



Gilian® LFS™ Pro

Operation Manual

SENSIDYNE®
Industrial Health & Safety Instrumentation

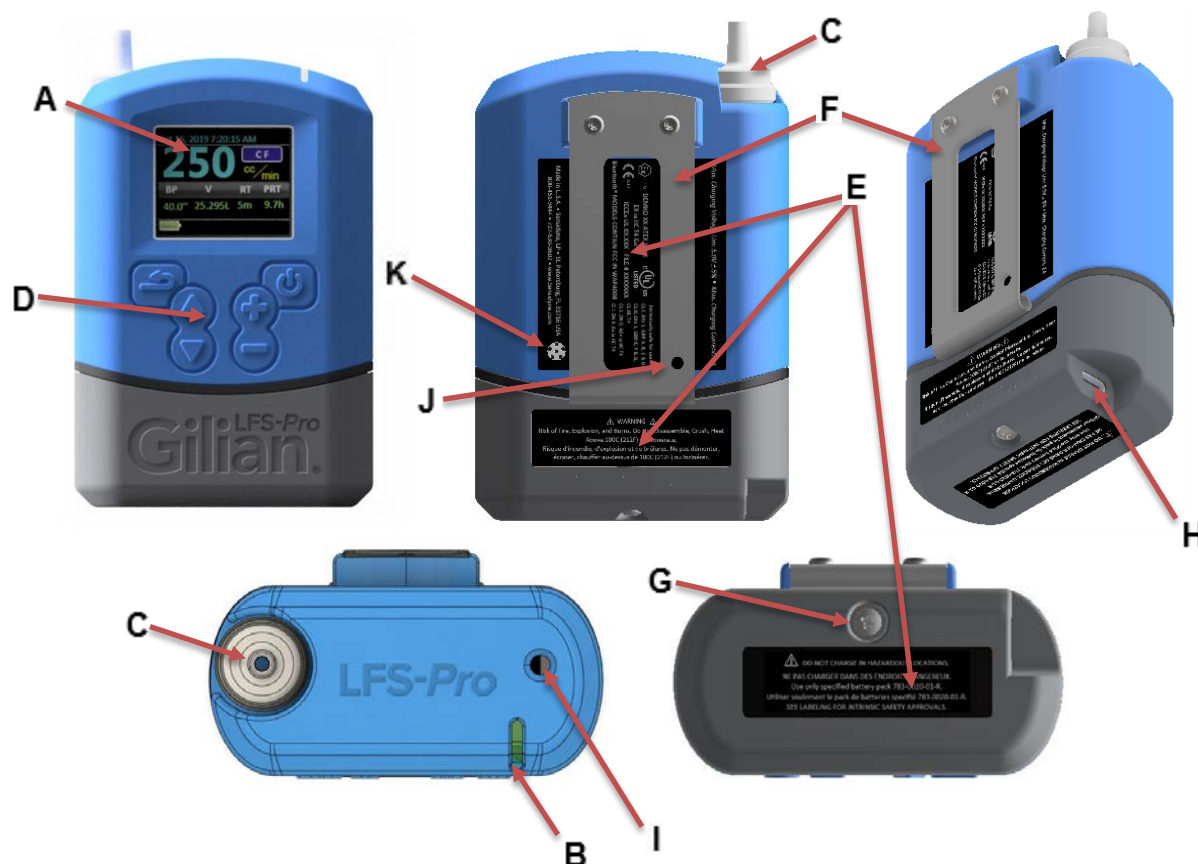
1000 112TH Circle N, Suite 100 • St. Petersburg, FL 33716 USA

(800) 451-9444 • +1 (727) 530-3602

www.Sensidyne.com • info@Sensidyne.com

REF 360-1801-01 (Rev A, Software Version 1.0.0)

LFS-Pro Identifiers:



A LCD Display

B Status and Notification LED

C Inlet Filter

D Push Button Controls

E Safety and Certification Labels

F Belt Clip

G Battery Access Screw

H Charging and Communication Port

I Exhaust Port

J Tube Tip Breaker

K Vent

Quality Policy Statement

At Sensidyne, our customers love our products because they work, they last a long time, and they protect people—even in dangerous places. We continuously improve them. We meet regulations. We exceed expectations of every product and service.

Sensidyne, LP

Warranty

Sensidyne warrants that, at the time of delivery, the LFS-Pro shall be free of all defects in workmanship and material. Sensidyne will repair or replace, at its sole option, any LFS-Pro 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 keypad of the LFS-Pro has a five (5) year warranty
2. The rechargeable Li-Ion battery pack has a one (1) year warranty.
3. The Belt clip has a one (1) year warranty.
4. Consumables have a ninety (90) day 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.

Table of Contents

LFS-Pro Identifiers:	II
Quality Policy Statement	III
Warranty.....	IV
Table of Contents	V
SECTION ONE: Preface	9
SECTION TWO: Introduction	15
2.1. Product Description	15
2.2. Pump Kit Descriptions	17
SECTION THREE: Set-Up	18
3.1. Preparation	18
3.2. Navigation	18
3.3. Pump Start Up	19
3.3.1. Power Up	19
3.3.2. Startup sequence	19
3.3.3. Power Down.....	19
3.4. Power Options	19
SECTION FOUR: General Operation.....	20
4.1. Overview	20
4.2. Connections	20
4.3. Menus.....	21
4.4. Displays	22
4.4.1. Instant Menu	24
4.4.2. Idle Menu	24
4.4.3. Menu Details	25
4.4.4. Run Details Display	25
4.4.5. Constant Flow Run Display Details	26
4.4.6. Constant Pressure Display Details	26
4.4.7. Fault Display Details	26
4.4.8. Program Display.....	27
4.4.9. STP Display	27
4.4.10. Motion Display.....	28

4.5.	Sensor Calibration	29
4.6.	Run Mode	29
4.6.1.	Run Mode Descriptions	29
4.6.2.	Locking the Keypad	30
4.6.3.	Unlocking the Keypad	30
4.7.	Flow Set (cc/min)	31
4.7.1.	Setting the Flow Rate	31
4.7.2.	Selecting a Pre-Set Setting of Flow Rate	31
4.8.	Pressure Set	32
4.8.1.	Setting the Pressure	32
4.9.	Field Calibrate	32
4.9.1.	Field Calibration	32
4.9.2.	Calibration Option (SmartCal SM)	32
4.9.3.	Displayed Flow Calibration	33
4.9.4.	Alternate Flow Calibration Procedure	34
4.10.	Fault Condition Cause and Displays	35
	SECTION FIVE: Options	36
5.1.	Setup ►	36
5.2.	Event ID Enable	36
5.3.	Pre/Post-Calibration	37
5.4.	User Mode	39
5.5.	Power-on Run	39
5.6.	Event Lock	39
5.7.	EN13137	39
5.8.	Fault Retry	40
5.9.	SmartCal SM Automatic Calibration	40
5.9.1.	Gilian Go-Cal Pro	41
5.10.	Clear Datalog	42
5.11.	Run Options ►	43
5.11.1.	Standard Temperature	43
5.11.2.	Standard Pressure	43
5.11.3.	Sensor Option	44
5.11.4.	PaTa compensation	44

5.12. Display Options ►	44
5.12.1. Language	44
5.12.2. Temperature Units	45
5.12.3. Pressure Units	45
5.12.4. Atmospheric Pressure (AP) Units	45
5.13. Clock Set ►	46
5.13.1. Clock	46
5.13.2. Date	46
5.13.3. Time Format	47
5.13.4. Date Format	47
5.14. Password	48
5.15. Control Mode (Constant Flow or Constant Pressure Low)	49
5.16. Run Mode: Manual, Timed, Vol, RT and Program name	50
5.17. Run Setup ►	51
5.17.1. Timed Start (T/V/R start)	51
5.18. Timed Duration	51
5.19. Vol Set	52
5.20. RT	52
5.21. Pressure Set ("H ₂ O, mmHg, KPa or mbar)	52
5.22. Motion Menu ►	53
5.22.1. Steps Threshold	53
5.22.2. Motion Threshold	53
SECTION SIX: Programming	54
6.1. Program ►	54
6.2. Program Edit ►	55
6.3. Program Name	55
6.4. Control Mode	56
6.5. Set the Flow Rate or Pressure	56
6.6. Program Steps	56
6.7. Function	57
6.8. Function Value	58
6.9. Save a Program	59
6.10. Review Events	59

SECTION SEVEN: PC Interface 60

7.1. Gilian CONNECT Pro 60

SECTION EIGHT: Maintenance Menu 61

8.1. Maintenance ► 61

8.2. Factory Defaults 61

8.2.1. Global Reset 61

8.2.2. Reset (save programs)..... 63

8.2.3. Clear Datalog 64

8.3. T ambient Cal ► 65

8.4. Barometric P Cal ► 66

8.5. Factory Cal 67

8.6. Info 67

SECTION NINE: User Maintenance 68

9.1. Li-Ion Battery Maintenance and Reconditioning 68

9.2. Battery Replacement 68

SECTION TEN: Appendices 69

Appendix A: Example Program Setup & Edit 70

Appendix B: Temperature and Barometric Pressure Compensation 77

Appendix C: Low Flow Manifold 78

Appendix D: Troubleshooting Guide 79

Appendix E: Parts List 82

Appendix F: Specifications 83

Appendix G: LFS-Pro Light Sequences..... 85

Appendix H: Factory Calibration and Service 87

Appendix I: Revision History 88

SECTION ONE: Preface

Proprietary Notice

The intended use of this manual is exclusive to owners of Gilian LFS-*Pro* air sampling pumps. 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.

Copyright Notice

© 2026 Sensidyne, LP All Rights Reserved. Reproduction, transmittal, transcribing, storing in a retrieval system or translation of this document in part or in its entirety is strictly prohibited without the prior written permission of Sensidyne, LP.

Trademark Notice

Sensidyne, the Sensidyne logo, Gilian, and LFS-*Pro* names and logos are registered trademarks of Sensidyne, LP. Other trademarks and service marks used in this document are the property of their respective companies and are used only for informational and explanatory purposes.

Firmware/Software License

The firmware and the associated PC application software installed in or provided with the LFS-Pro pump 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 LFS-Pro pump. 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.

Disclaimer

THE SELLER ASSUMES NO RESPONSIBILITY WHATSOEVER, TO ANY PARTY WHOSOEVER, FOR ANY PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH RECEIVED BY OR RESULTING FROM, IN WHOLE, OR IN PART, THE IMPROPER USE, INSTALLATION, OR STORAGE OF THIS PRODUCT BY THE USER, PERSON, FIRM, ENTITY, CORPORATION OR PARTY NOT ADHERING TO THE INSTRUCTIONS AND WARNINGS IN THIS MANUAL, OR OTHERWISE PROVIDED BY THE SELLER OR FROM NOT ADHERING TO ALL FEDERAL, STATE, AND LOCAL ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY LAWS AND REGULATIONS. THE SELLER SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES RESULTING FROM THE SALE AND USE OF ANY GOODS AND SELLER'S LIABILITY HEREUNDER SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF ANY GOODS FOUND DEFECTIVE.



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.

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

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

The LFS-Pro portable air sampling pump is intended for both indoor and outdoor use. The unit is not waterproof. NEVER submerge the unit in water. Pump failure, faulting or user injury may result.

The LFS-Pro Pump is Intrinsically Safe when used with specified battery pack part number 783-0020-01-R. Refer to the Certifications and Approvals section for approval ratings. **Due to risk of static charge, do not clean the pump labels or keypad with a dry cloth in areas where acetylene may be present.**

DO NOT operate this product should it malfunction, require repair, or have a cracked or broken case or other visible or known damage.

DO NOT repair or modify this product, except as specified in this Operation Manual. All user controls and adjustments are made via the sealed keypad on the front of the pump. The only user-replaceable parts are the Battery Pack, Belt Clip and Pump Inlet Filter (See Appendix E and Section 9.2.)

Use ONLY specified Sensidyne parts when performing maintenance procedures described in this manual. Intrinsic safety certifications become void by substitution of unauthorized components, unauthorized repair or alteration. All other Service should be performed by Sensidyne Authorized Service Departments only. (See Appendix E for Parts List; see Appendix H for Service Contact Information).

This product uses rechargeable Lithium Ion (Li-Ion) batteries. **Always fully charge before use.** DO NOT attempt to deeply discharge the pump battery pack.

DO NOT open the pump case, charge or replace batteries in an explosive atmosphere. Use only battery pack specified in the Parts List. Battery Pack is nominal 3.7V (5V max.) Maximum allowable charging voltage Um: 5 Volts.

Caution: Battery may become warm during charging. L-Ion 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 212° F (100° C), or incinerate. Replace battery with Sensidyne Battery Pack (P/N 783-0020-01-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 LFS-Pro pump comes into contact with a destructive substance(s) it is the responsibility of the user to take suitable precautions that prevent the pump from being adversely affected, thus ensuring that the Intrinsic Safety protection is not compromised. 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).

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

Examples of Product Labeling are shown below.

If further translation is required, please contact Schauenburg Electronic Technologies, the Sensidyne EU Authorized Representative.



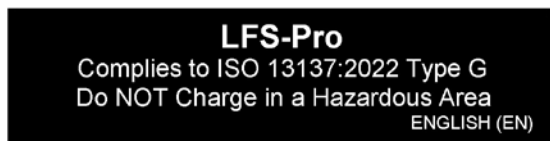
Rear Label, Main Housing



Rear Label, Battery Pack



Bottom Label, Battery Pack



ISO 13137 Label, Belt Clip

RF Regulatory Certifications for Pumps Equipped with Bluetooth®

Module: Cypress CYBLE-014008-00

Regulation	Certification ID
USA(FCC)	WAP4008
Canada(IC)	7922A-4008
Japan(MIC/TELEC)	203-JN0505
South Korea(KC)	MSIP-CRM-Cyp-4008

SECTION TWO: Introduction

2.1. Product Description

The LFS-Pro is an advanced personal air sampling pump system available in two models: a standard model without Bluetooth, and a Bluetooth enabled model. Both models come standard with data logging and standard temperature and pressure (STP) corrected volumes. The STP feature corrects the display flow rate and air volume to standard conditions of temperature and pressure. The STP feature can also correct pump flow rate to keep flow constant with changes in barometric pressure and ambient temperature.

Note: Models with the Bluetooth will display the Bluetooth symbol in the lower right corner. The symbol will display in grey until connected to the Gilian Mobile Pro app, at which time the symbol will display in blue showing a connection.

PUMP MODEL	STANDARD	BLUETOOTH
FLOW RATE 1 TO 500 CC/MIN	✓	✓
CONSTANT FLOW & CONSTANT PRESSURE	✓	✓
RECHARGABLE LI-ION BATTERY	✓	✓
MOTION MODULE (OPTIONAL)	✓	✓
ADVANCED PROGRAM FUNCTIONS	✓	✓
DATALOGGING & TRANSFER TO PC	✓	✓
SMARTCAL AUTOMATED CALIBRATION OPTION	✓	✓
STANDARD TEMP & PRESSURE DATA	✓	✓
BLUETOOTH COMMUNICATION		✓

All models offer constant flow modes and constant pressure control modes. The Constant Flow Mode holds the set flow constant against changing backpressure within 5% or 3 cc/min whichever is larger. The Constant Pressure Mode holds the pressure constant when taking samples using constant resistance sampling trains. The constant pressure (multi-flow) mode allows the air stream to be split into two or more separate samples so that multiple samples can run at the same time. (See Appendix C for information on the multi-port manifolds) Operation down to 1 cc/min is possible in the constant pressure mode using a manifold system as a critical orifice to control the flow.

