

# **DryCal<sup>®</sup> DC-2 Manual**

## DryCal<sup>®</sup> DC-2 Specifications

**Base Size** 7.75" x 4" x 7.75" • 197 mm x 102 mm x 219 mm

**Cell Size** 4" Diameter x 10" H • 101 mm Diameter x 254 mm H

**Weight** Base and cell, 51 oz. • 140 g

**Standardized (Corrected) Accuracy** This represents the additional tolerance due to temperature and pressure inaccuracies when reading standardized flow (SLPM). Accuracy is percent of reading.

Temperature Range	Typical	Maximum
293–303 °K (20–30 °K)	±1.1%	±1.4%
273– 323 °K (0–50 °K)	±1.3%	±2.1%

**Flow Ranges | Air Flow Accuracy** Specifications based on averaged readings; lower limit is based on self-tested max. leakage. All flow cells are interchangeable. Accuracy is percent of reading.

Model	Optimum Flow Range (±1%)	Extended Flow Range*
DC-LC-1	10 ml/min–300 ml/min	1 ml/min–500 ml/min
DC-MC-1	100 ml/min–5 L/min	10 ml/min–10 L/min
DC-HC-1	500 ml/min–30 L/min	50 ml/min–50 L/min

\*Contact Bios for application assistance

**Battery System** 6V rechargeable, sealed lead acid

**AC Battery Charge | Power Adapter** Wall-mounted, single-station charger and power adapter. Input: 100 – 120 VAC, 60Hz; output: 12 VDC. Optional input: 200 – 240 VAC, 50 Hz.; output: 12 VDC.

