Metal block thermostats series MBT250-1^{NT} and MBT250-2^{NT}

Operation manual

Content

Laboratory Devices for Automated Sampling

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1 Intended use

The metal block thermostats of the MBT250^{NT} series are used for temperature control of liquid or powder samples in test tubes or other sample vessels. These sample vessels can be used in specially designed, exchangeable, metallic insert blocks.

The adjustable temperature range is between room temperature from 20 ° C to 250 ° C.
They are used inside closed rooms, for example in laboratories or similar premises. The devices are not suitable for use in potentially explosive environments.

2 Brief description of the function

The devices have a temperature-insulated shaft with a controllably heated base plate in which the specially designed aluminum blocks can be set and tempered between 20 and 250 ° C.
There is a selection of blocks for a wide variety of sample vessels.
The devices are operated using a membrane keyboard with two LCD displays. The microprocessor control allows the specification of setpoints and heating times, which are automatically implemented by means of a PID controller for temperature control of the blocks.
The temperature can also be checked by connecting an external temperature sensor.
Ramp functions in temperature control and data transmission via interfaces to the outside are not provided.
For safety reasons, an additional internal overtemperature protection is provided, which reversibly switches the heating off independently of the control loop in the event of impermissible overheating.

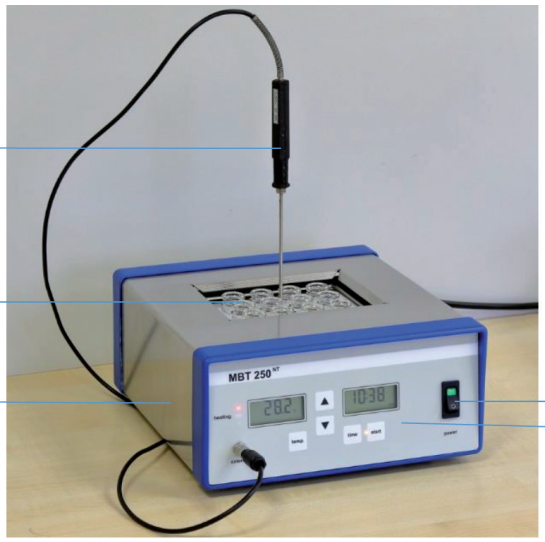
3 Security requirements

These instructions are intended to prevent personal injury and property damage. They must be followed and supplement the safety requirements in your working area.

