



Electronic Development Labs, Inc.



Mini Salt Bath

User Manual

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MSB-500[®] OPERATIONS MANUAL

WARNINGS:

CAUTION: The high operating temperatures of this bath will cause severe and dangerous burns to any exposed skin, and can start a fire on exposed clothing. Always wear the appropriate fireproof protection, fire proof gloves, and full face shields when using this equipment.

CAUTION: Never attempt to move this bath while the salt is in a liquid state. Although the bath is designed to contain the salt, it could slosh or splash out and severely burn you, and start a fire!

CAUTION: When inserting a sensor into the bath, always make sure the sensor is dry and not porous. Water can cause an explosion of the salt and serious injury will occur.

CAUTION: When removing a sensor from the bath, be extremely careful, the sensor will be extremely hot and cause instantaneous burns if it touches your skin. Do not wipe probes with cloth or paper towels, the high temperatures will ignite them. In addition, the hot salt may drip and ignite combustible materials.

CAUTION: When operating the drain, be extremely careful not to put the hot salt into any container that is not capable of handling the 200.0°C and able to hold the 226 Cubic inches of volume. Control the flow by using the valve, remember the $\frac{3}{8}$ " allen key will get extremely hot during use.

CAUTION: Do not overfill the bath, salt expands as it heat up, always allow enough room for expansion.

CAUTION: When adding salt, be careful not to drop large pieces into the liquid as they may splash.

DISCLAIMER:

These baths are manufactured for the sole purpose of temperature calibration. Baths used for applications other than calibration, are used at the discretion and sole responsibility of the customer. EDL will not and cannot accept any responsibility for the use of baths for any application other than temperature calibration. Use this instrument only as specified in this manual, otherwise, the protection provided by the instrument may be impaired and serious injury could result.

Limited Warranty & Limitation of Liability

All products manufactured by EDL Inc. are warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year for the MSB-500 calibration bath. The warranty period begins on the date of the shipment. Parts, product repairs, and services are warranted for 120 days. This warranty extends only to the original buyer, end-user, or customer of EDL Inc., or an EDL Inc. authorized reseller, and does not apply to fuses, disposable batteries or to any other product, which in our opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling. EDL Inc. warrants that any supplied software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. EDL Inc. does not warrant that software will be error free or operate without interruption.

EDL Inc. does not warrant calibrations on the MSB-500 calibration bath. EDL Inc. authorized resellers shall extend this warranty on new and unused products to end-user customers only, but have no authority to extend a greater or different warranty on behalf of EDL Inc. Warranty support is available if the product is purchased through an EDL Inc. authorized sales outlet. EDL Inc. reserves the right to invoice the buyer for importation costs of repairs/replacement parts when the product is purchased in one country, and is submitted for repair in another country.

EDL Inc.'s warranty obligation is limited, at EDL Inc.'s option, to a refund of the purchase price, free of charge repair, or replacement of a defective product, which is returned to EDL Inc. with an RMA within the warranty period.

To obtain warranty service, contact EDL Inc., or send the product, with a description of the difficulty, postage, and insurance prepaid (FOB Destination), to EDL Inc. at 244 Oakland drive, Danville VA 24540. EDL Inc. assumes no risk for damage in transit. Following a warranty repair, the product will be returned to buyer, transportation prepaid (FOB Destination). If EDL Inc. determines that the failure was caused by misuse, alteration, accident, abnormal conditions of use/storage, operation, or handling, EDL Inc. will provide an estimate or the repair cost and obtain authorization before commencing the work. Following repair, the product will be returned to the buyer, transportation prepaid and the buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. EDL Inc. SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL. OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT, RELIANCE OR ANY OTHER THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this Warranty is held invalid or unenforceable by a court of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

High Precision STIRRED LIQUID BATH

Mini Salt Bath® Operation Manual

NOTES

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Chapter 1

Introduction

The MSB-500 Mini Salt Bath is a high precision stirred liquid bath covering the range of 200°C through 500°C. This bath will help improve your daily measurement capability without the need for extensive knowledge of temperature metrology and laboratory based measurements. Throughout this manual, you will find not only instructions specific to the Mini Salt Bath, but many other helpful tips and suggestions regarding temperature measurement and calibration.

Features and Capabilities

The Mini Salt Bath MSB-500 uses sealed electric heaters for heating; this eliminates the possibility of Salt intrusion into the heating element. These baths have a tank depth of 10” and an insertion depth of approximately 9”, the entrance is 3” in diameter. A bail handle allows for portability and can act as a sensor support if needed. A spare fuse is located in the fuse holder, below the On/Off switch.

Controller Features

The Mini Salt Bath uses an extremely high quality controller to accurately control and maintain its high precision. The advanced technology features a very stable temperature control utilizing a PID loop. The Graphic interface allows easy adjustment and the use of presets for fast setups.

General Construction

The MSB-500 Mini Salt Bath is designed with the technician who is on the go in mind. The finish is all stainless steel, and the exhaust air is directed backwards, away from the user and the instrumentation. The electrical components are commercially available items; no proprietary electronic devices are used in this product. Our goal is to provide a product that functions well and can be maintained for many years to come without the fear of unavailability of parts. These precision baths are 100% designed and built at our facility in Danville VA.

The chamber, screen, and stirring blades are constructed of stainless steel so they are resistant to the liquefied salt.

Safety Features

MSB-500 Mini Salt Baths have multiple safety features incorporated into their design. On initial power up, both the control and the graphic display go through a self-test procedure. The stirring motor is controlled through a separate supervisory circuit that will not allow it to operate before the salt is liquefied, $\sim 190^{\circ}\text{C}$. In addition, this supervisory circuit also monitors the tank temperature, and if the temperature exceeds our preset high temperature, the bath will be shut down and require servicing.

