



User Manual

ParticleScan™ CR
ParticleScan™ Pro

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Important Safety Information

Class 1 Laser Product

This product incorporates a Class 1 laser diode based sensor as defined in *21 CFR, Subchapter J, of the Health and Safety Act of 1998* and applies when the instrument is used under normal operating conditions and during maintenance procedures.

Service procedures performed on the sensor can result in exposure to invisible radiation. Service
The laser diode based sensor inside this instrument carries a warning label as shown below:



Warning

- Do not attempt to sample reactive gases (such as hydrogen or oxygen) with the particle counter. Reactive gases create an explosion hazard within the counter.
 - Water, solvents, or other liquids of any type should never be allowed to enter the instrument.
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Table of Contents	page
Important Safety Instructions	
Chapter 1 – About Particle Counting	6
1.1 How do Particle Counters Work?	6
1.2 The Two ParticleScan Models	6
1.3 Data Logging Options	6
Chapter 2 – The ParticleScan Kit	7
2.1 Unpacking and Initial Inspection	7
2.2 Packing List	7
Chapter 3 – Getting to Know the ParticleScan	8
3.1 The ParticleScan Unit	8
3.2 ParticleScan Features	9
Chapter 4 – Taking Measurements with the ParticleScan	10
4.1 Preparing the ParticleScan for Use	10
4.2 Switching the ParticleScan On and Off	10
4.3 Sampling Particles	10
4.4 Taking Samples at Different Size Channels	10
Chapter 5 – Adjusting Settings in the Menu	11
5.1 Location Menu [Loc]	11
5.2 Data Logging Menu [Log]	11
5.3 Delete Data Menu [data]	11
5.4 Full Memory Menu [FULL]	11
5.5 Concentration Units Menu [Con]	11
5.6 Sample Time Menu [SAti]	12
5.7 Sample Repeat Menu [SAr]	12
5.8 “Geiger Counter” Menu [GEIG]	12
5.9 Alarm Menu [A]	12
5.10 Time Menu [t]	13
5.11 Date Menu [MM:DD:YYYY]	13
5.12 Auto Timer Menu [auto]	13
5.13 IP Menu [IP]	13
5.14 Remote Monitoring Menu [InEt]	13
Chapter 6 – Maintenance of the ParticleScan	14
6.1 The Battery	14
6.1.1 Low Battery Indicator	14
6.1.2 Recharging the Battery	14
6.1.3 Replacement of the Battery Pack	14
6.2 Sensor Testing & Cleaning	14
6.2.1 “Zero Count” Test	14
6.2.2 Sensor Cleaning	14

Table of Contents	page
Chapter 7 – Computer Connectivity	15
7.1 Features	15
7.2 Computer Connectivity Options	15
7.2.1 Via a Network	15
7.2.2 Via a Crossover Connection	15
7.2.3 Via USB	16
7.2.4 USB Driver Installation	16
7.2.5 ParticleScan USB Software for PC Installation	17
7.2.6 Starting the ParticleScan USB Software for PC	18
7.3 Accessing the ParticleScan via the Web Browser	19
7.4 The ParticleScan Control Window	20
7.4.1 Start/Stop Measurements	20
7.4.2 Sample Time	20
7.4.3 Sample Repeat	20
7.4.4 Measurement Units	20
7.4.5 Count Type	20
7.4.6 ParticleScan Display On/Off	20
7.5 Setting the Time & Date	21
7.6 Using the Auto Timer	21
7.7 Scheduling Regular Measurements	22
7.8 Data Logging	23
7.8.1 Checklist Before Data Logging	23
7.8.2 Data Logging to Computer	23
7.8.3 Data Logging to ParticleScan Memory	24
7.8.4 Full Memory Options	24
7.8.5 Viewing Logged Data	24
7.8.6 Printing Logged Data	25
7.8.7 Saving Logged Data to a CSV File	25
7.8.8 Importing a ParticleScan Data File into Excel	26
Chapter 8 – Troubleshooting	28
8.1 Symptom, Cause and Corrective Action	28
Chapter 9 – Technical Specifications for ParticleScan Pro and CR	29
9.1 Technical Specifications	29

Chapter 1 – About Particle Counting

1.1 How Do Particle Counters Work?

Laser particle counters use a laser diode light source and collection optics for particle detection. Particles scatter the light from the laser diode beam in the direction of the collection optics. The collection optics focus the light onto a photo diode that converts the bursts of light into electrical impulses. The pulse height is proportional to the particle size. Impulses are counted and their intensity is measured for particle sizing. The results are then displayed digitally for the specific size channel(s) and set measurement unit.

1.2 The Two ParticleScan Models

The six-channel ParticleScan handheld particle counters are available in two configurations:

▷ ParticleScan Pro

This model is designed for indoor air quality use, featuring a 0.025 cfm sampling rate.

The flow rate of 0.025 cfm of the ParticleScan Pro is more suitable for environments with normal to high particle counts since the lower flow rate and smaller sampling diameter allow more accurate counting of elevated particle concentrations.

▷ ParticleScan CR

This model is designed for cleanroom use, featuring a 0.1 cfm sampling rate and a HEPA filter for the exhaust air.

The higher flow rate of the ParticleScan CR permits statistically significant results even if the particle concentration is low and the measurement time is short.

1.3 Data Logging Options

ParticleScan Pro and ParticleScan CR handheld counters allow the logging (recording) of measurement data onto the ParticleScan's internal memory from where it can be downloaded at a later time to a computer via the ParticleScan Utility Software or a web browser.

When the ParticleScan is connected to a computer or network, measurement data can also be logged in real time to the computer via the ParticleScan USB Utility Software.

In both cases, the data can be viewed and saved to a text file that can be easily opened and formatted in any common spreadsheet program. Logged data can also be printed directly from the logging window to a printer.

A printout of particle counting results can be used as a record whenever documentation of room cleanliness is required, as in Fed-Std-209E cleanroom certification. A permanent record is also useful when tracking the particle concentration trend at a workstation or other remote location.

Chapter 2 – The ParticleScan Kit

2.1 Unpacking and Initial Inspection

Each ParticleScan device has been thoroughly inspected and tested by the manufacturer and is ready for use. Prior to use, please read this instruction manual.

Upon receipt, inspect the shipping carton for damage. If the carton is damaged, notify the carrier and dealer and save the carton for carrier inspection.

Note: You may wish to keep the outer carton for safe shipment when you send the ParticleScan for calibration. Always store and ship the ParticleScan in the carrying case.

2.2 Packing List

Open the two latches of the carrying case and inspect the kit for completeness. Also check visually for broken parts, scratches, dents or other damage.

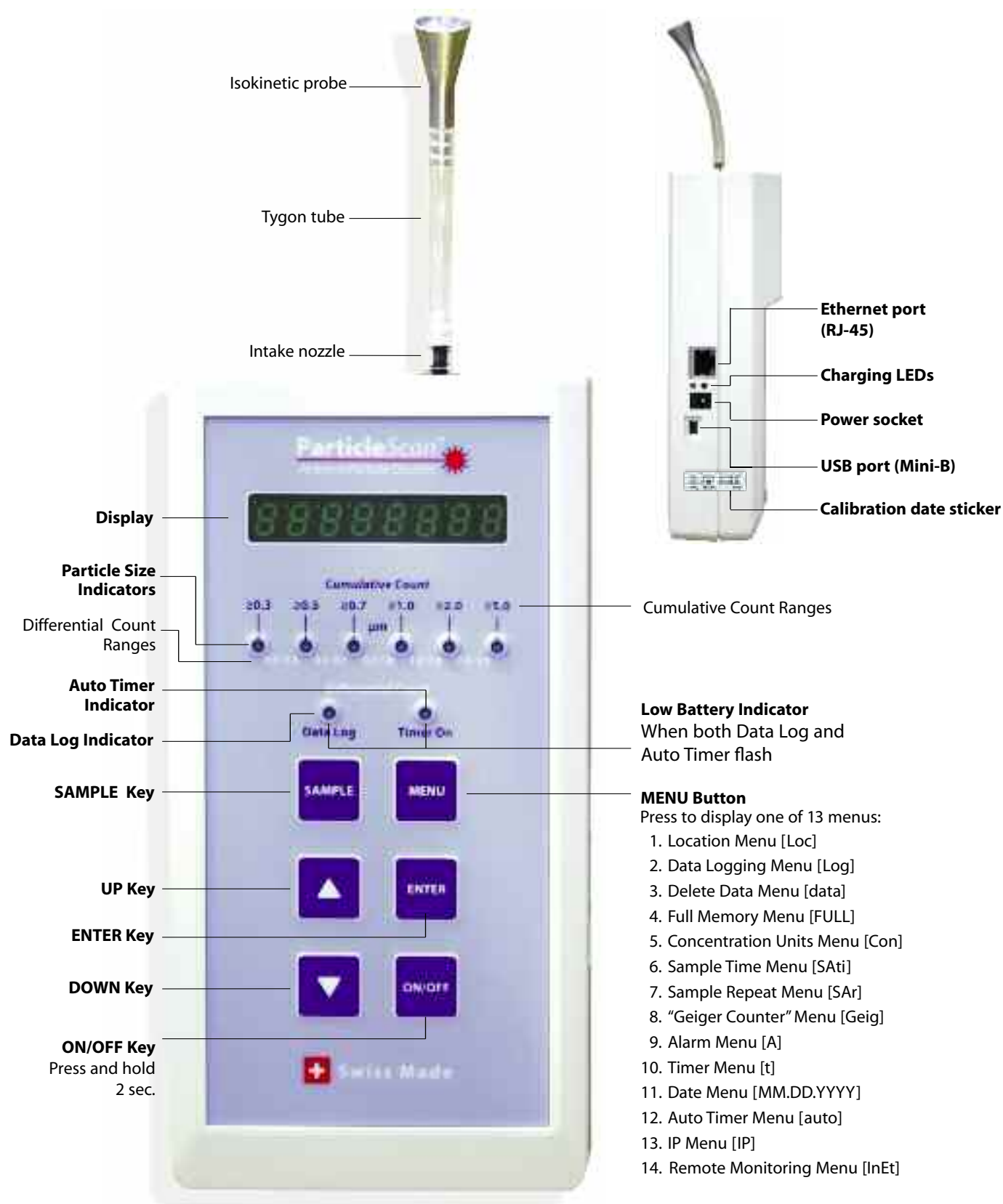
Your ParticleScan kit should consist of the following items:

- ParticleScan device (with red protection cap on intake nozzle)
- Protective carrying case
- Isokinetic probe with tubing
- Power adaptor
- Purge filter with tubing
- Network cable (Ethernet, Cat. 5)
- Crossover adapter (Ethernet, Cat 5)
- USB cable
- ParticleScan CD with ParticleScan USB Utility Software, USB drivers, Java Runtime, Excel data import sheet, ParticleScan pdf-manual
- User manual
- Calibration certificate
- Warranty registration card



Chapter 3 – Getting to Know the ParticleScan

3.1 The ParticleScan Unit



3.2 ParticleScan Features

Isokinetic probe The isokinetic probe with the Tygon tube piece allows uniform low turbulence sampling of ambient air. It is also necessary for proportional sampling of particles of all sizes.

Intake nozzle The intake nozzle is covered during shipping with a protective red plastic cap, which is designed to keep small objects from entering into the sampling chamber. The cap must be removed prior to taking a sample to prevent possible damage to the internal pump.

Display When the device is off and not connected to the charger, the display will also be off. If the device is off and connected to the charger, it will show [charging] or [charged]. When the unit is sampling, the particle concentration measured will be displayed. The displayed concentration can be shown for one particle size range at a time (see Particle Size Indicators). When the Menu key is pressed, the display will show the user settings.

Particle Size Indicators The particle size indicators show which particle size range is currently displayed. When the Alarm is set and the set particle concentration threshold is exceeded, the appropriate particle size indicator will flash and a beep will sound.

Cumulative Count Ranges There are six cumulative size channels to select from: ≥ 0.3 / ≥ 0.5 / ≥ 0.7 / ≥ 1.0 / ≥ 2.0 / ≥ 5.0 microns. When a cumulative size channel is selected, the ParticleScan will count particles which are equal to and larger than the selected size channel.

Differential Count Ranges There are five differential size channels to select from: 0.3–0.5 / 0.5–0.7 / 0.7–1.0 / 1.0–2.0 / 2.0–5.0 microns. When a differential size channel is selected, the ParticleScan will count the particles whose size lies between the selected two size channels.

Data Log Indicator This indicator lights up when data logging has been turned on. Whenever a measurement is taken, it will be logged to the ParticleScan's internal memory.

Timer On Indicator This indicator lights up when the auto timer is actively set. The Auto Timer is a feature that allows the ParticleScan to take automatic measurements based on a timer schedule. The Auto Timer schedule is set via the ParticleScan USB Utility Software or the web browser interface.

Low Battery Indicator When the battery is running low, both the Data Log Indicator and the Timer On Indicator will flash. The unit can operate for another 5–10 minutes from the time the Low Battery Indicator comes on.

ON/OFF Key Press and hold for 2 seconds to turn the device on or off.

SAMPLE Key Press once when the device is on to start a measurement. Press again to stop a measurement.

UP/DOWN Keys Use during a measurement to select size channel displayed. It is also used to change a menu setting.

MENU Key Press 1 to 14 times to display one of 14 user menus.

ENTER Key Press and hold for 2 seconds when in a menu to make a menu item changeable. Press once in certain menus to progress. Press and hold for 2 seconds to save changes in a menu.

Chapter 4 – Taking Measurements with the ParticleScan

4.1 Preparing the ParticleScan for Use

To prepare your ParticleScan for use, simply follow these steps:

1. Remove the red protective cap from the intake nozzle.
2. Take the isokinetic probe and attach it with the tubing end to the intake nozzle.

4.2 Switching the ParticleScan On and Off

1. To switch the ParticleScan on, press and hold down the ON/OFF key for 2 seconds. When the device is turned on, it will sound a short beep and show [STANDBY] on the display.
2. To turn off the device, press and hold down the ON/OFF key for 2 seconds. When the ParticleScan turns off, it will sound a short beep and the display will extinguish or show [Charging] when it is connected to the power adapter.

4.3 Sampling Particles

1. To take a measurement, turn the ParticleScan on and press the SAMPLE key. The display will count down while the pump gathers the first air sample and then displays the first measurement. There will be a delay of a few seconds until the countdown starts, during which the ParticleScan performs a routine check. The number in the display represents the number of particles calculated to be present per cubic foot, liter or cubic meter (1000 liters) of air, depending on the concentration unit selected (see Chapter 5.5).
2. The display of the ParticleScan will update in regular intervals, as selected in the Sample Time Menu. The default setting is 6 seconds (see Chapter 5.6).
3. To stop taking measurements, press the SAMPLE key once. The last measurement result is now frozen on the display.

4.4 Taking Samples at Different Size Channels

The ParticleScan features six size channels which allows the user to take cumulative counts for six different particle size ranges and *differential* counts for five different size ranges.

1. When the ParticleScan is first switched on, it will display the particle concentration per cubic foot (cu. ft.) of air for the default Cumulative Count Range (i.e. $\geq 0.3\mu\text{m}$).
2. To change the size channel to the next particle size range, simply press the UP key once. The Size Range Indicator LED will shift from “ ≥ 0.3 ” to “ ≥ 0.5 ”.
3. Repeated pressing of the UP key will scroll through all the different size ranges, first the Cumulative Count Ranges, then the Differential Count Ranges. To reach the required count range, simply scroll through all the count ranges until the desired Particle Size Indicator is lit.

Chapter 5 – Adjusting Settings in the Menu

The ParticleScan Pro/CR has 14 menus which allow the user to set a range of parameters. To access these menus, press the MENU key one to 14 times. To fast exit a menu at any time and get back to the measurement screen, you may press the SAMPLE key at any time.

5.1 Location Menu [Loc]

The Location Menu allows the user to assign a location number from 1–256 to any data that is logged.

To change the location number, press the MENU key once until the display shows [Loc]. Press and hold the ENTER key for two seconds until the location number starts to flash. Then use the UP or DOWN key, to select the desired location number. To confirm the selection, press and hold the ENTER key for two seconds, until the location number stops flashing.

5.2 Data Logging Menu [Log]

The Data Logging Menu allows the user to log data to the ParticleScan's internal memory. A user can set this function to be on or off. Whether data logging is currently on or off is indicated by the status of the Data Log indicator. To turn the data logging on or off, press the MENU key until the display shows [Log].

Press and hold the ENTER key for two seconds until [on] or [off] selection starts to flash. Use the UP or DOWN key to select the desired setting. Confirm the selection by pressing and holding the ENTER key for two seconds, until the selection stops flashing.

5.3 Delete Data Menu [dAtA]

The Delete Data Menu shows how many data points have been logged to the ParticleScan memory and allows to erase the logged data. The ParticleScan can log a maximum of 14,336 data points.

