

Service Manual

SAHARA 4


Manufacturer and customer service address:	Device data: (to be completed by the customer)
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1 Safety advice

- Follow the advice in the instructions for use.
- Repairs, maintenance and inspections on the device must only be conducted by authorised persons and organisations who have the know-how and the appropriate tools and test equipment available. Maintenance and repairs for which the device interior must be opened using tools may not be carried out by third parties and must only be carried out by the manufacturer.
- For ordering of spare parts always specify the serial no. of the device.
You will find the serial no. on the device and on the cover sheet of this service manual.
- Only use original spare parts for service works. Spare parts must not be modified.
- Before removing the cover turn off the device and disconnect it from the local power supply system.
- After service works always inspect the device functions if the service works may have an effect on the safety or functioning of the device.
- If necessary, exchange of single components is explained separately by an instruction for repair, which is delivered together with the spare part.

2 Symbol description



Follow instructions for use



WARNING

Important information. If ignored a serious or life-threatening injury may occur.



WARNING

Important information. If ignored an electrical shock due to dangerous voltage may occur.



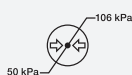
CAUTION

Important information. If ignored a minor injury may occur.



CAUTION

Helpful information on the appropriate use of the device. If ignored an operating error, malfunction or device defect may occur



Permissible pressure range



Permissible temperature range



Store in a dry place



Item number



Serial number



CE mark



Medical device



Manufacturer



Country of manufacture



Manufacturing date



Unique product identification



Separate collection of electrical and electronic equipment

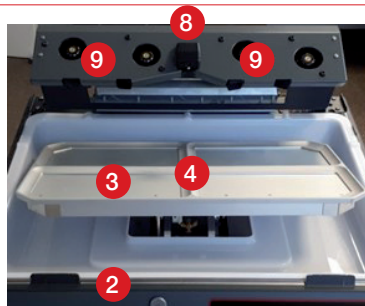


Alternating current

3 Device setup



1. Housing cover



2. Lower part of the housing

3. Warming plate

4. Positioning frame

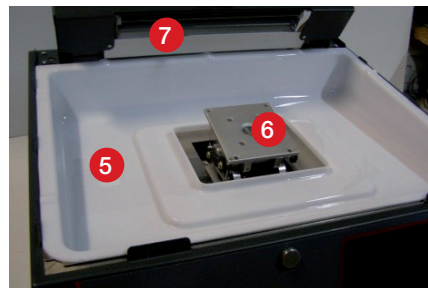
5. Collection tray

6. Agitator mechanism

7. Fan heater

8. Infrared sensor

9. Position fan






4 Preventive controls and maintenance by the service personnel

4.1 Maintenance via integrated service functions

4.1.1 Activating the service functions

The integrated service functions can be activated via the options menu of the device.

- Switch on the device and when it goes into standby mode press the button  on the display.
- Select the menu item for the system information.
- Touch the red logo  in the upper left corner and hold for a few seconds.

The service functions are activated within the options menu after pressing the button  again.



The service functions are deactivated again after switching off the device.

4.1.2 Overview of service functions

After activation, the following integrated service functions can be selected via the extended options menu:

Service function	Description of the service function
Scanning area	Representation of the scanning area of the infrared sensor.
External calibration	See sec. 4.1.3
Test position fans	See sec. 4.1.4
Data base management – Delete data base	Database maintenance function: Database stored in the device with the registration and tempering data records is deleted.
Lock options menu	See sec. 4.1.5
Error memory	The last 10 error messages that occurred on the device are displayed with date and time.

4.1.3 External calibration

By means of the external calibration, the temperature of the warming plate heated to approx. 37 °C can be recorded using a reference clinical thermometer with an accuracy of at least $\pm 0.5^{\circ}\text{C}$ and then compared with the temperature of the warming plate determined by the device.

A thermometer block, available separately (see sec. 7), is required in addition to a clinical thermometer for external calibration.

- Remove objects from the warming plate and switch off the device for at least 15 minutes.
- Switch on the device and activate the service functions (see sec. 4.1.1).
- Activate the process via the “External calibration” menu item in the options menu.
- Insert the clinical thermometer into a suitable opening on the thermometer block. When prompted by the display, place the thermometer block with clinical thermometer onto one of the front heating zones (see Figure).
- After confirming this process, close the cover.

The warming plate and the thermometer block on top of the warming plate are heated for approx. 15 min.

