Original operating instructions

Central controller rZR 16x2

Status 2025-12

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 and must be handed over to personnel who come into contact with the device. The operator must ensure that the information contained in the operating instructions and the accompanying documents is 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, objects or the device itself caused by:

- improper use,
- non-compliance,
- insufficient attention

the safety criteria contained herein or by:

- modification of the device,
- use of unsuitable spare parts.

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For better readability, the generic masculine form is used in this original operating manual. The personal designations used refer to all genders.

As of: 21 November 2024

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1. INFORMATION ABOUT THE DOCUMENT

The following information serves 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 part of the ratiotherm central controller rZR 16x2. The ratiotherm central controller must not be operated without this document.
The operating instructions must be made available to the operator and the specialist installer for information at all times. If the central controller is sold, the instructions must also be supplied. ratiotherm GmbH & Co. KG accepts 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 DIN ISO 3864-1 standard. The design complies with DIN EN 82079-1 and ANSI Z 535.4.

Signal word	Explanation
DANGER	Indicates a dangerous situation which, if ignored, 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.
NOTE	Indicates operating instructions and cross-references. A note excludes the risk of property damage or injury.

1.2 SAFETY SIGNS

1.2.1 OTHER SIGNS IN ACCORDANCE WITH DIN EN ISO 7010

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

- Mandatory signs ⇨ prescribe an action (e.g. use eye protection).
- Warning signs ⇨ depict a source of danger and supplement 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
	Follow instructions		General mandatory sign
	Disconnect before maintenance or repair		Use hand protection

1.2.2 OTHER SYMBOLS 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 DATA

Device designation:	Central
controller type:	rZR 16x2
Year of manufacture:	See type plate
Country of origin:	Germany

2.2 INTENDED USE

The rZR 16x2 central controller is used to control heating systems. 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. Proper use also includes:

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

The rZR 16x2 controller is state-of-the-art and built in accordance with recognised safety regulations. The device is intended exclusively for domestic and/or commercial use for the control of heating systems.
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 central controller 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 permit its use by persons with disabilities (e.g. 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/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 system 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 working on the device
- Knowledge of how to operate the product provided by specialist personnel and the op

Qualified personnel

A person employed by a qualified specialist company for heating systems and hot water preparation. 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 tasks assigned to them (e.g. instruction of personnel, switching on, programmes and switching off) and be able to identify potential hazardous situations.

Qualification of specialist personnel:

- Of legal age and physically/mentally capable of working on the device
- Knowledge and several years of experience in working on heating and hot water systems

2.4 MISUSE

2.4.1 LY FORESEEABLE MISUSE

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

- Use of the device contrary to its intended purpose
- Feeding in 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
- Operating the device contrary to the provisions of the risk assessment
- Bypassing or decommissioning protective and safety devices
- Operating the device with obvious faults
- Operation of the device by persons with limited physical, sensory or mental abilities or by children

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 consent 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
- Disasters involving foreign objects or force majeure

The operating instructions must be read before using 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
- 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 legal guidelines, standards and laws applicable in the respective country must be observed.

3. SAFETY INSTRUCTIONS

DANGER

Read and observe the operating instructions before you start 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:

- Installation may only be carried out in dry indoor areas.
- The controller must be able to be disconnected from the mains using an all-pole disconnecting device in accordance with local regulations (plug/socket or 2-pole disconnect switch).
- Before carrying out any installation or wiring work on the device, the controller must be completely disconnected from the mains voltage and secured against being switched on again.
- Never mix up the connections of the safety extra-low voltage area (e.g. sensor connections) with the 230 V connections. Damage and life-threatening voltages on the device and the connected sensors are possible.
- Solar systems can become very hot. There is a risk of burns. Take care when installing temperature sensors.
- For safety reasons, the outputs may only remain in manual mode for testing purposes. In manual mode, maximum temperatures and sensor functions are not monitored.
- If the controller or connected devices show visible damage, no longer function or have been stored incorrectly for a long period of time, safe operation is no longer possible. In this case, the controller or connected device must be taken out of service and secured against unintentional operation.

3.2 ADDITIONAL INFORMATION

Local accident prevention regulations apply to all work on the device. The following must also be observed:

- applicable binding regulations for accident prevention
- Recognised technical rules for safe and professional work
- Existing environmental protection regulations
- other applicable regulations

Before starting work, check that the controller is de-energised.
Do not make any changes to the following components:

- Power cables
- Residual current circuit breaker (RCCB)
- structural conditions that affect the operational safety of the controller
- Structural conditions in the vicinity of the controller, insofar as these affect the operational safety of the controller

3.3 RESTRICTED RISK

⚠ WARNING

Measures/work carried out by unauthorised/unqualified personnel

Measures/work 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 working. 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. ACCESSORIES

4.1 SENSOR

Cable sensor/immersion sensor

- PT1000 B (-40 °C to +180 °C)
- 5.0 m silicone cable
- Sensor Ø 5.5 mm

Collector sensor/solar sensor

- PT1000 B (-40 °C to +180 °C)
- 2.5 m silicone cable
- Sensor Ø 5.5 mm
- Overvoltage protection

Pipe contact sensor

- PT1000 B (-40 °C to +180 °C)
- 5.0 m silicone cable
- Fastening clamp
- Thermal paste

Ultra-fast cable sensor

- PT1000 B (-40 °C to + 180 °C)
- 5.0 m PVC cable
- Brass screw fitting 1/2" AG

Outdoor sensor

- PT1000 B (-40 °C to +180 °C)
- Overvoltage protection

Flow "turbine"

- Included with the compact drinking water station
- For installation instructions, see the operating manual "Storage tank and accessories"

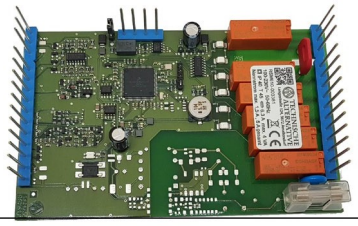
4.2 OPTIONAL ACCESSORIES

Room setpoint transmitter RSGplus

- DL bus device
- Potentiometer (± 5 °C)
- Individual room control
- Operating mode selector switch

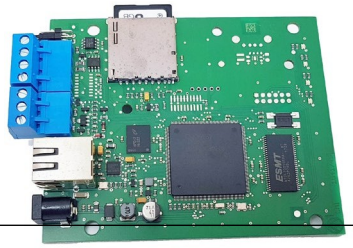
Room remote control

- With its 4.3" touch display, the CAN-MTx2 is a control and display unit for the freely programmable universal controllers UVR16x2, RSM610 and all x2-compatible devices. It has the same operating concept as the UVR16x2 controller and features a sensor unit for room temperature and humidity.



RSM/UVR 610 expansion module

- 6 inputs
- 6 outputs (switching output or mixer control)
- 4 outputs (0 to 10 volts or PWM)
- Sensors as required



C.M.I. module

- The C.M.I. (Control and Monitoring Interface) is an interface for convenient system monitoring, remote control and visualisation of all ratiotherm controllers with DL bus or CAN bus.

Electronic volume flow sensor

- DN 10: Flow rates between 2 and 32 litres per minute
- DN 15: Flow rates between 4 and 50 litres per minute
- DN 20: Flow rates between 5 and 85 litres per minute
- DN 25: Flow rates between 9 and 150 litres per minute
- Measurement of medium temperatures from -40 °C to 125 °C (PT1000)
- Output of measured values via DL bus

5. STRUCTURE AND FUNCTION

5.1 TECHNICAL DATA

rZR	16x2	Unit
Device data		
Dimensions	399 x 479 x 81	W x H x D (mm)
Weight	3.5	kg
Connection	230 V / 2 ~ / 60 Hz / B10	/
Power consumption	3.5 to 4	W
Ambient temperature	+5 to +45	°
Protection class	IP 40	
Inputs		
All inputs	Temperature sensors of types PT1000 (standard sensor for ratiotherm), KTY 10 (2 kΩ/25 °C), KTY 10 (1 kΩ/25 °C), PT100, PT500, Ni1000TK5000 and Room sensors RAS and RASPT, radiation sensor GBS01, thermocouple THEL, humidity sensor RFS, rain sensor RES01, pulses max. 10 Hz, voltage up to 3.3 V DC, resistance (1 to 100 kΩ) and as digital input	
input 7	Additional voltage (0 to 10 volts DC)	
Input 8	Additional voltage (4 to 20 mA DC), voltage (0 to 10 volts DC)	
Inputs 15, 16	Additional pulse input max. 20 Hz, e.g. for volume flow sensor VIG or So signal	
Output		
Outputs 1, 2, 3, 4, 6, 7, 8, 9, 10, 11	Relay outputs, some normally closed and normally open (max. switching capacity 230 V/3 A) Relay	
Exit 5 Optional: 12, 13	changeover contact – potential-free	
Outputs 12, 13, 14, 15, 16	Analogue outputs 0 - 10 V (max. 20 mA) or PWM (10 V/1 kHz) or expansion option as switching outputs via additional relays (max. 3 A)	
Max. bus load (DL bus)	100	
CAN bus	Standard data rate 50 kbit/s, adjustable from 5 to 500 kbit/s	
Differential temperatures	with separate switch-on and switch-off difference	
Threshold values	with separate switch-on and switch-off difference or with fixed hysteresis	
Temperature measuring range	-49.9 °C to +249.9 °C with a resolution of 0.1 K	
Temperature measurement accuracy	Typ. 0.4 K, max. ± 1 K in the range from 0 to 100 °C for PT1000 sensors	
Voltage measurement accuracy	Typ. 1%, max. 5% of the maximum measuring range of the input	
~~Supply cable~~	~~3 x 1 mm² H05VV-F according to EN 60730-1~~	
Power reserve	In the event of a power failure, the controller has a power reserve of approx. 3 days for the date and time.	

To avoid fluctuations in measured values, ensure that signal transmission is free from interference so that the sensor cable is not exposed to external negative influences from 230 V cables. The sensor cables must not be routed together with the mains voltage in a cable duct. When using unshielded cables, sensor cables and 230 V mains cables must be laid in separate or partitioned cable ducts and with a minimum distance of 5 cm between them. Sensor cables for PT100 and PT500 must be shielded. All sensor cables with a cross-section of 0.5 mm^2 can be extended up to 50 m. With this cable length and a PT1000 temperature sensor, the measurement error is approximately +1 K. For longer cables or a lower measurement error, a correspondingly larger cross-section is required.

5.2 FUNCTION DESCRIPTION

Intelligent and sophisticated networking

If we consider the heating system as an organism, the Oskar° stratified storage tank represents the heart and our central controller, the regulation and control unit, represents the brain. As part of a sophisticated and intelligent energy management system, temperatures are recorded at various measuring points, valves are controlled, heat generators are activated and pumps are switched on and off.

This is based on software that is individually adapted to the individual components of the heating system and the requirements of the residents. The goal: maximum savings with maximum use of renewable energies, without compromising on comfort.

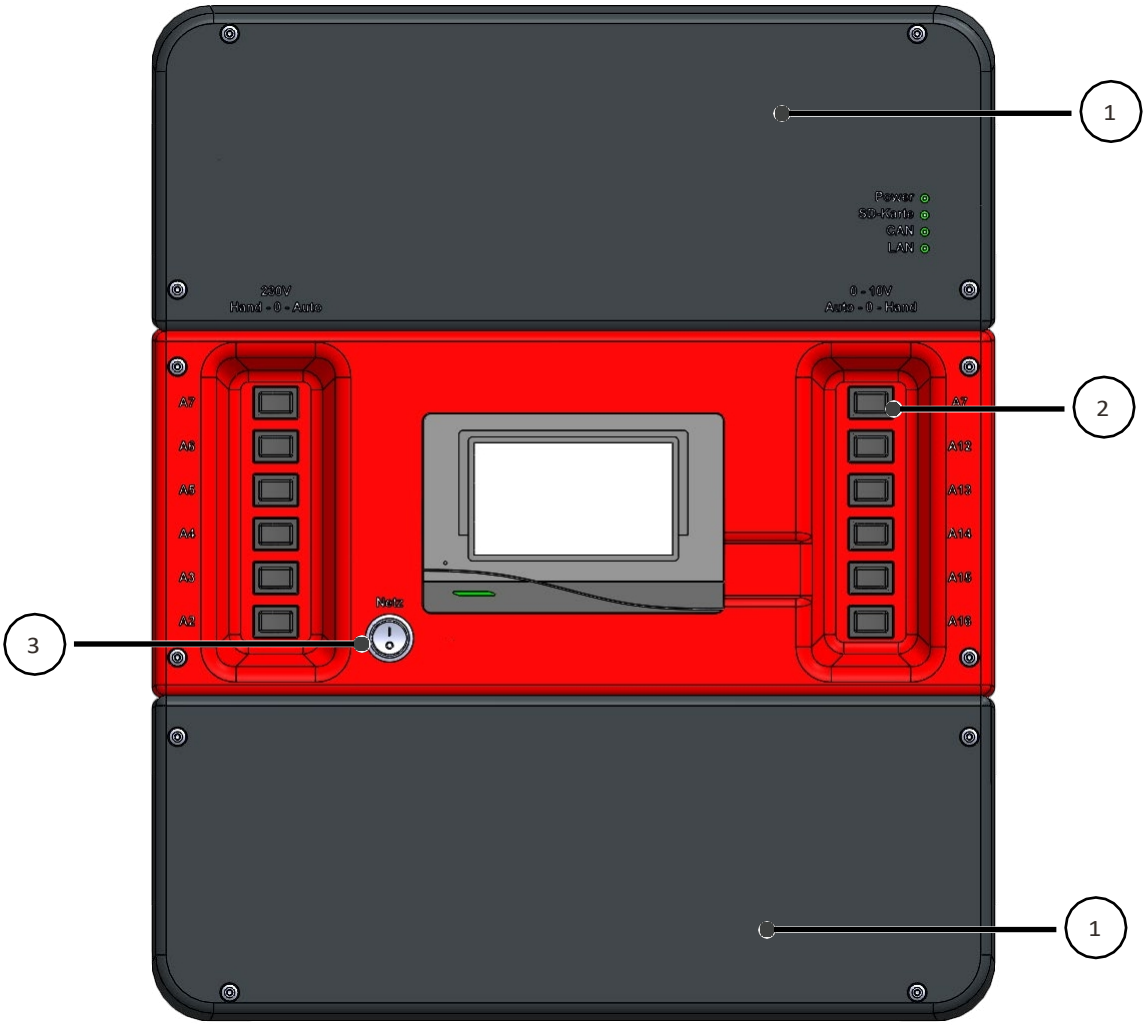
Decades of experience have gone into the intelligent and sophisticated software of the central controller, which utilises every last detail of a sophisticated system for ongoing optimisation. This allows the system technology to respond flexibly to a wide variety of situations. At the same time, heat and energy losses are consistently avoided.

ADVANTAGES

- Easy installation and maximum comfort
- Optimal networking of the entire heating system
- Optimised software to consistently avoid heat and energy losses and increase renewable energy gains
- Programmable for almost any application; only property-specific parameters need to be adjusted on site
- Maximum flexibility thanks to freely configurable inputs and outputs and extensive expansion options
- A fully coordinated system with other ratiotherm components

5.3 STRUCTURE, SPARE PARTS AND SAFETY DEVICES

The ratiotherm central controller rZR 16x2 is shipped complete and ready for operation. The central controller is equipped with a UVR 16x2 from Technische Alternative, as well as twelve 3-way rocker switches and one 2-way rocker switch. The device also has various safety devices, which can be seen in the following illustration.



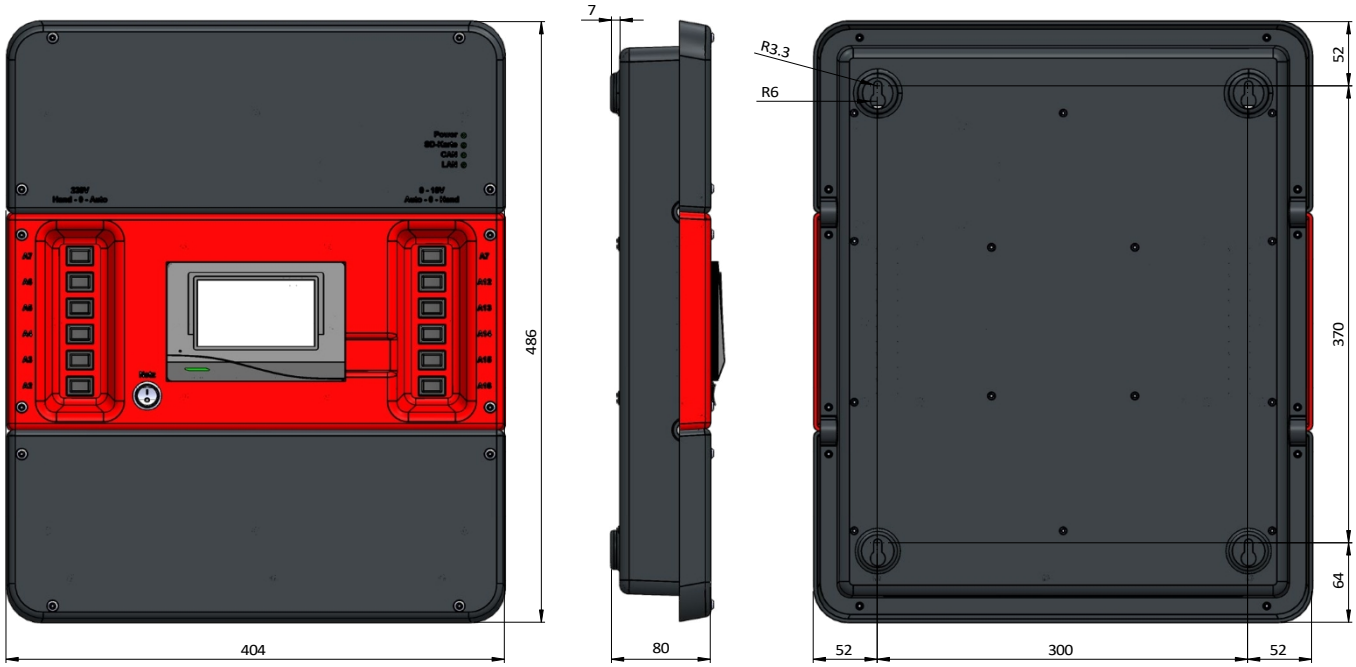
1 Protective enclosure or housing
2 Rocker switch
3 Main switch ON/OFF

6. TRANSPORT, ASSEMBLY AND INSTALLATION

6.1 TRANSPORT, UNPACKING, STORAGE

The following instructions for transporting the device must be observed:

- Only allow qualified personnel to carry out the transport.
- Protect yourself with PPE (e.g. safety shoes, etc.).
- 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, check that the delivery is complete.
- Use the delivery notes and packing lists provided to check the contents.



The responsible specialist tradesman (specialist personnel) must ensure the following measures are taken:

- The danger zone must be well lit for assembly, using additional lighting units if necessary.
- Staff must have the necessary qualifications and have received the necessary training in advance.
- Personnel must have read and understood the operating instructions.
- Personnel must have access to the operating instructions at all times.
- Local accident prevention and environmental regulations must be implemented and complied with.
- Personnel must be instructed by the responsible supervisor and unauthorised persons must be kept away from the device.
- The device may only be handed over and operated in a safe and functional condition.