To view the number of data points logged to the ParticleScan internal memory, press the MENU key until the display shows [dAtA]. To delete the logged data, press and hold the ENTER key for two seconds until [dEL_dAtA] flashes on the display. Press and hold the ENTER key for two seconds to confirm the deletion of all logged data. After the deletion of logged data the display will show [dAtA___0].

5.4 Full Memory Menu [FULL]

The Full Memory Menu allows the user to select what should happen when the ParticleScan's data log memory is full. [FULLstop] means that once the maximum number of data points have been logged, data logging will stop. [FULLcycl] means that once the maximum number of data points has been logged, newly logged data will overwrite the oldest ParticleScan data logged.

To change the Full Memory Setting, press and hold the ENTER key for two seconds until the [stop] or [cycl] selection starts to flash. Use the UP or DOWN key to select the desired setting. Confirm your selection by pressing and holding the ENTER key for two seconds until the selection stops flashing.

5.5 Concentration Units Menu [Con]

The Concentration Units Menu allows the user to select whether the particle concentration is displayed in particles per cubic foot [Con__CF], particles per liter [Con__Lit] or particles per cubic meter (1000 liter) [Con1000L].

To change the concentration units, press and hold the ENTER key for two seconds until the [CF], [1000L] or [L] selection starts to flash. Use the UP or DOWN key to select the desired setting. Confirm your selection by pressing and holding the ENTER key for two seconds until the selection stops flashing.

5.6 Sample Time Menu [SAti]

The Sample Time Menu allows the user to select the sampling period (in terms of seconds) for particle sampling. The default setting is 6 seconds, which means that the ParticleScan will sample and display a new particle concentration measurement after 6 seconds. The minimum time period that can be set is 1 second and the maximum update period is 600 seconds (10 minutes).

To change the sample time period, press and hold the ENTER key for two seconds until the currently set time period starts to flash. Use the UP or DOWN key to select the desired setting. Confirm your selection by pressing and holding the ENTER key for two seconds until the selection stops flashing.

5.7 Sample Repeat Menu [SAr]

The Sample Repeat Menu allows the user to have the ParticleScan take just one sample [Once] and hold the result or take continuous samples [Cont] until the sampling is stopped. The default setting is continuous.

To change the Sample Repeat setting, press and hold the ENTER key for two seconds until the current setting starts to flash. Use the UP or DOWN key to select the desired setting. Confirm your selection by pressing and holding the ENTER key for two seconds until the selection stops flashing.

5.8 “Geiger Counter” Menu [GEIG]

The “Geiger Counter” function enables the ParticleScan to emit an audible signal at intervals which are proportionate to the number of particles ($\geq 0.3 \mu\text{m}$) that are detected in a period of one second. The “Geiger Counter” Menu allows the user to choose from 10 sensitivity levels. The most sensitive setting is 1, which means that for each particle counted in a period of one second, the ParticleScan will generate one beep. The least sensitive setting is 10, which means that for every 500 particles counted in a one-second period, one beep will be generated.

To change the “Geiger Counter” setting, press the Menu key until you reach the Menu display starting with [GEIG]. Press and hold the ENTER key for two seconds until the current setting starts to flash. Use the UP or DOWN key to select the desired setting. [OFF] means that the “Geiger Counter” function is disabled. 1 to 10 represent the available sensitivity settings (see table). Use the UP or DOWN key to select the desired setting. Confirm your selection by pressing and holding the ENTER key for two seconds until the selection stops flashing.

Setting	One beep per x particles
OFF	N/A
1	1
2	5
3	10
4	20
5	40
6	60
7	80
8	100
9	200
10	500

Note: Whereas the ParticleScan display updates particle concentration after 6 seconds (default), the “Geiger Counter” issues a beep based on the number of particles sampled in one second. Due to the shorter sampling period, the “Geiger Counter” reacts more quickly to changes in particle concentrations than the display.

5.9 Alarm Menu [A]

The Alarm Menu allows the user to set audio alarm thresholds for every one of the six cumulative (≥ 0.3 , ≥ 0.5 , ≥ 0.7 , ≥ 1.0 , ≥ 2.0 , ≥ 5.0 microns) and five differential (0.3–0.5, 0.5–0.7, 0.7–1.0, 1.0–2.0, 2.0–5.0 microns) size channels. When an alarm threshold is exceeded, a beep alarm will sound and the appropriate channel size LED will flash.

To set an alarm threshold for a channel, use the UP or DOWN key to select the size channel for which you would like to activate the alarm. Then press the Menu key until you reach the Menu display starting with [A] for Alarm. Press and hold the ENTER key for two seconds until [A0000000] appears. Use the UP or DOWN key to enter the first digit and/or press the ENTER key to move one digit to the right. Once the desired threshold is entered, press and hold the ENTER key for 2 seconds to confirm.

To turn off an alarm threshold, select the appropriate size channel LED with the UP or DOWN key, press the MENU key until you reach the Menu starting with [A], press and hold the ENTER key for two seconds until the display shows [A0000000], with the first zero flashing. Press and hold the ENTER key for two seconds until the zero stops flashing and switches to [A...OFF]. Your alarm threshold has now been turned off.

5.10 Time Menu [t]

The Time Menu allows the user to set the current time inside the ParticleScan. The ParticleScan uses a 24 hour clock format. The internal clock is used to time stamp logged measurements. It is also used for the automatic timer function.

To set the time, press the MENU key until the display menu that starts with [t] is shown. Press and hold the ENTER key for two seconds until the hour block flashes. Use the UP or DOWN key to set the hours. Press the ENTER key to advance to the minutes. Use the UP or DOWN key to set the minutes. Press the ENTER key to advance to the seconds. Use the UP or DOWN key to set the seconds. Press and hold the ENTER key for two seconds until the flashing stops to save the selection.

5.11 Date Menu [MM:DD:YYYY]

The Date Menu allows the user to set the current date inside the ParticleScan. The date format used is MM:DD:YYYY. This date is used to date stamp logged measurements. It is also used for the automatic timer function.

To set the date, press the MENU key until [MM'DD'YYYY] is shown on the display. Press and hold the ENTER key for two seconds until the month block starts flashing. Use the UP or DOWN key to set the current month. Press the ENTER key to advance to the days. Use the UP or DOWN key to set the day. Press the ENTER key to advance to the year. Use the UP or DOWN key to set the year. Press and hold the ENTER key for two seconds until the flashing stops to save the selection.

5.12 Auto Timer Menu [auto]

The Auto Timer Menu allows the user to activate or inactivate a timer program that has been set via the ParticleScan web browser interface (see Chapter 7.7). The auto timer allows the ParticleScan to turn itself on and off to take measurements at regular intervals. This is useful to collect regular particle samples over long periods, without having to sample all the time. This is desirable for permanent sampling applications, in order to reduce the wear on the sampling pump and other components. It also can be useful to reduce sampling noise in noise-sensitive environments.

5.13 IP Menu [IP]

The IP Menu allows the user to activate and deactivate the network port (RJ-45) and assign an IP address to the ParticleScan on the network. The IP address is a number with which the ParticleScan is identified on a network. When the IP number is entered into a web browser such as Internet Explorer, the ParticleScan can be accessed via the network.

The IP Menu has three main settings: IP OFF, DHCP and STATIC. The default setting of the IP Menu is IP OFF, which means that the RJ-45 port of the ParticleScan is inactive. NOTE: Data transfer via the USB port requires the IP Menu selection to be set to [IP OFF]. To activate DHCP, press the MENU key until the IP Menu [IP OFF] appears, press the ENTER key for three seconds until [IP OFF] starts to flash. Then press the ARROW DOWN key once. [DHCP] will appear flashing on the display. If the ENTER key is pressed, the DHCP mode is activated.

To view the current IP address that has been assigned to your ParticleScan by a network router, connect your ParticleScan to a network with a network cable and ensure that DHCP is selected in the IP Menu. The IP Menu should now show the IP address assigned to your ParticleScan by intermittently displaying [DCHP], [IP xxx'xxx'] and ['xxx'xxx]. The x stands for numbers. The IP address consists of four blocks separated by a period. The first two blocks have the "IP" in front. Blocks three and four do not. A typical IP address could look like this on the ParticleScan display: [IP 192'168' 0' 79]. In this example, the IP address would be 192.168.0.79. It is this set of numbers together with the periods must be entered into the address field of the web browser. When the IP address is flashing on the display, this means the ParticleScan is not receiving an IP address. This could be due to a problem with the physical connection to the network or a problem with the DHCP server. Note: If the ParticleScan was disconnected from the network, it can take up to 3 minutes for the ParticleScan to be reassigned an IP address by the network router.