**Operating Modes** Single cycle, 10 readings, or auto-mode.

**Temperature Range** 0-55° C

**Humidity Range** 0-70% non-condensing

**Printer Port** Standard parallel (Not compatible with printers that require Microsoft<sup>®</sup> Windows<sup>™</sup>)

**Serial Port** RS-232 compatible

**Warranty** Product, 1 year; battery, 6 months

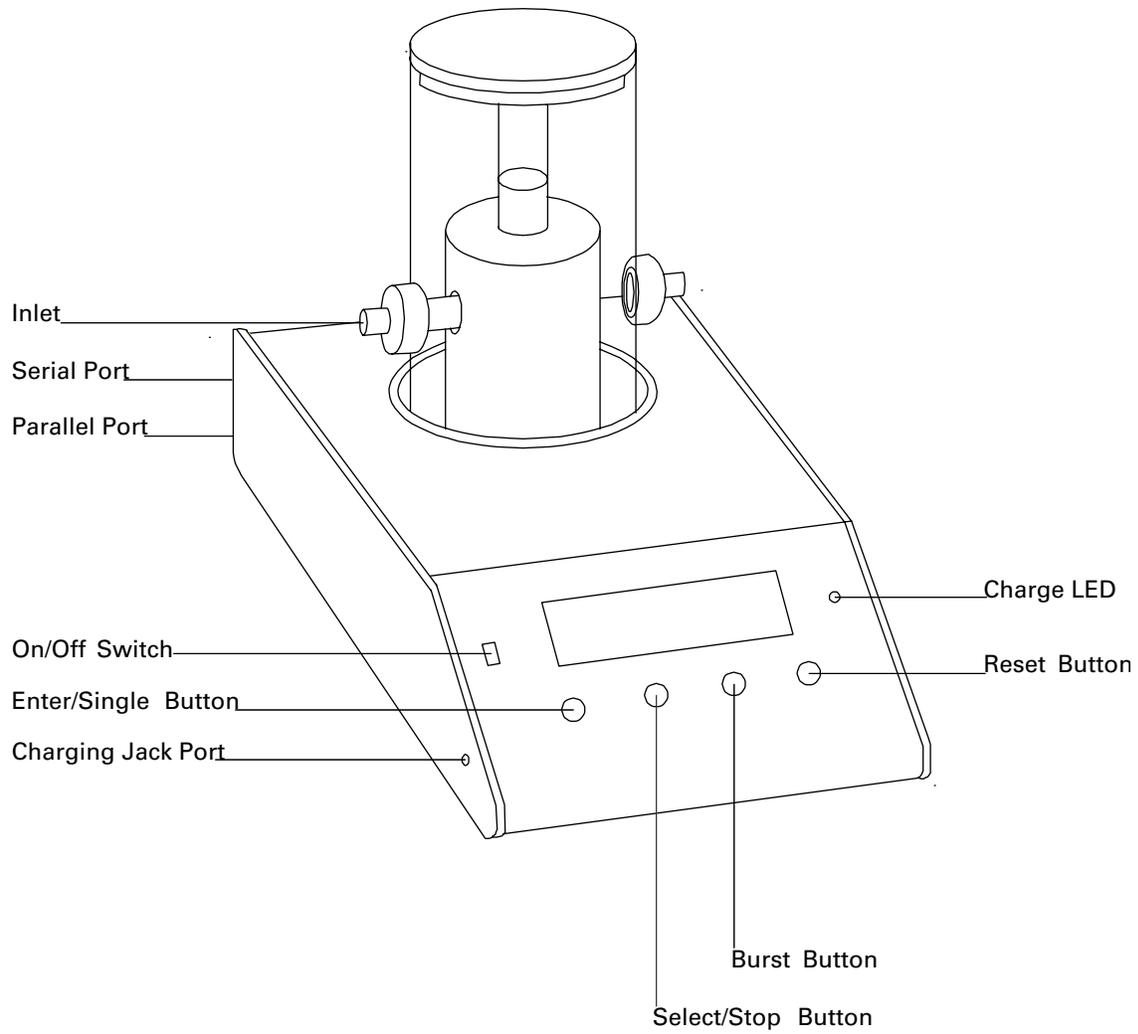
The annual recalibration program offered by Bios is elective and is not included as a warranty item. All specifications are subject to change.

Please contact Bios or visit our web site at [www.drycal.com](http://www.drycal.com) for the most current information.

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## 1.0 DC-2 Features



## 2.0 DC-2 LCD Data Display Samples

Display amounts indicated are for reference only and used only to introduce the general functions of the display. The values indicated on your display will be relative to specific user preference settings and actual time, temperature and atmospheric pressure conditions.

### 1 DC-2M Main Menu Screen

```

DC-2M Main Menu
Run
Setup
Leak Check
    
```

### 2 Run Screen

```

VFlow 1998 ml/m
VAvg 2004 # 10
SFlow 2015 Sml/m
SAvg 2010 P
    
```

### 3 Setup Screen

```

Next Esc
Units
Printer
Formats
    
```

### 4 Temperature Correction Menu

```

Next Esc
Temp Corr. 25.0 °C
Sample Rate 00 min
# to Average 10
    
```

### 5 Delimiter Menu

```

Next Esc
Delimiter Comma/ Space
    
```

### 6 Date/Time Setup Menu

```

96/05/20 14:41
    
```

### 7 Current Stats Display

```

Temp 299.5 °K
Pres 736 mmHg
Bat 6.16 Volts
    
```

### 8 Units Menu

```

Temp - °C °F °K
Pres - inHg mBar mmHg
    
```

### 9 Printer Menu

```

Printer - Wide1 Wide2 On
Print All Readings
Print Avg Readings
    
```

### 10 Formats Menu

```

Time - AM PM / 24 Hr
Date - MT/DT/YR DT/MT/YR
YR/MT/DT
    
```

### 11 "Bat" Low Battery Indication

```

DC-2M Main Menu
Run
Setup
Leak Check BAT
    
```

### 12 "P" Print Mode Indication

```

VFlow 1998 ml/m
VAvg 2004 # 10
SFlow 2015 Sml/m
SAvg 2010 P
    
```

### 3.0 Unpacking Checklist

Your DryCal DC-2 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 if you have any questions, please contact Bios immediately.

