

CH-100 / CH 3-150

Heating/cooling systems



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1. About this edition of the operating manual

The manual applies to following model and versions of heating/cooling system:

- **CH-100** versions V.7A01, V.7A02 and V.7A03
- **CH 3-150** versions V.2AD and V.2AE

2. 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!

Surfaces can become hot or cold during use.

GENERAL SAFETY

- Use only as specified in the Operating Manual provided.
- Protect the unit from shocks or falling.
- Store and transport the unit at ambient temperatures between -20°C and +60°C and maximum relative humidity of 80%.
- After transportation or storage, keep the unit under room temperature for 2-3 h before connecting to 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 external power supply (**CH-100**) or electric circuit (**CH 3-150**) with voltage corresponding to that on the serial number label.
- Use only the external power supply (**CH-100**) provided with the unit.
- Do not use an ungrounded power socket or an ungrounded extension lead.
- Ensure that the switch and the plug are easily accessible during use.
- If liquid penetrates into the unit, disconnect it from electric circuit and have it checked by a repair and maintenance technician.
- Disconnect the unit from electric circuit before moving.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in the Specification section.

DURING OPERATION

- Use only tubes of standard size.
- Do not check the temperature by touch. Use a thermometer.
- (For model **CH 3-150**) Remove the blocks only using the included extractor tool.
- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possibility of unit operation in specific atmosphere.
- Do not operate the unit if it is faulty or has been installed incorrectly.
- Do not use outside laboratory rooms.
- Do not leave the operating unit unattended.

BIOLOGICAL SAFETY

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

3. General information

CH-100 and **Combitherm-2 CH 3-150**, dry-block thermostats with heating and cooling function, are designed to thermally stabilize materials at a wide range of temperatures. Built-in Peltier elements allow fast and precise cooling, and heating plates – heating of the materials according to used methods.

Model **CH-100** with built-in blocks (on request) is intended for micro quantities of reagents, in volume range from 0.5 to 2.0 ml. Temperature setting range is from -10°C to +100°C. Model features exceptional temperature maintenance stability and uniformity, as well as high heating and cooling speed.

Model **Combitherm-2 CH 3-150** with changeable blocks is designed for increased versatility. Temperature setting range is from -3°C to +20°C for cooling block and from +25°C to +150°C for heating block. **Combitherm-2** consists of two independent modules for interchangeable blocks, cooling and heating, combined in a single unit. Control panel is divided in two parts for separate control of cooling and heating blocks. Blocks are controlled independently, with possibility of setting up to 16 custom programs for different temperature and thermostating time. Seven thermoblocks are available, for different size and quantity of tubes.

Models can be used in:

- Molecular and cell biology, for nucleic acid extraction and analysis.
- Protein analysis (denaturation).
- Biochemistry, for analysis of enzyme processes.
- Chemical laboratories, in matter composition analysis.
- Food and environmental investigation laboratories, in composition analysis of food and cosmetics.

Depending on the model, different quantities of microtubes of different volumes can be placed in the thermostat.

Table 1. Block capacity, by model

Model and block	Capacity	Tube types
Model CH-100		
CH-1	20 / 12	0.5 / 1.5 ml Eppendorf-type microtubes
CH-2	20	1.5 ml Eppendorf-type microtubes
CH-3	20	2 ml Eppendorf-type microtubes
Model CH 3-150		
B23-1.5	23	1.5 ml Eppendorf-type microtubes
B18-12	18	Ø12 mm tubes
B10-13	10	Ø13 mm tubes
B10-16	10	Ø16 mm tubes
B6-25	6	Ø25 mm tubes
B5-29	5	Ø29 mm flasks
B2-50	2	Ø50 mm beakers

