Gilian 3500

Live Flow Air Sampling Pump

OPERATION & SERVICE MANUAL

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Revision D • Document No. 801934M

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Sincerely,

Carl Mazzuca

Carl Mazzuca
President, Sensidyne, Inc.

800-451-9444
727-530-3602
727-539-0550 (FAX)

PACKING LIST

The items shipped with different configurations of the Gilian 3500 Live Flow Air Sampling Pump are shown in the table below:

Item Shipped	Pump only 801934-111	Starter Kit (US) 801934-1201	Starter Kit (Euro) 801934-2301
Gilian 3500 Live Flow Air Sampling Pump	X	X	X
Tubing	X	X	X
Airboss Kit	X	X	X
Operation & Service Manual	X	X	X
Filter Cassette Holder Kit		X	X
120 VAC Battery Charger		X	
230 VAC Battery Charger			X

ALWAYS check to make certain you have received all of the items listed above.

If you have any questions or need assistance, contact your Sales Representative, or call

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OR

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⚠ WARNINGS ⚠

READ AND UNDERSTAND ALL WARNINGS BEFORE USE

Read and understand **ALL** warnings before using this product. Failure to read, understand, and comply with **ALL** warnings could result in property damage, severe personal injury, or death.

Read and understand **ALL** applicable Federal, State, and Local environmental health and safety laws and regulations, including OSHA. Ensure complete compliance with **ALL** applicable laws and regulations before and during use of this product.

UNDER NO CIRCUMSTANCES should this product be used except by qualified, trained, technically competent personnel and not until the warnings, *Operation and Service Manual*, labels, and other literature accompanying this product have been read and understood.

The *Operation and Service Manual must be read and understood by each user before operating this product* or using its accessories, in order to ensure proper and safe use and installation of this product and to ensure familiarity with the proper treatment and safety procedures in the event of an accident.

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

DO NOT operate this product should it malfunction or require repair. Operation of a malfunctioning product, or a product requiring repair may result in serious personal injury or death. **DO NOT** attempt to repair or modify the instrument, except as specified in the *Operation and Service Manual*. Contact the Sensidyne Service Department to arrange for a Returned Material Authorization (RMA).

Use **ONLY** genuine Sensidyne replacement parts when performing any maintenance procedures described in this manual. *Failure to do so may seriously impair instrument performance.* Repair or alteration of the product beyond the scope of these maintenance instructions, or by anyone other than an authorized Sensidyne serviceman, could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain severe personal injury or death. ***Intrinsic safety certifications may be voided by unauthorized repair***.

DO NOT operate in excessive chemical or water vapor atmospheres. Failure to follow instructions may cause permanent damage to the equipment.

The Gilian 3500 Air Samplers employ rechargeable Nickel-Metal-Hydride batteries. **ALWAYS** fully charge the battery before starting the pump. Always charge the battery pack in a safe area. Never attempt to operate the charger in a hazardous atmosphere.

DO NOT operate the unit with improperly maintained batteries. This can cause pump failure or faulting.

DO NOT operate the unit with a dirty or blocked inlet filter. This can cause pump failure or faulting.

DO NOT drop, crush, or roughly handle the unit, and **NEVER** submerge the unit in water. This can cause pump failure or faulting.

Failure to keep the Nickel-Metal-Hydride batteries charged may cause loss of operating capacity.

DO NOT run the pump beyond its recommended specifications.

SECTION ONE
INTRODUCTION

1.1 DESCRIPTION

This manual contains basic operating information for the Gilian 3500 Live Flow Air Sampling Pump. The pump is available separately, or as part of a kit (see Appendix A: Parts List for available kits).

The unit can be electronically set for flow rates from 700 cc to 3500 cc in 100 cc increments.

The Gilian 3500 Sampling Pump consists of a pneumatic system, a flow control system, and a rechargeable battery pack. Air sampling system features are shown in Figure 1.1.

The pump is designed to maintain flow within ± 5% of the flow rate set during pump calibration, while the pump is subjected to changes in load.

The Gilian 3500 includes the following features:

- Environmentally Friendly Nickel-Metal-Hydride Battery
- Extremely Easy to Use
- Live Flow Indication
- Wide Dynamic Flow Range
- Total Sampled Volume Indicator
- Push Button Controls

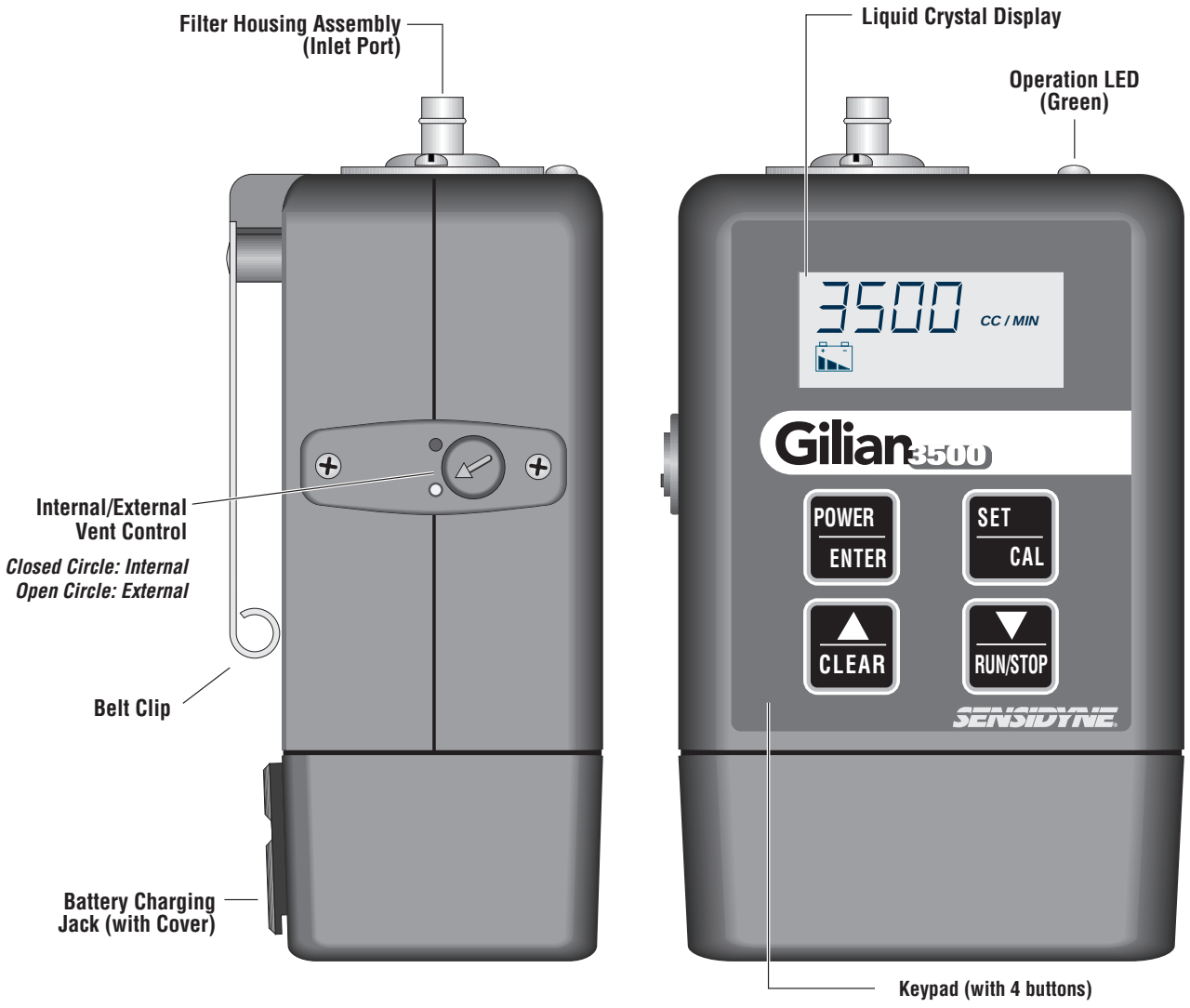


Figure 1.1
Gilian 3500 Air Sampling Pump

1.2 DISPLAY & INDICATORS

The Gilian 3500 offers an easy-to-read LCD with 4 large characters, a battery icon, and several status indicators. The indicators are described below.

Operation LED

The pump has a green Operation LED indicator located on the top of the unit. The LED flashes at 1 second intervals when the pump is on and functioning normally.

Four-Character Display

During Ready Mode the pump display alternately shows the Set Flow Rate, Sample Time, and Total Volume Sampled. During normal sampling operation the display alternately shows the Live Flow, Sample Time, and Total Volume Sampled.

The LCD is also used to display alpha characters (e.g., "FLO," "CAL," "Clr") during specialized operations.

- ***Battery Icon***

The battery icon is always displayed and is valid beginning 2 minutes after start-up. The icon indicates whether the battery voltage is High (3 black bars), Medium (2 black bars), or Low (1 black bar).

- ***"FAULT" & "HOLD"***

The "FAULT" message appears when the pump cannot maintain flow within ± 5% of the calibrated flow rate. If, after 30–35 seconds, the fault cannot be corrected, the pump stops and the message "HOLD" appears.

This 30-35 second delay prevents a *momentary* flow obstruction from shutting down the pump. Fault shutdown prevents the collection of bad data through flow loss. At shutdown the run time is displayed, and retained in memory, to preserve the sample data.

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

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

- ***"HRS"***

The "HRS" indicator appears during the power-up sequence to show the number of hours the pump has been operational since its last calibration. The actual number of hours (preceded by a "C") appears above the "HRS" indicator. The pump must be calibrated every 200 run hours or every 30 days, whichever comes first.

- ***"CC/MIN"***

This is displayed as part of the pump flow rate (either as a set point in Set Mode or as a live flow rate during sampling).

- ***"MIN"***

This indicates the total sample run time in minutes.

- ***"VOL" & "L"***

These indicators are displayed to show the total volume sampled in liters.