Although it is unlikely that your Mini Salt Bath should require servicing, if it does, there is an electrical diagram included for your reference in Appendix 3.

CAUTION: Due to the high operating temperatures of these baths, and the associated safety issues, we do not recommend user servicing.

CAUTION: The MSB-500 Mini Salt Bath has a drain for removing the salt, but it is highly recommended that this procedure is not done by the user.

Chapter 2

Installation and Setup

Unpack and carefully inspect the Bath for any damage that may have occurred in shipping. **Do Not Plug In the Bath Until It Has Been Inspected.** There should be no loose parts or any bent or damaged surfaces. Make sure there are no stray pieces of packing material anywhere in or on the bath. This is very important as this material could ignite during heat up.

Connecting to Power Source

The power required for this instrument is nominally 110VAC, 60Hz with a maximum current requirement of 10 Amperes, see figure 4. It should be plugged into a 110VAC outlet capable of supplying the required current. The outlet must be grounded, thus reducing the hazard of electrical shock!

Basic Operation

The Mini Salt Bath has an On/Off switch located on the side panel above the power cord, see figure 4. The only user input is through the Graphic interface keys. The set point temperature is entered by pushing either the up or down arrow keys on the face of the controller. Place the Graphic interface/Computer switch in the Graphic interface position, see figure 4. This allows you to enter and check data directly at the bath using the Graphic interface. The bath should be filled to a level approximately 4.9" (125mm) below the top of the entrance well, see figure 1; this allows room for expansion as the salt is heated.

Initial Start up

The initial preprogrammed set point is 200.0°C; this calibrator should be operated at this temperature for a period of one hour prior to using this bath. This procedure will allow the salt to re-melt and the stirrer to start operating. In addition, this temperature soak serves to remove any moisture that may have occurred because of condensation during shipment.

Operation Keys

All programming functions are performed using the keys on the front of the Graphic interface. The bath is shipped fully preprogrammed and may be used without any changes other than setting the desired temperature. To set the desired temperature, press the F1 key to enter the set point screen, then use the arrow keys to navigate and change the set point as desired, push the enter button and the new set point is shown and active.

Rear Panel Fuse

The rear panel fuse is the main power fuse and limits the current to the entire unit. This is a 10 Amp fuse and should not be altered for any reason. It is located in the power entry module on the side of the bath. A spare fuse is included for your convenience and it can be found in the fuse holder. Please refer to figure 4. Fuse Ratings are shown in Appendix 1.

