

User Manual

Digital Immersion Heater Circulator

Model : TH7100

Version: 1.1 – 16/06/2015
English



www.ratek.com.au

60 Wadhurst Dve, Boronia, Victoria 3155, Australia - P: +613 9887 2161 - F: +613 9887 2163 - E: sales@ratek.com.au

© All Rights Reserved

Made in Australia, User Manual printed in Australia
Changes without prior notification reserved
Errors and omissions excepted.

Thank you

Thank you for purchasing a Ratek product.

This User Manual will assist you in the correct installation and operation of the Digital Immersion Heater Circulator, 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"

- **TH7100 Ratek Immersion Heater Circulator**
- **User Manual**

Table Of Contents	Page
INTENDED USE	4
Suitable Articles For Use With This Immersion Heater Circulator	4
Unsuitable Articles For Use With This Immersion Heater Circulator	4
Suitable Environments For The Immersion Heater Circulator	4
General Operation	4
OPERATOR RESPONSIBILITY – SAFETY CONSIDERATIONS	4
Conditions of Operation	4
Safety Labels And Markings	5
PREPARATION	7
Identification of Controls & Functions	7
Recommended Liquids	8
Safety Warnings	8
Safety Recommendations	8
Preparation & Installation	10
Unpacking and Installing	10
Filling The Water Bath	11
Adjusting the Mounting Clamp	11
Adjusting the Pump Flow Rate	11
Attaching a Hose For External Pump-Out	11
Connecting Power	11
Switching On The Immersion Heater Circulator	11
OPERATING INSTRUCTIONS.....	11
General Operation	15
Setting the Over Temperature Alarm	15
Loading/Un-Loading the Water Bath	11
Switching Off The Immersion Heater Circulator	11
Over Temperature Safety Cutout	11
Storing & Relocating	11
ROUTINE CLEANING AND MAINTENANCE.....	11
Cleaning	11
Maintenance	11
Over-Temperature Safety Cutout Test.....	11
TECHNICAL SPECIFICATIONS	11
DISPOSAL	11
EMC CONFORMITY.....	11
RATEK SERVICE CONTACT INFORMATION.....	11
TROUBLESHOOTING.....	11
WARRANTY CONDITIONS.....	11

Intended Use

This Immersion Heater Circulator is intended for the purpose of heating water in a laboratory water bath or inside other containers designed for the purpose. The operator may load a suitable article into the water bath for the purpose of controlled temperature application. The Immersion Heater Circulator is intended for use with tap water or filtered water only, as well as suitable additives where required as outlined in this User Manual.

The Immersion Heater Circulator is **not** intended for use with any medium other than those outlined in this User Manual. The Immersion Heater Circulator is **not** intended to provide direct contact between the medium (water) and an unprotected medical, food, biological or medico-techno item. In all cases the item should be enclosed in a suitable vessel as described below to protect it from coming into contact with the Immersion Heater Circulator.

Suitable Articles For Use With This Immersion Heater Circulator

- Plastic or glass laboratory test tubes that are sealed, waterproof and rated to withstand the intended temperature.
- Plastic or stainless steel laboratory test tube racks that are rated to withstand the intended temperature.
- *An example of a suitable article would be a sealed plastic laboratory centrifuge tube filled with blood.*

Unsuitable Articles For Use With This Immersion Heater Circulator

- Any item where the article is not waterproof or may result in its contents coming into contact with the Immersion Heater Circulator or the heating medium (water).
- Any item that is not rated to withstand the intended temperature.
- *An example of an unsuitable article would be an exposed piece of animal or plant matter.*

Suitable Environments For The Immersion Heater Circulator

The Immersion Heater Circulator 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 Immersion Heater Circulator should not be used outdoors or in dirty, dusty, steamy, humid or windy environments. The acceptable operating conditions are outlined further in this User Manual.

