TRANSMED
SARSTEDT-GRUPPE

SERVICE MANUAL

SAHARA-III
SAHARA-TSC

SN 99121624

CE 0123

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1 General advice

- ! Carefully read the complete service manual. Follow the information in the instructions for use.
- ! Repairs, maintenances and tests on the device must only be conducted by authorised persons and organisations who have the know-how and the appropriate instruments and test equipment available. Just owning this service manual does not entitle to service works.
- ! 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 modificated.
- ! Before opening 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.
- ! Calibration of inspection equipment has to be performed by the tester himself.

2 Symbol description

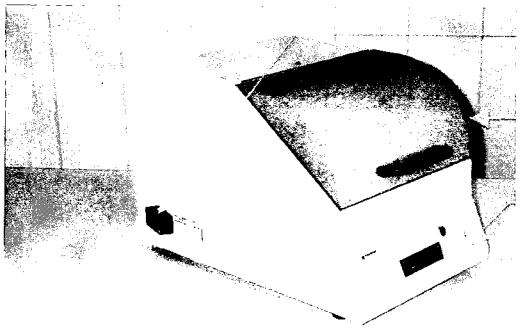
Important information. If ignored a defect may occur.

Helpful information.

Operating instruction.

3 Device setup

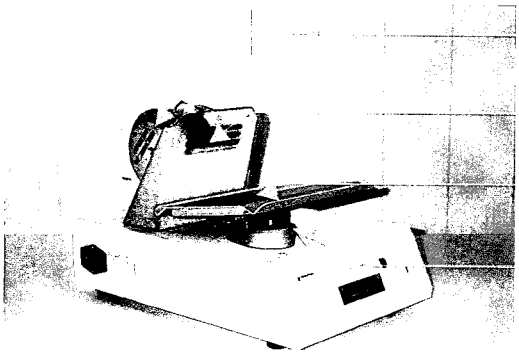
3.1 Exterior view



- Power switch
- System flap
- Keypad

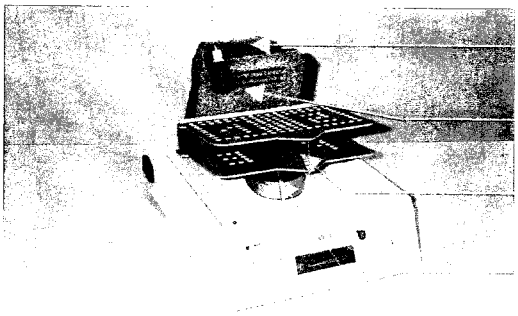
3.2 Interior view - SAHARA-III

3.2.1 SAHARA-III Basic model



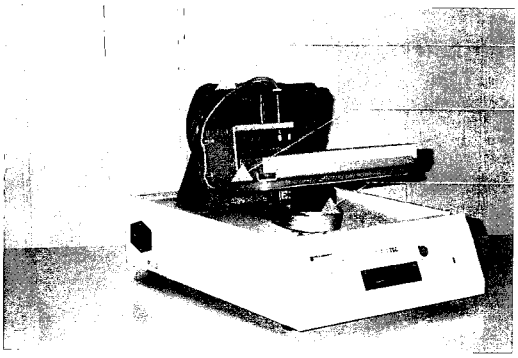
- Warming blower
- Infrared sensor
- Module Warming plate
- Agitator mechanism

3.2.2 SAHARA-III MAXITHERM



- Warming blower
- Infrared sensor
- Module MAXITHERM
- Agitator mechanism

3.3 Interior view - SAHARA-TSC



- Warming blower
- Warming plate SAHARA-TSC
- Agitator mechanism

3.4 Functional description

3.4.1 Agitator mechanism

The agitator mechanism incl. the cable AM-CPU serves the agitation of the agitation plate installed in the device during the tempering process. The tilting of the agitator mechanism is generated by a DC servo motor, transferring its motion to the agitator mechanism via a distance bolt. The direction of rotation and the terminal positions of the DC servo motor are controlled via a pulse-width modulation signal of the microprocessor on the main board. The microprocessor is connected to the agitator mechanism via the cable AM-CPU.