4. Getting started

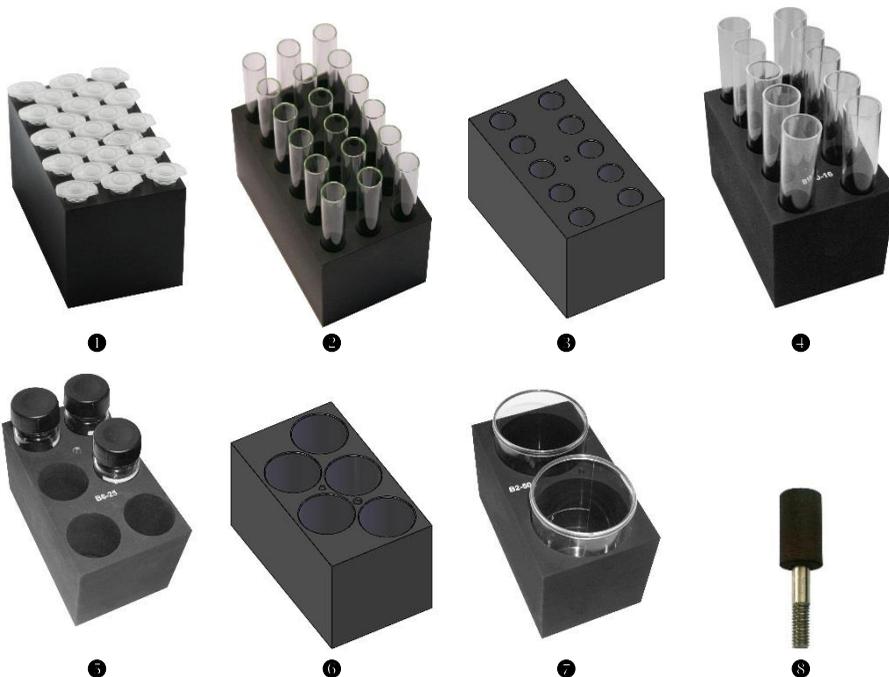
4.1. Unpacking.

Remove packing materials carefully and retain them 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.

4.2. Complete set. Package contains:

4.2.1. CH 3-150 Combitherm-2

- CH 3-150 Combitherm-2 heating/cooling dry block system 1 pce.
- Transparent block lids 2 pcs.
- Spare fuse (inside fuse holder) 1 pce.
- Power cable 1 pce.
- Operating manual, declaration of conformity 1 copy
- B23-1.5 block ❶ on request
- B18-12 block ❷ on request
- B10-13 block ❸ on request
- B10-16 block ❹ on request
- B6-25 block ❺ on request
- B5-29 block ❻ on request
- B2-50 block ❼ on request
- Extractor tool ❽ 1 pce. with each block



4.2.2. CH-100

- **CH-100** heating/cooling dry-block system 1 pce.
- Transparent block lid..... 1 pce.
- External power supply 1 pce.
- Power cable 1 pce.
- Operating manual, Certificate..... 1 copy

4.3. Setup.

- Place the unit upon even horizontal non-flammable surface at least 20 cm away from any flammable materials;
- Do not place any objects 40 cm behind the unit to ensure unimpeded air circulation;
- Remove protective film from the display;
- (Model **CH 3-150**) Plug the power cable into the socket on the rear side of the unit, and position the unit with easy access to the power switch and plug.
- (Model **CH-100**) Connect the external power supply and the power cable. Plug the external power supply into the socket on the rear side of the unit and position the unit with easy access to the power switch and plug.

4.4. Heating or cooling block installation and replacement (model **CH 3-150**).



Caution! Heating/cooling block surface may become very hot or cold during the operation. Avoid touching the block or heating/cooling surfaces.

Change the blocks only at room temperature.

- Use the extractor tool for removing blocks. Screw the tool into a threaded hole in the middle of a heating/cooling block and lift it out. Unscrew the tool.
- Ensure that the heater bed and the block are clean in order to ensure good thermal contact between unit and the block, resulting in optimal temperature control performance.

5. Operation

Recommendations during operation



Please check the tubes before using, be sure that tubes are heat resistant. Don't heat the tubes over the melting point of the material they are made of. Remember that thin-walled tubes have a higher thermoconducting factor.

- Microtube caps can open under the action of high temperature ($> 85^{\circ}\text{C}$), thus causing sample volume shrinkage or potential health risk when working with infected material. To prevent such cases, use microtubes with cap lock of Safe-Lock[®] type.
- Do not fill tubes more than 3-5 mm over the level they are immersed in the heat block.

