

LIGHTHOUSE
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Active Count Biological Air Sampler

Operating Manual

Lighthouse Worldwide Solutions

ActiveCount Biological Air Sampler

Operating Manual

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About this Manual

Text Conventions

Note: *A note appears in the sidebar to give extra information regarding a feature or suggestion*

WARNING: *A warning appears in a paragraph like this and warns that doing something incorrectly could result in personal injury, damage to the instrument or loss and/or improper storage of data.*

The following typefaces have the following meanings:

<i>italics</i>	Represents information not to be typed or interpreted literally. For example, <i>file</i> represents a file name. Manual titles are also displayed in italics.
boldface	Introduces or emphasizes a term.
<code>Courier font</code>	Indicates command syntax or text displayed by the diagnostic terminal.
Bold Courier	Indicates commands and information that the user types. The user can enter uppercase or lowercase letters; in this manual, commands are shown in uppercase.
<i>Helvetica Italics</i>	Indicates a comment on a command or text output.

Hexadecimal numbers are shown with the word “hex” or with a small “h” following the digits. For example:

hex 0D
0Dh

Additional Help

For more information about the Lighthouse ActiveCount Biological Air Sampler, contact Lighthouse Worldwide Solutions:

(800) 945-5905 Sales and Support
(541) 770-5905 Outside of USA

techsupport@golighthouse.com
www.golighthouse.com

1 Introduction

Safety Considerations

Warnings and cautions are used throughout this manual. Familiarize yourself with the meaning of a warning before operating the ActiveCount. All warnings will appear in the left margin of the page next to the subject or step to which it applies or within the step. Take extreme care when performing any procedures preceded by or containing a warning.

WARNING: *The use of controls, adjustments or performance of procedures other than those specified within this manual may result in personal injury and/or damage to the instrument .*

For additional product information or technical assistance, contact Lighthouse Worldwide Solutions.

Design Concept

The ActiveCount was developed for monitoring airborne microorganism levels in critical areas, such as cleanrooms, food processing plants and fermentation plants. The equipment conforms to the new European ISO/TC (dated 25 July 1999) recommendation.

The ActiveCount allows collection of airborne biocontaminants by impacting them on standard 60mm +/- 2mm & 90mm +/-2mm agar plates containing one of a variety of culture media.

The ActiveCount can be successfully used in a wide variety of applications ranging from air quality control in pharmaceutical, food and cosmetics processing plants, to monitoring sterile and non-sterile areas in hospitals, clinics and laboratories. It is also very useful for monitoring the air in building air conditioning (HVAC) systems.

Working Principle

The air being sampled is drawn through a perforated head at a constant velocity for a programmable period of time. The incoming air is forced to impact the surface of the agar plate (Petri dish with culture medium). The culture medium is chosen for the microbiological investigation to be carried out.

At the end of the sampling period, the agar plate is removed and placed in an incubator. When the incubation period is completed, the Culture Forming Units per square centimeter (CFU/cm²) can be counted and the area's biocontamination level can be evaluated based on the volume of air sampled. Refer to Figure 1-1.

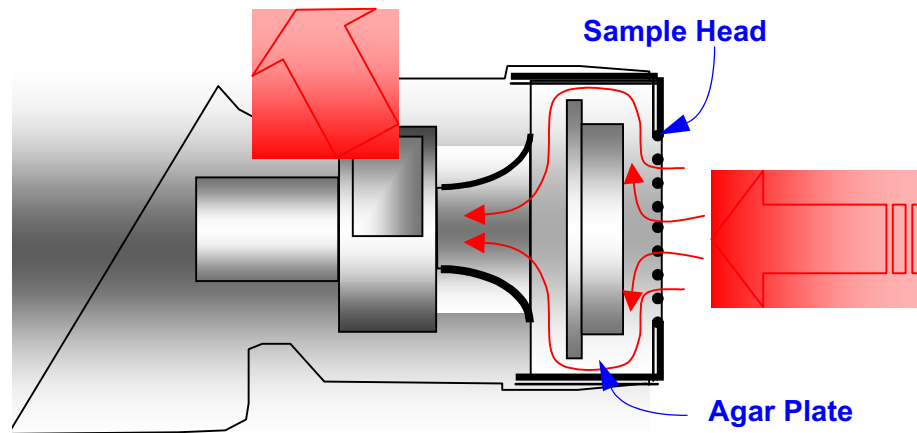


Figure 1-1 Sample Head Cross Section and Airflow

Major Features

- Infrared remote control
- Rechargeable NiMH battery
- Microprocessor-controlled air sample fan
- Programmable start delay
- Programmable sample volume
- Stores and displays up to 99 samples with date, time, flow rate, volume and type of sample (Manual, Program, Sequential)
- Low-battery alarm and fan control
- USB port for data download to PC (optional cable and software)
- Two-position sampling (vertical and horizontal)
- Tripod mounting

ActiveCount Specifications

Flow Rates	30, 60, 90, 100 (ISO/TC 209), 120 lpm
Sample Head Materials	Autoclavable Anodized Aluminum or Stainless Steel
Available Plate Sizes	60 and 90mm
Available Models	ActiveCount 60, ActiveCount 90C, ActiveCount 60/90C
Sample Types	Manual, Programmable (Auto), Sequential
Data Storage	Stores up to 99 sample records (volume, date and time, flow rate, sample type)
Communication Modes	ASCII via USB
Screen Display	High contrast fluorescent
Key Set Up Features	Simple Menu-driven
Enclosure	Seamless Polyurethane
Vacuum Source	Internal pump, flow controlled
Power	100-240 VAC, 50-60Hz; 16VDC
Battery	NiMH rechargeable
Dimensions	12.2" (L) x 5.11" (D) x 6.70" (H) [31 x 13 x 17 cm]
Weight	4.2 lbs (1.9 kg)
Operating Temp/RH	50° F to 104° F (10° C to 40° C) / 20% to 95% non-condensing
Storage Temp/RH	14° F to 122° F (-10° C to 50° C) / Up to 98% non-condensing

Table 1-1 ActiveCount Specifications

2 *Unpacking, Inspection and Start Up*

Initial Inspection

The instrument is thoroughly inspected and tested at the factory and is ready for use upon receipt.

