CONTAMINATION CONTROL

Remote Particle Counters

AEROTRAK™ Remote Airborne Particle Counters

Models 7201/7301/7501/7310/7510

Operation Manual

P/N 6002276, Revision C
October 2010

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AEROTRAK™ Remote Airborne Particle Counters

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Operation Manual

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Manual History

The following is a manual history of the AEROTRAK™ Remote Airborne Particle Counters, Models 7201/7301/7501/7310/7510 Operation and Service Manual (P/N 6002276).

Revision	Date
A	February 2009
B	February 2010
C	October 2010

Warranty

Part Number 6002276/ Revision C / October 2010

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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 1-800-874-2811 (USA) or +001 (651) 490-2811 (International).

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Safety

This section gives instructions to promote safe and proper handling of the AEROTRAK™ Remote Airborne Particle Counters.

IMPORTANT
There are no user-serviceable parts inside the instrument. Refer all repair and maintenance to a qualified factory-authorized technician.

Laser Safety

The TSI AEROTRAK™ Remote Airborne Particle Counters (particle counter) are Class I laser-based instruments. During normal operation, you will ***not*** be exposed to laser radiation.

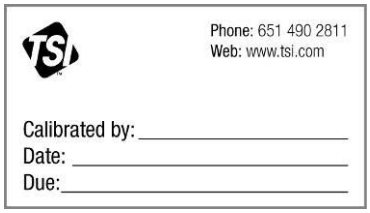
The following precautions should be taken to avoid exposure to hazardous radiation in the form of intense, focused, visible light. Exposure to this light may cause blindness.

- ***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 or covers. 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

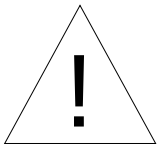
Advisory labels and identification labels are attached to the outside of the particle counter housing and to the optics housing on the inside of the instrument.

1. Serial number label (left-side panel)	
2. Calibration label (right-side panel)	
3. Laser radiation label (internal)	**DANGER!** INVISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM WARNING: NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL
4. Laser radiation symbol label (internal)	
5. European symbol for non-disposable item. Item must be recycled.	

Description of Caution/Warning Symbols

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

Caution



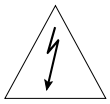
C a u t i o n
Caution means ***be careful***. Not following the procedures prescribed in this manual may result in irreparable equipment damage. Caution also indicates important information about the operation and maintenance of this instrument is included.

Warning

W A R N I N G
Warning means unsafe use of the instrument could result in serious injury or cause irrevocable damage to the instrument. Follow the procedures prescribed in this manual to use the instrument safely.

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:

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500 Cardigan Road
Shoreview, MN 55126 U.S.A.
Fax: (651) 490-3824 (USA)
Fax: 001 651 490 3824 (International)
Telephone: 1-800-874-2811 (USA) or (651) 490-2811
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Web site: www.tsi.com

CHAPTER 1

Introduction and Unpacking

The AEROTRAK™ Remote Airborne Particle Counter (particle counter) is a compact sensor that is appropriate for use in multiple locations in a large clean room or critical environment to continuously monitor a process. The sensors are very simple compared to a typical particle counter. They have no display (other than several LED indicators) and no pump (central vacuum is used along with an integral critical orifice).

Sensor data is collected by a central server running a software package (such as Facility Monitoring Software) that collects, organizes and stores data from each point for process control and documentation. The sensor and software alerts a user when a predefined condition is met or out of control.

The following table shows the remote particle counter models covered by this manual. Note that each model below is available with a flow-monitoring option designation by an "F" at the end of the model number. The 7201 and 7310 series are only available with the flow option.

Model	Size Range (µm)	Flow Rate	No. Size Channels	Size Channels (µm)
7201-01	0.2 to 10	2.8 L/min (0.1 cfm)	2	0.2/0.3 µm
7201-02	0.2 to 10	2.8 L/min (0.1 cfm)	4	0.2/0.3/0.5/1 µm
7201-03	0.2 to 10	2.8 L/min (0.1 cfm)	2	0.2/0.5 µm
7201-04	0.2 to 10	2.8 L/min (0.1 cfm)	4	0.2/0.3/0.5/2 µm
7301-01	0.3 to 25	2.8 L/min (0.1 cfm)	2	0.3/0.5 µm
7301-02	0.3 to 25	2.8 L/min (0.1 cfm)	4	0.3/0.5/1/5 µm
7310-01	0.3 to 25	28.3 L/min (1 cfm)	2	0.3/0.5 µm
7310-02	0.3 to 25	28.3 L/min (1 cfm)	4	0.3/0.5/0.7/1 µm
7310-03	0.3 to 25	28.3 L/min (1 cfm)	4	0.3/0.5/1/5 µm
7501-01	0.5 to 25	2.8 L/min (0.1 cfm)	2	0.5/5 µm
7501-02	0.5 to 25	2.8 L/min (0.1 cfm)	4	0.5/1/2/5 µm
7510-01	0.5 to 25	28.3 L/min (1 cfm)	2	0.5/5 µm
7510-02	0.5 to 25	28.3 L/min (1 cfm)	4	0.5/0.7/1/5 µm

