



IMMERSION COOLERS FC55, FC100 OPERATOR'S MANUAL

FTS SYSTEMS FLEXI-COOL

VirTis

Genevac

FTS Systems

Hotpack

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Important Symbols



WARNING! INJURY OR EVEN DEATH MAY RESULT IF A RECOMMENDATION MARKED WITH THIS SYMBOL IS NOT HEEDED.



CRUSH HAZARD. KEEP HANDS CLEAR WHEN OPERATING DOOR.



ELECTRIC SHOCK DANGER! USE APPROPRIATE CAUTION TO AVOID INJURY OR DEATH.



CORROSIVE CHEMICAL. WEAR SUITABLE GLOVES, SAFETY GLASSES, AND PROTECTIVE CLOTHING.



BURN DANGER! POTENTIALLY HOT SURFACE. USE APPROPRIATE CAUTION.



PROPERTY CAUTION! TO PREVENT DAMAGE TO CHAMBER EQUIPMENT AND/OR LOAD, ADHERE TO PROCEDURES MARKED BY THIS SYMBOL.



DO NOT STORE FLAMMABLE MATERIALS IN CHAMBER.



PRACTICAL OPERATING TIP. THESE RECOMMENDATIONS STREAMLINE UNIT OPERATION AND PREVENT COMMON OPERATOR ERRORS.



WEAR SAFETY GLASSES.



EXPLOSIVE MATERIALS HAZARD! KEEP OBJECTS AWAY FROM HEAT.

Safety Warnings

- ✓ *Always transport the unit with care. Sudden jolts or drops may damage the refrigeration system.*
- ✓ *Always observe all warning labels.*
- ✓ *Always turn off the unit and disconnect the line cord from the available power source prior to performing any service or maintenance procedures.*
- ✓ *Always turn off the unit and disconnect the line cord from the available power source prior to moving the unit.*
- ✓ *Always operate, store and transport the unit in the upright position.*
- ✓ *Never operate equipment with damaged line cords.*
- ✓ *Never remove warning labels.*
- ✓ *Never operate damaged or leaking equipment.*

Warranty Information

FTS Systems Flexi-Cool low temperature baths are warranted by SP Scientific to be free of defects in material and workmanship when operated under normal conditions as specified in the instructions provided in this manual. Please take this opportunity to locate the serial tag on your new FTS Systems Flexi-Cool and record the information below for future reference. SP Scientific also recommends that you complete and return your unit's warranty registration card.

Model Number _____

Serial Number _____

Part Number _____

Limited Warranty

SP Scientific (the "Company") shall warrant each of its products against defects in material or workmanship for a period of 12 months from the date of shipment provided that the product is used in a reasonable manner under appropriate conditions and consistent with the applicable operating instructions.

The obligation of the Company shall be, at its option, to repair or replace, without charge any parts that prove to be defective within the warranty period, if the purchaser notifies the Company promptly in writing of such defect. No product shall be returned to the Company without prior approval of the Company.

This limited warranty shall cover the costs of parts and labor to repair or replace all defective product(s) at the Seller's factory. For all products installed by the Company and located within the Company service travel areas, this warranty shall cover transportation charges to ship the product to and from the Company's factory and/or the costs of travel, room and board if the Company's employees conduct repair at the Buyer's location. In lieu of repair or replacement at the Company's factory, the Company may, in its discretion, authorize a third party to perform the repair or replacement at the Buyer's location, and at the Company's sole expense.

The Company shall not be responsible for labor charges payable with respect to persons other than Company employees. Replacement or repair of parts pursuant to this warranty shall not in any way extend the original warranty period. The Company shall not be responsible for any unauthorized repairs, replacements or product modifications, nor will it be responsible for any product failures resulting from such unauthorized repairs, replacements or product modifications negligently or otherwise made by persons other than Company employees or authorized representatives of the Company. The buyer shall assume transportation charges to ship the product to and from the Company's factory and the costs of travel, room and board if the Company's employees conduct repair at the Buyer's location within the warranty period if the product was not installed by the Company's and/or is not located within the Company's service travel areas.

THE COMPANY DOES NOT MAKE AND EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE SALE, INSTALLATION, DESIGN OR USE OF ITS PRODUCTS. ADDITIONALLY, THE COMPANY SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF OR ANY DEFECTS IN ITS PRODUCTS.