3.4.2 Warming blower

The warming blower serves the heating and distribution of air inside the device during the tempering process; it is composed of a blower, a flat heating device and the sensor module circulating air. The air temperature inside the device is controlled via a microprocessor on the main board which continuously measures the air temperature in the suction area of the warming blower via the sensor module circulating air and controls the flat heating device and the blower. The microprocessor is connected to the sensor module circulating air via the cable CPU-Air sensors.

3.4.3 Infrared sensor

The infrared sensor is composed of a Thermopile module incl. an infrared sensor cable, a round frame including the infrared filter and a screw joint PG7 and serves the contactless temperature measurement of the blood product placed below. The microprocessor is connected to the infrared sensor via the infrared sensor cable.

3.4.4 Module Warming plate

During the tempering process the module *Warming plate* is actively heated. It is composed of an aluminium plate, a built-in electrical flat heating device as well as the cable heating circuit board-AM with a coding plug at its end. The temperature of the warming plate is controlled via a microprocessor on the main board which continuously measures the temperature of the warming plate via a sensor pair in the warming plate and controls the flat heating device. After plugging the cable heating circuit board-AM in the agitator mechanism, the microprocessor is connected to the sensor pair in the warming plate and the flat heating device in the module Warming plate via the cable AM-CPU.

3.4.5 Module MAXITHERM

The module *MAXITHERM* is composed of a folding double plate and a coding plug that is connected with the double plate. In contrast to the module Warming plate the module MAXITHERM is not actively heated during the tempering process.

3.4.6 Warming plate SAHARA-TSC

The warming plate SAHARA-TSC is actively heated during the tempering process. It is composed of an aluminium plate, a built-in electrical flat heating device, the infrared sensor TSC as well as the cable heating cicuit board-AM with a coding plug at its end. The temperature of the warming plate is controlled via a microprocessor on the main board which continuously measures the

temperature of the warming plate via a sensor pair in the warming plate and controls the flat heating device. After plugging the cable heating circuit board-AM in the agitator mechanism, the microprocessor is connected to the infrared sensor TSC, the sensor pair in the warming plate and to the flat heating device in the module Warming plate via the cable AM-CPU.

4 Safety tests

The operator is bound to regularly perform the following safety tests or have these done. After maintenance or repair works the tests below have to be done if the safety and the functioning of the device could be affected by the service measures.

Test	Proceeding	Test interval
Visual examination	Check the device for completeness, contamination and safety-relevant damages. Check the device inscriptions for completeness and readability. Check the accompanying documents for availability and completeness.	Every 24 months
Examination of the electrical safety	Measurement of the earth leakage current and the resistance of the protective earth conductor according to IEC/EN 60601-1.	Every 24 months
Function test	Execution of the system test according to the instructions for use	Every 3 months

Please use the form „Check list for safety tests" as documentation of the tests (see Chap. 9)

5 Repair

When ordering spare parts please do always indicate the serial number of the SAHARA device concerned!

5.1 List of spare parts

5.1.1 Assemblies

Product	Order no.	Packaging
Infrared sensor Consisting of Thermopile module incl. infrared sensor cable, round frame incl. infrared filter and screw joint PG7	97.8671.404	1
Agitator mechanism incl. Servo and MM-CPU cable	97.8671.501	1
Warming blower 230 V Consisting of blower, flat heating device and sensor module circulating air	97.8671.601	1

Product	Order no.	Packaging
Warming blower 115 V Consisting of blower, flat heating device and sensor module circulating air	97.8671.602	1
Warming plate SAHARA-TSC incl. cable heating circuit board-AM and infrared sensor TSC	97.8671.605	1
Module MAXITHERM Consisting of a double plate and a coding plug	97.8710.580	1
Module Warming plate incl. cable heating circuit board-AM	97.8710.590	1

