eppendorf

Thermomixer 5350/5355
Thermostat plus 5352

Service manual - English

5355 900.055-17/082014

Table of contents

1 Operating instructions

1.1 Using this manual

- Make sure that the service manual and the operating manual are available in the latest versions. To do so, compare the version numbers. The latest versions of the manuals can be downloaded from www.eppendorf-support.com and www.eppendorf.com.
- Read the service manual before commencing work on the device.
- Read the chapters "Installation" and "Operation" of the operating manual.
- Observe the safety instructions in the operating manual.

1.2 Danger symbols and danger levels

The safety precautions in these instructions have the following danger symbols and danger levels.

1.2.1 Danger symbols

	**Biological hazard**		**Explosion**
	**Risk of electric shock**		**Risk of burns**
	**Cuts**		**Hazard point**
	**Material damage**		

1.2.2 Danger levels

DANGER	*Will* lead to severe injuries or death.
WARNING	*May* lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Depiction	Meaning
1. 2.	Actions in the specified order
▸	Actions without a specified order
•	List
Text	Display text or software text
ⓘ	Additional information

1.4 Abbreviations used

DWP
Deepwell plate

EEPROM
Electrically Erasable Programmable Read-Only Memory

IQ
Installation Qualification

MTP
Micro test plate

OQ
Operational Qualification

PCB
Printed circuit board

rpm
Revolutions per minute

SOP
Standard Operating Procedure

WAF
Wrench opening

5350
Thermomixer compact

5352
Thermostat plus

5355
Thermomixer comfort/Thermomixer R

2 Product description

2.1 Product description

Product numbers and device designations

- 5350: Thermomixer/Thermomixer compact
- 5352: Thermostat plus
- 5355: Thermomixer R/Thermomixer comfort

3 Safety

3.1 User profile

The specialist entrusted with maintenance, repair or testing must meet the following prerequisites:

- Successful participation in service trainings with certification by Eppendorf AG for the product that is to be maintained, repaired or tested.
- Qualification as a specialist with knowledge of the applicable local and international standards.
- Qualification to evaluate the work assigned to him.
- Recognition of potential hazards and how to prevent or correct them.

3.2 Notes on liability

The Eppendorf service organization entrusted with maintenance, servicing or testing is liable for ensuring that all work is carried out in a professional manner.

- Repair, maintenance and testing may not change the existing construction of the device. The device must always be as safe as it is in its original state.
- Only accessories and original spare parts recommended by Eppendorf, and measuring and test equipment recommended by Eppendorf may be used for any maintenance, servicing or testing work.

3.3 Maintenance and repair hazards

DANGER! Electric shock.

- Switch the device off.
- Unplug the mains/power plug.
- Then begin repairing, servicing or cleaning the device.

DANGER! Risk of explosion.

- Do not operate the device in areas where work is completed with explosive substances.
- Do not use this device to process any explosive or highly reactive substances.
- Do not use this device for processing any substances which could generate an explosive atmosphere.

WARNING! Infection by contaminated material.
There may be contaminated material on the device and accessories. Risk of infection with contaminated material.

- Find out more about contamination risks before beginning work.
- Check the device decontamination certificate.
- Work may only be completed on a decontaminated device.
- Wear personal protective equipment (protective gloves, protective goggles).

WARNING! Burns from hot surfaces.
The metal surfaces of the thermoblocks and the hot plate reach temperatures in excess of 100 °C.

- Do not touch any hot surfaces.
- Wait until the thermomixer or thermostat have cooled to room temperature.
- Then start your test, maintenance or repair work.

CAUTION! Injury from sharp-edged components.
The opened device contains sharp-edged components. Risk of injury from sharp-edged components.

- Wear protective gloves.
- Work with extreme care.

3.4 Warning and instruction signs on the device

Representation	Meaning	Location
	**Warning! Risk of burns from hot surfaces.** The exchangeable thermoblock and the heating/cooling plate can be very hot after heating and cause burns. ▸ Allow heated exchangeable thermoblocks and the heating/cooling plate to cool down completely before removing the exchangeable thermoblock.	Upper device side

4 Operation

5 Troubleshooting

5.1 Error messages

5.1.1 Thermomixer 5350 and 5355

Problem	Cause	Solution
Display remains dark.	• No mains connection. • Device fuse defective. • Switched power supply unit defective.	▸ Insert power plug. ▸ Exchange fuses. ▸ Exchange switched power supply unit.
No reaction to keystroke.	• Keypad defective. • Plug connection to the keypad slack.	▸ Exchange keypad. ▸ Restore plug connection.
Nominal temperature is not reached. (5350 only)	• With target values < 4 °C over ambient temperature	▸ Set up the device in a cooler environment.
Device is not heating.	• Heating/cooling plate or thermoblock defective. • Control defective.	▸ Exchange heating/cooling plate or thermoblock. ▸ Exchange PCB Mixer compact/ comfort.
Device is not cooling (only 5355).	• Heating/cooling plate defective. • Control defective. • Large fan defective (only 5355).	▸ Exchange heating/cooling plate. ▸ Exchange PCB Mixer comfort. ▸ Exchange large fan.
"TOO HOT"	• Heating/cooling plate or thermoblock hotter than 110°C.	▸ Exchange heating/cooling plate or thermoblock.
"T-SENSOR ERR"	• Temperature sensor defective.	▸ Exchange heating/cooling plate or thermoblock.
"TEMP ERR"	• Nominal temperature is not reached.	▸ Exchange heating/cooling plate or thermoblock.
"EEChksumERR" "RAM ERR" "EEprom ERR"	• Memory error	▸ Switch off / on device. ▸ Exchange PCB Mixer compact/ comfort.
"MOTOR ERR"	• Drive (motor, swing frame, eccentric, exchangeable thermoblock) blocked. • Motor defective. • Control defective.	▸ Rotate drive by hand and remove blockage if necessary. ▸ Exchange motor. ▸ Exchange PCB Mixer compact/ comfort.
"SPEED ERR"	• Motor is turning at overspeed.	▸ Exchange PCB Mixer compact/ comfort. ▸ Exchange motor.
"HEAVY LOAD" Mixer will not start at 300-400 rpm.	• Software version < V1.3. • Exchangeable thermoblock / thermoblock blocked.	▸ Software update (replace EEPROM). ▸ Remove blockage.

Problem	Cause	Solution
"Unspec. thermoblock" Exchangeable thermoblock is not detected, or not detected correctly (only 5355).	• Block sensors defective. • Block ID switched off. • Exchangeable thermoblock cannot be detected due to old software.	▸ Exchange heating/cooling plate. ▸ Switch on block ID. ▸ Software update (exchange EEPROM).
Device automatically switches off and on intermittently (self-reset).	• Contact fault in the connector between switched power supply unit and PCB Thermomixer compact/ comfort (5 V line).	▸ Thoroughly clean contacts in the connector and the switched power supply unit.

5.1.2 Thermostat 5352

Problem	Cause	Solution
Display remains dark.	• No mains connection. • Device fuse defective. • Switched power supply unit defective (5 V missing).	▸ Insert power plug. ▸ Exchange fuses. ▸ Exchange switched power supply unit.
No reaction to keystroke.	• Keypad defective. • Plug connection to the keypad slack.	▸ Exchange keypad. ▸ Restore plug connection.
Is not heating and cooling, fan pair is not running.	• Switched power supply unit defective (24 V missing). PCB Thermostat plus defective.	▸ Exchange switched power supply unit. ▸ Exchange PCB Thermostat plus.
No temperature control, fan pair is functioning.	• Thermoblock defective. • PCB Thermostat plus defective.	▸ Exchange thermoblock. ▸ Exchange PCB Thermostat plus.
Is heating, but not cooling, or vice versa.	• Relay on PCB Thermostat plus defective.	▸ Exchange PCB Thermostat plus.
Cooling is not fast enough. Nominal temperature < ambient temperature is not reached.	• Ambient temperature too high. • Fan pair defective	▸ Set up the device in a cooler environment. ▸ Exchange fan pair.

5.2 Service functions Thermomixer 5350 and 5355

The service program comprises several service functions. Individual assemblies of the thermomixer can be checked with the service functions and different settings can be made.

5.2.1 Activating the service program

1. Switch on the device.
2. Set the speed to 500 rpm.
3. Turn the mixer back off.
4. Press the **Temp –** key and switch the mixer on. Hold the **Temp –** key until "SERVICE ON" appears on the display.

   The service program is now activated.

The device must be switched off to exit the service program.

5.2.2 Service functions

Operating the service functions

- The service functions can be selected with the **Temp +/-** keys.
- To activate a service function press the **Start/Stop** key.
- Some of the service functions have several sub-functions which are counted alphabetically (example: 6. HeatPWM - sub-functions: Ha, Hb, Hc, etc.).
- To call subfunctions, use the **Temp +/-** key.
- To change parameters or activate/deactivate functions, use the **Mix +/-** key.
- To save the changes or to exit the function, use the **Start/Stop** key.

Only the subfunctions required for the servicing the devices are explained.
the parameters for the other subfunctions may not be changed!

5.2.3 Service functions for Thermomixer 5350

Abbreviation	Definition	Subfunctions
1. Motor	no service function	no service function
2. Temp	no service function	no service function
3. TempSens.	Setting of the Offset parameters for the sensors 0 (internal sensor) and 1 (external sensor).	(see *Setting of the temperature offset parameters on p. 41)*
4. TempCalibrate	Function for automatic temperature alignment	(see *Automatic temperature calibration on p. 43)*
5. SpeedSens.	Checking the speed sensor at 500 rpm. Hold the **Short/Mix** key pressed. The mixer starts and the current speed is displayed.	▸ Da: Starting of the drive with the Taste **Short/Mix** key.
6. HeatPWM	Switching the PWM between 1 kHz (slow) and 16 kHz (fast)	▸ Hc: Switching between slow and fast with the **Mix +/-** key.
7. Mot.PWM	no service function	no service function
8. Block	Function for manual temperature alignment	(see *Manual temperature calibration on p. 45)*
9. Inits!	Initialization	▸ Ia: Initializing the parameters entered by the user with the **Mix +** or **Mix -**key. ▸ Ib: Initializing all parameters with the **Mix +** or **Mix -** key. All changed or set parameters (including temperature alignment data) are reset or deleted. After an initialization of all parameters, a temperature alignment has to be performed(see *Thermomixer 5350 and 5355 temperature calibration on p. 41)*.

5.2.4 Service functions for Thermomixer 5355

Abbreviation	Definition	Subfunctions
1. Motor	no service function	no service function
2. Temp	no service function	no service function
3. TempSens.	Setting of the Offset parameters for the sensors 0 (internal sensor) and 1 (external sensor).	(see *Setting of the temperature offset parameters on p. 41)*
4. TempCalibrate	Function for automatic temperature alignment	(see *Automatic temperature calibration on p. 43)*
5. SpeedSens.	Checking the speed sensor at 500 rpm. Use the **Short/Mix** key. The mixer starts and the current speed is displayed.	▸ Da: Starting of the drive with the Taste **Short/Mix** key.
6. CoolPWM	no service function	no service function
7. HeatPWM	no service function	no service function
8. Mot.PWM	no service function	no service function
9. Block	Function for manual temperature alignment.	(see *Manual temperature calibration on p. 45)*
10. BlockID	Block identification	(see *Block ID Thermomixer 5355 on p. 20)*
11. Inits!	Initialization	▸ Ia: Initializing the parameters entered by the user with the **Mix +** or **Mix -**key. ▸ Ib: Initializing all parameters with the **Mix +** or **Mix -** key. All changed or set parameters (including temperature alignment data) are reset or deleted. After an initialization of all parameters, a temperature alignment has to be performed (see *Thermomixer 5350 and 5355 temperature calibration on p. 41)*.

5.2.5 Block ID Thermomixer 5355

WARNING! Warning! Damage due to deactivated block recognition.
With disabled block recognition, all exchangeable thermoblocks can be operated at up to 1500 rpm and 99 °C, although this is not permitted for some blocks.
At a too high speed, the device may begin to move around and fall off the table or damage objects in the vicinity.
Some exchangeable thermoblocks are not approved for operation at 99°C as they can be damaged by heat.

- Never operate the device with disabled block recognition.
- After repair or maintenance, ensure that the block recognition is enabled.
- Eppendorf accepts no warranty or liability for damage resulting from the disabling of the block recognition.

Subfunctions

- BIa: Switching the block ID on and off with the **Mix +/-** keys.
- BIb: Displaying the sensor values M1 and M2
- BIc: Displaying the block number and clear text display of the block.
- BId: Display of the voltage generated in the sensors. The values must be between 0 V and 5 V.

Functioning of the block ID

Two Hall sensors are embedded into the heating/cooling plate. With this function, the Hall sensors are displayed as M1 and M2. To make sure that different thermoblock types are identified, magnets with different positions (M1 and M2 (see Fig. 5-1 on p. 20)) and polarities (north and south) are assembled into the thermoblocks. When the value of the Hall sensor > 150 digits, it is identified as north (N). When the value is < 104 digits, it is identified as south (S). The minus symbol means there is no magnet at the sensor. The acceptable value for the Hall sensor –without thermoblock – at a heating/cooling plate temperature of ca. 25 °C must be between 120 and 140 digits. If the Hall sensor without thermoblock is < 120 / > 140, the heating/cooling plate must be replaced.

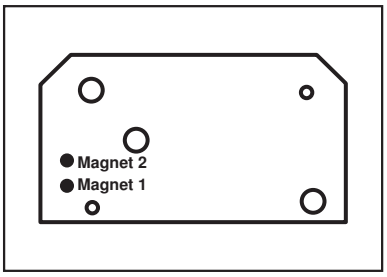


Fig. 5-1: View of the thermoblock from below.

Block code

Block type		**Display**	**Max. rpm**	**Max. [°C]**	**No.**	**Code table**			
						Magnet 1		Magnet 2	
Block 1	Block 2					North Magnetic Pole	South Magnetic Pole	North Magnetic Pole	South Magnetic Pole
without	without	>>>NO BLOCK<<<			0	-	-	-	-
Epp. 1.5/2 mL	Cryo 1.5-2 mL	1.5 mL/2.0 mL	1400	99	1	X	-	-	-
Epp. 0.5 mL	(open)	0.5 mL	1500	99	2	-	X	-	-
MTP	Hybri-4-slides DC	MTP/slides	1400	70 *	3	-	-	X	-
Conical tube 15 mL	Conical tube 50 mL	Conical tube 15/ 50 mL	750	99	4	-	-	-	X
Hybri-4-slides	(open)	Slides	1400	99	5	X	-	X	-
Block 6.1	Block 6.2	Block type 6			6	X	-	-	X
Block 7.1	Block 7.2	Block type 7			7	-	X	X	-
Block 8.1	Block 8.2	Block type 8			8	-	X	-	X

*: from software V2.13 max. 99 °C

6 Disassembly/assembly

6.1 Tools

- Allen screwdriver: WAF 2, WAF 3
- Cross screwdriver size 0, 1, 2
- Torx screwdriver: T8, T10 (only with newer devices)
- Slit screwdriver: 1x1, 5x100 or similar size
- Wrench: WAF 5, WAF 7

