Original operating instructions

PV Max-Heater F12

As of 2025.03

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:

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Smart Energy Systems

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

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Status: 25 April 2023

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 PV Max-Heater. The ratiotherm PV Max-Heater must not be operated without these operating instructions.
The operating instructions must be made available to the operator and the specialist installer for information at all times. If the ratiotherm PV Max-Heater is sold, the instructions must also be supplied. 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 in accordance with DIN EN ISO 7010 and DIN ISO 3864 are used in the relevant sections of 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 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

Symbol	Explanation	Symbol	Explanation
	Follow instructions		General command 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

Device designation: PV heater Type:
PV Max-Heater
Year of manufacture: See type plate
Country of origin: Germany

2.2 INTENDED USE

The PV Max-Heater F12 device is designed to use environmental heat from the ambient air to provide direct heating support and 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 Pv Max-Heater F12 device 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 (domestic water) and for heat or cold generation.

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 PV Max-Heater F12 device is not intended for use by persons (including children) with limited physical, sensory or mental abilities , as well as persons with insufficient experience and/or knowledge. The risk is borne solely by the operator and user.

2.3 ZIELGRUPPEN

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 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 system fo
direct heating support and hot water preparation. The person must ha
knowledge of the necessary protective devices and protective measure
Qualification of operators and users:

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

Specialist personnel

A person from a qualified specialist company for heating and hot wate
special knowledge and experience through professional training. The p
to assess the work assigned to them (e.g. instruction of personnel, swit
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 is defined for all operating modes as:

- 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.
- Operating 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 capabilities.

⚠ 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, 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, residual risks may still exist. 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 device, switch off the device and shut off the connection to the rest of the heating system. The leaks must then be repaired immediately.
- To prevent corrosion on the device, do not use the following products: 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 disabled. 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 for 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 60 °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 air heat pump and the water and electricity pipes;
  - To the safety valve;
  - To structural conditions that may affect the operational safety of the device;
  - To 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 DATA

Max-Heater	F12	F12 + 9kW	Unit
Hydraulic			
Flow	300 - 2500	300 - 2500	litres/hour
Max. temperature	85	85	°C
Connections	6/4	6/4"	AG
Capacity in litres	approx. 4	approx. 5	litres
Max. system pressure	3	3	bar
Device data			
Dimensions	1364 x 460 x 198	1564 x 460 x 198	W x H x D (mm)
Empty weight	39	50	kg
Sound pressure level	/	/	/
Electrical			
Mains connection	400V / 3~ / 50 Hz	400V / 3~ / 50 Hz	/
Max. operating current	24	32	A
Fuse protection	B 25	B40	/
Materials	**Material**		
Seal	Rubber and paper seal		
Insulation	Armaflex		
heating element	Stainless steel		

4.2 FUNCTION

The PV Max-Heater F12 device was specially designed for the utilisation of surplus electricity from green electricity systems, e.g. PV systems. The associated measuring device reliably records excess electricity and determines the available energy in real time. This is forwarded to the continuously adjustable device with a capacity of up to 12 kW, which heats the hydraulically integrated heat storage tank for later use in heating and domestic hot water production. The PV Max-Heater F12 varies the speed of the integrated pump depending on the amount of electricity available in order to always produce water at the flow temperature set by the user – comparable to a conventional heating system. This is also the biggest advantage over conventional heating elements, as only heat at the required temperature level is produced.

In this way, the surplus output of the PV system is converted into thermal energy and stored as renewable energy. Intelligent control increases the amount of renewable electricity consumed on site and reduces the costs of conventional generation.

ADVANTAGES of the system

- Direct heating support and hot water production using surplus PV electricity.
- Significantly more effective than a conventional heating element.
- Economical use and storage of natural energy outside the EEG.
- Higher yield with expiring grid feed-in contracts.
- Quick and easy retrofitting.
- Sustainable, climate-friendly and independent.

4.3 DESIGN AND SPARE PARTS

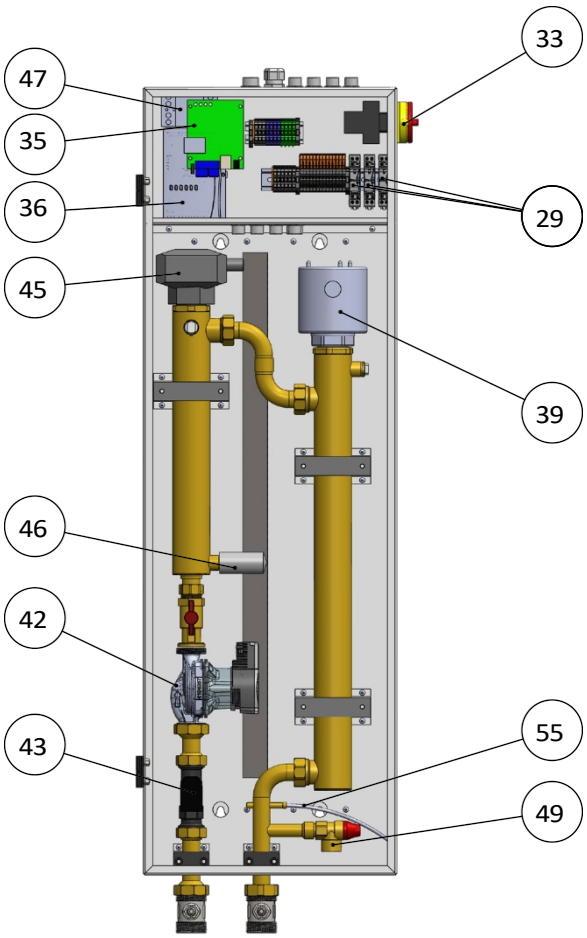
The ratiotherm PV Max-Heater F12 has a complete heat cycle and uses surplus electricity from PV systems as its primary energy source, for example.

The ratiotherm PV Max-Heater is shipped in fully functional condition.

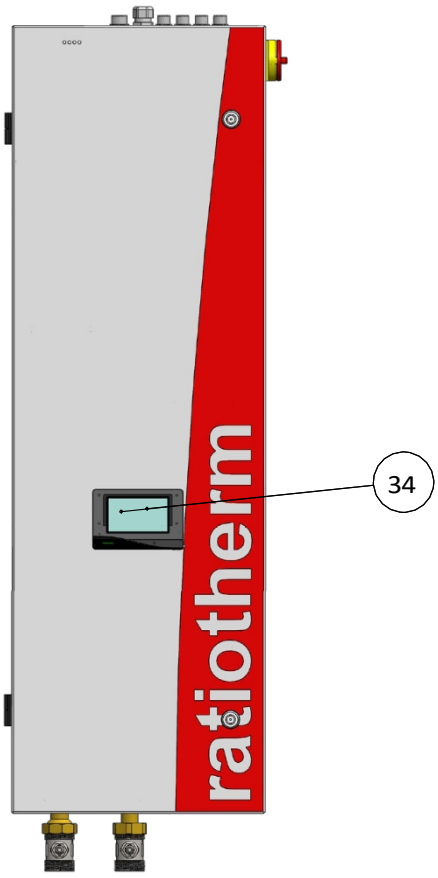
The ratiotherm PV Max-Heater is controlled by the UVR 610k o.D. controller and the CAN-MTx2 from Technische Alternativen.

All parameters and operating states of the PV Max-Heater are shown on the CAN-MTx2 display.

The ratiotherm PV Max-Heater can be operated in combination with most electric, gas or oil boilers.



Item number	Designation	Description	Quantity
29	Relay	ra/12270	3
33	Main switch	ra/14466	1
34	CAN monitor	ra/95.10.3212	1
35	CMI		1
36	Universal controller	ra/14414	1
39	E-rod 9kW	ra/14437	1
42	Pump	ra/13310	1
43	Volume flow sensor	ra/95.85.4525	1
45	E-rod 3kW	ra/14425	1
46	Pressure sensor	ra/11656	1
47	3-phase relay		1
49	Diaphragm Safety valve		1
55	Temperature sensor		1



4.4 CONTROL LOGIC AND CONTROL

Control logic in conjunction with PV-Max-Control (CAN-EZ3)

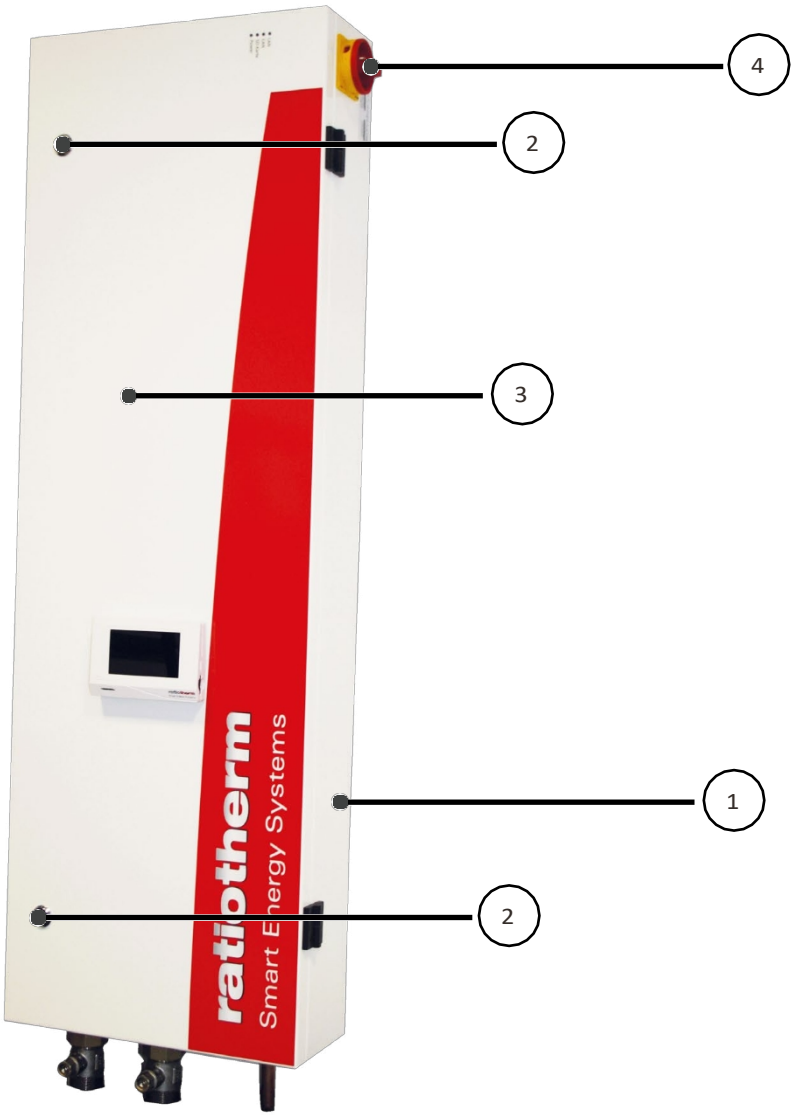
- The PV Max Heater communicates with the PV Max Control via CAN bus
- The PV Max-Heater automatically regulates to a specified surplus level.

