AeroTrak®
Portable Airborne Particle Counter

Model 9310/9350/9510/9550/9500

Operation Manual

P/N 6004217, Revision U
November 2022

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AeroTrak® Portable Airborne Particle Counter

Model 9310/9350/9510/9550/9500

Operation Manual

P/N 6004217, Revision U
November 2022

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Manual History

The following is a manual history of the AeroTrak® Portable Airborne Particle Counter, Model 9310, 9510, 9350, 9550, 9500 Operation Manual (P/N 6004217).

Revision	Date
A	July 2010
B	September 2010
C	November 2010
D	December 2010
E	February 2011
F	May 2011
G	December 2011
H	November 2012
J	October 2013
K	October 2013

Revision	Date
L	January 2014
M	June 2014
N	January 2016
P	February 2016
Q	August 2016
R	January 2018
S	March 2018
T	December 2019
U	November 2022

Warranty

Part Number 6004217 / Revision U / November 2022

Address TSI Incorporated / 500 Cardigan Road / Shoreview, MN 55126 / USA

E-mail Address answers@tsi.com

Limitation of Warranty and Liability (effective April 2014)

(For country-specific terms and conditions outside of the USA, please visit www.tsi.com.)

Seller warrants the goods, excluding software, sold hereunder, under normal use and service as described in the operator's manual, to be free from defects in workmanship and material for **24 months**, or if less, the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions and exceptions:

a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment;

b. Pumps are warranted for hours of operation as set forth in product or operator's manuals;

c. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment;

d. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies;

e. This warranty does not cover calibration requirements, and seller warrants only that the instrument or product is properly calibrated at the time of its manufacture. Instruments returned for calibration are not covered by this warranty;

f. This warranty is **VOID** if the instrument is opened by anyone other than a factory authorized service center with the one exception where requirements set forth in the manual allow an operator to replace consumables or perform recommended cleaning;

g. This warranty is **VOID** if the product has been misused, neglected, subjected to accidental or intentional damage, or is not properly installed, maintained, or cleaned according to the requirements of the manual. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

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Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI's Customer Service department at 1-800-680-1220 (USA) or +001 (651) 490-2860 (International).

Trademarks

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Safety Information

This section gives instructions to promote safe and proper handling of the AeroTrak® Portable Airborne Particle Counter.

IMPORTANT

There are no user-serviceable parts inside the instrument. Refer all repair and maintenance to a qualified factory-authorized technician. All maintenance and repair information in this manual is included for use by a qualified factory-authorized technician.

Laser Safety

- This Portable Airborne Particle Counter is a Class I laser-based instrument.
- During normal operation, you **WILL NOT** be exposed to laser radiation.
- Precaution should be taken to avoid exposure to hazardous radiation in the form of intense, focused, visible light.
- Exposure to this light may cause blindness.

Take these precautions:

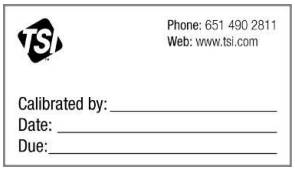
- **DO NOT** remove any parts from the particle counter unless you are specifically told to do so in this manual.
- **DO NOT** remove the housing. There are no user-serviceable components inside the housing.

WARNING

The use of controls, adjustments, or procedures other than those specified in this manual may result in exposure to hazardous optical radiation.

Labels

Advisory labels and identification labels are attached to the outside of the particle counter housing and to the optics housing on the inside of the instrument.

1. Serial number label (back panel)	
2. Laser radiation label (internal)	**DANGER!** VISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM WARNING: NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL
3 Laser instrument compliance label (*back panel*)	**Class 1 Laser Product** Complies with 21 CFR 1040, 10 and 1040, 11 Except for deviations Pursuant to Laser notice No. 50 Dated June 24th, 2007
4. Calibration Label (*back panel*)	
5. Laser radiation symbol label (back panel and internal)	
6. European symbol for non-disposable item. Item must be recycled.	

Description of Caution/Warning Symbols

Appropriate caution/warning statements are used throughout the manual and on the instrument that require you to take cautionary measures when working with the instrument.

Caution

CAUTION
Failure to follow the procedures prescribed in this manual might result in irreparable equipment damage. Important information about the operation and maintenance of this instrument is included in this manual.

Warning

WARNING
Warning means that unsafe use of the instrument could result in serious injury to you or cause damage to the instrument. Follow the procedures prescribed.

Caution or Warning Symbols

The following symbols may accompany cautions and warnings to indicate the nature and consequences of hazards:

	Warns that uninsulated voltage within the instrument may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make contact with any part inside the instrument.
	Warns that the instrument contains a laser and that important information about its safe operation and maintenance is included in the manual.
	Warns that the instrument is susceptible to electro-static dissipation (ESD) and ESD protection procedures should be followed to avoid damage.
	Indicates the connector is connected to earth ground and cabinet ground.

Getting Help

To obtain assistance with this product or to submit suggestions, please contact Customer Service:

TSI Incorporated
500 Cardigan Road
Shoreview, MN 55126 U.S.A.

Fax: (651) 490-3824 (USA)
Fax: 001 651 490 3824 (International)

Telephone: 1-800-680-1220 (USA) or (651) 490-2860
International: 001 651 490 2811

E-mail Address: technical.services@tsi.com
Web site: www.tsi.com

CHAPTER 1

Introduction and Unpacking

The AeroTrak® Portable Airborne Particle Counter (particle counter) has a touch-screen interface and operates on the included lithium-ion battery or AC power.

These devices have either a 1.0 CFM (28.3 L/min) flow rate, 50 L/min (1.77 CFM) flow rate or a 100 L/min (3.53 CFM) flow rate and count bin sizes from 0.3 to 25 µm depending on the model ordered (see table below). Up to 10,000 data sets can be downloaded for analysis and reporting using the TrakPro™ Lite Secure Data Downloading Software included with the device. Each model is also available with an “N” suffix to indicate a “No Printer” option.

Model	Size Range	Flow Rate
9310-02	0.3, 0.5, 1.0, 3.0, 5.0, 10.0 µm	28.3 L/min (1 CFM)
9510-02	0.5, 0.7, 1.0, 3.0, 5.0, 10.0 µm	28.3 L/min (1 CFM)
9350-02	0.3, 0.5, 1.0, 2.0, 3.0, 5.0 µm	50 L/min (1.77 CFM)
9350-03	0.3, 0.5, 1.0, 3.0, 5.0, 10.0 µm	50 L/min (1.77 CFM)
9550-02	0.5, 0.7, 1.0, 3.0, 5.0, 10.0 µm	50 L/min (1.77 CFM)
9500-01	0.5, 0.7, 1.0, 3.0, 5.0, 10.0 µm	100 L/min (3.53 CFM)

Typical applications for these particle counters include cleanroom monitoring, research, exposure assessment, indoor air quality, filter testing, clearance testing, quality assurance, and contaminant migration studies. All AeroTrak® particle counters meet JIS standards.

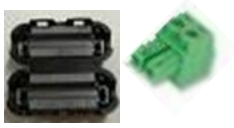
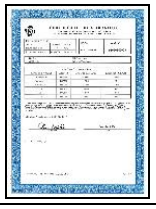
(continued on next page)

Unpacking the AeroTrak® Airborne Particle Counter

Carefully unpack the AeroTrak® Airborne Particle Counter from the shipping container and verify that all the items shown in the photos below and listed in the following tables are present. Contact TSI immediately if items are missing or broken (see Chapter 7, Contacting Customer Service for more information).

AeroTrak® Portable Airborne Particle Counter Parts List

Qty.	Item Description	Part/Model	Reference Picture
1	AeroTrak Airborne Particle Counter	9310-02 9510-02 9350-02 9350-03 9550-02 9500-01	
1	Power Supply 24 VDC 3.0A (Power cord included is country dependent)	700230	
1	Country-Specific Power Cord	700057 (US) 700058 (UK) 700059 (Euro)	
1 or 2	Battery Pack (can install up to 2 ea.)	700028 Qty = 1 (28.3 and 50 L/min models) Qty = 2 (100 L/min models)	
3 m (10 ft)	Sample Tubing	3/8 ID x 1/2 OD (28.3 or 50 L/min models) 1/2 ID x 5/8 OD (100 L/min model)	
1	Isokinetic Probe (Aluminum)	700068 (28.3 L/min) 700089 (50 L/min) 700092 (100 L/min)	

Qty.	Item Description	Part/Model	Reference Picture
1	Computer Cable (2 m), USB A to B	700033	
2	Stylus	N/A	
1	HEPA Zero Filter Assembly	700119 (for the 28.3 and 50 L/min model) 700098 (for the 100 L/min model)	
1	TrakPro™ Lite Secure Software for 21 CFR Part 11 compliant data downloading (includes manuals)	N/A	Available on TSI® website: https://tsi.com/support/tsi-software-and-firmware/
1	Operation Manual	6004217	Available on TSI® website: tsi.com. Log into “My Account” to view manual.
1	Quick Start Guide	6004218	
1	Alarm Accessories	One Clamp on Ferrite and One 2-pin connector	
1	Calibration certificate	N/A	

Optional Accessories

The following photos and table list optional accessories. If you ordered optional accessories, make certain they have been received and are in working order.

AeroTrak® Portable Airborne Particle Counter Optional Accessories

Item Description	Part/Model	Reference Picture
Stainless Steel Isokinetic Probe (used with tubing)	700069 (28.3 L/min)700026 (50 L/min) 700091 (100 L/min)	
Basic Filter Scanning Probe	700070 (28.3 L/min)700071 (50 L/min) 700088 (100 L/min)	
Electronic Filter Scanning Probe (with start/stop, LED, sound)	700094 (28.3 L/min)700095 (50 L/min) 700096 (100 L/min)	
Tubing, Superthane 3/8-inch ID x 1/2-inch OD, Clear 100 ft	700062 (28.3 or 50 L/min models)	
Printer Paper (10 rolls)	700027	
Dual Battery Charger Supplied w/ US Power Cord, Order international cord separately	700029	
Velocity/Temperature/ Relative Humidity Probe	964 (Straight) 966 (Articulated)	

Item Description	Part/Model	Reference Picture
Velocity/Temperature Probe	960 (Straight) 962 (Articulated)	
Temperature/RH Probe with Cable	700097	
Carry Case	700086	
Heavy Duty Carry Case (rolling case)	700087	

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CHAPTER 2

Getting Started

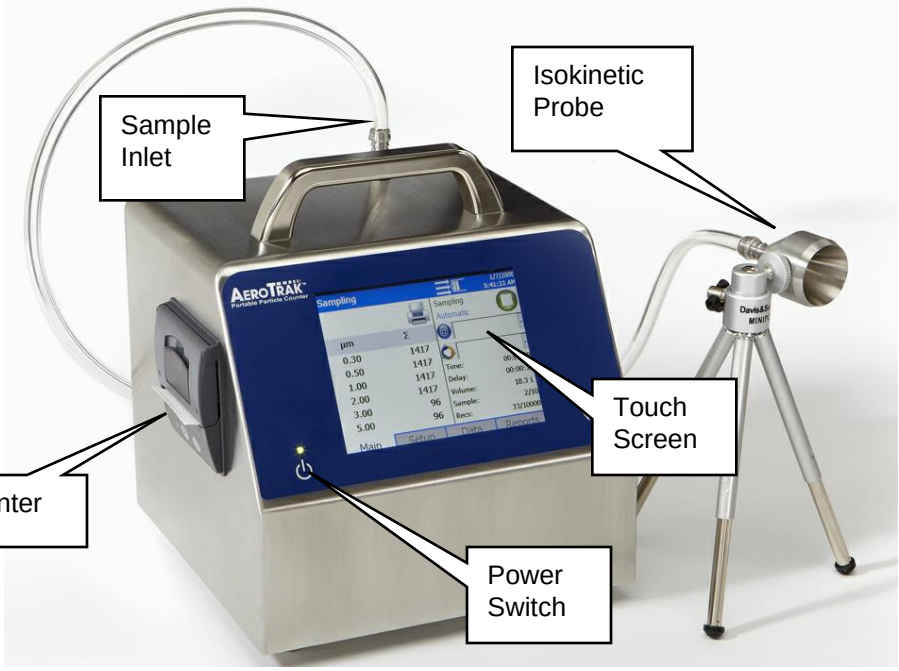
This chapter describes the features, connections, and installation of the AeroTrak® Portable Airborne Particle Counter (particle counter). It includes:

- Instrument Description
- Providing Power
- Using the Stylus
- Using the Integral Thermal Printer
- Using Peripherals
- Using Communications Ports
- Using an Isokinetic Probe

(continued on next page)

Instrument Description

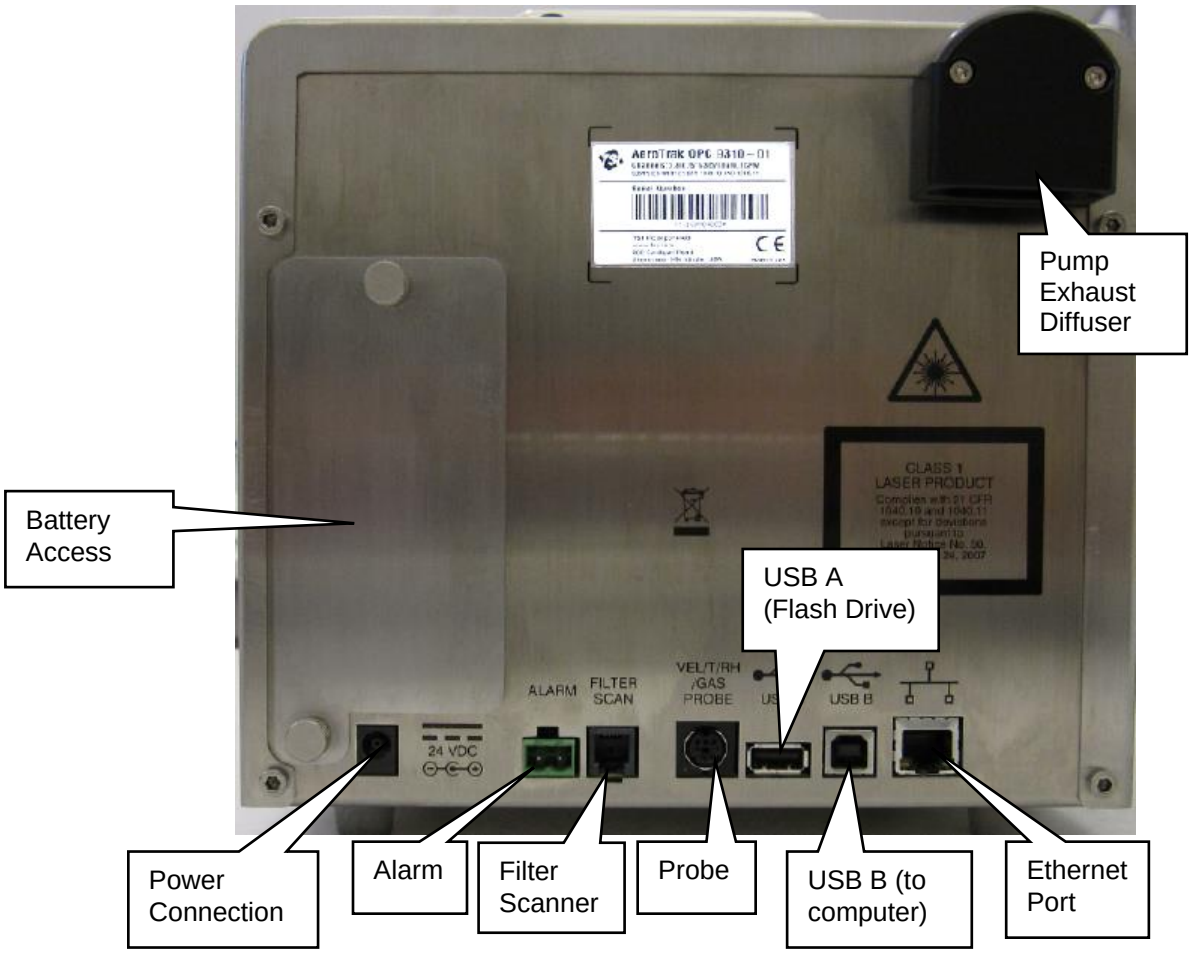
The AeroTrak® Portable Airborne Particle Counter has many features to make measurements convenient. The power switch is located on the front panel in the lower-left. A power LED indicates when the instrument is powered up. The main interface for the user is the color touch-screen interface on the front (see the note below on using a stylus with the screen). The sample inlet is located on the top of the instrument. The barbed isokinetic probe can be used with a short section of tubing above the inlet or with longer tubing and an adjustable tripod mount (*not included*) to monitor particles in hard to reach places or that are flowing horizontally. A large handle is also located on top to carry the instrument. On the left side of the instrument is a built-in printer.



