EX Series
Bath Circulators

Thermo NESLAB Manual P/N 000259
Rev. 10/26/00

Instruction and Operation Manual

EX-Series Bath Circulator
Table of Contents

Preface

Compliance

Products tested and found to be in compliance with the requirements defined in the EMC standards defined by 89/336/EEC as well as Low Voltage Directive (LVD) 73/23/EEC can be identified by the CE label on the rear of the unit. The testing has demonstrated compliance with the following directives:

LVD, 73/23/EEC	Complies with UL 3101-1:93
EMC, 89/336/EEC	EN 55011, Class A Verification EN 50082-1:1992 IEC 1000-4-2:1995 IEC 1000-4-3:1994 IEC 1000-4-4:1995

For any additional information refer to the Letter of Compliance that shipped with the unit (Declaration of Conformity).

Unpacking

Retain all cartons and packing material until the unit is operated and found to be in good condition. If the unit shows external or internal damage, or does not operate properly, contact the transportation company and file a damage claim. Under ICC regulations, this is your responsibility.

Warranty

Units have a warranty against defective parts and workmanship for one full year from date of shipment. See back page for more details.

NES-care Extended Warranty Contract

- Extend parts and labor coverage for an additional year.
- Worry-free operation.
- Control service costs.
- Eliminate the need to generate repair orders.
- No unexpected repair costs.

Other contract options are available. Please contact NESLAB for more information.

After-sale Support

Thermo NESLAB is committed to customer service both during and after the sale. If you have questions concerning the operation of your unit, contact our Sales Department. If your unit fails to operate properly, or if you have questions concerning spare parts or Service Contracts, contact our Customer Service Department. Before calling, please obtain the following information from the unit's serial number label:

- *BOM number* _____
- *Serial number* _____

Section I Safety

Warnings

Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions concerning the operation of your unit or the information in this manual, contact our Sales Department.

Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the manufacturer's warranty.

Observe all warning labels.

Never remove warning labels.

Never operate damaged or leaking equipment.

Never operate the unit without bath fluid in the bath.

Never use pure ethylene glycol as a bath fluid. A minimum 80/20 mixture of Ethylene Glycol and tap water is allowed.

For 220 - 240 volt units supplied without a line cord, use a harmonized (HAR) grounded 3-conductor cord, type H05VV-F, with conductors listed below. A suitable cord end is required for connecting to the equipment (see unit socket) and must terminate with an IEC approved plug for proper connection to power supply.

NON-BOOST HEATER UNITS	**Nominal 1.0 mm^2 cross section rated 10 Amps**
	Unit Socket: IEC - 320 C13
BOOST HEATER UNITS	**Nominal 1.5 mm^2 cross section rated 16 Amps**
	Unit Socket: IEC - 320 C19

Always turn off the unit and disconnect the line cord from the power source before performing any service or maintenance procedures, or before moving the unit.

Always empty the bath before moving the unit.

Never operate equipment with damaged line cords.

Refer service and repairs to a qualified technician.

In addition to the safety warnings listed above, warnings are posted throughout the manual. These warnings are designated by an exclamation mark inside an equilateral triangle with text highlighted in bold print. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury or death.

Section II General Information

Description

The EX Series Bath Circulators are designed to provide temperature control for applications requiring a fluid work area or pumping to an external system.

The units consist of a circulation pump, stainless steel bath, a work area cover, and a temperature controller.

Specifications

	EX-111	EX-211
Temperature Range[1] *Analog controller* *Digital controller*	Ambient +3°C to +100°C Ambient +3°C to +150°C	
Temperature Stability[2] *Analog controller* *Digital controller*	±0.1°C ±0.01°C	
Pumping Capacity	15 lpm at 0' (0 M) 0 lpm at 16' (4.9 M)	
Heater *Watts* *50 Hz Models*	800 1000	
Bath Work Area (H x W x D) *Inches* *Centimeters*	4 3/4 x 8 x 6 12.1 x 20.3 x 15.2	9 1/4 x 10 x 6 23.5 x 25.4 x 15.2
Bath Volume *Liters*	7.0	12.25
Case Dimensions *(L x W x D)* *Inches* *Centimeters*	17 x 10 5/16 x 15 7/8 43.2 x 26.2 x 40.3	17 x 12 3/8 x 18 3/8 43.2 x 31.4 x 46.7
Power Requirements[3]	115 V, 60 Hz, 9 Amps 220/240 V, 50 Hz, 5.5 Amps	

1. Low-end temperature with tap water cooling. The controller may be set to -30°C, however to achieve temperatures below the specified range requires accessory cooling. Contact Thermo Neslab for more details.
2. Stability is a function of the bath fluid temperature. The use of a work area cover and tap water cooling may optimize bath stability for your work. For some applications, agitation and stability above ambient temperatures may be may be improved by connecting a small length of hose between the PUMP INLET and PUMP OUTLET connections on the rear of the unit.
3. Power Board Transformer Fuse–Analog T 0.5A 250V (Qty 1), Digital T 0.8A 250V (Qty 2) [T=Time Delay]

Specifications

	EX-221	EX-411	EX-511
Temperature Range[1] *Analog controller* *Digital controller*	Ambient +3°C to +100°C Ambient +3°C to +150°C		
Temperature Stability[2] *Analog controller* *Digital controller*	±0.1°C ±0.01°C		
Pumping Capacity	15 lpm at 0' (0 M) 0 lpm at 16' (4.9 M)		
Heater *Watts* *50 Hz Models*	800/800 boost 1000/800 boost	800 1000	800/800 boost 1000/800 boost
Bath Work Area *(H x W x D)* *Inches* *Centimeters*	9 1/4 x 10 x 9 23.5 x 25.4 x 22.9	19 1/4 x 10 x 6 48.9 x 25.4 x 15.2	16 1/4 x 10 x 12 41.3 x 25.4 x 30.5
Bath Volume *Liters*	20.5	22.0	41.5
Case Dimensions *(L x W x D)* *Inches* *Centimeters*	20 x 12 3/8 x 18 3/8 50.8 x 31.4 x 46.7	17 x 12 3/8 x 28 3/8 43.2 x 31.4 x 72.1	23 x 12 3/8 x 25 3/8 58.4 x 31.4 x 64.5
Power Requirements[3]	115 V, 60 Hz, 16 Amps 220/240 V, 50 Hz, 10 Amps	115 V, 60 Hz, 9 Amps 220/240 V, 50 Hz, 5.5 Amps	115 V, 60 Hz, 16 Amps 220/240 V, 50 Hz, 10 Amps

1. Low-end temperature with tap water cooling. The controller may be set to -30°C, however to achieve temperatures below the specified range requires accessory cooling. Contact Thermo Neslab for more details.
2. Stability is a function of the bath fluid temperature. The use of a work area cover and tap water cooling may optimize bath stability for your work. For some applications, agitation and stability above ambient temperatures may be may be improved by connecting a small length of hose between the PUMP INLET and PUMP OUTLET connections on the rear of the unit.
3. Power Board Transformer Fuse–Analog T 0.5A 250V (Qty 1), Digital T 0.8A 250V (Qty 2) [T=Time Delay]

Section III Installation

Site

Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.