5.1. Working with model **CH-100**.

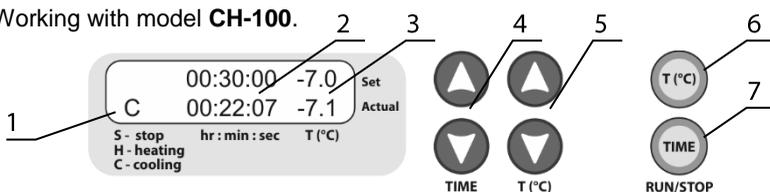


Fig. 1. Control panel of CH-100

- 5.1.1. Connect the external power supply to a grounded power socket. Switch on (position I) the power switch on the rear panel of the unit.
- 5.1.2. The unit will turn on and the following readouts will be shown on the display:
 - In the upper line **Set**: previously set time and temperature parameters;
 - In the lower line **Actual**: operation status (S – stopped), timer indication STOP and current temperature.
- 5.1.3. **Temperature setting**. Use the **▲** and **▼ T (°C)** keys (fig. 1/5) to set the required temperature. Values are shown on display (upper line, fig. 1/3). Temperature increment is 0.1°C . Pressing the key down for more than 2 s makes the values change quicker.
- 5.1.4. Press the **RUN/STOP T (°C)** key (fig. 1/8) to start heating or cooling. The corresponding operation status is indicated on the display, **H** for heating, **C** for cooling (fig. 1/1). Current temperature value is shown on display (lower line, fig. 1/5).
- 5.1.5. To stop the heating or cooling, press the **RUN/STOP T (°C)** key again. It takes a few moments before the heating or cooling process stops and the operation mode indicator shows **S**, for stopped.
- 5.1.6. The set temperature can be changed during operation without stopping the process.
- 5.1.7. After thermal stabilisation of the unit (i.e. after set and current temperatures equalize, fig. 1/3), open the block lid, place samples and close the lid.
- 5.1.8. **Timer setting**. The unit is equipped with an independent timer for convenient control over the samples heating/cooling time.
- 5.1.9. Use the **▲** and **▼ TIME** keys (fig. 1/4) to set the required time period. Values are shown on display (upper line, fig. 1/2). Time increment is 1 minute. Pressing the key down for more than 2 s makes the values change quicker.
- 5.1.10. Press the **RUN/STOP TIME** key (fig. 1/7) once to start the timer. The elapsed time is indicated in the lower line of the display (fig.1/2). When the set time is reached, the timer stops and a sound signal is heard.

**Caution!**

After the set time elapses and the timer stops, the device does not stop the heating or cooling process. Press the **RUN/STOP T (°C)** key (fig. 1/7) manually to stop the heating or cooling.

5.1.11. The timer can be stopped before the set time elapses if required by pressing the **RUN/STOP TIME** key. Pressing the key again restarts the timer.

5.1.12. The set time value can be changed during operation without stopping the timer.

5.1.13. After finishing the operation, turn off (position **O**) the unit switching off the power switch on the rear panel. Disconnect the external power supply from electric circuit.

5.2. Working with model **CH 3-150**.

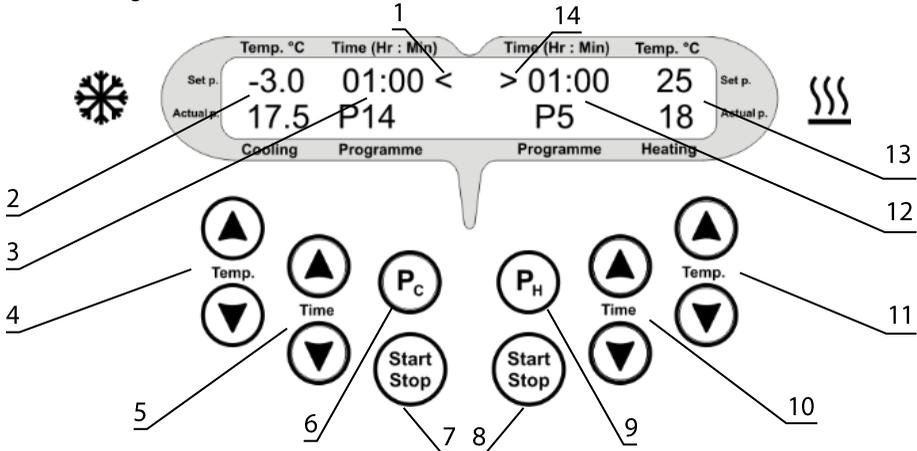


Fig. 2. Control panel of CH 3-150

5.2.1. Connect the power cord to a grounded power socket and switch on (position **I**) the power switch located on the rear panel of the unit.

5.2.2. The unit will switch on and the following readouts will be shown on the display:

- In the upper line **Set p.:** previously set time and temperature parameters;
- In the lower line **Actual p.:** program indication STOP and current temperature.

