

**FLUKE®**

# **Fluke 983**

Particle Counter

Users Manual

PN 2414721

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# Fluke 983 Particle Counter

## Introduction

### Warning

**Read “Safety Information” before using the Fluke 983 Particle Counter.**

The Fluke 983 Particle Counter (“The Particle Counter”) is a portable instrument that measures and reports air contamination. It holds 5,000 samples in memory and records the date, time, counts, sample volume, temperature, and relative humidity of each sample. The data can be easily downloaded to a personal computer using the interface cable adapter, cable, and FlukeView® Forms Documenting Software provided with the unit.

## Applications

The Particle Counter can be used for:

- Monitoring cleanrooms
- Indoor air quality investigations
- Monitoring gowning rooms
- Testing filter seals
- Locating particle contamination sources
- Monitoring particle size distributions

## Contacting Fluke

To contact Fluke or for service, call one of the following telephone numbers:

USA: 1-888-44-FLUKE (1-888-443-5853)

Canada: 1-800-36-FLUKE (1-800-363-5853)

Europe: +31 402-675-200

Japan: +81-3-3434-0181

Singapore: +65-738-5655

Anywhere in the world: +1-425-446-5500

Or, visit Fluke's Web site at [www.fluke.com](http://www.fluke.com).

To register your product, visit [register.fluke.com](http://register.fluke.com)





## **Safety Information**

A **Warning** identifies a condition or action that pose hazard(s) to the user; a **Caution** identifies a condition or action that may damage the Particle Counter or the equipment under test.

Read the entire Users Manual before using the Particle Counter.

Safety symbols used in this manual and on the Particle Counter are displayed in Table 1.

**Table 1. Symbols**

<b>Symbol</b>	<b>Meaning</b>
	Risk of Danger. Important information. Refer to manual.
	Hazardous voltage. Risk of electrical shock.
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.
	Conforms to relevant European Union directives.

### **⚠⚠ Warning**

To avoid electric shock, injury, or damage to the Particle Counter, follow these safety guidelines:

- Use the Particle Counter only as described in the Users Manual, otherwise the protection provided by the instrument may be impaired.
- Do not use the Particle Counter in explosive atmospheres.
- The Particle Counter contains no user-serviceable parts. Do not open the instrument. For service and battery replacement, the instrument must be sent to Fluke. See “Contacting Fluke”.
- Have the Particle Counter serviced only by qualified service personnel.
- Inspect the Particle Counter before use. Do not use it if it appears damaged.
- Always use the ac adapter/charger and connector (supplied with the Particle Counter) appropriate for the voltage and outlet of the country or location in which you are working.

### **⚠ Caution**

To avoid possible damage to the Particle Counter:

- Avoid using the Particle Counter in an excessively dirty or dusty atmosphere. Excessive particle intake can damage the Particle Counter.
- Remove the Isokinetic-Probe Cover (the black cap) before use. Not doing so can damage the Particle Counter.
- Do not use a wrench to connect or disconnect the Isokinetic Probe or intake nozzle. The connection should be finger tight.
- If using the tilt stand, hold the instrument while using the keypad.

## **Compliance**

The Particle Counter complies with:

CE, JIS B9921: 1997, 89/336/EEC, 73/23/EEC, EN61326:  
1997, EN60825-1:2001, Federal Standard 209E

## **Quick Start**

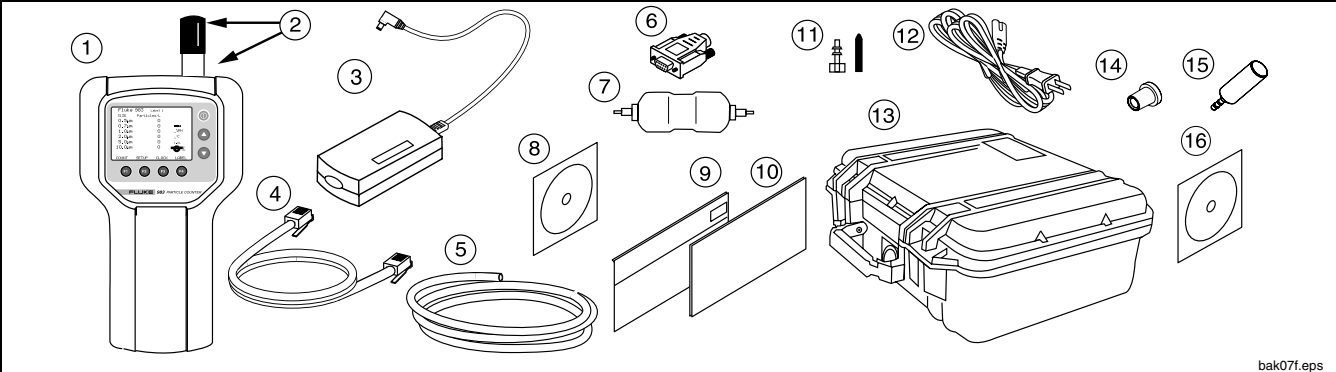
The Particle Counter may be used directly out of the box.  
To immediately use the Particle Counter:

1. Read "Safety Information"
2. Remove the Isokinetic Probe Cover (the black cap)
3. Press the POWER keypad
4. Press **(F1)** to start sampling

Be sure to read the entire Users Manual for more detailed information.

**Shipping Contents**

The Particle Counter ships with the items shown in Figure 1.



