Gilian 3500

Air Sampling Pump

Operation Manual

SENSIDYNE®

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REF 360-0039-02 (Rev B)

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TABLE OF CONTENTS

WARNINGS

READ AND UNDERSTAND ALL WARNINGS AND INSTRUCTIONS BEFORE USE

Failure to read, understand, and comply with ALL accompanying literature, product labels, and warnings could result in property damage, severe personal injury, or death.

Read and understand ALL applicable environmental health and safety laws and regulations. Ensure complete compliance with ALL applicable laws and regulations before and during use of this product.

DO NOT remove, cover, or alter any label or tag on this product, its accessories, or related products.

UNDER NO CIRCUMSTANCES should this product be used except by qualified, trained, technically competent personnel.

DO NOT operate this product should it malfunction, require repair, or have a cracked or broken case. DO NOT repair or modify, except as specified in Operation Manual. Service to be performed by Sensidyne Authorized Service Departments only.

Use ONLY specified Sensidyne parts when performing maintenance procedures described in this manual. Intrinsic safety certifications become void by substitution of components, unauthorized repair or alteration.

This product is intended for both indoor and outdoor use when protected from splashed or wind blown liquids. The unit is not waterproof so NEVER submerge the unit in water. Pump failure or faulting may result.

This product uses rechargeable Nickel-Metal-Hydride batteries. ALWAYS fully charge before use. DO NOT open case, charge or replace batteries in a explosive atmosphere. Use only battery pack and chargers specified in Operation Manual. DO NOT insert any foreign objects into the battery charging jack. DO NOT insert any foreign objects into the battery connection slot at the top of the battery pack. Shorting the contacts will blow the protective fuse. DO NOT operate pump while charging.

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. Examples of aggressive substances are acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials. Examples of suitable precautions are regular checks as part of routine inspections or establishing from material data sheets that it is resistant to specific chemicals.

DO NOT operate with a dirty or blocked inlet filter or kinked tubing. Pump failure or faulting may result.

Caution: Both charger and battery become warm during charging.

If further translation is required, please contact Goffin Meyvis, the Sensidyne EU Authorized Representative (see Appendix E for Service contact information).

USA

Class I = Flammable Gases, Vapors, or Liquids
Division 1 = Ignitable concentrations can exist all of the time
Group A = Acetelyene
Group B = Hydrogen
Group C = Ethylene
Group D = Propane

Class II = Combustible dusts
Group E = Metal Dust
Group F = Carbonaceous Dust
Group G = Grain Dust

Class III = Ignitable fibers & flyings

Temp Code = T3C (≤ 160°C)

CANADA

Class I = Flammable Gases, Vapors, or Liquids
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CE marking & number of notified body responsible for production

Explosion protection

II = Equipment Group
2 = Equipment Category
G = Hazardous Gases, vapors or mists

EEx = Explosion Protected equipment in compliance with CENELEC EN 50014 series
ib = Intrinsic safety protection method
IIB = Gas group
T4 = 135°C, maximum external surface temperature

EC-Type examination certification number

European Economic Community

North American & European Certifications

SECTION ONE
INTRODUCTION

- **COMPONENTS**

See Figure 1.1

(1) Filter Housing Assembly (Inlet Port)

(2) [not used]

(3) Belt Clip

(4) Battery Charging Jack (with cover)

(5) 4-button Keypad

(6) Operation LED (Green). Flashes when the pump is functioning normally.

(7) Liquid Crystal Display (LCD)

(7.1) Ready Mode display alternately shows the Set Flow Rate, Sample Time, and Total Volume Sampled. Sampling display alternately shows the Live Flow, Sample Time, and Total Volume Sampled.

Also displays “FLO,” “CAL,” “Clr” during those operations.

(7.2) **VOL & L**. Shows total volume sampled (liters).

(7.3) **MIN**. Elapsed time during sampling.

(7.4) **CC/MIN**. Displays set flow rate (Ready Mode) or live flow rate (Sampling Mode).

(7.5) **SET**. Appears during Set Flow Rate Mode and Pump Calibration Mode.

Figure 1.1
Gilian 3500

(7.6) **FAULT.** Appears when pump cannot maintain flow within ± 5%.

After fault shutdown pump attempts to restart every 3 minutes for next hour.

FAULT appears when pump is initially turned on, but disappears when pump reaches preset flow rate.

(7.6) **HOLD**. If, after 30–35 seconds, fault cannot be corrected, pump stops and **HOLD** appears

(7.7) **HRS**. Shows number of run hours since last calibration. Pump display must be calibrated every 200 run hours or every 30 days.

(7.8) **Battery Indicator**.

3 bars = High charge
2 bars = Medium charge
1 bar = Low charge

NOTE

The Gilian 3500 automatically calculates the total air volume sampled using the following formula:

Total Air Volume (Liters) =
Air Flow Rate (cc/min) x Sample Time (minutes) / 1000 cc/Liter

OR

$$\frac{AFR \times ST}{1000}$$

SECTION TWO
SET-UP

2.1 PREPARATION

NiMH battery pack must be fully charged (about 5 hours). Refer to Section Four for battery maintenance.

Charge battery pack through built-in jack. Battery pack may be charged while attached to pump, or separately.

CAUTIONS & NOTES

Both charger and battery pack become warm during charging.

Charger switches automatically to trickle mode when battery is fully charged. **DO NOT** operate pump while charger is attached.

Do not short battery terminals. Shorting will blow internal fuse.

2.2 PUMP START-UP

- Power Up (see Figure 2.1)

Press and release POWER button (1).

Start-Up Sequence (approx. 10 seconds):

Self Test screen (2)

Version No. screen (3)

Last Cal screen (4)
Screen shows number of run hours since last calibration.

- **Ready Mode**

After start-up, pump enters Ready Mode (5).

In Ready Mode display cycles through following screens:

Flow Rate Set Point (6)

Total Sample Time (7)

Total Volume Sampled (8)

If no buttons are pushed, Ready Mode continues cycling through screens for 75 minutes then turns off.

To begin sampling go to page 20 (Starting The Sample Run).

- **Power Down**

Press and hold POWER button until unit turns off (3–4 seconds). Display will show “OFF” before shutting down.

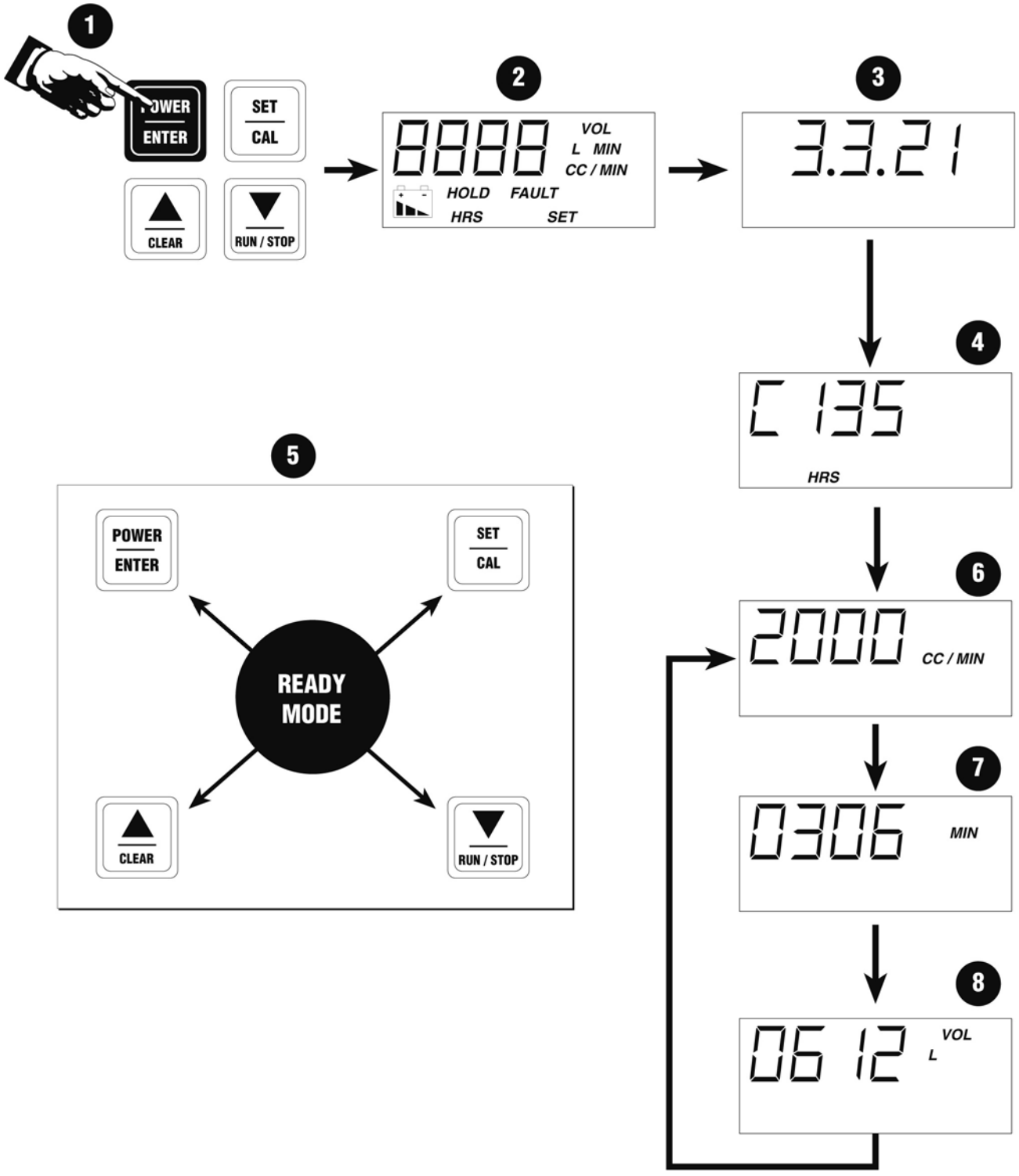


Figure 2.1
Power-Up / Ready Mode

2.3 SETTING THE FLOW RATE

NOTE

This section is required only if you are changing pump flow rate. If you're using previously set flow rate, simply verify it using a Gilibrator 2 (see Section 2.4.2).