#### Your DryCal DC-2 Includes

- Single-Station Battery Charger
- Tubing Kit
- DC-2 Unit with Flow Cell(s)
- Protective Case
- Certificate of Calibration
- Instruction Manual
- Warranty Registration Card

### 4.0 Warnings

 The DC-2 is not rated intrinsically safe and is not for use with explosive gasses or for use in explosive environments.

 The DC-2 is not designed for pressurization above 0.35 bar (5 PSI) or for gas flows above the rated specifications of the flow cell in use. Please consult the product specification on the inside front cover of the manual for more information regarding acceptable gas flow ranges or visit our website at [www.Drycal.com](http://www.Drycal.com) for the most current product specifications.

 For use with clean laboratory air or other inert, non-corrosive gasses only.

### 5.0 General Description

The DryCal DC-2 is a simple-to-use battery-powered portable primary flow meter. The DC-2 can be used to measure air flow rates for either a vacuum flow source (connected to the outlet port) or a pressure flow source connected to the inlet port. Using proprietary near-frictionless piston technology, it combines high-accuracy with unequaled speed and convenience.

The DryCal consists of two primary sections. The base contains the electronics and computer, while the flow cell performs the actual physical measurements. The base has an opening on its upper surface into which the flow cell is installed. The front of the base is angled for easy reading of the LCD display and includes a **Power On/Off** switch and Charge LED indicator. Below these are 4 white push-button switches.

Volumetric flow readings are obtained with the push of a button. The DryCal can be set to take flow readings automatically, or manually one reading at a time. With each reading, both the volumetric flow and the standardized flow are automatically displayed on the four-line LCD display. The DC-2 can be programmed for up to 99 readings in an averaging sequence, useful for reproducibility studies.

A built-in standard parallel printer port for hardcopy printing of flow readings is located on the rear panel. DryCal seamlessly interfaces with the BP-1 portable thermal printer.

The DryCal DC-2 also includes an integrated RS-232 port for computer interface capability. Using Windows® HyperTerminal, a simple program is installed to allow data transfer for an electronic audit trail. Additional buttons provide enhanced calibration functions as well as access to user-settable preferences.

## 6.0 Theory of Operation

The DryCal is a true primary gas standard. The time required for a frictionless piston to traverse a known volume is precisely measured and an internal computer calculates the flow. The accuracy of the instrument is built into its dimensions, sensors and timing crystal.

When in use, gas flows from the inlet fitting through the internal cell valve to the outlet fitting. When a reading is begun, the valve closes and gas is diverted into the flow-measuring cell. The piston rises at the rate of gas flow. A photo-optic sensor reads a precision encoder attached to the piston and the time between encoder windows is measured by a crystal clock after a suitable acceleration interval.

When a reading is completed, the valve is opened and the piston resets. The DC-2 instantaneously displays the flow reading on its LCD display.

## 7.0 Operating Instructions

### 7.1 Factory Default Settings

The DC-2 has a number of user-definable features and settings. If you wish to change any of these settings, refer to Section 8.0, Setting User Preferences.

#### Factory Settings

Temperature: °C

Atmospheric Pressure: mm Hg

Standardized Temperature Setting: 25 °C

# Of Readings in an Averaging Sequence: 10

Date Format: M/D/YR

Time Format: AM/PM

Printer Setting On (Narrow Printing Format)

Delimiter Setting: [,] comma (for RS232 export)

### 7.2 Hard Reset

A “Hard Reset” restores the DC-2 to its factory default settings. In order to perform a “Hard Reset” press the ▲ and the ▼ buttons simultaneously from the DC-2 Main Menu.

### 7.3 Turning the Power On

Turn power on by sliding the **On/Off** switch upward toward the interchangeable flow cell.