Lift the unit by grasping it under the case, near the rubber feet.

Locate the unit on a sturdy table or bench top. Ambient temperatures should be inside the range of +50°F to +80°F (+10°C to +27°C).

Electrical Requirements

Line voltage may be easily accessible inside the pump/control box. Always unplug the unit prior to removing pump/control box cover.

Refer to the serial number label on the rear of the unit to identify the specific electrical requirements of your unit.

Ensure the voltage of the power source meets the specified voltage, ±10%.

The unit construction provides extra protection against the risk of electric shock by grounding appropriate metal parts. The extra protection may not function unless the power cord is connected to a properly grounded outlet. It is the user's responsibility to assure a proper ground connection is provided.

For 220 - 240 volt units supplied without a line cord, use a harmonized (HAR) grounded 3-conductor cord, type H 0 5 V V - F , with conductors listed below. A suitable cord end is required for connecting to the equipment (see unit socket) and must terminate with an IEC approved plug for proper connection to power supply.

NON-BOOST HEATER UNITS	**Nominal 1.0 mm² cross section rated 10 Amps**
	Unit Socket: IEC - 320 C13
BOOST HEATER UNITS	**Nominal 1.5 mm² cross section rated 16 Amps**
	Unit Socket: IEC - 320 C19

Plumbing Requirements

Ensure the unit is off before connecting tubing to the unit.

To prevent damage to the plumbing lines, always support the ¾" fittings while installing/removing the pumping caps and lines.

Hose Connections

The pump connections are located at the rear of the pump box and are labelled PUMP INLET and PUMP OUTLET. These connections are bent upward so the recirculating fluid will drain back into the reservoir when the hoses are disconnected. The connections are capped with stainless steel serrated plugs.

The pump lines have ¼" MPT for mating with standard plumbing fittings. For your convenience two stainless steel adapters, ¼" FPT to ⅜" O.D. serrated fitting, are provided. (To assure proper fit, they should be installed using 1½ turns of Teflon® tape around the threads.)

Flexible tubing, if used, should be of heavy wall or reinforced construction. Make sure all tubing connections are securely clamped. Avoid running tubing near radiators, hot water pipes, etc. If substantial lengths of tubing are necessary, insulation may be required to prevent loss of cooling capacity.

Tubing and insulation are available from Thermo NESLAB. Contact our Sales Department for more information (see Preface, After-sale Support).

It is important to keep the distance between the unit and the external system as short as possible, and to use the largest diameter tubing practical. Tubing should be straight and without bends. If diameter reductions must be made, make them at the inlet and outlet of the external system, not at the unit.

If substantial lengths of cooling lines are required, they should be pre-filled with bath fluid before connecting them to the unit. This will ensure that a adequate amount of fluid will be in the bath once it is in operation.

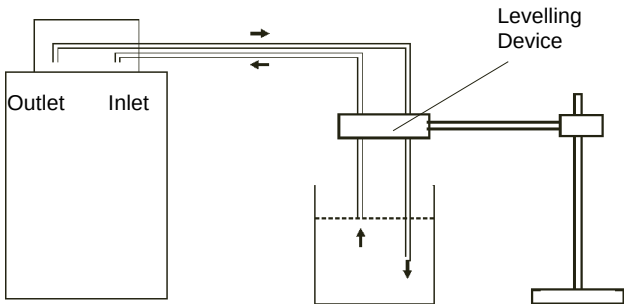
Pumping

The pump is designed to deliver a flow of 15 liters/minute (4 gallons per minute) at 0 feet head. To prevent external circulation, the PUMP INLET and PUMP OUTLET lines are capped. The caps must be removed when external circulation is required.

To properly secure the external hose connections to the unit, wrap teflon tape around the pipe line threads before installation. Once the hose connections are made, the pump must be properly plumbed to an external system. *It is important the bath is not in operation until all plumbing is complete.*

If the bath is not used for external circulation, make sure the stainless steel caps are in place prior to operating the bath.

Circulating to an open container



Bath (Rear View) Open Container

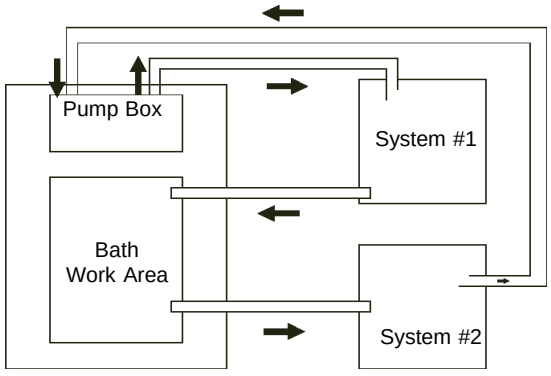
A stainless steel leveling device is available to aid circulation to an open vessel. Contact our Sales Department for more information (see Preface, After-sale Support).

Support the leveling device over the open container with a ringstand. Stagger the tubes in the leveling device so one tube is submerged in the vessel fluid, and the other tube is level with the fluid surface. Connect the deeper tube to the PUMP OUTLET and the shorter tube to the PUMP INLET.

Adjust the flow rate using the accessory flow control valve connected to the PUMP OUTLET, or by partially restricting the outlet tubing. When properly adjusted, the pump inlet will draw an occasional air bubble to prevent over flow, and the pump outlet will force fluid through the submerged tube to prevent aeration of the vessel.

To avoid siphoning the bath work area when the unit is shut off, lift the leveling device out of the vessel and above the level of the unit.

Circulating through two closed loops



Bath (Top View)

The pump can be used to circulate through two closed loop systems. Connect the shortest practical length of flexible tubing from the PUMP OUTLET to the inlet of external system #1. Connect the outlet of system #1 directly into the bath work area. Connect tubing from the bath work area to the inlet of system #2. Connect the outlet of system #2 to the PUMP INLET.

