

**OPERATING MANUAL**

**BFS-MP FREEZING STAGES  
FOR MICROTOMES**

**BFS-3MP, BFS-5MP, BFS-30MP**

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## **WARNING! DO NOT USE DRY ICE ON TOP OF THE STAGE**

Several customers have reported using Dry Ice (CO<sub>2</sub>) to speed up the freezing of tissue specimens mounted on their BFs series freezing stage.

This may cause several problems. Putting dry ice, which is at -85°C, directly onto the metal surface of the stage fools the controller into believing that the top plate has reached its set temperature and so it shuts off power to the thermoelectric cooling elements.

If there is too much dry ice on the plate it can cause irreparable damage to the thermoelectric modules which are designed for a temperature gradient of 60°C. With dry ice on the surface of the stage this gradient can exceed 100°C. This can cause severe mechanical stress on the components of the module due to thermal expansion and contraction and can literally shear it apart.

Bearing the above cautionary information in mind, it is possible to use dry ice of top of the specimen itself to reduce its temperature quickly.

Do not put the dry ice directly on the metal surface of the stage.

Please contact our technical department for further assistance.

1-800-452-8510

# BFS/MP SERIES THERMAL STAGES

## 1.0 GENERAL DESCRIPTION

1.1 Physitemp manufactures three freezing stages for use with microtomes. All stages operate in the same way and reach the same minimum temperature. They differ only in surface area, as follows:

BFS-3MP has stage area 3cm x 4cm

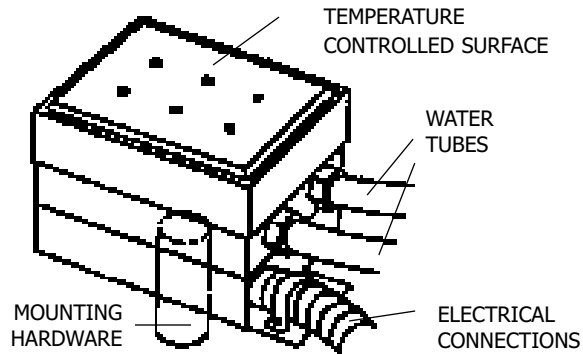
BFS-5MP has stage area 3.8cm x 4cm

BFS-30MP has stage area 7.5cm x 8cm

This manual also covers the FRM/MP series freezing microtomes which comprise a BFSMP Stage and an ERMA Microtome.

1.2 The BFS/MP THERMAL STAGE

The stage is a metal plate, 1/16" thick. Heat is supplied to or withdrawn from the specimen by means of an electric heat pump attached to the underside of the plate, and excess heat is conducted away by cooling water.



1.3 The CONTROLLER will maintain stage temperature at any point between -35° (-40° for BFS-30MP) and ambient. Resolution is 1/10°C. It has a simple set point control LED readout and pushbutton entry control. Once the unit is turned on, the LED displays the set point and current temperature. The set point can be adjusted by simply incrementing the set point up or down with the pushbuttons.

1.4 Optional PUMP AND TANK UNIT, PTU-3. The stage needs running water for operation. If access to a water tap is inconvenient, a circulating pump with a small water tank is required.

1.5 Optional ELECTRICALLY OPERATED SOLENOID VALVE, ECV-1, enables the user to activate a tap water supply with the controller power switch.

## 2.0 UNPACKING AND CHECKING THE PACKAGE CONTENTS

The BFS-MP Controller and Stage is comprised of the following items.

1. Digital Temperature Controller with AC line cord
2. A Freezing Stage with 3 foot connector lead and water tubing with self-sealing male fittings.
3. 5 foot water tubing extensions with self-sealing female fittings
4. Operating Manual with Warranty Registration Card

Optional Accessories purchased with the unit may include:

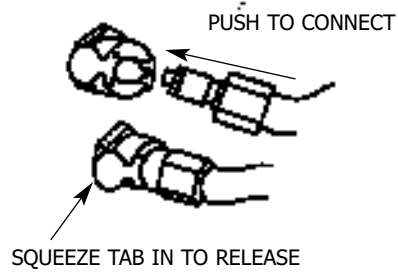
- 1 PTU-3 Pump and Tank Unit, supplied with AC line cord and 5 foot extension water tubes with male and female self-sealing fittings
- 2 ECV-1 Electrically Controlled Solenoid Valve, supplied with AC line cords and a 12VDC 1.3 Amp desktop power supply