General Operation

- The Immersion Heater Circulator is mounted onto a suitable laboratory water bath or other rigid water container using the adjustable mounting clamp, retort mounting boss or water bath bridge plate.
- The water bath or vessel is filled with water following the safety guidelines contained within this User Manual.
- The Immersion Heater Circulator 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 inside the water bath or vessel.
- The Immersion Heater Circulator is operated via a combination of front and rear panel buttons and switches consisting of a power switch, temperature control buttons and menu buttons. These controls allow the operator to set a required water temperature as well as the over-temperature alarm set point..
- The Immersion Heater Circulator should be operated strictly in accordance with the Operating Instructions 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 Immersion Heater Circulator. 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, element or 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.
- **Important:** 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 water temperature. The ambient air temperature must be at least 7° Celsius lower than the desired controllable water 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 Customer 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 element at the bottom of the Immersion Heater Circulator. At all times during operation the safety guard MUST REMAIN FITTED to the Immersion Heater Circulator to avoid possible burns or scalds from the heating element.

The operator or user must also take extreme care when the bath is working at temperatures above 50° C as steam will be present and can cause scalding.

Caution Labels



Colours: Black on a yellow background



Colours: Black on a yellow background



Colours: Black on a yellow background

Definition

The Immersion Heater Circulator 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, unscrewed, 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.

The Immersion Heater Circulator is fitted with a removable guard which protects against contact with the heating element. This guard **MUST REMAIN FITTED** at all times during operation. Under no circumstances should the heating element be touched whilst in operation. This label is fitted by the manufacturer and must not be removed under any circumstances.

The Immersion Heater Circulator is designed for heating water to temperatures that can cause burns or scalding. Use extreme caution when working near hot water or steam to avoid injury. Under no circumstances should the heating element be touched whilst in operation. This label is fitted by the manufacturer and must not be removed under any circumstances.

Preparation

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

Identification of Controls & Functions

The figure below indicates all key controls and components of the Immersion Heater Circulator with their corresponding numerical element labeled.