Control logic in conjunction with external controllers:

- Requests via external controllers take priority over ratiotherm controllers.
- An enable contact can be switched by an external control or battery storage unit. The external control can be connected either to the Max-Control or to the Smart-Control. If this is not used, a separate storage sensor must be provided.
- If there is no 0-10 V signal, the PV Max-Heater automatically regulates itself to a setpoint output.
- If a 0-10 V signal is present, a fixed value for "temperature control" can be used to determine whether a target output or a target temperature is transferred.

4.5 SAFETY DEVICES

The device is equipped with various safety devices. The safety devices are shown in the following illustration:



1	Protective enclosure or housing	**3**	Protective door
2	Mechanical lock	**4**	Main switch ON/OFF

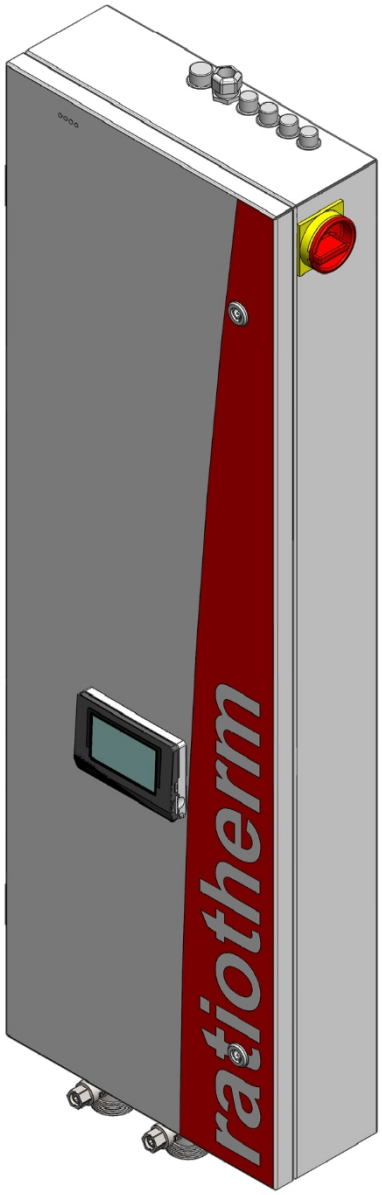
5. TRANSPORT, ASSEMBLY AND INSTALLATION

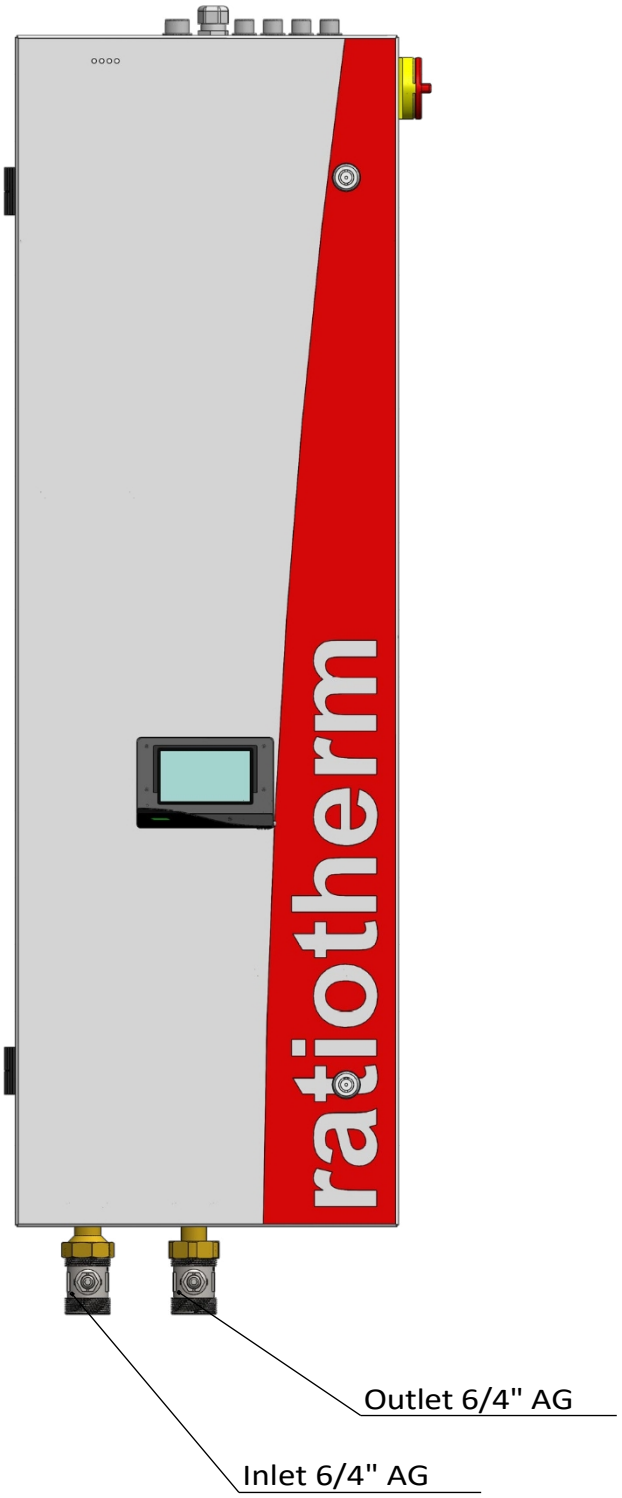
5.1 TRANSPORT AND UNPACKING

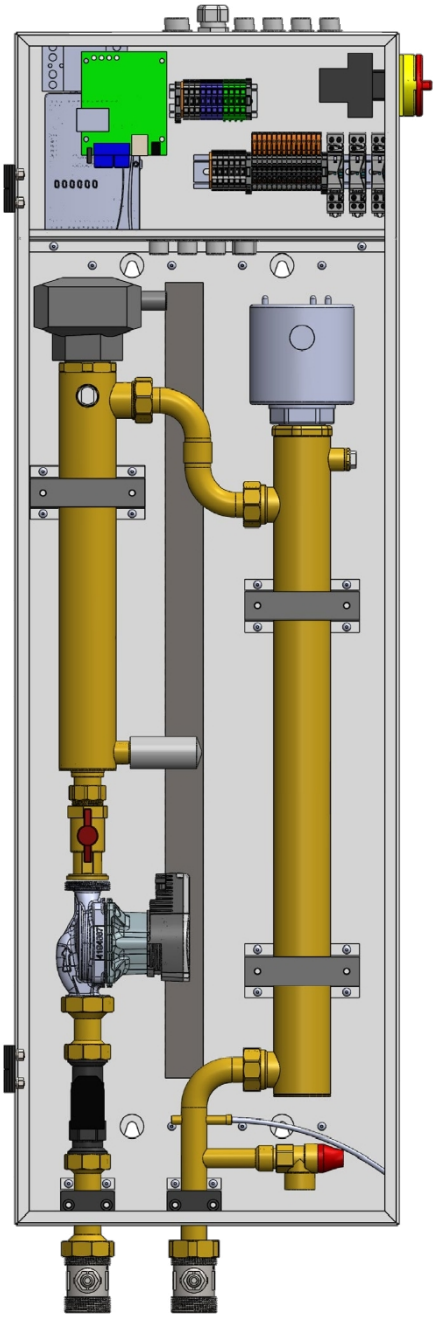
The following instructions for transporting the device must be observed:

- Transport should only be carried out by qualified personnel.
- Protect yourself with PPE (e.g. safety shoes, etc.).
- Take the weight of the device (approx. 39 kg) into account when selecting the appropriate lifting equipment (forklift, pallet truck, etc.).
- Take the centre of gravity of the device into account.
- 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.




