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## 1.0 UNPACKING CHECKLIST

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Your quality BIOS product has been packaged with care and includes all components necessary for full operation. Please take a moment to check that you have received the following items. If you believe you have not received a full shipment or have questions, please contact BIOS immediately.

- DryCal<sup>®</sup> DC-Lite
- Single Station Battery Charger
- Tubing Kit And Leak Test Accessory
- Carrying Bag
- Instruction Manual, NIST Certificate, Warranty Card

**Note: Quick-Start** Instructions are on page 15 of this manual. Make copies for handy reference.

## 2.0 GENERAL DESCRIPTION

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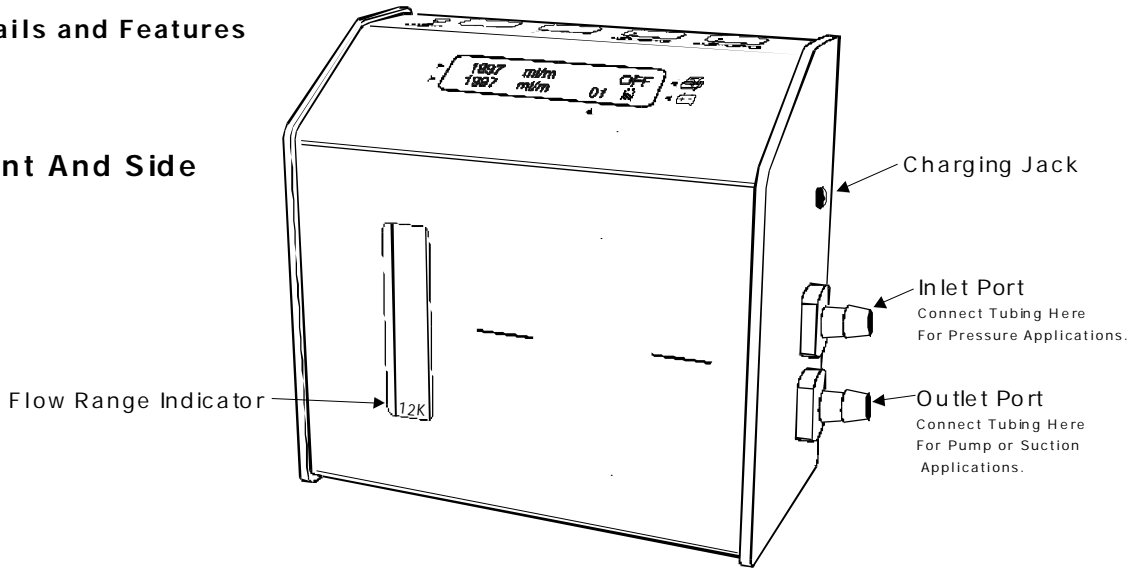
Air flow measuring equipment has come a long way, beginning with buret, soap film, stopwatch and flow charts, moving to automated systems with electric timers and microprocessors, and then finally to the DryCal precision piston flow measuring technology.

The DryCal DC-Lite is an ultra compact, field portable primary air flow meter used for industrial hygiene, environmental and laboratory applications. The DC-Lite uses patented near-frictionless piston technology and photo optic sensors to obtain volumetric flow rates quickly and accurately.

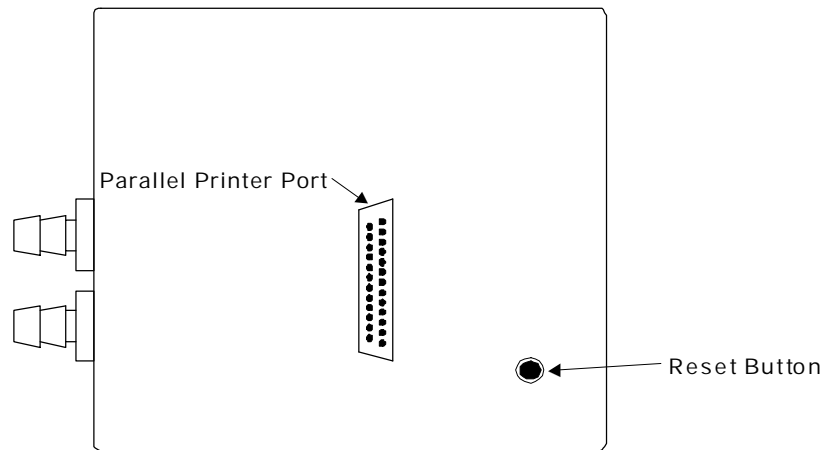
Housed in a small, sturdy case, each unit employs a variety of popular user conveniences such as AC/DC operation, battery level indicator, a large alphanumeric LCD, push-button read and auto-read functions, 5 minute automatic shut-off and a parallel printer port for datalogging.

