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# Operator's Manual

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## IP-80 and IP-100 Immersion Probe Coolers

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## Introduction

Your Immersion Probe Cooler can be used to achieve low-temperature capability with non-refrigerated circulating baths or boost the cooling capacity of refrigerated circulators. It is also excellent for trapping and Dewar-type applications, making it an economical alternative to dry ice or liquid nitrogen. A 6-ft. (1.83 m) flexible hose allows convenient placement of the cooling probe.








It will take you very little time to get your Immersion Probe Cooler installed and running. This operator's manual is designed to guide you quickly through the process. We recommend that you read it thoroughly before you begin.

	<b>NOTE:</b> The Immersion Probe Cooler operates at maximum cooling performance. Maximum temperature stability will be achieved in an agitated fluid and with a constant heat load. Allow ample time to reach the lowest achievable temperature.
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## General Information

### General Safety Information


When installed, operated, and maintained according to the directions in this manual and common safety procedures, your Immersion Probe Cooler should provide safe and reliable cooling. Please ensure that all individuals involved in the installation, operation, or maintenance of this unit read this manual thoroughly prior to working with the unit.


	This symbol marks chapters and sections of this instruction manual that are particularly relevant to safety. When attached to the unit, this symbol draws attention to the relevant section of the instruction manual.
	This symbol advises you of danger from electricity or electric shock.
	This symbol marks information that is particularly important.
	This symbol indicates alternating current.
	These symbols on the Power Switch / Circuit Breaker indicate that they place the main power supply ON / OFF.
	This symbol on the Power Key indicates that it places the unit in a standby mode. It DOES NOT fully disconnect the unit from the power supply.
	This symbol indicates a protective conductor terminal.

**Read all instructions pertaining to safety, set-up, and operation.  
Proper operation and maintenance is the user's responsibility.**

## Safety Recommendations


To prevent injury to personnel and/or damage to property, always follow your workplace's safety procedures when operating this equipment. You should also comply with the following safety recommendations:


	<p><b>WARNING:</b></p> <ul style="list-style-type: none"><li>• Always connect the power cord on this unit to a grounded (3-prong) power outlet. Make certain that the outlet is the same voltage and frequency as your unit.</li><li>• Never operate the unit with a damaged power cord.</li><li>• Always turn the unit OFF and disconnect Mains power before performing any maintenance or service.</li></ul>
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	<p><b>WARNING:</b></p> <ul style="list-style-type: none"><li>• Never touch the immersion probe assembly while the unit is operating.</li><li>• Always allow the immersion probe to warm to ambient temperature before repositioning or working on the unit.</li><li>• Do not move the immersion probe assembly while the unit is operating.</li></ul>
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## Unpacking Your Immersion Probe Cooler

Your Immersion Probe Cooler was packed in a special carton. You should keep the packaging, along with all packing materials, until the unit has been installed and you are certain it is working properly.

	<p><b>CAUTION:</b> Remove any loose packing material that may have clung to the base or wand assembly.</p>
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	<p><b>WARNING:</b> Keep unit upright when moving. Be sure to follow your company's procedures and practices regarding the safe lifting and relocation of heavy objects.</p>
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In the unlikely event that the unit was damaged or does not operate properly, contact the company where your Immersion Probe Cooler was purchased.

## **Regulatory Compliance & Testing**

### **cCSAus (120V, 60Hz units)**

UL 61010-1 (3rd Edition) - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

CAN/CSA-C22.2 No 61010-1-12 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

Product meets CAN ICES-1/NMB-1 and FCC Part 15

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: 1. This device may not cause harmful interference, and 2. This device must accept any interference received, including interference that may cause undesired operation.

### **IEC/CE (230V, 50Hz units; 100V, 50/60Hz units)**

Machinery Directive 2006/42/EC Annex I

IEC 61010-1:2010 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

EN 61010-1:2010 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

EMC Directive 2014/30/EU

EN 61326-1:2013 - Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements - Part 1: General Requirements

RoHS Directive 2011/65/EU

EN 50581:2012 - Technical Documentation for The Assessment of Electrical and Electronic Products With Respect to The Restriction of Hazardous Substances

