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Airborne Particle Counter

Operating Manual

Lighthouse Worldwide Solutions

HANDHELD 3013 Airborne Particle Counter

Operating Manual

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LWS Part Number: 2480833334-1 Rev 3



EU DECLARATION OF CONFORMITY

Manufacturer's Name Lighthouse Worldwide Solutions, Inc.

Manufacturer's Address: Lighthouse Worldwide Solutions, Inc.
1221 Disk Drive
Medford, OR 97501

Declares that the product:

Product Name: Handheld Airborne Particle Counter
Model Number(s): HANDHELD 3013

Conforms to the following Product Specifications:

<u>SAFETY</u>	EN61010-1:2001	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part I: General Requirements IEC 61010-1:2000
	CAN/CSA C22.2 No. 1010.1-1992	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part I: General Requirements
<u>LASER SAFETY</u>	IEC 60825-1 Am. 2 IEC 60601-2-22 (Laser Notice 50)	Guidance on Laser Products: Conforms to FDA 21 CFR Chapter I Subchapter J
<u>EMC</u>	EN61326	Electrical Equipment for Measurement, Control and Laboratory Use EMC Requirements Part I: General Requirements Includes Amendment A1:1998; IEC 61326:1997 + A1:1998

UL 61010A-1 – UL Standard for Safety Electrical Equipment for Laboratory Use; Part I: General Requirements.
Replaces UL 3101-1

Supplementary information: The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC amended by Directive 93/68/EEC and the EMC Directive 89/336/EEC amended by Directive 93/68/EEC, and carries the CE marking accordingly.

A handwritten signature in black ink, appearing to read "W L Shade", is written in a cursive style.

Fremont, CA, May 15, 2007

William L. Shade – V.P. Engineering

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About this Manual

This manual describes the detailed operation and use of the Lighthouse HANDHELD 3013 Airborne Particle Counter.

Text Conventions

The following typefaces have the following meanings:

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

italics

Represents information not to be typed or interpreted literally. For example, *file* represents a file name. Manual titles are also displayed in italics.

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 of data.*

boldface

Introduces or emphasizes a term.

`Courier font`

Indicates command syntax or text displayed by the diagnostic terminal.

Bold Courier

Indicates commands and information that you type. You can use uppercase or lowercase letters; in this manual, commands are shown in uppercase.

Helvetica Italics

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 HANDHELD 3013 Airborne Particle Counter, contact Lighthouse Worldwide Solutions:

(800) 945-5905 Sales & Service
(510) 438-0500 Outside of USA

www.golighthouse.com
techsupport@golighthouse.com

1 General Safety

Safety Considerations

Warnings and cautions are used throughout this manual. Familiarize yourself with the meaning of a warning before operating the particle counter. Warnings may appear in the left margin next to the subject to which warning applies or in the body of the text. The same warning may appear in several places within this manual. Exercise extreme care when performing any procedure preceded by or containing a warning.

There are several classifications of Warnings defined as follows:

- Laser - pertaining to exposure to visible or invisible Laser radiation
- General Use - pertaining to use of the instrument

Laser Safety Information

This product contains a Laser-based sensor that is a Class 1 product (as defined by 21 CFR, Subchapter J of the Health and Safety Act of 1968) when used under normal operation and maintenance. Service procedures on the sensor can result in exposure to invisible radiation. Service should be performed only by factory-authorized personnel.

The particle counter has been evaluated and tested in accordance with EN 610109-1:1993, "Safety Requirements For Electrical Equipment for Measurement, Control, and Laboratory Use" and IEC 825-1:1993, "Safety of Laser Products".

WARNING: *The use of controls, adjustments, or performance of procedures other than those specified within this manual may result in exposure to invisible infrared radiation that can quickly cause blindness.*



Figure 1-1 Warning label inside unit

For further technical assistance, contact our Technical Support Team at (800) 945-5905.

Sampling Safety

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.*

Sampling any gas under pressure can damage the instrument and void the warranty.

Sampling any gas that is not the same density as ambient air can result in inaccurate data.

Do NOT allow water, solvents, or other liquids to enter the instrument via the inlet tube - the instrument will be damaged and void the warranty.

Do NOT operate the instrument with the inlet tube capped or plugged - the internal pump may be damaged and void the warranty.

Contact Lighthouse for more information.

2

Introduction

Overview

This operating guide describes how to use the Lighthouse HANDHELD 3013 Airborne Particle Counter.



Figure 2-1 HH 3013 with Isokinetic Probe

Note: *Throughout this manual, HANDHELD, HANDHELD 3013 and HH 3013 are used to describe the instrument. These terms mean the same thing and are interchangeable.*

The HH 3013 has up to three particle-size channels starting at 0.3µm with a flow of 0.1 CFM and a positive touch interface. A microprocessor controls all instrument functions. In Auto Mode, particles can be displayed as Cumulative (CUMM) or Differential (DIFF). When operating the HANDHELD 3013 in Concentration (CONC) mode, particles are displayed in CUMM or DIFF as particles per cubic meter (**M3**), per cubic foot (**FT3**) or liters (**L**).

The instrument uses a laser-diode light source and patented collection optics for particle detection. Particles scatter light from the laser diode. The collection optics collect and focus the light onto a photo diode that converts the bursts of light into electrical pulses. The pulse height is a measure of particle size. Pulses are counted and their amplitude is

measured for particle sizing. Results are displayed as particle counts in the specified size channel.

Description

The Lighthouse HANDHELD 3013 particle counter is ergonomically designed and lightweight.

- The HH 3013 displays cumulative or differential particle count data on its easy to read high-contrast 128 x 64 OLED screen.
- A rechargeable battery maximizes the HH 3013's utility.
- Data is easily downloaded using LMS XChange software and the HH 3013's integrated USB port.

Additionally, the HH 3013 allows you to:

- Set the Sample Time;
- Configure the number of samples to be taken;
- Choose multiple or single samples;
- Choose between differential (DIFF) or cumulative (CUMM) display when in concentration (CONC) or automatic sample (AUTO) mode;
- Choose BEEP mode for a geiger-counter-like use when detecting particles;
- Display counts as per cubic foot (**FT3**), cubic meter (**M3**) or liters (**L**);
- Off load and save your data for historical data review;
- Print data tables from your PC using the data transfer software included with the instrument.

