

# Gilian®

## Gilibrator® 3 with *STABLFLOW™*



## Operation Manual (This Manual Covers All Gilibrator® 3 Kit Models)

Sensidyne Document No. 360-0213-01 - Rev D

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## Gilibrator 3 Identifiers:



**A LCD Display**

**B Status and Notification LED**

**C Ambient Light Sensor and Charge Indicator LED**

**D SD Card Port**

**E Power Switch**

**F Power Port**

**G USB Port**

**H DB9 Port**

**I Cell Release Button**

**J Viewing Window**

**K Inlet**

**L Outlet**

## Quality Policy Statement

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***At Sensidyne, we are committed to providing products and services that consistently meet customer needs and comply with all applicable statutory and regulatory requirements.***

***Our products are designed, manufactured and calibrated in accordance with standards ISO 9001:2015, ISO/IEC 17025:2017, ISO/IEC 80079-34, ATEX Directive 2014/34/EU, and IECEx, where applicable. Through ongoing review of our designs, supplier performance, and customer feedback we strive to ensure continuous improvement.***

***All employees at Sensidyne share the responsibility to provide products that are produced efficiently and economically representing the best value to our customers. We are committed to meeting or exceeding customer expectations in everything we do.***

***Sensidyne, LP***

## Warranty

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Sensidyne warrants that, at the time of delivery, the Gilibrator 3 shall be free of all defects in workmanship and material. Sensidyne will repair or replace, at its sole option, any Gilibrator 3 found to be defective by Sensidyne, if notified by Purchaser within the Warranty time period.

The warranty time period shall be for two (2) years from the date of original shipment by Sensidyne, except as noted below.

A. Exceptions to the above two year warranty time period:

1. The rechargeable LiFePO<sub>4</sub> battery pack has a one (1) year warranty.

B. This warranty shall be null and void on any product which:

1. is operated or used in excess of the product's operating specifications; or
2. is not properly maintained in accordance with its maintenance manual or specifications; or
3. has been repaired or modified by persons other than authorized Sensidyne personnel or Factory Trained Service Centers, unless such work is authorized in advance in writing by Sensidyne; or
4. has been damaged, abused, or misused.

C. Warranty on Service and Repairs:

1. Goods, which have been repaired or replaced during the warranty period, are warranted only for the remainder of the unexpired portion of the original warranty period.
2. Repairs or service provided not pursuant to warranty: 180 days from date of shipment by Sensidyne.

**THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT BEING LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE FOR A PARTICULAR PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED, AND CONSTITUTES THE ONLY WARRANTY OF SENSIDYNE WITH RESPECT TO GOODS SOLD OR DELIVERED.**

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## SECTION ONE: Preface

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### Proprietary Notice

The intended use of this manual is exclusive to owners of Gilian Gilibrator 3 Dry Cell Calibrator. The material within this manual is proprietary information and is to be used only to understand, operate, and service the instrument. By receiving this document, the recipient agrees that neither this document, the information disclosed within, nor any part thereof shall be reproduced or transferred, physically, electronically or in any other form or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by Sensidyne, LP.

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### Firmware/Software License

The firmware and the associated PC application software installed in or provided with the Gilibrator 3 Dry Cell Calibrator is the property of Sensidyne, LP and shall remain the property of Sensidyne, LP in perpetuity. The firmware/software is protected by U.S. and international copyright laws and is licensed for specific use with the Gilian Gilibrator 3 Dry Cell Calibrator. The user may NOT reverse-engineer, disassemble, decompile, or make any attempt to discover the source code of the firmware/software. The firmware/software may NOT be translated, copied, merged or modified in any way. The user may NOT sublicense, rent, or lease any portion of the firmware/software. The right to use the firmware/software terminates automatically if any part of this license is violated.

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# WARNINGS



**READ AND UNDERSTAND ALL WARNINGS AND INSTRUCTIONS BEFORE USE**

Failure to read, understand, and comply with **ALL** accompanying literature, instructions, 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 before operating this product. Ensure complete compliance with **ALL** applicable laws and regulations before and during the 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. **DO NOT** remove, cover, or alter any label or tag on this product, its accessories, or related products.

The Gilibrator 3 Dry Cell Calibrator is intended for both indoor and outdoor use. The unit is not waterproof. **NEVER** submerge the unit in water or draw liquids of any type into the unit. Pump failure, faulting or user injury may result.

**Do Not** operate this unit with corrosive gasses or gasses that condensate.

**Do Not** pressurize the calibrator.

**The Gilibrator 3 Dry Cell Calibrator is not intrinsically safe and should not be used in explosive atmospheres.** Refer to the Certifications and Approvals section for approval ratings.

**DO NOT** operate this product should it malfunction, require repair, or have a cracked or broken case or other visible or known damage. Operation of a malfunctioning product, or a product requiring repair may result in serious personal injury or death.

**DO NOT** operate with a dirty or blocked inlet filter or kinked tubing.

**DO NOT** attempt to repair or modify the instrument, except as specified in the *Operation and Service Manual*. If repair is needed, 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.

This product uses rechargeable Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries. **Always fully charge before use.** **DO NOT attempt to deeply discharge the internal battery pack. The internal LiFePO<sub>4</sub> battery pack should be drained to 25% prior to shipping.**

**DO NOT open the Gilibrator 3 Dry Cell Calibrator, charge or replace batteries in an explosive atmosphere.** Use only the charging cable provided for the Gilibrator 3 Dry Cell Calibrator as specified in the Parts List. Battery Pack is nominal 3.2V (3.6V max.). **Caution:** Both base and battery may become warm during charging.

**Gilibrator 3 batteries may only be replaced by an authorized Sensidyne Service Center.** LiFePO<sub>4</sub> batteries must be promptly disposed of in a manner that corresponds to local regulatory requirements for Lithium Batteries. Keep away from children. The battery used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above 140° F (60° C), or incinerate. Replace battery with Sensidyne Battery Pack (P/N 615-1703-01-R) only. Use of another battery may present a risk of fire or explosion.

**Do not disassemble or reconstruct battery pack.** The battery pack has safety functions and a protection circuit to avoid danger. If those have serious damage, the pack may generate heat, smoke, rupture, or burn.

**Do not short-circuit battery pack.** Do not connect the + and - terminals with metals (such as wire). Do not carry or store the battery pack with metal objects (such as wire, necklace, or hairpins). If the battery pack is short-circuited, excessive large current will flow and then heat generation, smoking, rupture, or burning will occur. In addition, it causes heat generation at metals.

**Do not incinerate or heat the battery pack.** These cause the melting of insulator, damage of gas release vent or safety function, or ignition of electrolyte. The above mentioned actions cause heat generation, smoking, rupture, or burning.

**Do not reverse-charge or reverse-connect.** The battery pack has polarity. In case the battery pack is not connected with charger or equipment smoothly, do not force them to connect, but do check polarity of battery pack. If the battery pack is connected to opposite polarity with charger, it will be reverse-charged and abnormal chemical reaction will occur. It causes heat generation, smoking, rupture, or burning.

If the Gilibrator 3 Dry Cell Calibrator comes into contact with a destructive substance(s) it is the responsibility of the user to take suitable precautions that prevent the unit from being adversely affected. Destructive substances include acidic liquids or gases that may attack metals, solvents that may affect polymeric materials, other solvents, or corrosives. Suitable precautions are regular checks as part of routine inspections and establishing from material data sheets that chemicals known to be present do not have an adverse effect on the material of the pump (polycarbonate, polyester, silicone, Buna-N, Neoprene, Stainless steel, brass and epoxy).

## Certifications, Approvals and Compliances

The Gilibrator® 3 is EN 61010-1, CE, RoHS and EMC compliant. The Gilibrator® 3 contains an internal battery which has been approved for shipping and transport per UN/DOT 38.3 and IEC 62133-2 (2<sup>nd</sup> Edition).

Examples of Product Labeling shown below:

### Base Unit and Dry Flow Cell Labels



### Battery Pack Labels

**Gilibrator®3 Battery Pack**  
**Rechargeable Li-ion**

**3.2V, 4200 mAh, 13.4Wh 1IFpR19/65-3**  
**Red= PWR Black=GND Yellow=NTC**

**⚠ CAUTION**  
 Risk of fire and burns. Do not open, crush, heat above 140°F(60°C) or dispose of in fire.

Manufactured by Sensidyne  
 St. Petersburg, FL 33716 USA  
 PART NUMBER: 615-1703-01-R





## SECTION TWO: Introduction

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### 2.1. Product Description

The Gilibrator 3 Dry Cell Calibration System is an easy to use Primary Standard for the calibration of air sampling equipment. The system includes a high accuracy, volumetric flow meter that provides quick air flow readings and cumulative averaging of multiple samples. Three Dry Cell Assemblies provide a wide range of flow rates and are easily interchangeable using the quick release system for mounting the Flow Cell to the Base.

Features of the Gilibrator 3 Dry Cell Calibration System include an easy-to-read color touch screen LCD display; multi-screen user interface with drop down menus and screen keyboard input capabilities; corrections for standard temperature and pressure; statistical analysis and confidence level percentages; ability to save and name individual calibration records; and the ability to preview and export calibration records in Bitmap and CSV formats. You can also specify the number of samples to be taken (3 to 20) for averaging.

Gilibrator 3 Dry Cell Calibration System Kits include a Dry Cell Assembly (Flow Cell), Control Unit Base (Base), Battery Charger, Tubing, Adapters, Fittings and Manual.

Interchangeable Flow Cell Assemblies are available as follows:

- Low Flow Dry Cell (5 to 450 cc/min)
- Standard Flow Dry Cell (50 to 5000 cc/min)
- High Flow Dry Cell (1 to 30 LPM)

The Gilibrator 3 offers +/- 1% accuracy across the full range of air flow at normal temperature and pressure (NTP). NTP is commonly used as a standard condition for testing and documentation of air flow. Normal Temperature and Pressure is defined as air at 20°C (293.15 K, 68°F), and 1 atm (101.325 kN/m<sup>2</sup>, 101.325 kPa, 14.7 psia, 0 psig, 29.92 in Hg, 407 in H<sub>2</sub>O, 760 torr), and density of 1.204 kg/m<sup>3</sup> (0.075 pounds per cubic foot). The temperature accuracy is typically +/- 0.3°C (Max= +/- 0.5°C). The pressure accuracy is typically +/- 1.8 in H<sub>2</sub>O (Max = +/- 3.75 in H<sub>2</sub>O).