**DryCal DC-Lite  
Details and Features**

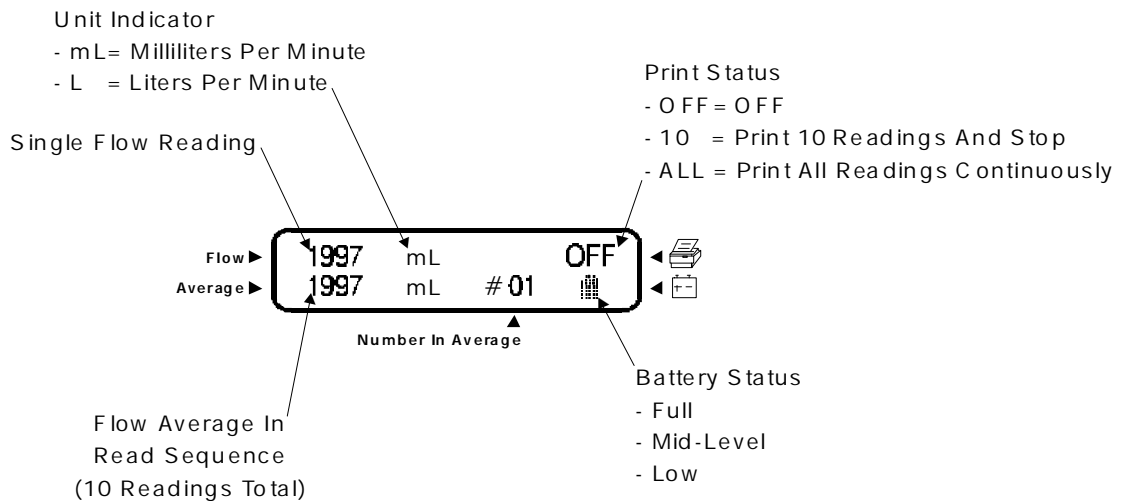
**Front And Side**



**Back**



**Display Features And Nomenclature**



**Figure 1-A**

### 3.0 THEORY OF OPERATION

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The DryCal DC-Lite can be used for measuring air flow rates for either a pumping flow source (in the suction mode) or for either regulated bottled gas or other types of pressure flow sources (in the pressure mode). If you are using the unit in the suction mode the pump should be connected to the outlet port (the lower air boss). Or, if you are using a pressure flow source, it should be connected to the inlet port (the upper air boss). Before a reading is initiated or between readings a computer directed valve performs a bypass function permitting the air to pass through the DryCal bypassing the flow measuring cell.

As a reading is initiated (by pressing the <READ> button) the cell valve closes and the pump or flow source evacuates or pressurizes the air in the flow-measuring cell. The piston rises at the rate of evacuation or pressurization. A precision laser etched encoder system provides two finely collimated light beams with a known distance between the beams. After a suitable acceleration interval the piston breaks the light beams as it passes. The flow reading is completed when the second beam is broken and a crystal clock measures the time between the two breaks. The valve is then opened by the computer and the piston resets. The flow measurement is instantly displayed on the LCD in milliliters per minute (mL) or liters per minute (L).

### 4.0 NIST CERTIFICATION

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The Bios DryCal DC-Lite is a true primary standard. As such BIOS provides NIST traceable certification for volume and time, the two primary elements in the gas flow measurement formula;  $\text{air flow rate} = \frac{\text{volume}}{\text{time}}$ .

Time and volume is certified as follows:

**Time:** The precision crystal controlled oscillators used for timing in DryCals are tested with a NIST traceable frequency counter, which is periodically re-certified by a NIST traceable laboratory.

**Volume:** The Borosilicate glass cylinders are manufactured and characterized to  $\pm 0.00005$  inch tolerance. At BIOS each cylinder is re-measured with transfer standards and NIST traceable gauge blocks. The inert nature of the high quality glass and the proprietary graphite resin piston ensures long lasting dimensional stability and operational dependability.



