User Manual

Digital Dry Block Heater
Applicable Models: DBH1000D, DBH2000D, DBH4000D

Version: INIT – 26/08/2019

English

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Thank you

Thank you for purchasing a Ratek product.

This User Manual will assist you in the correct installation and operation of the DBHx000D Series Digital Dry Block Heater, as well as explain the safety requirements for its use.

Important: Please read the contents of this User Manual before unpacking and operating the product.

Unpacking and Checking

Once you have read these instructions in full and understand the installation and safety requirements including those for unpacking the carton, please carefully open the packing and slowly remove the product. Carefully inspect the condition of the product to ensure it has not been damaged in transit. Any damage should be reported immediately to the responsible carrier. If the product is damaged in any way, re-pack the product into the supplied packaging and notify the responsible carrier immediately.

Important: Do not operate the equipment if it has been damaged in any way. Any failures resulting through the use of a damaged product will not be covered by the product warranty.

Carton Contents

Ensure that you have received all items outlined below before proceeding. If you have not received all components in the supplied carton, please re-pack the carton and notify a Ratek Service representative immediately. Contact details are provided in the section of this User Manual titled “Ratek Service Contact Information”

- **Ratek DBHx000D Series Digital Dry Block Heater**
- **User Manual**
- **IEC Mains Power Lead**

TABLE OF CONTENTS

PAGE

Intended Use

This Dry Block Heater is intended for the purpose of heating samples in test tubes seated in a suitable heating block. The operator may load a heating block into the heating cavity for the purpose of controlled temperature application.

The Dry Block Heater is **not** intended for use with any other medium. **Never put water or oil directly into the heating chamber.** Failure to adhere to this will cause liquid damage to the electrical components within this product. In all cases the item should be enclosed in a suitable vessel as described below.

Suitable Articles For Use With This Dry Block Heater

- Ratek test tube heat block inserted into heating chamber, coupled with plastic or glass laboratory test tubes/vials that are sealed, waterproof and rated to withstand the intended temperature.
- *An example of a suitable article would be a 50ml Falcon Test Tube filled with a liquid substance coupled with a Ratek FB50 Heat Block.*

Unsuitable Articles For Use With This Dry Block Heater

- Any item where the article is not sealed or correctly held in the heating chamber which may result in its contents coming into contact with the internal electronic circuitry inside the Dry Block Heater.
- *An example of an unsuitable article would be water or oil being poured directly into the heating chamber (ie: not in an approved heating block and not stored in a suitable tube or vial.*

Suitable Environments For The Dry Block Heater

The Dry Block Heater is intended for use in a clean laboratory environment only where adequate ventilation, a good power supply and provisions for routine cleaning are available. The Dry Block Heater should not be used outdoors or in dirty, dusty, humid or windy environments. The acceptable operating conditions are outlined further in this User Manual.

General Operation

- The Dry Block Heater is plugged into an appropriate power source. It is powered by an alternating current power supply with protective earth and with the appropriate receptacle, rated voltage and frequency for the country of its intended use. Further details on power requirements are outlined in this User Manual.
- A suitable article (as defined above) is placed in the heating chamber.
- The Dry Block Heater is operated via a front panel interface consisting of heating temperature controls and rear power switch. These controls allow the operator to set a required heating temperature.
- The Dry Block Heater should be operated strictly in accordance with the Operating Procedures outlined further in this User Manual.

Operator Responsibility – Safety Considerations

When operated in strict accordance with this User Manual, plus routine cleaning and maintenance being carried out, the product shall provide safe operation for the operator. The operator should be aware of the following before installing and operating the product :

Conditions of Operation

***Note:** The term "operator" referred to in this User Manual is the primary person who has been tasked to install, maintain and train in the usage of this equipment. Other personnel shall be referred to as "Users".

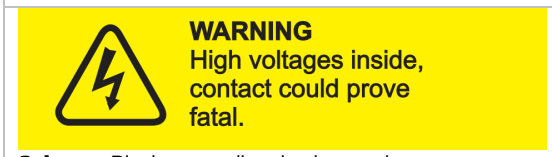
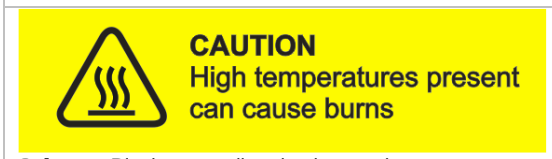
- The operator shall be aware that the protection provided by the equipment may be impaired if the equipment is used with accessories not provided or recommended by the manufacturer, is modified in any way or is used in a manner not specified by the manufacturer.
- The operator is responsible for ensuring all users of the product are qualified to do so, and are well versed in common safety concepts. The product should only be operated by an adult who has read and understood this User Manual provided in the appropriate language in its entirety.
- Any user must be informed by the responsible operator of any potential hazards that may arise through the use of this equipment in the course of their work, including any local environmental hazards not related directly to the Dry Block Heater. They should also be able to demonstrate that they understand any preventative safety measures in operation prior to operating the equipment.
- The operator shall agree to accept responsibility for the use of the equipment in accordance with this User Manual, and be fully aware that the equipment is designed for commercial use.
- It is assumed that the user and operator have had experience in a commercial environment, and had appropriate training in how to perform their work safely in accordance with any local operational health and safety regulations. The operator and all users should be well versed in local emergency procedures as per the workplace safety regulations in effect.
- Avoid any direct impact with any surface of the equipment, including the casing, cover panel and most importantly the control panel.