See Figure 2.2

If pump is off, press POWER button.

(1) When pump is in Ready Mode, press SET button once. "FLO" is displayed.

(2) Press ENTER button to begin setting the flow rate.

(3) Press and hold ▲ button to increase flow rate set point or ▼ button to decrease flow rate set point.

(4) When desired flow rate set point is reached press ENTER button. Elapsed Time and Total Volume will be cleared.

Go to Section 2.4 to calibrate pump.

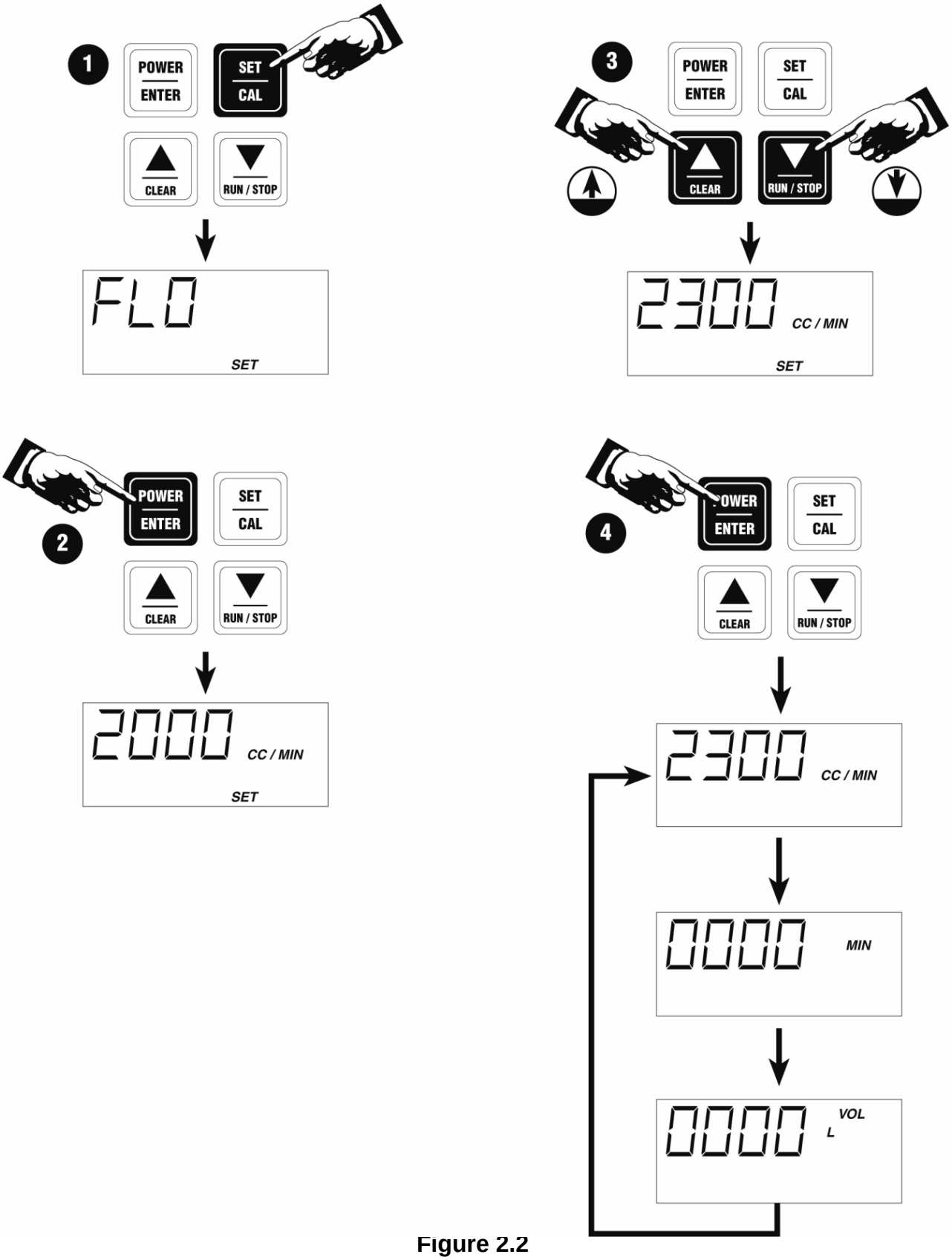


Figure 2.2
Setting The Flow Rate

2.4 DISPLAY CALIBRATION

The display should be calibrated at least every 30 days. For optimum accuracy of the displayed flow, it is also recommended when a new flow is chosen. Use the set-up method described in 2.4.1 or 2.4.2 followed by the display calibration procedure in 2.4.2.

2.4.1 Sample Media Method Set-Up

- **See Figure 2.3**

(1) Prepare a Gilibrator-2 using a standard wet cell.

CAUTION

Calibration with a Piston Cell Gilibrator 2 (or other dry cal device) can lead to erratic results at flow below 2 LPM due to pulsation. The wet cell version of the Gilibrator 2 is the preferred calibrator.

(2) Choose a sample media either the same or of similar back pressure to that used in the field.

(3) *A*ttach 1/4” ID tubing from pump to media and from media to Gilibrator-2.

Proceed to Section 2.4.2 for display calibration procedure.

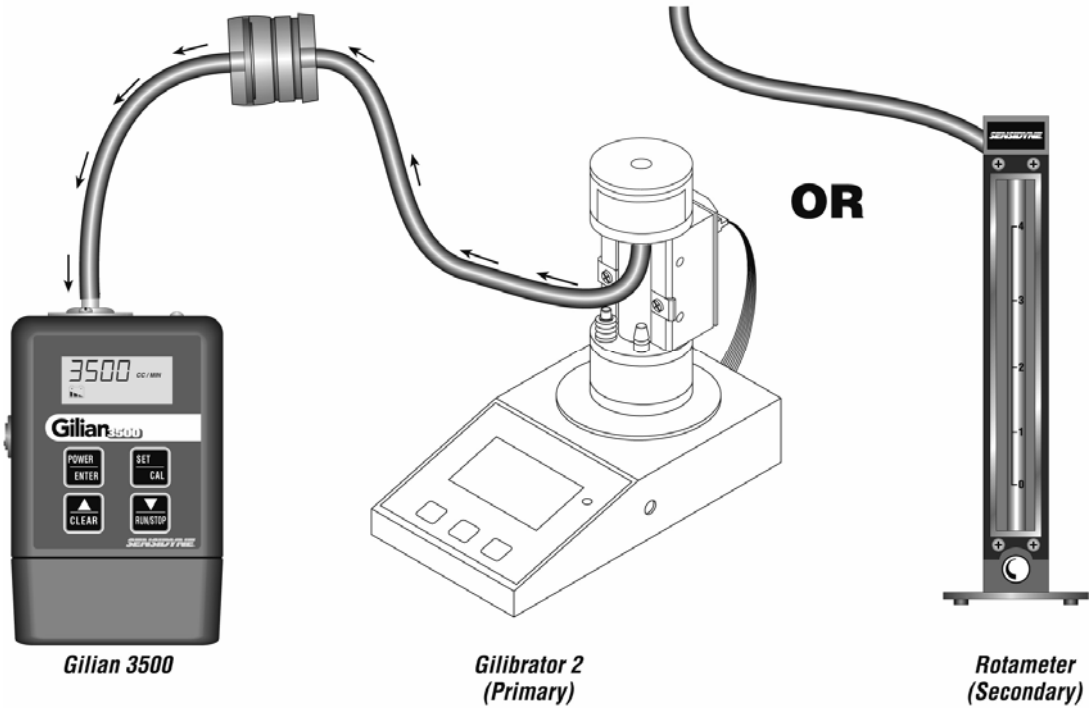


Figure 2.3
Sample Media Method Set-Up

2.4.2 Display Calibration Procedure

- **See Figure 2.4**

Before performing display calibration, the pump, must be set up following Section 2.4.1.