ratiotherm
Outlet 6/4" AG
Inlet 6/4" AG



5.2 MECHANICAL INSTALLATION

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

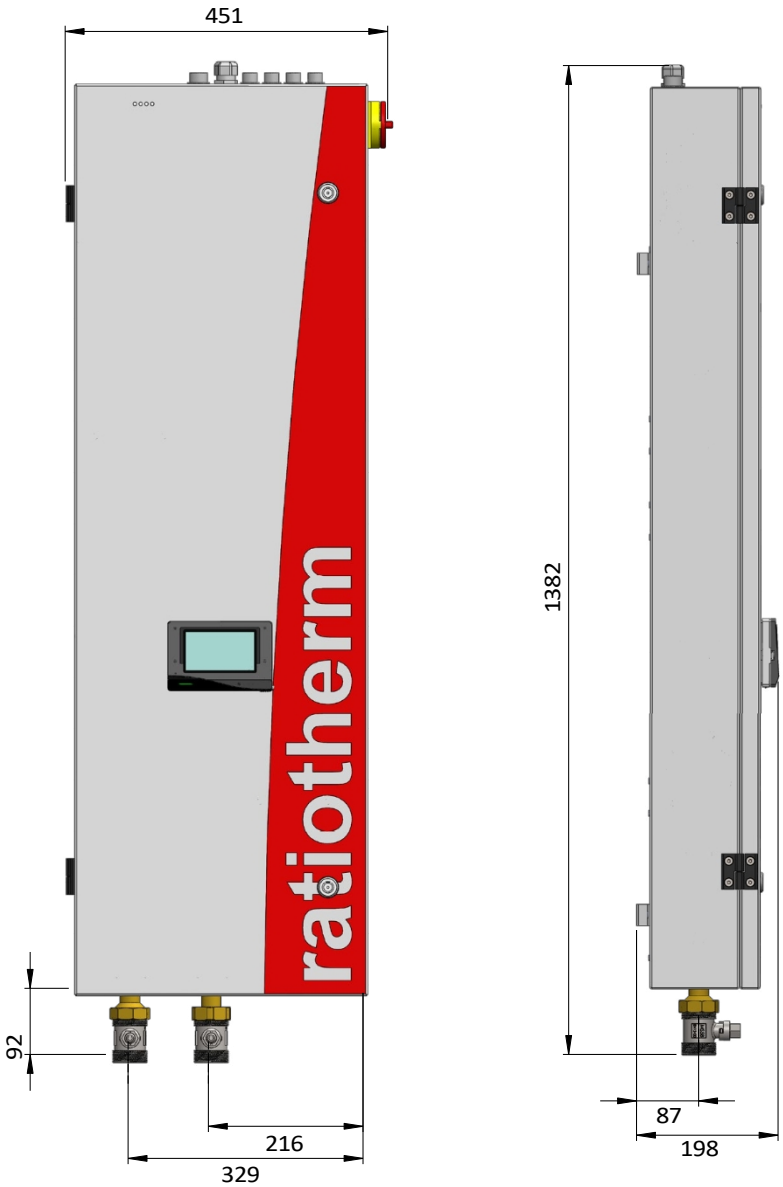
- Illuminate the danger zone for assembly and installation with additional lighting units if necessary.
- Ensure that personnel have the necessary qualifications and receive the necessary training.
- Ensure that personnel have read and understood the operating instructions.
- The operating instructions are available to personnel at all times.
- Local accident prevention and environmental regulations are implemented and complied with.
- The personnel are instructed by the responsible supervisor and unauthorised persons are kept away from the device.
- The device is only handed over and operated in a safe and functional condition.

Storage conditions:

- Ensure frost-free storage.

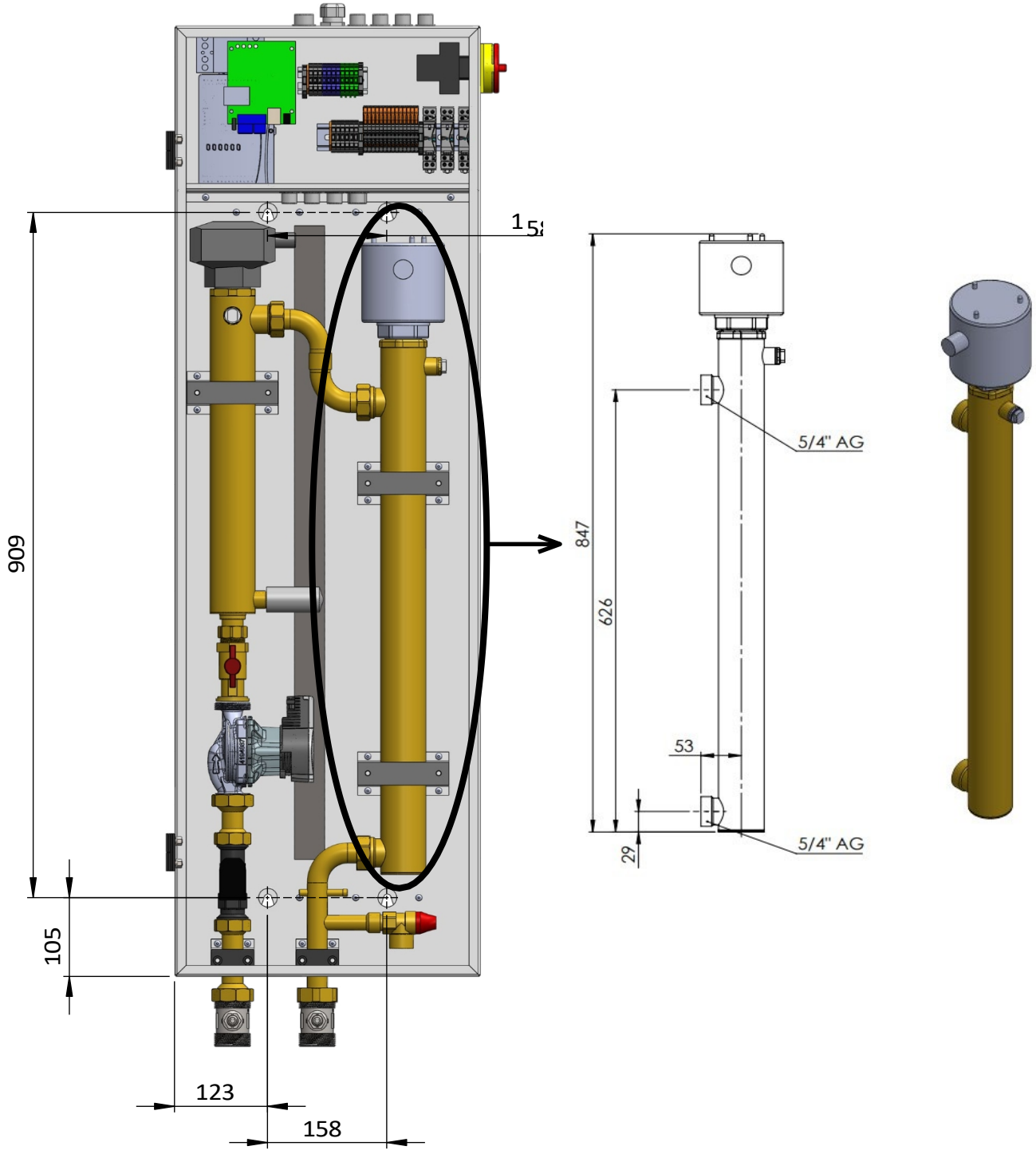
Installation conditions:

- A floor drain must be provided to protect against water damage.
- The PV Max-Heater must be installed in a clean, ventilated and dry location.
- The location must have a constant temperature of 5 °C to 40 °C.

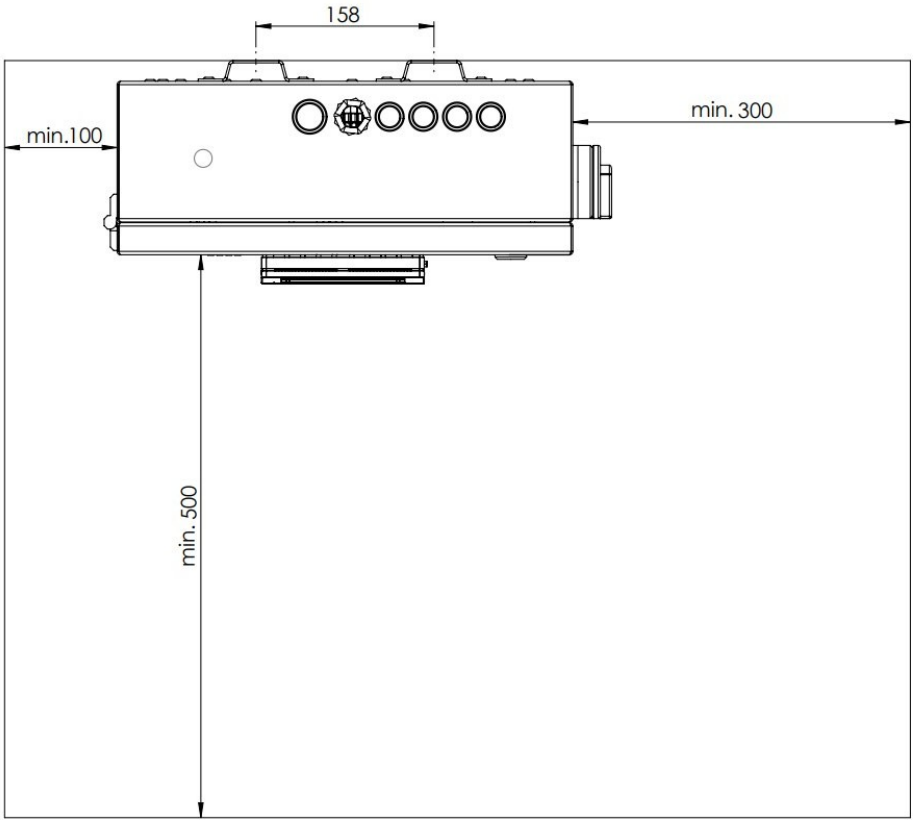


Bore:

- 4 x 10 Ø
- Use suitable dowels and screws.