## 5.0 PRODUCT SPECIFICATIONS

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<b>Size:</b>	(H) 5" x (W) 5" x (D) 2-3/4"	
<b>Weight:</b>	42 oz. / 1200 g	
<b>Flow Ranges:</b>	DCL500	2-500 ml/min.
	DCL5K	5 ml/min.-5 Lpm
	DL12K	10 ml/min.-12 Lpm
	DCL20K	20 ml/min.-20 Lpm
	DCL40K	1-40 Lpm

---

<b>Air Flow Accuracy:</b>	Single Reading:	±2%
	Averaged Reading:	±1%

### Flow Range Specific Leakage Value:

DCL500	DCL5K	DCL12K	DCL20K	DCL40K
±0.075 ml/min.	±0.25 ml/min.	±0.5 ml/min.	±1.0 ml/min.	±2.5 ml/min.

**NOTE:** 1. There is a specific error associated with each cell representing the leakage that may occur in the space between the piston and cell wall. This leakage value is flow range specific and should be added to the percentage value shown as "Air Flow Accuracy". The maximum leakage is approximately .005% of full scale. The values shown below are the calculated values representing the potential leakage error for each specific flow range.  
2. This accuracy statement pertains to the core mid-ranges for each flow cell. Accuracy at the extreme high and low ends of the flow range may vary from the percentage stated. For additional detailed information contact BIOS International Corp.

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**Battery System:** 6V Rechargeable, sealed lead acid,  
6-8 hours typical operation

**NOTE:** Lead acid batteries do not have memory effect problems and with built-in smart charging circuitry the battery can be left charging indefinitely without causing battery damage.

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**AC Battery Charger:** Wall-mounted, single station charger,  
Input: 100 to 120VAC, 50 to 60 Hz,  
Output: 12VDC, 2.5mm charger plug, center positive (Optional: 200 – 240 VAC, 50 to 60 Hz)

**NOTE:** The charger can be used as an AC adapter.

---

**Electronics:** LCD function display includes battery charge level indicator. Charging LED indicator and automatic battery charging circuitry, tapering charge to trickle when battery approaches full charge.

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**Temperature Range:** 0-55 °C

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**Printer Port:** Standard Parallel (IBM Centronics)

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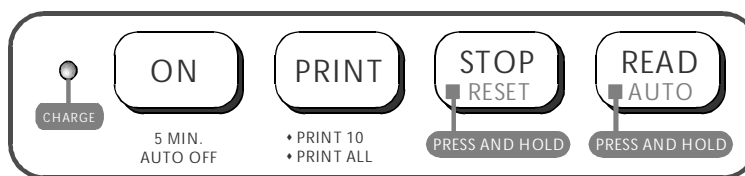
**Warranty:** 2 Years

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**NOTE:** *The recertification program offered by BIOS is an elective and is therefore not included as a warranty item.*

## 6.0 DRYCAL DC-LITE OPERATING INSTRUCTIONS

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### DC-LITE BUTTON PANEL

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#### 6.1 TURNING THE POWER “ON”

1. Press the <ON> button to turn the DC-Lite “ON”.

**NOTE:** 1. An initializing screen will be displayed first showing the computer revision number, then the standard flow display screen will be displayed.  
2. The DC-Lite has an “energy saving” 5 minute inactivity shut-off feature.  
3. For your convenience, there is also a “Reset” button located on the lower back panel. If pressed, this button will quickly “Reset” the unit back to the initializing screen.

---

#### 6.2 TAKING A SINGLE FLOW READING

The flow source and the DC-Lite should be connected with tubing and both instruments should be turned “ON”. The connecting air flow ports are located on the right side of the unit. The lower port is for suction (outlet) and the upper port is for pressure (inlet). For industrial hygiene or environmental applications, typically the sampling medium should also be connected in-line.

*When using the DC-Lite with a Mass Flow Controller (MFC):*

**NOTE:** The DC-Lite has an internal valve that closes when the read button is pressed. The insertion pressure of the valve may cause an MFC to react if the two instruments are not isolated. The isolation can be accomplished with an in-line load equal to at least 8”-12” of H<sub>2</sub>O (typically a filter or orifice can be used for this purpose).

1. Press the <READ> button once to obtain a single flow measurement. The flow measurement will appear on the LCD.
2. Continue this procedure to obtain the required number of flow readings.

**NOTE:** All successive readings in an averaging sequence will be used to calculate the average flow. The unit will automatically clear the average after ten readings and begin a new averaging sequence.

---

#### 6.3 TAKING AUTO-REPEAT READINGS

Readings can be taken continuously in the auto-repeat mode for hands-free operation.