The optional motion features of the module allow the pump to record additional motion data that can be used for verifying pump-wearing compliance and user activity monitoring. User motion is tracked and recorded by motion intensity. **ACTIVE** motion (walking), **PASSIVE** motion (wearing, but not walking), and **INACTIVE** motion (not wearing). The percentage of each motion intensity can be displayed on the pump event data review screen and the time-based graphs of instantaneous motion are available within the latest Gilian CONNECT Pro software.

Gilian Mobile Pro (available for Android and iOS) can connect to a Bluetooth-enabled pump during a sample run, allowing confirmation that pump is performing as desired. Users may Start, Pause, and Stop a sample; and review sample history. Since the connection is wireless, the pump's user doesn't need to be disturbed, and the review can be done from a distance. User access controls prevent unauthorized app users from controlling the pump sampling state.

The vent on the rear of the instrument is a certification requirement to mitigate potentially dangerous events that may occur if the Li-Ion cell were to catastrophically fail and vent electrolyte and gaseous material. The vent allows for the release of these gases to atmosphere and remediates the potential of a hazardous condition inside the instrument. A similar configuration is present within the cell construction itself. Additionally, the vent solves issues previously seen with hermetically sealed volumes and the resulting deleterious effects on pressure transducer readings.



2.2. Pump Kit Descriptions

Kits are available in one and five pump configurations, with power cords in US, Euro and UK versions (5-Pack Only). A matrix chart for the available kits are provided below.

Kit Type	LFS-Pro Pump	Carrying Case	Charcoal Tube Holder	Thumb drive with Software, Quick Start Guide and Manual
Single Kits comes with Pump, Charger, USB Cable, Tube Holder Kit, Tubing, Thumb Drive with Software, Quick Start Guide and Manual.				
Without Bluetooth With Motion 910-1810-11EN-R*	1	No	1	1
Bluetooth With Motion 910-1811-11EN-R*	1	No	1	1
Without Bluetooth Without Motion 910-1800-11EN-R*	1	No	1	1
Bluetooth Without Motion 910-1801-11EN-R*	1	No	1	1
5-Pack Kits comes with Hard Shell Carry Case, USB Charging/Comms Hub, Thumb Drive with Software, Quick Start Guide and Manual, and 5 of each: Pump, USB Cable, Tube Holder Kit, and Tubing				
Without Bluetooth With Motion 910-1810-52EN-R*	5	Yes	5	1
Bluetooth With Motion 910-1811-52EN-R*	5	Yes	5	1
Without Bluetooth Without Motion 910-1800-52EN-R*	5	Yes	5	1
Bluetooth Without Motion 910-1801-52EN-R*	5	Yes	5	1

*** Kits are available in Region specific configurations: EN, EU, UK, CH, PT**

See Appendix E for spare part numbers, kits and accessories.

SECTION THREE: Set-Up

3.1. Preparation

The kit includes the pump, inlet filters, tube holder kit, bag fill adapter, power supply, and USB cord. The pump arrives fully assembled.

The USB cord serves as both the charging cable and the communications cable. Plug the power supply into AC power, connect the USB-A side into the power supply and the USB-C side into the pumps USB port. The AC power supply can accept 100-240 VAC at 50 or 60 Hz.

IMPORTANT

Before proceeding, you **MUST** charge the battery to full capacity prior to using the pump.

Allow up to ten hours for a complete charge. Display shows the state of charge. A red LED on the pump indicates charging in progress; a solid green LED indicates charged and ready for use. The green LED will engage during charge and will blink constantly while on trickle charge. For more information on charging, see Appendix G.

3.2. Navigation

The LFS-Pro pump uses an intuitive six-button keypad for menu navigation and pump operation. The buttons and their functions are summarized in the table below.

Symbol	Name	Function
	Power/Enter	Powers the unit up or down, and enters a menu or confirms a parameter change
	Escape	Exits a menu
	Up Arrow	Select display screen options or move cursor up menu
	Down Arrow	Select display screen options or move cursor down menu
	Increase	Adjusts a parameter to higher values
	Decrease	Adjusts a parameter to lower values

3.3. Pump Start Up

3.3.1. Power Up

Power pump on by pressing and holding down (about 2 seconds) the  button until the pump turns on.

3.3.2. Startup sequence

As the pump starts it goes through a number of phases that check for correct pump operation and special situations at startup.

Startup Phases:

1. **Serial number display:** The next display shows the product type, the serial number and the software revision for about 5 seconds.
2. **System initialization:** During system initialization the memory is read and checked for validity in the following sections.

Datalog Index: Datalog is checked for validity and the index is created. The number displayed is the number of events in the datalog

Calibration: The system calibrations are checked for validity.

Point Cal: Flow calibrations are checked for validity.

System setup: The block of memory containing the user set parameters is checked for validity.

Programs: The user program area is checked for validity.

3.3.3. Power Down

Turn power off from any display when the pump is not running by pressing and holding down the  button. After approximately two seconds a power down display will appear and a 3 second shutdown sequence will start. If the button is released before the shutdown sequence is complete the power will not switch off. At the termination of the shutdown sequence, power is off.

3.4. Power Options

The LFS-Pro comes standard with a rechargeable lithium ion (Li-Ion) battery pack. The unit is charged through the USB cable and power supply that is included with all starter kits.

Warning: Do not charge in Hazardous Areas. Intrinsic safety certifications are only valid when using the rechargeable Li-Ion battery pack, not connected to the USB cable.

SECTION FOUR: General Operation

4.1. Overview

The LFS-Pro has the capability of generating and controlling flow over the range of 20 cc/min to 500 cc/min in constant flow mode and 1 cc/min to 500 cc/min in constant pressure mode. The actual flow is measured and controlled by the pump's internal processor. Flow control is provided directly in the constant flow mode. Pressure control is provided in the constant pressure control mode, which controls flow indirectly. During a sampling event the flow rate is displayed in the constant flow mode and backpressure is displayed in the constant pressure mode. Pump flow is not displayed in the constant pressure mode. The STP feature measures the ambient temperature and pressure and can correct sample volumes and flows to Standard conditions. Standard temperature and pressure can be set to desired values. In addition, the flow rate is compensated for changes in temperature and pressure from the calibration point, holding the calibration value against altitude induced variability. (Appendix B)

4.2. Connections

Sample media is connected to the inlet port using 1/8 inch ID tubing. Adapters that cause high pressure drop or using smaller diameter tubing may affect the sample flow. Minimize pressure drop in tubing and fittings and avoid any condition that will exceed the pump backpressure specifications (see Appendix F). The inlet port is part of the inlet filter system that provides a tapered inlet port connection and a filter that protects the pump from contamination by particulates if operated without an effective sampling media. This inlet port and filter system is user replaceable and should be replaced if discolored, clogged or obstructed in any way.

An accessory Outlet Fitting, Bag Fill Adapter (811-0913-01-R) accommodates filling sample containers such as Tedlar or Kynar sampling bags. Connect the bag fill adapter as shown below. The connection is sealed with a precision taper and should be inserted only finger tight. The knurled handle will not seat flush to the surface of the pump and should not be forced. The sample bag attaches with ¼ inch ID tubing. If the pressure in the bag increases, such as when it is completely filled, the pressure increase will be shown as increased pump backpressure and will terminate the event if the backpressure specification is exceeded.



4.3. Menus

The operation of the pump is controlled by entering the menu system and selecting the menu item that performs the desired function. The menu has submenus that allow control of related functions. A quick reference menu outline appears in Section 4.4.2. When the menu is not displayed, the  and  buttons select among the display screen options. The display screens are automatically selected by the pump whenever the mode of operation is changed (example: when an event is started or a fault occurs). The display screens include the **Instant Menu** display, **Idle** display, the **Run Details** display, the **Constant Flow** control operating display, the **Constant Pressure** control operating display, the **Fault** display, **Program Status** display, **STP** Display, and **Motion display** (if enabled on unit). A description of the data displayed on each menu screen is contained in the Displays section (Section 4.4.) of this manual.

Sampling events: The LFS-Pro accumulates sample data on events. An event is a sample run. The data for each sample event is stored as the event progresses so that no data loss is possible. When a sample is started, the event data is cleared to begin the new event. As the pump samples, the flow is controlled at the event flow rate or pressure depending on the selected control mode. The event data (time, flow, volume, backpressure and other information) is stored into nonvolatile memory.

If the pump is paused the event is not terminated. When the event continues, volume and time accumulation continue in the same event. If the event is stopped, the run data is available for review (Section 6.10.) and in the idle screen until another event is started. The data from the last 200 events is available in the data review menu.

General operation of the menu system: Access the menu by pressing the  button and selecting the  icon. The menu is displayed in a vertical column. Some menu items have a  sign after the menu item and lead to submenus. When the selected menu has the , pressing the  button enters the submenu. Pressing the  button exits the submenu and returns to the higher level menu. If a parameter is displayed at the right end of the line, the  and  may be used to adjust the parameter up and down. If a parameter is changed it will be retained only if the  button is pressed to confirm the change

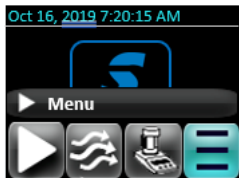
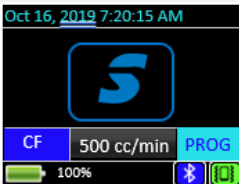
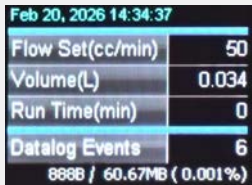
If the menu selection is altered with the  or  buttons without confirmation with the  button, the parameter will revert to its original value.

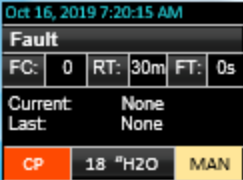
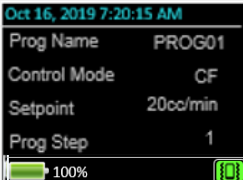
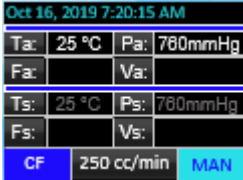
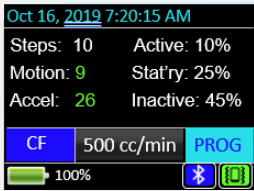
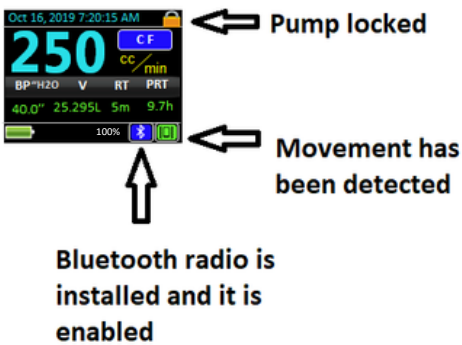
If the value is numeric, the  and  buttons alter the numeric value. If the parameter is a selection, the buttons will select each option in sequence. The option may require the  and  buttons to select. For instance, the “enable” selection is always made by the  button and the disable option is selected with the  button.

NOTE: Several parameters have numeric values, allowing the user to scroll through the entire range by simply pressing and holding down either the  or  buttons. In addition to this feature after pressing and holding the  and  button, the  and  buttons will accelerate the rate of scrolling. The  button moderately and the  button quickly accelerates the rate.

4.4. Displays

The display screens include the **Menu** display, **Idle** display, **Constant Flow** control operating display, **Constant Pressure** control operating display, **Fault** display, and the **Program Status** display. All displays include; the top status line displaying the Date, Time, and lock status; bottom status line displays the Battery type and charge status,

Displays	Description
Instant Menu 	The Instant Menu allows all of the parameters of the operation of the LFS-Pro to be set, calibrated and start sample. The Menu option will take you to the complete Main Menu options.
Idle 	Shown when the pump is not conducting an event or in the main menu. Idle displays control mode, flow set point, run mode, battery percentage, and enabled functions (BT and IMU).
Run Details 	The Run Details displays Flow Set Point, Total Sample Volume, Run Time, the number of events stored, and the percentage of the datalog memory used.
Constant Flow 	Displays Actual Flow rate (cc/min), Backpressure BP (inches water, mmHg, KPa or mbar), Total Sample Volume V (Liters), Run Time RT (minutes) and Projected Run Time PRT (hours), based on battery charge status and backpressure.
Constant Pressure 	Displays Backpressure BP (inches water, mmHg, KPa, mbar), Run Time RT (minutes) and Projected Run Time PRT (hours) based on battery charge status and backpressure.

Fault 	Displays Run Time RT (min), Fault Count FC, Fault Run Time FT (sec), Current Fault(s) and Last Fault(s) when a fault condition is detected or when the pump has stopped due to a fault condition.
Program Status 	When a sample is not running, the program status page will display the program name and number of steps. When a run is active, displays the status of a programmed run. Number of steps in the total program and the current and next step are shown. In the current step the progress of the step is shown.
STP 	This screen shows ambient temperature and pressure averages from the active or previous event and the standard values. Flow and Volume are shown at ambient and standard conditions.
Motion 	In pumps equipped with the Motion Module, the motion review screen is enabled. The left column displays the number of steps and intensity of body motion within the last minute, which are compared to the threshold settings. The right column, enabled during a sampling event, displays the percentage of each motion type over the duration of the sample run.
	Activated functions such as Bluetooth connection or IMU motion module (red, yellow, or green depending on the amount of motion detected) display in the bottom right. If a user locks the unit, a lock icon will display in the top right.

The LCD display can be switched between several information screens through the keypad. The pump will automatically switch to the appropriate display when certain menu items are selected or the status of the pump changes.

4.4.1. Instant Menu

- 1.** Flow/Pressure set (cc/min): In Constant Flow mode, the display indicates the flow rate in cc/min at ambient conditions, while in Constant Pressure mode it shows the set pressure using the unit of measurement selected in the settings menu.
- 2.** Preset Flow: Includes four preset flow rates that can be changed by the user while in constant flow mode. The default flow rates are 50cc/min, 100cc/min, 200cc/min, and 400cc/min.
- 3.** Calibrate: Manual and SmartCal calibration options can be selected from this menu for constant flow mode.
- 4.** Menu: Additional user-adjustable settings and pump details are available within this section.

4.4.2. Idle Menu

- 1.** Date and time: Displayed in selectable format mm/dd/yy or dd/mm/yy
- 2.** Battery icon: Charge status is approximate and depends on many factors including age, number of charge cycles, temperature and recent charge or discharge history.
- 3.** Control mode: Displays the event control mode of the pump, either constant flow (CF) or constant pressure low (CPL). In constant flow mode, the pump controls the flow rate regardless of changes in filter load (backpressure). In constant pressure, the pump controls inlet pressure, regardless of the flow.
- 4.** Flow/Pressure set (cc/min): In Constant Flow mode, the display indicates the flow rate in cc/min at ambient conditions, while in Constant Pressure mode it shows the set pressure using the unit of measurement selected in the settings menu.
- 5.** Run mode: Displays the status of the Run mode, which indicates how the pump's sampling schedule is set. There are five modes; manual (operator turns the pump on and off); timed (pump turns on at a preset time and off at a specified number of minutes later); Vol, (pump turns on at a specified time and collects a specified volume); RT (pump turns on at a specified time and runs for a specified number of minutes), and program (indicated by the name of the program).