5.4 MAINTENANCE AREA



5.3 HYDRAULIC INSTALLATION

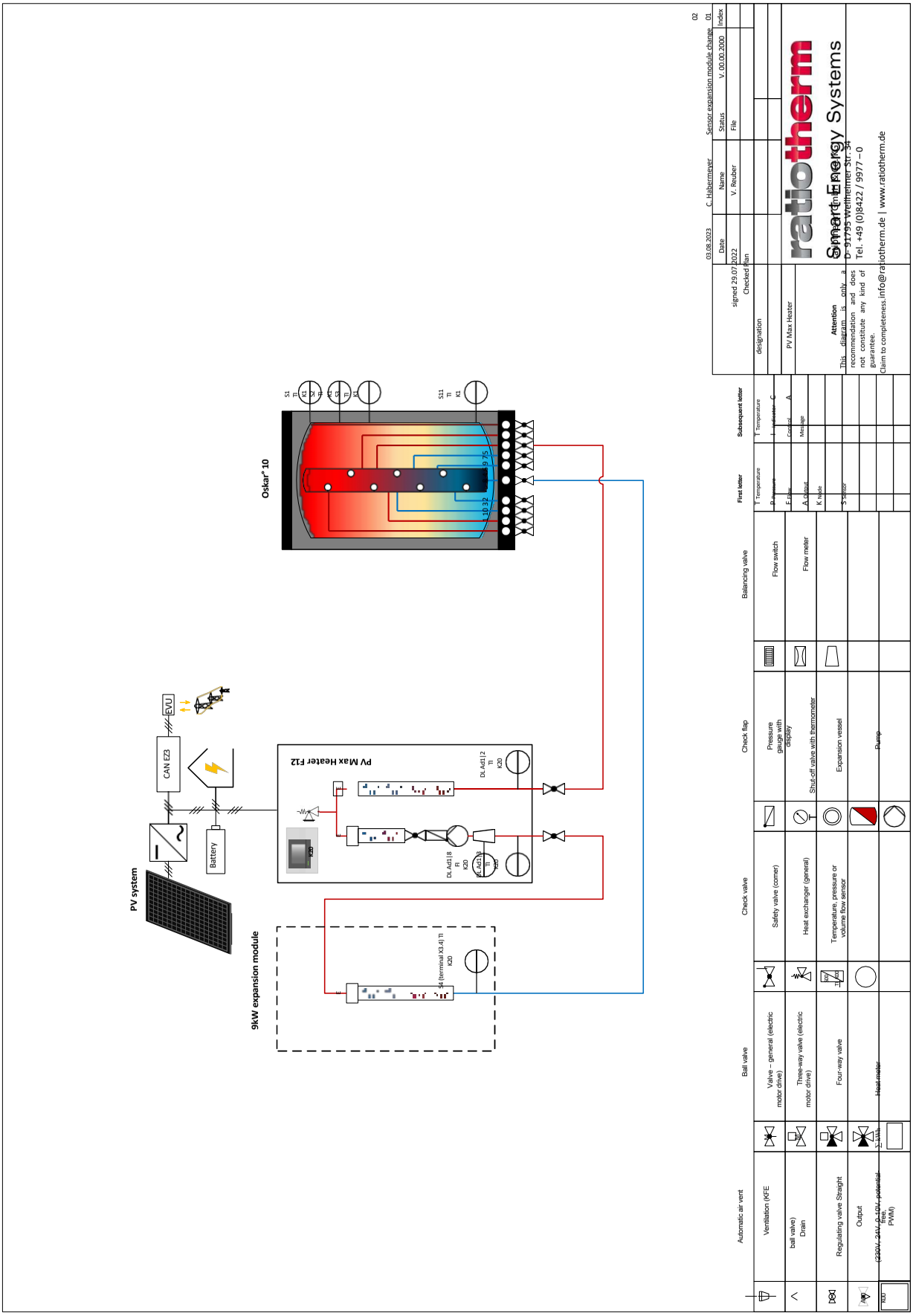
The following instructions must be observed:

- Hold the connections steady when tightening.
- Ventilation must be carried out at high points.
- A magnetite cutter and a sludge separator should be installed.

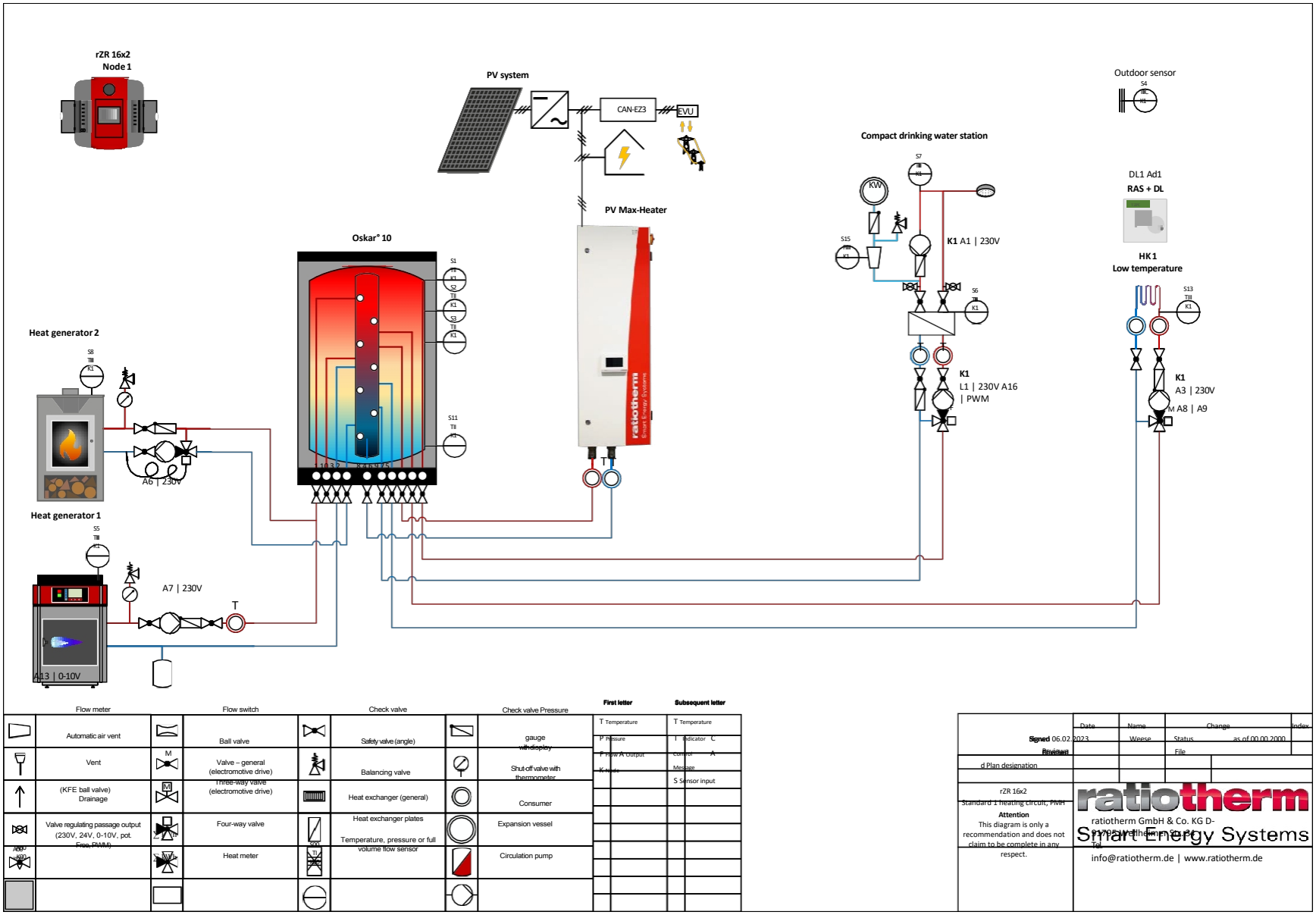
	DN25	DN32	DN40
F12	up to 6 m	up to 21 m	up to 56 m
F12 + 9kW electric rod		up to 7 m	up to 25 m

* Available pressure drop over total length: 10,000 PA, assumed pipe roughness: 0.0070 mm

5.4.1 HYDRAULIC DIAGRAM



5.4.2 HYDRAULIC DIAGRAM: STANDARD WITH ADDITIONAL HEAT GENERATOR



5.5 ELECTRICAL INSTALLATION

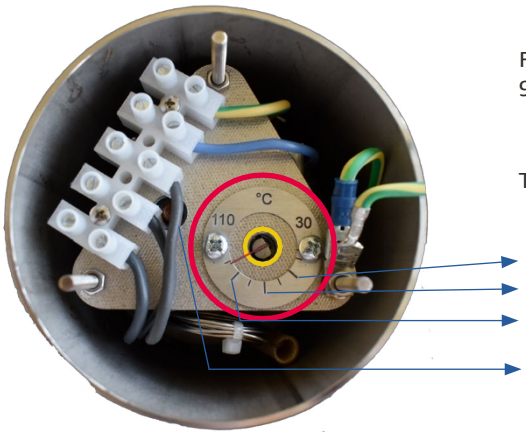
DANGER!

- The power supply to the heater comes from the control cabinet and must be protected by a residual current device with a maximum tripping current of 30 mA (RCD) with the appropriate power rating.
- The RCD must be marked separately for the heater, e.g. as "P2H". When wiring, please ensure that the phase and neutral conductors are correctly assigned.
- Ensure that the rotating field is clockwise.
- The device must be earthed.
- Use cables with a cross-section suitable for the power rating of the heater.
- The electrical installation must comply with the applicable standards and generally accepted technical rules.
- Never work on the hydraulics or mechanics of the device while it is live.
- The same applies when filling or subsequently pressurising.
- Even if the main switch of the device is switched off, the cable terminal is still live.
- To completely disconnect the device from the mains, the RCD circuit breaker in the control cabinet must be switched off.
- Maintenance work may only be carried out by an authorised person.
- Never short-circuit the safety pressure limiter of the heat pump.

5.5.1 TERMINAL DIAGRAM AND DESCRIPTION

- Terminal range X is intended for the 400 V supply line. Please use a 4 mm² cable and fuse accordingly.
- X3.1 is an enable contact that can be switched by an external control or battery storage unit. If this is not used, a separate storage sensor must be provided! This can be connected either to the PV Max-Heater or to the Smart-Control.
- X3.2 is used to connect a storage sensor.
- X3.3 is used for external forced demand. When the contact is closed, the heater heats with adjustable power or to a set temperature.
- X3.4 is intended for requests via setpoint specification. If a signal > 1.0 V is present, the heater becomes active and heats either at a set output or to a set temperature.
- Ensure that the CAN bus is wired correctly! No star-shaped network!
  Use shielded, 4-pin cable! Follow the instructions for the technical alternative.