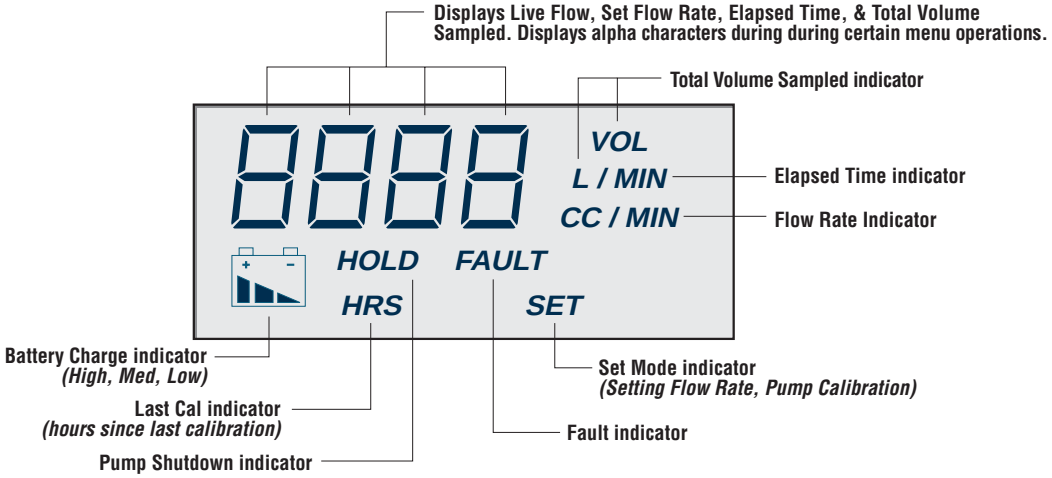


Figure 1.2
Gilian 3500 Display

SECTION TWO
SET-UP

2.1 PREPARATION

The NiMH battery pack must be fully charged and maintained properly to achieve maximum pump run time. The battery pack for the Gilian 3500 pump is rated at 4.8 Volts (2.2 Ampere-hour).

Charge the battery pack through the built-in jack, on the back of the battery pack. The battery pack may be charged while attached to the pump, or separately.

The Nickel-Metal-Hydride Battery is fully charged in five hours.

NOTE

Do not short the battery terminals or the charging jack. Shorting will blow the internal fuse.

- ***Bag Sampling***

Bag sampling capability is available. The Internal/External Vent Control (see Figure 1.1) is removed from the side of the unit and replaced with an air boss outlet port.

A sampling bag with tubing is attached to the airboss. Sampling is done in the range 700-3500 cc/min.

2.2 PUMP START-UP

2.2.1 Power Up

To power up the Gilian 3500, press and release the **POWER** button (refer to Figure 2.1).

The pump will display the Self Test screen for 5 seconds, followed by a screen showing the current version of the software.

The version number screen is followed by a screen showing the number of hours the pump has been in actual operation since last calibration. The screen normally displays for 3–5 seconds. However, the screen will flash for a full 16 seconds if the total run time since last calibration equals or exceeds 200 hours.

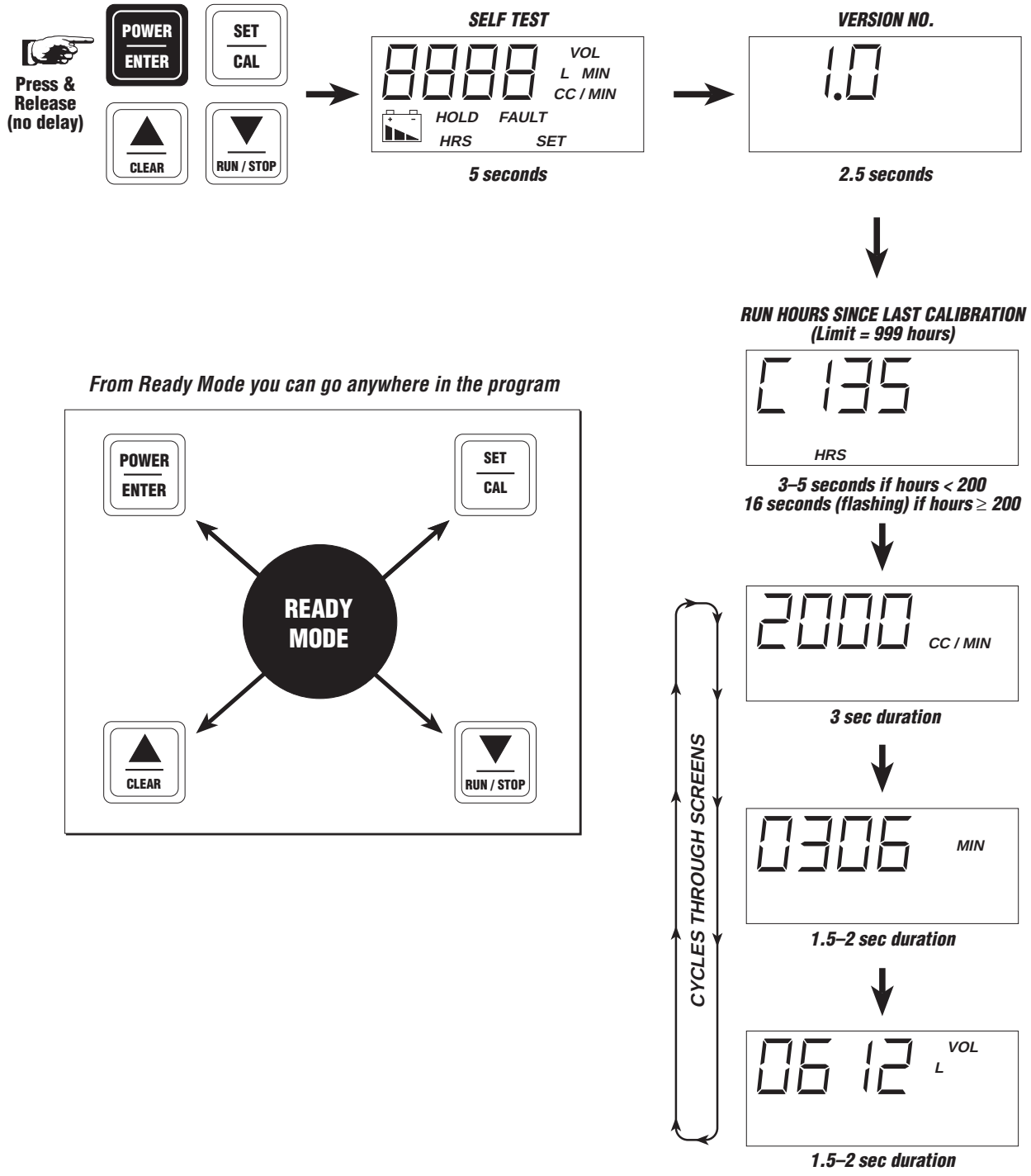
2.2.2 Ready Mode

After initial start-up the pump enters Ready Mode. This is the center point for all menu functions (see Figure 2.1).

In Ready Mode the pump cycles through the following screens (with screen duration): Flow Rate Set Point (3 seconds), Total Sample Time (1.5–2 seconds), Total Volume Sampled (1.5–2 seconds).

If you do not press any buttons, Ready Mode continues cycling through these three screens for 75 minutes before powering down the unit.

To manually power down from Ready Mode, simply press and hold the **POWER** button until power down occurs (about 3–4 seconds).



Screens continue cycling in Ready Mode for 75 minutes before powering down pump, unless operator presses CLEAR, RUN/STOP, or SET/CAL buttons. Pressing POWER/ENTER for 3-4 seconds during Ready Mode powers down pump and saves data to EEPROM.

Figure 2.1
Pump Start-Up & Ready Mode

2.3 SETTING THE FLOW RATE

NOTE

This section is required only if you are changing the pump flow rate. If you're using the previously set flow rate, simply verify it using a Gilibrator 2 (see Section 2.4).

To set the pump flow rate follow the steps below.

1) If the pump is off, press and release the **POWER** button. This begins the pump self test and brings the unit into Ready mode.

2) Once the pump is in Ready Mode, press and release the **SET** button once. This brings up the initial Flow Set screen (see Figure 2.2, Step 1). The Flow Set screen shows the words "FLO" and "SET" on the display.

3) Press and release the **ENTER** button to begin setting the flow rate. The current flow rate set point is displayed along with the word "SET" (refer to Figure 2.2, Step 2).