The back of the instrument has many features that are described in the table below.

Description	Function
Battery access	This plate provides access to a battery bay. The instrument can be run on up to two rechargeable batteries to allow portable operation for up to two to seven hours (model dependent) or with a single battery to allow switching outlets between rooms without powering the unit down.
Pump exhaust diffuser	Provides an outlet for the filtered exhaust.
DC Power connection	This power connection is for use with an external supply. Only the TSI®-supplied 24 VDC 3.0 A power supply model 6011436 should be used.

Description	Function
Alarm	This connector provides two pins for a contact closure to control an external alarm. The contact closure is normally open and rated for 0 to 60 V AC/DC at 1.5A peak, 0.5A continuous. The “alarm out” connection is rated for 60 V insulation. The contact is closed under alarm conditions determined by the programming of the device.
Filter scanner	This connector is used with the optional TSI® Electronic Filter Scanner (TSI® P/N 700103).
Probe	This connector is used with a variety of TSI® velocity / temperature / humidity probes.
USB A	This standard USB connector is provided for use with “flash drive” devices to download data from the instrument and transfer to a computer or other device. The data files are in ASCII format for easy use in spreadsheet programs. This port can also be used to also connect a keyboard.
USB B	The standard USB connector is used to connect the instrument to a computer running TSI® TrakPro™ Lite software for data downloading and recipe uploading. It is used with a standard USB cable (included).
Ethernet port	The particle counter is compatible with either 10 or 100 MBps systems. The green LED indicates that the network is connected. The yellow LED indicates activity on the network cable.



Providing Power

These particle counters may be powered using rechargeable lithium-ion batteries (from one to four) or through an AC power cord.

NOTICES

- When using AC power, the battery (if installed) charges when the instrument is on, while actively sampling (trickle charging), and when the power is put in standby—charge battery mode.
- Removing/changing the lithium-ion battery or disconnecting AC power does not cause loss of data. The AeroTrak® Airborne Particle Counter has an internal, non-user accessible battery to maintain settings and save logged data.
- Note that the battery provided has a built-in indicator of charge level. Push on the "**Check**" button to see the charge level. If none of the LEDs lights up, the battery is not charged.

To Install the Lithium-Ion Battery

1. Remove the battery door on the back of the instrument by turning the two thumbscrews counterclockwise.

2. One battery is provided for the 28.3 and 50 L/min models, but up to two batteries can be used to extend the run time. Two batteries are provided for the 100 L/min model (Model 9500) and both must be present for the unit to operate on batteries. This is due to the larger power draw at the 100 L/min setpoint. Slide the battery into the slot (it does not matter which one), pressing until it is flush with the back panel (note the orientation of the tabs).
3. Replace the battery door and secure with the two thumbscrews.

4. The batteries will be charged if the instrument is on and not actively taking a measurement. If you use the unit with batteries often, you might also consider using the TSI® external battery charger (see *Optional Accessories* in Chapter 1).

NOTICE

It is also possible to “hot swap” batteries if you are careful. As long as one charged battery is engaged at all times, a fully charged battery can be inserted and then the depleted battery removed without powering down the unit.

WARNING

The battery supplied by TSI® (P/N 1208057) has built-in protection against explosion and fire hazard. **DO NOT** use a substitute.

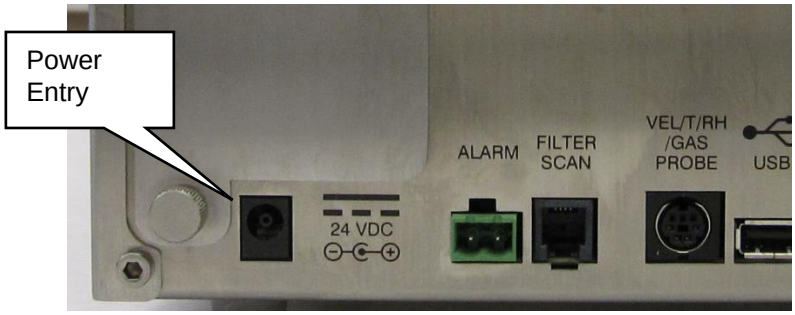
DO NOT use any other type of battery in this instrument. Fire, explosions, injuries, or other hazards may result.

To Use AC Power

1. Connect the country-appropriate power cord to the external power supply.
2. Next connect the 24 VDC connector to the socket in the particle counter and then connect the other end to an AC outlet.

WARNING

The instrument turns on automatically when the AC power supply is plugged in.



Using the Stylus

This particle counter is shipped with a plastic stylus for use with the touch screen interface. Use your fingertip or the stylus only. **DO NOT** use sharp objects, such as pens or pencils on the touch screen as they may damage it.

Using the Integral Thermal Printer

The side-mounted integral thermal printer is standard on most models to print manually, automatically after each test is completed, or whenever the alarm function is activated (see Print Setup Screen and Print Schedule Screen on the System Setup Screen).

Printer paper has a colored strip printed on the last few feet of each roll to indicate time to change the paper roll.

When installing a new roll of paper, the tag end should be from the bottom of the roll and pulled through the printer door.

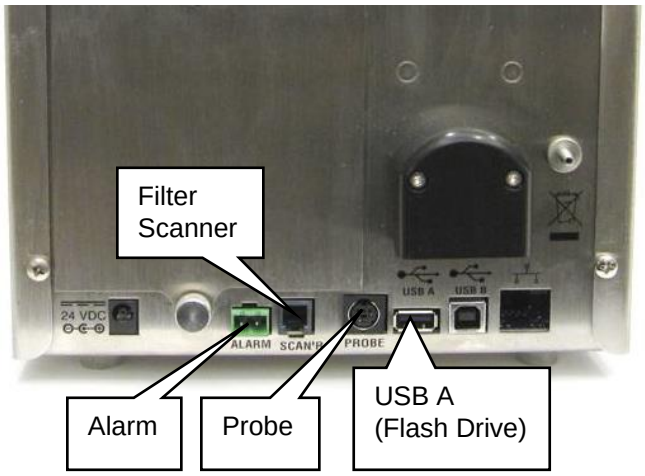
The printer has an LED indicating that the printer is ready.

There is also a feed button to allow a manual feed of the paper before tearing it off. To tear off, pull steadily down on the paper from one side of the serrated edge to the other.

The printer has a feed and stop button as well as an LED indicating that the printer is ready. The feed button can be held down at the end of a print to allow enough space to tear off the paper. If you unintentionally start a print (especially something very long), stop printing with the stop button.

Connecting to the Alarm Closure

This connector provides two pins for a contact closure to control an external alarm. The contact closure is normally open and rated for 0 to 60 V AC/DC at 1.5A peak, 0.5A continuous. The “alarm out” connection is rated for 60 VDC insulation. The contact is closed under alarm conditions determined by the programming of the device. When used with an externally powered device, this can trigger a visual or audible local alarm (such as a light pole).



WARNING

The monitor Alarm Output function **SHOULD NOT** be used to detect hazardous conditions or to provide an alarm for protecting human life, health, or safety.

CAUTION

The alarm switch **MUST NOT** be wired to AC power! Failure to properly install the user alarm could damage the instrument and/or void the instrument warranty! Please read and follow all instructions before wiring or operating the user alarm.

WARNING

When connected to the alarm out connector, you must use safety certified equipment and/or power sources.

Filter Scanner

This connector is used with the optional TSI® Electronic Filter Scanner (TSI® P/N 700103). Plugging in the connector from the Electronic Filter Scanner allows you to start and stop a sample from the probe head. In addition, the alarm for exceeding a given level can be heard at the probe as well as from the instrument.

Probe

This connector is used with a variety of TSI® velocity/temperature/ humidity probes such as those listed below. The probe is plugged into this port with the power off. When a probe is connected to the instrument, additional velocity, temperature, and relative humidity information is displayed on the top, center of the main screen as well as stored in each data file. Data for these parameters is averaged over the sample time for each sample.

Velocity/Temperature/Relative Humidity Probe	964 (Straight) 966 (Articulated)
Velocity/Temperature Probe	960 (Straight) 962 (Articulated)

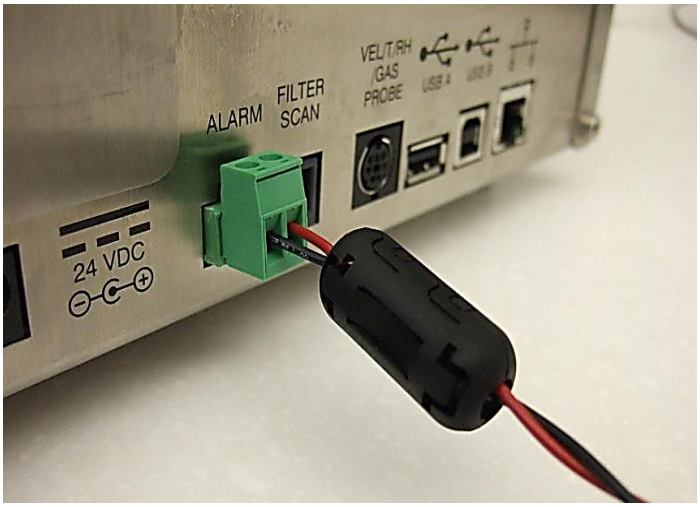
USB A

This standard USB connector is provided for use with “flash drive” devices to download data from the instrument and transfer to a computer or other device. The data files are in XML format for easy use in spreadsheet programs. You can plug in a flash drive at any time. Make sure there is enough space free on the drive to download data files. See instructions on using the flash drive in Chapter 4.

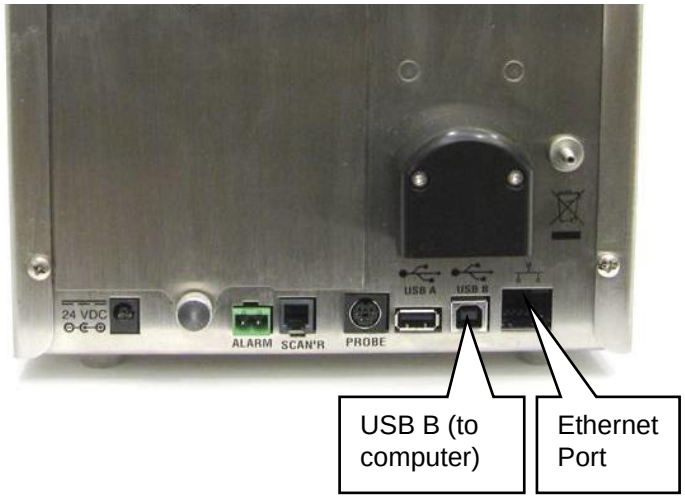
A keyboard can also be used with this standard USB connector, to facilitate data entry at the portable, if desired, as an alternative to the touch screen keyboard.

Alarm

This connector is used to communicate the alarm status of the instrument. When the instrument is in flow or laser alarm, the dry relay will close. The mating connector and ferrite is provided. The user must supply the wiring. Install the clamp-on ferrite so that it is within 1 inch of the connector as shown.



Using Communications Ports



USB B

The standard USB B connector is used to connect the instrument to a computer running TSI® TrakPro™ Lite Secure software for data downloading and analysis. It is used with a standard USB cable and TrakPro™ Lite Secure Software (both included).

Ethernet Port

The particle counter is compatible with either 10 or 100 MBps systems. The green LED indicates that the network is connected. The yellow LED indicates activity on the network cable. The instrument cannot be operated using power-over-Ethernet (POE).

The Ethernet LAN connector is a standard 10/100 Mbps 8-Position 8-Contact (8P8C, often called RJ45) modular plug connection.

Using an Isokinetic Probe

The isokinetic probe smoothly accelerates air into the inlet of the instrument. The barbed isokinetic probe can be used with tubing and an adjustable tripod mount *(not included)* to monitor particles in hard to reach places or that are flowing horizontally.

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CHAPTER 3

Operation

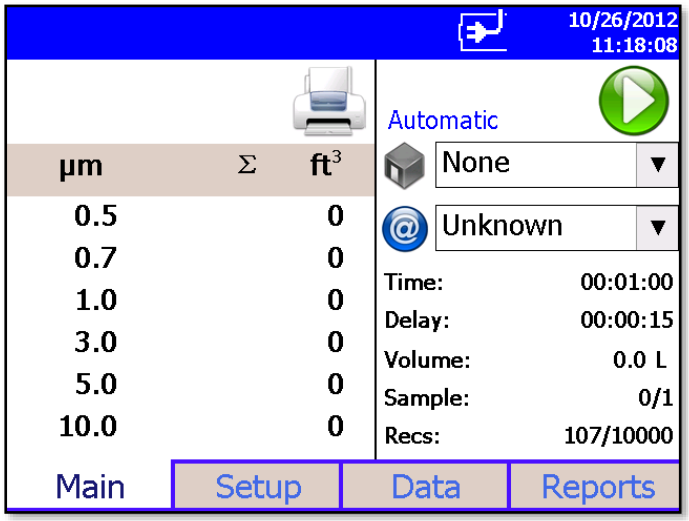
The AeroTrak® Portable Airborne Particle Counter is controlled using a touch screen display.

NOTICE
Use the plastic stylus or your finger tip. **DO NOT** use sharp objects (such as a pen point) that may damage the screen overlay.

To turn on the instrument, press the power switch . After a splash screen displays the TSI® logo, a brief start-up sequence begins as the Windows® CE operating system boots up.

The instrument is ready for operation when the **Main** tab (shown below) appears. If an optional temperature/humidity probe is attached, those values will be shown in the upper-left white area also.

The printer icon will come on when sampling is started.



Screen Layout and Functionality

There are four main screens (tabs):

- Main tab
- Setup tab
- Data tab
- Reports tab

The operation of each of these screens, the information displayed on them, and the operations you can perform from each are described in the remainder of this chapter.

Some screens require or allow you to enter information. To enter information, tap on the screen and an on-screen keyboard appears.

Software Input Panel (Keyboard or Keypad)

1. Throughout the setup screens, a keyboard or keypad appears on the screen when text or numbers may be entered.
2. When you enter information using the keyboard, press either the ↵ (**Enter**) or **Esc** keys when you are done. When you enter data using the keypad, the data is entered when you press **OK** on the screen. The keyboard will then be hidden until another text entry box is selected.

3. When numeric input is needed, a numeric keypad will appear on the screen.

Main Tab

The **Main** tab is the default screen. The left side of the screen summarizes the concentrations for the currently selected location. Tap on the size and count portion of the screen to enable Zoomed Data Screen (see Setup Tab).

The display shows:

- Temperature*
- Relative humidity*
- Air Velocity*
- Bin sizes
- Particle count/concentration

The status bar at the top of the screen shows the current time and date settings (see the Setup Tab) and indicates:

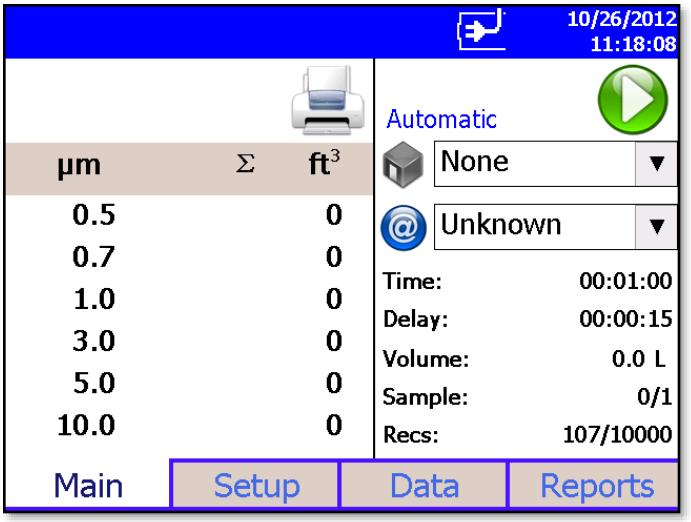
Icon	Description
	Instrument status error. If this icon is shown, it can be pressed and a more detailed description of the operational error will be shown. Refer to the troubleshooting section for appropriate actions. If an instrument error occurs, an audible alarm will also sound.
	Sufficient flow through the instrument. **NOTICE** During Start Delay (Delay) and Hold Times (Hold), this is only an indicator of flow On. During Sample Time (Time), this is an indicator of flow within specified tolerances.
	Insufficient flow through the instrument. If this icon is shown, it can be pressed and a more detailed description of the flow error will be shown. Refer to the trouble shooting section for appropriate actions. If a flow error occurs, an audible alarm will also sound. **NOTICE** During Start Delay (Delay) and Hold Times (Hold), this is an indicator of flow Off. During Sample Time (Time), this is an indicator of flow not being within specified tolerances.
	Operating on AC power, no battery installed.
	Operating on AC power, battery is installed and charging. (The battery charges when the instrument is on but not actively taking a particle sample.)
	Battery charged
	Low battery and operating on battery.