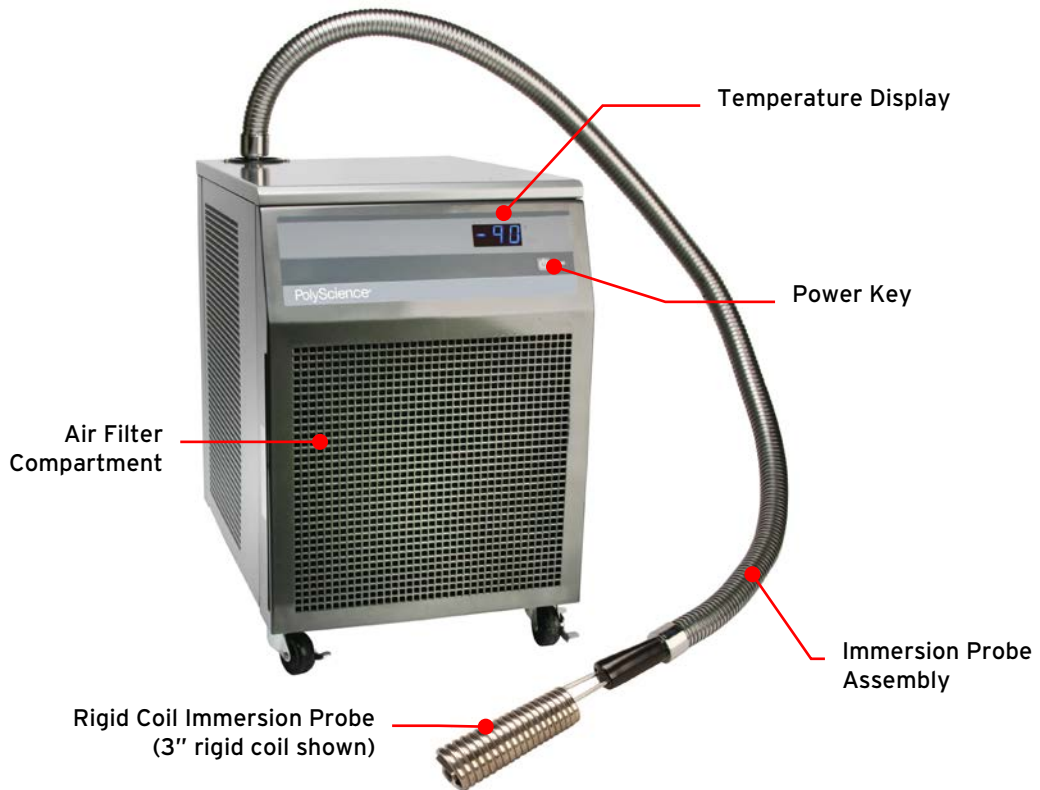
### **Highly Accelerated Life Test (HALT) and Vibration Tests per ASTM D4169-8 (All units)**


## **Contents**

The Following Items Have Been Included With Your Immersion Probe Cooler:

- Operator's Manual
- IEC Electrical Cord
- Certificate of Compliance

# Controls & Components



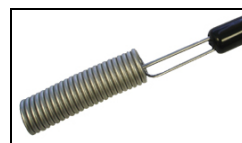
	<p><b>IMPORTANT:</b> The temperature display is for reference only. The actual temperature of the immersion probe will be colder than the displayed temperature.</p>
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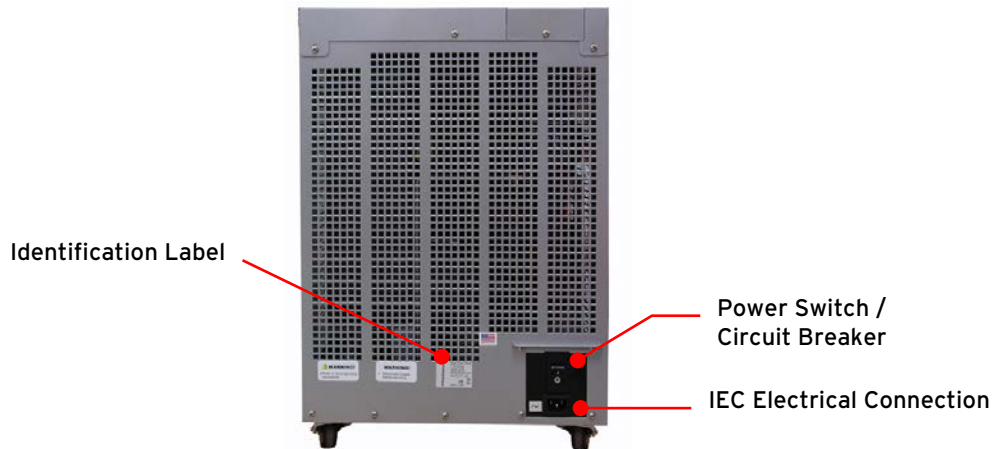
Cold Finger Immersion Probe



