

# Thermal Mixer

## Catalog Number 13687711





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# 1. Safety precautions

The following symbols mean:



**Caution!**

Make sure you have fully read and understood the present Manual before using the equipment. Please pay special attention to sections marked by this symbol.



**Caution!**

Hot surface! Platform surface becomes very hot during use. Always use protective cotton gloves to install or remove test plate when set temperature is higher than 60°C.

## GENERAL SAFETY

- Use only as specified in the operating manual provided.
- The unit should be saved from shocks or falling.
- The unit must be stored and transported in a horizontal position (see package label).
- After transportation or storage keep the unit under room temperature for 2-3 h before connecting it to the electric circuit.
- Before using any cleaning or decontamination methods except those recommended by the manufacturer, check with the manufacturer that the proposed method will not damage the equipment.
- Do not make modifications to the design of the unit.

## ELECTRICAL SAFETY

- Connect only to the external power supply unit with voltage corresponding to that on the serial number label.
- Use only the external power supply unit provided with this product.
- Ensure that the power switch and external power supply are easily accessible during use.
- Do not plug the unit into an ungrounded power socket, and do not use an ungrounded extension lead.
- Disconnect the unit from electric circuit before moving.
- Disconnect the external power supply unit from power socket to turn off the unit.
- If liquid penetrates into the unit, disconnect it from the external power supply unit and have it checked by a repair and maintenance technician.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in the Specifications section.

## DURING OPERATION

- Do not leave the operating unit unattended.
- Do not impede the platform motion.
- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possible operation of the unit in specific atmospheres.
- Do not operate the unit if it is faulty or has been installed incorrectly.
- Do not use outside laboratory rooms.
- Do not check the temperature by touch. Use a thermometer.

## BIOLOGICAL SAFETY

- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or penetrates into the equipment.

## 2. General information

This Thermo Scientific Thermal Mixer provides mixing and temperature control of samples in micro test tubes or PCR plates. Features of this product meet the highest expectations of users according to numerous parameters:

- Fast reaching of specified mixing speed and maintenance of equal amplitude of rotation throughout the block
- Stability of maintaining the set temperature in a wide range throughout the block surface.
- With the help of the temperature calibration function the user can calibrate the unit approx.  $\pm 6\%$  of the selected temperature to compensate differences in the thermal behaviour of tubes from different manufacturers
- LCD display indicates preset and current values of temperature, speed and time of operation
- Quiet motor operation, compact size, prolonged service life.

Functions of heating (up to  $+100^{\circ}\text{C}$ ), cooling (up to  $15^{\circ}\text{C}$  below room temperature) and mixing can be performed both simultaneously and independently, i.e. the unit implements three devices in one:

1. Shaker
2. Dry Bath / Block Heater
3. Thermal Mixer

There are five heating and cooling blocks available, including a block with a plastic lid for PCR-plates. All blocks are mutually interchangeable and can be easily installed on thermal mixer.

The device is applicable in:

- genetic analyses in extraction of DNA, RNA and further sample preparation;
- biochemistry for studying of enzymatic reactions and processes;
- extraction of metabolites from cellular material.

### 3. Getting started

#### 3.1. Unpacking

Remove packing materials carefully and retain for future shipment or storage of the unit. Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage. Warranty covers only the units transported in the original package.

**Caution!** Automatic balancing system in this product produces a light metal-like noise when moving the unit which is likely to be heard during unpacking and also during operation (acceleration/deceleration of the platform). It is a normal occurrence and does not indicate a fault or a loose part.

#### 3.2. Complete set. Thermal mixer set includes:

##### Standard set

- Thermal mixer..... 1 pce
- external power supply..... 1 pce
- power cord..... 1 pce
- spare rubber belt .....2 pcs
- Operating Manual; Certificate..... 1 pce
- 

##### Optional accessories or included in package

- Block for 20 x 0.5ml and 12 x 1.5ml microtubes ❶ ..... Cat. No. 13687715
- Block for 20 x 0.2ml and 12 x 1.5ml microtubes ❷ ..... Cat. No. 13687714
- Block for 24 x 2.0ml microtubes ❸ ..... Cat. No. 13687713
- Block for 24 x 1.5ml microtubes ❹ ..... Cat. No. 13687712
- Block for 96-well PCR microplate or 0.2ml tubes/strips ❺ Cat. No. 13687716



### 3.3. Set up:


- place the unit on even horizontal non-flammable surface 30 cm away from any flammable materials;
- to provide optimum ventilation, ensure clearance around the device - 20 cm on all sides;
- remove protective film from the display;
- plug the external power supply unit into the socket at the rear side of the unit;
- connect the power cord to the external power supply unit.

