



CONTROLLED RATE FREEZER OPERATOR'S MANUAL

FTS SYSTEMS BIO-COOL IV CONTROLLED RATE FREEZER

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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 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 / bath chamber.*
- ✓ *Never remove warning labels.*
- ✓ *Never operate damaged or leaking equipment.*

Warranty Information

FTS Systems Bio-Cool IV 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 Bio-Cool IV 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

Congratulations on your decision to purchase FTS Systems Bio-Cool IV Controlled Rate Freezer. The Bio-Cool Controlled-Rate Freezer is a mechanically refrigerated bath for single slope controlled-rate cooling of biological specimens prior to storage or single slope programmed thawing prior to use. The specimen chamber is refrigerated and heated in response to the program selected.

Key Features

- Methanol is the heat transfer media.
- Specimen chamber is 5 inches (12.7cm) in diameter and 6 inches (15.2cm) deep.
- Cooling rates can be set over a range of .1 °C/minute to the maximum allowable rate of the bath (see chart below).
- Magnetic stirrer and vortex breaker allows for constant agitation of bath.
- Optional racks allow for the use of straws or ampules.

Maximum Cooling Rates

The cooling rates can be set over a range of 0.1 °C/minute to the maximum rate allowed by the bath.

Temperature Range	Maximum Cooling Rate
+20 to -20 °C	3 °C/minute
-20 to -30 °C	2 °C/minute
-30 to -40 °C	1 °C/minute

These rates are achieved with conditions of 22 °C (72° F) ambient using clean methanol as the bath fluid. Some deviation from these rates may occur in environments that deviate from the ambient temperature or if the methanol is contaminated with water.



Installation and Startup

Initial Inspection

Your FTS Systems Bio-Cool IV controlled rate freezer 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. 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.

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



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

The FTS Systems Bio-Cool IV is designed for 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. Space should be provided so that air can properly circulate around the unit. The refrigeration system on the Bio-Cool is air-cooled. Air inlets and outlets should be free of obstructions. SP Scientific recommends a 6-inch clearance be maintained at all inlet and outlet sites. 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 Conditions

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 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.

Services and Utilities



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

Once the Bio-Cool is in the location where it will be operated, it can be connected to its electrical source.

1. Allow a six inch clearance at any inlet or outlet site.
2. Make sure the front of unit is not blocked.
3. The controller is built into the cabinet of the Bio-Cool IV.
4. There are two voltage and frequency configurations for the unit:
 - If the unit is 120V/60HZ, plug into the proper receptacle.
 - If the unit is 220/50HZ, it is shipped without a plug at the end of the line cord. Connect the appropriate plug and plug into the proper receptacle.
5. Plug with ground needs to be connected to a grounded outlet at the supply.

Note: The use of an extension cord is NOT recommended. If it is required it should be sufficient to handle 10 amps without heating.

Initial Refrigeration Check

Magnetic Stirrer and Vortex Breaker

1. Remove the lid.
2. Remove the steel washer at the bottom of the bath (only used during shipping).
3. Remove the magnetic stirrer assembly from the shipping bag. It consists of a frame with 4 lock-down screws on top and a slave magnet inside the circular housing.
4. Remove steel washer from circular magnet housing.
5. Place magnetic stirrer in the bath with the cylindrical magnet side down.
6. Tighten the 4 lock-down screws with a small screw driver until securely seated against the interior wall of the bath.
7. Turn on the magnetic stirrer by pressing the POWER button (stirrer is automatically activated with the activation of the unit).

Note: The stirrer may be shut off without shutting off the entire system by pressing the STIR button on the panel. The stirrer speed is adjustable using a stirrer menu (explained in the Operation chapter).

8. The frame of the stirrer should remain stationary and the cylindrical magnet housing should rotate freely.

Note: If magnet is not rotating, loosen the 4 lock-down screws and move the stirrer assembly up or down until free movement of the magnet is obtained. Tighten the 4 lock-down screws securely.

9. Remove vortex breaker from shipping bag.

10. Insert the vortex breaker into the bath by holding it at a right angle to the top of the bath and inserting it past the rubber gasket.
11. Turn the vortex breaker so it is parallel to the bottom of the bath with the screen and lift tab on top.
12. The vortex breaker should rest directly on top of the magnetic stirrer.

Fluid Requirements



CAUTION: ACETONE AND ISOPENTANE SHOULD BE AVOIDED. THESE CHEMICALS WILL DESTROY THE RUBBER AND PLASTIC COMPONENTS OF THE UNIT.

Methanol is the recommended heat transfer fluid for the Bio-Cool IV. Other heat transfer fluids may be used, however, it may affect the cooling/heating performance. Methanol can be purchased at a local hardware store or through a scientific supply house. A low purity methanol is sufficient for use.