5.1.2 Single components

Product	Order no.	Assembly	Packaging
Power supply unit 115/230V Power supply for CPU	97.8671.101		1
CPU 230V Main board, equipped	97.8671.201		1
CPU 115 V Main board, equipped	97.8671.202		1
Keypad	97.8671.301		1
Infrared filter	97.8671.401	*Infrared sensor and warming plate SAHARA-TSC*	1
Infrared sensor TSC	97.8671.402	*warming plate SAHARA-TSC*	1
Sensor module circulating air	97.8671.403	*Warming blower*	1
Servo	97.8671.502	*Agitator mechanism*	1
Cable AM-CPU Connects agitator mechanism to CPU	97.8671.503	*Agitator mechanism*	1
Flat heating device 230V	97.8671.603	*Warming blower*	1
Flat heating device 115V	97.8671.604	*Warming blower*	1
Cable CPU-Air sensors Connects CPU to sensor module circulating air	97.8671.901	*Warming blower*	1
Screw joint PG7	97.8671.902	*Infrared sensor*	1
Cable CPU-Interface Connects CPU to RS 232 interface at the rear of the device	97.8671.903		1
Cable keypad-CPU Connects keypad to CPU	97.8671.904		1
Cable heating circuit board-AM Connects heating circuit board to agitator mechanism	97.8671.905	*Module Warming plate and warming plate SAHARA-TSC*	1
Pin Guide pin for agitation plate	97.8671.910	*Module Warming plate, warming plate SAHARA-TSC and module MAXITHERM*	1
Warming shell SAHARA-TSC	97.8710.620		1

5.2 Open and close the housing

☞ Switch off the device and disconnect it from the local power supply.

☞ Open the turnbuckle at the rear of the housing. Carefully lift the upper part of the housing, pull it to the front and lift it off.

☞ If an agitation plate is built in remove it carefully from its plug-in connection and remove the coding plug from the agitator mechanism. Do not tilt the agitation plate by hand! If a stainless steel tray is installed remove it.

☞ Lay the device sideways and unscrew the screws at the edge of the housing bottom. Put the device upright again.

☞ Lift the lower part of the housing and put it on the right side.

For re-assembling, follow the instructions above in reverse order.

At re-assembling and closing the housing take care not to shut any cable.

5.3 Agitator mechanism

☞ Open the housing (see Chap. 5.2).

☞ Note the positioning of the servo cable plug on the main board. Pull the cable AM-CPU and the servo cable from the main board.

☞ Lay the device sideways and unscrew the screws holding the agitator mechanism at the housing bottom. Put the device upright again and remove the defect agitator mechanism.

☞ Mount the new agitator mechanism to the housing bottom and connect the cable AM-CPU and the servo cable to the main board.

Observe the previously noted positioning of the servo cable at plugging it in the main board.

☞ Close the housing (see Chap. 5.2).

☞ Start the device and check the functioning of the agitator mechanism by means of the system test.

5.4 Warming blower

☞ Open the housing (see Chap. 5.2).

☞ Pull the 3-pin plug of the blower cable from the main board and note the colour allocation of the blower cable wires to the wrap connections. Unscrew the plug of the blower cable.

☞ Pull the 2-pin plug of the flat heating device cable from the main board and unscrew the plug.

☞ Unscrew the ring lug of the protective earth conductor from the housing bottom and cut the cable. Lead the protective earth conductor, flat heating device cable and blower cable through the grommets.

☞ Reset the lower part of the housing on to the housing bottom and remove the cable CPU-air sensors from the sensor module circulating air.

☞ Remove the cable duct of the infrared sensor cable from the housing of the warming blower.

☞ Unscrew the screws holding the warming blower from the sheet metal.

☞ Remove the defect warming blower and mount a new warming blower as well as the cable duct. Connect the cable CPU-air sensors to the sensor module circulating air.

☞ Lift the lower part of the housing and lay it to the right side.

☞ Lead the protective earth conductor, flat heating device cable and blower cable through the grommets. Fix the protective earth conductor to the ring lug and screw the ring lug to the lower part of the housing.

☞ Screw the cable of the warming blower and of the flat heating device to the corresponding plugs and connect them to the main board.

Observe the previously noted allocation of wires to the wrap connections at screwing the blower cable plug.

☞ Close the housing (see Chap. 5.2).

☞ Start the device and check the functioning of the warming blower by means of the system test.

5.5 Infrared sensor

In order to exchange the infrared sensor the service module is indispensable (see Chap. 7).

☞ Open the housing (see Chap. 5.2).

☞ Remove the cable tie and disconnect the infrared sensor cable from the main board.

☞ Note the colour allocation of the wires in the infrared sensor cable to the wrap connections in the frame. Loosen and pull out the contacts in the frame of the infrared sensor cable by means of a pointed tool.

☞ Loosen the screw nut of the strain relief at the screw joint PG7 and unscrew the screw joint PG7 at the round frame of the infrared sensor.

☞ Lead the infrared sensor cable through the grommet, the screw joint PG7 and the warming blower sheet metal and remove the defect infrared sensor.

