

## LOW-TEMPERATURE BATH OPERATOR'S MANUAL

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# FTS SYSTEMS HISTOCHILL™ Tissue-Freezing Bath



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**Part Number 100005399**

**Rev 004, 05/12**

**Original Instructions**

The U.S. English version of this document is the original instructions.  
All other languages are a translation of the original instructions.

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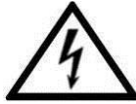
## Important Symbols



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.

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## 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 empty the reservoir / bath chamber prior to moving the unit.*
- ✓ *Never operate equipment with damaged line cords.*
- ✓ *Never operate the unit without cooling fluid in the reservoir.*
- ✓ *Never remove warning labels.*
- ✓ *Never operate damaged or leaking equipment.*

## Warranty Information

FTS Systems HistoChill™ 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 HistoChill™ 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

The FTS Systems HistoChill™ delivers fast freezing capabilities, as well as continuous operation at temperatures as low as -80 °C. Built to provide you with years of smooth, quiet and reliable operation, the FTS Systems HistoChill™ packs both performance and innovation into a compact, bench-top design.

Utilizing a liquid medium, the FTS Systems HistoChill™ rapidly and thoroughly freezes samples, minimizing the formation of microscopic ice crystals and sample distortion, without the use of expendables such as dry ice or liquid nitrogen ( $N_{2(liq)}$ ).

The FTS Systems HistoChill™ is available in three different models, HC55, HC80\_0 and HC80\_1.<sup>1</sup> Models with temperature control also include a variable speed-controlled magnetic stirrer to provide more accurate temperature control and uniformity. Each configuration features an air-cooled refrigeration system and stainless steel reservoir.

**Note:** SP Scientific recommends using 3M™ Novec™ 7000 Engineered Fluid for optimum performance. Before using this fluid, read the current product Material Safety Data Sheet and any precautionary statements on the product package. Follow all applicable precautions and directions.



THE FLUID AND INNER WALLS OF THE RESERVOIR CAN REACH TEMPERATURES BELOW -90 °C (-130 °F). EXTREMELY LOW TEMPERATURES CAN CAUSE SERIOUS AND IMMEDIATE DAMAGE TO SKIN. THE ABSENCE OF FROST IN UNITS EQUIPPED WITH THE FROST ISOLATING WARMING LOOP SHOULD NOT BE MISTAKEN AS AN INDICATION OF WARM TEMPERATURE. DESPITE THE ABSENCE OF FROST, THE TEMPERATURE OF THE RESERVIOR FLUID AND WALLS MAY BE DANGEROUSLY LOW.



THE FTS SYSTEMS HISTOCHILL™ IS NOT INTENDED FOR USE WITH EXTREMELY FLAMMABLE FLUIDS SUCH AS ISOPENTANE (C5H12).

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<sup>1</sup> The underscore used in the HC80 model numbers serves as a placeholder for the purchased equipment's voltage code. This underscore will be replaced by a letter 'A' or 'D' on the unit's serial tag, depending on the equipment's voltage requirement. The letter 'A' represents a power configuration designed to be operated at 60Hz. The letter 'D' represents a power configuration designed to be operated at 50Hz.

## Key Features

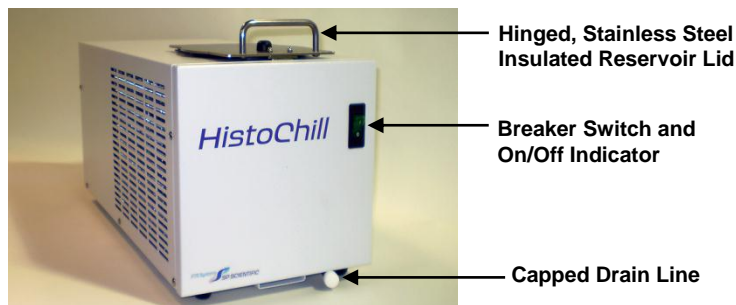
- Quiet operation.
- Mechanically refrigerated, no expendable refrigerants utilized.
- Compact, bench-top design with 1.5-liter stainless steel reservoir.
- Hinged and insulated reservoir lid for easy bath access.
- Frost isolating warming loop to minimize ice build-up in the reservoir (HC80 models only).