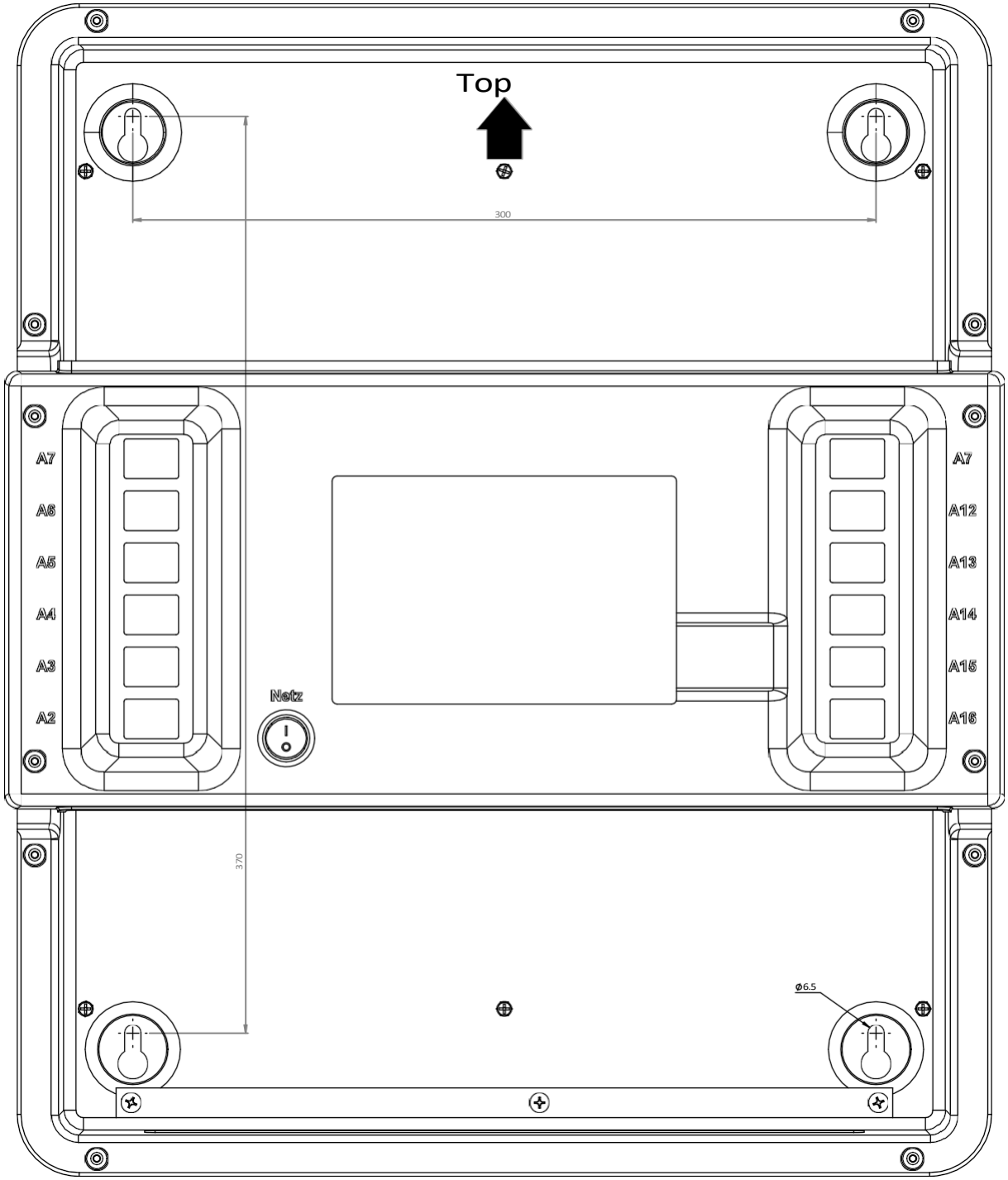
Storage conditions: The central controller must be stored in a dry, frost-free place and protected from dust and dirt.

Installation conditions: The central controller must be installed in a clean, ventilated and dry room. Temperatures must remain between 5 and 40 degrees Celsius.

6.2 INSTALLATION

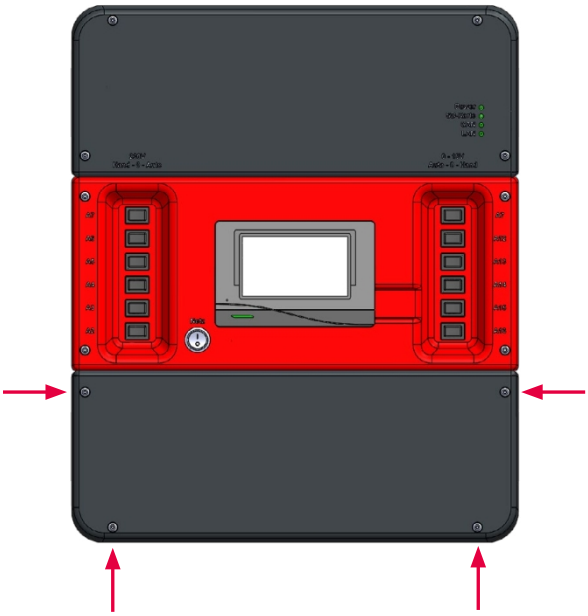
6.2.1 WALL MOUNTING OF THE CONTROLLER

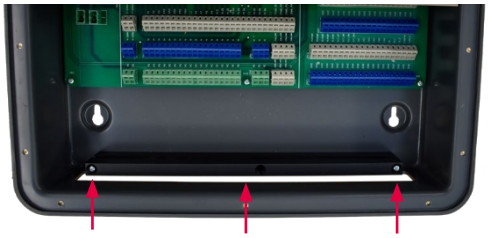
The controller must be mounted on the wall at eye level (approx. 1.6 m high) using the mounting materials provided. Drilling: 4 x 8 Ø



Once the four screws have been fitted with wall plugs in the desired positions, the controller housing can be attached to the wall using the brackets provided.

6.2.2 WIRING THE CONTROLLER



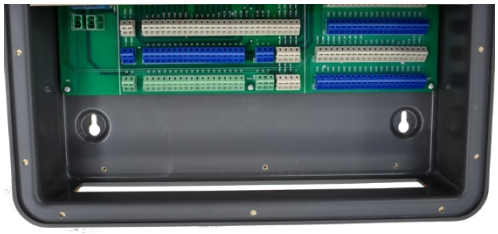


To wire the controller, first remove the lower controller cover. To do this, loosen the 4 screws using a Phillips screwdriver.

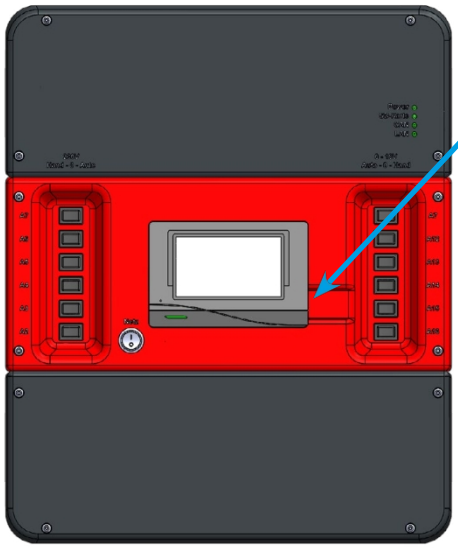
Then remove the upper half of the strain relief by unscrewing the 3 Phillips screws.

Now you can start wiring. Make sure that the wiring is correct!

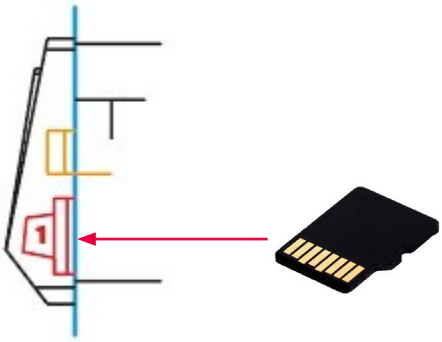
Once everything is wired correctly, the controller housing can be reassembled in reverse order. Fit the strain relief and then the lower controller cover.



6.2.3 INSERTING THE SD CARD

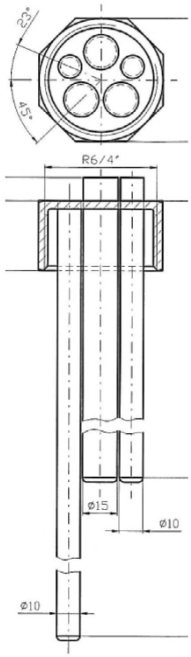


There is a recess to the right of the controller display. This is the slot for the SD card.



6.2.4 INSTALLATION OF THE IMMERSION SENSORS IN THE OSKAR° 10 AND OSKAR° WPS

Four temperature sensors, S1, S2, S3 and S11, are installed at different heights in each Oskar°. For this purpose, each stratified storage tank is equipped with a stainless steel immersion sleeve, each containing 5 immersion tubes. 3 immersion tubes with a diameter of 15 mm and 2 immersion tubes with a diameter of 10 mm. The two temperature sensors S1 and S2 are installed in the two protruding and shorter immersion tubes. S1 is located at the highest point of all sensors and requests hot water preparation, while sensor S2 is located below S1 and terminates the hot water request. The immersion depths of these sensors can be determined using the diagram on the following page. The temperature sensor S3 is located relatively in the centre of the storage tank and is responsible for the heating request. The sensor S11 is located at the bottom of the storage tank and can be used, for example, to request a solar system. The correct immersion depths for sensors S3 and S11 can be found in the tables on the next page.

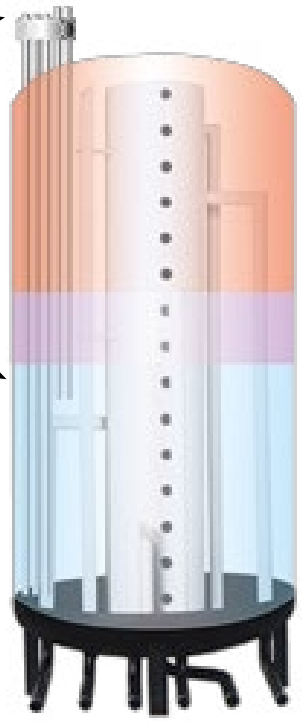


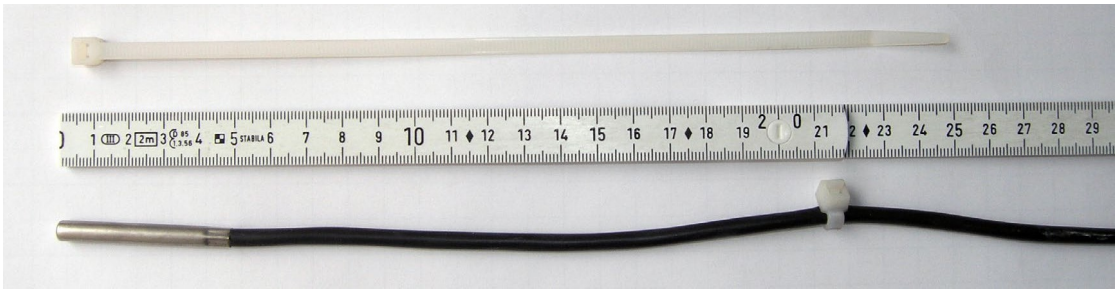
Immersion depth of the immersion tubes; the sensors can be arranged at any height; the tubes extend to approx. storage tank.

The two upper pipes extend to approx. to the centre of the t:

Stainless steel immersion sleeve with

- 3 x immersion tube 15 x 1 mm
- 2 x immersion tube 10 x 1 mm



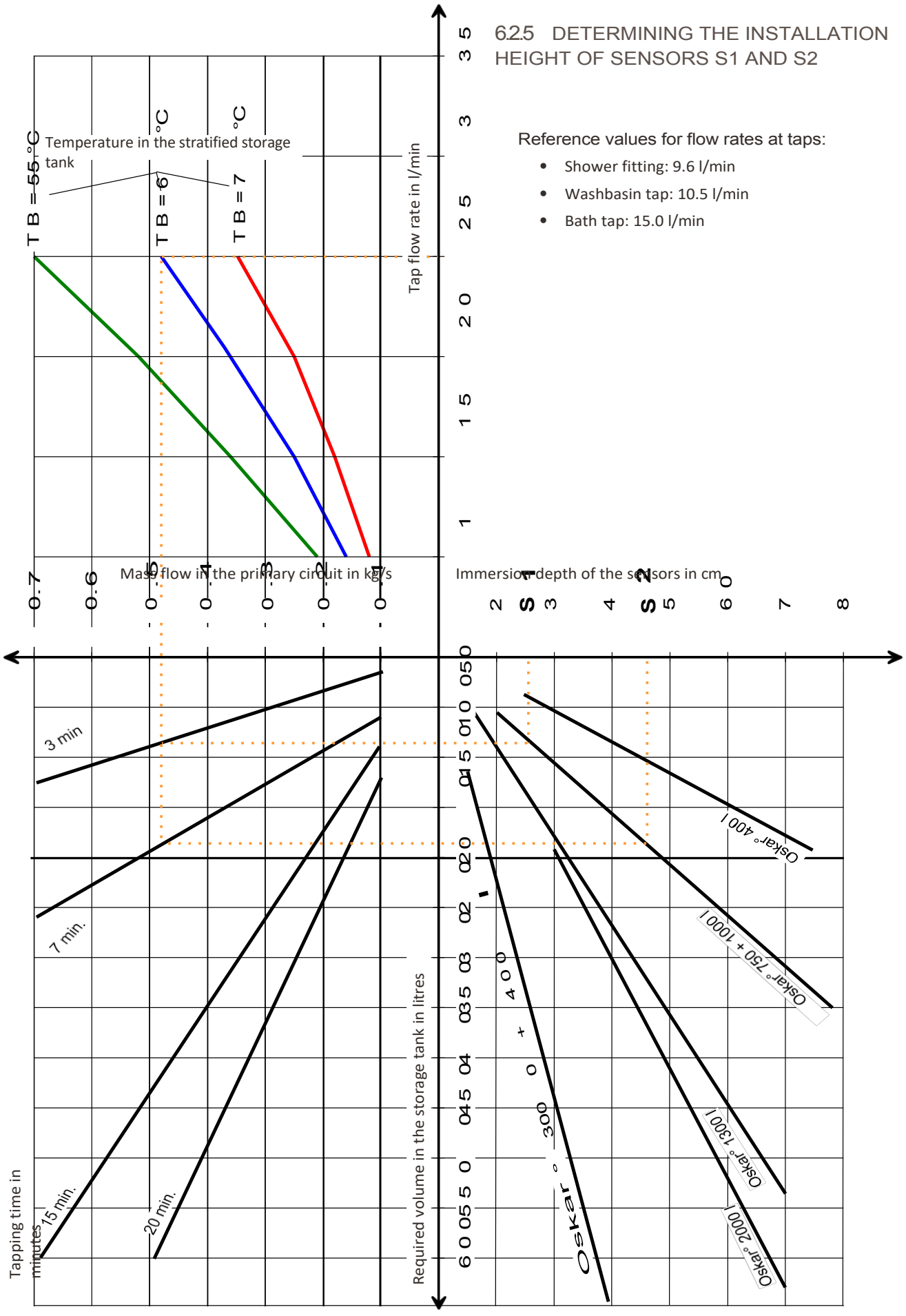


- Determine the immersion depth of the sensors using the diagrams and tables and secure them to the cable with a heat-resistant plastic cable tie.
- Select the heat-shrink tubing with the correct designation from the enclosed heat-shrink tubing and use it to mark the sensor at both ends.
- Insert the sensor up to the cable tie position. The cable tie should ensure the correct immersion depth.
- If necessary, extend the sensors in accordance with VDE regulations to ensure reliable contact.

6.2.5 DETERMINING THE INSTALLATION HEIGHT OF SENSORS S1 AND S2

Reference values for flow rates at taps:

- Shower fitting: 9.6 l/min
- Washbasin tap: 10.5 l/min
- Bath tap: 15.0 l/min



Example: Oskar° 10/1.5/750 or 10/1.5/1000

- Primary charging temperature: 60 °C
- Cold water inlet: 10 °C
- Hot water outlet: 50 °C
- Flow rate: 25 l/min
- Tapping time: 7 min
- Tapping quantity: 175 litres

From diagram: Sensor position S1 at approx. 25 cm immersion depth
Sensor position S2 at approx. 47 cm immersion depth

6.2.6 DETERMINING THE IMMERSION DEPTH OF SENSORS S3 AND S11

Oskar°-10/1.5/Volume							
Volume	750	100	130	2000	3000	4000	litres
Immersion depth S3	600	600	600	600	600	600	millimetres
Immersion depth S11	1500	1880	1700	1700	1500	2010	millimetres

Oskar° heat pump storage tank 10/1.5/volume							
Volume	750	1000	1300	2000	300	4000	litres
Immersion depth S3	950	1200	950	1200	950	1200	millimetres
Immersion depth S11	1500	1880	1700	1700	1500	2010	millimetres

Oskar°-10/5.0/volume						
Volume	1000	1300	2000	300	4000	litres
Immersion depth S3	1200	950	600	600	700	Millimetres
Immersion depth S11	1880	1700	1700	1500	2010	Millimetres

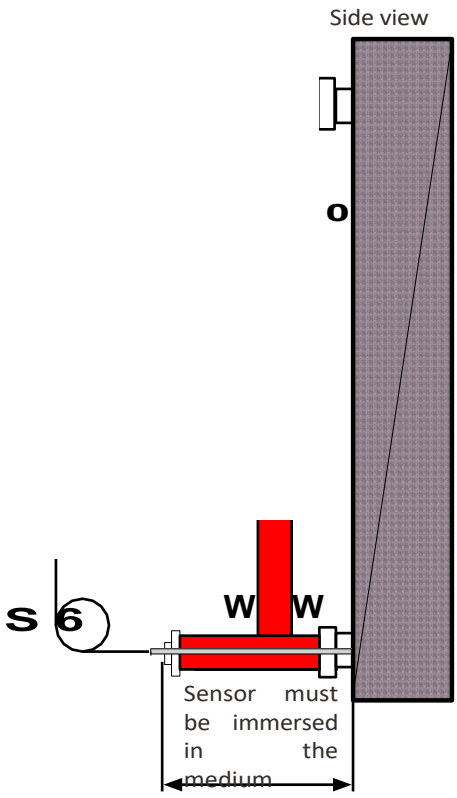
Oskar° heat pump storage tank 10/5.0/volume				
Volume	2000	3000	40	litres
Immersion depth S3	1100	1100	1100	Millimetres
Immersion depth S11	1700	1500	2010	millimetres

6.2.7 INSTALLATION OF IMMERSION SENSORS IN THE OSKAR° 08

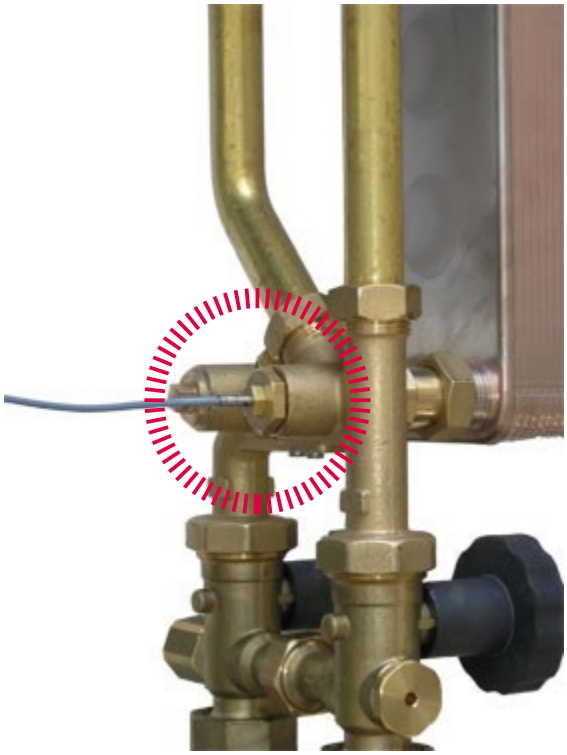
The sensor designations differ in the Oskar° 08. In this case, the two upper temperature sensors for hot water demand are S2 and S3. S4 is responsible for heating demand and S5 is the lowest sensor. With the Oskar° 08, all immersion depths of the sensors can be read from the following table.