**Caution!**

Temperature starts changing automatically after switching on according to selected settings. Time of temperature stabilization depends on the initial temperature.

5.2.3. The unit has 16 cooling and 16 heating programs for temperature and time setup. One cooling and three heating programs are factory pre-set. The programs have following settings:

Program	Temperature	Time, hh:mm
Cooling [P1]	-3 °C	1:00
Cooling [P2-16]	-3 °C	0:00

Program	Temperature	Time, hh:mm
Heating [P1]	+80 °C	0:30
Heating [P2]	+105 °C	0:07
Heating [P3]	+150 °C	2:00
Heating [P4-16]	+25 °C	0:00

5.2.4. **Selecting a program.** Press the **P_C** key (fig. 2/6) to select cooling programs or the **P_H** key (fig. 2/9) to select heating programs. Each press selects next program in cycle.

5.2.5. Changing current program parameters. All 32 programs can be changed.



Note. Holding the key pressed for more than 2 seconds increases the parameter change speed.



Note. The settings cannot be changed during operation of the timer.

5.2.5.1 Cooling programs. Press and hold the **P_C** key for 4 seconds until < symbol appears on the display (fig. 2/1).

Use the **▲** and **▼ Temp.** keys (fig. 2/4) to set the required temperature. Cooling increment is 0.1°C. Set values are shown on display on the left in the upper line, **Set p.** (fig. 2/2).

Use the **▲** and **▼ Time** keys (fig. 2/5) to set the required work time interval in hours and minutes. Time increment is 1 minute. Set values are shown on display on the left in the upper line, **Set p.** (fig. 2/3).

Press the **P_C** key to save settings and return to work mode.

5.2.5.2 Heating programs. Press and hold the **P_H** key for 4 seconds until > symbol appears on the display (fig. 2/14).

Use the **▲** and **▼ Temp.** keys (fig. 2/11) to set the required temperature. Heating increment is 1°C. Set values are shown on display on the right in the upper line, **Set p.** (fig. 2/13).

Use the **▲** and **▼ Time** keys (fig. 2/10) to set the required work time interval in hours and minutes. Time increment is 1 minute. Set values are shown on display on the right in the upper line, **Set p.** (fig. 2/12)

Press the **P_H** key to save settings and return to work mode.

5.2.6. **Program execution.** When the necessary program is selected with **P_C** or **P_H** key, heating or cooling processes start automatically.

5.2.7. After thermal stabilisation of the unit (i.e. after set and current temperatures equalize), open the heating or cooling block lid, place samples and close the lid.



Caution! Surfaces can become hot or cold during use. Use of protective cotton gloves is advised.

5.2.8. Press the **Start Stop** key (fig. 2/7 or 2/8) to start the cooling or heating timer.

5.2.9. After the set time elapses, timer stops, display shows the flashing STOP indication and the unit makes a repeating sound signal. Press the corresponding **Start Stop** key to turn off the signal.



Caution! Stopping the timer does not stop the heating and cooling process. Set the temperature higher than 20 °C when cooling or lower than 25 °C when heating, with **▲** and **▼ Temp** keys.

5.2.10. The running timer can be stopped at any time by pressing the **Start Stop** key. Pressing **Start Stop** key again restarts the timer.

5.2.11. After finishing the operation, turn off the unit by setting the power switch on the rear panel to position **O** (off) and disconnect the power cord from electric circuit.

6. Calibration

- 6.1. The device is precalibrated at the factory (calibrating coefficient is 1.000) for operation with temperatures measured by a sensor in the heating block.
- 6.2. To change the calibration coefficient, hold the **RUN/STOP TIME** key (fig. 1/7, **CH-100**) or **Start Stop** (fig. 2/7, **CH 3-150**) key pressed for more than 8 s to activate calibration mode. The calibration mode appears on the display (fig. 3).
- 6.3. **Restoring factory settings.** Set 1.000 value using the **▲** and **▼ Temp or T (°C)** keys as shown on fig. 3/1 to restore the factory settings. Press the **RUN/STOP TIME** or **Start Stop** key once to save the changes and exit the calibration mode.



Note. For model **CH 3-150**, coefficient value changes are recommended after the unit has reached 30°C temperature.

- 6.4. **Calibration procedure.**
- 6.4.1. Install independent sensor (0.5°C accuracy) into microtubes placed into the block sockets.
- 6.4.2. Set the required temperature in operation mode (e.g. 40°C).