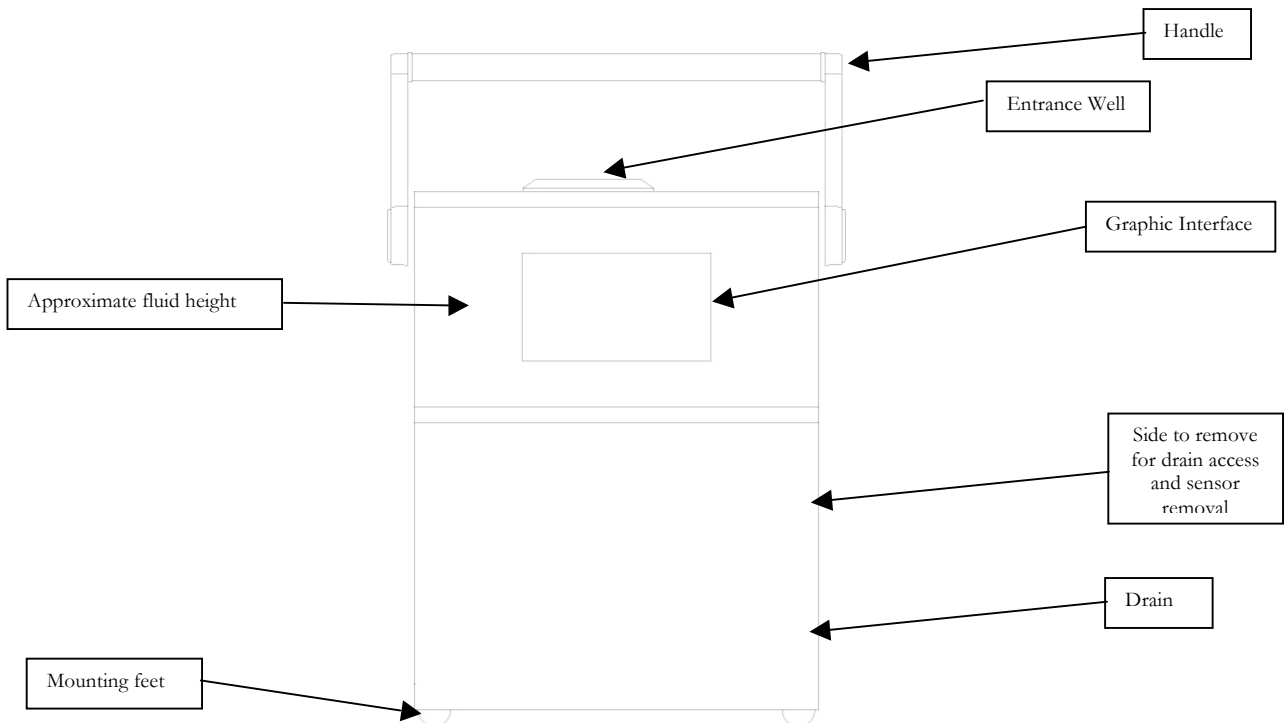


Figure 1

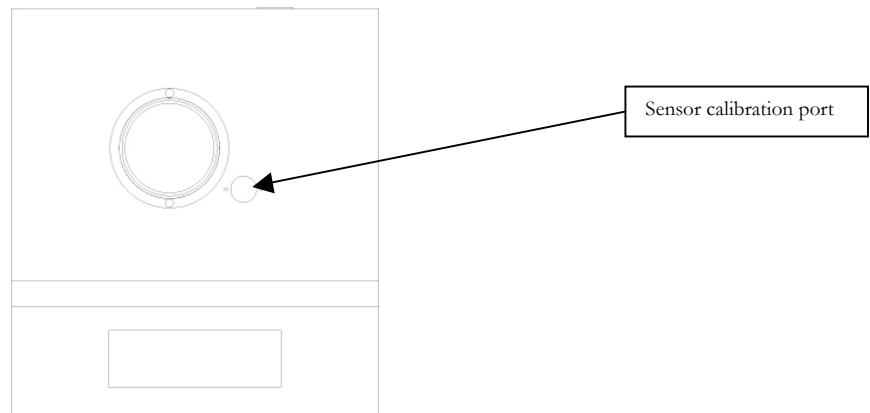


Figure 2

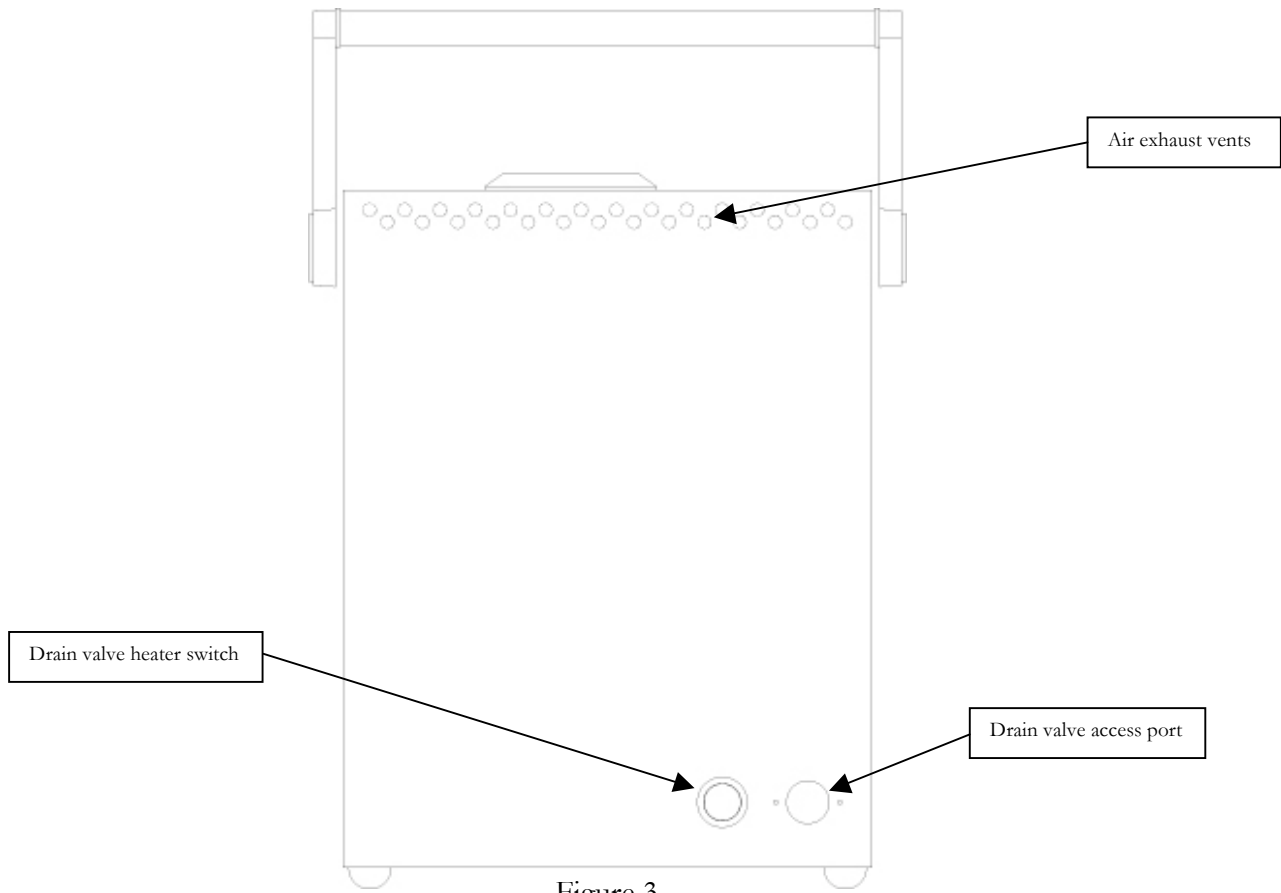


Figure 3

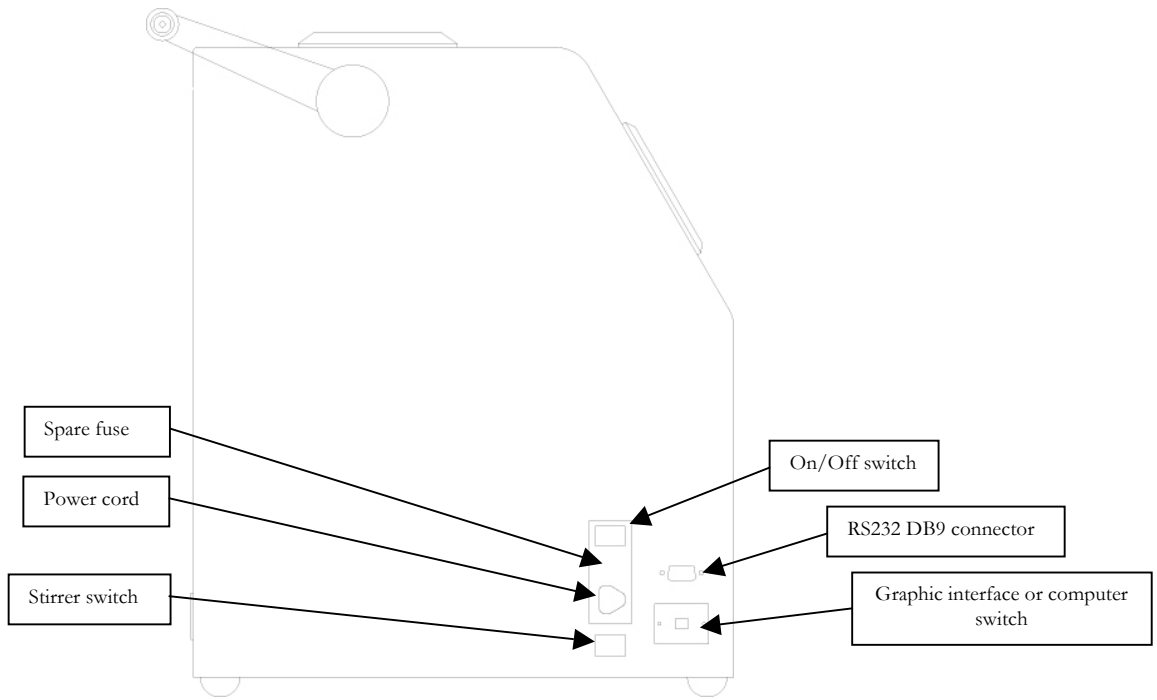


Figure 4

Chapter 3

Use and Operation

The first step in using the Mini Salt Bath is to place the cover on the entrance well, this closes the chamber. Determine your temperature set point requirement, and fill the bath with salt, if you are restarting a cooled bath, you do not need to add salt. After the initial hour of startup, you may set the bath to any temperature between 200°C and +500°C with a setting resolution of 0.1°C. To set the desired temperature use the Graphic interface, the F1 key and the down arrow buttons to set the temperature, then press enter. Once the temperature is set, sufficient time is required for the bath to reach its set point temperature and stabilize. Stabilization is achieved within 30 minutes after reaching the set point.

Looking at the top of the bath you will see a cover that closes the chamber. Please, be aware that when this cover is in place, the salt will not be able to splash.

CAUTION: The cover is not leak proof or spill proof, it will only contain splashing from the stirring. When the bath is at operating temperature and the salt is in a liquid state, the bath should not be moved.

Comparison calibrations

The 3" diameter entrance well coupled with the high heat capacity of the liquid salt, and the stirring makes comparison calibrations easier to accomplish. You should always insert your sensors as close as possible to the same depth as your reference. Try to always use an insertion depth that will minimize the errors caused by stem conduction. Please note, it is not recommended to have the sensors touch