1. Press and hold the <READ> button until a reading starts then release. This will begin a continuous read session.
2. To “STOP” the continuous read session, press the <STOP> button once. The display will indicate the current flow reading (FLOW), the average flow value

(AVERAGE) and the number of readings in the average (NUMBER IN AVERAGE) (up to 10).

---

## 6.4 PRINT SETUP

1. The flow source should be turned “ON” and connected to the appropriate air flow port on the right side of the DC-Lite.
2. Turn the DC-Lite “ON” before connecting a printer to the parallel port on the back of the DC-Lite.

**NOTE:** 1. *The DC-Lite sends out basic ASCII text to the printer. It has been designed to recognize and communicate with most standard IBM compatible office printers including most laser printers. There may be some exceptions to this rule, however, and we have found that dot matrix and ink jet printers work the best.*

2. *If your printer doesn't communicate with the DC-Lite and you don't have an alternative printer please refer to section 6.8 in this manual. You can use a parallel to serial converter to transfer the data to your PC and print from there.*

3. *If you would prefer a dedicated printer for the DC-Lite, the BIOS BMP-1, compact printer makes an excellent and convenient traveling companion for the DC-Lite.*

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## 6.5 SELECTING A PRINT SETTING

The “PRINT” button will toggle between three print settings.

1. The default setting is “OFF”. When the power is turned “ON” the printer setting will always be in the “OFF” position.
2. To engage the printer, press the <PRINT> button once for the print “10” setting (*this will allow printer to print 10 readings and stop*) or press 2 times for the print “ALL” position, (*this will print all readings continuously*).

**NOTE:** 1. *After the printer setting selection has been made a “READ” mode selection (single or auto) must also be made to initiate the flow measurement process.*

2. *If you are using a laser printer and the printed page is not feeding properly, press and hold the <RESET> button while pressing the <READ> button. This will release the page feed.*

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## 6.6 RESETTING THE AVERAGING SEQUENCE AND INITIATING A PRINTED HEADING FOR A PRINTED SEQUENCE

1. The number of readings in an “Averaging Sequence” can be reset to (0) at any time by pressing and holding the <STOP> button for 2 full seconds.

**NOTE:** 1. *The “RESET” process also initiates a printed heading for a printed sequence. The heading includes a column for each flow reading <FLOW>, the running average <AVERAGE> and the number of samples in the average <# SAMPLES>.*

Flow    Average    # Samples

2. *If the printer is not connected this is a “RESET” procedure only.*
- 

## 6.7 “HARD RESET” BUTTON

In some situations there may be a need to restart the DC-Lite. For this purpose there is a “HARD RESET” button on the back panel of the DC-Lite. The button resets the unit back to the initializing screen and the printer setting will revert to the “OFF” position.

It is a white flush mounted button located on the lower right side of the back panel near the parallel printer port. When necessary the button can be pressed with a screw driver or a ball point pen.

---

## 6.8 DOWNLOADING DATA TO A COMPUTER

**NOTE:** *Sample data from the DC-Lite can be downloaded to a PC by using a parallel to serial converter. Prior to setup determine whether your computer is equipped with an open COM Port. Check the connector configuration for that COM Port and get a standard printer cable and the appropriate connection adapters for the selected Port. Also, determine the correct COM Port number (COM1, COM2, etc.). The data will be output in the Standard NZR Data Format.*

You will need to set up a terminal file in your computer to receive the “Inbound” data.

For Windows 95:

1. In Windows 95, click on the <START BUTTON> located in the lower left corner of your terminal screen.
2. Select <PROGRAMS> from the menu.
3. Select <ACCESSORIES> from the next menu.
4. Select <HyperTerminal> from the “ACCESSORIES” menu.
5. In “HyperTerminal” double click on the <Hypertrm> Icon.
6. Type the name that you wish to give the permanent receiving file and select an Icon from the available choices. Press <OK>.
7. Select the appropriate <COM PORT> (COM 1, COM 2 depending on your computer) and press <OK>.
8. Select:

Baud Rate:	9600 Bit per second
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	X on / X off

And press <OK>.

9. From the “File Menu” select <PROPERTIES>.
10. Then select <SETTINGS>.
11. Press <ASCII SETUP>.
12. Set- Line delay: 100 Character delay: 100
13. Select ASCII Receiving <Append line feeds to incoming line ends> and Press <OK>.
14. Press <OK> again.