Unpacking the AEROTRAK™ Remote Airborne Particle Counter

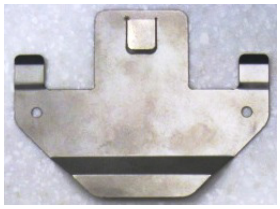
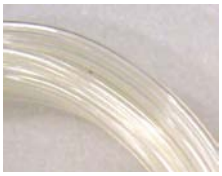
Carefully unpack the AEROTRAK™ Remote Airborne Particle Counter (particle counter) from the shipping container and check the contents of the shipment against the tables below. If any parts are missing or broken, notify TSI immediately. Keep the shipping container for returning the device for service.

Qty.	Item Description	Part/Model	Reference Picture
1	AEROTRAK™ Remote Airborne Particle Counter	7xxx	
1	Operation Manual (6002276) installed on CD	6002236	
1	Calibration Certificate	N/A	

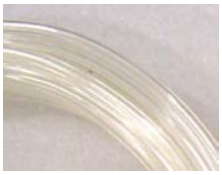
Optional Accessories

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

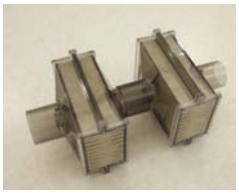
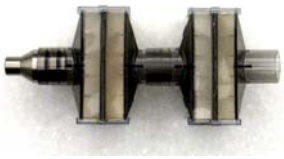
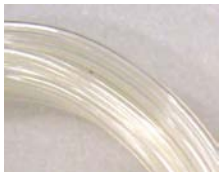
All Models

Item Description	Part/Model	Ref.
Power Supply (Power cord must be ordered separately.)	700006	
Power Cord (U.S.)	1303053	
Power Cord (U.K.)	1303230	
Power Cord (Europe)	1303075	
Mounting Bracket	700008	
Vacuum Tubing Superthane Tubing – ¼ ID ⅜ OD 100 ft Superthane Tubing – ¼ ID ⅜ OD 1000 ft	 700011 700012	
Temperature/Humidity Sensor	700013	

2.83 L/min, 0.1 cfm Models (7201-xx, 7301-xx, 7501-xx)

Item Description	Part/Model	Ref.
HEPA Zero Filter Assembly	700005	
Isokinetic Inlet (2.8 L/min, 0.1 cfm) Nickel-Plated Aluminum Stainless Steel	 700003 700004	
Isokinetic Probe – used with tubing (2.8 L/min, 0.1 cfm) Nickel-Plated Aluminum Stainless Steel	 700001 700002	
Barb Inlet Fitting (2.8 L/min, 0.1 cfm)	700000	
Sample Tubing Superthane Tubing – $\frac{1}{8}$ ID ¼ OD 100 FT Superthane Tubing – $\frac{1}{8}$ ID ¼ OD 1000 FT	 700009 700010	

28.3 L/min, 1.0 cfm Models (7310-xx, 7510-xx)

Item Description	Part/Model	Ref.
HEPA Zero Filter	700015	
Zero Filter Adapter Fitting (used with HEPA zero filter)	700067	
HEPA Zero Filter Assembly (order 700015 and 700067 separately)		
Stainless Steel Isokinetic inlet (28.3 L/min, 1.0 cfm)	700018	
Isokinetic Probe with tripod mount – used with tubing (28.3 L/min, 1.0 cfm) Nickel-Plated Aluminum Stainless Steel	 700016 700017	
Barb Inlet Fitting (28.3 L/min, 1.0 cfm)	700014	
Sample Tubing Superthane Tubing – ¼ ID $^{3}/_{8}$ OD 100 ft Superthane Tubing – ¼ ID $^{3}/_{8}$ OD 1000 ft	 700011 700012	

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CHAPTER 2

Getting Started

This chapter describes the features, connections, and installation of the AEROTRAK™ Remote Airborne Particle Counter (particle counter).