Drain

Ensure the temperature of the bath fluid is safe before draining the unit.

The unit is equipped with a drain located at the back of the unit at the base of the bath. The drain has ¼ inch male pipe threads and is capped with a stainless steel plug. To drain the reservoir simply remove the cap.

To assure proper fit when replacing the cap, be sure to line the threads with Teflon tape.

Fluids

Never use flammable or corrosive fluids with this unit.

Tap water is the recommended fluid for operation to +80°C.

Above +80°C, the user is responsible for fluids used.

Never use pure ethylene glycol as a bath fluid. A minimum 80/20 mixture of Ethylene Glycol and tap water is allowed.

Filling Requirements

The bath work area has a high and low level marker to guide filling. The markers are 1 inch horizontal slits located in the center of the stainless steel baffle separating the work area and the pump assembly. The correct fluid level falls between these two markers. The heating coils will be exposed and may become damaged if the correct fluid level is not provided.

When pumping to an external system, keep extra fluid on hand to maintain the proper level in both the circulating lines and external system.

Never run the unit when the work area is empty. Avoid overfilling. Overfilling the bath may damage the insulation and affects stability.

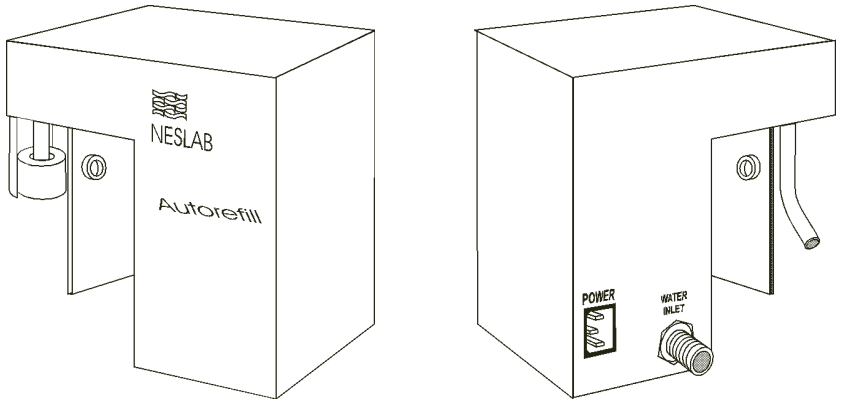
Autorefill (Optional)

An optional autorefill device is designed to maintain the correct level of fluid in the reservoir. The device consists of a float switch and a solenoid valve. If the fluid level falls, the float switch will open the solenoid valve and allow makeup fluid to fill the reservoir. Once the fluid reaches the proper level, the float switch will rise and the solenoid valve will close.

The plumbing connection for the autorefill device, labeled WATER INLET, is located on the rear of the autorefill assembly. The connection is 3/8 inch OD stainless steel. Remove the nut and install the tubing from your makeup fluid source. Reinstall the nut and tubing on to the connection.

Tubing is available from Thermo NESLAB. Contact our Sales Department for more information (see Preface, After-sale Support).

The autorefill device requires its own source of electrical power. The connector for the line cord (provided with the assembly) is also located on the rear of the autorefill device. The connector is labelled POWER.



Autorefill Device

Section IV Controllers

Controllers

Two standard temperature controllers are available with the unit: Analog and Digital. This section explains the installation and operation of the controllers.

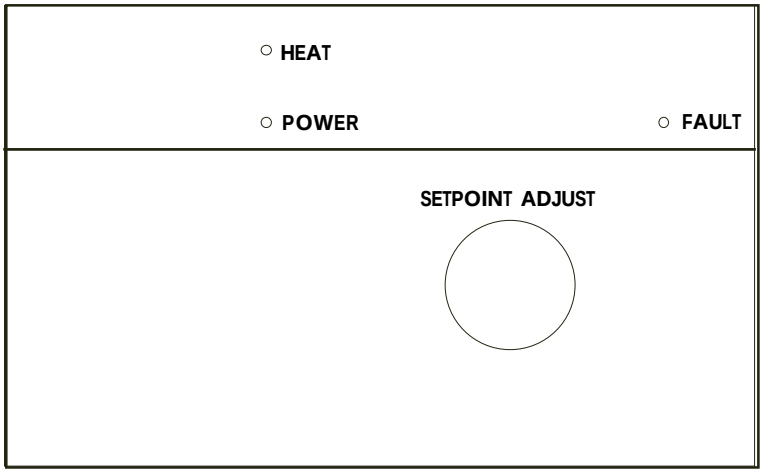
Analog

Start Up

Before starting the unit, check all electrical and plumbing connections and make sure the work area has been properly filled with bath fluid.

To start 115V units press the I/O switch on the side of the controller to the **I** (power on) position. The pump will start and the POWER LED will light.

220V units have a circuit breaker instead of a switch. The circuit breaker is labeled **I** (power on) and **O** (power off). Ensure the circuit breaker is in the **I** position.



Analog Controller

The HEAT LED indicates the status of the heater. As the temperature of the fluid in the bath approaches the temperature setpoint, the lamp will cycle on and off to indicate the approximate duty cycle of the heater.

Temperature Adjustment

Units with Analog temperature controller are equipped with a glass tube thermometer. Insert the thermometer in the grommet located on the left side of the work area.

To adjust the bath temperature, turn the dial to the desired setpoint. Use the bath thermometer to make fine adjustments to the bath temperature.

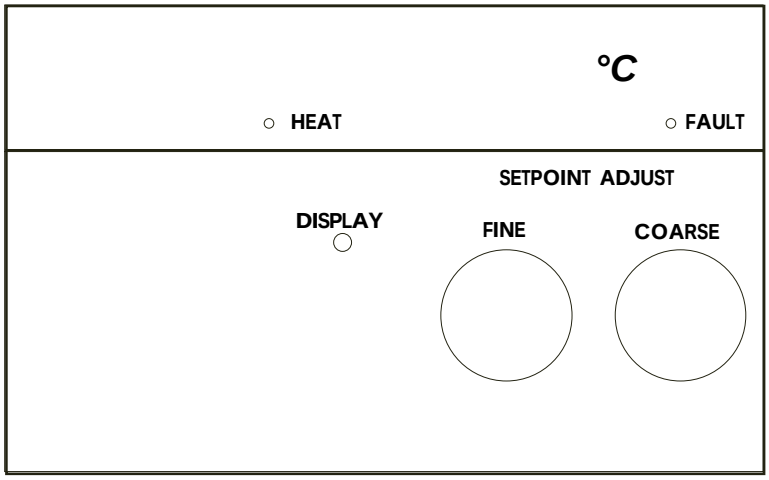
Digital

Start Up

Before starting the unit, check all electrical and plumbing connections and make sure the work area has been properly filled with bath fluid.