The Gilibrator 3 has an operating temperature range of 10°C (50°F) to 40°C (104°F). Operating Time is approximately 3 hours at max flow rates per cell range, and up to 8 hours with low brightness at average flow ranges.

**Note: Temperatures extremes (Hot and Cold), and ambient pressure can impact the flow rate results perceived by all calibrators. The Gilibrator 3 calibrator is designed to compensate for changes in temperature and pressure. The specified accuracy is maintained while operating the device below 15°C (59°F), down to 100 cc/min.**

## 2.2. Theory of Operation

To be a primary standard, all values must be absolute and measured as absolute. A primary standard airflow measurement is a volume divided by a time interval as performed by the Control Unit of the Gilibrator 3 Dry Cell Calibration System. The volume (V) is measured volume of space between a pair of sensors. The time (t) is that interval needed for the puck to travel between the two sensors which bound the volume. Thus, the volume per unit of time (V/t) becomes the flow rate. Because the electronic clock is far more accurate than the volume measurements, the volume measurement accuracy determines the overall accuracy of the unit.

The Gilibrator 3 Dry Cell Calibration System consists of two elements, the Dry Flow Cell Assembly and the Control Unit Base. The function of the Flow Cell Assembly is to provide a means for measuring the puck traveling up a flow tube through a known volume of space.

Measurement of the travel time is done by means of a reflective sensor array mounted along the flow tube. The volume bound by these sensors is set accurately to a primary volume standard.

As the puck moves up the tube, the device records the time between a pair of sensors. Once a complete cycle has occurred, the time difference between the sensors becomes the elapsed travel time. This timing information (along with the volume information) is sent to the microprocessor in the Control Unit Base. The calculated flow and sample information are then displayed directly on the Liquid Crystal Display.

### 2.3. Gilibrator 3 Dry Cell Calibration Kit Descriptions

Kits are available in one cell, two cell and three cell configurations, with power cords in US, Euro and UK versions. A matrix chart for the available kits are provided below.

Kit Type	Gilibrator 3 Base	Dry Cell	Carrying Case
		<ul style="list-style-type: none"> <li>• Low Flow Dry Cell (5 to 450 cc/min)</li> <li>• Standard Flow Dry Cell (50 to 5000 cc/min)</li> <li>• High Flow Dry Cell (1 to 30 LPM)</li> </ul>	
Single Cell Base Pack	1	<p style="text-align: center;"><b>Choose 1 Dry Cell</b></p> <p style="text-align: center;">910-1708-US-R† Gilibrator 3 Low Flow Dry Cell            910-1709-US-R† Gilibrator 3 Standard Flow Dry Cell            910-1710-US-R† Gilibrator 3 High Flow Dry Cell</p>	No
Single Cell Kit	1	<p style="text-align: center;"><b>Choose 1 Dry Cell</b></p> <p style="text-align: center;">910-1702-US-R* Gilibrator 3 Low Flow Dry Cell            910-1703-US-R* Gilibrator 3 Standard Flow Dry Cell            910-1704-US-R* Gilibrator 3 High Flow Dry Cell</p>	Yes
Two Cell Kit	1	<p style="text-align: center;"><b>Choose 2 Dry Cell</b></p> <p style="text-align: center;">910-1705-US-R* Gilibrator 3 Low Flow and Standard Flow Dry Cell            910-1706-US-R* Gilibrator 3 Standard Flow and High Flow Dry Cell            910-1707-US-R* Gilibrator 3 Low Flow and High Flow Dry Cell</p>	Yes
Deluxe Kit	1	<p style="text-align: center;"><b>All Three Dry Cells</b></p> <p style="text-align: center;">910-1701-US-R* Gilibrator 3 Base and All Three Dry Cell Sizes</p>	Yes

† Base Packs are available with US, EU, UK, and No cords options for charging system. All Base Packs include control base, interchangeable dry cell, DC charger/AC power supply, and tubing. Carry case is NOT included.

\* Kits are available with US, EU, and UK cords for charging system. All kits include control base, interchangeable dry cell, DC charger/AC power supply, and tubing, in hard shell carry case.

## SECTION THREE: Set-Up

### 3.1. System Components

The Gilibrator 3 Dry Cell Calibration System (refer to Figure 3.1) contains a crystal-controlled microprocessor timing system. This type of microprocessor, used in conjunction with the built-in software, provides an extremely accurate method for calculating the flow rate parameters.

The Gilibrator 3 Dry Cell Calibration System contains the following components:

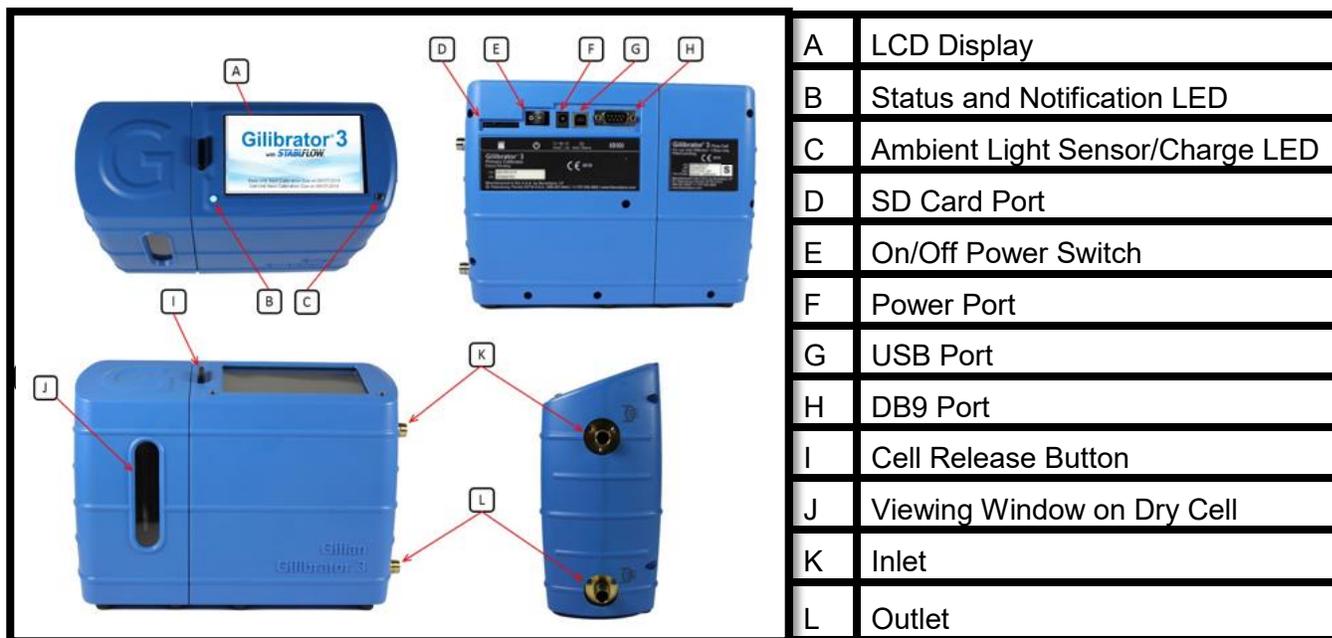


Figure 3.1

### 3.2. Base Unit Components

The **ON / OFF Power Switch**, located on backside of the unit, turns the Control Unit Base on and off. Once turned on, the Control Unit Base has an **LCD Display** screen that will illuminate and display the “Gilibrator 3” insignia, along with the Calibration Due dates for the base and the cell.

The Control Unit Base is powered by an internal LiFePO4 battery and whilst charging is powered from an external 12 volt, 5 amp AC adapter that connects to the **Power Port** on the backside of the unit (Adjacent Right of Power Switch). The Control Unit Base may also be slow charged through the provided USB Cable, via a 5 volt, 0.5 amp source.

**NOTE:** USB input power is limited to 500mA, regardless of the rating of the USB supply, which may be less than the power necessary to operate the Gilibrator-3. In this case, the battery will not charge because incoming power is going directly to running the Gilibrator-3. The battery may even discharge, however it will not discharge as quickly as if USB was not connected. For continuous operation, please connect the 12V power supply.

The **Status and Notification LED**, located adjacent to the lower left corner of the LCD Display, will display the following status codes:

- Solid Blue – Gilibrator-3 is on.
- Green – Firmware update pending or in progress.
- Blue-Red flash – Extremely low battery. Gilibrator-3 will shut itself off.

The **Charge Indicator LED and Ambient Light Sensor** is located adjacent to the lower right corner of the LCD Display. The LED indicates the status of battery charging. The sensor allows the LCD backlight to increase to full brightness when direct sunlight is detected. The LED will briefly be turned off as necessary to measure the ambient light level.

- Off – No power supply connected
- Red – Charging
- Green – Charged or trickle charging
- Alternating Red / Green – USB power insufficient to charge the battery while running.

Communications to your personal computer is achieved via a **USB Port**, located on backside of the unit. Calibration records may also be exported to a SD Card, located inside the **SD Card Port** (Adjacent Left of Power Switch).

The Gilibrator 3 Dry Cell Calibration System can be used with the Gilian GilAir Plus Pumps to perform SmartCal Calibrations. This is achieved by connecting the Control

Unit Base to the Gilian GilAir Plus docking stations using the provided cable inserted into the **DB9 Port** located on backside of the unit.

The **Cell Release Button** is located to the left of the LCD Display and protrudes upwards from the top of the base unit. Depressing this button will release the Flow Cell from the Base Unit. Additionally, depressing this button during a sample will reset the puck to the bottom position to start a new flow cycle.

The **Inlet Fitting** is located on the side of the base unit towards the top. The **inlet** is used for makeup air when calibrating a device in suction mode. An icon is located to the right of the inlet fitting depicting the fitting with three wavy arrows pointing into the fitting.