*Temperature, Humidity, and Air Velocity are displayed only if the optional T/H probe is installed.

Icon	Description
	Battery is very low!
	Indicates that TrakPro™ Lite Secure software is interfacing with the AeroTrak® particle counter. The front panel GUI is inoperable when the software is operational. Once the software is exited, normal front panel operation will resume.

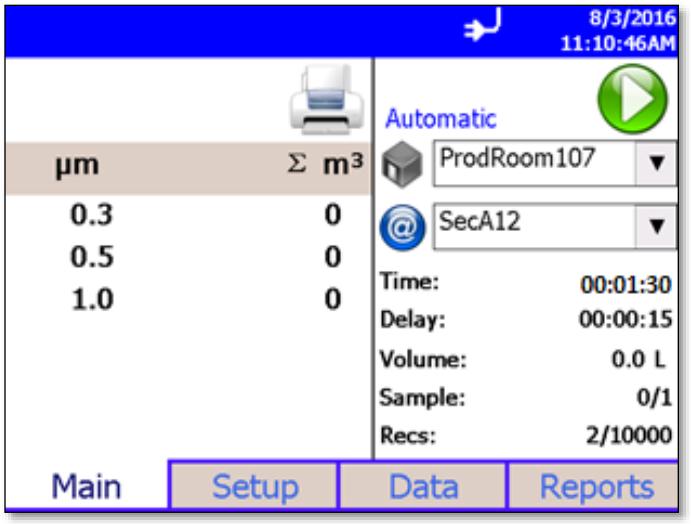
Press and hold the  (Zone) icon to display a summary of information for the current zone.

Tap the  (Location) icon to step through the list of Locations for the Zone.



Field	Description
 **(Zone)**	Displays the Zone where the sample is being taken by the instrument. Press the icon to display a summary of information for the zone.
 **(Location)**	This drop-down box allows selection of a preconfigured Location to associate the sampled data to.
Time	The time for each sample.
Delay/Hold	The Delay displays one of two times: 1. Before the **Start** button is pressed the Start **Delay** time is displayed and then immediately after the **Start** button is press the delay time begins a countdown. 2. During sampling and between cycles (after the **Start Delay** has been displayed), the **Hold Delay** is displayed and then begins a countdown.
Volume	The volume of air sampled for a given sample.
Sample	The specific sample being taken out of the total number of samples programmed to be taken.
Recs	The total number of records in the database/10000 (maximum number of records).
Manual/Automatic/Beep	Mode Indicator; refers to the "**Data Count Mode**" (see section below).
	**Start/Stop** button to begin and end sampling in the configured mode.
	Press to print the current sample to the optional printer.

1D barcode scanners that support USB 1.0 or 1.1 devices can be used (Zebra LS2208 works well) to select an existing Zone and Location pair in the list boxes on the Main page, if the barcodes use the format ZoneName:LocationName (i.e., the zone name followed by a colon followed by the location name). The barcode can then be scanned and the specified zone and location will be automatically selected in the list boxes.



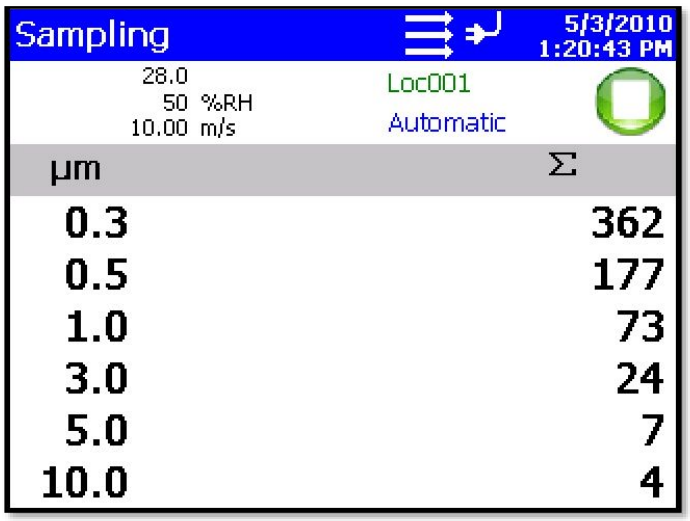
There are free online barcode generators available (i.e., http://barcode.tec-it.com/en). Select linear Code 128 to generate the barcodes.

Zoomed Data Screen

The **Zoomed Data** screen is entered by touching in the size and count part of the main tab display. The bottom portion of the screen summarizes the concentrations for the currently selected location. Tap the size and count portion of the display to switch back to the **Main** tab display.

The display shows:

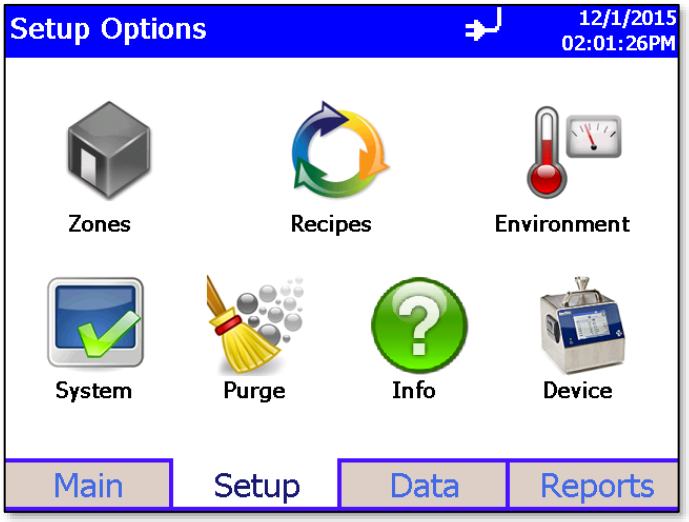
- Temperature*
- Relative humidity*
- Air Velocity*
- Bin sizes
- Particle count/concentration



Field	Description
Location	Label that displays information about the currently selected location.
Manual/Automatic/Beep	Mode Indicator; refers to the "**Data Count Mode**" (see section below).
	Press the **Start/Stop** button the begin sampling in the configured mode.

*Temperature, Humidity, and Air Velocity are displayed only if the optional T/H probe is installed.

Setup Tab



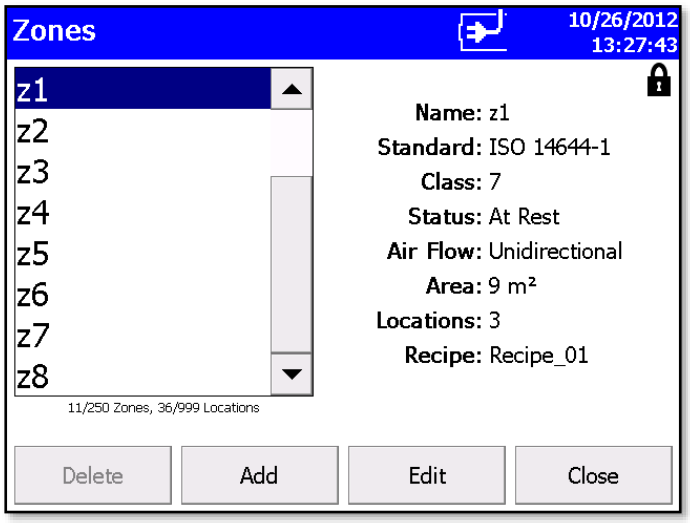
The setup tab provides access to the following:

Zones Setup	Identify and save the location information associated with collected samples.
Recipes Setup	Save a group of settings (a recipe) that you use over and over so you don't have to reset individual settings.
Environment Setup	Sets which units are preferred for displaying environmental measurements taken using optional measurement probes.
System Setup	Change Power On Password, Setup Password, System Configuration, Print Settings, Print Schedule and Clear Samples.
Purge	Purge residual particles from flow path.
Info	Display instrument information such as model number, firmware version, serial number, etc.
Device Setup	Set Date and Time, Screen Alignment, Communications, Regional Settings, and get device information.

Zone Setup Screen

“Zones” are a convenient way to group sample data for printing and export, and are required for creating standards-based classification reports. A Zone contains 1 or more “Locations;” this is modeled after cleanroom standards that prescribe the classification of a zone (or room) by taking samples at various locations within the zone.

Use the Zone Setup screen to add, delete or edit Zone configurations.



The Zone configuration screen provides the following information for each zone that is configured.

Field	Description
Name	The name you assigned to the zone.
Standard	The classification standard to use for the samples taken in the Zone. Options include ISO 14644-1, EU-GMP, Fed Std 209E F, Fed Std 209E, and None. Use “*None*” for taking measurements that are not associated with standards classification.
Class	The Class selected for the classification of the Zone. Options vary by the Standard selected.
Status	The occupancy status of the Zone. Options vary based on the selected standard, but include *At Rest*, *Operational* and *As Built.*
Air Flow	The direction of air flow through the zone: options are Unidirectional or Multidirectional.
Area	The area of the zone in ft^2 or m^2.
Largest Particle Size to Consider	The largest particle size to consider for classification measurements. Used by most standards to calculate minimum required sample volume.
Locations	The number of locations within the zone.
Recipe	The recipe assigned to the zone.

To Delete A Zone

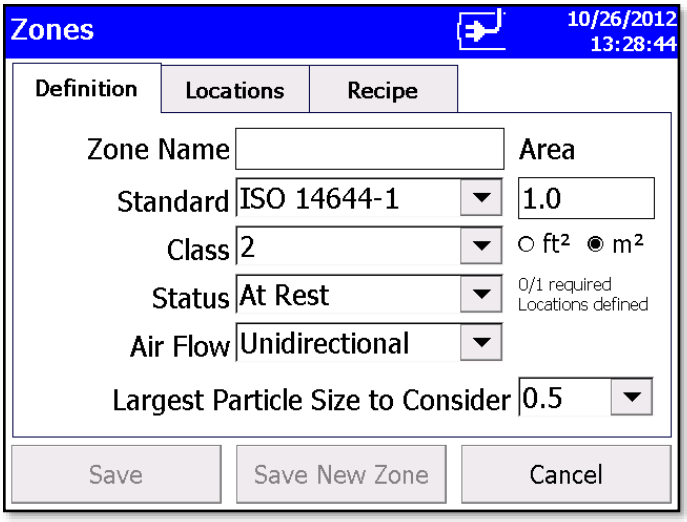
To delete a zone from the configuration screen, select (highlight) the zone name and press **Delete**. A verification message “Are you sure you want to delete this Zone?” appears. Press **Yes** to delete the zone.

A zone that has data associated with it cannot be deleted. The data associated with the zone must be deleted from the instrument before the zone can be deleted.

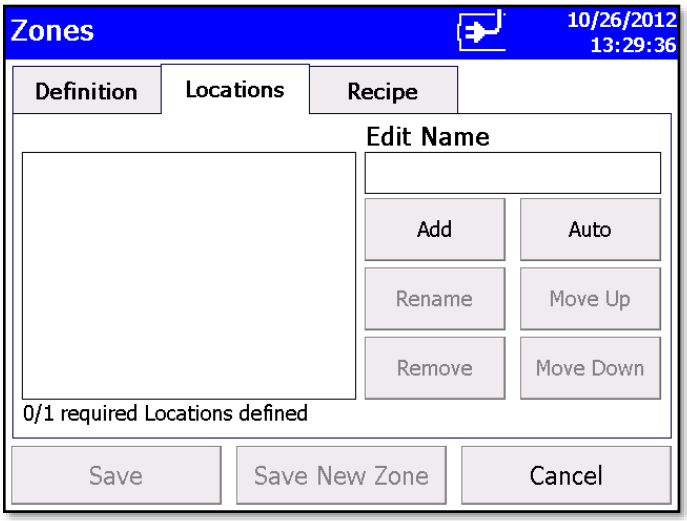
To Add a Zone

To add a zone, press **Add.** The Definition Screen is displayed.

1. Enter a name for the zone and select the **Standard**, **Class**, **Status**, **Air Flow**, and **Largest Particle Size to Consider** options from the drop-down boxes. Input the Area using the keypad and select either ft^2 or m^2 to describe the area of the zone.



2. Press the **Locations** tab. The Locations screen is displayed.



3. Enter names for each location in the zone and the press **Add** after entering each. The name will be added to the box on the left side of the screen.

4. Press the **Recipe** tab. The Recipe screen is displayed with a default recipe in the "**Selected Recipe"** field.

5. **Select the recipe you want** to use from the "Selected Recipe" field or press **Create Recipe** to create a new recipe or **Edit Recipe** to edit the recipe shown in the "**Selected Recipe**" field.

   See Recipes Setup Screen in the Setup Tab section for information about the fields and parameters of the recipe tabs.

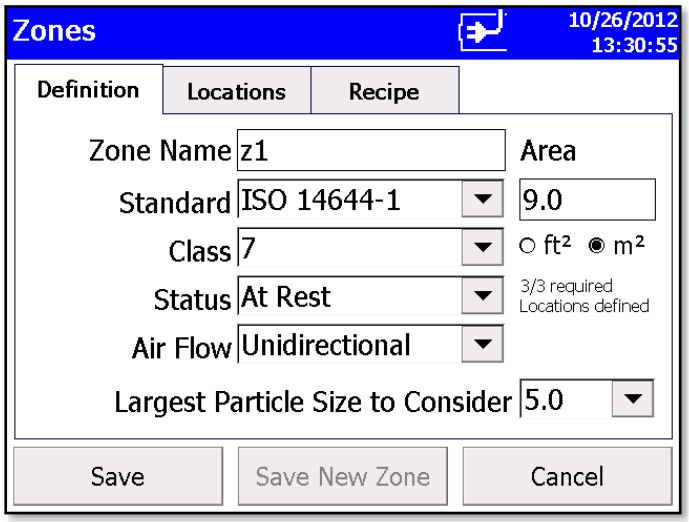
NOTICES

- You can also create recipes from the **Setup** tab by selecting the **Recipe** icon . But if you create a new recipe here, information you have already entered for the zone is prepopulated into the required fields.
- If you edit an existing recipe, your changes will affect all zones using that recipe. Be certain that is what you want to do.

6. When you are done selecting the recipe to use or adding a new recipe or editing an existing recipe, press **Save** or **Save New Zone**.

To Edit A Zone

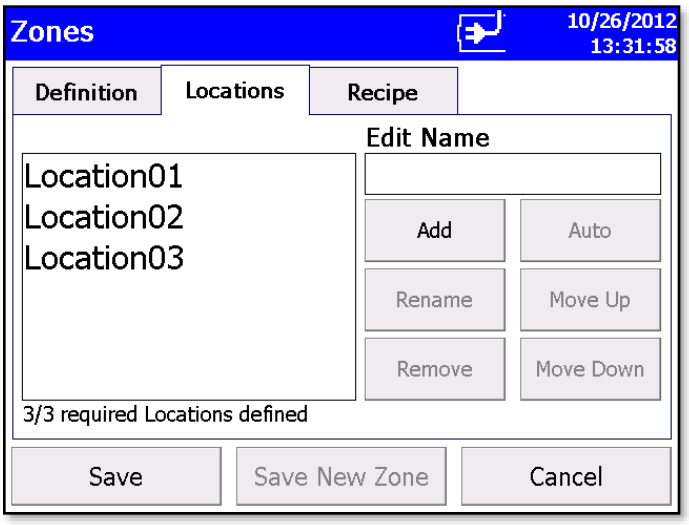
1. To edit an existing zone configuration, press **Edit**. The following screen is displayed.