To start 115V units press the I/O switch on the side of the controller to the **I** (power on) position. The pump will start and the POWER LED will light.

220V units have a circuit breaker instead of a switch. The circuit breaker is labeled **I** (power on) and **O** (power off). Ensure the circuit breaker is in the **I** position.



Digital Controller

The HEAT LED indicates the status of the heater. As the temperature of the fluid in the bath approaches the temperature setpoint, the lamp will cycle on and off to indicate the approximate duty cycle of the heater.

Temperature Adjustment

To display the temperature setpoint, press the DISPLAY switch. To adjust the setpoint, press and hold the DISPLAY switch and turn the COARSE and FINE dials until the temperature setpoint is indicated on the LED display.

NOTE: Inadvertent movement of the COARSE and FINE dials, regardless of the position of the DISPLAY switch, will result in a change of the setpoint. The change will not be immediately reflected on the LED display unless the DISPLAY switch is pressed. The display will eventually change as the unit responds to the new setpoint.

Tap Water Cooling Coils

The unit is equipped with a cooling coil located behind the stainless steel baffle in the bath. The bath can be cooled and temperature stability improved by circulating cold fluid through the coil. For best results, the fluid should be at least 5°C below the temperature setpoint. The required fluid flow rate depends on the type of fluid, the setpoint, and the desired stability.

The plumbing connections for the cooling coil are $^{3}/_{8}$ inch OD stainless steel tubes located on the rear of the unit. These connections will accept $^{3}/_{8}$ inch or $^{5}/_{16}$ inch ID tubing. Tubing is available from Thermo NESLAB.

Connect the COOLING COIL IN tube to the cold fluid source. Connect the COOLING COIL OUT tube to the cold fluid return (or drain if tap water is being used).

Boost Heater

EX-221 and EX-511 units are equipped with a boost heater. The boost heater is designed to provide additional heat to the unit.

To start the heater press the BOOST HEAT switch, located on the front of the temperature controller, to the ON position. Even though the switch automatically returns to the OFF position, the boost heater will start to function. (You can verify this by observing the fluid temperature rising.) The boost heater automatically ceases operation when the setpoint is reached.

High Temperature/ Low Liquid Level Safety

To protect your application, the adjustable High Temperature/Low Liquid Level Safety (HIGH TEMP/LOW LEVEL) ensures the heater will not exceed temperatures which can cause serious damage to your unit. A single temperature sensor, located on the heater coils in the bath, monitors both conditions. A High Temperature/Low Liquid Level fault occurs when the temperature of the sensor exceeds the set temperature limit.

In the event of a fault, the unit will shut down. The cause of the fault must be identified and corrected before the unit can be restarted.

The safety on single heater systems is not preset and must be adjusted during initial installation.

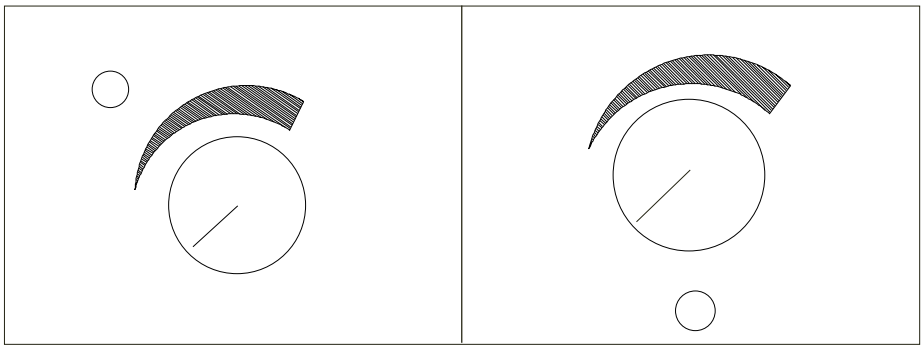
Units with a boost heater have an additional nonadjustable safety located behind the main safety. It has a red reset button but no adjustment knob.

To set the safety, locate the HIGH TEMP/LOW LEVEL SAFETY adjustment dial on the right side of the pump box. Turn the dial fully clockwise and press the red RESET switch. The RESET switch is located next to the adjustment dial. NOTE: For units without a reset switch turn the I/O switch off then back on.

Start the unit. Adjust the setpoint for a few degrees higher than the highest desired fluid temperature and allow the bath to stabilize at the temperature setpoint. Turn the HIGH TEMP/LOW LEVEL SAFETY dial counterclockwise until you hear a click and the unit shuts down. The red FAULT LED on the temperature controller will light to indicate a fault has occurred.

Cool the bath and then, without moving the adjustment dial, press the red RESET switch or turn the I/O switch off then back on.

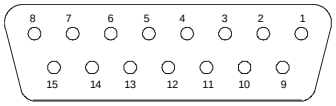
NOTE: For units with a reset switch, the minimum high temperature safety setting is 50°C. For units without a reset switch the safety has a temperature range of 0°C to 180°C.



High Temperature/Low Liquid Level Safety (Typical)
(Some units do not have a reset switch.)

15-Pin Accessory Connector (Optional)

Digital units are equipped with a 15 pin D-subminiature female receptacle on the right side of the power box. An ENABLE/DISABLE switch is located just below the receptacle. Place the switch to the ENABLE position to control the bath via the receptacle connection. (The sensor temperature and setpoint, pin 7 and 8, can be read with the switch in either position.) The pin-out information is listed below.



15 pin D-subminiature female receptacle

Pin #	Function
1	Chassis ground.
2	No connection.
3	Span +. Indicates the maximum setpoint value the unit can be set to operate. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +350mV = +35.0°C).
4	Span -. Indicates the minimum setpoint value the unit can be set to operate. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +50mV = +5.0°C).
5	No connection.
6	Analog ground. The analog ground is physically separated from the power ground throughout the unit. To prevent offsets that result from ground currents, the analog and power grounds are only connected at the unit's power supply. Analog ground should only be used as a reference pin.
7	Sensor temperature (current limited through 2.7K OHM resistor). The fluid temperature, as measured by the controller's sensor located in the reservoir, can be read at this pin. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +150mV = +15.0°C).
8	Setpoint out. The present temperature setpoint can be read at this pin. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +150mV = +15.0°C).
9	Power Ground.
10	No connection.
11	No connection.
12	Digital display (input only). An external voltage can be displayed on the operator panel digital display by applying the voltage to this pin. The display has a low input resistance and a full scale rating of ±1.99VDC. Input is referenced to analog ground, pin 6. The maximum voltage applied to the display should be limited to ±2VDC.
13	- 5V. Power supply of -5VDC (15mA maximum).
14	+5V. Power supply of +5VDC (50mA maximum).
15	Setpoint in. The temperature setpoint can be controlled by applying a known voltage to this pin. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +230mV = +23.0°C).