the bottom of the tank. The output of a thermocouple is given by the entire gradient from the hot end to the cold end, and often they will tend to be less sensitive to conduction error than RTD type devices. It is beyond the scope of this manual to discuss all of the considerations regarding stem conduction and immersion depth, but some practice and experience will produce confident and reliable measurements.

A rough comparison reading can be made between the UUT and the display of the Graphic interface. Using this method, the uncertainties shown on the specification sheet for overall uncertainties must be used. This value includes the combined uncertainty of the internal reference sensor, the controller indicator, uniformity errors, and stability errors. To reduce this figure, a direct comparison should be made using a calibrated instrument and a reference sensor while readings are being taken for the UUT. This will improve the overall accuracy by virtue of the reference sensor and instrument.

Graphic Interface operation

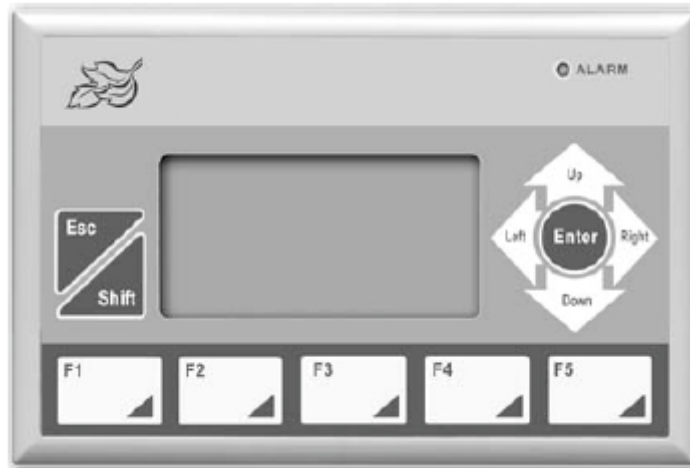


Figure 5

MAIN DISPLAY

The main display is shown in Figure 6, it displays the average power being applied to the heaters as well as the Process temperature and the set point. All temperature readings are to 0.1°C resolution.

MENU DISPLAY

See figure 7.

This page displays the Menus for the Mini Salt Bath **MSB-500**.

Press **SF5** from any screen and the instrument will display this Menu screen.

Press **F1**, “*Set Point*”, to display the Set Point screen.

Press **F2**, “*Presets*,” to display Preset 1 screen

Press **F3**, “*Set Limits*” to access MUB High and Low limits. (Password required)

Press **F4**, “*MFG Info*,” to display Part Number, Serial Number, Unit ID, etc.