6. Enabled Functions: In pumps equipped with Bluetooth, a blue icon will appear in the lower right. If the pump is equipped with the Motion Module, the indicator in the lower right corner will change from red to yellow or green depending on how much motion is detected. If a user selects to lock the device controls, a lock icon will appear in the upper right corner of the display.

4.4.3. Menu Details

1. Menu Structure:

Run Flow set (cc/min) Press. Set Calibrate Setup ▶	▶ Bluetooth Control Mode Run Mode Run Setup ▶
▶ Event ID ▶ Pre/Post cal ▶ Fault retry ▶ User Mode ▶ Power-on Run ▶ Event Lock ▶ EN13137 ▶ Clear Datalog ▶ Run Options ▶	▶ T/V/RT start ▶ Timed Duration ▶ Vol Set ▶ RT ▶ Press Set ▶ Program Edit ▶
▶▶ Std Temp ▶▶ Std P(mmHg) ▶▶ Sensor option ▶ Display Options ▶	▶▶ Prog Name ▶▶ Control Mode ▶▶ Setpoint ▶▶ Prog Step ▶▶ Function ▶▶ Value ▶▶ Save
▶▶ Language ▶▶ Temperature Units ▶▶ Pressure Units ▶▶ AP units ▶ Clock Set ▶	Review Maintenance ▶
▶▶ Clock ▶▶ Date ▶▶ Time format ▶▶ Date format ▶ Password ▶ Motion menu ▶	▶ Factory Defaults ▶
▶▶ Steps threshold ▶▶ Motion threshold	▶▶ Global reset ▶ ▶▶ Reset (save programs) ▶ ▶▶ Clear Datalog ▶ T ambient Cal ▶ ▶ Barometric P Cal ▶ ▶ Factory Cal ▶ ▶ Info ▶

4.4.4. Run Details Display

1. Flow set (cc/min): The flow rate, always shown in cc/min at ambient conditions.
2. Volume (L) - Sample volume: The total volume of the sample, always shown in liters, at ambient conditions.
3. Run time (min) – Sample time in minutes.
4. Datalog Events: Displays the number of events recorded, and the percentage of the storage area used.

4.4.5. Constant Flow Run Display Details

1. Flow cc/min: The flow rate, always shown in cc/min at ambient conditions.
2. BP - Back Pressure: The backpressure measured at the input to the pump after the manifold and protective filter. The units of the backpressure can be selected by the operator as inches of water, millimeters of mercury, kilopascals or millibars.
3. V - Sample volume: The total volume of the sample, always shown in liters, at ambient conditions.
4. RT - Run Time: Total pump **ON** time. Does not include Sensor calibrations, pauses or scheduled off time in programs.
5. PRT - Projected Run Time: The projected run time is an estimate of the remaining run time in hours, based on the current estimated battery capacity and the current drain on the pump, which is dependent on flow rate, backpressure and temperature.

4.4.6. Constant Pressure Display Details

1. Pressure: the pressure rate, shown at ambient conditions in the units of measurement selected in the settings menu.
2. BP - Back Pressure: The backpressure measured at the input to the pump after the manifold and protective filter. The units of the backpressure can be selected by the operator as inches of water, millimeters of mercury, millibars or kilopascals.
3. RT - Run Time: Total pump **ON** time. Does not include Sensor calibrations, pauses or scheduled off time in programs.
4. PRT - Projected Run Time: The projected run time is an estimate of the remaining run time in hours, based on the current estimated battery capacity and the current drain on the pump, which is dependent on flow rate, backpressure and temperature.

4.4.7. Fault Display Details

1. Fault – During a sample run, the display indicates how long an active fault has been present. If a fault interrupts the run, it changes to a countdown for the next automatic reattempt.
2. RT - Run Time: Total pump **ON** time. Does not include Sensor calibrations, pauses or scheduled off time in programs.
3. FC - Fault Count: Total number of faults that have resulted in suspension of sampling. When the count reaches 10, the pump will cease retrying and terminate the event.

4. FT - Fault Time: Total time, in seconds, the pump has run while being in a fault status.
5. Current: Active fault display field of fault indicators, "None" is displayed unless a fault is active. The faults that may be displayed are FC (flow control out of range), PC (pressure control out of range), BP (Backpressure over allowable limit), OP (Backpressure out of allowed range, causing emergency stop), and LB (low battery).
6. Last: Previous fault condition, same format as Current fault.

4.4.8. Program Display

1. Program: Program name of selected program.
2. Steps: Number of active steps /Total number of steps Type of the active step.
3. Next: Next step function.
4. Date and time of next step start.

Note: If sample run is not active, the program display will show the program name and the number of steps in the program.

4.4.9. STP Display

1. Ta: Average ambient temperature during active or last event
2. Pa: Average measured barometric pressure during active or last event
3. Fa: Ambient conditions flow rate
4. Va: Ambient conditions sample volume
5. Ts: Standard conditions temperature
6. Ps: Standard barometric pressure
7. Fs: Standard conditions flow rate
8. Vs: Standard conditions sample volume

4.4.10. Motion Display

1. Steps: number of steps the user has made in the last minute during a sample
2. Motion: intensity of body movements the user has made in the last minute during a sample
3. Active: % **ACTIVE** motion during a sample. This type of motion is representative of the user walking while wearing the pump.
4. Stationary: % **STATIONARY** motion during a sample. This type of motion is representative of the user wearing the pump while being sedentary at a desk, in a vehicle, or simply standing.
5. Inactive: % **INACTIVE** motion during a sample. This type of motion is representative of the pump not being worn by the user and resting on a surface.

Note: If sample run is not active, activity percentages are not displayed.

4.5. Sensor Calibration

The LFS-Pro pump has a built in automatic sensor calibration feature which allows the pump to maintain an accurate stable flow rate by intermittently calibrating the pump's flow sensor to establish the zero flow point. This routine occurs before starting, when the internal temperature of the pump changes more than 3 degrees C, or whenever one hour has elapsed since the last sensor calibration, depending on the Sensor option setting (Section 5.11.3.). The sensor calibration takes several seconds during which time the pump stops running. Sample time and volume are not counted during the sensor calibration routine as the pump automatically accommodates this brief stoppage in the accumulation of sample results. The message "Sensor Calibration" displays during this process. The sensor calibrations eliminate the effect of sensor drift on flow rate stability. If the sensor calibrations are reduced or eliminated (Section 5.11.3.) flow stability may be affected.

4.6. Run Mode

4.6.1. Run Mode Descriptions

Selecting **Run** begins a sampling event. The previous event data is cleared. Before selecting Run, the control mode, constant flow or constant pressure should have the proper setting and the flow rate or control pressure should be at the desired set point. If **Manual Run Mode** is active, the pump starts in the selected control mode at the set point. If the **Timed Run Mode** is selected, the pump waits for the start time and then starts and runs until the start time plus the specified duration. If the **Vol Run Mode** is selected, the pump waits for the start time and then starts and runs until the specified volume has been collected. If the **RT Run Mode** is selected, the pump waits for the start time and then starts and runs until the run time has elapsed; this does not count pauses, sensor calibration intervals and fault stop times. If the **Program Run Mode** is selected, the program starts and controls sampling until the program completes.

Note: The pump is designed to operate with a minimum backpressure of 0.5" H2O.

When the Run menu item is selected, readiness to start the event is evaluated. If the pump is using battery power, the battery status is checked. If the battery has less than about 5% of remaining charge, the event will not start. If the battery has less than 85% charge, a message box will appear to warn that the battery is not fully charged.

The Event log is checked for available space. If space is not available, a message will warn the user. If the ESC button is pressed, starting the event will be abandoned and control will return to the menu to allow the data to be recorded or downloaded before continuing. If ENTER is pressed, the pump will enter the clear datalog dialog

and allow the datalog to be cleared. If the datalog is not cleared the event cannot begin. If the datalog is cleared, the event will start.

If the Event ID option is enabled, the user will be prompted to enter an Event ID, which will be stored with the event data for later review or download.

If the Pre/Post Cal option is enabled, a Pre-Cal flow calibration will start. If the ESC key is used to exit the Pre-Cal flow calibration, the event will be canceled and the unit will return to the idle display. The preset SmartCal device will be used if the pump is connected, otherwise a manual calibration will be performed.

The **Stop** menu can be accessed by the  button during Run to pause or stop the event. If **Pause** is activated the pump stops with flow, timing, and total volume accurately maintained. The menu changes to allow continuation of the event. The **Stop** menu item terminates the sample event. The keypad can be locked to avoid event modification as described in the next sections.

4.6.2. Locking the Keypad

To lock the keypad:

Press and hold down simultaneously the  and  buttons. A lock symbol will appear in the top status line. Release the buttons and the pump will be locked. After locking the pump it will only respond using the  and  buttons to access the Idle, Run Details, Fault, Program, Motion (if applicable), and Standard Conditions Status screens. Warning: If a password is in place to restrict access to the pump, it will have to be entered to unlock the pump. Be certain that you know the password before you lock the pump.

4.6.3. Unlocking the Keypad

To unlock the keypad:

Press and hold down simultaneously the  and  buttons until the lock symbol disappears from the top middle portion of the screen.

IMPORTANT! – The above instructions apply *only* if no Password (Section 0) has been selected for the pump (the Password is set at the factory default value of 0, disabled). If a Password has been previously selected, after the user has performed the instructions above, the keypad will prompt the user to enter the Password, then press and release the  button before the pump will unlock itself.

4.7. Flow Set (cc/min)

Flow Set allows the flow rate at which the pump will operate in constant flow control mode to be set. The allowable range is 20 cc/min to 500 cc/min.

4.7.1. Setting the Flow Rate

NOTE: This operation is required only if you are *changing* the pump flow rate. If you are using the previously set flow rate, you will only need to verify it using a calibrated reference flow meter.

1. At the Home Screen press the , use the  and  buttons to move the highlighted icon to the Instant Menu Bar's Main Menu icon , press the  button to open the menu.
2. Use the  and  buttons to move the cursor  to Flow Set. Press the  button to open the Flow Set window.
3. Use the  and  buttons to set the desired rate of flow. This will occur inside of a pop-up window.
4. Press the  button to accept the flow rate. Flow set is now complete and is displayed in the middle of the information bar at the bottom of the screen.

Note: You can also change the set flow rate by pressing , and pressing the  and  button while the  is highlighted in the instant display menu.

4.7.2. Selecting a Pre-Set Setting of Flow Rate

NOTE: This operation is used to select a pre-set flow rate. Once selected, you will only need to verify it using a calibrated reference flow meter.

1. At the Home Screen press the , use the  and  buttons to move the highlighted icon to the Instant Menu Bar's Pre-Set icon , press the  button to open the menu.
2. At the Main Menu screen, use the  and  buttons to move the cursor  to a Pre-Set Flow value. If one is already entered, press the  button to select that value as your flow rate.
3. Alternatively, use the  and  buttons to set a new desired rate of flow.
4. Press the  button to accept the flow rate. Flow set is now complete.

4.8. Pressure Set

Pressure Set allows the pressure at which the pump will operate in constant pressure low (CPL) control mode to be set. The allowable range is 1”H₂O to 40” H₂O.

4.8.1. Setting the Pressure

NOTE: This operation is required only if you are *changing* the pump default pressure of 10” H₂O.

1. At the Home Screen press the , use the  and  buttons to move the highlighted icon to the Instant Menu Bar's Main Menu icon , press the  button to open the menu.
2. Use the  and  buttons to move the cursor  to Press. Set. Press the  button to open the Flow Set window.
3. Use the  and  buttons to set the desired constant pressure.
4. Press the  button to accept the new constant pressure. Constant Pressure is now complete, and is displayed in the middle of the information bar at the bottom of the screen.

4.9. Field Calibrate

4.9.1. Field Calibration

It is recommended Industrial Hygiene practice to conduct a field calibration prior to and after each field sample. This practice is commonly known as the Pre-Cal and Post-Cal. In this procedure, the sample flow rate is set and verified during the Pre-Cal using an external air flow calibrator, preferably one that is traceable to National Institute for Standards and Technology (NIST). The flow is again verified at Post-Cal using the same or equivalent air flow calibration device. Procedures for field calibrations are found in the OSHA Technical Manual and in the NIOSH Manual of Analytical Methods (NMAM). Following these published guidelines for field sampling is highly recommended.

The LFS-Pro has a Pre-Cal/Post-Cal mode (See Section 5.3.) accessible through the Set-up menu. This mode will record a Pre-Cal/Post-Cal value for each sample accessible through the PC interface and upon pump data review. Pre-Cal and Post-Cal may be conducted as separate events through the sample run mode, this method will not include calibration data as events preceding and following the sample event in the datalog.

4.9.2. Calibration Option (SmartCalSM)

An optional hand-free user calibration kit is available for the LFS-Pro called SmartCal. SmartCal provides communication between the pump and the calibrator allowing the pump to self-adjust its flow rate. When using the Pre/Post-Cal selection, calibration data is recorded in the transferable event datalog. This option is available for the calibrators listed on the following table:

Air Flow Calibrator	Communications Cable	Cable Part Number
Gilian Go-Cal™ Pro	Type-C Cable	811-9810-01-R

See Section 5.9. for SmartCal Calibration instructions.

4.9.3. Displayed Flow Calibration

Calibrate allows the flow rate of the pump to be verified or adjusted to the desired operating point. The calibration will be stored and used in subsequent operation until the pump is recalibrated. Calibration is performed with an air flow calibrator and pressure panel or representative sampling media. The pressure panel should be connected to the inlet of the pump and the reference meter connected to the pressure panel inlet. Calibration always takes place at the selected flow rate. A representative of the planned sample train should be inserted between the pump and the reference device. The ideal load is the actual sample train that will be used with a representative filter as show in the photograph below. If no load is present the flow will be more variable than with the actual sample. If the actual sample media is not available, use a load that is over two inches of water back pressure for maximum stability.



Calibrating the Displayed Flow Rate:

1. Set up a flow reference instrument (e.g., Go-Cal Pro, Gilibrator-2) following the manufacturer's instructions and recommendations.
2. Choose a sample media of similar backpressure to that intended for use in the field, or use a test panel to set the back pressure at the calibration flow rate to a representative back pressure for the sample train and flow rate. The recommended back pressure required for calibration is 0.5 inches of water.
3. Attach 1/8 inch ID tubing from the pump to the sample media, and then from the sample media to the reference flow meter.
4. At the Home Screen press the , use the  and  buttons to move the highlighted icon to the Instant Menu Bar's Calibration icon , press the  button to open the menu.
5. Use the  and  buttons to move the cursor  to select Manual or Go-Cal Pro SmartCal Calibration (See Section 5.9. for SmartCal Calibration instructions), press the  button to select the option.