Installation of the new infrared sensor in reverse order.

Observe the previously noted allocation of wires to the wrap connections at inserting the wires in the frame.

☞ Close the housing (see Chap. 5.2).

☞ Adjust the infrared sensor by means of the service module (see Chap. 7).

5.6 Module Warming plate

☞ Switch off the SAHARA-III and open the system flap.

☞ Carefully pull the defect warming plate out of its plug-in connection and remove the coding plug from the agitator mechanism. Do not tilt the warming plate by hand!

☞ Connect the coding plug „Warming plate" of the new warming plate to the socket at the rear of the agitator mechanism and plug the new warming plate in the agitator mechanism.

Only use warming plates disposing of the same colour coding as the agitator mechanism.

☞ Close the system flap.

☞ Start the device and check the functioning of the warming plate by means of the system test.

5.7 Warming plate SAHARA-TSC

☞ Switch off the SAHARA-TSC and open the system flap.

☞ Carefully pull the defect warming plate out of its plug-in connection and remove the coding plug from the agitator mechanism. Do not tilt the warming plate by hand!

☞ Connect the coding plug „Warming plate" of the new warming plate SAHARA-TSC to the socket at the rear of the agitator mechanism and plug the new warming plate SAHARA-TSC in the agitator mechanism.

Only use warming plates disposing of the same colour coding as the agitator mechanism.

☞ Close the system flap.

☞ Start the device and check the functioning of the warming plate by means of the system test.

5.8 Module MAXITHERM

☞ Switch off the SAHARA-III and open the system flap.

☞ Carefully pull the double plate of the defect module MAXITHERM out of its plug-in connection and remove the coding plug from the agitator mechanism. Do not tilt the double plate by hand!

☞ Connect the coding plug „MAXITHERM" of the new module MAXITHERM to the socket at the rear of the agitator mechanism and plug the new double plate in the agitator mechanism.

☞ Close the system flap.

☞ Start the device and check the functioning of the module MAXITHERM by means of the system test.