NOTE

To exit Calibration Mode without changing any values, simply press ENTER twice. This action will also reset the hours since last calibration.

If pump is off, press POWER button.

(1) At Ready Mode, press SET/CAL button twice.

(2) Press ENTER button to enter Calibration Mode. “SCAL” is displayed for 10 seconds, then, pump motor starts running. The set flow rate is displayed.

(3) Measure flow rate using Gilibrator-2.

NOTE

Actual pump flow rate is displayed on Gilibrator 2.

(4) Adjust pump display to match actual flow rate on Gilibrator 2. Press and hold ▲ button to increase. Press and hold ▼ button to decrease.

(5) When pump display matches Gilibrator 2 display press SET button.

Pump motor continues running and adjusts speed to deliver adjusted flow rate. Pump display changes to show the original set flow rate.

(6) Continue to measure live flow rate on Gilibrator 2. If pump display does not match measured Gilibrator flow rate within a few cc’s, you may repeat Steps 4 and 5 until display shows the actual flow rate. When the displays DO match, go to Step (7).

(7) Press ENTER button again to complete calibration.

The pump stops before returning to Ready Mode.

NOTE ON FIELD CALIBRATION

The above display calibration procedure serves to make internal pump adjustments and improve the accuracy of the flow display. It does not replace field calibration as described by OSHA and NIOSH. A flow verification using the Gilibrator and the exact field sampling train should be conducted before field sample. Procedures for field calibration may be referenced in the *NIOSH Manual of Analytical Methods* at www.cdc.gov/niosh or in the *OSHA Technical Manual* at www.osha.gov.

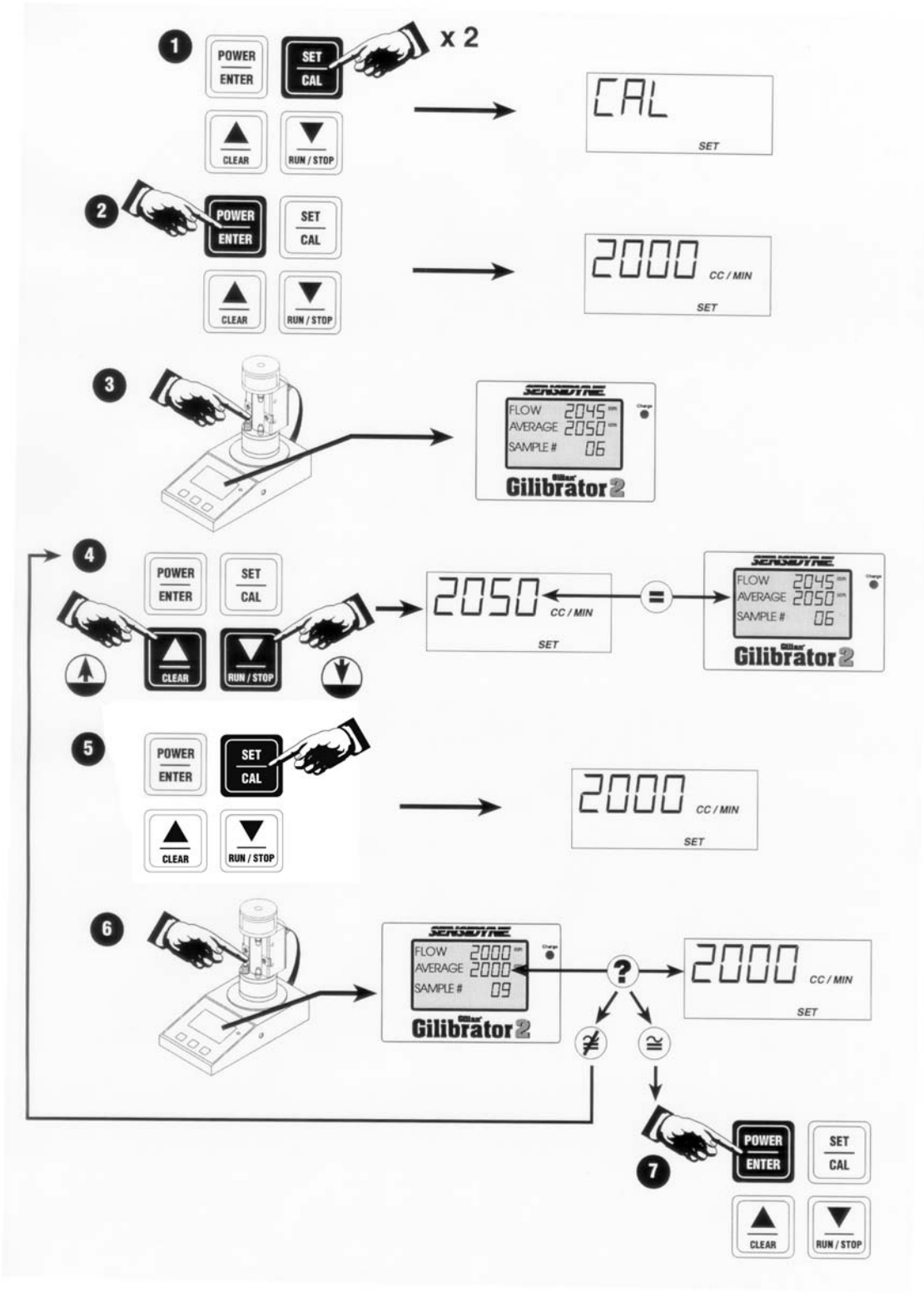


Figure 2.4
Display Calibration Procedure

SECTION THREE
OPERATION

3.1 STARTING THE SAMPLE RUN

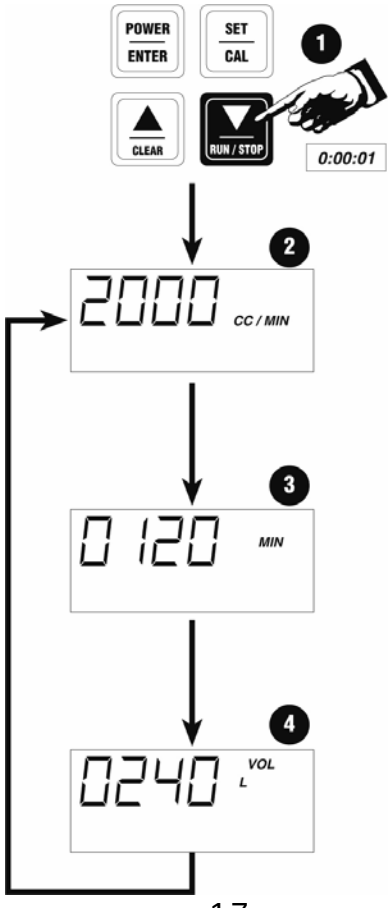
NOTE: Total Run Time and Total Volume Sampled are cumulative from one sample run to the next unless you reset the flow rate, clear the display, or calibrate the display. If you want to clear the values before starting a sample run, see Section 3.5 for instructions on clearing the run data.

Make sure pump is fully charged, that flow rate has been properly set, and that the pump has been field calibrated using actual sampling set-up. Make certain all sample tubing and any sample media have been properly installed.

• If pump is turned off, press POWER button.

• Press and **hold** the RUN button [1] until "SCAL" is displayed, then release button. Pump motor will start 10 seconds later. **Note**: "SCAL" indicates pump is doing a an internal Self Adjustment. This self adjustment may occur during the course of a sample if the temperature changes by more than 3ºC. The pump is not operating and the clock does not count the time while the pump is in the SCAL mode.

• During sampling, pump alternately displays following screens: Live Flow Rate (cc/min) [2], Total Run Time (min) [3], Total Volume Sampled (liters) [4].



3.2 STOPPING THE SAMPLE RUN

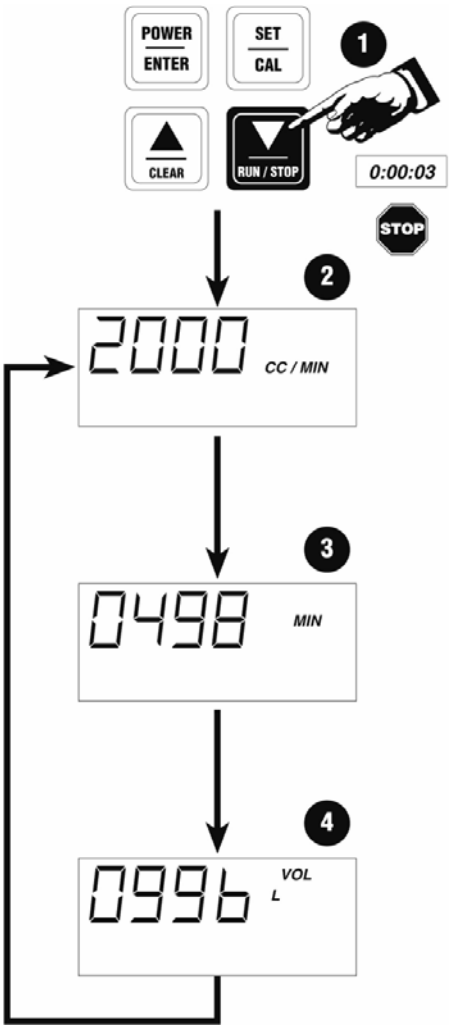
- Press and hold the STOP button [1] until pump motor stops.

