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INSTRUCTIONS

Reacti-Therm™ I and III Heating Modules

18822 18824

2101.2

Number	Description
18822	**Reacti-Therm I Heating Module (single block)**
18824	**Reacti-Therm III Heating Module (triple block)**

Introduction

The Thermo Scientific® Reacti-Therm Modules are easy-to-use dry-block heaters that provide constant temperature control (see Table 1 for specifications). They are ideal for heating and evaporation required for sample preparation before analysis by gas chromatography, high-performance liquid chromatography and other methods. Designed with a recessed cavity that holds interchangeable Reacti-Block™ Aluminum Blocks, the modules can also be used for routine sample incubation when elevated temperature control is required.

Table 1. Electrical and performance specifications of the single- and triple-block heating/stirring modules.

	Single Block	Triple Block
Electrical Input		
Voltage	120 V or 240 V	120 V or 240 V
AC Input Voltage Tolerance	+/– 10%	+/– 10%
Wattage (Maximum)	130 W	260 W
Frequency	50/60 Hz	50/60 Hz
Fuse		
Type	3 A, 250 V, Fast-acting	3 A, 250 V, Fast-acting
Size	5 × 20 mm	5 × 20 mm
Location	Inside cord inlet housing	Inside cord inlet housing
Environment for Operation		
Location	Indoor use only	Indoor use only
Ambient Temperature	17-27°C (room temperature)	17-27°C (room temperature)
Ambient Humidity	10-85% at 25°C (non-condensing)	10-85% at 25°C (non-condensing)
Installation Category	II (overvoltage)	II (overvoltage)
Pollution Degree	2	2
Altitude Limit	2,000 m	2,000 m
Performance		
Temperature Range*	ambient + 10°C to 200°C	ambient + 10°C to 200°C
Temperature Uniformity*	± 0.5°C	± 0.5°C
Temperature Stability*	± 0.5°C at 37°C	± 0.5°C at 37°C

*Thermal values are based on temperatures from thermometers inserted into the Reacti-Block Aluminum Block thermometer well. Values may vary slightly as a result of aluminum block size. Block weight will vary with size and number of holes in each block.

Symbol Definitions



Caution! Risk of Danger.



Caution! Hot Surface.

Pierce Biotechnology 3747 N. Meridian Road | PO Box 117 Rockford, IL 61105 USA | (815) 968-0747 (815) 968-7316 fax | www.thermo.com/pierce

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Safety Information

Reacti-Therm Heating Modules were designed for proper function, reliability and safety. The researcher is responsible for installation in conformance with local electrical safety codes. This manual contains important safety information. Read this manual carefully and understand its contents before using this equipment.

A. CE Marking and CSA Certification

The Reacti-Therm Models 18822 and 18824 have been evaluated to comply with CE certification requirements, in accordance with the following IEC standards, as they apply for use with non-flammable materials only.

- EN/IEC 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
- EN/IEC 61010-2-010:2005 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials

The Reacti-Therm Models 18822 and 18824 have CSA certification per file number 245561.

B. Warnings of Potential Hazards

Reacti-Therm Models 18822 and 18824 (hereafter "equipment" or "unit") have been designed for safe operation when in normal use and conditions and operated in accordance with these instructions. The following Warnings identify conditions and actions that pose potential hazards to the User(s). The Responsible Body for the equipment must read these Warnings and this entire Instruction Manual and verify that the User(s) are suitably trained before using the equipment.

Warnings:

- Always follow good laboratory practices when using this equipment and follow your institution's safety procedures and health and safety and associated legislation applicable to your areas of operation. Understand laboratory procedures for substances being heated to ensure that any hazards (e.g., explosion, implosion or the release of toxic or flammable concentrations of gases) that might arise have been suitably addressed before using this equipment.
- The equipment is not spark/explosion proof and has not been designed for use in hazardous areas according to the terms of EN/IEC Code BS5345: Codes of practice for selection, installation, and maintenance of electrical apparatus for use in potentially explosive atmospheres.
- When heating certain substances, the liberation of hazardous gases may require the use of a fume hood, or other suitable extraction system, to avoid the accumulation of hazardous concentrations of any gasses. Keep in-block vials of any potentially hazardous materials closed unless evaporating using the Reacti-Vap Evaporator and inert (nitrogen or argon) gas flow. Perform small-volume analytical derivatization reactions or vacuum hydrolysis reactions in approved Reacti-Vial Small Reaction Vials or similar vessels.
- Position and operate the equipment on a clean, dry, non-combustible work surface with at least 16 inches (41 cm) of clearance from other equipment or materials. Do not position the equipment in a space where it is difficult to disconnect the power cord at the rear of the unit. Do not allow the power cord to contact hot surfaces of the equipment, accessories or samples.
- Do not fill or empty sample-containing vial(s) when positioned in the unit to avoid potential spills. Use caution and appropriate laboratory procedures when handling and transporting heated and non-heated vials and samples. The module is not designed to retain liquids. If spillage occurs, immediately disconnect main power supply and then remove liquid to prevent damage to electrical components and to prevent possible fire hazard.
- Do not cover the unit when in use or leave the heating or stirring functions on except when needed for use with samples.
- Do not lean or stretch over equipment. Vials or other objects protruding from the top could be broken or cause injury.
- Allow the unit to cool before cleaning. Always disconnect the power plug from the outlet before attempting any external cleaning. Use mild soap and water only. Verify that cleaners and decontaminants are compatible with the chemical properties of relevant samples and are appropriate for the unit and any accessories (e.g., glassware, aluminum blocks, steel evaporator needles) involved.

Note: If this product is not used in accordance with these Warnings and this entire Instruction Manual, then the basic safety protection afforded by the equipment may be compromised. Protection provided by the equipment may be impaired if the equipment is used with accessories not provided or recommended by the manufacturer, or is used in a manner not specified by the manufacturer.

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Unpack and Set Up Module

1. Before opening the carton, examine it for signs of damage. Then open the carton without damaging it, and carefully remove and inspect the Reacti-Therm Module and other contents. Call the delivery carrier and immediately file a claim if shipping damage is observed. Do not discard packaging material.
2. Check to ensure that the package includes the appropriate cord set for electric outlets in your country. (Your package may include two cord sets, as all modules ship with a U.S. cord set for 120V outlets regardless of target country.) If the correct cord set was not included, contact Technical Support.
3. Verify and/or set Voltage Selection Switch for your local input voltage (110-120V or 220-240V). The Voltage Selection Switch is located at the rear of the unit, opposite the power cord. The factory setting is "115 V" for U.S.A. and other countries with 110-120 voltage. Move the switch to the "230V" position for countries with 220-240 voltage. The module is equipped with a fuse set that is compatible for use with both 120V or 240V sources of electricity (see Table 1).
4. Select an appropriate location for module operation (see Table 1 on page 1 and Warnings on page 2). For optimal performance (i.e., temperature stability and uniformity), place the module in a thermally stable environment free of erratic drafts and other heating devices. To facilitate even and efficient heating, make sure the module and blocks are free of debris or contamination.
5. Set Heat knob to the off position (turn all the way counter-clockwise). Set the Temperature Display Adjustment knob to the center position.
6. Plug the power cord into a suitable, grounded outlet (see Table 1 on page 1 and Warnings on page 2). The module is powered whenever it is connected by the cord to a power supply. The unit does not have an on/off power switch.

Instructions for Use with Standard Thermometer

1. Place clean Reacti-Block Aluminum Block(s) into the module reservoir. **Note:** The triple-block reservoir space of the Reacti-Therm III Module must be filled with three aluminum blocks to obtain acceptable heating performance.
2. Set Heat knob to the off position (turn all the way counter-clockwise). Set the Temperature Display Adjustment knob (Display Adjust knob) to the center position.
3. Place a thermometer (200°C range; Product No. 18915) into the aluminum block thermometer well.
4. Turn the Heat knob clockwise to set the desired target block temperature (°C), as indicated in the LED display above the Heat knob. The displayed value will continue to flash (blink) until the block temperature approaches the set temperature. (The Temp. Probe indicator light remains off unless the Remote Temperature Probe, Product No. 18820, is being used.)