Press **SF1**, “*Setup*,” to set Temperature Unit and Unit ID Number. (Password required)

Press **SF2**, “*User Cal*,” to access calibration values. This will provide a two-point calibration. (Password required)

Press **SF3**, “*PID Info*,” to display PID information, Input Filter settings, and control offsets.

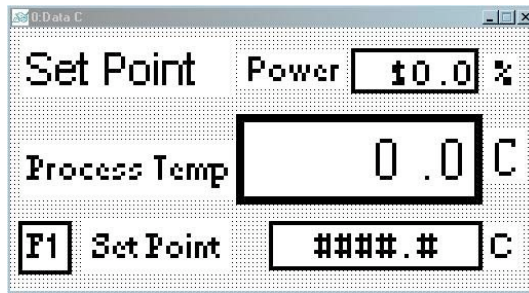


Figure 6

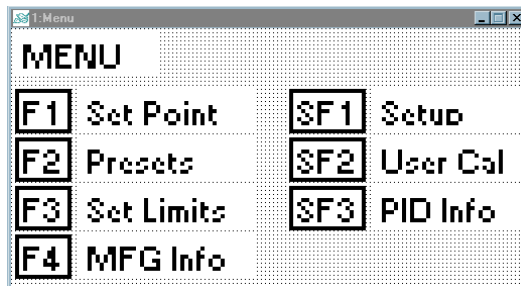


Figure 7

Procedure for setting MSB Set Point

Press **F1**, “*Set Point*,” to show the Numeric Entry screen. This screen displays the minimum and maximum allowed values at the top (the actual limits are Min: 200°C Max: 500°C).

In the center of the screen, the current Set Point is displayed. To enter a new number into the Numeric Entry screen, you must highlight each digit of the number using the blinking block cursor. Once selected, each digit can be changed one of two ways:

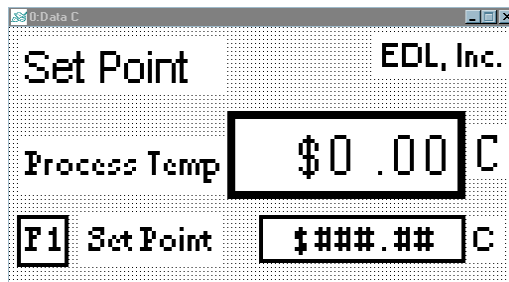


Figure 8

- by pressing the UP/DOWN keys of the **Graphic Interface (GI)**
- by pressing one of the function keys (F1-F5 Figure 10).

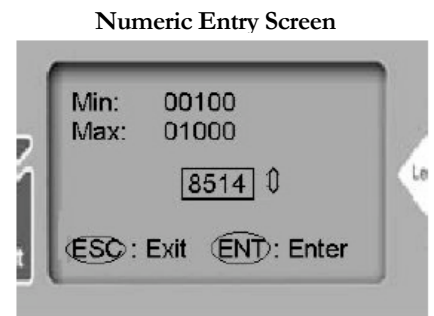


Figure 9

After you have changed the digit to the appropriate number, press the RIGHT/LEFT keys of the **GI** to advance to the next digit.

When you have finished, press the ENTER key. If the number entered is Out Of Range, an error message is briefly displayed on the **GI**. If the number is within range, it is immediately written to the **MSB** control system, the Numeric Entry screen closes, and the prior screen is displayed. To cancel this operation, press the ESC key.

Note: The entered temperature should be displayed in the Set point display.

The **MSB** should proceed to the new set point.

Key	No Shift Key	Shift Key
F1	1	6
F2	2	7
F3	3	8
F4	4	9
F5	5	0

Figure 10

Procedure for MSB Preset-1 Temperatures

Page 1 of 2, **MSB** preset temperature pages, see figure 11. To view the second page simply press the down arrow, see figure 12. All units are in Celsius.

Select the desired set point from the choices displayed by pressing the corresponding function switch.

- F1 200.0°C
- F2 Freezing point of Tin
- F3 300.0°C
- F4 350.0°C

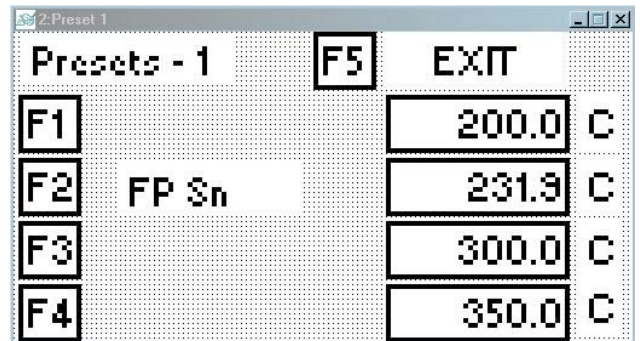


Figure 11

Press **F5**, “Exit,” to return to the set point page. Note the entered temperature should appear in the “Set Point” readout.

The **MSB** should proceed to the new set point.

Procedure for MSB Preset-2 Temperatures

Page 2 of 2, **MSB** preset temperature pages, see figure 12. To view the first page simply press the up arrow, see figure 11. All units are in Celsius.

Select the desired set point from the choices displayed by pressing the corresponding function switch.

- F1 400.0°C
- F2 Freezing point of Zinc
- F3 450.0°C
- F4 500.0°C

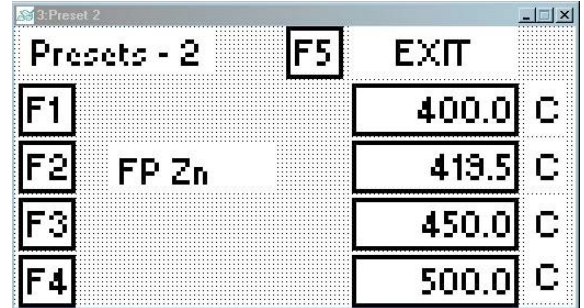


Figure 12

Press **F5**, “Exit,” to return to the set point page. Note the entered temperature should appear in the “Set Point” readout.