The Company's employees are available to provide general advice to customers concerning the use of the Company's products; however, oral representations are not warranties with respect to particular products or their uses and may not be relied upon if they are inconsistent with the relevant product specifications for the items set forth herein.

Notwithstanding the above, the terms and conditions set forth in the Company's formal sales contracts shall be controlling and supersede any inconsistent terms contained herein, and any changes to such contracts must be made in writing and signed by an authorized executive of the Company.



WARNING! THE DISPOSAL AND/OR EMISSION OF SUBSTANCES USED IN CONNECTION WITH THIS EQUIPMENT MAY BE GOVERNED BY VARIOUS FEDERAL, STATE OR LOCAL REGULATIONS. ALL USERS OF THIS EQUIPMENT ARE URGED TO BECOME FAMILIAR WITH ANY REGULATIONS THAT APPLY IN THE USERS AREA CONCERNING THE DUMPING OF WASTE MATERIALS IN OR UPON WATER, LAND OR AIR AND TO COMPLY WITH SUCH REGULATIONS.

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Introduction

Overview

Flexi-Cool immersion coolers offer high heat removal and fast cool down capability. The refrigerated Flexi-Cool Probes can be placed wherever you require direct cooling and heat removal from ambient to -100 °C. These probes achieve maximum efficiency because the refrigerant expands directly inside the probe; there is no secondary medium or pumping involved that introduces additional heat loads and thus decreases efficiency. All FTS Systems-Brand chillers feature innovative design, high-quality construction, and dependable components. This chiller will reliably serve your cooling needs for years to come.



THE FTS SYSTEMS FLEXI-COOL IS NOT INTENDED FOR USE WITH EXTREMELY FLAMMABLE FLUIDS SUCH AS ISOPENTANE (C₅H₁₂).

Key Features

- Small Footprint.
- Three standard probe configurations: cartridge, coil, and flexible.
- 60-inch flexible delivery line.
- Efficient Removal of Heat.
- Operating temperatures from ambient to -100 °C.
- Mechanical Refrigeration.

Installation and Startup

Initial Inspection

Your FTS Systems Flexi-Cool immersion cooler was carefully packed and thoroughly inspected before leaving the SP Scientific factory. However, in the unlikely event that shipping damage has occurred, retain all packing material and contact your freight carrier immediately.



DO NOT ACCEPT DAMAGED SHIPMENTS FROM A CARRIER WITHOUT A SIGNED NOTIFICATION OF DAMAGES.

Upon receiving your shipment, inspect all contents of your equipment for damage. Carefully remove unit from the box taking care when handling the probe, and make a visual inspection for shipping damage. Check packing material for small accessory items. Inspect the inside of the unit and related parts for visible damage and leaks. Check for visible liquid at or near the base of the unit.

If concealed damage or loss is discovered, contact the freight carrier immediately.¹ Keep all contents, packing material and related paperwork intact until a written report is obtained.

Note: *SP Scientific will cooperate in the matter of collecting your claim, but is not responsible for the collection or free replacement of the material. When possible, replacement parts will be shipped and invoiced to you, making them a part of your claim.*

¹ "Concealed damage or loss" refers to damage or loss that does not become apparent until the merchandise has been unpacked and inspected. Should damage or loss be discovered, you may make a written request for inspection by the carrier's agent within 15 days of the delivery date. You may then file a claim with the freight carrier or SP Scientific, depending on the terms of your shipment. If your shipment was "FOB Destination" file your claim with SP Scientific and include the inspection report and any other supporting documents. If your shipment was "FOB Shipping Point" file your claim with the freight carrier and include the inspection report and any other supporting documents.

Setup and Installation

Physical Location



NEVER PLACE THE UNIT IN AND AREA WHERE EXCESSIVE HEAT, MOISTURE OR CORROSIVE MATERIALS ARE PRESENT.

The area where you place the unit should be smooth, level, and capable of safely supporting the weight of the machine. Space should be provided so that air can properly circulate around the unit. If obstacles are blocking the airflow, the compressor may overheat. This reduces performance, and can lead to early compressor failure.

The environment should be well ventilated to prevent excessive buildup of heat. Normal room ventilation is usually adequate.