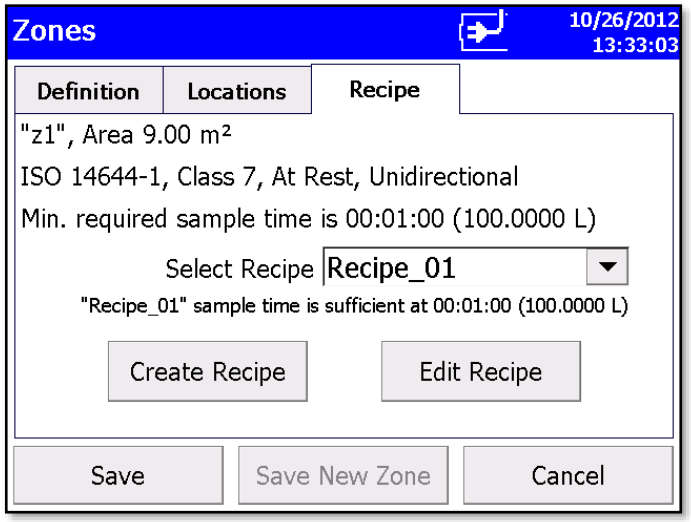
2. The display has three tabs:
   - Definition
   - Locations
   - Recipe

   Select the tab for the information you want to edit.

3. The **Definition** screen for each zone provides the same information as displayed on the main Zone Configuration screen with the addition of "**Largest Particle Size to Consider**" field.
4. The **Locations** screen displays the locations within the selected zone. You can add, rename, or remove a location from the zone. You can also move the location name up or down in the list. The Auto feature will generate the number of locations required by the chosen standard. This utilizes the room area entered in the zone definition. The locations can then be renamed or the default naming convention can be maintained.
5. You can take as many samples as possible (up to 10,000) under a specific location attached to a specific recipe and then be able to select the samples based on date to print a report or export data for a selected number of samples.



6. The **Recipe** screen displays the recipe in use for the selected zone and information relevant to that recipe. You can select a different recipe for the zone or you can create a new recipe or edit an existing recipe. (For information about recipes see the Recipes Setup Screen in Setup Tab section.)



NOTICE

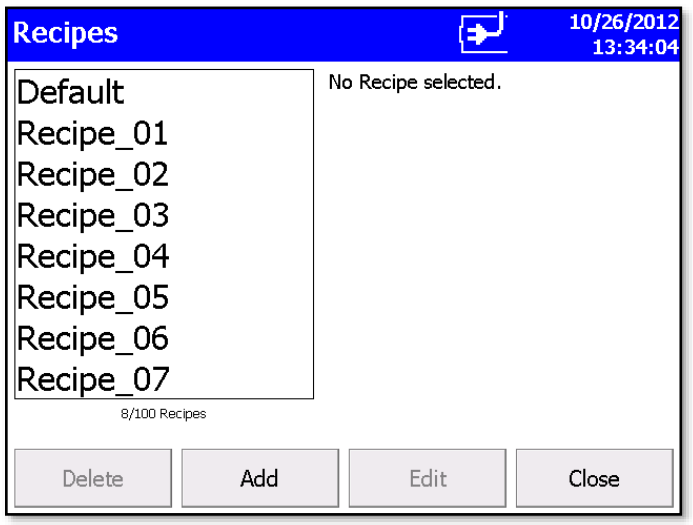
If you edit a recipe, the changes will affect all zones using that recipe. Be certain that is what you want to do.

7. When all the changes have been made, press **Save**.

Recipes Setup Screen

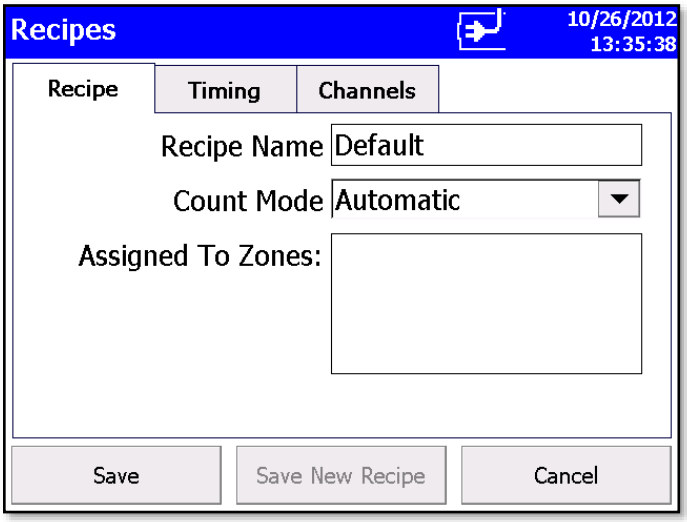
Use the **Recipes** setup screen to review recipes, add or delete recipes, and edit recipes. The "**Default**" recipe cannot be deleted. A recipe that has samples cannot be deleted.

NOTICE
The **Delete** button will be grayed out and unavailable if the recipe has samples.



The steps for adding or editing a recipe are identical. Press either the **Add** button or the **Edit** button and proceed as follows:

1. Press **Add** or **Edit** button to display the **Recipe** tab.



2. On the **Recipe** tab, enter a name or edit the name of the recipe. For a new recipe, a default name will appear, but you can type over it and name the recipe anything you want.

3. Select the **Count Mode**: options are Automatic, Manual, and Beep as described below.

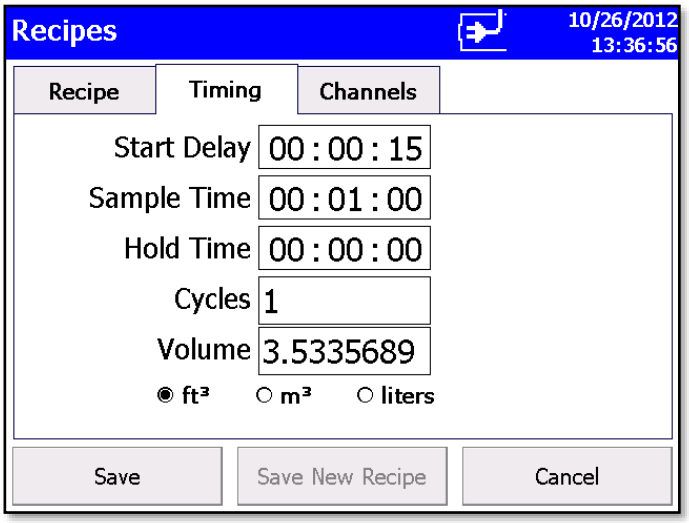
Field	Description
Automatic	If this mode is selected, the particle counter starts counting in automatic mode when the start button is pressed according to the settings on the Recipes Timing Screen.
Manual	If this mode is selected, the particle counter starts sampling immediately when the start button is pressed and stops at the end of the sample time, which is configured on the Recipes Timing Screen.
Beep	The **Beep** mode enables the AeroTrak® particle counter to operate in a "Geiger Counter" mode. As particles are detected, a beep is emitted. The frequency of beeps configured utilizing the alarm thresholds setting. It works on a single bin. If you wish to beep on total particulates, configure the unit in cumulative mode and set an alarm threshold for the .5 channel. The alarm threshold determines the beep frequency. The actual number of particulates measured in the preceding 1 second will be divided by the threshold and the corresponding number of beeps emitted. An alarm threshold of 0 will not emit beeps. To alarm on viable particulates, be sure that all total particulate alarms are disabled and configure an alarm in the viable count channels. It is configured in the same manner described above. If multiple alarms are configured, the AeroTrak® particle counter will emit beeps only on a single channel. The AeroTrak® particle counter searches for the alarm to trigger, starting with the smallest to largest channel selected. Settings in the sample timing screen are ignored in beep mode. **Example**: Looking for a viable particle source that raises above 500 count background by 10000. Configure the unit in cumulative mode and enable the .5 viable particulate alarm to 500. The AeroTrak particle counter will now emit a single beep for every 500 particles. At steady state, a beep will be emitted once per second (500/500=1). When the source is encountered it will emit 20 beeps per second (10,000/500) = 20. If a higher frequency is desired lower the threshold to 200. This will result in 50 beeps per second being emitted. The maximum number of beeps that can be emitted per second is 50.

4. Finally, enter the zones that will use this recipe.

NOTICE

Entering the names of the zones in this box does not assign this recipe to the zone; it is for information only. When you change the recipe for a zone, update the information here.

5. Press the **Timing** tab to enter or edit start delay times, sample time, hold time, etc.



6. To make changes to the timing settings, highlight the value to change (hours, minutes, seconds, etc.) and use the on-screen keypad to change the value.

WARNING

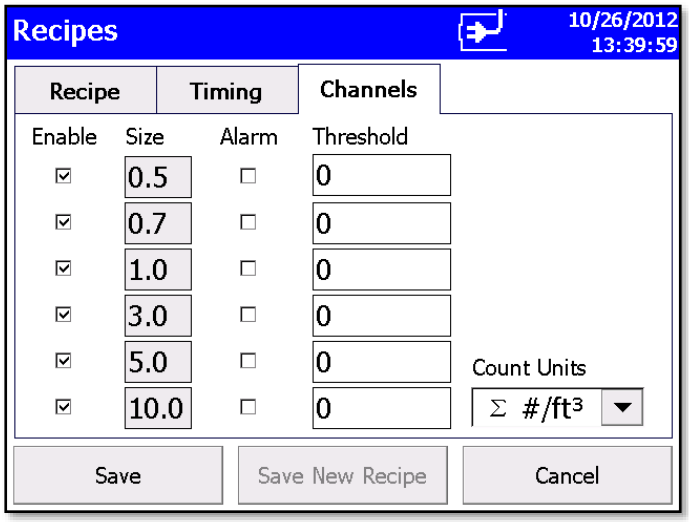
Instrument status alarms are inactive if samples times are 10 seconds or less. Flow error alarms may not occur if sample time is less than 15 seconds. To ensure proper instrument status and flow alarm operation, use a sample time of 15 seconds or larger.

NOTICE

With firmware version 2.4 and higher, you may select a date to print reports and/or export sample data. There is no need to create new zones to select data by date. There is no need to print all samples in a zone to view a specific sample or samples taken on specific dates. Samples can also be selected by date for a given recipe and zone.

Field	Description
Start Delay 	Start Delay indicates the instrument delay before starting a sample. **NOTICE** It takes approximately 10 seconds for the pump to reach the flow set point; taking a measurement before the pump is properly functioning may result in a data and flow error.
Sample Time	**Sample Time** indicates the instrument sample interval length.
Hold Time	**Hold Time** indicates the instrument delay between samples.
Cycles	**Cycles** is the total number of samples to collect. In Automatic mode, a cycle value of 0 causes the instrument to continuously count using the settings for **Delay**, **Time**, and **Hold** until the **Start/Stop** button is pressed again.
Volume	**Volume** sets a limit of air volume to collect for each sample. After you enter a volume, you must select Cubic Feet, Cubic Meters or Cubic Liters for measurement.

7. Press the **Channels** tab.



8. This tab can be used to view or set the particle size for each channel (not supported in all models), enable/disable the channel, enable/disable alarm for each channel and set the alarm threshold for each channel. The threshold values are expressed in the units selected in the **Count Units** control. Select the appropriate **Count Units** from the list.

   During sampling, when a channel value exceeds the threshold value set here, the channel data is highlighted in red on the Main screen, an audible alarm sounds, and the alarm icon.

   To acknowledge the alarm and silence the buzzer, tap the alarm icon .

NOTICES

- In **Differential modes (Δ)**, disabling one or more channels will disable all threshold alarms. Other alarms are not affected.
- While in **beep mode**, a threshold of 0 will not trigger an audible alarm even if Alarm is enabled.
- **Concentration display** is unavailable in Beep mode.

9. Press **Save** or **Save New Recipe** as appropriate when done.

NOTICE

The **Channel Configuration** screen has restrictions that must be noted when **Differential mode** (Δ) is selected.

When **differential Δ particle count or concentration** (Δ) is selected, the total number of counts is the number of particles *between* enabled bin sizes. When particle concentration is cumulative (Σ), the total number of counts includes all particles larger than the bin size.

In **Differential Display/Alarm** mode, there are two constraints:

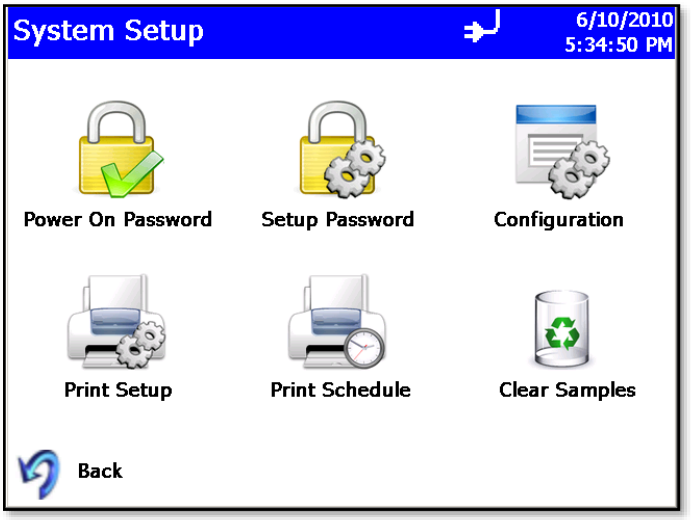
- If alarming is desired, *all* channels must be *enabled.*
- If channel selection is desired, then *all* alarms must be *disabled*.

The controls work in a mutually exclusive manner. When any of the channel "**Enable**" boxes are unchecked, all "**Alarm**" enable boxes will be cleared. When any of the "**Alarm**" boxes are checked, all of the channel "**Enable**" boxes will become checked.

For the **Cumulative** modes (Σ), there are no such constraints. Any combination of "**Enable**" and "**Alarm**" selections can be made.

System Setup Screen

Use the System Setup screen to select (or change) the power on password, set up a password, select system configuration parameters, select print settings, schedule printing and clear samples.



Change Power On Password Screen

If a **Power On** password is set, when the instrument starts, a password screen will require a password before the instrument can operate. If a **Power On** password has been previously set, that password must be entered before choosing a new **Power On** password. A blank password is considered no password, so if set as a new password, the instrument will not prompt for a password on system startup.

NOTICE
Keep the password in a safe place. It is difficult to reset the password and requires contacting the factory. If the password has been misplaced, please contact TSI technical support.

Tap the **Power On** password icon to display the on-screen keyboard and enter the required information.

Field	Description
Old Password	Enter your existing password (if one has already been set) or leave blank.
New Password	Enter a new password. The password can be any length and use any characters.
Confirm New Password	Retype the new password then press **OK**. A confirmation message appears if the password is changed.

NOTICE
Leave both **New Password** and **Confirm New Password** fields blank to turn off password protection. Contact TSI if the password is forgotten.

Change Setup Password Screen

If a Setup password is set, a password must be entered to change instruments settings. On the main screen, selecting the **Setup** tab at the bottom will display a password screen. If a Setup password has been previously set, that password must be entered before choosing a new Setup password.

NOTICE

Enabling a password for the Setup protects against a user changing instrument settings. These settings may include creating/changing zones, locations, and sample recipes.

You can still use the existing zones, locations, recipes, create reports, and transfer data. You would need the password to change any of these functions.

Tap the **Setup Password** icon to display the on-screen keyboard and enter the required information.

Field	Description
Old Password	Enter existing password (if one has already been set) or leave blank.
New Password	Enter a new password The password can be any length and use any characters.
Confirm New Password	Retype the new password then press **OK**. A confirmation message appears if the password is changed.