5.5.2 E-ROD SETTING

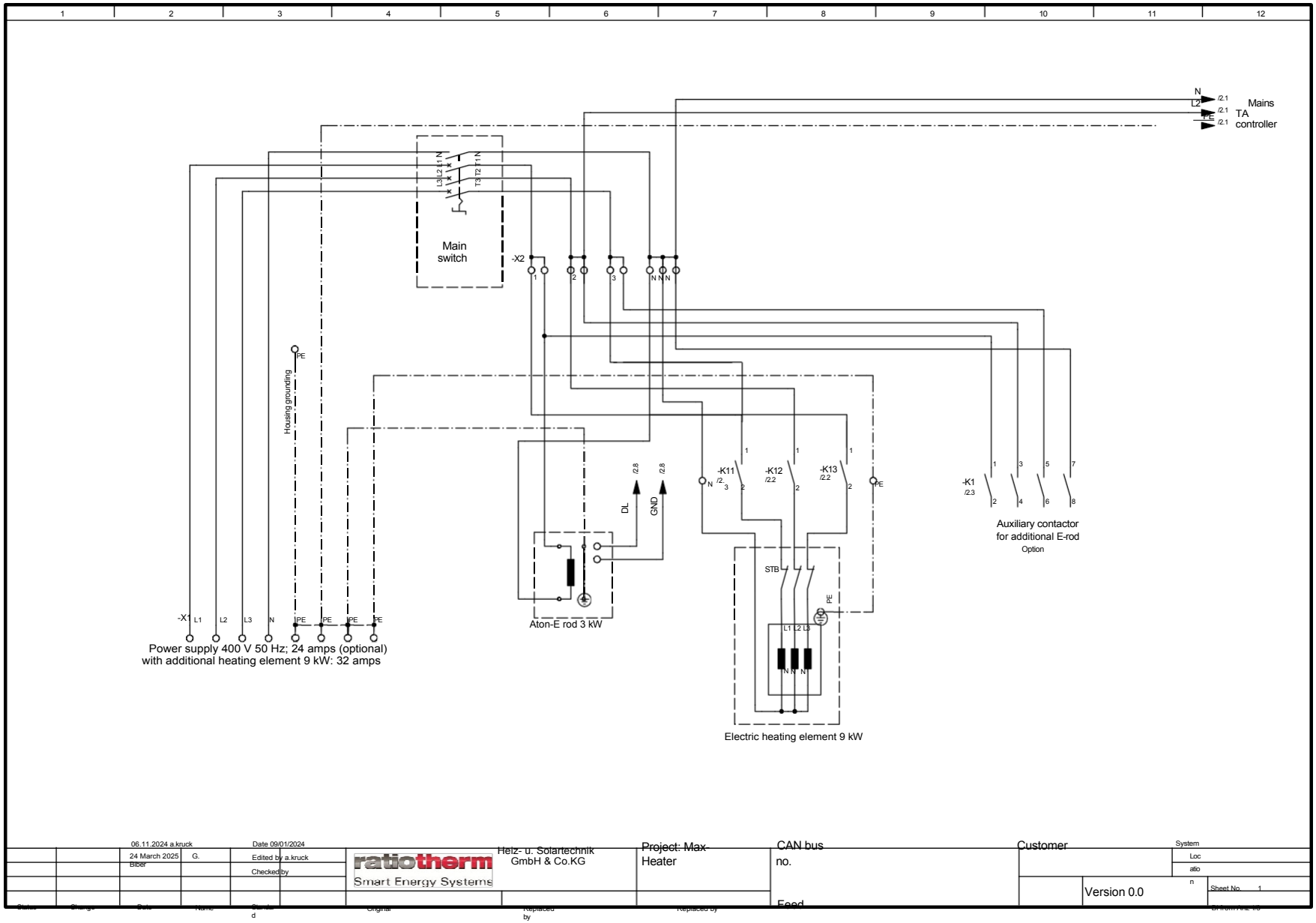


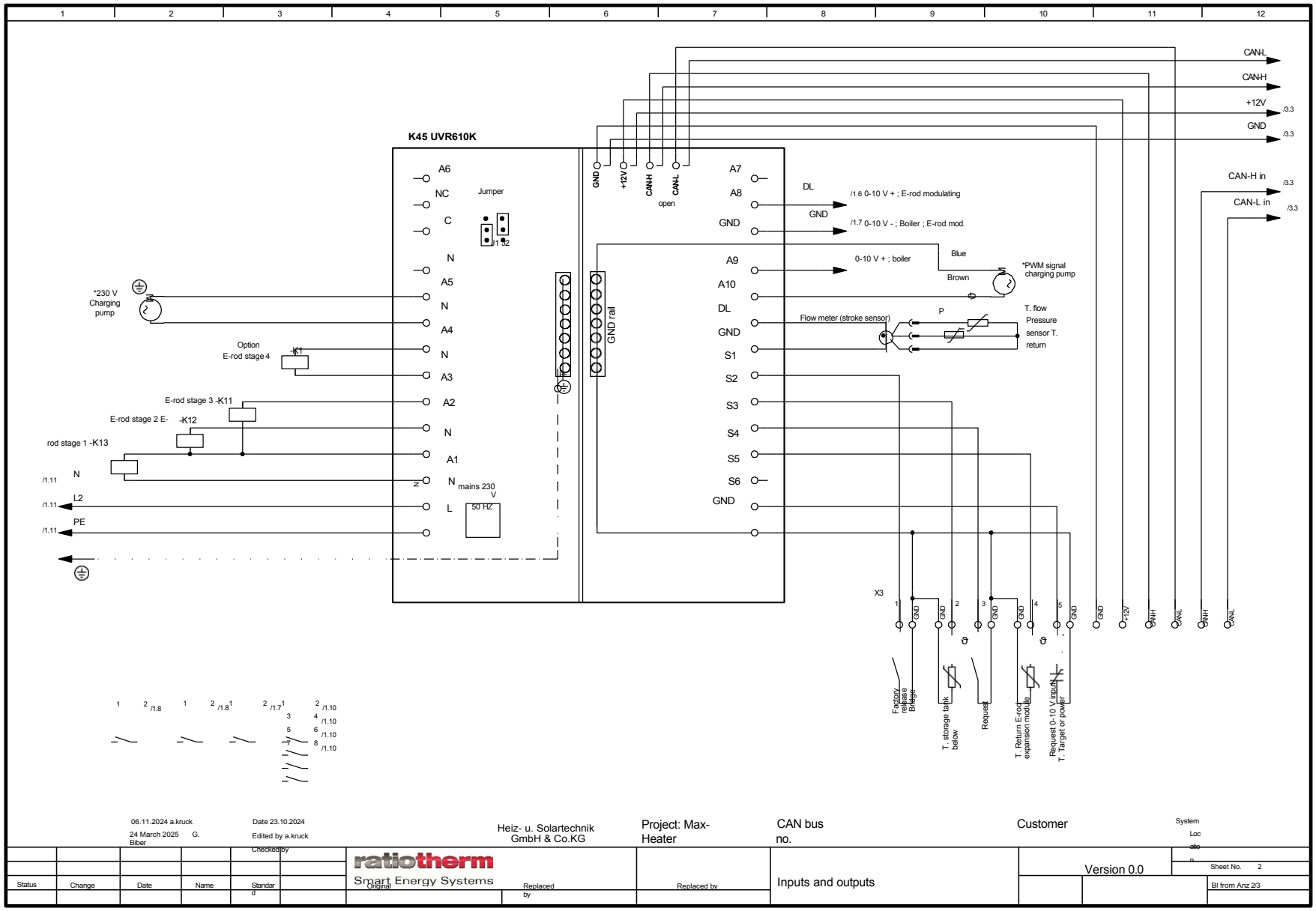
For the additional E-rod, ensure that the screw tip, outlined in yellow, is set to 90 °C. If this is not the case, carefully turn the screw tip to 90 °C.

The E-rod can be set between 30 °C and 110 °C. 50 °C
70 °C
90 °C

Safety temperature limiter (STP)