- Pump alternately displays following screens: Set Flow Rate (cc/min) [2], Total Run Time (min) [3], Total Volume Sampled (liters) [4].

NOTE

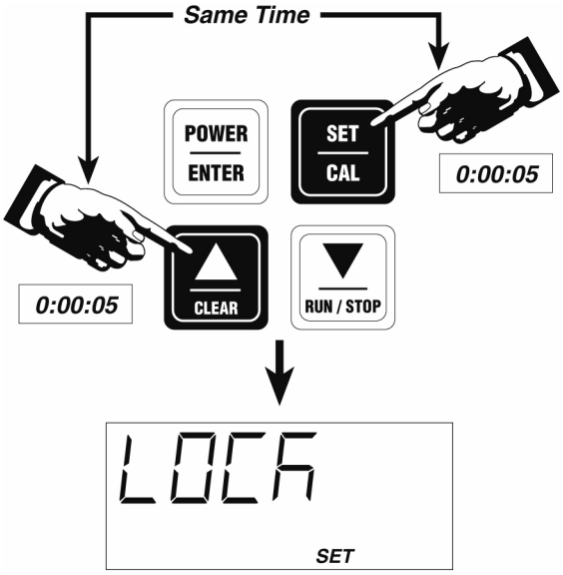
If the pump motor does not stop, go to Section 3.4 to unlock the keypad.

• You may power down by pressing and holding the POWER button for 4-5 seconds. The display will show "OFF" before shutting down.



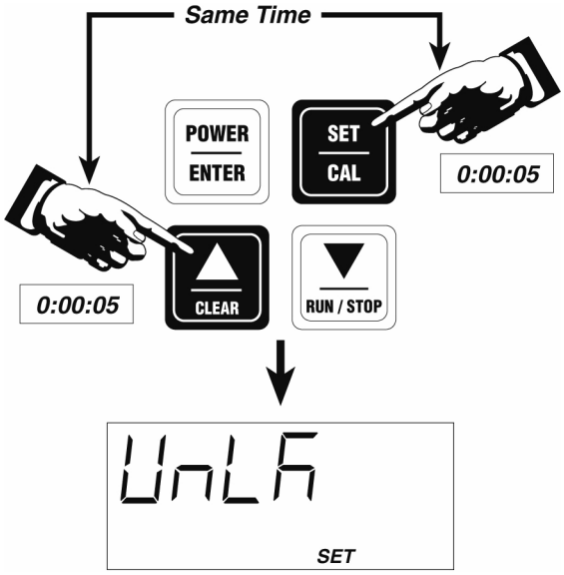
3.3 LOCKING THE KEYPAD

The keypad can be locked during sampling to prevent tampering. To lock, press and hold **both** buttons for 5 seconds. After locking, the unit returns to normal sampling after 2-3 seconds.



3.4 UNLOCKING THE KEYPAD

To unlock, press and hold **both** buttons for 5 seconds. After unlocking, the unit returns to normal sampling after 2-3 seconds..



3.5 CLEARING THE RUN DATA

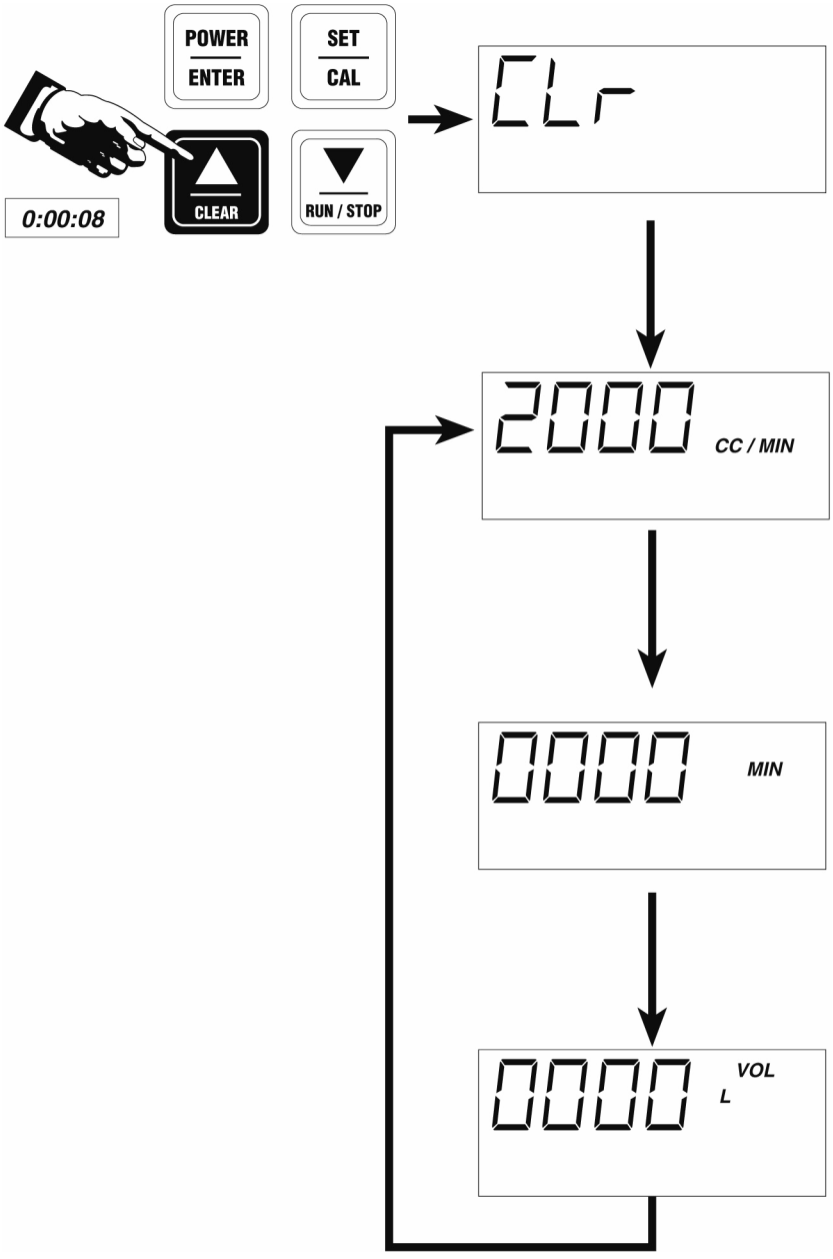
- If the pump is off press POWER button.

- Wait until Ready Mode, then press and hold CLEAR button for 8 seconds. The pump will display “CLr”, and the “CLr” display will flash for a total of 8 seconds. As long as “CLr” is displayed the data can be saved by releasing the CLEAR button.

NOTE

If you remove the battery pack all stored data will be lost. However, if you turn off the unit using the POWER button while in Ready Mode, all data will be saved.

NOTE: Changing the flow rate will also clear previous run data.



SECTION FOUR
MAINTENANCE

4.1 BATTERY MAINTENANCE

NOTE

• Do not charge or replace battery pack while in an explosive atmosphere.
• Do not leave charger on for extended periods of time.

The Gilian 3500 pump uses rechargeable Nickel-Metal-Hydride batteries that must be fully charged and properly maintained for maximum run time. The battery pack has a charge time under 5 hours. Battery pack may be charged separately or while on the pump.

Make certain charger plug is fully inserted into jack on battery pack (see Figure 1.1, #4 for charger jack location). If not fully inserted, charger LED will flash Red or be off.

Charger LED is Red during normal charging and Green during trickle charge.

After charging is complete, make certain the rubber jack cover is plugged back into the charging jack to protect the jack during operation.

CAUTIONS & NOTES

Both charger and battery pack become warm during charging.

Charger switches automatically to trickle mode when battery is fully charged. **DO NOT** operate pump while charger is attached.

Do not short battery terminals. Shorting will blow internal fuse.