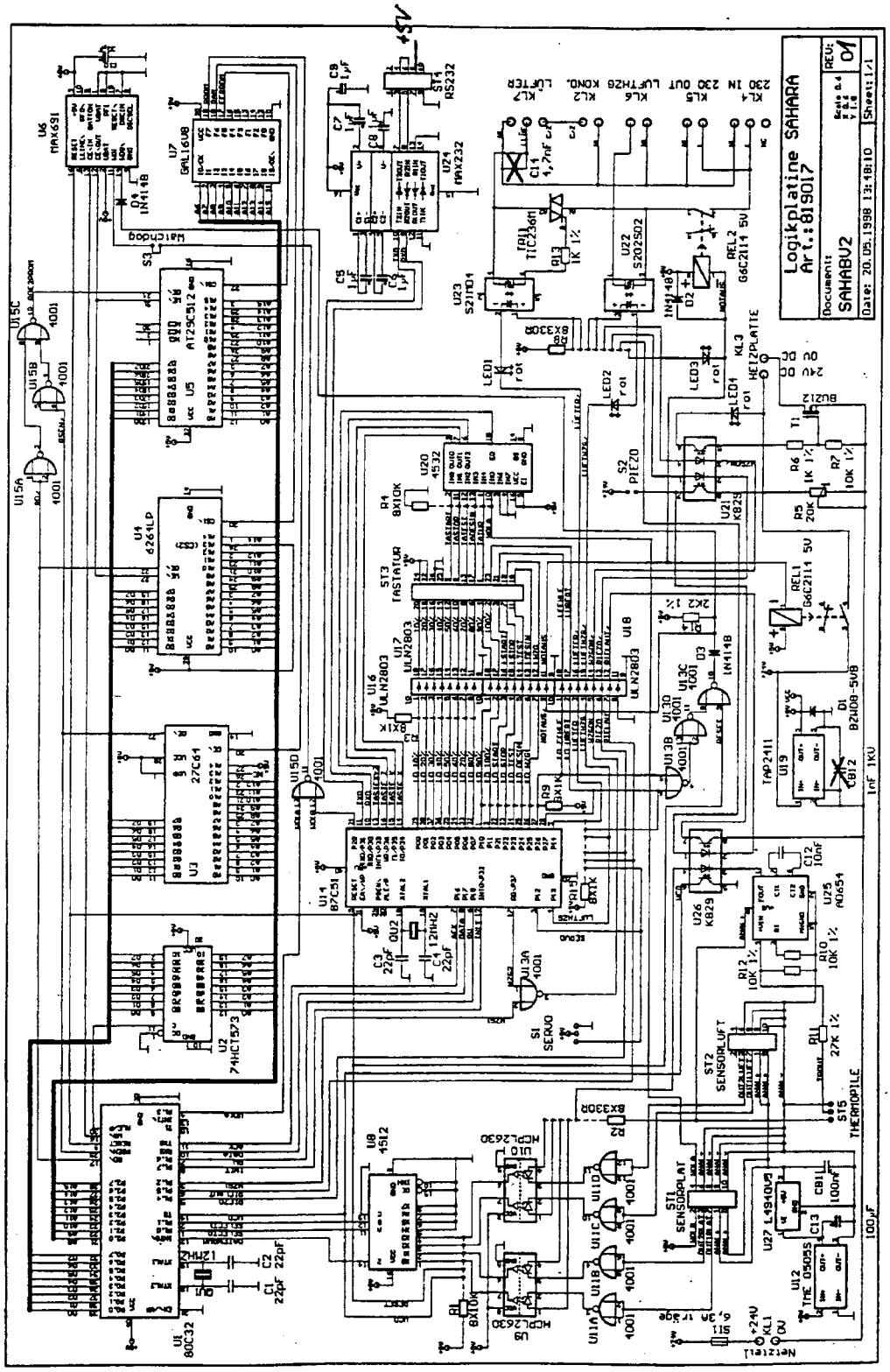
6 Technical information

6.1 Technical data

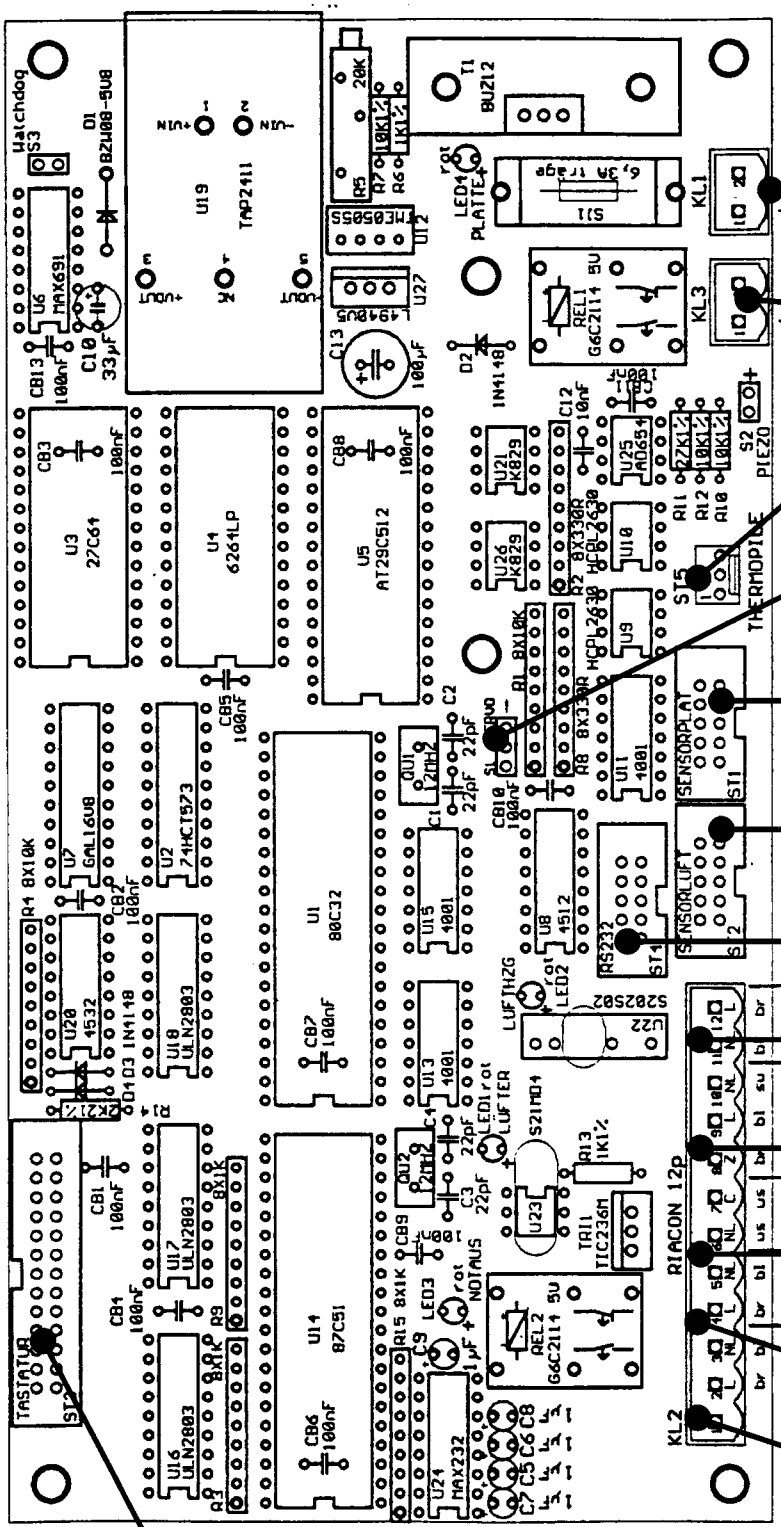
Dimensions:	W×H×D: 320 mm × 325 mm × 493 mm	
Weight:	SAHARA-III basic model:	13,7 kg
	SAHARA-III basic model 115V:	13,7 kg
	SAHARA-III MAXITHERM:	13,4 kg
	SAHARA-III MAXITHERM 115V:	13,4 kg
	SAHARA-TSC	14,3 kg
	SAHARA-TSC 115V	14,3 kg
Rated voltage (±10 %):	SAHARA-III basic model:	230 V AC
	SAHARA-III basic model 115V:	115 V AC
	SAHARA-III MAXITHERM:	230 V AC
	SAHARA-III MAXITHERM 115V:	115 V AC
	SAHARA-TSC	230 V AC
	SAHARA-TSC 115V	115 V AC
Frequency:	50 – 60 Hz	
Rated power; current consumption:	SAHARA-III basic model:	530 W; 2,3 A
	SAHARA-III basic model 115V:	530 W; 4,6 A
	SAHARA-III MAXITHERM:	400 W; 1,7 A