6. Alternatively, from the Main Menu screen. Using the  and  buttons, move the cursor  to Calibrate. Press and release the  button and follow the instructions from Step 5 above.
7. The pump begins to run. Measure the flow rate using the reference flow meter. Use the  and  buttons to adjust the flow rate shown on the pump display to match the actual flow rate measured on the reference meter. Press and release the  button. Using the information of the actual flow rate, the pump will adjust to run at the calibration point. The displayed flow rate will return to the calibration flow rate.
8. Measure the flow rate again using the reference flow meter. If necessary, adjust the flow rate shown on the pump display to match the actual flow rate measured on the reference meter. Press and release the  button.

NOTE: To exit Calibrate without changing any values, simply press the  button.

Repeat the adjustment until the measured flow rate is within 1% of the desired rate of flow. Calibration is now complete. Press the  button without making a change in the flow rate to exit calibration. A confirmation screen will appear. If the  is pressed the calibration will be saved. If the  is pressed the calibration will not be saved.

4.9.4. Alternate Flow Calibration Procedure

A fast access method to calibration can be entered from within the sampling event. Press and hold  for 3 seconds while the pump is running and it will open the calibration window. Measure the flow rate using the reference flow meter. Use the  and  buttons to adjust the flow rate shown on the pump display to match the actual flow rate measured on the reference meter. Press and release the  button. Using the information of the actual flow rate, the pump will adjust to run at the calibration point. The displayed flow rate will return to the calibration flow rate. Follow step 8 above to complete the calibration and return back to the active sampling event.

Note on User Calibration

The above display calibration procedure makes internal pump adjustments and improves the accuracy of the flow display. It does not replace field calibration as described by OSHA and NIOSH. A flow verification using the Gilibrator or other calibrator and the exact field sampling train should be conducted before and after each field sample. Procedures for field calibration may be referenced in the *NIOSH Manual of Analytical Methods* at www.cdc.gov/niosh or in the *OSHA Technical Manual* at www.osha.gov (See Section 4.9.1.).

4.10. Fault Condition Cause and Displays

When the LFS-Pro encounters operating conditions outside of the pump's operating specifications it will respond by activating the pump's fault system. The fault system will indicate a fault condition by changing the flashing green LED to a flashing red LED. If the fault condition persists continuously, the pump will shut the sample off to prevent sample collection under fault conditions. Once the pump has stopped, due to a fault condition, the Fault display screen will appear with the fault type and duration time in fault. There will be no LED illumination during the pause. If fault retry is enabled (See Section 5.8.), the LFS-Pro will attempt an automatic re-start after three minutes. During that time if the fault cause was corrected (e.g., user sat in a chair and pinched the connection tubing shut momentarily) the pump will resume sampling. When the condition remains after ten restart attempts, the pump will end the event. If fault retry is disabled, the sampling event will end when the pump stops after 30 seconds of operation in fault and no retry will be attempted.

Several conditions can initiate a fault condition as described below:

Flow Control Fault (fault code FC): If the pump is running in the **Constant Flow Control** mode, and the flow rate cannot be maintained within the constant flow rate specification, the pump will go into a Flow Fault, a fault caused by flow outside the specifications of the pump.

Note: There is a user selectable option (section 5.7.) to use the flow fault detection criteria that is specified in the EN13137 standard. If this option is selected, the criteria for fault is fully blocked flow, with fault shutdown when the duration of blockage exceeds 120 seconds. Restart will not be attempted with this option.

Back Pressure Fault (fault code BP): If the pump is running in the **Constant Flow Control** mode and the sample media has increased in flow resistance (i.e., backpressure) due to the accumulated sample or a blockage in the sample train, the pump will go into a fault condition after reaching its specified backpressure maximum.

Over Pressure Fault (fault code OP): If the pump is running in the **Constant Flow Control** mode and the backpressure exceeds the maximum allowed for the pump, an immediate fault condition and shutdown will occur. The pump will try a restart if the Fault Retry option is enabled.

Pressure Control Fault (fault code PC): If the pump is running in the **Constant Pressure** mode and the sample backpressure cannot be maintained within +/- 10% of the set point pressure the pump will go into a Pressure Control Fault condition. This is usually caused by insufficient sample resistance, which causes flow rates beyond the operating range of the pump.

Low Battery Fault (fault code LB): If the battery voltage has dropped below a minimum level, the pump will go into a fault condition due to a low battery. Restart attempts will not be made for this fault.

SECTION FIVE: Options

5.1. Setup ►

The **Setup** submenu has controls that adjust the basic operating parameters of the pump.

To change the settings for each item in the **Setup** submenu:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to the submenu item for which you desire to change the setting. Use the + and - buttons to select the setting desired for that item, then press and release the ⏻ button. The change to the new setting is now complete.

Note: Many setup menu items are in the submenus.

5.2. Event ID Enable

An event is defined as one sample run. **Event ID Enable** enables or disables the collection of sample identification information that will be stored in the event record to identify the event. When the event is enabled the pump will prompt for an ID each time an event is started. The pump will remember the event number and propose it for modification when the next event ID is required. The ID is available in **Review** and via data communications.

To utilize the **Event ID enable** function:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the Setup submenu screen.
2. At the Setup submenu screen, the cursor ► will now be at Event enable. The default setting for Event enable is disable. Press and release the + and - buttons to enable. Press and release the ⏻ button.

Note: Event ID is enabled when Run is used to start an event. The pump will prompt the user for an ID in Manual, Timed or Program operation modes.

3. Press and release the ⏻ button to return to the Main Menu. Use the ▲ button to move the cursor to Run. Press and release the ⏻ button.
4. Event ID 1 will now be displayed. Use the + and - buttons to assign the event any unique identification number from 1 to 999. The ▲ and ▼ keys can be used to accelerate the adjustment rate (see Section 4.3.).

Note: A single press and release of either of these buttons will increment or decrement the ID number by 1. Press and hold down either button to scroll through

the full range of numbers. When the ID number is selected, press and release the  button to complete.

5. Upon pressing and releasing the  button, the pump will begin to run at the flow rate selected at Flow Set (see Section 4.7.). To pause or stop the run, press and release the  button again. The Instant Menu Bar will appear with the Pause  and Stop  icons.
6. Press and release the  button to move the cursor to Stop . Press and release the  button. The pump stops running.
7. At the Main Menu, use the  button to go to Review. Press and release the  button. The run data for the event is displayed: Flow control mode setting; flow rate or backpressure setting; volume sampled; start time and date; Pre-Cal and Post-Cal flow rate and event ID number.

5.3. Pre/Post-Calibration

Pre/Post-Calibration allows the user to record both a Pre-Cal and Post-Cal rate of flow for a sample. The default setting for this function is **disable**. When enabled, Pre and Post-Cal flow readings will be taken in Manual, Timed and Program operating modes. To enable the **Pre/Post-Cal** function:

1. At the Main Menu screen, use the  and  buttons to move the cursor  to **Setup** . Press and release the  button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the  and  buttons to move the cursor  to **Pre/Post Cal**. Use the  button to select **enable** or the  button to select **disable**. Press and release the  button to complete.

This completes the enable of the Pre/Post-Cal option. The description of the use of the option when starting an event is below.

3. When you are at **Run** in the Main Menu and press the  button to start a sample run, the display shows a notification that Pre-Cal is selected. Press the  button to continue to Pre-Cal or the  to exit the event. When the Pre-Cal is entered, the calibration screen displays the set flow rate for the sample (See Section 4.7.). Using a calibrated flow measurement reference (e.g., Gilibrator-2 or Gilibrator-3), measure the pump's flow rate, then adjust the displayed flow rate on the pump, using the  and  buttons, to match the flow rate displayed on the reference flow meter. Press and release the  button. The pump will adjust its flow rate on the basis of the entered value to run at the setpoint flow rate. The adjustment of the displayed flow rate and correction can be repeated. To complete the Pre-Cal press enter without changing the flow rate. When complete a confirmation screen will show.

4. After confirming the Pre-Cal and entering the event, the pump begins to run showing the Constant Flow display screen. Complete the sample run, then press and release the  button. A **Pause/Stop** message box appears. Use the  button to move the cursor  to **Stop**. Press and release the  button.

Note: When the event ends in Program or Timed operating modes, the Post-Cal will be requested at that time.

Note: Choosing to calibrate while within the calibration menu will automatically start a run once pre/post calibration is enabled.

5. The pump stops running and the following message appears on the screen:

Ready for Post Cal

Press Enter

Press and release the  button. The pump begins to run again, and the calibration screen is displayed showing the validation flow rate for the sample (See Section 4.5.). Using the calibrated flow measurement reference, measure and enter the pump's flow rate. Press and release the  button.

6. To review the sample go to the Main Menu screen, use the  and  buttons to move the cursor  to **Review**. Press and release the  button. The screen shows a summary of the event data. The  and  buttons can be used to scroll through the data. The Pre-Cal flow rate is marked "**Pre:**". The Post-Cal flow rate is marked "**Post:**". The $\Delta\%$ will show the percent difference between the Pre and Post calibration values.

Note: SmartCal can be used to supply the Pre/Post-Cal data.

5.4. User Mode

User mode is an option that changes the operation of the menu system to only present a limited menu. Only the Run selection and a selection to exit User Mode are available. When User mode is enabled and control is returned to the idle screen, the main menu will change to offer only the User mode menu of Run and Exit. The user can start an event by selecting Run. The event can use any of the run modes available in the pump; Manual, Timed, Volume, RunTime or a program. During the event, the user can pause or stop the event, but not make any changes in its setup. The display will remain locked to the default operating display for the selected control mode (or fault if one occurs) and does not allow the user to browse the other displays.

In order to exit the User mode, the pump password is required unless the password is set to zero.

5.5. Power-on Run

Power-on Run is an option that causes the pump to start an event when the power is turned on. The event can use any of the run modes available in the pump; Manual, Timed, Volume, RunTime or a program. During the event, the user can pause or stop the event. If the run mode is Timed, Volume, RunTime or a program, the pump will power down thirty minutes after the event. During the period after the event, the user can change any aspect of the pump setup including the Power-on Run option. When Power-on Run is enabled, Pre and Post calibration will not be performed.

5.6. Event Lock

Event Lock if enabled, sets the pump to lock the keyboard automatically when an event starts. The event will proceed as if it were locked manually after the event started. Unlock works as described above in section 4.6.3.

Warning: IF a password has been set, it will be required to unlock the pump, just as if it were manually locked.

5.7. EN13137

The LFS-Pro has two fault detection modes, normal and EN13137. When EN13137 is enabled, a flow control fault will occur when the flow rate falls to zero for more than 120 seconds as specified in the EN/ISO13137 standard. Restart will not be attempted with this option.

5.8. Fault Retry

When **Fault Retry** is enabled, the pump will attempt an auto restart every 3 minutes after it has encountered a condition where it has gone into fault and stopped running. The pump will attempt restart for up to 30 minutes with a total of 10 attempted restarts. The default setting for **Fault Retry** is **enabled**.

To disable **Fault Retry**, so that the pump will not attempt a restart after faulting off:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup ►**. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Fault Retry**. Use the ⊕ and ⊖ buttons to select **disable or enable**. Press and release the ⏻ button to complete.

5.9. SmartCalSM Automatic Calibration

LFS-Pro has an optional automatic calibration capability called SmartCal. Select an air flow calibrator and connect it to the pump using the appropriate communications cable. When active; Pre, Post and flow calibration can be performed automatically.

The tubing setup is the same as a manual calibration (See Section 4.9.3.). Using the SmartCal feature requires the LFS-Pro pump to be connected to the calibrator using a USB C to C cable (811-9810-01-R).

The calibrator type must be specified to the pump before use. The calibrator type can be selected in the **Setup ► SmartCal** menu item. After specification, the calibrator type is stored and used whenever the pump is calibrated. If calibration is performed when the pump is not connected to a calibrator, the manual calibration option will be used.

When **Calibrate** is selected from the main menu, the pump enters SmartCal and displays the type of calibrator and the current flow rate reading. Follow the instructions for your calibrator to begin the calibration.

5.9.1. Gilian Go-Cal Pro

The Gilian Go-Cal Pro reads flow continuously and reports it for display on the LFS-Pro. When flow stability is reached, the calibration will be calculated and stored. *Calibration Complete* will be displayed. The  button can be used to return to the main menu. The SmartCal sets the operating mode of the calibrator to the setup required for proper calibration. After completion of the calibration, the calibrator is returned to the standard setup for the Go-Cal Pro.



1. Connect the SmartCal cable between the USB-C port on the Go-Cal Pro and the LFS-Pro USB-C port on the bottom of the pump.
2. On the LFS-Pro pump, go to **Flow set**. Use the  and  buttons to set the desired flow rate. Press and release the  button. Next, go to **Setup**, then **SmartCal**. Use the  and  buttons to select **Go-Cal**. Press and release the  button. This setup is only required once. Go to **Calibrate**, then press and release the  button. The pump will begin to run in the SmartCal mode.
3. While running in the SmartCal mode, the Go-Cal Pro displays the flow rate, and the following is displayed on the pump:

SmartCal	Go-Cal Pro (flow rate) cc/m
-----------------	------------------------------------
4. When flow stability is reached, the calibration will be calculated and stored. *Calibration Complete* will be displayed.
5. **Before removing the pump from the calibrator**, press and release the  button. The Main Menu screen is displayed. Remove the pump USB-C cable. Go to **Run**. Press and release the  button. The pump begins to run at the set flow rate.

5.10. Clear Datalog

Clear Datalog erases all datalog entries. When the datalog is full, any data saved in subsequent events will be lost. The datalog should be cleared after the data is extracted to allow space for new events. **The Datalog has the capacity to store up to 200 events.** The number of slots consumed in the datalog is shown on the Run Details screen. Starting an event without space in the datalog will cause a warning screen and the datalog must be cleared to before initiating an event is possible. Transfer any required data to written records or use the PC app to transfer to the computer database.

To clear the datalog:

IMPORTANT! Verify that all desired data has been archived prior to clearing!

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup ►**. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Clear Datalog**. Press and release the ⏻ button.
3. Press and release the ⏮ button to change the display to read OK. The message box now displays:

Erase Datalog?

► Cancel

Erase Datalog?

► OK

4. Press and release the ⏻ button when the display reads OK. The Datalog is now erased.

Note: To cancel out of **Clear Datalog**, press and release the ⏻ button when the display reads Cancel. Or press the ⏮ button on the device.

Note: Alternatively, the datalog can be cleared from the Factory Defaults screen within the Maintenance screen.

5.11. Run Options ►

5.11.1. Standard Temperature

Users may set the temperature that will be used in the calculation of the standard flow and volumes. The LFS-Pro factory default is 25°C (77°F) as the standard temperature.

To set the Standard Temperature:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Run Options** ►. Press and release the ⏻ button.
3. The cursor ► will now be at **Std Temp (° C or ° F)**. The current setting for **Std Temp (° C or ° F)** will be displayed at the right side of the screen. Use the + and - buttons to adjust the setting to the temperature desired.

Note: A single press and release of either of these buttons will increment or decrement the temperature setting by 1 degree. Press and *hold down* either button to scroll through the full range of numbers. When the desired temperature setting is selected, press and release the ⏻ button to complete.

5.11.2. Standard Pressure

Users may set the pressure that will be used in the calculation of the standard flow and volumes. The LFS-Pro factory default is 760 mmHg as the standard pressure.