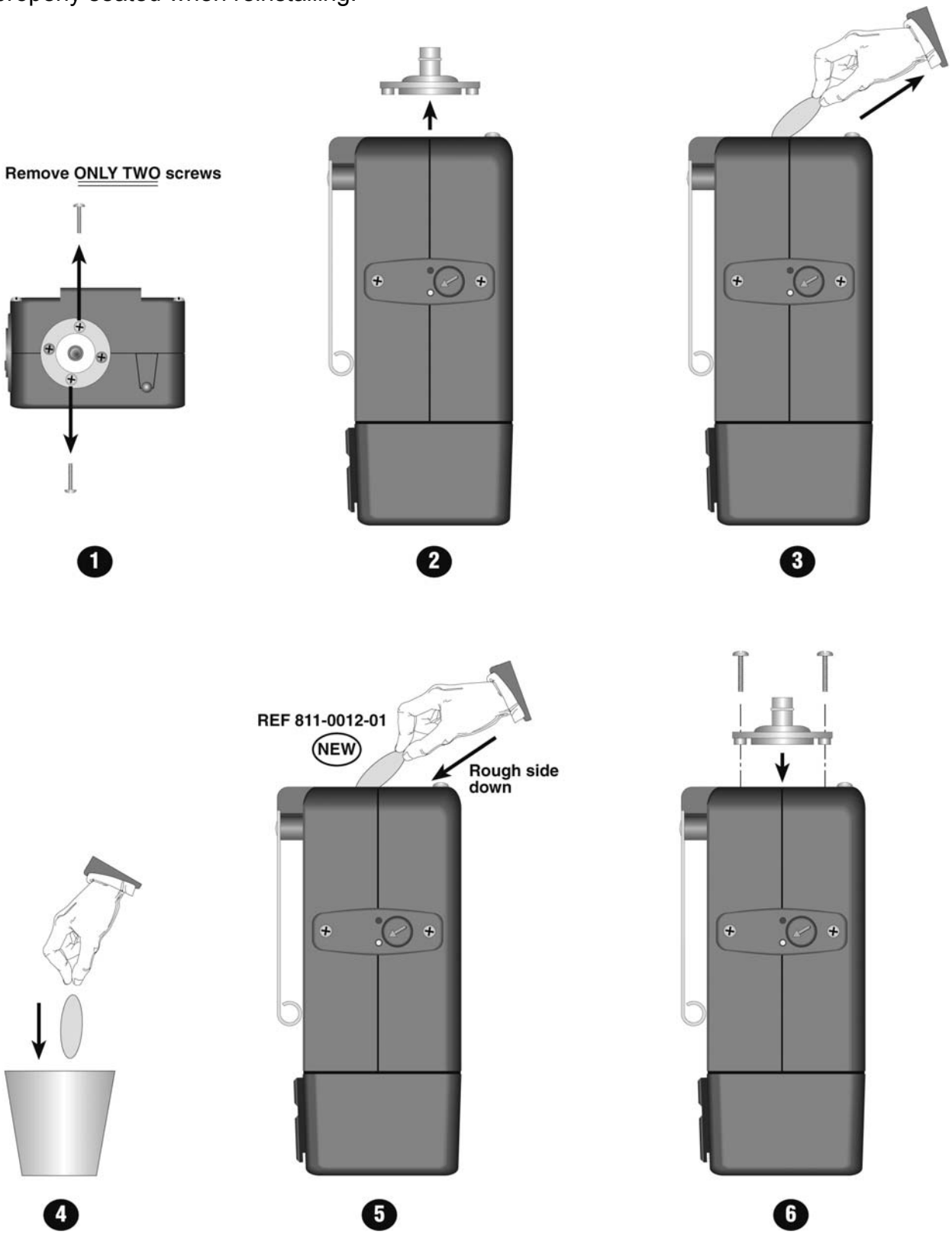
All NiMH batteries lose charge when not in use. If battery pack has not been charged for 3-4 days, recharge battery before use. This ensures that batteries are fully charged just prior to sampling. NiMH batteries stored for extended time periods should be recharged every 1-2 months to avoid complete discharge.

Battery pack has an estimated life of 300–500 charge/discharge cycles, depending on use. Table below shows estimated battery life based on usage level.

Pump Usage	**Weekly Use**	**Est. Battery Life**
High	40-60 hrs	1.0-1.5 yrs
Medium	20-39 hrs	1.5-2.5 yrs
Low	< 20 hrs	2.5 yrs

4.2 PUMP FILTER MAINTENANCE

Change internal pump filter when it is dirty or damaged. Reuse o-ring and ensure it is properly seated when reinstalling.



APPENDIX A
PARTS LIST

- Spare PARTS & ACCESSORIES

Part Number	Description
811-0009-01	Back Pressure Simulation Kit [simulates back pressure during display calibration] (includes orifices for flow rates of 700, 1000, 2000, 2500, 3000, and 3500 cc/min.)
402289-1	Single Unit 120 VAC Charger
402290-1	Single Unit 230 VAC Charger [Europe]
402290-2	Single Unit 230 VAC Charger [U.K.]
811-0011-01	Five Unit Charger [U.S. cord]
811-0011-02	Five Unit Charger [Euro cord]
811-0011-03	Five Unit Charger [no cord]
401562	U.S. Cord
700707	Euro Cord
801930	Battery Pack
811-0012-01	10 Filters
360-0039-02	Operation Manual
801961	Low Flow Adapter
801980	Fixed Mount Assembly
801979	Pulsation Dampener (flow regulator)
800565-8	Diagnostic Panel & Carrying Case (0.5-5 LPM, 20-200 CC/min, 2-50 cc/min)
800573-3	Diagnostic Panel only, Hi/Lo (0.5-5 LPM, 20-200 CC/min, 2-50 cc/min)
800783-3	Diagnostic Panel with Stand, Hi/Lo (0.5-5 LPM, 20-200 CC/min, 2-50 cc/min)
800149	Tube Holder Kit, Single Tube Holder Kit (No Manifold), 6 x 70 mm
800259	Tube Holder Kit, Single Tube Holder Kit (No Manifold), 7-10 x 110 mm
800148	Tube Holder Kit, Dual Manifold (Holders/Ends/Tubing), 6 x 70 mm
801407	Tube Holder Kit, Dual Manifold (Holders/Ends/Tubing), 10 x 110 mm
200484	Tubing, 36”, 1/4” ID
800159	Tubing, 36”, 1/8” ID (with 1/4” ID adapter)
200505	Tubing, 36”, 1/8” ID

APPENDIX B
SPECIFICATIONS

Performance

Operating High Flow Range	700–3500 cc/min
Accuracy (Air Flow Readout)	± 5%
Constant Flow control	< ± 3% of set flow (after calibration) between 1-3 LPM; ± 5% of set flow below 1 LPM and over 3 LPM
Constant Flow Compensation	3500cc up to 12” water back pressure 3000cc up to 20” water back pressure 2500cc up to 25” water back pressure 2000cc up to 30” water back pressure 1000cc up to 30” water back pressure 700cc up to 40” water back pressure
Run Time	*8 hour minimum (See Chart)*
Flow Fault	If flow changes exceed 5%, fault icon appears. If fault exceeds 30 seconds, pump shuts down. Pump attempts to restart every 3 minutes for up to 1 hour.

General

Controls	Power/Enter, Set/Cal, ▲/Clear, ▼/Run/Stop
Indicators	Flashing Green LED (“Normal Operation”)
Icons (LCD)	Battery Indicator, Hold, Fault, Set
Dimensions	3.2” (W) x 5.4” (H) x 2.3” (D)
Weight	19.5 oz.
Display (Normal Operation)	Live Flow, Elapsed Time & Volume Sampled

Electrical

Battery Pack	Removable, Sealed, Rechargeable Nickel-Metal-Hydride (4.8V, 2.2 AH)
Battery Level Indicator	Icon displays Full, Mid, & Low charge levels
Interface Connectors	Charging Jack
Charge Time	< 5 hours

APPENDIX B
SPECIFICATIONS

Approvals (pending)

Intrinsic Safety

UL Certification..... Class I, Div 1, Groups A, B, C, D;
Class II, Groups E, F, & G; Class III. T3C.

CUL Certification ..... Class I, Div 1, Groups C, D;
Class II, Groups E, F, & G; Class III. T3C.

CE

CENELEC Certification ..... ATEX Ex II 2 G, EEx ib IIB T4

EMC EMI/RFI ..... EN 55022 Class B; EN 50082-1; IEC 801-2, 3, & 4

Environmental

Temperature

Operating ..... 0°C to 45°C (32°F to 113°F)

Storage ..... -20°C to 45°C (-4°F to 113°F)