Specifications

Table 2-1 HH 3013 Specifications

Size Range	0.3 - 10.0µm
HH 3013 Standard Channel Thresholds	0.3, 0.5, 5.0µm; 0.3, 1.0, 5.0µm; optional sizes are available at time of order
Flow Rate	0.1 CFM (2.83 LPM)
Counting Efficiency	50% (per JIS)
Laser Source	Laser diode
Zero Count Level	<1 count / 5 minutes (per JIS)
Calibration	NIST Traceable
Count Modes (Particle Mode)	Concentration (cumulative or differential display), automatic (cumulative or differential display) or beep
Data Storage	Up to 999 sample records, including particle data, location and time
Communication Modes	RS232 via USB to PC
Supporting Software	LMS XChange Data Transfer Software
Display	High-contrast 128x64 OLED
Key Firmware Features	Historical data review, password protection
Enclosure	High impact injection molded plastic
Vacuum Source	Internal pump
Power	Unit: +24VDC Input; AC/DC Adapter: 100-240V, 47-63Hz
Battery	Rechargeable Li-Ion
Dimensions	6.68"(L) x 4.125"(W) x 2.0"(H) [16.97 x 10.48 x 5.08 cm]
Weight	1.26 lb (0.57kg)
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

The manufacturer recommends that your Lighthouse instrument be calibrated annually by a Certified Lighthouse Service Provider to ensure that it continues to perform within specification.

3

Unpack, Inspect and Install

Unpacking and Initial Inspection

Your instrument is thoroughly inspected and tested at the factory and is ready for use upon receipt. When received, inspect the shipping carton for damage. If the carton is damaged, notify the shipper immediately.

If the carton appears to be undamaged, carefully inspect the instrument for broken parts, scratches, dents, or other damage before using.

Verify the contents of the package against the Packing List.

If anything is missing from the list, please contact your sales representative at Lighthouse Worldwide Solutions immediately at (800) 945-5905 or techsupport@golighthouse.com.

Keep the carton and all packing material for reshipment for its annual calibration.

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 on page 3-2.

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, nozzle caps and packing materials whenever possible. Refer to www.golighthouse.com/rma for detailed instructions.
2. If the original container and packing materials are not available, wrap the unit in static conductive 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 customer. You may contact Lighthouse to purchase a replacement shipping container and nozzle caps.
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.

Accessories

You may order optional accessories for use with the unit, such as:

- Additional Purge Filter
- Additional USB Cable
- Additional Power Adapter

Contact Lighthouse Worldwide Solutions for more information.

Prepare Instrument for Use

Power Requirements

The power adapter input requirement is 100-240VAC, 47-63Hz, 1A. Its output is +24VDC, 0.75A. A power adapter and power cord are included with your HANDHELD 3013.

Charging the Battery

The HH 3013 has a built-in rechargeable battery. The battery recharges whenever the unit is plugged into AC power.

The HH 3013 was designed to extend its battery life without sacrificing performance. If the unit is idle for 30 minutes, it will power off to save battery life. The HH 3013's in-use battery life is over 5 hours (pump on and sampling air). In the powered-off state (HH 3013 stored), the battery life is up to three months.

The battery should be charged for eight hours before its first use. After that, a full charge can be reached in about 1.5 hours. Any time it is stored for extended periods, it should be recharged once every three months to maintain its battery life.

The HH3013 will flash the outer blue LED arrow buttons to indicate the unit needs to be charged.

Connect Power

Connect the power adapter as illustrated in the following steps:

1. Insert the round DC power plug into its receptacle on the right side of the HANDHELD.



Figure 3-1 DC power plug

2. Push the connector in until fully seated.
3. Plug the adapter's AC power cord into the AC power source. The battery will begin and continue to charge until it is fully charged or DC power is removed.

Connecting to an External Computer or Facility Management System

The HH 3013 can be connected to a PC running LMS XChange Data Transfer Software to download its data. LMS XChange software can export data to a *.csv file for historical review.

Note: *The DATA port is used to connect the HH 3013 to an external computer. It can only be used to download data from the instrument.*

1. To connect to the HH 3013, insert the small end of the USB data communications cable to the DATA port.



Figure 3-2 Connecting USB data communications cable

2. Connect the USB-A (larger connector) end of the data cable into your PC USB port.

Please refer to the LMS XChange Operating Manual for more information.

4

Operation

This chapter describes how to use the HANDHELD 3013 Airborne Particle Counter in Particle Mode.

Instrument Setup

The HH 3013 comes with a built-in battery and is ready for use after charging the battery. To start using the instrument, proceed as follows:

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.*

Do NOT attempt to run particle counter when the Isokinetic probe is capped or plugged.

Sampling any gas under pressure can damage the instrument and void the warranty.

Sampling any gas that is not the same density as ambient air can result in inaccurate data.

Contact Lighthouse for more information.

1. For first-time use or after extended storage, start with a fully-charged battery (see Chapter 3 for instructions).
2. Position the instrument in the environment to be measured.
3. Remove the protective cap from the Isokinetic Probe. **NOTE: Do not discard the protective cap. It should be placed on the inlet any time the instrument is moved outside of the environment being measured or is not being used.**
4. Review Figure 4-1 for HANDHELD 3013 layout.

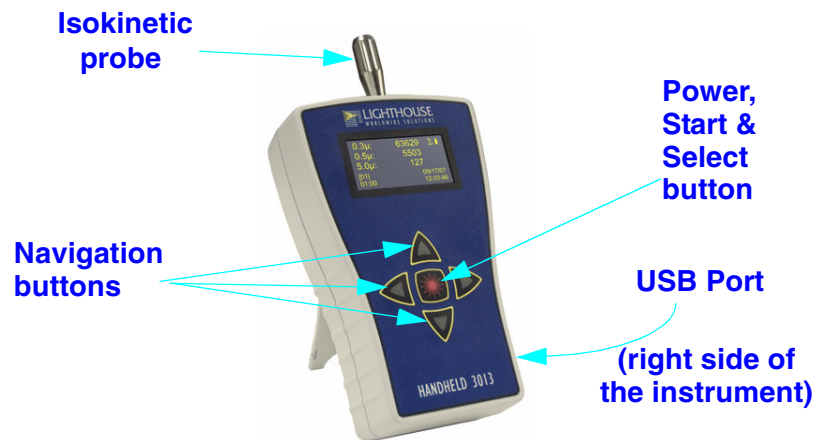
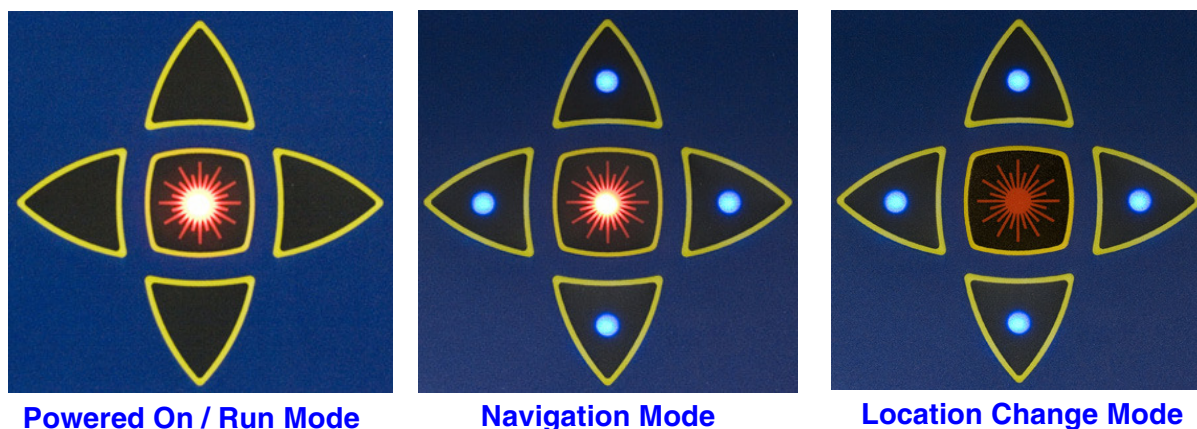


Figure 4-1 HH 3013 Instrument Layout

The Center button is also referred to as the SELECT button or Star-Center - these terms are used interchangeably throughout this manual.