Oskar°-08				
Volume	500	75	10	litres
Immersion depth S2	200	200	200	millimetres
Immersion depth S3	540	450	450	millimetres
Immersion depth S4	900	810	810	millimetres
Immersion depth S5	1500	1500	1880	millimetres

6.2.8 INSTALLATION OF THE ULTRARAPID SENSORS



Measurement only takes place at the sensor tip!



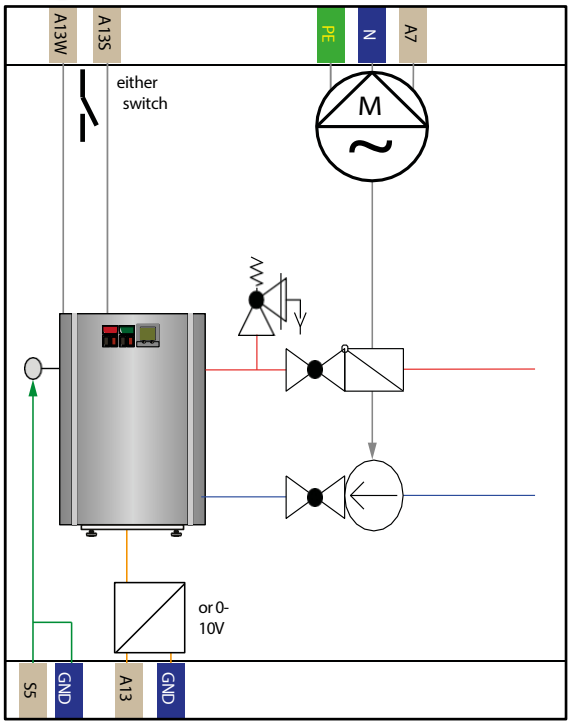
CAUTION

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

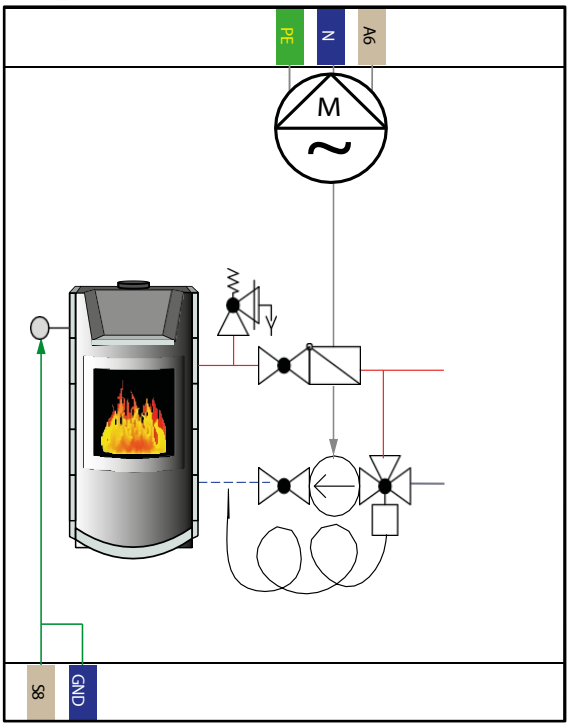
Seal via the metal part of the sensor – not via the cable!

6.3 WIRING OF THE COMPONENTS

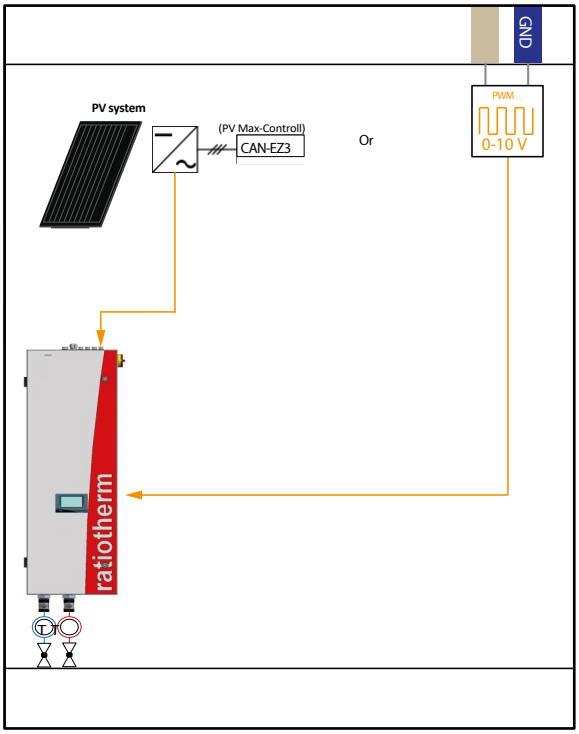
Automatic heat generator



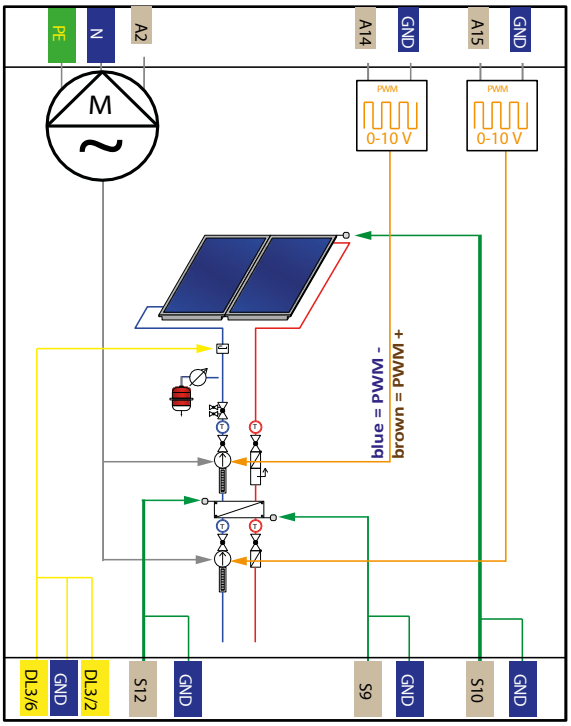
Manual heat generator



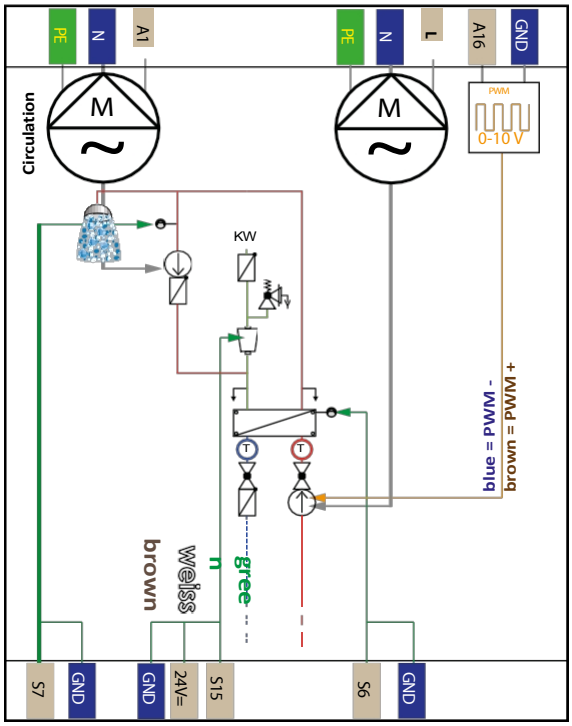
Automatic heat generator



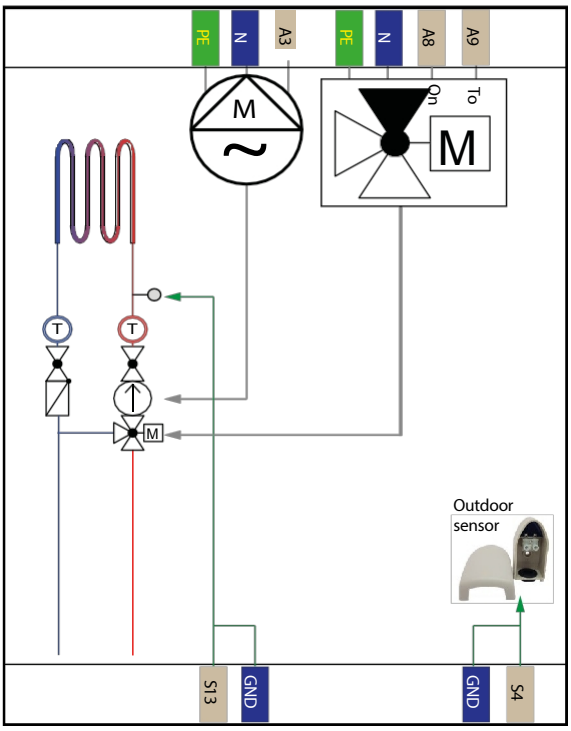
Solar



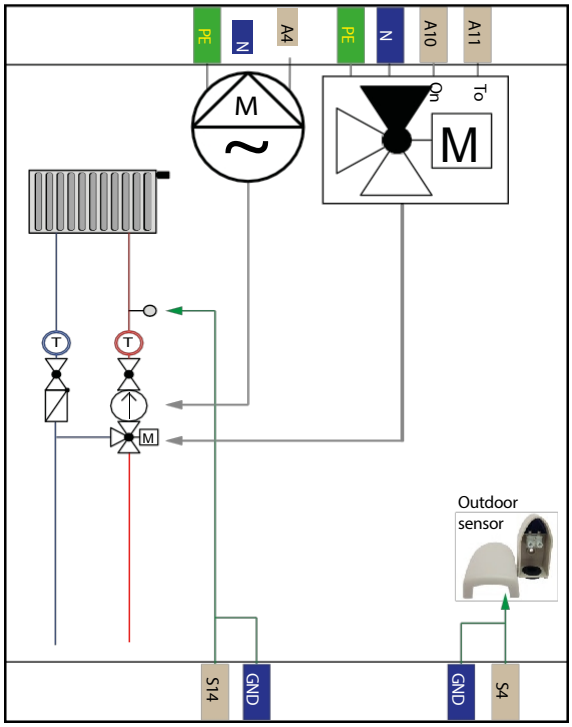
Drinking water compact station



Heating circuit 1 Low temperature

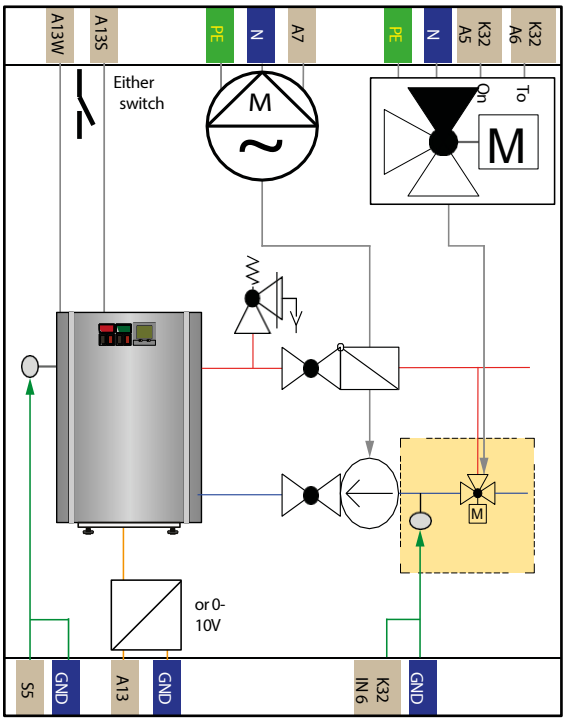


Heating circuit 2 high temperature

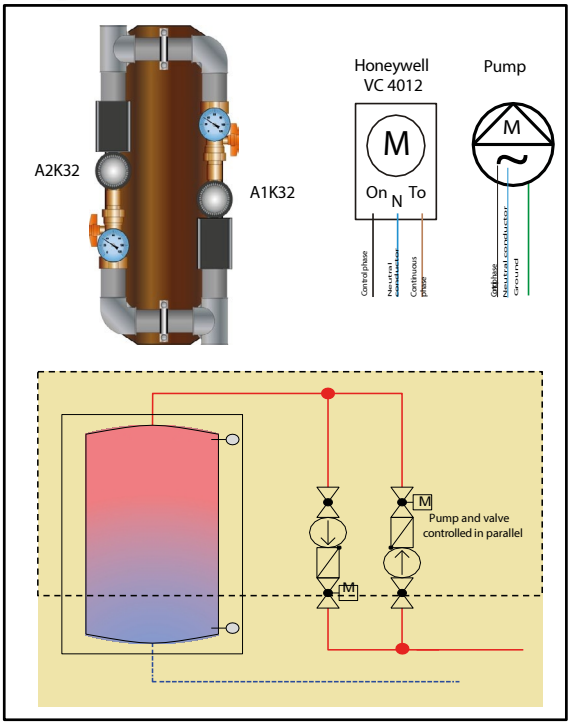


ratiotherm
Smart Energy Systems

Heat generator Return flow boost



Removal and return storage 2. Buffer storage



6.4 OVERVIEW OF OUTPUTS

A1	A2	A3	A4	A5	A6	A7	A8+9	A10+11	A12	A13
N/PE	N/PE	N/PE	N/PE	W+S	N/PE	N/PE	N/PE	N/PE	W+S	W+S
Pumpe Zirkulation	Pumpe Solar	Pumpe Heizkreis 1	Pumpe Heizkreis 2	Ventil Kühlung WP	Pumpe man. WE	Pumpe aut. WE	Mischer Heizkreis 1	Mischer Heizkreis 2	Ventil Warmwasser	Anford. aut. WE

A14	A15	A16	IO66-A1S	IO66-A2S			IO66-A5S+A6S			
GND	GND	GND	N/PE	N/PE			N/PE			
PWM	PWM	PWM								
Solar Primärkreis	Solar Sekundärk.	Pumpe TWK-Station	Pumpe Auslagerung	Pumpe Rückladung			Mischer Rück-laufanhebung			

6.5 BOARD

Powe
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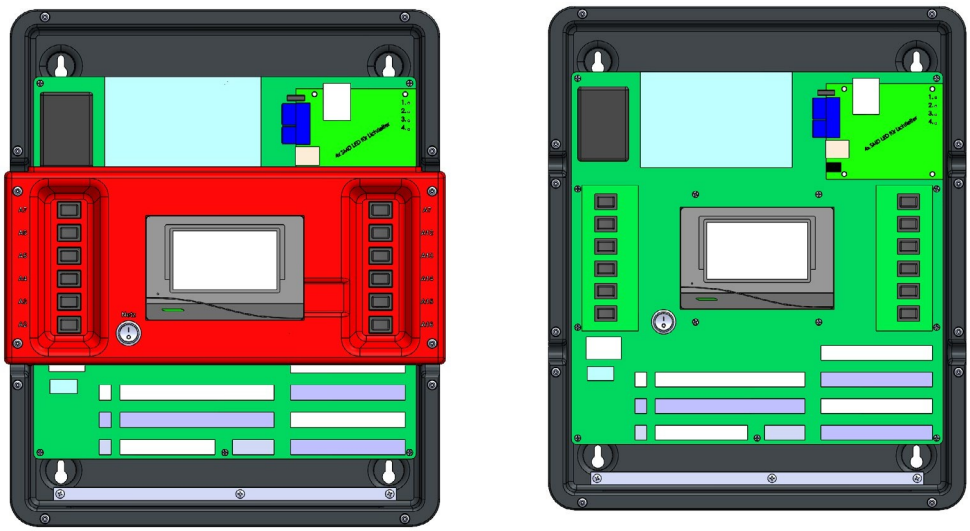
sup
ply

RSM 610
(K32)

CMI module
(K56)

Main board x2.2 from ratiotherm



6.6 CABLE SELECTION AND NETWORK TOPOLOGY

Shielded twisted pair cable has become the standard for use in CANopen networks. This is a cable with twisted conductor pairs and a common outer shield. This cable is relatively insensitive to EMC interference and can achieve extensions of up to 1000 m at 50 kbit/s. The cable cross-sections specified in the CANopen recommendation (CiA DR 303-1) are shown in the following table. [n]

Bus length [m]	Length-related resistance [mΩ/m]	Cross-section [mm^2]
0 to 40	70	0.25 to 0.34
40 to 300	< 60	0.34 to 0.60
300 to 600	< 40	0.50 to 0.60
600 to 1000	< 26	0.75 to 0.80

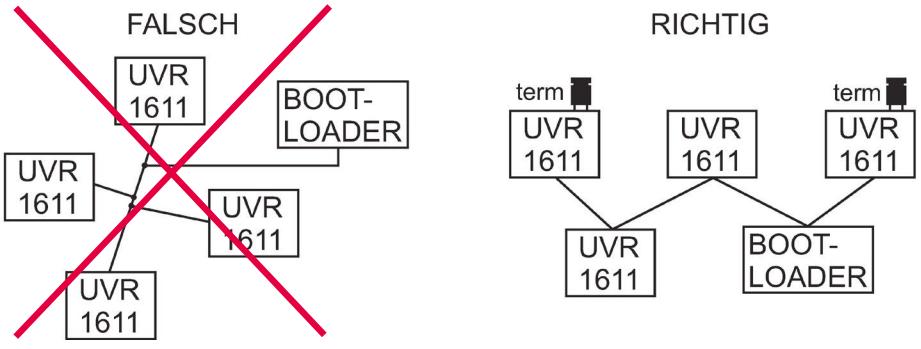
The maximum cable length also depends on the number of nodes [n] connected to the bus cable and the cable cross-section [mm²].

Cable cross-section [mm²]	Maximum length [m] with n = 32	Maximum length [m] with n = 63
0.25	20	170
0.5	360	310
0.75	550	470

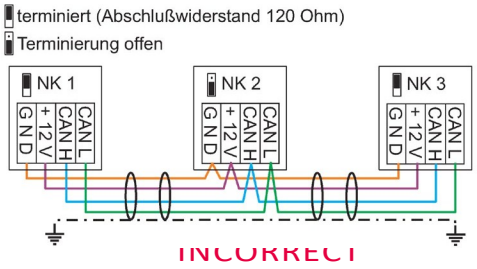
Recommendation: A 2x2-pin, twisted pair (twist CAN-L with CAN-H or +12V with GND) and shielded cable with a conductor cross-section of at least 0.5 mm², a conductor-to-conductor capacitance of max. 60 pF/metre and a characteristic impedance of 120 ohms. The standard bus speed of the rZR16x2 is 50 kbit/s.