---

## 6.8 DOWNLOADING DATA TO A COMPUTER, CONTINUED

### TO SAVE AS A SHORTCUT ICON

1. Click on File select <SAVE AS>.
2. Give the file a permanent name or accept the existing name.
3. Press <SAVE> and exit file.
4. In the “HyperTerminal File” find the Icon, with the file name that you selected earlier, and click once to highlight the Icon.
5. Go to the “File Menu” and click on <CREATE SHORTCUT>.
6. Click on the new <SHORTCUT ICON> and drag it to the desk top area of your screen.
7. Close the “HyperTerminal File”.

### TAKING FLOW READINGS FOR TRANSFER TO SPREADSHEET PROGRAM (EXCEL)

1. Make sure that the DC-Lite is connected to your computer with a connecting cable.
2. At your Windows 95 desk top, double click on the <SHORTCUT ICON>.
3. Click on <TRANSFER> and select <CAPTURE TEXT>.
4. Change the file name to a dated or specific name for this calibration session. Include a (.txt) suffix.
5. Press <START>.
6. Turn the DC-Lite <ON> and select a print mode (10, All etc.). Press and hold the <STOP> button. This will “Reset” and print a heading in the terminal file.
7. Take readings as necessary and when the session is completed select <TRANSFER> and go to <CAPTURE TEXT> and press <STOP>.
8. Open EXCEL or another spreadsheet or database program.
9. Click on <File> and select <OPEN>.
10. In the “File type” area in the lower left corner of the box , select <.txt> (Text files).
11. At the top of the box “Look In” Click on the arrow and select <C:\>, then double click on <Program Files>.
12. Double click on <Accessories>, then double click on <Hyper Terminal>.
13. Double click on <The Correct Data File>.
14. A new import setup box will appear. Select <Delimited> and select which row you want to start the import with and type it into the box.
15. Click on <Next> and select <Comma>.

**NOTE:** If “COMMA” doesn’t separate the data properly select “SPACE”.

16. Click on <Next> and then click on <Finish>.
17. The appropriate part of the file will automatically be dumped into the current worksheet on the screen. Clean up the file if necessary and treat it like any other spreadsheet or database file.



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## 6.8 DOWNLOADING DATA TO A COMPUTER, CONTINUED

For Windows 3.1:

1. Under Windows directory, select run "TERMINAL.EXE".
2. Select "SETTINGS".
3. Select "TERMINAL PREFERENCES".
4. Set CR > CRLF to "INBOUND".
5. Select OK.
6. Select "SETTINGS".
7. Select "COMMUNICATIONS".
8. Set the following:
  - COM1 or COM2 (this depends on your PC)
  - Baud Rate: 9600
  - Data Bits: 8
  - Stop Bits: 1
  - Parity: None
  - Flow Control: X on / X off
9. Select "TRANSFER".
10. Select "RECEIVE TEST FILE".
11. Input a unique file name such as "DC2DATA.TXT".
12. Select OK. PC is now ready for data transfer.

---

## 7.0 THE BATTERY SYSTEM

The DryCal DC-Lite is powered by an internal lead-acid battery. The battery will power the instrument for 6-8 hours of continuous use and has a typical service life of approximately 3-5 years. The DC-Lite provides a convenient 5 minute automatic shut-off feature for extended battery life. Use of a printer does not affect the battery life.

The DC-Lite can be charged and/or powered by the BIOS single-station charger when plugged into a standard 115V AC power source outlet (220V AC optional). Optionally, the DC-Lite can also be charged using one station of the 4000D multi-station charger. Please read all setup and charging instructions indicated in this manual before using equipment.



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## 7.1 CHARGING THE BATTERY

Before using your DryCal DC-Lite, be sure that the battery system has been fully charged to ensure that unit will perform to specification and maintain proper operation for the required time period.

The DC-Lite is equipped with a smart battery indicator that provides battery charge indication at three levels. When the battery indicator on the display is empty the unit will continue to operate for a short period of time before shutting itself off.

To Charge the DC-Lite;

1. Connect only the appropriate BIOS 12VDC charger, provided with the DC-Lite flow meter, into a standard wall outlet. Optionally, one station of the BIOS AirPro 4000D multi-station charger may be used.
2. Insert the charger barrel plug into the charging jack located on the right side of the DC-Lite housing above the inlet and outlet air bosses. A green “CHARGE” LED will illuminate while the unit is charging. Full charge takes 8 to 12 hours, and the DryCal can charge while being used.
3. To view the actual charging status during the charging period, disconnect the battery charger and wait 3-5 minutes. When the indicator is solid black the battery is fully charged.