## Key Benefits

- Rapid freezing of tissue samples to minimize ice crystal formation and increase lab throughput.
- Easy bath access.
- Liquid medium to increase temperature uniformity and stability.

## HistoChill™ Basic, HC55

The HC55 model includes single-stage refrigeration and features a simple on/off breaker switch with an internal green indicator light, which indicates that the unit is turned on. It takes approximately 45 minutes for the bath to cool from ambient to its ultimate low temperature of  $-55\text{ }^{\circ}\text{C}$ .<sup>2</sup> This model also includes a capped drain line.



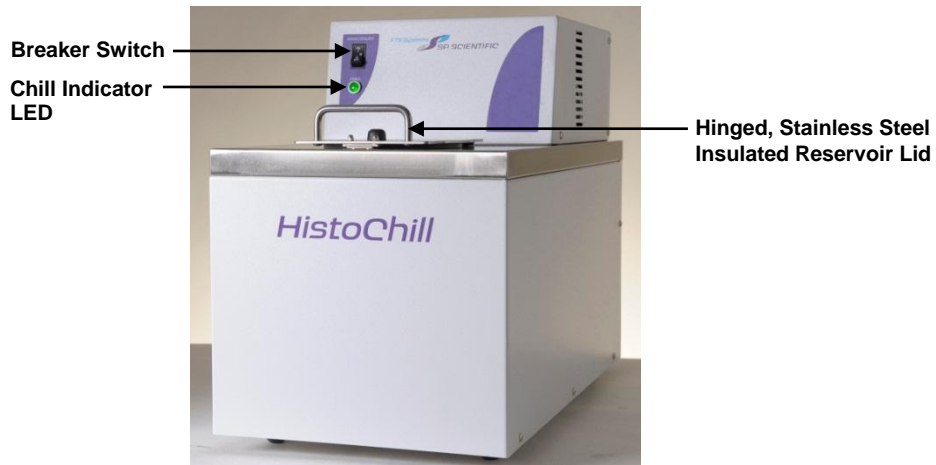
HistoChill™ HC55\_0

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<sup>2</sup> The FTS Systems HistoChill™ HC55 offers continuous operation at temperatures as low as  $-55\text{ }^{\circ}\text{C}$ . Lowest possible temperatures may be dependent upon the selected bath fluid, as well as ambient conditions and airflow.

## HistoChill™ Basic, HC80\_0

The HC80\_0 model is designed for general freezing applications. This unit includes a cascade refrigeration system and features an on/off breaker switch. The green Chill Indicator light indicates when the bath is being chilled.



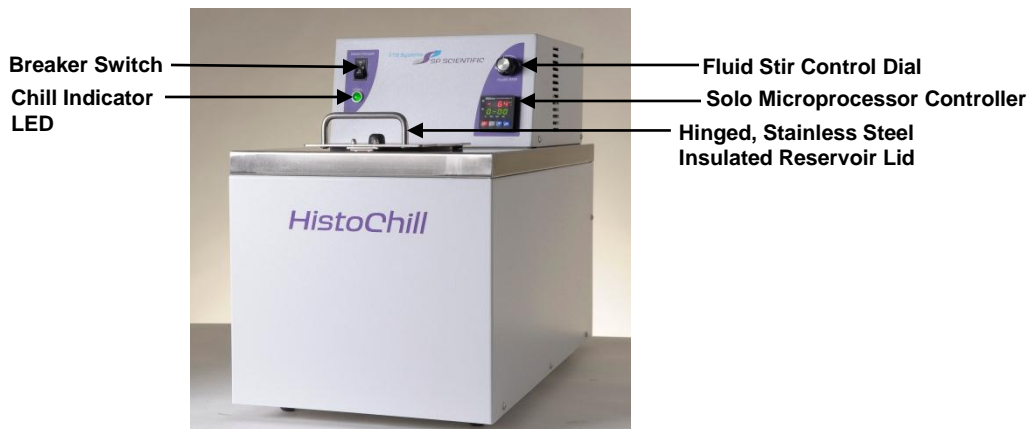
**HistoChill™ HC80-0**

When powered on, the HistoChill™ HC80\_0's refrigeration system will activate and cool the fluid in the reservoir to the lowest possible temperature under the existing heat load. After approximately two (2) minutes, the green Chill light illuminates to indicate that the second stage compressor is active.