### 7.4 Installing & Removing Flow Cells

DryCal accepts three interchangeable cells for different flow ranges. Cells should always be changed with the power switch in the **Off** position.

### Installing Flow Cells

- 1 Position the selected flow cell into the electronics base opening with its top label facing upwards.
- 2 Rotate the cell back and forth gently to locate the 9 pin connector. When the cell no longer turns and the connector is engaged, press firmly downward.
- 3 When the power is turned on, the DryCal electronics will sense which cell is installed and display the appropriate readings for that cell.

### Removing Flow Cells

With the power turned off, grasp the flow cell firmly by the cylinder and wiggle gently upward and out of the base.

## 7.5 Taking Readings

When taking air flow calibration readings for industrial hygiene applications, confirm that the intended sample medium is in-line between the sampling pump and the calibrator.

 The temperature sensor accuracy may be degraded if the unit is operated while charging. Remove the charger from AC power prior to use and allow the DC-2 to equalize temperature.

### Taking a Single Reading

- 1 Ensure that there is an active flow source.
- 2 Turn the DC-2 on. The start-up sequence will indicate on the display.

```
* * * * *
*   DryCal DC-2M   *
*   Version 1.08   *
* * * * *
```

- 3 Immediately following the Start-Up Screen, the DC-2 Main Menu will appear. The blinking cursor will highlight the "R" of the "Run" selection

```
DC-2M Main Menu
Run
Setup
Leak Check
```

- 4 Press the **Enter** button. The Run screen will indicate on the display.

```
VFlow      ml/m
VAvg       #
SFlow      Sml/m
SAvg
```

- 5 Press the **Enter** button again. The first flow reading will be indicated.

```
VFlow 2011 ml/m
VAvg 2011 # 01
SFlow 2023 Sml/m
SAvg 2023
```

- 6 Continue to press the Enter button to obtain flow readings in the manual mode.





- 4 Press the **Enter** button once to enter the Setup screen:



## 8.2 Setting Temperature & Pressure Units

Highlighting “Units” and pressing the **Enter** button allows the user to select and set temperature and barometric pressure units. The **Select** button allows the user to choose temperature or barometric pressure. The ▲ and ▼ buttons change the options. The **Enter** button accepts the selections and returns the user to the Setup screen.

Menu choices:

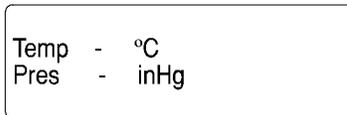
Temp (erature): in °C, °F, °K

Pres (sure): in Hg, mbar, mmHg

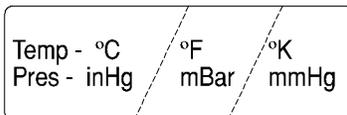
- 1 After entering the Setup screen, highlight “Units” by pressing the **Select** button two (2) times or until the “U” in “Units” is highlighted.



- 2 Press the **Enter** button once to enter the Units screen.



- 3 To select the temperature type, press the ▲ button to scroll the choices.



- 4 When preferred type is indicated, press **Select** to accept and advance to Pressure type or press **Enter** to return to the Setup screen.

## 8.3 Setting Print Options

Selecting “Printer” and pushing **Enter** allows the user to define the printer type and select printing options. The printer port can be selected as “On”, “Wide1” and “Wide2” using ▲ and ▼ buttons. Experiment with selections to determine the best choice for your printer. You may also select the option of printing every calibration or just the final

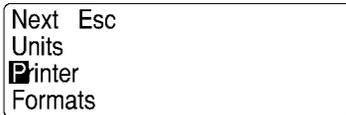
average calibration using the ▲ and ▼ buttons. After these options are chosen, the **Enter** button records the selections and returns the user to the Setup screen.