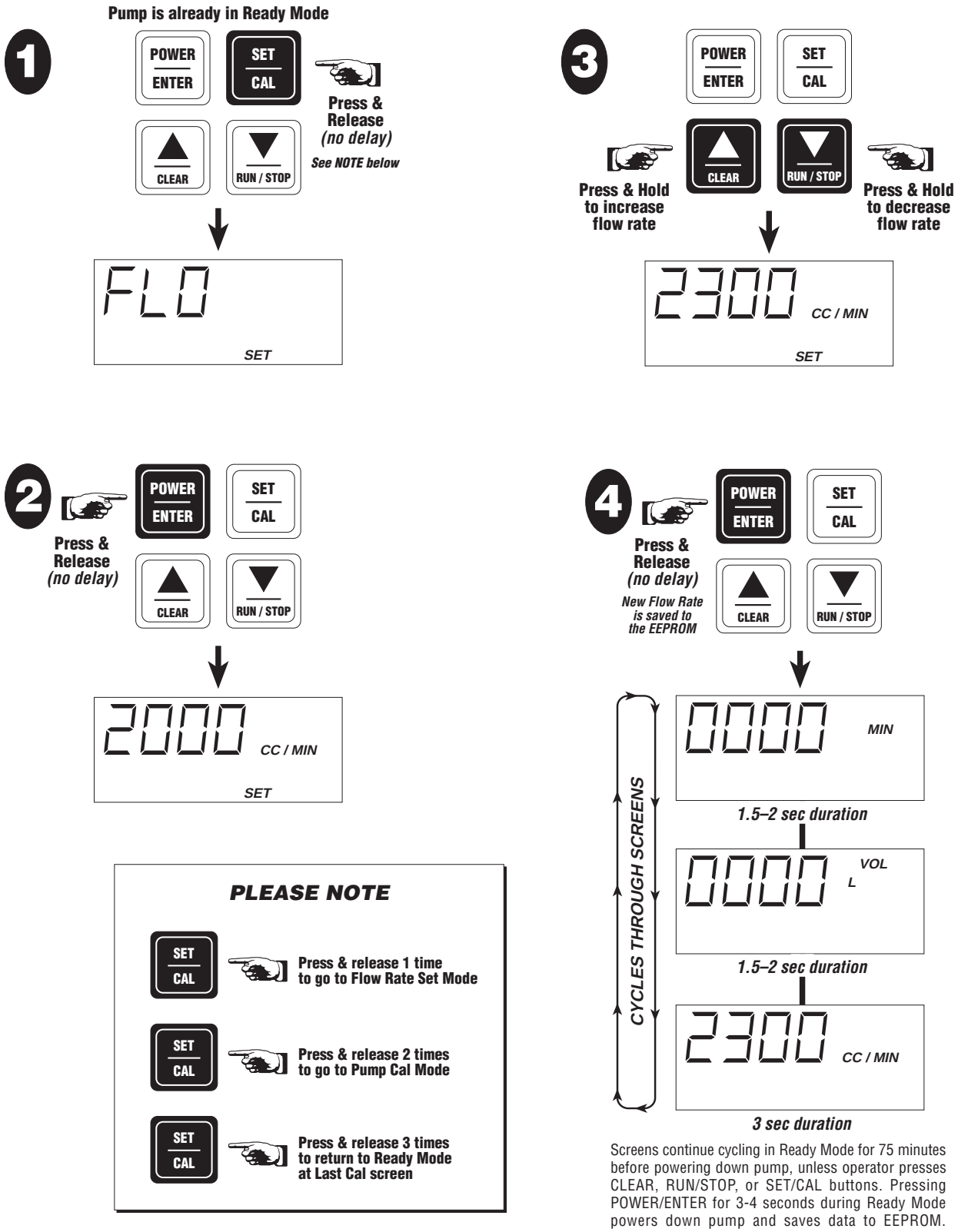
4) Press and hold the ▲ button to increase the flow rate set point or the ▼ button to decrease the flow rate set point.

5) Once the desired flow rate set point has been reached, press and release the **ENTER** button.

6) The pump saves the new flow rate set point and returns to Ready Mode.

7) Go to Section 2.4 to verify the new flow rate.

8) Go to Section 3.2 to start the sampling run.



Screens continue cycling in Ready Mode for 75 minutes before powering down pump, unless operator presses CLEAR, RUN/STOP, or SET/CAL buttons. Pressing POWER/ENTER for 3-4 seconds during Ready Mode powers down pump and saves data to EEPROM.

Figure 2.2
Setting The Pump Flow Rate

2.4 CALIBRATING THE PUMP

Calibration is performed to adjust the actual flow of the pump (motor speed) to match the flow rate set point.

NOTE

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

To perform calibration refer to Figures 2.3 & 2.4 and follow the steps below. Make certain the pump is connected to a primary calibration device such as a Gilibrator 2.

NOTE

Install the filter media in-line (or provide simulated back pressure) before calibrating the pump. The same back pressure used during sampling should be used for calibration.

1) If the pump is off, press and release the **POWER** button. This begins the pump self test and brings the unit into Ready mode.

2) Once the pump is in Ready Mode, press and release the **CAL** button twice. This brings up the initial Calibration screen (see Figure 2.3, Step 1). The Calibration screen shows the words “CAL” and “SET” on the display.

3) *Make certain the Gilibrator 2 is turned on and running.* Press and release the **POWER** button to enter Calibration Mode. The pump motor also starts running.

4) During calibration, the current flow rate set point is displayed along with the word “SET” (refer to Figure 2.3, Step 2). The live (actual) pump flow rate is displayed on the Gilibrator 2.

5) Adjust the pump display value to match the actual flow rate shown on the Gilibrator 2. To increase the display value, press and hold the ▲ button. To decrease the display value, press and hold the ▼ button.

6) When the display value matches the live (actual) flow rate displayed on the Gilibrator 2, press and release the **ENTER** button.

7) The pump motor adjusts speed to match the new display value and continues running. The display changes to show the original flow rate set point.

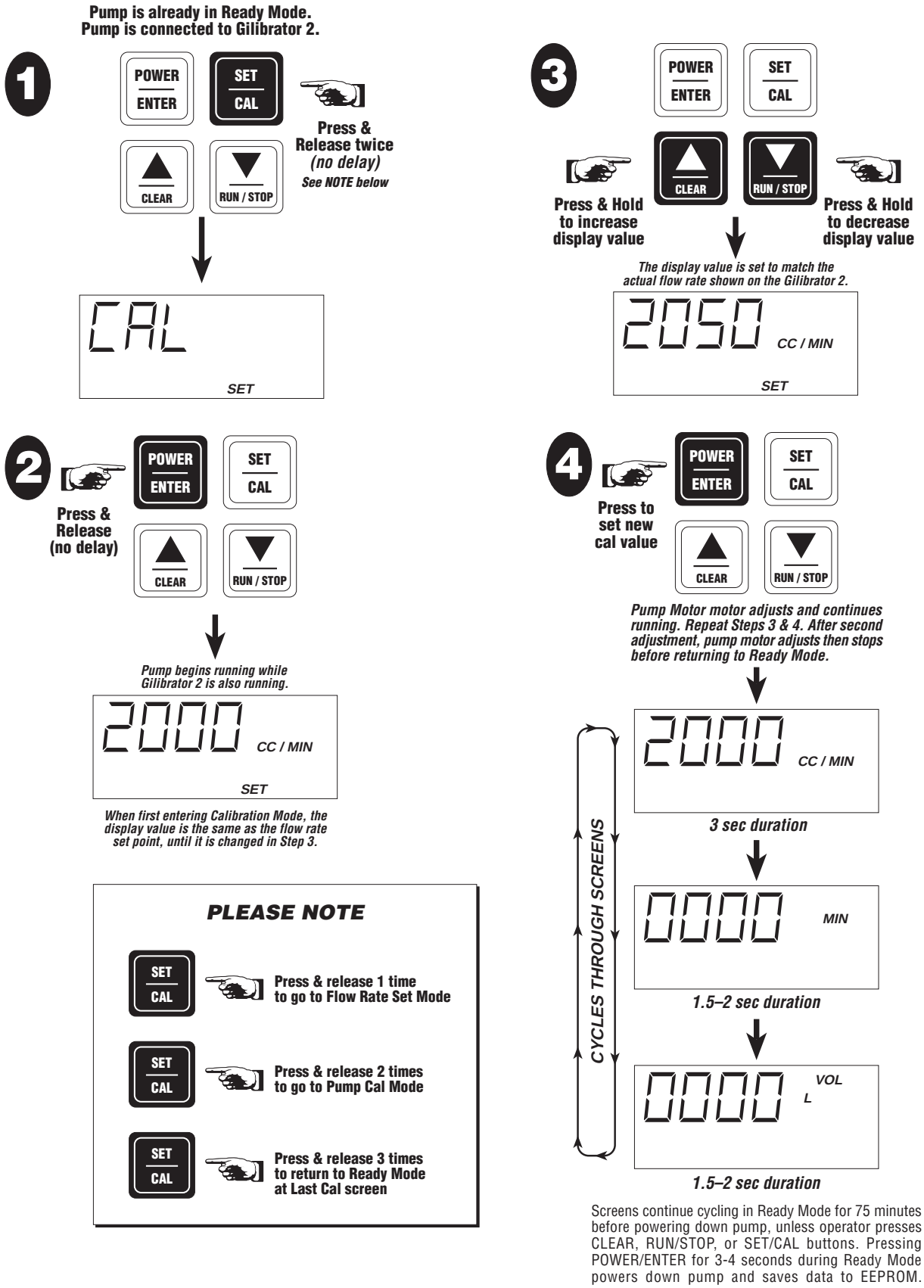
8) Continue monitoring the live flow rate on the Gilibrator 2. If flow rate shown on the Gilibrator 2 does not match the flow rate set point displayed on the pump, continue with Step 9. If the flow rate matches, Press the **ENTER** button again go to Step 11.

9) Continue adjusting the pump display value to match the actual flow rate shown on the Gilibrator 2. To increase the display value, press and hold the ▲ button. To decrease the display value, press and hold the ▼ button.

10) When the pump display value matches the live (actual) flow rate displayed on the Gilibrator 2, press and release the **ENTER** button.

11) The pump motor adjusts its speed to match the new display value on the pump, and then stops before returning to Ready Mode.

12) Go to Section 3.2 to start the sampling run.



Screens continue cycling in Ready Mode for 75 minutes before powering down pump, unless operator presses CLEAR, RUN/STOP, or SET/CAL buttons. Pressing POWER/ENTER for 3-4 seconds during Ready Mode powers down pump and saves data to EEPROM.