Unpacking

It is presumed that when the instrument was received, the following took place:

1. The shipping container was inspected for damage.
2. If the container was damaged, the shipper was notified immediately.
3. The instrument was carefully inspected for broken parts, scratches, dents and other damage before use, even if the container appeared undamaged, and
4. Any damages were reported to Lighthouse Technical Support at +1-800-945-5905 (USA) or +1-541-770-5905 (Outside of USA) before proceeding.

Verify the contents of the package against the Shipping List. If anything appears to be missing, please contact your sales representative at Lighthouse Worldwide Solutions immediately at (800) 945-5905 or techsupport@golighthouse.com.

To maintain your warranty, keep the undamaged shipping container and all packing material for reshipment of the instrument for annual calibration. Order replacement containers and packing materials from Lighthouse directly, or from a Lighthouse-authorized distributor.

Shipping Instructions

Should it become necessary to return the unit to the factory for any reason, contact Lighthouse Customer Service or visit our website, www.golighthouse.com/rma, and obtain a Return Merchandise Authorization (RMA) number. Reference this number on all shipping documentation and purchase orders. After receipt of the RMA number, follow the shipping instructions below:

WARNING: *If the instrument is damaged during a return shipment due to inadequate user packing, the warranty may be voided and may result in additional repairs being billed to the customer.*

1. Use the original container and packing materials whenever possible. Remove any instrument battery and package it to ship separately - refer to www.golighthouse.com/rma for detailed instructions. Remove any attachments and package to prevent any physical and ESD damage.
2. If the original container and packing materials are not available, wrap the unit in “bubble pack”, surround with shock absorbent material and place in a double-wall carton - the instrument should not rattle around when the carton is vigorously shaken. If the instrument is damaged during shipment due to inadequate user packing, the warranty may be voided and may result in additional repairs being billed to the customer. You may contact Lighthouse to purchase a replacement shipping container.
3. Seal container or carton securely. Mark “FRAGILE” and write the Return Merchandise Authorization (RMA) number on any unmarked corner.
4. Return the instrument to the address provided by your Lighthouse representative or the RMA website.

WARNING: *Do not ship the instrument with the battery installed.*

Accessories

Several accessories may be ordered to tailor the instrument to your needs. Contact your Lighthouse Sales Engineer for more information.

Product Controls

The following section displays components and controls of the ActiveCount for use as a reference.



Figure 2-1 Instrument Side View



Figure 2-2 Front View



Figure 2-3 Rear View (Control Panel)

Figure 2-3 shows the Control Panel connectors and buttons.

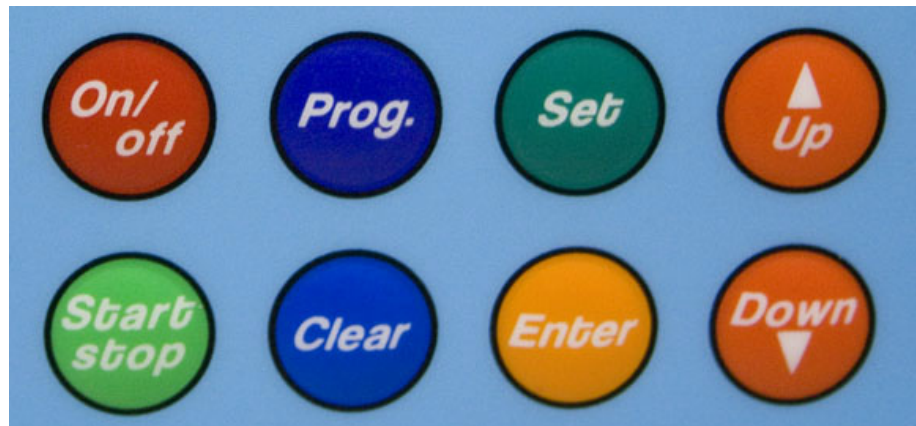


Figure 2-4 Control Panel Buttons

Figure 2-4 illustrates the Control Panel buttons used to control and program the ActiveCount. Control Panel functions are discussed in detail in Chapter 3: *Operations*.

Start Up

Preparing the ActiveCount for Use

Charge the Battery

The ActiveCount comes with a rechargeable NiMH battery - the following instructions need to be read and followed.

The battery needs to be fully charged before the instrument can be used for portable operation. An external battery charger is provided for this purpose.

1. Insert the charger male connector into the DC receptacle on the ActiveCount. Plug the charger into the AC supply and observe that the green LED on the charger illuminates. After a moment or two the second LED should illuminate to indicate that charging is taking place. Allow the battery to charge for a minimum of eight hours. The second LED should blink when the battery is approaching a full charge and turn off when fully charged.



Figure 2-5 Charging Battery

If the battery becomes completely or nearly completely discharged and will not properly run the fan, the ActiveCount must be attached to the battery charger for at least 30 minutes before operating the instrument again. If the instrument shows the “Battery Level VERY LOW WARNING” screen, it will run for only up to four samplings, depending on the settings. If the ActiveCount is not charged when this message appears, “programmed sampling” data may be lost when the battery becomes fully discharged.

The following chart illustrates the approximate run time for the ActiveCount on a fully-charged battery at the flow rates shown.