The **MSB** should proceed to the new set point.

Procedure for MSB Set Point Limits

Press **F1**, “Set Lo Limit,” see figure 13, to show the Numeric Entry screen.

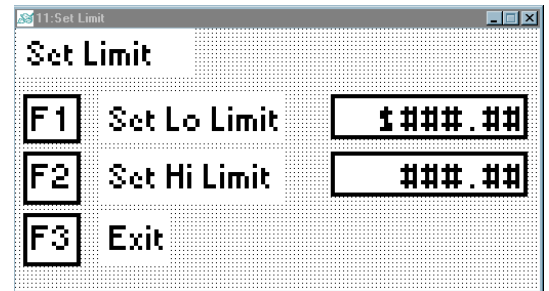


Figure 13

The screen displays the minimum and maximum allowed values at the top (the actual limits are Min: 200.0°C Max: 500.0°C). In the center of the screen, the current value of the set point limit is displayed. To enter a new number into the Numeric Entry screen, you must highlight each digit of the number using the blinking block cursor. Once selected, each digit can be changed one of two ways:

- by pressing the UP/DOWN keys of the **GI**
- by pressing one of the function keys (F1-F5 see figure 10).

After you have changed the digit to the appropriate number, press the RIGHT/LEFT keys of the **GI** to advance to the next digit.

Numeric Entry Screen

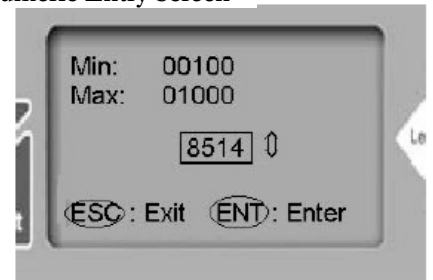


Figure 14

When you have finished, press the ENTER key. If the number entered is Out Of Range, an error message is briefly displayed on the **GI**. If the number is within range, it is immediately written to the PLC register, the Numeric Entry screen closes, and the prior screen is displayed. To cancel this operation, press the ESC key

Press **F2**, “Set Hi Limit,” and repeat the procedure.

Press **F3**, “Exit,” to return to “Set Point.”

MSB MFG Info

PN: Part Number of Mini Salt Bath.

S/N: Serial Number of this instrument.

VER: Software Version of the Controller.

ID: User assigned ID Number (Set by user on Setup page.)

OP RANGE: Operating Range of this instrument.

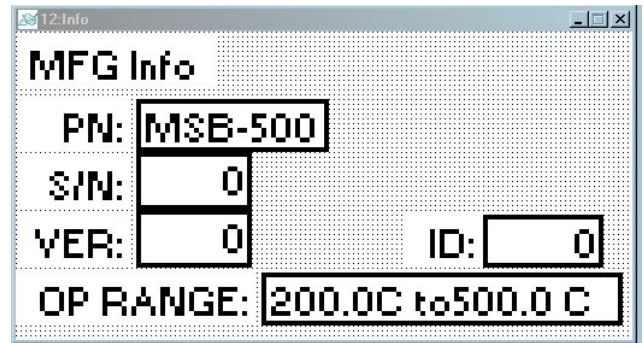


Figure 15

Procedure for MSB Setup

CAUTION

This device is designed to function in Celsius. Fahrenheit can be selected, however, the presets, calibration, and PID loop values are selected to work in Celsius and do not convert when Fahrenheit is selected. Set Point will accurately display the Process Value and Set Point in Fahrenheit but all other displays will be unusable.

Press **F1**, "*Unit C*," to set Celsius as the unit of measure.

Press **F2**, "*Unit F*," to set Fahrenheit as the unit of measure.

Press **F3**, "*Change ID*" to input your chosen ID number. The Numeric Entry screen is displayed. The screen displays the minimum and maximum allowed values at the top (the actual limits are Min: 0000 Max: 9999). In the center of the screen, the current value of the ID is displayed. To enter a new number into the Numeric Entry screen, you must highlight each digit of the number using the blinking block cursor. Once selected, each digit can be changed one of two ways:

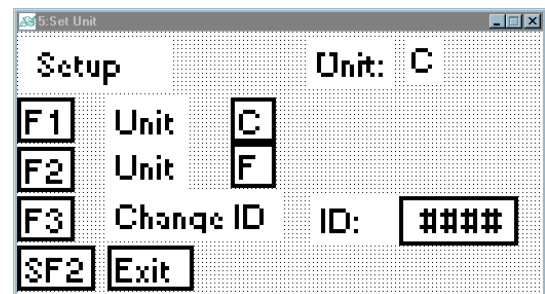


Figure 16

- by pressing the UP/DOWN keys of the **GI**
- by pressing one of the function keys (F1-F5), see figures 10 .

After you have changed the digit to the appropriate number, press the RIGHT/LEFT keys of the Graphic Interface (**GI**) to advance to the next digit.

When you have finished, press the ENTER key. If the number entered is Out Of Range, an error message is briefly displayed on the **GI**. If the number is within range, it is immediately written to the ID number, the Numeric Entry screen closes, see figures 16 & 17, and the prior screen is displayed. To cancel this operation, press the ESC key, the entered ID should be displayed in the Setup display.

Press **SF2**, "*Exit*," to return to the menu.



Figure 17

PID Info

The information on this page is for reference only. The user can not set the values on this page, you can only view the values, see figure 18.