The **Outlet Fitting** is located on the side of the base unit towards the bottom. The **outlet** is used for when calibrating a device in suction mode. An icon is located to the right of the outlet fitting depicting the fitting with three wavy arrows pointing out from the fitting. See Figure 3.2.



**Figure 3.2**

### 3.3. Flow Cell Components

The Dry Flow Cell Assembly consists of a tube and puck flow measurement system. The puck is carried by airflow through the Dry Flow Cell. Flow rate is calculated based on the amount of time it takes the puck to travel between a pair of calibrated detectors.

White LED lights can be seen through the **Viewing Window on Dry Cell**. These lights will illuminate when connected to the base and the base is turned on. A solid green LED indicates the cell is in bootloading mode and is awaiting a firmware update. A solid blue LED indicated the cell is in normal operating mode.

Dry Flow Cell Assemblies come in three sizes:

- Low Flow Dry Cell (5 to 450 cc/min)
- Standard Flow Dry Cell (50 to 5000 cc/min)
- High Flow Dry Cell (1 to 30 LPM)



**Figure 3.3**

### 3.4. Preparation

The Gilibrator 3 Dry Cell Calibration System Kits include a Dry Cell Assembly (Flow Cell), Control Unit Base (Base), Battery Charger, Tubing, Adapters, Fittings and Manual.



**Figure 3.4**

The Gilibrator 3 Dry Cell Calibration System arrives assembled, and has interchangeable Flow Cells that connect into the base unit.



**Figure 3.5**

## IMPORTANT

Before proceeding, you **MUST** charge the battery to full capacity prior to using the calibrator. To charge the calibrator, plug the power supply into the Base Unit and the AC power cord into the power supply. Connect the AC power cord to mains supply. The supply can accept 100-240 VAC at 50 or 60 Hz.

Allow up to 3 hours for a complete charge. A red LED on the calibrator indicates charging in progress. A red LED turning off indicates the unit is fully charged.

### 3.5. System Set Up

This section describes the steps necessary to set up the Gilibrator 3 Dry Cell Calibration System. This includes initial setup, mounting the Flow Cell Assembly, connecting the tubing, and setting up the sampling source. Figure 3.6 shows how a complete Gilibrator 3 Dry Cell Calibration System may be configured.

Prior to setup make certain you have properly connected the battery charger to the power port on the backside of the Base Control Unit and to an appropriate AC wall outlet. If the charger/adaptor is properly connected, the Charge Indicator should light up. If you plan to use the Gilibrator 3 in the field, make certain the unit is fully charged before operating the unit. If you plan to use the unit in the lab/office (i.e., near an AC wall outlet), you can continue with setup and operation immediately.



Figure 3.6

The flow source must not be connected when unit is powered on. The base must acclimate to the ambient temperature prior to starting the airflow. A pop-up window will appear if the calibrator detects airflow prior to taking the ambient readings. It is recommended to allow your calibrator to acclimate to the environment for 2 hours prior to use.

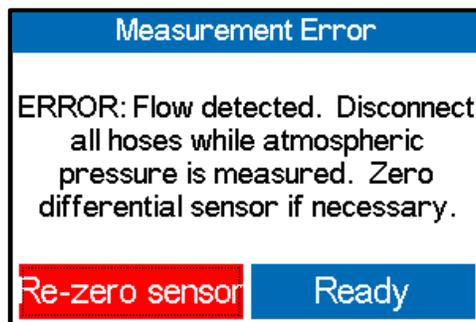


Figure 3.7

### 3.6. Connecting the Sampling Source

The sampling source to be calibrated should be connected to the lower hose barb. Tubing must be selected based on the flow range and fittings. The calibration base unit comes standard with a 3/8 inch (OD) fitting. Step-down adapters are provided with the kit, (1) 3/8" to 1/4" adapter, and (1) 1/4" to 1/8" adapter.

**Note: If sampling source will be used with a filter media, ensure that the media is placed in between the sampling source and the calibrator to account for backpressure. Failure to do so will alter the flow rates of sample.**

## SECTION FOUR: General Operation

---

### 4.1. Overview

The Gilibrator 3 Dry Cell Calibration System has the capability of reading and recording flow over the range of 5 cc/min to 30,000 cc/min (30 LPM) by use of three Dry Flow Cells (Low ranges: 5-450 cc/min, Standard: 50 – 5000 cc/min, and High: 1-30 LPM), that are selected based on the desired flow rate of the sampling source. The Gilibrator 3 contains a STP sensor that measures the ambient temperature and pressure and can correct sample flows to Standard conditions. Standard temperature and pressure can be set to desired values.

The calibrator may be set up to run in continuous mode or averaging mode. In averaging mode, the user may select the number of samples to be averaged, ranging from a 3 – 20 sample count. While averaging, the calibrator will provide a percent 2-sigma (95% confidence level) number that is  $2 \times \text{standard deviation} / \text{average} \times 100\%$  and lets the user evaluate the stability of the flow measurement in real-time. The user may select from a range between 0.5 – 5% for the threshold, so that the number is displayed GREEN if below, and RED if above.

When the base is powered down or when flow cells are disconnected, all air paths are bridged to allow free-flow of air from the inlet to the outlet and the puck is allowed to drop to the bottom of the cell. Once the base is powered-up, a cell is attached, and a flow source is present, the system will begin cycling and tuning the back-pressure that the pump sees. This process may take several cycles, depending on the flow conditions. Gravity affects the backpressure compensation and therefore the unit should be kept stable while making measurements. The cell calibration offset is also affected by gravity and therefore the unit should be kept within 5 degrees of vertical for measurements in the low range of the dry cells.

**WHEN THE FLOW SOURCE IS STOPPED OR DISCONNECTED, IT IS IMPORTANT TO MOMENTARILY PRESS THE “CELL RELEASE BUTTON” TO RESET THE FLOW CONTROL ELEMENTS IN THE BASE BEFORE THE FLOW IS RESTARTED.**

The flow measurement will always be displayed on the LCD for the user to make pump adjustments. Once the flow is stable, the user can press the “START” button to begin sampling data for the report and/or transmit data on the DB9 port. In AVERAGING mode, once all samples are collected, the SAVE button will be enabled to allow the user to save the report to internal memory. Reports can be exported from internal memory to an SD card in bitmap format for easy printing and CSV for importing in a spreadsheet application.

**Note: Do not have flow source running when unit is powered on. The base must acclimate to the ambient temperature prior to starting the airflow.**

## 4.2. Navigation

The Gilibrator 3 Calibrator uses an intuitive touchscreen LCD Display for menu navigation and operation.

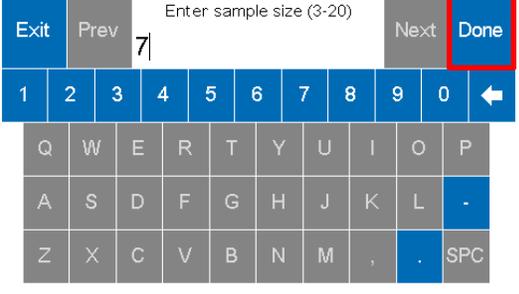
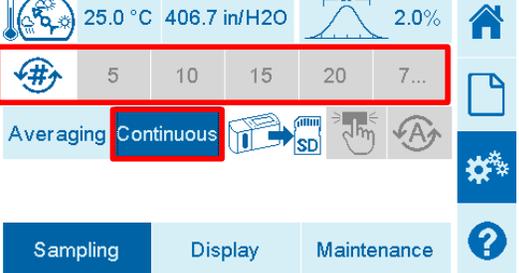
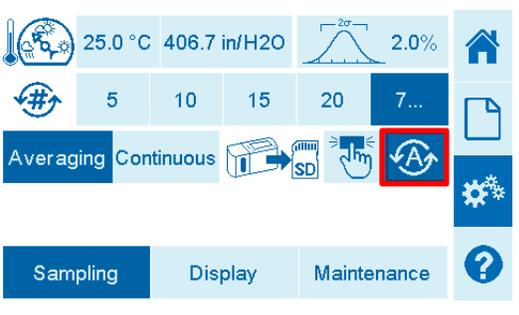
The menu bar is vertical and is located on the right edge of the screen. The menu bar tabs are summarized in the table below.

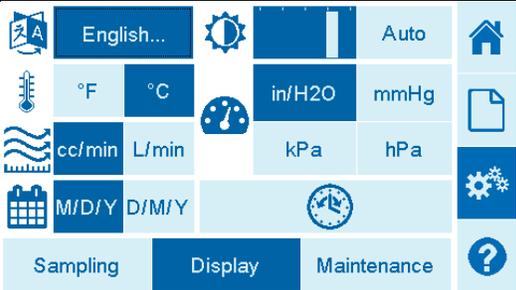
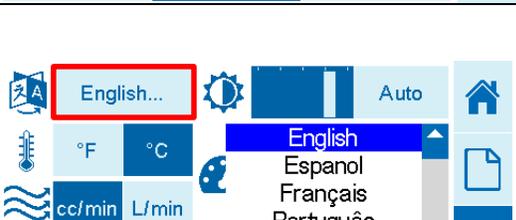
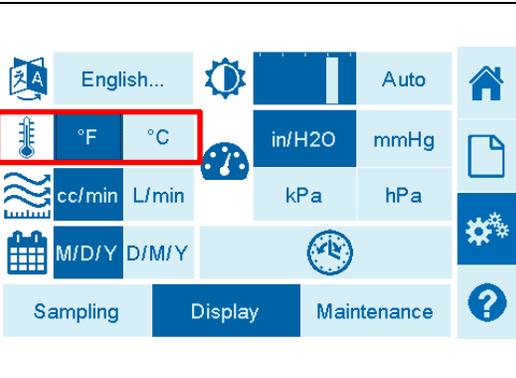
Symbol	Name	Tab Summary
	Home Screen	<b>Home Screen</b> displays: Time, Date, Sampling Mode, Live Flow Rate, Average Flow Rate, Sample Start Button, Sample Reset Button, Record Save Button, STP/Volume Button, Ambient Temperature, Ambient Pressure, Sample Count, Battery Life, and Flow Cell type with flow range.
	Reports Screen	<b>Reports Screen</b> displays: most recent calibration reports by date, allows for preview and export of reports, and for deletion of single or all reports.
	Settings Screen	<p><b>Settings Screen</b> toggles between three settings pages.</p> <ul style="list-style-type: none"> <li>• <b>Sampling</b> allows selection of Standard Temperature and Pressure (STP), Confidence Interval (2 Sigma), Sampling Mode, Sample Count Number, and SD Card Saving Mode.</li> <li>• <b>Display</b> allows for selection of Language, Brightness Control, Units of Measurement, Setting the Time &amp; Date, and Date Format.</li> <li>• <b>Maintenance</b> allows user to perform Battery Health Check, Filter Health Check, Leak Test, Zero Ambient Pressure Sensor, Upload New Firmware, Set Sleep Timer, Set Calibrator Communication Emulator, and Prepare to Ship.</li> </ul>
	Help Screen	<b>Help Screen</b> displays device information and Sensidyne Support Contact Information.