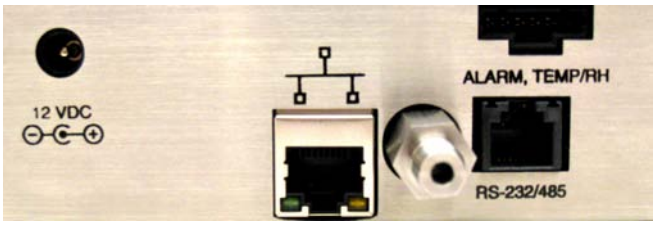
Indicator LEDs

The two LEDs on the front of the Remote Airborne Particle Counter provide indication of the particle counter's operation as described in the table below.

Indicator	Status	Function
Power/Service	Off	Device is not powered
	Green	Power is present and device is functioning normally
	Yellow	Device has a flow error (if equipped with a flow sensor)
	Red	Device has a laser or detector error requiring service
Counting	Blue	Counting is enabled
	Off	Counting is disabled

Electrical Connections

The state-of-the art AEROTRAK™ Remote Airborne Particle Counter (particle counter) supports multiple communications and connectivity options. A brief description of each of the connections is listed below.



Device Connections

- 12 VDC connector
- Ethernet connector
- Alarm, Temp/RH connector
- RS-232/485 connector

12 VDC Connector

This power connection is for use with an external supply only when Power-Over-Ethernet (POE) is not available. Only a TSI-supplied 12 VDC power supply (such as TSI model 700006) should be used.

Ethernet Connector

Although it can be connected to a 10/100 MBps network, the particle counter operates at 10 MBps. It should be connected to a network that supports Power-Over-Ethernet (POE) if available. The green LED indicates that the network is connected. The yellow LED indicates activity on the network cable.

The Ethernet LAN connector is a standard 10/100 Mbps 8-Position 8-Contact (8P8C, often called RJ45) modular plug connection that supports Power-Over-Ethernet (POE) devices. POE is typically 48 VDC.

Alarm, Temp/RH Connector

This six-pin connector provides two pins for a contact closure to control an external alarm. The contact closure is normally open and rated for 0-60V AC/DC at 1.5A peak, 0.5A continuous. The contact is closed under alarm conditions shown below. The remaining four pins connect to the TSI Temperature/Relative Humidity Sensor. The Alarm, Temp/RH is a custom connector that requires a cable available from TSI for use with accessories.

Alarm Conditions

The alarm contact closure is normally open. The contact is closed when the device has a laser or detector error requiring service or if there is a flow error.

RS-232/485 Connector

This connector supports RS-232 or RS-485 Serial communications depending on how the device is configured. It can be used with TSI-provided cables to communicate with legacy controllers that do not support Ethernet.

Tubing Connections

Vacuum Connector

The vacuum connection at the bottom of the device (next to the electrical connections) should be connected to a vacuum pump or central building vacuum supply capable of providing 15 inHg (38 cmHg) of vacuum at the rated flow rate of 0.1 or 1.0 cfm (2.8 or 28.3 L/min).

Inlet

The sampling inlet at the top of the device can be configured with a barbed inlet (default) for sampling or connection to a sample tube. The barbed fitting can also be replaced with a screw-on isokinetic sampling inlet configured based on the sample flow as shown below. See the table of optional accessories in Chapter 1 for more information.

Installation

Installation of the AEROTRAK™ Remote Airborne Particle Counter (particle counter) consists of:

- Determining the installation location
- Mounting the particle counter
- Supplying power to the particle counter
- Connecting communications from the particle counter to the computer
- Connecting the vacuum and sample tubes to the particle counter

Determine the Installation Location

Determine the installation location according to your monitoring needs. The Remote Airborne Particle Counter can be mounted in any orientation. It is generally convenient to mount the particle counter to a flat surface such as a wall, but the particle counter can also be mounted on or under a table, on the ceiling, inside a vented hood, or a location close to the point of measurement.

Mounting the Remote Airborne Particle Counter

The Remote Airborne Particle Counter can be mounted using a variety of mounting brackets and schemes.

TSI provides an optional mounting bracket (TSI P/N 700008) that allows the particle counter to be easily mounted and removed on a surface (see figures below).

Mounting Bracket (optional)

To install the mounting bracket:

1. The bracket is provided with two 0.169 inch (4.30 mm) diameter holes, suitable for a #6 or M4 screw. Screw the bracket to the mounting surface using appropriate screws.
2. Slide the particle counter onto the mounting tabs at the top of the bracket and snap it into the locking tab (circled above).