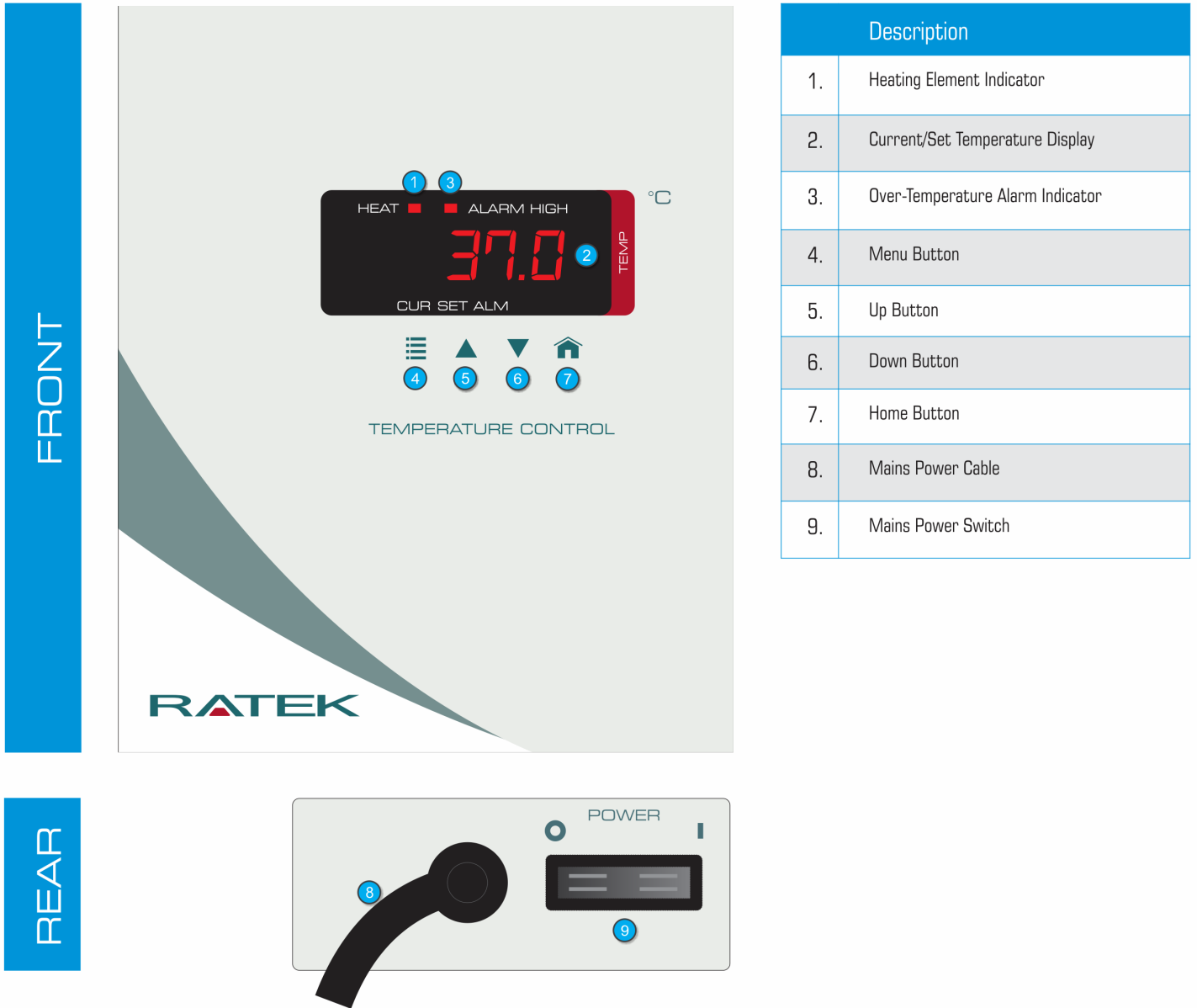


Figure 1

Recommended Liquids

Care should be taken when selecting the most appropriate heating medium for use with the Immersion Heater Circulator to ensure optimum performance and user safety. Please refer to the table below as a guide :

Primary Temp Range °C	Recommended Medium	Comments
0 ~ 30 0 ~ 100	80% water, 20% laboratory ethylene glycol	Laboratory ethylene glycol will prevent freezing at 0°C and reduce evaporation at 100°C and as such is a good all purpose heating medium. Use a lid to reduce the dilution of the medium caused by condensing water vapour from the air. Recommended over water alone for most applications between 0° and 100°C
5 ~ 60	Water	Water alone is suitable for most low temperature applications, however laboratory ethylene glycol should be used if working above 60°C to reduce evaporation, reduce the chance of scalding by steam and help maintain temperature stability. At temperatures approaching 100°C the temperature stability will be affected due to localised boiling if laboratory ethylene glycol is not used . This unit should not be used to boil water.

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 as a result of scalding or burns if the situation is not avoided.



CAUTION

Indicates a possibly highly dangerous situation which may result in serious injury or threat to life as a result of electric shock 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 Immersion Heater Circulator 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

The Immersion Heater Circulator is intended for use with tap water or filtered water **only**. De-ionized or distilled water can cause corrosion. Recommended water additives are outlined further in this User Manual. Use with any other medium is not permitted.

The use of flammable liquids may cause serious injury or danger to life.



CAUTION

Always work above the level of the Immersion Heater Circulator to avoid spillage of dangerously hot water. At no point should the user, operator, animal or any other perishable object be situated directly beneath the Immersion Heater Circulator or water bath.



- **ALWAYS** wear protective eyewear when working with hot liquids.
- **ALWAYS** place the water bath on a strong, even, dry, flat waterproof surface which is made of inflammable material. Placing the Immersion Heater Circulator on an unstable water bath could cause hot water to spill.
- **ALWAYS** turn off the mains power switch when the unit is not in operation and turn off the mains power supply at the outlet.
- **ALWAYS** turn off the mains power switch and unplug the equipment from the mains power supply outlet before emptying the water bath or moving the equipment.
- **ALWAYS** be careful of water condensation above or near the Immersion Heater Circulator and ensure at all times that the condensation cannot come in contact with the Immersion Heater Circulator control panel or mains power lead. Ensure benches are kept dry at all times.
- **ALWAYS** operate the Immersion Heater Circulator in a well ventilated area with adequate clearance around the Immersion Heater Circulator as indicated.
- **ALWAYS** be careful of steam and avoid making contact.
- **NEVER operate the Immersion Heater Circulator without water in the water bath.**
- **NEVER** empty the water bath while it contains hot water. Always allow the water to cool to ambient room temperature before emptying.
- **NEVER** operate the equipment if you believe it is damaged in any way.
- **NEVER** operate the Immersion Heater Circulator if the mains power supply cable is damaged in any way
- **NEVER** use any sharp or metal objects near the Immersion Heater Circulator control panel.
- **NEVER** lift the Immersion Heater Circulator if you have an existing injury that impairs your ability to lift.