**Menu Choices:**

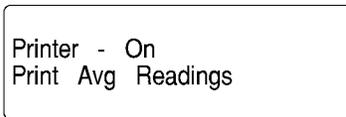
Wide1, Wide2, On

Print All Readings, Print Avg. Readings

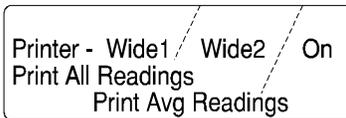
- 1 After entering the Setup screen, highlight "Printer" by pressing the **Select** button until the "P" of "Printer" is highlighted.



- 2 Press the **Enter** button once to enter the Printer screen. The following screen will be indicated:



- 3 To select the printer type, press the ▲ button to scroll the choices. Choose "Wide 1", "Wide 2" or "On". "On" is for a narrow printer like the Bios BP-1 printer. "Wide1" and "Wide2" are two different wide carriage printer formats.



- 4 When preferred type is indicated, press **Select** to accept and advance to Print Avg./ All Readings. Use the ▲ and ▼ buttons to select options or press **Enter** to return to the Setup screen.
- 5 If your selected printer type option does not activate your printer, choose another option.

## 8.4 Setting Time & Date Formats

Selecting "Format" and pressing **Enter** allows the user to select time and date formats; the options include 24 hr or AM/PM time formats, MT/DT/YR, YR/MT/DT, or DT/MT/YR. Time and Date formats are chosen using the **Select** button and the ▲ and ▼ buttons. After these options are chosen, the **Enter** button records the selections and returns the user to the Setup screen.

**Menu choices:**

Time: 24 Hr, AM/PM

Date: MT/DT/YR, YR/MT/DT, DT/MT/YR,

- 1 After entering the Setup screen, highlight "Formats" by pressing the **Select** button until the F in "Formats" is highlighted.



- 2 Press the **Enter** button once to enter the Formats screen.

Time - AM PM Date - MT / DT / YR
-------------------------------------

- 3 To select the time type, press the ▲ button to scroll the choices. Choose “AM/PM” or “24 Hr”.

Time - AM PM / 24 Hr Date - MT/DT/YR DT/MT/YR YR/MT/DT
--

- 4 When preferred time type is indicated, press **Select** to accept and advance to “Date”. Use the ▲ and ▼ buttons to select options or press **Enter** to return to the Setup screen.

## 8.5 Setting Temperature, Sample Rate & Readings in Average

Selecting this screen allows the user to set temperature correction, the sample rate frequency, and the number of flow readings to include in the automatic average. The **Select** button and the ▲ and ▼ buttons are used to highlight and increase or decrease preferences. After these options are chosen, the user can press **Select** to highlight “ESC”, and press the **Enter** button. Exiting records the selections and returns the user to the Setup Screen.

### Menu choices:

Temp Corr(rection): 0-51.0 °C

Sample Rate: 0-255 min

# To Average: 1-100

- 1 After entering the Setup screen, the cursor will be highlighting the “N” of “Next”. Press the **Enter** button once to access the “Temperature Correction”, “Sample Rate” and “# to Average” screen.

Next Esc	
Temp Corr.	25.0 °C
Sample Rate	00 min
# to Average	10

- 2 Press **Select** twice to highlight “Temp Corr.” When highlighted, use the ▲ and ▼ buttons to increase or decrease the desired temperature correction. Depending on the preferences, the screen will indicate the temperature correction in °C, °K, or °F.
- 3 When the desired temperature correction amount has been reached, press **Select** to highlight and set the “Sample Rate” and/or “# to Average” or highlight “Esc” and press **Enter** to return to the Setup screen.

## 8.6 Setting Delimiter for RS232 Export to PC

Selecting this screen allows the user to set the delimiter preference. The **Select** button and the ▲ and ▼ buttons are used to highlight and choose preferences. After these options are chosen, the user can press **Select** to highlight “Esc”, and press the **Enter** button. Exiting records the selections and returns the user to the previous screen.