Initial Operation

1. Press and hold the center of the Star (SELECT) for five seconds to power the HANDHELD 3013 ON.



WARNING: *Do NOT allow water, solvents, or other liquids to enter the instrument via the inlet - the instrument will be damaged and void the warranty.*

Do NOT operate the instrument with the inlet capped or plugged - the internal pump will be damaged and void the warranty.

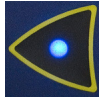
Figure 4-2 Star Button Illumination Patterns

2. The red star illuminates and the Run screen appears.
3. To start counting particles, momentarily press the SELECT button.
4. While the instrument is running, any button will silence alarms.
5. To stop the instrument, momentarily press the SELECT button.
6. While running, the screen displays the channel sizes and any counts for those channels, as well as its operating mode, battery condition and other data.
7. The HH 3013 comes pre-configured with a one-minute cycle time, continuous cycle and alarms set for counts exceeding 1000 counts per channel. Refer to Table 6: on page B-1 for a list of default settings. These presets may be changed at any time using the instructions starting at "Operation" on page 4-8.
8. To turn the HANDHELD 3013 OFF, press the SELECT button to stop counting, press the LEFT arrow to exit to the Main Menu screen then use the UP or DOWN arrow to navigate to Power OFF and press the SELECT button. Confirm at the next screen by pressing the SELECT button. The HANDHELD 3013 will power OFF.

Menu System Overview

The HANDHELD 3013 incorporates a unique control interface to operate and configure the instrument. Operation is accomplished by pressing the arrows or the center of the Star. Lighted LEDs indicate which buttons may be used. Refer to Figure 4-3, Figure 4-4, Figure 4-5 and Figure 4-6 for the different menu structures.

The Star buttons perform the following functions:



- BACK (left-pointing) Arrow:
 - Exit the MAIN Run Screen
 - Move back one space in Edit fields
 - Move up the Menu Tree in Menu fields
 - Decrement or decrease the Multiplier



- FORWARD (right-pointing) Arrow:
 - Move one space to right in Edit fields
 - Increment or increase the Multiplier
 - When stopped in AUTO mode, enable change of Location



- UP Arrow
 - Scrolls UP a Menu Tree
 - Increment or increase a field value



- DOWN Arrow
 - Scroll DOWN a Menu Tree
 - Decrement or decrease a field value



- SELECT (Center button)
 - Toggle Start/Stop at MAIN Run Screen
 - Select (enter into) Menu Branch
 - Confirm changes in Edit field
 - Power unit ON (hold for five seconds)

Menu Maps

Top Level:

HH3013 Menu Tree, Top Level

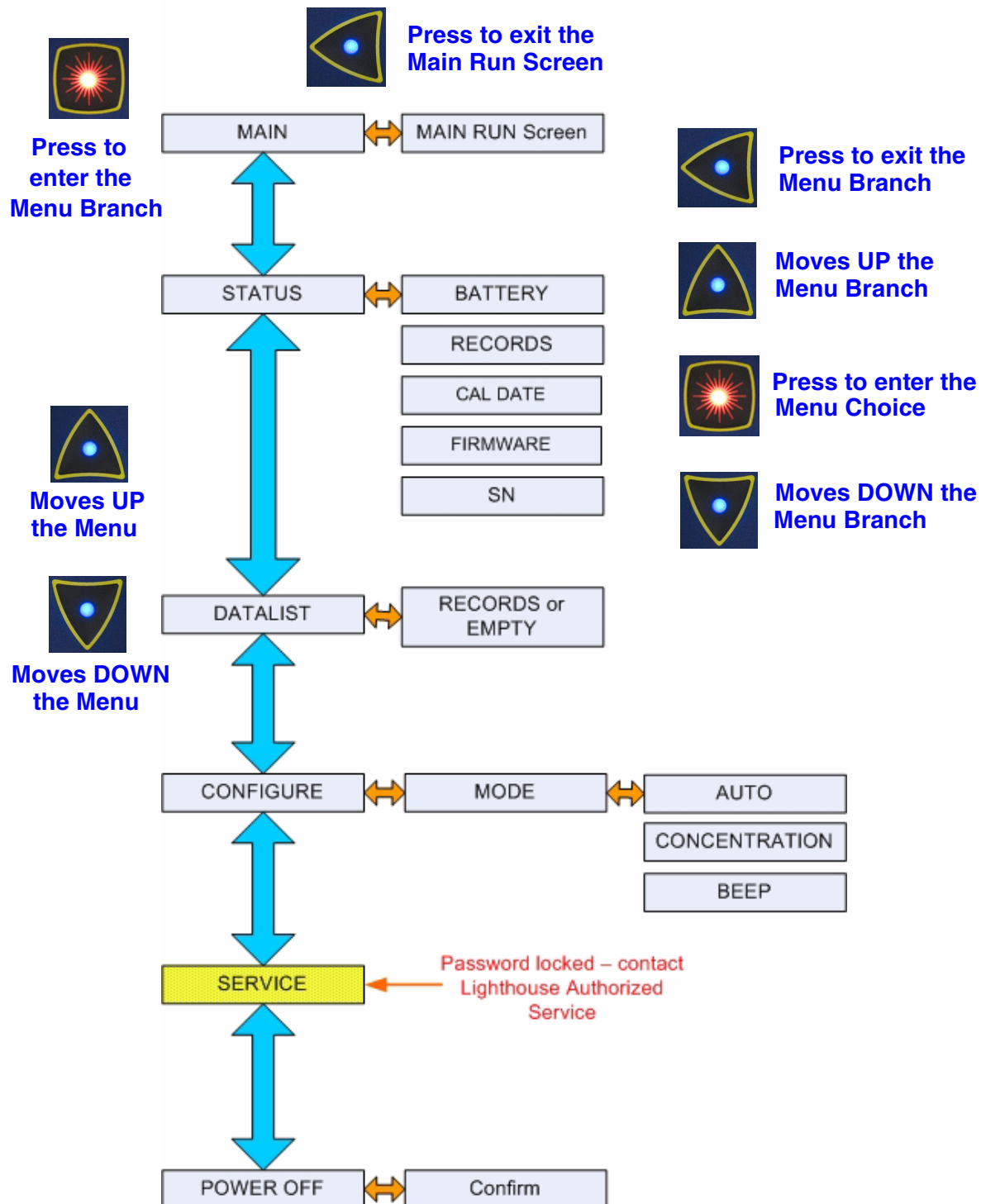


Figure 4-3 HH 3013 Top Level Menu Tree

AUTO Mode Configure:

HH3013 Menu Tree, AUTO MODE Configure, Rev2

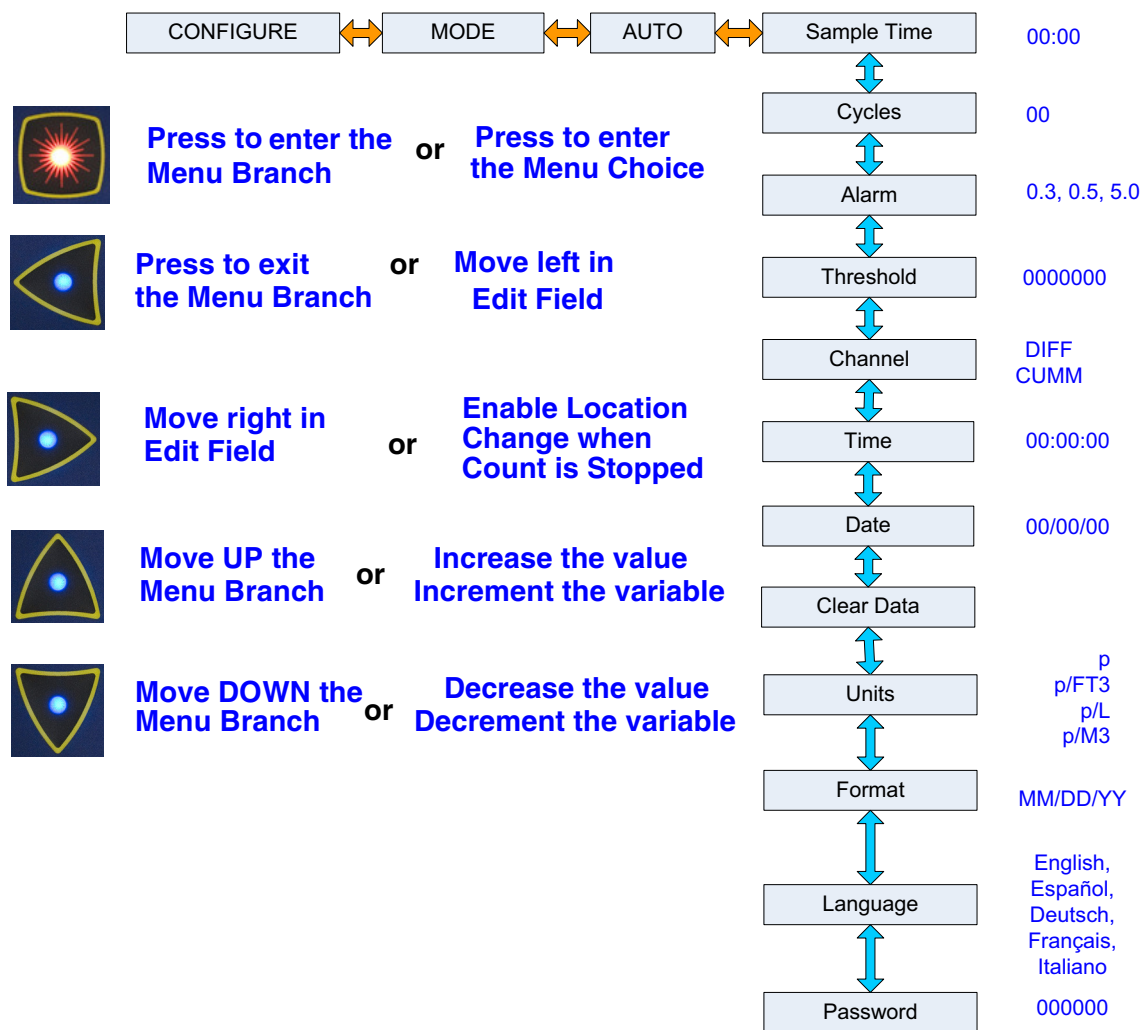


Figure 4-4 HH 3013 AUTO Configure Menu Tree

CONC Mode Configure:

HH3013 Menu Tree, CONC MODE Configure, Rev2

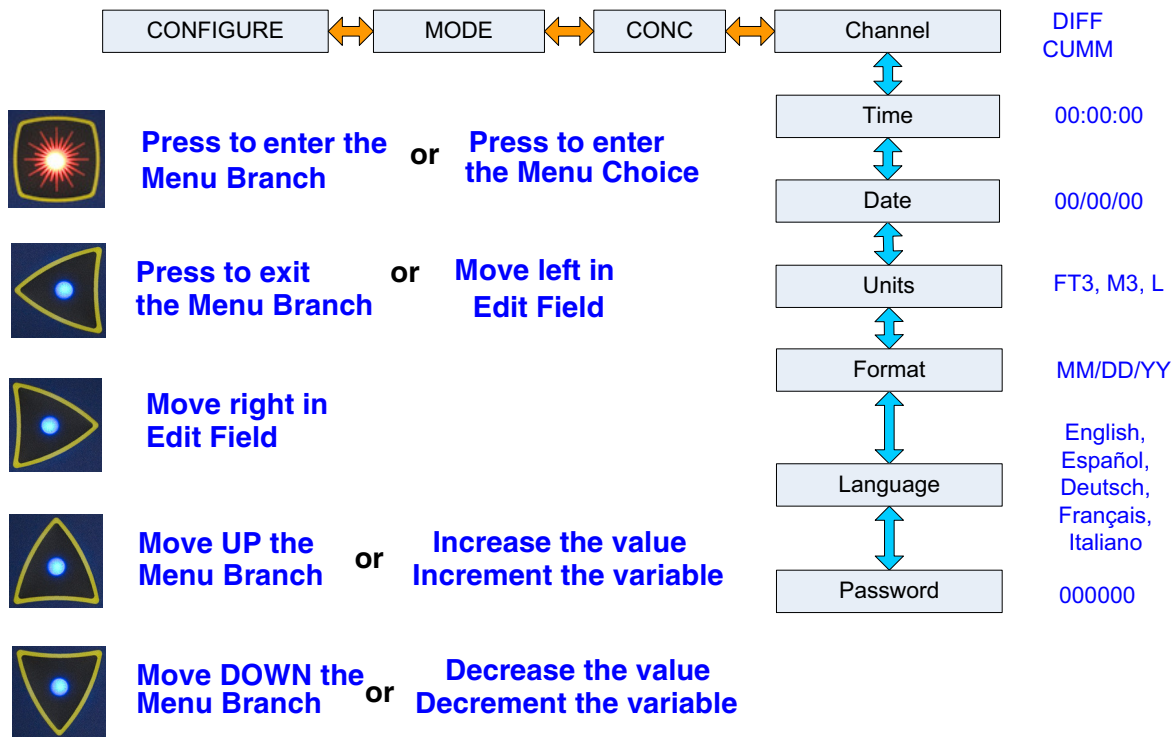


Figure 4-5 HH 3013 CONC Configure Menu Tree

BEEP Mode Configure:

HH3013 Menu Tree, BEEP MODE Configure

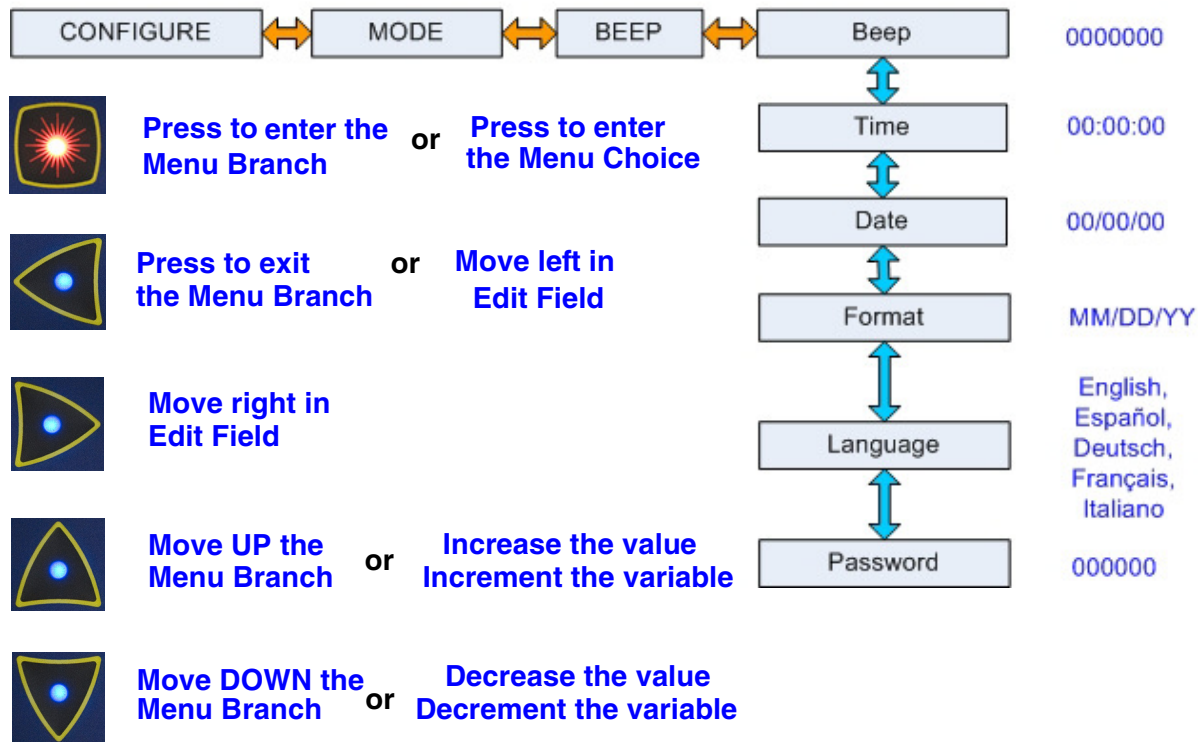


Figure 4-6 HH 3013 BEEP Configure Menu Tree

Operation

Note: *When making a change from one operating mode to another, you must "activate" the mode by pressing the SELECT button after choosing it by the UP/DOWN buttons. Otherwise, the menu choices may not reflect those available for the desired mode.*

Operating Modes

Three modes of operation are available on the HANDHELD 3013:

AUTO (Automatic) MODE:

Select this mode from the Configure Menu to enable an easy-to-use mode that will automatically measure all channels and record their data to a specified location whenever the Start button is pressed. This mode:

- Is the default operating mode when the HANDHELD 3013 is shipped from the factory and is the most frequently used mode;
- Is used for record keeping and uses locations to store counts or readings;
- Displays counts as Differential (Δ) or Cumulative (Σ).

The choices available from the AUTO Configure screen are:

1. Sample Time - measured in seconds, from 00:00 to 59:59.
2. Cycles - up to 99. If set to 00, the counter will run continuously and record the counts at the end of the Sample Time into the 999-record rotating buffer.
3. Alarm - set to any of the channel sizes. This selects the channel the counter monitors for a count level that, when achieved, the counter should indicate an alarm condition and beep every second. This is useful for particle sizes that are known to be mold, for instance, or will be particularly damaging in a specific process, such as paint finish. When an alarm is triggered, pressing any button will silence the alarm beep.
4. Threshold - up to 9999999. This is the level at which the counter will indicate an alarm when achieved. Having an alarm set too low for an area that is known to be "dirty" will cause excessive alarming and setting it too high may not be useful. This depends on the area being monitored, such as a paint booth that shouldn't have more than 1,000 5.0 μ m particles counted in one minute. Setting this value to 0000000 disables alarming.
5. Channel - CUMM or DIFF. This setting determines how the data is displayed on the screen - as Cumulative (CUMM) for each channel size or the Differential (DIFF) between the channel sizes.
6. Time - set as hh:mm:ss. This setting is available from all Configure Menus for the different modes.

7. Date - set as MM/DD/YY or DD-MM-YY, dependent on Format, below.
8. Clear Data - clears the data stored in the buffer - must be confirmed.
9. Format - sets the Date format as MM/DD/YY or DD-MM-YY.
10. Language - choose as English, Español, Deutsch, Français or Italiano.
11. Password - set numerically using 000000 through 999999. If a value greater than 000000 is entered, this value will be required to gain access to the Configure menu. A password of 000000 disables password protection for the Configure menu.

Changing Locations:

In AUTO MODE, stop the counting by pressing the SELECT button. Momentarily press the RIGHT arrow which puts the counter into the Location Edit function and highlights the left-most digit. If the left-most digit needs to be changed, press the UP or DOWN arrow to change the value to a desired number.

If the right-most digit needs to be changed, press the RIGHT arrow to highlight the digit then the UP or DOWN arrow to change the value to that desired.

The counter can be started and stopped at this screen by pressing the SELECT button. If several readings need to be taken and the location changed between readings, stopping the counter, choosing the location and restarting the counter can be done quickly from this screen.

Monitor the screen to determine when the cycle has completed before changing the location. If the counter is stopped before the cycle has completed, no data will be recorded for that location. This ensures compliance with regulations by preventing "short" readings from being recorded as legitimate data.

CONC (Concentration) MODE:

Select this mode from the Configure Menu to have calculated concentrations of particles displayed on a per-channel basis and based on the unit of measurement. The values are displayed on a six-second rolling average with the display updated every second.

Concentration is continually updated and the displayed results are based on the last six seconds of data. This allows the user to trend the particle concentration in real-time and display that information in the preferred units of measure (cubic foot, Liter or cubic meter). Particle counts are not stored in memory.