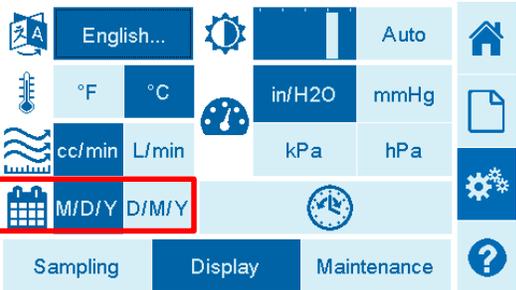
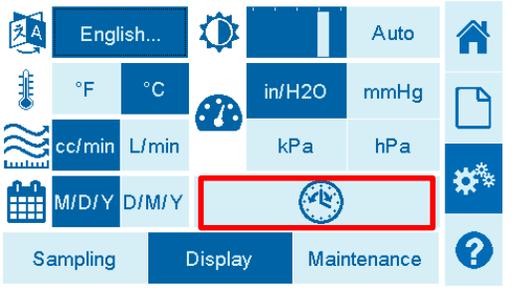
### 4.3. Setting Operational Functions

The operation of the calibrator is controlled by entering the settings menu tab and selecting the operational parameters that the user desires for sampling. The settings menu has submenus that allow control of related functions. A reference display outline appears in the following table.

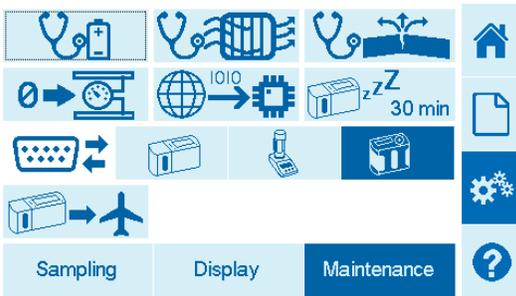
Display Image	Description
	<p><b>Settings Sampling Page</b> allows selection of Standard Temperature and Pressure (STP), Confidence Interval (2 Sigma), Sampling Mode, Sample Count Number, and SD Card Saving Mode.</p>
	<p>Selecting Reference Temperature and Pressure – Touch the <b>25.0 °C</b> button on the Screen adjacent to the STP icon. The Input Keyboard will appear.</p> <p><b>Note: User may change from °F to °C on Settings Display Page.</b></p> <p>Use keyboard to enter your reference temperature based on your local accepted preferences and touch the <b>Next</b> button.</p>
	<p>Use keyboard to enter your reference pressure based on your local accepted preferences and touch the <b>Done</b> button.</p> <p><b>Note: User may select units from four units of pressure: in/H<sub>2</sub>O mmHg, kPa, or hPa on Settings Display Page.</b></p>
	<p>Selecting Confidence Interval Sample Percentage – Touch the  button labeled, “2sigma (2.5%)”. A dropdown window will appear. Select a threshold from 0.5 – 5%. This threshold will be utilized until changed.</p> <p><b>Note: When averaging sample set, the statistical information will appear on the Home Screen just below the sample’s Average Flow Rate.</b></p>

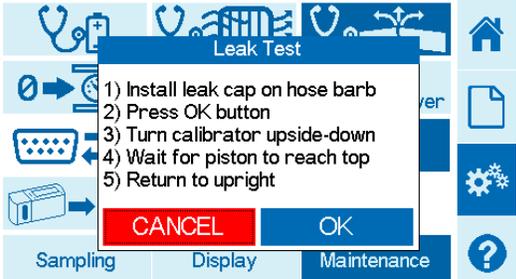
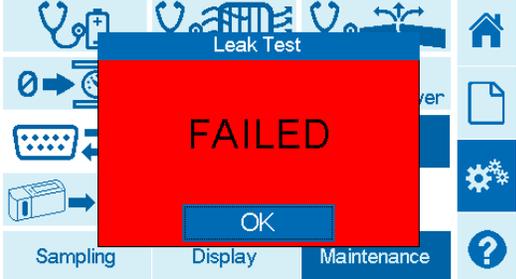
Display Image	Description
 <p>The screenshot shows the Home Screen with various data points and icons. A red box highlights the 'Averaging' and 'Continuous' buttons in the middle row.</p>	<p>Select Sampling Mode. Averaging Mode will allow the live flow rate to be averaged over a selected sample count.</p> <p>Continuous Mode will display the live flow readings without accumulating an average.</p> <p><b>Note: The Sample Mode is displayed on the top right corner of the Home Screen.</b></p>
 <p>The screenshot shows the Home Screen with the sample count buttons highlighted by a red box.</p>	<p>Sample Count displays the number of samples within an averaging set. Choose from one of four pre-selected values, or select <b>7...</b> to open a keyboard window and select a value from 3 to 20.</p>
 <p>The screenshot shows the sample size input screen with a numeric keypad and a 'Done' button highlighted by a red box.</p>	<p>Type the number, ranging from 3 – 20, of samples you wish to have averaged in your sample set. Touch the <b>Done</b> Button to complete this action</p>
 <p>The screenshot shows the Home Screen with the 'Continuous' button highlighted by a red box.</p>	<p><b>Note: The sample count buttons are not selectable in Continuous Mode.</b></p>
 <p>The screenshot shows the Home Screen with the SD Card Saving Mode icon highlighted by a red box.</p>	<p>Selecting SD Card Saving Mode – Touch the  button to select manual saving mode. This allows for viewing the report on the <b>Reports Page</b>, and manually selecting the record for export to the SD Card.</p> <p>Touch the  button to select the automatic save to SD Card mode. This mode will automatically save the bitmap report and excel file to the SD Card.</p>

Display Image	Description
	<p><b>Settings Display Page</b> allows selection of Language, Screen Brightness, Units of Measure (Temperature, Pressure and Flow Rate), Date Format, and Setting Time &amp; Date.</p>
	<p>Selecting Language – Touch the button adjacent the Language icon . A Drop Down window will appear with 10 languages to choose from. Select the language preference and the button will now change to the selected language.</p>
<ul style="list-style-type: none"> <li>• English</li> <li>• Spanish</li> <li>• French</li> <li>• Portuguese</li> <li>• German</li> </ul>	<ul style="list-style-type: none"> <li>• Dutch</li> <li>• Italian</li> <li>• Chinese</li> <li>• Polish</li> <li>• Turk</li> </ul>
	<p>Selecting Screen Brightness – Touch the slider along the graduated marks to manually adjust screen brightness. Furthest right is Brightest, and Furthest left is Dim.</p> <p>There is an <b>Auto Brightness</b> mode that will adjust the brightness to a minimum select level based on the optical sensor reading.</p> <p><b>Note: The optical sensor is located on the top of the instrument, adjacent the bottom right corner of the display screen.</b></p>
	<p>Selecting the Temperature Units – Touch the buttons adjacent the <b>Temperature</b> icon , to switch from degrees Fahrenheit (°F) to degrees Celsius (°C).</p> <p><b>Note: The temperature will be displayed in the select units on the Home Screen and corresponding records.</b></p>

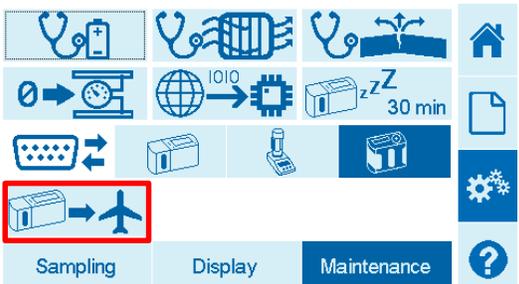
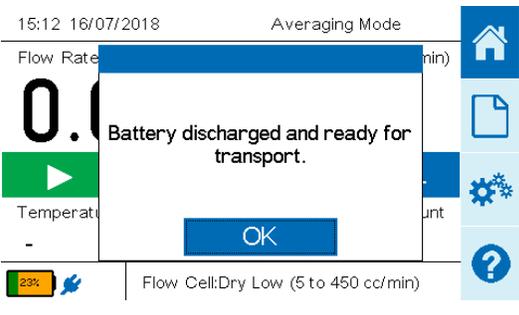
Display Image	Description
 <p>The screenshot shows the Home Screen with various settings. The 'Flow Rate Units' section has 'cc/min' and 'L/min' buttons highlighted with a red box. Other visible settings include Language (English...), Temperature (°F/°C), Ambient Pressure (in/H2O, mmHg, kPa, hPa), Date Format (M/D/Y, D/M/Y), and a bottom menu with 'Sampling', 'Display', and 'Maintenance' buttons.</p>	<p>Selecting the Flow Rate Units – Touch the buttons adjacent the <b>Air Flow</b> icon , to switch from cubic centimeters per minute (cc/min), recommended for <b>Low Flow Rate</b> sampling sources, to liters per minute (L/min), recommended for <b>High Flow Rate</b> sampling sources.</p> <p><b>Note: The Air Flow will be displayed in the select units on the Home Screen and corresponding records.</b></p>
 <p>The screenshot shows the Home Screen with the 'Ambient Pressure' section highlighted by a red box. It contains buttons for 'in/H2O', 'mmHg', 'kPa', and 'hPa'. Other settings like Language, Temperature, Flow Rate Units, Date Format, and the bottom menu are also visible.</p>	<p>Selecting the Ambient Pressure Units – Touch the buttons adjacent the <b>Pressure</b> icon , to select from four units of pressure; in/H<sub>2</sub>O, mmHg, kPa, or hPa.</p> <p><b>Note: The Ambient Pressure will be displayed in the select units on the Home Screen and corresponding records.</b></p>
 <p>The screenshot shows the Home Screen with the 'Date Format' section highlighted by a red box. It contains buttons for 'M/D/Y' and 'D/M/Y'. Other settings like Language, Temperature, Ambient Pressure, Flow Rate Units, and the bottom menu are also visible.</p>	<p>Selecting the Date Format – Touch the buttons adjacent the <b>Calendar</b> icon , to select from Month/Day/Year format (M/D/Y) or Day/Month/Year format (D/M/Y).</p> <p><b>Note: The Date will be displayed in the select format on the Home Screen and corresponding records.</b></p>
 <p>The screenshot shows the Home Screen with the 'Clock' icon highlighted by a red box. The icon is located in the bottom right area of the settings grid. Other settings like Language, Temperature, Ambient Pressure, Flow Rate Units, Date Format, and the bottom menu are also visible.</p>	<p>Setting the Time and Date – Touch the button with the <b>Clock</b> icon , to program in your local time and date. A keyboard window will appear.</p>