To set the Standard Pressure:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Run Options** ►. Press and release the ⏻ button.
3. The cursor ► will now be at **Std Temp**. Press and release the ▼ button to move the cursor ► to **Std P**. The current setting for **Std P** will be displayed at the right side of the screen. Use the + and - to adjust the setting to the pressure desired. **Note:** A single press and release of either of these buttons will increment or decrement the pressure setting by 1. Press and *hold down* either button to scroll through the full range of numbers. When the desired pressure setting is selected, press and release the ⏻ button to complete. **Note:** Pressure Units can be changed in the AP Units screen found in the Display Options Menu.

5.11.3. Sensor Option

This option controls sensor calibration during sampling events. The sensor calibration is done at the beginning of each event to zero reference the flow measurement. During the event it is normally done at one hour intervals and whenever the temperature change at the flow sensor changes by more than 3 degrees C. The Sensor Option control has three settings, All, Hourly, and None. The operation in each option selection is described below.

All: All sensor calibrations are enabled, hourly and on temperature change.

Hourly: Only hourly sensor calibrations are enabled, not on temperature change.

None: No sensor calibrations are done during the event.

Note: The sensor calibration eliminates the major source of drift in the flow control system and ensures that drift will not affect flow accuracy. If sensor calibrations are reduced or eliminated, long term flow stability may be affected.

5.11.4. PaTa compensation

This compensation is applied for changes in ambient conditions. The correction adjusts the flow control to compensate for the change in barometric pressure and ambient temperature since the last calibration. This allows calibration at set of ambient conditions and operation across a wide range of pressure and temperature. The compensation barometric pressure and temperature ranges are given in Appendix B .

5.12. Display Options ►

These parameters control the appearance and format of displayed pump data.

5.12.1. Language

Users may select the display language; languages available include: English, Spanish, French, Dutch, German, Italian, Portuguese, Chinese, Korean and Turkish.

Note: Portuguese and Chinese language versions are limited to specific markets and are not standard.

English is the default.

To select the display language:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Display Options** ►. Press and release the ⏻ button.
3. The cursor ► will now be at **Language**. Press and release either the ➕ and ➖ button. Each press and release allows you to select from the following choices of languages: English, Spanish, French, Dutch, German, Italian, Portuguese, Chinese, Korean and Turkish. When the desired language is selected, press and release the ⏻ button to complete.

5.12.2. Temperature Units

Set the displayed temperature unit to **Celsius** or **Fahrenheit**.

To set the units in which temperature is displayed:

1. From the Main Menu screen, use the  and  buttons to move the cursor ► to **Setup** ►. Press and release the  button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the  and  buttons to move the cursor ► to **Display Options** ►. Press and release the  button.
3. Press and release the  button to move the cursor ► to **Temperature Units**. Press and release either the  or  button. Each press and release allows you to select either °C or °F. When the desired unit is selected, press and release the  button to complete.

5.12.3. Pressure Units

Set the displayed unit of pressure for backpressure to **"H₂O, mmHg, KPa or millibar**.

To set the units in which pressure is displayed:

1. At the Main Menu screen, use the  and  buttons to move the cursor ► to **Setup** ►. Press and release the  button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the  and  buttons to move the cursor ► to **Display Options** ►. Press and release the  button.
3. Press and release the  button to move the cursor ► to **Pressure Units**. Press and release either the  or  button. Each press and release allows you to select **"H₂O, mmHg, KPa or millibar**. When the desired unit is selected, press and release the  button to complete. In display screens, inches of water is abbreviated ", mmHg is abbreviated Hg, KPa is abbreviated KP, and millibar is abbreviated mbar.

5.12.4. Atmospheric Pressure (AP) Units

Set the displayed units of pressure for Atmospheric pressure to **"H₂O, mmHg, Kpa, or millibar**.

To set the units in which pressure is displayed:

1. At the Main Menu screen, use the  and  buttons to move the cursor ► to **Setup** ►. Press and release the  button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the  and  buttons to move the cursor ► to **Display Options** ►. Press and release the  button.
3. Press and release the  button to move the cursor ► to **AP Units**. Press and release either the  or  button. Each press and release allows you to select **"H₂O, mmHg, KPa or millibar**. When the desired unit is selected, press and release the  button to complete. In display screens, inches of water is abbreviated ", mmHg is abbreviated Hg, KPa is abbreviated KP, and millibar is abbreviated mbar.

5.13. Clock Set ►

Set the date, time, and hour format.

5.13.1. Clock

To set the time of day:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Clock Set** ►. Press and release the ⏻ button.
3. The cursor ► will now be at **Clock**. Use the + and - buttons to set the hour. When the desired hour is selected, press and release the ⏻ button to confirm and continue to the next step to edit the minutes.
4. Following the same steps use the + and - buttons to set the minutes. When the desired value for minutes is selected, press and release the ⏻ button to confirm. The selected time will be displayed at the top right portion of the display screen.

5.13.2. Date

To set the Date:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Clock Set** ►. Press and release the ⏻ button.
2. Press and release the ▼ button to move the cursor ► to **Date**. Use the + and - buttons to set the year. When the desired year is selected, press and release the ⏻ button to confirm and continue to the next step to set the month.
3. Following the same steps the month can be set with the + and - buttons. When the month is selected press the ⏻ button to confirm and continue to the next step to set the day.
4. Following the same steps the day can be set. Use the + and - buttons to select the day. When the day is selected, press and release the ⏻ button to confirm. The selected month, day and year will be displayed in the top left portion of the screen.

5.13.3. Time Format

Choose between 12-hour and 24-hour clock display.

To select the displayed **Time Format**:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup ►**. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Clock Set ►**. Press and release the ⏻ button.
3. Press and release the ▼ button to move the cursor ► to **Time format**. Use the + and - buttons to select either the **12h** or the **24h** format. When the desired time format is selected, press and release the ⏻ button to complete. The time will now be displayed in the selected format in the top status line.

5.13.4. Date Format

Select between MM/DD/YY and DD/MM/YY date formats.

To set the **Date Format**:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup ►**. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Clock Set ►**. Press and release the ⏻ button.
3. Press and release the ▼ button to move the cursor ► to **Date format**. Use the + and - buttons to select either the **mm/dd/yy** or the **dd/mm/yy** format. When the desired date format is selected, press and release the ⏻ button to complete. The date will now be displayed in the selected format in the top left portion of the screen.

5.14. Password

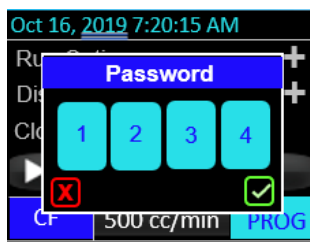
The LFS-Pro offers a password protection feature. The password for unlocking the keypad can be set in this menu item. A password may consist of 4 numerals. If the password is set to 0000, the password will not be required and the keypad will unlock without password entry.

Change password to 0000 to remove an existing password.

To set the password:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup** ►. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.

At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Password**, Press and release the ⏻ button. Use the ▲ and ▼ buttons to move the cursor from one number space to the next. Use the + and - buttons to assign any unique number from 0 to 9 for each of the four number spaces as a password. When the *password* is selected, press and release the ⏻ button to complete. The ⏮ button can be used to cancel and return to the main menu.



5.15. Control Mode (Constant Flow or Constant Pressure Low)

The **Control Mode** determines which control parameter the LFS-Pro holds constant during the sample. The two control mode options are holding the flow constant or holding the pressure constant. Minimum flow in **Constant Flow (CF)** is 20cc/min. **Constant Flow** control should be chosen for single samples, and **Constant Pressure Low (CPL)** control should be chosen when splitting the flow into multiple samples, and utilizing the variable manifold kits. In the **CF** mode, both the flow rate and the backpressure are displayed. In the **CPL** mode only the backpressure is displayed. Constant pressure control requires sample media holders with needle valves to control the flow rate. In the constant pressure mode, the flow rate is read at the external calibrator only.

Constant Flow Control and **Constant Pressure Control** are fundamentally different modes of operation. A description of the two modes follows.

Constant Flow Control holds the flow rate constant throughout the sample duration, even in the presence of variations in the backpressure of the sample media often caused by backpressure buildup on the filter.

Constant Pressure Control maintains a constant pressure level at the inlet of the pump, which provides a stable vacuum for drawing the sample. A needle valve is required in the sample media holder to set the flow rate. If the sample media resistance is constant, the flow through the media will also remain constant.

This mode allows the sample to be split, and it is also called the **Multi-Flow Mode**. This mode requires a sample media holder that incorporates a needle valve in each split segment.

Example; a dual holder will require two needle valves to set the two flow rates independently. The constant pressure source allows the flow to be split, because adjusting one side does not change the flow rate through the other side, since the collective force pulling the two samples remains constant.

Constant pressure mode maintains constant flow in the sample only when the flow resistance of the sample path remains constant during sampling. If the flow resistance varies the flow rate will vary. With the default pressure set point of 10 inches of water, if the pressure varies by 0.9 inches of water, the flow will change by about 5%. Care should be used in selecting the applications that are used with constant pressure control and the behavior of the sample resistance under field conditions should be verified.

To select the **Control Mode**:

1. At the Main Menu screen, use the  and  buttons to move the cursor  to **Control Mode**. Press and release the  button.
2. Use the  and  buttons to select either the **CF** (Constant Flow [20-500 cc/min]), or **CPL** (Constant Pressure [1-500cc/min]) control mode. When the desired control mode is selected, press and release the  button to complete. The selected control mode will now be displayed in the bottom status line.

3. Alternate Control Mode Procedure

A fast access method to select control mode can be entered from within the home screen. Press and release the  button for 3 seconds and it will open the Control Mode window. Use the  and  buttons to choose CF or CPL and then press and release the  button to complete.

5.16. Run Mode: Manual, Timed, Vol, RT and Program name

The **Run Mode** selection determines how the timing of the event is managed. In **Manual** mode, the pump is switched on and off with the keypad. Any run time is possible within the limits of the pump capacity. In **Timed** mode, the start time and stop time of a sample is specified in the **Run Setup** submenu.

In **Vol** mode the total volume sampled is specified in the **Run Setup** submenu. The specified volume in milliliters (mL) will be selected in increments of 25 mL. In **Vol** mode the control mode must be in Constant Flow (CF) to allow measurement of the specified volume. If an event has a Constant Pressure (CP) mode specified, **Vol** mode will not be available.

In **RT** mode the start time and the event sampling duration is specified in the **Run Setup** submenu. The duration is independent of pauses, sensor calibrations, and fault off time.

In **Program** mode, the flow rate and a series of clock times, dates, days of the week, on-periods and off-periods can be programmed. The program is entered in **Program edit** under **Run Setup**. Each Program has a name and the names are shown in this menu item selection to allow the desired run parameters to be set.

To set the Run Mode:

1. At the Main Menu screen, use the  and  buttons to move the cursor ► to **Run Mode**. Press and release the  button.
2. Use the  and  buttons to select either the desired mode. When the desired run mode is selected, press and release the  button to complete.

Note: User programs will be listed as available **Run Mode** selections *in addition to* the **Manual, Timed, Vol** and **RT** modes, these can be selected the same way.

Note: When the pump is powered on it will remember the last set **Run Mode, Manual, Timed, Vol, RT** or selected Program. If a different mode is desired, it must be set before running an event.

5.17. Run Setup ►

Go to **Run Setup** to set the parameters for constant pressure mode operation, timed and programmed runs.

To enter Run Setup:

At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Run Setup** ►. Press and release the ⏻ button.

5.17.1. Timed Start (T/V/R start)

Select a specific clock time as the beginning time of a sample event. At the selected time, the pump will sample for the timed duration as specified below. The event will start when the time is after the set time. If the timed Start is set to midnight (00:00:00) the event will start immediately and use the current time as the start time.

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Run Setup** ►. Press and release the ⏻ button.
2. The cursor ► will now be at **T/V/R start**. On the display screen, to the right of **Timed start**, a clock time is displayed in the selected system time format. Use the + and - buttons to set the hour. When the hour is selected, press and release the ⏻ button.
3. The minute portion of the clock time can now be adjusted. Use the + and - buttons to set the minutes. When the minutes are selected, press and release the ⏻ button. The setting of the start time for the timed run is now complete.

5.18. Timed Duration

Timed Duration specifies the how many minutes after the time specified in **T/V/R start** the event will end. The event starts as soon as the time has passed. If the T/V/R start time is set to 0:00 it will start immediately and use the current time as the start time. The event will end at the start time plus the specified duration. As an example, if the start time is 1:00, and the duration is 120min, the event will start at 1:00 am and conclude at 3:00am. If the event is started after 1:00am it will start immediately and run until 3:00am. If started after 3:00am it will start the pump and end the event immediately since both 1:00am and 3:00am have passed. The pump will run for less than one second. **To set:**

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Run Setup** ►. Press and release the ⏻ button.
2. Use the ▲ and ▼ buttons to move the cursor ► to **Timed Duration**. Use the + and - buttons to set the time for the duration of the run in minutes. When the run time in minutes is selected, press and release the ⏻ button. The setting of the stop time for the event is now complete.

5.19. Vol Set

Vol Set allows the specification of the volume to be collected in the event. The volume is in liters. **To set:**

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to Run Setup ►. Press and release the ⏻ button.
2. Use the ▲ and ▼ buttons to move the cursor ► to Vol Set. Use the + and - buttons to set the number of liters to collect. When the volume is selected, press and release the ⏻ button. The setting of the volume for the event is now complete.

5.20. RT

RT specifies the how many minutes the event will run, sensor calibration, user pauses and shutdown times due to fault will not be included. **To set:**

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to Run Setup ►. Press and release the ⏻ button.
2. Use the ▲ and ▼ buttons to move the cursor ► to RT. Use the + and - buttons to set the time for the duration of the run in minutes. When the run time in minutes is selected, press and release the ⏻ button. The setting of the run time for the event is now complete.

Note: See Section 6.1. and Appendix A for advanced programming.

5.21. Pressure Set ("H₂O, mmHg, KPa or mbar)

Pressure set is used to set the pressure that will be maintained when the pump is running in the constant pressure (**CP**) control mode (See Section 5.15.). Available pressure set points are between 1 inch of water to 40 inches of water. If the pressure is set outside the performance capability of the pump, a fault will occur when **Run** is selected.

Note: Factory default is 10 inches of water.

To set the pressure that will be maintained in the Constant Pressure Mode:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to Run Setup ►. Press and release the ⏻ button.
2. Use the ▲ and ▼ buttons to move the cursor ► to Press set ("H₂O, mmHg or KPa) (See Section 5.12.3. to select units). Use the + and - buttons to set the pressure. When the pressure is selected, press and release the ⏻ button to complete.

5.22. Motion Menu ►

Set the motion thresholds

5.22.1. Steps Threshold

The Steps Threshold setting determines when the motion of a pump is considered ACTIVE based on the number of pump-wearer steps per minute. When the pump-wearer steps are below the Steps Threshold setting, the pump is considered Stationary or Inactive based on the Motion Threshold. The default Steps Threshold is 3; this setting can be increased to disregard steps taken within a small area and only change states when the wearer walks for longer distances.

5.22.2. Motion Threshold

The Motion Threshold setting determines the motion state when the pump-wearer is not ACTIVE. Using subtle pump motion, it differentiates between INACTIVE motion and STATIONARY. The default Motion Threshold setting is 13, increasing this setting may prevent a pump's motion state from changing from INACTIVE to STATIONARY when a pump is placed on a mobile service (i.e. a car seat while the car is being driven).