NOTE: With the switch in the ENABLE position and no input to pin 15, the bath will slowly go to the setpoint value set on the digital controller.

Section V Maintenance

To avoid electrical shock, disconnect the mains cord prior to removing any access panels or covers.

Service Contracts

Thermo NESLAB offers on-site Service Contracts that are designed to provide extended life and minimal down-time for your unit. For more information, contact our Service Department (see Preface, After-sale Support).

Reservoir Cleaning

Routine cleaning can be achieved by simply sponging down the seamless stainless steel tank with tap water. (Dish washing detergent may be used but the tank must be thoroughly rinsed.)

To gain access to the entire reservoir the pump box and reservoir cover should be removed.

Remove the line cord from the rear of the unit.

Remove the four screws securing the reservoir's cover.

Carefully raise the controller and cover assembly to remove it from unit.

Place the cover on its side.

Algae

To restrict the growth of algae in the bath, we recommend the bath cover be kept in place and that all circulation lines be opaque. This will eliminate the entrance of light required for the growth of most common algae.

Thermo NESLAB also recommends the use of Chloramine-T, 1 gram per 3.8 liters.

Section VI Troubleshooting

Checklist

Unit will not start

Make sure the voltage of the power source meets the specified voltage, ±10%. Refer to the serial number label on the rear of the unit to identify the specific electrical requirements of your unit.

Check the High Temperature/Low Liquid Level Safety. If the FAULT light is on, make sure the fluid level in the bath is between the marks in the baffle and the HIGH TEMP/LOW LEVEL SAFETY setting is greater than the fluid temperature. Push the RESET switch(es) or, for units without a reset switch, turn the I/O switch off then back on and attempt to restart.

No external circulation

Make sure the stainless steel plugs on the PUMP INLET and PUMP OUTLET have been removed.

Check for obstructions, kinks, or leaks in the circulation tubing.

Circulation will cease when the pump head has been exceeded.

Service Assistance and Technical Support

If, after following these troubleshooting steps, your unit fails to operate properly, contact our Customer Service Department for assistance (see Preface, After-sale Support). Before calling, please obtain the following information:

Part number
Serial number
Voltage of unit
Voltage of power source

Our Service Department can provide you with a wiring diagram and a complete list of spare parts for your unit. Before calling, please obtain the following information:

Part number
Serial number

Section VII Programming Software

NEScom Software

The Thermo NESLAB Communications Software is a user friendly software that allows you to automate your temperature control process. The software includes a 3½" disk, Comprehensive Operator's Manual and a toll-free number to a trained technical staff.

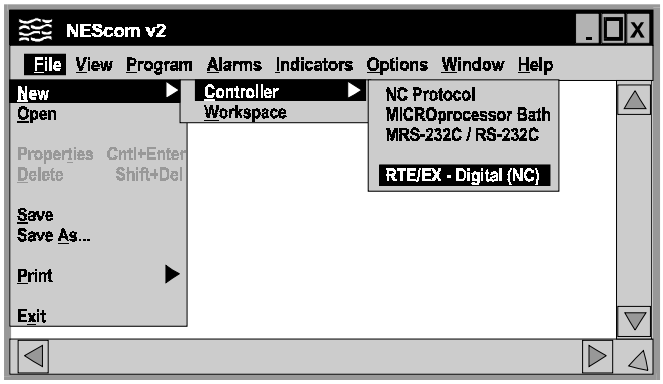
NEScom Software allows you to write custom temperature programs for our Digital or Microprocessor based temperature control apparatus. Choose upper or lower temperature limits and monitor system status with an alarm. NEScom can also record your results on a user selectable graph. NesCom must be used with an IBM or 100% compatible computer.

Select from easy to use product icons.

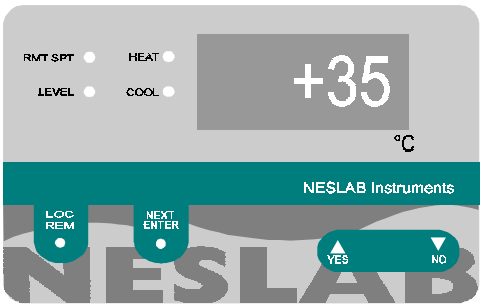
Create graphs and charts.

Easily configure ramping functions which set the setpoint over time.

View pop-up alarm windows which display if an alarm condition occurred.



Select software functions from the easy to use pulldown menus.



View a virtual controller screen which allows remote monitoring and operation of product control panel.

Appendix

International Quick Reference Guides

EX - Serie Kurzbedienungsanleitung

Installation
Stellen Sie das Gerät auf einen stabilen Tisch oder Labortisch. Die Umgebungstemperatur sollte zwischen +10 °C und +27 °C liegen.

Vergewissern Sie sich, daß die Spannung Ihrer Stromanschlüsse mit der für das Gerät vorgesehenen Spannung übereinstimmt (± 10%).

Die Schlauchanschlüsse (1/4 Zoll MPT) des Gerätes befinden sich an der Rückseite und sind mit PUMP INLET und PUMP OUTLET bezeichnet. Entfernen Sie die Kappen, falls externe Zirkulation gewünscht wird. Schließen Sie den PUMP OUTLET-Anschluß an den Eingang Ihres Instruments und den PUMP INLET-Anschluß an den Ausgang Ihres Instruments an.

Füllen Sie das Reservoir bis zu einem Stand, der zwischen den horizontalen Markierungen liegt, die auf dem Blech markiert sind, das den Arbeitsbereich von der Pumpeneinheit trennt.

Verwenden Sie niemals entflammbare oder Korrosion verursachende Flüssigkeiten. Für den Betrieb im Arbeits-Temperaturbereich bis +80°C empfiehlt Thermo NESLAB Leitungswasser. Oberhalb +80 °C ist der Anwender selbst für die verwendeten Flüssigkeiten verantwortlich. Über +115 °C dürfen Sie niemals pures Ethylenglykol als Badflüssigkeit verwenden.