Ambient Air Requirements



NEVER OPERATE THE FLEXI-COOL IN AN AREA WITH AN AMBIENT TEMPERATURE ABOVE 32 °C (90 °F).

This unit is designed for operation in a normal indoor environment. Systems should not be mounted outside or otherwise exposed to the elements. The environment should be free from air containing large amounts of moisture, salt or sulfur. If your system utilizes an air-cooled condenser; the fan in the system draws ambient air across the condenser (radiator) to cool the refrigerant.

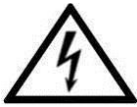
Ambient Air Temperature Requirements	
12 °C to 21 °C (55 °F to 69 °F)	Acceptable
21 °C to 24 °C (70 °F to 75 °F)	Ideal
24 °C to 27 °C (75 °F to 80 °F)	Acceptable, but a reduction in the cooling capacity of the unit is to be expected (about a 1% cooling capacity reduction per degree above 72 °F).
27 °C to 29.5 °C (80 °F to 85 °F)	Expect reduced reliability. Warranty may be voided.
Over 29.5 °C (Over 85 °F)	Not Acceptable. Warranty will be voided.

Electrical Requirements

Only qualified personnel should perform the installation of this unit. The voltage and frequency requirements are specified on the serial tag on the rear of the unit. Standard variances in frequency ($\pm 3\text{Hz}$) and voltage (-5% , $+10\%$) are allowed.

- Verify that the facility's voltage matches the requirement for the machine, which is printed on the serial tag on the rear of the machine.
- The electric service wiring must be of a large enough wire gauge that the voltage is maintained to the receptacle even when a full load is applied to the receptacle. Additionally, the receptacle voltage should be measured while that receptacle is under load.
- Ensure the proper amperage circuit breaker is installed in the line and located near the equipment.
- Plug in the line cord. Avoid the use of long extension cords, these cause a significant power drop between the wall receptacle and the machine. The MAINS lamp should light

Note: For Lock Out / Tag Out plug the appropriate device into the line cord.



CAUTION! IF YOU ARE UNSURE ABOUT THE AVAILABLE ELECTRICAL VOLTAGE SUPPLY IN YOUR FACILITY, CONSULT A QUALIFIED ELECTRICIAN.

Water Requirements

If your unit is water-cooled it will require 2-3 gpm of clean utility water at 30-60 psi, at a temperature of 13 °C to 22 °C.

Operation

Basic Operation

System Preparation

- Place the probe so that it is in contact with the fluid / vapor to be cooled.
- Make sure the delivery line is not strained or forced to bend a tight radius.

Start Up

- Move the rocker switch to the ON position.
- The Flexi-Cool's refrigeration system will now begin to remove heat from your application.

Shut Down

- Move the rocker switch to the EMO (off) position.
- The refrigeration will shut down.
- Thoroughly clean and dry the probe head after each use.

Note: Do not turn off the unit and quickly turn it back on, this causes undo strain to the refrigeration system. After the compressor has shut down, allow five minutes for the internal pressures to equalize before restarting the unit.

Delivery Line and Probe

Delivery Line

Flexi-Cools have a delivery line that carries the refrigerant to the probe and back. This flexible delivery line is made of corrugated stainless steel tubing with several layers of insulation. Although this line is strong, it can be damaged to the point of rupture if it is repeatedly bent too sharply or forcibly twisted. This line must remain gas-tight in order to contain the refrigerant charge in the unit. Be especially careful with the probes on the caster-mounted Flexi-Cool's (MFC and LFC).

- Never bend the delivery line more sharply than a 5 inch (12.7 cm) radius or a 10 inch (25.4 cm) diameter.
- Supporting the delivery line at one (1) or more places is recommended to prevent sagging or stressing the line.
- Wide contact points on the supports are recommended to avoid compressing or degrading the internal insulation.

Adjusting the delivery line when it is cold will damage the insulation, resulting in reduced performance.

Note: Do not move the delivery line when it is cold, always turn the system off for at least 4 hours before making any adjustments to the placement of the delivery line.

Probe

Flexi-Cools come equipped with one of three standard probe configurations.

1. Cartridge Probe- well suited to cooling vapors.
2. Coil Probe- provides the highest surface area and allows maximum cooling of immersion baths.