Note: *Methanol should be changed frequently as it will become contaminated with water vapor.*

- Fill bath at room temperature to about one inch below the rubber gasket (approximately 1½ liters).
- **DO NOT** overfill bath as it may overflow into the interior components and destroy them.

Operation

Lid Removal

To remove the liquid tight lid:

1. Turn the center thumbscrew counterclockwise (the lock down bar will loosen and move).
2. Lift up on the center thumbscrew and the lid will release.

Note: The lid should be realigned whenever the unit is moved to help maintain the position of the reservoir.

Calibration

The controller/programmer is calibrated to National Institute of Standards and Technology (NIST) standards, but during its operating life may experience some zero drift due to aging of components. The programmer may be calibrated while it is in the setpoint controller condition with the following procedure:

1. Using the Bio-Cool as a setpoint controller, set for 0°C.
2. Place a NIST partial immersion thermometer into ice bath.
3. Let stabilize, then adjust the Bio-Cool setpoint up or down a few tenths at a time until the thermometer reads 0°C.
4. After this occurs, press the RUN key pad to disengage from run, and very quickly press the UP and DOWN key pads simultaneously until ZERO is displayed in the lower window.
5. The bath is now zeroed.
6. Press RUN and set the controller for 0°C. The thermometer should now match with the Bio-Cool.

Power Failure

Two power failure algorithms are available.

- Power failure option **0** will return the idle (non-operating) mode upon restoration of power.
- Power failure settings **1** or **2** will return the system to operating mode and control the bath at the temperature it is at upon restoration of power. In each mode, an audible alarm will sound and PF will flash on the display.

Magnetic Stirrer Speed Adjustments

ON/OFF

The stirrer will engage automatically to the user's programmed speed upon initialization of the system via the main ON (power) switch. If the system is turned off via the POWER switch, the stirrer will stop.

The stirrer may be turned ON or OFF independently of the POWER switch for procedural purposes (such as insertion of a product sample into the reservoir). Generally speaking, the unit should not be operated without stirring, as the reservoir fluid will exhibit thermal variations if the fluid is not agitated. SP Scientific recommends the use of full speed at all times for optimal operation and specifications performance of the Bio-Cool.

To turn the stirrer ON (when it is off), depress and release the stirrer switch. The stirrer will begin to move toward the programmed speed. If the switch is held for too long before release the speed programming routine will be engaged instead. See "Speed Change" below.

To turn the stirrer OFF (while it is running), depress and release the stirrer switch. The indicator LED will be extinguished and the stirrer will stop. (If the button is held for too long before release, the system programming routine will be engaged instead.)

Speed Change

To change the stirrer speed, depress and hold the STIR switch for a few seconds. A prompt "Stir" will appear on the display, alternating with a value 1 to 128, where 1 is a minimum speed (actually below operational) and 128 is full speed. If either of the up/down buttons is depressed, the display will change accordingly and the stirrer (if running) will start to move toward the new speed. If the numeric speed is changed quickly it may take several seconds for the stirrer to catch up.

When satisfied with the speed, press SET and the display will revert to its normal operational mode. Thereafter, upon application of ON, the stirrer will go to this programmed speed.

Operational Notes

The actual numbers 1 through 128 are not FIXED speeds but rather representative values on the scale. From unit to unit, in installations with more than one Bio-Cool, the actual speed represented by a given value will change as a function of electronic components, line voltage, and individual motor characteristics, belt tension, fluid viscosity, and so forth. For a given unit operating under repeated conditions a given value will produce fairly repeatable results.

A typical unit will have a "stall" speed (insufficient power applied to turn the motor) somewhere in the range of 30 to 50. Satisfactory stirring will generally be obtained from approximately 50 to the full 128. Very few differences will be observed in the range from about 100 to 128.

Changes in operating speed, except for turning the unit off, are accomplished by ramping the speed characteristic of the motor, to prevent the magnetic coupling from losing "lock." This will result in a time lag between changing the speed and an actual observed change in stirrer speed. Also, a nominal medium speed is always used to start the stirrer. From this temperature it ramps up or down to the user's final endpoint.

The inertia of the stirring system will always be overcome before it attempts to ramp down to an extremely slow operating speed if programmed.

Note: *The stirrer motor is a shaded-pole motor, with speed governed by phase modulation of the AC applied to it. Even at stall speed there is still significant voltage applied to the motor.*



Accessories

Straw and Ampule Racks

Straw Stacks (Model SR-36)

The straw rack can hold up to 36 quarter ($\frac{1}{4}$) or half ($\frac{1}{2}$) cc straws. It consists of a Lucite top plate that is placed directly on top of the bath gasket and three black delrin racks that hold 12 straws each.