①	Fluke 983 Particle Counter and Holster with Hand Strap	⑨	Users Manual (English)
②	Isokinetic Probe and Cap	⑩	Safety Information (Multi-language)
③	AC Adapter/Charger	⑪	Intake Nozzle and Cap
④	RS-232 Modular Cable	⑫	Power Cord
⑤	¼ in. High Purity Tubing (2 ft.)	⑬	Hardshell Carrying Case
⑥	RJ-45 to DB-9 Connector	⑭	Zero Count Filter Adapter
⑦	Zero Count Filter	⑮	Isokinetic Probe with Barb
⑧	983 Users Manual CD	⑯	FlukeView® Forms Documenting Software CD

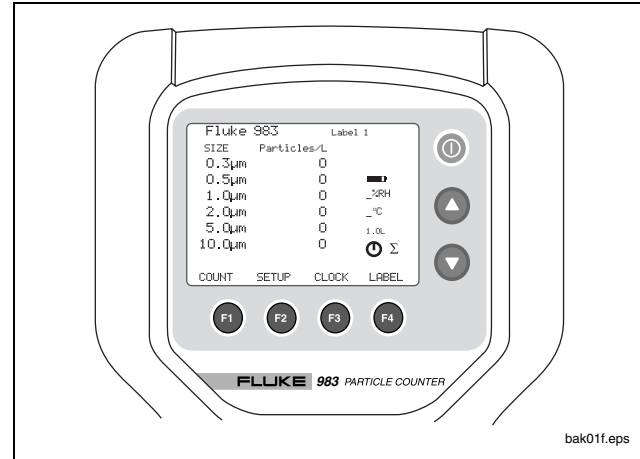
**Figure 1. Fluke 983 Shipping Contents**




### The Keypad

Use the keypad to navigate among different screens on the display, refer to Figure 2.

### The Backlight

The Particle Counter is equipped with an automatic backlight that stays on for two minutes when the unit is powered up. If within two minutes no keys are pressed, the backlight turns off to conserve battery power. If the backlight goes out, press any function or arrow key to turn it back on.



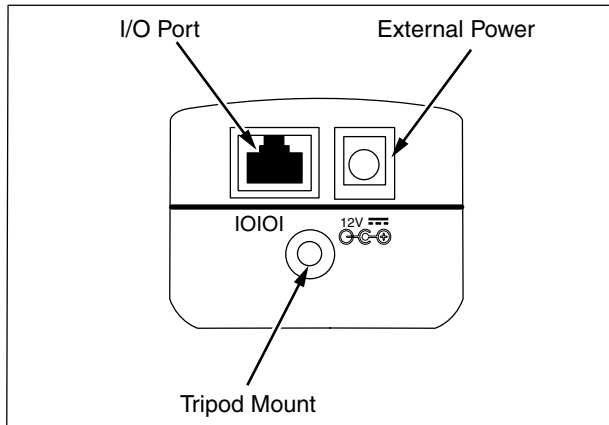
 <b>Power Key</b>	Turns the Particle Counter on and off.
 <b>Arrow Keys</b>	Press to navigate up and down through the different sections of the menus or to control the display contrast when on the Main Screen.
 <b>Function Keys</b>	Each function key corresponds to a name above each function key. Different menus have different labels above the keys.

**Figure 2. Fluke 983 Keypad**



### **The Base**

On the base of the Particle Counter are the connection ports for the RS-232 Modular Cable (I/O Port) and the 12 V External Power Adapter. The Tripod Mount is also located on the base under the holster. See Figure 3.



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**Figure 3. The Base of the Fluke 983**

### **The Display**

The LCD Display shows several different screens and menus. Navigate through each using the keypad. The following sections explain the different screens used by the Particle Counter.

The following screens appear on the display:

- Main Screen
- Setup Screen (pages 1 and 2)
- Clock Setup Menu
- Label Setup Menu

The bottom of the display includes information about the corresponding function keys.

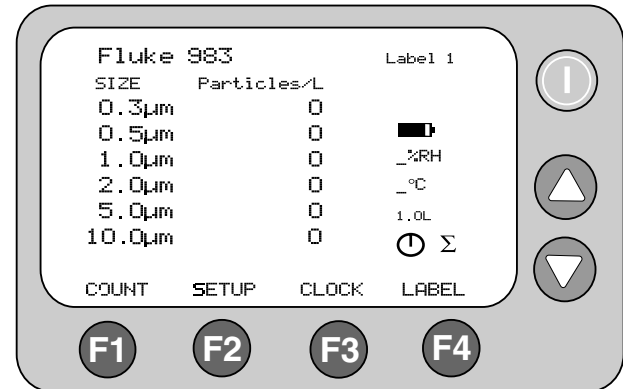
### **The Main Screen**

The Main Screen (see Figure 4) appears after the Particle Counter is turned on and after the opening screen appears.

The Main Screen includes:

- Six particle-size channels
- Particle counts
- Relative humidity (%RH)
- Air-sample temperature (°C or °F)
- Sample-location name
- Battery-charge indicator (charge remaining)
- Time indicator (represents time to complete)
- Sample volume
- Particle-count mode
- Total counts/volume

The parameters on the Main Screen are selected by using the Setup Screens, the Clock Setup Menu, and the Label Setup Menu.



**Figure 4. Main Screen**

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## The Setup Screens

To use the Setup Screens:

1. From the Main Screen, press **F2** (SETUP). The Setup Screen 1 appears, see Figure 5. To get to Setup Screen 2 while on Setup Screen 1, press **F1** (PAGE 2), see Figure 6.
2. Use **▲** and **▼** to move up and through each parameter. Use **F2** (left arrow) and **F3** (right arrow) to navigate within each screen entry that is highlighted. See Figures 5 and 6.
3. Press **F4** (RETURN) to store the setup changes and to return to the Main Screen.

