

# - CUSTOM BIOGENIC SYSTEMS - 2100 CONTROLLED RATE FREEZER SET-UP & TECHNICAL MANUAL



150 Shafer Drive • Romeo , MI 48065 • U.S.A.  
1.800.523.0072 • Ph: 586.331.2600 • Fax: 586.331.2588



Leading the World with Innovative Cryopreservation Technology Solutions

Visit our website at: [www.custombiogenics.com](http://www.custombiogenics.com)

European Authorized Representative  
**EMERGO GROUP**  
Molenstraat 15  
2513 BH, The Hague  
The Netherlands

**EC REP**

## - IMPORTANT INFORMATION -

We at Custom Biogenic Systems are proud of our work, and appreciate your purchase of this product. With proper care, this equipment will be trouble-free for many years to come. Before setting up and using your new cryogenic rate freezer, first check to see that all parts are accounted for and that no damage has occurred during shipping. Also, read this manual completely before proceeding to set-up. If at any time you are unsure of the procedures for set-up and use of this product, please contact CBS or your CBS sales representative.

**NOTE:** If equipment is used in a manner not specified by Custom Biogenic Systems, the protection provided by the equipment will be impaired.

### PRODUCT WARRANTY

Custom Biogenic Systems, warrants all manufactured cryogenic equipment to be free from defects in workmanship or materials, for a period of three years.

Custom Biogenic Systems' liabilities under the warranty shall be limited to correcting or replacing the defective workmanship or materials. A claimant under the warranty must notify Custom Biogenic Systems within ten (10) days after discovery of the defect. Custom Biogenic Systems reserves the right, at their discretion, to correct the defect(s) in the field without return shipment to Romeo, Michigan.

This warranty does not cover defects on cryogenic equipment resulting from abusive handling and subsequent structural failure.

Rate Freezer Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

**For Technical Assistance Call: 1-800-523-0072**

Phone: (586) 331-2600 Fax: (586) 331-2588

## - LIQUID NITROGEN SAFETY -

**IMPORTANT:** The following section on LIQUID NITROGEN SAFETY should be read carefully and be followed completely, but is by no means a complete volume on the safe use of cryogenic liquids. All personnel should have a complete knowledge of the correct procedures, as well as the hazards of working with liquid nitrogen. Failure to do so could result in serious injury or death.



### WARNING



LIQUEFIED GASES ARE EXTREMELY COLD LIQUIDS - LIQUID NITROGEN EXISTS AT  $-196^{\circ}\text{C}$ . BECAUSE OF THESE COLD TEMPERATURES, LIQUEFIED GASES WILL “BURN” IF THEY COME INTO CONTACT WITH SKIN. NEVER ALLOW DIRECT SKIN CONTACT WITH LIQUID NITROGEN OR SERIOUS BURNS WILL RESULT.

ALTHOUGH LIQUID NITROGEN ITSELF IS NON-TOXIC, WHEN RELEASED INTO A CONFINED SPACE IT CAN DISPLACE OXYGEN CAUSING ASPHYXIATION. ENTERING AN OXYGEN DEFICIENT ROOM CAN CAUSE UNCONSCIOUSNESS WITHOUT WARNING. ALWAYS CHECK AIR QUALITY UPON ENTERING A ROOM WHERE CRYOGENIC LIQUIDS ARE BEING USED, AND IF POSSIBLE, HAVE AIR RESPIRATORS AVAILABLE.

INTRODUCING EQUIPMENT WHICH IS AT ROOM TEMPERATURE INTO LIQUID NITROGEN IS ALWAYS SOMEWHAT HAZARDOUS. BEWARE OF SPLASHING AND “BOILING” WHICH MAY OCCUR. ALL PERSONNEL PERFORMING THESE OPERATIONS SHOULD BE FULLY INFORMED OF PROPER HANDLING PROCEDURES, AND SHOULD ALWAYS WEAR A FACE SHIELD AND PROTECTIVE CLOTHING.