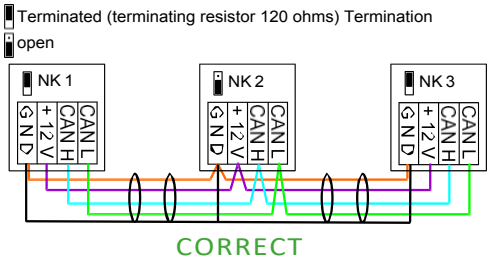
This would allow a bus length of 500 m to ensure reliable transmission. The following cable complies with this recommendation: Cable type Unitronic®-Bus CAN 2x2x0.5 from Lapp Kabel (1st pair = CAN-H, CAN-L, 2nd pair = GND, 12 V)

Wiring: A CAN bus must never be set up in a star configuration. The correct setup consists of a star cable from the first device (with termination) to the second device, then to the third device, etc. The first and last bus connections are fitted with a termination bridge. The termination bridges are initially located in a "blind" slot in all devices and must be reconnected accordingly.



Example: Connecting three network nodes (NK) with a 2x2-pin cable and terminating the final network nodes.





Every CAN network is equipped with a 120 Ω bus connection at the first and last participants in the network (termination is carried out with a jumper). This means that there are always two terminating resistors in a CAN network. Drop cables or star-shaped CAN wiring are not permitted according to the official specification. As can be seen from the tables, reliable transmission depends on many factors (cable type, cross-section, length, number of nodes, etc.). However, all specifications can be considered relatively conservative, so that no problems should arise if the dimensions are reasonable. The shield conductor of the bus cable must be connected to the controller ground (GND) on both sides.

Grounding the shield to the protective conductor leads to uncontrolled controller behaviour in the event of interference voltages above 2000 volts.

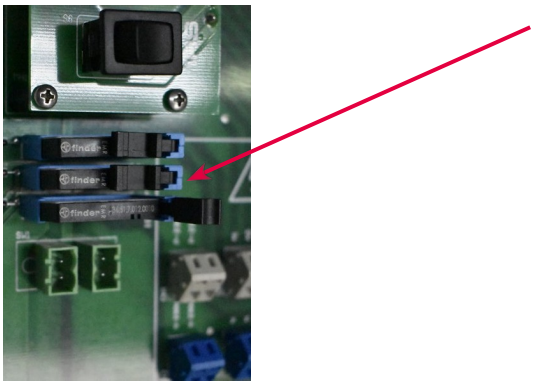
6.7 TERMINAL DIAGRAM

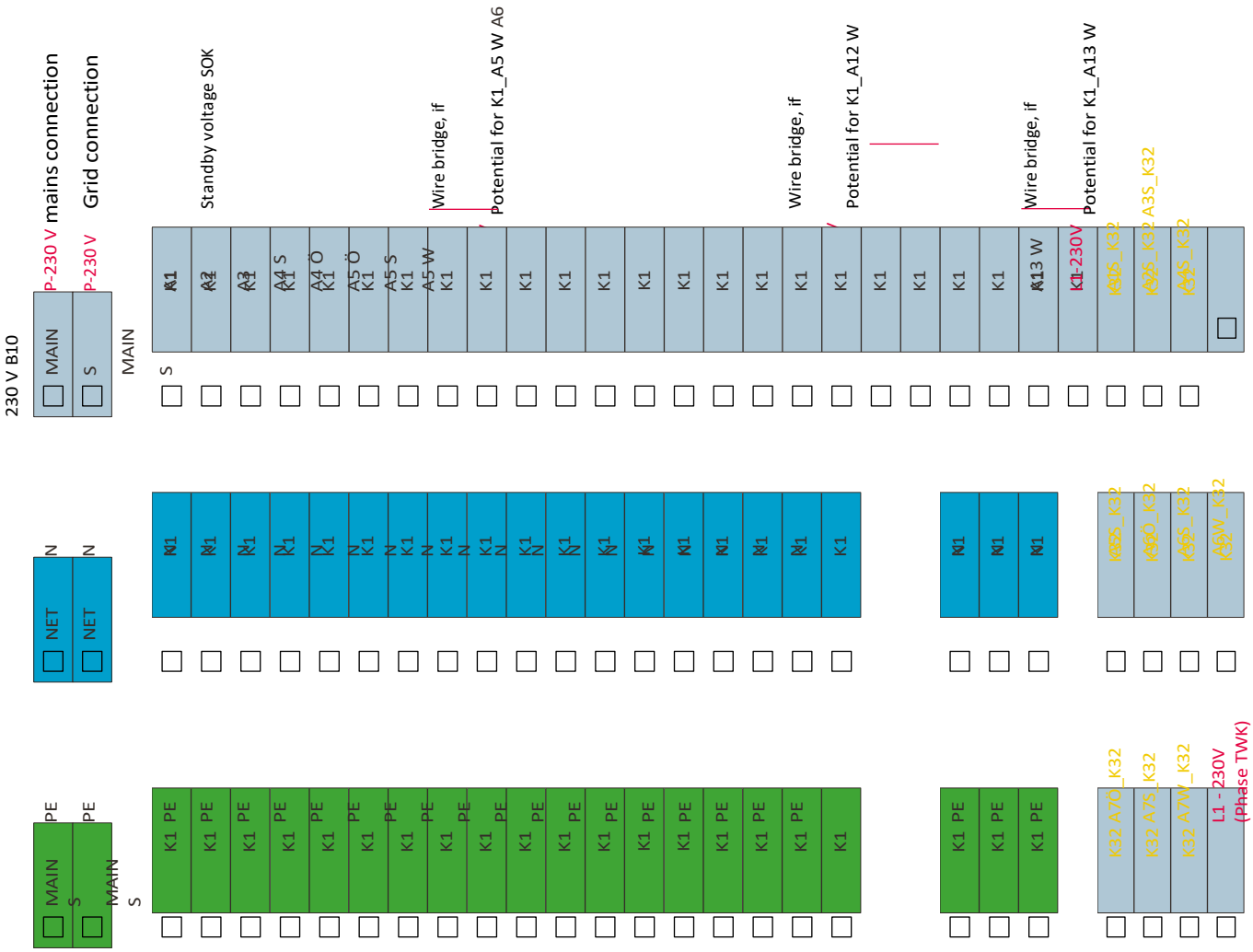
Special features of outputs K1 A12, K1 A13 and K32 A7:

These outputs can be used either as switching outputs with or without potential via relays that are factory-connected, or as 0–10 volt (PWM signal) outputs on the circuit board sensor side.

When using these outputs as PWM, the corresponding relay above the controller network switch must be removed from the circuit board. Otherwise, the relay will flutter due to the fluctuating voltage and may eventually become defective.

To remove the relay, flip up the black mounting bracket and then, while it is still open, press the pivot head (lever) downwards. This will lift the relay slightly so that it can be removed.





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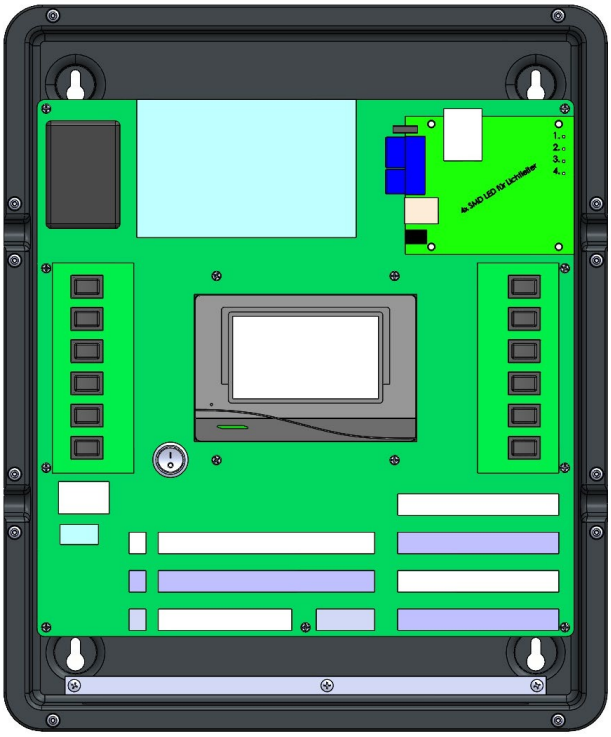
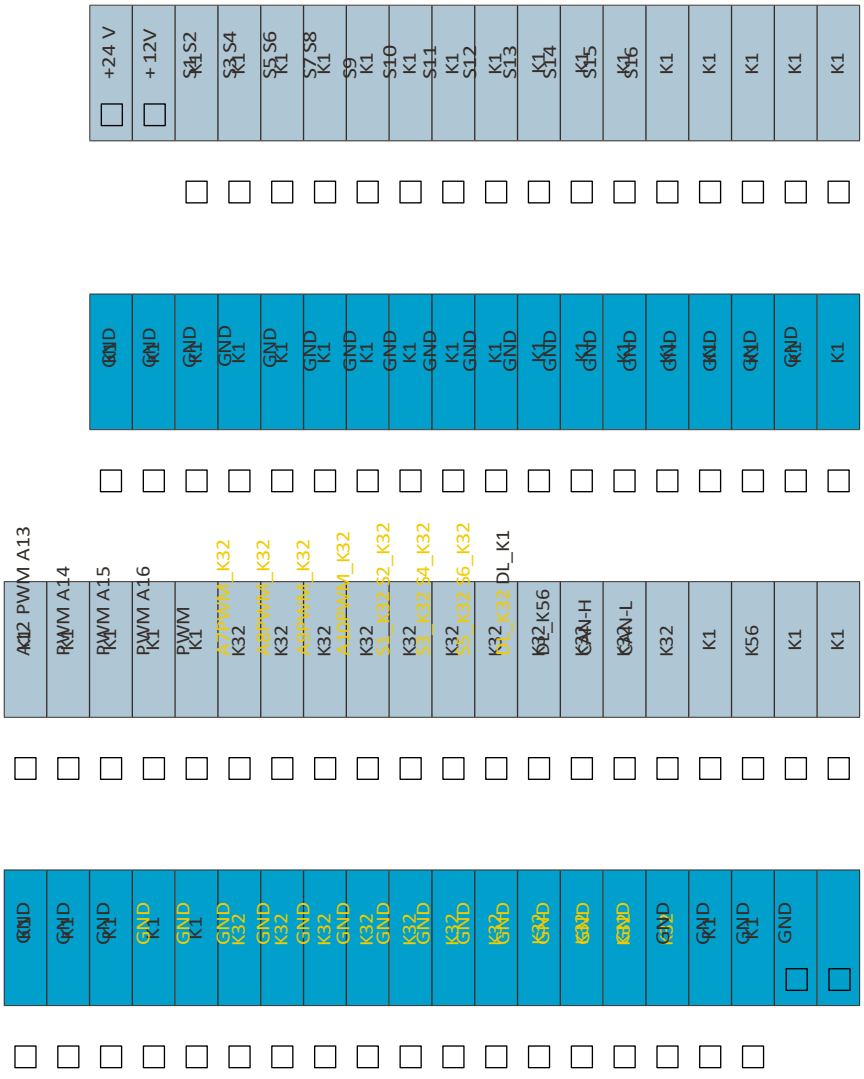
Cable selection up to 100 m cable length:

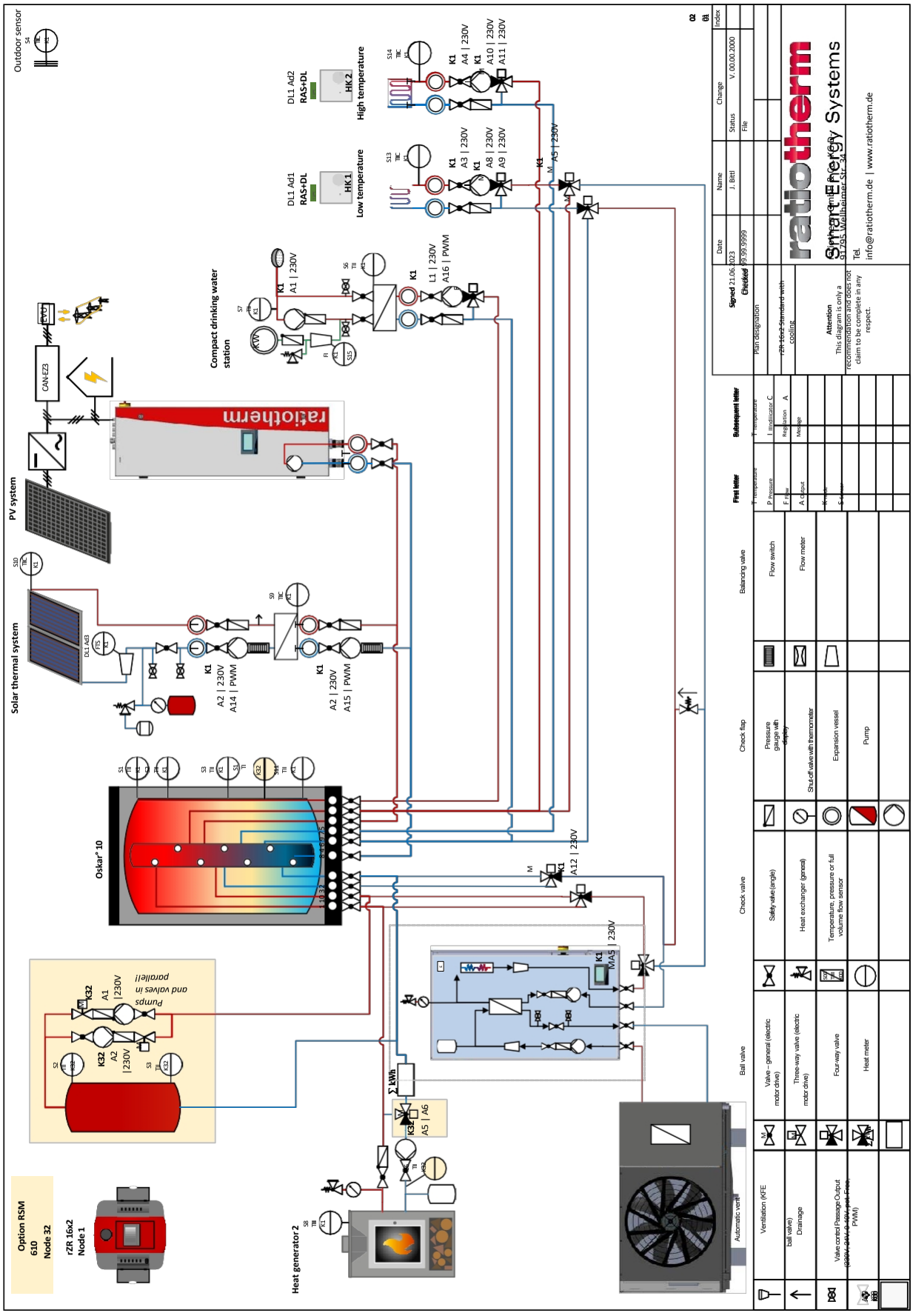
Power supply:	3 x 1.5 mm²
Sensor:	2 x 0.75 mm²
Outputs:	3 x 0.75 mm²
Mixer:	4 x 0.75 mm² BUS
cable:	see section 6.7
DL line:	See section 6.8.5

Recommendation: Actuating tool with partially insulated shaft for screwless terminals, e.g. WAGO, Phönix, Elektronik Conrad





6.8 STANDARD PROGRAMMING



6.9 ELECTRICAL INSTALLATION

6.9.1 INPUTS (NODE 1) FOR STANDARD HYDRAULICS

Sensor input	Circuit board terminal		Designation
S1	K1 S1	GND	Insertion sensor Storage tank top 1 - Hot water demand
S2	K1 S2	GND	Insertion sensor, top of storage tank 2 – hot water shut-off
S3	K1 S3	GND	Insertion sensor, middle of storage tank – heating flow temperature
S4	K1 S4	GND	Outdoor sensor in surface-mounted housing
S5	K1 S5	GND	Insertion sensor heat generator 1 (automatic heat generators)
S6	K1 S6	GND	Ultra-fast hot water outlet sensor
S7	K1 S7	GND	Hot water circulation return temperature sensor
S8	K1 S8	GND	Insertion sensor heat generator 2 (manual heat generator)
S9	K1 S9	GND	Insertion sensor solar heat exchanger bottom
S10	K1 S10	GND	Insertion sensor Solar thermal system
S11	K1 S11	GND	Insertion sensor, bottom of storage tank (sensor for solar thermal and wood gasification boiler)
S12	K1 S12	GND	-
S13	K1 S13	GND	Heating circuit 1 flow temperature sensor
S14	K1 S14	GND	Heating circuit 2 flow temperature sensor
S15	K1 S15	GND	Flow signal transmitter for water heater Wire colours S15: = 24 V Green = S15 Brown = GND
S16	K1 S16	GND	-

6.9.2 ADDITIONAL INPUTS (NODE 32) FOR STANDARD HYDRAULICS WITH OSKAR°-10

RSM required!

Sensor input	Circuit board terminal		Designation
S1	IN1	GND	Reference sensor for removal
S2	IN2	GND	Sensor for storage memory top
S3	IN3	GND	Sensor for lower storage tank
S4	IN4	GND	-
S5	IN5	GND	-
S6	IN6	GND	Contact sensor for motorised return flow boost in heat generators

6.9.3 OUTPUTS (NODE 1) FOR STANDARD HYDRAULICS

Sensor output	Circuit board terminal		Designation
A1	K1 A1	N/PE	Hot water circulation
A2	K1 A2	N/PE	230 V standby voltage for both solar pumps
A3	K1 A3	N/PE	Heating circuit 1 pump
A4	K1 A4	N/PE	Heating circuit 2 pump
A5	K1 A5 S	N/PE	Cooling valve Heat pump
A6	K1 A6	N/PE	Charging pump heat generator 1
A7	K1 A7	N/PE	Charging pump heat generator 2
A8	K1 A8	N/PE	Mixer motor heating circuit 1 (on)
A9	K1 A9	N/PE	Mixer motor heating circuit 1 (closed)
A10	K1 A10	N/PE	Mixer motor heating circuit 2 (open)
A11	K1 A11 S	N/PE	Mixer motor heating circuit 2 (closed)
A12	K1 A12 S	N/PE	Hot water valve
A13	A13 W	A13 S	Heat generator 1 request (potential-free); potential if bridge L1 on A13 W
A13 PWM	A13 PWM	GND	Requirement for heat generator 1 (0 - 10 V); Caution - remove corresponding relay!
A14 PWM	A14 PWM	GND	Charging pump 1: primary solar pump top, glycol circuit
A15 PWM	A15 PWM	GND	Charging pump 2: secondary solar pump at the bottom, storage circuit
A16 PWM	A16 PWM	GND	Charging pump compact drinking water station

6.9.4 ADDITIONAL OUTPUTS (NODE 32) FOR STANDARD HYDRAULICS WITH OSKAR°-10

RSM required!