6.2 Disassembling the Thermomixer 5350

6.2.1 Thermoblock

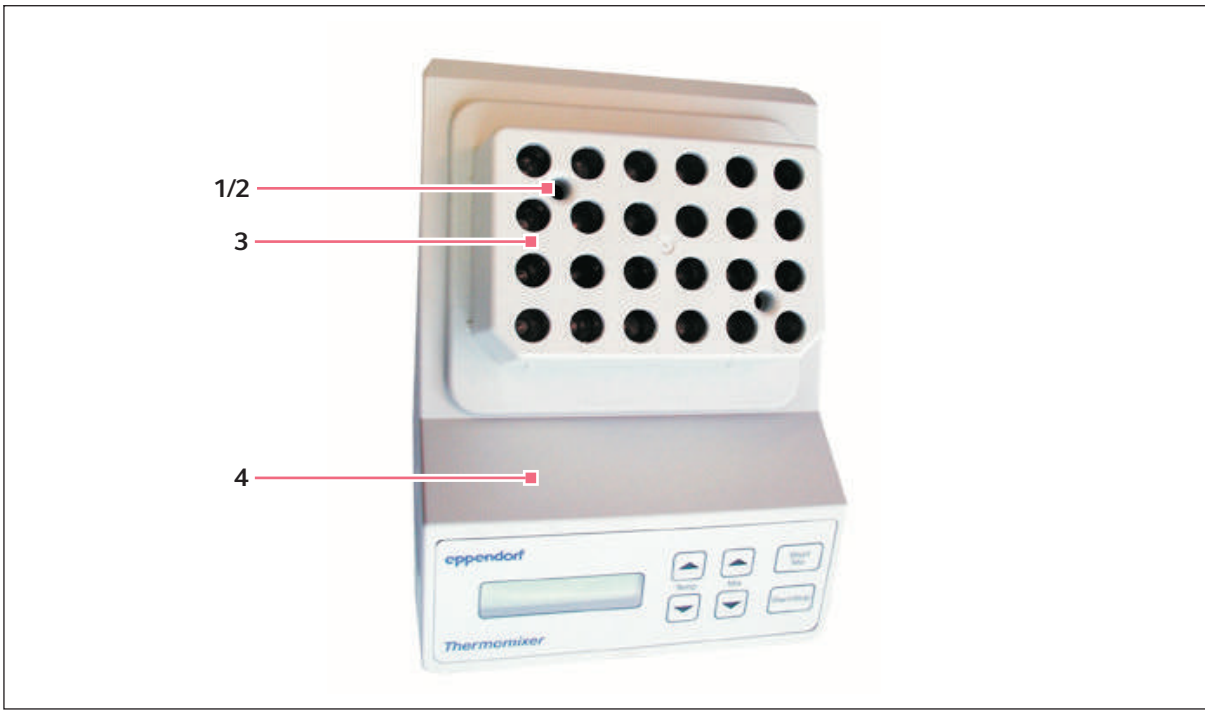


Fig. 6-1: View from above

1 Cover plugs

2 Allen screws

3 Thermoblock

4 Upper part of housing

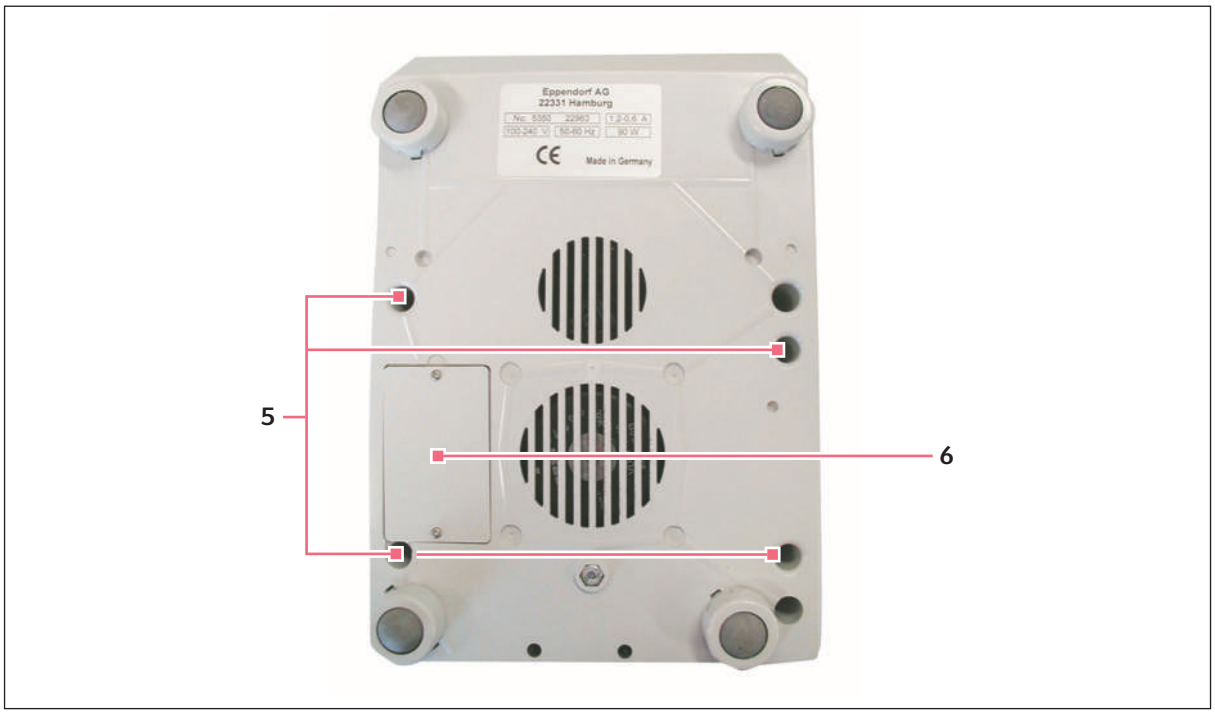


Fig. 6-2: View from below

5 Housing screws **6 Cover plate**

1. Place the device upside down.
2. Remove the cover plate (see Fig. 6-2 on p. 24).
3. Loosen the flex cable of the thermoblock
4. Place the device back on the feet.
5. Remove both cover plugs (see Fig. 6-1 on p. 23).
6. Remove both of the Allen screws (see Fig. 6-1 on p. 23).
7. Remove the thermoblock (see Fig. 6-1 on p. 23) upwards.
8. The assembly is carried out in reverse order. An adjustment is not necessary.

During assembly, observe that the flex cable does not touch the upper part of housing. It must be lead through behind the silicone ring.
Mind the positioning of the silicone ring. The silicone ring must be positioned on the bottom of the spacer bar (white plastic). Otherwise, the flex cable could touch the housing and be damaged during operation.
Put the shrink tubing over the flex cable, coming from below.

After the exchange of the thermoblock, the temperature must be calibrated (see *Thermomixer 5350 and 5355 temperature calibration on p. 41)*!

6.2.2 Upper part of housing

Prerequisites

The thermoblock has been removed.

1. Place the device upside down.
2. Remove the four housing screws (see Fig. 6-2 on p. 24) inside the sinkings.
3. Turn the device over again.
4. Lift the upper part of housing (see Fig. 6-1 on p. 23) and remove the plug connection to the keypad.
5. Installation proceeds in reverse order. An adjustment is not necessary.

6.2.3 Oscillating frame

Prerequisites

The thermoblock and the housing have been removed.

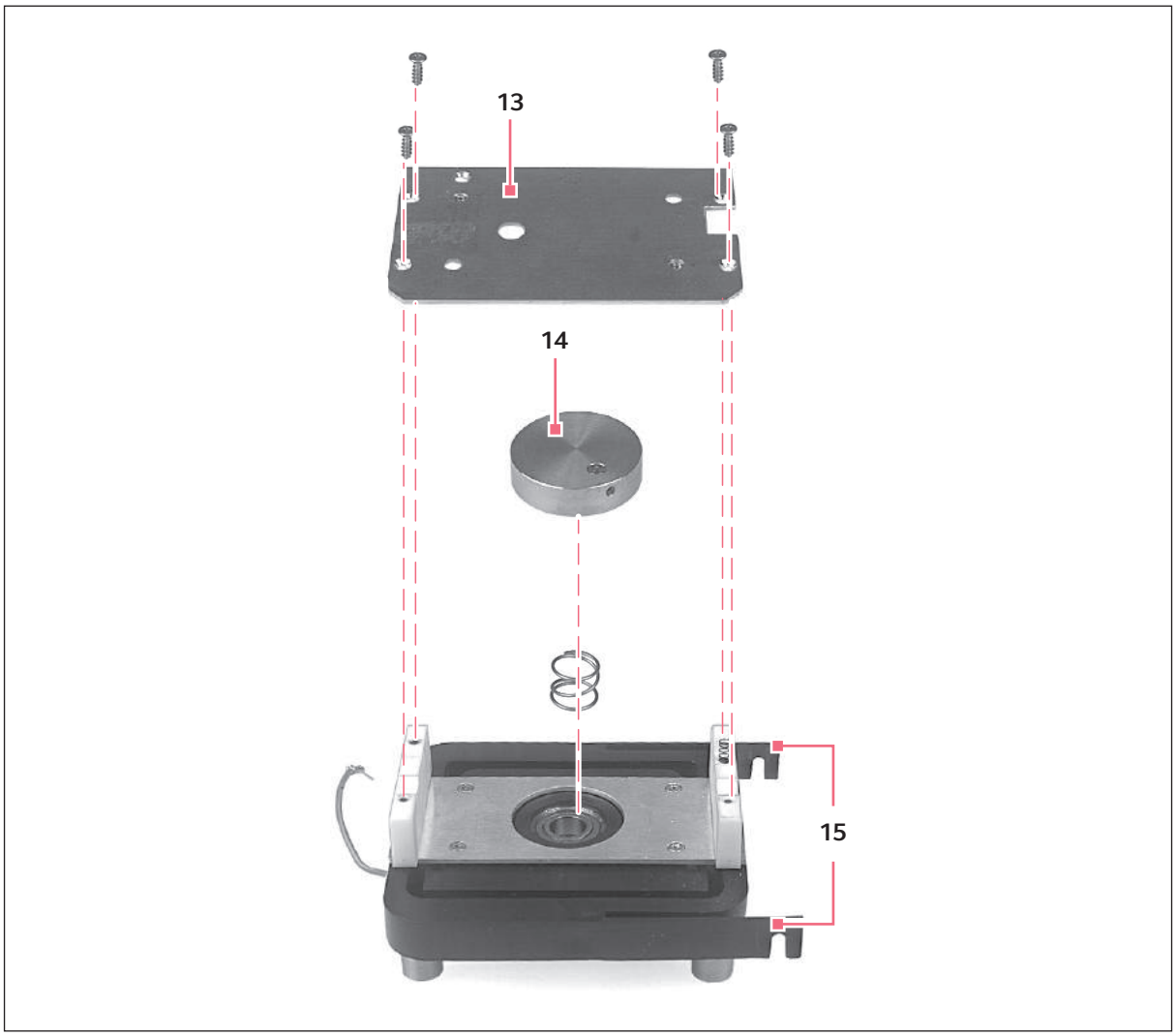


Fig. 6-3: Oscillating frame

13 Upper plate

14 Unbalance-compensating disc

15 Clamping screws

1. Remove the upper plate (see Fig. 6-3 on p. 26) from the oscillating frame.
2. Loosen the Allen screw of the imbalance disk (see Fig. 6-3 on p. 26)and remove the imbalance disk together with the spring.
3. Remove the clamping screws (see Fig. 6-3 on p. 26) from the oscillating frame.
4. Remove the oscillating frame upwards.
5. Remove the counterweights and the spacing strips
6. Installation proceeds in reverse order.

Mind the correct orientation of the counterweights and spacing strips during assembly.
The oscillating frame must be adjusted during installation (see *Oscillating frame adjustment for Thermomixer 5350 and 5355 on p. 39)*!

6.2.4 Motor

Prerequisites

The thermoblock, the housing and the oscillating frame have been removed.

1. Remove the four fastening screws of the motor.
2. Remove the motor.
3. Loosen the clamping screw of the eccentric and remove the eccentric.
4. Installation proceeds in reverse order.

The motor must be adjusted during installation (see *Motor alignment Thermomixer 5350 and 5355 on p. 39)*!

6.2.5 PCB Thermomixer compact

Prerequisites

The thermoblock and the housing have been removed.

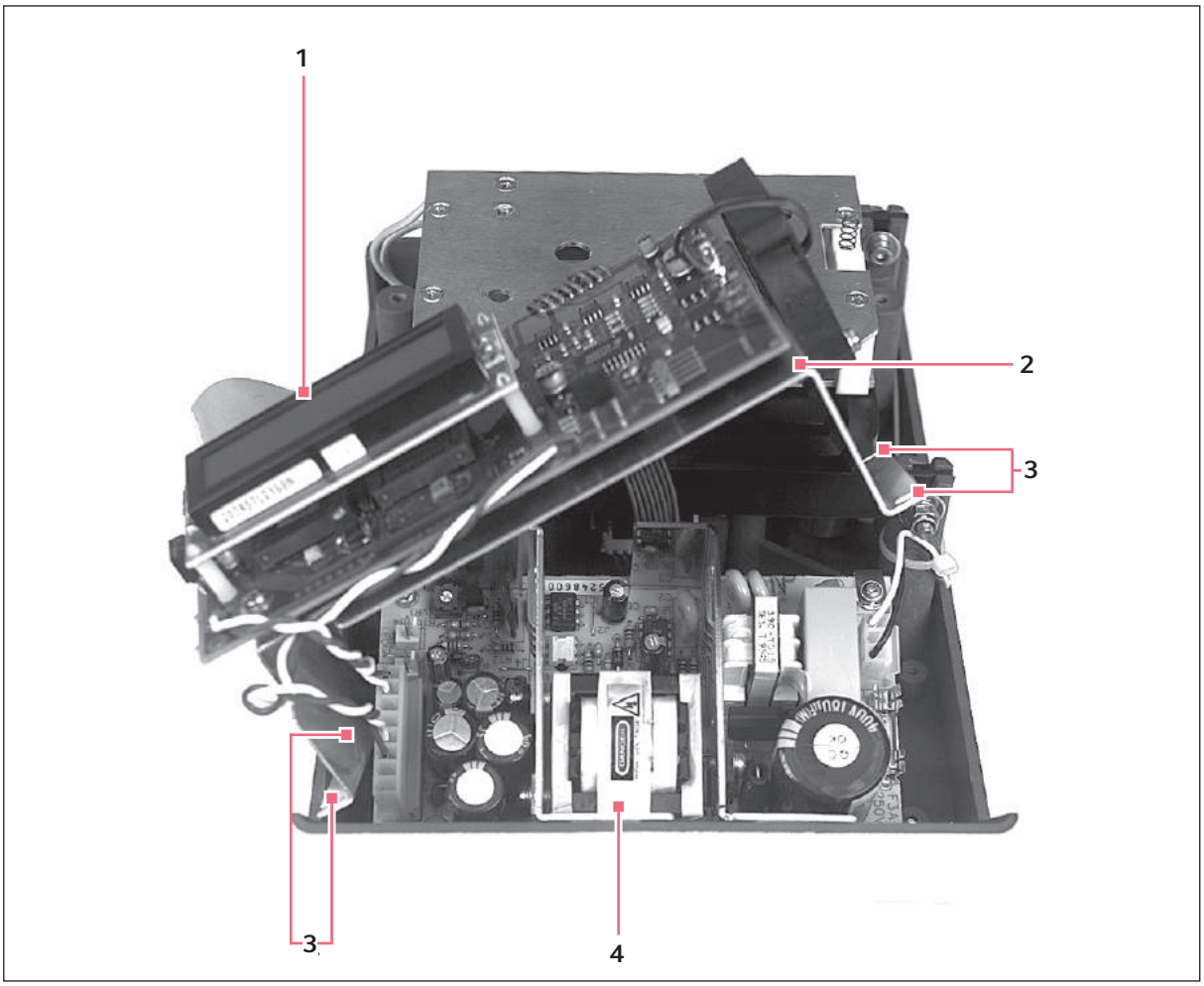


Fig. 6-4: Internal view

1 PCB Thermomixer compact

2 Angular plate

3 Fastening screws of the angle bracket

4 Switched-mode power supply

1. Remove the four fastening screws from the PCB. (see Fig. 6-4 on p. 28)
2. Remove the four fastening screws of the angular plate (see Fig. 6-4 on p. 28).
3. Lift the angular plate together with the PCB and loosen the plug connections.
4. Desolder the fan connections.
5. Installation proceeds in reverse order. An adjustment is not necessary.

After the exchange of the PCB Thermomixer compact, the temperature must be calibrated (see *Thermomixer 5350 and 5355 temperature calibration on p. 41)*!

6.2.6 Switched-mode power supply

Prerequisites

The thermoblock, the housing and the PCB with the angular plate have been removed.

(see Fig. 6-4 on p. 28)

1. Remove the plug connection to the mains input module.
2. Remove the four fastening screws.
3. Installation proceeds in reverse order. An adjustment is not necessary.

6.2.7 Mains input module

Prerequisites

The thermoblock, the housing, the oscillating frame and the PCB with the angular plate have been removed.

1. Remove the plug connection to the switched-mode power supply.
2. Loosen the fastening screw of the choke.
3. Press the barbs (2 pieces on the upper and lower sides, respectively) into the mains input module while removing the mains input module from behind.

   The lower two barbs can be reached via two boreholes on the lower side of the device.
4. Installation proceeds in reverse order. An adjustment is not necessary.

6.3 Disassembling the Thermomixer 5355

6.3.1 Housing

Prerequisites

The exchangeable thermoblock has been removed.