The HC80\_0 bath, when energized, will cool to its ultimate low temperature of -80 °C.

## HistoChill™ Advanced, HC80\_1

The HC80\_1 is an advanced model bath. This unit features the Solo microprocessor controller, which provides precise temperature control within  $\pm 0.1$  °C across the temperature control range of -80 to 0 °C.<sup>3</sup>



**HistoChill™ HC80\_1**

Advanced model baths with temperature control are also equipped with a solid-state variable speed-controlled magnetic stirrer to provide more accurate temperature control and uniformity.

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<sup>3</sup> The FTS Systems HistoChill™ HC80\_1 offers continuous operation at temperatures as low as -80 °C. Lowest possible temperatures may be dependent upon the selected bath fluid, as well as ambient conditions and airflow.

# Installation

## Initial Inspection

Your FTS Systems HistoChill™ low-temperature bath 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.

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Upon receiving your shipment, inspect all contents of your equipment for damage. Uncrate and/or unwrap the unit. Carefully remove all packing material from the unit and inspect for visible damage. Check packing material for small accessory items and retain shipping carton and packing material if possible. 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. The reservoir should be clean and dry.

If concealed damage or loss is discovered, contact the freight carrier immediately.<sup>4</sup> 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.*

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<sup>4</sup> "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.

## Installation

The FTS Systems HistoChill™ is designed for bench-top installation in a laboratory environment. The unit should be installed on a firm, level surface in a location that is convenient for both operation and service.



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

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### Air Flow Considerations

The FTS Systems HistoChill™ is equipped with an air-cooled refrigeration system. Air is pulled from the left side of the unit to cool the refrigeration system components and then exits the rear panel. When positioning your system, ensure that it is located on a firm, level surface in an area that provides adequate air circulation.

Inadequate airflow will degrade the unit's cooling capacity and in extreme cases may result in compressor failure. A minimum of six (6) inches of clearance on all sides of the unit is required to ensure proper airflow and avoid damage to the refrigeration system.

### Ambient Conditions

For best low-temperature operation, consider that the ideal ambient temperature for your FTS Systems HistoChill™ is approximately 22 °C (72 °F). Higher ambient temperatures will interfere in the system's ability to achieve its ultimate low temperature.



NEVER OPERATE THE FTS SYSTEMS HISTOCHILL™ IN AN AREA WITH AN AMBIENT TEMPERATURE ABOVE 32°C (90°F).

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### Services and Utilities

The FTS Systems HistoChill™'s serial tag, which is located on the unit's back panel, provides the serial number, as well as the unit's electrical requirements. Ensure that the voltage, phase, frequency and amperage listed on the serial tag match your facility's available power supply (e.g., as a minimum the power outlet you intend to use must meet the requirements listed on the serial tag).



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

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Prior to connecting your FTS Systems HistoChill™ to the available electrical supply, ensure that the Main Power switch is in the Off position. You may connect the unit to the available electrical supply at this time.

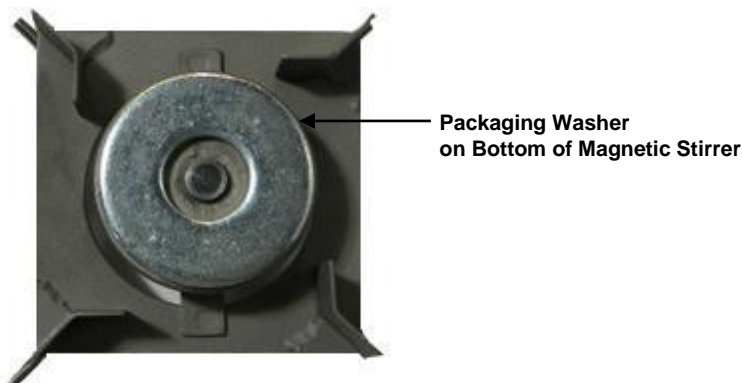
## Installing the Magnetic Stirrer and Vortex Breaker (HC80\_1 Only)

The advanced model bath with temperature control (model HC80\_1) is equipped with a solid-state variable speed-controlled magnetic stirrer and a vortex breaker to provide more accurate temperature control and uniformity. To install the magnetic stirrer and vortex breaker:

1. Remove the packaging washers from the inside of the stainless steel reservoir and from the bottom of the magnetic stirrer. These washers are placed on the magnetic components of the unit for shipping purposes only and are intended to be removed prior to operation.