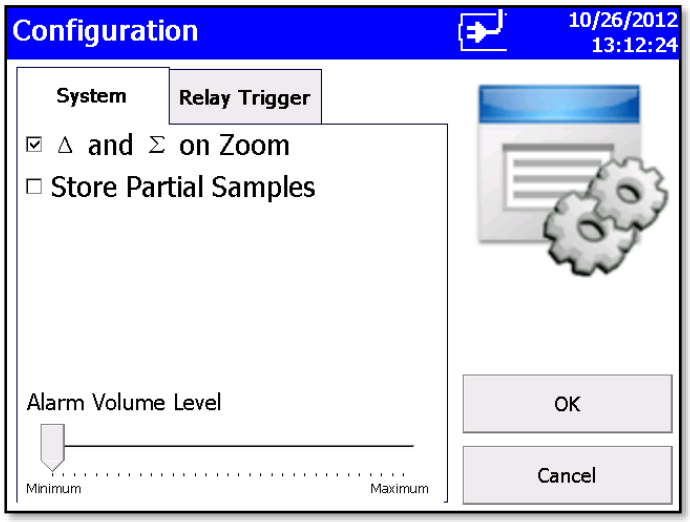
NOTICE

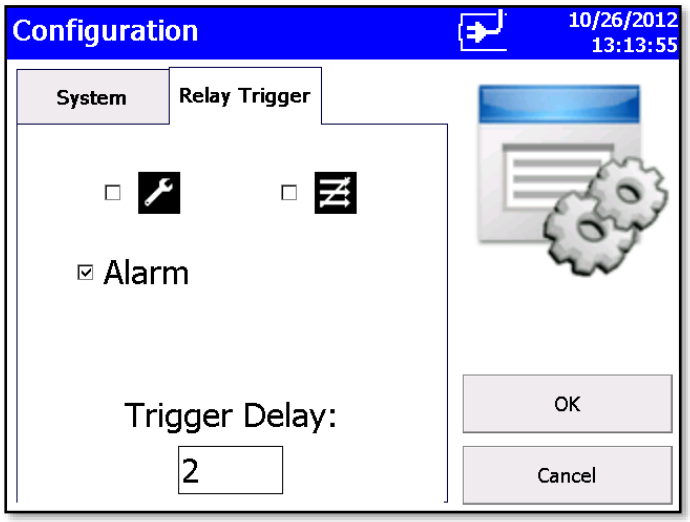
Leave both **New Password** and **Confirm New Password** fields blank to turn off password protection.

Contact TSI® if the password is forgotten.

Configuration Screen

The Configuration icon provides settings for instrument configuration. Press **OK** when finished.





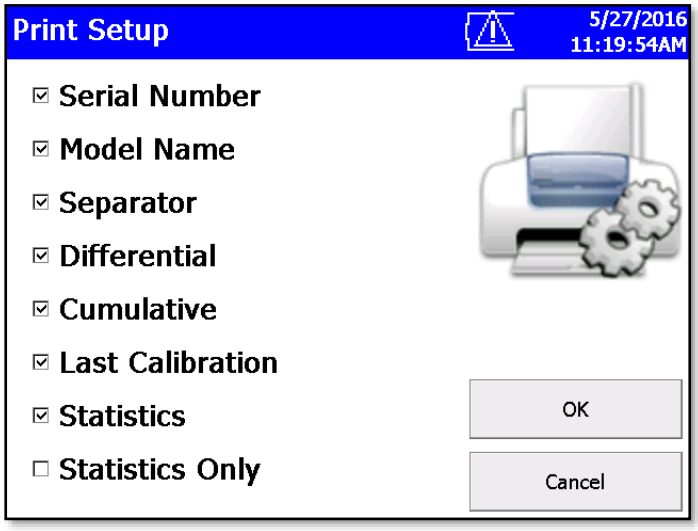
Field	Description
Δ and Σ on Zoom	When selected, tapping the left side of **Main** tab on the instrument's screen will zoom (enlarge) both cumulative (Σ) and differential (Δ) counts (allow the screen a moment to update). Tap on the screen again to return to normal view.
Store Partial Samples	When selected, if the instrument stops during a sampling period, the database will record the partial sample data.
Alarm Volume Level	Controls the alarm volume setting.

Field	Description
Relay Trigger	Check the box or boxes to select when the relay trigger will close. ☐  Relay will close on instrument status errors including laser error, algorithm corruption, or select control voltages. ☐  Relay will close on any flow error including sample flow, sheath air flow, or concentrator flow. Either of these errors signifies potentially invalid data. Relay closure can be selected to operate on any or all alarm functions.
Trigger Delay	This is the number of sample cycles that must occur before the relay is activated.

(continued on next page)

Print Setup Screen

A hard copy of a sample set or statistics can be printed from the instrument using an optional thermal printer. Use this screen to set print parameters. Press **OK** when finished. These selections will apply when printing automatically or when printing from the Data tab page.



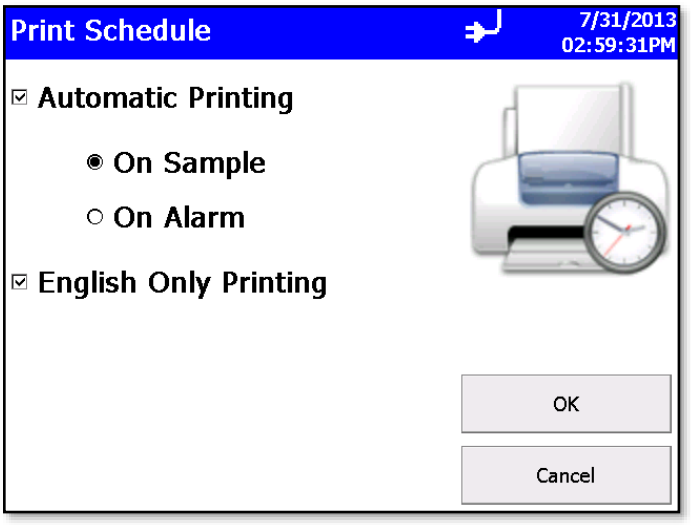
Field	Description
Serial Number	Indicates that the serial number of the particle counter used to collect the data will be printed.
Model Name	Indicates that the model number of the particle counter used to collect the data will be printed.
Separator	Indicates a line separator will be printed after the Model Name and Serial Number in the header of all printouts.
Differential	Indicates that the differential value of the data will be printed.
Cumulative	Indicates that the cumulative value of the data will be printed.
Last Calibration	The date and time the instrument was last calibrated by TSI®.
Statistics	A statistical summary is printed after the sample data.
Statistics Only	A statistical summary is printed instead of sample data.

NOTICE
Printer paper has a colored strip printed on the last few feet of each roll to indicate when it is time to change the paper roll.

Print Schedule Screen

Use the **Print Schedule** screen to schedule automatic printing. Choose to either print when a sample is compete or when an alarm occurs.

"**English Only Printing**" will print reports in English even when the selected language is not English. The default zones and locations will print in English. If zones or locations have been created with names in other languages, the names are not translated to English.



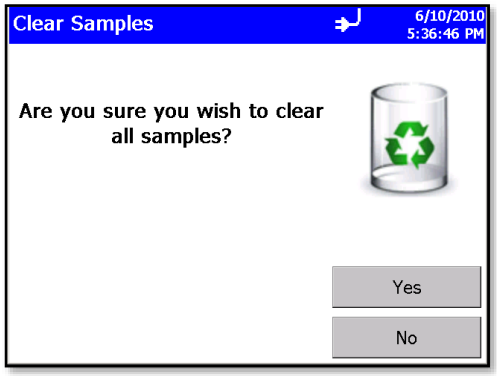
Field	Description
Automatic Printing	Enables automatic printing.
On Sample	Print data whenever a sample completes.
On Alarm	Print data when an alarm condition occurs.
English Only Printing	Always print data in English.

Clear Samples Screen

Use the Clear Samples screen to clear all samples from the internal database. Select **Yes** to clear all samples. Select **No** to return to the System Setup screen.

CAUTION

WHEN "**YES**" IS SELECTED ON THE CLEAR SAMPLES SCREEN, ALL SAMPLE RECORDS WILL BE **DELETED** FROM THE INSTRUMENT! THERE IS NO WAY TO RECOVER THEM ONCE THEY HAVE BEEN DELETED.

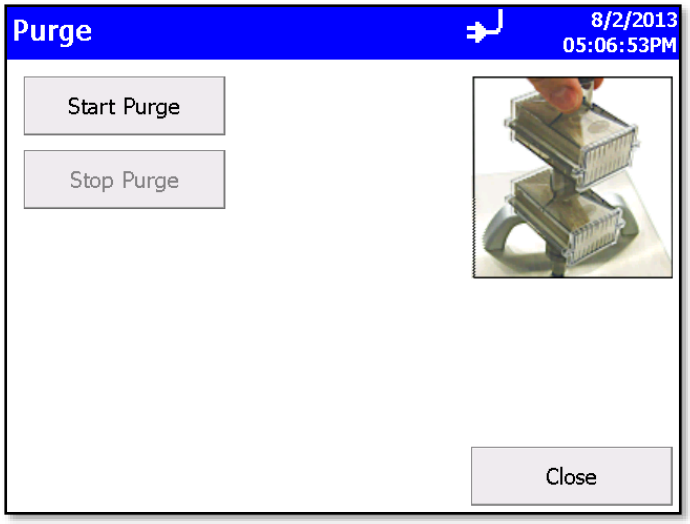


Purge Screen

Use the Purge feature to improve zero count test by removing any residual particles in the flow path. TSI® recommends this feature be used when:

1. The instrument was exposed to high concentrations.
2. The instrument was not zeroed over long periods of time.
3. After a field calibration.
4. The instrument was moved around a lot.

Attach filters to the inlet and click the **Start Purge** button. The pump will continue to run for 15 minutes and then stop. To stop the pump before the 15 minutes have completed, click the **Stop Purge** button.

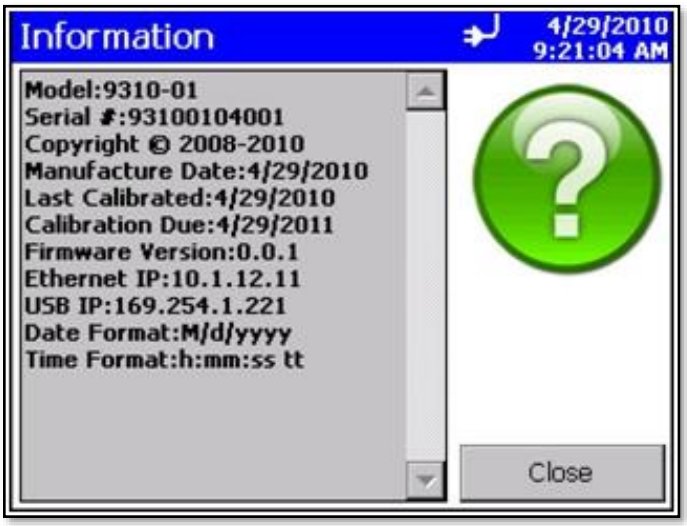


Information Screen

Use the **Information** screen to view the following on the system:

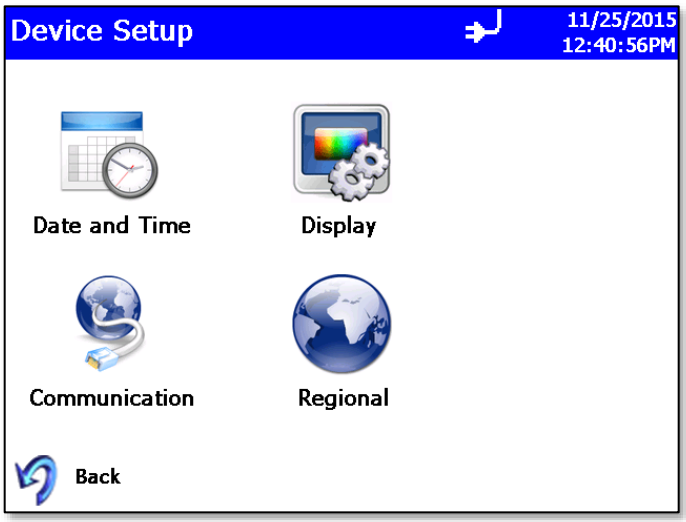
- Model Number
- Serial Number
- Copyright
- Manufacture Date
- Last Calibrated
- Calibration Due
- Firmware Version
- Ethernet IP Address
- USB IP Address
- Date Format
- Time Format

Press **Close** when finished.



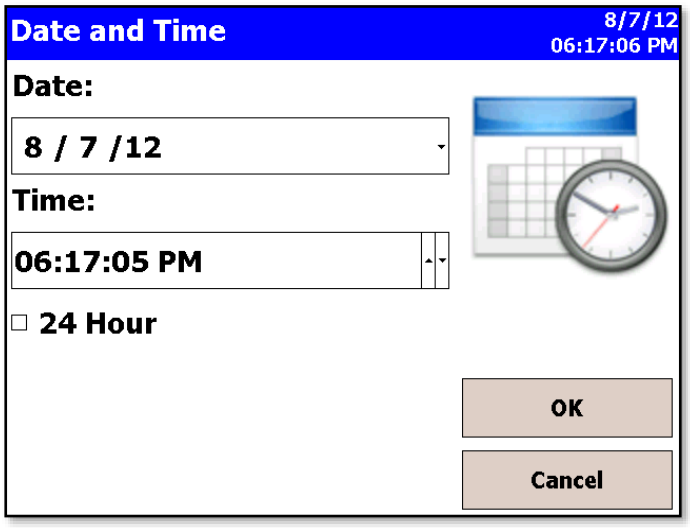
Device Setup Screen

Use the **Device Setup** screen to access screens to set or change the date and time, set visual parameters of the display, set up communications, or set regional features.



Date and Time Screen

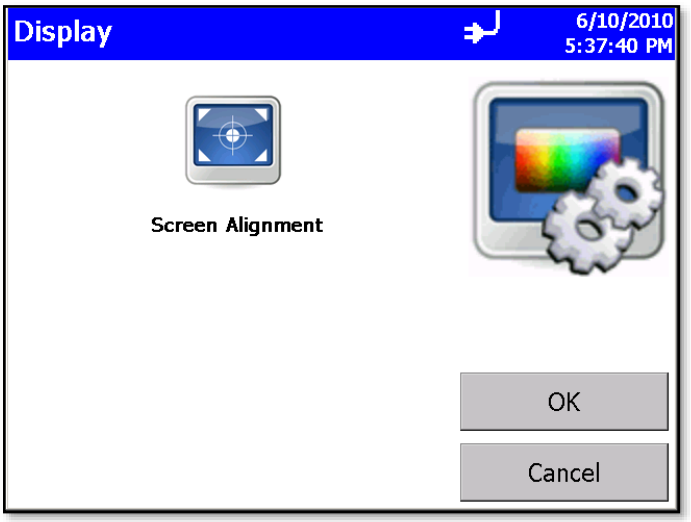
Use the **Date and Time** screen to set the current date, time, and the time format. Press **OK** when finished. Select options using the arrows or tapping on the screen which displays the keypad.



Field	Description
Date	Press the down arrow to display a calendar then select the date from the calendar.
Time	Select the time component you want to change (hours; minutes; seconds) and then use the left and right arrows to adjust to the current time.
24 Hour	Time display is in 24 hour format.

Display Screen

Use the Display screen to set or change visual parameters.



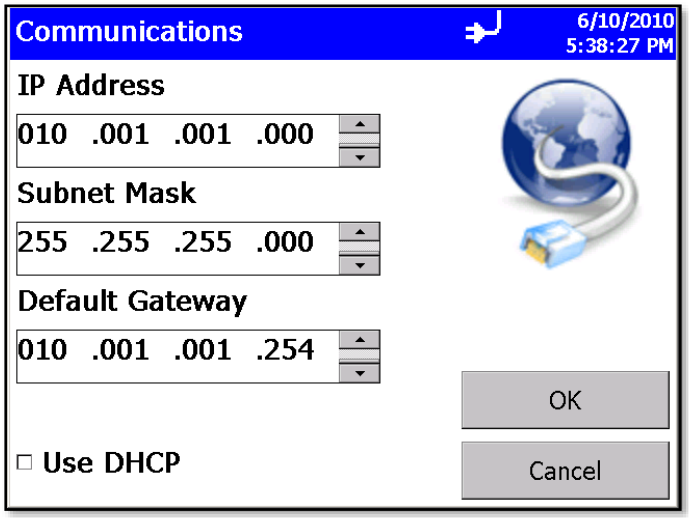
Field	Description
Screen Alignment	Press this item to reset the screen alignment. Follow the directions on the alignment screen. **NOTICE** The touch screen display is aligned at the factory and typically will stay aligned for the life of the instrument. Only perform this alignment if tapping on the onscreen controls of the instrument seems to give poor results.