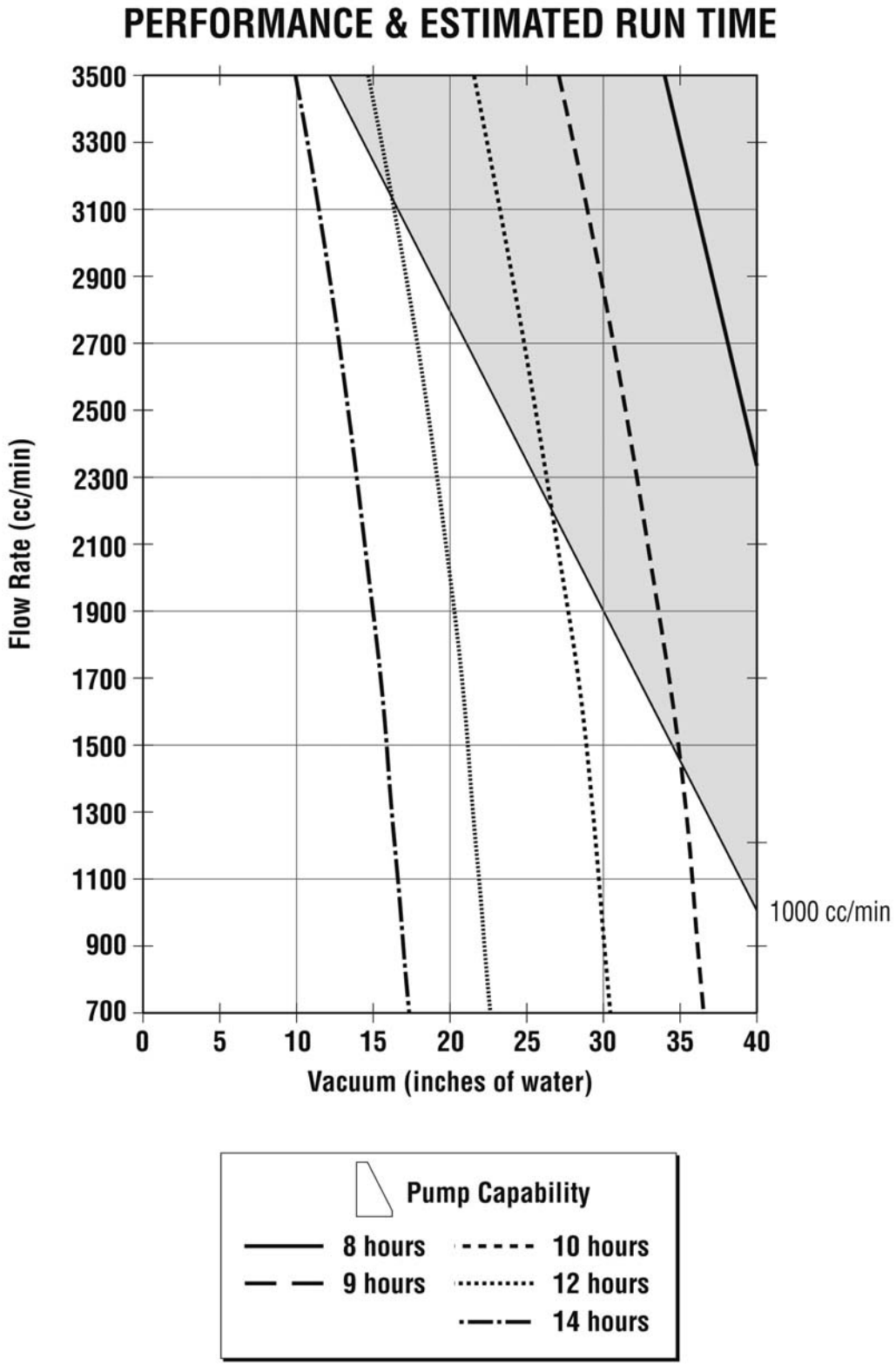
Charging ..... 5°C to 40°C (41°F to 104°F)

Humidity

Operating ..... 0–85 %RH

Storage 0–98 %RH, non-condensing

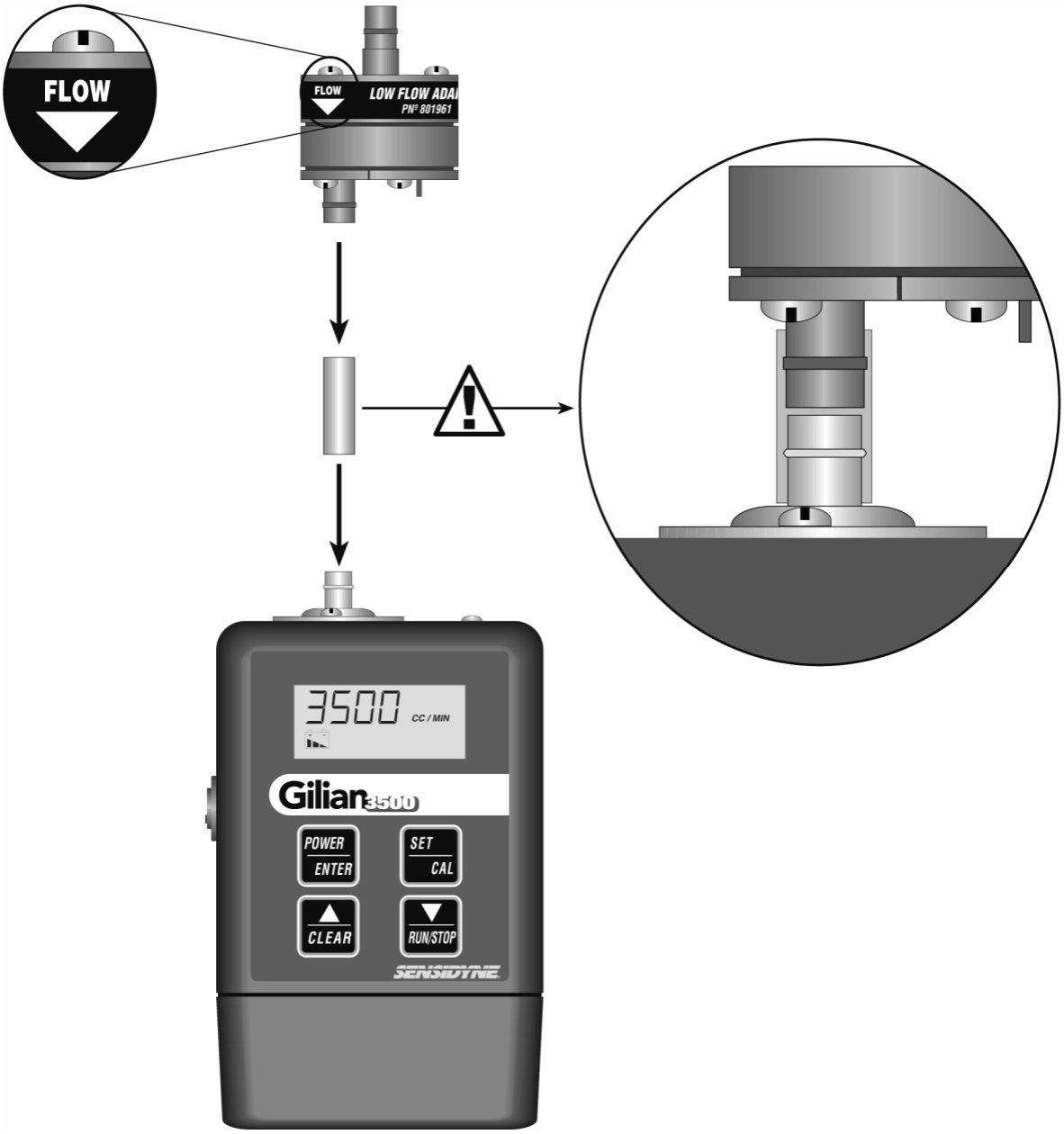
APPENDIX B
SPECIFICATIONS



APPENDIX C
LOW FLOW ADAPTER

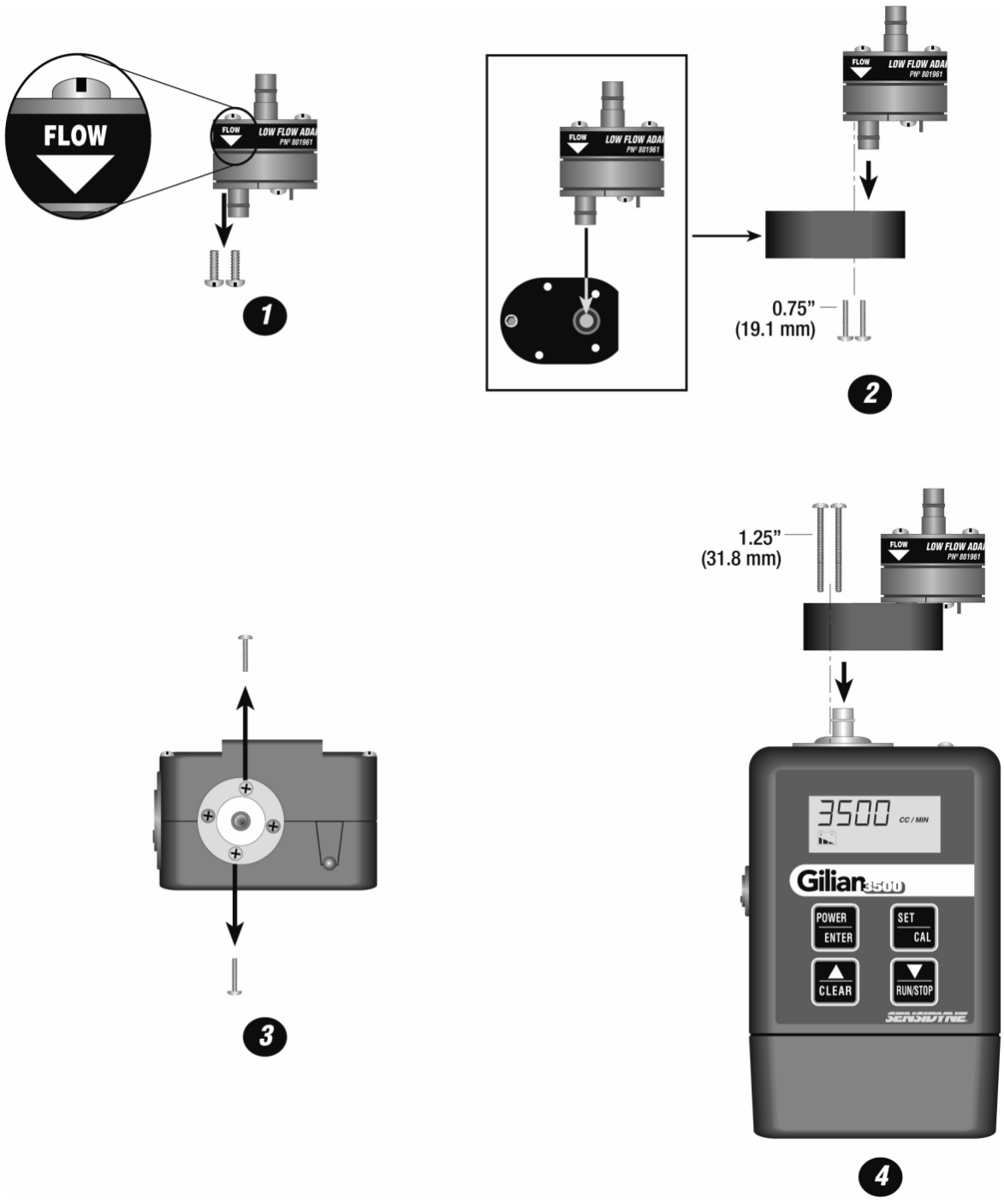
- **Direct Installation to Gilian 3500**