HC80-1 Reservoir (Top View)

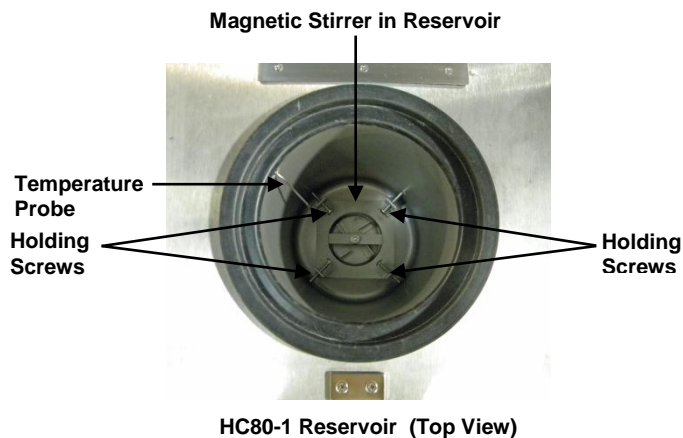


Magnetic Stirrer (Bottom View)

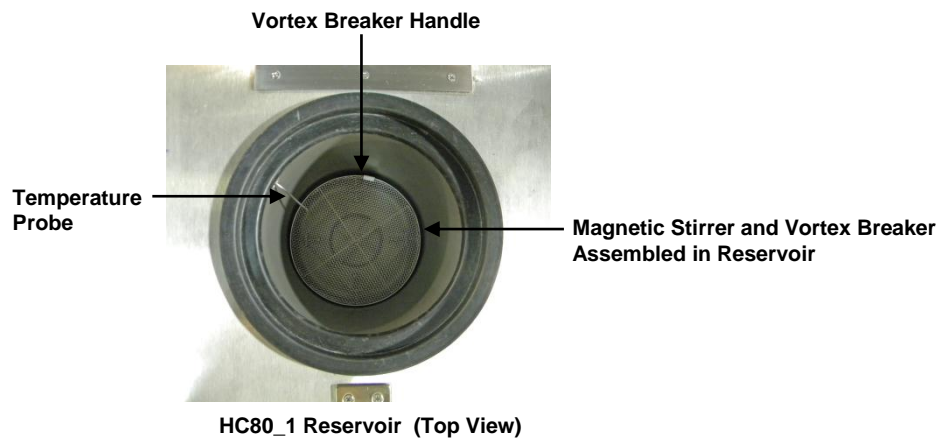
2. Place the magnetic stirrer, magnet side down, into the center of the reservoir. (Pushing the edges of the stirring mechanism beyond the black gasket at the top of the reservoir may require some force.) As you lower the magnetic stirrer into place, be careful not to bend or tweak the metal temperature probe that hangs inside the reservoir.

**Note:** The screws on top of the magnetic stirrer should not come in contact with the sides of the bath as you place the magnetic stirrer into the reservoir. If they do, retract them using your fingers or a screwdriver.

3. Once the stirrer assembly is in place, adjust the four holding screws by hand so that each screw lightly touches the side of the reservoir. Then, use a screwdriver to further extend each screw so that the stirrer is held snugly in place in the center of the reservoir. Be sure that all screws are extended to the same length; this will keep the stirrer assembly centered in the bath.



4. Hold the vortex breaker by its metal handle (a small tab, bent 90° at the tip) and place it into the reservoir so that it rests evenly on top of the magnetic stirrer. (Pushing the edges of the vortex breaker beyond the black gasket at the top of the reservoir may require some force.)





# Operation

## Overview

The HistoChill™ low-temperature bath is available with or without temperature control. The HC55 and HC80\_0 models offer no control of bath temperatures and are simply activated and deactivated using the main breaker switch.