Communications Screen

Use the **Communications** screen to configure the following:

- IP address
- Subnet Mask
- Default Gateway (to which the instrument belongs)

Addresses can be entered using the arrows or by selecting a field and using the on-screen keypad.



Field	Description
IP Address	The numerical identification (logical address) that is assigned to this device when participating in a computer network utilizing the Internet Protocol for communication between its nodes.
Subnet Mask	A network of computers and devices that have a common, designated IP address routing prefix. All hosts within a subnet can be reached in one "hop" (time to live = 1), implying that all hosts in a subnet are connected to the same link.
Default Gateway	A node on the computer network that serves as an access point to another network and is chosen when the IP address does not belong to any other entities in the Routing Table.
Use DHCP (Dynamic Host Configuration Protocol)	When checked, this protocol is used to automatically obtain the information necessary for operation from a DHCP server running on your local network.

NOTICE
TCP/IP is an industry standard networking protocol that allows computers and devices to communicate over Ethernet and other media access channels. Providing full details on how to configure an IP network is beyond the scope of this manual. Please contact your company IT department or a qualified networking professional if you are not qualified to configure such a network.

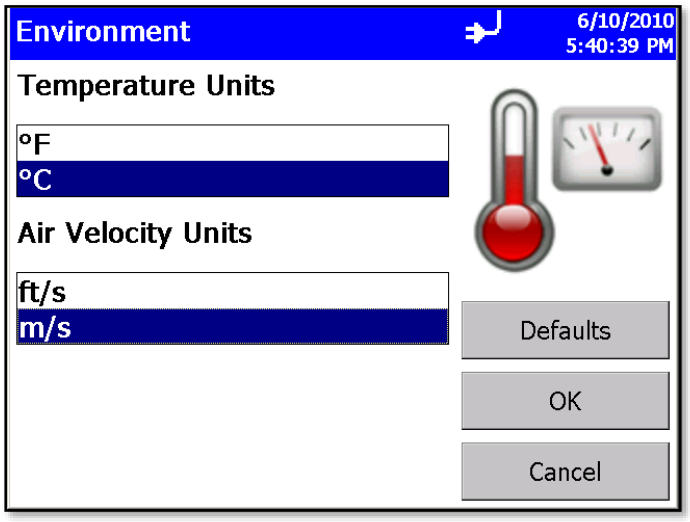
Regional Screen

Use the **Regional** screen to set the language for the display dialogs and the regional format for numbers.

Field	Description
Language	Select the language for the display; options are German, English, Spanish, French, Italian, Chinese (simplified), and Japanese.
Formats	Select the format that is commonly used to display real numbers and the date and time in your region.

Environment Screen

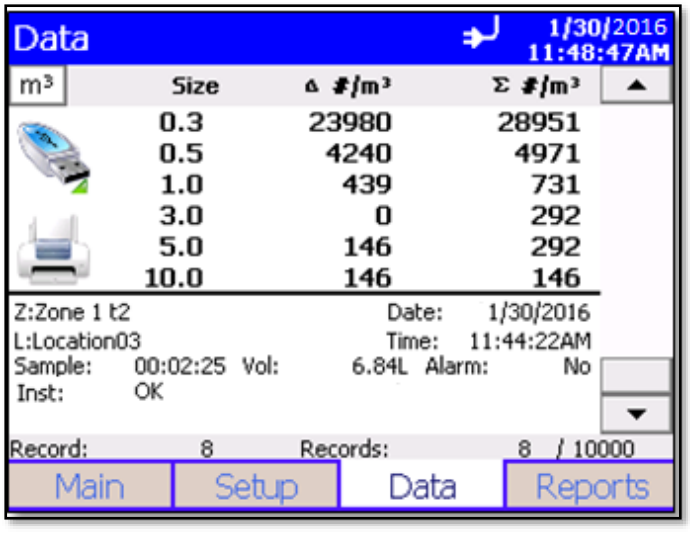
When a temperature, humidity, or air flow velocity sensor is connected to the instrument, use the **Environment** screen to set the units that will display on the Main and Data Tabs and in the printouts.



Field	Description
°F	Display temperature in degrees Fahrenheit.
°C	Display temperature in degrees Celsius.
ft/s	Display velocity in feet per second.
m/s	Display velocity in meters per second.

Data Tab

Use the **Data** tab to preview data that has been collected. To scroll though the records, use the elevator (slide) on the right. The record number is displayed at the bottom of the tab. As each record displays, its data and relevant parameters are displayed.



NOTICE
Counts displayed on the data tab concentration may have slight rounding errors when comparing all channels to values with selected channels enabled. The method for calculating concentration is to sum the raw counts for each location then calculate concentration from sample volume and then round. This may result in slight rounding errors when comparing counts with all channels enabled versus concentrations with selected channels enabled. The methodology utilized is covered in ISO 14644-1 Annex D.

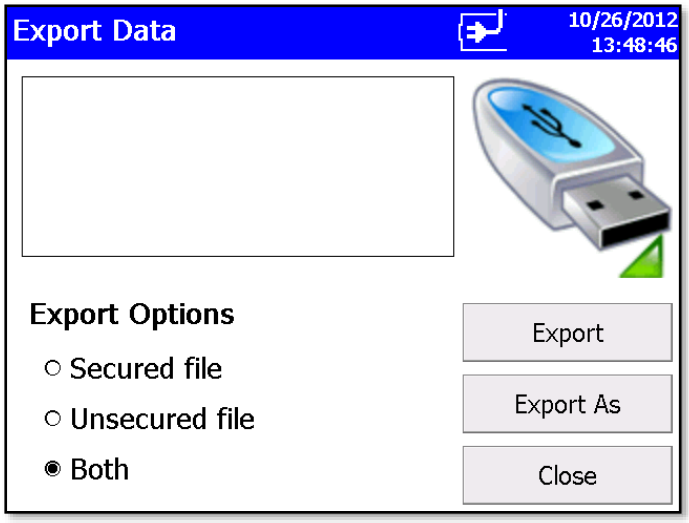
Field	Description
#, ft^3, m^3	Button used to change between counts and concentration displays: # = number ft^3 = particles per cubic foot m^3 = particles per cubic meter
Size	Channel size.
Δ	Differential concentration.
Σ	Cumulative concentration.
	Export the data to a flash drive. See Export Data Screen below.
	Print data to the optional printer. See Print Data below.
Zone (Z)	Zone where the data was collected.
Location (L)	Location where the data was collected.
Sample	Duration of the sampling period.
Date	Date on which the data was collected.
Time	Time at which data was collected.
Temp	Temperature at the end of the time the data was collected (if probe connected during sampling).
RH	Humidity level at the end of the time the data was collected (if probe connected during sampling).
Alarm	Alarm threshold was triggered (**Yes**) or not (**No**).
Inst	Status of the instrument hardware. **OK** if no issues or an error abbreviation if instrument has a possible issue.
Vol	Volume of air that was sampled.
Vel	Velocity of the ambient air at the sampling location as measured by a connected TSI Velocity probe (*optional*).
Record	This record number.
Records	Total number of records.

Export Data Screen

Use the **Export Data** screen to export sample data to a USB flash drive. Select the name of the file and range of data to export. Data is downloaded into an XML file that can be opened with commonly used spreadsheet programs.

To Export Data

1. Click the USB drive icon on the Data tab. The **Export Data** screen appears.

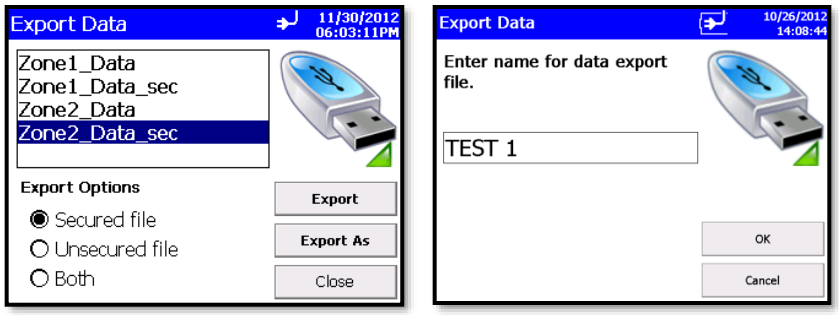


Field	Description
Secured file	This file is intended to be used with TrakPro™ Lite Secure software and maintains CFR 21 Part 11 compliance. The file has the extension ***file name*_sec.xml**.
Unsecured file	This file is intended for user input into Excel® for graphing and data manipulation purposes and has the extension ***file name*.xml**.
Both	If using both file types, both file formats can be exported. Please note that the data export time is longer when both file formats are exported.

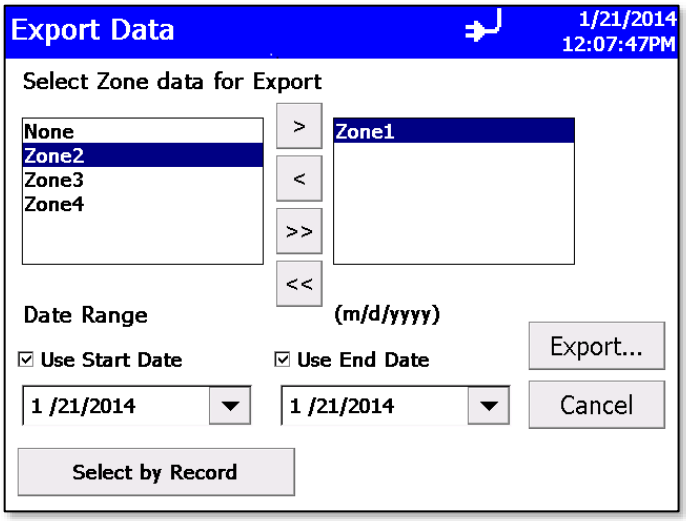
CAUTION

DO NOT modify the secure file. If the "_SEC" secure file is modified, TrakPro™ Lite Secure software will not be able to open the file.

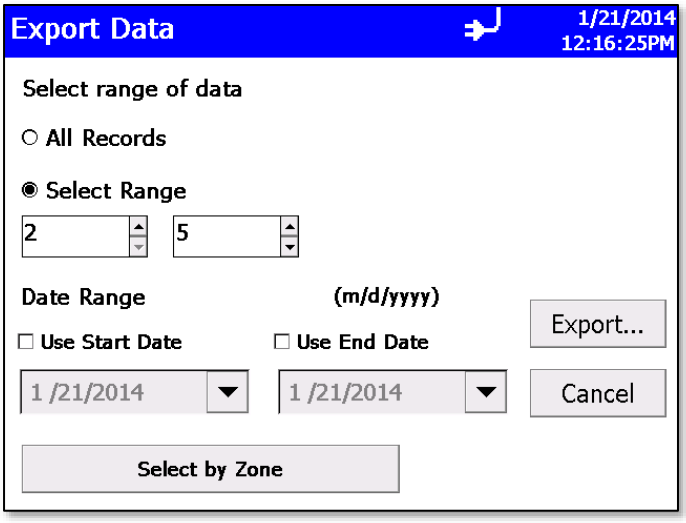
2. Select a file from the list and click:
   a. "**Export**" to overwrite an existing file.
   b. "**Export As**…" to enter a file name. Then select **OK**.



3. Select **Sample data** by **Zone** or by **Sample** index range with option of limiting samples to a date range.
   a. Check "**Use Start Date**" checkbox and select a start date to exclude data that was collected prior to that start date.
   b. Check "**Use End Date**" checkbox and select an end date to exclude data that was collected after that end date. Date is displayed as month/day/year.



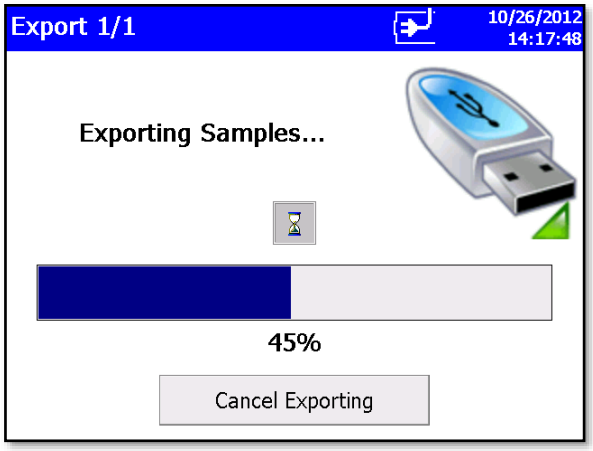
4. To select data for export by zone, move a desired zone to the box on the right to select it. To select data by sample index range instead, tap the **Select by Record** button at the bottom.



5. To select data for export by range of sample Index, tap **Select Range** radio button and then select the lower and upper sample index numbers. To select data for export by zone instead, tap the **Select by Zone** button at the bottom.

6. Once the records or the zone have been selected, press **Export…** to begin exporting. Status screens allow viewing the progress of the export.

or



CAUTION

DO NOT remove the external drive during the export process. If the thumb drive is removed, re-insert and restart the download process. Data stored on the instrument is not lost during the transfer.

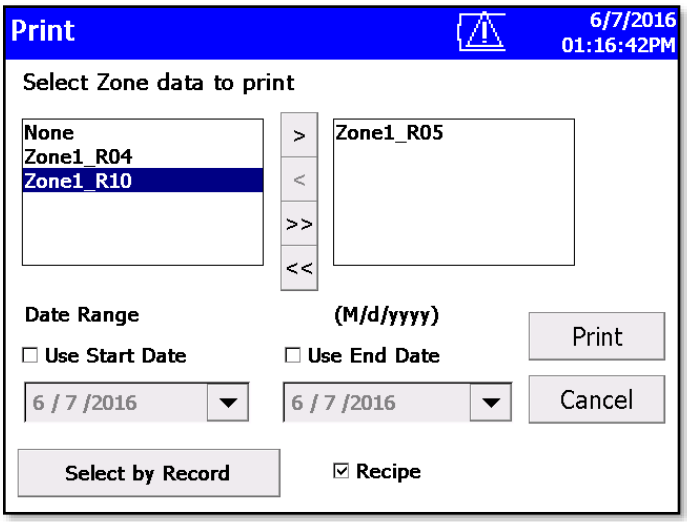
Print Data

The print button allows a range of sample data to be printed using the internal printer.

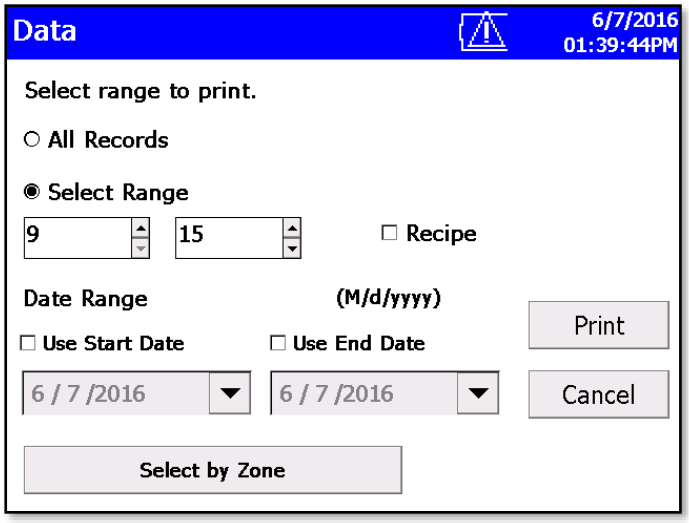
- The "**Print by Record**" form or the "**Print by Zone**" form can be used. Both forms provide the option to limit data selection to a date range.
- Check the "**Use Start Date**" checkbox and select a start date to exclude samples collected before that date.
- Check the "**Use End Date**" checkbox and select an end date to exclude samples collected after that date.
- Check the "**Recipe**" checkbox to include recipe details for each recipe used in the report.