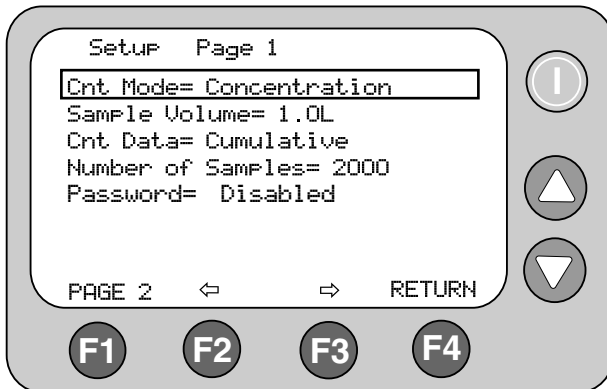


Figure 5. Setup Screen 1

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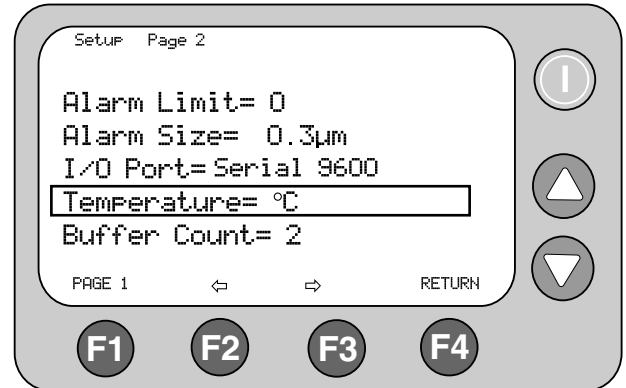


Figure 6. Setup Screen 2

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## The Clock Setup Menu

To use the Clock Setup Menu:

1. From the Main Screen, press **(F3)** (CLOCK). From the Clock Setup Menu, the user can change the Particle Counter's date, time, and delay, see Figure 7.
2. Use **(▲)** and **(▼)** to move the cursor up and down on this screen. Press **(F1)** (PROGRAM) to enter the edit mode. Once in this mode, **(▲)** and **(▼)** are used to increase or decrease the selected entry.
3. Use **(F2)** (left arrow) and **(F3)** (right arrow) to change the entry selected.
4. Once the correct data has been entered, press **(F1)** (ENTER) to store the data.

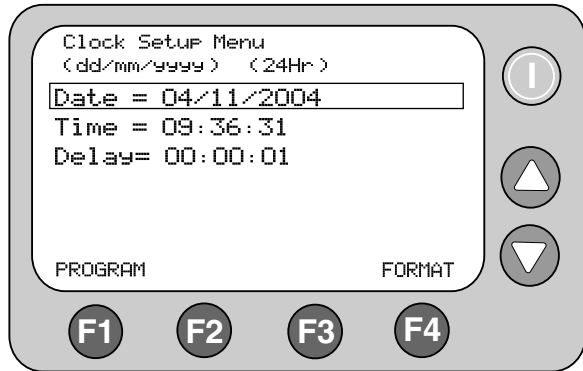


Figure 7. Clock Setup Menu

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To change the format of the date from dd/mm/yyyy to mm/dd/yyyy:

1. Move the cursor down to **Date**.
2. Select **(F1)** (PROGRAM).
3. Select **(F4)** (FORMAT). The date will switch to the next version.
4. Press **(F1)** (ENTER) to store the choice.

To use a 24-hour clock or a 12-hour clock:

1. Move the cursor down to **Time**.
2. Select **(F1)** (PROGRAM)
3. Select **(F4)** (FORMAT). The clock will switch to a 24 or 12-hour version.
4. Press **(F1)** (ENTER) to store the choice.
5. Press **(F4)** (RETURN) to return to the Main Screen.

## Label Menu

It may be useful to assign labels to samples taken from different areas or rooms. Use the Label Menu to select sample labels, see Figure 8.

To use the Label Menu:

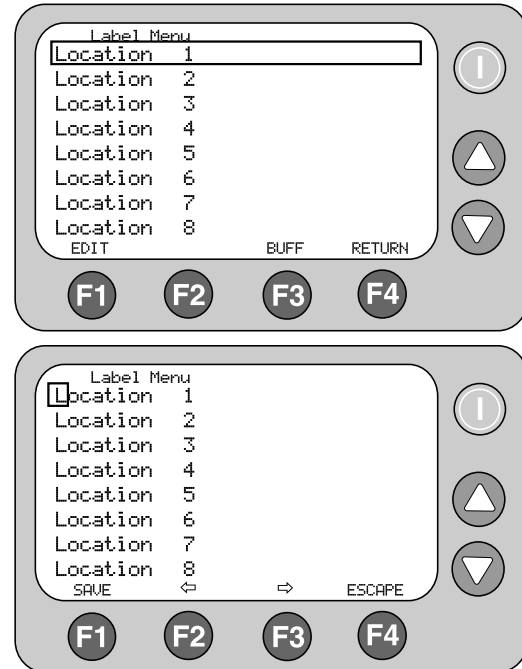
1. From the Main Screen, press **(F4)** (LABEL).
2. Once at the Label Menu, use **(▲)** and **(▼)** to select the desired location number.
3. Once the location number is selected, press **(F1)** (EDIT).

4. The large cursor changes to a single-character cursor. Use  $\blacktriangle$  and  $\blacktriangledown$  to change the individual characters.
5. Press  $\leftarrow$  (F2) and  $\rightarrow$  (F3) to change to the next character in the series.
6. Once the desired label name is entered, press  $\rightarrow$  (F1), which has now changed to **SAVE**, to store the new label name. Press  $\rightarrow$  (F4) (ESCAPE) to exit the Label Menu without storing the label name.
7. Continue to edit label names by following the previous process. When finished, press  $\rightarrow$  (F4) (RETURN) to return to the Main Screen. Notice that the Main screen now has the sample label in the upper right hand corner.

You may also use the FlukeView® Forms Documenting Software provided to change the label names. Refer to “Transferring Data to a Personal Computer”.

### **Reviewing the Buffer**

To review the buffer from the Label Menu, press  $\rightarrow$  (F3) (BUFF) to recall the buffer and use  $\blacktriangle$  and  $\blacktriangledown$  to scroll through the different samples.



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**Figure 8. Label Menu**

## **Using the Particle Counter**

The following sections give detailed information about using the Particle Counter.

### **Purging the Particle Counter**

Before taking particle samples, the Particle Counter should be purged using the Zero Count Filter.

Purging the Particle Counter will make sure the readings are accurate. To purge the Particle Counter:

1. Fit the Filter Adapter onto the end of the Zero Count Filter. Note the arrow on the filter denoting airflow direction.
2. Connect the adapter directly onto the end of the Isokinetic Probe.
3. Operate the unit for approximately 5 minutes.
4. Verify the data on the display:
  - On the average, not more than one particle greater than 0.3  $\mu\text{m}$  in five minutes or not more than one particle per 0.5 cubic foot should be apparent.
  - Once the unit has been purged, resume normal use. Remove the zero count filter from the Isokinetic Probe.

