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CC-65/CC-100
CFC-Free
Immersion Coolers

Thermo NESLAB Manual P/N 002782
Rev. 04/05/99

Instruction and Operation Manual

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CryoCool Series Immersion Coolers
Instruction and Operation Manual

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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 Thermo 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 or the information in this manual, contact our Sales Department. If your unit fails to operate properly or if you have questions concerning spare parts or Service Contracts, contact our Service Department.

Before calling, *please* refer to the serial number label on the rear of the case top to obtain the following information:

- BOM number _____

- Serial number _____

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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 (see After-sale Support).

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.

Transport the unit with care. Sudden jolts or drops can damage the refrigeration lines.

Observe all warning labels.

Never remove warning labels.

Never operate damaged equipment.

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.

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, or personal injury or death.

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Section II General Information

Description

The CryoCool Series of immersion coolers is designed as a refrigeration source for sub-ambient work in liquid baths.

CryoCools employ mechanical refrigeration systems constructed with full-hermetic refrigeration compressors. The CC-65 employs a single stage refrigeration system with one compressor. The CC-100 has a dual stage refrigeration system using two compressors in cascade configuration. An insulated coaxial hose assembly carries refrigerant to the cooling probe.

Specifications

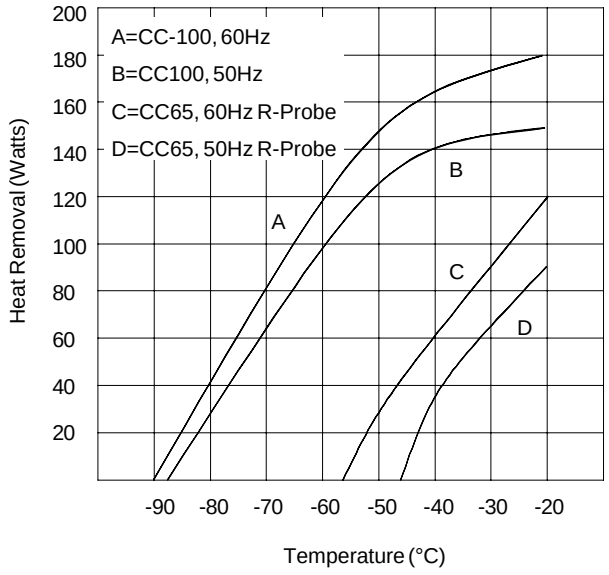
	CC-65	CC-100
Temperature Range[1]	-20°C to -55℃	-25°C to -90°C
Temperature Stability	±0.5℃	±0.5°C
Evaporator Head Dimensions[2] (Length x Diameter)		
F-head		
Inches	N/A	18 x 5/8
Centimeters	N/A	45.7 x 1.6
FV-head		
Inches	25 x 1/2	25 x 1/2
Centimeters	63.5 x 1.3	63.5 x 1.3
R-head		
Inches	7 ¼ x 1 1/4	7 ¼ x 1 1/4
Centimeters	18.4 x 3.2	18.4 x 3.2
Minimum Bend Radius[3]		
F-head		
Inches	N/A	1 1/2
Centimeters	N/A	3.8
FV-head		
Inches	1	1
Centimeters	2.5	2.5
R-head		
Inches	N/A	N/A
Centimeters	N/A	N/A

1. Low end specifications listed for "no load" conditions.
2. See Section III, Cooling Probes for a description of the evaporator heads.
3. The minimum bend radius is the smallest radius that the cooling probe can be bent without suffering damage at room temperature. Never bend the probe when it is cold.

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	CC-65	CC-100
Evaporator Hose Dimensions (Length x Diameter) *Inches* *Centimeters*	44 x 1 1/4 111.8 x 3.2	65 x 1 ½ 165.1 x 3.8
Unit Dimensions (H x W x D) *Inches* *Centimeters*	15 1/4 x 7 1/2 x 10 1/4 38.7 x 19.1 x 26.0	20 1/2 x 14 1/2 x 17 3/4 52.1 x 36.8 x 45.1
Weight *Pounds* *Kilograms*	41.0 18.6	130.0 59.0

Cooling Capacity[4]



4. Specifications obtained in a 2 liter container at +20°C ambient with cooling fluid specific heat of 0.5.

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Section III Installation

Site

The unit should be located in a laboratory or clean industrial environment where ambient temperatures are inside the range of +55°F to +95°F (+13℃ to +35°C).



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

The unit has an air-cooled refrigeration system. On the CC-65 air is drawn through the top of the unit and discharged through the sides and bottom of the unit. On the CC-100 air is drawn through the front of the unit and discharged through the rear. The unit must be positioned so the intake and discharge are not impeded. A minimum clearance of 12 inches (30 centimeters) on all vented sides is necessary for adequate ventilation.