Preparation & Installation

The Immersion Heater Circulator should be installed and operated in strict accordance with the following instructions.



CAUTION

The Immersion Heater Circulator 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 Immersion Heater Circulator, as well as the supplied User Manual and any other supplied accessories.
- Carefully inspect the Immersion Heater Circulator, 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 received a damaged product.
- Ensure the water bath to be used is empty, clean and dry and has a suitable area to accommodate the Immersion Heater Circulator.
- Ensure that there is a minimum unobstructed distance of 300 millimetres between the left, right and rear panels of the Immersion Heater Circulator and any other object or wall.
- Ensure that there is a minimum unobstructed distance of 1 metre above the top of the water bath to allow for adequate ventilation and for steam to dissipate.
- 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 Immersion Heater Circulator should not be plugged into any double-adaptor, 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 metre in front of the Immersion Heater Circulator to allow adequate room for the user to maintain a safe operating distance of 300 millimetres.
- Place the Immersion Heater Circulator in an upright position with the adjustable clamp over the side wall of the water bath whilst supporting the front of the unit.
- If the clamp requires adjustment to suit the side wall of the water bath, refer to the section of this User Manual titled "Adjusting the Mounting Clamp".
- Slowly tighten the clamp screw to secure the unit to the side wall of the water bath, do not over-tighten.



CAUTION

The Immersion Heater Circulator is designed for the purpose of heating immersed plastic or glass **sealed** laboratory test tubes, flasks or bottles suitable for use at the water 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 water bath .

ALWAYS use plastic, stainless-steel or plastic powder-coated tubes racks and accessories in the water bath . This will assist to prevent corrosion and thus help to extend the useful life of the Immersion Heater Circulator.



CAUTION

Poor water quality can lead to corrosion of the Immersion Heater Circulator even though it is constructed from high quality stainless steel, and eventually lead to a potentially hazardous situation. The Immersion Heater Circulator is intended for use with tap water or filtered water only.

Depending on local conditions, the water supply may be ferrous or overly chlorinated. Both of these conditions may lead to corrosion if used with the Immersion Heater Circulator.

Distilled or de-ionized water may lead to corrosion if used with the Immersion Heater Circulator.

Use of any liquid medium other than that recommended above will void the product warranty.

Contact the supplier of your Immersion Heater Circulator before filling the water bath if you are unsure of your water supply.



CAUTION

Before filling the water bath, ensure the mains power supply outlet is switched **off** and that the mains lead to the Immersion Heater Circulator is **unplugged** from the mains power supply outlet.

The nature of pouring water is unpredictable and should be done carefully away from any electrical supply to avoid the risk of electric shock.

Filling The Water Bath



CAUTION

Always fill the water bath in a safe manner following the manufacturer's guidelines where possible. It is important that power to the Immersion Heater Circulator is switched off at the mains outlet before filling the water bath to avoid possible electric shock.



CAUTION

Do not over-fill the water bath. If the bath is over-filled, water may spill out and create a hazardous situation if it comes near an electrical current.

The minimum water depth is 120 millimetres below the bath rim.

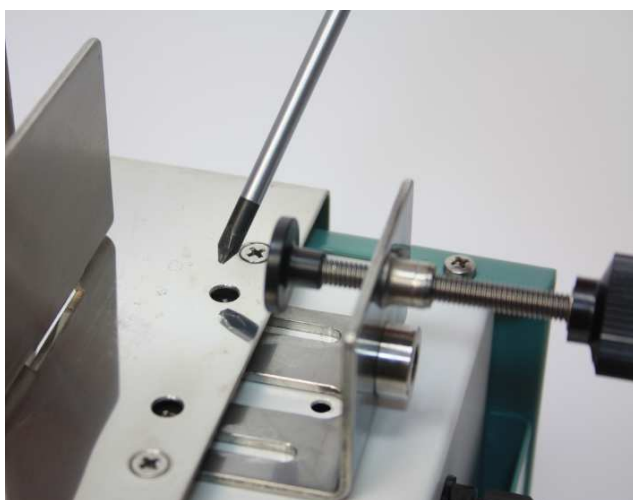
The maximum water depth is 20 millimetres below the bath rim.