Display Image	Description
	<p>Step 1: Enter the Hour (0-23). Touch “Next” button.</p>
	<p>Step 2: Enter the Minute (0-59). Touch “Next” button.</p>
	<p>Step 3: Enter the Month (0-12). Touch “Next” button.</p>
	<p>Step 4: Enter the Day (1-31). Touch “Next” button.</p>
	<p>Step 5: Enter the Year (17-99). Touch “Done” button.</p> <p><b>Note: The Date will be displayed in the select format on the Home Screen and corresponding records.</b></p>

Display Image	Description
	<p><b>Settings Maintenance Page</b> allows user to perform Battery Health Check, Filter Health Check, Leak Test, Zero Ambient Pressure Sensor, Upload New Firmware, Set Sleep Timer, Set Calibrator Communication Emulator, and Prepare to Ship (Drain Battery).</p>
	<p>Assess <b>Battery Health</b> – Touch the button with the <b>Battery Health</b> icon , a Battery Health Update window will appear. Connect the 12 V charger to the calibrator and touch the OK button to initiate the test. This may take up to 5 hours, do not unplug or turn off the unit while test is in progress.</p> <p>A Please Wait.... window will appear while the test is in progress. The unit will need to fully discharge to complete the test.</p> <p><b>Note: This test is best performed overnight while the unit is not in use.</b></p>
	<p>Assess <b>Filter Health</b> – Touch the button with the <b>Filter Health</b> icon , a Filter Health Update window will appear. Connect a 5 L/min flow source to the calibrator and touch the OK button to initiate the test. This will take approximately 5 seconds.</p> <p>A Please Wait.... window will appear while the test is in progress.</p> <p><b>Note: A Flow Cell Must be connected to the base during the test.</b></p> <p>The filter health information is displayed on the on the <b>Help and Information Screen</b> .</p>

Display Image	Description
 <p>The main menu screen shows various icons for different functions. The 'Leak Test' icon, which depicts a syringe and a piston, is highlighted with a red rectangular box. Below the icons are three tabs: 'Sampling', 'Display', and 'Maintenance', with 'Maintenance' currently selected. A home button and a help button are also visible on the right side.</p>	<p>Perform <b>Leak Test</b> – Touch the button with the <b>Leak Test</b> icon .</p>
 <p>The 'Leak Test' instruction window is displayed over the main menu. It contains a list of five numbered steps: 1) Install leak cap on hose barb, 2) Press OK button, 3) Turn calibrator upside-down, 4) Wait for piston to reach top, and 5) Return to upright. At the bottom of the window are two buttons: 'CANCEL' (in a red box) and 'OK' (in a blue box).</p>	<p>A <b>Leak Test</b> instruction window will appear.</p> <ul style="list-style-type: none"> <li>• Install leak caps on inlet and outlet port hose barbs.</li> <li>• Press the OK button.</li> <li>• Turn the calibrator upside down.</li> <li>• Wait for the piston inside of the flow cell to fall completely (reach the top of the flow cell while upside down).</li> <li>• Return the unit to upright position and place on a flat surface.</li> </ul>
 <p>The 'Leak Test' window now displays a large green background with the word 'PASSED' in white capital letters. An 'OK' button is centered at the bottom of the window.</p>	<p>The unit will take several seconds to read the natural rate of descent of the piston.</p>
 <p>The 'Leak Test' window now displays a large red background with the word 'FAILED' in white capital letters. An 'OK' button is centered at the bottom of the window.</p>	<p>Upon completion of the reading the unit will display a Pass or Fail window.</p>
 <p>The main menu screen is shown again, but now the 'Zero Differential Pressure' icon, which depicts a pressure gauge, is highlighted with a red rectangular box. The 'Maintenance' tab is still selected.</p>	<p>Zero Differential Pressure Sensors – Touch the button with the <b>Zero Differential Pressure</b> icon .</p>

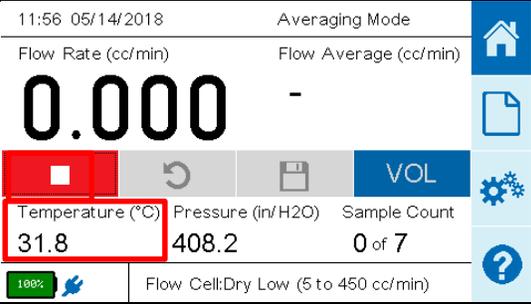
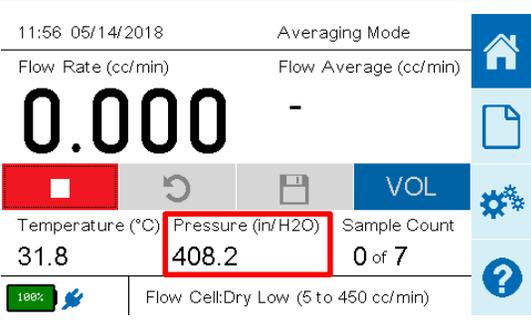
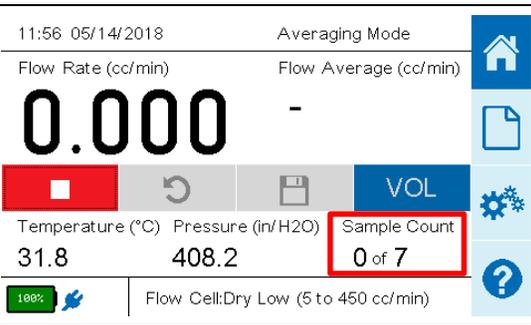
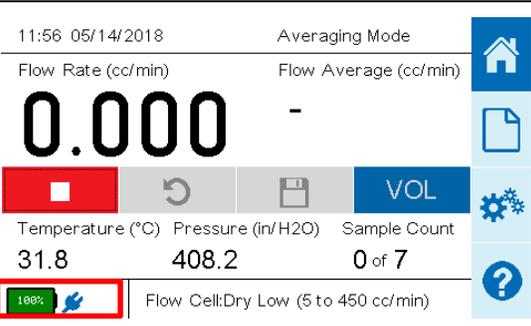
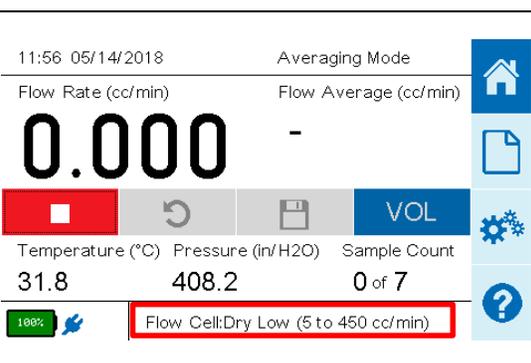
Display Image	Description
	<p>A <b>Zero Differential Pressure</b> instruction window will appear.</p> <ul style="list-style-type: none"> <li>Remove hoses or caps on inlet and outlet port hose barb.</li> <li>Press Ok button.</li> </ul>
	<p>Updating Firmware – Touch the button with the <b>Firmware Update</b> icon .</p>
	<p>A <b>Firmware Update</b> instruction window will appear.</p> <ul style="list-style-type: none"> <li>Press OK button to begin update.</li> <li>Do not turn off unit until the update is complete.</li> </ul>
	<p>Set Sleep Timer - Touch the button with the <b>Sleep Timer</b> icon .</p>
	<p>A Drop Down window will appear with five choices of Sleep Times to choose from. Select the time or Never preference and the button will now change to the selected Sleep Time.</p> <p><b>Note: To awaken the unit, switch the On/Off Switch to the Off position, and then back to the On position.</b></p>