**NOTE:** *The unit may be charged for an indefinite time period without causing battery damage.*

---

## 7.2 BATTERY MAINTENANCE AND STORAGE

### **Battery Maintenance:**

Lead-acid batteries will not exhibit the “memory effect” common to nickel-cadmium batteries. A lead acid battery may be charged for an indefinite time period without damage.

### **Long-Term Storage:**

Long-term storage without charging can damage the battery pack, therefore if the DC-Lite cannot be left charging continuously, it should be charged at least every three months.

## **8.0 AIR CONTAINING CIGARETTE SMOKE OR OTHER ORGANIC CONDENSEABLES LIKE OILY VAPOR**

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Air containing cigarette smoke or other excessive dust and particulate should be filtered from the DryCal DC-Lite. An air filter (part# AF516) is available for this purpose. The filter should be placed ahead of the DryCal in the flow stream, on the inlet side.

## **9.0 ISOLATING THE DRYCAL WHEN USING IT WITH CERTAIN INSTRUMENTS**

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When taking flow readings with the DryCal DC-Lite an internal valve closes placing an insertion pressure spike into the flow stream. Generally the pressure spike is invisible to the flow source, however, it can cause an interaction with some instruments, i.e. some Mass Flow Controllers, MSA “Elf” Air Samplers, Magnehelic Manometers and Rotameters.

### **9.1 USE WITH INSTRUMENTS CONTAINING MASS FLOW CONTROLLERS**

The insertion pressure spike caused by the internal DryCal valve can intermittently interact with some instruments that contain fast responding Mass Flow Controllers (MFC) such as Gas Analyzers and Gas Chromatographs. When the valve closes in the DryCal some MFC’s may respond or search. If this interaction between the DC-Lite and your instrument occurs it can be remedied by isolating the DryCal from the MFC or the instrument containing the MFC.

The isolation can be achieved by placing a small backpressure or load equaling 8-10 inches of water column between the two instruments. This is most easily accomplished by using an isolating flow restrictor such as an in-line orifice or filter.

### **9.2 USE WITH THE MSA “ELF”**

BIOS DryCals should be used to calibrate or check the flow rate of an MSA Escort ELF<sup>®</sup> sampling pump only if an isolating flow restriction (such as the air sampling media, filter cassette or an in-line orifice like the Gemini tube holder). The restriction should provide at least 5 inches of water column and should be placed between the pump and the flow meter. Typically the filter cassette or sorbent tube and Gemini variable orifice satisfies this requirement. Failure to use such an isolation technique may cause a calibration inaccuracy on the order of  $\pm 2\%$  and is not recommended.

---

## 9.3 CALIBRATING ROTAMETERS

Rotameters may oscillate when attached to any large volume such as a flow meter. The rotameter ball may exhibit instability when used in series with the DryCal. For optimum accuracy, use a rotameter over its mid-range.

To calibrate rotameters:

1. Attach an isolating load or sample medium, with a pressure drop of about 8 to 12 inches of water column, in series with a stable pump and a DryCal.

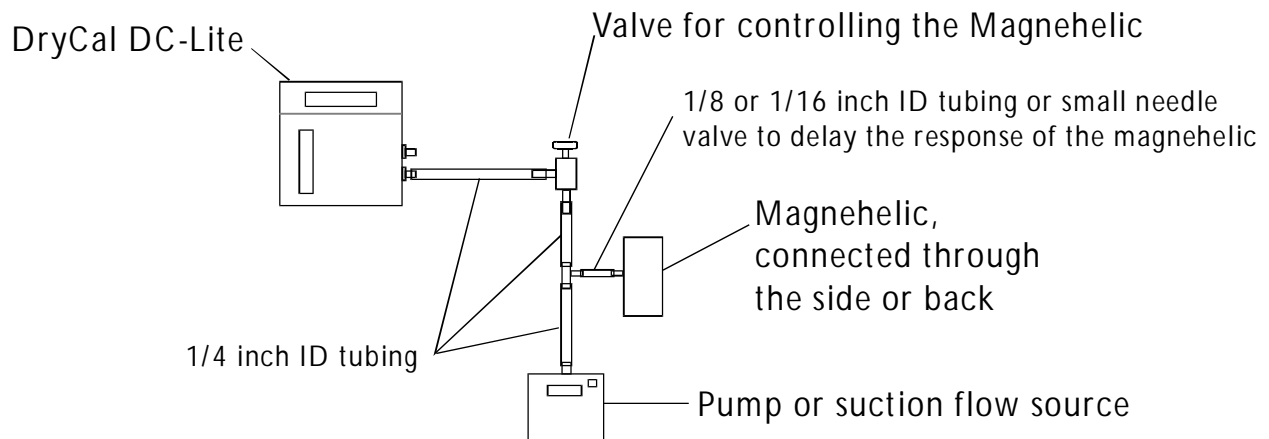
**NOTE:** Use of a 25mm, 0.8m filter cassette makes a suitable load for most flow rates for industrial hygiene applications. This method yields good stable results and stabilizes variations in flow due to differences in pressure drop between the two instruments.