Sensor input	Circuit board terminal		Designation
A1	IO66_A1S	N/PE	Charging pump: Oskar -> Off-site storage
A2	IO66_A2S	N/PE	Charging pump: External storage -> Oskar
A3	IO66_A3S	N/PE	-
A4	IO66_A4S	N/PE	-
A5	IO66_A5S	N/PE	Motorised return flow boost for heat generator
A6	IO66_A6S	N/PE	Motorised return flow boost for heat generator

6.9.5 DL INPUTS

DL input	Designation
1/11	Room setpoint sensor heating circuit 1
1/12	Room setpoint sensor heating circuit 2
3	Temperature sensor for solar thermal return flow (primary circuit)
3/6	Flow detection solar thermal return (primary circuit)

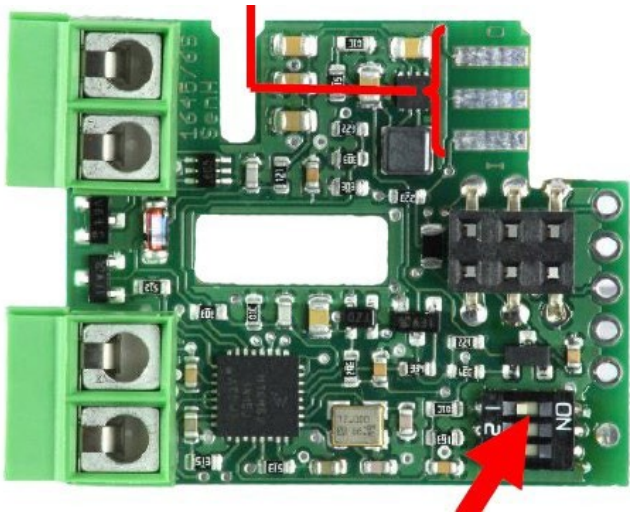
The DL bus serves as a bus line for various external sensors and modules. It is a bidirectional data line and operates independently of the CAN bus.

The DL bus consists of two wires: DL and GND (sensor ground).

The power supply for the DL bus sensors is provided by the DL bus itself. Some DL bus devices can/must be powered by a 12 V source, e.g. that of the CAN bus (this is explicitly noted in the operating instructions for that sensor). The cables can be laid in a star configuration or in series (from one device to the next). Any cable with a cross-section of 0.75 mm^2 and a maximum length of 30 m can be used as a data cable. For lengths over 30 m, the use of shielded cables is recommended, which increases the permissible length of the cable to 100 m. Long cable ducts for power and data cables laid close together cause interference from the power supply to be introduced into the data cables. A minimum distance of 20 cm between two cable ducts or the use of shielded cables is therefore recommended.

The data line must never be routed in the same cable as a CAN bus line.

Each DL sensor must have its own DL bus address. In most cases, the address is adjusted via dip switches on the device circuit board. Most DL sensors can record different measured values (e.g. volume flow and temperature).



The settings are pre-coded at the factory if the application is known.

A separate index must be specified for each measured value. The applicable index can be found in the DL sensor data sheet.

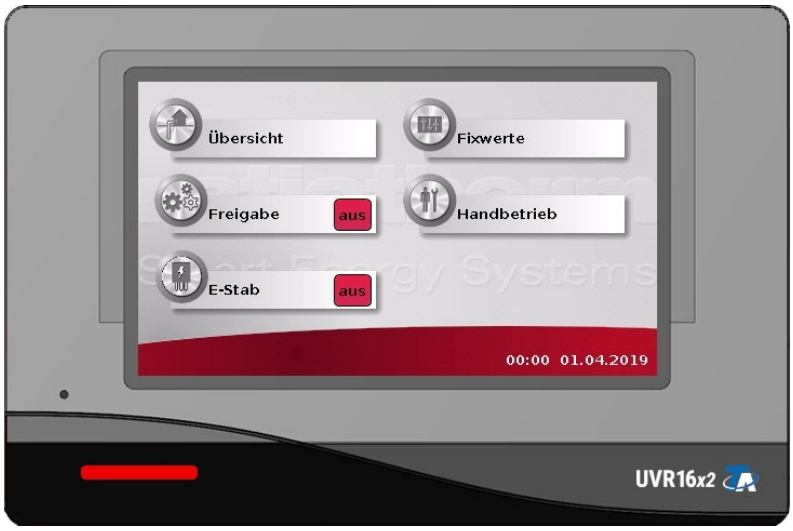
The devices are delivered with the DL address 1. This is also the value of each bus device. The DIP switches are labelled: **| 1 | 2 | 4 |**

Example 1:
DL address 3 = device + 2
| 1-OFF | 2-ON | 4-OFF |

Example 2:
DL address 7 = Device + 6
| 1-OFF | 2-ON | 4-ON |

7. OPERATION

7.1 CONTROLLER OPERATION



- The rZR16x2 is operated via a 4.3" touch screen (= touch-sensitive screen).
- For easier handling, a stylus is provided, which is inserted above the controller (under the cover).
- The stylus can be used to tap on control surfaces and scroll through the display view by sliding the scroll bar.
- Selecting one of the windows takes you to the corresponding submenu.

The indicator light can display different statuses:

- Red steady light - The controller is booting up (=start-up routine after switching on, a reset or update) or displaying a message that has not yet been deleted.
- Orange steady light - Hardware initialisation after booting.
- Green steady light - Normal operation of the controller.
- Green flashing light – After hardware initialisation, the controller waits approx. 30 seconds to receive all the information necessary for operation (sensor values, network inputs).

Controls:

Previous page

Main menu

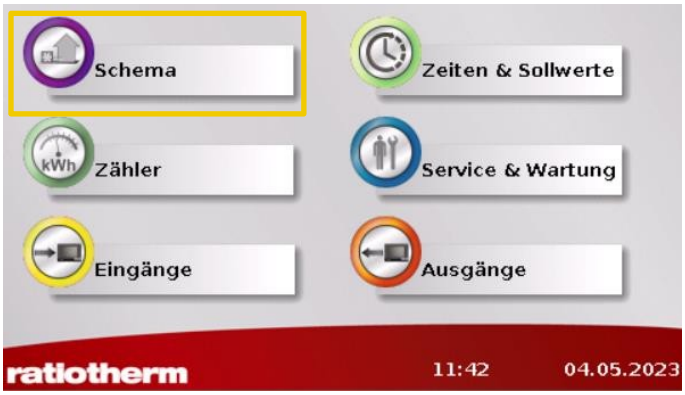
Next page

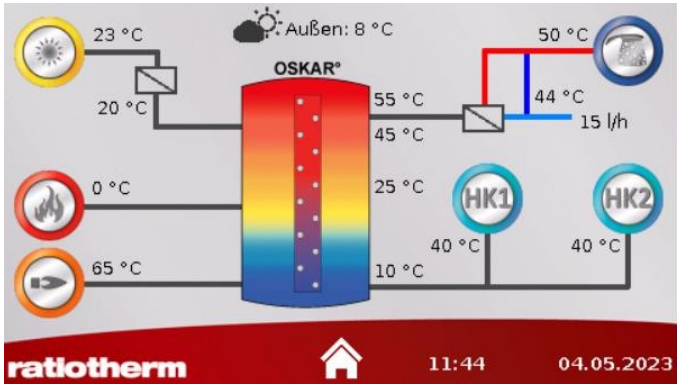
Control switch:

ON/OFF switch

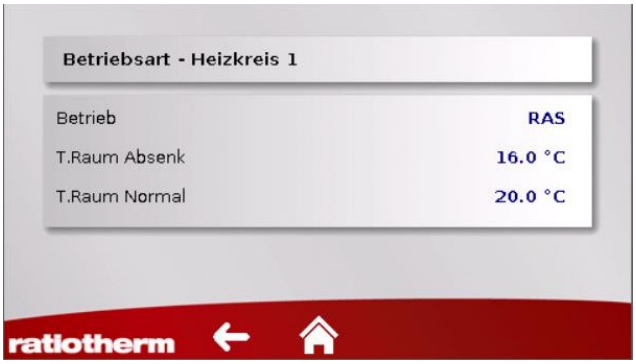
7.1.1 MENU STRUCTURE

Designation	Symbol		Description
Press this area Press			Yellow frame/ green frame
shows the path			yellow arrow/ green arrow
shows the path on the next page on			yellow line/green line






Schema
Zeiten & Sollwerte
Zähler
Service & Wartung
Eingänge
Ausgänge
ratiotherm
11:42
04.05.2023


Betriebsart - Heizkreis 1
Betrieb
RAS
T.Raum Absenk
16.0 °C
T.Raum Normal
20.0 °C
ratiotherm

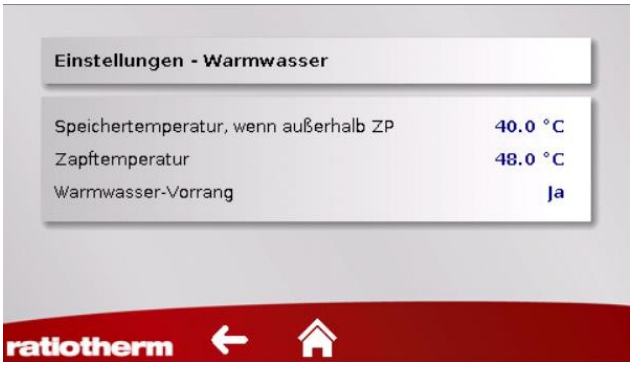

HK
Heizkreise
Zirkulation
Warmwasser
Kalenderfunktion
keine Kühlung
ratiotherm


HK1
Heizkreis 1
HK2
Heizkreis 2
Heizung deaktivieren
Sommer-/Winterbetrieb
Die Heizkreise werden ab-/angeschalten!
ratiotherm


Zeitprog. 1 - Heizkreis 2
Mo
Di
Mi
Do
Fr
Sa
So
00:00 - 24:00
00:00 - 00:00
00:00 - 00:00
Betriebsart
ratiotherm
1 von 3


Zeitprog. 1 - Heizkreis 1
Mo
Di
Mi
Do
Fr
Sa
So
00:00 - 24:00
00:00 - 00:00
00:00 - 00:00
Betriebsart
ratiotherm
1 von 3

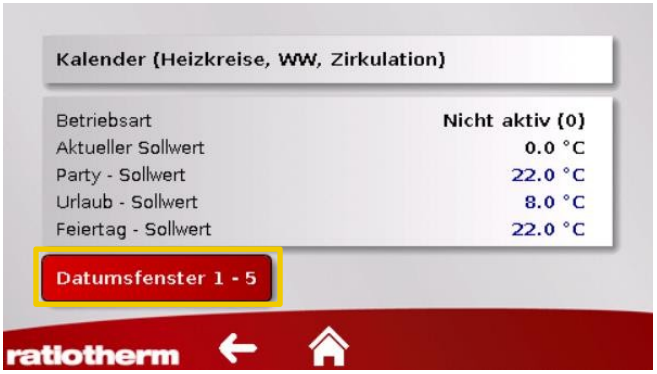

Heizkreise
Zirkulation
Warmwasser
Kalenderfunktion
keine Kühlung
ratiotherm


Einstellungen - Warmwasser
Speichertemperatur, wenn außerhalb ZP 40.0 °C
Zapftemperatur 48.0 °C
Warmwasser-Vorrang Ja
ratiotherm

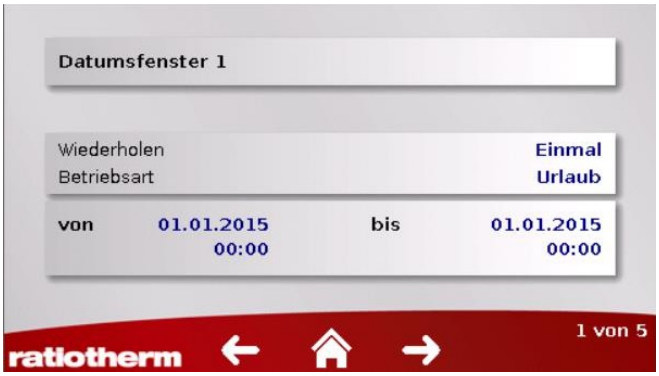

Zeitprogramm 1 - Zirkulation
Mo Di Mi Do Fr Sa So
05:00 - 08:00
00:00 - 00:00
00:00 - 00:00
1 von 3
ratiotherm


Heizkreise
Zirkulation
Warmwasser
Kalenderfunktion
keine Kühlung
ratiotherm


Heizkreise
Zirkulation
Warmwasser
Kalenderfunktion
keine Kühlung
ratiotherm

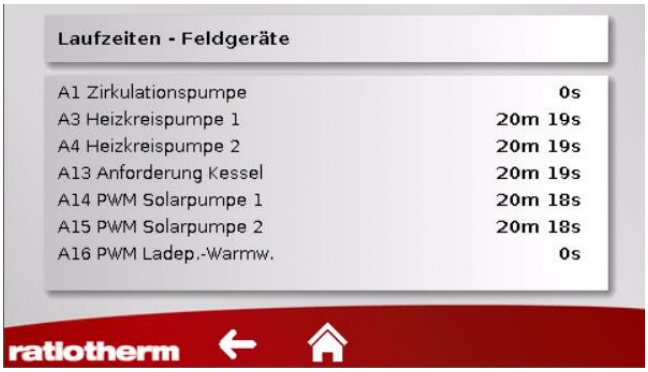

Kalender (Heizkreise, WW, Zirkulation)
Betriebsart Nicht aktiv (0)
Aktueller Sollwert 0.0 °C
Party - Sollwert 22.0 °C
Urlaub - Sollwert 8.0 °C
Feiertag - Sollwert 22.0 °C
Datumsfenster 1 - 5
ratiotherm

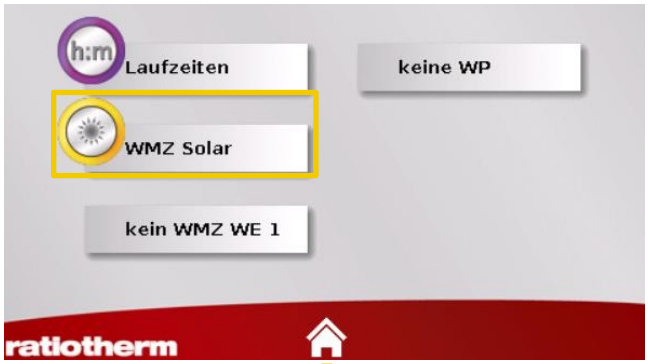

Zeitprogramm 1 - Warmwasser
Einstellungen
Mo Di Mi Do Fr Sa So
Speichertemperatur
06:00 - 09:00 55.0 °C
11:00 - 14:00 55.0 °C
17:00 - 22:00 55.0 °C
1 von 3
ratiotherm


Datumsfenster 1
Wiederholen Einmal
Betriebsart Urlaub
von 01.01.2015 00:00
bis 01.01.2015 00:00
1 von 5
ratiotherm

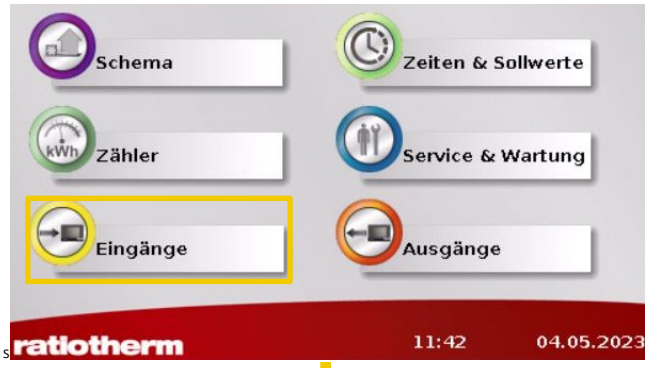

Schema
Zeiten & Sollwerte
Zähler
Service & Wartung
Eingänge
Ausgänge
ratiotherm
11:42
04.05.2023


Laufzeiten
keine WP
WMZ Solar
kein WMZ WE 1
ratiotherm

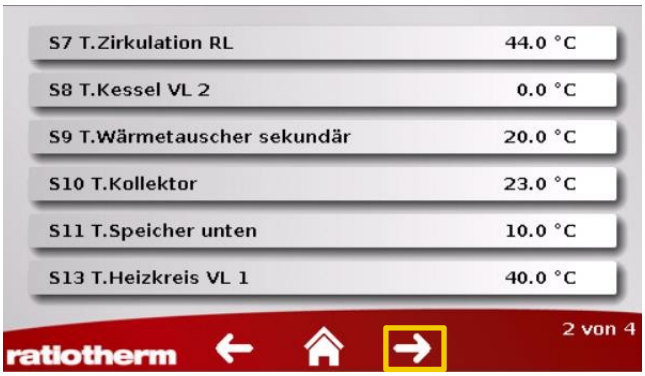

Laufzeiten - Feldgeräte
A1 Zirkulationspumpe 0s
A3 Heizkreispumpe 1 20m 19s
A4 Heizkreispumpe 2 20m 19s
A13 Anforderung Kessel 20m 19s
A14 PWM Solarpumpe 1 20m 18s
A15 PWM Solarpumpe 2 20m 18s
A16 PWM Ladep.-Warmw. 0s
ratiotherm


Laufzeiten
keine WP
WMZ Solar
kein WMZ WE 1
ratiotherm

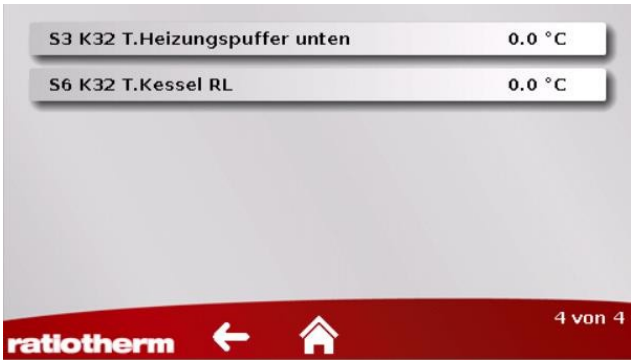

Wärmemengenzähler - Solarthermie
Vorlauftemperatur Ist S10 23.0 °C
Rücklauftemperatur Ist DL 18.0 °C
Durchfluss Ist DL 20.0 °C
Status unkalibriert
Leistung 1.05 kW
Kilowattstunden gesamt 0.3 kWh
Zähler löschen
ratiotherm


Schema
Zeiten & Sollwerte
Zähler
Service & Wartung
Eingänge
Ausgänge
ratiotherm
11:42
04.05.2023

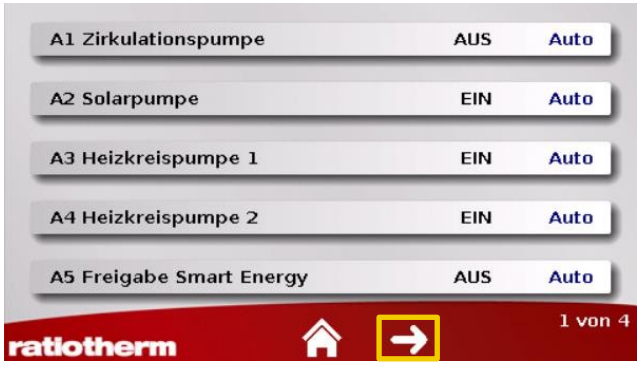

S1 T.Speicher oben 1 55.0 °C
S2 T.Speicher oben 2 45.0 °C
S3 T.Speicher mitte 25.0 °C
S4 T.Außen 8.0 °C
S5 T.Kessel VL 1 65.0 °C
S6 T.Warmwasser 50.0 °C
ratiotherm
1 von 4