### 3.0 SETTING UP THE SYSTEM

*This section gives instructions for set-up if the equipment is to be used with tap water:  
If a Pump and Tank Unit is to be used to circulate the cooling water, see Appendix 1*

#### 3.1 ATTACH THE WATER TUBES

Connected to the stage are an electrical lead and two PVC tubes which terminate in male self-sealing connectors. A pair of 5 foot water tubes with mating female connectors is also provided. Connect the 5 foot tube to the tubes on the stage. Attach one tube to the the laboratory water supply, while the other goes to a convenient sink or drain. The direction of the water flow through the stage is not important. The water supply should be adjusted until it flows steadily from the output tube without spurting.



If the water supply is accidentally reduced or turned off while the equipment is operating, the stage will tend to heat up. However, an electronic safety circuit will sense the rise in temperature and shut off power to the stage before damage can occur.

#### 3.2 ATTACH THE STAGE TO THE MICROTOME

If the make and model of the microtome were specified with the order, the freezing stage should have been shipped with the correct mounting hardware already in place. The most frequently used hardware is a 3/4" vise block. Other pillar and blocks are available as well as adaptor plates for many brands and models of microtome.

#### 3.3 CONNECT THE STAGE TO THE CONTROLLER

Connect the electrical lead from the stage to the mating socket on the rear of the controller. Rotate the collar on the connector housing in a clockwise direction to lock in place.

Connect the blue thermocouple plug to the mating socket on the rear panel. This is the Stage Temperature Feedback Sensor.

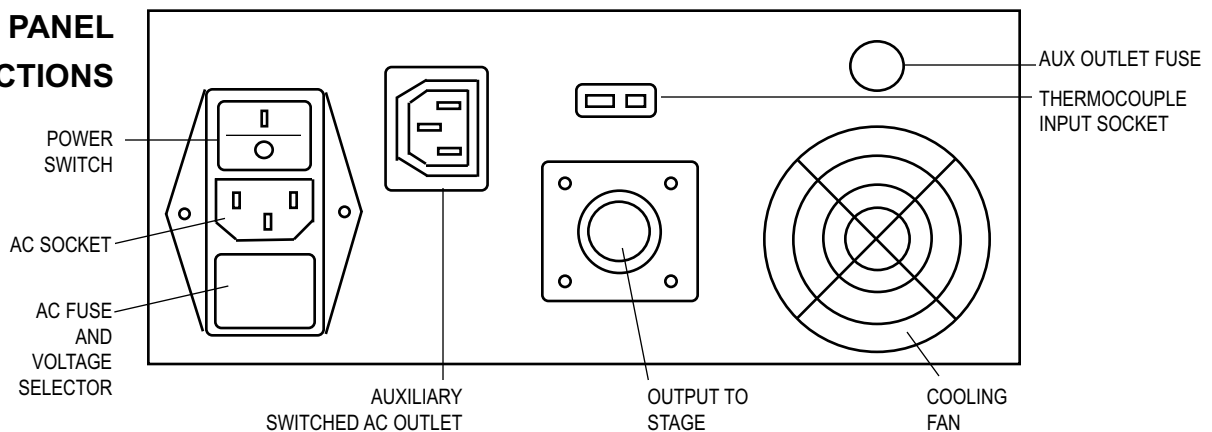
#### 3.3 ATTACH AC LINE CORD



Before connecting controller to AC power supply, check the VOLTAGE SELECTOR SWITCH on the rear panel to ensure that it is set for the correct line voltage..

Connect the line cord supplied with the controller to the mating socket on the rear panel.

### REAR PANEL CONNECTIONS



## 4.0 OPERATING INSTRUCTIONS

### WARNING

*The auxiliary AC outlet is designed for use only with our approved accessories, the PTU-3 Pump and Tank Unit and the ECV-1 Electrically Operated Solenoid Valve. No other AC devices should be connected to this outlet without first consulting our engineering department.*

- 4.1 Ensure that the POWER Switch on the rear panel of the controller is in the OFF position
- 4.2 Connect the AC power cord to any suitable grounded AC outlet.
- 4.3 Unless you have PTU-3 or ECV-1, turn on the water supply and adjust the flow rate until it flows steadily, without spurting.
- 4.4 Turn the POWER switch on the rear of the controller ON and ensure that the display on the front is illuminated.