- **Important:** Do not use any sharp or pointed metal objects anywhere near the equipment, in particular the control panel.
- Avoid using the equipment near any other vibrating equipment or source of excessive vibration.
- Ensure the equipment is cleaned and maintained in accordance with this User Manual.
- Ensure that all original safety warning labels are in an adequate, legible condition and are firmly affixed to the equipment before using the product.
- Plug the equipment directly into a wall power outlet. Do not plug the equipment into a multi-socket adapter of any kind.
- The equipment is intended for operation in a controlled electromagnetic environment. Avoid the use of transmitting devices (e.g. cellular or mobile telephones) near the equipment whilst operating. A minimum distance of 2 Metres from the product is recommended for any transmitting device.
- The equipment must only be installed and operated in well ventilated areas. The unit is not intended for use in explosive atmospheres, in confined spaces or inside any other piece of laboratory equipment such as humidity cabinets or incubators.
- The allowed operating environment must be between 5° Celsius and 40° Celsius ambient air temperature. Be aware that the ambient air temperature will limit the minimum controllable block temperature. The ambient air temperature must be at least 5° Celsius lower than the desired controllable block temperature.
- The maximum allowed relative humidity of the operating environment is 80%.
- The equipment should not be stored in direct sunlight, near chemicals, or other contaminants.
- If any of these safety recommendations cannot be achieved or the equipment has been damaged in any way, the equipment should not be installed or operated.
- **Important :** If you have any concerns or questions relating to operator or user safety, please contact the appropriate Ratek Service department before installing and operating the unit. Contact details are provided in this User Manual.

Safety Labels And Markings

The equipment is provided with safety caution labels. An explanation of each caution label is provided below. It is the responsibility of the operator and user to fully understand the meaning of these warning labels prior to operating the equipment.

Very Important: Particular care should be taken when working near the heating plate on the base of the heating chamber.

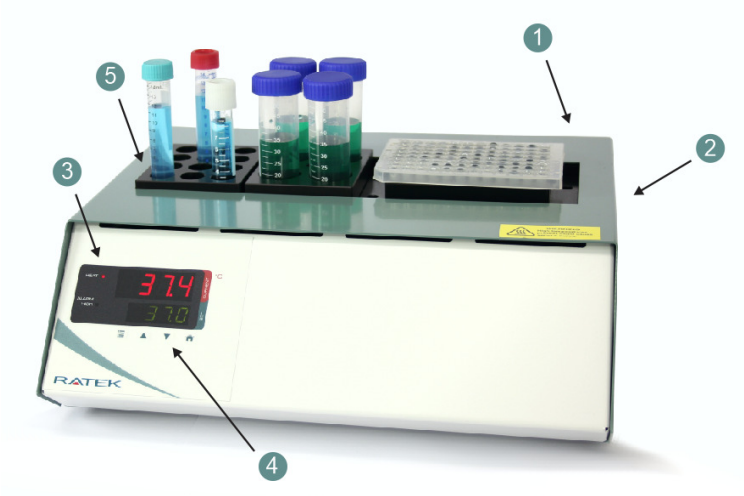
Caution Labels	Definition
 **Colours:** Black on a yellow background	The Dry Block Heater is powered by an alternating current power supply sufficient to cause harm if contact with the electrical supply is made. Under no circumstances should any part of the equipment be opened, un-screwed, loosened or disassembled whilst power is applied to the unit. Only authorized service agents are permitted to remove covers. This label is fitted by the manufacturer and must not be removed under any circumstances.
 **Colours:** Black on a yellow background	The Dry Block Heater is designed for heating articles to temperatures that can cause burns or scalding. Use extreme caution when working near the heating blocks to avoid injury. Under no circumstances should the heating chamber be touched whilst in operation. This label is fitted by the manufacturer and must not be removed under any circumstances.

Operating Procedures

You must take the time to familiarize yourself completely with the following operating procedures before installing or operating the Dry Block Heater in order to achieve the best performance and maximum attainable user safety.

Identification of Controls & Functions

Throughout this User Manual, the numerical element representing a control or component of the Dry Block Heater will be used to identify it. The figure below indicates all key controls and components of the Dry Block Heater with their corresponding numerical element labeled.



Numerical Element & Description of Component

1	ON/OFF Mains Power Switch
2	IEC Power Inlet Socket
3	Heating Element Indicator
4	Temperature Controls and Digital Display
5	Heating Chamber

Figure 1 (DBH4000D model pictured with SB16, FB50 and MB2 block inserts (blocks sold separately)

Safety Warnings

Throughout this User Manual, specific warnings will be supplied which relate to the current operation being referred to. These warnings are supplied in addition to the main warning labels affixed to the product and the key points outlined in the section of this User Manual titled 'Operator Responsibility – Safety Considerations'.