- When prompted by the display, start temperature measurement with the clinical thermometer and enter the reference temperature read off via the touch screen.
- Remove the clinical thermometer together with the thermometer block from the warming plate.

After confirming this process, the result of the external calibration is provided on the touch screen and on a USB stick.



4.1.4 Checking the position fans

By means of this service function, a function test of all position fans can be carried out.

- Switch on the device and activate the service functions (see sec. 4.1.1).
- Activate the service function via the “Test position fans” menu item in the options menu.
- Open the tension locks at the rear of the device and remove the cover.
- Visually check that the blades of all position fans rotate.
- Exit the service function after the visual inspection has been completed. Then reattach the cover to the lower part of the housing and close the tension locks at the rear of the device.




When closing the housing, make sure that no cables are caught or have gone loose during the test.

4.1.5 Locking the options menu

- Switch on the device and activate the service functions (see sec. 4.1.1).
- Select the menu item “Lock options menu” in the options menu.
- Set the selection window to “ON” and confirm with the key



To unlock the options menu in standby select the key and enter the numerical code “4711” or read the master barcode  via a barcode reader.

4.2 System update

The device can be updated by installing new software.

- Backup all data records from the internal memory of the device on an external memory medium.
- Switch off device and remove all connected USB sticks.
- Insert the USB stick with the new software into one of the USB slots of the device and switch device on.

The software update is read from the USB stick after confirmation and saved in the memory of the device.

- Remove the USB stick from the USB slot.



The current version of the software can be called up in the options menu under the “System information” menu item.

5 Repair



When ordering spare parts, always indicate the serial number of the device!

5.1 List of spare parts

5.1.1 Assemblies

Product	Order no.	Pcs./SU
S4 Collection tray	97.8680.401	1
S4 Positioning frame 4X1	97.8680.402	1
S4 Warming plate 4x1	97.8680.490	1
USB stick	97.8700.445	1

5.1.2 Single components

Product	Order no.	Assembly	Pcs./SU
S4 housing hood	97.8680.500	Housing cover	1
S4 acrylic glass flap, lacquered	97.8680.501	Housing cover	1
S4 magnet for flap 15/3	97.8680.502	Housing cover	1
S4 Fuse 10AHT	97.8680.515		2
S4 radial fan angular 24V DC	97.8680.600	Position fan	1
S4 radial fan straight 24V DC	97.8680.601	Position fan	1
S4 cross flow fan 24V DC	97.8680.602	Fan heater	1
S4 fan LED platine	97.8680.605	Fan heater	1
S4 heating register	97.8680.610	Fan heater	1
S4 thermopile sensor	97.8680.620	Infrared sensor	1

5.2 Open and close the housing

- Switch off the device and disconnect it from the power supply by removing the mains cable.
- Open the turnbuckle at the rear of the housing and carefully lift off the housing cover.

To re-assemble, follow the instructions above in reverse order.



When closing the housing, make sure that no cables are caught or have gone loose during the repair.

5.3 Replacing the fuses

The fuse holder is located in the mains switch insert on the rear of the device. To replace the fuses, proceed as follows:

- Disconnect the device from the power supply by removing the mains cable.
- Carefully lever the mains switch insert out of the mains connection housing using a suitable flatblade screwdriver.
- Remove the old fuses from the fuse holder of the mains switch insert.
- Insert the new fuses into the fuse holder of the mains switch insert.
- Reinstall the mains switch insert in the mains connection housing.
- Connect the device to the power supply via the mains cable.

6 Technical information

6.1 Technical data

Dimensions:	W×H×D: 574 mm x 348 mm x 554 mm
Weight:	27,3 kg
Nominal voltage:	100 – 240 V AC
Power supply frequency:	50 – 60 Hz
Max. power consumption:	1000 W
Protection class:	I
Operating mode:	Continuous operation
Temperature adjustment range:	37 °C to 42 °C
Temperature control accuracy:	-1,5 °C / +2,5 °C
Accuracy of infrared sensor:	± 3 % at a blood product temperature of 37 °C
Max. load:	4 blood products , each weighing up to 400 g
Fuse characteristics:	2 x T 10,0 A H 250 V, 20 x 5 mm acc. to IEC / EN 60127-2
Connections:	2 x USB, 1 x LAN*

Ambient operating conditions:	+10 °C to +30 °C 30 % to 75 % rel. humidity 790 hPa to 1060 hPa max. 2000 m altitude
Ambient conditions for storage and transport:	-20 °C to +50 °C 500 hPa to 1060 hPa
Expected service life:	10 years (in normal use and provided that the required regular inspections and maintenance were carried out)
*is not supported at this time	