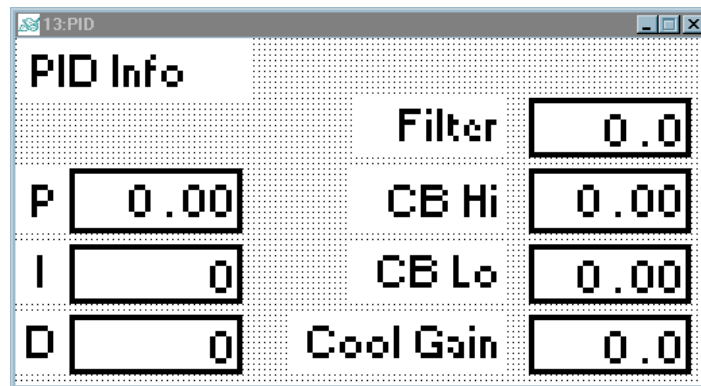


Figure 18

Definitions

P	Proportional value in unit of measure.
I	Integral value in seconds
D	Derivative value in seconds
Filter	Input filter setting in seconds
CBHi	Cutback value for Heat settings
CBLow	Cutback value for Cool settings
CoolGain	Gain difference between heating and cooling proportional value.

Computer interface

Itools is a software program from Eurotherm. When the MSB-500 is in the computer mode, the Graphic interface is turned off, and the RS-232 port is active. The bath will continue to function at whatever settings were on the Graphic interface, before it was turned off.

When a computer is attached to the RS-232 port, the required settings are; 19 200 baud rate, 8 data bits, 1 stop bit, none for parity, and hardware flow control.

Itools can be downloaded at the following location <http://www.eurotherm.com/itools/>. We do not include it since it is not our program. Itools has operating instructions and works very well with the MSB-500 Mini Salt Bath.

NOTE: Itools gives you complete access to many settings and features of the bath controller that you should not alter. To maintain the high accuracy and safe operation of the bath, do not change any of the operating parameters! Use Itools for informational purposes only.

Draining the bath

Please be aware that we do not recommend draining the MSB-500 Mini Salt Bath. If it is necessary to send it in for repair, it is far safer to allow the salt to solidify and then return the bath for service.

If it becomes imperative to drain the salt, please contact our technical department at 1-800-DIALEDL 1-800-342-5335. They will discuss the procedure with you and advise you on the safest way to drain your bath.

Chapter 4

Improving your Measurements

This chapter contains fundamental information that will help you to improve your temperature measurements.

As a general rule of thumb, if during use you find the handles of your sensors getting hot to the touch, we recommend the use of a heat shield to reduce the temperature. This will give you much more accurate results and increase the life of your sensors.

Calibration of the internal sensor

The internal sensor is a three wire 100 Ω platinum RTD, to remove the sensor for calibration follow these steps:

1. Set the bath to 200.0°C and let it stabilize at this temperature. Turn off the stirrer motor, turn off the bath, and unplug it from the power mains.
2. Remove the handle by placing it in the removal position, see figure 4. Press in on the tabs, pull and lift one side of the handle away from the bath, then do the other side. Do not force the handles and do not use more than a few pounds of force, or you may break the handle.
3. Remove the right side of the bath, see figure 1.
4. Remove the sensor calibration port, see figure 2. You will see the sensor and cable directly below.
5. Next to, the fan is a small connector with a pushbutton on the top, press the button and pull the connector out of the jack.
6. Carefully pull the sensor up through the access hole, remember the sensor will be hot and it will drip liquid salt that can cause severe burns and ignite combustible materials.
7. Calibrate the sensor and reverse the procedure.

Comparisons

The International Temperature Scale of 1990 (ITS 90) is defined by a series of highly reproducible fixed temperature points. These points are based on the inherent properties of specific materials such as the Triple Point of Water (TPW), Freezing Point of Elements such as Aluminum, and the vapor pressure of an elemental gas. As you can imagine these are expensive and difficult to achieve and are not required for most applications. They are the defining points on the scale and uncertainties of less than 1mK are quite obtainable. Next, in the dissemination chain are full size stirred liquid baths; these baths provide excellent stability and uniformity and are capable of overall uncertainties of between 1mK and 10mK. Liquid baths with the proper sensor and reference instrument are highly reliable and are an excellent temperature source. They too are quite expensive and require sophisticated measuring equipment to realize their true accuracy potential. A more practical solution to daily calibrations when the highest accuracy is not required, is the portable stirred liquid bath. They are clean, efficient, accurate, and require less experience than the preceding calibration techniques.

The following recommendations will help maximize the use of your Mini Salt Bath.

1. Stem conduction errors are related to immersion depth and should always be considered. Generally, sensors should be placed into the bath as deep as possible and all measurements should be made at full depth. Thermocouples are less sensitive to conduction errors and it is recommended to have the sensor immersed about seven times the sensor diameter. RTD Sensors usually have long cylindrically shaped elements, which are positioned further from the tip of the element; this makes the RTD more sensitive to its position in the bath.
2. If an external reference is to be used it should be placed at the same depth as the unit under test (UUT). By using an external reference, the inaccuracies in the internal sensor and controller display are removed. The uncertainty contributed by those components is shifted to your calibrated reference sensor and instrument.
3. Time is often neglected during precision temperature measurements; allow enough time for the bath and the sensor to reach equilibrium. A reading cannot be obtained until a steady state condition is reached and will be shown by stability in both the reference and the UUT readings. Stable readings for the bath are usually achieved in less than 30 minutes after reaching your set point.
4. Sensors must be clean, dry, and free of any type of coating; oxides and other contaminants can impede heat flow, or contaminate your bath fluid during calibration. The result will be unreliable readings and reduced life expectancy for the fluid.