Caution: Tubing connection between low flow adapter and Gilian 3500 should be as short as possible to prevent kinking. The two air boss connections should nearly touch inside the tubing.



APPENDIX C
LOW FLOW ADAPTER

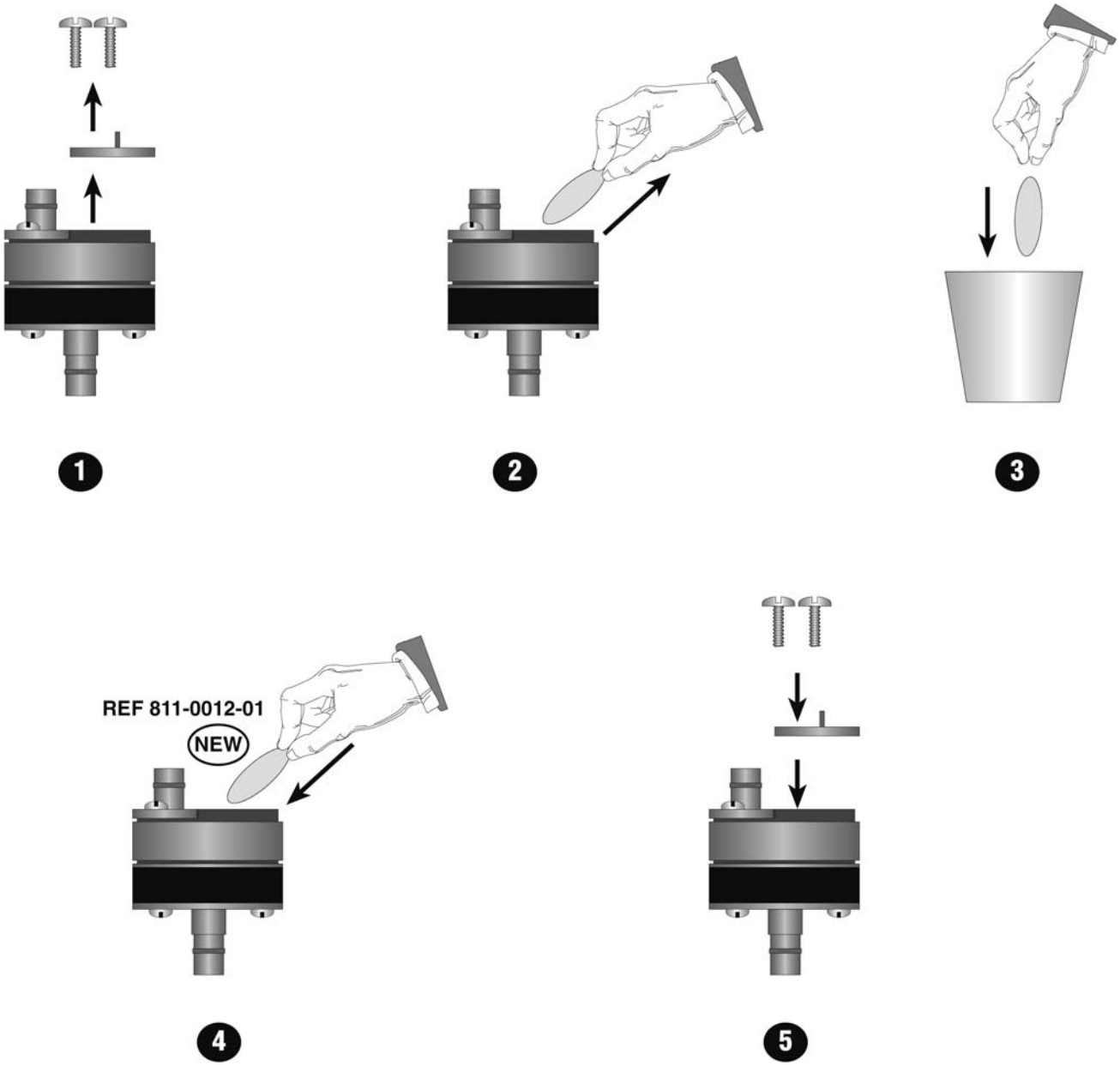
- **Installation To Gilian 3500 Using Fixed Mount Assembly**



APPENDIX C
LOW FLOW ADAPTER

- **Filter Maintenance**

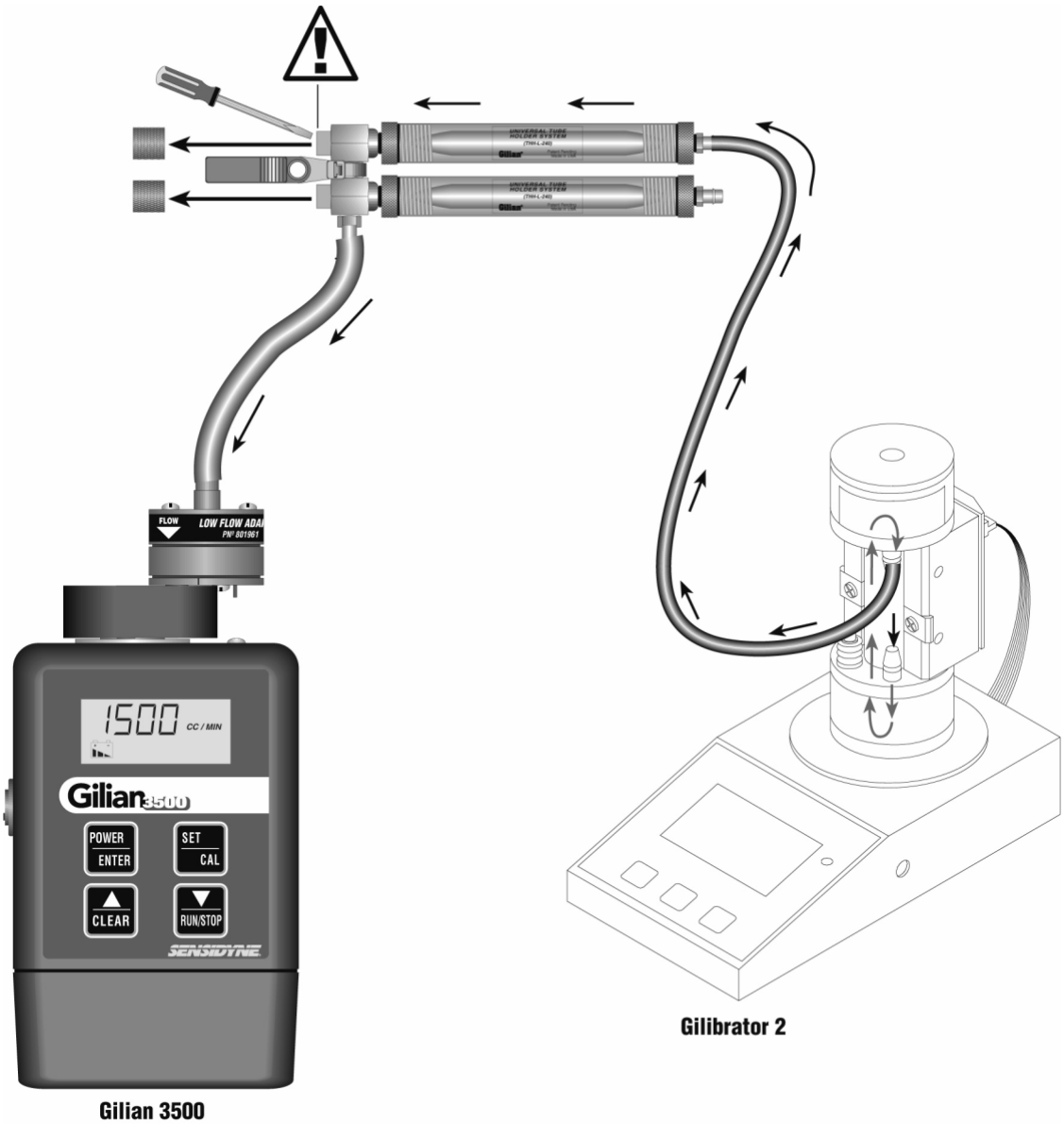
Change Low Flow Adapter filter when it is dirty or damaged.