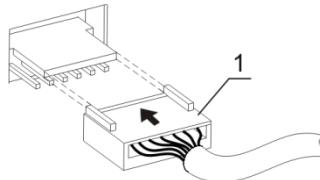
### 3.4. Block installation (if block is not installed):



#### **Caution!**

Block installation and replacement have to be performed only when the power switch is turned off and external power supply is disconnected from the device.

- Choose the block, connect the plug to the contact terminal according to the scheme on Fig.1/1 on the underside of the block. Make sure that the connector is mounted tightly.
- Align the block so that the warning label  is facing the front of the unit.
- Secure with the four knurled screws (Fig. 2/1).



**Fig. 1. Block connection**



**Fig. 2. Block set up**

### 3.5. Changing blocks

- Disconnect the external power supply unit from the device.
- Remove the four knurled screws, lift the block without damaging the cable and disconnect the plug (fig.1/1).
- Select the new block and install according to the point 3.4.

# 4. Operation

## Recommendations during operation

- Please check the tubes/microplates before using, be sure that plates are heat-resistant. Do not heat the deep well plates over the melting point of the material they are made of.
- It is recommended to fill wells up to 75% of the rated volume for efficient mixing.



**Caution!** Hot surface! Platform surface becomes very hot during use. Always use protective cotton gloves to install or remove test plate when set temperature is higher than 60°C.

- 4.1. Connect external power supply unit to a grounded power socket and set the power switch, located on the rear panel of the unit, to position I (ON).
- 4.2. The display will turn on with the upper line (Set) showing time, speed and temperature set earlier and the lower line (Actual) showing current readings of the same parameters (platform temperature °C, which automatically starts rising according to the temperature set in the upper line). The time of temperature stabilization depends on the initial temperature.

## Setting the parameters

Use the readings in the upper line of the display (Set), while setting the required parameters.

- 4.3. **Setting time (TIME).** Using the ▲ and ▼TIME button (Fig. 3/1) set the required working time interval in hours and minutes (increment 1 min). Pressing the button for more than 3 s will increase the increment rate.
- 4.4. **Setting speed (RPM).** Using the ▲ and ▼RPM button (Fig. 3/2) set the required speed (increment 10 rpm). Pressing the button for more than 3 s will increase the increment rate.
- 4.5. **Setting temperature (T, °C).** Using the ▲ and ▼T, °C button (Fig. 3/3) set the necessary temperature (increment 0.1°C). Pressing the button for more than 3 s will increase the increment rate.

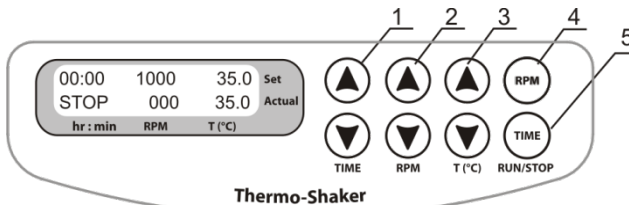


Fig. 3. Control Panel



**Caution!**

Heating/temperature maintenance process does not stop when the timer is finished. Platform thermal regulation can be turned off only by setting the required temperature below 25 °C (the display will show OFF - T,°C - set point). In this mode thermal mixer can be used in the cold rooms as a mixing device without thermoregulation. Settings can be changed during operation.

**Program execution.** After the thermal stabilization of the Thermal mixer (when the set and current temperature readings become the same):

- 4.6. Place the deep well plate on the platform and close the lid.
- 4.7. Press the **RPM-RUN/STOP** button (Fig. 3/4). The platform will start rotating and the timer indicator will start counting up the time interval (with 1 min precision).

**Note!**

If the rotation speed is set to zero, pressing **RPM-RUN/STOP** key will start the timer but the platform will not move.

- 4.8. After finishing the program (after the set time elapses) the platform motion will stop and the timer will show the flashing reading STOP accompanied by the repetitive sound signal until the **RPM-RUN/STOP** button is pressed.
- 4.9. If the working time is not set (or is reset) and the timer indicator in the upper line shows 00:00, pressing the **RPM-RUN/STOP** button will start continuous operation of the device with countdown timer in the lower line (Actual) until the **RPM-RUN/STOP** button is pressed again.
- 4.10. If required, there is possibility to restart the timer when it is running. Press the **TIME-RUN/STOP** key once (Fig. 3/5) to stop the timer. Press the **TIME-RUN/STOP** button again to restart the timer.
- 4.11. The platform motion can be stopped at any time by pressing the **RPM-RUN/STOP** button. In this case the program realization and the platform motion will stop and the timer will switch into the STOP mode saving previously set time. Press the **RPM-RUN/STOP** button to repeat the operation with the same time and speed.