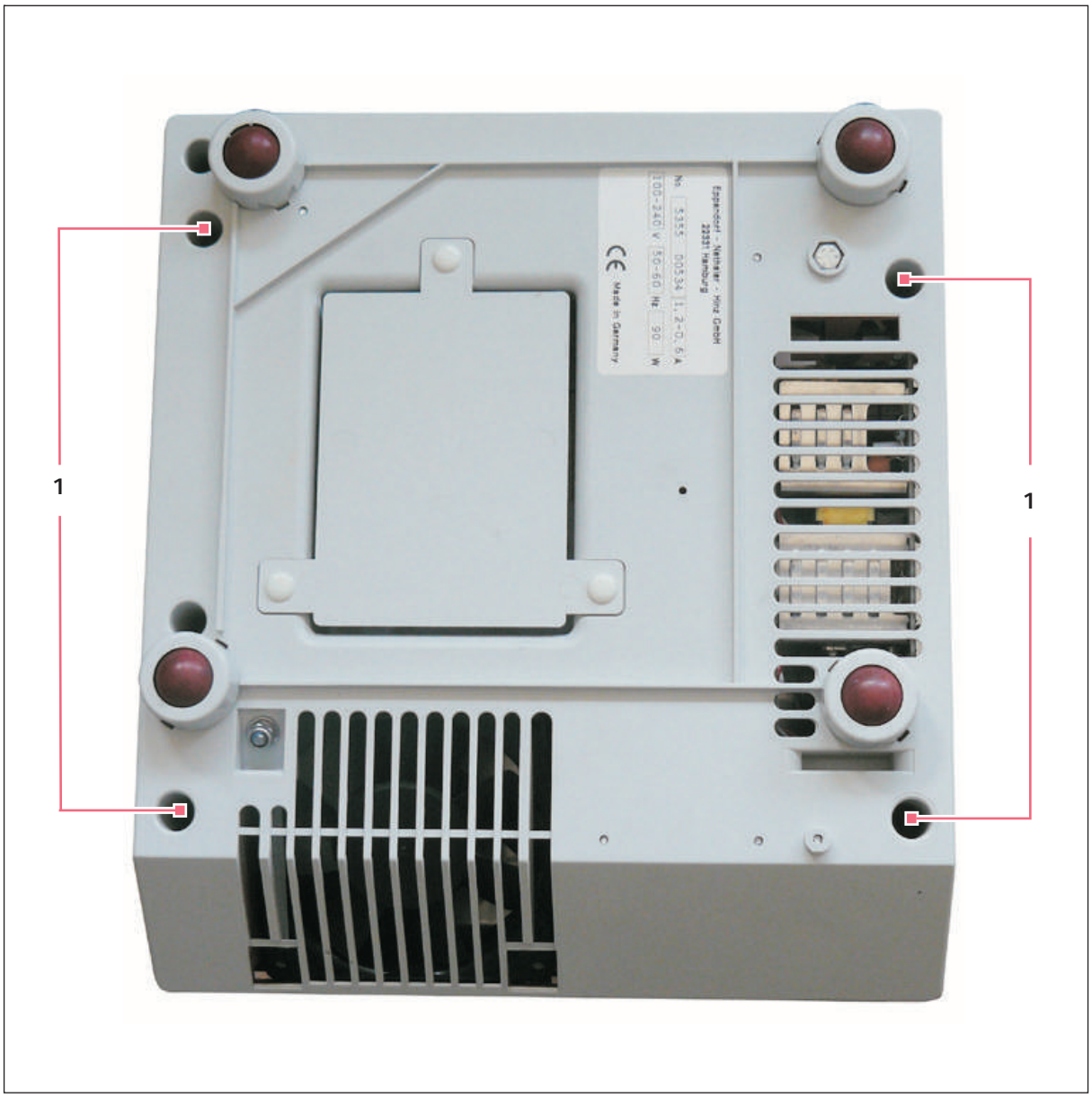


Fig. 6-5: View from below

1 Housing screws

1. Lay the device on its side.
2. Remove the four housing screw (see Fig. 6-5 on p. 30).
3. Turn the device over again.
4. Lift the housing and remove the plug connection to the keypad.
5. Installation proceeds in reverse order. An adjustment is not necessary.

6.3.2 Large fan

Prerequisites

The housing has been removed.

1. Remove the fan cover.
2. Unscrew the nut at the bottom , under the fan. A rotating of the screw can be prevented with the short end of the Allen screwdriver.
3. Remove the fan upwards.
4. Remove the pin. Observe the polarity when doing so!
5. Installation proceeds in reverse order. An adjustment is not necessary. Observe the polarity of the connections!

6.3.3 Heating/cooling plate

Prerequisites

The housing has been removed.

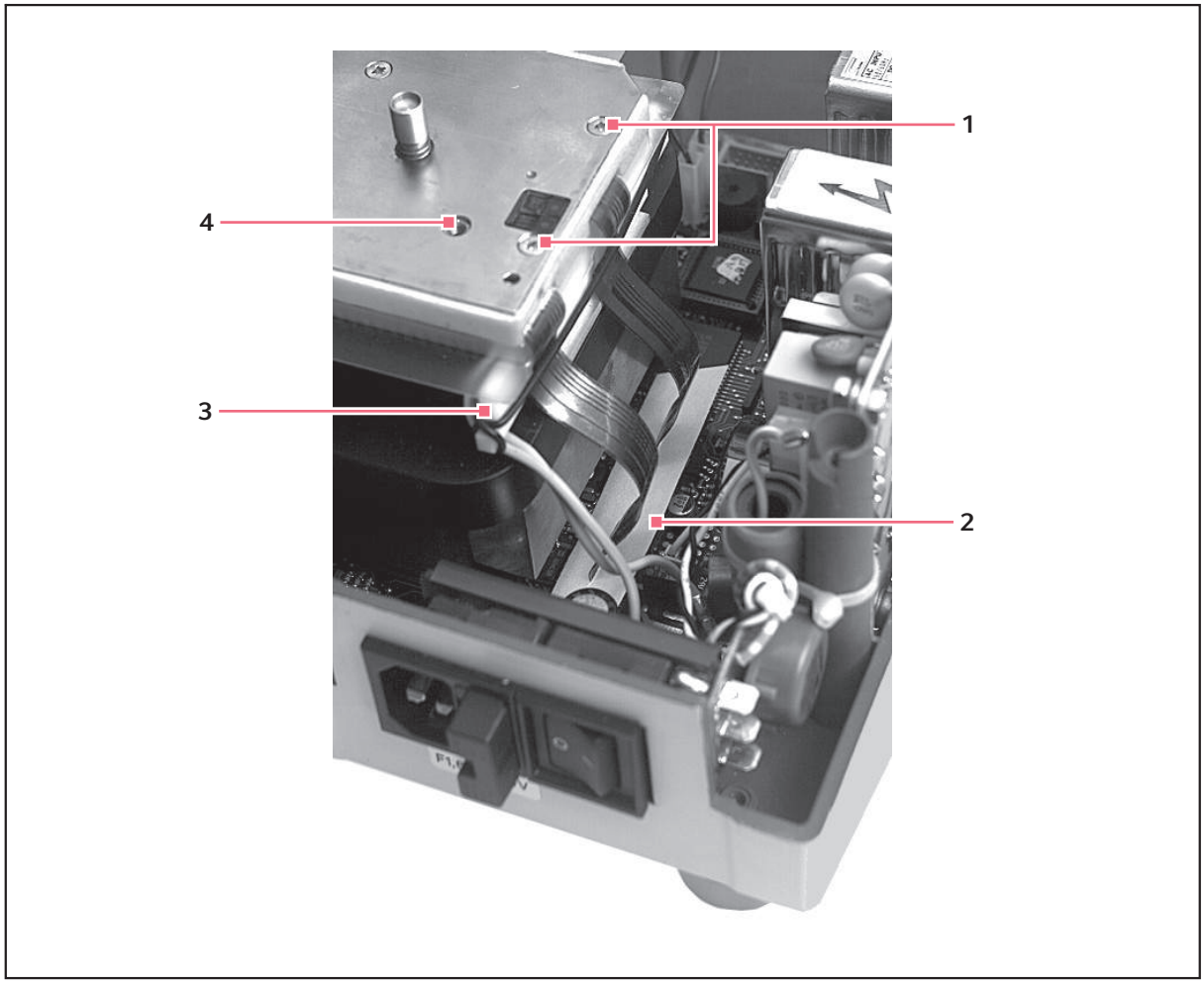


Fig. 6-6: Disassembly heating/cooling plate

1 Fastening screws for heating/cooling plate
2 Plug connections for flex cable
3 O-ring or silicone ring
4 Heating/cooling plate

1. Remove the pins of the flex cable (see Fig. 6-6 on p. 32).
2. Unscrew the nut from the protective earth.
3. Unscrew the four fastening screws (see Fig. 6-6 on p. 32) on the sides of the heating/cooling plate. Do not twist the center screws!
4. Loosen the O-ring (at older devices) or the silicone ring (at newer devices) (see Fig. 6-6 on p. 32) and slide it upward, removing it.
5. Remove the heating/cooling plate.
6. Installation proceeds in reverse order. An adjustment is not necessary.

Observe the following points during assembly:
- (see Fig. 6-6 on p. 32)To prevent that it slides upward, the O-ring must be crossed on one side.
- The flex cables must not touch the upper part of housing. they must be led through behind the O-ring or silicone ring.

After the exchange of the heating/cooling plate, the temperature must be calibrated (see *Thermomixer 5350 and 5355 temperature calibration on p. 41)*!

6.3.4 Oscillating frame

Prerequisites

The housing and the heating/cooling plate have been removed.

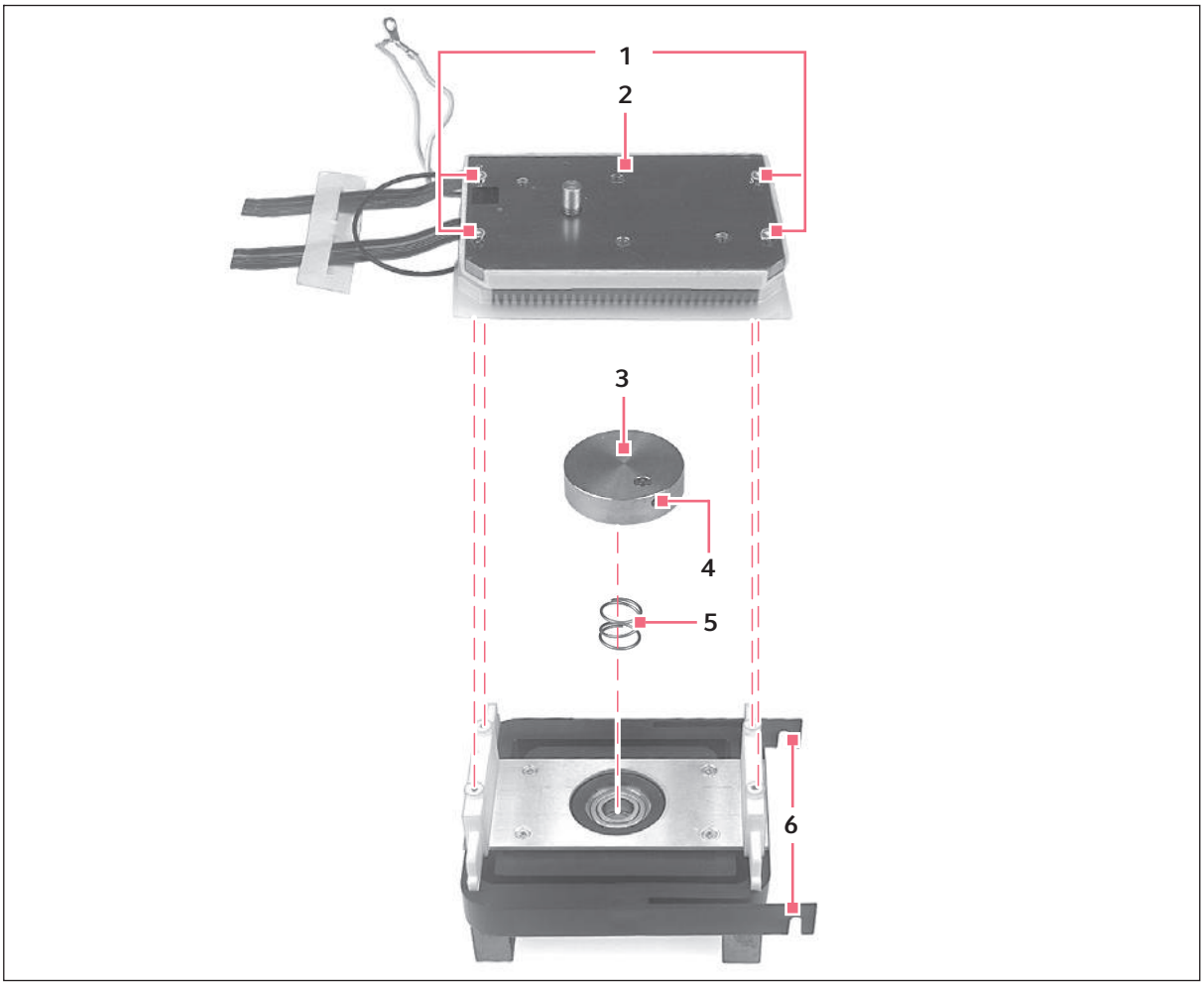


Fig. 6-7: Oscillating frame

1 Fastening screws for the heating/cooling plate
2 Heating/cooling plate
3 Unbalance-compensating disc
4 Allen screw
5 Spring
6 Clamping screws

1. (see Fig. 6-7 on p. 33)Loosen the Allen screw of the imbalance disk and remove the imbalance disk together with the spring.
2. Remove the clamping screws (see Fig. 6-7 on p. 33) from the oscillating frame.
3. Remove the oscillating frame upwards.
4. Remove the counterweights and the spacing strips
5. Installation proceeds in reverse order.

Mind the correct orientation of the counterweights and spacing strips during assembly.
The oscillating frame must be adjusted during installation (see *Oscillating frame adjustment for Thermomixer 5350 and 5355 on p. 39)*!

6.3.5 Motor

Prerequisites

The housing, the heating/cooling plate and the oscillating frame were removed.

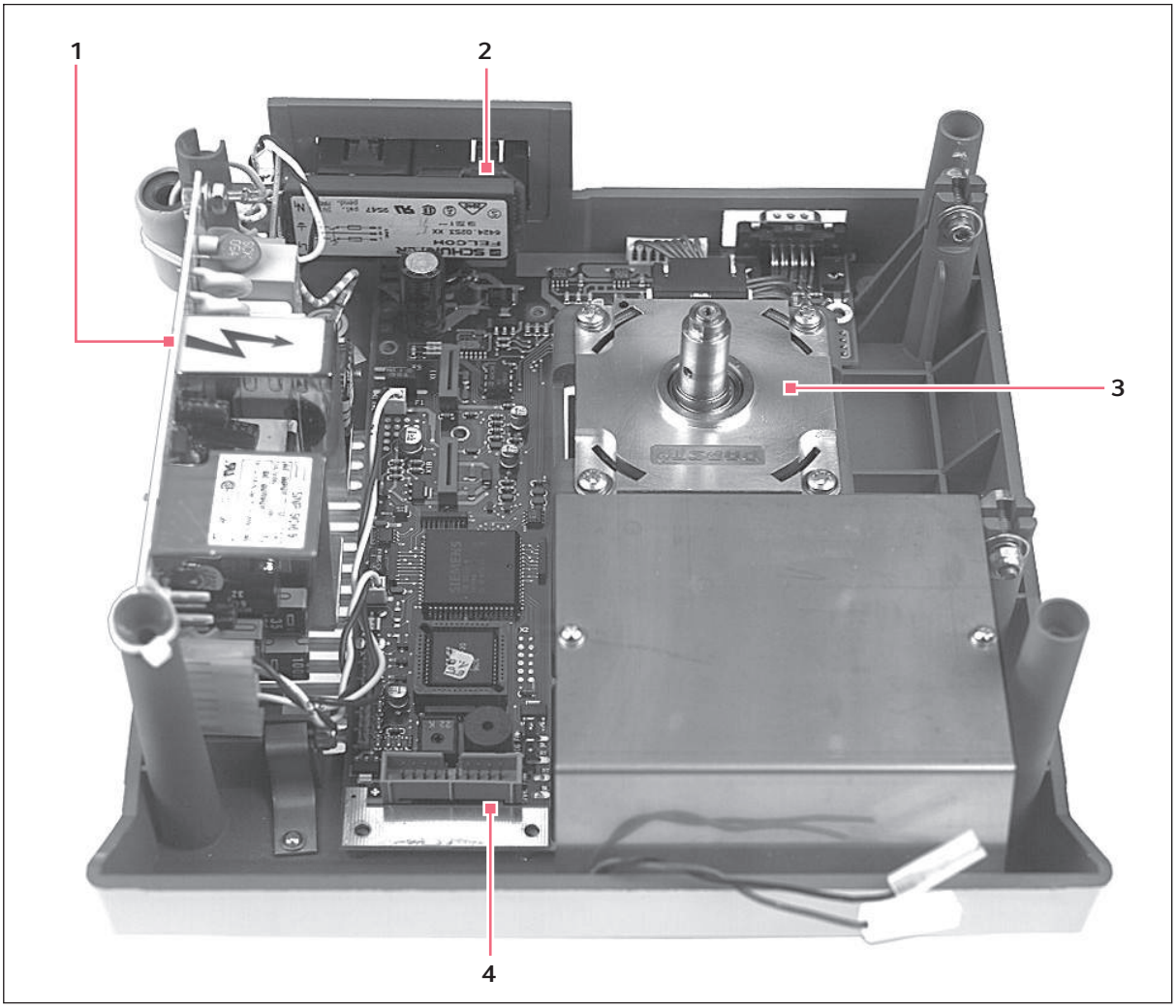


Fig. 6-8: PCB, motor, mains input module and switched-mode power supply

1 Switched-mode power supply
2 Mains input module
3 Motor
4 PCB Thermomixer comfort

1. Remove the four fastening screws of the motor (see Fig. 6-8 on p. 35).
2. Remove the motor.
3. Loosen the clamping screw of the eccentric and remove the eccentric.
4. Installation proceeds in reverse order.