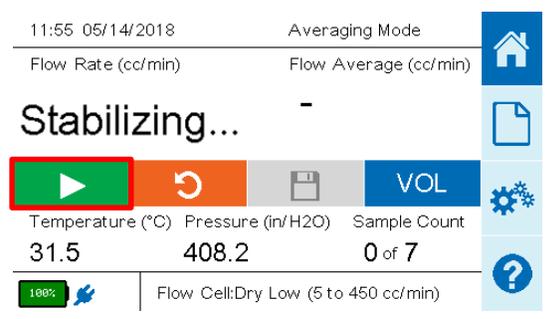
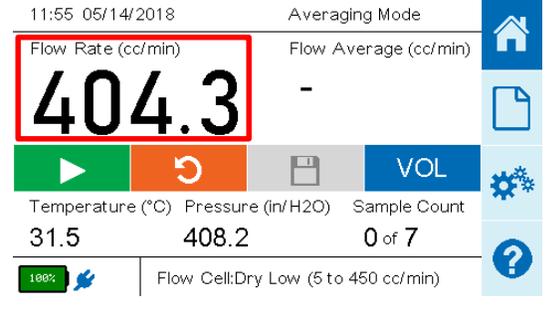
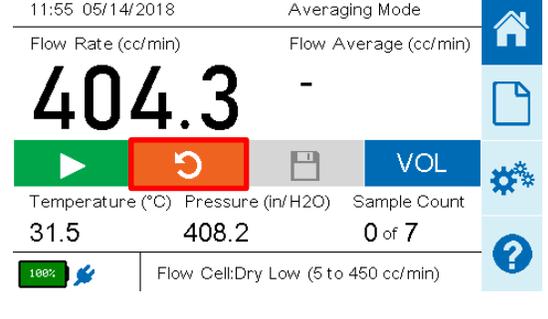
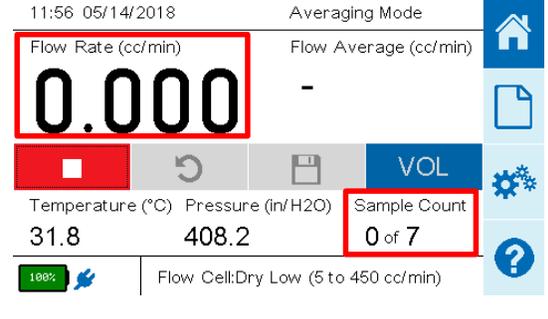
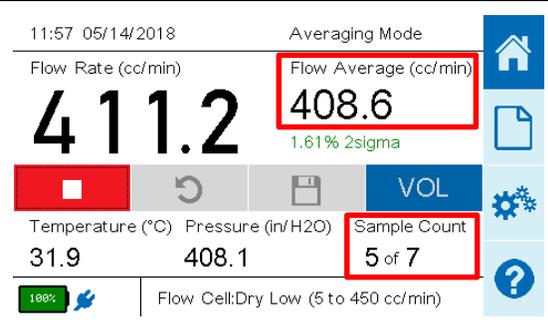
Display Image	Description
 <p>The screenshot shows the main menu with various icons. The icon representing the Communication Format (a battery with a double-headed arrow) is highlighted with a red rectangular box. Below the icons are three buttons: 'Sampling', 'Display', and 'Maintenance'. A question mark icon is visible on the right side of the menu.</p>	<p>Selecting the Communication Format – Touch the buttons adjacent the <b>Communication Format</b> icon , to select from three calibrator units communication types; Gilibrator® 3, Gilibrator® 2, or Defender.</p> <p><b>Note: The communication format must be aligned with the SmartCal format on the GilAir Plus Pump</b></p>
 <p>The screenshot shows the main menu with the 'Ship Gilibrator' icon (a battery with an airplane) highlighted with a red rectangular box. The 'Maintenance' button is now highlighted in blue.</p>	<p>Prepare To Ship – Touch the button with the <b>Ship Gilibrator</b> icon .</p>
 <p>The screenshot shows a dialog box titled 'Prepare to ship?'. The text inside reads: 'Disconnect USB and 12V plug. Battery will be drained to 25% to comply with transportation regulations. This may take a few hours.' There are two buttons at the bottom: 'CANCEL' (in red) and 'OK' (in blue).</p>	<p>A <b>Prepare to ship</b> instruction window will appear.</p> <ul style="list-style-type: none"> <li>• Disconnect USB Cables.</li> <li>• Disconnect Power Source (12 VDC Plug).</li> <li>• Press Ok button.</li> </ul> <p>The unit will self-discharge the battery until it reaches 25%.</p>
 <p>The screenshot shows a message box with the text: 'Battery discharged and ready for transport.' Below the message is an 'OK' button. The background shows the main menu with a flow rate of 0.1 and a battery level indicator at 23%.</p>	<p>Upon completion, an instruction window will appear.</p> <ul style="list-style-type: none"> <li>• Press OK button.</li> <li>• Turn Gilibrator off.</li> <li>• Package appropriately for transport.</li> </ul> <p><b>Note: Once discharged, do not plug unit back into power source. You may select the Cancel button at any time and plug in your unit to recharge back to full power.</b></p>

### 4.4. Home Screen Displays and Operation Features

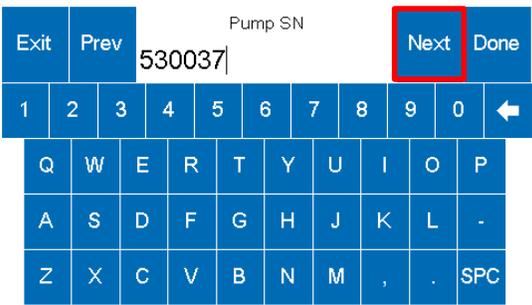
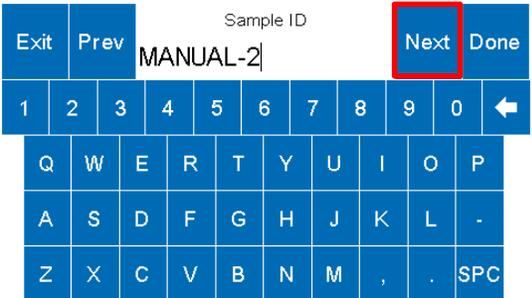
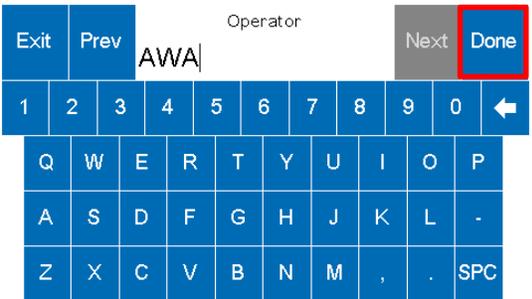
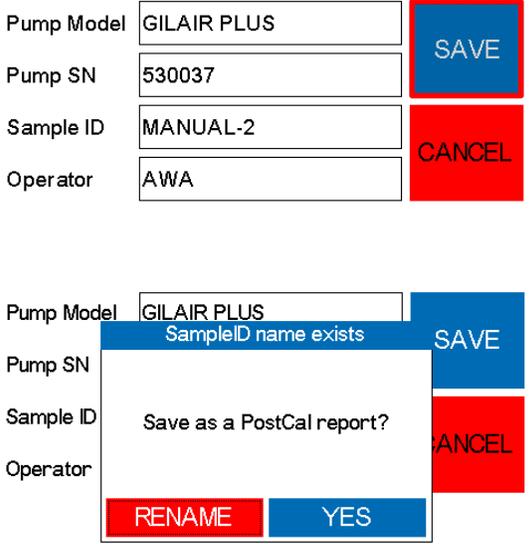
The Home Screen will adjust based on the user settings selected. The Home Screen displays; Time, Date, Sampling Mode, Live Flow Rate, Average Flow Rate, Sample Start Button, Sample Reset Button, Record Save Button, STP/Volume Button, Ambient Temperature, Ambient Pressure, Sample Count, Battery Life, and Flow Cell type with flow range. A Home Screen reference display is outlined in the following table.

Display Image	Description
	<p>The flow source must not be connected when unit is powered on. The base must acclimate to the ambient temperature prior to starting the airflow. A pop-up window will appear if the calibrator detects airflow prior to taking the ambient readings.</p> <p><b>Note: It is recommended to allow your calibrator to acclimate to the environment for 2 hours prior to use.</b></p>
	<p>Home Screen – Time and Date is displayed in the top left corner of the Home Screen.</p> <p>The time and date can be edited on the Settings Display page.</p> <p>Home Screen – Sampling Mode is displayed on the top right corner of the Home Screen.</p> <p>Averaging Mode or Continuous Mode is selected on the Settings Sampling page.</p>
	<p>Home Screen – Calculation Model. This feature allows the user to select between a simple volumetric calculation, and an adjusted calculation based upon the ambient pressure and temperature as related to the user’s selected reference temperature and pressure.</p> <p>Touch the button labeled, “VOL” to change the calculation model to adjust for ambient Temperature and Pressure, “STP”.</p>
	<p>Touch the button labeled, “STP” to change the calculation model back to volumetric only, “VOL”.</p> <p><b>Note: The Flow Rate units will change to scc/min or sL/min when the calibrator is in STP Mode.</b></p>

Display Image	Description
 <p>11:56 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) 0.000 - Temperature (°C) Pressure (in/H2O) Sample Count 31.8 408.2 0 of 7 100% Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen – Temperature is displayed in degrees Celsius or Fahrenheit.</p> <p>The Temperature units can be edited on the Settings Display page.</p>
 <p>11:56 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) 0.000 - Temperature (°C) Pressure (in/H2O) Sample Count 31.8 408.2 0 of 7 100% Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen – The Ambient Pressure is displayed in in/H<sub>2</sub>O, mmHg, kPa, or hPa.</p> <p>The Pressure units can be edited on the Settings Display page.</p>
 <p>11:56 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) 0.000 - Temperature (°C) Pressure (in/H2O) Sample Count 31.8 408.2 0 of 7 100% Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen – Sample Count displays the number of samples within an averaging set.</p> <p><b>Note: The sample count window does not appear in Continuous Mode.</b></p>
 <p>11:56 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) 0.000 - Temperature (°C) Pressure (in/H2O) Sample Count 31.8 408.2 0 of 7 100% Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen – Battery Life is displayed in the bottom left corner of the Home Screen. The battery time shows the percentage of charge remaining.</p> <p>When the battery is full and the charging source is plugged-in, it will read 100%. The time estimates are based on the last 30 seconds of power usage and the current battery level.</p>
 <p>11:56 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) 0.000 - Temperature (°C) Pressure (in/H2O) Sample Count 31.8 408.2 0 of 7 100% Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen – Flow Cell Information is displayed in the bottom right corner of the Home Screen. The base will recognize the flow cell attached and provide the Flow Cell type and the flow rate range for the cell attached.</p>