Remote Airborne Particle Counter Mounted on Optional Bracket

To remove the Remote Airborne Particle Counter from the mounting bracket:

1. Press the locking tab at the top of the bracket.
2. Lift the particle counter off the mounting tabs.

Supplying Power to the Remote Airborne Particle Counter

The AEROTRAK™ Remote Airborne Particle Counter may be powered in one of two ways. For easy installation, the particle counter is designed to work primarily with Power-Over-Ethernet (POE). In some cases however, this is not possible or practical, so the particle counter can also be powered by the optional TSI Model 700006 power supply.

WARNING

If the Remote Airborne Particle Counter is powered by a network, it should be connected only to a standard 10/100 MBps Ethernet network that supports Power-Over-Ethernet (POE) according to the IEEE 802.3af standard. Use of power supplied over a network that does not comply with this standard could seriously damage your particle counter.

Using Power-Over-Ethernet (POE)

To supply power using a POE device:

1. Make sure the Ethernet hub or router supplies power over the Ethernet cable (check with the equipment supplier or your computer services or Information Technology department). If the device is not capable of providing power, you will have to use an auxiliary AC power supply (see "Using DC Power" below).
2. Connect the Ethernet cable to the Ethernet hub.
3. Connect the other end of the Ethernet cable to the Ethernet port on the particle counter.

Remote Airborne Particle Counter Shown Powered by POE Hub

W A R N I N G
Only a TSI-supplied 12 VDC power supply (such as TSI model 700006) should be used. Using another power supply could seriously damage your particle counter.

Using DC Power

To supply DC power to the particle counter:

1. Connect the 12 VDC connector to the instrument at the power entry connector as shown in the figure below.
2. Connect the appropriate power cord to the 12 VDC supply and plug it into a suitable AC outlet. The power light on the particle counter should illuminate.

Remote Airborne Particle Counter Using DC Power

Connecting the Remote Airborne Particle Counter to a Computer

There are three options for communicating with particle counter:

- Modbus TCP over Ethernet
- Ethernet Web Browser
- Modbus RTU over RS-485 Serial

For more information, please refer to Chapter 3, Communications.

Modbus® TCP over Ethernet

Modbus® TCP over Ethernet is the preferred method of communications with the particle counter. Using the eight-pin RJ-45 socket described above, Modbus® RTU provides compact, binary representation of the data contained in a register within the instrument memory. If you used POE to provide power, you have already made the necessary communications connection to the particle counter. POE carries both power and communications through an Ethernet cable to the Remote Airborne Particle Counter. If DC power is used, simply connect the instrument to a non-POE hub, switch, or router, or disable the POE option on your manageable Ethernet switch/router.

Note: *The Remote Airborne Particle Counter operates only in "half-duplex" mode. Make sure that the switch, router, or Ethernet adapter it is connected to is also configured to communicate in half-duplex mode (typically this is the default).*

Ethernet Web Browser

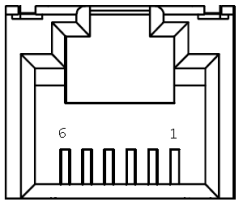
The method for using a web browser to communicate with an instrument is covered in Chapter 3, Communications.

Modbus® RTU over RS-485 Serial

The serial communications connector provides RS-485 Serial communications.

The serial connector is a standard 6-Position 6-Contact (6P6C, often called RJ12) modular plug connection that supports RS-485 devices.

Pin	Description
1	TX
2	RX
3	B
4	A
5	GND
6	Unused



Socket View

The communications settings for RS-485 are:

- 19200 Baud
- 8 data bits
- no parity
- 1 stop bit, no flow control.

For more information, please refer to Chapter 3, Communications.

Tubing Installation

Connecting Vacuum Tubing

For simplicity and reliability, the remote particle counter does not include an internal pump to move particles through the instrument. Instead, it uses a critical or sonic orifice to maintain a steady flow of air and particles.

This requires a vacuum source from a central vacuum system or an external vacuum pump capable of delivering at least 15 inches of Mercury (15 inHg) at the outlet of the counter. The vacuum should be confirmed using an external vacuum gauge.