The motor must be adjusted during installation (see *Motor alignment Thermomixer 5350 and 5355 on p. 39)*!

6.3.6 PCB Thermomixer comfort

Prerequisites

The housing, the heating/cooling plate and the oscillating frame were removed.

(see Fig. 6-8 on p. 35)

1. Remove the four fastening screws from the PCB.
2. Remove the plug connections.
3. Remove the mains unit module rearward.
4. Lift the PCB on the front side and remove it.
5. Installation proceeds in reverse order. An adjustment is not necessary.

After the exchange of the PCB, the temperature must be calibrated (see *Thermomixer 5350 and 5355 temperature calibration on p. 41)*!

6.3.7 Switched-mode power supply

Prerequisites

The housing has been removed.

(see Fig. 6-8 on p. 35)

1. Loosen the plug connections to the mains input module and to the PCB Thermomixer comfort.
2. Loosen the fastening screw of the angle bracket (on the threaded rod in the front).
3. Loosen the Allen screw on the threaded rod in the front.
4. Cut through the cable strap on the front upper end of the switched-mode power supply.
5. Lift the switched-mode power supply on the front end, press it slightly to the right and remove it towards the front.
6. Installation proceeds in reverse order. An adjustment is not necessary.

6.3.8 Mains input module

Prerequisites

The housing has been removed.

(see Fig. 6-8 on p. 35)

1. Loosen the plug connection of the switched-mode power supply.
2. Unscrew the nut from the protective earth.
3. Press the barbs (2 pieces on the upper and lower sides, respectively) into the mains input module while removing the mains input module from behind.
4. Installation proceeds in reverse order. An adjustment is not necessary.

6.4 Disassembling Thermostat 5352

6.4.1 Housing

Prerequisites

The exchangeable thermoblock has been removed.

1. Lay the device on its side.
2. Remove the four housing screw at the bottom.
3. Turn the device over again.
4. Lift the housing and remove the plug connection to the keypad.
5. Installation proceeds in reverse order. An adjustment is not necessary.

6.4.2 Switched-mode power supply

Prerequisites

The housing has been removed.

1. Loosen the plug connections to the mains input module and to the PCB Thermostat Plus comfort.
2. Loosen the two fastening screws on the left side.
3. Lift the switched-mode power supply together with the plastics retaining plate.
4. Remove the switched-mode power supply from the plastic retaining plate.
5. Installation proceeds in reverse order. An adjustment is not necessary.

6.4.3 Fan pair

Prerequisites

The housing has been removed.

1. Remove the plug connection.
2. Remove both of the fastening screws on the lower side.
3. Remove the fan downward
4. Installation proceeds in reverse order. An adjustment is not necessary.

6.4.4 Thermoblock

Prerequisites

The housing has been removed.

1. Loosen the plug connection of the flex cable.
2. Unscrew the protective earth.
3. Turn the device over.
4. Remove the four slotted screws (plastic) under the thermoblock.
5. Remove the thermoblock upwards.
6. Installation proceeds in reverse order.

After the exchange of the thermoblock, the temperature must be calibrated (see *Thermostat 5352 temperature calibration on p. 46)*!

6.4.5 PCB Thermostat plus

Prerequisites

The housing and the switched-mode power supply have been removed.

1. Unscrew both fastening screws of the PCB.
2. Unscrew both fastening screws at the interfaces of the PCB.
3. Remove the small fan.
4. Remove the display.
5. Lift the PCB at the front side and pull it out.
6. Installation proceeds in reverse order.

After the exchange of the PCB, the temperature must be calibrated (see *Thermostat 5352 temperature calibration on p. 46)*!

6.5 Device assembly

For all assembly steps, the installation proceeds in reverse order. During assembly, also observe chapter 7 "Adjustment/alignment" and the notes in the disassembly instructions.

7 Alignment/adjustment

7.1 Motor alignment Thermomixer 5350 and 5355

In order to ensure error-free operation of the device, the motor must be adjusted to the retaining domes of the oscillating frame. The sequence of the adjusting steps must be observed at all times.

Tools

- Cross screwdriver: size 2

7.1.1 Procedure

Perform the following steps in the sequence described.

1. Position the device so that the front side of the device faces towards you.
2. Insert the motor so that the motor connection points towards the front side of the device, on the 5350, and towards the rear side of the device on the 5355.
3. Screw in the fastening screws (do not tighten).
4. Press the motor to the right and tighten the fastening screws.

   The motor is now correctly adjusted.

7.2 Oscillating frame adjustment for Thermomixer 5350 and 5355

To ensure error-free operation of the devices, the oscillating frame must be adjusted to the eccentric (motor) and the retaining pin. The sequence of the adjusting steps must be observed at all times.

Tools

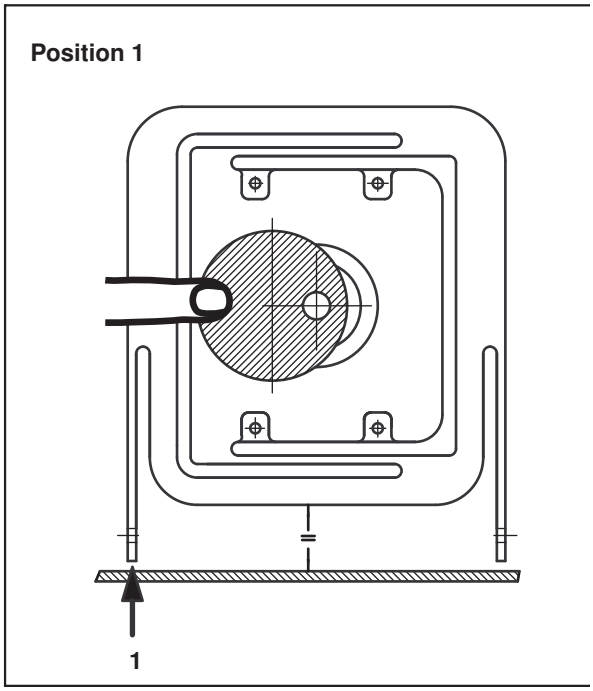
- Size 3 Allen screwdriver
- WAF 7 wrench

Requirement

- The eccentric has been mounted to the motor shaft.
- The oscillating frame with the mounted counterweights and spacing strips was inserted loosely.
- The imbalance compensation disc was mounted to the eccentric.

Perform the following steps in the sequence described.

1. Put the mixer down in such a way that the two fixing arms of the oscillating frame are pointing towards you.
2. Rotate the imbalance compensation disk several times by hand in both directions until the fixing arms are clear from the oscillation frame and sit on the retaining pins.
3. Rotate imbalance disk to position 1 and hold it in this position (see figure at right).
4. Lock the left mounting nut (1) with the wrench and tighten the screw with the Allen screwdriver.



5. Then rotate the imbalance disk to position 2 and hold it in this position (see figure at right).
6. Lock the right mounting nut (2) with the wrench and tighten the screw with the Allen screwdriver.

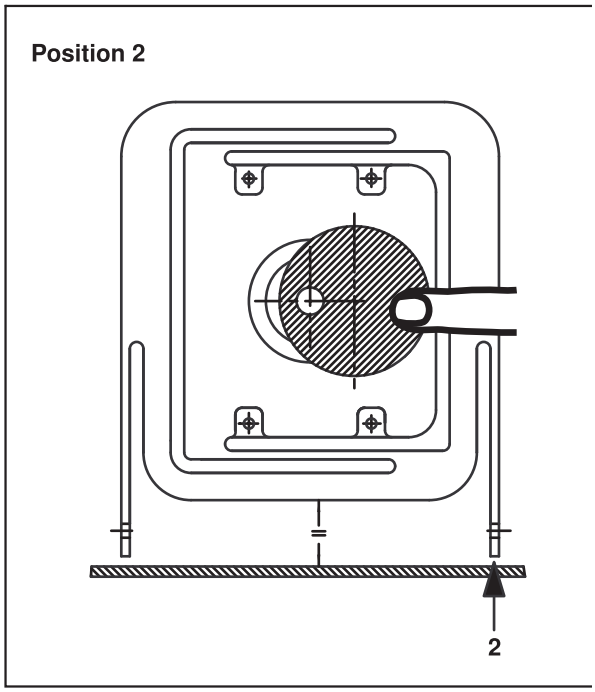


Fig. 7-1: Oscillating frame adjustment for Thermomixer compact 5350 and Thermomixer comfort 5355

7.3 Thermomixer 5350 and 5355 temperature calibration

The temperature must be calibrated after the replacement of the PCB, thermoblock or heating/cooling plate. The temperature calibration can be completed automatically or manually.

The device must be initialized prior to the temperature calibration (automatically and manually). After the initialization, the temperature offset parameters must be checked and set as necessary.

The temperature calibration of the Thermomixer comfort 5355 must always be completed with the 1.5 mL exchangeable thermoblock. A temperature calibration cannot be completed with a different exchangeable thermoblock.

The ambient temperature should be between 20 °C and 25 °C.

The Thermomixer must be protected from temperature variations (drafts).

7.3.1 Initialization

Perform the following steps in the sequence described.

1. Switch the device on in the service program.
2. Using the **Temp +/-**keys, call up service function **9** (5350) or **11** (5355) **"Inits!"** and activate using the **Start/Stop** key.
3. Using the key **Temp +**, switch to **"Ib:InitAll=MIX"**.
4. Using the **Mix +/-** key, start initialization.
   The device completes the initialization and then briefly switches off and back on. The service program has been exited.
   The initialization was successfully completed.

7.3.2 Setting of the temperature offset parameters

Both of the offset parameters for S0 and S1 must be entered one after the other. An offset of, for instance, "-10" corrects the actual temperature by approx. 1 °C downwards. The sensor S0 is the internal temperature sensor of the device. The sensor S1 is the temperature sensor from the adapter for temperature adjustment. (Both temperature sensors must be checked and corrected as necessary, even if a manual adjustment is to be completed.)

Perform the following steps in the sequence described.

1. Switch the device on in the service program.
2. Using the keys **Temp +/-**, call up service function **"3. TempSens"** and activate using the **Start/Stop** key.
3. Using the **Temp +** key (press 2x), call up the sub-function **"Sc: Sens: S0"**.
   Using the **Mix +/-** keys enables you to switch between sensor "S0" and "S1".
4. Use the **Temp +** key (press 3x) to call up **"Sf: S0 Offs= XX"**.
5. Enter the corresponding offset parameters using the **Mix +/-** keys (see Tab. on p. 42).

6. Using the key **Temp -** call up the sub-function **"Sc: Sens: S0"**.
7. Using the key **Mix +** to switch to **"Sc: Sens: S1"**.
8. Using the key **Temp +** (press 3x) call up **"Sf: S1 Offs= XX"**.
9. Enter the corresponding offset parameters using the **Mix +/-** keys (see Tab. on p. 42).
10. Press the **Start/Stop** key to save the changes and to exit the service function.
    The offset parameters are now correctly set.
11. Switch off the device.

Overview of offset settings

Device	PCB version	Software	Offset	
	See label on the PCB	See label on the EEPROM or in the display immediately after switch-on	S0	S1
5350	to 5350 800.001-03	≥ 2.0	-10	0
5350	as of 5350 800.001-04	≥ 2.0	0	0
5355	to 5355 800.000-06	≥ 2.10	-10	-10
5355	as of 5355 800.000-07	≥ 2.10	0	0

Continue with …
- Automatic temperature calibration (see *Automatic temperature calibration on p. 43)*
  or
- Manual temperature calibration (see *Manual temperature calibration on p. 45)*

7.3.3 Automatic temperature calibration

Utilities:

- Adapter for temperature adjustment (0024 204.707)
- Adapter cable for temperature adjustment 5350 (0024 204.804)

Preparation of Thermomixer 5350:

1. Place the Thermomixer upside down and remove the small cover plate.
2. Insert the adapter cable for temperature adjustment 5350 in the pin bar of the starter PCB (see Fig. 7-2 on p. 43).
   Ensure that the connector is correctly oriented, the contacts in the connector cannot be visible.
3. Connect the adapter cable for temperature adjustment 5350 and the adapter for temperature adjustment.
   Press the temperature sensor from the adapter for temperature adjustment firmly into rack position 15 (3rd row from above and 3rd borehole from the left).

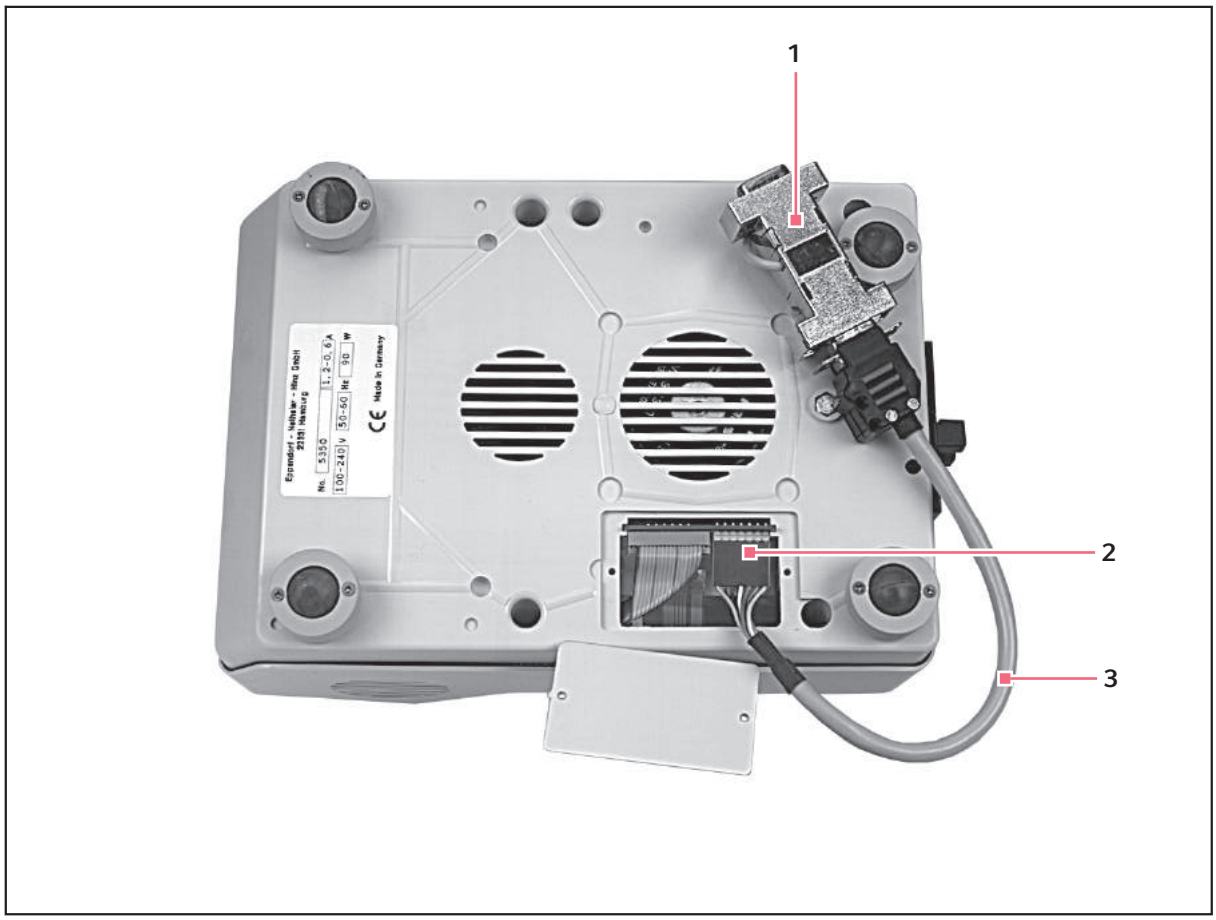


Fig. 7-2: Preparation of Thermomixer 5350 automatic temperature calibration

1 Adapter for temperature adjustment (0024 204.707)

2 Starter PCB

3 Adapter cable for temperature adjustment 5350 (0024 204.804)

Preparation of Thermomixer 5355:

1. Mount 1.5 mL exchangeable thermoblock.
2. Insert the adapter for temperature adjustment directly into the Sub-D9 connection (see Fig. 7-3 on p. 44).
   Press the temperature sensor from the adapter for temperature adjustment firmly into rack position 15 (3rd row from above, 3rd borehole from the left).