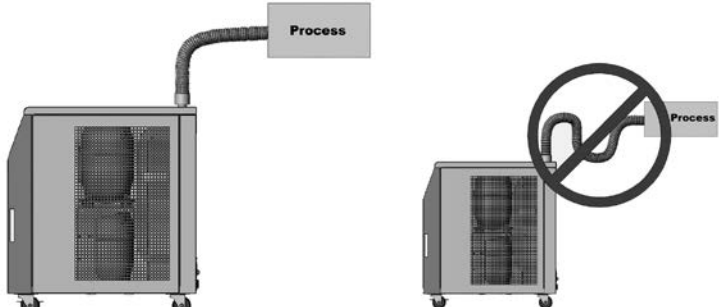
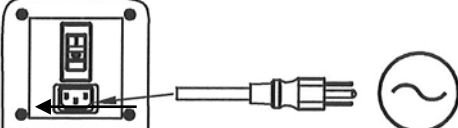
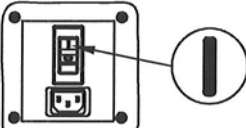
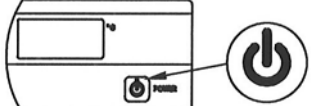
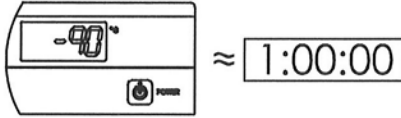
Flexible Immersion Probe




1.75'' Rigid Coil Probe



# Quick-Start

<p><b>1</b></p>	<p>Position Immersion Probe</p>	
<p><b>2</b></p>	<p>Connect power. See Identification Label.</p>	
<p><b>3</b></p>	<p>Turn main power ON.</p>	
<p><b>4</b></p>	<p>Turn Standby power ON. Allow approximately 10 minutes for the system to begin the cooling process.</p>	
<p><b>5</b></p>	<p>Allow approximately 1 hour for system to reach -80°C (IP-80) or -90°C (IP-100).</p>	 <p>(typical)</p>

	<p><b>CAUTION:</b> Moving Immersion Probe Cooler while unit is operating may result in damage.</p>
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## Installation & Startup

Your Immersion Probe Cooler is designed to be simple to set-up and install. No tools are required.

### General Site Requirements

Locate the unit on a level surface, free from drafts and out of direct sunlight. Do not place it where there are corrosive fumes, excessive moisture, high room temperatures, or where excessive dust is present.

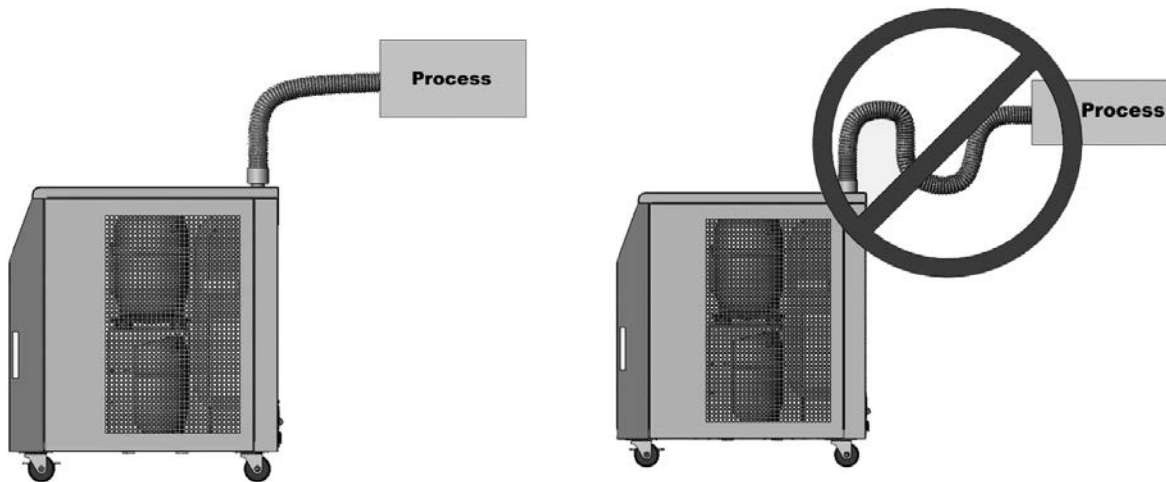
The unit must be a minimum of 6 inches / 15.24 cm away from walls or vertical surfaces so that airflow around the unit is not restricted. It should not be placed in cabinets or where exiting warm air or warm air from other devices will be drawn into the air intake on the front of the unit.