Figure 2.3
Pump Calibration Menus

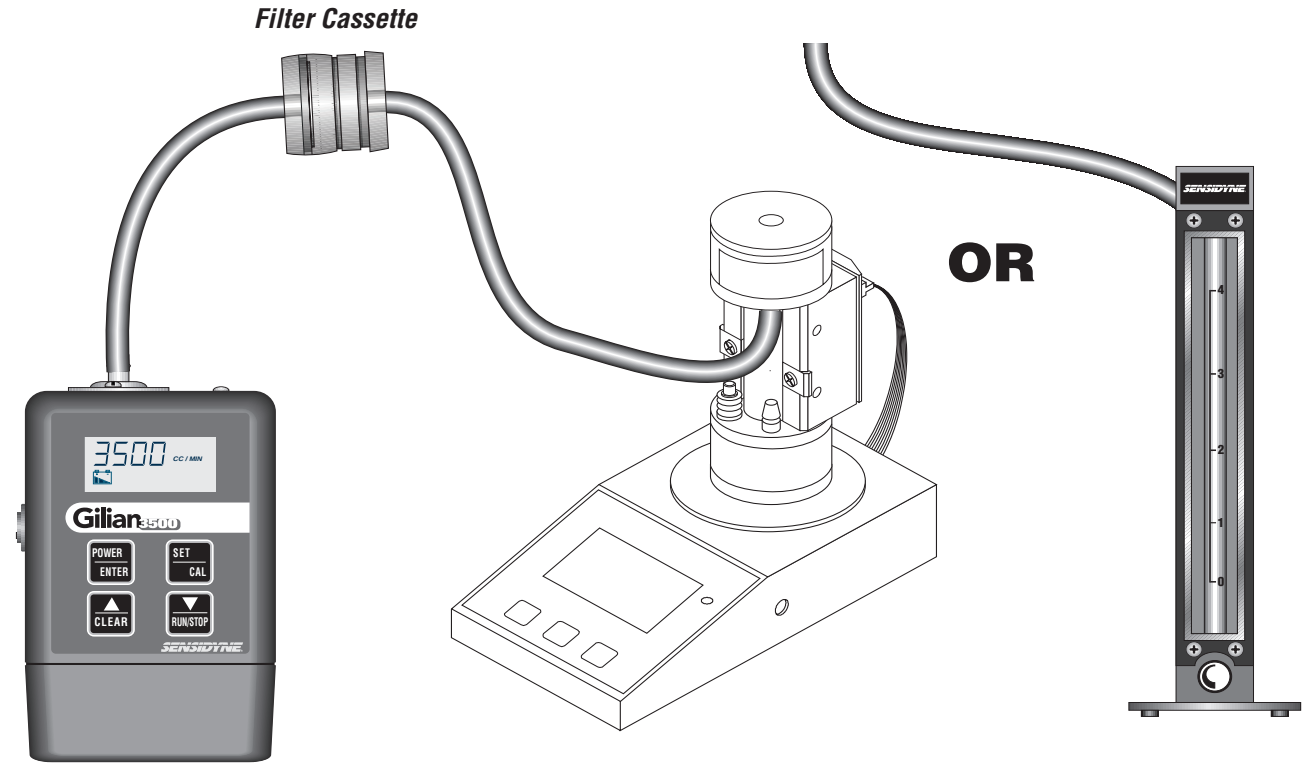


Figure 2.4
Pump Calibration Equipment Set-Up

3.1 SAMPLING SET-UP

Make certain the unit has been turned on and is in Ready Mode. Check the Battery Icon to determine if sufficient charge exists to complete the sampling run.

Make certain all sampling tubing and any sample media have been properly installed.

During sampling the following information is alternately shown on the display:

- Live Flow Rate (in cc/min) *(3 seconds duration)*
- Total Elapsed Sample Time (in minutes) *(1.5–2 seconds duration)*
- Total Volume Sampled (in liters) *(1.5–2 seconds duration)*

3.2 STARTING THE SAMPLE RUN

Before sampling make sure the pump flow rate has been properly set and the pump has been calibrated (if needed).

To begin a sample run, follow the steps below (refer to Figure 3.1).

NOTE

The Total Run Time and Total Volume Sampled are cumulative from one sample run to the next unless you reset the flow rate or calibrate the pump. If you want to clear the Total Run Time and Total Volume Sampled data before starting a sample run, see Section 3.4 for instructions on clearing the run data.

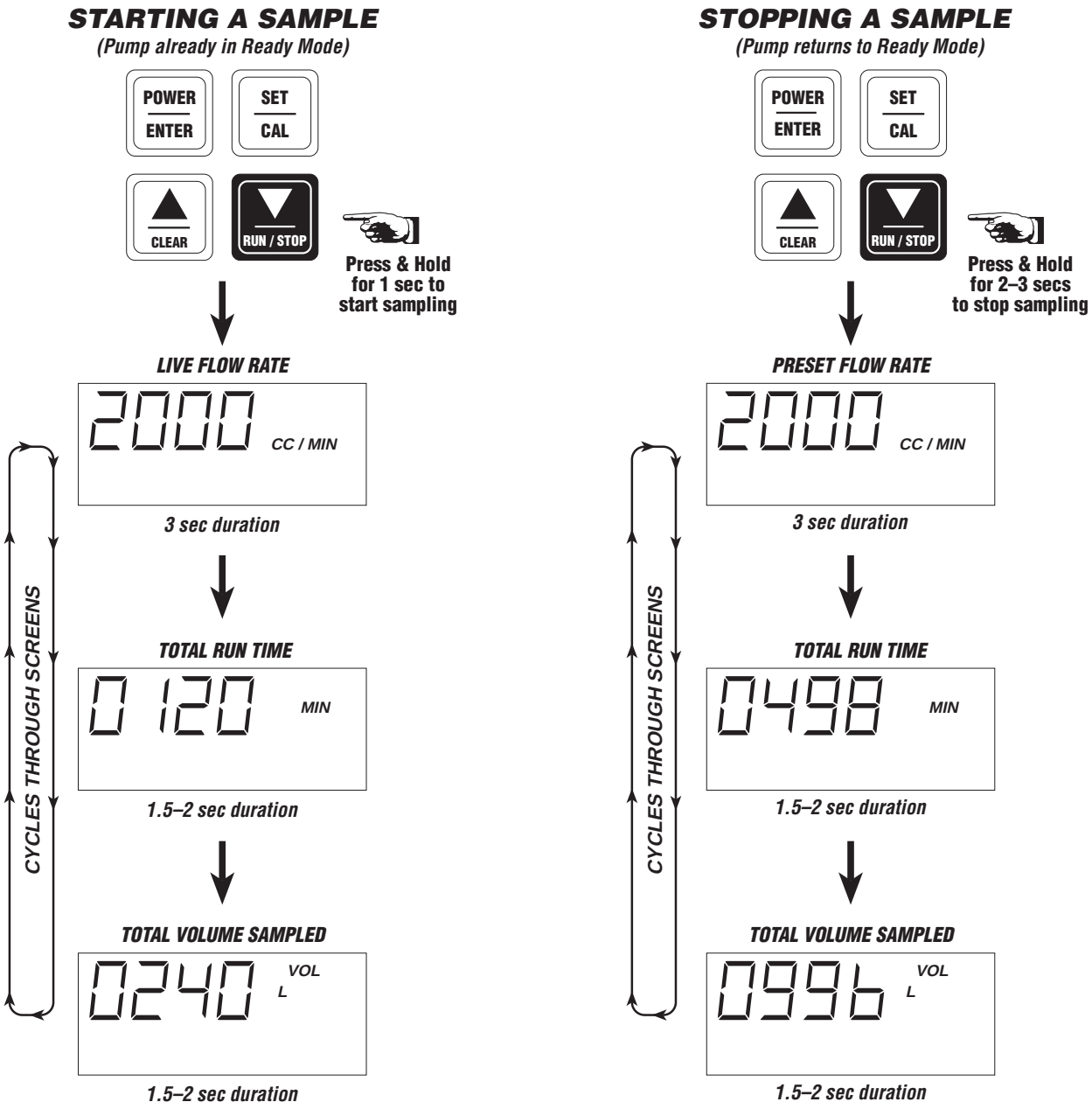
1) If the pump is turned off, press and release the **POWER** button. This begins the pump self test and brings the unit into Ready mode.

2) Press and hold the **RUN** button for about 1 second, or until the pump motor starts.

3) The pump will begin running at the current flow rate set point.

4) During the sample run the pump will alternately display the following screens:

   - Live Flow Rate (cc/min.) [3 seconds]
   - Total Run Time (min.) [1.5-2 seconds]
   - Total Volume Sampled (liters) [1.5-2 seconds]



Pump is in run mode.
Screens continue cycling during run.

Screens continue cycling in Ready Mode for 75 minutes before powering down pump, unless operator presses CLEAR, RUN/STOP, or SET/CAL buttons. Pressing POWER/ENTER for 3-4 seconds during Ready Mode powers down pump and saves data to EEPROM.

Figure 3.1
Pump Sampling

3.3 LOCKING THE KEYPAD (OPTIONAL)

The keypad can be locked after sampling has begun to prevent tampering during the sampling run.

To lock the keypad refer to Figure 3.2 and follow the steps below:

1) Press and hold both the ▲ and **SET** buttons for 4-5 seconds, until the word "Lock" appears on the display.

2) "Lock" appears on the display for 2-3 seconds before the unit returns to the normal sampling screens.

3.4 STOPPING THE SAMPLE RUN

To stop a sample run, follow the steps below (refer to Figure 3.1). *Note: If the keypad is unlocked, skip to Step 3.*

The pump is actively taking a sample.

1) Press and hold both the ▲ and **SET** buttons for 4-5 seconds, until the word "Unlk" appears on the display.

2) "Unlk" appears on the display for 2-3 seconds before the unit returns to the normal sampling screens.

3) Press and hold the **STOP** button for approximately 2–3 seconds, or until the pump motor stops.

NOTE

If the pump motor does not stop after Step 3, go to Step 1 to unlock the keypad.