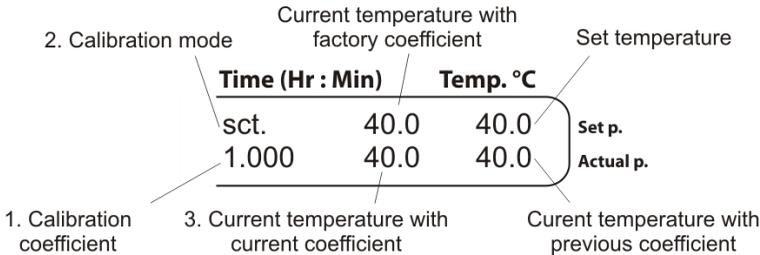


Fig. 3. Control panel in calibration mode

- 6.4.3. After the unit reaches the set temperature (when the set and current temperature readings equal) leave the unit for 30 min for thermal stabilization.
- 6.4.4. Let us assume that the readings of independent sensor is 39°C, but the display's actual temperature is 40°C (fig. 3/4). Then it is necessary to add 1°C correction.
- 6.4.5. Hold the **RUN/STOP TIME** or **Start Stop** key pressed for more than 8 s to activate calibration mode. The following parameters will be shown on the display (fig. 3).
- 6.4.6. Using the **▲** and **▼ Temp or T (°C)** keys, change the calibration coefficient (fig. 4/1) so that the new temperature value (fig. 4/2) corresponds to the independent sensor temperature. In our example, the calibration coefficient will be 0.974.



Note. Calibration coefficient can be changed in range from 0.936 to 1.063 with increment of 0.001. This calibrating coefficient will correct temperature through all the operation range of the block.



Note. For model **CH 3-150**, coefficient value changes are recommended after the unit has reached 30°C temperature.

- 6.4.7. After finishing the calibration, press the **RUN/STOP TIME** or **Start Stop** key once to save the changes and exit the calibration mode.
- 6.4.8. The display will show calibrated temperature as shown on fig. 5/1 and the unit will continue thermal stabilization according to the previously set temperature.

Time (Hr : Min)	Temp. °C	
sct.	40.0	40.0
0.974	39.0	40.0

1. Calibration coefficient 2. Current temperature with current coefficient

Fig. 4. Control panel in calibration and operation mode

Time (Hr : Min)	Temp. °C
00:00	40.0
STOP	39.0

Set temperature

Calibrated temperature

Fig. 5. Control panel in operation mode after calibration

7. Specification

The unit is designed for operation in cold rooms, incubators (except CO₂ incubators) and 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.

Temperature specifications		CH-100	CH 3-150
Setting range	Cooling	-10°C ... +100°C	-3°C ... +20°C
	Heating		+25°C ... +150°C
Control range	Cooling	30°C below RT* ... +100°C	23°C below RT ... 5°C below RT
	Heating		5°C above RT ... +150°C
Setting resolution	Cooling	±0.1°C	±0.1 °C
	Heating		±1 °C
Stability		±0.1°C	
Uniformity at +37°C		±0.1°C	
Heat up time from 25°C to 100°C		16 min	12 min
Cool down time from 25°C		21 min (to -10°C)	60 min (to -3°C)
Temperature calibration option		yes	
Calibration coefficient range	Heating	0.936 ... 1.063 (±0.063)	0.936 ... 1.063 (±0.063)
	Cooling		-

General specifications		CH-100	CH 3-150
Digital time setting		1 min – 96 h	1 min – 99 h 59 min
Digital time setting increment		1 min	
LCD Display		2x16 symbols	2x24 symbols
Dimensions		240x260x165 mm	295x285x220 mm
Weight**		3.2 kg	5.6 kg
Power consumption		60 W	430 W
Input current		DC 12 V, 5.0 A	AC 230 V, 50 Hz, 1.9 A or AC 120 V, 60 Hz, 3.6 A
External power supply		In AC 100-240 V, 50/60 Hz Out DC 12 V	-

Table 2. Built-in block capacity in CH-100

Built-in block	Capacity	Catalogue number
CH-1	20 x 0.5 ml and 12 x 1.5 ml microtubes	BS-010410-BAI
CH-2	20 x 1.5 ml microtubes	BS-010410-BAI
CH-3	20 x 2 ml microtubes	BS-010410-BAI