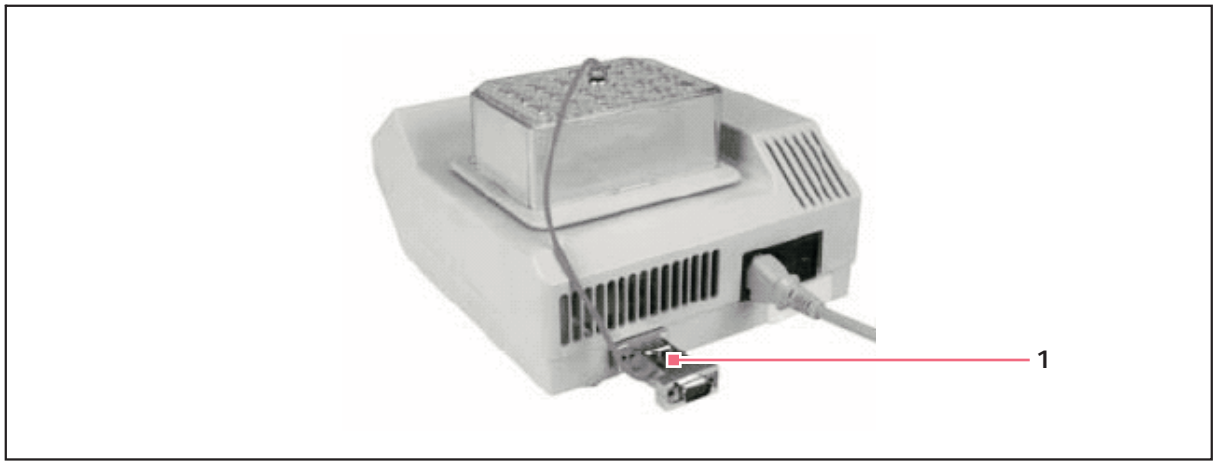


Fig. 7-3: Preparation of Thermomixer 5355 automatic temperature calibration

1 Adapter for temperature adjustment (0024 204.707)

The temperatures 37 °C and 95 °C are calibrated one after the other. If a temperature of 37 °C or 95 °C is reached, it must be in a steady state and stable for 180 s (countdown is only displayed with 5355). After that, the switch is automatically made to the second calibration temperature. If the temperature continues to fluctuate, the countdown will need to be started multiple times.

During the calibration, the current calibration temperature and the actual temperature of the internal and external temperature sensors is displayed:

- S = calibration temperature
- B = internal temperature sensor
- C = external temperature sensor

Perform the following steps in the sequence described.

1. Switch the device on in the service program.
2. Using the keys **Temp +/-** select service function **"4. Temp. Calibrate"** and activate with the **Start/Stop** key.
3. On the display, **"Ca:MIX=StartCal!"** appears.
4. To start the adapter self-test, press the **Mix +** or **Mix -** key.
5. On the display, **"MIX=StartCalib!"** appears.
6. To start automatic temperature calibration, press the **Mix +** or **Mix -** key.
7. When temperature calibration is completed, the display will alternate between showing the calibration data for the individual temperatures and **"Calibration OK"**.
8. Press the **Start/Stop** key to save the temperature calibration and to exit the program.
   The temperature of the thermomixer is now calibrated.

7.3.4 Manual temperature calibration

Auxiliary equipment

- Temperature measuring device from the Temperature Verification System - single-channel (0055 000.298 / 0056 000.003)
- 1.5 mL temperature sensor (5354 850.500 / 0056 003.002)

Also observe the operating manuals of the Temperature Verification System - single-channel and the 1.5 mL temperature sensor .

Perform the following steps in the sequence described.

1. Switch the device on in normal operating mode.
2. Mount the 1.5 mL exchangeable thermoblock (only Thermomixer comfort 5355).
3. Insert the 1.5 mL temperature sensor into position 15 (3rd row from above, 3rd borehole from the left).
4. Measure and note the calibration temperatures 37 °C and 95 °C one after the other.

   After reaching the corresponding temperature, wait a few minutes until the measured value is stable before taking the reading.
5. Switch off the device.
6. Switch the device on in the service program.
7. Using the **Temp +/-** keys, call up the service function **8** (5350) or **9** (5355) **"Block"** and activate it with the **Start/Stop** key.
8. Using the **Mix +/-** keys, enter the measured value for 37 °C and 95 °C. (Switching between the adjustment temperatures with the **Temp +/-** keys)
9. To save the change and to exit the function with **Start/Stop** key.
10. Switch off the device.

    The temperature of the thermomixer is now calibrated.

7.4 Thermostat 5352 temperature calibration

The temperature must be calibrated after the replacement of the PCB or the heating/cooling plate. The temperature calibration can be completed automatically or manually.

The device must be initialized prior to the temperature calibration (automatic and manual)!

The temperature calibration of the Thermostat 5352 must always be completed with the 1.5 mL exchangeable thermoblock. A temperature calibration cannot be completed with a different exchangeable thermoblock.

The ambient temperature should be between 20 °C and 25 °C.

The Thermostat must be protected from temperature variations (drafts).

7.4.1 Initialization

Perform the following steps in the sequence described.

1. Switch off the device.
2. Press and hold the **Temp +** and **Temp -** simultaneously.
3. Switch the device on and continue to hold the keys.
4. Two short and one long signal tones sound; release the keys after the long signal tone.
   Initialization of the device is now complete.

Continue with …
- Automatic temperature calibration (see *Automatic temperature calibration (software version 1.08 or higher) on p. 46)*
  or
- Manual temperature calibration (see *Manual temperature calibration on p. 47)*

7.4.2 Automatic temperature calibration (software version 1.08 or higher)

Utilities:
- Adapter for temperature adjustment (0024 204.707)

Perform the following steps in the sequence described.

1. Switch off the device.
2. Mount the 1.5 mL exchangeable thermoblock.
3. Insert the adapter for temperature adjustment directly into the Sub-D9 connection and insert the sensor firmly into position 15 (3rd row from above, 3rd borehole from the left).
4. Press the **Time +** and **Time -** simultaneously and switch the device on. As soon as **"Please press start button"** appears on the display, release the keys.
5. Press the **Start/Stop** key to start the temperature calibration.

The temperature calibration takes approx. 20 min. The calibration temperatures are 37°C and 60°C. The respective calibration temperature and the current temperature are displayed during the calibration (the current temperature is only displayed after the target temperature has been reached). After the successful temperature calibration **"Calibration valid"** appears briefly on the display and the device returns to the normal operating mode.

6. Switch off the device.
7. Remove the adapter for temperature adjustment.

   The temperature of the Thermostat is now calibrated.

7.4.3 Manual temperature calibration

Auxiliary equipment

- Temperature measuring device from the Temperature Verification System - single-channel (0055 000.298 / 0056 000.003)
- 1.5 mL temperature sensor (5354 850.500 / 0056 003.002)

Also observe the operating manuals of the Temperature Verification System - single-channel and the 1.5 mL temperature sensor .

Perform the following steps in the sequence described.

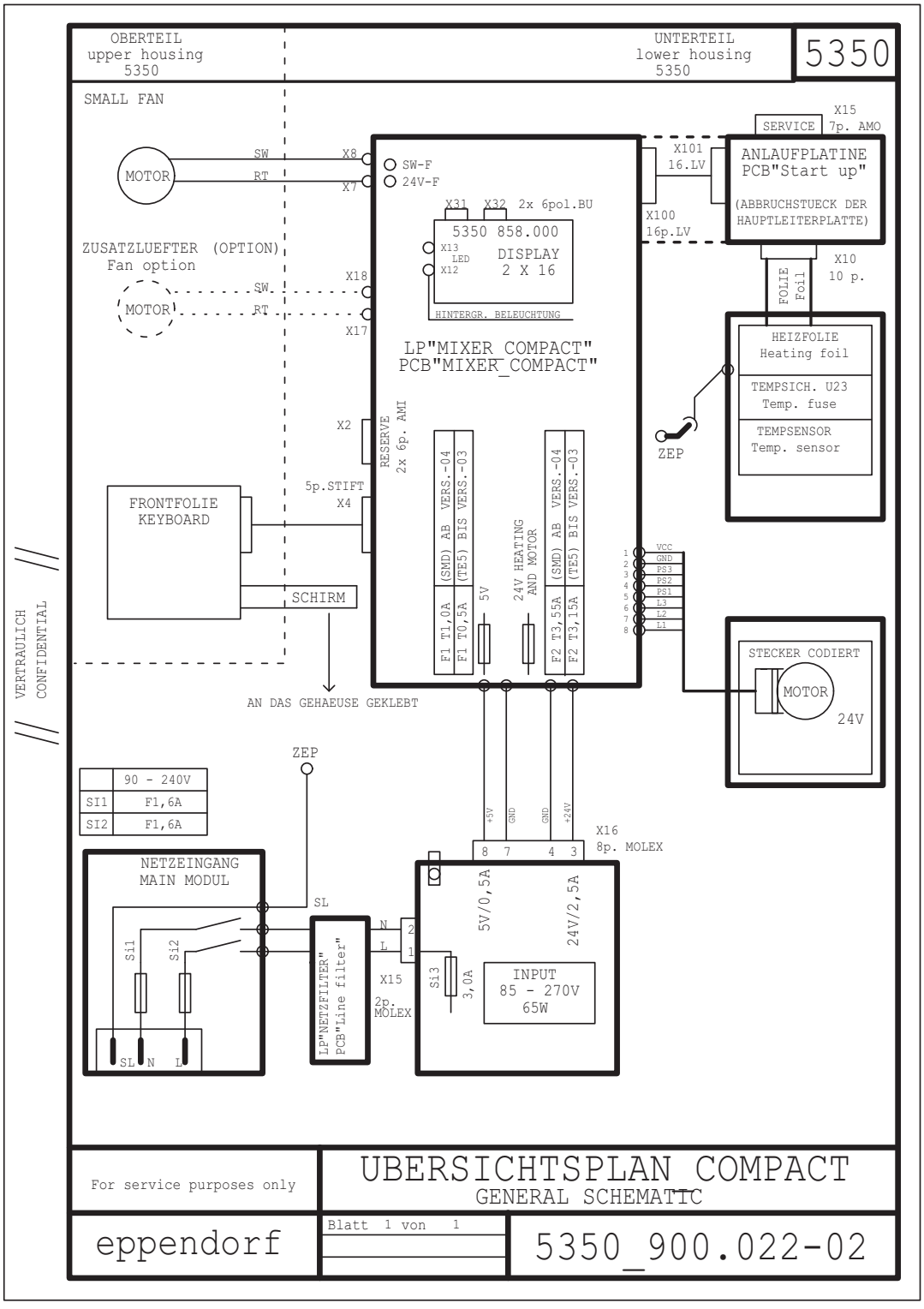
1. Mount the 1.5 mL exchangeable thermoblock.
2. Insert the 1.5 mL temperature sensor into position 15 (3rd row from above, 3rd borehole from the left).
3. Switch on the device.
4. Measure and note the calibration temperatures 37 °C and 75 °C one after the other.

   After reaching the corresponding temperature, wait a few minutes until the measured value is stable before taking the reading.
5. Switch off the device.
6. Press and hold the **Temp +** and **Time +** keys and switch on the device. Hold the keys until **"MEAS.-VAL Range1 / 370"** appears on the display (370 = 37,0 °C).
7. Enter the value measured at 37 °C with the **Temp +/-** keys (e.g. 378 = 37,8 °C) and confirm with the **Progr.** key.
8. **"MEAS.-VAL Range2 / 750"** is displayed (750 = 75.0 °C).
9. Entered the value measured at 75 °C with the **Temp +/-** keys (e.g. 742 = 74.2 °C) and confirm with the **Progr.** key.
10. **"MEAS.-VAL Range1 / 378"** (e.g.) is displayed again.
11. Switch off the device.

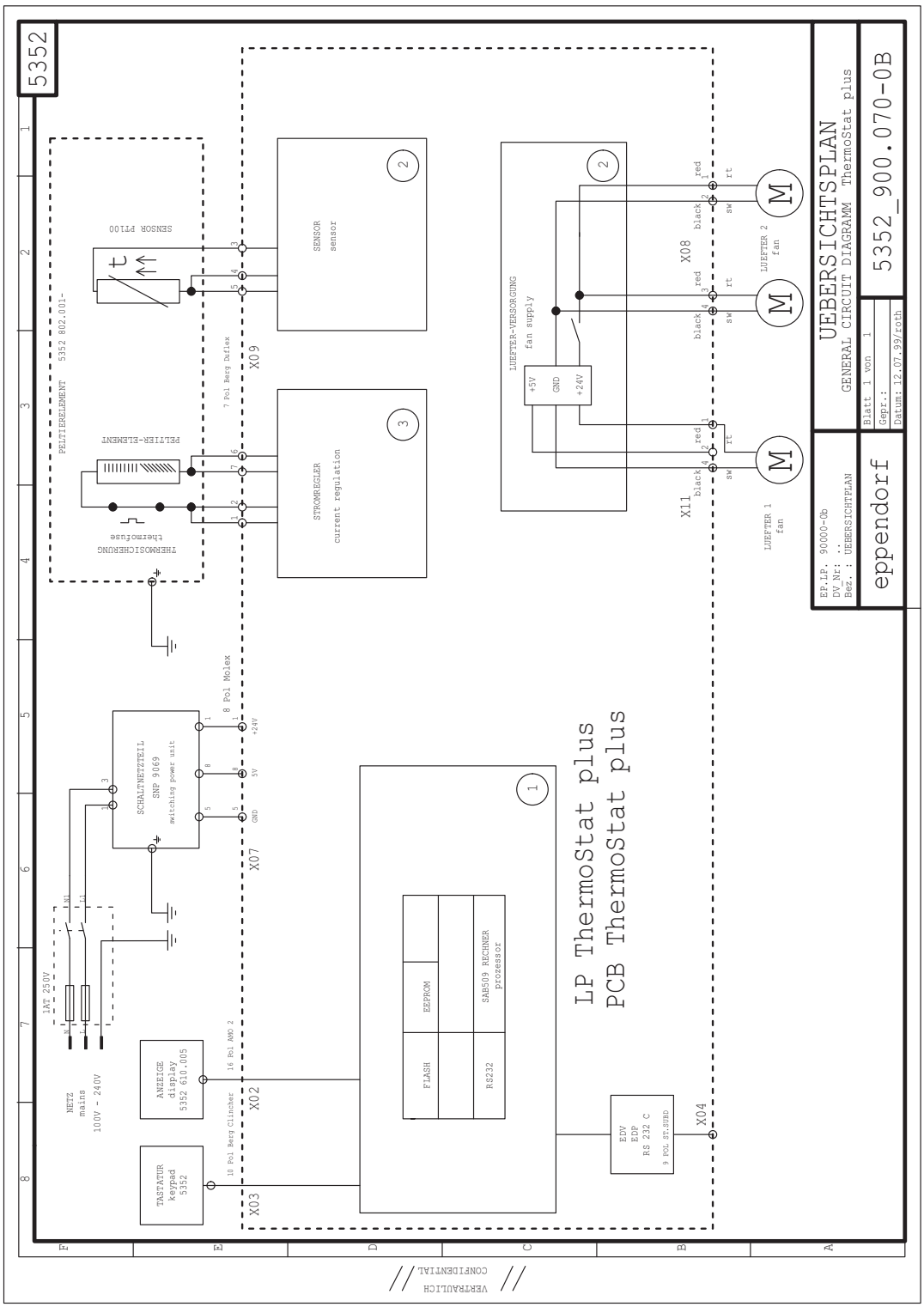
    The temperature of the Thermostat is now calibrated.