### Menu Choices:

Delimiter: Comma/Space

- 1 After entering the Setup screen, the cursor will be highlighting the "N" of "Next". Press the **Enter** button twice to access the Delimiter screen.

Next	Esc
Delimiter	Comma/ Space

- 2 Press the **Select** button to highlight "Delimiter". When highlighted, use the ▲ and ▼ buttons to choose the desired preference.
- 3 Press the **Select** button to highlight "Esc" and press **Enter** to return to the previous screen.

## 8.7 Setting Date and Time

Selecting this screen allows the user to set the current date and time. The **Select** button and the ▲ and ▼ buttons are used to highlight and increase or decrease selections. After these options are chosen, the user can press the **Enter** button and advance to the current statistics screen. Exiting records the selections and returns the user to the previous screen.

### Menu choices, Date/Time:

- 1 After entering the Setup screen, the cursor will be highlighting the "N" of "Next". Press the **Enter** button three times to access the "Date and Time" screen.

96/05/20	14:41
----------	-------

- 2 Press the **Select** button to highlight the month/day/year or hours: minutes. When highlighted, use the ▲ and ▼ buttons to choose the desired preferences.
- 3 When the desired date and time have been set, press **Enter** twice to return to the DC-2 Main Menu.

## 8.8 Display Ambient Conditions

This screen is used to view current ambient conditions.

- 1 After entering the "Run" mode from the Main Menu and from the "Flow" screen, press and hold the **Select** button for three (3) seconds. The current temperature and barometric pressure reading will indicate.

96/05/16	17:06
Temp 296.5	°K
Pres 747	mmHg
Vol. 8.037	ml

- 2 To return to "Run" mode after viewing the data, press the ▼ button.

## 9.0 Data Options

The DryCal DC-2 allows to data to be output in both electronic (via RS-232 serial port) and hard-copy (via parallel printer port) formats. It also allows the user to save data internally to be output to either a printer or a computer at a later date.

### 9.1 Data Output (RS-232)

A separate guide to outputting data in electronic format is included with the DC-2.

Printing must be enabled for data output to occur. If printing is enabled there will be a "P" displayed in the lower right corner of the display. To enable printing see Section 9.2.

## 9.2 Printing Hard-Copy Output (Parallel Port)

The DryCal DC-2 does not support any printers except those supplied by Bios. The DryCal sends basic ASCII text in IBM/Centronics parallel format to a printer. Although the DC-2 may work with older and some stand-alone IBM compatible office printers (printers that do not require drivers to be installed on an attached computer in order to operate), we do not recommend their use.

If you wish to experiment nonetheless, try the "Wide 1" and "Wide 2" formats to test compatibility (See Section 8.3). You may get one page per line or other incompatible results. For those with incompatible printers it is possible to output data directly to a PC (See Section 9.1) and then print that previously logged data at a later time.

Bios offers the BP-1 stand-alone battery powered printer for hard copy output of DryCal data. This printer is small, portable, convenient and easy to use. It makes an excellent dedicated printer for use with DryCal products. Bios cannot guarantee compatibility with any other printer than the Bios BP-1 portable thermal printer.

### Using the Burst Mode (Automated 10 Readings Function)

After the required flow rate is set, the Burst Mode is ideal for hardcopy printout or computer data logging of the preset averaging sequence. A printer or computer must be connected at this time.

If printing is enabled there will be a "P" displayed in the lower right corner of the display.

To enable printing, go to the Run screen and press and hold the **Enter** and ▲ buttons simultaneously. A "P" will appear in the lower right corner of the display. At this point press the Reset switch (furthest to the right) to lock in the print-enabled setting.

#### To Print in Burst Mode

VFlow	1998	ml/m
VAvg	2004	# 10
SFlow	2015	Sml/m
SAvg	2010	<b>P</b>

- 1 While the flow source is running, press the **Burst** button to print 10 sequential readings and stop.
- 2 To deselect the "P" printing function, press the **Enter** and ▲ buttons simultaneously again, followed by the **Reset** button.
- 3 To exit the Flow Reading screen and return to the Main Menu, press the **Select** and ▼ buttons simultaneously.