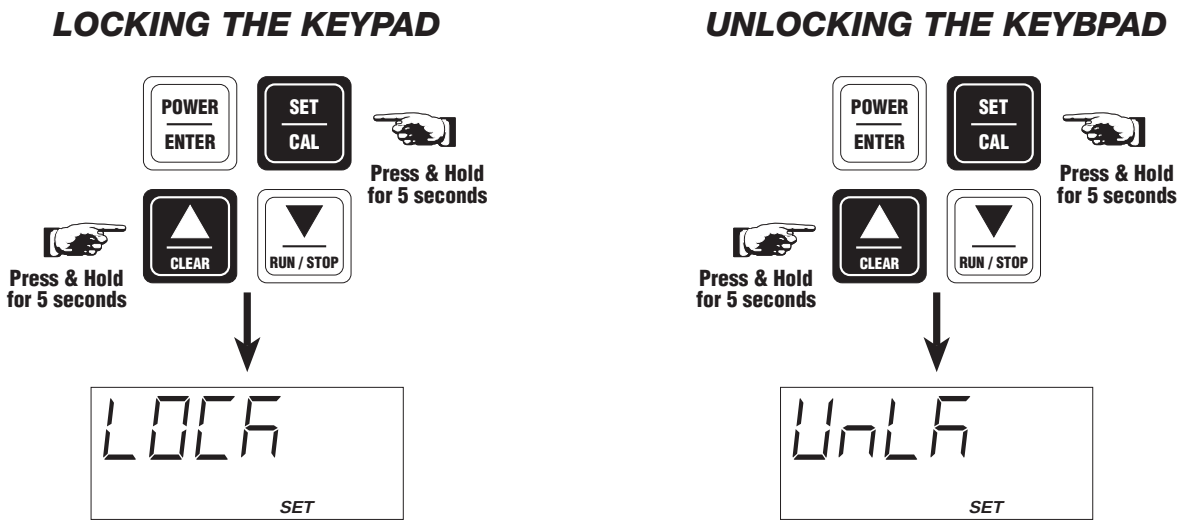


Figure 3.2
Locking & Unlocking The Keypad

4) The unit will return to Ready Mode.

5) During Ready Mode, the pump alternately displays the following screens:

   - Flow Rate Set Point (cc/min.) [3 seconds]
   - Total Run Time (min.) [1.5-2 seconds]
   - Total Volume Sampled (liters) [1.5-2 seconds]

NOTE

The Total Run Time and Total Volume Sampled are cumulative from one sample run to the next unless you reset the flow rate or calibrate the pump. If you want to clear the Total Run Time and Total Volume Sampled data before starting a sample run, see Section 3.4 for instructions on clearing the run data.

3.5 CLEARING THE RUN DATA

To clear run data from memory follow the steps below (refer to Figure 3.3).

1) If the pump is off, press and release the **POWER** button. This begins the pump self test and brings the unit into Ready mode.

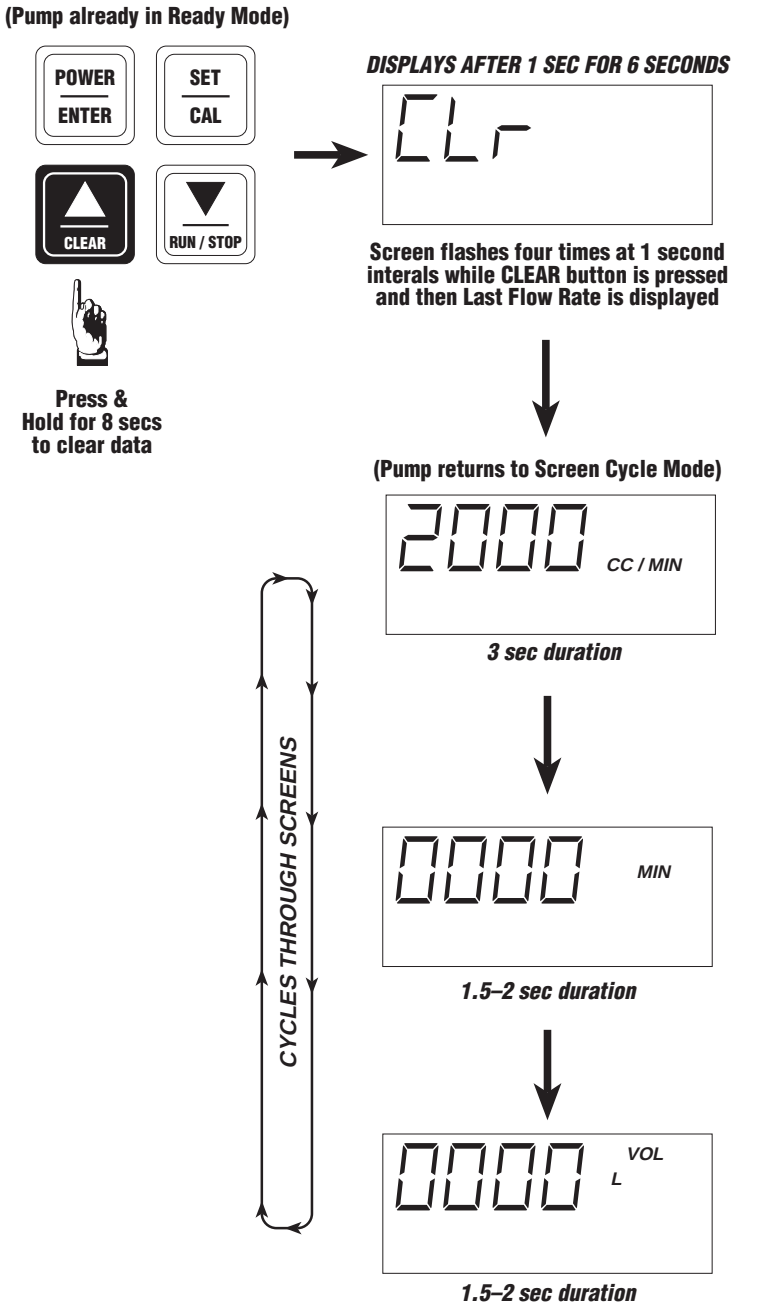
2) Press and hold the **CLEAR** button for approximately 8 seconds.

3) While pressing and holding the **CLEAR** button the word "Clr" appears on the display. The word flashes four times to indicate that the Total Run Time and Total Volume Sampled data are being cleared from memory.

4) When clearing has been completed, the pump returns to Ready Mode showing the current Flow Rate Set Point, and "0000" for both Total Run Time and Total Volume Sampled.

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.



Screens continue cycling in Ready Mode for 75 minutes before powering down pump, unless operator presses CLEAR, RUN/STOP, or SET/CAL buttons. Pressing POWER/ENTER for 3-4 seconds during Ready Mode powers down pump and saves data to EEPROM.

Figure 3.3
Clearing The Run Data

SECTION FOUR
LOW FLOW ADAPTER

4.1 OVERVIEW

The incorporation of the Low Adpater (PNº 801961) will allow flows from 20 cc/min to 750 cc/min.

The Low Flow Adapter is attached to the top of the pump (see Figure 4.1). The Low Flow Adapter is suitable for multiple tube sampling and can be used in conjunction with the Gilian Universal Tube Holder System to perform multiple tube sampling. The adapter maintains a constant negative (vacuum) pressure of approximately 20" H_2O at the pump's inlet while allowing changes in total flow through the system. With a constant pressure in the tube holder manifold, the flow through each tube can be set independently without affecting the flow(s) through the adjacent tube(s). The total flow rate through all sampling tubes cannot exceed 750 cc/min..

• *Set-Up & Installation*

Install the Low Flow Adapter as follows:

1) Set the flow rate to 1500 cc/min on the pump per Section 2.3 for a flow of 1.5 LPM.

2) Calibrate the pump per Section 2.4 using the appropriate back pressure.

3) Attach a short piece of tubing to the inlet on the pump.

4) Attach the Low Flow Adapter to the tubing. Make certain the arrow on the adapter is pointing toward the tubing.

5) Follow the steps for the Performance Verification (recommended).

4.2 USING THE ADAPTER

• *Performance Verification*

Performance verification is recommended, though not necessary, to verify the proper combined operation of the Low Flow Adapter and the Gilian 3500. A Diagnostic Calibration Panel is required to perform this operation. To ensure that the Low Flow Adapter and the Gilian 3500 are operating properly, the following steps may be performed after the pump has been set to 1.5 LPM following the steps in Section 2.3.

1) With the pump on and the Low Flow Adapter attached to the inlet filter, set the Load Selector Valve on the Diagnostic Calibration Panel in the Bypass position.

2) Connect a tube from the Low Flow Adapter inlet port to the air outlet fitting on the Diagnostic Calibration Panel (labeled "Pump").

3) Connect a tube from the outlet port on the Gilibrator 2 to the appropriate air inlet fitting (located below the rotameter) on the Diagnostic Calibration Panel.

4) Fully open the appropriate valve (V3 or V4) on the Panel by turning it completely counterclockwise.

5) Move the Load Selector Valve on the diagnostic panel from the Bypass position to one of the valve positions (V3 or V4).

6) Using the selected valve (V3 or V4) on the panel, gradually turn the valve clockwise until it is completely closed. The pressure gauge on the Panel should display a load (back pressure) of 20" ± 3" H_2O.

NOTE

Always open and close valves SLOWLY, as this gives the Gilian 3500 pump time to accommodate the change in back pressure. If the Calibration Panel Adjustment Valve is adjusted too fast, the pump may fault. Do not be alarmed if the pump stops pumping; it will begin pumping in a few seconds.