8 Diagrams

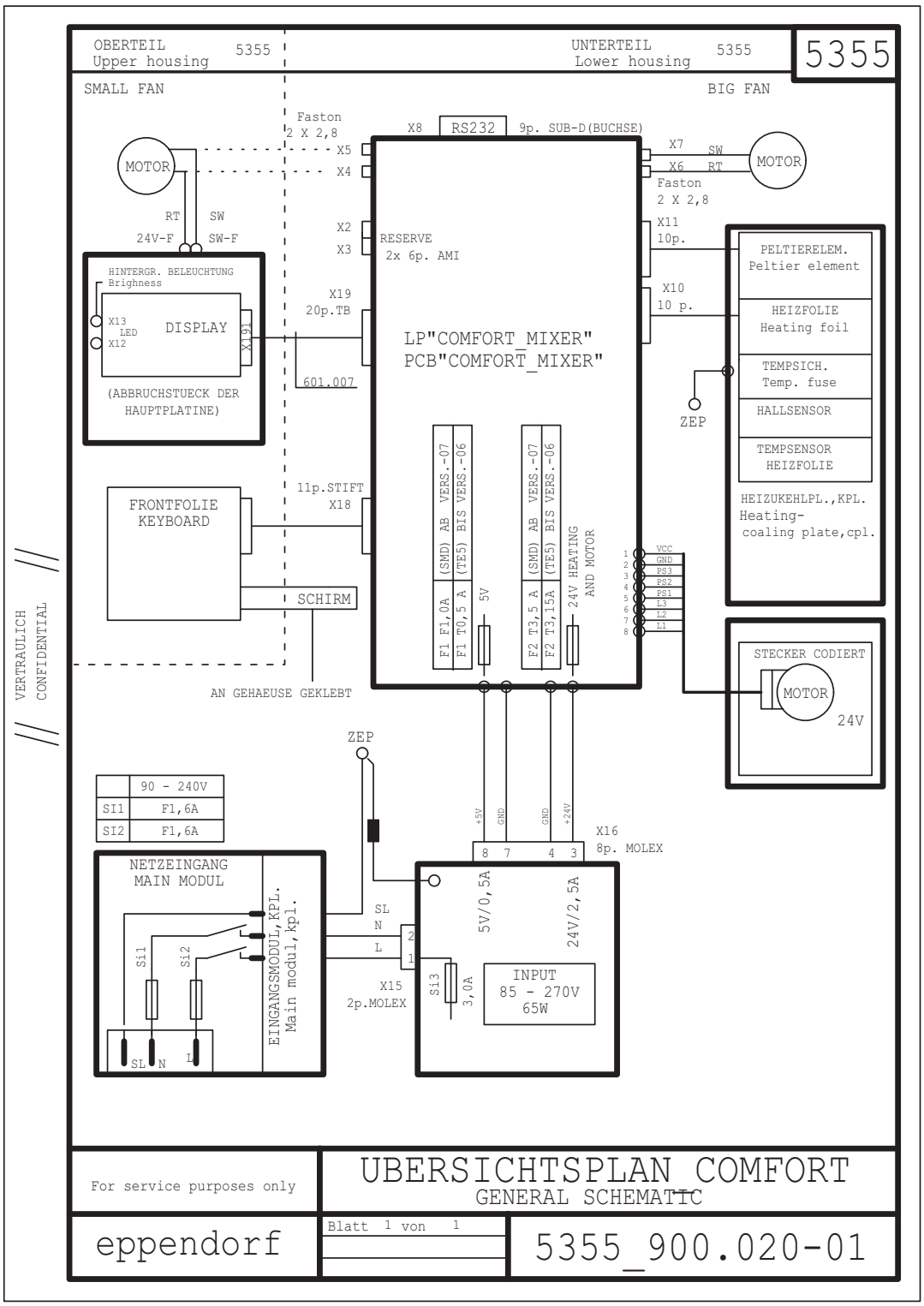
8.1 Circuit diagram for Thermomixer compact 5350



8.2 Circuit diagram for Thermostat 5352



8.3 Circuit diagram for Thermomixer comfort 5355



9 Maintenance

9.1 Cleaning, disinfection, decontamination

DANGER! Electric shock as a result of penetration of liquid.

- Switch off the device and disconnect the power plug before starting cleaning or disinfection work.
- Do not allow any liquids to penetrate the inside of the housing.
- Do not spray clean/spray disinfect the housing.
- Only plug the device back in if it is completely dry, both inside and outside.

WARNING! Infection by contaminated material.
There may be contaminated material on the device and accessories. Risk of infection with contaminated material.

- Find out more about contamination risks before beginning work.
- Check the device decontamination certificate.
- Work may only be completed on a decontaminated device.
- Wear personal protective equipment (protective gloves, protective goggles).

NOTICE! Damage from the use of aggressive chemicals.

- Do not use any aggressive chemicals on the device or its accessories, such as strong and weak bases, strong acids, acetone, formaldehyde, halogenated hydrocarbons or phenol.
- If the device has been contaminated by aggressive chemicals, immediately clean it by means of a mild cleaning agent.

NOTICE! Corrosion from aggressive cleaning agents and disinfectants.

- Do not use corrosive cleaning agents, aggressive solvents or abrasive polishes.
- Do not incubate the accessories in aggressive cleaning agents or disinfectants for a longer period of time.

For further information as well as a detailed description on how to perform cleaning, disinfection and decontamination, please refer to the operating manual of the device. Carefully read the respective sections of the operating manual before you start cleaning, disinfection or decontamination.

9.2 Shipping the device

WARNING! Risk to health from contaminated device

1. Follow the instructions in the decontamination certificate. You find it as a PDF file on our website (www.eppendorf.com/decontamination).
2. Decontaminate all the parts you would like to dispatch.
3. Include the fully completed decontamination certificate in the package.

NOTICE! Damage as a result of incorrect packing.
Eppendorf AG is not liable for damage caused by improper packing.

- The device may only be stored and transported in its original packaging.

Transport packaging can be ordered via your Eppendorf service organization. The order number can be found in the chapter Ordering information.

9.3 Service and inspection

9.3.1 Essential check

Check duration: approx. 15 minutes per device.

Visual check of exterior.	▸ Check all external parts for visible damage, e.g., housing, chassis, device feet.
Visual check of accessories (if available). • Exchangeable thermoblocks • IsoRack • MTP lid	▸ Check the accessories all the way round for visible damage.
Check of exchangeable thermoblock detection (5355).	▸ Attach all the available exchangeable thermoblocks one after the other. Check whether all exchangeable thermoblocks are correctly detected and shown on the display.
Functional check (without measurement). • Mixing (5350 and 5355) • Heating (5350, 5352 and 5355) • Cooling (5352 and 5355)	▸ Mixing: Set several arbitrary speeds and start the drive. Check whether the device runs without errors or unusual noises. ▸ Heating: Set any temperature above the ambient temperature. Check whether the exchangeable thermoblock or the thermoblock is heated. **Danger of burns: Do not set a too high temperature!** ▸ Cooling: Set any temperature below the ambient temperature. Check whether the exchangeable thermoblock is cooled.

9.3.2 Advanced maintenance

Check duration: approx. 45 minutes per device.

Cleaning of exterior	▸ Clean the device according to the description in the operating manual and the hints in the service manual.
Visual check of exterior.	▸ Check all external parts for visible damage, e.g., housing, chassis, device feet.
Cleaning of internal parts and assemblies.	▸ Remove any dust and dirt from all internal parts and assemblies. **Note**: Avoid damage to the electronics from moisture or electrostatic charge!
Visual check of internal parts and assemblies.	▸ Check all the internal parts, e.g., housing, drive, oscillating frame, cable etc., for visible damage. ▸ Check the plug connections for secure fit.
Visual check of electrical connection.	▸ Check the power cord for visible damage. ▸ Check the plug connections for secure fit in the device and in the power outlet. ▸ Check the mains input module in the device for secure fit and damage.
Cleaning of accessories (if available). • Exchangeable thermoblocks • IsoRack • MTP lid	▸ Clean the accessories according to the description in the operating manual and the hints in the service manual.
Visual check of accessories (if available). • Exchangeable thermoblocks • IsoRack • MTP lid	▸ Check the accessories all the way round for visible damage.
LED and display check.	▸ Switch on the device and check whether the text and icons are displayed without errors during the following test steps. ▸ Check the contrast setting for good legibility. ▸ Press all keys with LED indication one after the other. Check whether the LEDs work.
Keyboard check.	▸ Press all the keys one after the other. Check whether the device responds according to the key functions.
Check of exchangeable thermoblock detection (5355).	▸ Attach all the available exchangeable thermoblocks one after the other. Check whether all exchangeable thermoblocks are correctly detected and shown on the display.

Functional check (without measurement). • Mixing (5350 and 5355) • Heating (5350, 5352 and 5355) • Cooling (5352 and 5355)	▸ Mixing: Set several arbitrary speeds and start the drive. Check whether the device runs without errors or unusual noises. ▸ Heating: Set any temperature above the ambient temperature. Check whether the exchangeable thermoblock or the thermoblock is heated. **Danger of burns: Do not set a too high temperature!** ▸ Cooling: Set any temperature below the ambient temperature. Check whether the exchangeable thermoblock is cooled.
Functional check of fans. • Electronic fan (small fan) • Cooling fan (5352 and 5355)	▸ Electronic fan: Check whether the electronic fan sucks in or blows out air. ▸ Cooling fan: Set any temperature below the ambient temperature. Check whether the cooling fans start after a short time.

9.3.3 Qualification services - operational qualification (OQ)

Eppendorf recommends checking the essential technical data and functions of the devices at least once per year in accordance with the OQ checklist.

The OQ checklist is available on our website www.eppendorf-support.com (password required) or on request.

Detailed descriptions of how to perform the individual measurements can be found in the chapter "Device inspection".

Check duration: approx. 45 - 60 minutes per device.

9.4 Device inspection

9.4.1 Temperature check

Use the 1.5 mL exchangeable thermoblock (reference exchangeable thermoblock) for the temperature check at the Thermostat plus and at the Thermomixer comfort. A correct temperature check in a different thermoblock is not possible!

Measuring device

- Temperature measuring device from the Temperature Verification System - single-channel (0055 000.298 / 0056 000.003) with the 1.5 mL temperature sensor (5354 850.500 / 0056 003.002)

Carry out the measurement:

1. Only 5352 and 5355: Install a 1.5 mL exchangeable thermoblock.
2. Position the temperature sensor in position 15 (3rd row from above, 3rd borehole from the left).
3. Set the temperature that is to be checked.
4. Wait until the temperature has been reached and is stable.
5. Note the measuring result.
   If required, repeat steps 3 to 5 for other temperatures.

9.4.2 Speed check

Measuring device

- Digital RPM tester, suitable for non-contact measurement.
- Measuring range: 1 rpm to ≥ 9,999 rpm
- Accuracy: ≤ 0.1 %

Carry out the measurement:

1. Only 5355: Assemble thermoblock
2. Mark the thermoblock with a reflector. (Accessories of the measuring device).
3. Start the thermomixer with the desired speed. Run the thermomixer for a short time.
4. Measure the speed. Observe the operating manual of the measuring device.
5. Note the measuring result.
   If required, repeat steps 3 to 5 for other speeds.

9.4.3 Timer check

Measuring device

- Stopwatch
- Accuracy: ≤ 0.1 s

Carry out the measurement:

1. Only 5352 and 5355: Set cycle time > 5 min.
2. Start Thermomixer/Thermostat and stopwatch simultaneously.
3. Run Thermomixer/Thermostat for 5 min.
   Compare the time displayed on the device and the time measured with the stopwatch.

9.5 Electrical safety check

Effective standard

- Pre-IEC 62638 (international)
- VDE 701/702 (Germany)
- NFPA 99 (USA)

Notes concerning the measuring procedure:

- Testing electrical safety may only be carried out by a suitably trained electrician.
- Measurement is carried out on a grounded, metallic point on the lower part of the housing/chassis that is not insulated and can be touched from the outside.
- Never use any interfaces that may be present for measuring. This could damage the electronic system of the device.
- Due to the internal electrical design the insulation resistance cannot be measured!
- Due to the internal electrical design the equivalent leakage current cannot be measured!
  –> Always measure the real leakage current (direct measurement or differential current measurement).

10 Technical data

10.1 Power supply

Tab. 10-1: Themomixer 5350 and 5355

Voltage	100 – 240 V ±10 %,
Frequency	50 - 60 Hz
Fuses	see nameplate or label on the rear of the device
Power consumption	90 W

Tab. 10-2: Thermostat 5352

Voltage	100 – 240 V ±10 %, The voltage is automatically adapted.
Frequency	50 - 60 Hz
Fuse at 100 to 240 V	T1, 6 A, 250 V (2 pieces)
Power consumption	75 W
Maximum current consumption	< 0,8 A
Protection class	I
Overvoltage category	II (IEC 61010-1)
Degree of pollution	2 (IEC 664)

10.2 Ambient conditions

Tab. 10-3: Thermomixer 5350 and 5355

Environment:	For indoor use only
Ambient temperature	4 – 35 °C
Maximum relative humidity	70 %

Tab. 10-4: Thermostat 5352

Ambience	For indoor use only
Ambient temperature	4 – 40 °C
Maximum relative humidity	80 %

10.3 Weight/dimensions

Tab. 10-5: Thermomixer 5350

Dimensions	Width: 165 mm Depth: 250 mm Height: 145 mm
Weight basic device	2.4 kg

Tab. 10-6: Thermostat 5352

Dimensions	Width: 220 mm Depth: 250 mm Height: 125 mm
Weight	5.0 kg

Tab. 10-7: Thermomixer 5355

Dimensions	Width: 220 mm Depth: 250 mm Height: 125 mm
Weight	3.2 kg

10.4 Application parameters

Tab. 10-8: Thermomixer 5350

Temperature control range	4 °C above room temperature up to 99 °C
Temperature accuracy • at nominal values <20 °C and >45 °C • at set values between 20 °C and 45 °C	 • ± 2 °C • ± 1 °C
Heating rate	approx. 5 °C/min Temperature changes proceed slower inside filled vessels.
Mixing frequency	300 rpm – 1,400 rpm
Mixing stroke	3 mm (circular path)

Tab. 10-9: Thermostat 5352

Temperature control range	–5 °C to 99 °C
Usable temperature control range	30 °C below room temperature to 99 °C
Usable temperature control range CombiBox	30 °C below room temperature to 95 °C (depending on the filling level)
Temperature accuracy (thermoblock 1.5 mL) at • 0 °C • 37 °C • 90°C	 • ± 1.0°C • ± 0.5 °C • ± 1.0°C
Heating rate	5 °C/min
Cooling rate • simple temperature control operation – 25 °C to 99 °C – –5 °C to 25 °C • programmable temperature control operation	 • 6,0 °C/min • 1,5 °C/min • 0,5 °C/min
Maximum temperature deviation via the thermoblock for 24 micro test tubes	0.2 °C

Tab. 10-10:Thermomixer 5355

Temperature control range Thermoblocks for reaction vessels Thermoblocks for microplates	 13 °C below room temperature to 99 °C 10 °C below room temperature to 99 °C
Temperature accuracy (Reference: Thermoblock 1.5 mL) • at nominal values <20 °C and >45 °C • at set values between 20 °C and 45 °C	 • ± 2.0 °C • ± 0.5 °C
Heating rate	approx. 5 °C/min The temperature changes in the filled tubes are slower.
Cooling rate Cooling rate from room temperature to 13 °C below room temperature	2 °C/min – 3 °C/min 0.5 °C/min – 1.0 °C/min
Mixing frequency for • Thermoblocks 0.5 mL • Thermoblocks 1.5 and 2.0 mL • Microplates • Conical tubes • Cryotubes	 • 300 rpm – 1,500 rpm • 300 rpm – 1,400 rpm • 300 rpm – 1,400 rpm • 300 rpm – 750 rpm • 300 rpm – 1,400 rpm
Mixing stroke	3 mm (circular path)

10.5 Additional data

10.5.1 Interfaces

EDP connection	RS -232, Sub-D9 male

Only connect devices to the interfaces that meet the IEC 950/EN 60950 (UL 1950) standards.