Display Image	Description
 <p>11:55 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) <b>Stabilizing...</b> Temperature (°C) Pressure (in/H2O) Sample Count 31.5 408.2 0 of 7 Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>To Start a Sample Set - Connect the flow source to the calibrator and touch the button with the Play icon , to begin the averaging sample count data set.</p> <p><b>Note: The Gilibrator may take several cycles to stabilize.</b></p>
 <p>11:55 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) <b>404.3</b> Temperature (°C) Pressure (in/H2O) Sample Count 31.5 408.2 0 of 7 Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen –Flow Rate displays the live flow rate measurement from the Flow Cell.</p>
 <p>11:55 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) <b>404.3</b> Temperature (°C) Pressure (in/H2O) Sample Count 31.5 408.2 0 of 7 Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Reset Sample Set - Touch the window labeled, “” to reset the averaging sample count data set.</p>
 <p>11:56 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) <b>0.000</b> Temperature (°C) Pressure (in/H2O) Sample Count 31.8 408.2 0 of 7 Flow Cell: Dry Low (5 to 450 cc/min)</p>	
 <p>11:57 05/14/2018 Averaging Mode Flow Rate (cc/min) Flow Average (cc/min) <b>411.2</b> <b>408.6</b> 1.61% 2sigma Temperature (°C) Pressure (in/H2O) Sample Count 31.9 408.1 5 of 7 Flow Cell: Dry Low (5 to 450 cc/min)</p>	<p>Home Screen –Flow Average displays the running flow rate average for the sample set being recorded.</p> <p><b>Note: The Flow Average will stop averaging once the Sample Count reaches the designated number of samples.</b></p>

Display Image	Description
	<p>Home Screen – Statistical information is displayed during the averaging sample set. The statistical percentage font will turn red if the percent difference between individual samples is outside the designated range.</p>
	<p>Home Screen – Save Record Button. The save record button will become highlighted when the number of individual samples has reached the designated sample count.</p> <p>Touch the button with the disk icon  to begin input of the record detail.</p>
	<p>Recently Used Pump Screen – This screen will populate with recently used pump information.</p> <p>If unpopulated or the flow source name is not present, touch the button labeled, “Skip” to continue to input the record detail.</p> <p>If populated and your flow source is named, touch the field with the desired flow source, and the input detail will become pre-populated with that pumps model and serial number.</p>
	<p>Record Input Screen – The record detail contains four fields; Pump Model, Pump Serial Number (SN), Sample Identification (ID), and Operator.</p> <p>Touch the field adjacent to the label “Pump Model” to continue to input the record detail. A keyboard will appear.</p>
	<p>Pump Model Input Keyboard – Enter in the Pump or Flow Source Model. Touch the button labeled, “Next” to advance to the Pump Serial Number keyboard.</p>

Display Image	Description
	<p>Pump Serial Number Keyboard - Enter in the Pump or Flow Source Serial Number. Touch the button labeled, “Next” to advance to the Sample ID keyboard.</p>
	<p>Sample ID Keyboard - Enter in the unique sample identification. Touch the button labeled, “Next” to advance to the Operator ID keyboard.</p>
	<p>Pump Operator ID Keyboard - Enter in the operator information. Touch the button labeled, “Done” to complete the record detail.</p>
	<p>Record Input Screen – Review the record detail information. If correct, touch the “Save” window.</p> <p><b>Note: If Automatic Save to SD Card Mode is turned on, the file will save to SD Card. If file name already exists, a window will appear asking if the sample set should be saved as a PostCal report?</b></p>

## 4.5. Reports and Data Storage

The Reports Screen will update once you have saved your record. The Report Screen displays the most recent calibration reports by date, allows for preview and export of reports, and for deletion of single or all reports.

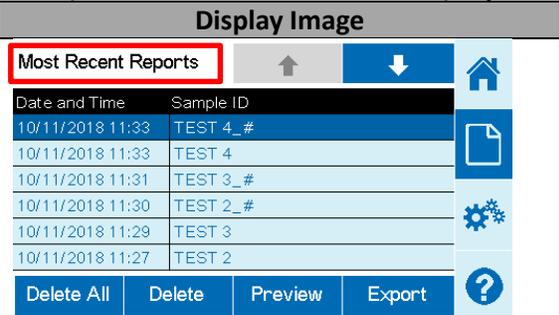
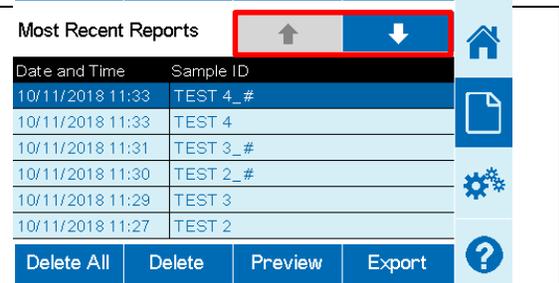
Reports are stored in internal memory in a native format. If the user changes measurement units after the report is saved and previews or exports the record again, the data will be shown with the new unit settings.

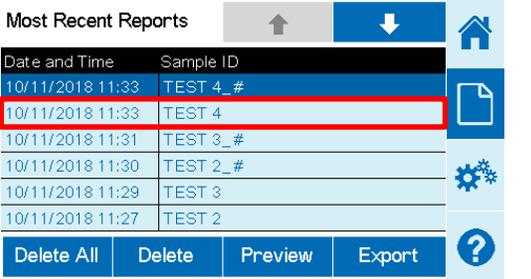
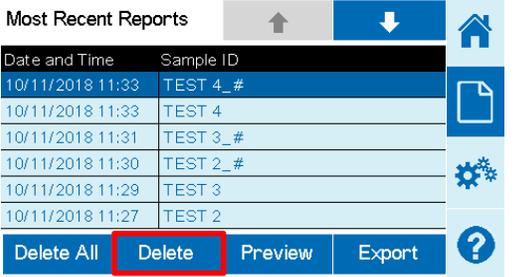
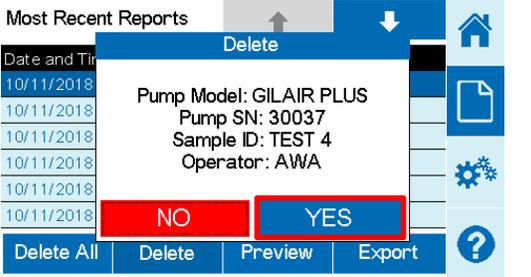
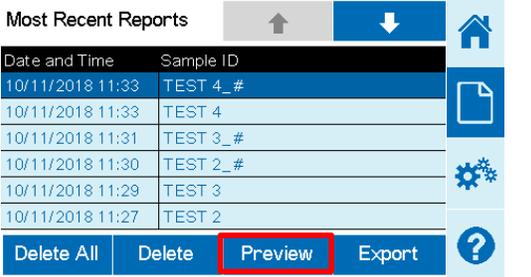
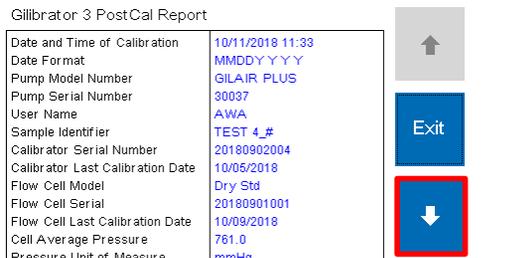
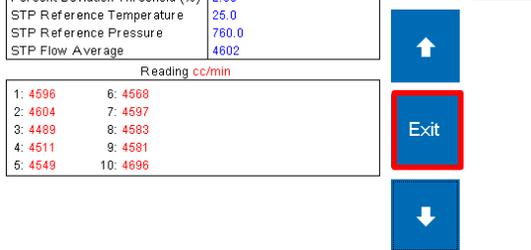
If an existing sample ID is found in the internal memory when the SAVE button is pressed, the user is prompted to save this record as a post-cal linked to the first record denoted with a `_#` behind the sample ID in the reports table (ex. Sample ID`_#`).

When a record is exported to the SD card, the folder REPORTS is created if it does not exist. A folder with the sample ID name is created inside it, and the CSV and BMP files are saved with the sample ID as a file name (ex: D:\REPORTS\Test 1\Test 1.bmp and D:\REPORTS\Test 1\Test 1.csv). If a post-cal record is created and exported to the SD card, the files will also appear in the same sub-folder. The post-cal files will be denoted with a `_#` behind the sample ID (ex: D:\REPORTS\Test 1\Test 1`_#`.bmp and D:\REPORTS\Test 1\Test 1`_#`.csv).

If a linked post-cal record is deleted, a new post-cal record should be saved before exporting. If the pre-cal record is deleted, the user must delete the post-cal record as well. If the SD card already contains an exported record with the same sample ID, a window will appear asking, Overwrite existing file? The user must confirm to overwrite it. If the user attempts to save a record to internal memory that already has 100 records, the new record will not be saved. When the memory is full. One or more records must be deleted prior to saving the new record.

A Reports Screen reference display is outlined in the following table.