The HC80\_1 model, designed to include the optional temperature controller, offers a continuous display of temperatures in 0.1 degree increments and is capable of controlling temperatures within  $\pm 0.1$  °C across the equipment's full operating temperature range.

**Note:** Temperature controller equipped units also include a magnetic stirrer.

## No Control Operation (For Models HC55 and HC80\_0)

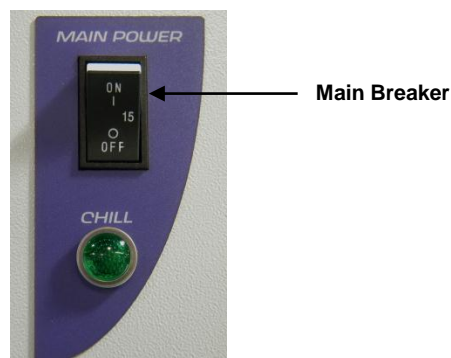
The HistoChill™ HC55 and HC80\_0 are designed for general freezing applications. The HC55 model features a simple on/off breaker switch. The HC80\_0 model features an on/off breaker switch and a green LED to indicate when the unit is in Chill mode.

## Powering On and Cooling

**Note:** Before powering on and cooling, fill the reservoir with fluid as described in Chapter 4.

To activate the refrigeration system and begin cooling the fluid in the reservoir:

1. Toggle the on/off breaker switch to the On position.



(Model HC80-0 shown)

2. The HistoChill™'s refrigeration system shall begin cooling the reservoir fluid to its lowest possible temperature under the existing heat load. In the HC80\_0 model, the green LED Chill light will illuminate after approximately two (2) minutes to indicate that the second stage compressor is active.

## Powering Off

To power off the HistoChill™:

1. Toggle the on/off breaker switch to the Off position.
2. The green indicator light shall turn off and the HistoChill™'s refrigeration system compressor(s) shall stop.

**Note:** When the HistoChill™ is not in use, ensure that the bath reservoir lid is closed to prevent evaporation of the cooling fluid.

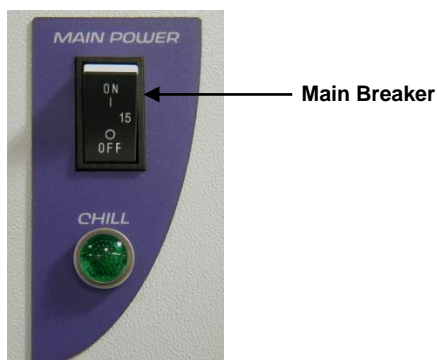
## Temperature Control Operation (For Model HC80\_1)

### Powering On

**Note:** Before powering on and cooling, install the magnetic stirrer and vortex breaker (as described in Chapter 2) and fill the reservoir with fluid (as described in Chapter 4).

To activate the refrigeration system:

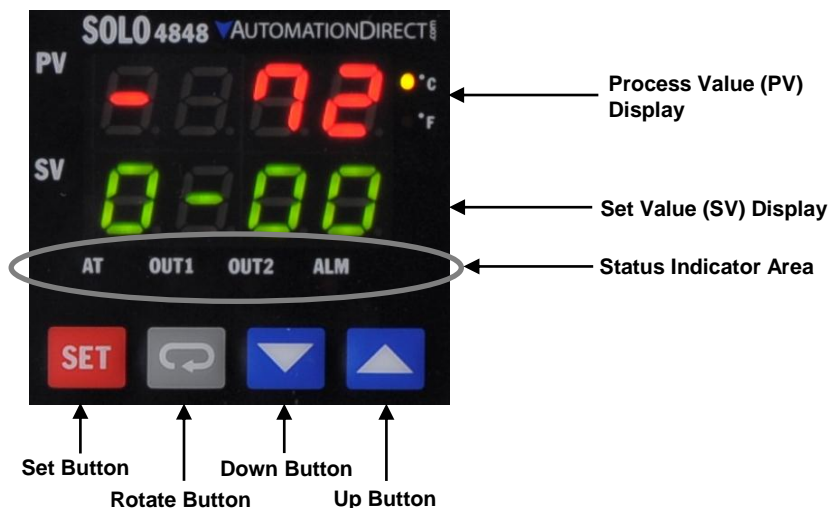
1. Toggle the on/off breaker switch to the On position.