In a clean-room application, the zero count filter verifies that the counter is not counting electrical noise signals from internal components and is not subject to external interference. In other applications, the zero count filter purges the sensor immediately after a high-concentration

sampling. If the unit fails, see “Purging the Particle Counter Sensor”.

### **Set Up**

To set up the Particle Counter:

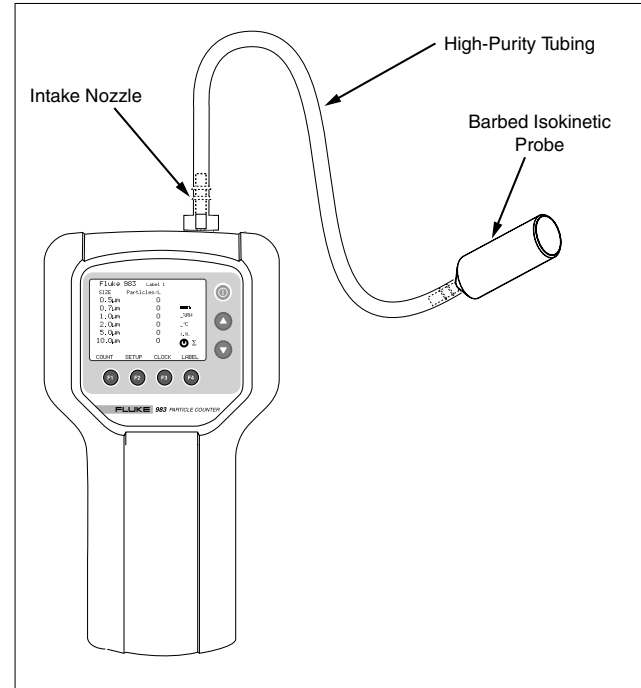
1. Go through the different screens and set the desired parameters for sampling. Refer to previous sections regarding the different screens and menus.
2. Select the desired intake device. There are two Isokinetic Probes that ship with the Particle counter:
  - The Isokinetic Probe is attached when the Particle Counter ships and is for general use.
  - The Barbed Isokinetic Probe connects to the High Purity Tubing. Use the intake nozzle, tubing, and Barbed Isokinetic Probe for areas where the Particle Counter would not normally fit. See Figure 9.

### **Caution**

**Remove the Isokinetic-Probe Cover (the black cap) before use. Not doing so can damage the Particle Counter.**

To use the Particle Counter in hard to reach areas, do the following:

1. Unscrew the threaded Isokinetic Probe.
2. Replace it with the intake nozzle.
3. Connect the high purity tubing to the intake nozzle.
4. Connect the Barbed Isokinetic Probe to the open end of the tubing.



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**Figure 9. Using the High-Purity Tubing and Barbed Isokinetic Probe**

## **Setting the Particle Counting Mode**

The Particle Counting Mode choices are:

### **Concentration Mode**

In Concentration Mode, the Particle Counter samples a small volume of air and calculates what the value would be for the volume setting on the Particle Counter (liter, cubic foot, etc.). This mode is useful for taking a quick glimpse of airborne particle contamination levels. For example, Concentration Mode might be used in areas where particulate levels are unknown and may exceed the operating levels of the Particle Counter. This mode should not be substituted for full sampling.

### **Totalize Mode**

In Totalize mode, the counts are seen as they accumulate until the end of the sample. When the sample is complete, the record is stored and the value appears on the screen until the next sample is started.

### **Audio Mode**

In Audio mode, the Particle Counter beeps once each time the alarm limit is exceeded, (see “Setting the Alarm”). For example, if the limit is set to 10, the counter beeps when the count first reaches 10 and beeps again for each multiple of 10. In Audio Mode, the display shows counts as in Totalize Mode.

1. On Page 1 of the Setup Screen, use ▲ and ▼ to highlight “Cnt. Mode”. If coming from the Main Screen, Cnt Mode should already be highlighted.

2. Use Ⓕ (left arrow) and Ⓖ (right arrow) to select other modes.
3. When the desired mode shows on the screen, press Ⓕ (RETURN) to select that mode and return to the Main Screen.

## **Setting the Air Sampling Volume or Sampling Time**

The choices for the sample volume setting are:

- 1.0L (counts for 21 seconds)
  - 2.83L (60 seconds)
  - 10.0L (3.53 minutes)
  - 28.3L (10 minutes)
  - 0.01CF (6 seconds)
  - 0.1CF (60 seconds)
  - 1.0CF (10 minutes)
  - MANUAL - Select this option to continuously sample and display the counts until the unit is stopped manually. The display shows the total volume sampled in Liters.
1. On Page 1 of the Setup Screen, use ▲ and ▼ to highlight “Sample Volume” or “Sample Time”.
  2. To select a sample volume, sample time, or to manually stop the Particle Counter, press Ⓕ (left arrow) and Ⓖ (right arrow).



If Sample Time CF or Sample Time L is selected:

3. Press **F1** (EDIT) to edit the sampling time.
4. Press **F2** (Min) to highlight the minutes digit.
5. Press **F3** (Sec) to highlight the seconds digit.
6. Once the minutes or seconds digits are selected use **▲** and **▼** to change the values.
7. Press **F1** (SAVE) to save the settings and return to the previous screen.
8. Press **F4** (ESCAPE) to return to the previous screen without saving changes.
9. Press **F4** (RETURN) to select the desired volume/time and return to the Main Screen. The volume selected appears on the right of the Main Screen.

In Sample Time mode the display shows the calculated volume in either liters or cubic feet, based on the time selected.

### **Setting the Method of Counting Data**

The choices for data counting are:

#### **Cumulative**

Cumulative counting mode includes all particles that are greater than or equal to the particle size selected in the Sample Volume field.

#### **Differential**

Differential counting mode includes all particles that are greater than or equal to the particle size selected in the Sample Volume field, but less than the next largest particle size.