**Caution!**

At the end of the set time period the platform movement is stopped automatically, but the heating can be stopped only manually by reducing the temperature using the **▼T,°C** button (Fig. 3/3 - lower button) till the OFF sign appears in the upper line (Set) of the display

**Caution!**

When lid is open the platform and lid heating surfaces will remain hot. Please, take necessary care and use protective cloth gloves at temperatures over 60°C.

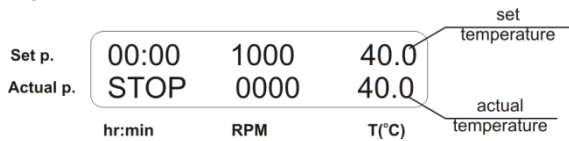
- 4.12. After finishing the operation set the power switch, located on the rear panel of the unit, in position O (Off) and disconnect the external power supply from electric circuit.

# 5. Calibration

- 5.1. The device is pre-calibrated at the factory (calibrating coefficient is 1.00) for operation with temperatures, measured by a sensor, installed in the heating block.
- 5.2. To enter the calibration coefficient, hold the **TIME-RUN/STOP** button (Fig. 3/5) pressed for more than 8 s to activate calibration mode. The calibration coefficient will be shown on the display (Fig. 5/1).
- 5.3. Set 1.000 value using the **▲** and **▼RPM** buttons (Fig. 3/3) as shown on Fig. 5/1 to restore the factory settings.
- 5.4. Press the **RPM-RUN/STOP** button once to exit the calibration mode.

### Calibration procedure

- 5.5. Install autonomic sensor (0.5°C accuracy) into the plate well placed on the platform. Close the lid.
- 5.6. Set the required temperature in operation mode (e.g. 40°C).
- 5.7. After the unit reaches the set temperature (when the set and current temperature readings equal) leave the unit for 30 min for thermal stabilization.
- 5.8. Let us assume that the readings of independent sensor is 39°C, but the display's actual temperature is 40 °C (Fig. 4). Then it is necessary to add 1°C correction.
- 5.9. Hold **TIME-RUN/STOP** button (Fig. 3/5) pressed for more than 8 s to activate calibration mode. The following parameters will be shown on the display (Fig.4):



**Fig. 4 Control panel in operation mode**

5.10. Use the temperature with multiplier coefficient readings to set the new temperature value.

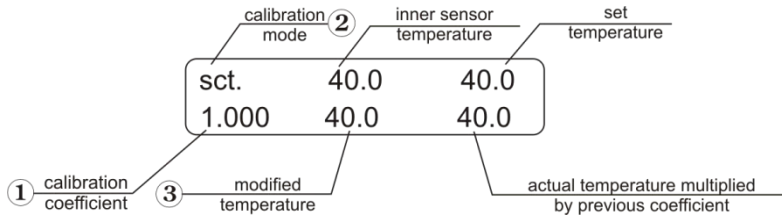
Using the **Temp. ▲** and **▼** buttons (Fig. 3/3), change the calibration coefficient (Fig. 5A/1) so, that the new temperature value (Fig. 5A/2) corresponds to the autonomic sensor temperature. In our example the calibration coefficient will be 0.974 (in range: 0.936 up to 1.063; increment 0.001).



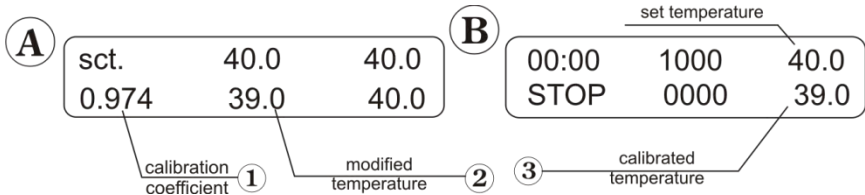
**Caution!** This calibrating coefficient will correct temperature through all the operation range.

5.11. After finishing the calibration press the **RPM-RUN/STOP** button (Fig. 3/4) once to save the changes and exit the calibration mode.

5.12. The display will show calibrated temperature as shown on Fig. 5B/3 and the unit will continue thermal stabilization according to the previously set temperature.