- Displays counts as Differential (Δ) or Cumulative (Σ).
- This is the instrument's most flexible sample mode.
- Concentration mode uses the sample time, flow rate and particles detected to calculate how many particles exist per unit selected, such as cubic feet, cubic meters or liters. Because the quantity of particles per unit number can get very large, the display shows counts in scientific notation only.

The choices available from the CONC Configure screen are:

1. Channel - CUMM or DIFF. This setting determines how the data is displayed on the screen - as Cumulative (CUMM) for each channel size or the Differential (DIFF) between the different channel sizes.
2. Time - set as hh:mm:ss. This setting is available from all Configure Menus for the different modes.
3. Date - set as MM/DD/YY or DD-MM-YY, dependent on Format, below.
4. Units - set as FT3 (Cubic Feet), L (Liters) or M3 (Cubic Meters).
5. Format - sets the Date format as MM/DD/YY or DD-MM-YY.
6. Language - choose as English, Español, Deutsch, Français or Italiano.
7. Password - set numerically using 000000 through 999999. The password prevents undesired access to the Configure menu.

BEEP MODE:

Select this mode from the Configure Menu whenever an audible means of detecting particles counted is desired, such as when measuring an area is required but constant visual monitoring of the screen is impractical.

- In this mode, the HANDHELD 3013 operates like a geiger counter, beeping whenever the total count exceeds the threshold set for the 0.3 μ m channel size.
- The sample time used in this mode is fixed at one second. Select the quantity of particles that the instrument should indicate has been exceeded (the threshold). A beep occurs every time the threshold is reached.
- The threshold is a cumulative value and the instrument will continue to count until the threshold is reached and then it will beep. If this threshold is low enough or particle count high enough during each one-second sample, the instrument can beep every second.

The choices available from the BEEP Configure screen are:

1. Beep - set the threshold from 0000000 to 9999999. Multiples of this value must be met or exceeded on the first channel to have the instrument "beep". This means that the first beep in one second would occur after a value of, say, 100 then the second beep would occur after 200, etc. Setting this parameter to all zeroes will disable the beep.
2. Time - set as hh:mm:ss. This setting is available from all Configure Menus for the different modes.
3. Date - set as MM/DD/YY or DD-MM-YY, dependent on Format, below.
4. Format - sets the Date format as MM/DD/YY or DD-MM-YY.
5. Language - choose as English, Español, Deutsch, Français or Italiano.
6. Password - set numerically using 000000 through 999999. The password prevents undesired access to the Configure menu.

Operating Screens

When the HANDHELD 3013 is first powered ON, the MAIN screen gives the user a snapshot of the instrument configured-mode status, showing such items as configured channel sizes and their associated counts, count mode (Differential = Δ , Cumulative = Σ), battery level and the instrument date and time. The symbols and information shown will change based on which "operating mode" the HH3013 is set to. The different screens are shown in Figure 4-7 through Figure 4-10.

At any of these screens, press  to start or stop counting.