(Model HC80-0 shown)

### The Solo Controller

HistoChill™ models designed for temperature control include a proportional-integral-derivative (PID) microprocessor controller. The Solo controller features a bright, two-line, two-color, seven segment LED readout.



## Display and Indicators

### Process Value (PV) Display

Displays the current fluid temperature in the bath.

### Set Value (SV) Display

Displays the desired fluid temperature.

## Adjusting Bath Temperature

1. Press the Up and/or Down buttons to increase and decrease the fluid temperature shown on the SV Display.
2. Press the Set button to select the displayed value.

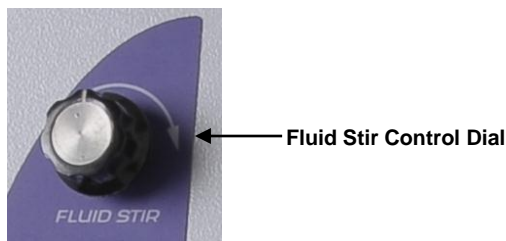
## Magnetic Stirrer

HistoChill™ models designed to include the optional temperature controller are equipped with a magnetic stirrer offering quiet, efficient stirring of the selected bath fluid.

**Note:** Do not operate the magnetic stirrer without fluid in the reservoir.

To operate the magnetic stirrer:

1. Activate the magnetic stirrer by rotating the Fluid Stir Control Dial clockwise.
2. Adjust the rotational speed of the stirrer by turning the Fluid Stir Control Dial clockwise (to increase the speed) and/or counterclockwise (to decrease the speed).



3. To deactivate the stirrer, rotate the Fluid Stir Control Dial counterclockwise.

The magnetic stirrer may be turned on or off at any time for procedural purposes, but in general, the unit should not be operated without stirring. If the reservoir fluid is not agitated, the fluid may exhibit thermal variations. SP Scientific recommends setting the Fluid Stir control dial to its maximum speed at all times for optimal operation and performance.

## Powering Off

To power off the HistoChill™:

1. Toggle the on/off breaker switch to the Off position.
2. The green indicator light shall turn off and the HistoChill™'s refrigeration system compressor(s) shall stop.

**Note:** *When the HistoChill™ is not in use, ensure that the bath reservoir lid is closed to prevent evaporation of the cooling fluid.*

## Restarting

Due to the nature of the refrigeration system and its compressor, the HistoChill™ should never be restarted immediately after it is powered off. SP Scientific recommends waiting approximately five (5) minutes between shutting down and restarting the HistoChill™.

Selecting a fluid or fluid mixture for use in your FTS Systems HistoChill™ is the single most important decision to be made. Always select a fluid that is appropriate for the temperature and/or temperature range at which you will operate your system. Improperly selected fluid can result in damage to both your process and your equipment. SP Scientific recommends using 3M™ Novec™ 7000 Engineered Fluid or equivalent for optimal performance.

Refer to the following table for a list of fluids that may be used with the FTS Systems HistoChill™.



CAUTION: BEFORE USING ANY FLUID PRODUCT, READ THE CURRENT PRODUCT MATERIAL SAFETY DATA SHEET AND ANY PRECAUTIONARY STATEMENTS ON THE PRODUCT PACKAGE. FOLLOW ALL APPLICABLE PRECAUTIONS AND DIRECTIONS.

### 3M™ Novec™ 7000 Fluid Selected Properties

Fluid	Temperature Range (°C)	Flammability	Toxicity	Dielectric
3M™ Novec™ 7000 <sup>5</sup>	-120 to 30	None	Very Low	High

<sup>5</sup> SP Scientific recommends using 3M™ Novec™ 7000 Engineered Fluid or equivalent for optimal performance. Before using this product, read the current product Material Safety Data Sheet and any precautionary statements on the product package. Follow all applicable precautions and directions.

## Fluid Filling

While operating at or above ambient temperature (approximately 22 °C (72 °F)), fill the reservoir with your selected fluid until the fluid is about 1 inch below the gasket.

