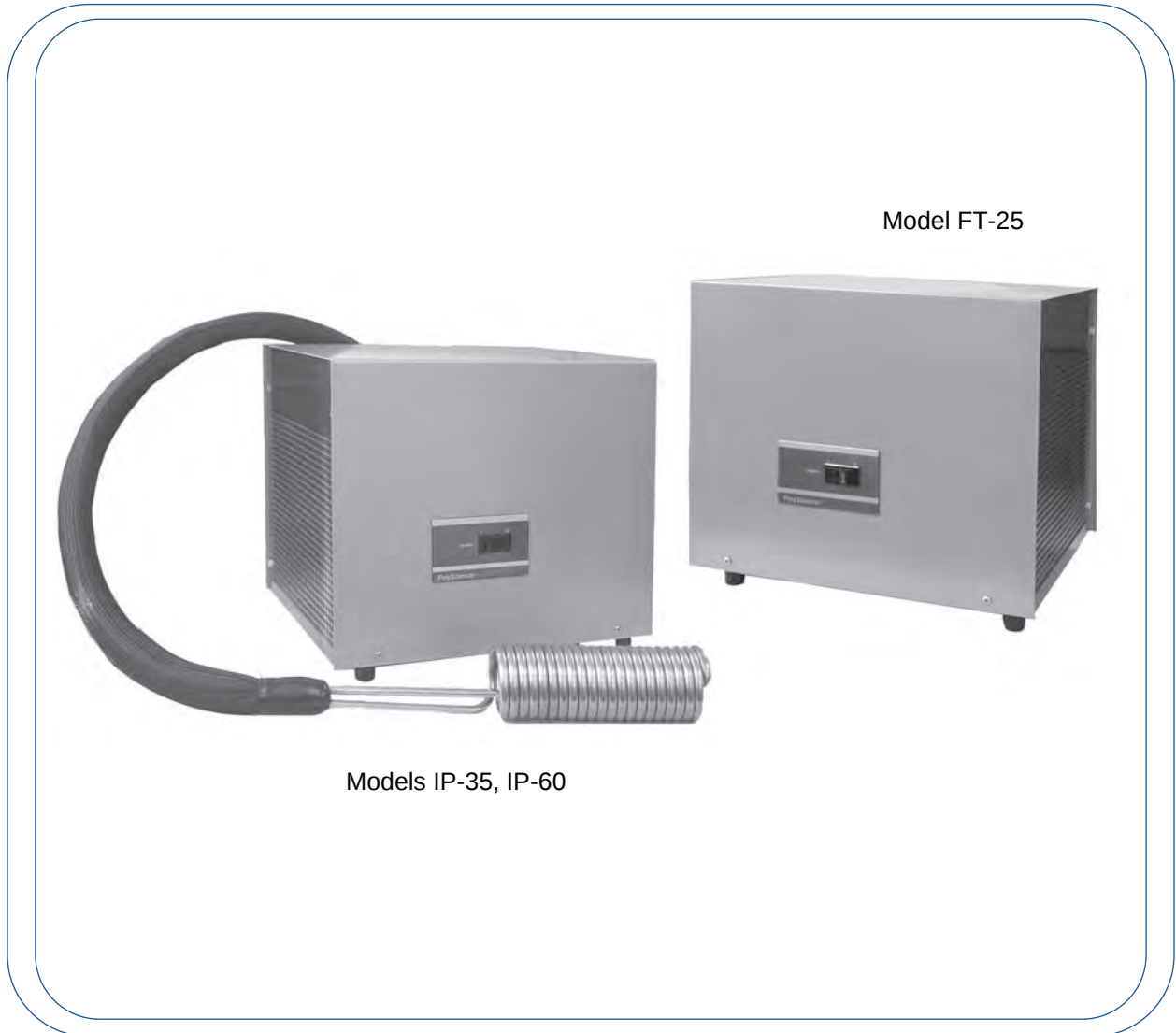


Operator's Manual

Low Temperature Coolers



110-064 04.25.12

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Introduction

Thank you for choosing a Low Temperature Cooler. Designed to enhance and simplify your low temperature work, Immersion Probe and Flow Through Coolers provide rapid, low-cost cooling of liquids to temperatures as low as -60°C. Both styles run at maximum cooling capacity and are designed to provide continuous cooling. Typical applications include the cooling of exothermic reactions, freeze point determinations, freeze drying, impact testing, and vapor and solvent trapping.