Wenn sie zu einem externen System zirkulieren, sollten Sie zusätzliche Kühlflüssigkeit zur Hand haben, um den Kühlflüssigkeitsstand in den Zirkulationsleitungen und dem externen System beibehalten zu können.

Betreiben Sie das Gerät niemals mit leerem Arbeitsbereich!

Inbetriebnahme
Vor Inbetriebnahme des Gerätes vergewissern Sie sich bitte, daß die elektrischen Anschlüsse und die Rohr- u. Schlauchanschlüsse sachgemäß installiert sind und daß das gesamte System mit Kühlflüssigkeit gefüllt ist.

Geräte, die bei 220 Volt betrieben werden, verfügen über einen Stromkreisunterbrecher auf der Rückseite des Gerätes. Vergewissern Sie sich, daß dieser auf ON gestellt ist. Um das Gerät einzuschalten, müssen Sie den I/O-Schalter auf „I“ stellen. Die Power-Lampe leuchtet auf, wenn das Gerät in Betrieb ist. Um das Gerät abzuschalten, muß der I/O-Schalter auf „O“ gestellt werden.

Die HEAT-LED-Anzeige zeigt den Status des Heizelements an. Sie leuchtet auf, wenn das Heizelement arbeitet. Wenn die Arbeitstemperatur den gewünschten Setpoint erreicht, blinkt die LED-Anzeige, um den ungefähren Arbeitsrhythmus des Heizelements anzuzeigen.

Einstellung der Analog-Temperatursteuerung
Um die Temperatur einzustellen (setpoint), drehen Sie den SETPOINT ADJUST-Schalter an der Vorderseite des Gerätes auf die gewünschte Temperatur.

Einstellung der Digital-Temperatursteuerung
Um sich den Temperatur-Setpoint anzeigen zu lassen, drücken Sie den DISPLAY-Schalter und halten Sie ihn gedrückt. Um den Temperatur-Setpoint einzustellen, drücken Sie den Display-Schalter, halten diesen, und drehen gleichzeitig den SETPOINT ADJUST-Schalter so lange, bis die gewünschte Temperatur in der Digitalanzeige angezeigt wird. Wenn die Temperatur eingestellt ist, lassen Sie den Display-Schalter los. Die Digitalanzeige zeigt dann die Temperatur der Kühlflüssigkeit im Reservoir an.

Wartung
Überprüfen Sie das Reservoir regelmäßig. Sollte eine Säuberung notwendig sein, spülen Sie das Reservoir mit einer speziellen Reinigungsflüssigkeit, die mit dem Umlaufsystem und der Zirkulationsflüssigkeit kompatibel ist.

Für umfassende Informationen einschließlich Fehlerbeseitigungsmöglichkeiten schlagen Sie bitte in der Betriebsanleitung nach oder wenden Sie sich an unsere Service-Abteilung: 069/50 91 90 32.

EX Serie Kvik Referance

Installation:
Operationstemperatur ved 100% udnyttelse er fra stuetemperatur til+75^0 C under forudsætning af, at netspændingen er den nominelle 240V +/- 10%.

Tilslutning af slanger er på bagsiden mærket „PUMP INLET“ (ind) and „PUMP OUTLET“ (ud). Tilslutningerne er $^1/_4$" MPT-gevind.

Fyld resovoiret til mærket placeret på bafflen mellem arbejdsområdet og pumpeenheden.

Anvend aldrig brandbare væsker, rent ionbyttet eller dobbeltdestilleret vand kan anvendes op til +80^0 C, over denne temperatur anbefales specialvæsker.

Sørg altid for at den rette mængde væske er til stede i termostatkarret, og husk at kompensere for den væske, der medgår til ekstern cirkulation.

Betjening:
Før opstart checkes elektriske forbindelser, slangeforbindelser og kølevæske stand.
Check hovedkontakten på bagsiden af badet, og sørg for at den er tændt. Når badet skal startes trykkes I/O kontakten på siden i I position, og strømindikatoren tænder. Skal
badet slukkes, trykkes I/O kontakten i O stilling, og indikatoren slukker.

Dioden på frontpanelet angiver status på badet, der lyser ved opvarmning og
slukker, når den indstillede temperatur er nået.

Analog temperatur kontrol:
Drej ^{0}C tasten til den ønskede temperatur og lad systemet stabiliserer sig.

Digital temperatur kontrol:
Tryk på „DISPLAY“ tasten for at se den indstillede temperatur. Indstilling af ny temperatur, tryk på „DISPLAY“ og drej på „ADJUST“ indtil den rigtige temperatur vises, slip derefter „DISPLAY“ tasten. Skærmen vil nu vise den aktuelle temperatur i badet.

Periodisk vedligeholdelse:
Check standen af kølevæske periodisk. Før skift af væske indstilles temperaturen på „de-ice“. Check med mellemrum vakuummet på pumpesiden, rens systemet og check for aflejringer, vækst, utætheder og evt. filtre. Husk åben aldrig instrumentet uden strømmen er afbrudt, og strømkablet er taget ud!

EX Series, Handleiding voor snelle installatieprocedures

Installatie
Plaats het apparaat op een tafel of werkbank. Omgevingstemperaturen moeten liggen tussen de +10°C en +27°C.

Let erop dat de netspanning gelijk is aan het aangegeven voltage, +/- 10%.

De slangaansluitingen zijn bevestigd aan de achterkant van het apparaat en zijn voorzien van de labels PUMP INLET en PUMP OUTLET. Deze aansluitingen zijn 1/4 inch MPT. Verwijder de pluggen indien externe circulatie gewenst is. Bevestig de PUMP OUTLET aan de ingang van uw applicatie. Bevestig de PUMP INLET aan de uitgang van uw applicatie.

Vul nu het reservoir tot het niveau tussen de horizontale strepen op de roestvrij stalen scheidingsplaat, die de werkruimte van het pompgedeelte scheidt.

Gebruik nooit brandbare of andere koelvloeistoffen, die het toestel kunnen aantasten. Kraanwater wordt in het algemeen aanbevolen wanneer u bij temperaturen werkt van +8°C tot +80°C. Boven de + 80C. zal de gebruiker verantwoordelijk zijn voor de benodigde vloeistoffen. Indien men boven de 115°C. werkt, gelieve nooit puur ethylene glycol als badvloeistof te gebruiken.