A graphical symbol as pictured below will be used next to each warning with accompanying text, the danger level for each is described below :

	**CAUTION** Indicates a possibly dangerous situation which may result in serious injury or threat to life if the situation is not avoided.
	**CAUTION** Indicates a possibly highly dangerous situation which may result in serious injury or threat to life if the situation is not avoided.
	**CAUTION** Indicates a possibly harmful situation which may result in injury or damage to product or property if the situation is not avoided.

Safety Recommendations

The following safety recommendations must be followed to prevent damage or injury. In addition to these safety recommendations, it is assumed that the user and operator have had experience in a commercial environment, and had appropriate training in how to perform their work safely in accordance with any local operational health and safety regulations. The operator and all users should be well versed in local emergency procedures as per the workplace safety regulations in effect.

	**CAUTION** If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
	**CAUTION** The equipment must only be used with a protective earth power socket. The earth contact provides protection to the user and the equipment. If you do not have a protective earth power socket, or you are unsure as to whether you have a protective earth power socket, **do not** connect the equipment. In such cases you should consult your workplace administrator or electrical maintenance staff to determine if a protective earth power socket is available. **A surge protected power outlet is strongly recommended as it provides some protection for the equipment in areas of poor electrical quality as well as providing some protection against lightning strikes. The equipment should be operated on a good, reliable supply of power at all times.** Note: The Dry Block Heater should not be operated on the same electrical circuit as other high voltage household appliances such as fridges, clothes dryers, washing machines or other continuous operation high voltage devices. These types of devices can create power fluctuations that are undesirable for electrically sensitive equipment. Consult your workplace administrator or electrical maintenance staff if you are unsure.
	**CAUTION** Always work above the level of the Dry Block Heater to avoid spillage of samples. At no point should the user, operator, animal or any other perishable object be situated directly beneath the Dry Block Heater.

- **ALWAYS** wear protective eyewear when working with hot liquids.
- **ALWAYS** place the Dry Block Heater on a strong, even, dry, flat waterproof surface which is made of inflammable material. Placing the Dry Block Heater on an unstable surface could cause liquids/samples to spill.
- **ALWAYS** turn off the mains power switch (element 1 in Figure 1) when the unit is not in operation and turn off the mains power supply at the outlet.
- **ALWAYS** be careful of liquid above or near the Dry Block Heater and ensure at all times that no liquid comes in contact with the Dry Block Heater control panel, Inside the heating chamber or near the mains power lead. Ensure benches are kept dry at all times.
- **ALWAYS** operate the Dry Block Heater in a well ventilated area with adequate clearance around the Dry Block Heater as indicated.
- **ALWAYS** be careful of steam and avoid making contact.
- **NEVER operate the Dry Block Heater with water in the water or oil in the heating chamber.**
- **NEVER** attempt to remove a heating block(s) whilst it is hot. Always allow the heating blocks(s) to cool to near ambient room temperature before removing.
- **NEVER** operate the equipment if you believe it is damaged in any way.
- **NEVER** operate the Dry Block Heater if the mains power supply cable is damaged in any way
- **NEVER** use any sharp or metal objects near the Dry Block Heater control panel.
- **NEVER** lift the Dry Block Heater if you have an existing injury that impairs your ability to lift.

Preparation & Installation

The Dry Block Heater should be installed and operated in strict accordance with the following instructions.

CAUTION
The Dry Block Heater is not for use in explosive atmospheres as there is a risk of fire, explosion, burns or scalding present under these conditions.

CAUTION
Be careful when lifting and observe your local operational health and safety requirements for lifting before unpacking the carton.

Unpacking and Installing

- Carefully remove all packaging material from the Dry Block Heater, as well as the supplied User Manual and any other supplied accessories.

- Carefully inspect the Dry Block Heater, mains power lead and all packaging for any signs of damage. If any signs of damage are present, **do not** install or operate the equipment. Contact the supplier of your equipment if you have a received a damaged product.

- Place the Dry Block Heater in an upright position as per Figure 1 on a strong, even, flat waterproof surface which is made of inflammable material.

- Ensure that there is a minimum unobstructed distance of 100 millimetres between the left, right and rear panels of the Dry Block Heater and any other object or wall.

- Ensure that there is a minimum unobstructed distance of 500 millimetres above the top of the heating chamber to allow for adequate ventilation.

- Ensure that there is a suitable mains power supply outlet within reach of the supplied mains power lead without placing any strain whatsoever on the lead, socket or plug. The Dry Block Heater should not be plugged into any double-adapter, power board, or power point splitter of any kind but instead directly into a correctly earthed wall mounted power socket.

- Ensure that there is a minimum unobstructed distance of 1,000 millimetres in front of the Dry Block Heater to allow adequate room for the user to maintain a safe operating distance of 300 millimetres.