* Room temperature

** Accurate within ±10%.

Table 3. Exchangeable block capacity in CH 3-150

Block model	Description	Form of block socket bottom	Catalogue number
B23-1.5	23 sockets for 1.5 ml microtubes	Conical	BS-010418-DK
B18-12	18 sockets Ø12 mm, depth 58 mm	Round	BS-010418-EK
B10-13	10 sockets Ø13 mm, depth 30 mm	Flat	BS-010418-LK
B10-16	10 sockets Ø16 mm, depth 56 mm	Flat	BS-010418-BK
B6-25	6 sockets Ø25 mm, depth 40 mm	Flat	BS-010418-CK
B5-29	5 sockets Ø29 mm, depth 40 mm	Flat	BS-010418-KK
B2-50	2 sockets Ø48 mm, depth 58 mm	Flat	BS-010418-AK

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

8. Maintenance

- 8.1. If the unit requires maintenance electric circuit, disconnect the unit from electric circuit and contact Biosan or your local Biosan representative.
- 8.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.
- 8.3. Standard ethanol solution (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and decontamination of the unit.
- 8.4. Fuse replacement (model **CH 3-150**)
 - Disconnect from electric circuit.
 - Remove the power plug from the rear side of the unit.
 - Pull out the fuse holder by applying leverage in recess (fig. 6/A).
 - Remove the fuse from the holder.
 - Check and replace with the correct fuse if necessary, **M 2 A** for 230 V or **M 3.15 A** for 120 V, (type **M** - time lag: **Medium**).
- 8.5. Error codes in case of a defect.

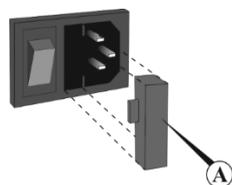


Fig. 6. Fuse replacement

Some malfunctions trigger an error code to appear on display, accompanied by a sound signal every 8 s. Press **RPM RUN/STOP** key to turn off the signal. Error code format is letters **ER** and a number from **1** to **5**.

Disconnect the unit from the electric circuit and report the error code to Biosan or your local Biosan representative.

9. Warranty and Claims. Registration

- 9.1. The manufacturer guarantees the compliance of unit with the requirements of specifications, if the customer follows the operation, storage and transportation instructions.
- 9.2. The warranted service life of unit from date of delivery to the customer is 24 months. For extended warranty, see p. 9.5.
- 9.3. Warranty covers only the units transported in the original package.
- 9.4. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment report shall be compiled, certified and sent to the local distributor address. To obtain the claim form, visit section **Technical support** on our website at link below.
- 9.5. Extended warranty.
- For **CH 3-150**, a *Premium* class model, one year of extended warranty is available free of charge after registration, during 6 months from the date of sale. Online registration form can be found in section **Warranty registration** on our website at the link below.
 - For **CH-100**, a *Basic Plus* class model, extended warranty is a paid service. Contact your local Biosan representative or our service department through the **Technical support** section on our website at the link below.
- 9.6. Description of the classes of our products is available in the **Product class description** section on our website at the link below.

Technical support



biosan.lv/en/support

Warranty registration



biosan.lv/register-en

Product class description



biosan.lv/classes-en

- 9.7. 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	CH-100 / CH 3-150 Combitherm-2 Dry block heating/cooling system
Serial number	
Date of sale	

10. EU Declaration of conformity

EU Declaration of Conformity

Unit type	Dry block thermostats
Models	Bio TDB-100, TDB-120, CH-100, CH3-150, DB-4S, DB-10C
Serial number	14 digits styled XXXXXXYYMMZZZZ, where XXXXXX is model code, YY and MM – year and month of production, ZZZZ – unit number.
Manufacturer	SIA BIOSAN Latvia, LV-1067, Riga, Ratsupites str. 7/2
Applicable Directives	EMC Directive 2014/30/EU LVD Directive 2014/35/EU RoHS2 2011/65/EU WEEE 2012/19/EU
Applicable Standards	<u>LVS EN 61326-1: 2013</u> Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements. <u>LVS EN 61010-1: 2011</u> Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. <u>LVS EN 61010-2-010: 2015</u> Particular requirements for laboratory equipment for the heating of materials.

We declare that this product conforms to the requirements of the above Directives



Signature

Svetlana Bankovska
Managing director

19.07.2016.

Date



Signature

Aleksandr Shevchik
Engineer of R&D

19.07.2016

Date

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