5.5.3 CIRCUIT DIAGRAM





		06.11.2024 a.kruck		Date 23.10.2024		Heiz- u. Solartechnik GmbH & Co.KG	Project: Max-Heater	CAN bus no.	Customer	System Location	
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Status	Change	Date	Name	Standard		ratiotherm Smart Energy Systems		Inputs and outputs		Version 0.0	Sheet No. 2
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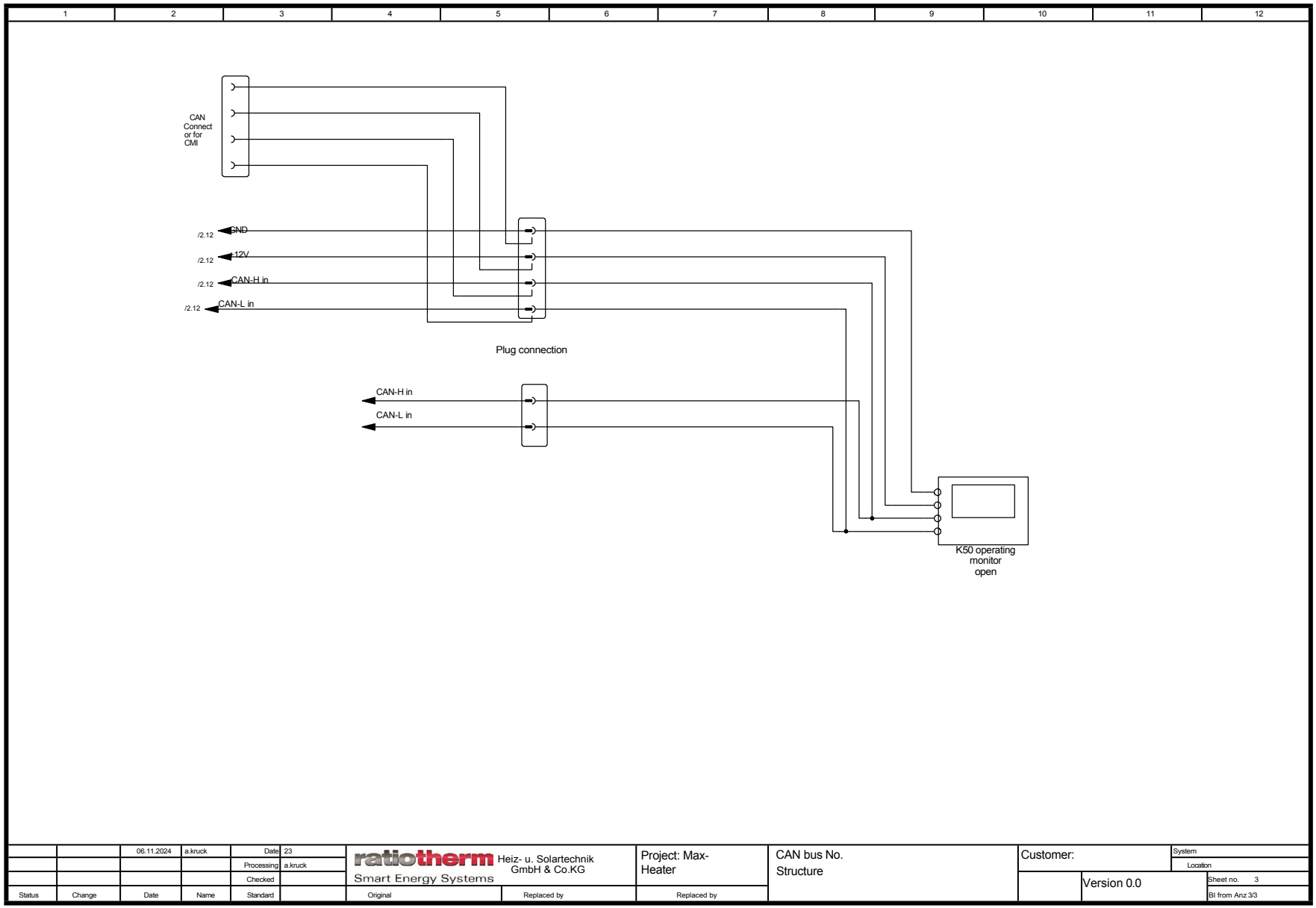
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5.5.4 INTERFACE DESCRIPTION OF THE PV MAX-HEATER

The PV Max-Heater has three relevant inputs:

1. Input request: Digital input with which the PV Max-Heater is requested and runs at an adjustable, constant power. This can be used to implement forced or emergency operation.

2. Input request 0-10V: Analogue input, which can be used to specify a target power or target temperature for the PV Max-Heater. This input can be used for PV surplus operation.

3. With the remote maintenance module as an optional accessory, the PV Max-Heater also provides a Modbus TCP interface, which can also be used for PV surplus.

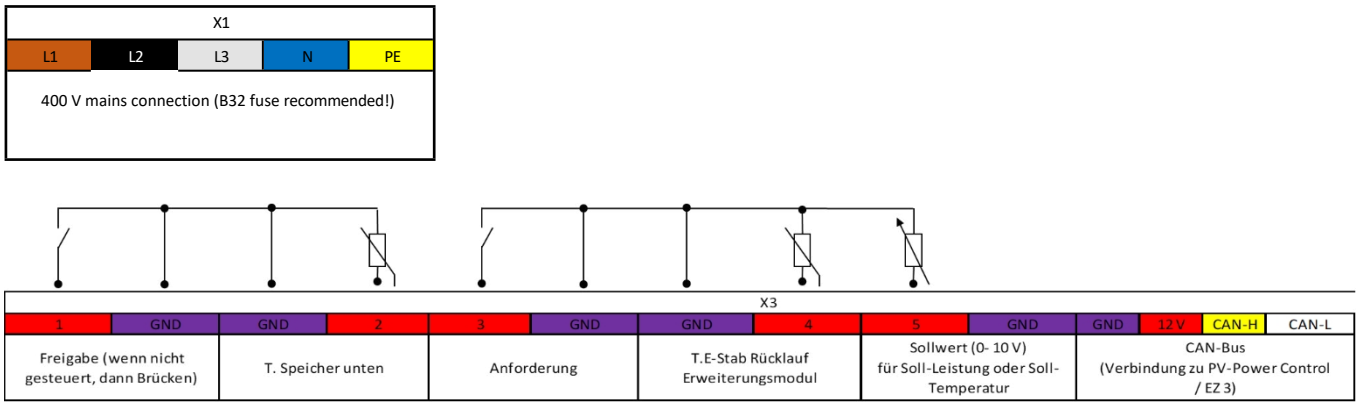
There are two ways to integrate the PV Max-Heater with PV surplus:

1. The PV Max Control is used as a converter measurement. This measures the surplus current shortly before the utility connection and thus gives the PV Max-Heater a power specification via the internal CAN bus.

2. There is already an energy meter that measures the PV surplus and can communicate this PV surplus to us via a 0-10V signal. This signal is then connected to the 0-10V input.

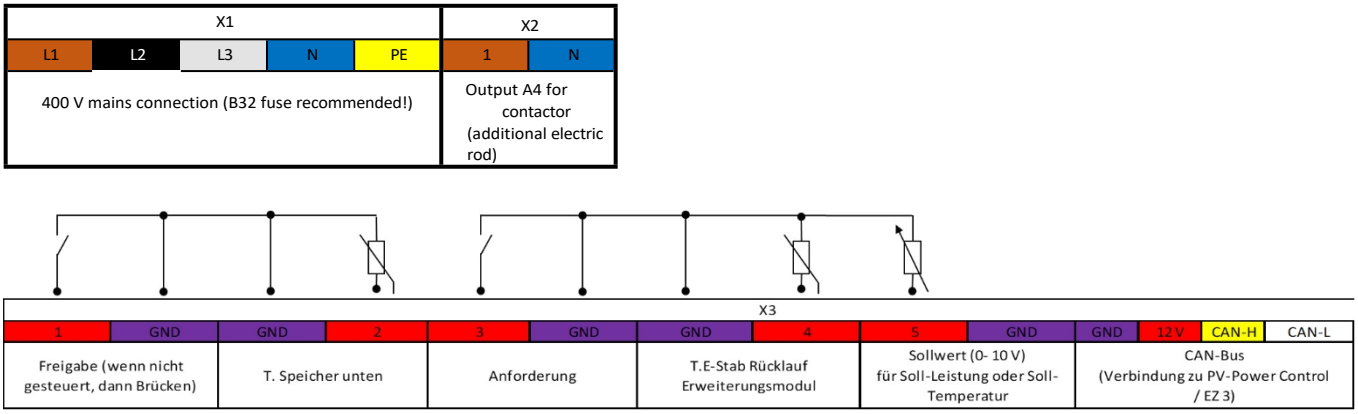
3. The Modbus TCP interface is used for communication with the inverter, which transmits the necessary information to the PV Max-Heater.

Terminal diagram for PV Max-Heater F12 connection box, including electric contactor:



- Terminal range X1 is intended for the 400 V supply line. Please fuse with at least 32 A and use 4 mm² cable.
- X3.1 is an enable contact that can be switched by an external control or battery storage system. If this is not used, a separate storage sensor must be provided! This can be connected either to the PV-Max or to the PV-Smart-Control.
- X3.2 is used to connect a storage sensor.
- X3.3 is used for external forced demand. When the contact is closed, the heater heats with adjustable power or to a set temperature.
- X3.4 is used to connect the electric rod return sensor of the 9 kW expansion module.
- X3.5 is intended for use with setpoint specifications. If a signal > 1.0 V is present, the heater is activated and heats either to a setpoint power or to a setpoint temperature.

Terminal diagram for PV Max-Heater F12 connection box:



- Terminal range X1 is intended for the 400 V supply line. Please fuse with at least 32 A and use 4 mm² cable.
- Terminal range X2 is intended for the 230 V output A4 of the contactor (additional heating element).
- X3.1 is an enable contact that can be switched by an external control or battery storage unit. If this is not used, a separate storage sensor must be provided! This can be connected either to the PV-Max or to the PV-Smart-Control.
- X3.2 is used to connect a storage tank sensor.
- X3.3 is used for external forced demand. When the contact is closed, the heater heats with adjustable power or to a set temperature.
- X3.4 is used to connect the electric rod return sensor of the 9 kW expansion module.
- X3.5 is intended for use with setpoint specifications. If a signal > 1.0 V is present, the heater is activated and heats either to a setpoint power or to a setpoint temperature.