Notes: The 'Cartridge' and 'Coil' probes are constructed of Type 304 or 316 stainless heavy wall tubing and will withstand hard usage. The probes are shipped from the factory in a chemically passive form and will withstand corrosion attack normal to this type of stainless. However, if the probe comes into contact with other steel surfaces, the stainless surface will become contaminated with free iron, and rusting or pitting of the stainless surface may occur. In severe cases, this pitting can lead to perforation. If such a condition is observed, treat with a 20% Nitric Acid solution by dipping or brushing for approximately one hour.

While cleaning, be sure not to dip the brazed connection at the top of the coil in the acid solution.

3. Flexible Probe- A corrugated, stainless steel flex-line makes this probe a versatile tool that can be used for any number of applications.

Note: The 'Flexible Probe' is a probe made of flexible stainless steel tubing. All the precautions outlined for the delivery line apply to this probe. The probe has no protective braid and is much more susceptible to abrasion or puncture by a sharp object than the delivery line. Please observe the following precautions.

- a. Never reposition the Flexible Probe when it is cold.
- b. Do not allow the Flexible Probe to drag on the floor or other rough surfaces.
- c. Never wrap the Flexible Probe around the delivery line.
- d. Never chip ice from the probe.
- e. Never bend the Flexible Probe more sharply than a 1 inch (2.5 cm) radius or a 2 inch (5 cm) diameter.

Maintenance



ALWAYS REMOVE POWER FROM THE UNIT BEFORE PERFORMING MAINTENANCE PROCEDURES.



NOTICE: ONLY QUALIFIED PERSONNEL SHOULD PERFORM MAINTENANCE ON THE REFRIGERATION SYSTEM ITSELF, AND ONLY EPA CERTIFIED TECHNICIANS MAY EVACUATE OR CHARGE REFRIGERANTS.



WARNING: HAZARDOUS VOLTAGES. RISK OF ELECTRIC SHOCK, DISCONNECT ALL POWER BEFORE SERVICING THIS UNIT. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



HAZARDOUS MATERIAL/CONTACT HAZARD: THE CHEMICALS USED IN THIS UNIT ARE CONTAINED WITHIN FULLY ENCLOSED SYSTEMS. NO MAINTENANCE ACTIVITIES INVOLVING THE REFRIGERATION SYSTEM ARE TO BE PERFORMED BY THE END-USER.



HOT SURFACE: THE COMPRESSOR AND ASSOCIATED TUBING IN THE LOWER PORTION OF THE UNIT ARE LIKELY TO BE HOT AND POSE A POTENTIAL BURN HAZARD.

Cleaning

The following procedure should be followed on a routine basis, from weekly to monthly depending upon the operating environment:

1. Disconnect electric utilities.
2. Wipe down all exterior cabinet surfaces with a damp cleaning cloth.
3. Vacuum dust from the refrigeration condenser as well as all screens and openings.
4. Remove cabinet panels.
5. Blow compressed air systematically from the top to bottom. Let air settle for several minutes and repeat.
6. Check for areas that have frosted during operation and insulate as required.
7. Replace cabinet panels.
8. Connect electric utilities.



Appendix A: Troubleshooting

Symptom	Possible Cause	Remedy
Compressor shuts off and then turns itself back on in 3-4 minutes.	Low Voltage	Check the voltage on the unit while it is under load. The voltage must be within 5% of the voltage listed on the serial tag on the rear or the unit.
	High Ambient Temperature	Check the room temperature and compare with the Ambient Air Requirement listed in Installation and Startup. Take steps to reduce this temperature if it is too high.
	Dirty or Blocked Condenser Fins	Clean condenser.
	Fan not Working	Check for operation of fan (you can feel air being drawn across the condenser). If it isn't working, please call SP Scientific Service.
Compressor fails to restart after it has been shut off.	High Pressure in the Refrigeration System	Wait several minutes and try starting the unit again.
Gradual loss of Temperature.	Dirty or Blocked Condenser Fins	Clean condenser.
	High Ambient Temperature	Check the room temperature and compare with the Ambient Air Requirement listed in Installation and Startup. Take steps to reduce this temperature if it is too high.
	Loss of Refrigerant	Call SP Scientific Service.



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