In some network environments, it may be desirable to manually assign a specific, fixed IP address, commonly referred to as a static IP address. To set a static IP address, go to the IP menu, press the ENTER key for two seconds until the display starts flashing. Then press the ARROW UP or DOWN key until [STATIC] flashes on the display. Press the ENTER key for two seconds until a constant [-STATIC] appears. Now you can adjust the IP address [-IP Addr], the subnet mask [-Subnet] and the gateway [-Gate], by pressing an ARROW key to reach the item to be modified, followed by pressing and holding the ENTER key. The ARROW and ENTER keys serve to modify the IP address, subnet mask and the gateway.

5.14 Remote Monitoring Menu [InEt oFF] (Beta-Feature)

Please visit www.ParticleCam.com to find out more about this beta-feature. **Important Note:** Changing [InEt oFF] to [InEt on] disables all normal functions. These normal functions can be enabled again at any time by selecting [InEt oFF].

Chapter 6 – Maintenance of the ParticleScan

6.1 The Battery

Your ParticleScan is equipped with a internal Ni-MH (Nickel-Metal Hydride) rechargeable battery pack. Fully charged, the ParticleScan Pro will run continuously for up to five hours and the ParticleScan CR will run continuously for up to four hours.

Note: For maximum battery life, IP OFF should be selected in the IP Menu (see Chapter 5.13).

6.1.1 Low Battery Indicator

When the battery is running low, both the Data Log Indicator and the Timer On Indicator will flash simultaneously. The unit can operate for another 5-10 minutes from the moment the Low Battery Indicator comes on.

6.1.2 Recharging the Battery

To recharge the internal battery pack of the ParticleScan, simply connect the supplied power adaptor/charger to a power outlet and the round connector to the power socket of the ParticleScan. It takes about 3 hours to fully recharge the internal battery pack. When the unit is turned off and the power adapter is connected, the display will show [charging]. When the battery is fully charged, the display will show [charged].

Caution: Only use the supplied adaptor/charger to recharge the ParticleScan device.

There are two charging LEDs next to the power socket. The green LED is on when the power adapter is connected. The red LED is on when charging is in progress.

6.1.3 Replacement of the Battery Pack

The ParticleScan features one of the most sophisticated charging circuits available today, which ensures maximum battery life by monitoring voltage and temperature during charging. This means that the ParticleScan can be recharged over 1000 times before the battery pack may need replacement. To replace the battery, contact Technical Support, see page 28.

6.2 Sensor Testing & Cleaning

After taking repeated readings in non-controlled environments, the highly sensitive particle sensor in your ParticleScan may have accumulated contaminants. As a result, the particle count may become inaccurate. A special purge filter is supplied with the ParticleScan kit to test the sensor for contamination. The test should be undertaken as follows:

6.2.1 “Zero Count” Test

1. Remove the red protective cap or isokinetic probe from the ParticleScan’s intake nozzle.
2. Attach the tubing end of the purge filter to the intake nozzle.
3. Switch the ParticleScan on.

If the particle count reaches zero after a few readings, the sensor is clean.

If the particle count does not reach zero within a few minutes, this suggests sensor contamination. In such a case, follow the below steps. (see Chapter 6.2.2)

6.2.2 Sensor Cleaning

To clean the sensor, the ParticleScan must be fitted with the purge filter and left running for several hours. Should the readout still not show a zero count after that, the ParticleScan should be returned to a ParticleScan Service Center for professional cleaning and re-calibration (see page 28).

Note: In order to prevent the gradual accumulation of contaminants on the sensor, the purge filter ‘zero count’ test should be performed regularly, especially after having used the ParticleScan in environments with elevated levels of airborne contamination.

Chapter 7 – Computer Connectivity

7.1 Features

The ParticleScan Pro/CR features a built-in Ethernet port (RJ-45) and USB port (Mini-B). The connection of a ParticleScan to a computer or network allows to control the ParticleScan via a Java interface on the computer. The control and data transfer features allow the user to:

- Initiate manual or automated particle measurements
- Update important ParticleScan settings, such as date, time and measurement updates
- Download logged data from the ParticleScan memory to a computer
- Log particle measurements in real-time from the ParticleScan to a computer (i.e. use as a remote sensor).
- Program the ParticleScan to take regular automated measurements, with or without being connected to a computer.

Caution: To use USB port reliably, the IP menu needs to be set to IP OFF (see Chapter 5.13).

7.2 Computer Connectivity Options

There are three basic ways to connect a ParticleScan to a computer:

7.2.1 Via a Network

Connection: Network cable from ParticleScan Ethernet port to network.

System requirements: Windows 98/ME/NT/2000/XP/Vista, Mac OSX, Linux

Software requirements: Web browser, Java Runtime Environment

Other requirements: Network with router

If a network is available, connecting a ParticleScan to the network via a network hub or switch allows to access the ParticleScan from any computer in the network that has a web browser (e.g. Internet Explorer, Safari etc.) and Java Runtime Environment installed. The ParticleScan CD includes J2RE for PC. For other computers, the appropriate J2RE version can be downloaded for free from www.java.com. On many current computers Java Runtime Environment is pre-installed. The ParticleScan is identified in the network by an IP address. The ParticleScan comes pre-configured with its network port and IP address off. To activate the network port and IP address of the ParticleScan go to the IP Menu and activate either DHCP or STATIC (see Chapter 5.13).



ParticleScan with network cable for direct connection to the network.

7.2.2 Via a Crossover Connection

Connection: Network cable with crossover adapter from ParticleScan Ethernet port (RJ-45) to computer Ethernet port (RJ-45)

System requirements: Windows 98/2000/NT/XP/Vista, Mac OSX, Linux

Software requirements: Web browser, Java Runtime Environment

Other requirements: Ethernet port (RJ-45) on computer, network cable with crossover connector (supplied)

If no network is available, but the computer has an Ethernet port (RJ-45), you can connect to the ParticleScan with the supplied network cable and the crossover adapter. You connect to the ParticleScan via a normal web browser by entering a valid IP address in the address window of the web browser. It is recommended that a fixed (static) IP address is assigned to the ParticleScan and the computer, otherwise IP addresses are assigned randomly with each restart. An IP address can be assigned to the ParticleScan in the IP Menu of the ParticleScan (see Chapter 5.13).



ParticleScan with crossover adapter and network cable for direct connection to the ethernet port of a computer.

7.2.3 Via USB

System requirements: Windows XP/Vista

Software requirements: ParticleScan USB Connection Software and ParticleScan USB drivers (supplied on CD)

Hardware: Computer with USB port, USB cable (supplied)

The USB connection of the ParticleScan is only supported for Windows XP/Vista computers. For USB connectivity, the installation of ParticleScan USB drivers and of the ParticleScan USB Connectivity Software is necessary. These are included on the ParticleScan CD supplied with the ParticleScan.

Important: The IP Menu needs to be set to [IP OFF] for the USB connection to work (see Chapter 5.13).

7.2.4 USB Driver Installation

To allow data communication via a USB connection to a Windows computer, two drivers need to be installed. This installation process is easy and automatic.

1.



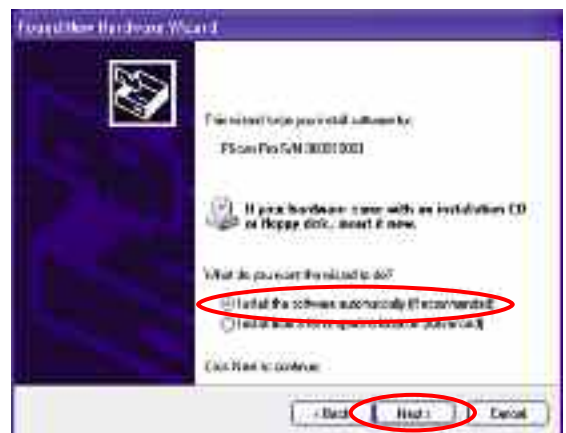
Connect the ParticleScan and the computer with the supplied USB cable.

2.



The New Hardware Wizard automatically appears. Select <No, not this time> and click <Next>.

3.



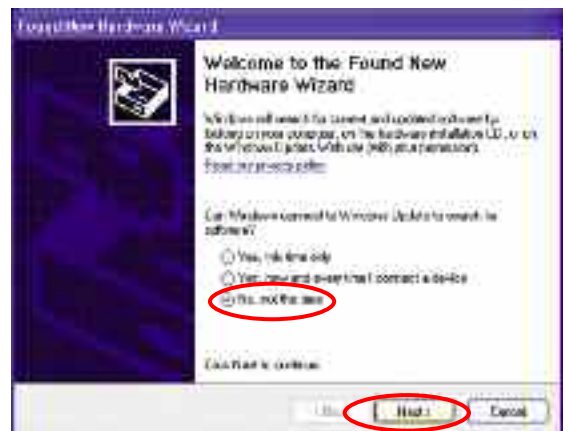
Insert the ParticleScan CD and leave the selection on <Install the software automatically>. If the installation doesn't start, click <Next>.