S7 T.Zirkulation RL 44.0 °C
S8 T.Kessel VL 2 0.0 °C
S9 T.Wärmetauscher sekundär 20.0 °C
S10 T.Kollektor 23.0 °C
S11 T.Speicher unten 10.0 °C
S13 T.Heizkreis VL 1 40.0 °C
ratiotherm
2 von 4


S14 T.Heizkreis VL 2 40.0 °C
S15 Durchfluss Kaltwasser 15 l/h
DL Ad3/2 T.Solar RL 18.0 °C
DL Ad3/6 Durchfluss Solar 20.0 °C
S1 K32 T.Ref.Speicher 0.0 °C
S2 K32 T.Heizungspuffer oben 0.0 °C
ratiotherm
3 von 4


S3 K32 T.Heizungspuffer unten 0.0 °C
S6 K32 T.Kessel RL 0.0 °C
ratiotherm
4 von 4


Schema
Zeiten & Sollwerte
Zähler
Service & Wartung
Eingänge
Ausgänge
ratiotherm
11:42
04.05.2023


A1 Zirkulationspumpe AUS Auto
A2 Solarpumpe EIN Auto
A3 Heizkreispumpe 1 EIN Auto
A4 Heizkreispumpe 2 EIN Auto
A5 Freigabe Smart Energy AUS Auto
ratiotherm
1 von 4


A6 Ladepumpe-Speicher 2 AUS Auto
A7 Ladepumpe-Speicher 1 EIN Auto
A8/9 Mischer-Heizkreis 1 0.0 % Auto
A10/11 Mischer-Heizkreis 2 56.5 % Auto
A12 Ventil-Warmwasser AUS Auto
ratiotherm
2 von 4

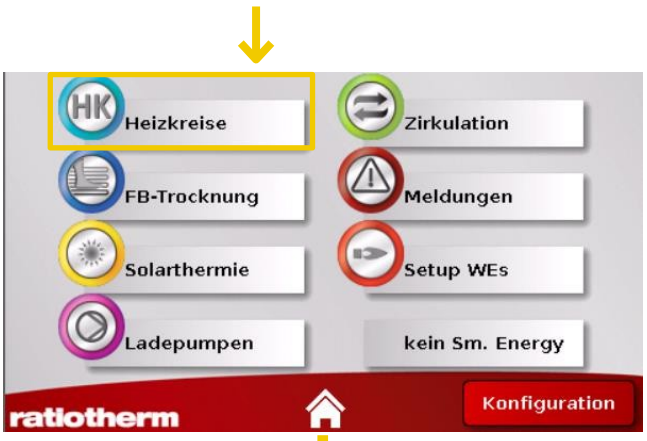

A13 Anforderung Kessel 10.00 V EIN Auto
A14 PWM Solarpumpe 1 35.0 % EIN Auto
A15 PWM Solarpumpe 2 25.0 % EIN Auto
A16 PWM Ladep.-Warmw. 0.0 % AUS Auto
A1 K32 Ladepumpe Puffer AUS Auto
ratiotherm
3 von 4


A2 K32 Ladepumpe-Speicher 3 AUS Auto
A5/6 K32 Mischer-RL-Anhebung 0.0 % Auto
A7 K32 Mischer-RL-Anhebung AUS Auto
ratiotherm
4 von 4

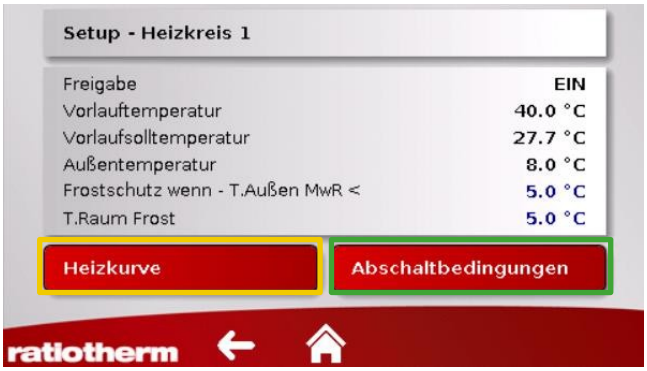

Schema
Zeiten & Sollwerte
Zähler
Service & Wartung
Eingänge
Ausgänge
ratiotherm
11:42
04.05.2023

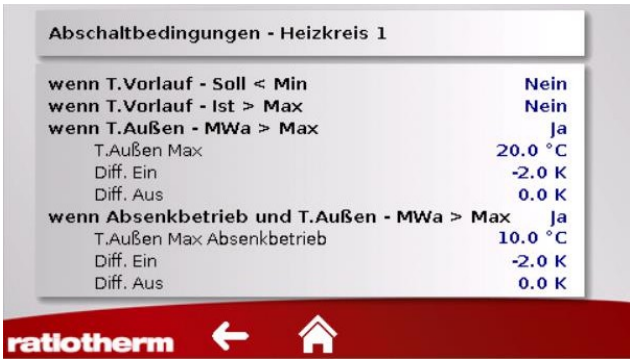

Service & Wartung
Zum Service Menü
Kessel starten
ratiotherm


Passwort eingeben
ratiotherm


HK
Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration

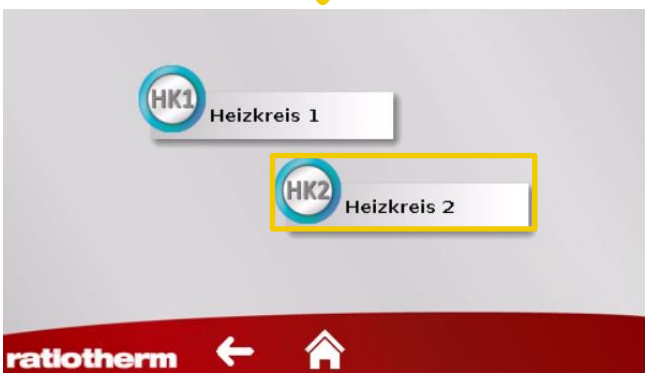

HK1
Heizkreis 1
HK2
Heizkreis 2
ratiotherm

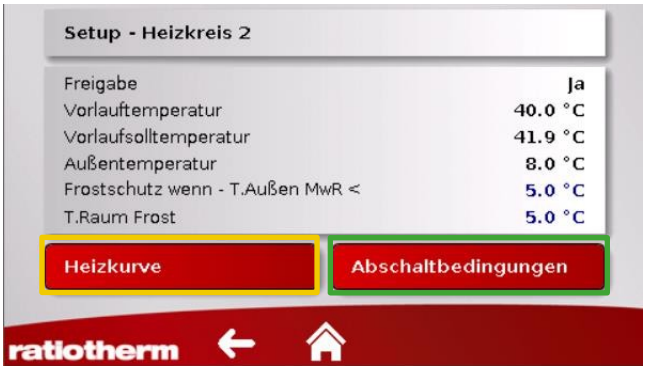

Setup - Heizkreis 1
Freigabe EIN
Vorlauftemperatur 40.0 °C
Vorlaufsolltemperatur 27.7 °C
Außentemperatur 8.0 °C
Frostschutz wenn - T.Außen MwR < 5.0 °C
T.Raum Frost 5.0 °C
Heizkurve
Abschaltbedingungen
ratiotherm

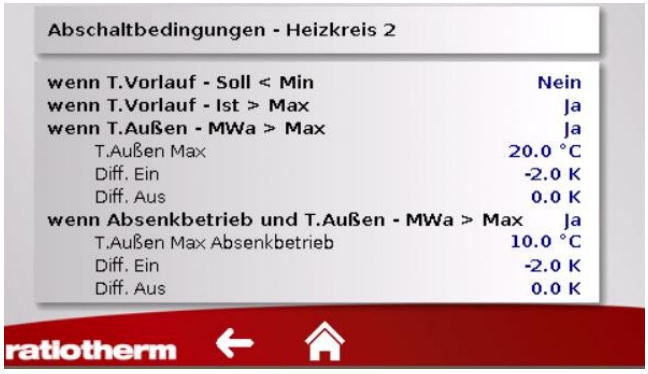

Abschaltbedingungen - Heizkreis 1
wenn T.Vorlauf - Soll < Min Nein
wenn T.Vorlauf - Ist > Max Nein
wenn T.Außen - MWa > Max Ja
T.Außen Max 20.0 °C
Diff. Ein -2.0 K
Diff. Aus 0.0 K
wenn Absenkbetrieb und T.Außen - MWa > Max Ja
T.Außen Max Absenkbetrieb 10.0 °C
Diff. Ein -2.0 K
Diff. Aus 0.0 K
ratiotherm


Heizkurve - Heizkreis 1
Raumeinfluss 0.0 %
Einschaltüberhöhung 0.0 %
T.Vorlauf Max 42.0 °C
T.Vorlauf Min 27.0 °C
Niveau 0.0 K
T.Vorlauf +10°C 27.0 °C
T.Vorlauf -20°C 35.0 °C
ratiotherm


HK
Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration


HK1
Heizkreis 1
HK2
Heizkreis 2
ratiotherm


Setup - Heizkreis 2
Freigabe Ja
Vorlauftemperatur 40.0 °C
Vorlaufsolltemperatur 41.9 °C
Außentemperatur 8.0 °C
Frostschutz wenn - T.Außen MwR < 5.0 °C
T.Raum Frost 5.0 °C
Heizkurve
Abschaltbedingungen
ratiotherm


Abschaltbedingungen - Heizkreis 2
wenn T.Vorlauf - Soll < Min Nein
wenn T.Vorlauf - Ist > Max Ja
wenn T.Außen - MWa > Max Ja
T.Außen Max 20.0 °C
Diff. Ein -2.0 K
Diff. Aus 0.0 K
wenn Absenkbetrieb und T.Außen - MWa > Max Ja
T.Außen Max Absenkbetrieb 10.0 °C
Diff. Ein -2.0 K
Diff. Aus 0.0 K
ratiotherm


Heizkurve - Heizkreis 2
Raumeinfluss 0.0 %
Einschaltüberhöhung 0.0 %
T.Vorlauf Max 65.0 °C
T.Vorlauf Min 40.0 °C
Niveau 0.0 K
T.Vorlauf +10°C 40.0 °C
T.Vorlauf -20°C 60.0 °C
ratiotherm

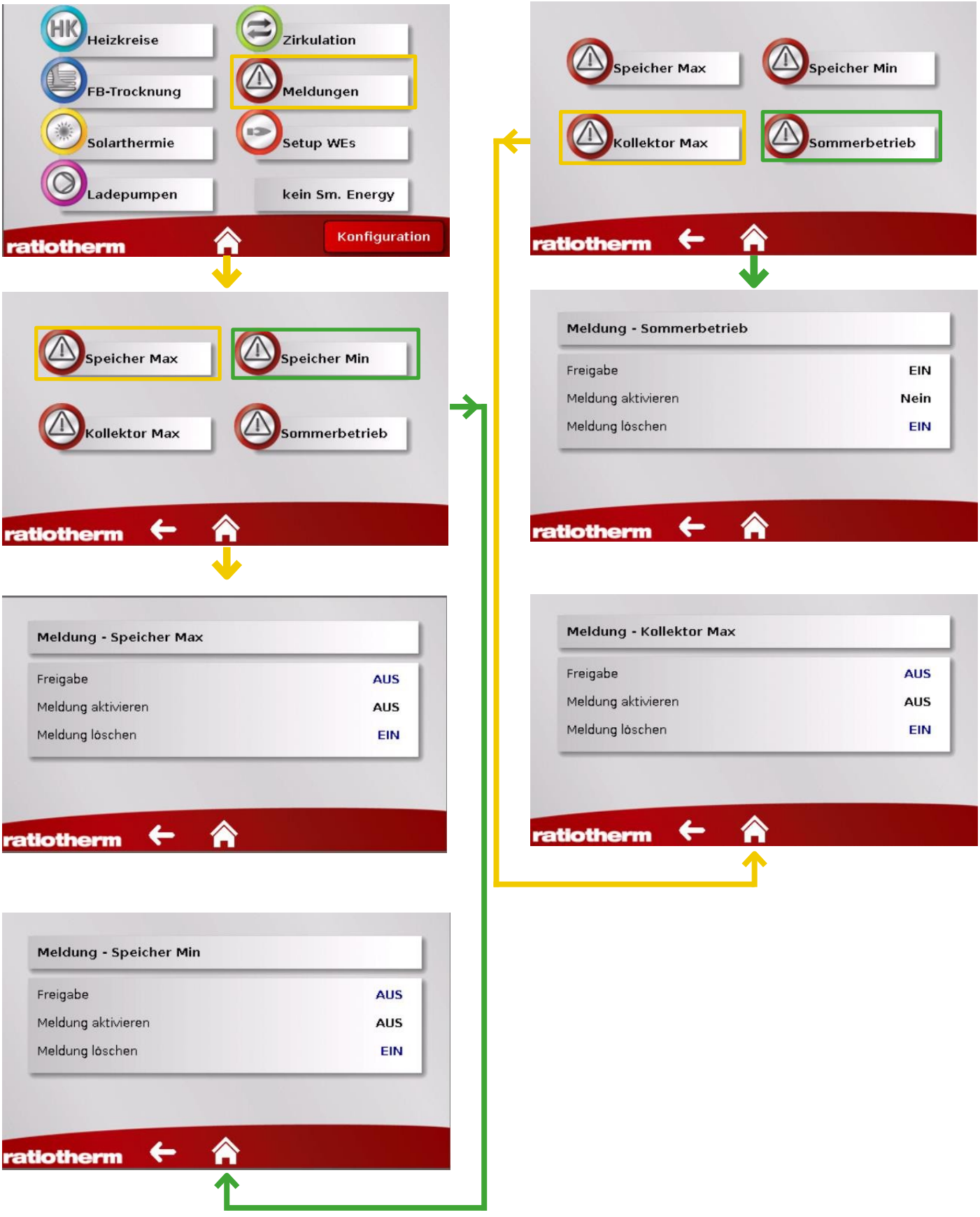

Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration

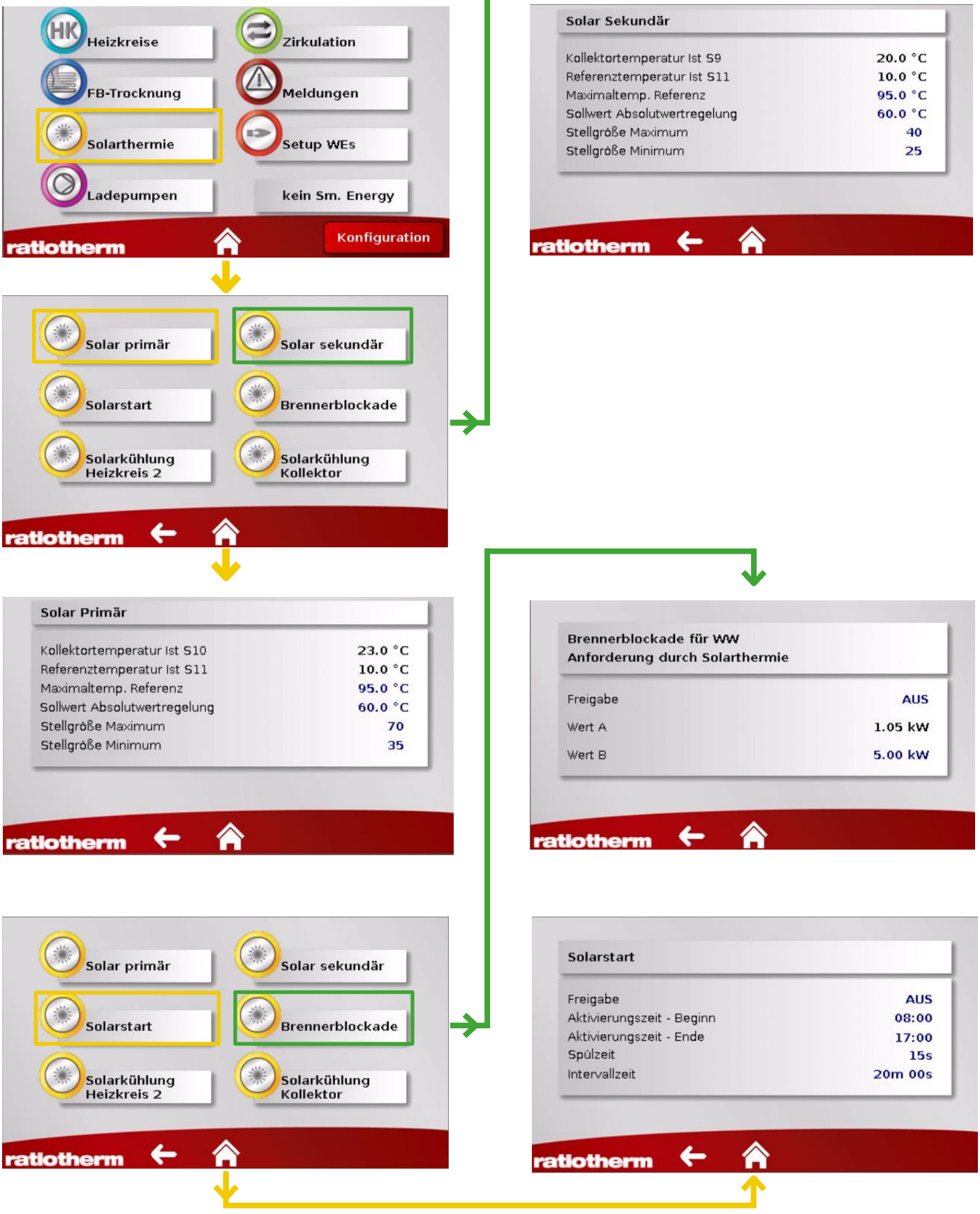

Einstellungen - Zirkulation
Betriebsart Zeit/Puls
Solltemperatur Zirkulation 42.0 °C
Rücklauftemperatur Ist S7 44.0 °C
EIN, wenn Diff. zu Solltemperatur -5.0 K
AUS, wenn Diff. zu Solltemperatur 0.0 K
Laufzeit (Pulsbetrieb) 05m 00s
Pausenzeit (Pulsbetrieb) 15m 00s
ratiotherm


Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration

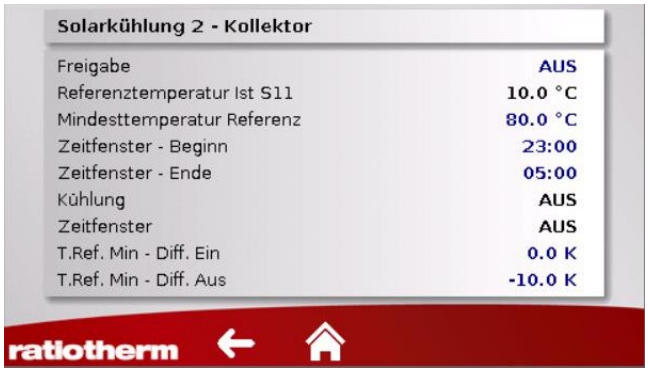

FB - Trocknung - Heizkreis 1
Profil starten
Taktzeit der Stufen: 24h 00m 00s
Aktuelle Stufe: 0
Stufe 01 25.0 °C
Stufe 02 30.0 °C
Stufe 03 35.0 °C
Stufe 04 40.0 °C
Stufe 05 45.0 °C
Stufe 06 50.0 °C
Stufe 07 50.0 °C
Stufe 08 50.0 °C
Stufe 09 50.0 °C
Stufe 10 45.0 °C
Stufe 11 40.0 °C
Stufe 12 35.0 °C
Stufe 13 30.0 °C
Stufe 14 25.0 °C
ratiotherm
1 von 2