Immersion Probe Coolers are excellent for trapping and Dewar-type applications and reduce the expense of using dry ice or liquid nitrogen. A flexible hose allows convenient placement of the cooling probe.

Flow Through Coolers extend the temperature range of non-refrigerated circulators to below ambient and boost the cooling capacity of refrigerated circulators. They also offer an economic alternative to the tap water cooling of heated circulating baths when rapid cool-downs or operation at or near ambient is needed.

It will take you very little time to get your new Low Temperature 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.

General Information

General Safety Information

When installed, operated, and maintained according to the directions in this manual and common safety procedures, your Low Temperature Cooler should provide safe and reliable liquid heating. 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 alerts you to a wide range of potential dangers
	This symbol advises 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 indicates a protective conductor terminal.

**Read all instructions pertaining to safety, set-up, and operation.
Proper operation 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:

	• 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. • Never operate the unit with a damaged power cord. • Always turn the unit OFF and disconnect Mains power before performing any maintenance or service.
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	Immersion Probe Coolers: • Never touch the immersion probe assembly while the unit is operating. • Always allow the immersion probe to warm to ambient temperature before repositioning or working on the unit. • Do not move the immersion probe assembly while the unit is operating.
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Regulatory Compliance and Testing

CE (50 Hz units)

EC Low Voltage Directive 2006/95/EC

EC Electromagnetic Compatibility Directive 2004/108/EC

IEC 61010-1-2001

IEC 61010-2-2001

IEC 61326:2005 / EN 61326 : 2006

Unpacking Your Low Temperature Cooler

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

We recommend that you begin using your Low Temperature Cooler immediately to confirm proper operation, since beyond one week you may be eligible for warranty repair only (rather than replacement). You'll find complete warranty information in the back of this manual.

In the unlikely event that the unit was damaged or does not operate properly, contact the transportation company, file a damage claim, and contact the company where your Low Temperature Cooler was purchased.

	CAUTION: Keep unit upright when moving. Be sure to follow your company's procedures and practices regarding the safe lifting and relocation of heavy objects.
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Contents

The following items were included in the shipping carton:

- Low Temperature Cooler
- Operator's Manual
- Warranty Card

Installation

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

Electrical Power



WARNING: Make certain that the electrical outlet is the same voltage and frequency as your Low Temperature Cooler. The correct voltage and frequency for your unit are indicated on the identification label.



IMPORTANT: 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.

Verify that the Power Switch / Circuit Breaker is in the OFF position.
Connect the Electrical Power Cord to an appropriate electrical outlet.



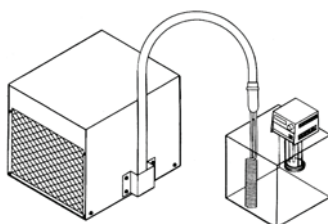
WARNING: DO NOT place your Low Temperature Cooler's Power Switch / Circuit Breaker in the ON position until you are ready to begin operation.

Immersion Probe (IP) Coolers

Positioning the Immersion Probe Assembly

Immersion Probe Coolers have a flexible hose connected to a probe which can be easily immersed in a Dewar flask, cold trap, or bath requiring cooling.

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



Immersion Coolers have a flexible hose connected to a probe & easily immerse in to a dewar flask, cold trap, or bath requiring cooling.