APPENDIX C
LOW FLOW ADAPTER

- **Low Flow Operation Example**

Set flow rate on pump to 1500 cc/min (Section 2.3). Calibrate pump using appropriate back pressure (Section 2.4). Attach low flow equipment as shown. Remove tube holder manifold caps. Adjust the flow rate for each tube at the manifold.



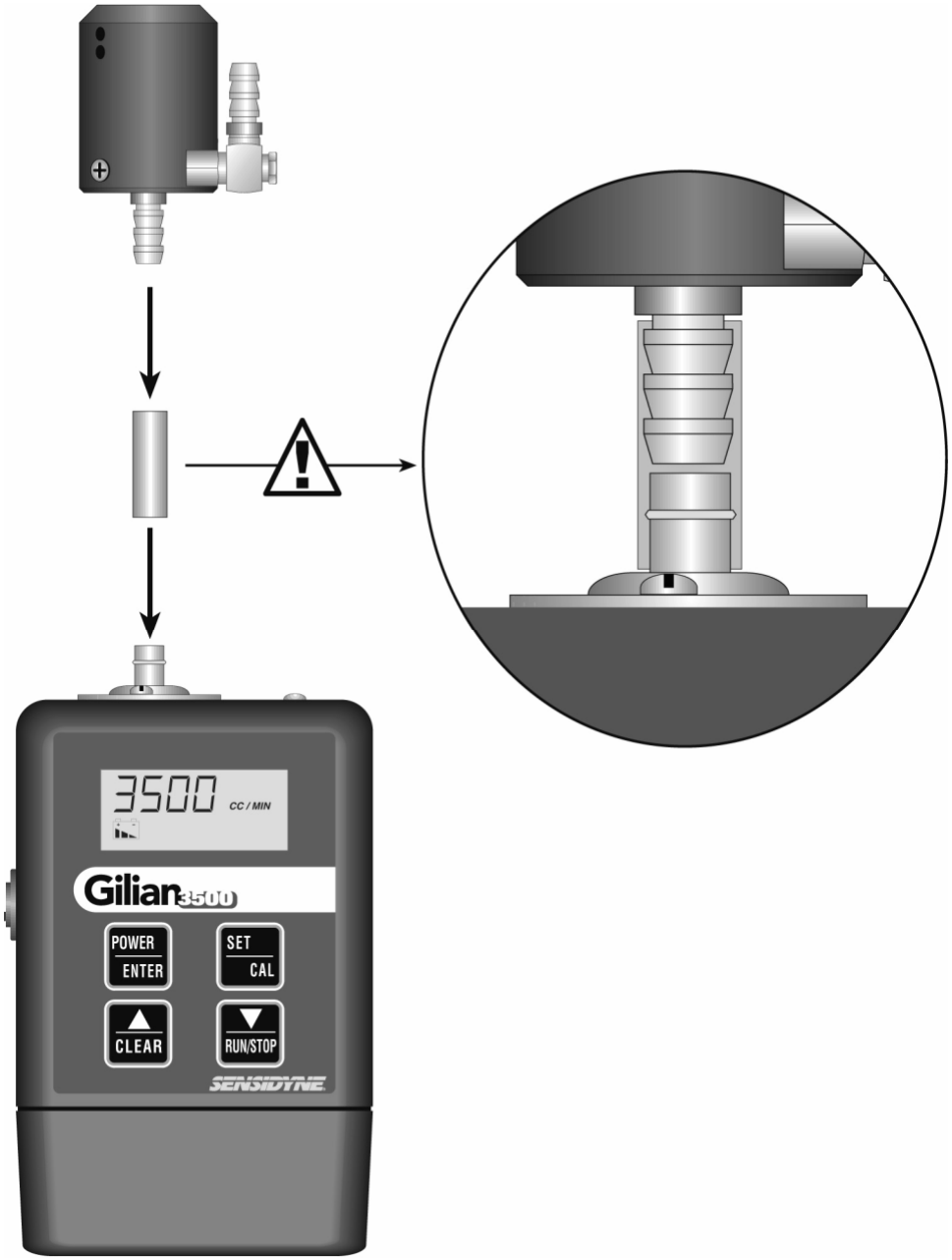
Gilian 3500

Gilibrator 2

APPENDIX D
PULSATION DAMPENER

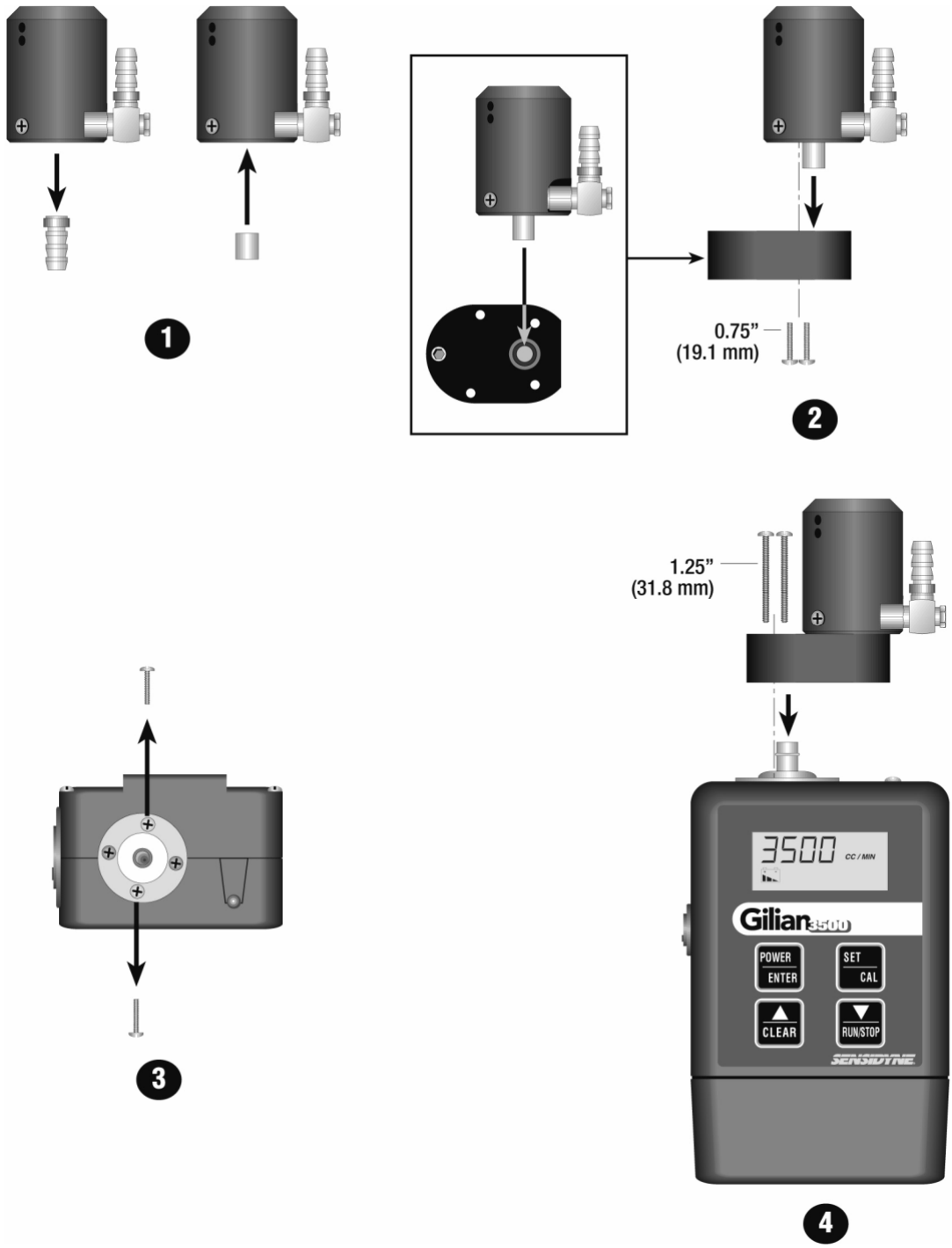
- **Direct Installation to Gilian 3500**

Caution: Tubing connection between pulsation dampener and Gilian 3500 should be as short as possible to prevent kinking. The two air boss connections should nearly touch inside the tubing.



APPENDIX D
PULSATION DAMPENER

- **Installation To Gilian 3500 Using Fixed Mount Assembly**



APPENDIX E
FACTORY CALIBRATION & SERVICE

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