LIQUEFIED GASES SHOULD NEVER BE USED IN COMBINATION WITH OTHER SUBSTANCES WITHOUT KNOWING WHAT THE RESULT WILL BE. WHEN IN DOUBT, CONTACT A COMPETENT AUTHORITY.



# - LIQUID NITROGEN SAFETY -

## HANDLING LIQUID NITROGEN

Personnel handling liquefied gases should be thoroughly instructed as to the nature of these materials. Proper training is essential to safety, and will ensure the accident-free use of this equipment.

Because of their low temperatures, liquefied gases will burn the skin much in the same way as hot liquids can. For this reason, always wear the proper protective clothing when handling these materials. It is advised that during use, handlers of liquid nitrogen should protect themselves by wearing goggles or face shields, cryogenic gloves large enough to allow quick removal and a cryogenic apron. It is preferable that shoes worn at these times have high tops, as to not permit accidentally spilled liquid from entering, as well as pant legs which come down over the tops of shoes for further protection.

Also because of the extremely low temperatures, liquid nitrogen should only be handled and transported in approved containers. Many materials become brittle and may shatter when put into contact with liquid nitrogen and other cryogenic liquids.

## FIRST AID

In the event a person is burned by liquefied gas, the following first aid treatment should be given while awaiting the arrival of medics or a doctor:

- 1) If the material has contacted skin or eyes, flood those areas with large quantities of unheated water and protect frozen areas with loose, bulky, dry, and sterile dressings.
- 2) If the skin is blistered or there is a chance that the eyes have been affected, seek medical help immediately.

# TABLE OF CONTENTS

## **1.0 INTRODUCTION**

- 1.1 THEORY OF OPERATION*
- 1.2 HOLD FUNCTION*
- 1.3 REVIEWING DATA*
- 1.4 THE NOTEBOOK PC*

## **2.0 INSTALLATION AND SETUP**

### *2.1 UNPACKING*

- 2.1.1 INITIAL INSPECTION*
- 2.1.2 UNPACKING PROCEDURE*
- 2.1.3 DETECTED DAMAGE*
- 2.1.4 EQUIPMENT RETURN*
- 2.1.5 STORAGE*

### *2.2 INSTALLATION*

### *2.3 CONNECTION*

- 2.3.1 POWER CONNECTIONS*
- 2.3.2 THERMOCOUPLE CONNECTIONS*
- 2.3.3 USB CONNECTIONS*
- 2.3.4 SOLENOID VALVE CONNECTIONS*
- 2.3.5 OPTIONAL POWER CONNECTIONS*
- 2.3.6 LIQUID NITROGEN SUPPLY CONNECTION*

### *2.4 ALARM DEVIATION*

## **3.0 BASIC OPERATING INSTRUCTIONS**

### *3.1 PREVIEW*

### *3.2 PROGRAM*

### *3.3 START FREEZE RUN*

### *3.4 USER ACCOUNTS*

### *3.5 LOGOUT*

### *3.6 VIEW OLD DATA*

### *3.7 CONFIG FIELDS*

### *3.8 CALIBRATION*

## **4.0 ADVANCED SETUP**

### *4.1 PRINTING OPTIONS*

### *4.2 AUDIT TRAIL FUNCTIONS*

## **5.0 SPECIFICATIONS, TROUBLESHOOTING GUIDE, CLEANING, & MAINTENANCE**

## ***1.0 INTRODUCTION***


Welcome to the Custom BioGenic Systems Model 2100 Controlled Rate Freezing System. This system consists of a freezing chamber, notebook PC equipped with Microsoft Windows operating system, Cryogenic Freezing Software, sample probe, sample rack, storage cabinet (optional), and a liquid nitrogen transfer hose. Optional equipment will not be described in this document, and you should read and understand the documentation appropriate to the optional equipment that you purchased, if any.