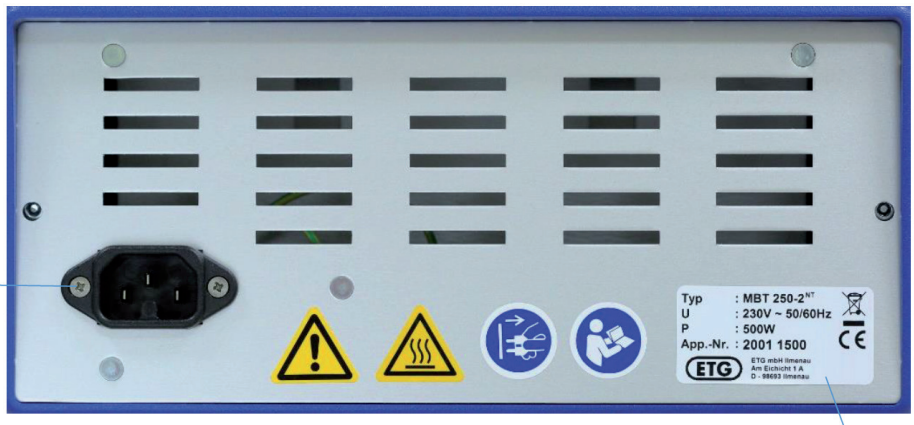



- Read these operating instructions before starting up the device.
- Depending on the working temperature and the type of goods to be tempered, personal protective equipment must be worn (gloves, glasses ...).
- The device has not be operated in potentially explosive areas.
- The device must be operated in an ambient temperature of 10 ° C to 40 ° C, the relative humidity should not exceed 50% at 40 ° C.
- The device must be set up and operated on a level, heat-resistant table (e. g. laboratory table) or on a heat-resistant surface.
- Operation of the device under a fume hood is permitted.
- Before commissioning the device, the mains voltage in your area of application must be compared with the information on the type label.
- The device may only be operated from mains sockets with protective contact.
- The mains connection of your house installation must have a residual current circuit breaker (Ia 30mA).
- The power cord supplied by the manufacturer with the hot device coupling must always be used.
- Damaged power cables must be removed from traffic.
- The safety stickers must be observed, metallic housing parts can be hot at high set temperatures.
- When using plastic sample vessels, the restricted working area depending on the plastic material must be observed.
- If blocks are removed from the device after heating up, they can be very hot - risk of burns!
- Use only the removal rod included in the scope of delivery to remove the blocks.
- If you have to remove hot blocks with the help of the removal stick, only place the removed hot blocks on a fireproof surface - Risk of fire!
- Avoid getting liquids inside the device.
- Before transport, the device must be switched off, the mains plug must be pulled.
- Service and repair work may only be carried out by authorized specialists.
- It is a portable electrical device that must be checked regularly in accordance with DIN VDE 0701-0702. The operator of the device is responsible for this.
- The operator is responsible for the qualification of the operating personnel and must ensure that the operators are trained at regular intervals about the dangers involved in their work and how to avoid them.

4 Device description

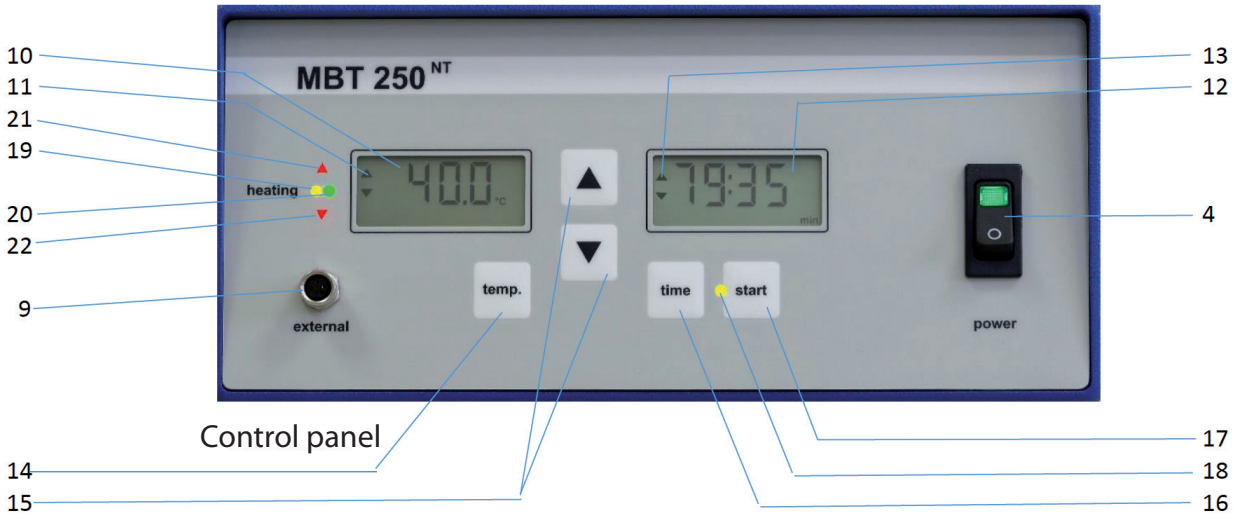


1 .....MBT250-1NT metal block thermostat
2 .....insert block, equipped with sample vessels (not in the standard scope of delivery)
3 .....control panel with displays, buttons and signal LEDs
4 .....power switch
5 .....external temperature sensor (not in the standard scope of delivery)



Rear view

6 .....mains connection for hot appliance mains cable
7 .....Warning and bid information
8 .....type label