If you add fluid while the system is at a sub-ambient temperature and you fail to drain fluid before returning the system to room temperature, the fluid will likely expand and overflow the fluid reservoir.

**Note:** *Fluids will typically contract when cooled and expand when heated.*

*The gasket at the top of the fluid reservoir does not provide a liquid tight seal.*

If the fluid reservoir chamber is overfilled, the liquid will flow over the rim of the fluid reservoir into the polyurethane insulation. Organic solvents will attack, dissolve and/or render ineffective the chamber insulation. When the insulation is saturated with solvent, the HistoChill™ may be unable to reach its maximum low temperature.



IF THE RESERVOIR IS OVERFILLED, THE FLUID MAY OVERFLOW THE RESERVOIR RIM AND SEEP INTO THE POLYURETHANE INSULATION. ORGANIC SOLVENTS WILL ATTACK AND DAMAGE THIS INSULATION MATERIAL, RENDERING THE INSULATION INEFFECTIVE. WITHOUT ADEQUATE INSULATION, THE HISTOCHILL™ WILL NOT REACH MAXIMUM LOW TEMPERATURES.

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## Magnetic Stirrer

If your system is equipped with a magnetic stirrer, you may switch it on once the reservoir has been properly filled with fluid. The magnetic stirrer must be on for the system to operate properly. Refer to the magnetic stirrer operation section of the previous chapter for additional information.

**Note:** *Do not operate the magnetic stirrer without fluid in the reservoir. Be sure the stirrer is turned off before emptying fluid from the reservoir.*

# Maintenance



ALWAYS SHUT OFF THE POWER SUPPLY TO THE UNIT BEFORE PERFORMING MAINTENANCE PROCEDURES.



ALWAYS NOTIFY THE SP SCIENTIFIC SERVICE DEPARTMENT BEFORE PERFORMING REPAIRS TO A UNIT THAT IS UNDER WARRANTY. FAILURE TO NOTIFY SP SCIENTIFIC SERVICE BEFORE PERFORMING REPAIRS WILL VOID THE FACTORY WARRANTY.

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## Cleaning

### Condenser

The refrigeration system is air-cooled. Room air is drawn across the finned condenser, over the compressor and out the unit's rear panel. The fins of the air-cooled condenser must be kept clean. The fins may be brushed clean using a stiff bristled brush. Blown compressed air, such as the type used to dust computers, may also be used to clean the fins. A buildup of dust or debris on the fins of the condenser will cause a reduction in cooling capacity, and in extreme cases, compressor failure.

Following the initial installation, SP Scientific recommends performing monthly visual inspections of the condenser until an adequate cleaning schedule can be established. The frequency of cleaning shall depend on the operating environment, as well as the frequency of operation.

### Bath System

Periodically wipe down the interior of the reservoir, including stainless steel components, using a soft cloth and mild soap solution. Do not use steel wool as it may lead to rusting of the exterior components. Dry the bath using a soft, dry cloth.

## Compressor Safeties

### Refrigerant Types and Properties

HistoChill™ models equipped with a single-stage refrigeration system use 1.27 ounces of R1270 or Propylene.

HistoChill™ models equipped with a cascade refrigeration system are comprised of two separate compressors which utilize two separate refrigerants. The first stage compressor, also referred to as the high stage, uses 1.27 ounces of R1270 (Propylene). The second stage compressor, also referred to as the low stage, uses 0.97 ounces of R170 (Ethane).

Properties		R1270 or Propylene	R170 or Ethane
National Fire Protection Association (NFPA) Rating	Health	1	
	Flammability	4	
	Instability	0	
	Special	0	
	Toxicity	This product is a gas at normal temperature and pressure, and in ultra-low quantities, this makes inhalation or ingestion very unlikely. No harm is expected from contact of gas to the skin and eyes, however, liquid may cause frostbite.	
	Personal Safety Information	If handling cylinders, wear gloves and OSHA approved eye and foot protection.	

### Refrigeration System

The HistoChill™ refrigeration system compressors are equipped with two safety devices for protection against low voltage or high temperatures. If the voltage drops below what is required for the compressor to operate, an overcurrent device turns the compressor off. If the compressor temperature rises too high due to insufficient air-cooling, a high-temperature thermostat deactivates the compressor.