Wanneer u wilt pompen naar een extern systeem, dient u altijd extra vloeistof achter de hand te houden om met juiste vloeistofniveau's zowel in het interne als het externe gedeelte van het systeem, te handhaven.

Gebruik het apparaat nooit wanneer het reservoir leeg is.

Operationeel gebruik
Alvorens het apparaat in gebruik te nemen, dient u eerst alle elektrische- en slangaansluitingen te controleren. Tevens dient u te controleren of het systeem gevuld is met vloeistof.

220 Volt apparaten hebben een z.g. "circuit breaker" aan de achterkant van het apparaat. Controleer of deze in werking is gesteld. Om het apparaat te starten, gelieve de I/O knop aan de zijkant van het apparaat te draaien naar de I positie. Het lampje zal oplichten als indicatie dat het systeem in werking is gesteld. Om het apparaat uit te zetten, gelieve de I/O knop naar de O positie te draaien.

Het "HEAT LED" duidt de actuele status van het verwarmings-element aan. Het zal oplichten indien het verwarmingselement in werking is gesteld. Als de ingestelde temperatuur de set-point heeft bereikt, zal de LED aan en uit gaan om het proces van de heater aan te duiden.

Analog Controller Temperature Adjustment
Om de temperatuur set-point aan te passen, draai de SETPOINT ADJUST knop aan de voorkant van het apparaat naar de gewenste temperatuur.

Digital Controller Temperature Adjustment
Om de temperatuur set-point af te kunnen lezen, houdt u de DISPLAY knop ingedrukt. Om de temperatuur set-point aan te passen, houdt u de DISPLAY knop ingedrukt en draait u de set-point set point knop, totdat de gewenste temperatuur set-point af te lezen is van de display. Als de set-point is aangepast, kunt u de DISPLAY knop weer loslaten. De display zal nu de temperatuur weergeven van de vloeistof in het reservoir.

Periodiek Onderhoud
Het reservoir dient regelmatig gecontroleerd te worden. Indien reiniging noodzakelijk is, zal het reservoir schoongespoeld moeten worden met een vloeistof, welke verenigbaar is met het systeem en de koelvloeistof.

Indien u meer informatie wenst, inclusief procedures in geval van problemen, kunt u de handleiding raadplegen of contact opnemen met de Thermo NESLAB service-afdeling: (+31) - 40 - 300066.

Kortfattad Bruksanvisning för EX Serie

Installation
Ställ maskinen på ett stadigt bord eller en bänk. Temperaturen i rummet bör vara mellan +50°F (10°C) och +80°F (27°C).

Försäkra att spänningen är den samma som den som är given i instruktionerna ± 10%.

Röranslutning finns på baksidan av maskinen och har följande beskrivning: SUPPLY och RETURN. Anslutningarna är 1/4 inch MPT. Ta bort de skyddande plast bitarna från röranslutningarna. Anslut SUPPLY kopplingen till intaget av din anordning och RETURN kopplingen till uttaget.

Lösgör skruvarna och ta bort luckan för att fylla tanken. Ta bort tank locket och fyll tanken med ren kylnings vätska.

Använd aldrig eldfarliga eller frätande vätskor. Kran vatten rekommenderas upp till +80°C. Över +80°C är användaren ansvarig för vilken vätska som används. Använd aldrig ren etylen glykol som vätska över 115°C.

Ha extra vätska redo om din anordning kräver det så att den rätta nivån behålls i cirkulations sytemet.

Användning
Kontrollera alla elektriska och alla rör anslutningar innan maskinen startas. Se till att cirkulations systemen har fyllts med vätska.

220V maskiner har en ström brytare på baksidan av maskinen. För att starta maskinen, sätt I/O knappen på sidan av maskinen på I. Lampan lyser för att visa att maskinen är på. Sätt knappen på O för att stänga av den.

Analog Kontroll, Temperatur Ändring

För att ändra den önskade förbestämda temperaturen, vrid °C knappen på framsidan av maskinen tills den önskade temperaturen är nådd.

Digital Kontroll, Temperatur Ändring
Håll Display knappen intryckt för att visa den önskade temperaturen. Håll Display knappen intryckt och vrid Adjust knappen för att ändra den önskade temperaturen. Släpp Display knappen efter att den önskade temperaturen visas på kontroll panelen. Temperaturen på vätskan i tanken visas nu på kontroll panelen.

Periodiskt Underhåll
Inspektera vätskan i tanken periodvis. Om det är nödvändigt med rengöring, spola tanken med en vätska som är förenlig med cirkulations sytemet och med kylvätskan.

NOTICE D'UTILISATION

BAINS EX

INSTALLATION
Placer l'appareil sur une table ou une paillasse suffisamment robuste. La température de la pièce doit être comprise entre 10 et 25°C.

S'assurer que l'alimentation électrique soit celle requise à ±10%.

Les connections sont situées à l'arrière de l'appareil et sont étiquetées " PUMP INLET " et " PUMP OUTLET ". Ces connections sont en inox d'un diamètre 3/8eme de pouce. Retirer les embouts en inox si vous souhaitez recirculer. Enficher le connecteur " PUMP OUTLET " à l'entrée de votre équipement et le connecteur " PUMP INLET " à la sortie.

Remplir le réservoir à un niveau compris entre les deux graduations " maxi " et " mini ".

Ne pas utiliser de liquide inflammable, corrosif, ou dont la viscosité serait inférieure à 50 centistokes aux températures les plus basses. Pour un fonctionnement jusqu'à 80°C, l'eau du robinet est la plus indiquée. En phase d'amorçage (au début de la recirculation), rajouter rapidement du liquide. Ne jamais l'utiliser sans liquide ou en dessous du niveau minimum.

Ces bains sont équipés d'un robinet de vidange situé à l'arrière.

MISE EN ROUTE
Vérifier les connections électriques, les tuyaux d'eau ainsi que le niveau de remplissage.

Les modèles en 220V ont un interrupteur général à l'arrière. Vérifier qu'il est sur " on ", placer l'interrupteur sur la position 1. La pompe, ainsi que le système de réfrigération se mettent en route. Le controleur de température numérique indique la température dans le bain. Pour éteindre, mettre l'interrupteur sur la position 0.

Le témoin lumineux " heat " indique que le bain fonctionne en mode " chauffage ". Quand la température approche de celle souhaitée, la diode s'éteint et s'allume.

REGLAGE DU CONTROLEUR DE TEMPERATURE ANALOGIQUE
Tourner le potentiomètre situé à l'avant jusqu'à ce que la température désirée coïncide avec la graduation.