FLOW RATE	LIFE BATTERY
30 Lt	10 h
60Lt	8 h
90 Lt	7 h
100 Lt	6 h
120 Lt	5 h

Figure 2-6 Battery Life Chart



Figure 2-7 Battery Very Low Warning

Install the Agar Plate

1. The next step in preparing the ActiveCount for use is to disinfect the unit. Using sterile gloves, remove the Sample Head by twisting counter-clockwise a quarter-turn. Disinfect the head with a suitable solution and place it in a sterile container.



Figure 2-8 Sample Head Removal

WARNING: Getting any liquid inside the ActiveCount will void its warranty. Take extreme care to avoid this.

- Disinfect the plate mounting caps and the entire area around them, taking care not to get any liquid or spray into the instrument. If the instrument is a 60/90C and the clips are adjusted for a size different from the size to used, adjust the clips to fit BEFORE disinfecting the Plate Mount area.

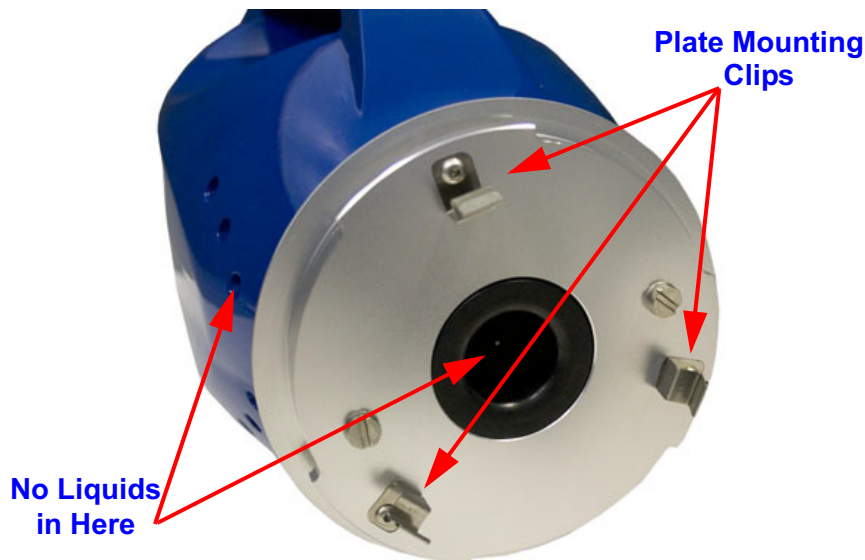


Figure 2-9 Plate Mount Area Exposed

- Place one edge of the plate under the rolled edge of a clip. While pushing the plate in the direction of that clip, tilt the plate towards the instrument and press into the remaining two clips. The plate should “snap” into place. Refer to Figure 2-10.

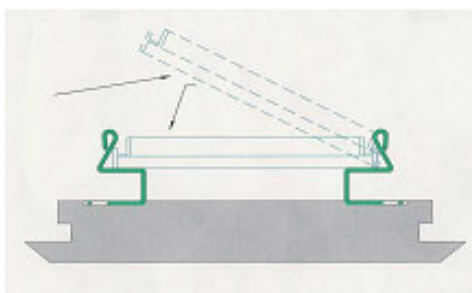


Figure 2-10 Example of How to Install Plate

- Remove the plate cover and store in a sterile environment.
- Reinstall the Sample Head and lock by twisting clockwise.

The ActiveCount is now ready for use. See Chapter 3: *Operation*.

3

Operation

Using the Instrument for the First Time

WARNING: *Do not attempt to sample reactive gases (such as hydrogen or oxygen) with this instrument. Reactive gases create an explosion hazard in the instrument. Sample only inert gasses, such as nitrogen or carbon dioxide, with the ActiveCount.*

Sampling any gas under pressure requires an optional adapter.

Please contact Lighthouse for more information.

This chapter describes how to use the Active Count Airborne Particle Counter. The ActiveCount is ready to use once its battery has been charged and the unit has been disinfected. To start using the instrument, proceed as follows:

1. Charge the instrument's battery according to instructions in Chapter 2.
2. The ActiveCount can be used on battery power or while attached to the charger. Position the instrument in the environment to be measured.
3. Use sterile gloves while handling or using the ActiveCount to prevent contaminating it.
4. Press the On/off button briefly to turn the unit ON.



5. When power is turned on, the unit displays a series of startup screens (Figure 3-1) that repeat in sequence until the unit begins sampling or is in a setup mode.

The MAIN Display

The following screens are displayed in rotating succession until a function is chosen:



Figure 3-1 Rotating Status Screens





Note: *Make sure to set the Date and Time on the instrument before using for the first time or when the ActiveCount has not been used for an extended period of time.*

When the instrument is powered ON for the first time, the date and time should be set. If the unit hasn't been used for a while, it is suggested that the date and time be verified before sampling. Refer to "Setup date and clock" on page 10 for details.

Control Panel Buttons






Main screen

Buttons that work only from the Main screen:

-  1. Turns the ActiveCount on or off
-  2. Starts or stops current sampling
-  3. Selects Programmed (Sample type) menu - See “Sample type select” on page 3-4.
-  4. Enters the Setup menu - See “Setup Menu Overview” on page 3-10.

Settings screens

Buttons that work in the Settings screens:






-  1. Increases the affected value or moves up in the list of available choices.
-  2. Decreases the affected value or moves down in the list of available choices.
-  3. Moves to the next selection choice or category in the menu, setting the choice.
-  4. Clears the current data or exits the menu, saving the choices.
-  5. Enters the menu to change the settings or confirms an action.

Program (Sample type) Menu Overview

Note: Changes to the Sample type are saved, so, powering the ActiveCount off will not lose the type. It is advised to check this setting before pressing the Start/stop button.

When the **Prog.** button is pressed at the **Main** screen, the **Sample type** screen is displayed, which allows the user to change the type of sampling that will be performed when the **Start/stop** button is pressed at the **Main** screen. Choices are Programmed, Sequential and Manual. For example, changing the screen to show Sequential will cause the ActiveCount to run in Sequential mode when the **Start/stop** button is pressed at the **Main** screen.