**Fig. 4 Control panel in calibration mode**



**Fig. 5 Control pane and corrected values**

## 6. Specifications

The unit is designed for operation in cold rooms, incubators and closed laboratory rooms at ambient temperature from +4°C to +40°C in a non-condensing atmosphere and maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

### 6.1. Temperature specifications

Setting range .....	+4°C to +100°C
Control range .....	15°C below Ambient to +100°C
Setting resolution .....	0.1°C
Stability**, at +37°C .....	±0.1°C
Maintaining accuracy**, at +37°C .....	±0.5°C
Uniformity over the platform**, at +37°C .....	±0.1°C
Average heating speed from +25°C to +100°C .....	5°C/min
Average cooling speed	
from +100°C to Ambient .....	5°C/min
from Ambient to 15°C below Ambient .....	1.8°C/min
Temperature calibration option	
Calibration coefficient range .....	0.936...1.063 (± 0.063)

### 6.2. General specifications

Speed range .....	250-1400 rpm
Speed setting resolution .....	10 rpm
Maximal speed deviation	
for 250 rpm .....	2%
for 1400 rpm .....	0.7%
Orbit .....	2 mm
Digital time setting .....	1 min - 96 h
Time setting resolution .....	1 min
Maximal continuous operation time .....	96 h
Recommended interval between operation sessions not less than 8 hours	
Display .....	16x2 symbols, LCD
Dimensions .....	205x230x130 mm
Input current/power consumption .....	12 V, 4.9 A/ 60 W
External power supply unit .....	in AC 100-240 V 50/60 Hz, out DC 12 V
Weight*** .....	3.7 kg

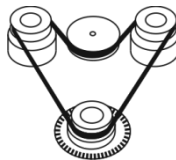
\*\*\* Accurate within ± 10%.

Cat. No.	Block description	Weight, kg*
<b>13687712</b>	Block for 24 x 1.5ml microtubes	0.7
<b>13687713</b>	Block for 24 x 2.0ml microtubes	0.7
<b>13687714</b>	Block for 20 x 0.2ml and 12 x 1.5ml microtubes	0.6
<b>13687715</b>	Block for 20 x 0.5ml and 12 x 1.5ml microtubes	0.7
<b>13687716</b>	Block for 96-well microplate for PCR, w/o skirt, with half skirt, low and high profile or 0.2ml tubes/strips	0.7

Thermo Fisher Scientific is committed to a continuous program of product improvement and reserves the right to alter design and specifications of the equipment without additional notice.

## 7. Maintenance

- 7.1. If the unit requires maintenance, disconnect the unit from the electric circuit and contact Thermo Fisher Scientific.
- 7.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.
- 7.3. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and decontamination of the unit.
- 7.4. Rubber belt replacement:
  - For maintenance of reliable operation of the device the producer recommends to replace rubber belts after 1.5 years or 2000 hours of operation time.
  - Disconnect the external power supply unit from the device.
  - Remove 4 fixation screws on the device bottom and remove the bottom plate.
  - Replace the rubber belt (Fig. 6).
  - Reassemble the device.



**Fig. 6. Rubber belt replacement**

\* Accurate within  $\pm 10\%$ .

## 8. Warranty and Claims

- 8.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the customer follows the operation, storage and transportation instructions.
- 8.2. The warranted service life of the unit from the date of its delivery to the customer is 24 months.
- 8.3. Warranty covers only the units transported in the original package.
- 8.4. If any manufacturing defects are discovered by the customer, Thermo Fisher Scientific should be contacted immediately.
- 8.5. The following information will be required in the event that warranty or post-warranty service comes necessary. Complete the table below and retain for your records.

Model	Thermo Scientific Thermal Mixer Cat. No. 13687711
Serial number	
Date of sale	
Purchase or Sales Order Number	

## 9. Declaration of conformity

This declaration of conformity indicates that the equipment meets the requirements of the following Directive(s):

**EMC Directive 2014/30/EC**

**Low Voltage Directive 2014/35/EC**

**RoHS 2011/651EC**

**WEEE 2002/96/EC & 2012/19/EU**

Applied standards:

<b>EN 61326-1</b>	Electrical equipment for measurement, control and laboratory use EMC requirements. General requirements.
<b>EN 61010-1</b>	Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements.
<b>EN 61010-2-010</b>	Particular requirements for laboratory equipment for the heating of materials.
<b>EN 61010-2-051</b>	Particular requirements for laboratory equipment for mixing and stirring.

**For support call:**

Customer Service: 866.984.3766

Technical Service: 800.438.4851

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