- Carefully insert the heating block(s) (sold separately) into the heating chamber. The heating chamber should be filled so that the block(s) cover the heating element and provide protection from direct contact with the heat it generates. (ie: for the DBH4000D model ensure you have 4 heating blocks installed)

CAUTION
The Dry Block Heater is designed for the purpose of heating plastic or glass **sealed** laboratory test tubes, vials or PCR Plates suitable for use at the temperature selected by the operator.

The contents of these test tubes is the sole responsibility of the user or operator, and the use of corrosive, flammable, combustible, hazardous, environmentally unsafe or otherwise dangerous materials within the immersed container is done so at the risk and liability of the user or operator.

ALWAYS be 100% sure of the contents of your containers, the expected behavior once heated and the applicable safety measures that should be employed when handling such substances.

ALWAYS ensure your containers are firmly sealed and there is no chance of the sample leaking into the Dry Block Heater.

Using The Dry Block Heater

Loading a Heating Block

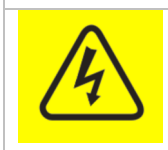
CAUTION
It is important that the user not attempt to remove a Heating Block whilst it is hot. The user should always allow adequate cooling time to ensure the heating block has returned to or near ambient room temperature. Operating the Dry Block Heater without heating block(s) inserted into the heating chamber creates a hazardous situation sufficient to cause burns or scalding if contact with the heating plate is made.

- The Dry Block Heater should be fitted with suitable heating blocks that fit the heating chamber correctly (Ratek heat blocks are made to fit the chamber snugly. 1 block will fit into the DBH1000D and 4 standard blocks can be inserted into the DBH4000D.

- Ensure there the heating plate is clear from dust, dirt or debris as any build up of this kind of substances will not allow good thermal contact with the heating plate.

- Place the heating block(s) into the heater, it is important to use blocks that have been machined flat to ensure good thermal contact with the heating plate.

Connecting Power



CAUTION
The equipment must only be used with a protective earth power socket. The earth contact provides protection to the user and the equipment. If you do not have a protective earth power socket, or you are unsure as to whether you have a protective earth power socket, **do not** connect the equipment. In such cases you should consult your workplace administrator or electrical maintenance staff to determine if a protective earth power socket is available.

The mains power supply must be rated to match the power requirement as identified on the product identification label on the bottom left corner of the rear panel. This is normally expressed in the format of Voltage Range and Frequency. **A surge protected power outlet is strongly recommended as it provides some protection for the equipment in areas of poor electrical quality as well as providing some protection against lightning strikes. The equipment should be operated on a good, reliable supply of power at all times.**

Note: The Dry Block Heater should not be operated on the same electrical circuit as other high voltage household appliances such as fridges, clothes dryers, washing machines or other continuous operation high voltage devices. These types of devices can create power fluctuations that are undesirable for electrically sensitive equipment. Consult your workplace administrator or electrical maintenance staff if you are unsure.

IMPORTANT : Use of an incorrect power supply will void the product warranty waive all liability for any and all damage caused by such use. If you are unsure about the rating of your power supply, consult your workplace administrator or electrical maintenance staff to determine if your power supply is suitable for use with this product before connecting the power lead.

CAUTION
Regularly check the mains power lead condition over the life of the product, and do not operate the equipment if you suspect there is damage to any part of the equipment or the mains power lead.

Do not operate the equipment if you suspect the power lead has been stretched, over-extended or damaged in any way.

- Insert the plug end of the mains power supply lead firmly into a properly rated, protective earthed wall mounted power supply outlet.

If there are double-adapters or oversized DC power packs causing obstruction of the mains power lead plug, these should first be removed.

- Ensuring your hands are dry, switch on the power on the mains power supply outlet.

Switching On The Heating Plate

- Before switching on the heating plate, determine the temperature you wish to operate the dry block heater at.

- Once you are ready to begin heating, switch the On/Off mains power switch (element 1 in Figure 1) to the On position. The Digital Display (element 4 in Figure 1) will turn on and will indicate the software version number, then indicate the current block temperature.

- If the set dial temperature is greater than the current heating plate temperature, the Heating Element Indicator (element 3 in Figure 1) will light up and either flash to indicate intermittent heating or remain lit constantly to indicate constant heating.

CAUTION
Once the Heating Element Indicator (element 3 in Figure 1) is lit, the heating plate is active and the surface of the bottom of the heating chamber will remain extremely hot whilst heating and for many minutes even after power to the unit has been disconnected. Once the Heating Element Indicator has lit, under no circumstances should you remove any heating block(s) or place any part of your body near the heating plate. The residual heat of the element creates a hazardous situation sufficient to cause burns or scalding if contact with the heating plate is made.

Setting the Required Heating Temperature

- The LED temperature display (element 4 in Figure 1) indicates the **current** block temperature in degrees Celsius on the **top** line of the display in **red**.

- The LED temperature display (element 4 in Figure 1) indicates the **desired/set** block temperature in degrees Celsius on the **bottom** line of the display in **green**.