If the water level falls below this minimum level during operation, the unit should be powered off, disconnected from the mains electrical supply and the water level topped up with cold water. Be aware that this may result in the rapid decrease in the water temperature and the effect of this in relation to the current procedure being carried out must be considered.

No liability will be accepted if in the normal course of operation the contents of the containers being heated are damaged due to insufficient water levels or inappropriate temperatures being applied as a result of re-filling.

Adjusting the Mounting Clamp

The Immersion Heater Circulator features an adjustable clamp that allows the unit to be mounted on water baths and tanks with side walls varying from 1mm to 63mm wide. Before adjusting the clamp, ensure the equipment is disconnected from the mains power supply and the element is cold. The adjustment is performed in 2 steps as illustrated below. Step 1 – Turn the unit upside down and gently rest it on the lid on a non-scratch surface. Using a phillips head screwdriver, loosen the 2 clamp screws as illustrated below with half a turn anti-clockwise. The clamp bracket can now slide in and out to the required depth as required. Once the depth has been set, re-tighten the 2 clamp screws by gently tightening in a clockwise direction. Step 2 – Once the unit is placed on the bath, gently tighten the thumb-screw by turning in a clockwise direction until the unit is secured to the bath.



Step 1 – Use a phillips head screwdriver to adjust the clamp depth



Step 2 – Use the thumb-screw to tighten against the bath

Adjusting the Pump Flow Rate

The Immersion Heater Circulator pump features an adjustable flow rate to suit a variety of different tank sizes. Decreasing the flow rate will generally reduce temperature uniformity within the bath and should be considered prior to adjustment. For most applications the pump should be left at maximum flow rate to ensure good temperature uniformity within the bath and maximize control stability.

Before adjusting the flow rate, ensure the equipment is disconnected from the mains power supply and the element is cold. The adjustment is performed by simply rotating the pump adjustment throttle on the under-side of the pump head as below. The throttle may be set to any position from fully open to fully closed to achieve the desired flow rate.



Pump adjusted to minimum flow rate



Pump adjusted to maximum flow rate

Attaching a Hose For External Pump-Out

The Immersion Heater Circulator pump features two outlets that can be fitted with a suitable hose to allow water to be pumped out of the bath, either for external re-circulation purposes or to assist in emptying large water baths. For most applications, only one hose should be fitted, allowing the other outlet to circulate water in the bath to maintain temperature uniformity within the tank. If both outlets are used, temperature uniformity in the bath will be reduced and should be considered as part of your application.

Before attaching a hose, ensure the equipment is disconnected from the mains power supply and the element is cold. The diameter of the pump outlet fitting is 9.5mm. Use a suitable hose with an internal diameter of approximately 9 to 9.5mm to maintain a snug fit on the outlet, with an outer diameter no larger than 15mm. Silicon hose is recommended for most applications. Simply push the hose over either outlet until it touches the guard, a hose clamp may be used if required however this is not normally necessary if using the correct size hose.



Hose attached for external pump-out

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 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 Immersion Heater Circulator 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. 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 Immersion Heater Circulator



CAUTION

Ensure you have filled the water bath to at least the minimum required level before switching on power. Failure to do so may create a hazardous situation that can cause burns, scalding and create a fire risk.

- Before switching on the immersion heater circulator, determine the temperature you wish to operate the bath at.
- If you wish to heat your containers from ambient temperature, you should load the bath prior to switching on the unit. See the section titled "Loading the Water Bath" below.
- If you wish to add your containers to warm or hot water, this should be done with extreme care once the temperature of the water bath has stabilized.
- Once you are ready to begin heating the water, switch the Mains Power Switch to the position marked with a vertical line. The Current/Set Temperature Display will illuminate to indicate the heating system is active.
- If the last set temperature is greater than the current water temperature, the Heating Element Indicator will light red and either flash to indicate intermittent heating or remain lit constantly to indicate constant heating.