This machine is a versatile Cryogenic Rate Freezer. It has all the capability of a traditional Cryogenic Rate Freezer, with a number of specific exceptions - *NO PAPER CHART RECORDER IS REQUIRED, ALL FUNCTIONS ARE EXECUTED WITHIN A DEDICATED NOTEBOOK PC, ALL DATA IS STORED IN THE INTERNAL HARD DRIVE AND CAN BE VIEWED AND PRINTED VIA THE NOTEBOOK PC.*

## ***1.1 THEORY OF OPERATION***

This Cryogenic Rate Freezer freezes at pre-defined, user programmable rates. This means that the user has total freedom when it comes to programming their freezing profiles. A few good practices when programming and running profiles is: 1) *THE CHAMBER TEMPERATURE SHOULD BE USED FOR CONTROLLING THE FREEZING OF THE SAMPLE.* This means that, due to the principles of Thermodynamics, any mass (such as a sample) that is within the chamber HAS to follow that chamber's temperature profile. 2) *THE SAMPLE TEMPERATURE SHOULD ONLY BE USED TO AUTOMATICALLY CONTROL THE ADVANCEMENT OF STEPS WITHIN A PROFILE, NOT TO CONTROL THE ENTIRE FREEZING PROCESS.* 3) *PLACING THE SAMPLE PROBE WITHIN THE SAMPLE WILL ALWAYS YIELD THE MOST ACCURATE AND REPEATABLE FREEZE RUNS.* If it is not possible to place a probe inside a sample due to the sensitivity of the material, an equivalent *dummy sample* can be used. This just involves using the same type of sample receptacle (i.e. vial, bag, straw) that has an equivalent mixture of whatever is being frozen, minus the actual sample material. In this way the user can be confident they're getting the most accurate and repeatable results possible, without compromising an actual sample.

## ***1.2 HOLD FUNCTION***

Another important aspect of the Cryogenic Rate Freezer is the fact that *ANY STEP WITHIN A PROFILE THAT IS PROGRAMMED WITH A ZERO DEGREE RATE AUTOMATICALLY GETS INTERPERETED BY THE SOFTWARE AS A "HOLD" FUNCTION.* This means that if the step is programmed to cool at 0° per minute, the machine will attempt to cool to the set point as fast as possible and then hold there until the  button is pressed, regardless if any hold time is programmed in. This is typically done during the first step in a profile based on how the user prepares the samples for insertion into the chamber. EXAMPLE: A user is freezing 2ml vials of fluid. They keep the samples in an ice bath until they are ready to insert them into the chamber. An ice bath is typically no warmer than +4°C, so the user programs the first step in the profile to cool at 0° per minute down to +4°C. The ZERO DEGREE RATE

causes the chamber to cool to and hold at +4°C. The user then loads the samples into the chamber, presses the  button, and the freezing profile advances to the next step. It will then continue to advance through the programmed steps as long as another ZERO DEGREE RATE is not encountered.

### ***1.3 REVIEWING DATA***

Data can be viewed as it is being acquired, and after the freeze run has completed. When viewing data during a freeze run, there are two tabs at the top of the graph labeled RECENT DATA and ALL DATA. The RECENT DATA view is selected by default and shows only the most recent portion of the freeze run. The ALL DATA view is used to see the entire run up to the current time.

**IMPORTANT:** The RECENT DATA view should be selected for the majority of the run. The ALL DATA view is used to periodically check the entire run up to the current time. If the ALL DATA view is left selected during the entire run, the time that is logged will become offset from “real time”.

Due to the fact that the software is continually updating and displaying a growing number of data points, the same loop of code takes longer and longer to execute as time goes on. This manifests itself as a time loss as compared to real time. It has been observed to be 10-15 seconds of loss per hour. While it does not adversely affect the operation of the Cryogenic Rate Freezer, this time loss does exist, but only builds up when the ALL DATA view is selected for an entire freeze run. The vast majority of users will not be concerned with this effect.