2. Calibrate the sampling pump at the desired flow setting, i.e.: 2.00 Lpm, with the DryCal. When the desired flow setting is obtained, disconnect the DryCal and attach the tubing to the outlet boss of the rotameter.
3. When the rotameter ball stabilizes, mark the rotameter for the true flow rate (2.00 Lpm for example) using tape and a permanent marker to denote the calibrated flow setting or note the point on a rotameter flow chart. Repeat this procedure for any additional flow settings.

---

## 9.4 USE WITH MAGNEHELIC MANOMETERS

High capacitance spring loaded gauges such as Magnehelic manometers can cause vibration of the DryCal piston. This is not a defect in the DryCal. The piston is accurately mirroring the transient internal vibrations of the gauge. This type of gauge must be isolated from the DryCal by inserting a suitable restriction between the gauge and the calibrator (as shown below).





## 10.0 MAINTENANCE, QUALITY ASSURANCE, STORAGE, SHIPMENT

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### 10.1 MAINTENANCE

When not in use always store your DC-Lite in a clean, dry environment. When possible leave the unit on charge. Wipe only with a damp cloth and do not spray or use abrasive cleaners.

### 10.2 LEAK-TEST CHECK PROCEDURE

A quality assurance self-test feature is provided to verify proper integrity and operation of the flow cell. It is recommended that the self-check leakage test be conducted periodically as part of an on-going quality assurance program.

To initiate the LEAK-TEST:

1. Place the Leak-Test tubing accessory (short piece of tubing with red cap) over the top (inlet) air boss. The low flow range DC-Lite requires the small Leak-Test tubing accessory that should be supplied in the tubing kit.
2. Press and hold the <STOP> button while pressing the <ON> button. The display will read:

Leak Test    Invert & Push Read
------------------------------------

**NOTE:** *If the DC-Lite is already "ON" press and hold the <STOP> button while pressing the <HARD RESET> button on the back of the unit (Section 6.7).*

3. Invert the DC-Lite so the piston moves to the top of the cell. While the piston is resting at the top of the cell press the <READ> button and the internal valve will close. Return the unit to an upright position and it will time the descent of the piston.

**NOTE:** *1. The test may take as long as 15-20 minutes. Observe the location of the piston to insure that it is at the top of the cell when the test begins.  
2. Check the display every 3-5 minutes for the results of the test. After the test is complete the unit will automatically shut itself "OFF" in 5 minutes. If this occurs without documenting the results, the information will be lost and the test will have to be repeated.*

If the test is completed successfully, the display will read:

Test OK Push Read
----------------------

4. Press the <READ> button as directed and the internal valve will open and the piston will fall.
5. Repeat the test with the Leak-test tubing accessory connected to the lower (outlet) air boss.

**NOTE:** *If the unit fails the Leak-test the display will read:*

Maintenance    Reqd Push Read
----------------------------------



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## **10.3 RETURN AUTHORIZATION**

Prior to returning your DryCal for repair or Re-certification, please contact BIOS International for technical support, troubleshooting assistance and an RMA number if necessary (800.663.4977).

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## **10.4 SHIPMENT OF DC-LITE**

When shipping the DryCal DC-Lite please ensure that the packaging is adequate to protect the instrument. When possible the DC-Lite should be shipped in the original packaging or wrapped with foam inserts for protection. BIOS International Corp. is not responsible for damage that occurs during shipment.

---

## **10.5 LONG-TERM STORAGE**

DryCal flow meters can remain on “Charge” in the laboratory until needed without causing damage to the battery. If the DryCal is stored for long periods of time the battery should minimally be charged once every three months.