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

Flow Through (FT) Cooler

Tubing Connections

The Flow Through Cooler is designed to provide auxiliary cooling to a circulator or other connected device. 3/8 inch female NPT fittings are provided on the rear of the unit for the inlet and outlet connections. Depending on the application, tubing connections are made as illustrated below:

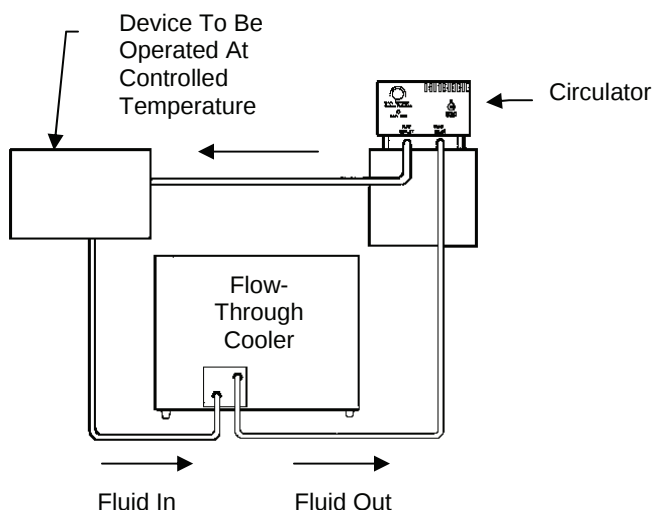
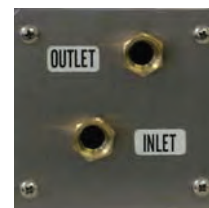


Fig. A: Fluid connections and flow when using the Flow Through Cooler to control the temperature of an external device.

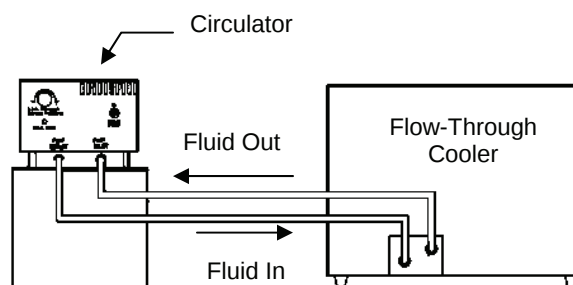


Fig. B: Fluid connections and flow when using the Flow Through Cooler to temper samples in a circulator.

When all connections have been made, fill the circulator with the cooling fluid to be used (see *Suitable Fluids*) and start the circulator's pump.

Application Notes:

1. Your application may require that fluid be pumped through one or more external closed systems (as in Figure A). The only limitations on this type of configuration are the pump capacity and the Cooler's cooling capacity.
2. The circulator must have enough heat capacity to compensate for the cooling effect of the Cooler. If the heating is insufficient, the fluid will continue to be cooled below the circulator's set point temperature, resulting in poor temperature control.
3. Fluid may need to be added to the circulator reservoir to compensate for fluid pumped into the tubing, the Cooler, and external device.

Suitable Fluids



WARNING:

DO NOT circulate water through your Flow Through Cooler.
DO NOT use combustible or toxic fluids, such as pure methanol.
DO NOT use fluids corrosive to copper.

There are two important factors to consider when choosing a cooling fluid to use with your Flow Through Cooler: Fluid viscosity and freeze point.

The two most frequently used fluids are (1) a mixture of methanol and distilled water and (2) a mixture of ethylene glycol or propylene glycol and distilled water. For most applications, a 50:50 mixture of methanol and distilled water is preferred. This mixture is low in viscosity, has a low freezing point, and is not flammable.

The following table lists various fluids and their performance characteristics. We recommend then when using any fluid, you stay within the fluid's normal temperature range for best stability and low vaporization.