If you are using ECV-1 and have installed it according to the instructions in Appendix 2, turn on the water supply now and adjust the flow rate as described above.

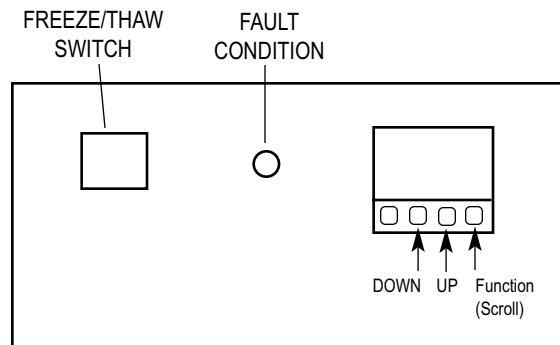
If you are using PTU-3, and have installed it according to instructions in Appendix 1, check that the neon lamp on the side of the pump is illuminated and you can hear a low hum from the pump. Check that the water is flowing by observation of air bubbles inside the tubing or remove the cap on the tank and check the water stream from the return tube which is located at the top of the tank underneath the tubing connections.

### 4.6 SETTING THE STAGE TEMPERATURE

The operating temperature may be set anywhere in the range from ambient down to  $-35^{\circ}\text{C}$  ( $-40^{\circ}\text{C}$  for BFS-30MP.)

Resetting the control temperature:

- a) Press Function key. SP will appear on the display
- b) Press UP or DOWN buttons and hold until desired set temperature is reached
- c) Press Function key again to store new temperature



**FRONT PANEL CONTROLS**

### WARNING

*Various functions of the display and controller are accessible via the three buttons on the display. It is inadvisable to make any adjustments to these parameters, which are preset at the factory for optimum performance. In the event that these operating parameters are changed accidentally, please consult our engineering department for restoration to the original settings.*

#### 4.7 REMOVING SPECIMEN FROM STAGE

Press the Freeze/Thaw switch and hold in the QUICK THAW position for a few seconds. Allow the stage to warm up until specimen slides off easily. Wipe stage dry.

#### 4.8 TYPICAL STAGE PERFORMANCE

The degree of cold obtained is dependent on the temperature of the cooling water. The stage temperature should reach 55-65° below that of the cooling water. Therefore, a stage temperature of -40° can be achieved under normal conditions. 1/2" thickness of liver which covers the stage should freeze within 15-20 minutes. Temperature throughout the tissue should drop to -20°C in a further ten minutes. Tissue under 1/16" in thickness should be ready for sectioning within 90 seconds after switching on.

#### 4.9 MEASUREMENT AND CONTROL OF TISSUE TEMPERATURE

One of the main advantages of these freezing stages is the ease with which the temperature of frozen tissue can be changed. Optimum cutting temperature varies for different tissue and is best determined by experiment. The following temperatures have been found satisfactory:

TISSUE	TEMPERATURE °C
Kidney	-15
Brain	-18
Liver	-18
Thyroid	-20
Skin	-30
Keloid	-35
Patella	-40

#### 4.10 ADJUSTING THE VIEWING ANGLE OF THE INSTRUMENT

The two front feet can be flipped down to adjust the viewing angle. Rotate the feet down and towards the front until they lock in position. To return the original position, pull down slightly then rotate back.

### 5.0 TROUBLESHOOTING

- 1 Controller display fails to illuminate when power is turned on

Check power cord continuity from the AC outlet to the input socket on the rear of the controller. Check the fuse next to the AC input socket in the rear panel. If these are both OK, try a different AC outlet

- 2 Fault Condition lamp is illuminated

As a safety feature, this unit has power supply short circuit protection. In the event that the output becomes short circuited by a wiring fault, a protection circuit built in the power supply senses the increase in current and shuts off the output power. Before output power can be restored to the controller, the AC power supply must be turned off and the fault condition corrected. Consult our engineering department for further details.

If the PTU-3 or ECV-1 is being used, check for adequate water flow as described in section 3.1. Touch the silver heat sink, the middle segment of the stage, to see if it is hot to the touch -- this would indicate a low or inadequate flow rate.

If water flow is OK, the stage or controller may be defective. In order to check the stage, turn off the power to the controller and remove the stage connection from the rear of the controller by turning the

collar in an anti-clockwise direction. An ohmmeter will be required to make several readings on the stage connector. Once the connector has been removed the pin numbers are visible as slightly raised numerals on the face of the connector.