When viewing data after a freeze run, click on the  button on the main menu to select a file to view. Use the DATA VIEWING FUNCTIONS (*figure 1 below*), indicated by the small magnifying glass, cross hair, and hand icons located to the right of the graph to view the data. Clicking on these icons reveals zoom, selection, and manipulation modes. The DATA VIEWING FUNCTIONS are also available during a freeze run.



Figure 1

### ***1.4 THE NOTEBOOK PC***

The notebook PC that ships with the Cryogenic Rate Freezer is DEDICATED to controlling the machine. It is not intended to be used for “NORMAL” PC functions (i.e. internet browsing, networking, word processing, etc.) with the exception of the uses defined in this manual (such as printing). Because it is strictly a controller for the chamber, the notebook PC does not have any anti-virus software and has its network options DISABLED. Any uses other than the ones explained in this manual will be considered to void the warranty.

## **2.0 INSTALLATION AND SETUP**

### **2.1 UNPACKING**

#### **2.1.1 INITIAL INSPECTION**

Check to make sure that you have received a total of three boxes. The first box will contain the rate freezer chamber. The second box will contain the notebook PC. The third box will contain the requested sample rack and a liquid nitrogen transfer hose. Exercise care when unpacking the rate freezer from the shipping carton. The rate freezer is packed in a custom cardboard box to prevent damage during normal transit. If damage to the shipping carton is evident, ask the carrier's representative to be present when the instrument is unpacked.

#### **2.1.2 UNPACKING PROCEDURE**

Of the three boxes you receive, box 1 will contain the rate freezer chamber. To unpack your rate freezer chamber, first remove the foam retainer and the rate freezer chamber from the shipping carton. Box 2 will contain the notebook PC. To unpack the notebook PC, remove the PC itself, the battery, power supply & cord, and the PC software package. Box 3 will contain the requested sample rack and liquid nitrogen transfer hose. To unpack the sample rack and transfer hose, simply remove them from the box and remove any foam or packing materials from them.

#### **2.1.3 DETECTED DAMAGE**

Once all items are removed from their respective boxes, check them for damage. Also check that the unit is as ordered. If damage is detected after unpacking the rate freezer, immediately report it to the shipping agent and re-pack the rate freezer for return to the factory as described in the following section.

#### **2.1.4 EQUIPMENT RETURN**

Before returning damaged or malfunctioning equipment to the factory for repair, contact the sales organization from which you purchased the equipment. A Return Merchandise Authorization (RMA) number *MUST* be obtained from the factory before returning equipment for any reason.

#### **2.1.5 STORAGE**

For prolonged storage before installation, re-pack the rate freezer in the shipping container and store in a cool, dry area. We do not recommend storage of the rate freezer for more than six months. If longer storage time is required, contact the factory for additional storage information.

## **2.2 INSTALLATION**

The rate freezer is intended to operate in the following environment:

### **Indoor use only**

**Installation Category II** per IEC664

**Pollution Degree Level II** per IEC61010-1

**Temperature:** 10°C to 50°C operating per IEC61010-1

**Humidity:** Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

**Rate Freezer Power Requirement:** 120VAC or 220VAC depending on destination country. Check indication on unit.

**Liquid Nitrogen Supply Pressure:** Must be between 18-22 psi 22 psi max.

### **2.2.1 BENCH TOP INSTALLATION**

The rate freezer should be set on a bench top in a vertical position to ensure proper operation. Ensure that you have the proper clearances for the liquid nitrogen connection.

### **2.2.2 OPTIONAL STORAGE CART INSTALLATION**

Same as above, except the rate freezer is set on the optionally purchased storage cart.

### **2.2.3 NOTEBOOK PC INSTALLATION**

The notebook PC was intended to be set on top of the rate freezer chamber. If another location other than the top of the chamber is required, contact the factory for additional installation instructions.

## **2.3 CONNECTION**

Make all of the following connections BEFORE turning on the notebook PC.