4.

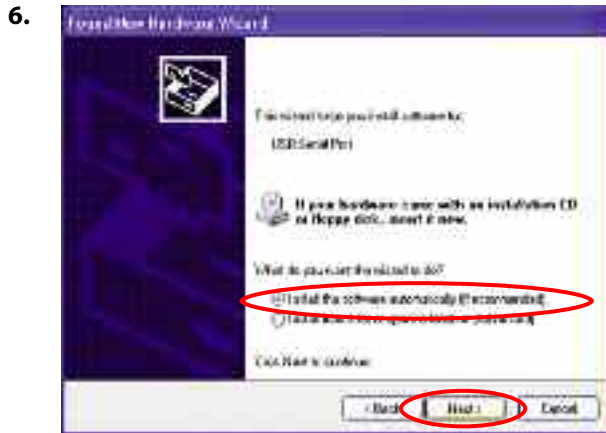


Click <Finish>. The first driver is now installed.

5.



The New Hardware Wizard automatically appears to install the second driver. Select <No, not this time> and click <Next>.



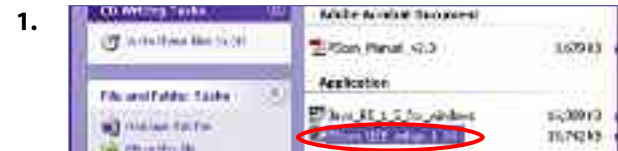
Leave the selection on <Install the software automatically> and press <Next>.



Click <Finish>. All required drivers are now installed.

7.2.5 ParticleScan USB Utility Software for PC Installation

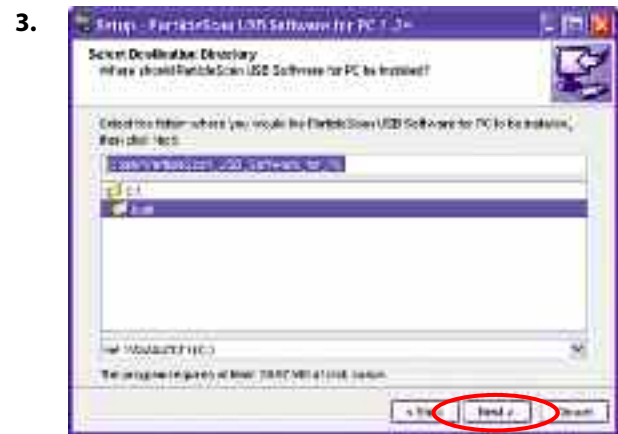
To view and transfer data between the computer and the ParticleScan, the ParticleScan USB Utility Software needs to be installed. It is supplied on the ParticleScan CD.



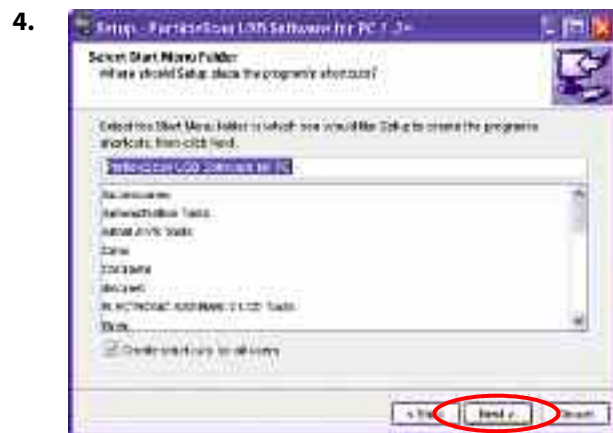
Double-click on the <PScan_USB_setup> which is found on the ParticleScan CD.



Click on <Next> in the Setup Wizard window.



Click on <Next>.



Click on <Next>.



Click on <Finish> to finish the setup.

7.2.6 Starting the ParticleScan USB Software for PC

Ensure that the ParticleScan is connected to the computer via a USB cable. Switch your ParticleScan on by pressing the ON/OFF key for two seconds.

Start your ParticleScan USB Software for PC by a simple double-click on the ParticleScan icon on your desktop.

After a few seconds, the <Connection Dialog> window opens. If you are properly connected to the ParticleScan, the unit's name and serial number will appear in the USB description field.

The ParticleScan Control window will appear. The Connection Status should be <Connected>.

Note: If <Not Connected> appears, the ParticleScan may have been switched off. In this case you need to quit the ParticleScan software, switch the ParticleScan on and start the ParticleScan USB Software again.

Important: The IP Menu needs to be set to [IP OFF] for the USB connection to work (see Chapter 5.13).



7.3 Accessing the ParticleScan via the Web Browser

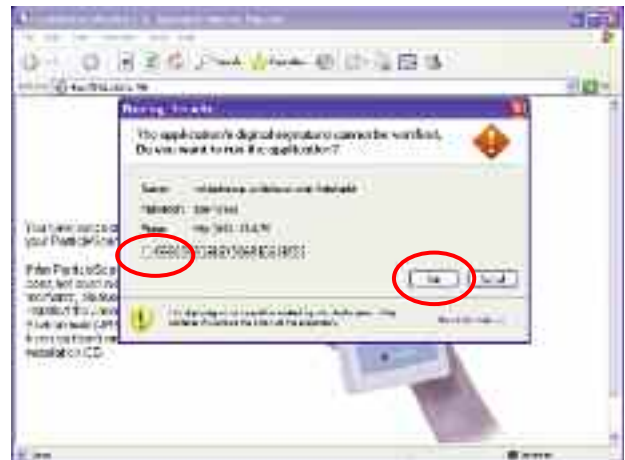
Open your web browser and enter the IP address of your ParticleScan (e.g. <http://192.168.100.14>).

The IP address of your ParticleScan can be determined by going into the IP Menu (see Chapter 5.13).



When the Security Window appears, click <Always>.

If you are running under J2RE 5.0 select <Always trust content from this publisher> and click <Run>.



Remote Monitoring Menu [InEt oFF] (Beta-Function)

The ParticleScan device features a beta-version of the new Remote Monitoring Menu (see Chapter 5.14). The Remote Monitoring Menu allows the user to turn the ParticleScan into a remote particle monitor, which can be accessed from anywhere around the globe via internet.

Please visit our Website
www.ParticleCam.com
 to find out more about this beta-feature.

Important note: The selection of [InEt on] disables all normal ParticleScan functions. These normal functions can be enabled again at any time by selecting [InEt oFF].

This is a free beta-version for trial purposes only. Full functionality is not guaranteed.

7.4 The ParticleScan Control Window

The ParticleScan control window which can be reached via a web browser connection or a ParticleScan USB software connection has numerous remote control and data logging features.

7.4.1 Start/Stop Measurements

To manually start or stop a measurement, click on the <Start> and <Stop> button. The measurement data is displayed in six current measurement fields, after every measurement update.

7.4.2 Sample Time

The <Sample Time> selection allows to select the update period (in terms of seconds) for particle sampling. If the setting is 6 seconds, the ParticleScan will display a new particle concentration measurement every 6 seconds. The time also coincides with the data points logged.

7.4.3 Sample Repeat

The Once/Continuous selection allows the user to have the ParticleScan take just one sample and hold the result ([once]) or take continuous samples ([cont]) until the sampling is stopped.

7.4.4 Measurement Units

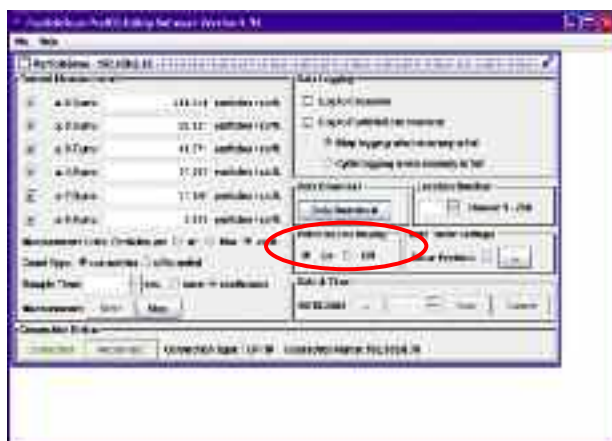
Select one of the three measurement units: particles per cubic meter (1000 L), particles per liter or particles per cubic foot (cu.ft.). This can be done during or after a measurement.

