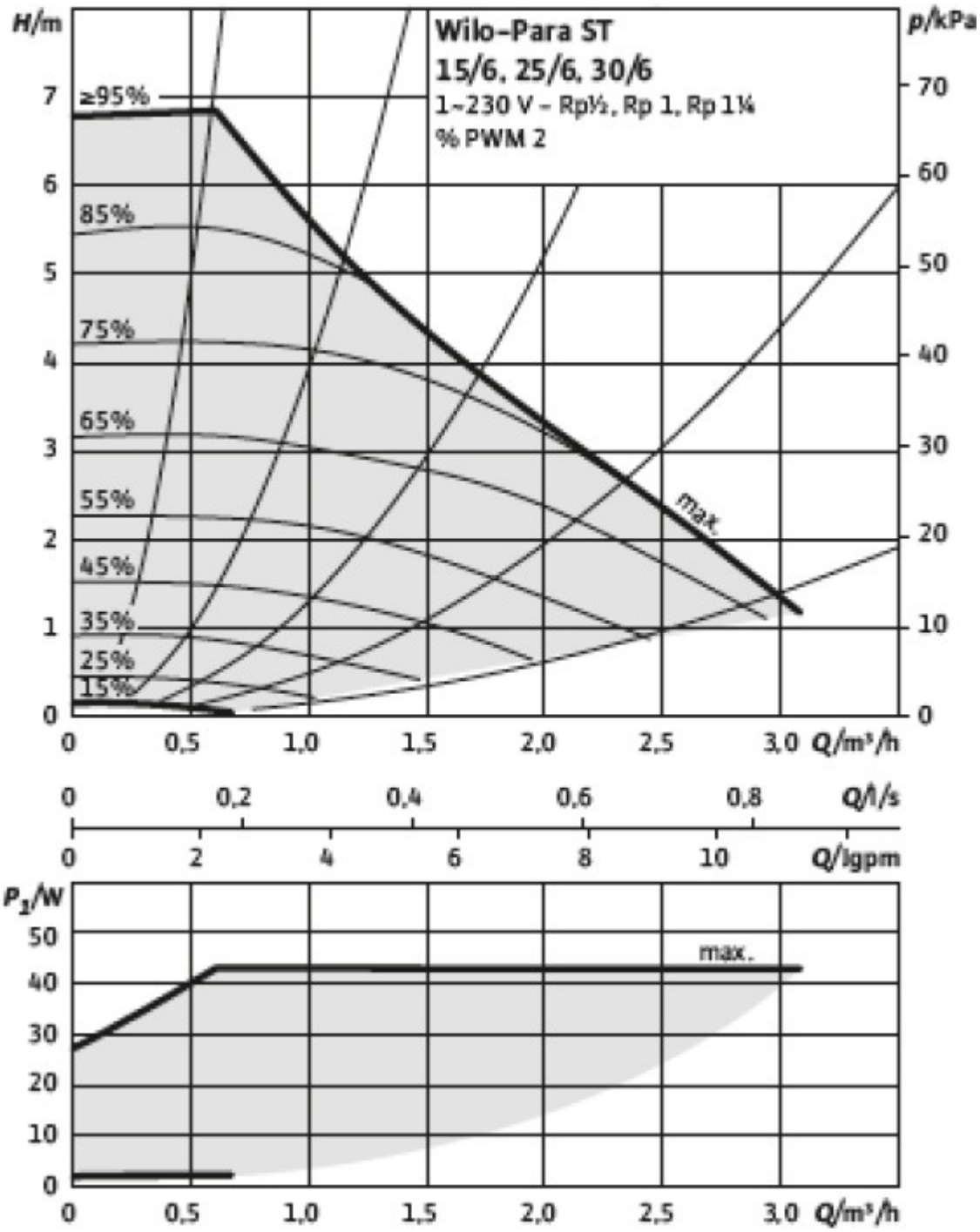
0 - 7%:	Pump stops (standby)
7 - 15%:	Pump runs at minimum speed (operation) 12 -
15%:	Pump runs at minimum speed (start-up)
15 - 95%:	The pump speed increases linearly from n_{min} to n_{max}
> 95%:	Pump runs at maximum speed

Vent

Ventilation is activated by pressing and holding (3 seconds) the control button and automatically vents the pump.
The heating system is not vented during this process.