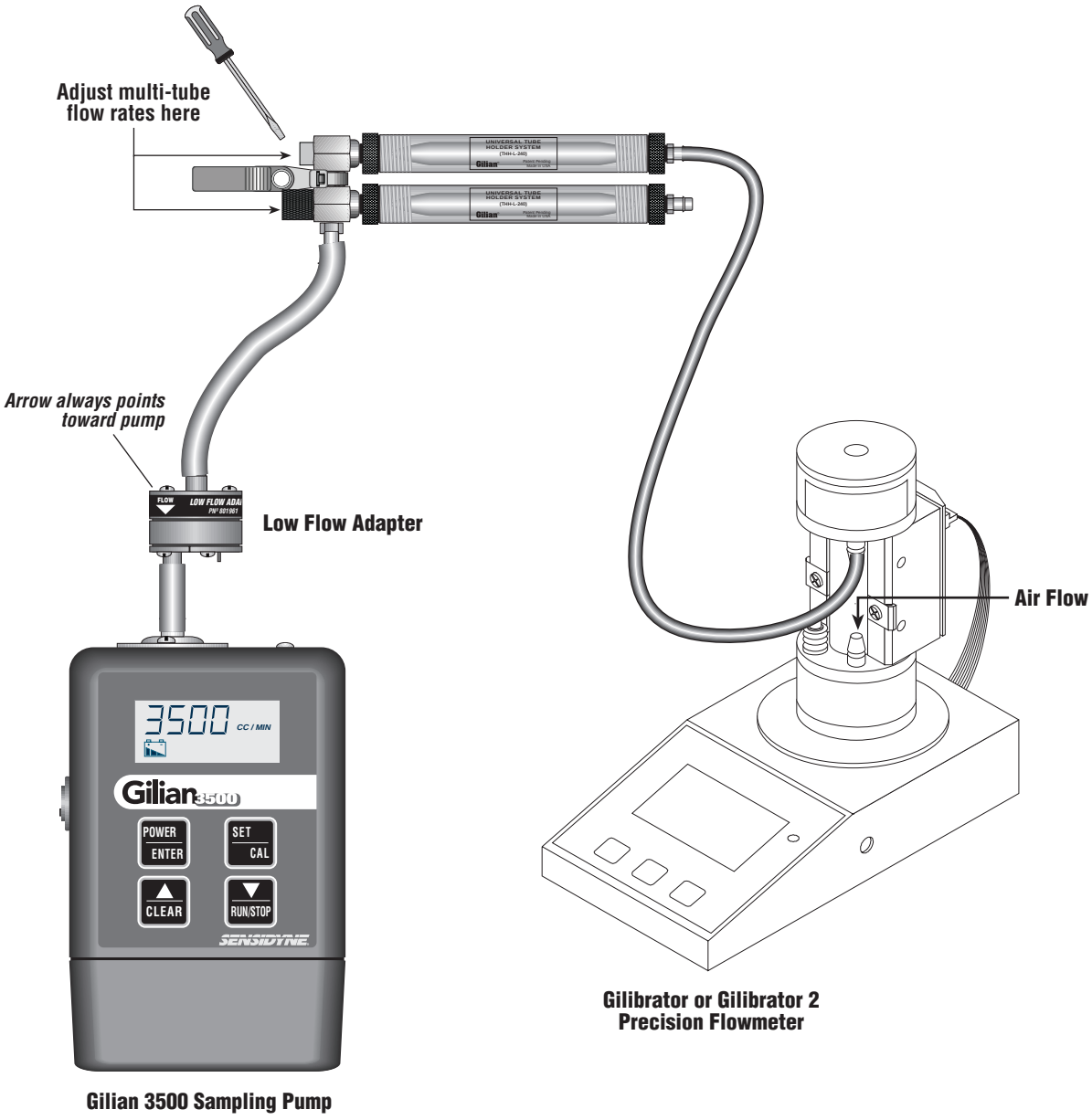


Figure 4.1
Low Flow Adapter (with multiple Sorbent Tubes)

7) Now, open the selected load valve slowly by turning it counterclockwise until the flow rate is approximately 750 cc/min. Use the Gilibrator 2 to verify the 750 cc/min flow rate.

8) Remove the diagnostic panel tubing and connect the Tube Holder System in its place (see Figure 4.1). Fit each sorbent tube to an appropriately sized Tube Holder and connect the outlet of the Tube Holder's Manifold to the inlet of the Low Flow Adapter. Remove the variable manifold valve caps to expose the flow adjustment valve.

NOTE

When connecting the tube to the Tube Holder Manifold the pump may stop. However, the pump will adjust and begin pumping in a few seconds.

9) Set the flow through each tube by adjusting the corresponding flow control valve in the Manifold on the Tube Holder. Turning the tube holder clockwise will restrict the flow and decrease the flow rate. The flow through each tube should be measured with a calibrated device connected to the inlet of that tube holder. A Gilibrator 2 Calibrator is preferable since the pressure drop through this type of device is negligible. *Always recheck results after each adjustment.*

- ***Filter Maintenance***

The filter on the Low Flow Adapter should be changed whenever it appears to be dirty or damaged.

To change the filter, do the following:

1) If the adapter is installed on the pump, remove it. Remove the short tubing between the adapter and the pump.

2) Unscrew the two screws on the filter cover (see Figure 4.2).

3) Replace the dirty filter with a clean one (PNº 3-3900-34P – pkg of 10).

4) Replace the filter cover and secure the cover with the two screws.

5) Reinstall the adapter on the pump.

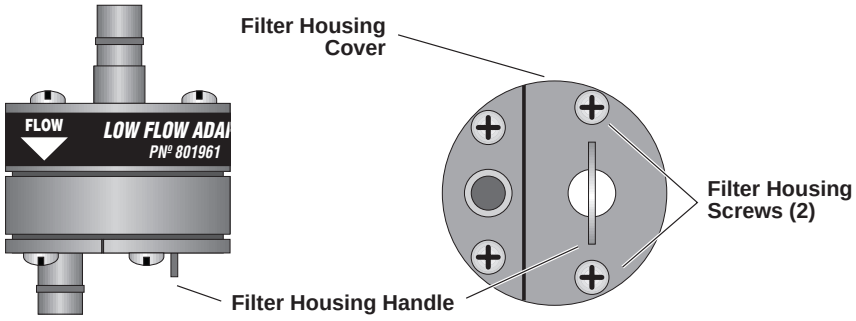


Figure 4.2
Low Flow Adapter Filter Maintenance

5.1 BATTERY MAINTENANCE

Gilian 3500 pumps use rechargeable Nickel-Metal-Hydride battery packs. They must be fully charged and maintained properly to achieve maximum pump run time. The battery pack is rated at 4.8 Volts (2.2 Ampere-hour), and when using the specified charger, the charging time is less than 5 hours. The battery chargers indicate rapid charging (solid red LED) and maintenance charging (solid green LED).

The battery pack for the Gilian 3500 pump is charged through a built-in jack on the back of the battery pack. The battery pack may be charged while installed on the pump, or separately. *Do not short the battery terminals or the charging jack. Shorting will result in blowing the internal fuse.*

Battery life is usually measured in charge/discharge cycles. Gilian battery packs are capable of providing between 300 and 500 charging cycles. Since this is very difficult to track over the life of the battery, the table below can help you estimate how long the battery should last.

The estimated battery life is based on proper battery maintenance. The best way to ensure maximum battery life is to track daily pump usage and only charge the battery pack when necessary.

If the battery pack has been removed from the charger for more than 4–6 hours without use, it will require additional charging to restore it to full capacity. This process can be safely repeated two or three times.

IMPORTANT NOTE

The battery must be fully re-charged on a regular (monthly) basis when not in use. Long periods of inactivity will result in damage to the battery cells.

5.2 FILTER MAINTENANCE

Change the filter whenever it appears dirty or damaged. To change the filter do the following:

1) Unscrew only the two *non-recessed* screws on the filter housing (see Figure 5.1).

2) Remove the filter housing.

3) Remove the dirty filter and replace it with a clean filter (PNº 3-3900-34). Make certain the filter is placed in the unit with the rough side down.

4) Make certain the housing O-Ring is properly seated.

5) Reinstall the filter housing. Make certain the Housing Guides are properly inserted in their mating holes.

Pump Usage and Estimated Battery Life

Pump Usage Rate	Weekly Use	Estimated Battery Life
High	40–60 hours	1.0–1.5 years
Medium	20–39 hours	1.5–2.5 years
Low	< 20 hours	2.5 years