### **2.3.1 POWER CONNECTIONS**

The rate freezer is designed to operate on either 120VAC or 220VAC, depending on the destination country. Check to make sure that the rate freezer voltage is the correct voltage for the local power system. The rate freezer is supplied with either a North American style plug or a European style plug, depending on the destination country. User supplied adapters may still need to be utilized to properly connect to main power.

The notebook PC has its own universal power supply that operates between 100-240VAC, and can be plugged into an available power outlet in the rear electrical panel.

**See 2.3.5 Optional Power Connections.**

### **2.3.2 THERMOCOUPLE CONNECTIONS**

The rate freezer uses two different Type T thermocouples, denoted as CHAMBER and SAMPLE probes. The CHAMBER probe is factory installed and should not need to be adjusted. The SAMPLE probe connection is located on the inside of the chamber in the upper left hand corner of the fan guard. Insert the male end of the SAMPLE probe into the female jack in the fan guard. The thermocouple plugs are designed to only fit one way, so make sure that the male and female sides of the plug are lined up correctly.

### **2.3.3 USB CONNECTIONS**

There are two USB plugs that emerge out of the top of the Rate Freezer Chamber that need to be connected to USB ports on the Notebook PC. It does not matter which plugs go to which ports.

### **2.3.4 SOLENOID VALVE CONNECTIONS**

There are two solenoid valves in the rate freezer denoted as COOL and COOL+. These are connected to outlets in the rear electrical panel by North American style power cords. The valve that is deeper in the fiberglass cavity is the COOL valve. The valve that is closest to the outside is the COOL+ valve.

### **2.3.5 OPTIONAL POWER CONNECTIONS**

There is one available power outlet in the rear electrical panel. This is used to power the notebook PC.

**WARNING:** The available power outlet is INTENDED for the notebook PC. Do not power any equipment that is not specified in this manual, without first contacting the factory for additional instructions.

### **2.3.6 LIQUID NITROGEN SUPPLY CONNECTION**

The liquid nitrogen supply connection is located between the external solenoid valves. This connector accepts a standard LN<sup>2</sup> transfer hose.

## **2.4 ALARM DEVIATION**

The alarm deviation consists of two things. 1) The temperature difference between the CHAMBER and TARGET values that has to exist for a TRACKING ALARM to occur, and 2) The amount of time that these two values are not equal before a TRACKING ALARM occurs. The default settings are 5°C for 1 minute. This means that if the CHAMBER temperature is deviated 5°C or more from the TARGET temperature, for 1 minute, a TRACKING ALARM occurs. These values can be changed in the PROGRAM menu.

## 3.0 BASIC OPERATING INSTRUCTIONS

### 3.1


A blue rectangular button with the word "Preview" in white text.

This menu button allows the user to preview a previously programmed profile, or to see a graph of the rates in their programming as they make changes. This function is intended to simplify the creation of freezing profiles.


### 3.2

A blue rectangular button with the word "Program" in white text.

This menu button allows the user to program, edit, and save freezing profiles. This function is typically done after the profile is perfected in the preview menu. Below are the steps to program a freezing profile:

- 1) At the main menu, click on the  button.
- 2) This will open a new window called PROGRAM PROFILE SCREEN. The program profile screen is where you will enter the steps of the profile. The number of each step will automatically be created when entered.

**NOTE:** The preferred method for starting a freezing cycle is to enter the wait pre-cool function. Enter a 0 (zero) as the cooling rate by clicking the pointer on the cooling rate area of step one and using the numbers on the computer keyboard. The “HOLD” function will pre-cool the chamber and keep the chamber temperature at the programmed target value. A step with a 0 (zero) rate will hold indefinitely at the programmed temperature, regardless if any hold time is programmed in.