- Use the ▲ and ▼ buttons below the LED displays to increase or decrease the required temperature by pressing quickly for single digit increments, or holding the key to increase the temperature setting by larger amounts. The value on the bottom green LED temperature display will alter.

- If the last set temperature is greater than the current block temperature, the Heating Element Indicator (element 3 in Figure 1) will light up and either flash to indicate intermittent heating or remain lit constantly to indicate constant heating.

- Once the block temperature nears the set point, the PID temperature control circuit will start to intermittently engage the element to reduce the rate of heating.

- **It is normal for the temperature to exceed the set point slightly whilst the temperature in the block equalizes. The block temperature will drop back down to the set temperature and then the proportional temperature control will attempt to accurately maintain the set temperature.**

CAUTION
If the temperature of the Dry Block Heater is critical to your application, ensure the Dry Block Heater is left for at least 20 minutes to stabilize after the temperature has reached the set-point before you insert any tubes or vials into your heating block(s). Verify the block temperature using a thermometer.

CAUTION
Temperatures above 50 degrees are sufficient to cause burns or scalding. Exercise extreme care paying particular attention to steam and splashing of liquid when the Dry Block Heater is operating at these high temperatures, particularly whilst loading and unloading tubes, vials or PCR plates. ALWAYS use appropriate tools (such as silicon insulated tongs and gloves) to lower such items into the heating blocks to avoid your hands coming into contact with any hot surface.

CAUTION
Be careful when working with hot items removed from the Dry Block Heater as burns or scalding may occur if contact occurs.

Always wear eye protection when loading or unloading items from a hot Dry Block Heater.

Do not use explosive or volatile containers with this Dry Block Heater.

Ensure all containers remain tightly sealed at all times whilst loading and unloading the Dry Block Heater.

Only use containers suitable for the temperature selected.

Setting the Over-Temperature Alarm

The DBHx000D series is equipped with a user configurable over-temperature audible and visible alarm.

The alarm is configured as a deviation alarm whereby it operates relative to the desired set temperature. If the current temperature deviates from the set temperature by the margin configured by the user, the alarm will activate. For example, an alarm value of 5.0°C will operate at 42°C if the set temperature is 37.0°C, and 55°C if the set temperature is 50.0°C

To configure the alarm set point :

- Press ☰ and SP3 will be displayed in the Current Temperature/Parameter Display.
- Press ▲ or ▼ to set the desired deviation for the over-temperature alarm.

  Important : The over-temperature alarm should be entered as a **positive** value.

Press ☰ until the current and set temperatures are displayed.

Switching Off The Heating Plate

- Switch the On/Off mains power switch (element 1 in Figure 1) to the left. The LED display will darken which indicates the heating system is now inactive.

CAUTION
Although the heating system may now be inactive, the residual heat in the heating chamber may be sufficient to cause serious burns or scalding.

Allow at least 10 minutes after switching off the heating system to allow the heating chamber and any blocks fitted to cool.

Allow the heating block(s) to reach ambient room temperature before proceeding to remove them from the heating chamber.

Storing & Relocating The Dry Block Heater

CAUTION
Be careful when lifting and observe your local operational health and safety requirements for lifting before relocating the Dry Block Heater. Ask for help if you are unable to move the Dry Block Heater by yourself.

The Dry Block Heater should be stored out of direct sunlight at an ambient temperature below 30° Celsius in a clean and dry location which meets the environmental conditions required as detailed in the technical specifications of this User Manual.

- Turn off the On/Off mains power switch (element 1 in Figure 1).

	- Unplug the equipment from the mains power supply outlet. - If the Dry Block Heater is empty, clean and dry, you may relocate it to an appropriate storage location. - Ensure the Dry Block Heater is stored in a clean and dry location away from potential damage by accidental knocks and bumps.

Routine Cleaning And Maintenance

To maintain the Dry Block Heater in good, safe working order and ensure maximum product lifespan, regular cleaning and general maintenance is required. The Dry Block Heater should be cleaned at least once every week for a unit being used on a daily basis, for infrequently used Dry Block Heaters a cleaning frequency of once every month is recommended. On each occasion, the general maintenance routine should be employed following cleaning.