   Example: To set temperature to 100°C, turn Heat knob until the value “100” appears (flashing) in the LED display.
5. Allow 30-60 minutes for the block to approach the set temperature, at which point the LED display stops flashing. (Flashing stops when the unit senses that the block is within 5°C of the set temperature.) The actual time required for the unit to reach a given temperature will vary with the block used and the ambient (room) temperature.
6. When the LED display stops flashing, monitor the in-block thermometer for an additional 15 minutes to ensure that the temperature has fully stabilized (i.e., that the thermometer reading remains unchanged for several minutes). Note that the thermometer reading, although stabilized, might still be different from the set temperature.
7. Once the block has stabilized at a given temperature, turn the Display Adjust knob until the LED display value matches the block temperature indicated by the in-block thermometer.

   Example: Suppose the Heat knob had been set to 100°C (step 4) as indicated by the LED display. After 30 minutes, the block temperature measures 98°C (as indicated by the thermometer) and has remained unchanged for several minutes. Harmonize the reported (display) value to the actual (thermometer) temperature by turning the Display Adjust knob until the LED display value equals 98°C.
8. If the Display Adjust knob was used in step 7, re-position the Heat knob to the original target temperature.

   Example: Having changed the Display Adjust knob until the LED display value equals 98°C, now turn the Heat knob so that the set temperature (LED display) equals 100°C.
9. After several minutes, the block will stabilize to the desired temperature.

   Note: An inert atmosphere can be maintained over samples by using the Reacti-Vap™ Evaporator manifold system, which provides a flow of an inert gas over samples.

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Note: Once calibration has been performed for a given aluminum block, vial size and ambient condition, setting the Heat knob to the same set temperature with the Display Adjust knob at the same dial position for subsequent uses will reproduce the same heating performance. You may wish to mark or note the Display Adjust dial position for future reference when using this same heating application.

Instructions for Use with Remote Temperature Probe (RTP, Product No. 18820)

Using the Remote Temperature Probe (RTP) provides more accurate and responsive control of the heating function because it replaces the internal heat sensor (housed under the block reservoir) with one placed directly in the aluminum block or reaction vial. However, the RTP is not a substitute for temperature calibration to an independent thermometer.

For best results, perform temperature calibration for a given application (i.e., particular temperature setting, aluminum block and vial/sample size) with the RTP placed in the aluminum block thermometer well and a standard thermometer placed in a reaction vial in one of the aluminum block wells. Calibration performed in this configuration will provide for accurate in-vial sample heating, controlled by the RTP conveniently positioned in the thermometer well. The triple-block module allows for both the RTP and thermometer to be placed in block thermometer wells, making alternative configurations possible. Calibrate with the RTP in a vial only if that will be the configuration for use. The following instructions assume the suggested calibration configuration. Be aware that the aluminum block and in-vial sample temperatures may be different.

1. Place clean Reacti-Block Aluminum Block(s) into the module reservoir. **Note:** The triple-block reservoir space of the Reacti-Therm III Module must be filled with three aluminum blocks to obtain acceptable heating performance.
2. Set Heat knob to the off position (turn all the way counter-clockwise). Set the Display Adjust knob to the center position. Connect the RTP to the Reacti-Therm Module (left side). When the Heat knob is turned on (step 4), the Temp. Probe light will illuminate to indicate that the RTP is connected and operating as the thermal sensor.

   Note: The Heat knob must be in the off position when connecting or disconnecting (plugging or unplugging) the RTP.
3. Place the RTP tip into the aluminum block thermometer well and insert a thermometer (200°C range) into a reaction vial placed in one of the block wells. For in-vial placement of the RTP, fill the vial sufficiently with mineral oil or other suitable liquid so that the probe tip is immersed at least 2.5 cm to ensure adequate thermal contact with the vial.
4. Turn the Heat knob clockwise to set the desired target block temperature (°C), as indicated in the LED display above the Heat knob. The displayed value will continue to flash (blink) until the block temperature approaches the set temperature.