- 3) Click the pointer on the Rate area. Use the number keys on the keyboard to enter the rate value.
- 4) Click the pointer on the target temperature area.
- 5) Click the cursor on the HOLD TIME area of the PROGRAM PROFILE SCREEN. Keep in mind that the use of hold times is not necessarily required, but may be desirable for certain users.
- 6) Enter all required values for the first step of the program.
- 7) Click on the  button.
- 8) Continue adding steps until the profile is complete.

**NOTE:** The software does not require an end of program command. The last step is interpreted as the end of the profile, and the chamber will sound an alarm and hold at the last programmed temperature indefinitely.

### 3.3

#### Start Freeze Run

This menu button brings up the profile and freeze name selection screen. Here are the steps to start a freezing run:

- 1) Click on the ASSIGN A FREEZE NAME button. A standard windows file requester screen appears. Give the run a new name or select a previously saved run.

**NOTE:** If a run already exists, a dialog box that says “Freeze name already exists. Overwrite existing file?” appears when the run button is clicked. If yes is selected, the freeze run previously saved under that name will be overwritten by the subsequent run. It is recommended to give each run a unique name to avoid unintentionally overwriting a freeze run as once this is done, there is no way to revert back to the previous freeze run that was saved on your machine.

- 2) Click on the SELECT FREEZE PROFILE button. A standard windows file requester screen appears. Select a saved freezing profile.
- 3) Click on the RUN button. The run screen will appear.
- 4) Click the START RUN button in the lower right corner to start the freeze.

### 3.4

#### User Accounts

This menu button allows the user to configure multiple users and passwords, and also to enable or disable security. There are also different levels of access that can be assigned to each user. Click on the blue question mark in the upper right hand corner to see a description of the access levels.

**NOTE:** The user names and passwords set up within the Rate Freezer Software have nothing to do with Windows user names and passwords. They are separate and independent.

### 3.5

#### Logout

This menu button is only usable when security is enabled in the user accounts menu. It allows users to logout of the system.

### 3.6



This menu button allows users to view and print previously saved freeze runs. The default print out consists of an information header and the graph. **See 4.0 Advanced Setup for other printing options.**

### 3.7



This menu button allows the user to define the **labels only** for the database fields that can be saved for each freeze run. This information is entirely optional and is used for database searching of freeze run information.

### 3.8



This menu button allows the user to access the thermocouple calibration screen.

**NOTE:** Calibration is done for the supplied probes at the factory. It is recommended that calibration be done at least once a year or if a probe is replaced.

Calibration should only be attempted by CONFIDENT users. This means that, although calibration is relatively simple, it should not be attempted until the user has read the manual and is comfortable with the machine. The chart recorder calibration screen is also accessible from the thermocouple calibration screen. This is for the optional Linseis style chart recorder.

**Reminder:** In the upper right corner of the calibration screen is a blue question mark. Click on it for an exact explanation of calibration for the thermocouple probes and the chart recorder. If the steps in the explanation are followed, the calibration will be easy and successful.

## 4.0 ADVANCED SETUP

The following options require the modification of an INI file located in the hard drive of the notebook PC, C:\Program Files\Cryogenic Rate Freezer\release custom biogenic systems\data\crfs. **DO NOT ATTEMPT TO MODIFY THIS FILE UNTIL THIS ENTIRE SECTION (4.0 - 4.3) IS READ AND UNDERSTOOD.**

After the INI file is modified correctly, press ctrl+S to save the INI file in its modified form. Only then will the changes take effect.

### 4.1 PRINTING OPTIONS

There are several printing options that can be enabled through the modification of the INI file. These are as follows:

SHORT = info header and graph, default setting.

LONG = info header, graph, and every data point taken from the thermocouples during the run.

**WARNING:** This option produces hundreds of pages of data and is usually only needed for validation purposes. If it needs to be used, make sure to switch the option back to SHORT or GRAPH to avoid printing hundreds of pages of data every time a freeze run graph is printed.

GRAPH = graph only printouts.