REGLAGE DU CONTROLEUR DE TEMPERATURE NUMERIQUE
Pour afficher la température souhaitée, maintenir appuyé l'interrupteur et tourner le bouton de réglage jusqu'à ce que la température souhaitée soit affichée. Relâcher ensuite l'interrupteur. L'affichage indique alors la température du fluide dans le réservoir.

MAINTENANCE PREVENTIVE
Vérifier régulièrement le fluide dans le réservoir,

Changer de temps à autre le liquide utilisé,

En cas de nettoyage, rincer avec un produit de lavage compatible,

PROCEDIMIENTOS DE OPERACION DE REFERENCIA RAPIDA

PARA LA SERIE EX

INSTALACION

Sitúe la unidad sobre una mesa resistente o sobre un banco de trabajo. Las temperaturas ambientes deben estar dentro del rango de + 50 ºF a + 80 ºF.

Asegúrese de que el voltaje de la fuente de energía sea igual que el voltaje especificado, +/- 10%.

Las conexiones de tuberías están situadas en la parte trasera de la unidad y están marcadas como PUMP INLET y PUMP OUTLET. Estas conexiones son 1/4" MPT. Saque las tapas cuando requiera circulación externa. Conecte el adaptador PUMP OUTLET a la entrada de su aplicación. Conecte el adaptador PUMP INLET a la salida de su aplicación.

Llene el reservorio a un nivel entre los marcadores horizontales situados en la puerta de acero inoxidable que separa la zona de trabajo de la bomba.

No utilice nunca fluidos inflamables o corrosivos. Se recomienda utilizar agua corriente para operar a +80 ºC. Por encima de +80 ºC, el usuario es responsable de los fluidos que utilice. Por encima de 115 ºC no utilice nunca etileno glicol puro como fluido de baño.

Cuando bombee a un sistema externo, tenga fluido extra a mano para mantener el nivel apropiado tanto en las lineas circulantes como en el sistema externo.

Nunca haga funcionar el instrumento con el área de trabajo vacía.

OPERACION

Antes de poner en marcha la unidad, compruebe todas las conexiones eléctricas y de tuberías. Asegúrese de que el sistema circulador se ha llenado con fluido.

Las unidades de 220 V. tienen un cortador de circuito en la parte trasera de la unidad. Asegúrese de que está en posición ON. Para poner en marcha la unidad, ponga el interruptor I/O situado en el lateral de la unidad en posición I. La lámpara Power se iluminará para indicar que el sistema está funcionando. Para apagarlo, ponga el interruptor de encendido en posición O.

El LED HEAT indica la situación del sistema del calentador. Se ilumina para indicar que el calentador está funcionando. A medida que la temperatura de funcionamiento se aproxima al punto fijado, el LED ciclará para indicar el ciclo de trabajo del calentador.

AJUSTE DE LA TEMPERATURA CON EL CONTROLADOR ANALOGICO

Para fijar el punto de ajuste de la temperatura, gire el dial SETPOINT ADJUST situado en el frontal de la unidad hasta la temperatura deseada.

AJUSTE DE LA TEMPERATURA CON EL CONTROLADOR DIGITAL

Para que el punto de ajuste de temperatura aparezca en pantalla, mantenga presionado el interruptor DISPLAY. Para fijar el punto de ajuste de temperatura, mantenga presionado el interruptor DISPLAY y gire los botones SETPOINT ADJUST hasta que la pantalla digital indique el punto de ajuste de temperatura deseado. Una vez fijado el punto de ajuste, suelte el interruptor DISPLAY. La pantalla indicará la temperatura del fluido en el reservorio.

MANTENIMIENTO PERIODICO

Inspeccione periódicamente el fluido del reservorio. Si es necesaria una limpieza, rocíe el reservorio con un fluido de limpieza compatible con el sistema de circulación y el fluido recirculante.

Para una información completa, incluyendo solución de problemas, refiérase al manual de instrucciones o contacte con el Departamento de Servicio al Cliente en el teléfono 1-800-258-0830.

WARRANTY

Thermo NESLAB Instruments, Inc. warrants for 12 months from date of shipment any Thermo NESLAB unit according to the following terms.

Any part of the unit manufactured or supplied by Thermo NESLAB and found in the reasonable judgment of Thermo NESLAB to be defective in material or workmanship will be repaired at an authorized Thermo NESLAB Repair Depot without charge for parts or labor. The unit, including any defective part must be returned to an authorized Thermo NESLAB Repair Depot within the warranty period. The expense of returning the unit to the authorized Thermo NESLAB Repair Depot for warranty service will be paid for by the buyer. Thermo NESLAB's responsibility in respect to warranty claims is limited to performing the required repairs or replacements, and no claim of breach of warranty shall be cause for cancellation or recision of the contract of sales of any unit.With respect to units that qualify for field service repairs, Thermo NESLAB's responsibility is limited to the component parts necessary for the repair and the labor that is required on site to perform the repair. Any travel labor or mileage charges are the financial responsibility of the buyer.

The buyer shall be responsible for any evaluation or warranty service call (including labor charges) if no defects are found with the Thermo NESLAB product.

This warranty does not cover any unit that has been subject to misuse, neglect, or accident. This warranty does not apply to any damage to the unit that is the result of improper installation or maintenance, or to any unit that has been operated or maintained in any way contrary to the operating or maintenance instructions specified in Thermo NESLAB's Instruction and Operation Manual. This warranty does not cover any unit that has been altered or modified so as to change its intended use.

In addition, this warranty does not extend to repairs made by the use of parts, accessories, or fluids which are either incompatible with the unit or adversely affect its operation, performance, or durability.

Thermo NESLAB reserves the right to change or improve the design of any unit without assuming any obligation to modify any unit previously manufactured.

THE FOREGOING EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Thermo NESLAB'S OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE COMPONENT PARTS AND Thermo NESLAB DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION.

Thermo NESLAB ASSUMES NO RESPONSIBILITY FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO LOSS OR DAMAGE TO PROPERTY, LOSS OF PROFITS OR REVENUE, LOSS OF THE UNIT, LOSS OF TIME, OR INCONVENIENCE.

This warranty applies to units sold in the United States. Any units sold elsewhere are warranted by the affiliated marketing company of Thermo NESLAB Instruments, Inc. This warranty and all matters arising pursuant to it shall be governed by the law of the State of New Hampshire, United States. All legal actions brought in relation hereto shall be filed in the appropriate state or federal courts in New Hampshire, unless waived by Thermo NESLAB.