Sample type select

1. From the Main screen, press  to enter the **Sample type** screen.
2. Use the  or  button to choose between Programmed, Sequential and Manual. Press  to leave the menu, which sets that choice as the operating default, which will be used when the  button is pressed at the Main screen.
3. An example of the **Sample type** setting is shown in Figure 3-2.

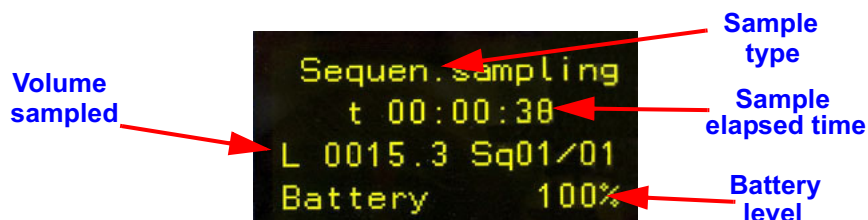









Figure 3-2 Sampling Screen

Modifying Sample type Run Parameters
















1. From the Main screen, press the  button to enter the *Sample type* setup screen.
2. Use the   to select *Sample type* you wish to modify.
3. Press  to change the settings for that choice.






Modifying *Programmed* Sample type

Note: *The actions required are the same for all of the following steps.*




1. At the *Sample type* screen, use the   to select *Programmed* and press  to change the settings.

Changing Programmed *Sample Volume*

2. Choose the *Sample Volume* 1000's digit with the   buttons or press the  to move to the next field. The 1000's field will show 0, 1 or 2. To sample more than 2,000 liters requires the *Manual* mode. Use the  button when the correct value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.
3. Choose the *Sample Volume* 100's digit by using   or press the  button to move to the next field. Use the  button when the correct value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.
4. Choose the *Sample Volume* 10's digit by using   buttons or press the  to move to the next field. Use the  button when the correct value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.

- Choose the **Sample Volume** 1's digit by using   buttons or press  to move to the next screen. Use the  button when the correct value is displayed or return to the first field. Press the  button to accept the displayed settings and move to **Flow Rate** screen.

Changing Programmed **Flow Rate**

- Choose the **Flow Rate** by using   and press  when the desired value is displayed and move to **Delay Start**. The values that can be chosen are 030, 060, 090, 100 and 120 L/min.

Changing Programmed **Delay Start**































- Choose the **Delay Start** in hours and minutes by using   buttons and the  button to move between the two fields. The maximum delay time is 23:59. Use the  button to accept the displayed values and move to the **Review** screen. For example, if one minute is desired, press the  button to move to the minutes column and press the  to display 00:01. Press the  to move to the next screen.
- The final screen will display the Flow Rate (Fr) in L/min, sample Volume (V) in Liters, the Delay Start (Ds) as minutes followed by the total run time (t) to produce the Volume desired. Figure 3-3 below is an example screen:






Figure 3-3 Programmed Sample type Confirm Screen





Modifying *Sequential* Sample type

1. At the *Sample type* screen, use   to display *Sequential*.
2. Press  to change the settings.
3. Choose the *Sample Volume* 1000's digit by using   buttons or press the  button to move to the next field. The 1000's field will show 0, 1 or 2. To sample more than 2,000 liters requires the *Manual* mode. Use the  button when the correct value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.
4. Choose the *Sample Volume* 100's digit by using   buttons or press the  button to move to the next field. Use the  button when the correct value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.
5. Choose the *Sample Volume* 10's digit by using   buttons or press the  to move to the next field. Use the  button when the correct value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.
6. Choose the *Sample Volume* 1's digit by using   buttons or press the  to move to the next screen. Use the  button when the correct value is displayed or return to the first field. Press the  button to accept the displayed settings and move to *Flow Rate* screen.





Changing Sequential *Flow Rate*

7. Choose the *Flow Rate* by using   buttons and press  when the desired value is displayed and move to *NUM SQ*. The values that can be chosen are 030, 060, 090, 100 and 120 L/min.








Changing Sequential *NUM SQ* (Number of Sequences)

8. Choose the *NUM SQ* (Number of Sequences to run) by using the   buttons. Use the  button when the desired value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *BreakSQ* screen.

Changing *BreakSQ* (Break in Sequence)

9. Choose the *BreakSQ* (Break in Sequence in minutes) by using the   buttons. Use the  button when the desired value is displayed or to move to the next field. Press the  button to accept the displayed settings and move to *Delay Start* screen.

Changing Sequential *Delay Start*




10. Choose the *Delay Start* in hours and minutes by using   buttons and the  button to move between the two fields. The maximum delay time is 23:59. Use the  button to accept the displayed values and move to the *Review* screen. For example, if one minute is desired, press the  button to move to the minutes column and press the  to display 00:01. Press the  to move to the next screen.

- The final screen will display the Flow Rate (Fr) in L/min, sample Volume (V) in Liters, the Delay Start (Ds) as minutes followed by the total run time (t) to produce the Volume desired. It also displays Number of Sequences to run (Nseq) and the Number of Sequence Breaks (Bseq). Figure 3-4 is an example screen:






Figure 3-4 Sequential Review Screen

Modifying *Manual* Sample type


- At the *Sample type* screen, use   to select *Manual*.
- Press  to change the settings.

Changing Manual *Flow Rate*







- Choose the *Flow Rate* by using   buttons and press  when the desired value is displayed and move to the *Manual Sampling* review screen. The values that can be chosen are 030, 060, 090, 100 and 120 L/min.






Setup Menu Overview

The Setup Menu allows changing the listed features or functions.