	Cleaning The Dry Block Heater
	**CAUTION** If the Dry Block Heater has been operated recently the heating chamber may be hot enough to create a hazard sufficient to burn or scald if contact is made. Ensure the Dry Block Heater is empty before cleaning. **Allow the Dry Block Heater to cool for at least 20 minutes after it has last been operated prior to starting the cleaning procedure.**
	**CAUTION** Do not use alcohol based cleaners or solvents on the Dry Block Heater as these may break down certain components of it's construction, reducing it's life and potentially creating a hazardous situation. Use only a mild household detergent when cleaning the Dry Block Heater.
	**CAUTION** If the Dry Block Heater has been used with any dangerous, chemical or biological substances it should be decontaminated prior to cleaning. Decontaminate the Dry Block Heater using a decontamination procedure appropriate to the contaminant, however in all cases ensure the following : - No decontamination or cleaning agents are used which could cause a hazardous situation to arise as a result of a reaction with parts of the Dry Block Heater or with any materials contained in it. For example, substances that may compromise the integrity or function of electrical insulation, electrical components, stainless steel components or water seals. - Ratek and the manufacturer are consulted prior to decontamination or cleaning being undertaken if there is any doubt about the compatibility of decontamination or cleaning agents with parts of the Dry Block Heater or with any materials contained in it.
	**CAUTION** When cleaning the unit, only use a damp sponge. **Do not use a sodden wet sponge.** Do not make any part of the control panel, any exposed control or receptacle or any part of the Dry Block Heater excessively wet, paying particular attention ensuring no water or cleaning fluids are allowed to seep down the sides of the heating chamber inside the unit. If these receptacles and controls remain wet once electrical power is restored they can create a hazardous situation sufficient to cause serious injury or risk to life due to electrical shock. Always ensure the unit and in particular all controls and switches are completely dry before restoring electrical power.
	- Turn off the On/Off mains power switch (element 1 in Figure 1). - Unplug the equipment from the mains power supply outlet. - Allow the Dry Block Heater to air dry, or use a dry cloth to remove any liquid from all surfaces. - Remove any heating blocks used.

- Using a mild detergent and damp sponge, clean around the sides of the dry block heater as required and carefully inside the heating chamber. Pay particular attention to any loose particles, dirt, dust or grime that may build up on the heating plate.

- Once the Dry Block Heater is clean, use a soft dry cloth to dry all surfaces of the Dry Block Heater paying particular attention to any controls or switches.

Once cleaning has been completed, it may be re-installed and operated in accordance with this User Manual.

Maintenance

- Turn off the On/Off mains power switch (element 1 in Figure 1).

- Unplug the equipment from the mains power supply outlet.

- Under good light, carefully inspect the mains power lead and check for any signs of wear, over-extension or damage. If you believe the lead to be damaged in any way, contact your supplier to arrange for service.

- Carefully check to ensure all safety warning labels are affixed and in a good readable condition. Refer to the section in this User Manual titled “Safety Labels & Markings” for a table of factory-fitted warning labels. If any labels are missing, illegible or otherwise not functional, contact your supplier to obtain new replacement labels before operating the equipment.

- Ensure all controls and switches are fitted firmly and are in good condition. If any are found to be loose or in poor condition, have an authorized service technician repair the unit before operating it.

CAUTION
If any controls or switches are found to be loose or in poor condition, do not operate the equipment. Loose or damaged electrical controls and connections create a hazardous situation sufficient to cause serious injury or risk to life. Refer the equipment to an authorized service technician for repair.

Accessories

Ratek offer a wide range of standard dry block inserts suitable for Ratek block heaters. All blocks are precision machined from black anodized aluminium which is resistant to corrosion, spills and staining. The smooth anodized surface ensures excellent heat transfer to all containers, and when used in Ratek heaters gives excellent temperature uniformity throughout the block.

Popular Block Sizes

Block Series	# of Holes	Hole Size/Type	Codes
10.5mm through to 14mm diameter holes	20	Code is diameter, 45mm deep	SB10.5, SB12, SB13, SB14
15mm through to 17mm diameter holes	12	Code is diameter, 45mm deep	SB15, SB16, SB17
Block to suit 1.5ml Eppendorf centrifuge tubes	20	Matched to tube profile	EB20
Block to suit 2ml Eppendorf centrifuge tubes	20	Matched to tube profile	SB2.0
Block to suit 15ml Falcon tubes	12	Matched to tube profile, 45mm deep	FB15
Block to suit 50ml Falcon tubes	4	Matched to tube profile, 45mm deep	FB50
Block to suit 2ml vials	20	12.3mm dia, 24mm deep, flat bottom	VB20
96 well plates (occupies 2 standard block positions, not suitable for DBH1000D)	96	Flat (MB1), Conical (MB2), Round (MB3), Tapered (MB4)	MB1, MB2, MB3,MB4
*Allow a minimum of 0.3mm on top of your tube diameter for the hole size		**A complete listing of standard blocks is available on our web site.**	