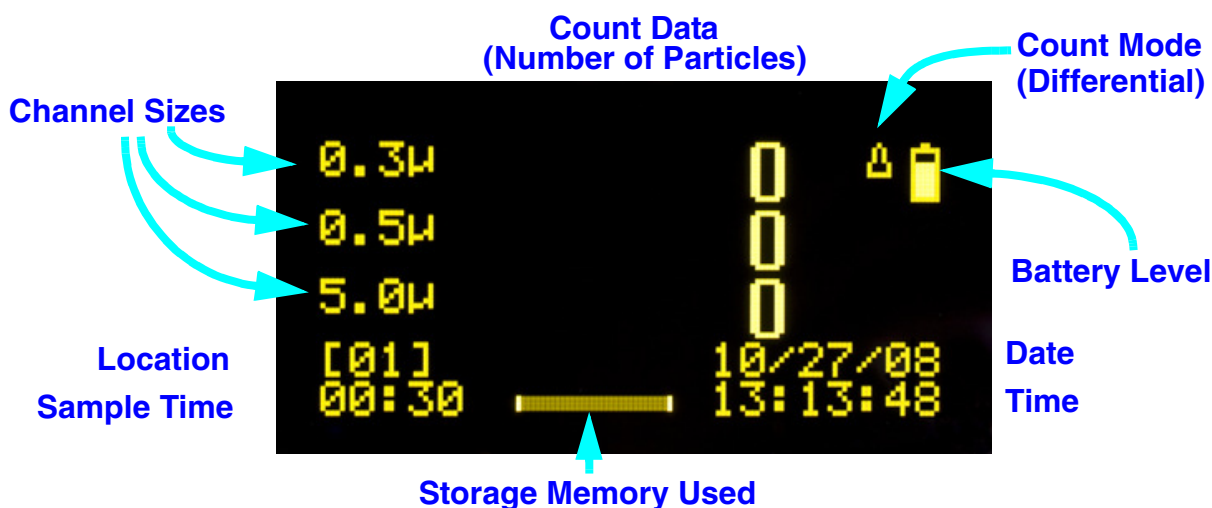


Figure 4-7 AUTO (Automated) Run Screen

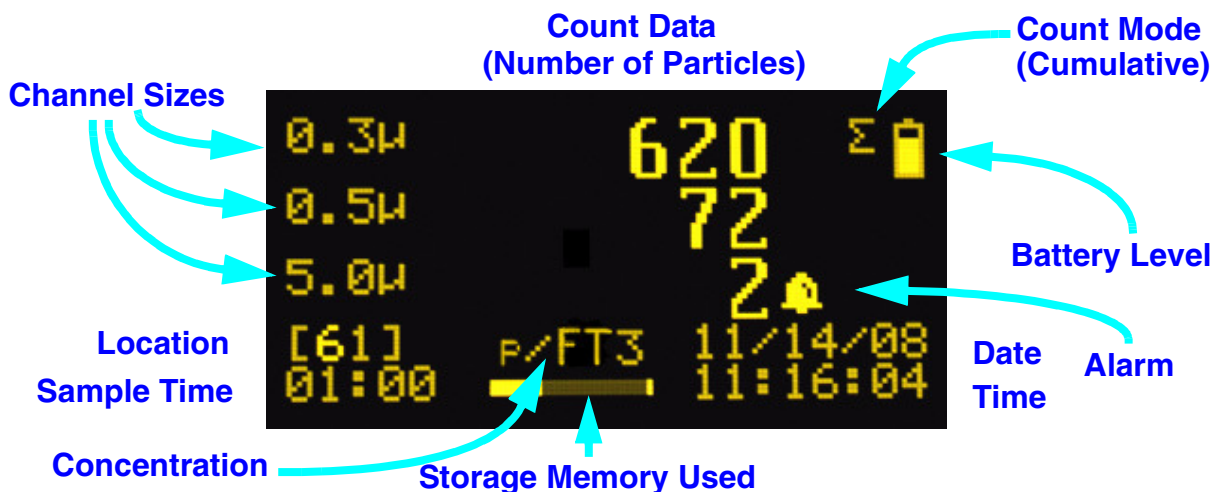


Figure 4-8 AUTO Run Screen with Alarm on Channel #3

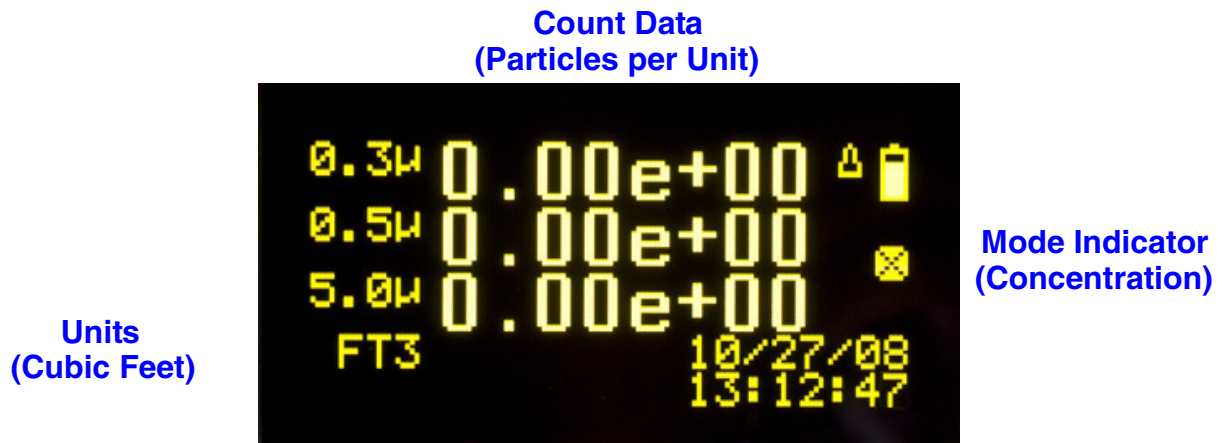


Figure 4-9 CONC (Concentration) Run Screen

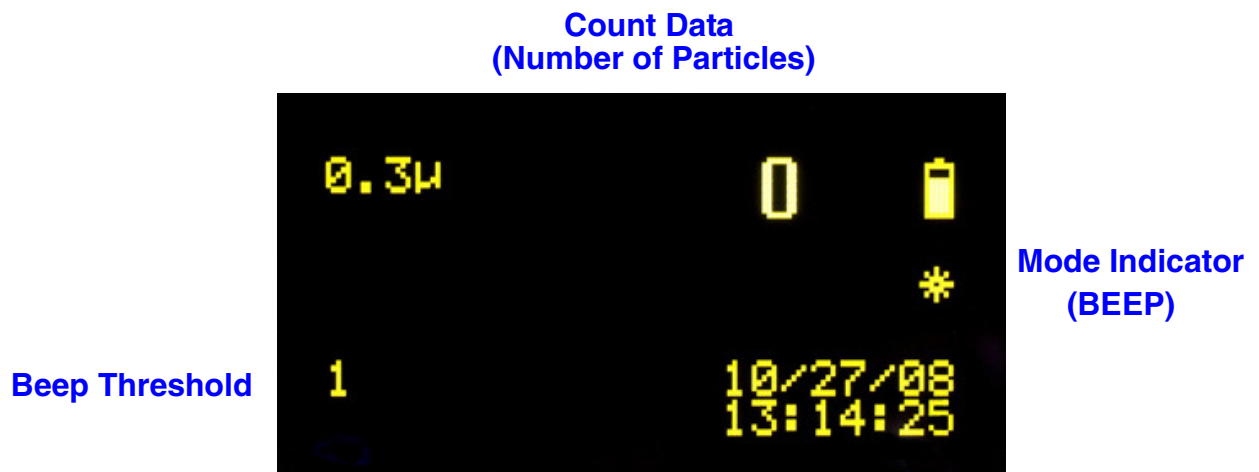


Figure 4-10 BEEP Run Screen

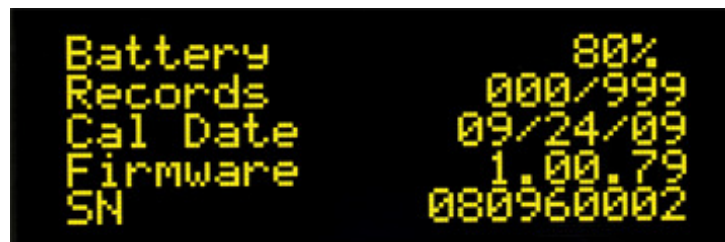


Figure 4-11 Status Screen Details

Battery Levels

Note: *If it appears that the remaining battery life indicators do not match the actual battery life, refer to "Battery Calibration" on page 5-1.*

The instrument can be powered by its external power adapter for long-term usage or while charging the internal battery. It can also be powered by its rechargeable battery as a portable. While on battery, the battery indicator will show the approximate level of charge remaining (Figure 4-12). If the unit is idle (no pump run or button actions) for 5 minutes, it will power off to save battery life.

When the instrument is connected to the AC Adapter, it will display the Charging Battery ICON when not fully charged and the AC Power Connected ICON connection when fully charged.

At the Status screen, the battery life will be shown as a percentage, rather than an ICON.

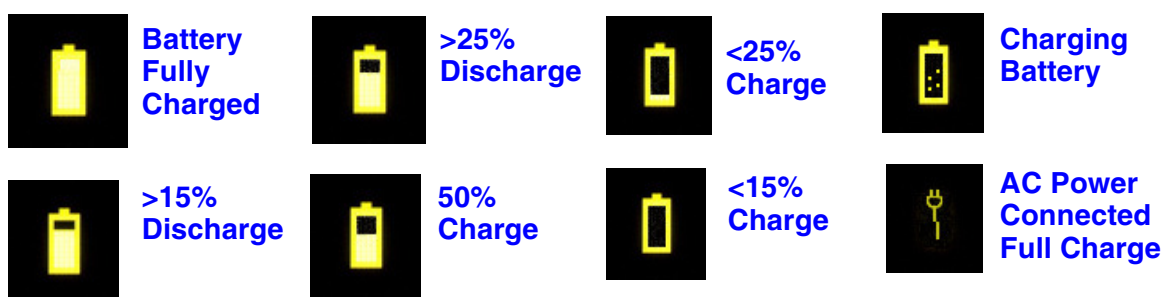


Figure 4-12 Battery Level ICONs

When the AC indicator symbol is displayed, it indicates the instrument is getting its power from an AC source.

Data Transfer

The HANDHELD 3013 uses LMS XChange to transfer collected data from the instrument to an IBM PC compatible computer system for display in an Excel[®] spreadsheet. Please refer to the LMS XChange Operating Manual found on the accompanying CD for details on installation, configuration and use of the software.