- Battery Level
 - The blower will start, allowing the system to more accurately measure the voltage level. Press the  button to exit.
- Reset System
 - Requires a password to complete and resets the system to default settings.
- Language Setup
 - Sets the language used for the display - choices are English, French, German, Italian and Spanish.
- Flow rate calibration
 - Allows checking and adjusting the calibration - requires the optional calibration kit.
- Delete memory
 - Clears the stored Sample data.
- Stored samplings
 - Displays Samples, in sequence, with dates, times and flow data.
- Date and clock
 - Sets the instrument date and time.
- Setup Head (60/90C unit only)
 - Sets the size head to be used for the 60/90C instrument only.

Setup date and clock





1. From Main, press the  button then the  button once.
2. At the Setup date and clock screen, press the  button.
3. Use the  or  buttons to change the displayed value.
4. Press the  button to move to the next field. The date is entered as Day / Month / Year as two digits each.
5. Time is entered based on the 24-hour clock with PM hours being entered as 12 through 23 (midnight is 00 hour).

6. When the date is displayed correctly, press the  button to move to the clock fields.
7. Use the   buttons to change the values and the  button to move to the next field. When all fields are correct, press the  button once to exit to the Setup menu or twice to exit to the main screen.





Stored Sampling



1. From Main, press the  button then the  button twice.
2. At the Stored sampling screen, press the  button.
3. Use the   buttons to display any one of the stored samples from a rotating buffer.
4. Press the  button once to return to the Set menu or twice to return to the Main screen.

Download Data





1. From Main, press the  button then the  button three times.
2. At the Download data screen, press the  button.
3. Press the  button once to return to the Set menu or twice to return to the Main screen.

Delete Memory







1. From Main, press the  button then the  button four times.
2. At the Delete memory screen, use the   buttons to choose 'Yes' or 'No'.

3. Press the  button to confirm your choice.
4. All data records will be deleted.
5. Press the  button once to return to the Set menu or twice to return to the Main screen.




Flow Rate Calibration








1. From Main, press the  button then the  five times.
2. At the Flow rate calibration screen, press the  button.
3. Enter the password provided with the kit.
4. Follow the instructions included with the kit.
5. Press the  button once to return to the Set menu or twice to return to the Main screen.

Language Setup








1. From Main, press the  button then the  six times.
2. At the Language Setup screen, press the  button.
3. Use the   buttons to change the displayed value.
4. Press the  button once to return to the Set menu or twice to return to the Main screen.

Set Up Head (60/90 Model only)

1. From Main, press the  button then the  button twice.
2. At the Setup head screen, press the  button.

3. Use the   buttons to change the displayed value.
4. Press the  button to confirm the choice.
5. Use the   buttons to choose 'Yes' or 'No'.
6. Press the  button to confirm the choice.
7. Press the  button once to return to the Set menu or twice to return to the Main screen.

Reset System

1. From Main, press the  button then the  button once.
2. At the Reset system screen, press the  button.
3. Use the   buttons to change the displayed values for the password.
4. Press the  button to move to the next field.
5. Press the  button once to return to the Set menu or twice to return to the Main screen.

Sterilizing the ActiveCount Head

Sterilization of the ActiveCount Sample Head should be performed between samplings to prevent cross-contamination and invalidation of samples. Spare heads should be purchased to allow for cycling of sterile heads. One of three methods may be used for sterilization:

- Autoclave
- Disinfectant solution
- Fire sterilization (using included pencil torch)

Autoclaving

The Sample Head can be autoclaved in an autoclavable bag following the standard procedures for sterilization (134°C for 18 minutes in hospital applications). The head should be packaged to protect them

from becoming contaminated prior to use.

Disinfecting Solution

An alternative to autoclaving the Sample Head is to remove the Sample Head and apply an approved disinfectant directly to it. Make sure the solution is fully dried before attempting to use the Sample Head or solution may be drawn into the ActiveCount and damage it. Liquids should never be allowed to enter the ActiveCount or its warranty may be voided.

Handle the Head with sterile gloves and after it is dry, install a fresh agar or petri plate, reinstall the Head onto the ActiveCount and proceed with sampling.

Flame Sterilization

WARNING: *Personal injury or death may result if the torch is used near explosive or combustible materials or where oxygen levels are above normal.*

The third method of disinfecting the Sample Head is through the use of the included Butane Pencil Torch. This method should not be used in a potentially explosive environment, around combustibles or where above-normal levels of oxygen may be present. Personal injury or death may result if the torch is not used properly or with appropriate precautions taken.

Using sterile gloves, remove the Sample Head then place it on a fire-safe surface or hold with sterile tongs. Aim the tip of the torch away from you, twist the Flame Adjust valve counter-clockwise and light the torch.

WARNING: *Heat the Sample Head evenly or it will be damaged.*

Adjust the flame to about 1/2-inch from the tip and apply the flame to the perforated area of the Head for at least two minutes, moving the flame around the entire area to heat it evenly. Turn off the torch and, to prevent contact burns, allow the Head to cool before attempting to reinstall using sterile gloves.