Fluid Description	Viscosity (cSt) @ 25°C	Normal Temperature Range	Extreme Temperature Range
Methanol (50%) / water (50%)	1	-40° to 10°C	-50° to 20°C
polycool EG -25 ⁽¹⁾ (50%) / water (50%)	20	-25° to 100°C	-35° to 115°C
polycool PG -20 ⁽²⁾ (50%) / water (50%)	20	-20° to 100°C	-30° to 115°C
DC200 (5 cSt) silicone oil	5	-35° to 60°C*	-50° to 125°C*
DC200 (10 cSt) silicone oil	10	-20° to 80°C	-35° to 165°C*
polycool HC -50	3	-53° to 60°C*	-62° to 60°C*

1. Ethylene glycol

2. Propylene glycol

* This is the fluid's flash point temperature

Normal Operation



NOTE: Low Temperature Coolers operate at maximum cooling performance.



IMPORTANT: To protect the compressor from damage, the Low Temperature 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.

Immersion Probe Coolers

1. Place the Power Switch / Circuit Breaker in the ON position.
2. Immerse the Cooler's immersion probe in the fluid to be cooled. Periodically check the temperature of the fluid to determine if it is dropping at a reasonable rate.



CAUTION: The IP-60 Immersion Probe Cooler is designed to reduce the temperature of a fluid in a Dewar flask and can also be used for cold traps in vacuum systems and other applications. It is intended for use only at temperatures between -60° and -20°C; the **IP-60 IMMERSION PROBE COOLER SHOULD NOT BE OPERATED AT TEMPERATURES ABOVE -20°C** for extended periods of time.



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

Flow Through Cooler

1. Set the circulator's temperature control to the desired temperature and allow a few minutes for the bath fluid to begin circulating through the system.
2. Place the FT-25's Power Switch / Circuit Breaker in the ON position.
3. Periodically check the circulator to determine if the temperature is being controlled as expected.

Routine Maintenance & Troubleshooting

Cleaning Exterior Surfaces

Only mild detergents and water or an approved cleaner should be used on the painted surfaces of your Low Temperature Cooler.

Cleaning the Refrigeration Condenser Fins

To keep the refrigeration system operating at optimum cooling capacity, the refrigeration condenser fins located behind the front grill holes should be kept free of dust and dirt. Accumulated dust should be blown out periodically using clean, dry compressed air.

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 Immersion Probe Cooler'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 Power Switch / Circuit Breaker in the OFF position.
2. Elevate the Immersion Probe Assembly as high as possible above the 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.



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



IMPORTANT: 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.

Troubleshooting



CAUTION: 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 (all models)	No power to unit Power Switch / Circuit Breaker in OFF position Compressor overload switch has tripped	Check that electrical cord is plugged into an operating electrical outlet. Place Power Switch / Circuit Breaker in ON position. Allow approximately 10 minutes for unit to restart. Check refrigeration condenser fins and air vents for blockages. Check that airflow around unit is not restricted and that room temperature does not exceed 95°F / 35°C Check compressor fan for operation (listen for fan noise, check for airflow through unit)
No cooling or insufficient cooling (FT-25)	No power to unit Blocked airflow Fluid too hot for Cooler to continuously cool Insufficient flow rate Fluid viscosity too high Freezing at desired temperature Compressor overload Insufficient electrical power Compressor fan not operating Refrigerant leak Compressor failure	Check that Power Switch / Circuit Breaker is ON Check refrigeration condenser fins and air vents for blockages. Check heat removal specifications. At less than 0°C, heat loss to room may be excessive. External reservoirs and tubing should be insulated where condensation or frost occur. High power pumps can introduce excessive heating. Check tubing connections. Quick-connect fittings or tubing less than 3/8 inch diameter may restrict flow. Flow should be 3 to 15 liters/minute. Use lower viscosity fluid. Fluid freeze point should be 10° to 20°C lower than desired temperature. Shut off power for 10 minutes and then restart. Check for proper voltage and frequency at power source during startup. Voltage must be within 10% of rated voltage. Use of extension cords may cause voltage drops. Check compressor fan for operation (listen for fan noise, check for airflow through unit) Have licensed refrigerating service technician recover refrigerant, locate and repair leak, evacuate and recharge system. Contact factory.