**NOTE:** It is recommended that your unit be run in ambient temperatures below 95°F / 35°C. While the unit will operate at higher ambient temperatures, it may not be able to achieve maximum cooling performance.

### Positioning the Immersion Probe Assembly

When installing the unit, make sure that the Immersion Probe Assembly is properly positioned. It should not be twisted. Incorrect positioning of the Wand Assembly will cause your Immersion Probe Cooler to perform below specifications.





**CAUTION:** Moving the Immersion Probe Assembly while the unit is operating may result in damage.



## Electrical Power

	<b>WARNING: IMPORTANT INFORMATION FOR 100V APPLICATIONS</b> On 100V 50Hz applications a step-up transformer IS NOT NEEDED and MUST NOT be used. On 100V 60Hz applications a step-up transformer MUST be used.
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	<b>WARNING:</b> Make certain that the electrical outlet is the same voltage and frequency as your unit. The correct voltage and frequency for your unit are indicated on the Identification Label on the back panel.
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	<b>WARNING:</b> The use of an extension cord is not recommended. If one is necessary, it must be properly grounded and capable of handling the total wattage of the unit. The extension cord must not cause more than a 10% drop in voltage to the unit.
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Attach the 6-ft / 1.8 m power cord to the IEC electrical connector on the back of the unit and then plug the male connector into the Mains electrical outlet.

Place the Power Switch / Circuit Breaker on the back of the Immersion Probe Cooler in the ON position. Three decimal points will appear on the Temperature Display. This indicates that the unit is in Standby mode.

Your Immersion Probe Cooler is now ready to begin normal operation.




## Normal Operation


### Turning Your Immersion Probe Cooler ON

Press the Power Key on the front panel. After a brief initialization message, the probe temperature will appear on the Temperature Display. After five minutes, the first stage compressor and fan will turn on to begin the cooling process. During this start-up phase, the displayed temperature will remain near or at ambient temperature.



After approximately 10 minutes, the second stage compressor will turn on, refrigerant will begin circulating through the system, and the displayed temperature will begin decreasing. It generally takes approximately 60 minutes from power up for the IP-80 to reach -80°C or for the IP-100 to reach -90°C.

	<b>NOTE:</b> The Immersion Probe Cooler operates at maximum cooling performance.
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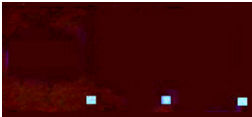



	<b>IMPORTANT:</b> To protect its compressors from damage, the Immersion Probe Cooler incorporates a special safety switch that delays compressor startup for 10 minutes whenever power is applied. This 10 minute delay will occur even when power is only momentarily disrupted.
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## Main Operational Display

The actual temperature of the immersion probe is displayed in degrees C on the unit's digital readout. Due to the location of the temperature sensor, this temperature is a few degrees warmer than the surface temperature of the immersion probe.



## Display Messages

Temperature Display	Description
	<b>Standby Mode</b> – Indicates that the Power Switch / Circuit Breaker on the back panel is in the ON position and unit is ready to operate.
	<b>Power On / Start-Up</b> – Appears briefly when the Immersion Probe Cooler is turned ON by pressing the Power Key on the front panel. The information represents the firmware version.
	<b>Main Operational Display</b> – Indicates unit is ON and operating. Displayed temperature is in degrees C.  Note: Displayed temperature is to one tenth of a degree (X..X) until it reaches -10°.
	<b>Warning Display</b> – Indicates that the external temperature sensor is not functioning properly. Unit will continue to cool.

## Loss of Power Restart

In the event that electrical power is disrupted during operation, the unit will begin operating automatically when power is restored. As with normal start-up, it will take approximately 60 minutes for the IP-80 to reach -80°C or the IP-100 to reach -90°C.