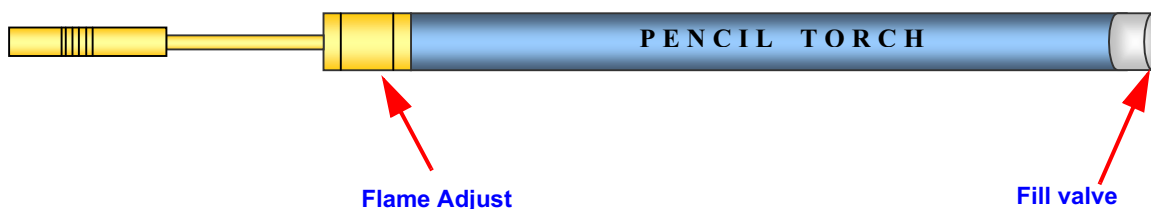


Figure 3-5 Pencil Torch

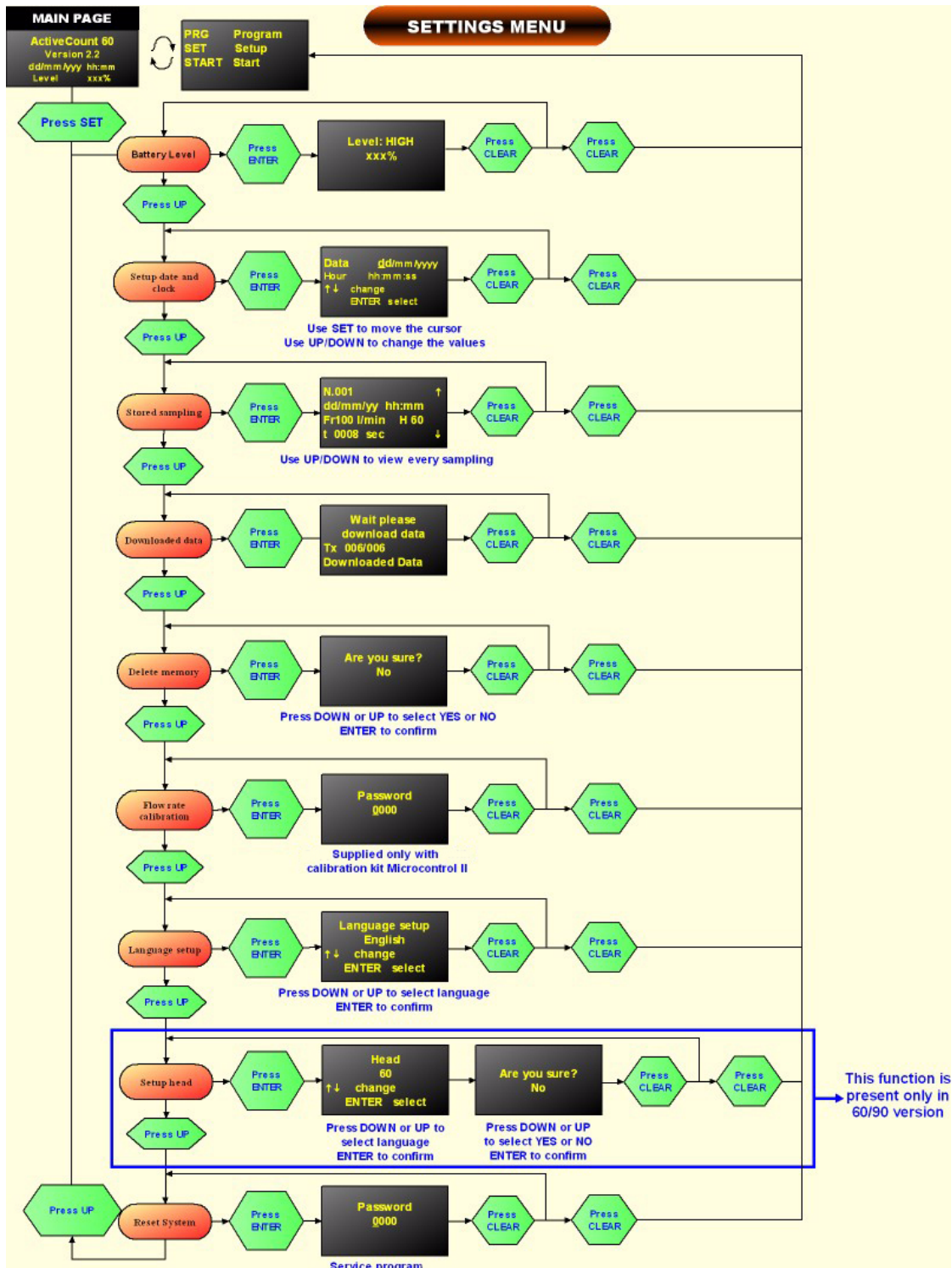


Figure 3-7 Settings Menu Map

4

Troubleshooting

If the ActionCount fails to respond as expected or emits noises, Table 4-1 is provided to help isolate causes and suggest solutions.

It is suggested to verify that menu choices are appropriate for the desired action. Expecting the instrument to perform an operation that it cannot will produce unreliable results.

For additional help, please contact Lighthouse Worldwide Solutions.

(800) 945-5905 Sales and Support
(541) 770-5905 Outside of USA
techsupport@golighthouse.com
www.golighthouse.com

Table 4-1 Troubleshooting Tree

Unit won't power on	Press and hold the On/off button for at least 3 seconds; Verify that the battery is fully charged; Contact Lighthouse service.
The blower motor does not work	Verify that power is on and that the correct menu button has been pressed; Contact Lighthouse service.
The infrared remote control switch doesn't start the sampling	Replace Remote Control battery with new; Contact Lighthouse service.
LCD display doesn't work properly	Contact Lighthouse service.
LCD display shows question marks or other characters	Contact Lighthouse service.
Red LED doesn't light during the sampling	Contact Lighthouse service.
Blower motor makes noise	Verify that the fan is clear of obstructions; Contact Lighthouse service.
Fan velocity is erratic	If the problem is present for one flow rate only, calibrate that flow rate with the calibration kit by following the included instructions. If the problem is present for all flow rates, verify each flow rate calibration. If the model is 60/90, take off the head and the support plate and verify the alignment of the fan. Contact Lighthouse service.
Control buttons don't work.	Contact Lighthouse service.

A

Conversion Tables

To correlate the Colony Forming Units (CFUs) present on the agar plate to the Most Probable Number (MPN) of microorganisms per cubic meter of air sampled, use the following formula:

$$Pr = N[1/N + 1/(N-1) + 1/(N-2) + \dots + 1/(N-r+1)]$$

Pr = most probable number of micro-organisms in the volume of air sampled

N = number of holes in ActiveCount Sample head

r = Number of CFUs on the agar plate after incubation

Use Table A-1 (ActiveCount 60) and Table A-2 (ActiveCount 90) to determine the values of 'Pr' by locating the value of 'r' in the table.