Problem	Cause	Corrective Action
Gradual loss of cooling (FT-25)	Blocked airflow Refrigerant leak Compressor valves failing	Check refrigeration condenser fins and air vents for blockages. Have licensed refrigerating service technician should recover refrigerant, locate and repair leak, evacuate and recharge system. Contact factory.
Fluid gets too cold (FT-25)	Insufficient heating	Circulator or external system cannot provide sufficient heating to compensate for cooling capability of Cooler. System with greater heating capability required.
Compressor shakes, stalls, or continually restarts (all models)	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 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

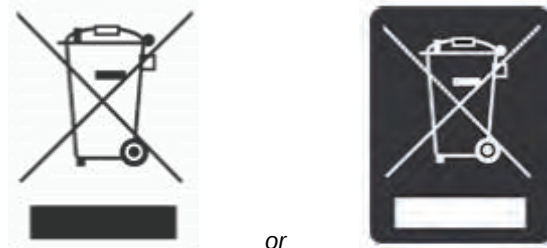
Performance Specifications

Model	IP-60		IP-35				FT-25	
			Small Coil		Large Coil			
Temperature Range	-60° to -20°C		-35° to +40°C				-25° to +40°C	
Temperature Control	Fixed at -60°C		Fixed at -35°C				Fixed at -25°C	
Electrical Requirements	120V, 60Hz, 5A	240V, 50Hz, 2.5A	120V, 60Hz, 5A	240V, 50Hz, 2.5A	120V, 60Hz, 5A	240V, 50Hz, 2.5A	120V, 60Hz, 5A	240V, 50Hz, 2.5A
Cooling Capacity watts @ -40°C -20°C 0°C 20°C	100 150	83 125	152 421 1,004	130 360 858	164 454 1081	140 388 924	117 322 745	100 275 656
Overall Dimensions (L x W x H)	11 x 10 x 9 in. / 27.9 x 25.4 x 22.9 cm		17 x 14 x 14 in. / 43.2 x 35.5 x 35.5 cm					
Probe Diameter	1.5 in. / 3.8 cm		1.75 in. / 4.4 cm		3.0 in. / 7.6 cm		N/A	
Inlet/Outlet	N/A		N/A		N/A		3/8 in. female NPT	
Compressor HP	1/4 HP		1/4 HP		1/4 HP		1/3 HP	

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

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 and Technical Support

If you have followed the troubleshooting steps outlined previously and your Low Temperature Cooler still fails to operate properly, contact the supplier from whom the unit was purchased. Have the following information available for the customer service person:

- Model, Serial Number, and Voltage (from back panel label)
- Date of purchase and purchase order number
- Supplier's order number or invoice number
- A summary of the problem

Warranty

The manufacturer agrees to correct for the original user of this product, either by repair, or at the manufacturer's election, by replacement, any defect that develops after delivery of this product within the period as stated on the warranty card. In the event of replacement, the replacement unit will be warranted for 90 days or warranted for the remainder of the original unit's parts or labor warranty period, whichever is longer. If a replacement unit is sent, the defective unit must be returned to the manufacturer within 30 days of receipt of the replacement unit. If the defective unit is not received within 30 days, the manufacturer reserves the right to bill for the replacement unit.

If this product requires service, contact the manufacturer/supplier's office for instructions. When return of the product is necessary, a return authorization number will be assigned and the product should be shipped (transportation charges pre-paid) to the indicated service center. To insure prompt handling, the return authorization number should be placed on the outside of the package and a detailed explanation of the defect enclosed with the item.

This warranty shall not apply if the defect or malfunction was caused by accident, neglect, unreasonable use, improper service, or other causes not arising out of defects in material or workmanship. There are no warranties, expressed or implied, including, but not limited to, those of merchantability or fitness for a particular purpose which extends beyond the description and period set forth herein.

The manufacturer's sole obligation under this warranty is limited to the repair or replacement of a defective product and 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. You may have other rights that vary from state to state.