# Routine Maintenance & Troubleshooting

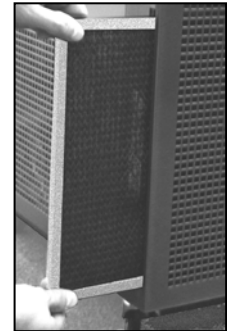
## Cleaning Exterior Surfaces

Only mild detergents and water or an approved cleaner should be used on the painted surfaces of the Immersion Probe Cooler. Do not allow cleaning liquids or sprays to come in direct contact with the digital display.

## Cleaning the Air Filter

To keep the refrigeration system operating at optimum cooling capacity, the front and back air vents and reusable filter should be kept free of dust and dirt. They should be checked on a scheduled basis and cleaned as required.

The reusable filter is easily accessed by simply sliding it out of the side of the front grill. Use a mild detergent and water solution to wash off any accumulated dust and dirt and then rinse and dry thoroughly before reinstalling.



## Draining Residual Oil from the Immersion Probe Assembly

A thin film of oil may build up within the Immersion Probe Assembly with extended use and adversely affect the unit's cooling efficiency. To ensure maximum cooling performance, we recommend that this oil be drained from the Immersion Probe Assembly after every 200 hours of use or whenever you see a drop in cooling performance.

1. Place the Immersion Probe Cooler in the Standby mode by pressing the Power Key on the front panel.
2. Elevate the Immersion Probe Assembly as high as possible above the unit's enclosure for 10 to 15 minutes to allow residual oil to drain back into the compressor. Do not allow the assembly to twist or dip as oil may pool internally in these areas.

	<b>CAUTION:</b> Moving Immersion Probe Assembly while unit is operating may result in damage.
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	<b>CAUTION:</b> Should you experience frequent drops in cooling performance due to the accumulation of oil in the Immersion Probe Assembly, verify that it is properly installed, without any twists. See Positioning the Immersion Probe Assembly under Installation & Startup.
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## Troubleshooting



**WARNING:** Always turn the Power Switch / Circuit Breaker OFF and disconnect the electrical cord from the power source before servicing the unit.

Problem	Cause	Corrective Action
Unit does not run (Temperature Display is blank)	No power to unit  Power Switch / Circuit Breaker in OFF position	Check that electrical cord is secure and plugged into an operating electrical outlet.  Place Power Switch / Circuit Breaker in ON position.
Unit does not run (Three decimals on Temperature Display)	Unit in Standby mode	Press Power Key on front panel.
Unit does not run (Temperature Display reading increasing or at ambient)	Compressor overload switch has tripped	Allow approximately 10 minutes for unit to restart. Check air filter and air vents for blockages. Check that airflow around unit is not restricted and that room temperatures does not exceed 95°F / 35°C. Check compressor fan for operation (listen for fan noise, check for airflow through unit).
No or insufficient cooling	Blocked air flow High ambient temperature  Oil in Immersion Probe Assembly  Improper line voltage and/or frequency	Check air filter and air vents for blockages. Check that airflow around unit is not restricted and that room temperatures does not exceed 95°F / 35°C. Drain oil from Immersion Probe Assembly. Verify that Mains voltage during start cycle is within 10% of rated voltage.
Gradual loss of cooling	Blocked air flow High ambient temperature  Oil in Immersion Probe Assembly	Check air filter and air vents for blockages. Check that airflow around unit is not restricted and that room temperatures does not exceed 95°F / 35°C. Drain oil from Immersion Probe Assembly.
Compressor shakes, stalls, or continually restarts	Compressor cycling or overloaded	Check air filter and air vents for blockages. Check that airflow around unit is not restricted and that room temperatures does not exceed 95°F / 35°C. Verify that Mains voltage during start cycle is within 10% of rated voltage. Check compressor fan for operation (listen for fan noise, check for airflow through unit).