## 10.0 Battery System

The DryCal DC-2 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 2-5 years, depending on use. Use of a printer does not affect battery life.

The DC-2 can be charged by the Bios single-station charger when plugged into a standard 115V AV power source outlet (220V AC optional.) Provided that the battery has sufficient charge to operate the DC-2, the DC-2 can be charged indefinitely using the AC wall adapter provided.

Although the DC-2 may be plugged into AC power, if the battery is exceptionally weak the DC-2 may not function. Please read all setup and charging instructions indicated in this manual before using equipment.

## 10.1 Charging the DC-2

Before using your calibrator, be sure that the battery system has been fully charged to ensure that it will perform to its specifications and maintain operation for the calibration period. If "BAT" is indicated on the display during operation, recharging is necessary.

The temperature sensor accuracy may be degraded if the unit is operated while charging. Remove the charger from AC power prior to use and allow the DC-2 to equalize temperature. Upon full charge, the charger will taper to a trickle mode automatically. The unit may be charged indefinitely without damage to the battery. Be sure to use only Bios-approved batteries and AC adapters/chargers for DryCal DC-2 calibrators.

- 1 Connect only the appropriate Bios 12VDC charger, included with the calibrator, into a standard wall outlet.
- 2 Insert the DryCal charger's barrel plug end into the charging jack located on the left side of the calibrator base. The red **Charge** LED will illuminate. Full charge takes 8 –12 hours.

## 10.2 Battery Maintenance & Storage

### Battery Maintenance

Lead-acid batteries will not exhibit the "memory effect" common to nickel-cadmium batteries due to continuous charging, and no further conditioning is required to maintain full performance.

### Long-Term Storage

Long-term storage without charging can damage the battery pack, therefore if the DryCal cannot be left charging continuously, it should be charged at least every three (3) months.

## 11.0 Maintenance, Quality Assurance

Although the DryCal DC-2 is a rugged instrument, certain care and maintenance requirements must still be met. When not in use always store your DC-2 in a clean, dry environment. When possible leave the unit on charge. Wipe only with a damp cloth and do not spray with liquid solvents or use abrasive cleaners.

Current service and calibration information and pricing can be found at [www.drycal.com/service/dc1\\_2.htm](http://www.drycal.com/service/dc1_2.htm).

## 11.1 Leak Test Procedure

A quality assurance self-test feature is provided to verify proper integrity of the flow cell. It is recommended that the self-check leakage test be conducted periodically as part of an ongoing quality assurance program. Passing the leak test does not ensure proper function of the DC-2. It does ensure that total leakage is within the product's allowable limits. To ensure proper function of the DC-2, annual factory calibration is recommended.

### To Initiate the Leak Test

The leak test tubing accessory is the short piece of latex tubing the red plug that was supplied with your DC-2. Any maintenance to the DryCal must be performed by Bios maintenance personnel.

From the DC-2 Main Menu:

- 1 Press the **Select** button to highlight "Leak Check"
- 2 Press **Enter**
- 3 Invert DC-2 (hold flow cell in place)
- 4 Place leak test tubing accessory over the inlet air boss
- 5 Turn DC-2 back over and place on a flat, vibration-free surface
- 6 Press **Enter**

- 7 Observe the location of the piston to ensure that it is at the top of the cell when the test begins (the test may take as long as 15–20 minutes.) If the test is completed successfully, the display will read: “Test OK Push Read.”
- 8 If the unit fails the leak test, the display will read: “Maintenance Reqd Push Read”
- 9 Repeat the test with the leak test tubing accessory connected to the lower (outlet) air boss

## 11.2 Return Authorization

Prior to returning your DryCal for service or calibration, please contact Bios International for a RMA number. You can telephone Bios at (800) 663 4977 or (973) 492 8400, or email [service@drycal.com](mailto:service@drycal.com).