Table 5.1
Estimated Battery Life

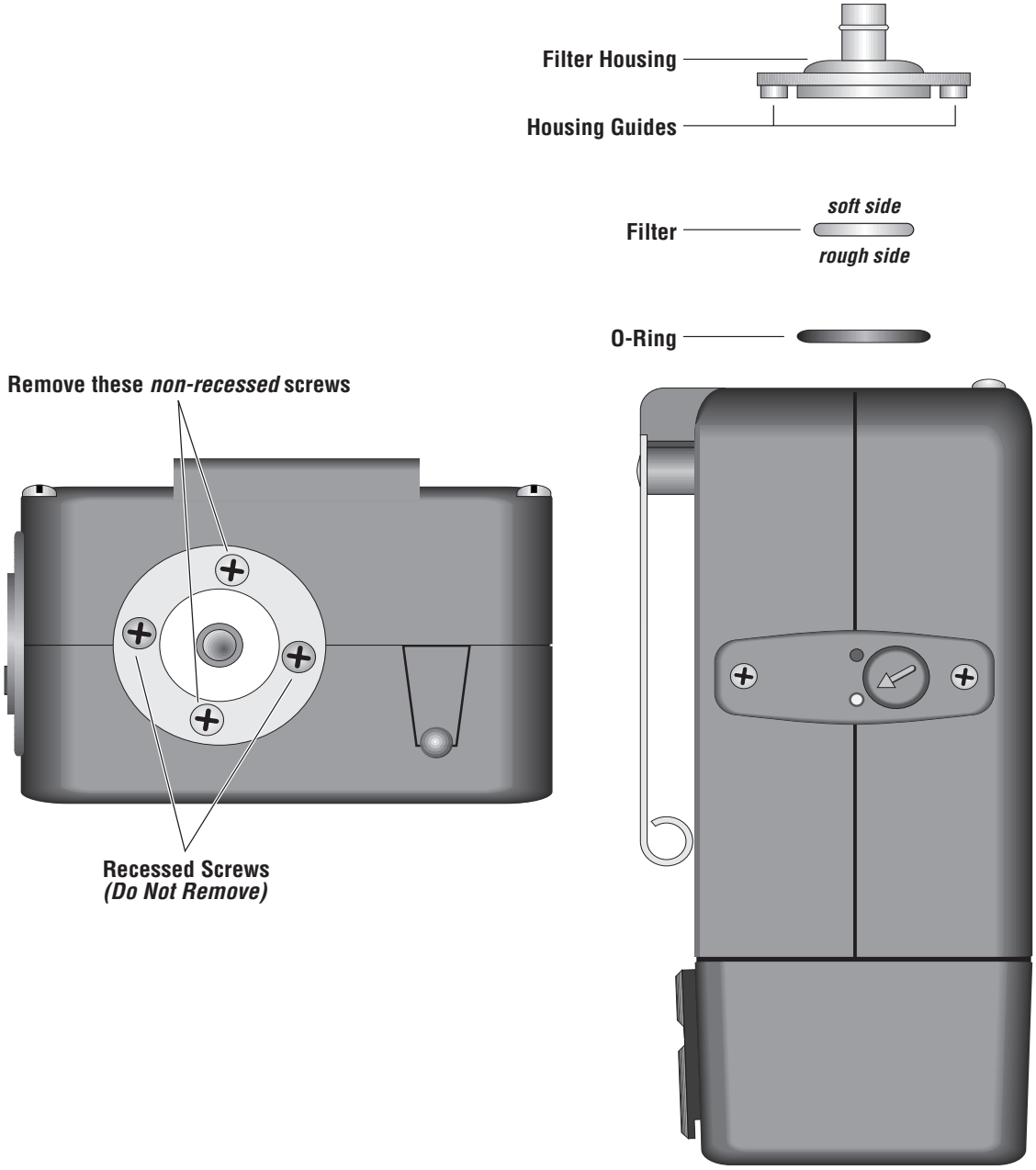


Figure 5.1
Filter Maintenance

Part No.	Description
801934-111	**Gilian 3500 Pump** *(includes Pump, Airboss, 36" Tubing, & Manual)*
801934-1201	**Gilian 3500 120 VAC Starter Kit** *(includes Pump, 120 VAC Single-Unit Charger, Airboss, Filter Cassette Kit, 36" Tubing, & Manual)*
801934-1205	**Gilian 3500 120 VAC 5-Pack Kit (quantities in parentheses)** *(includes Pump (5), 5-Unit Charger (1), Airboss (5), Filter Cassette Kit (5), 36" Tubing (5), & Manual(5))*
801934-2301	**Gilian 3500 230 VAC Starter Kit [European]** *(includes Pump, 230 VAC Single-Unit Charger, Airboss, Filter Cassette Kit, 36" Tubing, & Manual)*
801934-2301U	**Gilian 3500 230 VAC Starter Kit [U.K.]** *(includes Pump, 230 VAC Single-Unit Charger, Airboss, Filter Cassette Kit, 36" Tubing, & Manual)*
801934-2305	**Gilian 3500 230 VAC 5-Pack Kit (quantities in parentheses)** *(includes Pump (5), 5-Unit Charger (1), Airboss (5), Filter Cassette Kit (5), 36" Tubing (5), & Manual(5))*
402289-1	**Single Unit 120 VAC Charger**
402290-1	**Single Unit 230 VAC Charger [Europe]**
402290-2	**Single Unit 230 VAC Charger [U.K.]**
801961	**Low Flow Adapter**
801930	**Battery Pack**
3-3900-34P	**Filter (package of 10)**
801934M	**Operation & Service Manual**
800565-8	**Diagnostic Panel and Carrying Case (0.5–5 LPM, 20–200 cc, 0.5–50 cc)**
800573-3	**Diagnostic Panel only, Hi/Lo (0.5–5 LPM, 20–200 cc, 0.5–50 cc)**
800783-3	**Diagnostic Panel with Stand, Hi/Lo (0.5–5 LPM, 20–200 cc, 0.5–50 cc)**
800149	**Tube Holder Kit, Single Tube Holder Assy (No Manifold) 6 x 70 mm**
800259	**Tube Holder Kit, Single Tube Holder Assy (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 A
PARTS LIST

Item Nos. refer to Figures A.1 and A.2. Item Nos. 4E1 to 4E14 are located in Figure A.2.

Item No.	Part No.	Description
1	801930	Nickel-Metal-Hydride Rechargeable Battery Pack (includes 1A)
1A	*202783*	*Charging Jack Cover only*
2	801969	Front Case Assembly
3 **	850276	PCA Control Board
4 **	801924	Pneumatic Assembly with Outlet Extender (includes 4A to 4E)
4A	*6075-0418*	*Screw for Top Insert (4B) (2 required)*
4B	*801972*	*Top Insert with Vent Plug (for Internal/External Vent Control)*
4C	*1970-0008*	*O-Ring for Top Insert (4B) (2 required)*
4D	*801960*	*Outlet Extender Assembly*
*4E **	*801925*	*Pneumatics Sub-Assembly (includes 4E1 to 4E14)*
4E1	*800301*	*Pump Body & Set Screw Assembly*
4E2	*401811*	*Motor, 6 Vdc*
4E3	*200349-1*	*Eccentric*
4E4	*400968*	*Bearing, Shielded*
4E5	*800649 **	*Yoke Assembly **
4E6	*801931*	*Bottom Valve Plate Assembly*
4E7	*801933*	*Top Valve Plate Assembly*
4E8	*5274-0011*	*Quad Ring (4 required)*
4E9	*200015*	*Top Plate*
4E10	*201078*	*Bottom Plate*
4E11	*200704 **	*Pump Gasket (2 required) **
4E12	*401931-750*	*Plate Screw 4-20 x 3/4 SS (4 required)*
4E13	*401930-437*	*Plate Screw 4-20 x 7/16 SS*
4E14	*201320-40 **	*Valve-Pull-In (Silicone) (2 required per plate) **
5	6026-6205	Tygon Tubing (5/16 OD) for Flowmeter Assembly (6)
6 **	801922	Flowmeter Assembly (Paddle wheel)
7	801927	Manifold Assembly (includes 7A to 7E)
7A	*6075-0408*	*Manifold Assembly Screw (Pan-Head 4-40) (2 required)*
7B	*202771*	*Manifold Top Inlet*
7C	*3-3900-34*	*Manifold Filter*
7D	*7015044-70-016*	*Manifold O-Ring*
7E	*801970*	*Manifold Bottom Assembly*
8	6026-6204	Tygon Tubing (1/4 OD x 1/16)
9	801968	Rear Case Assembly
10	6075-0418	Rear Case Screw (Pan-Head 4-40) (2 required)
11	6075-0428	Battery Pack Mounting Screw (2 required)

* *These spares are also available as part of the Gilian 3500 Pneumatic Rebuild Kit (PNº 801967)*

** *Replacement of many of these parts requires Authorized Service Center electronic alignment procedures and equipment.*