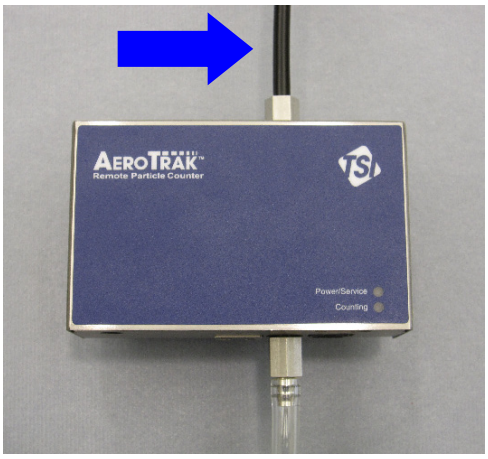
Connect the vacuum tubing to the particle counter at the vacuum inlet shown in the figure below. This requires tubing such as specified in the optional accessories table in Chapter 1 or PVC thick-walled tubing.

Connecting Vacuum Tubing to Remote Airborne Particle Counter

Connecting Sample Tubing

Sample tubing is used to carry a sample from a location close to a critical process to the particle counter a short distance away. This requires tubing such as specified in the optional accessories table in Chapter 1. Tubing length should be kept as short as possible with minimum bend radii to minimize particle loss. In addition,

care should be taken not to use tubing that may carry a very high static charge (such as Teflon® tubing). This will act like a filter and prevent particles being sampled into the device.



Connecting Sample Tubing to Remote Airborne Particle Counter

®Teflon is a registered trademark of DuPont.

CHAPTER 3

Communications

Generally the particle counter will be set up as one of many sensors in a network. In this case the operation of the network is controlled through Facility Management Software (TSI® FMS Software) running on a personal computer. FMS Software can be configured to communicate with the particle counter through either Modbus TCP over Ethernet or Modbus RTU over RS-485. Consult the FMS Software manual for more information.

***Note**: Technical documentation for integrating the TSI Airborne Particle Counter into custom applications, including details of the Modbus® implementation, is available upon request. Contact TSI Customer Service (see "Getting Help").*

Setting the IP Address of the Airborne Particle Counter

By default, each Airborne Particle Counter is shipped with an Ethernet address of 192.168.200.90. Since the IP address is fixed, before the remote Airborne Particle Counter can communicate with your computer system, you must assign an IP address to it that is compatible with your network. An example is shown below using Windows® XP operating system. Other operating systems and browsers should be similar.

***Note:** In a typical application, Airborne Particle Counters are configured using static IP addresses so that remote hosts and software can be configured to query each specific counter at known addresses. It is also possible to configure the Airborne Particle Counter using DHCP (Dynamic Host Configuration Protocol), but this should be done with care to ensure that the IP address of each device is known and always the same for each device. Further details of TCP/IP networking are beyond the scope of this document.*

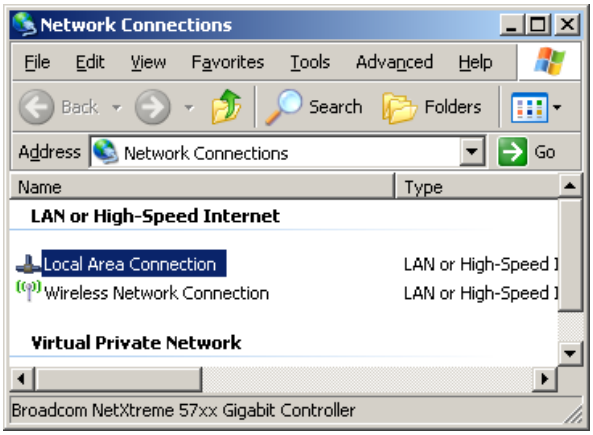
To connect to your Airborne Particle Counter with an internet browser, you will need the following:

- A Computer with a 10/100 Ethernet port.
- Ethernet crossover cable or an Ethernet hub and two standard cables.
- Airborne Particle Counter to be configured.
- A fixed IP address for your network.