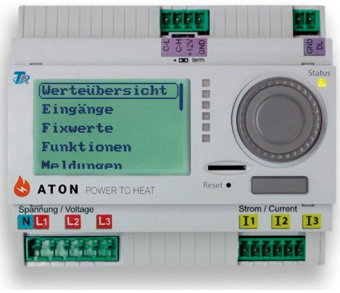
Manual restart

A manual restart is activated by pressing and holding (5 seconds) the control button and unblocks the pump if necessary (e.g. after a long period of inactivity during the summer).



9.7 ATON SYSTEM – POWER TO HEAT (OPTIONAL)

Item number: ra/32.90.6007



(Optional accessory – not included in FWS) ATON is a plug & play solution for utilising surplus PV energy – without additional cabling. It consists of an energy meter
and a continuously adjustable electric heating rod ranging from 50 W to 3 kW for installation in a buffer tank.

Function:
Connected via x 2 radio, the energy meter (x-2-tech) specifies the power to be consumed by the heating element.

The heating element sends all measured values (STB, internal temperature and the values of the two external sensors) back to the energy meters.

Advantages:
- Optimisation of the self-consumption rate
- Heating support
- Hot water preparation outside the heating period
- DL bus for controlling power points for extended energy management
- Remote access, data logging and visualisation via C.M.I
- Suitable as emergency heating

The EHS-R heating element (included in ATON) can be directly controlled in stages from 50 W to 3000 W via PWM using the freely programmable controllers (UVR16x2 and RSM610).

The heating rod transmits the sensor values via radio to the CAN-EZ3 for further processing or forwarding to the CAN bus or DL bus.

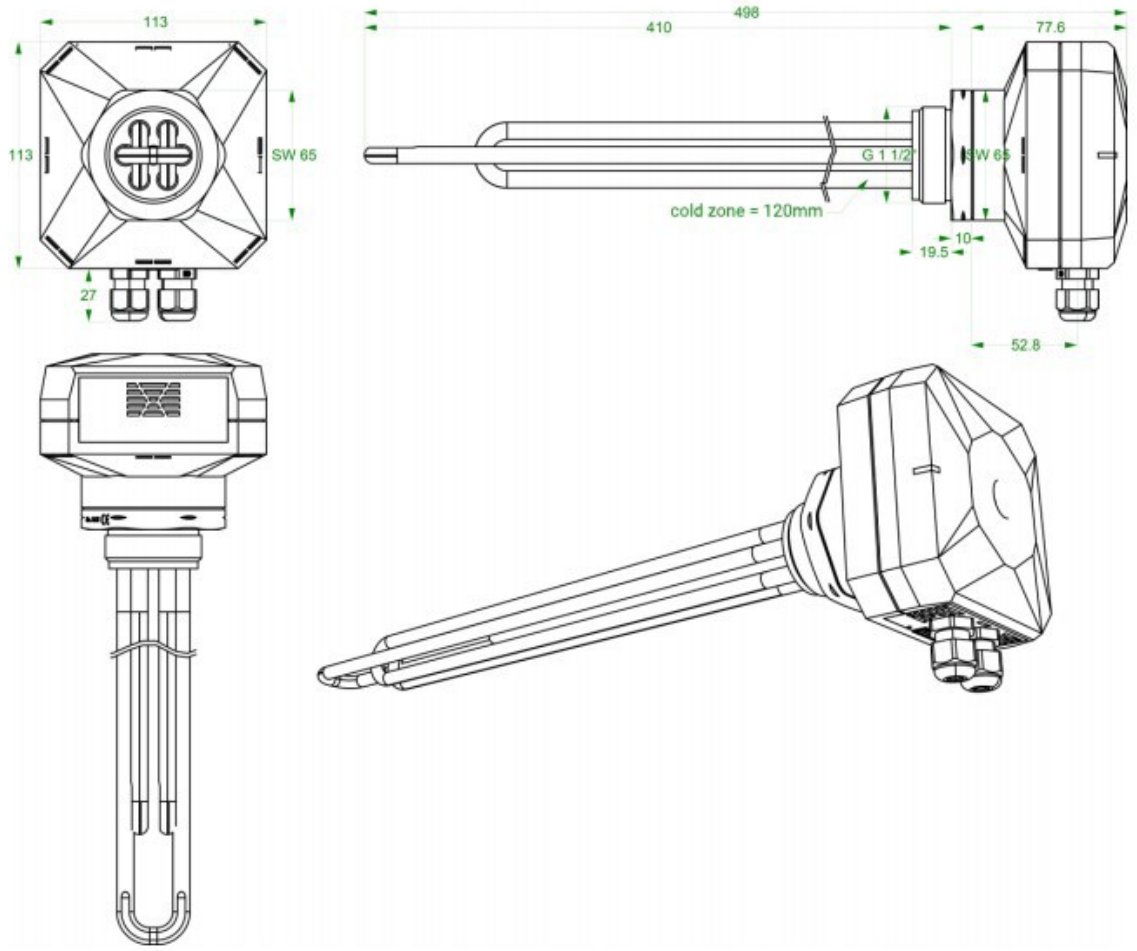
Radio range ~1 km open field or 2 reinforced concrete ceilings or walls.