Note: *You must have Administrator rights on the system to install the USB driver or XChange software.*

Driver Installation

If it hasn't been done, yet, install the USB driver provided on the product CD. Once it has been installed and the instrument is connected, the driver will be used to establish communications with the HH3013 using a virtual COM port on the PC. Click Cancel if the driver has not been installed and the HH3013 has been connected to the PC. Disconnect the HH3013 until after the driver is installed.

Using the USB Port to connect to a PC

Note: Make sure the USB driver has been installed on the PC before connecting and applying power to the 3013

1. If the HH3013 is running, power it OFF.
2. Connect the small end of the included USB cable to the 3013 (only one end will fit).
3. Connect the other end to any available USB port on the PC.
4. Apply power to the 3013.
5. Windows will recognize that a new hardware device has been attached and will finalize the installation as needed. This is a routine "registering" of components that should take only a moment. An additional COM port will be added to the PC.
6. Identify the computer port that has been added to the PC by right-clicking **My Computer** and choosing **Properties**.
7. Left-click the **Hardware** tab then **Device Manager** button.
8. Examine the COM ports. USB ports are generally added to the bottom of the list and named USB COM port 'x'. (Figure 4-13).

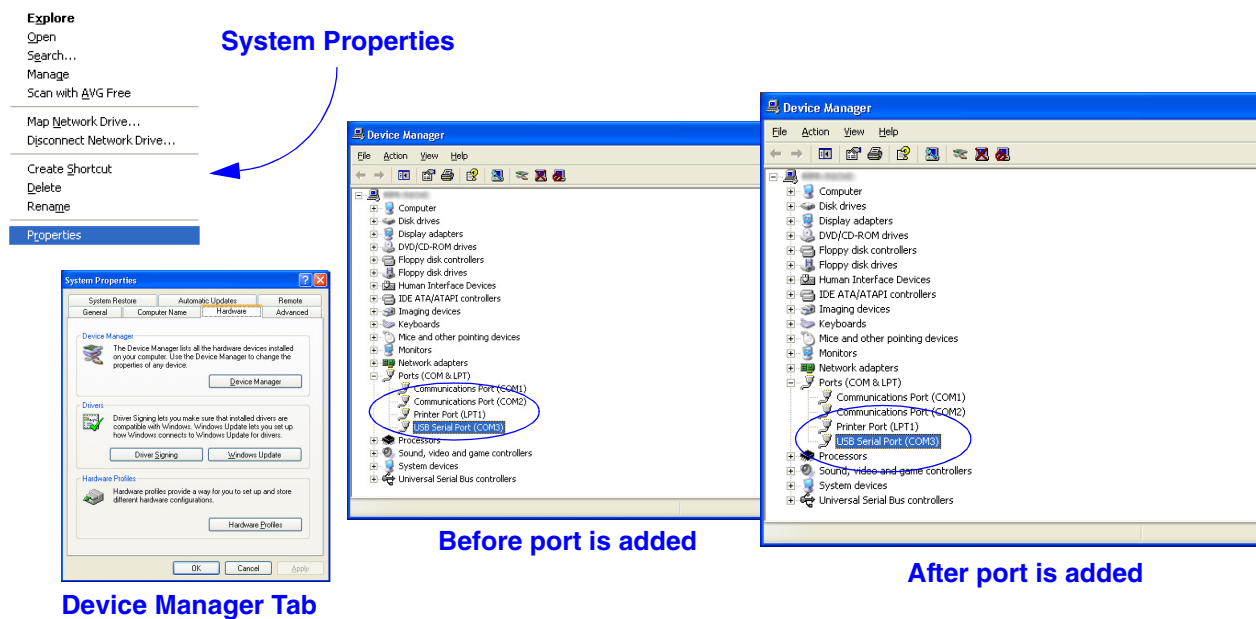


Figure 4-13 Example Device Manager Screens in XP

Use LMS XChange or one of the LMS Express products to connect to the instrument and retrieve data from it. Use the port assignment determined above.

5

Maintenance Procedures

This chapter provides the user with HANDHELD maintenance procedures.

Safety

Before performing any of the tasks described in this chapter, read the About chapter of this manual and become familiar with the warnings found throughout the manual regarding the HANDHELD 3013.

Battery Calibration

With age and usage, a Lithium Ion battery will recharge and discharge slower and may indicate the charge level differently from when it was new. The HH3013 can correct for this during its Battery Calibration procedure, a full discharge and recharge process.

To complete this process, fully discharge the HH3013 by running it in AUTO Mode until the screen turns off (pump must be running) without the AC power adapter. Plug in the power adapter and fully charge the battery until the AC Connected ICON comes on.

Calibration

To maintain optimum performance of this instrument, it should be recalibrated annually by a Lighthouse Authorized Service Provider.

Cleaning

Routine maintenance procedures may be superseded by customer requirements. Under no circumstances should Acetone be applied to the HANDHELD instrument.

1. To keep the interior of the instrument clean, install the protective plastic cap supplied with the instrument before cleaning it or moving it from one area to another.
2. Moisten a lint-free cloth with 99% isopropyl alcohol. The cloth should be moist, not wet.
3. Wipe down the exterior surfaces of the instrument.

Purge Test

Configure the HANDHELD

1. Connect the Purge filter to the sample inlet. The purge filter has an adapter to fit over the isokinetic probe.
2. Attach the power adapter and apply power to the instrument.

Set up Purge Clean

1. Exit from the MAIN Run screen and scroll down to Configure.
2. Choose AUTO mode.
3. Change Sample Time to 30 minutes (30:00).
4. Change Cycles to 01.
5. Exit the Configure menu, go to Main and start the counter.
6. Allow the instrument to sample through a 30 minute period. This time allows the unit to warm up and purge any residual particles that might be inside it. If the HANDHELD has been used in an exceptionally 'dirty' area, it might be prudent to run another 30-minute cleaning cycle.

Set up Purge Test

1. Exit from the MAIN Run screen and scroll down to Configure.
2. Change the Sample Time to 5 minutes.
3. Change Cycles to 10. The instrument will take ten five-minute samples.
4. Return to the Run screen and start the HANDHELD.
5. If an average of more than one count per five minute sample is reported, repeat the Purge Clean Cycle as outlined above, followed by the Purge Test.
6. After the instrument meets the requirements of the Purge Test, return the instrument to its normal location and operating status.
7. If the instrument still fails the Purge Test, contact Lighthouse Tech Support for assistance.

A *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 two years 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 two years 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 two years, 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 Two (2) Year Warranty:

- A. Upon expiration of the initial two-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.

B *Default Settings*

HANDHELD 3013 Default Settings

Table 6: Default Settings

MENU ITEM	VALUE
Mode	AUTO
Channel (Data Display)	CUMM
Particle Vol	FT^3
Sample Time	00:01:00
Cycles	00000 (continuous)
Alarm	Ch1
Threshold	0000000 (no alarm)
Format	MM/DD/YY
Language	English
Password	000000

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