To Print Data

1. Click the **Printer** icon on the Data tab. The "**Print by Zone**" screen appears.

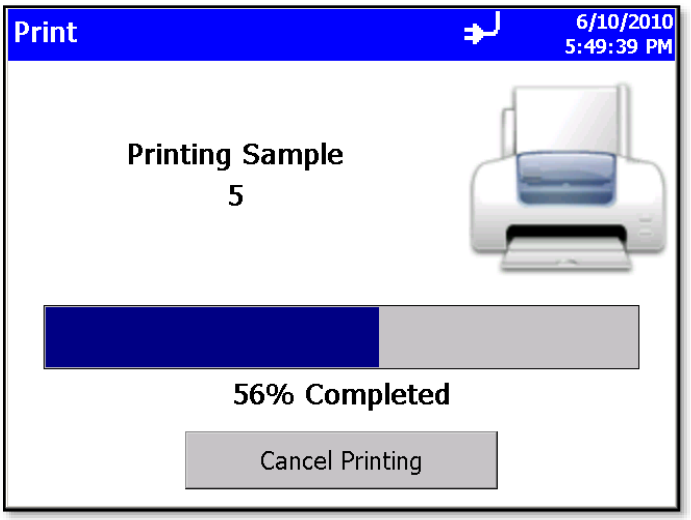


2. Move a zone to the box on the right to select it for printing.
3. Alternatively, print samples within a date range by checking **Use Start Date** and/or **Use End Date** checkboxes and selecting the dates.
4. Tap the **Select by Record** button at the bottom to select data by range or sample index.



5. The "**Select by Record**" screen above allows you to select data by range of sample index number.
   a. Tap the **Select Range** radio button and select the lower and upper sample index numbers.
   b. To select data by zone instead, tap the **Select by Zone** button at the bottom.
6. To filter the data by start and/or end date, check the appropriate checkboxes and select the date.
7. Check "**Recipe**" to include the details of each recipe used by samples that are included in the report.
8. Once you have identified the records or zone to print, press the **Print** button.

9. The print data screen shows progress on the current selected range of sample data. Press the **Cancel Printing** button to cancel the rest of the print job.



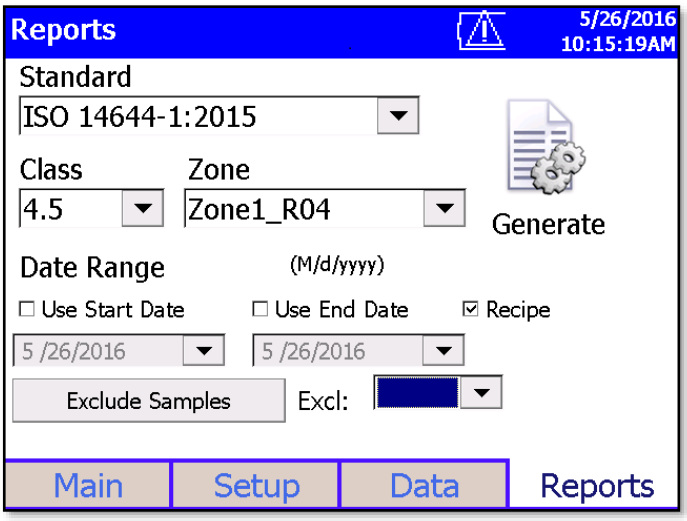
Printouts that include sample data will identify the samples as "**Sample X of Y**" where X is the current sample in the set (not the sample ID for the sample) and Y is the total number of samples in a set being printed (not the total number of samples on the instrument).

Reports Tab

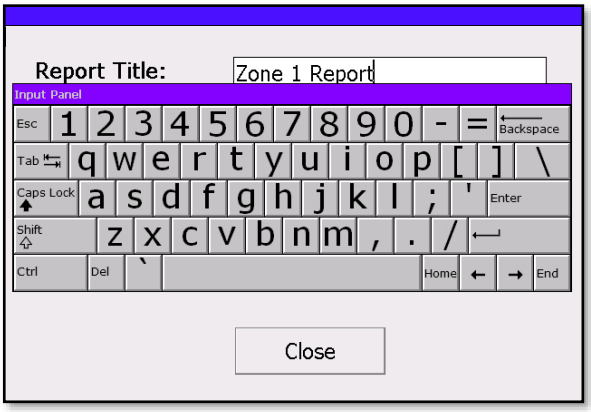
Use the **Reports** tab screen to select various standard reports for viewing and printing.

1. Select a zone to be included in the report. You have the option to restrict data to a date range.
   a. Check the **Use Start Date** checkbox and enter a start date to exclude data collected before that date.
   b. Check the **Use End Date** checkbox and select an end date to exclude data collected after that date.

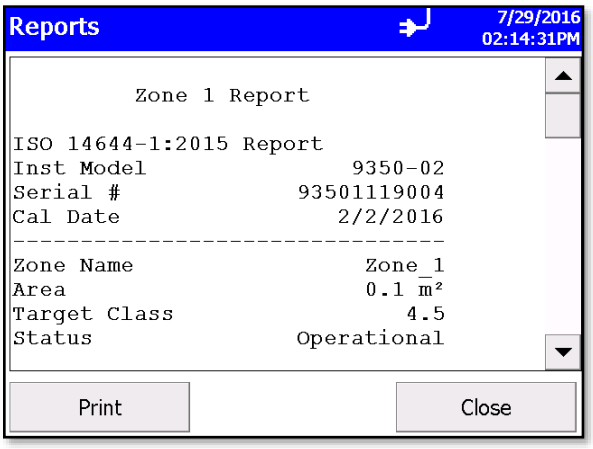
2. Check the “**Recipe**” checkbox to include recipe details on the report.



3. When you press the **Generate** button, you are given the option to enter a title for the report.
4. Enter a title or leave the textbox blank.
5. Press the **Enter** key on the visual keyboard or press the **Close** button to close the form and generate the report.



6. Report will show the title you provided.

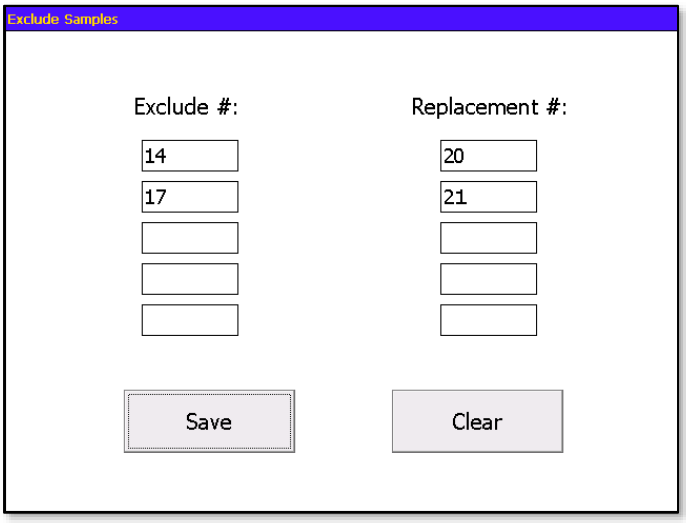


Field	Description
Zone	Select the zone from the drop-down list.
Standard	Select the standard from the drop-down list.
Class	Select the class from the drop-down list.
Use Start Date	Exclude samples collected before a specified date.
Use End Date	Exclude samples collected after a specified date.
Recipe	Check to include the recipe details on the report.
Exclude Samples button.	Tap **Exclude Samples** button to display form that allows you to enter IDs of samples to exclude and IDs of replacement samples (if required by standard). When you close the Exclude Samples form, the excluded samples will be listed in the listbox on the Reports page.
Generate	Press to begin generating a report that you can view on-screen or print.

Exclude Samples Form

The “**Exclude Samples**” form shown below is displayed when you click the **Exclude Samples** button.

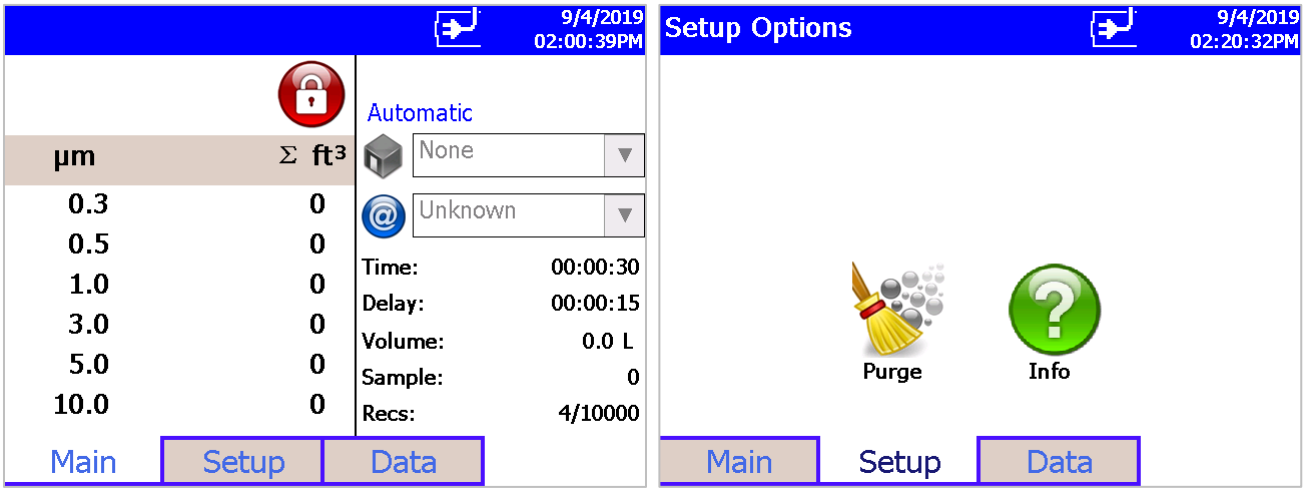
1. Enter the ID of a sample to exclude in the left column and enter the ID of a sample to replace it (if required by the selected standard) in the right column. The software allows you to enter up to five excluded and five replacement samples for ISO 14644-1:2015. If the standard (e.g., ISO 14644-1:1999) allows only one excluded sample and no replacements, only the first edit box in the left column will be enabled and the replacement boxes will all be disabled.
2. Press the **Save** button to save the selections for the report.
3. Press the **Clear** button to clear the text boxes (i.e., cancel use of excluded samples and replacements).



Data Integrity Mode

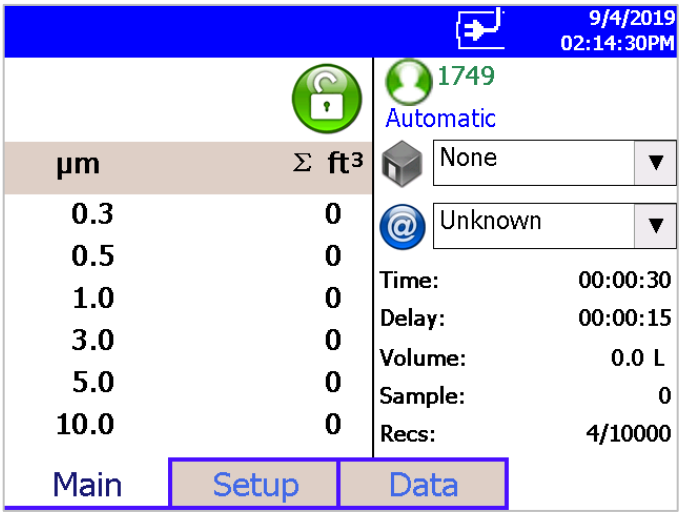
Data Integrity Mode allows the unit to be locked down to ensure the sampling data cannot be modified. When in this mode, all printing and data exporting is prohibited.

Data Integrity Mode is designed to be used in conjunction with TrakPro™ Lite Secure software. When enabling data integrity mode on the instrument, only the data can be viewed or purge the instrument.



The lock icon on the main page indicates the unit is in data integrity mode, but no user is logged in.

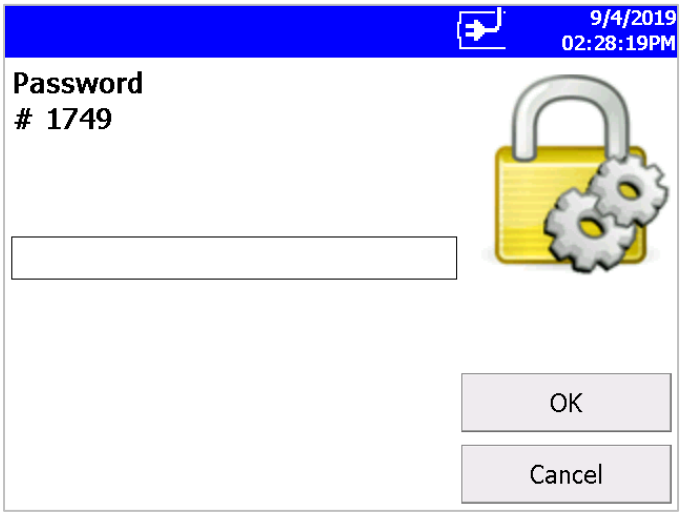
To allow sampling, the unit will need to be unlocked using TrakPro™ Lite Secure software. During this process TrakPro™ Lite Secure software will place the user ID # and password into the instrument to allow you to take samples.



The unlock icon on the main page indicates the instrument is in data integrity mode and unlocked. The user icon 1749 indicates which user has the instrument unlocked in data integrity mode.

Now that the instrument is unlocked for sampling, a zone and location can be selected. When this selection is first initiated the instrument will prompt for a password.

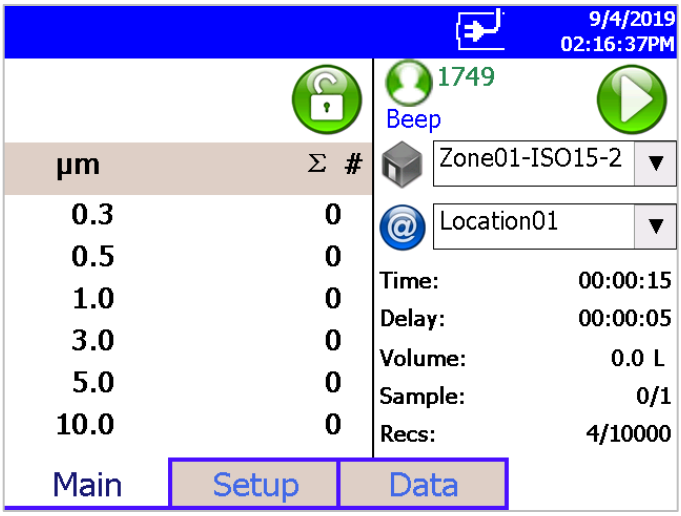
NOTICE
The password is the same password used when you logged into TrakPro™ Lite Secure software.



If an incorrect password is entered, you will not be able to start a sample.

A password needs to be entered when the unit first starts, or when the first sample is taken after disconnecting from TrakPro™ Lite Secure software; or after a timeout that was programmed from TrakPro™ Lite Secure software. The timeout is the time after a sample is complete until a new sample begins.

After a zone and location has been selected and password entered, the green start sample icon will appear and sample(s) can be taken.



After a sample is complete, the instrument defaults to no zone and no location; the start sample icon will no longer be available. A zone and location will need to be selected to enable the start sample icon.

NOTICE

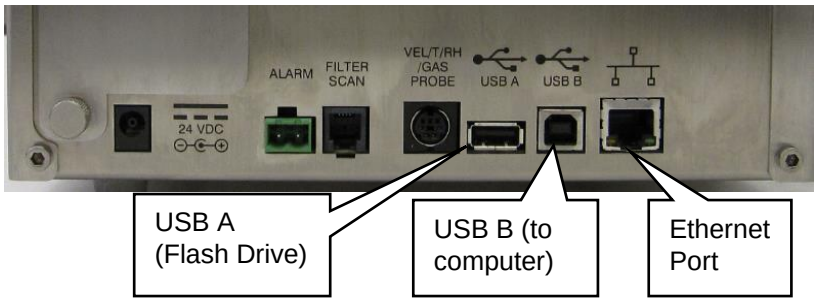
In rare events, a new sample will be started that requires the instrument to overwrite existing sample data. The screen, shown at right, will display and the instrument will not start the sample.

CHAPTER 4

Data Handling

There are three basic ways to get data from the AeroTrak® Portable Airborne Particle Counter:

1. Data download to a USB Flash Drive.
2. USB port connection to a computer using TrakPro™ Lite Secure software.
3. Ethernet connection to a TSI® FMS Server.