Always store DryCal flow meters in a clean dry environment and recharge the unit prior to use after long-term storage.

---

## **11.00 RECERTIFICATION**

Since the DryCal DC-Lite is a true primary standard it cannot be calibrated to match the accuracy of another standard. Based on the dimensional stability and precision of its components and controlled manufacturing procedures the DryCal either does or does not work properly. Annual recalibration is not possible or necessary.

For the purposes of quality assurance BIOS has instituted an elective recertification, upgrade and performance test program. There is no factory specified time requirement for this program. How often you have your DryCal re-certified by the factory is a QA/QC decision. The determining factors are whether the unit passes the internal Leak-Test, ISO requirements if applicable and the conditions in which the unit is used. Units used in a laboratory setting will require recertification less frequently than a unit that is used in a dusty environment. From one to three years is normal.

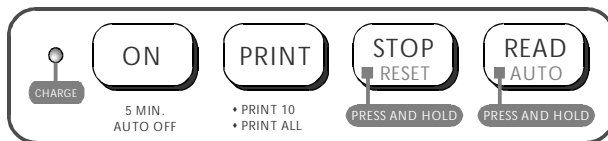
The program includes:

- Recertification of the timing device.
- Recertification the volume.
- Cleaning.
- A battery capacity test.
- Internal computer program upgrade as necessary.
- Mechanical upgrade as necessary.

**NOTE:** The recertification program is an elective and is therefore not included as a warranty item.

## QUICK START OPERATING INSTRUCTIONS

### DRYCAL DC-LITE Primary flow meter



#### TURNING THE POWER ON:

1. Press the <ON> button to turn the unit "ON".

**NOTE:** The DC-Lite has an "energy saving" 5 minute inactivity shut-off feature.

#### TAKING A SINGLE FLOW READING:

1. Connect tubing between the flow source and the DC-Lite with sampling medium in-line if the application requires it. Turn the DC-Lite and sampling pump "ON".

**NOTE:** 1. The inlet and outlet ports are located on the right side of the unit. The lower port is for suction (outlet) and the upper port is for pressure (inlet).

2. If using the DryCal DC-Lite with an instrument containing a Mass Flow Controller, MSA "ELF" Sampling Pump, Rotameter or a Magnehelic Manometer refer to the manual for detailed instructions.

2. Press the <READ> button once to obtain a single flow measurement. The flow measurement will appear on the LCD.

3. Continue this procedure to obtain the required number of flow readings.

**NOTE:** All successive readings will automatically be used to calculate the average flow. The unit will automatically clear the average after ten readings and begin averaging a new sequence.

#### TAKING AUTO-REPEAT READINGS:

Readings can be taken continuously in the auto-repeat mode for hands-free operation. The unit will automatically clear the average after ten readings and begin averaging a new sequence.

1. Press and hold the <READ> button until a reading starts then release. This will begin a continuous read session.

2. To "STOP" the continuous read session, press the <STOP> button once. The display will indicate the current flow reading (FLOW), the average flow value (AVERAGE) and the number of readings in the average (NUMBER IN AVERAGE) (up to 10).

#### RESETTING THE AVERAGING SEQUENCE:

1. The number of readings in an "Averaging Sequence" can be reset to (00) at any time by pressing the <STOP> button and holding for 2 full seconds.

#### PRINT SETUP:

1. The flow source should be turned "ON" and connected to the appropriate air boss on the right side of the DC-Lite.

2. Plug the printer cable into the parallel printer port located on the back of the DC-Lite. Make sure DC-Lite and the printer are "ON".

#### SELECTING A PRINT SETTING:

The "PRINT" button will toggle between three print settings.

1. The default setting is "OFF". When the power is turned "ON" the printer setting will always be in the "OFF" position.

2. To engage the printer, press the <PRINT> button once for the print "10" setting (*this will allow the printer to print ten readings and stop*) or 2 times for the print "ALL" position, (*to print continuously*).

**NOTE:** After the printer setting selection has been made a "READ" mode selection (single or auto) must also be made to initiate the flow measurement process.

#### <HARD RESET> BUTTON:

In some situations there may be a need to restart the DC-Lite. For this purpose there is a "HARD RESET" button on the back panel of the DC-Lite. The button resets the unit back to the initializing screen and the printer setting will revert to the "OFF" position.

**NOTE:** It is a white flush mounted button located on the lower right side of the back panel near the parallel printer port. When necessary the button can be pressed with a screw driver or a ball point pen.