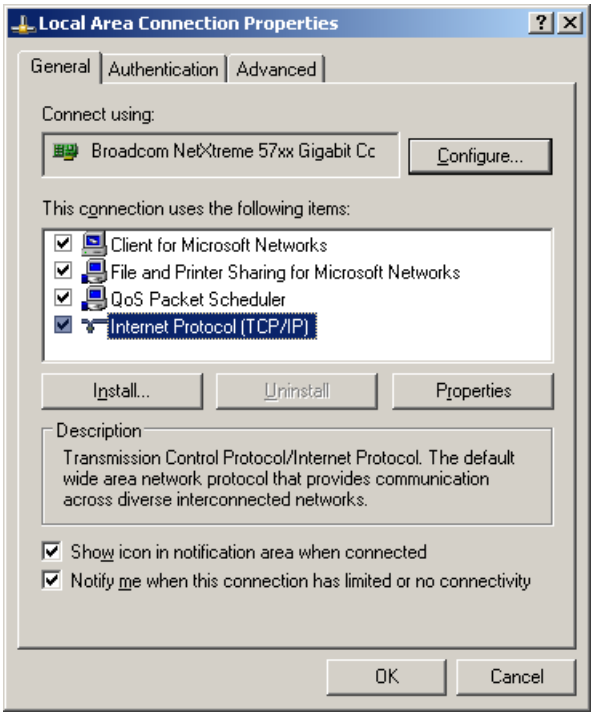
You will connect the Airborne Particle Counter to your computer on a “mini-network” consisting of just the computer, Airborne Particle Counter and an interface cable or hub. Follow the steps below to configure the IP address of your Airborne Particle Counter:

1. Physically disconnect any existing Ethernet cable from the computer to make it independent of any network. Open the Windows® control panel and click on the **Network Connections** icon.

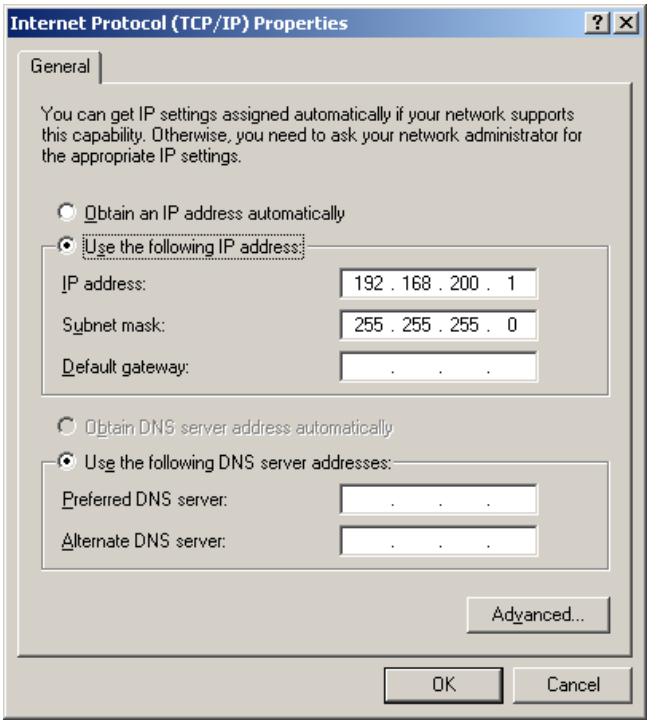
2. Click on the **Local Area Connection** icon in the list of connections.



3. Double-click on the **Internet Protocol (TCP/IP)** item.

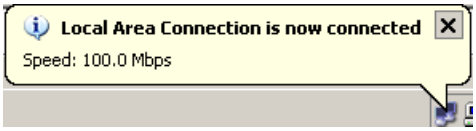


4. Set the IP Address to a fixed address as shown below and click **OK** and **OK** again.



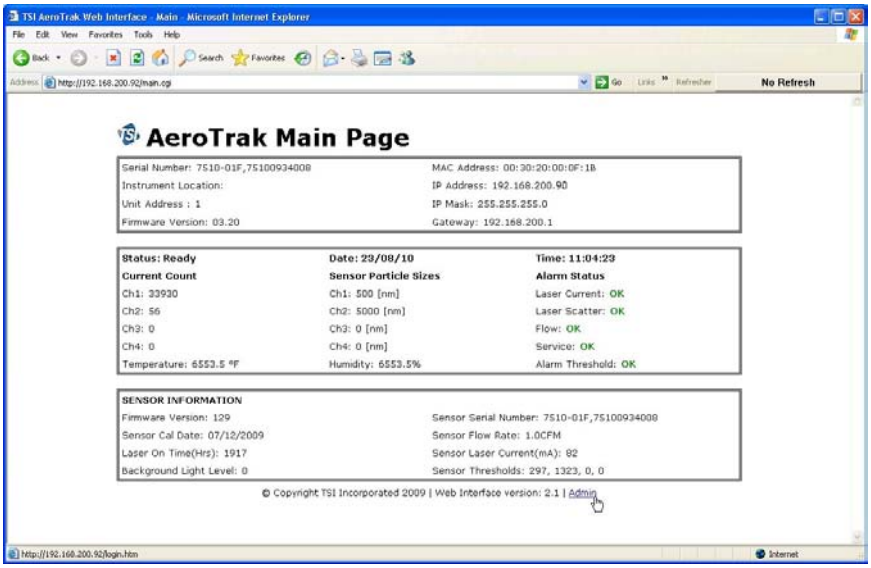
5. Plug in the Ethernet crossover cable between the computer and the Airborne Particle Counter ***or*** plug in the two standard

cables and Ethernet hub between the computer and Airborne Particle Counter. If the hub doesn't support power over Ethernet, also plug in the DC power supply. You should see a message like the one below.