**Note:** High temperature of the compressor can be caused by blocked airflow or by a malfunction of the fan motor.

The compressor will automatically start when the condition is corrected, but will again turn the compressor(s) off if the voltage is too low or the temperature is too high.



IF ANY REFRIGERATION SYSTEM PROBLEMS OCCUR MORE THAN ONCE, THE UNIT SHOULD BE SHUT OFF UNTIL THE CAUSE OF THE PROBLEM CAN BE DETERMINED AND CORRECTED. ALLOWING THE UNIT TO CONTINUE TO RUN DESPITE ENCOUNTERING A PERFORMANCE PROBLEM MAY LEAD TO FAILURE OF THE UNIT.



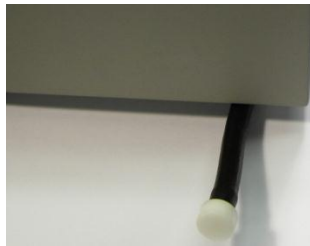
## Voltage

The voltage should not be above or below 10% of the voltage marked on the tag at the rear of the unit. To determine if the voltage is sufficient, the voltage should be measured while the compressor is drawing its starting current. During this time, any line drops will cause a significant voltage drop in inadequate wiring or on extension cords. Open circuit measurements are not satisfactory.

## Draining Fluid using the Capped Drain Line (HC55 only)

The basic HistoChill™ model HC55 is equipped with a drain hose that pulls out from the front of the unit to assist in draining the fluid from the reservoir.

To drain fluid, slide the hose out (as shown below), remove the drain plug and prepare a bucket to catch the fluid as it drains from the system.



**Drain Line on Model HC55**



# Appendix A: Troubleshooting

Condition	Recommended Corrective Action
<b>Unit will not start.</b>	<ul style="list-style-type: none"> <li>• Check power source. Ensure that the source voltage matches the unit's specified voltage.</li> <li>• Wait five (5) minutes after last power shut down before restarting.</li> </ul>
<b>Unit will not cool.</b>	<ul style="list-style-type: none"> <li>• Ensure that the unit has adequate airflow. Air is pulled from the left side of the unit to cool the refrigeration system components and then exits the rear panel.</li> <li>• Verify that the Chill light is illuminated (HC80 models only).</li> <li>• Ensure that unit has been positioned with a minimum of six (6) inches of clearance on all sides to maintain proper airflow and avoid damage to the refrigeration system.</li> </ul>
<b>Compressors will not start.</b>	<ul style="list-style-type: none"> <li>• Wait five (5) minutes after last power shut down before restarting. The HistoChill™ should never be restarted immediately after it is powered off. The refrigeration system compressor is equipped with a sensor designed to prevent the low-stage compressor from starting within several minutes of a loss of power, intentional or unintentional (e.g., power switched off, facility power outage, loss of main power, etc.).</li> </ul>
<b>Magnetic stirrer does not rotate.</b>	<ul style="list-style-type: none"> <li>• The driving magnet for the stirrer is located under the bath. This magnet is driven by a toothed drive belt, which is attached to a motor. Check the drive belt for proper tension. It is possible for the drive belt to tighten or loosen during shipment.</li> </ul> <p>To check the drive belt for proper tension:</p> <ol style="list-style-type: none"> <li>1. Switch off the unit.</li> <li>2. Unplug the unit and remove the cover.</li> <li>3. Ensure that the drive belt has slight tension.</li> </ol> <p>To adjust the tension of the drive belt:</p> <ol style="list-style-type: none"> <li>1. Loosen the drive motor mounting nuts and slide the motor until the belt shows slight tension (<i>i.e.</i>, 3/8- to 1/2-inch of play). The drive belt is toothed, and therefore, does not require full tension for operation.</li> <li>2. Retighten the mounting nuts once you have corrected the drive belt tension, and replace the cover.</li> </ol>
<b>Magnetic stirrer making noise.</b>	<ul style="list-style-type: none"> <li>• Ensure that the stirrer is centered in the bath and that the holding screws on the magnetic stirrer are snug. Refer to Chapter 2, Installation, for more information.</li> </ul>





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