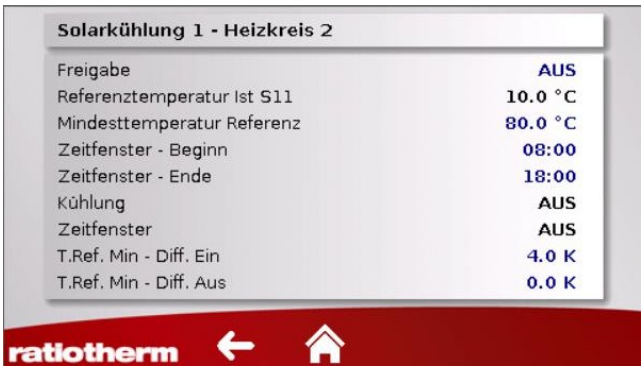

FB - Trocknung - Heizkreis 1
Taktzeit der Stufen: 24h 00m 00s
Aktuelle Stufe: 0
Stufe 15 0.0 °C
Stufe 16 0.0 °C
Stufe 17 0.0 °C
Stufe 18 0.0 °C
Stufe 19 0.0 °C
Stufe 20 0.0 °C
Stufe 21 0.0 °C
Stufe 22 0.0 °C
Stufe 23 0.0 °C
Stufe 24 0.0 °C
Stufe 25 0.0 °C
Stufe 26 0.0 °C
Stufe 27 0.0 °C
Stufe 28 0.0 °C
ratiotherm
2 von 2


Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
Konfiguration
ratiotherm
Speicher Max
Speicher Min
Kollektor Max
Sommerbetrieb
Meldung - Speicher Max
Freigabe AUS
Meldung aktivieren AUS
Meldung löschen EIN
Meldung - Speicher Min
Freigabe AUS
Meldung aktivieren AUS
Meldung löschen EIN
Meldung - Sommerbetrieb
Freigabe EIN
Meldung aktivieren Nein
Meldung löschen EIN
Meldung - Kollektor Max
Freigabe AUS
Meldung aktivieren AUS
Meldung löschen EIN


Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
Konfiguration
ratiotherm
Solar Sekundär
Kollektortemperatur Ist S9 20.0 °C
Referenztemperatur Ist S11 10.0 °C
Maximaltemp. Referenz 95.0 °C
Sollwert Absolutwertregelung 60.0 °C
Stellgröße Maximum 40
Stellgröße Minimum 25
Solar primär
Solar sekundär
Solarstart
Brennerblockade
Solarkühlung Heizkreis 2
Solarkühlung Kollektor
Solar Primär
Kollektortemperatur Ist S10 23.0 °C
Referenztemperatur Ist S11 10.0 °C
Maximaltemp. Referenz 95.0 °C
Sollwert Absolutwertregelung 60.0 °C
Stellgröße Maximum 70
Stellgröße Minimum 35
Brennerblockade für WW
Anforderung durch Solarthermie
Freigabe AUS
Wert A 1.05 kW
Wert B 5.00 kW
Solarstart
Freigabe AUS
Aktivierungszeit - Beginn 08:00
Aktivierungszeit - Ende 17:00
Spülzeit 15s
Intervallzeit 20m 00s

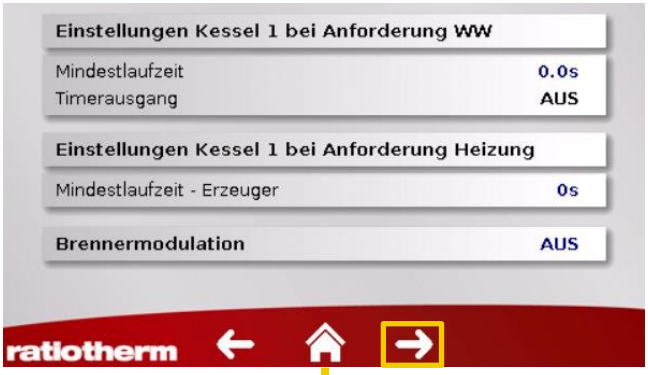

Solar primär
Solar sekundär
Solarstart
Brennerblockade
Solarkühlung Heizkreis 2
Solarkühlung Kollektor
ratiotherm


Solarkühlung 2 - Kollektor
Freigabe AUS
Referenztemperatur Ist S11 10.0 °C
Mindesttemperatur Referenz 80.0 °C
Zeitfenster - Beginn 23:00
Zeitfenster - Ende 05:00
Kühlung AUS
Zeitfenster AUS
T.Ref. Min - Diff. Ein 0.0 K
T.Ref. Min - Diff. Aus -10.0 K
ratiotherm


Solarkühlung 1 - Heizkreis 2
Freigabe AUS
Referenztemperatur Ist S11 10.0 °C
Mindesttemperatur Referenz 80.0 °C
Zeitfenster - Beginn 08:00
Zeitfenster - Ende 18:00
Kühlung AUS
Zeitfenster AUS
T.Ref. Min - Diff. Ein 4.0 K
T.Ref. Min - Diff. Aus 0.0 K
ratiotherm


Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration


Holzofen brennt - Blockade für Kessel 1
Freigabe AUS
Timerausgang AUS
Blockadezeit 10m 00.0s
ratiotherm


Einstellungen Kessel 1 bei Anforderung WW
Mindestlaufzeit 0.0s
Timerausgang AUS
Einstellungen Kessel 1 bei Anforderung Heizung
Mindestlaufzeit - Erzeuger 0s
Brennermodulation AUS
ratiotherm


Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration

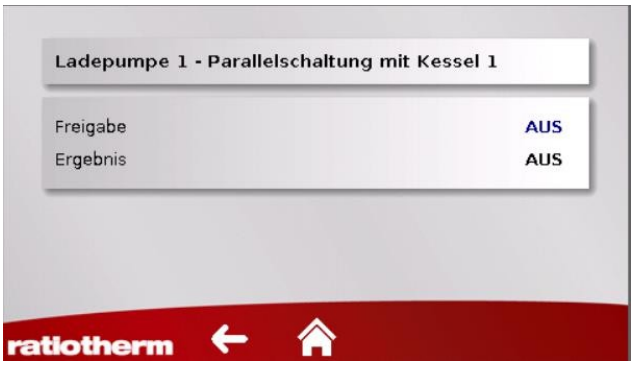

Ladepumpe A6 - Kessel 2
Freigabe Ja
Zubringertemperatur Ist S8 0.0 °C
Referenztemperatur Ist S11 10.0 °C
Mindesttemp. Zubringer 55.0 °C
Maximaltemp. Referenz 90.0 °C
Differenz Zub. - Ref. - Diff. Ein 6.0 K
Differenz Zub. - Ref. - Diff. Aus 3.0 K
Ladepumpe A6 AUS
ratiotherm


Ladepumpe Kessel 1
Ladepumpe Kessel 2
kein Auslagerung
kein Auslagerung
ratiotherm

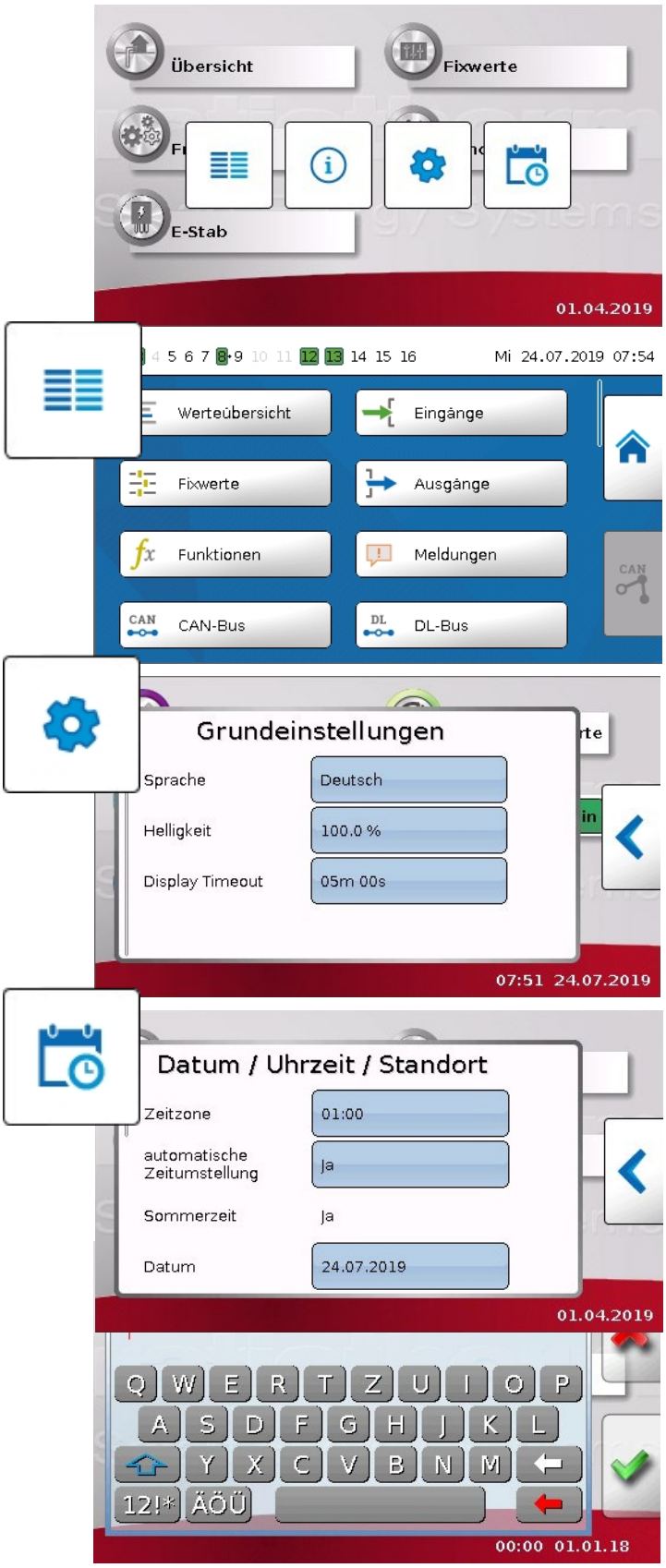

Heizkreise
Zirkulation
FB-Trocknung
Meldungen
Solarthermie
Setup WEs
Ladepumpen
kein Sm. Energy
ratiotherm
Konfiguration


Ladepumpe A7 - Kessel 1
Parallelschaltung
Freigabe EIN
Zubringertemperatur Ist S5 65.0 °C
Referenztemperatur Ist S3 25.0 °C
Mindesttemp. Zubringer 40.0 °C
Maximaltemp. Referenz 90.0 °C
Differenz Zub. - Ref. - Diff. Ein 6.0 K
Differenz Zub. - Ref. - Diff. Aus 3.0 K
Ladepumpe A7 EIN
ratiotherm


Konfiguration der Anlage
2.Heizkreis vorhanden: Ja
Solarthermie vorhanden: Ja
Holzofen vorhanden: Ja
Auslagerung vorhanden: Nein
Smart Energy vorhanden: Nein
WP-Speicher vorhanden: Nein
rt-Wärmep. vorhanden: Nein
rt-Wärmep. Typ: 0
Kühlung vorhanden: Nein
ratiotherm


Ladepumpe 1 - Parallelschaltung mit Kessel 1
Freigabe AUS
Ergebnis AUS
ratiotherm

7.1.2 MENU DESCRIPTION



Intermediate menu

Press and hold the display for 5 seconds to access the intermediate menu, which allows you to configure basic settings or switch to the controller menu.

Controller menu

Link to the controller menu

Basic settings

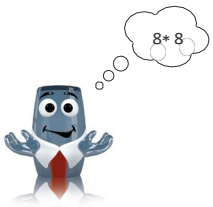
You can set the language, brightness and display timeout.

Date/time/location

Set the time zone and date

Enter password

Enter the specialist password to access the specialist menu



8. HYDR. ADJUSTMENT SOLAR COMPACT STATION

There are two pumps in the solar compact station: the primary pump and the secondary pump. Both pumps must be set separately, but the procedure is the same. They only differ in the flow rates to be set and the resulting minimum and maximum speed settings of the PWM control.

NOTE

Before adjusting the pumps, the solar system must already be filled with heat transfer fluid in the primary circuit and with water in the secondary circuit. Furthermore, the system must be vented and have the necessary operating pressure. The following steps must not be carried out in full sunlight. Otherwise, there is a risk of stagnation and overheating of the system.

Procedure:

- Determine the gross collector area.
- Read the maximum flow rate from the table below. If the gross area lies between two columns, the value must be interpolated.
- Remove the front insulation from both pumps.
- The flow rate adjustment valves of the throttle devices in the solar primary circuit (collector circuit) and around the solar secondary circuit (storage circuit) must be fully open (factory setting).
- Next, in the "Outputs" controller menu, set the outputs for the 230 volt power supply of the two solar pumps to "Manual ON" (default setting: A2) and set the manual toggle switch on the left-hand side to "Automatic". In addition, in the "Outputs" controller menu, set the outputs of the PWM control (default setting: A14 and A15) to "Manual OFF" and the manual toggle switches on the right-hand side to "Automatic".

Output A2	->	Manual ON
Toggle switch A2	->	Automatic
Output A14	->	Manual OFF
Toggle switch A14	->	Automatic
Output A15	->	Manual OFF
Toggle switches A15	->	Automatic

- The LEDs on the solar pumps start flashing.

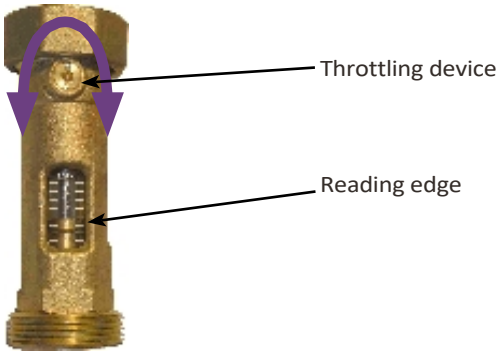
From here on, each pump is set separately, but the procedure remains the same!

- In the "Outputs" controller menu, set the 0 - 10 V output for PWM control to "Manual" (default setting: A14 primary pump, A15 secondary pump). A button opens where any control setting (0 - 100%) can be selected.

  0 = Pump off
  < 10% = minimum flow rate
  100% = maximum flow rate

- Start controlling the pump at 10% and gradually increase until the mass flow at the throttle device rises to more than 2 l/min. This value is considered the critical lower limit and is therefore the minimum control value. Continue to increase the control until the volume flow to be achieved according to the table can be read at the throttle device. This value is considered the maximum upper limit and is therefore the maximum control.
- The critical lower limit and maximum upper limit are now parameterised on the controller. To do this, select the service menu in the function overview, enter the specialist code and confirm. Then select the respective pump under the "Solar pumps" tile and enter and confirm the minimum and maximum PWM control in percent.

8.1 SETTINGS TABLE FOR THE SOLAR COMPACT STATION



Low-flow system [m²]	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5
V primary [l/min]	4.4	5.2	6.3	7.3	8.3	9.4	10.4	11.5	12.5	13.5
V secondary [l/min]	3.8	4.4	5.3	6.2	7.1	8.0	8.9	9.7	10.6	11.5
~max. power range [kW]	8.0	10.0	12.0	14.0	16.0	18	20	22.0	24.0	26.0

Low-flow system [m²]	35	37.5	40	42.5	45	47.5	50	52.5	55	57.5
V primary [l/min]	14.6	15.6	16.7	17.7	18.8	19.5	20.8	21.9	22.9	24.0
V secondary [l/min]	12.4	13.3	14.2	15.1	15.9	16.8	17.7	18.6	19.5	20.4
~max. power range [kW]	28.0	30	32	34.0	36.0	38.0	40.0	42.0	44.0	46.0

Low-flow system [m²]	60	62.5	65	67.5	70	72.5	75	77.5
V primary [l/min]	25.0	26	27.1	28.1	29.2	30.2	31.3	32.3
V secondary [l/min]	21.3	22.1	23	23.9	24.8	25.7	26.6	27.4
~max. power range [kW]	48.0	50	52	54.0	56.0	58.0	60.0	62.0

Example: Design for maximum power transfer at 80 W/m² Collector output Primary

circuit: Ethylene glycol 40%, inlet temperature 90 °C

Secondary circuit: Heating water, inlet temperature 30 °C

Recommendation: Adjustment or readjustment for heating support in the transition period

9. C.M.I.

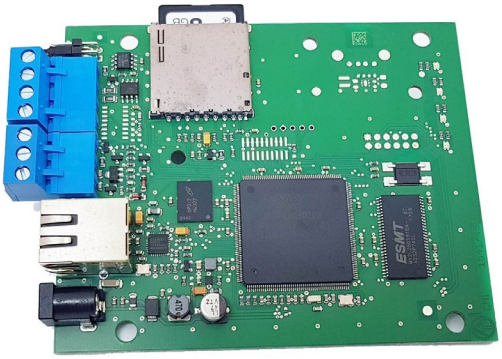
9.1 INSTALLATION

The C.M.I. is an interface for convenient system monitoring, remote control, data logging and visualisation of all controllers and devices with DL bus or CAN bus.

Interfaces: CAN bus, DL bus, Ethernet, SD card

Options:

- Remote maintenance of CAN bus devices
- Function data management for CAN bus devices
- Operating system management for CAN bus devices
- System visualisation via PC, smartphone or tablet
- Modification of CAN bus device parameters
- Data logging via CAN bus or DL bus
- Email notifications (e.g. in the event of malfunctions)
- Top-hat rail or wall mounting possible
- Plug & play solutions via server
- Slot for GSM module, MDC-GSM
- Connection option to Modbus TCP



C.M.I. circuit board module

Scope of delivery:

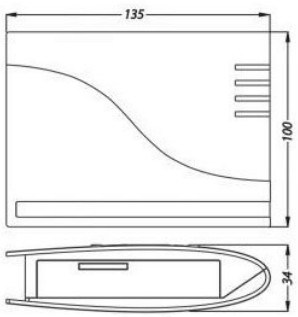
- C.M.I. circuit board module with pluggable connections
- SD card
- Silver sticker with serial number and key

Installation:

Plug the C.M.I. into the designated circuit board socket and establish the following connections:

1. Connection to the CAN bus
2. Connect the LAN cable to the router (e.g. Fritz box) or WNA router
3. Power supply via the controller circuit board

As an alternative to the circuit board version, the C.M.I. is also available in a plastic housing.