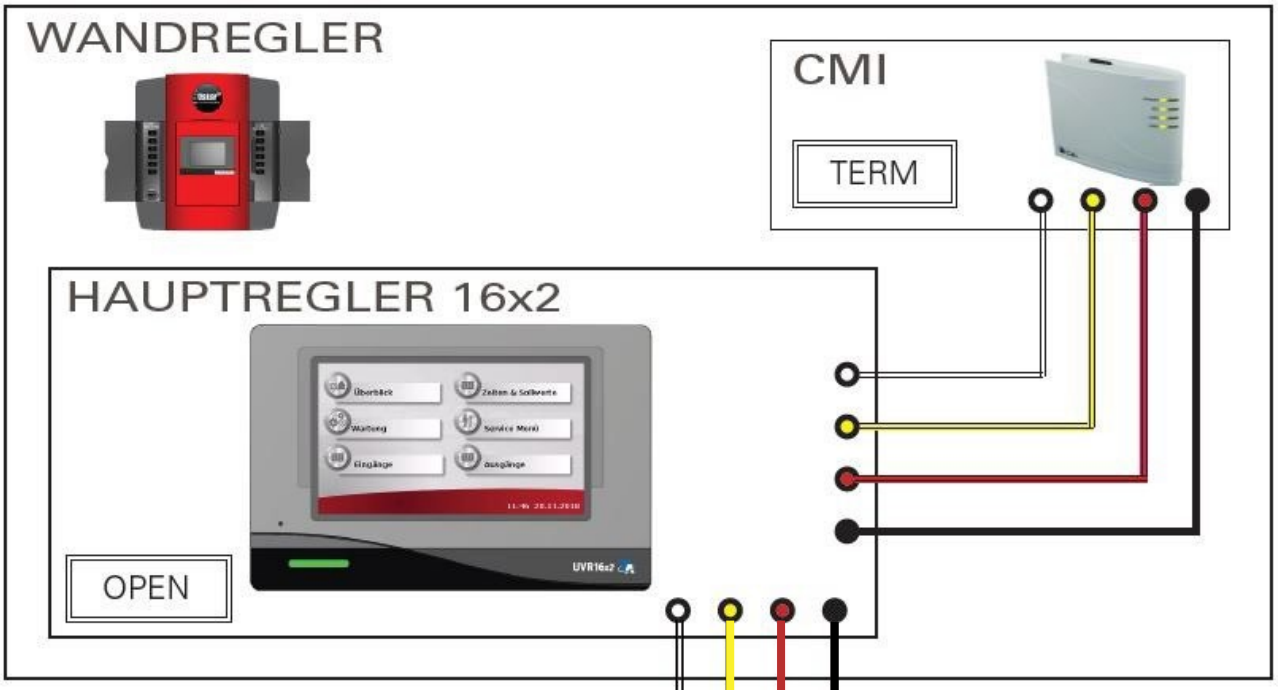
5.5.5 ELECTRICAL CONNECTION RATINGS

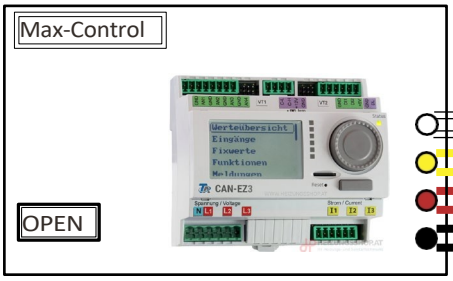
WARNING! Only authorised specialists should carry out installation and wiring.

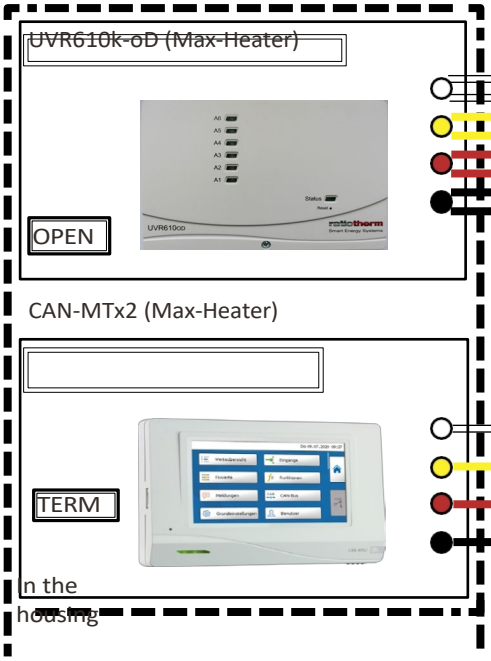
- A separate RCD must be provided for the PV Max-Heater circuit!
- All information, images and drawings are subject to errors and changes.
- The generally applicable and recognised rules of technology and any local regulations must be observed! Values apply to installation in conduits up to 100 m cable length.

	Type	F12	F12 + 9 kW
PV Max-Heater	Fuse:	B25 3-pin	B32 3-pole
	Cable cross-section:	5G 4 mm²	5G 4 mm²

5.5.6 CAN BUS PLAN







CAN-L CAN-H 12 V GND

NOTE:

- Ensure that the CAN bus is wired correctly!
- No star-shaped network!
- Use shielded, 4-pin cable
- Follow the instructions for the technical alternative.
- Non-binding cable recommendation: Unitronic Bus CAN FD P 2x2x0.34

NOTE:

- The wall-mounted controller is optional!
- The Max-Control is optional!
- Always terminate the start and end of the cabling!

6. OPERATION

6.1 CONTROLLER OPERATION

The CAN-MTx2 is operated via a 4.3" touch screen (= touch-sensitive screen). You can tap control surfaces with your finger 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 various 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 – after hardware initialisation, the controller waits approx. 30 seconds to receive all the information necessary for operation (sensor values, network inputs).

6.1.1 CONTROL ELEMENTS

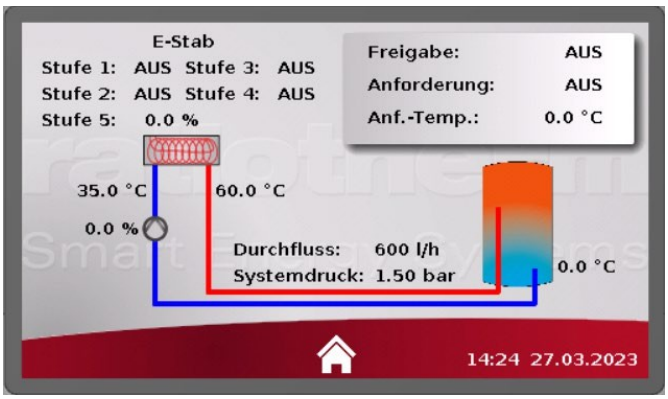
Previous page | Main menu | Next page

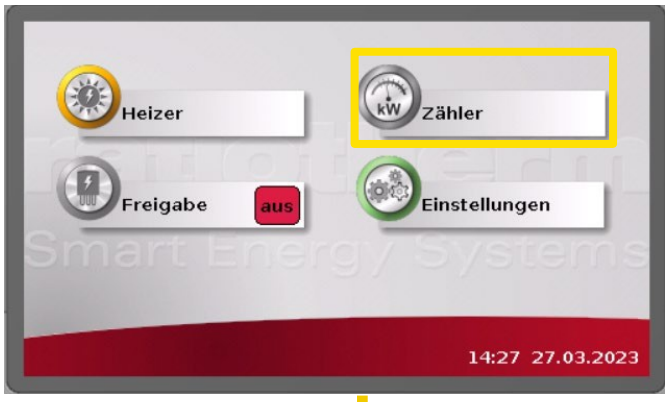
6.1.2 CONTROL SWITCH

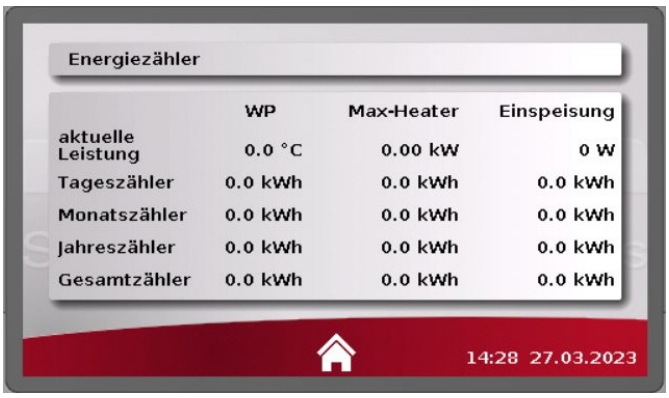
ON/OFF switch

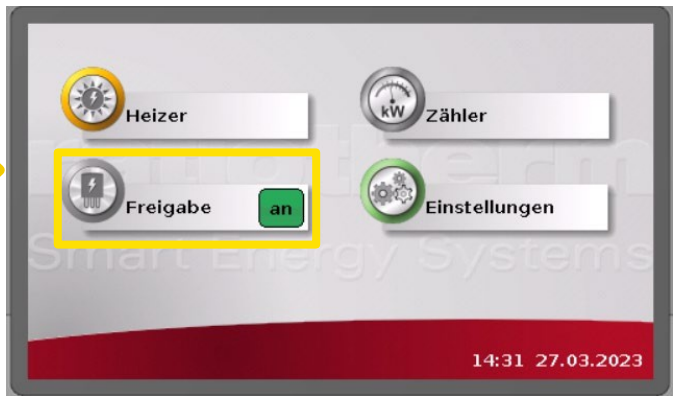
6.1.3 MENU STRUCTURE

Designation	Symbol	Description
On this surface Press		Yellow frame
Shows the path		Yellow arrow



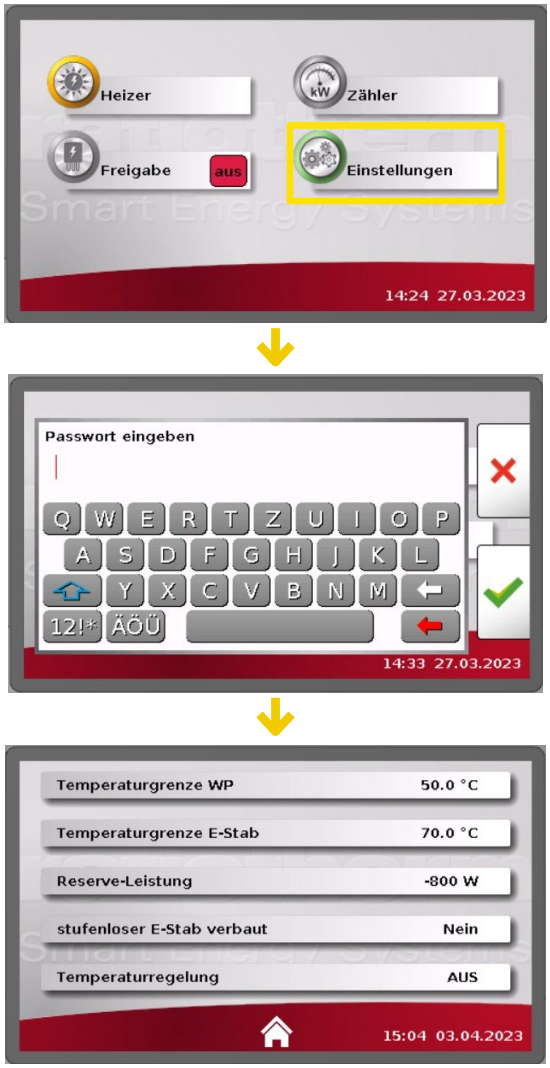






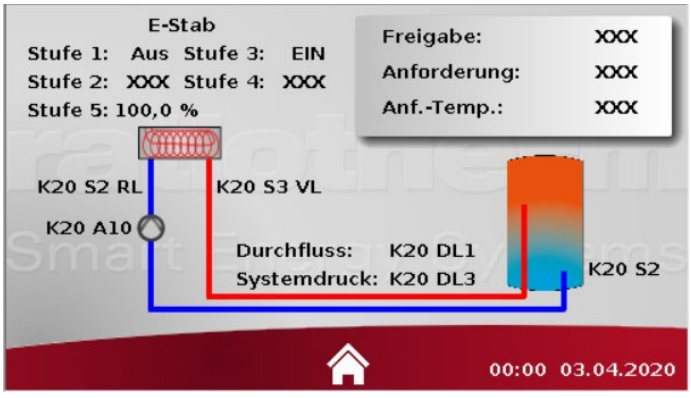
■ Share: OFF

■ Share: ON



- Enter password
- Enter the technician password to access the technician menu.