CAUTION

Once the Heating Element Indicator is lit, the heating element is active and the surface of the element 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 place any part of your body near the heating element. The residual heat of the element creates a hazardous situation sufficient to cause burns or scalding if contact with the element is made.

Operating Instructions



CAUTION

If the temperature of the water in the water bath is critical to your application, ensure the Immersion Heater Circulator is left for at least 10 minutes to stabilize after the temperature has reached the set-point before you insert your containers and samples into the water. Verify the water temperature using a thermometer. Temperature stability is affected by water bath size, ambient temperature, position of the pump outlets, lid usage and the heating medium. All of these factors should be considered to achieve best results.



CAUTION

Temperatures above 50 degrees are sufficient to cause steam and are also capable of causing burns or scalding. Exercise extreme care paying particular attention to steam and splashing of water when the Immersion Heater Circulator is operating at these high temperatures, particularly whilst loading and unloading, containers, racks or accessories. ALWAYS use appropriate tools (such as silicon insulated tongs) to lower such containers into the water to avoid your hands coming into contact with hot water.

General Operation

- The Current/Set Temperature Display indicates the current water temperature in the bath by default.
- To view the current Set temperature, press until the SET indicator lights red. The currently configured set temperature is now displayed.
- To adjust the set temperature, press or to increase or decrease the desired temperature accordingly. Once finished, press to return to normal operating mode. The current temperature will be displayed.
- If the set temperature is greater than the current water temperature, the Heating Element Indicator will light up and either flash to indicate intermittent heating or remain lit constantly to indicate constant heating.
- Once the water temperature nears the set point, the temperature control circuit will start to intermittently engage the element to reduce the rate of heating.
- For best results, a Ratek insulated water bath should be used, as well as a lid to reduce evaporation and heat loss.
- **Note:** It is normal for the temperature to exceed the set point slightly whilst the temperature in the bath stabilizes. The bath temperature will drop back down to the set temperature and then the proportional temperature control will attempt to maintain the set temperature.

Setting the Over Temperature Alarm


The TH7100 is equipped with an over-temperature visible alarm, which is configurable by the user.

The alarm is configured as a deviation alarm whereby it operates relative to the desired set point. If the current temperature deviates from the set temperature by the margin configured by the user, the alarm will activate.

To configure the alarm set point :

- Press repeatedly until the ALM indicator lights red.
- Press or to set the desired deviation for the over-temperature alarm.

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

Once finished, press  to return to normal operating mode. The current temperature will be displayed.

Loading/Un-Loading the Water Bath



CAUTION

NEVER place your hands near the heating element whilst the Immersion Heater Circulator is heating as serious burns and scalding could result.

ALWAYS use appropriate tools (such as silicon insulated tongs) to load and unload items from the water to avoid your hands coming into contact with hot water or the heating element.



CAUTION

If using the bath with a lid, be careful when lifting the lid as steam may be present.

ALWAYS remove the lid at arm's length with your face away from the bath.

ALWAYS use a safety glove when removing the lid as the lid may be hot enough to cause burns or other injury.

NEVER remove the lid with your face directly over the bath. Steam may be present and burns or injury could result.

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

Always wear eye protection when loading or unloading items from a hot water bath.

Do not use explosive or volatile containers with this Immersion Heater Circulator.

Ensure all containers remain tightly sealed at all times whilst loading and unloading the water bath.

Only use containers suitable for the water temperature selected.

- When loading, use appropriate tools (such as silicon insulated tongs) to slowly place the required rack, container or accessory into the bath. Ensure the item will not tip over and will not float. If containers will not stand securely or will float, a suitable rack or tray should be used which will prevent the container from floating or tipping over.
- When unloading, use appropriate tools (such as silicon insulated tongs) to slowly remove the items and place them onto a water-proof and heat-proof surface.
- Continue to load or unload your containers, racks or accessories until complete.

Switching Off The Immersion Heater Circulator

- Switch the Mains Power Switch to the position marked with a circle. The Current/Set Temperature Display will go dark.



CAUTION

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

The residual water temperature may also be sufficient to cause burns or scalding.