6.2 EMC advice

EMC-emitted interference	Classification
HF emission according to CISPR11	Group 1, class B
Emission of harmonics according to IEC 61000-3-2	Class A
Voltage fluctuations and flicker according to IEC 61000-3-3	No classification

EMC interference resistance	Test level
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 8 kV contact discharge ± 15 kV air discharge
Quick transient electric disturbances/ bursts according to IEC 61000-4-4	± 2 kV with 100 kHz repetition frequency for power cables ± 1 kV with 100 kHz repetition frequency for input and output wires
Surge voltages/surges according to IEC 61000-4-5	± 1 kV voltage between external conductor and external conductor ± 2 kV voltage between external conductor and earth
Voltage drops, short interruptions and fluctuations of the supply voltage according to IEC 61000-4-11	0 % UT; ½ period at 0, 45, 90, 135, 180, 225, 270 and 315 degree 0 % UT; 1 period at 0 degree 70 % UT; 25 periods 0 % UT; 5 seconds
Magnetic field at supply frequency according to IEC 61000-4-8	n.a. (the device does not contain magnetically sensitive components)
Conducted HF-disturbances according to IEC 61000-4-6	3 V between 0.15 MHz and 80 MHz; 80% amplitude modulation at 1 kHz 6 V in ISM and amateur radio bands between 0.15 MHz and 80 MHz; 80 % amplitude modulation at 1 kHz
Radiated HF-disturbances according to IEC 61000-4-3	10 V/m between 80 MHz and 2.7 GHz; 80 % amplitude modulation at 1 kHz
Radiated proximity fields from RF wireless communications equipment according to IEC 61000-4-3	27 V/m 385 MHz pulse modulation 18 Hz 27 V/m 450 MHz frequency modulation ± 5 kHz Hub, 1 kHz Sinus 9 V/m 710 MHz, 745 MHz, 780 MHz pulse modulation 217 Hz 28 V/m 810 MHz, 870 MHz, 930 MHz, pulse modulation 18 Hz 28 V/m 1.72 GHz, 1.845 GHz, 1.97 GHz, pulse modulation 217 Hz 28 V/m 2.45 GHz, pulse modulation 217 Hz 9 V/m 5.24 GHz, 5.50 GHz, 5.785 GHz, pulse modulation 217 Hz

6.3 Circuit board assembly and circuit diagrams

If circuit board assembly and circuit diagrams are required for a repair, these can be provided on request.

6.4 Error messages

By means of the following table errors indicated on the display during the system test can be remedied. If more than one measure appears to be suitable in remedying a particular error, each measure must be implemented one after another.

Should none of the listed measures eliminate the error or should an error code appear which is not listed below, please contact the manufacturer. In this case, please indicate the serial number, the version number of the operating system as well as an error description.

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Error code	Cause	Action
Open cover	Opening of the cover flap was not recognised	<ol style="list-style-type: none"> 1. Check whether the disc magnet has detached from the cover flap and is stuck to the lower part of the housing. 2. Affix the disc magnet to the cover flap.
Close cover	Closing of the cover flap was not recognised	<ol style="list-style-type: none"> 1. Check whether the disc magnet is on the cover flap. 2. Affix new disc magnet to the cover flap.
Warming plate defect	Warming plate does not heat	<ol style="list-style-type: none"> 1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 1.x	System driver could not be loaded	Contact the manufacturer.
init 2.1	Communication temperature monitoring sensor, fan heater	Remove the housing cover and check that the ribbon cable to the fan heater is fully inserted.
init 2.2	Communication temperature monitoring sensor, warming plate, heating circuit No. 1	<ol style="list-style-type: none"> 1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 2.3	Communication temperature monitoring sensor, warming plate, heating circuit No. 2	<ol style="list-style-type: none"> 1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 2.4	Communication temperature monitoring sensor, warming plate, heating circuit No. 3	<ol style="list-style-type: none"> 1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 2.5	Communication motor driver	Contact the manufacturer.
init 2.6	Communication IR sensor	Remove the housing cover and check that the infrared sensor plug is fully inserted.
init 2.7	Communication touch screen	Contact the manufacturer.
init 2.8	Communication warming plate controller	<ol style="list-style-type: none"> 1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 2.9	Communication ambient air controller	Remove the housing cover and check that the ribbon cable to the fan heater is fully inserted.
init 2.10	Warming plate not connected	<ol style="list-style-type: none"> 1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 2.12	Absence of supply voltage	Contact the manufacturer.
init 2.13	Communication I2c piezo – light	Contact the manufacturer.
init 2.14	Agitator mechanism defect	Contact the manufacturer.
init 2.15	Fan heater not connected	<ol style="list-style-type: none"> 1. Remove the housing cover and check that the ribbon cable to the fan heater is fully inserted. 2. Exchange fan heater.
init 2.16	Fan in the fan heater does not rotate	<ol style="list-style-type: none"> 1. Remove the housing cover and check that the ribbon cable to the fan heater is fully inserted. 2. Exchange fan heater.
init 2.17	Fan in the fan heater always rotates	<ol style="list-style-type: none"> 1. Remove the housing cover and check that the ribbon cable to the fan heater is fully inserted. 2. Exchange fan heater.