Table A-1 ActiveCount 60 Conversion Table

r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r
1	3	30	35	59	71	88	116	117	171	146	246	175	360	204	611
2	4	31	36	60	73	89	117	118	173	147	2493	176	365	205	628
3	5	32	37	61	74	90	119	119	175	148	252	177	370	206	646
4	6	33	38	62	75	91	121	120	178	149	255	178	376	207	666
5	7	34	39	63	77	92	122	121	180	150	258	179	381	208	688
6	8	35	40	64	78	93	124	122	182	151	262	180	387	209	712
7	9	36	42	65	80	94	126	123	185	152	265	181	393	210	739
8	10	37	43	66	81	95	128	124	187	153	268	182	399	211	771
9	11	38	44	67	83	96	130	125	189	154	272	183	405	212	807
10	12	39	45	68	84	97	131	126	192	155	275	184	412	213	851
11	13	40	47	69	86	98	133	127	194	156	279	185	418	214	906
12	14	41	48	70	87	99	135	128	196	157	282	186	425	215	979
13	16	42	49	71	89	100	137	129	199	158	286	187	432	216	1088
14	17	43	50	72	90	101	139	130	201	159	290	188	440	217	1307
15	18	44	52	73	92	102	141	131	204	160	293	189	447		
16	19	45	53	74	93	103	143	132	206	161	297	190	455		
17	20	46	54	75	95	104	144	133	209	162	301	191	463		
18	21	47	55	76	96	105	146	134	212	163	305	192	471		
19	22	48	57	77	98	106	148	135	214	164	309	193	480		
20	23	49	58	78	99	107	150	136	217	165	313	194	489		
21	24	50	59	79	101	108	152	137	220	166	317	195	499		
22	25	51	61	80	102	109	154	138	222	167	322	196	509		
23	26	52	62	81	104	110	156	139	225	168	326	197	519		
24	28	53	63	82	106	111	158	140	228	169	331	198	530		
25	29	54	65	83	107	112	160	141	231	170	335	199	542		
26	30	55	66	84	109	113	163	142	234	171	340	200	554		
27	31	56	67	85	111	114	165	143	237	172	345	201	567		
28	32	57	69	86	112	115	167	144	240	173	349	202	580		
29	33	58	70	87	114	116	169	145	243	174	354	203	595		

Table A-2 ActiveCount 90 Conversion Table

r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r	r	P_r
1	1	46	49	91	104	136	168	181	245	226	342	271	473	316	674	361	1129
2	2	47	50	92	105	137	170	182	247	227	345	272	477	317	680	362	1149
3	3	48	51	93	106	138	171	183	249	228	347	273	480	318	686	363	1170
4	4	49	52	94	108	139	173	184	251	229	350	274	484	319	693	364	1192
5	5	50	54	95	109	140	174	185	253	230	352	275	487	320	699	365	1216
6	6	51	55	96	110	141	176	186	255	231	355	276	491	321	705	366	1242
7	7	52	56	97	112	142	178	187	257	232	358	277	495	322	712	367	1269
8	8	53	57	98	113	143	179	188	259	233	360	278	498	323	718	368	1298
9	9	54	58	99	115	144	181	189	261	234	363	279	502	324	725	369	1330
10	10	55	59	100	116	145	182	190	263	235	365	280	506	325	732	370	1364
11	11	56	60	101	117	146	184	191	265	236	368	281	510	326	738	371	1402
12	12	57	62	102	119	147	186	192	267	237	371	282	514	327	745	372	1444
13	13	58	63	103	120	148	187	193	269	238	373	283	517	328	753	373	1492
14	14	59	64	104	121	149	189	194	271	239	376	284	521	329	760	374	1546
15	15	60	65	105	123	150	190	195	273	240	379	285	525	330	767	375	1609
16	16	61	66	106	124	151	192	196	275	241	381	286	529	331	775	376	1685
17	17	62	68	107	125	152	194	197	277	242	384	287	533	332	783	377	1780
18	18	63	69	108	127	153	195	198	279	243	387	288	537	333	791	378	1907
19	19	64	70	109	128	154	197	199	281	244	390	289	542	334	799	379	2097
20	21	65	71	110	130	155	199	200	283	245	392	290	546	335	807	380	2477
21	22	66	72	111	131	156	200	201	285	246	395	291	550	336	815		
22	23	67	74	112	132	157	202	202	288	247	398	292	554	337	824		
23	24	68	75	113	134	158	204	203	290	248	401	293	559	338	833		
24	25	69	76	114	135	159	206	204	292	249	404	294	563	339	842		
25	26	70	77	115	137	160	207	205	294	250	407	295	567	340	851		
26	27	71	78	116	138	161	209	206	296	251	410	296	572	341	861		
27	28	72	80	117	140	162	211	207	298	252	413	297	576	342	871		
28	29	73	81	118	141	163	213	208	301	253	415	298	581	343	881		
29	30	74	82	119	143	164	214	209	303	254	418	299	586	344	891		
30	31	75	83	120	144	165	216	210	305	255	421	300	590	345	901		
31	32	76	85	121	145	166	218	211	307	256	425	301	595	346	912		
32	33	77	86	122	147	167	220	212	310	257	428	302	600	347	923		
33	34	78	87	123	148	168	221	213	312	258	431	303	605	348	935		
34	36	79	88	124	150	169	223	214	314	259	434	304	610	349	947		
35	37	80	90	125	151	170	225	215	316	260	437	305	615	350	959		
36	38	81	91	126	153	171	227	216	319	261	440	306	620	351	972		
37	39	82	92	127	154	172	229	217	321	262	443	307	625	352	985		
38	40	83	94	128	156	173	230	218	323	263	447	308	630	353	998		
39	41	84	95	129	157	174	232	219	326	264	450	309	635	354	1012		
40	42	85	96	130	159	175	234	220	328	265	453	310	641	355	1027		
41	43	86	97	131	160	176	236	221	330	266	456	311	646	356	1042		
42	44	87	99	132	162	177	238	222	333	267	460	312	652	357	1058		
43	46	88	100	133	163	178	240	223	335	268	463	313	657	358	1075		
44	47	89	101	134	165	179	242	224	338	269	466	314	663	359	1092		
45	48	90	103	135	167	180	243	225	340	270	470	315	669	360	1110		