1. Insert straws through the guide holes, where pressure stainless steel clips hold them in place.

Notes: *If straws are not easily placed in the rack or if they fall out of the Rack, the clip may need adjustment. Remove the clip and either open or close the clip according to your needs.*

Unit should run with all 3 black delrin racks in place even if 36 straws are not being processed. This will help prevent condensation of water vapor.

2. If liquid nitrogen chilled forceps are being used for crystallization, SP Scientific suggests that the entire delrin rack is lifted out of the Lucite top and seeded at one time.
3. When freezing is complete, remove the black delrin rack out of the Lucite lid and pull the straws out from the bottom.

Ampule Rack (Model SR-12)

1. The ampule rack will accommodate ampules ranging from 2 ml to 5 ml.
2. The disks of the rack can be moved up or down to accommodate different ampule sizes. Loosen the nuts on either side of the rack to be moved and adjust the disk and retighten the nuts.

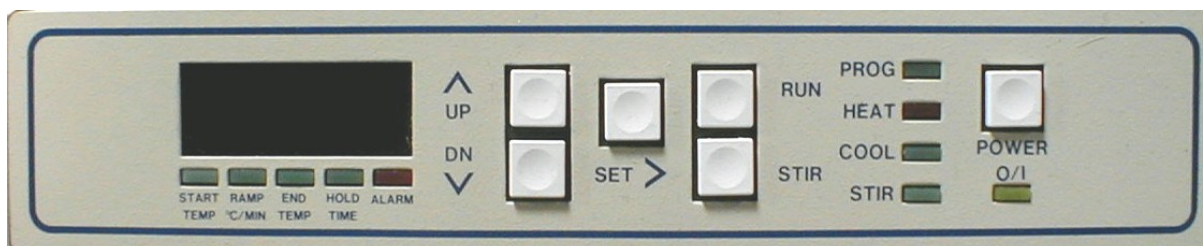
Note: *Always cover bath with the lid included with the Bio-Cool IV.*



Controller / Programmer

Overview

The Controller/Programmer is microprocessor-based and is operated from the front keypad. All programming and control is accomplished through the front panel of the Controller/Programmer.



Key Pad Identification and Use

POWER	The power button is used to turn the system refrigeration on or off.
RUN	The run button is used to activate a program. Pressing the RUN button briefly, while the system is in RUN, will pause the program. Pressing the RUN button and holding it will end a run.
STIR	The stir button performs two functions related to the stirrer. It is an ON/OFF button for the stirrer while the unit is running. It also accesses a stirrer speed menu when pushed and held while the power is on.
SET	The set key has a number of functions. When the unit not performing a run it accesses the program menu when pushed and held. While in any programming mode, it functions as an "index" button to step through the program.
UP	The up button is used to increment values shown on the display. It is also used to access the internal parameters of the controller when the system is in the idle mode (see section INTERNAL CONTROLLER PARAMETERS).
DN	The down button is used to decrement values shown on the display. It is also used to access the system defaults menu when the unit is in the idle mode (see section SYSTEM DEFAULT).



Programming a Run

Programming the Controller

The Bio-Cool will perform a single slope controlled-rate freezing program after stabilizing at an initial starting temperature. To program the system, follow the steps listed below.

1. Turn on the system by pressing the POWER button.
2. Press and hold the SET button until the Program (PROG) LED illuminates. The START TEMP LED will flash and the PROG LED will illuminate.
3. Use the UP/DOWN buttons to set the program start temperature.
4. Press the SET button to advance to the RAMP portion of the programmer.
5. With the RAMP LED and display flashing, use the UP/DOWN buttons to set the ramp rate in °C/minute.
6. Press the set button to advance to the END TEMP portion of the program.
7. Use the UP/DOWN buttons to select the desired end temperature.
8. Press the set button to advance to the HOLD TIME portion of the program.
9. Use the UP/DOWN buttons to select the desired hold time at the end of the program.
10. Press the set button.
11. The ALARM LED will flash. Using the UP/DOWN buttons, select "1" to have an activated audible alarm, or "0" to turn off the audible alarm.
12. Press the set button to leave the program mode.
13. If you want to change a program parameter repeat steps 2-12 again.