7.4.5 Count Type

Select between <Cumulative> and <Differential>. The cumulative selection shows all the particles equal to or larger than the selected size channel. The differential selection shows the particles whose size lies between two size channels. Refer to 3.2.

7.4.6 ParticleScan Display On/Off

The ParticleScan Display option allows to turn off the display and all indicators of the ParticleScan. This may be useful when the ParticleScan is used as a remote sensor. Turning off the display will also save battery life when the ParticleScan is not connected to a power adapter.

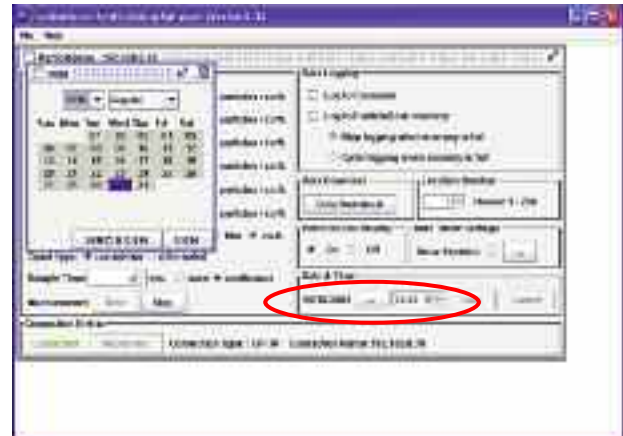


7.5 Setting the Time & Date

The <Time & Date> section shows the current time and date as set in the ParticleScan.

To change the time, double-click on the hour, minutes or seconds and use the arrows to adjust. To save your selection to the ParticleScan, press the <Save> button.

To change the date, double-click on the <...> button. This will open the <Date> window where the year, month and day can be selected. Press <Select & Close> to close the <Date> window. To save your selection to the ParticleScan, press the <Save> button.

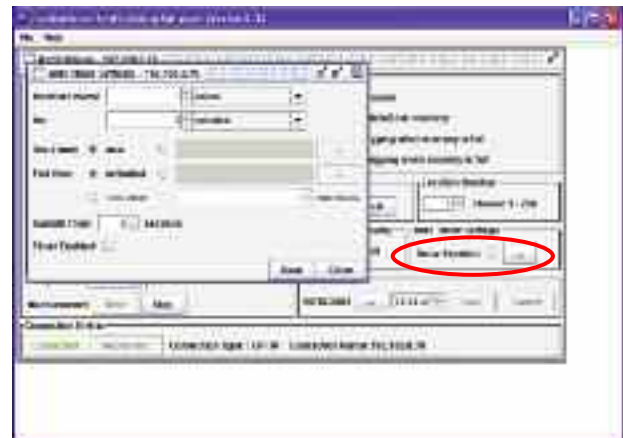


7.6 Using the Auto Timer

The Auto Timer Settings section allows to schedule the ParticleScan to make automatic measurements.

To access the <Auto Timer Settings>, click on the <...> button.

Note: When the Auto Timer schedules measurements, these will automatically be logged to the internal memory of the ParticleScan, whether or not <Log to ParticleScan memory> is enabled.



7.7 Scheduling Regular Measurements

To take measurements at regular intervals, choose the interval and the sample time per interval. If you would like to take a measurement every hour for 5 minutes, for example, enter <1> and <hour> in the top row of the window and <5> and <minutes> in the second row.

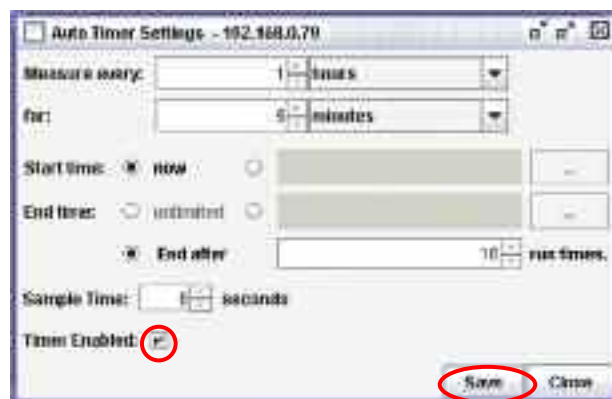
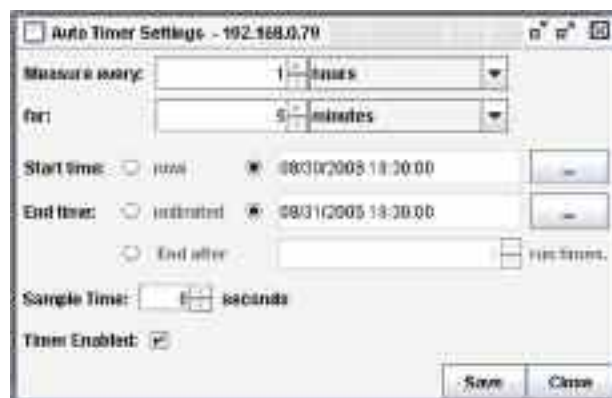
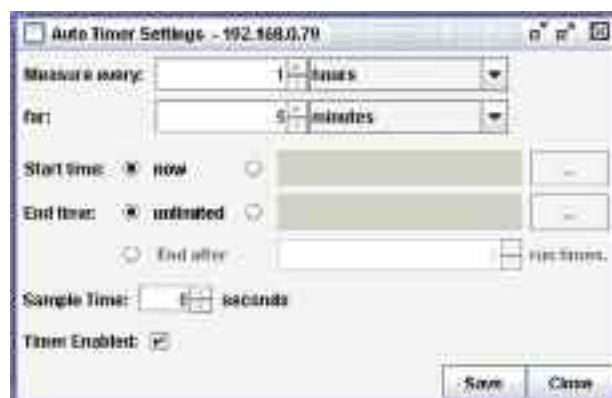
Next, select the time you would like this measurement schedule to begin, designated with <Start time>. If you would like to begin immediately, select <now>. If you would like the measurement to start at a specific time in the future, press on the <...> button and specify that time.

Next, select the desired <End time> of the measurement schedule. If you select <unlimited>, the measurement schedule will stay in effect until disabled. This can be done by deselecting the <Timer Enabled> button. Alternatively, the Auto Timer may be disabled directly in the ParticleScan Menu starting with [auto].

You can also select a specific end time by clicking on the button to the right of <unlimited> and clicking on the <...> button.

The third option to define the end time is to select a specified number of run times.

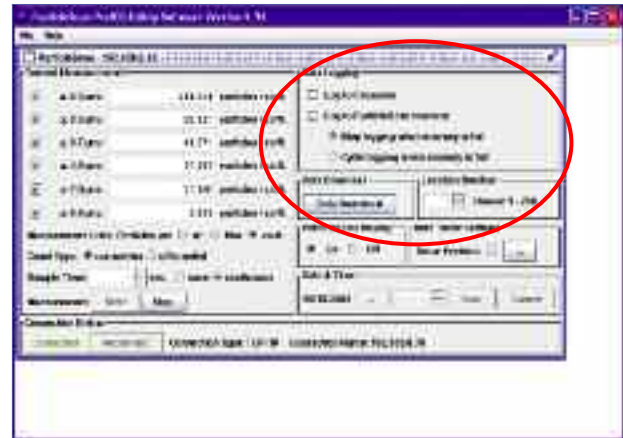
Once you made your selections, you can download these to the ParticleScan with the <Save> button. To enable the timer, you must select <Timer Enabled>. Alternatively you can enable the Auto Timer in the Auto Timer menu which is accessible from the ParticleScan.



7.8 Data Logging

The Data Logging window allows to activate data logging to two different physical locations:

- <Log to Computer> will log the measurement data of the ParticleScan automatically to the Log to Computer window. The maximum number of measurements logged to computer is limited only by the hard disk space on the computer.
- <Log to ParticleScan memory> will log the measurement data to the internal memory of the ParticleScan. The internal memory of the ParticleScan can log 14,336 measurements.



7.8.1 Checklist Before Data Logging

Before data logging either to a computer or to the ParticleScan memory is started, the following should be checked:

1. Is the correct date & time set? All measurement data will be date and time stamped based on the information in the Time & Date window which is accessible from the Tools tab.
2. Does the Location Number need to be changed? The location number is not only a useful tool to identify measurements taken in different locations, but also under different conditions.
3. Is there any redundant data that should be erased from the ParticleScan memory or the Log to Computer window?

7.8.2 Data Logging to Computer

To log measurement data to a computer, select <Log to computer>. This automatically opens the Log to Computer window.