	SAHARA-III MAXITHERM 115V:	400 W; 3,4 A
	SAHARA-TSC	550 W; 2,4 A
	SAHARA-TSC 115V	550 W; 4,8 A
Accuracy of temperature measurement:	SAHARA-III: Max. ± 4% at 37 °C	
	SAHARA-TSC: Max. ± 1,5 °C at 0 °C	
Ambient conditions:	5 - 30 °C	
	max. 85 % rel. air humidity	
Protection class:	I	

6.2 Circuit diagram



6.3 Component placement specification



6.4 Error messages

By means of the following table errors indicated on the keypad as well as occurring failures can be remedied. If more than one measure appears to be suitable in remedying a particular error, then each measure must be implemented one after another.

Should none of the listed measures eliminate the error please contact the manufacturer. In this case, please give the serial number that is indicated on the bottom side of the device, as well as an error description.

*After each measure a **system test** should be executed.*

Error message/Failure SAHARA-III/SAHARA-TSC	Cause	Measure(s):
ERROR +FREE OF ICE	Parameters of the infrared sensor beyond the tolerance range	1. Check the correct position of the infrared sensor. 2. Adjust the infrared sensor by means of the service module (see Chap. 7). 3. Exchange the infrared sensor (see Chap.5.5 for SAHARA-III).
ERROR+29°/ERROR+LED1	Cable AM-CPU is not connected to the main board	Open the housing (see Chap.5.2). Check if the cable AM-CPU is completely inserted in the plug ST1 of the main board (see Chap. 6.3).
ERROR+30°C /ERROR+LED2	Inadmissible temperature range	Inform the manufacturer of the device.
ERROR+31°C/ERROR+LED3	Warming plate defect	1. Take out the warming plate and check the cable heating circuit board-AM of the warming plate for possible breaks. In case of a cable break exchange the cable heating circuit board-AM . 2. Exchange the warming plate (see Chap. 5.6 or 5.7).
ERROR+32°C/ERROR+LED4	Sensor module circulating air defect	Exchange the sensor module circulating air.
ERROR+33°C/ERROR+LED5	Cable of the warming blower is not connected to the main board	Open the housing (see Chap. 5.2). Check if the 3-pin blower cable is completely inserted in the plug KL2, PIN 8, 9 a. 10 of the main board (see Chap. 6.3).
	Condenser cable is not connected to the main board	Open the housing (see Chap. 5.2). Check if the white 2-pin condensor cable is completely inserted in the plug KL2, PIN 6 a. 7 of the main board (see Chap. 6.3).
	Wires of the blower cable interchanged	Open the housing (see Chap. 5.2). Check if the colours of the 3 wires of the blower cable comply with those of the plug KL2 in the component placement specification (see Chap. 6.3).
	Warming blower defect	Exchange the warming blower (see Chap. 5.4).