## 11.3 Shipment

When shipping the DryCal DC-2 please ensure that the packaging is adequate to protect the instrument. When possible the DC-2 should be shipped in the original packaging. Bios International Corp. is not responsible for damage that occurs during shipment.

When transporting by air, the internal solenoid valve must be in the Open position to avoid possible cell damage. To open the valve, from the Run menu, press the **Stop** button.

## 11.4 Calibration

As a quality assurance measure, Bios recommends annual calibration of all measurement instruments. How often you have your DryCal calibrated is an internal quality control decision. The determining factors are whether the unit passes the internal leak test, quality system requirements if applicable, and the conditions in which the unit is used. Units used in a laboratory setting may require calibration less frequently than a unit that is used in a dusty environment. The annual calibration program is an elective and is therefore not included as a warranty item. “As received” flow test data and expedited “48 hour” turnaround service are also available at an additional cost. Please contact the factory for more information on available calibration services and pricing.

### Calibration Includes

- Cleaning (if required)
- Valve adjustment (if required)
- Battery capacity test
- Internal computer program upgrade as necessary
- Mechanical upgrades as necessary
- Run Test
- Performance Test
- NIST-Traceable Calibration Certificate

## 12.0 Calibration Statement

All DryCals are calibrated using the same methodology. Each device is dynamically tested by comparing it to a Laboratory Standard primary piston prover of much higher accuracy ( $\pm 0.25\%$  or better), and of similar operating principles. Flow generators of  $\pm 0.003\%$  stability (included in power accuracy) are used for the comparison. Use of provers of similar construction to the devices under test assures the validity of the flow generator as a transfer standard.

The primary Laboratory Standards are qualified by direct measurement of their dimensions (diameter, length of measured path, time base) against NIST-traceable gauges and instruments. A rigorous analysis of their accuracy in accordance with the International Guide to Uncertainty in Measurements has been performed assuring their traceable accuracy. Test procedures assure temperature matching of the Laboratory Standards and the devices under test

The calibration dates of the laboratory standards for each parameter (diameter, encoder spacing, time base) are included in our calibration reports, along with identification of the devices used for calibration, their calibration dates and NIST calibration numbers.

### **13.0 Limited Warranty**

The Bios DryCal DC-2 is warranted to the original end user to be free from defects in materials and workmanship under normal use and service for a period of 1 year from the date of purchase as shown on the purchaser's receipt. The DC-2's battery is warranted for 6 months from the original purchase date. If the unit was purchased from an authorized reseller a copy of an invoice or packing slip showing the date of purchase may be required to obtain warranty service.

The obligation of Bios International Corporation under this warranty shall be limited to repair or replacement (at our option), during the warranty period, of any part which proves defective in material or workmanship under normal use and service provided the product is returned to Bios International Corporation, transportation charges prepaid.

Notwithstanding the foregoing, Bios International Corporation shall have no liability to repair or replace any Bios International Corporation product:

- 1** Which has been damaged following sale, including but not limited to damage resulting from improper electrical voltages or currents, defacement, misuse, abuse, neglect, accident, fire, flood, act of God or use in violation of the instructions furnished by Bios International Corporation,
- 2** Where the serial number has been altered or removed or
- 3** Which has been repaired, altered or maintained by any person or party other than Bios International Corporation's own service facility or a Bios-authorized service center.

This warranty is in lieu of all other warranties, and all other obligations or liabilities arising as a result of any defect or deficiency of the product, whether in contract or in tort or otherwise. All other warranties, expressed or implied, including any implied warranties of Merchantability and fitness for a particular purpose, are specifically excluded. In no event shall we be liable for any special, incidental or consequential damages for breach of this or any other warranty, express or implied, whatsoever.

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