## ***4.2 AUDIT TRAIL FUNCTIONS***

The audit trail is an advanced feature that allows the tracking of freeze runs, new users added, users deleted, users edited, and profile changes. It also keeps track of invalid logins and locks the system out after repeated failed attempts. It only operates if security is "Enabled" in the user accounts menu. The audit trail is saved as an un-modifiable file and builds up indefinitely until the hard drive runs out of space. It is possible to disable the audit trail while still retaining user account functionality. Consult factory for details.

## ***5.0 SPECIFICATIONS***

**INPUT POWER:** The chamber voltage depends on destination country and should be specified when ordered. Either 120 VAC or 220 VAC. The notebook PC has a universal power supply rated for 100-240 VAC.

**OUTPUTS:** Outputs data to a printer. Printer is set up independently and supplied by the user.

**NO. OF CHANNELS:** 2

**THERMOCOUPLES:** Type T, +50°C to -200°C

**CHAMBER TEMPERATURE TOLERANCE:** +/- 2°C, This means that any point in the chamber is within +/- 2°C of the chamber probe temperature.

**RANGE OF RUNNABLE RATES:** Slowest rate possible is .01 degrees per minute. Fastest rate possible, ***with a 22 psi liquid supply***, is 99 degrees per minute.

**ENVIRONMENTAL:**

**Indoor use only**

**Installation Category II** per IEC664

**Pollution Degree Level II** per IEC61010-1

**Temperature:** 10°C to 50°C operating per IEC61010-1

**Humidity:** Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

**Rate Freezer Power Requirement:** 120 VAC or 220 VAC depending on destination country. Check indication on unit.

**Liquid Nitrogen Supply Pressure:** Must be between 18-22 psi, 22 psi max.

**AUDIBLE:** Internal buzzer.

**DIMENSIONS:**

## - TROUBLESHOOTING GUIDE: ALARMS -

CONDITIONS	CAUSES	SOLUTIONS
<b>Tracking Alarm</b>	The chamber temperature has been deviated from the target temperature for the programmed amount of time and temperature deviation.	This alarm is self correcting, which means that the alarm will reset once the values come back into range. Verify proper LN2 supply operation, i.e. correct pressure(18-22 psi, 22 psi max),and use of the shortest possible transfer hoses. Also, alarm time and deviation are saved along with the steps in a freezing profile. The default values are 5 deg. of deviation for 1 min. These may need to be adjusted depending on the installation of the user's LN2 supply.
<b>Sample Probe Alarm</b>	One (or both) of the thermocouple's conductors are broken or disconnected. This can occur anywhere between the tip of the probe and the computer.	This alarm is NOT self correcting, and only goes away once the cause has been fixed and the software re-started. Isolate the open (or broken) connection(s). The most common cause is within the thermocouple connection jacks, anywhere between the tip of the probe and the computer. Start by shorting the Female sample probe jack located in the

		upper left corner of the fan guard. If the alarm goes away, you know the problem is in the probe. If it doesn't go away, continue your way back towards the computer, checking the connections.
<b>Chamber Probe Alarm</b>	One (or both) of the thermocouple's conductors are broken or disconnected. This can occur anywhere between the tip of the probe and the computer.	This alarm is NOT self correcting, and only goes away once the cause has been fixed and the software re-started. Isolate the open (or broken) connection(s). The most common cause is within the thermocouple connection jacks, anywhere between the tip of the probe and the computer. Start by shorting the Male Chamber probe jack located in the rear 2100 housing. If the alarm goes away, you know the problem is in the probe. If it doesn't go away, continue your way back towards the computer, checking the connections.

**- CLEANING AND MAINTENANCE -**

**Cleaning**

Use a mild, non-abrasive household type cleaner for cleaning all surfaces of the unit except for the notebook PC. A mixture of 40% bleach, 60% water may be used inside the chamber of the unit for decontamination or heavy cleaning purposes. Check with Custom BioGenic Systems before using any cleaners not mentioned above. A lint-free cloth or compressed air of no more than 20 p.s.i. may be used to clean the laptop. The use of any chemicals, cleaners, or methods not mentioned above will void the warranty.