Running the Program

Once the program is installed following the instructions in the preceding section, a run is started by pressing the RUN button once and pressing it again once the unit is stabilized at the start temperature. The program will perform as follows:

1. The bath will go to the starting temperature as quickly as possible.
2. After the bath temperature has stabilized at the start temperature (refer to Stability Section), the program will pause, the audible alarm will sound if it is activated, and the display will flash. If you do not wish to wait for the one minute stabilization, the program may be forced into the ramp by pressing the set key if the actual temperature is within ± 0.5 °C of the start temperature.
3. To proceed to the ramp portion of the program press the run button. The RAMP LED will illuminate and the bath will begin a controlled-rate ramp to the end temperature.
4. When the end temperature is reached and the bath has stabilized, the END TEMP and HOLD TIME LEDs will illuminate and the programmer will begin timing the hold time.
5. When the hold time has expired, the HOLD TIME LED will go out and the END TEMP LED will remain on. The audible alarm will sound every 5 seconds if activated.

Ending a Run

1. To end a program run press and hold the RUN button. The program will disengage and all of the LEDs below the display panel will go out.
2. If you wish to return the system to original set point temperature to begin another run simply press the run button again.
3. To turn off the system press the POWER button.

Changing a Program during a Run

Sometimes you may need to change a program after you have started a run. You can change the current segment or future segments of the program by following these five steps:

1. Briefly press the RUN button.
2. The display will begin flashing indicating that the program is paused.
3. Press and hold the SET button. The PROG LED will illuminate and the START TEMP LED will start flashing.
4. Follow the same steps used in the Programming the Controller section to adjust the program.
5. Once out of the program mode, press the RUN button again to resume the run.

Internal Control Parameters

The Bio-Cool has been factory tested and programmed for use with methanol. If methanol is used as the heat transfer fluid, no adjustment to the controller's parameters should be necessary.

If you wish to check the internal parameter settings of the controller or modify them, they may be accessed by pressing the UP button while the system is idle (yellow 0/1 LED illuminated, display and all other LED's off). The internal controller parameters are:

Parameter Symbol	Parameter	Value
Pb	Proportioning Band	3.5
It	Integral	136.0
dt	Derivative	17.0
rdY	Ready Window	0.2
rdYt	Ready Time	15.0

After the parameter menu starts flashing on the display and the UP button is released, the UP and DOWN buttons can be used to change the flashing parameter. Pressing the SET button may access the next parameter. After scrolling through the parameters, the unit will return to the idle mode.

Stability Criteria

A stability-determination algorithm is used to determine that the process bath is indeed stable during the ramp cycle. This algorithm is used twice:

- At the initial slew to Start Temperature the process must be determined to be stable before it executes the pause (and optional audible signal) to insert product.
- At the END of the ramp, the process must be determined to be stable before initialization of the soak (timed-hold) timer.

Previous revisions of software required a rigorous stability of $\pm 0.1^{\circ}\text{C}$. for a duration of 15 seconds. Under some conditions this level of stability may be considered more severe than warranted; under some conditions this level may be nearly impossible to achieve.

Two programming values have been added to the PID menu (IP button menu): "rdY" and "rdYt."

Ready Window

A stability window is defined by the prompt "rdY" In $^{\circ}\text{C}$. Note that this value, expressed as a window, is the total band encompassed by a \pm value specification (e.g., rdY = 1.0 indicates a window of 1°C , equal to $\pm 0.5^{\circ}\text{C}$).

Ready Time

A stability time constant is defined by the prompt “rdYt” in seconds. This does not define an absolute time. The stability algorithm employs continuous integration of process error (until the result is less than half the window). This value programs the period of integration. Time differences will be noted under a variety of circumstances: small changes in process SP will stabilize more quickly than large changes (but small changes are less likely to overshoot). Recommended values for the above are rdY = 0.2 and rdYt = 15.0 (approximating $\pm 0.1^{\circ}\text{C}$ for 15 seconds).

System Defaults

The parameters in the system defaults define how the Bio-Cool displays data and allow the user to set limits on which values can be entered in a program. These default parameters are accessible by pressing and holding the DN button while the system is idle (yellow 0/1 LED illuminated, display and all other LED's off).

After the default menu starts flashing on the display and the ON button is released, the UP and DOWN buttons can be used to change the flashing parameter. Pressing the SET button may access the next parameter. After scrolling through the parameters, the unit will return to the idle mode.

The default values, parameters and their options are listed below.

Parameter Symbol	Parameter	Default	Options / Limits
dEG	Temperature Display	0	0 - Degrees Celsius 1 - Degrees Fahrenheit
PF	Power Failure	1	0 - Unit goes to idle upon power restoration. 1 & 2 - Unit returns to last set point and controls there.
SH	High Temperature Limit	25	0 to +25°C (Span High)
SL	Low Temperature Limit	-60	-60 to +10°C (Span Low)
HA	High Alarm	30	-65 to +35°C
LA	Low Alarm	-60	-70 to +25°C
dP	Decimal Point	1	0 - no decimal point 1 - decimal point

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