Inadequate ventilation will cause a reduction in cooling capacity and, in extreme cases, compressor failure.

Excessively dusty areas should be avoided and a periodic cleaning schedule should be instituted (see Section V, Cleaning).

The unit will retain its full rated capacity in ambient temperatures up to approximately +75°F (+24°C). Above +75°F, reduce the cooling capacity 1% for every 1°F above +75°F, up to a maximum ambient temperature of +95°F. In terms of Celsius, reduce the cooling capacity 1% for every 0.5°C above +24°C, up to a maximum ambient temperature of +35°C.

Electrical Requirements

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

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



Make sure an adequate ground connection is provided.

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Fluids

The selected fluid must have a viscosity of 50 centistokes or less at the lowest operating temperature.



Never use flammable or corrosive fluids with this unit.

Cooling Probes

Three cooling probes (or evaporator heads) are available with CryoCool units: F (flexible), FV (flexible, very), and R (rigid). Refer to Section II, Specifications to determine the specific cooling probe on your unit.

Place the cooling probe in the work area. For maximum cooling efficiency, the probe should be fully immersed in the fluid and should be located as close as possible to the agitator or stirrer motor (if so equipped).



Care should be taken not to stretch or bend the probe beyond it limits or exceed its minimum bend radius. Bend the probe only at room temperatures, never bend it when it is cold.

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Section IV Operation

Operation

Before starting the unit, double check all electrical connections and make sure the cooling probe is properly immersed in the work area.

All CryoCools are operated by a single power switch.

The CC-100 has three lights: one indicates the unit is operating, a second indicates the high stage compressor is operating, and a third indicates the low stage compressor is operating.

Once the unit is turned on, the refrigeration system will reduce the temperature of the cooling fluid in the work area to the lowest achievable temperature under the existing heat load conditions.

For best results, stirring or agitation in the work area is recommended. When not stirred, cooling capacities will be reduced and the work area will show temperature layering, with the coldest, most dense zone at the bottom.

When the unit is shut off, wait approximately five minutes before restarting. This allows time for the refrigeration pressures to equalize. If the pressures are not allowed to equalize, the compressor will short-cycle (clicking sound) and no cooling will occur.

Temperature Adjustment

If temperature control is desired, a Thermo NESLAB Cryotrol Temperature Controller is required. Refer to the Cryotrol Temperature Controller Instruction and Operation Manual for installation and operation instructions.



Never operate any CryoCool unit above -25°C.

Older Cryotrols are equipped with a round 8 pin connector. If you wish to connect your older Cryotrol unit to the CryoCool, an adapter cable is available from Thermo NESLAB. Contact our Service Department for more information (see Preface, After-Sale Support).

A Thermo NESLAB Exatrol Digital Temperature controller may also be used to control temperature. The Exatrol is designed for more precise temperature control and offers tighter temperature stability than the Cryotrol.

Refer to the Exatrol manual for additional information.

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Section V Maintenance

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).

Cleaning

For proper operation, the unit needs to pull substantial amounts of air through the condenser. A build up of dust or debris on the fins of the condenser will lead to a loss of cooling capacity.

Periodic vacuuming of the condenser fins is necessary. The frequency of cleaning depends on the operating environment. We recommend making a monthly visual inspection of the condenser after initial installation. After several months, the cleaning frequency will be established.

Cooling Fluid

The cooling fluid in the work area should be periodically replaced when operating at low temperatures. At low temperatures, the cooling fluid may collect water vapor from the air. As the concentration of water in the cooling fluid increases, performance is adversely affected.

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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 for the specific electrical requirements of your unit.

Loss of cooling capacity.

Make sure the heat load in the work area is not greater than the cooling capacity of the unit. Refer to Section II, Specifications to review the cooling capacity specifications.

Check for ice build up on the cooling probe. A layer of ice will act as insulation and reduce the cooling capacity. Ice build up is often an indication that the cooling fluid needs replacing. Defrost the cooling probe and change the cooling fluid.

When the unit is shut off, wait approximately five minutes before restarting. This allows time for the refrigeration pressures to equalize. If the pressures are not allowed to equalize, the compressor will short-cycle.

Service Assistance

If, after following these troubleshooting steps, your unit fails to operate properly, contact our 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

Technical Support

Our Service Department can provide you with a complete list of spare parts for your unit (see Preface, After-sale Support). Before calling, *please* obtain the following information:

Part number
Serial number

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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.

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