1. On Page 1 of the Setup Screen, use **▲** and **▼** to highlight "Cnt. Data".
2. Use **F2** (left arrow) and **F3** (right arrow) to change the method of counting data.
3. Press **F4** (RETURN) to select the desired data counting method and to return to the Main Screen.

The method selected appears as a symbol on the display. The SUM symbol ( $\Sigma$ ) denotes the Cumulative method and the DELTA symbol ( $\Delta$ ) denotes the Differential method.

### **Setting the Number of Samples**

1. From the Main Screen, press **F2** (SETUP).
2. From page one of the Setup Screen, use **▲** or **▼** to highlight "Number of Samples".
3. Select the number of samples by pressing **F2** (left arrow) or **F3** (right arrow).
4. When the desired number appears, press **F4** (RETURN) to return to the Main Screen.

#### *Note*

*When choosing the number of samples, "INF" denotes infinite and the unit will continue to take samples until the stop key is pressed.*

### **Enabling and Setting a Password for the First Time**

The Particle Counter's preference settings can be locked using the password feature. To enable and set the password for the first time, do the following:

1. From the Main Screen, press **F2** (SETUP).
2. From page one of the Setup Screen, use **▲** or **▼** to highlight "Password".
3. Press **F2** (left arrow) or **F3** (right arrow) to enable the password feature.
4. The screen changes to the Login screen. Notice the Particle Counter's serial number in the upper-right corner of the display.
5. Press **F1** (CHANGE).

6. Use **▲** and **▼** to change the selected character of the password.
7. Press **F2** (left arrow) or **F3** (right arrow) to move the cursor to the next character.
8. Continue to do this until you have entered the desired password.
9. When finished, press **F4** (ENTER) to save the password or press **F4** (ESCAPE) to exit the password menu without saving the new entry.

The next time the Particle Counter is turned on, the startup screen will have a **F1** (USER) field and a **F4** (ADMIN) field.

- If **F4** (ADMIN) is pressed, the password is requested before going to the main screen. If the correct password is entered, the preference settings can be changed. If the incorrect password is entered, the user is taken back to the startup screen to try again.
- If **F1** (USER) is pressed, the labels can be changed, and the Particle Counter can be used, but the other preference settings are locked.

### **Changing an Existing Password**

To change an existing password:

1. Go to the Password Menu.
2. Use **▲** and **▼** to select the current password.
3. Press **F1** (CHANGE).
4. Use **▲** and **▼** to select the new password.

5. Press **F1** (SAVE) to save the password or press **F4** (ESCAPE) to exit the password menu without saving the new entry.

### **Lost Passwords**

If the administrator password is forgotten or lost, contact Fluke to receive a new password. Refer to “Contacting Fluke”.

Technical support will require the following information to issue a new password:

- The Particle Counter’s serial number.
- The Particle Counter’s current date setting in the format MMDDYYYY.

### **Setting the Alarm**

When the alarm is set, the Particle Counter will continuously beep when the selected number and particle size is reached. The display also shows “CNT Alarm”.

1. From the Main Screen, press **F2** (SETUP) to access Setup Screen Page 1.
2. Press **F1** (PAGE 2) to access Setup Screen Page 2.
3. Alarm Limit is highlighted. Press **F2** (left arrow) or **F3** (right arrow) to move the alarm limits from zero (no alarm) to 100,000 in factors of 10.
4. Once the alarm limit is selected, press **▼** to select “Alarm Size”.
5. Press **F2** (left arrow) and **F3** (right arrow) to display the various particle sizes.

6. Select the desired particle size and press **F4** (RETURN) to return to the Main Screen.

#### *Note*

*When the alarm sounds, pressing **F1** (STOP) once will mute the alarm. Pressing **F1** (STOP) again will stop the sample.*

### **Setting a Delay Between Samples**

If continuous sampling is not necessary, a delay can be set. The delay timer allows a “time out” between automatic samplings. To set a delay:

1. Go to the Clock Setup Screen by pressing **F3** (CLOCK). See Figure 7.
2. Press **▼** and highlight Delay.
3. Press **F1** (PROGRAM).
4. Use **F2** (left arrow) and **F3** (right arrow) to move to the desired unit of time (hours, minutes, or seconds).
5. Press **▲** to increase the time; press **▼** to decrease the time.
6. Once the desired time has been selected, press **F1** (ENTER).
7. Press **F4** (RETURN) to return to the Main Screen.

#### *Note*

*The maximum delay time is 23:59:59.*

### **Setting Temperature Mode**

To set the Temperature Mode to Fahrenheit or Celsius:

1. Go to setup screen 2 and press  $\blacktriangledown$  or  $\blacktriangle$  to move the cursor to "Temperature".
2. Use  $\text{F2}$  (left arrow) and  $\text{F3}$  (right arrow) to select "°F" or "°C".
3. Press  $\text{F4}$  (RETURN) to save the choice and return to the Main Screen.

### **Restoring Default Settings**

At some point, it may be necessary to restore the Particle Counter's default settings. Restore the default settings by pressing and holding  $\text{F1}$  as the power is turned on. The default settings are as follows:

#### **Setup Page 1**

Cnt Mode = Concentration

Sample Volume = 1.0L

Cnt Data = Cumulative

Number of Samples = 1

#### **Setup Page 2**

Alarm Limit = 0

Alarm Size = 0.3 $\mu$ m

I/O port = Serial 9600

Temperature = °C

Buffer Count = 0

### **Setting the I/O Port to Download Data to a PC**

1. Go to Setup Screen 2 and press  $\blacktriangle$  or  $\blacktriangledown$  to move the cursor to "I/O Port".
2. Use  $\text{F2}$  (left arrow) and  $\text{F3}$  (right arrow) to select "Serial 9600".
3. Press  $\text{F4}$  (RETURN) to return to the Main Screen.