Display Image	Description
	<p>Most Recent Reports Screen. Report Screen displays the most recent calibration reports. The reports are sorted by Date and Time, with the most recent at the top of the list.</p> <p><b>Note: The PostCal Reports are denoted with the <code>_#</code> after the sample ID.</b></p>
	<p>Page Up and Page Down arrows will become highlighted when seven or more records have been stored.</p> <p><b>Note: The Base Control Unit will store up to 100 reports in the active memory.</b></p>

Display Image	Description
	<p>Lines of reports are displayed and sorted by Date &amp; Time, and Sample ID.</p> <p>Touch the line of report to access options to delete, preview, or export.</p>
	<p>Delete Single record – with the report line highlighted, touch the “Delete” button on the display screen.</p>
	<p>Delete record window appears. Touch the “YES” button to delete the single report.</p>
	<p>Preview a Report - With the report line highlighted, touch the button on the Most Recent Reports Screen labeled, “Preview”.</p>
	<p>Report Preview Screen (Top Half) – Touch the down arrow button on the display screen to view remainder of report.</p>
	<p>Report Preview Screen (Bottom Half) – Touch the up arrow button to view the top half of report, or touch “Exit” button to return to the recent reports page.</p>

Display Image	Description														
<p>The screenshot shows the 'Most Recent Reports' screen with a table of reports. The 'Export' button at the bottom right is highlighted with a red box.</p> <table border="1"> <thead> <tr> <th>Date and Time</th> <th>Sample ID</th> </tr> </thead> <tbody> <tr><td>10/11/2018 11:33</td><td>TEST 4_#</td></tr> <tr><td>10/11/2018 11:33</td><td>TEST 4</td></tr> <tr><td>10/11/2018 11:31</td><td>TEST 3_#</td></tr> <tr><td>10/11/2018 11:30</td><td>TEST 2_#</td></tr> <tr><td>10/11/2018 11:29</td><td>TEST 3</td></tr> <tr><td>10/11/2018 11:27</td><td>TEST 2</td></tr> </tbody> </table>	Date and Time	Sample ID	10/11/2018 11:33	TEST 4_#	10/11/2018 11:33	TEST 4	10/11/2018 11:31	TEST 3_#	10/11/2018 11:30	TEST 2_#	10/11/2018 11:29	TEST 3	10/11/2018 11:27	TEST 2	<p>Touch the box on the Display Screen labeled, “Export” to upload the reports to a SD Card.</p> <p><b>Note: Ensure that the SD Card is properly inserted prior to exporting data.</b></p>
Date and Time	Sample ID														
10/11/2018 11:33	TEST 4_#														
10/11/2018 11:33	TEST 4														
10/11/2018 11:31	TEST 3_#														
10/11/2018 11:30	TEST 2_#														
10/11/2018 11:29	TEST 3														
10/11/2018 11:27	TEST 2														
<p>The screenshot shows a dialog box titled 'Overwrite existing file?' with a red box around the 'OVERWRITE' button.</p>	<p>Exporting to SD Card - A “Please Wait...” window will appear during data transfer. Do not remove the SD card until transfer is complete. If the file already exists on the SD Card, a window will appear asking, “Overwrite Existing File”? Touch the OVERWRITE button to save the current file to the SD Card.</p> <p><b>Note: The each report is transferred in both .BMP and .CSV formats.</b></p>														
<p>The screenshot shows the 'Most Recent Reports' screen with a red box around the 'Delete All' button.</p>	<p>Deleting All Reports – To delete all reports, touch the button on the Display Screen labeled, “Delete All”.</p>														
<p>The screenshot shows a dialog box titled 'Delete All' with a red box around the 'YES' button.</p>	<p>The “Deleting All Calibration Records” window will appear. Touch the “Yes” button to delete all reports.</p>														

### 4.6. Help and Information

The Help Screen displays device information and Sensidyne Support Contact Information. A Help Screen reference display is outlined in the following table.

Display Image			Description																								
<table border="1"> <thead> <tr> <th></th> <th>Base</th> <th>Flow Cell</th> </tr> </thead> <tbody> <tr> <td>Serial Number</td> <td>20180902004</td> <td>20180901001</td> </tr> <tr> <td>Last Calibration</td> <td>10/05/2018</td> <td>10/09/2018</td> </tr> <tr> <td>Calibration Due</td> <td>10/05/2019</td> <td>10/09/2019</td> </tr> <tr> <td>Cycle Count</td> <td>004355</td> <td>001894</td> </tr> <tr> <td>Firmware Version</td> <td>V1.1 R1473</td> <td>V1.1 R1455</td> </tr> <tr> <td>Battery Health</td> <td>4415/4350(100%)</td> <td>10/05/2018</td> </tr> <tr> <td>Filter Health</td> <td>0.4/0.4(100%)</td> <td>10/09/2018</td> </tr> </tbody> </table> <p>For help or service on any Sensidyne product, please contact us on our website or via phone 800-451-9444/+1 727-530-3602 info@sensidyne.com</p>		Base	Flow Cell	Serial Number	20180902004	20180901001	Last Calibration	10/05/2018	10/09/2018	Calibration Due	10/05/2019	10/09/2019	Cycle Count	004355	001894	Firmware Version	V1.1 R1473	V1.1 R1455	Battery Health	4415/4350(100%)	10/05/2018	Filter Health	0.4/0.4(100%)	10/09/2018	   	<p>Help Screen – Displays Serial Number, Last Calibration, Calibration Due Date, Cycle Count and Firmware Version Battery Health, Filter Health, and Contact information for Sensidyne.</p> <p><b>Note: The Help Screen will display the information for both the Base and the Flow Cell attached.</b></p>	
	Base	Flow Cell																									
Serial Number	20180902004	20180901001																									
Last Calibration	10/05/2018	10/09/2018																									
Calibration Due	10/05/2019	10/09/2019																									
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	Base	Flow Cell																									
Serial Number	20180902004	20180901001																									
Last Calibration	10/05/2018	10/09/2018																									
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Battery Health	4415/4350(100%)	10/05/2018																									
Filter Health	0.4/0.4(100%)	10/09/2018																									

### 4.7. SmartCal

The Gilibrator 3 includes a DB9 port for use with the SmartCal function of the Gilian GilAir Plus pumps, by using the accessory cable P/N 780-0015-05-R (Not Included) attached to the pump docking station. It can also be used to record live data from the unit by attaching it to a null model cable and using a terminal program like PuTTY.

The DB9 is a standard RS232 port and sends data in the familiar Gilibrator2 format at 2400baud, 8N1. A header is sent on cell reset/connection and it is followed by flow data only after the user presses the “START” button. In AVERAGING mode, data is only sent after all the samples have been acquired. In CONTINUOUS mode, the data is sent after every sample.

In order to use SmartCal, the flow units need to be set to cc/min in the Gilibrator. The CONTINUOUS mode should also be selected. On the GilAir Plus, select Gilibrator mode for SmartCal under the setup menu. Plumb the pump to the Gilibrator with your sample, plug in the cable, set the pump in the dock position closest to the cables, set the flow rate, and start the calibration process. The pump will turn on and the Gilibrator3 will begin cycling. Allow several cycles for the system to stabilize and press the “START” button on the Gilibrator.

As measurements are sent to the pump, it will display the latest flow measurement on the screen. The Gilibrator 3 screen will show the measurement once the puck is moving up, so it may look delayed from the display of the pump. Allow the system to run until the calibration process is done and press the “STOP” button on the Gilibrator.

## 4.8. Maintenance

The Gilibrator 3 is designed so that little maintenance is required. However, annual calibration, cleaning, replacement of the battery pack and replacement of the filter element may be required to ensure years of trouble-free operation.

**Gilibrator 3 Maintenance may only be performed by an authorized Sensidyne Service Center.** All electronic and battery components must be disposed of in a manner that corresponds to local regulatory requirements.

## 4.9. Short-Term Storage

Turn off the Control Unit, the sampling source, and any attached output devices (if applicable). If the unit is not to be used daily, remove the sampling source connection from the fittings. Place black caps on both inlet and outlet fittings while not in use. Plug in the battery charger and connect it to the Base Control Unit Power Port. Recharge the unit (3 hours) for next day usage.

## 4.10. Long-Term Storage

If the Gilibrator 3 is not to be used for long periods of time, use the following procedures to keep the unit in proper working order.

1. Disconnect all cables from the Base Control Unit.
2. Place black caps on both inlet and outlet fittings of Base Control Unit.
3. Place black caps on both inlet and outlet ports of un-connected Dry Flow Cell.
4. Store units indoors (Storage Temperature 0-70°C/ 32-158°F)
5. Recharge the unit (3 hours) prior to next usage.

## 4.11. Battery Charging and Capacity

The battery system in the Gilibrator 3 takes advantage of a new lithium chemistry known as LiFePO<sub>4</sub>. This battery pack is much safer than other lithium chemistries and provides a long service life. Unlike traditional NiMH battery packs and much like a laptop or a cell phone, the battery capacity measurement is done with a fuel gauge. Therefore it may need to be reset periodically. If the unit was fully charged, unplugged, and powered-up, it may not show 99%. To reset the fuel gauge, simply plug the charger back in while the unit is on and wait for it to indicate that the battery is full; the battery capacity will be reset to 100% automatically.

The battery run time is strongly affected by the flowrate, as actuating the valve consumes the most energy. The LCD backlight is another variable power consumer, so if more run time is needed, the user should lower the backlight level.

## 4.12. Troubleshooting

If the system firmware freezes up, turn off the Control Base Unit and the system will power down in 6 seconds.

If the overpressure/stuck puck or overflow messages pop up frequently when starting the flow source, the user may have forgotten to reset the cell between stopping and starting the flow source. Simply press the “Cell Release Button” momentarily to reset the system.

The overflow error is tripped at 110% of the maximum flow range of the cell.

The “valve stuck” error is tripped if the valve inside the base unit cannot get in position within a certain amount of time. This can happen if the internal pressure drops below - 25” H<sub>2</sub>O, which is possible with high flow-rates on the outlet port and additional flow restrictions to the inlet port.

If the puck becomes stuck inside the flow cell due to moisture aspiration, it must be returned to Sensidyne for service.

Direct sunlight on the unit may trigger the internal optical sensors and cause the cell to be reset or produce inaccurate flow numbers. The valve can also audibly change very frequently. The Gilibrator 3 is only affected by high-intensity IR light, so while it can operate outdoors, it should be done in the shade.

## 4.13. Icon Glossary

 Arrow Down (Scroll Down)	 Export to SD Card	 Leak Test	 Settings Screen
 Arrow Up (Scroll Up)	 Filter Health Check	 Manual Save to SD Card	 Sleep Timer
 Automatic Save to SD Card	 Firmware Update	 Play Button (Start Sample)	 Ship Gilibrator (Drain Power)
 Battery Health Check	 Flow Rate Units	 Pressure Units	 Statistical Analysis
 Battery Life	 Gilibrator 2 Communication	 Report Screen	 Stop Button
 Brightness Display Setting	 Gilibrator 3 Communication	 Reset Average	 STP References
 Date Format	 Home Screen	 Sample Count	 Temperature Units
 Communication Method	 Information Screen	 Save Record	 Time and Date Setup
 Dry Calibrator Communication	 Language Selection	 Set Custom Sample Count	 Zero Pressure Check

NOTES

**Manufactured by:**

**Sensidyne, LP**

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