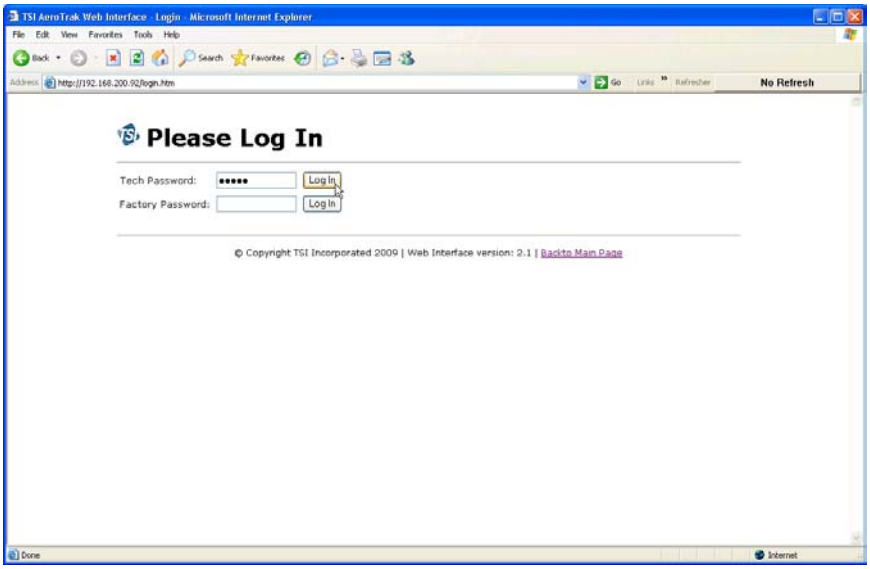


6. Launch your web browser application.
7. Enter the following URL: http://192.168.200.90 in the address bar and hit the **Enter** key.

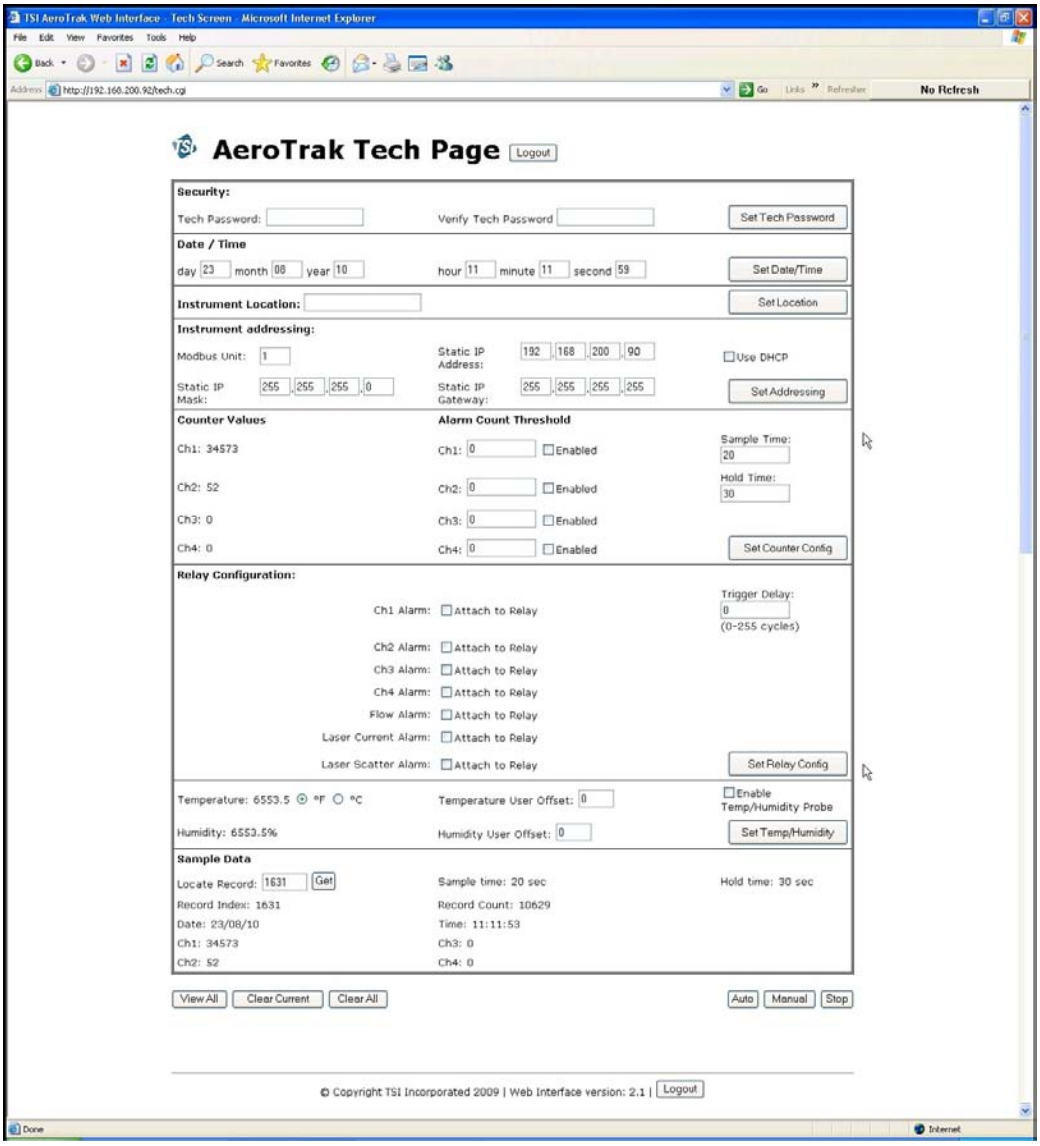
   The following main page should be displayed.