Technical data:

The heating rod must be installed horizontally in the storage tank.

Power consumption:	max. 3000 W (depending on the specified target power)
Nominal voltage:	230 V, 50 Hz
Surface heating power:	< 10 W/cm²
Cold zone (distance from thread head that is not heated):	120 mm (±10 mm)
Thread:	G 1 ½" / SW 65
Safety device:	No internal fuse
Cable cross-sections:	3 x 1.5 mm²
Dimensions:	See dimension designation
PWM input:	400 Hz - 4 Hz 9-13 V
Radio system frequency:	868.5 MHz
Transmission power:	-10 dBm
Sensor inputs:	PT1000
DL bus load (when using CORA-DL)	10
Heating element material:	Stainless steel 1.4541

Maßzeichnung



10. MAINTENANCE

10.1 CLEANING

10.1.1 CLEANING THE PLATE HEAT EXCHANGER

Due to the strong turbulence in the brazed plate heat exchanger, there is a high self-cleaning effect in the channels. Nevertheless, in some applications, fouling can be very high; this is the case, for example, with extremely hard water and high temperatures.

We recommend installing a suitable water softening system and checking the condition of the heat exchanger at most one year after commissioning and establishing a cleaning/maintenance cycle – or sooner in the case of very high water hardness.

It is possible to clean the heat exchanger by circulating a cleaning fluid (CIP - Cleaning In Place). Carry out cleaning at regular intervals.

All acids and bases are hazardous substances and should be used with great caution. Always follow the instructions for the substances and the associated safety measures.

Use a container with a weak acid, either 5% phosphoric acid or, if the heat exchanger is cleaned more frequently, 5% oxalic acid. Pump the cleaning fluid alternately through the heat exchanger.

For maintenance-intensive applications, we recommend on-site installed CIP connections/valves installed on site. To achieve optimum cleaning results, the flow rate of the cleaning solutions should be 1.5 times higher than during operation and preferably carried out in backwash mode.

After cleaning, do not forget to rinse the heat exchanger thoroughly with clean water. A solution of 1-2% sodium hydroxide (NaOH) or sodium bicarbonate (NaHCO) before rinsing ensures that all 3 acids are neutralised.

Resistance recommendation:

Electrical conductivity:	10-500	µS/cm
pH value:	7.5-9.0	
Carbon dioxide:	<5	CO^2
Total hardness:	4.5-8.5	°dH
Liquid content (primary):	1.554	litres
Liquid content (secondary):	1.665	litres
Permissible operating pressure:	25	bar
Permissible operating temperature:	166	°C

10.1.2 CLEANING THE CONTROLLER AND THE FWS 200/400L

NOTE

Improper cleaning

Incorrect cleaning agents can damage the appliance surfaces.

Please observe the following instructions.

- Do not use abrasive or cleaning agents that could damage the plastic panelling, fittings or controls.
- Do not use sprays, solvents or cleaning agents containing chlorine.
- Clean the controller with a damp cloth.
- Avoid placing or leaning objects on or against the fresh water tank.

NOTE

Limescale

Limescale deposits can cause the safety valves to become stuck.

Operate the safety valves of the heating and fresh water systems manually once a month.

10.2 SYMBOLS ON THE DEVICE

In order to provide staff with important information and warnings, standardised safety signs based on the DIN EN ISO 7010 and DIN ISO 7000 standards were used.