Note: Check the baseline motion setting prior to adjusting by going to the Idle Screen (Pump not sampling), and then scrolling to the Motion Screen. Observe the Acceleration (Accel) value while the instrument is sitting upright on a flat surface. If the value is above 13, consider setting the Motion threshold to a value that is 3 higher than what is shown as the Accel value.

SECTION SIX: Programming

6.1. Program ►

User programs specify a series of actions that control the sampling protocol employed by the pump. The pump can store up to 16 programs, each of which can be created, edited and executed. A program allows the specification of flow rate, control mode and the timed steps that determine when the pump runs.

IMPORTANT! – FOR AN ENTERED PROGRAM TO BE ABLE TO RUN:

The entered program will be one of sixteen allowed and will be named as selected in the entry edit procedure (Section 6.3.), and it must be *saved* (Section 6.9.).

Run Mode must be set to that program name (Section 5.16.).

Note: An example detailing the procedures for entering and editing a program can be found in Appendix A.

Note: Users can create, edit and load programs in the PC Application.

Programs specify a series of clock determined operations. Operations can wait for a specified time of day, turn on for a specified time, turn off for a specified time and cycle back to the previous steps a specified number of times. Clock determined means that the program sets a series of times that are used for all steps and pump on times or pump off times. An example will make it clear.

Program Step	Function	Value	Starts at	Ends At	Pump Action
1	Time	8:00 AM	Run Start	8:00 AM	Off
2	On	240	8:00 AM	12:00 PM	On
3	Off	60	12:00 PM	1:00 PM	Off
4	On	240	1:00 PM	5:00 PM	On
5	End	0	5:00 PM	5:00 PM	Off

User selected or pump controlled off times will adjust the sampling time, but will not change the beginning or ending times. Pump controlled off times include Sensor Calibrations and fault pauses. User controlled off times are keypad initiated pauses. When the RT or VOL program steps are used, the timing is set by the sampling time, not counting sensor calibrations, fault caused pauses or user pauses.

For example, in an ON INTERVAL step, if the user pauses the pump at 9:00 for 30 minutes, the total run time will be 450 minutes instead of 480, and the program step

changes will occur at the scheduled times. Pausing the pump will not alter the next step begin time.

In a RT step, if the user pauses the pump for 30 minutes, the step will extend the end time so that the actual run time is as specified in the step. Similarly, the VOL step determines the end of the step by the actual volume sampled, not by the time.

Programming sample schedules can be complicated when more advanced scheduling steps are involved. Some examples are shown in Appendix A that will assist in advanced programming.

6.2. Program Edit ►

This submenu allows the creation and editing of up to 16 programs. Each program is stored in nonvolatile flash memory and can be selected using the **Run mode** item on the main menu (See Section 5.16.).

IMPORTANT! Programs that are created or modified must be saved for the changes to be retained. If the program is not saved before exiting **Entry/Edit** it will be lost. If a change is made to a program, the "Save" menu item will show "Changed" indicating that a change has been made and editing is abandoned, the changes will be lost.

To navigate to the **Program Edit** function:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Run Setup** ►. Press and release the ⏻ button.
2. Use the ▲ and ▼ buttons to move the cursor ► to **Program Edit** ►. Press and release the ⏻ button.

6.3. Program Name

The program name is displayed when the **Run mode** is selected after a program has been entered and saved. When the program is entered on the pump, a name is assigned, i.e. – **PROG01** through **PROG16**.

Note: Using the *data communication option and a PC*, alphanumeric program names may also be assigned.

To pick a program to enter/edit:

1. While in the **Program Edit** menu (section 6.2.).
2. Move the cursor to **Prog Name**. At the right of **Prog Name**, a program name such as **PROG01** is displayed. Use the + and - buttons to select the **desired program**, then press and release the ⏻ button to complete.

6.4. Control Mode

Use to select either the **Constant Flow** or **Constant Pressure** control mode for a program. The **Set point** function is used to set the flow rate or pressure depending on the setting of this parameter. The unit will not allow you to select **VOL** if CPL is selected. To select the **Control Mode** for a program:

1. While in the **Program Edit** menu (section 6.2.).
2. Use the  and  buttons to move the cursor ► to **Control Mode**. Use the  and  buttons to select the control mode in which you want the pump to run during the execution of the program, then press and release the  button to complete.

6.5. Set the Flow Rate or Pressure

The flow rate set point for constant flow is selected in the **Program Edit** submenu. The same limits and restrictions apply in **Program Mode** as in **Manual Mode**.

To program the **Setpoint** flow rate for a program:

1. While in the **Program Edit** menu (section 6.2.).
2. Use the  and  buttons to move the cursor ► to **Setpoint**. Use the  and  to select the set point flow rate or pressure at which you want the pump to run during the execution of the program, then press and release the  button to complete.

Note: When in CF mode, the unit will not run unless the unit is calibrated to the selected setpoint value.

6.6. Program Steps

Each program step is numbered and executed sequentially. To enter or edit a program select the desired program step and edit it to perform the desired function. A program may have up to 20 steps.

To enter or edit a particular program step:

1. While in the **Program Edit** menu (section 6.2.).
2. Use the  and  buttons to move the cursor ► to **Prog Step**. Use the  and  buttons to select the program step you wish to enter or edit.

6.7. Function

Each program step performs a specific function. The available functions are:

- **On Interval** - turns on the pump for the specified number of minutes.
- **Off Interval** - specifies a time during which the pump does not sample.
- **Cycle** - loops back and repeats for a specified number of times to the last cycle function or the beginning of the program if there is no previous cycle function.
- **Time** - waits for a specified time to arrive before the next program step is executed. The time base setting for the next step is set to the time in the command.
- **Date** - waits for the date specified in the value. The time base setting for the next step is set. If the set date has already passed, the unit will display “Date Check/Set” as a reminder to update it.
- **Weekday** - waits for the day of the week specified in the value. The time base setting for the next step is set.
- **Vol** - will run the pump and collect the specified volume (in liters). The program must use CF control mode for this step type.
- **RT** - turns on the pump to run for the specified number of minutes, not counting sensor calibrations, user pauses and fault shutdown time.
- **End** - terminates the program.

The cycle function is used mainly for intermittent sampling (e.g., 5 minutes on and 55 minutes off for 72 hours).

IMPORTANT! – Verify that you are at the correct program step (and change it if necessary per Section 6.6.) before selecting or changing the function to be performed at that program step.

To set the **Function** for a particular program step:

1. While in the **Program Edit** menu (section 6.2.).
2. Use the  and  buttons to move the cursor ► to **Function**. Use the  and  buttons to select the program function you want the pump to perform at a particular program step, then press and release the  button to complete.

6.8. Function Value

Specifies the parameter associated with the function selected to be performed at a particular program step. For **Time**, the parameter is a time of day; for **On Interval** and **Off Interval**, the parameter is time in minutes; for **Cycle**, the parameter is number of cycles, for **Date** the parameter is a date and for **Weekday**, the parameter is a day of the week, for **Vol** the parameter is a Volume in Liters, for **RT** the parameter is in minutes.

IMPORTANT! – Verify that you are at the correct program step and that the correct program function (Section 6.7.) has been entered.

To set the **Value**:

1. While in the **Program Edit** menu (section 6.2.).
2. After verifying that you have entered the correct program step (Section 6.6.) and the correct program function (Section 6.7.) that you wish to enter or change the function value, use the  and  buttons to move the cursor  to **Value**. If the program step you are entering/changing has the **Time** function assigned, then use the  and  buttons to select first the hour (in 24-hour format), press and release the  button, then use the  and  buttons to select the minute, then press and release the  button to complete.
3. If the program step you are entering/changing has the **On Interval** or **Off Interval** function assigned, use the  and  buttons to select the number of minutes for the duration of that interval, then press and release the  button to complete.
4. If the program step you are entering/changing has the **Cycle** function assigned, use the  and  buttons to specify the total number of cycles for the number of times you want the pump to loop back and repeat the entire program, then press and release the  button to complete.
5. If the program step you are entering/changing has the **Date** function assigned, use the ,  and  buttons to set the date to the desired day.
6. If the program step you are entering/changing has the **Weekday** function assigned, use the  and  buttons to specify the desired day of the week. Press the  button to complete.
7. If the program step you are entering/changing has the **Vol** function assigned, use the  and  buttons to specify the desired volume. Press the  button to complete.
8. If the program step you are entering/changing has the **RT** function assigned, use the  and  buttons to specify the minutes of runtime desired. Press the  button to complete.

6.9. Save a Program

Save is used to store the edited program to the nonvolatile memory. If the program has been changed, the word "Changed" will be shown at the "Save" menu item.

IMPORTANT! All changes will be lost unless the program is saved! The program will remind to save if a change has been made and exit is attempted.

To **Save** a program after it has been entered or edited:

Use the  and  buttons to move the cursor  to **Save**. To the right of **Save**, you will see the message **Changed** displayed. Press and release the  button. The **Changed** message disappears from the screen. The program has now been saved to non-volatile memory.

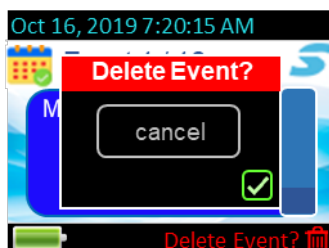
6.10. Review Events

Review allows the pump to display the results of the last 200 sample events. When the item is selected, a display appears that shows the sample number (1 is the oldest and the highest number is the most recently stored sample). Each stored event can be displayed by using the  and  buttons. The selected event can be deleted if desired. The display for each event includes control mode, run mode, flow rate or pressure, total sampled volume, run time, pre and post calibrations, start/stop times, EN13137 status, STP readings, average ambient temperature and pressure, STP volume and flow rate.

To **Review** the stored sample events:

1. At the Main Menu screen, use the  and  buttons to move the cursor  to **Review**. Press and release the  button.
2. Use the  and  buttons to select each sample event. There are four sets of screens that will display data for each event and the  and  buttons switch between these screens. Press and release the  button to exit **Review** and return to the Main Menu.

To delete an event being reviewed, scroll to the end of the Review menu until the cursor is on the Delete  icon. Press the  button. A question box will pop up and allow the deletion of the event to be canceled or confirmed.



SECTION SEVEN: PC Interface

7.1. Gilian CONNECT Pro

The LFS-Pro has the capability of PC interface through the USB-C connection. The PC interface enables communication with the Gilian CONNECT Pro pump management system. Gilian CONNECT Pro provides the following capabilities:

- Download of event data, including summary and minute by minute datalogs from the pump to a data base
- Creation of field reports for each sample
- Editing and transfer of settings to the pump
- Export of event historical data in CSV file format for use in a PC spreadsheet application such as Excel[™]

Connecting the pump to a PC can be performed with the included USB cable. Each pump is recognized by its serial number. A new pump must be registered before it will be recognized. The PC interface program format is summarized in the table below. A separate user manual (P/N 360-0268-01) describes the operation of Gilian CONNECT Pro in detail.

Main Tabs	Sub Tabs	Function
Data Retrieval and Reports	Review Data from Logs	Download Sample Logs & Produce Field Reports and Graphs
Pump Manager	Manage Pump Information & Manage Pump Configuration	Manage pump setup and parameters
Program Manager	Manage Programming & Transfer Programs to Pump(s)	Create, Edit, Duplicate or Delete Sampling Programs; Transfer Programs to Pump(s)

Note: Please see the Gilian CONNECT Pro Application User Manual for additional information.

SECTION EIGHT: Maintenance Menu

8.1. Maintenance ►

The **Maintenance** submenu has controls that are occasionally used. These functions are used for clearing the LFS-Pro pump memories, calibrating transducers or performing other pump maintenance functions.

To change the settings for each item in the **Maintenance** submenu:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Maintenance ►**. Press and release the ⏻ button. The pump will now display the **Maintenance** submenu screen.
2. At the **Maintenance** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to the desired submenu item. Each of the submenu items have additional menus or actions beneath them and are selected by pressing and releasing the ⏻ button.

8.2. Factory Defaults

8.2.1. Global Reset

Global Reset resets all user controlled parameters to the factory ship values.

Default factory values:

Parameter	Default Value
Flow Rate	250 cc/min
Control Mode	CF
Run Mode	Manual
Point calibrations	nominal
Pressure setpoint	10 inches H2O
Timed start	12:00 am
Timed duration	1 minutes
Event enable	disabled
Events in Datalog	retains current data
Standard Temperature	77 degrees F
Standard Pressure	760 mmHg
Language display	English
Temperature Units	degrees F
Pressure Units	inches H2O
Password	disabled (0)
User Programs	cleared
Power source	Li-Ion

To perform **Global Reset**:

Note: To preserve user programs, go to the Reset menu item instead of Global reset. (See Section 8.2.2.)

1. From the Main Menu screen, use the  and  buttons to move the cursor ► to **Maintenance ►**. Press and release the  button.
2. The pump will now display the **Maintenance** submenu screen. The cursor ► will be at **Factory Defaults ►**. Press and release the  button.
3. The cursor ► will now be at **Global reset**. Press and release the  button.
4. The following message box will appear:

Global reset
► Cancel

5. **Note:** To cancel out of **Global Reset**, press and release the  button or the  button at this time.
6. Press and release the  button. The message box now displays:

Global reset
► OK

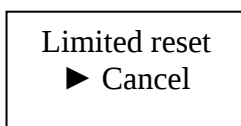
7. Press and release the  button. Global reset is now complete.

8.2.2. Reset (save programs)

Resets all user control parameters to factory ship values while preserving users programs.

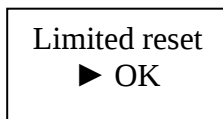
To perform **Reset (save programs)**:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Maintenance** ►. Press and release the ⏻ button.
2. The pump will now display the **Maintenance** submenu screen. The cursor ► will now be at **Factory Defaults** ►. Press and release the ⏻ button.
3. The cursor ► will now be at **Global reset**. Use the ▲ and ▼ buttons to move the cursor ► to **Reset (save programs)**. Press and release the ⏻ button.
4. The following message box will appear:



Note: To cancel out of **Reset (save programs)**, press and release the ⏻ button or the ⏮ button at this time.

5. Press and release the ⏮ button. The message box now displays:



6. Press and release the ⏻ button. Limited reset is now complete.

8.2.3. Clear Datalog

Clear Datalog erases all datalog entries. When the datalog is full, any data saved in subsequent events will be lost. The datalog should be cleared after the data is extracted to allow space for new events. **The Datalog has the capacity to store up to 200 events.** The number of slots consumed in the datalog is shown on the **Run Details** screen. Starting an event without space in the datalog will cause a warning screen. The datalog must be cleared before initiating an event is possible. Transfer any required data to written records or use the PC app to transfer to the computer database.

To clear the datalog:

IMPORTANT! Verify that all desired data has been archived prior to clearing!

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Setup ►**. Press and release the ⏻ button. The pump will now display the **Setup** submenu screen.
2. At the **Setup** submenu screen, use the ▲ and ▼ buttons to move the cursor ► to **Clear Datalog**. Press and release the ⏻ button. The following message box will be displayed:

Erase Datalog?

► Cancel

Note: To cancel out of **Clear Datalog**, press and release the ⏻ button at this time.