Control panel

4 .....power switch
9 .....Connection socket for external temperature sensor
10 .....LCD display for temperature display (setpoint setting or actual value display)
11 .....Display elements for entering the setpoint on the LCD display
12 .....LCD display to show the timer
13 .....Display elements for time entry in the LCD display
14 .....Button for selecting the temperature setting
15 .....Cursor keys to select the desired temperature or duration
16 .....Button for selecting the time setting
17 .....Key to start the timer
18 .....Indicator LED flashing yellow when the timer is running
19 .....Indicator LED lights up yellow continuous or clocking with heating function
20 .....Indicator LED lights up green when the setpoint is reached
21 .....Indicator LED lights up red when actual value is greater than setpoint
22 .....Indicator LED lights up red when actual value is still less than setpoint

5 Scope of delivery

1 piece	metal block thermostat MBT250-1^{NT} bzw. MBT250-2^{NT}
1 piece	hot device power cord
1 set	fixing screws DIN912 M5x20 (2 pieces or 4 pieces) for insert blocks
1 piece	hexagon key SW 4
1 piece	removal rod

Hot device power cord

Additional accessories included

6 Equipment

If required, additional accessories can be supplied, which must be ordered separately.

- Insert blocks made of aluminum with functional holes, as well as additional holes for receiving an external temperature sensor and holes for screwing the blocks onto the heating plate
- Special blocks on request
- External temperature sensor with Pt100 type A
- Spare part removal rod for insert blocks
- Spare part fastening screws for insert blocks
- Spare part hexagon key for fastening the insert blocks

External temperature sensor

Various blocks, also special blocks

Overview of standard blocks and spare parts available at short notice with type designations:

Typ	Best.-Nr.
Block for 24 tubes Ø 10mm	MBT 24/10
Block for 24 tubes Ø 12mm	MBT 24/12
Block for 12 tubes Ø 16mm	MBT 12/16
Block for 12 tubes Ø 19mm	MBT 12/19
Block for 40 Eppendorf tubes 0.5ml	MBT 40/0-5
Block for 24 Eppendorf tubes 1.5ml	MBT 24/1-5
Block for 24 Eppendorf tubes 2.0ml	MBT 24/2-0
Block without holes	MBT 0/0
External temperature sensor with Pt100 type A	MBT PT100
Withdrawal rod for insert blocks	MBT 250/E
Fastening screws for insert blocks	MBT 250/B
Hexagon key for fastening the blocks	MBT 250/S

7 Installation and connection

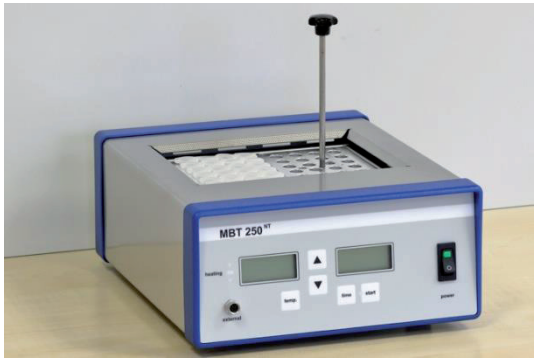
Place the device on a horizontal and level heat-resistant surface.
A laboratory table is most suitable.

Make sure that the power switch is in the „0“ position. Connect the included hot device power cable on the device side to the built-in connector on the rear of the device and then connect it to your power supply. Please make sure that your supply voltage corresponds to the operating voltage indicated on the type label.