Error message/Failure SAHARA-III/SAHARA-TSC	Cause	Measure(s):
ERROR+34°C/ERROR+LED6	Cable of the flat heating device of the warming blower not connected to the main board	Open the housing (see Chap. 5.2). Check if the cable of the flat heating device is completely inserted in the plug KL2, PIN 11 a. 12 of the main board (see Chap. 6.3).
	Flat heating device of the warming blower defect	Exchange the flat heating device.
ERROR+35°C/ERROR+LED7	Warming plate defect	1. Take out the warming plate and check the cable heating circuit board-AM cable of the warming plate for possible breaks. In case of a cable break, exchange the cable heating circuit board-AM. 2. Exchange the warming plate (see Chap. 5.6 or 5.7).
	Cable AM-CPU defect	Open the housing (see Chap. 5.2) and check the cable AM-CPU between the agitator mechanism and the main board for possible breaks. In case of cable breaks, exchange the cable AM-CPU.
	Cable AM-CPU not connected to the main board	Open the housing (see Chap. 5.2). Check if the cable AM-CPU is inserted in the plugs ST1 as well as PSL1 of the main board (see Chap. 6.3).
ERROR+36°C/ERROR+LED8	Communication with the sensor module circulating air interrupted	1. Take off the upper part of the housing and check the correct position of the cable CPU-air sensors in the plug of the sensor module circulating air. 2. Open the housing (see Chap. 5.2) and check the correct position of the cable CPU-air sensors in the plug on the main board (see Chap. 6.3).
	Cable AM-CPU defect	Open the housing (see Chap. 5.2) and check the cable AM-CPU between the agitator mechanism and the main board for possible breaks. In case of a cable break, exchange the cable AM-CPU.
	Cable AM-CPU not connected to the main board	Open the housing (see Chap.5.2). Check if the cable AM-CPU is completely inserted in the plug ST1 of the main board (see Chap. 6.3).
ERROR+37°C/ERROR+LED9	Communication with the infrared sensor interrupted	Open the housing (see Chap. 5.2) and check if the cable between the infrared sensor and the main board is completely inserted in the plug ST5 of the main board (see Chap. 6.3).
	Infrared sensor defect	Exchange the infrared sensor (see Chap. 5.5 for SAHARA-III).
No LED illuminated	Communication with keypad interrupted	Open the housing (see Chap. 5.2) and check the correct position of the cable keypad-CPU on the keypad and the main board. The plug marker has to point upwards!
	Power supply of the main board interrupted	Open the housing (see Chap. 5.2) and check the correct position of the cable between the power supply unit and the main board.

7 Accessories

Product	Order no.	Packaging
Service Modul SA-/TT-III/-TSC Module for adjustment, calibration and volume control of SAHARA-III/SAHARA-TSC, consisting of an adjustment plate inc. 5x calibration/adjustment labels, service plug and thermometer disk	97.8710.541	1
Set calibration/adjustment labels Contents: 20 pcs. calibration/adjustment labels	97.8710.542	1

8 Declaration of conformity

Due to the EC Council Directive MDD 93/42/EEC, appendix IX the dry-tempering systems SAHARA- III and SAHARA-TSC are medical electrical products of class IIa.

The company TRANSMED Medizintechnik GmbH & Co. KG is manufacturer according to the EC Council directive MDD 93/42/EEC. Because TRANSMED has implemented an assessment of conformity to MDD 93/42/EEC they are allowed to label the device with the EC mark

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