Allow at least 10 minutes after switching off the heating system to allow the heating element to cool.

Allow the water temperature to reach ambient room temperature before proceeding to empty the water bath.

Unplug the Immersion Heater Circulator from the mains power supply outlet and remove it from the water bath before emptying. Consult the water bath user manual for instructions on safely emptying the bath.

Over Temperature Safety Cutout

The Immersion Heater Circulator features a manually reset over-temperature safety cutout which cuts power to the heating element in cases where the heating element has become too hot as a result of an insufficient water level being maintained in the bath or an unsuitable heating medium has been used.

When the cutout activates, a small click sound may be heard.

Depending on the quality of the water being used, an unpleasant smell may also be noticed as a result of the impurities in the water becoming hot. This is normal.

- If the over-temperature cutout activates, turn off all power to the Immersion Heater Circulator immediately by setting the Mains Power Switch to the position marked with a circle.
- Turn off the mains power supply at the outlet.
- Allow the unit to cool for at least 10 minutes.
- Refill the water bath by referring to the section in this User Manual labeled "Filling The Water Bath".
- On the bottom panel at the rear of the Immersion Heater Circulator, the Over-temperature reset button should be pressed in gently until it remains in place. A small click sound should be heard.
- The Immersion Heater Circulator is now ready to be re-operated as per the section of this User Manual labeled "Switching On The Immersion Heater Circulator".

Storing & Relocating



CAUTION

Be careful when lifting and observe your local operational health and safety requirements for lifting before relocating the Immersion Heater Circulator. Ask for help if you are unable to move the Immersion Heater Circulator by yourself. Ensure the heating element is cold before relocating.

The Immersion Heater Circulator 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 Mains Power Switch by setting it to the position marked with a circle.
- Unplug the equipment from the mains power supply outlet.
- Ensure all parts of the Immersion Heater Circulator are clean and dry to avoid the potential for corrosion.
- Ensure the Immersion Heater Circulator is stored in a clean and dry location away from potential damage by accidental knocks and bumps.

Routine Cleaning And Maintenance

To maintain the Immersion Heater Circulator in good, safe working order and ensure maximum product lifespan, regular cleaning and general maintenance is required. The Immersion Heater Circulator should be cleaned at least once every month for a unit being used on a daily basis, for infrequently used Immersion Heater Circulators a cleaning frequency of once every 3 months is recommended. On each occasion, the general maintenance routine should be employed following cleaning with the exception of the over-temperature safety cutout test which need only be conducted every 2 years of normal operation.

Cleaning



CAUTION

If the Immersion Heater Circulator has been operated recently the heating element may be hot enough to create a hazard sufficient to burn or scald if contact is made. Ensure the Immersion Heater Circulator element is cold before cleaning.

Allow the Immersion Heater Circulator to cool for at least 10 minutes after it has last been operated prior to starting the cleaning procedure.



CAUTION

Do not use abrasive cleaners or solvents on the Immersion Heater Circulator 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 or laboratory sterilization agent when cleaning the Immersion Heater Circulator.



CAUTION

If the Immersion Heater Circulator has been used with any dangerous, chemical or biological substances it should be decontaminated prior to cleaning. Decontaminate the Immersion Heater Circulator 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 Immersion Heater Circulator 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 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 Immersion Heater Circulator 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 Immersion Heater Circulator excessively wet. 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 Mains Power Switch
- Unplug the equipment from the mains power supply outlet.
- Using a mild detergent and damp sponge, clean around the element and pump being careful not to knock the over-temperature safety capillary bulb which is clipped to the element. Pay particular attention to any loose particles that may lead to or accelerate corrosion.
- The bottom plate of the pump head may be removed by loosening 3 screws with a phillips head screwdriver to allow

access to remove any debris from around the pump impellor. Do not remove the impellor. Refit the pump cover once clean.

- Once the Immersion Heater Circulator is clean, use a soft dry cloth to dry all surfaces of the Immersion Heater Circulator 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 Mains Power Switch
- 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.



Over-Temperature Safety Cutout Test

- The over-temperature safety cutout should be tested periodically to ensure correct operation. This test should be conducted once every 2 years of normal operation.