Error code	Cause	Action
init 2.18	Communication temperature monitoring sensor, warming plate, heating circuit No. 4	1. Open cover flap and check that the plug to the warming plate is fully inserted. 2. Exchange warming plate.
init 3.1	Target temperature cannot be read	Contact the manufacturer.
init 3.2	Parameters for locking the options menu cannot be read	Contact the manufacturer.
init 3.3	Data management parameters cannot be read	Contact the manufacturer.
init 3.4	Controller parameters for fan heater cannot be read	Contact the manufacturer.
init 3.5	Controller parameters for warming plate cannot be read	Contact the manufacturer.
init 3.6	Error memory cannot be read	Contact the manufacturer.
init 3.7	Serial number cannot be read	Contact the manufacturer.
init 3.9	No access to the SD card possible	Reinsert the SD card or replace the defective SD card with a new one.
init 3.10	Volume parameters cannot be read	Contact the manufacturer.
init 3.11	Production parameters cannot be read	Contact the manufacturer.
init 3.12	Touch screen parameters cannot be read	Contact the manufacturer.
init 4.2	Controller cannot interrupt the supply voltage	Contact the manufacturer.
init 4.3	Watchdog controller cannot interrupt the supply voltage	Contact the manufacturer.

7 Accessories

Article	Article no.
Thermometer block for fixation of clinical thermometers	97.8710.543

8 Appendix

- Test reports of outgoing inspections
- Check list for preventive inspection
- Decontamination certificate

9 Check list for preventive inspection

Hints

- Observe the indications in the Service Manual and Instructions for use
- Only use calibrated test equipment

Test item

Type	Order no.	Serial no.
<input type="checkbox"/> SAHARA 4	97.8720.500	

Tests

Visual examination Every 24 months	Electrical safety according to EN 62353 Every 24 months	Function test/ External calibration Every 12 months
<input type="checkbox"/> Cleanness, completeness, damage	Grenzwert	Measur. value
<input type="checkbox"/> Device inscription	PE-resistance, permanently attached cord	0.300 Ω
<input type="checkbox"/> Documents	Equipment leakage current, Class I, direct	0.5 mA
		Ω
		mA
		<input type="checkbox"/> Function test
		<input type="checkbox"/> Position fan test
		<input type="checkbox"/> External calibration

Test equipment

Used test equipment	Test equipment name/number
Device for checking the electrical safety	
Thermometer	

Result and measures

Defects have been detected that may harm patients, users or third parties:

- YES NO
 Adjustment None

Measures to take: Repair

Comments:

Checked by:	Date/Signature:	Next test date:
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10 Decontamination certificate

1. General Information:

For all returns, the fully completed certificate of decontamination is a prerequisite for the acceptance and further processing of the used item.

Please attach the decontamination certificate clearly visible on the outside of the packaging so that it can be read without unpacking the item. If no corresponding declaration is enclosed, we will carry out a chargeable decontamination at your expense.

To be completed in block capitals:

Customer Name: _____

Institute/institution/company: _____

Place: _____

Safety level laboratory*: _____

Protection level laboratory *: _____

E-mail address: _____

Phone number: _____

*Applies only to items shipped from laboratories up to and including S2 and/or L2. Shipment is prohibited from L3/S3 onwards.

Quantity	Product description	Item No.	LOT/Serial No.

2. Confirmation:

Complaints pattern was contaminated: yes no

if so, by which substances:

- biological agents (according to BioStoffV)
- derived from body materials
- DNA intercalating substances
- Radioactive substances
- Other substances, if so, which:

Measures for decontamination: _____

I hereby certify that the items listed under point 1 are free from contamination with the substances listed under point 2.

Place, date
Signature of the authorized person