10.5.2 Time interval

Programmable time interval:	1 min – 99:59 h, unlimited

10.6 Tolerances

All data applies to an ambient temperature of 23 °C ± 2 °C.

Tab. 10-11:Speed and timer

Parameters	**Tolerance**
5350, 5355: Speed (entire speed range)	± 20 rpm
5352, 5355: Timer	At 5 min run time ± 2 s

11 Ordering information

11.1 Figures

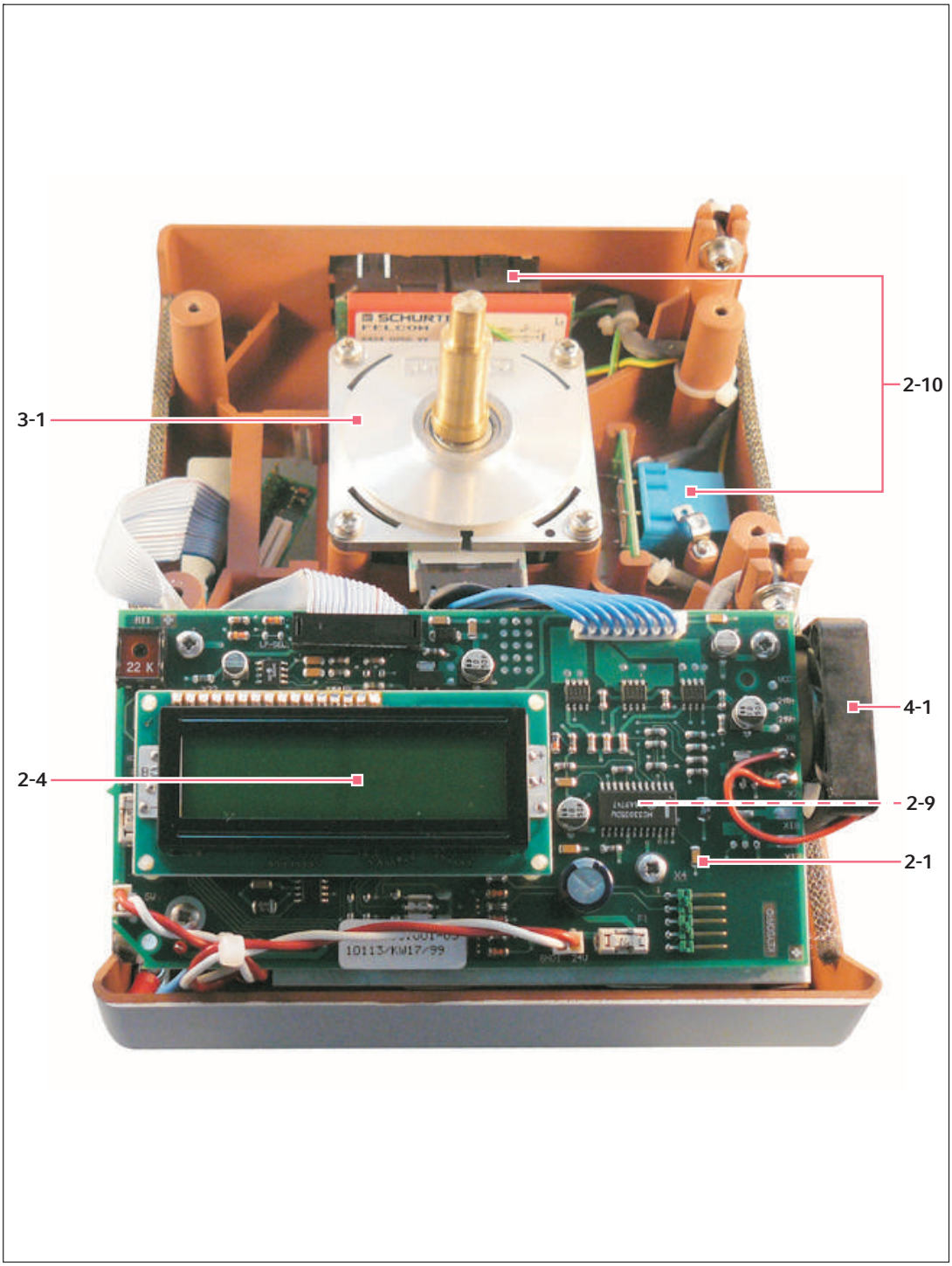


Fig. 11-1: Thermomixer 5350 internal view

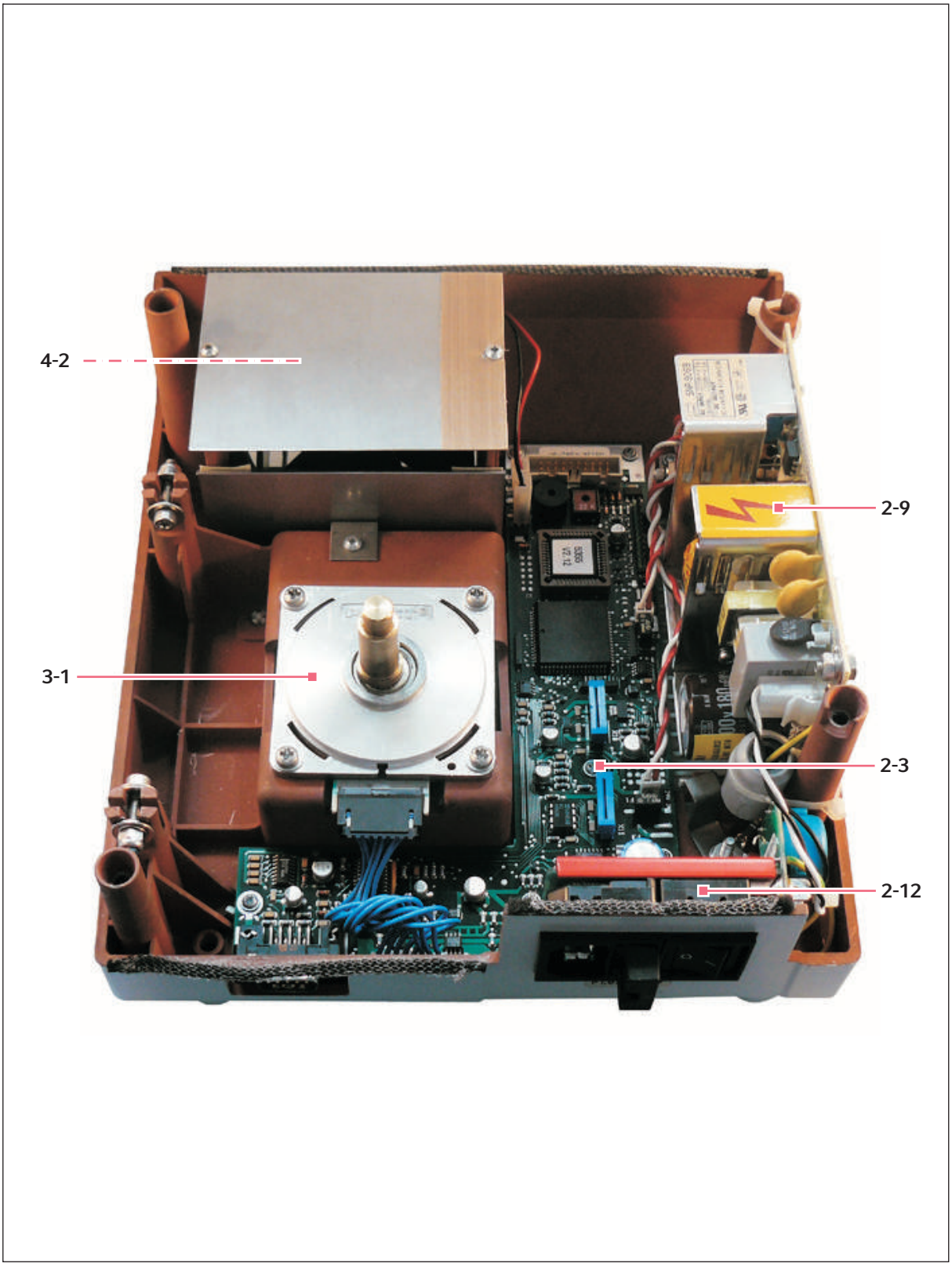


Fig. 11-2: Thermomixer 5355 internal view

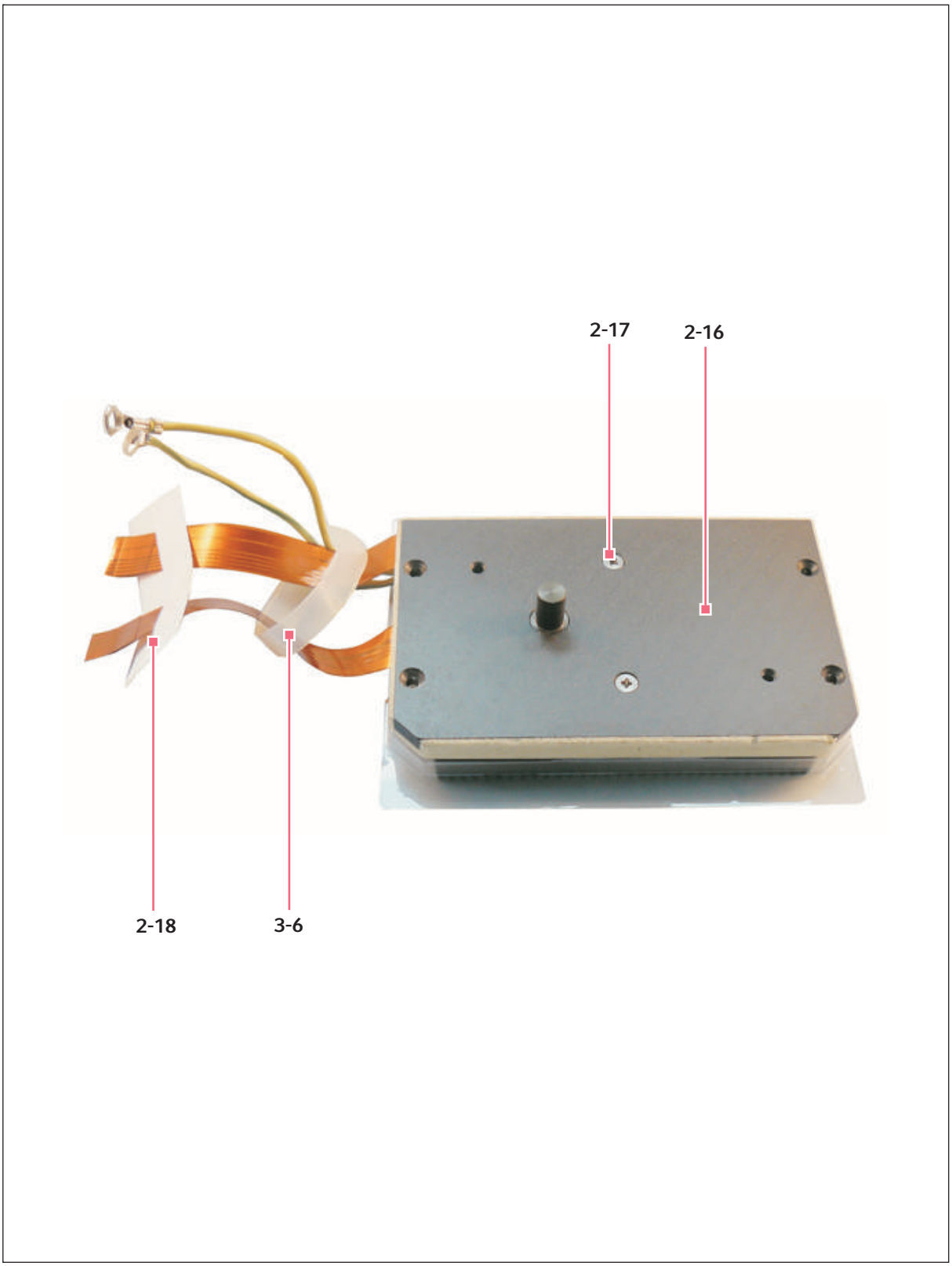


Fig. 11-3: Thermomixer 5355, heating/cooling plate

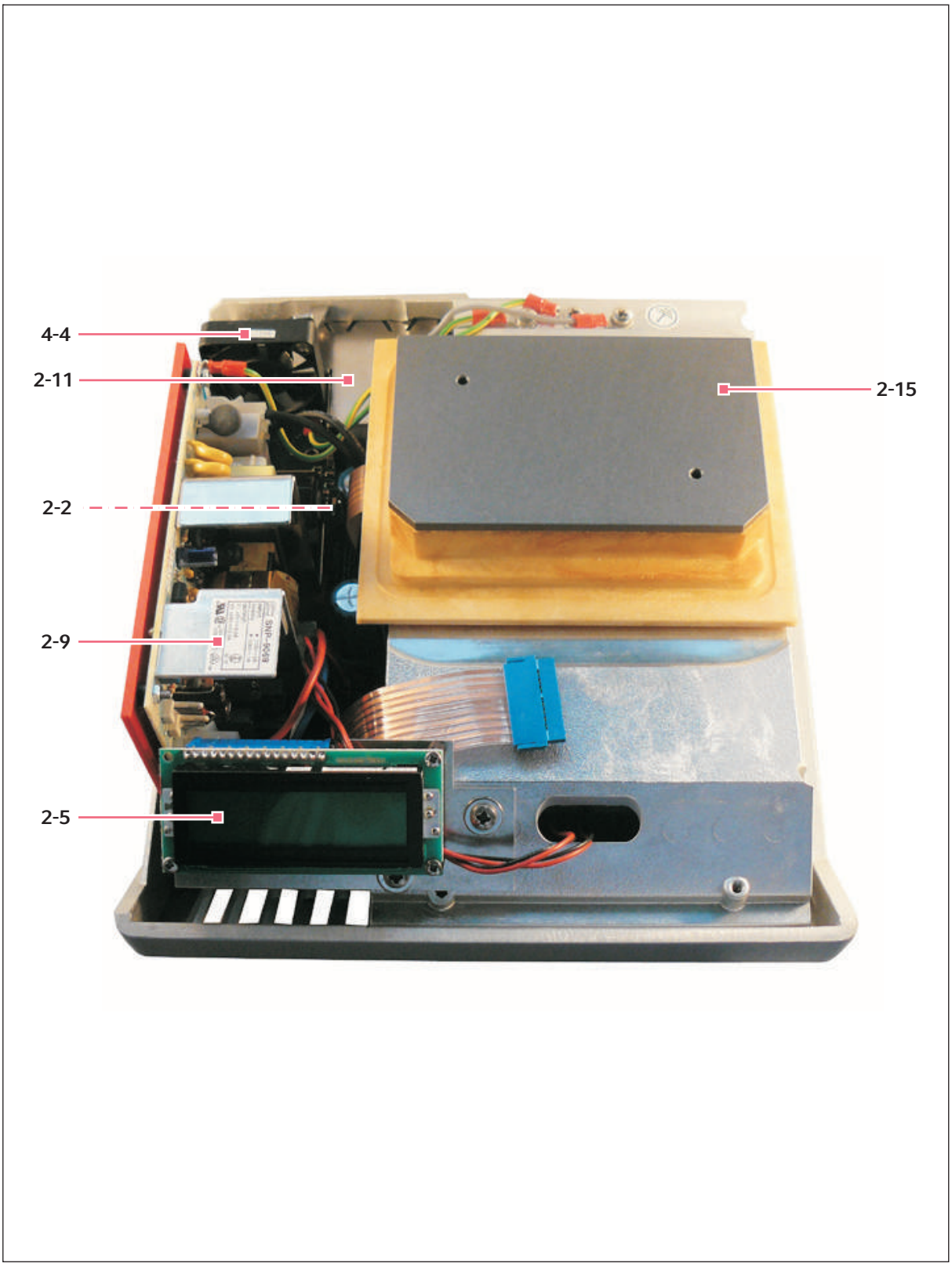


Fig. 11-4: ThermoStat 5352 inside view

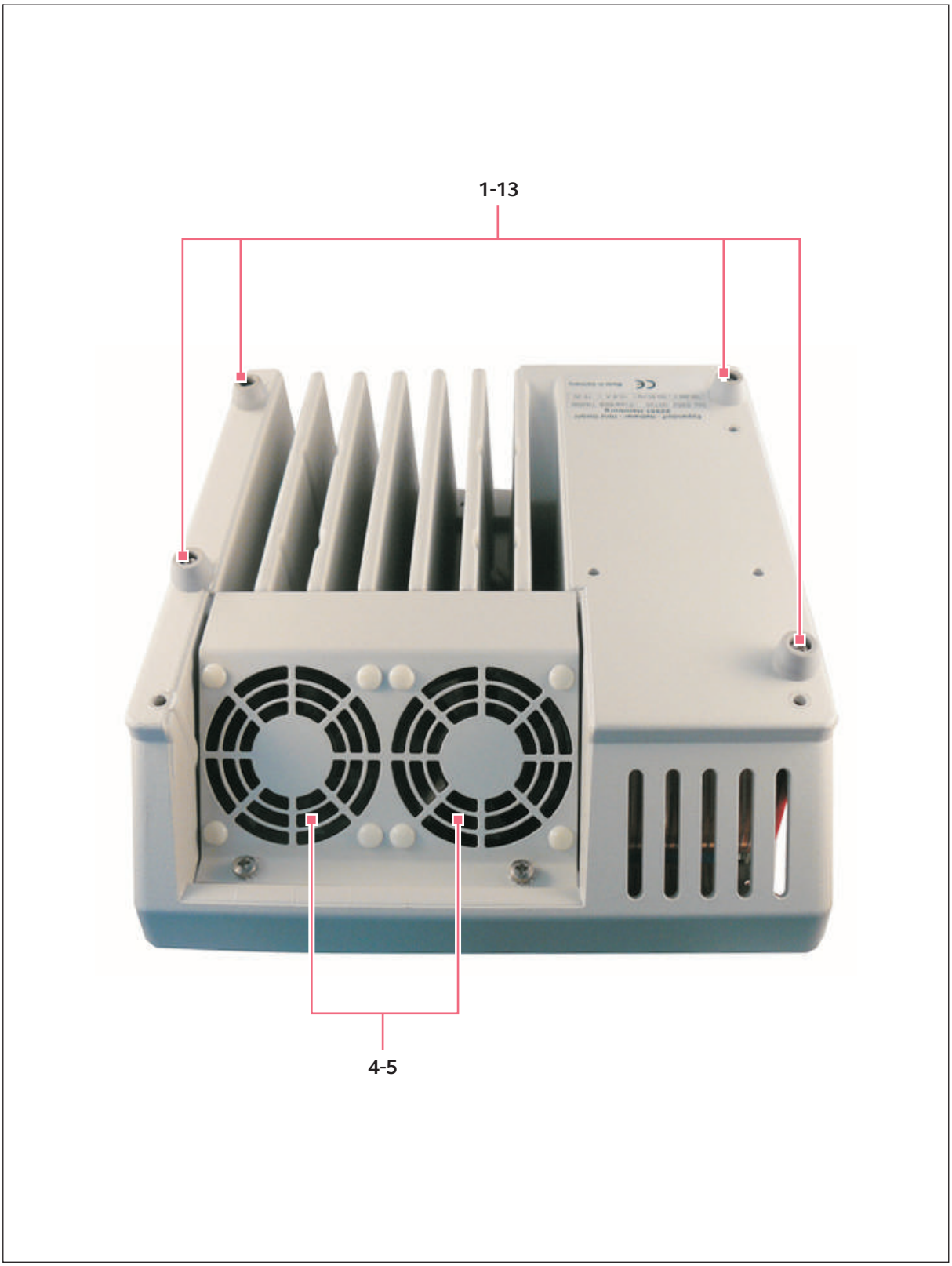


Fig. 11-5: ThermoStat 5352 lower part housing

Fig. 11-6: Oscillating frame 5350 / 5355

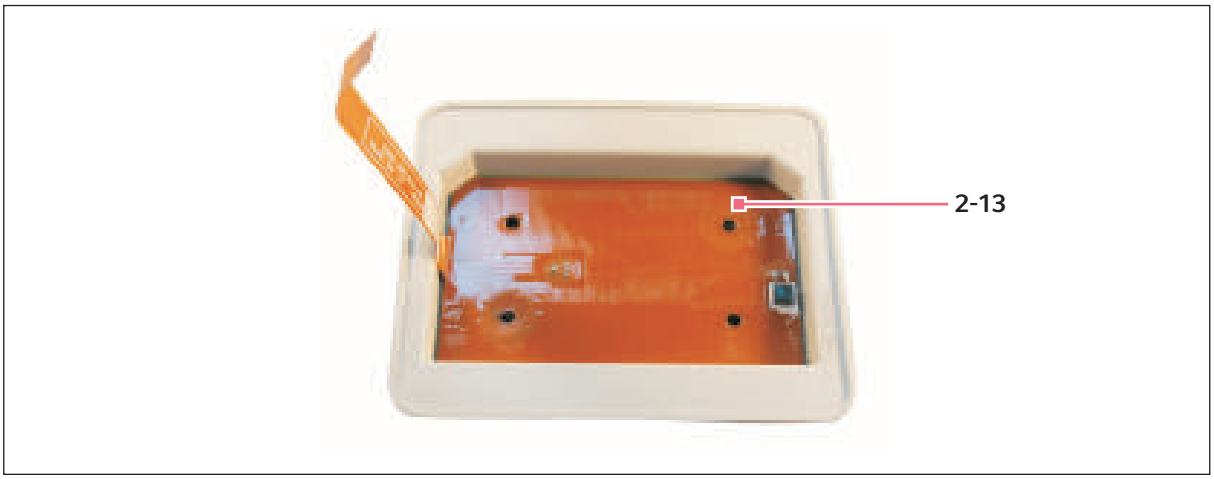


Fig. 11-7: 5350 thermoblock

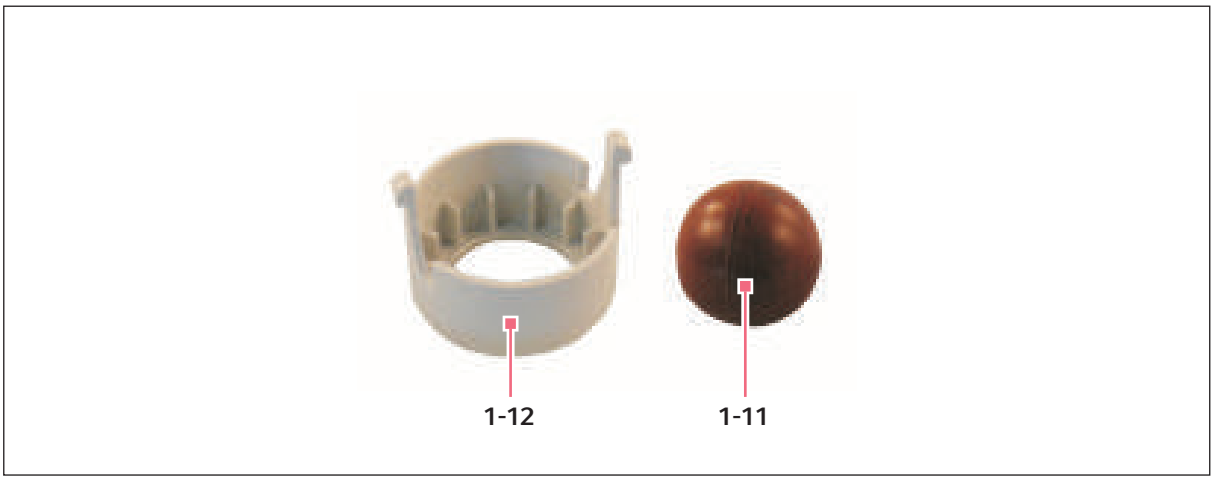


Fig. 11-8: Spherical foot and spherical support

11.2 Spare parts

Product numbers

- 5350: Thermomixer/Thermomixer compact
- 5352: Thermostat plus
- 5355: Thermomixer R/Thermomixer comfort

11.2.1 Housing

Fig.	Item	Order no. (International)	Description	5350	5352	5355
----	1-1	5352 853.005	**Upper part of housing**		X	X
----	1-2	5350 854.004	**Upper part of housing** with keypad	X		
----	1-3	5352 861.008	**Distance column for Upper part of housing**		X	
			Keypad			
----	1-4	5350 005.112	5350	X		
----	1-5	5350 005.163	5350 (ENA)	X		
----	1-6	5352 852.009	5352		X	
----	1-7	5355 005.048	5355			X
----	1-8	5355 005.234	5355 (ENA)			X
----	1-9	5355 012.001	**Fastening angle for display**			X
11-8	1-11	5355 863.001	**Spherical foot** set of 4	X		X
11-8	1-12	5355 864.008	**Spherical support** set of 4	X		X
11-5	1-13	5352 851.002	**Foot for housing** set of 4		X	
----	1-14	0011 205.208	**Softshield, 1m**	X		X

11.2.2 Electronics

Fig.	Item	Order no. (International)	Description	5350	5352	5355
11-1	2-1	5350 862.007	**PCB Mixer compact with PROM**	X		
11-4	2-2	5352 854.001	**PCB Thermostat plus**		X	
11-2	2-3	5355 857.001	**PCB Mixer comfort with PROM**			X
			PCB Display			
11-1	2-4	5350 858.000	5350, cpl.	X		
11-4	2-5	5352 859.003	5352, cpl.		X	
----	2-6	5355 856.005	5355, cpl.			X
11-1/11- 2/ 11-4	2-9	5350 855.000	**Switched-mode power supply**	X	X	X
			Mains input module			
11-1	2-10	5350 856.007	5350, cpl.	X		
11-4	2-11	5352 857.000	5352, cpl.		X	
11-2	2-12	5355 803.009	5355, cpl.			X
			Thermoblock			
11-7	2-13	5350 860.004	1,5 mL	X		
11-4	2-15	5352 858.007			X	
			Sealing cap			
----	2-14	5350 863.003	2 pieces	X		
11-3	2-16	5355 860.002	**Heating/cooling plate**			X
			Insert nut for Heating-/cooling plate			
11-3	2-17	5355 860.100	2 pieces			X
11-3	2-18	5355 005.277	**Filter paper**			X

11.2.3 Drive

Fig.	Item	Order no. (International)	Description	5350	5352	5355
11-1 / 11-2	3-1	5350 866.002	**Motor**	X		X
			Excenter and imbalance disk			
----	3-2	5350 859.006	5350	X		
----	3-3	5355 859.004	5355			X
11-6	3-4	5350 867.106	**Oscillating frame 5350/5355 (POM)**	X		X
11-3	3-6	5355 866.060	**Repair kit silicone ring**			X

11.2.4 Fan

Fig.	Item	Order no. (International)	Description	5350	5352	5355
			Fan			
11-1	4-1	0013 606.781	small	X		X
11-2	4-2	5355 604.006	large			X
----	4-3	5355 862.005	**Insulating tape - fan cover**			X
			Fan			
			1			
11-4	4-4	5352 855.008			X	
			Fan			
			2			
11-5	4-5	5352 856.004	2 pieces, mounted		X	

11.2.5 Fuses

Fig.	Item	Order no. (International)	Description	5350	5352	5355
			Soldering fuse			
----	5-1	0013 606.072	T 0.5 A	X		X
----	5-4	0013 607.877	T 3.15 A	X		X
			Fuse SMD			
----	5-2	0013 611.629	F 1 A	X		X
----	5-3	0013 608.695	T 1.5 A	X		X
----	5-5	0013 611.645	T 3.5 A	X		X
			Fuse			
			Mains input module			
----	5-6	0013 570.884	T 1 A		X	
----	5-8	0013 607.869	F 1.6 A	X		X
			Fuse			
----	5-7	0013 613.889	1.6 AT		X	