   Example: To set temperature to 100°C, turn Heat knob until the value "100" appears (flashing) in the LED display.
5. Allow 15-30 minutes for the block to approach the set temperature, at which point the LED display stops flashing the set temperature and begins reporting (without flashing) the block temperature recorded by the RTP. The actual time required for the unit to reach a given temperature may vary depending on the block used and the ambient (room) temperature.
6. When the LED display stops flashing, monitor the displayed temperature for an additional 15 minutes to ensure that the it has fully stabilized (i.e., that the in-vial thermometer reading remains unchanged for several minutes). Note that the thermometer reading, although stabilized, might still be different from the set temperature reported by the RTP.
7. Once the block has stabilized at a given temperature, turn the Display Adjust knob until the LED display value matches the block temperature indicated by the in-vial thermometer.

   Example: Suppose the Heat knob had been set to 100°C (step 4) as indicated by the LED display. After 30 minutes, the block temperature measures 98°C (as indicated by the in-vial thermometer) and has remained unchanged for several minutes. Harmonize the reported (displayed RTP) value to the actual (thermometer) temperature by turning the Display Adjust knob until the LED display value equals 98°C.
8. If the Display Adjust was used in step 7, re-position the Heat knob to the original target temperature.

   Example: Having changed the Display Adjust knob until the LED display value equals 98°C, now turn the Heat knob so that the set temperature (LED display) equals 100°C.
9. After several minutes, the block will stabilize to the desired temperature.

Note: Once calibration has been performed for a given aluminum block, vial size and ambient condition, setting the Heat knob to the same set temperature with the Display Adjust knob at the same dial position for subsequent uses will reproduce the same heating performance. You may wish to mark or note the Display Adjust dial position for future reference when using this same heating application.

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General Troubleshooting and LED Display Errors

Problem	Cause	Solution
Unit will not operate (no display lights illuminate and unit does not heat)	Unit is unplugged	Verify that unit is plugged in
	Blown or missing fuse	Verify that unit has two fuses (same rating) inserted into power entry module, and that both fuses are functional
	Incorrect voltage setting	Verify that the voltage setting switch on back of the unit is properly configured
Unit will not operate ("888" shows on display)	Software error occurred and needs to be reset	Cycle power to unit by unplugging power cord for 5 seconds and then reconnecting
Erratic heat control	Incorrect voltage setting	Verify voltage setting switch on back of the unit is properly set
	Excessive and/or erratic ventilation around unit	Protect unit from experiencing continually varying airflow that interferes with constant heat dissipation and measurement
All other errors	Connection error detected by unit	Cycle power to unit by unplugging power cord for 5 seconds and then reconnecting
	Various	Contact manufacturer or other trained service personnel. Use proper ESD precautions when servicing

Service and Maintenance

Replacement parts and repair services are available for Reacti-Therm Modules. Contact our Technical Support Department.

Related Thermo Scientific Products

18915 **Thermometer,** range 0-200°C

18820 **Remote Temperature Probe**

18825 **Reacti-Vap Evaporator (9-port)**

18826 **Reacti-Vap III Evaporator (27-port)**

18801-18819 **Reacti-Block Aluminum Blocks**

13100-13225 **Reacti-Vial Small Reaction Vials (12/pkg)**

29550 **Vacuum Hydrolysis Tubes,** 1 ml

29560 **Vacuum Hydrolysis Tubes,** 5 ml

29564 **Vacuum Hydrolysis Tubes,** 20 ml

This product ("Product") is warranted to operate or perform substantially in conformance with published Product specifications in effect at the time of sale, as set forth in the Product documentation, specifications and/or accompanying package inserts ("Documentation") and to be free from defects in material and workmanship. Unless otherwise expressly authorized in writing, Products are supplied for research use only. No claim of suitability for use in applications regulated by FDA is made. The warranty provided herein is valid only when used by properly trained individuals. Unless otherwise stated in the Documentation, this warranty is limited to one year from date of shipment when the Product is subjected to normal, proper and intended usage. This warranty does not extend to anyone other than the original purchaser of the Product ("Buyer").

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Current versions of product instructions are available at *www.thermo.com/pierce*. For a faxed copy, call 800-874-3723 or contact your local distributor.

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