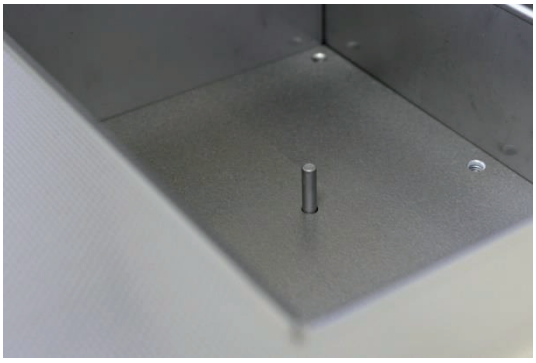
8 Operation

8.1 Insert blocks

Insert the insert block (MBT250-1^{NT}) or the insert blocks (MBT250-2^{NT}) into the device.
On the MBT250-2NT, please insert the first block in the left position, where the sensor pin protruding from the heating plate is located. All insert blocks have holes on the underside for this. To help insert the blocks, please use the removal rod that you previously screwed into the threaded hole on the top in the middle of the block.
If the blocks should not be removed often, but should remain in the device for a long time, it is recommended to fix the blocks with the included screws DIN912 - M5x20. For this purpose, the blocks have step holes diagonally in the corners, into which you can insert the screws and fix them with the hexagon key provided.
This gives you better thermal contact with the heating plate, which has an advantageous effect on the heating-up time, temperature distribution and precision.
Remove the sampling rod before heating it up so that it does not heat up unnecessarily.
When inserting and removing the blocks, make sure that you do not tilt them unnecessarily or drop them into the shaft. The sensor protruding from the heating plate, which measures the actual block temperature, could be damaged.



Block with screwed removal rod



Block temperature sensor

When using the MBT250-2^{NT}, it is recommended that the device be equipped with both blocks at all times, as this is the only way to achieve optimum temperature precision.
Now switch on the device at the power switch.

8.2 Set target temperature

Press the „temp." Key on the control panel.
In the left LCD display, the two up / down arrows flashing to the prompt.
Use the cursor keys to set the desired temperature.
The current value appears in the left LCD display. The display is in °C.
The target temperature is adjustable in steps of 0.1K to max. 250 °C.
If you hold down the cursor key for a longer time, the setpoint jumps in tenths of a degree later in degrees and then in ten degrees. This means that you can reach quickly larger setpoints.
The setpoint must be set by pressing the „temp." Button again for take over.
The two flashing up / down arrows on the LCD display become invisible and the device begins to heat and regulate.
The setpoint remains saved even after switch off the device.

8.3 Temperature display

During the heating and control phase, the colored LEDs on the left side besides the left LCD display have the following meaning:

LED yellow	●○:	Heating function (lights up continuously when heating up, clocking later)
LED green	○●:	Setpoint reached (±0,5K)
LED red	▲:	Setpoint exceeded
LED red	▼:	Setpoint not yet reached

The left LCD display shows the actual temperature of the insert blocks during the heating and control phase of the device, provided that no external sensor (special accessory) is connected.
To query the target temperature, please press the „temp." Button. The display in the LCD display now switches to the setpoint. If you do not set a new target temperature now, the display automatically switches back to the actual value after 10 seconds.
If the external temperature sensor is used, this LCD display shows the current temperature on the external sensor instead of the actual value of the block. Regardless of this, the block is further regulated to the set target temperature. So do not be confused by an external sensor that may be connected, which may be only beside to the device.

8.4 Short-term alarm clock (timer)

The function minute minder is useful if sample vessels or blocks are to be removed from the device after a limited time.

The time until the acoustic signal sounds is set as follows: Press the „time" button.
In the right LCD display, the two up / down arrows appear flashing at the prompt.
Now you can set the desired time using the cursor keys. The value appears in the right LCD display. The display shows time in min. The time is adjustable in steps from 1min to max. 120min.
Save the set value by pressing the „time" button again.

Then you can start the timer at the desired time by pressing the „start" button.
In this phase, the two up / down arrows will be unvisible on the LCD display.
While the timer is running, the LED in the „start" button flashes and are counted down on the LCD display (the minutes for times> 100 min or the minutes and seconds for times less than 100 min).
An acoustic signal sounds after the time has elapsed.
Press the „start" button again to restart the timer.

The minute minder function can be operated in two different modes. Depending on the selection of parameter P1 (1 or 0), the heating and the control switch off or not after the set time has elapsed when the acoustic signal sounds.
If the heating has switched off, the LEDs indicating the control status are also switched off. To reactivate heating and control, press the „start“ button.
In this case, you have to press the „start“ button a second time to restart the minute minder.

8.5 Parameter entry

Additional functions can be set by entering parameters. You can access the parameter levels by simultaneously pressing the buttons „temp.“ and „time“ once or twice. The parameters are varied using the cursor keys. The entries are accepted with the „Start“ button.