Custom Blocks

Dry Block Heater Blocks – Made to order

Match the block to your container

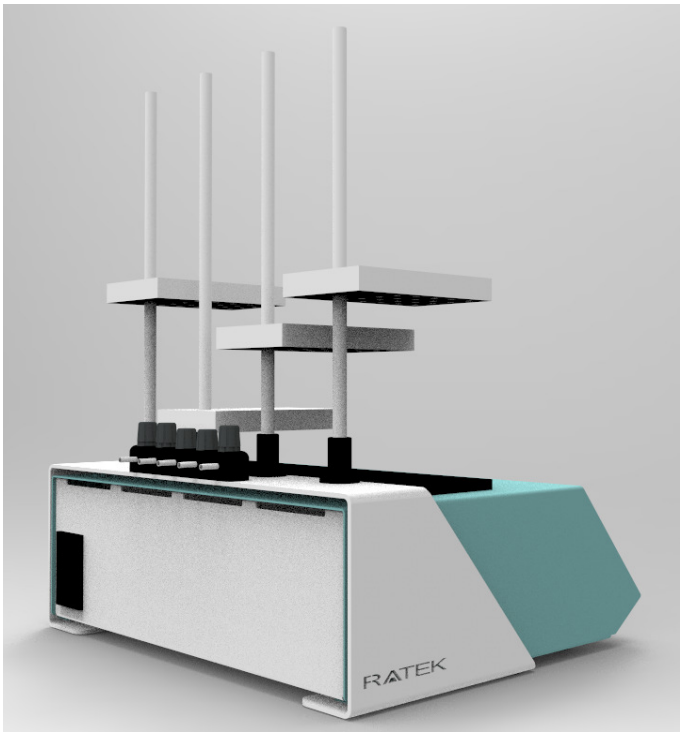
For optimum heat transfer in virtually any container, Ratek can manufacture blocks to exact specifications in almost any size. Our computerized machining centre delivers precise fit in a wide range of available material sizes and finishes. Custom blocks can be quoted quickly once your requirements have been determined. Contact Ratek today to discuss a custom-machined block to suit your application, or send a sample container for us to measure up accurately for you.

Evaporation/Blowdown Manifolds

Sample Concentration/Nitrogen Blow-Down Systems, Available To Suit Every Block Size

Evaporation systems can be fitted to any Ratek block heaters to allow a controlled gas flow into tubes and vials. Gas manifolds with stainless steel removable needles to suit all standard size blocks are available, with blanking needles available for use when not all outlets are required. The EM96 fixed needle manifold is also available to suit 96 well plates. The unique free-standing retort system allows the manifolds to be used both with or without the block heater, these stands allow height and clearance adjustment. A simple quick-set clamping screw holds the manifold in place whilst individual valves are provided on the rear of the mounting plate allowing independent control of gas flow to each manifold.

Evaporation systems are available for all Ratek block heater models.



Heater Model	**# of Manifold Positions**	**Matching Stand and Gas Tap Model #**	**Capacity**
DBH1000D	1	EMS1000	Single block manifolds only
DBH2000D	2	EMS2000	2 x single block manifolds or 1 x 96 well manifold
DBH4000D	4	EMS4000	4 x single block manifolds or 1 x 96 well manifold + 2 x single block manifolds or 2 x 96 well manifolds
Manifold Model (All manifolds supplied with a full set of needles. EM96 has fixed non-replaceable needles)	**# Of Needle Outlets**		**Applicable standard block models**
EM4	4		FB50
EM6	6		-
EM9	9		-
EM12	12		SB15, SB16, SB17, FB15
EM20	20		SB10.5, SB12, SB13, SB14, EB20, SB2.0, VB20
EM96 (*EMS2000 or EMS4000 required)	96		MB1, MB2, MB3,MB4
Spare Needles	**Length**	**Description**	**Applicable manifold models**
EMSN1	85mm	Stainless steel	EM4, EM6, EM9, EM12, EM20
EMSN2	N/A	Blanking needle	EM4, EM6, EM9, EM12, EM20

Technical Specifications

Control Type	Digital Microprocessor with dual LED Display		
Temperature Range	Ambient +5.0° to 200.0°C		
Temperature Stability	+/- 0.2°C ** Please note that temperature control and stability figures assume that a Ratek machined block is used and all block positions are filled*		
Display Resolution	0.1°C		
Safety	Adjustable over temperature alarm Mechanical manual reset over temperature cut out (internal) Over-current single blow fuse		
Mains Power Connection	240V / 50 Hz AC		
	DBH1000D	**DBH2000D**	**DBH4000D**
Power Requirements	240V AC 170 Watt	240V AC 335 Watt	240V AC 665 Watt
Heating Element	1 x High efficiency cartridge	2 x High efficiency cartridges	4 x High efficiency cartridges
Capacity	1 standard Ratek test tube block 95x75x50mm	2 standard Ratek test tube blocks 95x75x50mm	4 standard Ratek test tube blocks 95x75x50mm
Overall Dimensions (mm)	W130xD315xH125	W205xD315xH125	W353xD315xH125
Nett Weight (kg)	3.2 (without heating block)	4.4 (without heating blocks)	5.7 (without heating blocks)
Environmental Conditions	Suitable for use according to IEC 61010-1 standard as follows : - Indoor use - Altitude up to 2,000 Metres - Temperature 5° Celsius to 40° Celsius (Ambient temperature will limit the minimum achievable water temperature) - Maximum relative humidity 80 % for temperatures up to 31° Celsius decreasing linearly to 50 % relative humidity at 40° Celsius - MAINS supply voltage fluctuations up to ±10 % of the nominal voltage Over-voltage Category – II Pollution Degree – 2		

Disposal

At end of life, this equipment should be disposed of in an environmentally friendly way. This equipment cannot be disposed of with other general waste, but instead taken to your local or regional waste collection facility for recycling and/or suitable treatment procedure.

For more information about where you can drop off your waste equipment for recycling, please contact your local government office, your household waste disposal service or your nearest commercial recycling centre.