These safety signs are:

- Clearly visible to all,
- kept in a recognisable/legible condition and
- be replaced when necessary.

As the design of the device and the complexity of the production processes do not allow the use of persons with disabilities (e.g. with visual impairments) for safety reasons, the manufacturer has decided not to affix tactile symbols. The requirements for personnel and the technical qualifications required to operate the device are described in section "2.3 Target groups" on page 6.

10.3 MAINTENANCE PLAN

DANGER! Do not operate the device if there are any defects.

Maintenance work	Measures	Interval
Operators and users		
Visual and functional inspection	■ Check the device for visible defects and mechanical damage. ■ Perform a visual inspection of the operating elements. ■ Perform a visual and functional inspection of all safety devices.	
Cleaning the device	■ Observe the information in Chapter "10.1 Cleaning" on page 36.	
Qualified personnel		
Checking electrical components	■ Check the electrical components for damage. ■ Make any necessary repairs.	
Inspection of hydraulic components	■ Check the hydraulic components for damage. ■ Carry out repairs if necessary.	
Check safety devices	■ Perform a visual and functional inspection of all safety devices. ■ Document the inspection.	
Check symbols on devices	■ Check the symbols on the device. ■ Renew the symbols if necessary.	
Check Purchased components	■ Please refer to the manufacturer's documentation for the purchased components	

11. DECOMMISSIONING

When the fresh water tank is taken out of service, it must only be dismantled by qualified personnel. Hazardous materials and waste must be disposed of properly. When dismantling the fresh water tank, observe the instructions at the beginning of the technical documentation and the safety instructions listed below.

DANGER

Fatal electric shock

There is a risk of fatal electric shock when working on electrical equipment. **Disconnect the device from the power supply before decommissioning/dismantling**. Secure the device against being switched back on.

11.1 FINAL DECOMMISSIONING AND DISPOSAL

Only a specialist company may carry out the final decommissioning/disposal. Environmental requirements relating to the recovery, reuse and disposal of operating materials and components in accordance with current standards must be observed.

NOTE

Improper disposal

Improper disposal of the device may result in environmental pollution and/or damage.

Disposal Dispose of electrical and electronic components properly and in accordance with local regulations.

12. EC DECLARATION OF CONFORMITY

In accordance with the Low Voltage Directive 2014/35/EU, Annex IV and the Pressure Equipment Directive (2014/68/EU), Annex IV. We hereby declare under our sole responsibility:

Manufacturer		
ratiotherm GmbH & Co. KG Wellheimer Straße 34 91795 Dollnstein	Email: Telephone: Website:	info@raitotherm.de +49 (0) 8422/9977-0 www.ratiotherm.de

that the device:

Device name: FWS 200/400l

Year of manufacture: see type plate

Intended use: The FWS 200/400 device is intended for use in hot water preparation for operate

in the version supplied complies with the directives

- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.
- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of Member States relating to the making available on the market of pressure equipment, and the following harmonised standards and directives to which this declaration refers:

Applied harmonised standards:	Applicable EC directives
■ DIN EN 378-1-4	■ Directive 2014/30/EU
■ DIN EN ISO 12100	■ Directive 2014/30/EU
■ DIN EN 60204-1	■ Directive 2014/68/EU
■ DIN EN 60335-1	■ Directive 2009/125/EC
■ DIN EN 60335-2-40	■ Directive 2011/65/EU

Technical documentation is available. Name and address of the person authorised to compile the technical documentation:

Name: Julian Kruck, Head of Heat Pump Technology

Address: ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

We hereby certify that the certification procedure has been carried out in accordance with the Low Voltage Directive 2014/35/EU, Annex IV and the Pressure Equipment Directive (2014/68/EU), and that the requirements of the standard DIN EN ISO/IEC 17050-1 "Conformity assessment - Declaration of conformity by the supplier - Part 1: General requirements" were observed when issuing this declaration of conformity. In the event of any modification to the device that has not been agreed with us

device that has not been agreed with us, this declaration loses its validity. Any unauthorised modification in this sense excludes any liability on our part.

Dollnstein,_____ Signature of authorised representative:_____

Details of the person authorised to issue this declaration on behalf of the manufacturer or his authorised representative:

Name:_____ Position: _____

Address: ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

Where to find us

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