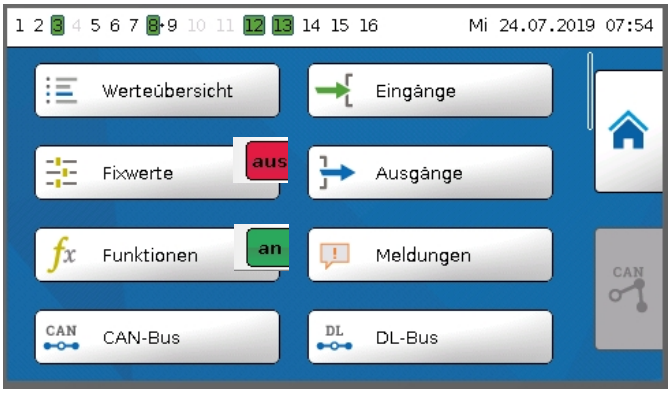
6.1.4 MENU DESCRIPTION



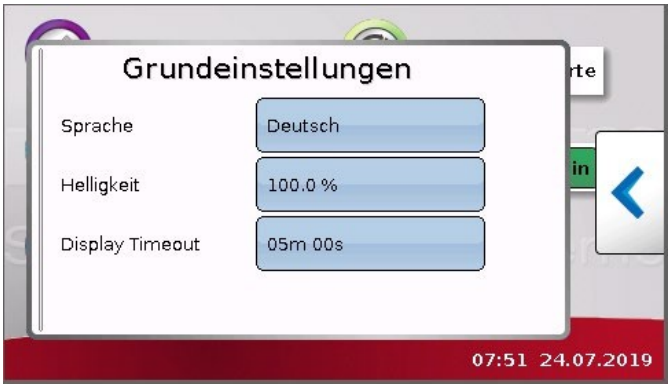
K20 S1	Enable
K20 S2	Temperature storage tank bottom
K20 S3	Request
K20 S6	Requirement 0-10 V
DL 1	Flow rate charging circuit
DL 2	T.Kessel RL
DL 3	T. boiler VL
DL 4	System pressure
K20 A1	E-rod stage 1
K20 A2	E-rod level 2
K20 A3	E-stick Level 3
K20 A4	E-rod Level 4
K20 A5	Charging pump
K20 A10	PWM charging pump

- 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.

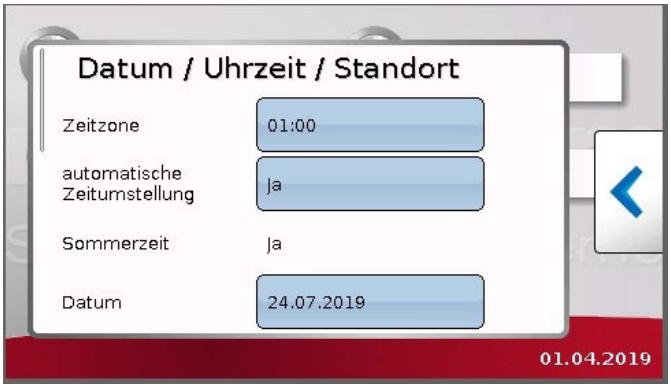
- Controller menu
- Link to the controller menu.



- Basic settings
- You can set the language, brightness and display timeout.



- Date/time/location
- Set the time zone and date.



6.2 SETTINGS

Fixed values	Description	Setting options	Default setting
Operators and users			
Approval	General approval	OFF/ON	OFF
Target power	Target power indicates how much power should be used.	500 W to 30,000 W	5000 W
Target temperature	Target temperature to which the PV Max Heater is set to.	10.0 °C to 80.0 °C	60.0 °C
Temperature limit E-rod	Temperature limit for electric heating rod, control up to max. temperature with manual request.	20 °C to 80 °C	70 °C
Temperature controller	Temperature control, switching between temperature control and power control.	OFF/ON	OFF
Qualified personnel			
Max. heating element power	Max. power of the PV Max heater. To be changed if 9 kW option is available.	12,000 W to 21,000 W	12540 W

7. MAINTENANCE

Regular inspection of the appliance by a recognised, qualified and ratiotherm-authorised specialist is essential to ensure continuous operational readiness, operational safety, reliability and a long service life. We recommend having maintenance carried out annually.

NOTE: We recommend taking out a maintenance contract.

⚠ WARNING

Improper handling

Improper handling of the appliance can result in serious injury. **Never attempt to carry out maintenance work and/or repairs on the appliance yourself.**

For maintenance work, commission a recognised, qualified specialist tradesman (specialist personnel) authorised by ratiotherm GmbH & Co. KG.

7.1 TROUBLESHOOTING

Error message	
Error description	**Overtemperature**
Behaviour of the PV Max heater	■ A 5-minute blockage ■ PV Max heater switches off
Cause of fault	■ Flow rate of PV Max-Heater too low ■ Temperature at the flow sensor too low
Troubleshooting	■ Check that the pump is working properly ■ Check the temperature sensor to ensure that it is working and in the correct position.

Error message	
Error description	**No flow**
Behaviour of the PV Max heater	■ PV Max heater goes into fault mode if insufficient flow is detected 45 seconds after the request. flow
Cause of fault	■ Flow is missing
Troubleshooting	■ Check the pump to ensure it is working properly ■ Check flow sensor to ensure it is working and in the correct position. ■ Check ball valve to ensure it is open

Error message	
Error description	**lack of pressure**
Behaviour of the PV Max Heaters	■ PV Max-Heater switches off
Cause of fault	■ System pressure too low
Troubleshooting	■ Check the pump to ensure it is working properly. ■ Check the pressure sensor to ensure that it is working and in the correct position. ■ Check ball valve to ensure it is open

7.2 CLEANING

7.2.1 CLEANING THE HEATING SIDE

- Cleaning: to be carried out by an installer
- Flushing device: connection to the flow and return.

NOTE

Improper cleaning

Using the wrong cleaning agents can damage the appliance surfaces.

Please observe the following instructions.

- Do not use abrasive or cleaning agents that could damage the plastic trim, fittings or controls.
- Do not use sprays, solvents or chlorine-based cleaning agents.
- Clean the heat pump casing with a damp cloth and a little soap.
- Avoid placing or leaning objects on or against the heat pump.

NOTE

Limescale

Limescale deposits can cause the safety valve to stick.

Operate the safety valve of the heating system manually once a month.

7.3 SYMBOLS ON THE DEVICE

In order to provide staff with important information and warnings, standardised safety symbols based on the DIN EN ISO 7010, DIN ISO 3864 and DIN ISO 7000 standards were used. These safety symbols 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 chapter "2.3 Target groups" on page 6.

7.4 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 external 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 section "7.2 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 these checks.	
Check the symbols on the device	■ Check the symbols on the device. ■ Renew the symbols if necessary.	
Check Purchased components	■ Observe the manufacturer's documentation for the purchased components	

8. DECOMMISSIONING

When the PV Max-Heater is taken out of service, the device may only be dismantled by qualified personnel. Hazardous materials and waste must be disposed of properly. When dismantling the heat pump, 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 death from fatal electric shock when working on electrical equipment.

Secure the device against being switched back on.

Disconnect the device from the power supply before taking it out of service/dismantling it.

8.1 TEMPORARY DECOMMISSIONING

NOTE

Improper decommissioning

Improper decommissioning of the device can result in damage to components and impaired functionality.

Switch off the device at the main switch.

Please note the following:

- Frost may cause damage to the device.
- Water freezes at outdoor temperatures below 0 °C.
- Decommissioning without draining the heating circuit is only permitted at temperatures above 0 °C.

8.2 FINAL DECOMMISSIONING AND DISPOSAL

Only a specialist company may carry out final decommissioning/disposal. Environmental requirements regarding 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.

Dispose of electrical and electronic components of the PV MAx-Heater properly and in accordance with applicable local regulations.

9. 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: info@ratiotherm.de Telephone: +49 (0) 8422/9977-0 Website www.ratiotherm.de

that the device:

Device name: **PV Max-Heater**

Year of manufacture: 2022

Intended use: The PV Max-Heater device uses surplus electricity from a PV system to provide direct heating support and hot water preparation. 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 with the harmonised standards and directives listed below, 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 2014/35/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 provisions of the standard DIN EN ISO/IEC 17050-1 "Conformity assessment – Declaration of conformity by suppliers – Part 1 : General requirements" have been observed in issuing this declaration of conformity. This declaration shall lose its validity in the event of any modification to the device that has not been agreed with us. Any unauthorised modification in this sense shall exclude any liability on our part.

Dollnstein, on _____ 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

You can find us here

ratiotherm
Smart Energy Systems

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