EMC Conformity

AS/NZS 61000.6.3: 2012 - Electromagnetic compatibility (EMC) – Part 6.3: Generic standards – Emission standard for residential, commercial and light-industrial environments.

Ratek Service Contact Information

Ratek are here to assist you in getting the most from your Dry Block Heater. Our friendly staff can you assist you at any stage of the product lifecycle.

If you have any concerns or questions regarding the operation of your Dry Block Heater, please contact us.

	Contact Us
	Ratek Instruments Pty Ltd 60 Wadhurst Dve Boronia Victoria 3155 Australia Telephone : 613 9887 2161 Fax : 613 9887 2163 Email: sales@ratek.com.au Web: www.ratek.com.au

Troubleshooting

The Dry Block Heater provides a simple-to-operate user interface when used in conjunction with this User Manual.

If at any stage you experience abnormal operation (anything other than that described in this Operating Manual) this may indicate a fault condition. If the Dry Block Heater fails to operate, this may also indicate a fault condition.

Fault conditions must be referred to an authorized service technician immediately and the equipment should be unplugged from the mains power supply socket.

Make a written note of any abnormal operation and contact Ratek using the contact details provided in the section of this User Manual titled "Ratek Service Contact Information" if you believe your equipment is exhibiting a fault condition.

Warranty Conditions

This Ratek product is covered by a 3 year parts and 12 months labour return-to-base warranty effective from the date of purchase. The product is manufactured in Melbourne, Australia.

The warranty is offered by Ratek Instruments Pty. Ltd. located at 60 Wadhurst Drive, Boronia, Victoria, Australia 3155, phone number +613 9887 2161.

- This warranty covers the repair or replacement of any parts or components found to be defective, subject to the service options listed below.
- The warranty is a return-to-base warranty, meaning the product must be returned to Ratek Instruments or an authorised Ratek agent for service at the discretion of Ratek Instruments. Where practical an on-site repair may be carried out at the discretion of Ratek Instruments.
- This warranty excludes any defect resulting from misuse, neglect, accidental damage, improper voltage, operation of the product outside the acceptable operating conditions as indicated in these operating instructions or any alteration which affects the performance of the equipment.
- It does not extend to any costs associated with delivery of the product to or from Ratek Instruments or an authorised Ratek agent, damage, or loss incurred during transport.
- This warranty is in addition to any Statutory regulations and provisions implied by the Trade Practices Act and any relevant State or Federal Government obligations, applicable only when purchased within Australia.
- The product may be replaced within the warranty period at the discretion of Ratek Instruments, however repair will be the normal course of action.

- For a period of 3 years from date of purchase, replacement parts will be supplied at no charge and the original components returned to the repairer. These replacement parts may be installed by an approved service agent with prior written agreement from Ratek Instruments.
- For a period of 12 months from date of purchase, service labour and repairs will be carried out at no charge by an approved repairer or Ratek Instruments at the discretion of Ratek Instruments.
- The limit of liability shall extend to the repair of the product only, all other compensation claims are excluded from this guarantee.
- The warranty does not extend to claims of suitability where the product does not deliver the intended function or fails to operate.
- No claims of suitability are made in relation to the product by Ratek Instruments. Any claim of suitability lies with the operator.
- The product is used at the risk of the operator. Any loss or damage caused to any item used with the product including but not limited to biological samples, tubes, racks, accessories, flasks, containers or the contents of such containers caused by the malfunction of the product or the failure of the product to function is not covered by this warranty.
- Proof of purchase is required for all warranty repairs.

DOA Product

Any claim under this warranty must be made within 7 days of the date of purchase of the product. To make a claim under the Warranty, you must present the product, together with proof of purchase or issue, to the store where you purchased the product from. If the product is defective and does meet the Warranty, you will be provided with a replacement product, or where that is not possible, a refund. Ratek Instruments will pay your reasonable, direct expenses of claiming under this Warranty. You may submit details and proof of your expense claim to Ratek Instruments for consideration.

This Warranty is provided in addition to other rights and remedies you have under law. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Return & Repair Procedures

The product is engineered from quality components designed to give long trouble-free operation. In the event that a technical problem has occurred that requires servicing by a Ratek Service agent, please follow these steps before returning the unit :

- Contact the supplier from where the equipment was purchased. If this is not possible, please contact Ratek Instruments either via email to service@ratek.com.au, or phone on +613 9887 2161 during business hours AEST. You may be referred to a local repair agent for service.
- Clean the unit thoroughly in accordance with this Operating Manual. If necessary, decontaminate the unit to ensure safety for the service technicians.
- Pack the unit into it's original packaging with the supplied mains power lead and use all original protective inserts. If the original packaging is not available, the unit must be packed with extreme care to ensure a safe journey. "Fragile" and "This Way Up" labels should be applied to the carton in a prominent location. No liability for a unit damaged in transit will be accepted. Use only reputable carrier services.
- Provide a full and complete fault description and your return contact details in the package and return the product as advised by the service representative.