CAUTION

This test must only be carried out by a qualified service technician. The test involves the heating element becoming very hot and is sufficient to cause serious burns or scalding if contact with the element is made. Ensure there are no vapours present that may ignite if heated.

- Turn off the Mains Power Switch
- Unplug the equipment from the mains power supply outlet and remove it from the water bath.
- Empty the water bath
- Fill the water bath with enough cold water to just cover the coil of the heating element.
- Re-fit the Immersion Heater Circulator to the water bath



CAUTION

NEVER touch the heating element whilst conducting the Over-Temperature Safety Cutout Test as serious burns and scalding could result. The test involves the heating element reaching very high temperatures.

ALWAYS wear eye protection during the Over-Temperature Safety Cutout Test.

ALWAYS maintain a safe working distance of 300mm from the Immersion Heater Circulator during the Over-Temperature Safety Cutout Test.

- Connect power to the Immersion Heater Circulator and set the Mains Power Switch to the position indicated with a vertical line.
- Ensure the temperature set-point is set to 100°C, this ensures the heating element will remain on during the test. Refer to the section of this User Manual labeled "General Operation".
- The Immersion Heater Circulator will begin heating and the Heating Element Indicator will light up.
- The water in the water bath will gradually boil away until the over-temperature safety cutout is exposed, this may take some minutes. **Do not leave the Immersion Heater Circulator unattended during the test.**
- Once the coil of the heating element has become exposed, the over-temperature cutout should have activated. When the cutout activates, a small click sound may be heard and the over-temperature reset button will pop out. If the over-temperature cutout has failed to operate or any part of the heating element has begun to glow, the test has failed and the Immersion Heater Circulator should be turned off immediately to prevent damage to the Immersion Heater Circulator.
- Depending on the quality of the water being used, an unpleasant smell may also be noticed as a result of the impurities in the water becoming hot. This is normal.
- Once the test has been completed, turn off power to the Immersion Heater Circulator immediately by setting the Mains Power Switch to the position marked with a circle.
- If the over-temperature cutout has failed to operate, contact Ratek using the contact details provided in the section of this User Manual titled "Ratek Service Contact Information".



CAUTION

NEVER operate the Immersion Heater Circulator if the over-temperature safety cutout test has failed. Operating the Immersion Heater Circulator without a functional over-temperature safety cutout may result in serious injury, threat to life, fire or damage to property.

- Turn off the mains power supply at the outlet.
- Allow the unit to cool for at least 10 minutes.
- Refill the water bath.
- On the bottom panel at the rear of the Immersion Heater Circulator, the Over-temperature reset button should be pressed in gently until it remains in place. A small click sound should be heard.
- If the over-temperature safety cutout test passed, the Immersion Heater Circulator is now ready to be re-operated as per the section of this User Manual labeled "Switching On The Immersion Heater Circulator".

Technical Specifications

Temperature Controller	Digital PID
Temperature Sensor	RTD PT100
Display Resolution	0.1°C
Temperature Control Range	0°C to 100.0°C, (external cooling required for ambient +7°C or less for stable temperature control)
Safety Features	<ul style="list-style-type: none"> - Re-settable safety thermostat - Over-current protection - Fully enclosed element guard
Mains Power Connection	240V / 50 Hz
Replaceable Fuse Type	F250V/5AL - M205 miniature glass type. Internal fuse holder requires technician to replace.
Heating Power	1,000 Watts
Total Operating Wattage	1,020 Watts
Minimum Tank Depth	200mm
Minimum Water Level	120mm below tank rim
Maximum Water Level	20mm below tank rim
Overall Dimensions	W125 x D190 x H360mm
Environmental Conditions	<p>Suitable for use according to IEC 61010-1 standard as follows :</p> <ul style="list-style-type: none"> - 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 <p>Over-voltage Category – II Pollution Degree – 2</p>

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 CISPR 14.1:2010 Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus – Emission. This forms the basis of compliance to the requirements of the Electromagnetic Compatibility Framework ('C TICK').

Ratek Service Contact Information

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

If you have any concerns or questions regarding the operation of your Immersion Heater Circulator, 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 Immersion Heater Circulator 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 Immersion Heater Circulator 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.