Chapter 5

Trouble Shooting

The Mini Salt Bath is a high precision portable stirred liquid bath that can suit the needs of metrology calibration and industrial requirements. For better serviceability, we have chosen standard industrial components based on past performance and commercial availability. This manual describes the use of the product, but also includes specifications, parts list, and an electrical diagram. In addition, the factory provides complete support for this product. Technician level personnel are available to assist in trouble shooting the device; laboratory and engineering personnel are available to assist you with issues regarding calibration.

The stirring paddles are protected by the screen running the full height of the tank.

Appendix One

Mini Salt Bath Specifications

Physical

- Dimensions.....370mm (14.5”) deep x 320mm (12.5”) wide x 430mm (17”) tall
- Weight66lbs (30Kg) including the salt
- MaterialsStainless Steel

Electrical

- Power.....110VAC, 10Amp 60HZ
- Main Fuse.....250VAC-10Amp
- Power Relay250VACC-25Amp (overrated for extended service)

Accuracy Specifications

- Range.....200.0 \pm C to 500.0 \pm C
- Resolution.....0.1 \pm C
- Stability & Uniformity.....at 200.0 \pm C \pm 10mK and 500.0 \pm C \pm 20mK (over 10 min. period)

(Note: Absolute accuracy may be improved by using remote reference.)

Heat up / Cool down Rates

- Heat-upApprox. 3 \pm C/minute
- Cool down..... < 1 \pm C/minute

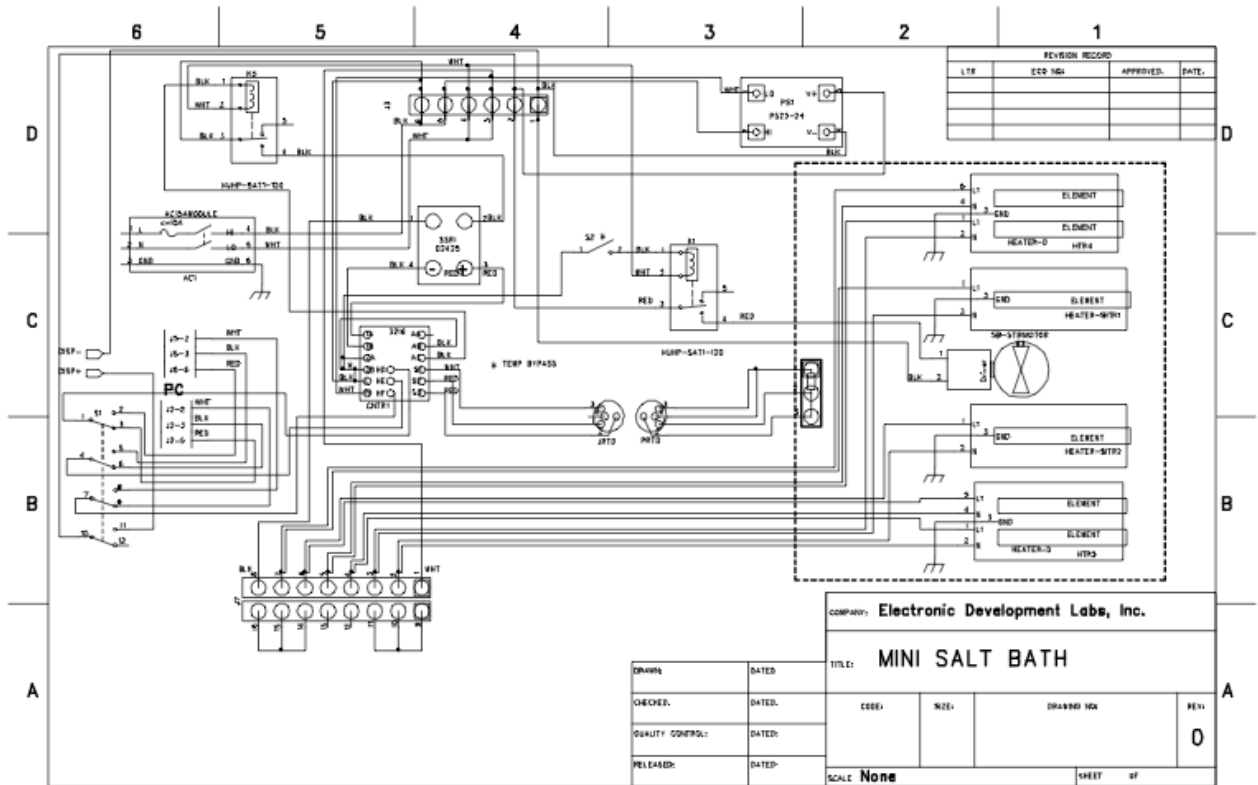
Appendix 2

Uncertainties

The uncertainties associated with the testing of this unit follow the NIST Guidelines for Evaluating and Expressing Uncertainty (Technical Note 1297). Type A uncertainties are combined with Type B uncertainties, where Type A is statistical data representing the measurements and Type B is based on scientific judgment of all relevant information concerning the testing. It is also assumed that uniform distribution exists for the measurement data. The two types of data are combined using the root sum squares method (RSS).

Appendix 3

Electrical Diagram



Appendix 4

Parts List

MSB-500Base Price: \$7 250.00

Price:

Calibration of MSB-500 \$350.00

Standard Replacement Parts:

Part

Price:

Solid State Relay 25 Amp	ECR-SLDSTTRELAY	\$48.16
DPDT Rocker Switch	SWR-RKRDPDT	\$3.15
Power cord 110 VAC 10 Amp	EHP-PWRCRD10	\$4.50
Fuses 10 Amp (5 pack)	EHU-FS10A5X20-5	\$6.55 (5 pack)

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