#### *Note*

*Serial 9600 is the default I/O Port setting for software version 1.1 and cannot be changed.*

### **Transferring Data to a Personal Computer**

Data that is collected and stored in the Particle Counter's memory can be downloaded to a personal computer (PC) using the included *FlukeView® Forms Documenting Software* and RS-232 cable and RJ-45 converter. Use *FlukeView® Forms Documenting Software* to change labels, set the time, set delay time, and start and stop a sample that is from a remote location. See Figure 3 to locate the I/O Port on the Particle Counter. To install the software, see the "*FlukeView® Forms Installation Guide*" that comes with the software.

To transfer data from the Particle Counter to the PC:

1. Install *FlukeView® Forms Documenting Software* on the PC. See Installation Guide.
2. Connect the RJ-45 converter to the serial communications port of the PC.

3. Connect the modular RS-232 cable to the RJ-45 converter and to the Particle Counter. Make sure the Particle Counter is off when making the connection.
4. Turn the Particle Counter on.
5. Open *FlukeView® Forms Documenting Software*.

*Notes*

- *The appropriate COM port must be selected prior to transferring data from the Particle Counter to the PC. The default port is COM 1, as indicated in the lower right hand corner of the FlukeView® Forms Documenting Software window.*
  - *To test the COM port, select “Tools” then “Options.” Select the appropriate COM port in the drop-down menu, then click “Test.”*
6. Click “OK” to “Get Meter Data Now?” prompt. Data is downloaded and displayed in the Virtual Meter.

*Notes*

- *The following codes can appear in the “Flags” column of the Virtual meter individually or in combination:*
  - 0 = Normal*
  - 1 = Sensor Error*
  - Samples are invalid, indicates a calibration failure or sensor failure condition.*
  - 2 = Count Alarm*

*The user-defined alarm limit has been exceeded.*

*4 = Low Battery*

*The battery charge was low during the sample. Recharge the battery as soon as possible.*

*8 = Counter Error*

*Samples are invalid. This flag indicates a hardware problem.*

- *To ensure no data is lost, verify that the download was successful before deleting the stored test results on the Particle Counter.*

7. Click “Copy Into Form” to transfer data to *FlukeView® Forms Documenting Software* template, or use the “Export Data...” menu to customize how the data is exported.

*Note*

*Until the data is copied into the form, the user can use the control buttons on the FlukeView Forms Virtual meter to change the data view as on the meter.*

**Control**

Data logging sessions can be scheduled, started, and stopped in the *FlukeView® Forms Documenting Software*.

Click "Meter" then "Logging" then press the "Schedule" tab to either schedule a datalogging session or begin datalogging remotely.

### **Labels**

Location labels in the Particle Counter can be changed in the *FlukeView® Forms Documenting Software*.

Click "Meter" then "Change Meter Setup" to access labels.

1. To get labels from the Particle Counter, click "Read from Meter."
2. To modify labels in the software, select the label in the window and edit.
3. To send modified labels to the Particle Counter, click "Send."

### **Time**

#### **Set Time**

In "Change Meter Setup", check the "Synchronize Clock with PC" checkbox to set the Particle Counter's time and date to match the PC.

#### **Printing the Samples to a Serial Printer**

##### *Note*

*The serial printer capability requires software version 1.2 or higher. If your Particle Counter has software version 1.1, and you wish to use the printer option, contact Fluke for instructions on how to update your software.*

Fluke offers a complete Thermal Printer Kit to take advantage of the printing capabilities of the Particle Counter.

The Fluke 983 Thermal Printer kit includes:

- Seiko DPU-414 Thermal Printer
- Seiko PW-4007-U1 120 V ac adapter or PW-4007-E1 220 V ac adapter
- Seiko BP-4005 battery pack
- 1 roll thermal paper
- RJ-45 to DB-9 serial printer adapter

To use the Seiko DPU-414 Thermal Printer with the Particle Counter, the following default settings on the printer must be changed:





1. Set the input method to serial.
2. Set the baud rate to 9600 baud.

Please refer to the Seiko DPU-414 Thermal Printer manual for instructions on changing these settings.

#### **Connecting the Printer to the Particle Counter**

1. Connect the serial Printer Adapter to the serial communications port on the printer.
2. Connect the modular RS-232 cable to the serial connector and to the Particle Counter's I/O port.

#### **To Print a Single Sample**

1. Go to Setup Screen 2 and press  or  to move the cursor to "I/O Port".
2. Use  (left arrow) and  (right arrow) to select "Printer".

3. Press **F4** (RETURN) to return to the Main Screen.
4. Press **F1** (COUNT) to start a sample.

After the sample is complete the data will be printed.

### **To Print a Single Sample Stored in the Buffer**

1. Go to Setup Screen 2 and press **▲** or **▼** to move the cursor to "I/O Port".
2. Use **F2** (left arrow) and **F3** (right arrow) to select "Printer".
3. Press **F4** (RETURN) to return to the Main Screen.
4. Press **F4** (LABEL) and then **F3** (BUFF) to enter the Buffer menu.
5. Use **▲** and **▼** to scroll to the sample you wish to print.
6. Press **F1** (PRINT) to print the selected sample.

### **To Print all of the Samples in the Buffer**

1. Go to Setup Screen 2 and press **▲** or **▼** to move the cursor to "I/O Port".
2. Use **F2** (left arrow) and **F3** (right arrow) to select "Print Buffer".
3. Press **F4** (RETURN) to return to the Main Screen.

The sample data stored in the buffer will begin printing.

### **Storing Samples**

The Particle Counter stores each measurement in a 5000-record buffer. Data is stored in a "first in, first out" order. When the 5001<sup>st</sup> record is saved, the first record is deleted, leaving 5000 records total.

### **Clearing the Buffer**

At some point, the user may wish to clear the Particle Counter's buffer. To do this:

1. Go to Setup Screen 2 and press **▼** or **▲** to move the cursor to "Buffer Count". Buffer Count displays the number of samples stored in memory.
2. Use **F2** (left arrow) and **F3** (right arrow) to select "Clear Buffer".
3. Press **F4** (RETURN) to clear the buffer and return to the Main Screen.