If a measurement is in progress, measurement data is added with every measurement update.

To delete the logged data, click on the <Delete Data> button. When the data is deleted, the Log to Computer window will automatically be cleared.

To print logged data, click on the <Print> button. (see Chapter 7.8.6)

To save logged data to a CSV file, click on the <Save to File> button. (see Chapter 7.8.7)

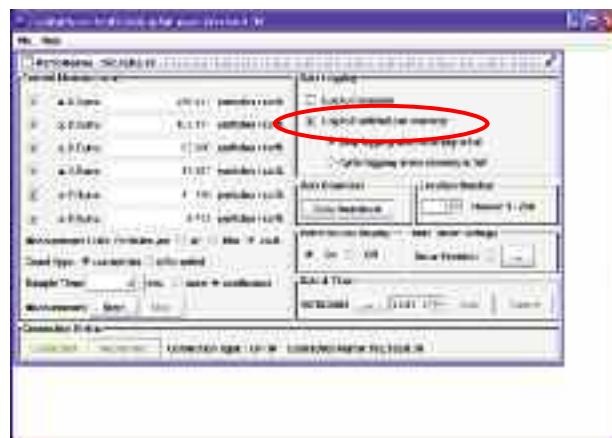


7.8.3 Data Logging to ParticleScan Memory

To log measurement data to the ParticleScan's internal memory, select <Log to ParticleScan memory>. If a measurement is in progress, the next measurement update will be logged to the ParticleScan's internal memory.

7.8.4 Full Memory Options

The ParticleScan can log 14,336 measurements. When this number is reached you have the option to stop data logging or to overwrite the oldest data with the newest logged data. Refer to Chapter 5.4 for more details.



7.8.5 Viewing Logged Data

To view data that was logged to the ParticleScan's memory, click on the <Data Download> button in the Control window. Then press the <Load Data> button. All the logged data will now be loaded from the ParticleScan to the window. Depending on the amount of data logged, this may take several minutes.

Note: Loading data to the window leaves the data on the ParticleScan memory unaffected.

- To delete the logged data on the ParticleScan, press the <Delete Data> button and confirm this choice in the pop-up confirmation window.
- The <Clear Window> button clears all data from the window, but leaves the data logged in the ParticleScan memory unaffected.
- To print logged data, click on the <Print> button. (see Chapter 7.8.6)
- To save logged data to a CSV file, click on the <Save to File> button. (see Chapter 7.8.7)

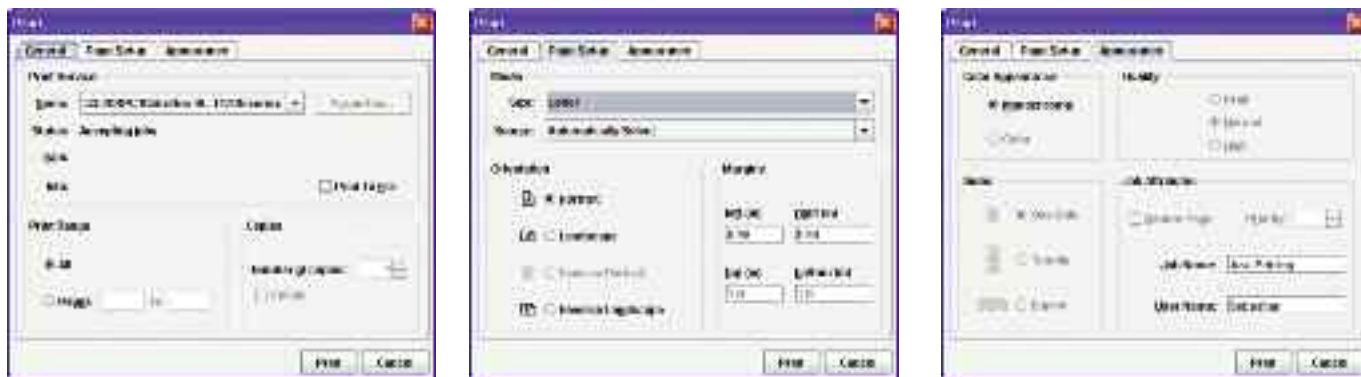


7.8.6 Printing Logged Data

To print logged data directly from the logged data window, press the <Print> button.

Note: The data will be printed in exactly the format that you see in the logging window. Ensure before clicking <Print> that the Measurement Units (Concentration Units) and the Count Type are set as desired.

For successful printing, ensure that you have selected the desired printer, the desired media size and orientation

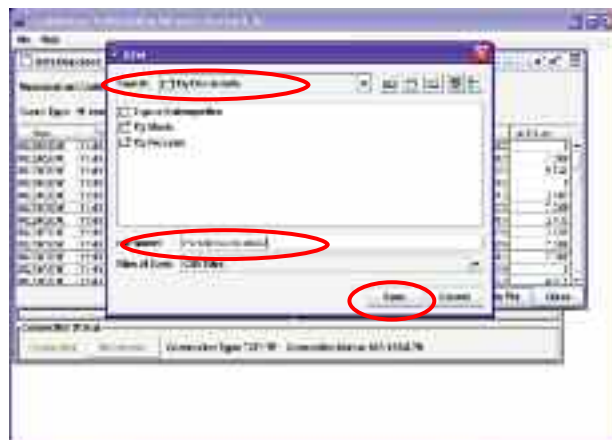


7.8.7 Saving Logged Data to a CSV File

To save logged data to a file for import into a spreadsheet or other program, press the <Save to File> button.

Note: The data will be saved to file in exactly the format that you see in the window. Ensure before saving to file that the Measurement Units and the Count Type are set as desired.

In the <Save> window select the desired location where the file should be saved and enter the file name. The file is saved in the CSV format for easy import into spreadsheets.



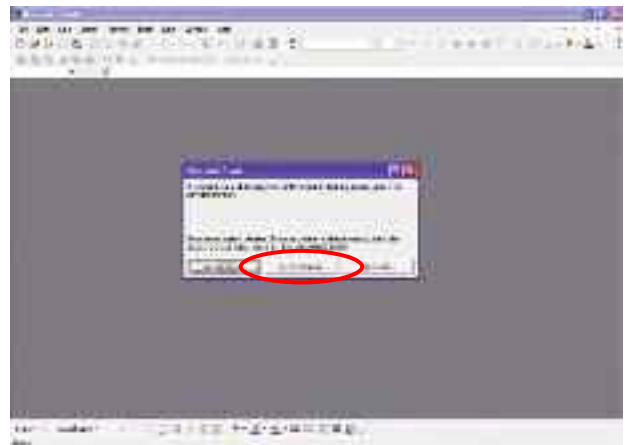
7.8.8 Importing a ParticleScan Data File into Excel

The CSV data file that can be saved from the data logging window (see Chapter 7.8.7) can be opened and formatted in any common spreadsheet program.

To make things easy, the ParticleScan CD contains an Excel Data Import Sheet that already contains convenient data import and formatting functions.

Double-click on the <Data_import_sheet> icon on the ParticleScan CD.

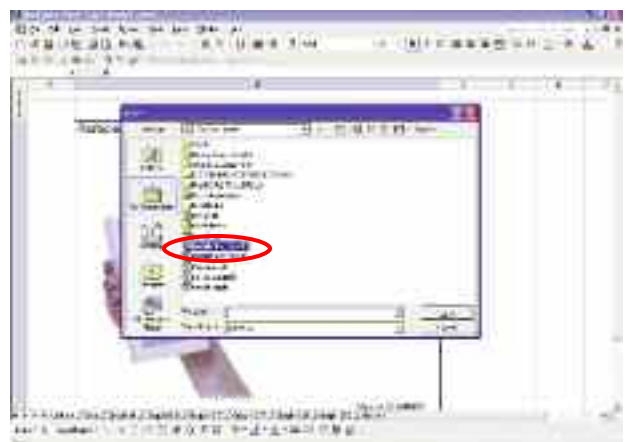
Click on <Enable Macros>.



Click on <Import Data File>



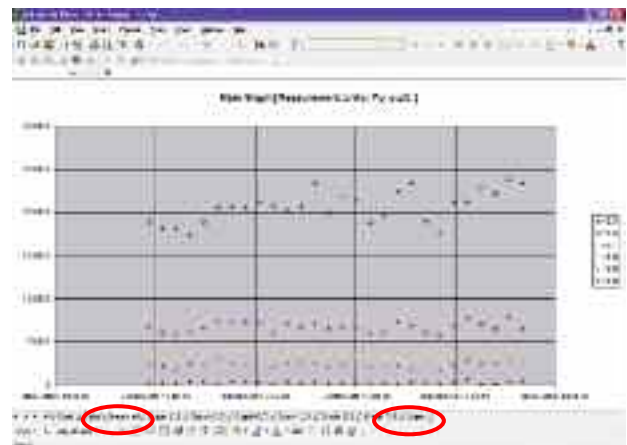
Locate and select the desired logged data file you created in Chapter 7.8.7. Then click on <Open>.