3. Press and release the ⏏ or ⏎ button. The message box now displays:

Erase Datalog?

► OK

4. Press and release the ⏻ button. The Datalog is now erased.

8.3. T ambient Cal ►

Calibrates the ambient temperature sensor used in the STP calculation. The calibration should be checked periodically, typically at the beginning of a sample run. Do not exceed six (6) months between calibrations of the ambient temperature sensor.

To perform **T ambient Cal**:

1. The pump should be idle and in a stable ambient temperature for at least one hour before this procedure. This ensures the ambient temperature sensor is not elevated by internal heating.
2. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Maintenance ►**. Press and release the ⏻ button. The pump will now display the **Maintenance** submenu screen. The cursor ► will now be at **Factory Defaults ►**.
3. Use the ▲ and ▼ buttons to move the cursor ► to **T ambient Cal ►**. Press and release the ⏻ button.

The following message box will appear:

Ta Sensor 23.6 C
Enter Ta 27.1 C

Note: To cancel out of **T ambient Cal**, press and release the button at this time.

4. Press and release the + or - button to adjust the “Enter Ta (C)” value to the current ambient temperature. Press and release the ⏻ button. The Ta sensor will change to show the current measured ambient temperature after calibration.
5. Press and release the ⏻ button. Ambient temperature calibration is now complete.

8.4. Barometric P Cal ►

Calibrates the barometric pressure sensor used in the STP calculation. The calibration should be checked periodically, typically at the beginning of a sample run. Do not exceed six (6) months between calibrations of the barometric pressure sensor.

To perform **Barometric P Cal**:

1. At the Main Menu screen, use the ▲ and ▼ buttons to move the cursor ► to **Maintenance ►**. Press and release the ⏻ button. The pump will now display the **Maintenance** submenu screen. The cursor ► will now be at **Factory Defaults ►**.
2. Use the ▲ and ▼ buttons to move the cursor ► to **Barometric P Cal ►**. Press and release the ⏻ button.
3. The following message box will appear:

PB sensor 761
Enter PB 760
[mmHg]

Note: To cancel out of **Barometric P Cal**, press and release the ⏻ button at this time.

4. Press and release the + or - button to adjust the “Enter PB” value to the current barometric pressure. Press and release the ⏻ button. The “PB sensor” will change to show the current measured ambient barometric pressure after calibration.
5. Press and release the ⏻ button. Barometric pressure calibration is now complete.

8.5. Factory Cal

Factory Cal restores the original factory calibration by resetting the ambient temperature and ambient pressure values, as well as the original Point Cal values. Following a Factory Cal reset, user should check the ambient temperature and pressure values and perform a new Point Cal for their desired flow rate.

8.6. Info

Info displays the key information about the pump, including Pump Firmware Version, Battery Firmware Version, Serial Number, Part Number and Last Calibration Date. Use the  and  buttons to view the two pages of information.

Firmware : V1.0.0.0 Battery Firmware : V1.1.1 Serial Number : 26141811999
--

Part Number : 610-1811-01-R Last Calib Date : Apr 01, 2026

SECTION NINE: User Maintenance

9.1. Li-Ion Battery Maintenance and Reconditioning

The Li-Ion battery pack provides service for 300 to 500 cycles depending on the conditions of use and storage. All rechargeable batteries lose charge over time even if not in use. This is called self-discharge. The self-discharge rate of the li-Ion cells used in the LFS-Pro battery pack is about 1% per day. It is important to have the pack fully charged when starting a sample. To guarantee full charge, leave the pump on charge until ready to use. Once the pump has charged completely, the battery pack will change to a trickle charge mode that maintains the battery at maximum capacity.

If a battery pack goes unused and/or uncharged for more than three (3) weeks, it should be reconditioned by putting it on charge for 12 hours. Remove the pump from charger and let it rest for at least one hour. Reconnect it to the charger for another charge cycle.

As the battery goes through charge/discharge cycles and ages, its capacity will diminish. If the battery is reconditioned as described above and does not result in expected run times, the battery has reached end of life and should be replaced.

This one hour reconditioning step may result in slightly extended charging times. If the pump detects a more serious battery condition it will provide an indication that a problem has been detected with the battery pack. See Appendix D for more information. Battery life can be extended by storing in cool conditions. High temperatures can cause accelerated aging. **DO NOT** attempt to deep discharge the battery pack.

Battery packs have several additional capabilities listed below.

1. The packs support the new run on charge for extended run mode.
2. When the battery charge becomes dangerously low, it is internally interrupted to slow the deep discharge of the pack. This will be reset when the pack is charged.

9.2. Battery Replacement

To replace the battery pack, follow the steps below:

1. Remove the case screw.
2. Remove the battery pack from the top case. Note that it is connected to the pump circuit board by a wire harness.
3. Carefully unplug the wire harness, noting the position of the ten pin connector.
4. Connect the new battery, observing the correct pin pattern.
5. Reconnect the case halves. Pay attention to wire routing so as not to pinch the wire harness.
6. Replace the case screw, and snug tighten only. Tighten until the gap between the case halves fully closes – **Do not over tighten.**
7. Charge the battery.

SECTION TEN: Appendices

Appendix A:	Example Program Setup & Edit
Appendix B:	Temperature and Barometric Pressure Compensation
Appendix C:	Low Flow Manifold
Appendix D:	Troubleshooting Guide
Appendix E:	Parts List
Appendix F:	Specifications
Appendix G:	LFS-Pro Light Sequences
Appendix H:	Factory Calibration and Service

Appendix A: Example Program Setup & Edit

This example program operates the pump as follows:

- The pump must be calibrated per Section 4.9.2. and 4.9.3. to run at a flow rate of 300 cc/min.
- Control mode is set to CF (Constant Flow Mode).
- Flow rate is set to 300 cc/min.
- The program starts with an On Interval at 4:00 PM (16:00 Hrs).
- The On Interval lasts for 1 minute, then an Off Interval begins and the pump stops running.
- The Off Interval lasts for 1 minute and then repeats the entire program for 2 cycles.

ENTER AND RUN THE PROGRAM

Note: The program must be saved before leaving the entry/edit process to transfer it to storage. If the program is not saved, it will be lost. Some users may want to save the program at each edit step. Saving the program after entry and editing before exiting will store the entire program.

1. At the Main Menu screen, use the  and  buttons to move the cursor ► to **Run Setup ►**. Press and release the  button. Use the  and  buttons to move the cursor ► to **Program ►**. Press and release the  button.
2. Use the  and  buttons to move the cursor ► to **Program Edit ►**. Press and release the  button.
3. The cursor ► is now at **Prog Name**. Use the  and  buttons to select the program name. Press and release the  button. Select **PROG01** to appear to the right of **Prog Name**.
4. Use the  and  buttons to move the cursor ► to **Control Mode**. Use the  and  buttons to set the Control Mode to CF (Constant Flow). Press and release the  button.
5. Use the  and  buttons to move the cursor ► to **Setpoint**. Use the  and  buttons to set the set point flow rate to 300 cc/min. Press and release the  button.
6. Use the  and  buttons to move the cursor ► to **Prog Step**. Use the  and  buttons to set the program step to 1.
7. Use the  and  buttons to move the cursor ► to **Function**. Use the  and  buttons to set the function to **Time**. Press and release the  button.
8. Use the  and  buttons to move the cursor ► to **Value**. Use the  and  buttons to set the hour to 16:00 or 4:00 PM. Press and release the  button.

9. Use the  and  buttons to set the minutes to 00. Press and release the  button. 16:00 or 4:00 PM is now the displayed program start time.
10. Use the  and  buttons to move the cursor ► to **Save**. Press and release the  button.
11. Use the  and  buttons to move the cursor ► back up to **Prog Step**. Use the  and  buttons to set the program step to 2.
12. Use the  and  buttons to move the cursor ► to **Function**. Use the  and  to set the function to Cycle. Press and release the  button.
13. Use the  and  buttons to move the cursor ► to **Value**. Use the  and  buttons to set the value to 0. Press and release the  button.
14. Use the  and  buttons to move the cursor ► to **Function**. Use the  and  buttons to set the function to On Interval. Press and release the  button.
15. Use the  and  buttons to move the cursor ► to **Value**. Use the  and  buttons to set the On Interval to 1. Press and release the  button.
16. Use the  and  buttons to move the cursor ► back up to **Prog Step**. Use the  and  buttons to set the program step to 3.
17. Use the  and  buttons to move the cursor ► to **Function**. Use the  and  buttons to set the function to Off Interval. Press and release the  button.
18. Use the  and  buttons to move the cursor ► to **Value**. Use the  and  buttons to set the Off Interval to 01. Press and release the  button.
19. Use the  and  buttons to move the cursor ► back up to **Prog Step**. Use the  and  buttons to set the program step to 4.
20. Use the  and  buttons to move the cursor ► to **Function**. Use the  and  buttons to set the function to Cycle. Press and release the  button.
21. Use the  and  buttons to move the cursor ► to **Value**. Use the  and  buttons to set the Cycle to 2. Press and release the  button.
22. Use the  and  buttons to move the cursor ► to **Save**. Press and release the  button.
23. Press the  button 3 times to exit to the Main Menu. Use the  and  buttons to move the cursor ► to Run Mode. Use the  and  buttons to set the Run Mode to **PROG01**. Press and release the  button. If **PROG01** is not available in the Run Mode, the programs have not been enabled.

24. Use the  and  buttons to move the cursor  to **Run**. Press and release the  button. The pump will then display the Event ID screen (if the Event function has been enabled see Section 5.2.). If Event has been enabled, enter the Event ID and press and release the  button. The pump now displays the Program screen, the event starts, and the pump will begin to run at the displayed start time (16:00). If the current time is later than 16:00, the next step will start immediately.

EDITING THE PROGRAM

To change the number of cycles in the program from 2 cycles to 3 cycles, perform the following steps:

1. At the Main Menu screen, use the  and  buttons to move the cursor  to **Run Setup** . Press and release the  button. Use the  and  buttons to move the cursor  to **Program Edit** . Press and release the  button.
2. The cursor  is now at **Prog Name**. Use the  and  buttons to select **PROG01** for the program name. Press and release the  button. **PROG01** now appears to the right of **Prog Name**.

IMPORTANT! – To edit an already existing program, you must correctly select the program name of the program you wish to edit. Otherwise, you may inadvertently edit the wrong program!

In this example, only one program was entered and stored into the pump. When the program was entered, it was entered into the program name **PROG01** (any other name could have been assigned as well, i.e. – **PROG03**). Enter **PROG01** to edit the program with the unique name **PROG01**.

Note: The pump provides program names PROG01 - PROG16, other program identifiers can be assigned via the PC Application Program Manager.

To change the number of cycles in **PROG01**, access the Program Step where the Cycle function was entered. For the example program, the Cycle function was selected at Program Step 4.

1. Use the  and  buttons to move the cursor  to **Prog Step**. Use the  and  buttons to set the program step to 4.
2. Use the  and  buttons to move the cursor  to **Function**. Verify that the setting assigned to Function for Program Step 4 is Cycle.
3. Use the  and  buttons to move the cursor  to **Value**. Use the  and  buttons to change the Function value from 2 to 3. Press and release the  button.
4. Use the  and  buttons to move the cursor  to **Save**. Press and release the  button. The change from 2 cycles to 3 cycles for the program named **PROG01** has now been successfully entered and stored. Press and release the  button 3 times to exit to the Main Menu.

SAMPLE PROGRAMS

This section contains several sample programs illustrating common program uses. The examples are intended to illustrate the use of each type of program step.

The programming examples below are presented in tabular form using 12 hour clock display. The first three columns provide the information necessary to enter each step. The next three columns interpret each step, and a summary of the program appears below each table.

Note: The pump will start the program when the run key is pressed. If the time specified in the program has already passed the program will continue to the next step. This will continue until the end statement is reached. Clock can be displayed in 12 hour or 24 hour time format. (See Section 0)

Basic Program (similar to Timed mode)

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
1	Time	8:00 AM	Run key	8:00 AM	Off
2	On Interval	480 (min.)	8:00 AM	4:00 PM	On
3	End	0	4:00 PM	4:00 PM	Prog End

This program waits until 8:00 AM is past on the current day, then turns the pump on until 4:00 PM (480 minutes, 8 hours) later. At 4:00 PM the program ends.

Timed with multiple sampling periods

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
1	Time	8:00 AM	Run key	8:00 AM	Off
2	On Interval	240 (min.)	8:00 AM	12:00 PM	On
3	Off Interval	60 (min.)	12:00 PM	1:00 PM	Off
4	On Interval	240 (min.)	1:00 PM	5:00 PM	On
5	End	0	5:00 PM	5:00 PM	Prog End

This program waits until 8:00 AM is past on the current day, then turns the pump on until 12:00 PM (240 minutes, 4 hours) later. The pump stays off until 1:00 PM, and then turns on until 5:00 PM. At 5:00 PM the program ends.

Date and time

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
1	Date	May 1, 2012	Run key	May 1, 2012	Off
2	Time	8:00 AM	May 1, 2012 12:00 AM	8:00 AM	Off
3	On Interval	240 (min.)	8:00 AM	12:00 PM	On
4	Off Interval	60 (min.)	12:00 PM	1:00 PM	Off
5	On Interval	240 (min.)	1:00 PM	5:00 PM	On
6	End	0	5:00 PM	5:00 PM	Off

This program waits until midnight on the specified day, then waits until 8:00 AM on that day, then turns the pump on until 12:00 PM (240 minutes, 4 hours) later. The pump stays off until 1:00 PM, and then turns on until 5:00 PM. At 5:00 PM the program ends.

Day of week

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
1	Weekday	Mon	Run key	Next Monday	Off
2	Time	8:00 AM	Monday 12:00 AM	8:00 AM	Off
3	On Interval	240 (min.)	8:00 AM	12:00 PM	On
4	Off Interval	60 (min.)	12:00 PM	1:00 PM	Off
5	On Interval	240 (min.)	1:00 PM	5:00 PM	On
6	End	0	5:00 PM	5:00 PM	Prog End

This program waits until midnight is past on Monday, waits until 8:00 AM, then turns the pump on until 12:00 PM (240 minutes, 4 hours) later. The pump stays off until 1:00 PM, and then turns on until 5:00 PM. At 5:00 PM the program ends.

Multiple day of week

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
1	Weekday	Mon	Run key	Monday 12:00 AM	Off
2	Time	8:00 AM	Monday 12:00 AM	8:00 AM	Off
3	On Interval	480	8:00 AM	12:00 PM	On
4	Off Interval	60	12:00 PM	1:00 PM	Off
5	On Interval	240	1:00 PM	5:00 PM	On
6	Weekday	Tue	Monday 5:00 PM	Tuesday 12:00 AM	Off
7	Time	8:00 AM	Tuesday 12:00 AM	8:00 AM	Off
8	On Interval	240	8:00 AM	12:00 PM	On
9	Off Interval	60	12:00 PM	1:00 PM	Off
10	On Interval	240	1:00 PM	5:00 PM	On
11	Weekday	Thu	Tuesday 5:00 PM	Thursday 12:00 AM	Off
12	Time	8:00 AM	Thursday 12:00 AM	8:00 AM	Off
13	On Interval	240	8:00 AM	12:00 PM	On
14	Off Interval	60	12:00 PM	1:00 PM	Off
15	On Interval	240	1:00 PM	5:00 PM	On
16	Weekday	Fri	Thursday 5:00 PM	Friday 12:00 AM	Off
17	Time	8:00 AM	Friday 12:00 AM	8:00 AM	Off
18	On Interval	240	8:00 AM	12:00 PM	On
19	End	0	12:00 PM	12:00 PM	Off

If this program is started anytime Tuesday to Sunday, it waits until midnight is past on Monday, waits until 8:00 AM, then turns the pump on until 12:00 PM (240 minutes, 4 hours) later. The pump stays off until 1:00 PM, and then turns on until 5:00 PM. The cycle repeats on Tuesday, Thursday and Friday. At Friday 12:00 PM the program ends.