### **Maintenance**

#### **⚠️⚠️ Warning**

**The Particle Counter contains no user-serviceable parts. To avoid electric shock, injury, or damage to the Particle Counter, do not open the instrument. For service and battery replacement, the instrument must be sent to Fluke. See "Contacting Fluke".**

Use the Zero Count Filter to ensure that the Particle Counter filter is free of contamination. Refer to "Purging the Particle Counter".

### **Cleaning the Case**

Periodically wipe the case and holster with a damp cloth and mild detergent.





## Caution

To avoid damaging the Particle Counter, do not use abrasives or solvents to clean the Particle Counter case.

### Charging the Battery and Using the AC Adapter

Recharge the battery as soon as "LOW BATTERY" appears on the display.

The battery symbols on the display show the status of the battery:

-  ++ The battery is in "Fast Charge" mode.  
The ac adapter/charger is connected and the battery is charging. When the battery is below 95 % of its charge, the Particle Counter uses "Fast Charge" mode to bring the battery back up to 95 %.
-  + The battery is in "Trickle Charge" mode. Once 95 % of the charge is attained, the Particle Counter switches to "Trickle Charge" mode to charge the remaining 5 % of the battery.
-  The battery is fully charged.
-  The battery is partially charged.

The ac adapter is used to recharge the battery as well as power the Particle Counter. This feature allows the counter to be used while the battery is charging.

To connect the ac adapter/charger:

1. Attach the power cord to the end of the charger.

2. Plug the charger into the 12V jack on the base of the Particle Counter.
3. Plug the ac adapter into an ac outlet. The Particle Counter will take two hours to fully charge.

#### Note

*If the Particle Counter is powered off during charging (Trickle Charge mode), the battery will require up to 18 hours for a full charge. To charge the battery in 2 hours, the Particle Counter must be turned on while charging (Fast Charge mode).*

*If the Particle Counter is charged while powered off (Trickle Charge mode) the battery symbol in the display will not update to show the actual charge status until the Particle Counter is turned on with the charger plugged in for approximately five minutes.*



***Purging the Particle Counter Sensor***

**⚠ Caution**

**To avoid possible damage to the Particle Counter, avoid using the Particle Counter in an excessively dirty or dusty atmosphere. Excessive particle intake can damage the Particle Counter.**

To purge the Particle Counter sensor:

1. Fit the adapter onto the end of the Zero Count Filter. Note the arrow on the filter denoting airflow direction.
2. Connect the adapter directly onto the end of the Isokinetic Probe.
3. Operate the unit for approximately 15 minutes.
4. On the average, not more than one particle greater than 0.3  $\mu\text{m}$  in five minutes or not more than one particle per 0.5 cubic foot should be apparent. This purges the Particle Counter.

Once the unit is purged, resume normal use. Remove the Zero Count Filter and adapter from the Isokinetic Probe.

## Troubleshooting

Use Table 2 to troubleshoot possible problems with the Particle Counter.

**Table 2. Troubleshooting**

Problem	Possible Reason and Recommended Actions
Particle Counter does not zero count	<ol style="list-style-type: none"> <li>1. Zero count filter or adapter is not properly attached. Reattach the filter or Filter Adapter.</li> <li>2. Internal air leak. Contact Fluke for repair.</li> <li>3. Cell contamination by excessive dust exposure. Return the Particle Counter to Fluke.</li> </ol>
Particle Counter does not turn on when pressing the POWER key.	Battery voltage is low. Refer to “Charging the Battery and Using the AC Adapter”. Try turning the unit on again after the ac adapter/charger is connected. If the Particle Counter does not turn on, contact Fluke for assistance.
“LOW BATTERY” displays	Battery voltage is low. Refer to “Charging the Battery and Using the AC Adapter”.
Particle Counter battery does not charge	A problem with the battery is indicated. Disconnect the Particle Counter from the ac adapter/charger. Check the line cord. If the problem persists, contact Fluke.
After fully charging the battery in trickle charge mode, the display does not show a full battery charge.	The Particle Counter needs to be turned on and the charger connected for the charge circuitry to update the battery status symbol. After the Particle Counter is turned on with the charger plugged in, the battery status symbol updates in approximately 5 minutes.
Display is too dark or light	The display contrast is set too low or too high. Turn the unit on, press ▲ to darken the display or ▼ to lighten it.

**Table 2. Troubleshooting (cont.)**

<b>Problem</b>	<b>Possible Reason and Recommended Actions</b>
Unable to download data in the buffer	<ol style="list-style-type: none"><li>1. There is a problem with the connections from the PC to the Particle Counter. Check those connections.</li><li>2. There may be a problem with the software. Refer to the Readme.txt file on the software.</li></ol>
The display shows "CAL ALARM" 1.	<ol style="list-style-type: none"><li>The sample exceeded the concentration limit (too many particles), which produced a temporary alarm. No corrective measure is required other than to stop sampling in that environment.</li><li>2. The sensor is contaminated. Refer to "Purging the Particle Counter Sensor".</li><li>3. The laser has dropped below acceptable levels. If the problem persists, contact Fluke.</li></ol>
No temperature/humidity reading or an incorrect reading	Temperature and humidity appear after the sample is in progress. Allow the unit to acclimate to the sampling environment for greater accuracy.

## **Specifications**

### **6 Particle-Size Channels:**

0.3, 0.5, 1.0, 2.0, 5.0, 10.0  $\mu\text{m}$

### **Flow Rate**

0.1 cfm (2.83 L/min)

### **Light Source**

Laser diode; index guided (26,000 MTBF at 25 °C)

### **Calibration**

PSL particles in air (NIST traceable)

### **Counting Efficiency**

50 % @ 0.3  $\mu\text{m}$ ; 100 % for particles > 0.45  $\mu\text{m}$   
(per JIS B9921:1997)

### **Zero Count**

1 count/5 minute (per JIS B9921:1997)

### **Coincidence Loss**

5 % at 2,000,000 particles per cubic ft.