## Maintenance

(The following should be performed at least once annually)

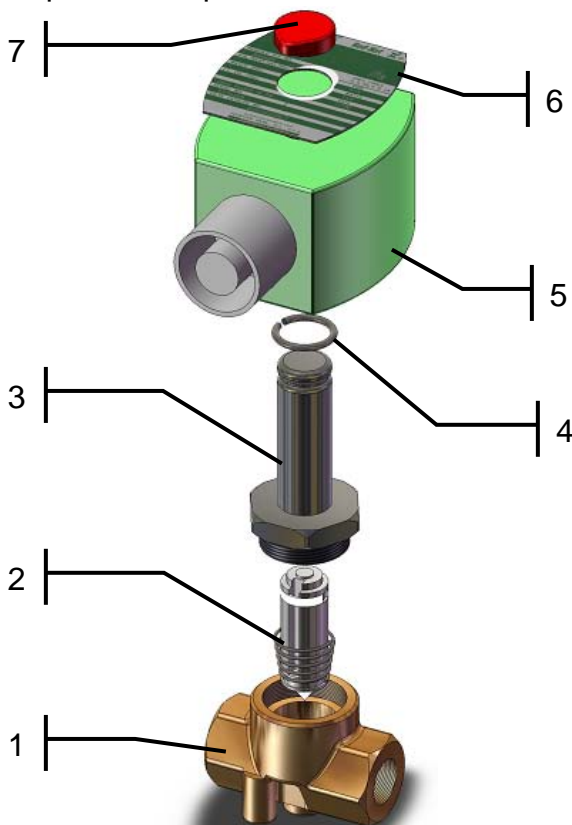
- 1) Test all alarm functions for proper operation.
- 2) Check accuracy of the chamber probe, sample probe, and chart recorder. If calibration is required, see section 3.8.
- 3) Check for leaks at all connection points of the liquid nitrogen lines.
- 4) Be sure that all electrical wires are free of damage and plugs are firmly in place.

## - SOLENOID VALVE MAINTENANCE -

**IMPORTANT:** This should be done *only as required*, and is not a necessary part of maintenance. Solenoid valve(s) may be opened to inspect for cleanliness and to check seals for wear. Wipe seals with a clean, lint free cloth. Distilled ammonia may be used to wipe seals if needed.

The solenoid valve(s) may be opened and cleaned if they are not working smoothly. If this is done, use the diagram below to reassemble the valves properly. If the valve is found to be defective, it must be replaced, as replacement parts are not available individually.

- 1) Valve Body
- 2) Plunger
- 3) Flange
- 4) Valve Coil Locknut
- 5) Coil
- 6) Spec. Plate
- 7) Valve Cap



**INTENDED USE:**

**VETERINARIAN, HORTICULTURAL,  
PHARMACEUTICAL, INDUSTRIAL,  
OR MEDICAL RESEARCH;**

**LABORATORIES FOR  
CONTROLLED RATE FREEZING  
OF BIOLOGICAL SPECIMENS,  
USED POSSABLY FOR INFUSION  
OR FOR RESEARCH.**

**AVAILABLE FROM CBS**

- Liquid Nitrogen Equipment Including:
  - Freezers & Dewars
  - Controlled Rate Freezing Systems
  - Freezer Racks & Boxes
  - Transfer Lines
  - Solenoid Valves
  - Liquid Level & Temperature Alarms
  - Liquid Level & Temperature Controls
  - Temperature Recorders/Monitors
  - Cryogenic Accessories



**Custom  
BioGenic  
Systems**

150 Shafer Drive  
Romeo, Michigan 48065, U.S.A.

2100CRF.TM1101 REV A

© 2001 - 2006 Custom BioGenic Systems

All designs and materials contained herein are protected under Federal copyright law.  
Unauthorized distribution or use will be subject to prosecution to the fullest extent of the law.