Abmessungen [mm]

9.2 REGISTRATION IN THE WEB PORTAL

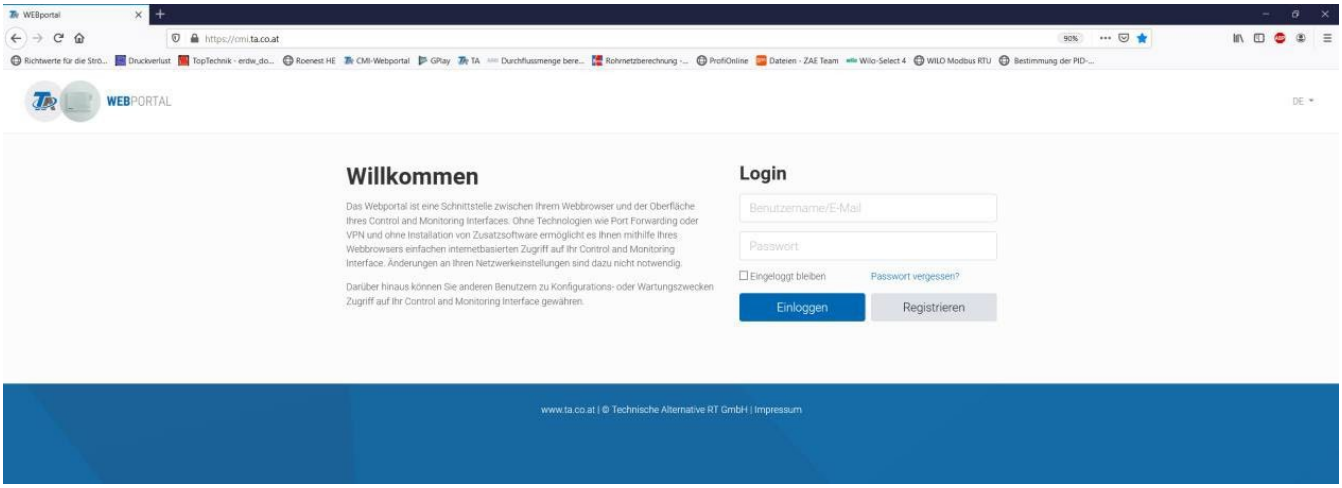
The following step-by-step guide explains how to register a C.M.I. module on the Technical Alternative web portal for your own use. The account you create will then have full access rights for remote maintenance of the system. This allows user A, for example, to operate their own system via remote access and make adjustments.

Prerequisite:
The corresponding C.M.I. has not yet been registered in the web portal. The corresponding C.M.I. must have Internet access via a LAN cable.
An IP address is required for access. In a network with a DHCP server (standard), network settings are determined automatically. In a network without a DHCP server, a direct connection to the Windows PC must be established. DHCP must be activated on the PC. This allows the PC and the C.M.I. to automatically obtain an IP address. This process may take longer than 1 minute.

The web portal is an interface between a web browser and the surface of a control and monitoring interface. Without technology such as port forwarding or VPN and without installing additional software, it allows you to easily access the control and monitoring interface via the internet using your web browser. No changes to your network settings are necessary. In addition, you can grant other users access to your interface for configuration or maintenance purposes.

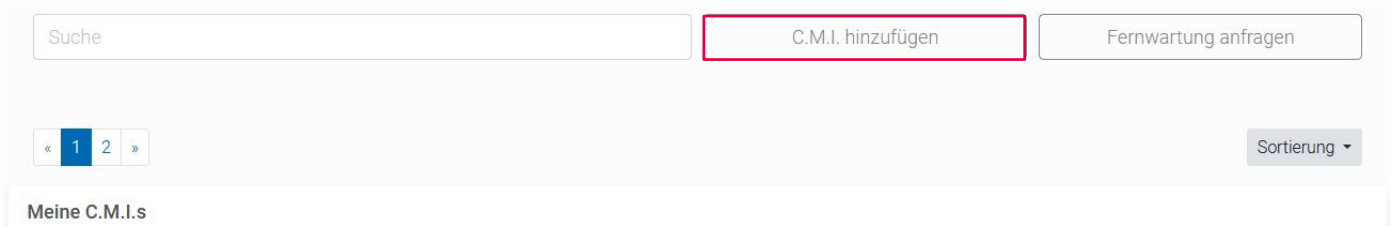
Step 1: Accessing the TA web portal
Open the page https://cmi.ta.co.at/ in your Internet browser.

Step 2: Register and log in to the web portal
If you have not already done so, please register on the web portal. To do this, click on "Register" and follow the instructions and input masks. Log in with the user ID that you want to use to register the corresponding C.M.I.



Step 3: Registering the C.M.I.

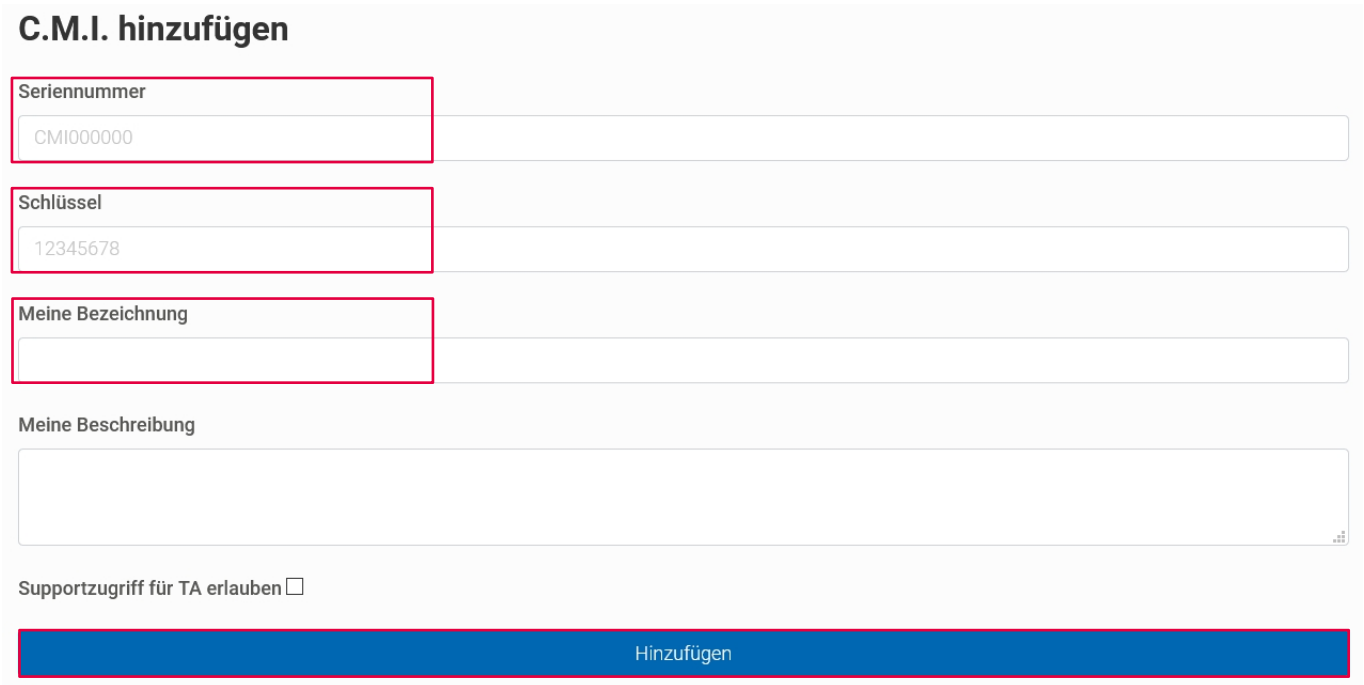
To register a new C.M.I., click on the "Add C.M.I." button.



Step 4: Enter C.M.I. data

To register the C.M.I., enter the C.M.I. data in the following input form. To do this, enter the C.M.I. serial number (format: CMI123456) under "Serial number", the key (format: 8 digits consisting of numbers and letters) under "Key" and a meaningful name (suggestion: family or company name) for your C.M.I. under "My name". The registration is completed by clicking on "Add". Your C.M.I. should now appear in the overview under "My C.M.I.s".

The C.M.I. data is located on a silver sticker included with the controller/C.M.I. Enter the key without spaces.



Example of C.M.I. sticker:

Mobile control for mobile phones/tablets:

ratiotherm offers a visually adapted app for Android devices for remote control of the controller. For Apple devices, there is the original app from the controller manufacturer Technische Alternative.

Google Play SCAN ME

SCAN ME

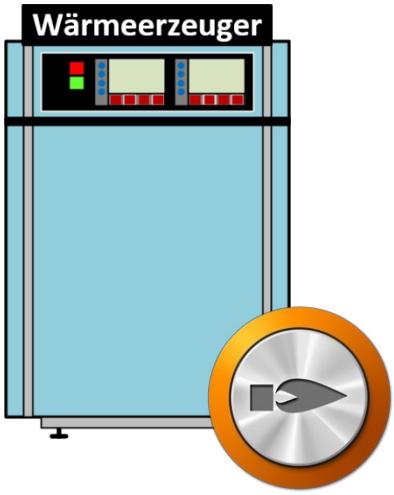
10. TROUBLESHOOTING

10.1 CONTROLLER

Controller display remains dark and shows nothing:

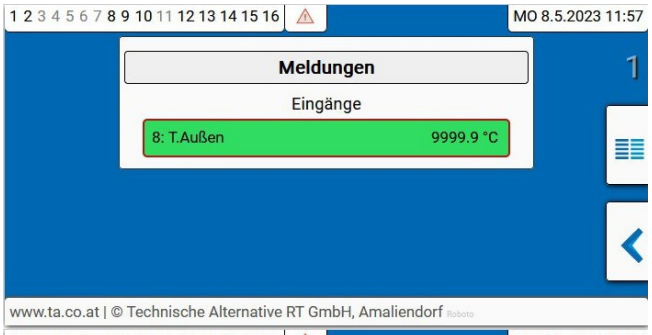
No display on the controller indicates a power failure. Therefore, first check the power supply to the controller and the device fuse (glass tube fuse 20 x 5 mm, 6.3 A quick-acting), which protects the device against short circuits and overcurrent due to ground faults.

The device fuse is located on the rear of the controller behind a screw connection.



Burner does not start despite request

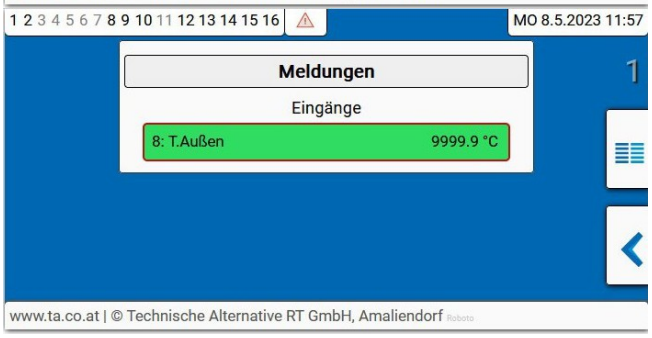
- Check the wiring: are "W" and "S" used correctly?
- Check the potential-free output with an ohmmeter.
- Check output with voltage with a voltage tester.
- Check the connection between the controller and the burner.
- Has the STB safety temperature limiter tripped?
- Is there a burner fault on the customer's side of the heat generator?



Message 9999.9

Sensor has an interruption:

- Check all connection points for interruptions.
- If the display is still present, the sensor is defective. *9999.9 is also displayed if the input is not in use.*



Message -9999.9

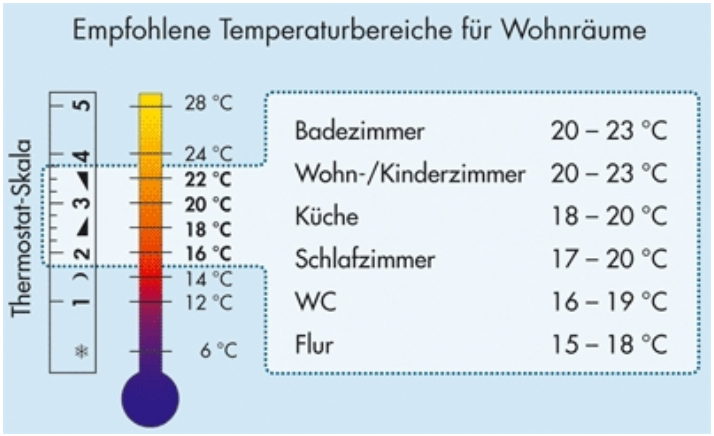
Sensor has a short circuit:

- Check all terminals for contact bridges.
- If the display is still present, the sensor is defective.

Output does not switch on or off despite request:

- The corresponding switch on the controller housing is set to manual operation (hand symbol).
- Green background = permanently switched on.
- No background = permanently switched off.

10.2 HEATING CIRCUITS AND HOT WATER



The room temperature is incorrect:

- Are the date and time set correctly?
- Is there a fault with the burner?
- Are the radiator valves stuck or set too low?
- Is the controller switched off? Check the fuse in the electrical distribution board, the heating emergency switch or the device fuse.
- Are the controller settings correct? Check the room target temperatures, heating curve and sensors.

The hot water temperature is incorrect:

- Are the date and time set correctly?
- Is there a fault with the burner?
- Is the controller switched off? Check the fuse in the electrical distribution board, emergency heating switch or device fuse.
- Are the controller settings correct? Check the room target temperatures, heating curve and sensors.
- Is there air in the storage tank?
- Is the heat exchanger calcified?
- Are there any hydraulic problems on site (mixer tap, non-return valve, pressure reducer, etc.)?

The hot water temperature fluctuates after a short time:

- Check the temperature in the storage tank. The storage tank temperature should be approximately 10 °C higher than the desired outlet temperature.
- Check the immersion depth of the water sensors in the storage tank. Are the immersion depths correct?
- Is there air in the storage tank?
- Check the hot water settings in the controller.
- Check the hot water outlet temperatures using an ultra-fast sensor. If these are OK, the problem is on site.
- Set the pump in the controller to continuous operation at 100% power. If this is OK, check the controller output.
- Next, turn the mixing valve fully open. If this is OK, the heat exchanger may be calcified or the problem may be on site.

The hot water pump runs without any water being drawn:

- Check the flow sensor for operability and correct function.

11. ADDITIONAL DOCUMENTS

11.1 WARRANTY

Unless otherwise agreed in writing, ratiotherm GmbH & Co. KG provides the following warranty for material and manufacturing defects in its products:

Product	Warranty period
Oskar° series storage tank	60 months
Accessories for the Oskar° serial memory	24 months
Compact station and accessories	24 months
Heating circuit assembly and accessories	24 months
Control/regulator units and accessories	24 months

The warranty period begins on the date of installation (invoice date of the installation company), but no later than 6 months after the manufacturer's date (invoice date of ratiotherm). The warranty period is not extended by returning the product for repair or replacement.

The following are excluded from the warranty:

- Damage caused by shipping/transport
- Improper installation/use/operation
- Wear parts such as signal lamps, fuses, etc.

The warranty expressly excludes consequential costs, in particular removal and installation costs, as well as further costs such as claims for damages.

The terms and conditions of the company apply exclusively:

ratiotherm
Smart Energy Systems

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

11.2 SERVICE ACCOMPANYING DOCUMENT

Company:		Street:	
Postcode/town:		Contact	
Customer number:		Telephone:	
Email:			
Device details:			
Item description:	Serial number:	RE or LS number:	Commission:
Return:			
☐ Repair	☐ Replacement	☐ Update	☐ Other
Fault description:			
When does the fault occur?			
☐ Always	☐ Reproducible	☐ Random	☐ During commissioning
Have you discussed the error with one of our technicians?			
☐ No	☐ Yes	Name of technician	
Should a chargeable repair be carried out if the defect is not covered by the warranty? ?			
☐ No	☐ Yes	☐ Yes, but only up to a maximum of	€
Location	Date	Stamp/signature	

11.3 COMMISSIONING REPORT MEMORY & ACCESSORIES

Oskar°: ☐ 08 ☐ 10 ☐ WPS	Shift work: ☐ 1.0 ☐ 1.5 ☐ 5.0	Type:
System filled according to VDI: ☐ YES ☐ NO	Comment:	
Water hardness: Target: 4.0 - 5.0 °dH Actual:	pH value: Target: 7.5 - 9.0 Actual:	Conductivity: Target: 10 - 500 µs/cm Actual:
Hydraulic test: ☐ OK	System tightness: ☐ OK	Tank vented: ☐ OK
Heat generator:		
Heat generator 1: Type: Make: Model: Year of manufacture: Output:	Heat generator 2: Type: Make: Model: Year of manufacture: Output:	Heat generator 3: Type: Make: Model: Year of manufacture: Output:
Drinking water heating:		
Drinking water station: ☐ OK	Circulation test performed: ☐	
Hardness of drinking water: °dH Softening recommended: ☐ YES ☐ NO	Hot water mixing valve set to: °C	Time until return flow becomes warm: min *If the return takes longer than 10 minutes to warm up, the circulation pump is too weak.*
Heating circuits:		
Heating circuit 1: ☐ OK Type: Flow: °C Return: °C	Heating circuit 2: ☐ OK Type: Flow: °C Return: °C	Heating circuit 3: ☐ OK Type: Flow: °C Return: °C
Heating circuit 4: ☐ OK Type: Flow: °C Return: °C	Heating circuit 5: ☐ OK Type: Flow: °C Return: °C	Heating circuit 6: ☐ OK Type: Flow: °C Return: °C
Solar thermal energy:	Orientation: E ☐ SE ☐ S ☐ SW ☐ W ☐	
Flat-plate collectors ☐ Tube collectors: ☐ Total area: m^2 Number:	Primary flow: l/min Secondary flow rate: l/min	Frost protection up to: °C Ventilation: ☐ Manual ☐ Auto Collector inclination: Degrees Connection to roof: Ø mm

11.4 COMMISSIONING REPORT CONTROL

Control system:	
Hydraulic diagram available ☐	Heating curves set ☐
Original operating instructions available ☐	Hot water operation set (storage tank) ☐
Date and time set ☐	Hot water supply set (drinking water station) ☐
Controller outputs checked ☐	Circulation mode set ☐
Controller inputs checked ☐	Backup copy created in controller ☐
Sensor positioning checked ☐	Backup copy by specialist company ☐
Sensor labels attached ☐	Instruction carried out ☐
Heating times set ☐	

Comments:

Date of initial commissioning:

Stamp (specialist company):

Commissioned by:

11.5 EU DECLARATION OF CONFORMITY

The manufacturer bears sole responsibility for issuing this declaration of conformity:

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

Product name:	**Central controller rZR 16x2**
Year of manufacture:	See type plate
Product description:	Freely programmable universal control

The item described above complies with the provisions of the following directives:

- 2014/35/EU Low Voltage Directive
- 2014/30/EU Electromagnetic compatibility
- 2011/65/EU RoHS Restriction of the use of certain hazardous substances
- 2009/125/EC Ecodesign Directive

Applied harmonised standards:

EN 60730-1: 2011	Automatic electrical controls for household and similar use - Part 1: General requirements
EN 61000-6-3: 2007	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission
+ A1: 2011	for residential, commercial and light industrial environments
+ AC2012	
EN 61000-6-2: 2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity
+ AC2005	For industrial areas
EN 50581: 2012	Technical documentation for assessing electrical and electronic equipment with regard to the restriction of hazardous substances

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

This declaration certifies compliance with the aforementioned directives, but does not constitute a guarantee of properties. Any modification to the device that has not been agreed with us will invalidate this declaration. We accept no liability for any unauthorised modifications of this kind.

Dollnstein, _____ Signature of authorised representative: _____ Details of the person authorised to issue this declaration on behalf of the manufacturer or its authorised representative:

Name: _____ Position: _____

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

You can find us here

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Smart Energy Systems

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91795 Dollnstein

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info@ratiotherm.de www.ratiotherm.de