### **Relative Humidity**

$\pm 7$  %, 20 % RH to 90 % RH, non-condensing

### **Temperature**

$\pm 3$  °C, 10 °C to 40 °C (50 °F to 104 °F)

### **Data Storage**

5000 sample records (rotating buffer)

### **Data Recorded**

Date, time, counts, relative humidity, temperature, sample volumes, alarms, label

### **Display**

Graphic liquid crystal with backlight

### **Count Modes**

Concentration, totalize, audio

### **Delay Time**

0 to 24 hours

### **Sample Inlet**

Isokinetic probe

### **Interface**

RS-232 and RS-485 via RJ-45

### **Vacuum Source**

Internal pump flow controlled

### **Dimensions**

4.5 " x 8.25 " x 2.25 " (11.43 x 20.96 x 5.72 cm)

### **Weight**

2.2 pounds (1.0 kg)

### **Environmental**

#### **Operating:**

10 °C to 40 °C (50 °F to 104 °F), 20 % to 90 % RH, non-condensing

#### **Storage:**

-10 °C to 50 °C (14 °F to 122 °F), Up to 90 % RH, non-condensing

### **Power**

AC Adapter, 12 VDC at 2.5 A, 90 to 250 VAC, 50 to 60 Hz

### **Rechargeable Battery**

NiMH, 4.8 V at 4.5 Ah; replaceable

Charge time: 2 hours (Fast Charge mode), 18 hours (Trickle Charge mode)

### **Continuous Operating Time**

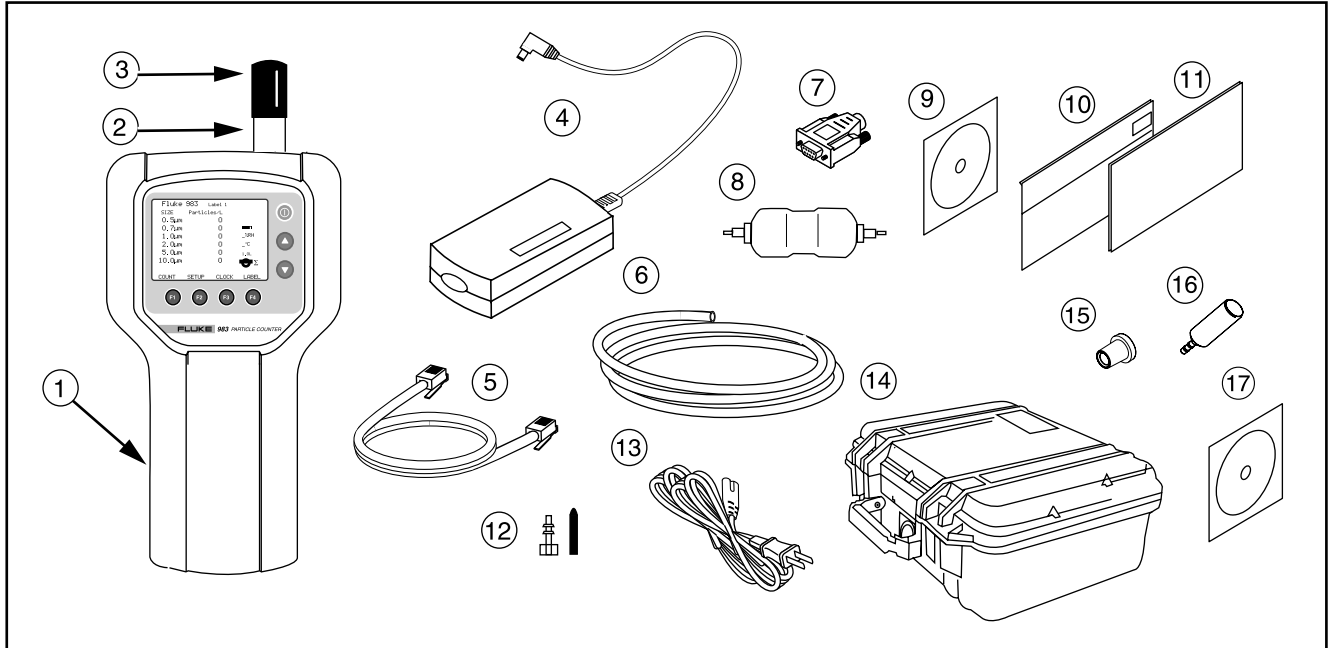
8 hours

### **Standards**

Complies with CE, JIS B9921: 1997

**Parts and Accessories**

To order parts and accessories for the Particle Counter, refer to Table 3 and Figure 10.



**Figure 10. Fluke 983 Replaceable Parts**

bak09f.eps

**Table 3. Replaceable Parts and Accessories**

Callout	Part Number	Description
①	2414654	Holster
②	2421437	Isokinetic Probe
③	2421481	Isokinetic Probe Cap
④	2421350	AC Adapter/Charger
⑤	2421377	RS-232 Modular Cable
⑥	2421455	¼" High Purity Tubing (2 ft.)
⑦	2421392	RJ-45 to DB-9 Connector
⑧	2421428	Zero Count Filter
⑨	2414717	983 Users Manual CD
⑩	2414721	Users Manual (English)
⑪	2414700	Safety Information (Multi-language)
⑫	2421443	Intake Nozzle and Cap
⑬	2421361	US Power Cord
⑭	2414693	Hardshell Carrying Case
⑮	2414668	Zero Count Filter Adapter
⑯	2424376	Barbed Isokinetic Probe
⑰	1578384	FlukeView® Forms Documenting Software CD

**Table 3. Replaceable Parts and Accessories (cont.)**

<b>Callout</b>	<b>Part Number</b>	<b>Description</b>
Not Shown	669069	Hand Strap (located on the back of the holster)
Not Shown	2543469	983 US Printer Kit 120V version: Seiko DPU-414 Thermal Printer Seiko PW-4007-U1 120 V AC Adapter Seiko BP-4005 Battery Pack 1-Roll Thermal Paper RJ-45 to DB-9 serial Printer Adapter
Not Shown	2547127	983 Euro Printer Kit 220V version: Seiko DPU-414 Thermal Printer Seiko PW-4007-E1 220 V AC Adapter Seiko BP-4005 Battery Pack 1-Roll Thermal Paper RJ-45 to DB-9 serial Printer Adapter