USB A (Flash Drive)

USB B (to computer)

Ethernet Port

USB Data Download

The AeroTrak® Portable Airborne Particle Counter is equipped with a USB A host drive that allows data downloads to a USB flash drive (commonly called a USB thumb drive). To download data, attach a flash drive to the USB A host port and follow the instructions in the operation section of this manual. The data is downloaded in XML format that can be opened in Microsoft® Excel® version 2003 or greater. The data files can also be opened in the latest versions of OpenOffice™.

USB Computer Communication

The AeroTrak® Portable Airborne Particle Counter is equipped with a USB compatible to USB B cable for connection to a personal computer. The cable plugs into the right side of the instrument. Data from the particle counter can be downloaded to a PC, through TrakPro™ Lite Secure software and recipes can be uploaded to the particle counters using the TrakPro™ Lite Secure software.

Installing Software

1. The TrakPro™ Lite Secure Data Transfer utility and user manuals are available on TSI's website: https://tsi.com/support/tsi-software-and-firmware/.
2. To install the communications software and drivers, follow the on-screen instructions.
3. See the *TrakPro™ Lite Secure (version 3.0 or later) Software User's Guide (*P/N 6004404) for installation instructions.

NOTICE
Make sure the particle counter is connected before you run the software.

Ethernet Communications

An Ethernet port is provided for use with TSI® Facility Monitoring Software (FMS). Refer to the FMS Software documentation and the TSI® service and installation manual for detailed configuration and operation information on Modbus® TCP over Ethernet.

CHAPTER 5

Maintenance

The chapter contains maintenance and troubleshooting solutions for the Model 9310/9510/9350/9550/9500 AeroTrak® Portable Airborne Particle Counters.

NOTICE
There are no user-serviceable parts inside this instrument. Opening the instrument case may void the warranty. TSI® recommends that the AeroTrak® Airborne Particle Counter be returned to the factory for any required maintenance or service not described in this manual. Cleaning can be done without removing the instrument case.

Maintenance Schedule

TSI recommends annual factory cleaning and calibration for the AeroTrak® Airborne Particle Counter. See Chapter 7, "Contacting Customer Service" for service/calibration.

Recommended Field Maintenance Schedule

Item	Frequency
Zero check	Daily or according to application
Factory cleaning and calibration	Annually.
Cleaning the instrument enclosure	As needed

Zero Check

The zero check ensures that the instrument is properly assembled and free from leaks, residual particles, and electronic noise.

Cleaning the Instrument Enclosure

To clean the enclosure, dampen a lint-free cloth and gently wipe the surface until surface contamination is removed.

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CHAPTER 6

Troubleshooting

Symptom	Possible Cause	Corrective Action
Counts are too low	Instrument is being operated outside temperature or relative humidity specifications.	Operate instrument within specifications.
	Internal parts have been damaged because instrument was stored at a temperature greater than 122°F (50°C).	Return to factory or factory authorized service centers for service.
	Instrument has contamination on the optics due to condensation or excessive loading.	Return to factory or factory authorized service centers for service.
	Laser or pump control is damaged.	Return to factory or factory authorized service centers for service.
	Unit is due for calibration.	Return to factory or factory authorized service centers for service.
Instrument does not turn on	 The on/off button is not being pressed properly.	Press and hold the on/off button for one second.
	Battery is not charged.	Recharge battery or connect to AC power.
	Power cord is not plugged into unit.	Connect power cord.
Instrument does not meet zero count specification (<1 particle/5 mins)	Instrument inlet is contaminated with particles.	Follow inlet cleaning instructions in manual.
	HEPA zero filter is not connected properly and room air is leaking into the HEPA zero filter assembly.	Check that the HEPA zero filter has been tightly connected to the inlet. Check that rubber O-ring (black) on the inlet is in place.
	Residual particles from previous samples are shedding off internal parts and into the optics.	Purge instrument by running the instrument for 15 to 30 minutes before attempting zero count test. Longer purge times may be required depending on amount of particle contamination in the instrument.
	An internal component has been damaged due to operation outside of temperature specifications or one or more excessive bumps or jolts, and electronic noise is inducing false counts.	Return to factory or factory authorized service centers for service.
	A leak has developed in the aerosol flow path.	Return to factory or factory authorized service centers for service.
	Internal optics have become dirty.	Return to factory or factory authorized service centers for service.

Symptom	Possible Cause	Corrective Action
Battery does not charge	The unit must be turned on but not in sampling mode for the battery to charge.	Turn on unit. Green LED by on/off button should be lit.
	Unit is actively taking data.	The unit will not recharge the battery while taking a measurement. Once the measurement is complete, the unit will begin recharging the battery.
	Unit not put in standby mode when turned off.	Select Standby/Charge when shutting off the instrument if you want the battery to be charged.
BATTERY ERROR 	Low battery (<10%).	Recharge battery or connect AC cord.
	Single battery in 100 L/min Model 9500, or two batteries where one has been only partially charged	The 100 L/min Model 9500 requires two batteries (within 25% charge of each other) to take a sample. If only 1 battery is installed, then the unit will not start a measurement and will display the battery warning. To correct, place a second charged battery in the instrument.
FLOW ERROR 	Instrument was unable to control flow rate [i.e., if sample tubing used is too long (greater than 12 m on 28.3 and 50 L/min instruments, 8 m on 100 L/min instrument)].	Restart measurement.
	Pressure drop across inlet may be too large.	Lower pressure drop across inlet by using larger diameter tubing, less tubing, and/or adding a bleed valve.
	Inlet tubing kinked.	Straighten tubing.
	Inlet not at ambient pressure.	**DO NOT** subject the unit to other than ambient pressure conditions.
LASER POWER / DETECTOR WARNING 	Excessive direct light is entering the aerosol inlet.	Remove instrument from direct light.
	Optical path blocked.	Return to factory for service.
	Nozzle is misaligned. Fiber attached on the nozzle tip.	Contact TSI® and return to factory.
	Detector board damaged. Laser power is normal.	Return to factory or factory authorized service centers for service.

CHAPTER 7

Contacting Customer Service

This chapter gives directions for contacting people at TSI® Incorporated for technical information and directions for returning the AeroTrak® Portable Airborne Particle Counter for service.

Technical Contacts

- If you have any difficulty setting up or operating the AeroTrak® Portable Airborne Particle Counter, or if you have technical or application questions about this system, contact an applications engineer at TSI Incorporated, 1-800-680-1220 (USA) or (651) 490-2860 or e-mail technical.services@tsi.com.
- If the AeroTrak® Portable Airborne Particle Counter, does not operate properly, or if you are returning the instrument for service, visit our website at tsi.com/service, or contact TSI® Customer Service at 1-800-680-1220 (USA) or (651) 490-2860.

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Returning for Service

Visit our website at tsi.com/service and complete the on-line "Service Request" form or call TSI® at 1-800-680-1220 (USA), (651) 490-2860, or 001 651 490-2860 (International) for specific return instructions.

Customer Service will need the following information:

- The instrument model number
- The instrument serial number
- A purchase order number (unless under warranty)
- A billing address
- A shipping address

Use the original packing material to return the instrument to TSI®. If you no longer have the original packing material, seal off any ports to prevent debris from entering the instrument and ensure that the display and the connectors on the instrument front and back panels are protected. This instrument is very fragile and must be packed in a manner appropriate for a precision instrument.

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APPENDIX A

Specifications

All specifications meet or exceed ISO 21501-4 and JIS B9921 and are subject to change without notice.

Specification	Description
Size Range	9310/9350: 0.3 to 25 µm 9510/9550/9500: 0.5 to 25 µm
Channel Sizes (additional channel sizes available)	9310-02: 0.3, 0.5, 1.0, 3.0, 5.0, 10.0 µm 9350-02: 0.3, 0.5, 1.0, 2.0, 3.0, 5.0 µm 9350-03: 0.3, 0.5, 1.0, 3.0, 5.0, 10.0 µm 9510-02: 0.5, 0.7, 1.0, 3.0, 5.0, 10.0 µm 9550-02: 0.5, 0.7, 1.0, 3.0, 5.0, 10.0 µm 9500-01: 0.5, 0.7, 1.0, 3.0, 5.0, 10.0 µm
Counting Efficiency	9310/9350: 50% @ 0.3 µm; 100% for particles >0.45 µm (per JIS and ISO 21501-4)[1] 9510/9550/9500: 50% @ 0.5 µm; 100% for particles >0.75 µm (per JIS and ISO 21501-4)[1]
Concentration Limits	9310/9510: 820,000 particle/ft^3 at 10% coincidence loss 9350/9550: 710,000 particle/ft^3 at 10% coincidence loss 9500: 425,000 particle/ft^3 at 10% coincidence loss
Light Source	Long life laser diode
Zero Count Level	<1 count/5 minutes (meets JIS B9921 and ISO 21501-4)
Flow Rate	9310/9510: 28.3 L/min (1.0 CFM) with ±5% accuracy (meets JIS and ISO 21501-4) 9350/9550: 50 L/min (1.77 CFM) with ±5% accuracy 9500: 100 L/min (3.53 CFM) with ±5% accuracy
Flow Control	Automatic
Calibration	NIST traceable
Sample Probe/Tubing	Isokinetic sampling probe
Sampling Modes	Manual, automatic, beep, cumulative/differential count, or concentration
Sampling Time	1 second to 99 hours
Sampling Frequency	1 to 9999 cycles or continuous
Sample Output	Internal HEPA filter
Vacuum Source	Internal pump with patented* flow control technology

[1]Meets all ISO 21501-4 specifications for ISO 14644-1 Class 3 and higher cleanrooms

*Patent Number 6,167,107

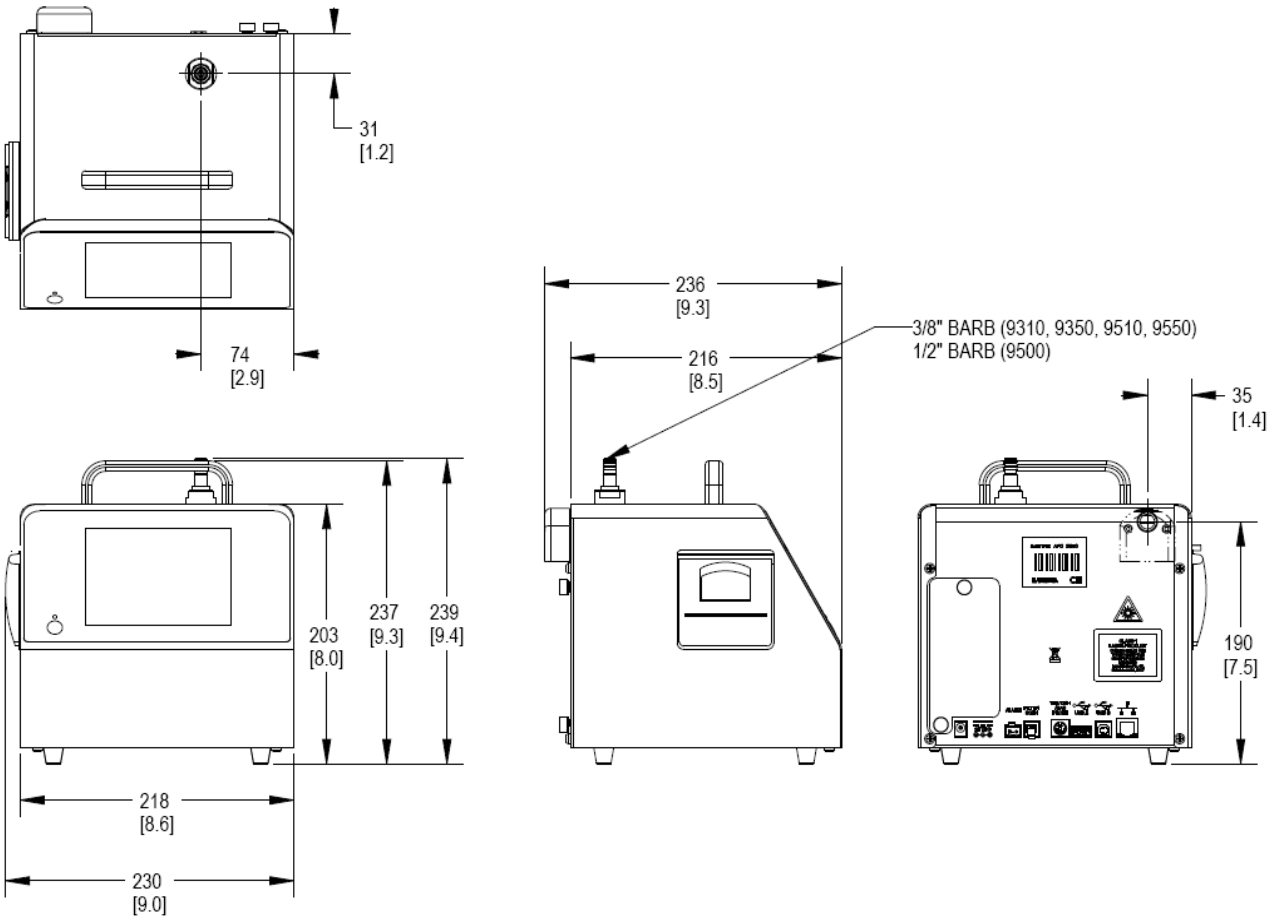
Specification	Description
Communication Mode	Modbus® TCP over Ethernet (TCP/IP) or USB output
Data Storage	10,000 sample records
Data Security	Password protected
Alarm/Status	Audible alarm sounds for counts over threshold values set in recipe and for instrument or flow errors also
Alarm	This connector provides two pins for a contact closure to control an external alarm. The contact closure is normally open and rated for 0 to 60 V AC/DC at 1.5 A peak, 0.5 A continuous. The “alarm out” is rated for 60 V insulation. The contact is closed under alarm conditions determined by the programming of the device.
Display	VGA 5.7-inch touch screen with Windows® CE
Languages	English, German, French, Spanish, Japanese, Chinese (simplified), Italian
Reports	On screen viewable and printable ISO 14644-1, FS-209E & EU GMP
Printer	Built-in thermal printer (also available without printer)
External Surface	Stainless Steel
AC Power (power to AC adapter)	110 to 240 VAC universal power supply
DC Power (power to instrument)	24 VDC @ 3.0 A
Battery	Removable/rechargeable Li-Ion (up to 2)
Battery Life	9310/9510: Up to 7 hours of continuous use 9350/9550: Up to 4 hours of continuous use 9500: Up to 2 hours of continuous use
Dimensions (L x W x H)	24.1 x 23.0 x 23.2 (9.5 x 9.0 x 9.2)
Standards	CE, JIS B 9921, ISO 21501-4 as listed above
Weight	5.8 kg (12.8 lbs.) with battery, 5.4 kg (11.8 lbs.) without battery
Warranty	2 years. Extended warranties available
Operating Conditions	2 to 35°C (36° to 95°F); 20% to 95% non-condensing relative humidity
Storage Conditions	0 to 50°C (32 to 122°F); Up to 98% non-condensing relative humidity
Included Accessories	Operating manual available on tsi.com, power cord, battery, isokinetic probe, 3 m (10 ft) tubing, purge filter, printer paper, USB cable, and TrakPro™ Lite Secure data download software
Optional Accessories	Electronic filter scanning probe, basic filter scanning probe, TSI® velocity probes, Temp/RH probe, additional battery, dual port external battery charger, isokinetic probes, sample tubing, carrying case

Compliance

CE Marking	EN61326 / EN 55011, Class BA: Radiated Emissions EN61326 / EN 55011, Class BA: Conducted Emissions EN61000-3-2: Harmonics EN61000-3-3: Voltage Fluctuations EN61000-4-2: Electrostatic Discharge Immunity EN61000-4-3: Electromagnetic Field Immunity EN61000-4-4: Burst Immunity EN61000-4-6: Conducted PS Immunity EN61000-4-5: Surge Immunity EN61000-4-8: Rated Power-Frequency Field Immunity EN61000-4-11: Voltage Dips\Short Interruptions Immunity
RoHS Marking ..	Yes
Laser Safety	Complies with 21 CFR 1040.10 and 1040.11

Dimensional Diagram

Dimensions are given in millimeters with inch equivalents in parenthesis.



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P/N 6004217 Rev. U Printed in U.S.A.