# Technical Information

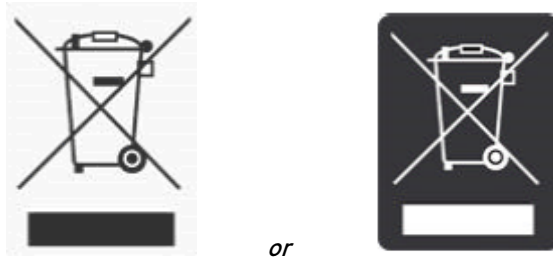
## Performance Specifications

Model	IP-80	IP-100
Temperature Range	-80° to -40°C	-100° to -60°C
Temperature Set Point	Fixed at -80°C	Fixed at -100°C
Readout Accuracy	±1.0°C	
Compressors	Two nominal ½ HP low back pressure reciprocating compressors	
Cooling Probe Assembly	6 ft. / 1.83 m flexible hose	
Cooling Probe	Rigid Coil 1.75 in. / 4.44 cm diameter; 7.0 in. / 17.8 cm length	Rigid Coil 3 in. / 7.62 cm diameter; 9.0 in. / 22.9 cm length  Rigid Cold Finger 0.75 in. / 1.91 cm diameter; 3.75 in. / 9.53 cm length  Flexible Cold Finger 0.625 in. / 1.59 cm diameter; 15 in. / 38.1 cm length
Dimensions (H x W x D)	21 x 15 x 20.125 in. / 53.34 x 38.1 x 51.12 cm	
Electrical Requirements:	120V, 60Hz, 12A 230V, 50Hz, 7.5A 100V, 50Hz, 12A 100V, 60Hz, 12A (step-up transformer required)	

Environmental Conditions: For indoor use only  
 Maximum altitude: 6562 ft. / 2000 m  
 Relative humidity: 80% for temperatures up to 95°F / 35°C  
 Over voltage: ±10%  
 Nominal ambient: 68°F / 20°C  
 Maximum recommended operating ambient: 95°F / 35°C  
 Installation Category II  
 Pollution Degree 2

	<p><b>WARNING: IMPORTANT INFORMATION FOR 100V APPLICATIONS</b>                  On 100V 50Hz applications a step-up transformer IS NOT NEEDED and MUST NOT be used.                  On 100V 60Hz applications a step-up transformer MUST be used.</p>
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## Equipment Disposal (WEEE Directive)



This equipment is marked with the crossed out wheeled bin symbol to indicate it is covered by the Waste Electrical and Electronic Equipment (WEEE) Directive and is not to be disposed of as unsorted municipal waste. **Any products marked with this symbol must be collected separately, according to the regulatory guidelines in your area.**

It is your responsibility to correctly dispose of this equipment at lifecycle-end by handing it over to an authorized facility for separate collection and recycling. It is also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect the persons involved in the disposal and recycling of the equipment from health hazards. By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Requirements for waste collection, reuse, recycling, and recovery programs vary by regulatory authority at your location. Contact your local responsible body (e.g., your laboratory manager) or authorized representative for information regarding applicable disposal regulations.

## Service & Technical Support

If you have followed the troubleshooting steps and your Immersion Probe Cooler fails to operate properly, contact the distributor or manufacturer from whom the unit was purchased. Have the following information available for the customer service person.

- Model, Serial Number, and Voltage (from back panel)
- Date of purchase and your purchase order number
- Suppliers' order number or invoice number
- A summary of your problem

## Warranty

The manufacturer agrees to correct for the original user of the product, either by repair (using new or refurbished parts), or at the manufacturer's election, by replacement (with a new or refurbished product), any defects in material or workmanship which develop during the warranty period. The standard warranty is twenty-four (24) months after delivery of the product. In the event of replacement, the replacement unit will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer. For purposes of this limited warranty, "refurbished" means a product or part that has been returned to its original specifications. In the event of a defect, these are your exclusive remedies.

If the product should require service, contact the manufacturer's/supplier's office for instructions. When return of the product is necessary, a return authorization number is assigned and the product should be shipped, transportation charges pre-paid, in either its original packaging or packaging affording an equal degree of protection to the indicated service center. To insure prompt handling, the return authorization number must be placed on the outside of the package. A detailed explanation of the defect should be enclosed with the item.

The warranty shall not apply if the defect or malfunction was caused by accident, neglect, unreasonable use, improper service, acts of God, modification by any party other than PolyScience, or other causes not arising out of defects in material or workmanship.

**EXCLUSION OF IMPLIED WARRANTIES.** THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXTEND BEYOND THE DESCRIPTION AND PERIOD AS STATED IN THE OPERATOR'S MANUAL INCLUDED WITH EACH PRODUCT.

**LIMITATION ON DAMAGES.** THE MANUFACTURER'S SOLE OBLIGATION UNDER THE WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT OF A DEFECTIVE PRODUCT AND POLYSCIENCE SHALL NOT, IN ANY EVENT, BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND RESULTING FROM USE OR POSSESSION OF THIS PRODUCT.

Some states do not allow: (A) limitations on how long an implied warranty lasts; or (B) the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights that vary from state to state.

Manufactured by:

**PolyScience**

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