Between pins	1 and 2	1 - 3 ohms
	6 and 7	20 - 27 Kilohms

If the readings you obtain do not fall within these ranges, please consult our engineering department.

3      Controller display is illuminated but module does not cool

Check the setting of the set temperature and adjust if necessary using the instructions provided in Section 4.6. If the set temperature is OK check the connector to the module cable on the rear of the controller and the fault condition light on the front of the controller.

If the fault light is on follow the instruction for fault condition number 2.

4      Display reads "OPEN".

The thermocouple feedback sensor is either broken or disconnected.

## 6.0 SPECIFICATIONS

### 6.1 CONTROLLER

Operating Range:	BFS-3MP and 5MP:	-35°C to ambient
	BFS-30MP:	-40°C to ambient
Digital Readout Resolution:	0.1°C	
Accuracy:	±0.2°C	
Ambient Operating Range:	15° - 45°C	
AC Supply Operating Range:	Voltage	100 - 240VAC 350VA
	Input Current	3.2A max.
	Frequency	47-63Hz
Power Output to stage:	BFS-30MP	- 12VDC @ 10Amps
	BFS-3 & 5 MP	- 5VDC @ 10Amps
Display:	Dual LED display of set and run Temperature	
Safety Features:	Power shutoff during over-temperature condition caused by inadequate coolant flow (50°C). Short circuit protection.	
Size:	9 1/2" wide x 10" deep x 4 1/2" high	
Weight:	5 lbs	
Other Features:	Self-sealing water connectors. Auxiliary switched AC output for ECV-1 or PTU-3. 2A max	

### 6.2 STAGE

Temperature Range:	-40°C to ambient
Controlled Surface Area:	BFS-3MP - 3 x 4cm
	BFS-5MP - 3.8 x 4cm
	BFS-30MP - 7.5 x 8cm
Weight:	15ozs, including leads
Lead Length:	5ft



## **7.0 MAINTENANCE, WARRANTY AND SERVICE**

### **7.1 MAINTENANCE**

The stage needs no maintenance at all. It may be cleaned as necessary with a soft cloth, water or detergent. **DO NOT IMMERSE IN WATER**

### **7.2 WARRANTY**

Physitemp Instruments Inc. warrants this system to be free from defects in material or workmanship for 12 months from date of shipment. Repair or replacement will be made at no charge at the discretion of Physitemp if the defect is not the result of misuse or abuse. Physitemp accepts no consequential liability for delay in delivery, alleged faulty performance of the product or any other cause.

Cables and probes are considered expendable and are not covered by this warranty.

### **7.2 REPAIRS AND RECALIBRATION**

For technical applications information on this instrument contact us at:

Tel: 973-779-5577

Fax: 973-779-5954

E-mail: [physitemp@aol.com](mailto:physitemp@aol.com)

In the event that any part of this system is to be returned for repair or recalibration, please pack it with care (in the original packing material if possible) and send it prepaid to:

Service Department  
PHYSITEMP INSTRUMENTS INC  
154 Huron Avenue  
Clifton, NJ 07013 USA

Please include with the instrument:

1. A note describing any problems encountered
2. The name and telephone number of a person we can contact
3. The complete return address for shipping.

For your protection, please pack the item carefully and insure against possible damage or loss. Physitemp will not be responsible for damage resulting from careless packaging. Please return freight prepaid.

**APPENDIX 1**  
**OPERATING INSTRUCTIONS FOR PHYSITEMP**  
**PUMP AND TANK UNIT, PTU-3**

1. Unscrew cap. Fill reservoir with 5 gallons of distilled water.
2. Connect extension tubing to the back of the controller and the connections on the tank. Direction of the flow is not important. All water fittings are automatically self-sealing when disconnected to prevent water spills.
3. Connect the AC line cord to the receptacle on the pump and to the outlet on the rear of the controller. This ensures that water is always flowing when the controller is on.
4. Switch on the controller.