Your data is now automatically imported into the data sheet.

[illegible]

The graph sheets give you a visual timeline for your logged data.



The Alarm sheet allows you to set alarm particle threshold levels. The values need to be selected before data is imported. Data points that are above the alarm threshold levels are then marked in red.

The screenshot displays a Microsoft Excel spreadsheet with a table of transactions. The table has columns for Date, Time, Amount, and Type. The data is organized into a table with multiple rows and columns, including a summary row at the bottom.

Date	Time	Amount	Type
2013/10/10	10:00	10.00	Income
2013/10/10	10:05	10.00	Income
2013/10/10	10:10	10.00	Income
2013/10/10	10:15	10.00	Income
2013/10/10	10:20	10.00	Income
2013/10/10	10:25	10.00	Income
2013/10/10	10:30	10.00	Income
2013/10/10	10:35	10.00	Income
2013/10/10	10:40	10.00	Income
2013/10/10	10:45	10.00	Income
2013/10/10	10:50	10.00	Income
2013/10/10	10:55	10.00	Income
2013/10/10	11:00	10.00	Income
2013/10/10	11:05	10.00	Income
2013/10/10	11:10	10.00	Income
2013/10/10	11:15	10.00	Income
2013/10/10	11:20	10.00	Income
2013/10/10	11:25	10.00	Income
2013/10/10	11:30	10.00	Income
2013/10/10	11:35	10.00	Income
2013/10/10	11:40	10.00	Income
2013/10/10	11:45	10.00	Income
2013/10/10	11:50	10.00	Income
2013/10/10	11:55	10.00	Income
2013/10/10	12:00	10.00	Income
2013/10/10	12:05	10.00	Income
2013/10/10	12:10	10.00	Income
2013/10/10	12:15	10.00	Income
2013/10/10	12:20	10.00	Income
2013/10/10	12:25	10.00	Income
2013/10/10	12:30	10.00	Income
2013/10/10	12:35	10.00	Income
2013/10/10	12:40	10.00	Income
2013/10/10	12:45	10.00	Income
2013/10/10	12:50	10.00	Income
2013/10/10	12:55	10.00	Income
2013/10/10	13:00	10.00	Income
2013/10/10	13:05	10.00	Income
2013/10/10	13:10	10.00	Income
2013/10/10	13:15	10.00	Income
2013/10/10	13:20	10.00	Income
2013/10/10	13:25	10.00	Income
2013/10/10	13:30	10.00	Income
2013/10/10	13:35	10.00	Income
2013/10/10	13:40	10.00	Income
2013/10/10	13:45	10.00	Income
2013/10/10	13:50	10.00	Income
2013/10/10	13:55	10.00	Income
2013/10/10	14:00	10.00	Income
2013/10/10	14:05	10.00	Income
2013/10/10	14:10	10.00	Income
2013/10/10	14:15	10.00	Income
2013/10/10	14:20	10.00	Income
2013/10/10	14:25	10.00	Income
2013/10/10	14:30	10.00	Income
2013/10/10	14:35	10.00	Income
2013/10/10	14:40	10.00	Income
2013/10/10	14:45	10.00	Income
2013/10/10	14:50	10.00	Income
2013/10/10	14:55	10.00	Income
2013/10/10	15:00	10.00	Income
2013/10/10	15:05	10.00	Income
2013/10/10	15:10	10.00	Income
2013/10/10	15:15	10.00	Income
2013/10/10	15:20	10.00	Income
2013/10/10	15:25	10.00	Income
2013/10/10	15:30	10.00	Income
2013/10/10	15:35	10.00	Income
2013/10/10	15:40	10.00	Income
2013/10/10	15:45	10.00	Income
2013/10/10	15:50	10.00	Income
2013/10/10	15:55	10.00	Income
2013/10/10	16:00	10.00	Income
2013/10/10	16:05	10.00	Income
2013/10/10	16:10	10.00	Income
2013/10/10	16:15	10.00	Income

Chapter 8 – Troubleshooting

8.1 Symptom, Cause and Corrective Action

Symptom	Possible Cause	Corrective Action
Unit does not turn on, no display	a) Low battery b) Defective adapter/charger c) Defective battery	Charge battery for 3 hours Contact Technical Support Contact Technical Support
Sample result remains at zero after sampling	a) Defective pump b) Laser diode failure	Contact Technical Support Contact Technical Support
Sample result is lower than normal	a) Isokinetic probe is missing b) Flowrate is low c) Something may be stuck in the inlet nozzle and blocking the beam d) Contaminated optics in sensor e) Calibration overdue	Attach isokinetic probe Contact Technical Support Clean intake nozzle with compressed air. (Do not push any object down into nozzle) Contact Technical Support Contact Technical Support
Sample result is higher than normal	a) Contaminated optics in sensor b) Internal noise c) Calibration overdue	Perform zero count test Contact Technical Support Contact Technical Support
Battery pack does not hold a charge	a) Defective or worn out battery pack b) Defective charger	Contact Technical Support Test voltage of charger. Replace charger. Contact Technical Support

8.2 ParticleScan Technical Support?

North America (United States, Canada and Mexico)

Our website www.iqair.us is available 24 hours per day and has answers for your most frequently asked questions. Technical Support is available from 8 am - 4:30 pm PST Monday-Friday. Call 888-560-1020, or email us at support@iqair.com.

Worldwide

Our website www.iqair.com is available 24 hours per day and has answers for your most frequently asked questions. For additional technical support, email info@incen.com.

Warning: Tampering or opening the ParticleScan device may result in exposure to invisible laser radiation that can cause severe eye injuries. Service and repairs on the ParticleScan must only be undertaken by IQAir or Incen. Tampering with the warranty seal on the ParticleScan will void the warranty.

Chapter 9 – Technical Specifications for ParticleScan Pro and CR

	ParticleScan Pro	ParticleScan CR
Minimum sensitivity	0.3 µm	0.3 µm
Flow rate	0.025 cfm	0.1 cfm
Size channels (µm)	0.3, 0.5, 0.7, 1.0, 2.0, 5.0	0.3, 0.5, 0.7, 1.0, 2.0, 5.0
Sample time	1–600 seconds (user selectable)	1–600 seconds (user selectable)
Count displayed as	particles per cu. ft., particles per liter or particles per cubic meter (1000L)	particles per cu. ft., particles per liter or particles per cubic meter (1000L)
Display	8-digit LED	8-digit LED
Laser source	Laser diode, 680 nm	Laser diode, 680 nm
Audible alarm range	1–99'999'999 particles per channel	1–99'999'999 particles per channel
Power	120V, 60Hz or 230V, 50Hz	120V, 60Hz or 230V, 50Hz
Rechargeable batteries	Nickel-Metal Hydride, 5 hours continuous operation	Nickel-Metal Hydride, 4 hours continuous operation
Dimensions & weight	7.75 x 4.0 x 2.25 inches (19.5 x 10.0 x 5.5 cm), 1.8 lbs (0.8 kg)	7.75 x 4.0 x 2.25 inches (19.5 x 10.0 x 5.5 cm), 1.8 lbs (0.8 kg)
Supplied accessories	carrying case, purge filter, isokinetic probe, power adaptor, network cable, crossover adapter, USB cable, CD, calib. certificate, user manual	carrying case, purge filter, isokinetic probe, power adaptor, network cable, crossover adapter, USB cable, CD, calib. certificate, user manual
Warranty	1 year on parts and labor	1 year on parts and labor
Data logging	<ul style="list-style-type: none"> • Internal memory for 14'366 data points • Realtime logging to computer via USB or network connection • Data transfer via USB or network conn. 	<ul style="list-style-type: none"> • Internal memory for 14'366 data points • Realtime logging to computer via USB or network connection • Data transfer via USB or network conn.
System requirements	<u>Network Connection:</u> <ul style="list-style-type: none"> • Windows 98/ME/NT/2000/XP/Vista, OSX or Linux <u>USB Connection:</u> <ul style="list-style-type: none"> • Windows XP/Vista 	<u>Network Connection:</u> <ul style="list-style-type: none"> • Windows 98/ME/NT/2000/XP/Vista, OSX or Linux <u>USB Connection:</u> <ul style="list-style-type: none"> • Windows XP/Vista