Intermittent sampling (single)

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
1	On Interval	6 (min.)	Run key	+ 6 min	On
2	Off Interval	54 (min.)	+6min	+60 min	Off
3	Cycle	10 (Total Iterations)			On
4	End	0	600 min	600 min	Off

This program samples for six minutes of each hour for 10 hours, accumulating 60 minutes of run time distributed across the 10 hours.

Intermittent sampling (multiple)

Program Step	Function	Value	Starts at Run Start	Ends At	Pump Action
	Time	8:00 AM	Run key	8:00 AM	Off
1	On Interval	6 (min.)		+ 6 min	On
2	Off Interval	54 (min.)	+6min	+60 min	Off
3	Cycle	4 (Total Iterations)			On
1	Off Interval	54 (min.)	+6min	+60 min	On
3	Cycle	0			On
1	On Interval	6 (min.)	+6min	+60 min	On
1	Off Interval	54 (min.)	+6min	+60 min	On
3	Cycle	4 (Total Iterations)			On
4	End	0	5:00 PM	5:00 PM	Off

This program waits until 8:00 AM is past on the current day, then turns the pump on for the first 6 minutes of each hour until 12:00 PM. The pump stays off until 1:00 PM, then turns on for the first 6 minutes of each hour until 5:00 PM. At 5:00 PM the program ends.

Appendix B: Temperature and Barometric Pressure Compensation

The LFS-Pro temperature and barometric pressure compensation feature allows the pump to be moved after calibration to another environment with different temperature and pressure with a minimal effect on the ambient flow rate. This compensation is available for operation at flow rates from 20 cc/min to 500 cc/min.

Good Industrial Hygiene practice dictates the sampling pump be calibrated immediately before use in the environment where the sampling event will take place. The compensation feature will allow much more accurate sample flow rate control in sampling environments with varying pressure and temperature such as an airplane in flight or where on the spot calibration is difficult, such as a mine.

The compensation feature of the pump is calibrated at one set of environmental conditions with flow rates from 20 cc/min to 500 cc/min. With this feature, the ambient conditions flow rate will not vary by more than 5% due to change in temperature or pressure, within specified flow rate and barometric pressure limits. In order to use this feature the pump must be calibrated at the flow rate required and the event started. The calibration can be done manually or by using the "Pre/Post Cal" mode.

Display:

A display screen will show the compensation conditions and factors. The display is visible from the main screen by pressing the  and  buttons to move between display screens.

Appendix C: Low Flow Manifold

Low Flow Manifold

(Multiple sorbent tube air sampling with one personal pump)

Sensidyne's Low Flow Manifold is used in conjunction with the LFS-Pro pump's constant pressure capability. The Low Flow Manifold allows separate flow settings on a multi-tube manifold system (1 to 4 valve options) using set screws on each valve stem. The constant pressure control maintains a constant negative pressure in the sample train between the pump and the manifold, so that the force driving the samples does not change. Adjusting the flow on one valve does not affect the others. Any sampling method that does not undergo a large backpressure change from start to finish may be accomplished using this system.

To operate the Low Flow Manifold with the LFS-Pro pump series, follow the steps below.

1. Set the LFS-Pro pump to operate in the constant-pressure (CP) mode.
2. Attach the Manifold system using the 1/8 inch tubing provided. The manifold should be mounted at the worker's lapel so as to represent the breathing zone. Note that the manifold is available in four configurations, allowing the choice 1, 2, 3, or 4 sorbent tubes to be run simultaneously.

Using the Gilibrator-2, Gilibrator-3, Go-Cal Pro or equivalent air flow calibrator with very low pressure drop, measure the flow rate at the sample inlet, and adjust the flow rates individually using the needle valves.



Appendix D: Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Run time too short; does not meet projected run time	Battery Pack not fully charged.	Charge battery (Sec. 3.1. Appendix G)
	Batteries have deeply discharged. Battery pack may need to be reconditioned.	Recondition battery pack (Sec. 9.1.). Store pumps on charge when not in use
	Battery pack capacity too low, at end of life	Replace battery (Sec. 9.2.)
Pump will not turn on	Low battery charge	Charge battery (Sec. 3.1.)
	Blown fuse in battery	Replace battery (Sec. 9.2.)
	Dead Cell in battery	Replace battery (Sec.9.2.)
	Control board problem	Return for service
	Processor Lock-up due to deep discharge	Recondition battery pack (Sec 9.1.) Disconnect battery and reconnect (Sec. 9.2.)
Backlight on but no text	Insufficient LCD drive voltage from battery pack	Replace battery (Sec. 9.2.)
Pump shows Fault in display/Enters HOLD	Inlet filter clogged	Replace Filter
	Intake obstructed	Examine sample holder and remove obstruction or run at lower flow rate
	Control board problem	Return for service
	Low battery	Charge battery (Sec. 3.1.)
	Flow rate is set too high for sample media	Correct the flow rate per sample method guidelines
	Sample media tubing pinched shut	Correct tubing obstruction
Pump runs flat out	Internal flow transducer problem	Backpressure too high; remove restriction or lower flow rate
	Control board problem	Return for service
	Improper Calibration	Recalibrate Pump (Sec. 4.9.3.)

Symptom	Possible Cause	Corrective Action
Pump runs erratic & faults	Faulty bearing	Return for service
	Faulty motor	Return for service
	Liquid in pump or other matter	Return for service
	Insufficient backpressure for stable operation	Check sample media or increase flow rate (minimum back pressure requirement is 1 inch of water)
Pump does not achieve flow specifications	Valve dirty or torn	Return for service
	Torn diaphragm on yoke assembly	Return for service
	Leak in pump	Tighten input manifold to snug tight only. Do not over tighten. Return for service if tightening does not solve leakage issue.
	Battery not sufficiently charged	Charge battery (Sec. 3.1.)
Pump surges	Display calibration adjusted out of range	Reset display calibrations to factory setting
Pump will not run program	Program time is set to zero	Enter non zero program duration (Sec. 6.1.)
	Program not selected in run mode	Check run setup (Sec. 5.17.)
Keypad inoperative	Keypad is locked	Unlock Keypad (Sec. 4.6.3.) If a password is required, enter the password. The override password is 9999.
	Pump in off phase of program	Wait for program to complete program or stop program
Pump stops occasionally and restarts after 20 seconds	Normal self-check function. Flow control is being re-zeroed.	None (Sec. 0) Sensor calibration can be set for three modes, See section 4.5.
Displayed flow rate does not match calibration	Flow display is out of calibration	Calibrate flow display (Sec. 4.9.3.)

Symptom	Possible Cause	Corrective Action
Pump will not run at desired flow rate in low flow mode	Wrong sample tube holder selected for constant pressure control adapter	Select tube holder that incorporates a needle valve
In SmartCal, "Check Device" displayed or no flow readings	Device communication error	Check that calibration device is powered, turned on and cable is connected from calibrator to pump. Check that correct calibrator is selected in Setup/SmartCal menu item.
Pump displays "Err" when calibrating back pressure	The requested change is a change of more than 5%, an unusual condition.	Allow more time for the pump to stabilize and try again. If problems persist, call Sensidyne for advice and service.
Data downloaded by Gilian CONNECT appears corrupted	Check the pumps firmware version and Gilian CONNECT version for compatibility	Update Gilian CONNECT to latest version.

Appendix E: Parts List

Part Number	Description
811-1801-01-R	KIT, BELT CLIP - LFS-PRO
811-1802-01	KIT, TUBE HOLDER, SINGLE (TH-S-225) - LFS-PRO
811-1802-02	KIT, TUBE HOLDER, SINGLE (TH-L-247) - LFS-PRO
811-1808-01-R	KIT, BATTERY, LFS-PRO
800093	INLET FILTER ASSEMBLY
811-9809-01-R	CALIBRATION ADAPTER
811-9810-01-R	USB-C TO USB-C DEVICE CABLE, 1FT
811-0913-01-R	OUTLET FITTING, BAG FILL ADAPTER
360-1801-01	OPERATION MANUAL
811-9997-01-R	USB-A TO USB-C CABLE, 6FT
811-0509-01-R	POWER ADAPTOR, WALL, USB
811-9816-01-R	KIT, USB-A TO USB-C DEVICE CABLE, 6 INCHES
811-9815-US-R	KIT, 7-PORT USB CHARGING/COMMS HUB, US CORD
811-9815-EU-R	KIT, 7-PORT USB CHARGING/COMMS HUB, EU CORD
811-9815-UK-R	KIT, 7-PORT USB CHARGING/COMMS HUB, UK CORD

Appendix F: Specifications

PERFORMANCE

Flow Range.....	20 - 500 cc/min
	1-500 cc/min in Constant Pressure mode
Flow Modes.....	Constant Flow or Constant Pressure
Flow Display.....	± 5% of set flow or ±3 cc/min whichever is higher
Constant Flow Control.....	± 5% of set flow or ±3 cc/min whichever is higher from minimum pressure of 0.5 "H2O to specified maximum
	Flow Range Max BP
	20 – 450 40" H2O
	450 – 500 35" H2O
Constant Pressure Control...	± 10% of back-pressure

Run Time/Back Pressure	Flow Range	BP	Time	Temperature
	300 cc/min	16" H2O	+ 8 hours	5°C/ 25°C
	500 cc/min	>40" H2O	5 Hours	5°C/ 25°C

Flow Fault.....	If flow changes exceed 5% within backpressure specifications, fault notification appears. If fault exceeds 30 seconds, pump shuts down. Selectable automatic fault recovery allows the pump to attempt restart every 3 minutes for up to 10 times or to hold until manual intervention.
-----------------	---

APPROVALS

ISO 13137:2022 Compliant

Intrinsic Safety

US/Canada NRTL (FM) Class 1, Div 1, Grp A, B, C & D
Class II, Div 1, Grp E, F & G
Class III, T3
CI I, Zn 0, AEx/Ex ia IIC T3 Ga

ATEX/IECEX..... II 1 G Ex ia IIC T3 Ga

CE

Applicable Directives..... ATEX 2014/34/EU, EMC 2014/30/EU,
Radio Equipment 2014/53/EU, RoHS 2011/65/EU

BAROMETRIC PRESSURE COMPENSATION

Correction Accuracy..... After calibration at the desired flow rate, the flow will not vary by more than 5% if the barometric pressure is in the range specified below.

Barometric Pressure Range.. 560mmHg to 1160mmHg

ENVIRONMENTAL

Temperature Ranges

Operating.....14°F to 104°F (-10°C to 40°C)

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

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

Humidity Ranges

Operating..... 5-95 %RH, non-condensing

Storage..... 5-98 %RH, non-condensing

GENERAL

Display..... Flow rate, sample time, and sample volume in actual conditions

Indicators..... Green, Blue and Red LED's

Dimensions..... 5.0 x 3.0 x 1.5 inches (12.7 x 7.4 x 3.8 cm)

Weight..... 11.3 ounces (320 g)

ELECTRICAL

Power Options..... Removable rechargeable Lithium Cobalt Oxide (Li-Ion) battery pack

Battery Level Indicator..... On-screen icon displays battery level

Charging Time..... Under 8 Hours

Bluetooth® 4 Link Distance..... 5 meters (if equipped)

Bluetooth Module (if equipped).. FCC ID WAP4008

Appendix G: LFS-Pro Light Sequences

LFS-Pro Light Sequences (Main Board)

<u>Sequence</u>	<u>Meaning</u>
Solid green	At least 95% charged (battery charger connected)
Fast green flashing	At least 90% charged (battery charger connected)
Solid red	Below 90% charged (battery charger connected)
Fast red flashing	Battery error (cell voltage is 0)

Initialization Screen

<u>Sequence</u>	<u>Meaning</u>
Solid Sensidyne blue	Initialization screen (either device powered on or initialization complete)

Stability Sensors

<u>Sequence</u>	<u>Meaning</u>
Slow flashing green	Constant flow mode: Flow is stable (within 5% deviation and has not shifted out of range for ~200ms) Constant pressure mode: Pressure is stable (within 1"H2O of setpoint and has not shifted out of range for ~200ms)
Fast flashing red	Constant flow mode: Flow is unstable (outside 5% deviation or has not been within range for at least ~200 ms) Constant pressure mode: Pressure is unstable (outside 1"H2O of setpoint or has not been within range for at least ~200 ms)

Bluetooth

<u>Sequence</u>	<u>Meaning</u>
Slow flashing blue	Bluetooth enabled for device and has valid version detected (connected)

Fault Mode

<u>Sequence</u>	<u>Meaning</u>
Fast red flashing	In fault condition (EN13137 disabled and fault retry is enabled)

Firmware Crash

<u>Sequence</u>	<u>Meaning</u>
Solid red	Device has crashed (firmware code error)

LFS-Pro Light Sequences (Battery Board)

<u>Sequence</u>	<u>Meaning</u>
Solid red (on startup only)	Failed to initialize
Solid red	Failed to read battery successfully or failed to save battery monitor parameters or failed to read battery charger successfully or pump has been disconnected or USB has been disconnected or device has powered off incorrectly (failed to read from battery monitor and save battery monitor parameters)
Solid green	Pump has been connected or USB has been connected or battery is at least 98.6% charged or device has powered off correctly (saved battery monitor parameters)
Flashing green	Battery is less than 98.6% charged

Appendix H: Factory Calibration and Service

U.S.A.

Sensidyne, LP
1000 112th Circle N, Suite 100
St. Petersburg, Florida 33716

800-451-9444
+1 727-530-3602
+1 727-539-0550 [Main fax]
+1 727-538-0671 [Service fax]
info@Sensidyne.com
www.Sensidyne.com

Appendix I: Revision History

Revision	Description
A	Initial Release of Product. Software version 1.0.0.0

Manufactured by:

Sensidyne, LP

1000 112th Circle N, Suite 100

St. Petersburg, Florida 33716

U.S.A.

800-451-9444 • +1 727-530-3602 • [fax] +1 727-539-0550

www.Sensidyne.com • info@Sensidyne.com

Authorized EU Representative

Schauenburg Electronic Technologies GmbH

Weseler Str. 35 · 45478

Mülheim-Ruhr Germany

+49 (0) 208 9 99 10 • +49 (0) 208 5 41 10 [fax]

www.schauenburg.com • international@schauenburg.com

Gilian®

SENSIDYNE®
Industrial Health & Safety Instrumentation

1000 112th Circle N, Suite 100 • St. Petersburg, FL 33716 USA
(800) 451-9444 • +1 (727) 530-3602
www.Sensidyne.com • info@Sensidyne.com