Press these two buttons at the same time,
once to get (P1) or twice in succession to get (P2)!

P1: Switching function of the timer
= 0 Timer without influence on the function of the heating (standard setting ex works)
= 1 The timer switches the heating off after the time has elapsed.

P2: Correction of Offset
Entry of a positive or negative offset value to correct the actual value.
Entry between -10K and + 10K in steps of 0.1K

Correct the offset only if the block temperature deviates from the actual temperature of the LCD display (at room temperature). The new device is optimally adjusted at the factory. The standard setting of the offset is 0 K.

8.6 Removal of blocks

To remove blocks from the device, please use the removal rod.
To do this, screw the removal rod into the threaded hole on the top in the middle of the block. Grasp the rod at the top of the plastic handle and remove the block vertically upwards. You should let hot blocks cool down in the device beforehand if possible.
If you still need to remove hot blocks, please use protective gloves.
If you remove hot blocks, place them on a heat-resistant shelf.
Please mark the storage area (caution hot!) and make sure that other people do not burn themselves on these hot removed blocks.

Please note that the cooling time for hot blocks can take several hours.

9 Care and Maintenance

Please only clean the device when it is cool,
otherwise there is a risk of burns!
Do not use harsh detergents to clean the outside of the housing.
Ethanol is the most suitable.

Before inserting the heating blocks, clean their undersides and the surface of the heating plate.
This is the only way to ensure fast heating-up times and good precision.

10 Technical data

Device	MBT250-1^{NT}	MBT250-2^{NT}	Special execution MBT250-3^{NT} / -4^{NT}
Number of insert blocks	1	2	3 / 4
Temperature range	25°C to 250°C		
Constant of temperature	± 0,1K		
Heating times to 100°C: to 200°C:	 approx. 15min approx. 30min		
Controlling	Microprocessor control		
Operating settings	digitally via membrane keyboard		
Display	4-digits, LCD		
Time control	4-digits, LCD		
Timer signal	acoustically		
Device dimensions			
width:	240mm		
depth:	240mm	280mm	400mm
height:	110mm (without legs)		
nominal voltage	230V 50/60Hz, special voltage on demand		
Electrical heating power	250W	500W	750 W / 1000 W
Dimensions (without blocks)	3 kg	3,6 kg	5 kg / 5,5 kg
Taric-No.: devices	9032102000		
Taric-No.: blocks	9032900090		

11 EC Declaration of Conformity

ETG ENTWICKLUNGS- UND TECHNOLOGIE GESELLSCHAFT mbH ILMENAU

Sonderfertigungen fürs Labor nach Ihren Wünschen

EU Declaration of Conformity

Manufacturer:
ETG Entwicklungs- und Technologie Gesellschaft mbH Ilmenau
Am Eichicht 1 A
D-98693 Ilmenau
Germany

Name of the product:
Product line metal-block-thermostats MBT250^{NT} and H250^{NT}

Type of devices:
MBT 250-1^{NT}, MBT250-2^{NT}, MBT 250-3^{NT}, MBT250-4^{NT} and H250^{NT}

Validity:
Valid for all named devices from serial-N° 2002 1501, from model: February 2020

Declaration:
Herewith we are declaring, that the named devices are corresponding to all claims of the following EC-directives:

Directive 2014/30/EC	of the European Parliament and of the Council of 26.02.2014 on the approximation of the laws of the Member States relating to electromagnetic compatibility
	Underlying harmonized standards:
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use - EMC requirements, Part 1,
EN 61000-3-2:2015-03	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions
EN 61000-3-3:2014-03	Electromagnetic compatibility (EMC). Limits Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
Directive 2014/35/EC	of the European Parliament and of the Council of 26.02. 2014 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits
	Underlying harmonized standards:
EN 61010-1:2011	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1
Directive 2011/65/EC	of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment Text with EEA relevance
	Underlying harmonized standards:
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The devices are marked from the producer with the CE-sign.

Ilmenau, 2020-02-20

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