11.2.6 Auxiliary equipment

The adapter for temperature adjustment (pos. 6-10) and the adapter cable for temperature adjustment 5350 (pos. 6-11) are no longer produced and therefore no longer available. The temperature calibration can only be completed manually.

Fig.	Item	Order no. (International)	Description	5350	5352	5355
----	6-2	0055 000.298	**Temperature Verification System – Single-channel** for Mastercycler, Mastercycler ep, Mastercycler pro, Mastercycler nexus, ThermoMixer compact, ThermoMixer comfort, Thermostat plus	X	X	X
----	6-3	5341 899.003	**Power supply for testo device** 230 V / 50 – 60 Hz	X	X	X
----	6-4	5354 850.500	**Temperature sensor** 1,5 mL	X	X	X
----	6-5	5355 352.007	**Allen key** for thermo block 3 mm		X	X
----	6-6	5325 620.007	**Data cable 5325** to connect a PC with 4308, 5247, 5248, 5325, 5352, 5181, 5183, 5186, 5188		X	
----	6-7	5355 858.008	**Data cable 5355** To connect a PC with 5355, 5804, 5810			X
----	6-8	5352 862.004	**Packing** 5352 and 5355		X	X
----	6-9	5350 868.005	5350	X		
----	6-10	0024 204.707	**Adapter for temperature adjustment**	X	X	X
----	6-11	0024 204.804	**Adapter cable** for temperature adjustment 5350	X		

11.2.7 Accessories

Fig.	Item	Order no. (International)	Description	5350	5352	5355
			Exchangeable thermoblock for 24 microcentrifuge tubes complete with IsoTherm Rack and IsoTherm cool pack 0 °C			
----	7-1	5361 000.015	0.5 mL		X	X
----	7-3	5360 000.011	1.5 mL		X	X
----	7-4	5362 000.019	2.0 mL		X	X
			IsoRack Set of 4 racks for			
----	7-2	3880 000.038	0.5 mL tubes		X	X
----	7-5	3880 001.034	1.5 mL/2.0 mL tubes	X	X	X
			Exchangeable thermoblock for MTPs and deepwell plates			
----	7-6	5363 000.012	with lid		X	X
----	7-6a	5363 850.016	**Screws for MTP-block**		X	X
----	7-7	5363 000.217	**Lid for MTP Block**		X	X
			Adapter plate for 96 × 0.2 mL PCR tubes and well PCR plates 96			
----	7-8	5363 007.009	to insert in exchangeable thermoblocks for MTPs		X	X
----	7-8a	5363 850.024	**Screws MTP + Adapter 0.2mL**		X	X
			CombiBox for any test tubes			
----	7-9	5352 100.007	interior 13.5 × 9.0 × 6.0 cm (W × D × H)		X	
			Exchangeable thermoblock for 24 micro test tubes			
----	7-10	5364 000.016	11 – 11.9 mm diam., height 30 – 76 mm		X	X
			Exchangeable thermoblock for Falcon tubes			
----	7-11	5366 000.013	8 × 15 mL		X	X
----	7-12	5365 000.010	4 × 50 mL		X	X
			Exchangeable thermoblock for 24 Cryo tubes			
----	7-13	5367 000.017	1.5 – 2 mL, diameter max. 12,5 mm, all base shapes		X	X
			Exchangeable thermoblock for slides DC			
----	7-14	5368 000.100	4 DualChip slides		X	X
			Exchangeable thermoblock for slides			
----	7-15	5368 000.010	4 slides, for hybridization experiments		X	X
----	7-16	5368 851.002	**Lid with sealing**		X	X
			Snap lock			
----	7-17	5368 852.009	Set of 2		X	X
			Reservoir-pads			
----	7-18	5368 001.408	Set of 3		X	X
			Exchangeable thermoblock for 5 mL tubes			
----	7-19	5309 000.333	8 × 5 mL		X	X

11.3 Spare parts proposals – initial equipment

Fig.	Item	Order no. (International)	Description	5350	5352	5355
11-1	2-1	5350 862.007	**PCB Mixer compact with PROM**	X		
11-4	2-2	5352 854.001	**PCB Thermostat plus**		X	
11-2	2-3	5355 857.001	**PCB Mixer comfort with PROM**			X
11-1/11-2/ 11-4	2-9	5350 855.000	**Switched-mode power supply**	X	X	X
			Thermoblock			
11-7	2-13	5350 860.004	1,5 mL	X		
11-4	2-15	5352 858.007			X	
11-3	2-16	5355 860.002	**Heating/cooling plate**			X
11-1/11-2	3-1	5350 866.002	**Motor**	X		X
11-6	3-4	5350 867.106	**Oscillating frame 5350/5355 (POM)**	X		X
----	6-2	0055 000.298	**Temperature Verification System – Single-channel** for Mastercycler, Mastercycler ep, Mastercycler pro, Mastercycler nexus, ThermoMixer compact, ThermoMixer comfort, Thermostat plus	X	X	X
			Temperature sensor			
----	6-3	5354 850.500	1,5 mL	X	X	X

12 Technical information

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