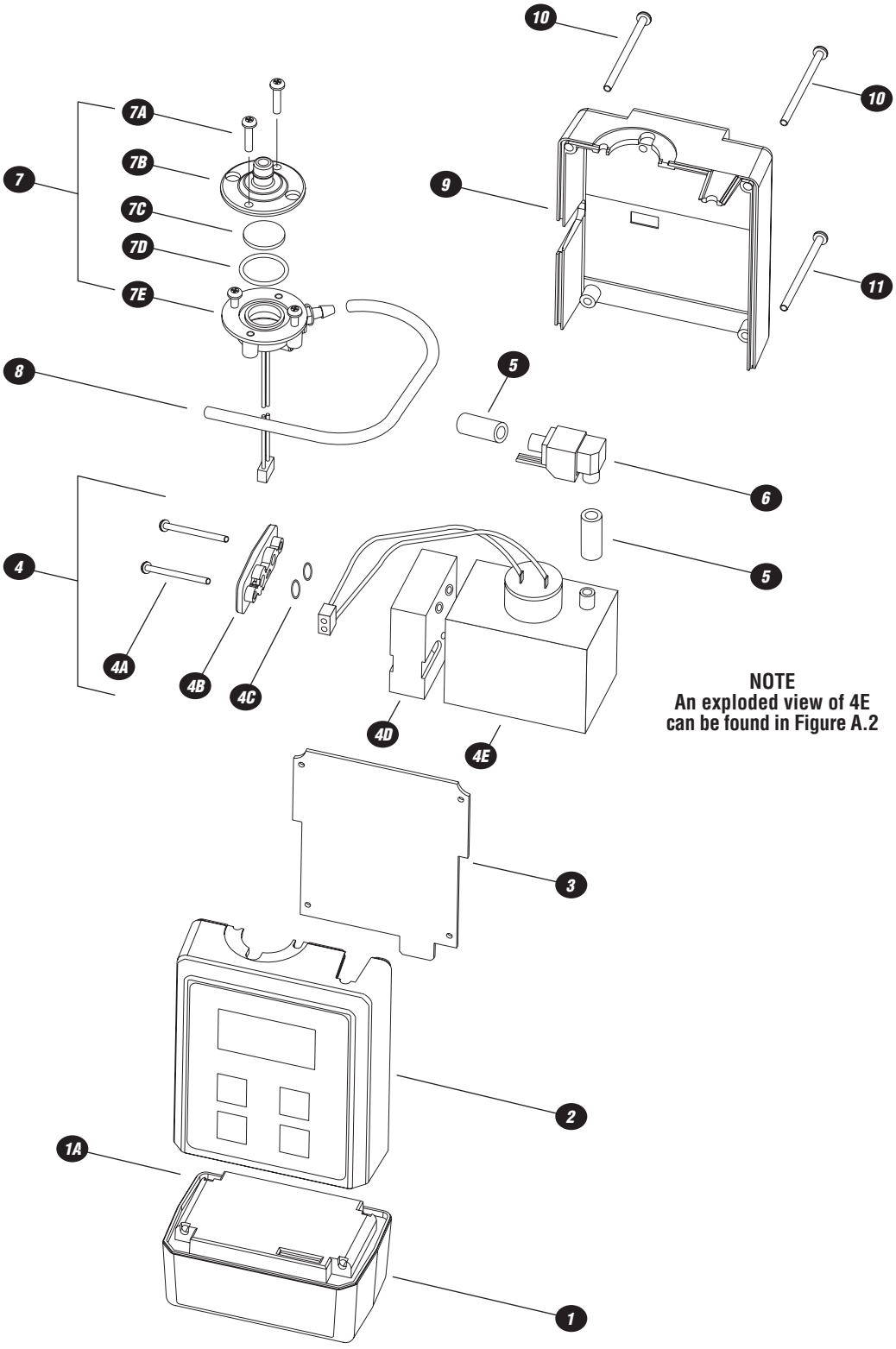


Figure A.1
Gilian 3500 Exploded View

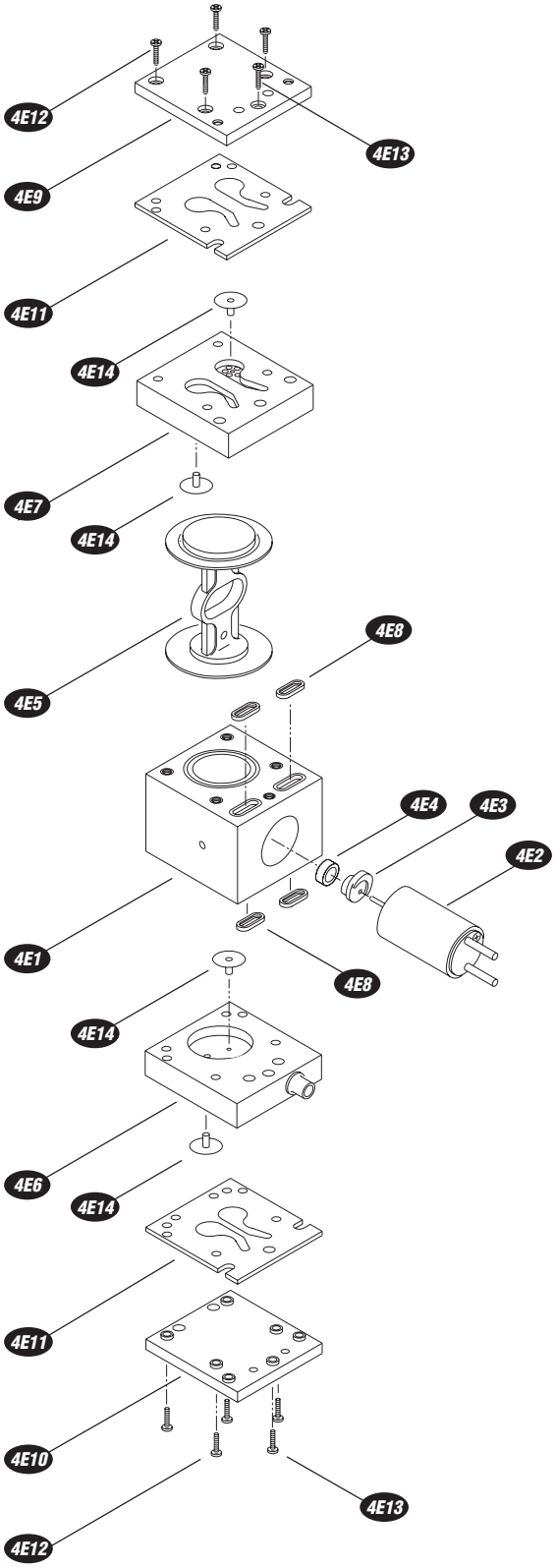


Figure A.2
Pump Assembly Exploded View

APPENDIX B
SPECIFICATIONS

Performance

Operating High Flow Range	700–3500 cc/min
Constant Flow control	Better than ± 5% of set flow (after calibration)
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	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
Battery Level Indicator	Icon displays Full, Mid, & Low charge levels
Interface Connectors	Charging Jack
Charge Time	Under 5 hours

Approvals

Intrinsic Safety

UL Certification	Class I, Div 1, Groups A, B, C, D; Class II Div 1, Groups E, F, & G; Class III. T3C.
$_{C}$UL Certification	Class I, Div 1, Groups C, D. T3C.
CENELEC Certification	EEx ib IIB T4

CE

EMC EMI/RFI	EN 55 022 Class B; EN 50082-1; IEC 801-2, 3

Environmental

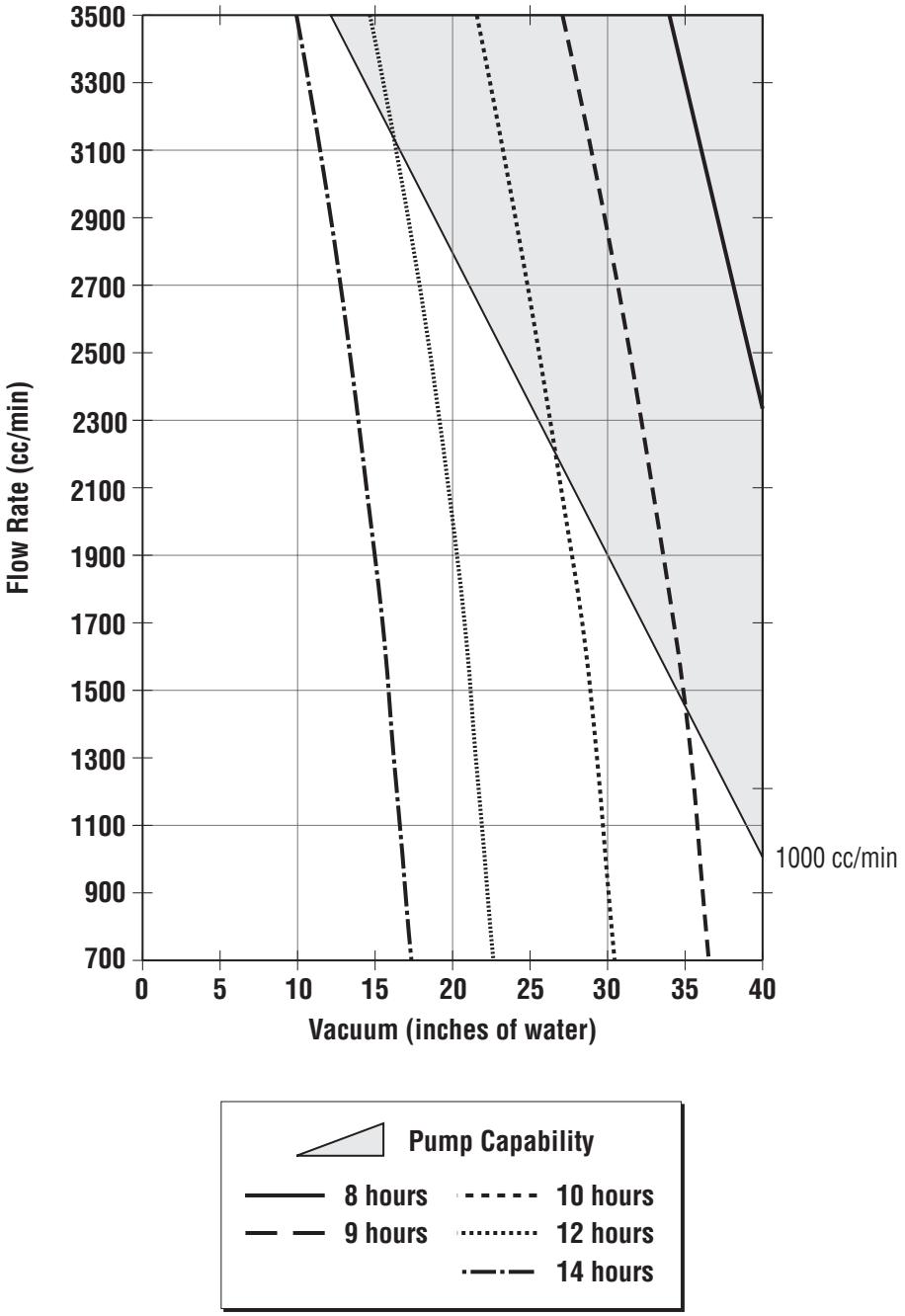
Temperature

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

PERFORMANCE & ESTIMATED RUN TIME



APPENDIX D
RETURNED MATERIAL AUTHORIZATION

Sensidyne maintains an instrument service facility at the factory to provide its customers with both warranty and non-warranty repair. Sensidyne assumes no liability for service performed by personnel other than Sensidyne personnel. To facilitate the repair process, please contact the Sensidyne Service Department in advance for assistance with a problem which cannot be remedied and/or requires the return of the product to the factory. All returned products require a Returned Material Authorization (RMA) number. Sensidyne Service Department personnel may be reached at:

Sensidyne
16333 Bay Vista Drive
Clearwater, FL 33760 USA
727-530-3602
727-538-0671 [Main Fax]

All non-warranty repair orders will have a minimum fee of $50 whether the repair is authorized or not. This fee includes handling, administration and technical expenses for inspecting the instrument and providing an estimate. However, the estimate fee is waived if the repair is authorized.

If you wish to set a limit to the authorized repair cost, state a "not to exceed" figure on your purchase order. Please indicate if a price quotation is required before authorization of the repair cost, understanding that this invokes extra cost and handling delay.

Sensidyne's repair policy is to perform all needed repairs to restore the instrument to its full operating condition.

Repairs are handled on a "first in - first out" basis. Your order may be expedited if you authorize an expediting fee. This will place your order next in line behind orders currently in process.

Pack the instrument and its accessories (preferably in their original packing) and enclose your return address, purchase order, shipping and billing information, RMA number, a description of the problem encountered with your instrument and any special instructions. All prices are subject to change without notice.

If this is the first time you are dealing directly with the factory, you will be asked to prepay or to authorize a COD shipment.

Send the instrument, prepaid, to:

SENSIDYNE
16333 BAY VISTA DRIVE
CLEARWATER, FL 33760 USA

ATTENTION: Service Department

RMA #:_____

SERVICE OPTIONS

The Sensidyne Service Department offers a variety of service options which will minimize costly interruptions and maintenance costs. These options include initial training, on-site technical assistance, and full factory repairs. Sensidyne has developed several programs which offer options best suited to your applications and needs. For further information, contact the Sensidyne Service Department at the following numbers: 800-451-9444 • 727-530-3602 • 727-538-0671 [Service Fax].

Certificate No. 970084

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16333 Bay Vista Dr. • Clearwater, Florida 33760 • (800) 451-9444 • (727) 530-3602 • (727) 539-0550 [FAX] • www.sensidyne.com