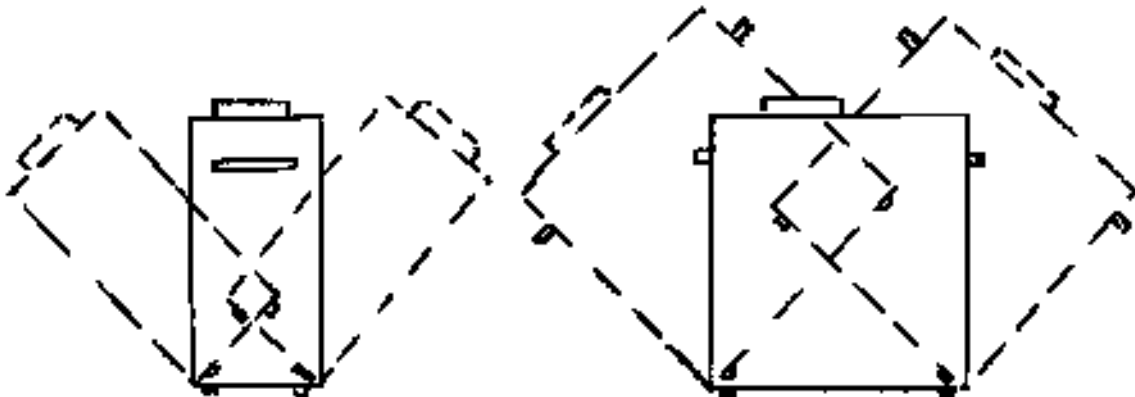
**GENERAL INSTRUCTIONS**

The use of distilled water is recommended. This avoids discoloration of the tubing due to organic matter in untreated water. A purification agent can be added to the water. Any commercially available dehumidifier treatment in liquid, powder or tablet form may be used.

If the stage will be operated for long periods, water temperature may gradually increase. Ice cubes can be added to the tank to maintain low temperature.

The tank should not be placed more than three feet below the stage itself.

When filling the reservoir for the first time, or when refilling it, a small amount of air may become trapped in the pump housing and cause intermittent noise, cavitation and a reduced flow rate. If this occurs, screw the cap firmly onto the tank and, while pump is running, tip it at an angle of approximately 45 degrees to the horizontal in all four directions as shown below. This will eliminate air in the pump housing and restore flow to its maximum.



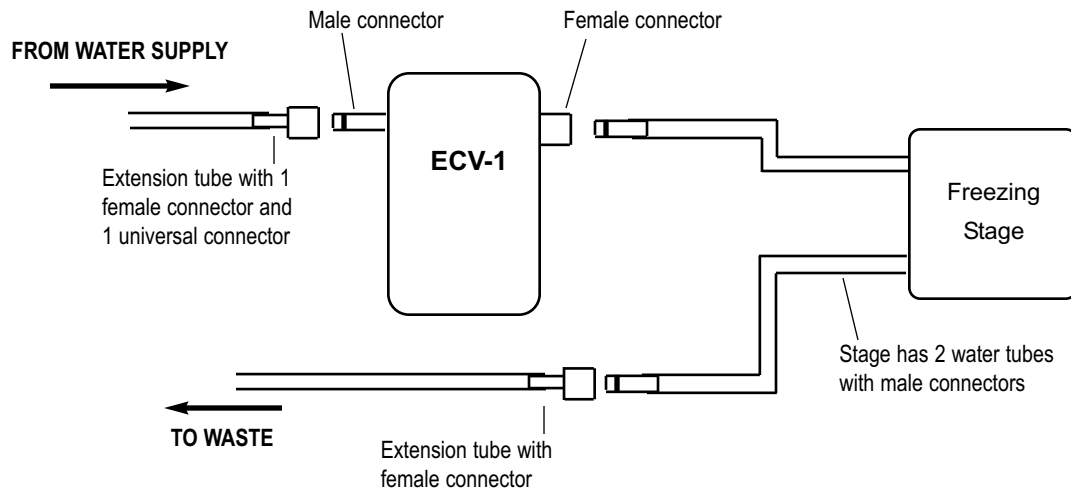
## APPENDIX 2

### OPERATING INSTRUCTIONS

#### ECV-1 ELECTRICALLY OPERATED SOLENOID VALVE

The ECV-1 is supplied with an AC line cord and 12 VDC desktop power supply.

- 1 Connect the line cord to the socket on the power supply and to the rear auxiliary outlet on the BFS-MP controller.
- 2 Connect the 12VDC power supply to the input socket on the front of the ECV-1.
- 3 Connect the water tubes as shown below:





PHYSITEMP INSTRUMENTS INC

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email: [physitemp@aol.com](mailto:physitemp@aol.com)

# **OPERATING MANUAL**

## **BFS-MP SERIES FREEZING STAGES**

**Models BFS-3MP, BFS-5MP, BFS-30MP**