B Limited Warranty

Limitation Of Warranties:

- A. Lighthouse Worldwide Solutions (LWS) warrants that all equipment shall be free from defects in material and workmanship under normal use for a period of one year from date of shipment to Buyer except that LWS does not warrant that operation of the software will be completely uninterrupted or error free or that all program errors will be corrected. Buyer shall be responsible for determining that the equipment is suitable for Buyer's use and that such use complies with any applicable local, state, or federal law. Provided that Buyer notifies LWS in writing of any claimed defect in the equipment immediately upon discovery and any such equipment is returned to the original shipping point, transportation charges prepaid, within one year from date of shipment to Buyer and upon examination LWS determines to its satisfaction that such equipment is defective in material or workmanship, i.e. contains a defect arising out of the manufacture of the equipment and not a defect caused by other circumstances, including, but not limited to accident, misuse, unforeseeable use, neglect, alteration, improper installation, improper adjustment, improper repair, or improper testing, LWS shall, at its option, repair or replace the equipment, shipment to Buyer prepaid. LWS shall have reasonable time to make such repairs or to replace such equipment. Any repair or replacement of equipment shall not extend the period of warranty. If the Instrument is modified or in any way altered without the explicit written consent of LWS then the warranty is null and void. This warranty is limited to a period of one year, except as noted below, without regard to whether any claimed defects were discoverable or latent on the date of shipment. The length of warranty for pumps in hand held particle counters is one (1) year. Batteries and accessories with all products are warranted for one (1) year. Fuses and purge filters carry no warranty. If a third party battery is used in the product, the product warranty is null and void. If the battery is charged by a third party battery charger the battery warranty is null and void.
- B. If Buyer shall fail to pay when due any portion of the purchase price or any other payment required from Buyer to LWS under this contract or otherwise, all warranties and remedies granted under this Section may, at LWS's option, be terminated.
- C. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER REPRESENTATIONS, WARRANTIES AND COVENANTS, EXPRESS OR IMPLIED WITH RESPECT TO THE EQUIPMENT AND ANY DEFECTS THEREIN OF ANY NATURE WHATEVER, INCLUDING AND WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LWS SHALL NOT BE LIABLE FOR, AND BUYER ASSUMES ALL RISK OF, ANY ADVICE OR FAILURE TO PROVIDE ADVICE BY LWS TO BUYER REGARDING THE EQUIPMENT OR BUYERS USE OF THE SAME. UNDER NO CIRCUMSTANCES SHALL LWS BE LIABLE TO BUYER UNDER ANY TORT, NEGLIGENCE,

STRICT LIABILITY, OR PRODUCT LIABILITY CLAIM AND BUYER AGREES TO WAIVE SUCH CLAIMS. LWS's SOLE AND EXCLUSIVE LIABILITY AND BUYERS SOLE AND EXCLUSIVE REMEDY, FOR ANY NONCONFORMITY OR DEFECT IN THE PRODUCTS OR ANYTHING DONE IN CONNECTION WITH THIS CONTRACT, IN TORT, (INCLUDING NEGLIGENCE), CONTRACT, OR OTHERWISE, SHALL BE AS SET FORTH IN THE SUBSECTION A HEREOF AS LIMITED BY SUBSECTION B HEREOF. THIS EXCLUSIVE REMEDY SHALL NOT HAVE FAILED OF ITS ESSENTIAL PURPOSE (AS THAT TERM IS USED IN THE UNIFORM COMMERCIAL CODE) PROVIDED THAT THE SELLER REMAINS WILLING TO REPAIR OR REPLACE DEFECTIVE EQUIPMENT (AS DEFINED IN SUBSECTION A) WITH A COMMERCIALY REASONABLE TIME AFTER RECEIVING SUCH EQUIPMENT. BUYER SPECIFICALLY ACKNOWLEDGES THAT SELLER'S PRICE FOR THE EQUIPMENT IS BASED UPON THE LIMITATIONS OF LWS'S LIABILITY AS SET FORTH IN THIS CONTRACT.

Warranty Of Repairs After Initial One Year Warranty:

- A. Upon expiration of the initial one-year warranty, all parts and repairs completed by an authorized Lighthouse repair technician are subject to a six (6) month warranty.
- B. Other than the above, LWS makes no warranty of any kind, expressed or implied, except that the products manufactured and sold by LWS shall be free from defects in materials and workmanship and shall conform to LWS's specifications; Buyer assumes all risk and liability resulting from use of the products whether used singly or in combination with other products. If instrument is modified or in any way altered without the explicit written consent of LWS, then the warranty is null and void.
- C. WARRANTY REPAIRS SHALL BE COMPLETED AT THE FACTORY, BY AN AUTHORIZED SERVICE LOCATION, BY AN AUTHORIZED SERVICE TECHNICIAN, OR ON SITE AT BUYER'S FACILITY BY A LIGHTHOUSE AUTHORIZED EMPLOYEE. BUYER PAYS FREIGHT TO FACTORY; SELLER WILL PAY STANDARD RETURN FREIGHT DURING THE WARRANTY PERIOD. BUYER MAY SELECT A FASTER METHOD OF SHIPMENT AT ITS OWN EXPENSE.

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