8. Click on the link at the bottom-right of the screen marked **Admin**. A Login screen should appear.



9. For the Tech Password, enter "**admin**" (must be all lower-case) and click the **Log In** button. The technician screen should display as shown below.



10. Typically Airborne Particle Counters will be configured with a static IP address and the **Use DHCP** checkbox will be unchecked. To enable DHCP, check the **Use DHCP** checkbox. In this case, the other settings are unused.

11. For static IP addressing (typical configuration) enter values for the **Static IP Address**, **Static IP Mask** (subnet mask), and **Static IP Gateway** (default gateway for the subnet).

12. Press **Set Addressing** to send the values to the instrument. Note that the IP address changes do ***not*** take effect until the instrument power is turned off and on again. Be sure to carefully record the values entered. It is impossible to communicate with the instrument via Ethernet when the IP address is not known.

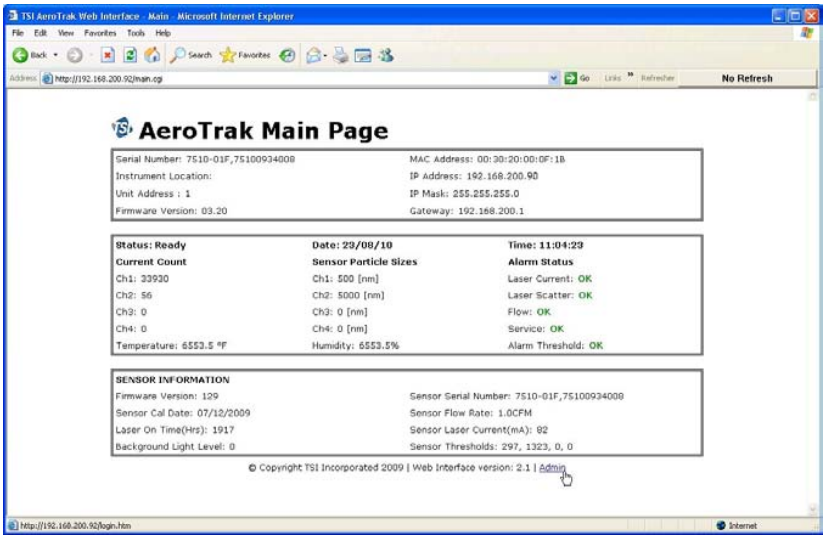
13. Press **Logout** to return to the login screen and then close your browser.
14. Disconnect the Airborne Particle Counter from the crossover cable or hub and remove DC power if it is used.
15. Reconnect the Airborne Particle Counter to your monitoring network and repeat steps 6 and 7 for the network address recorded in step 10 to confirm the new network IP address.

Configuring the Airborne Particle Counter

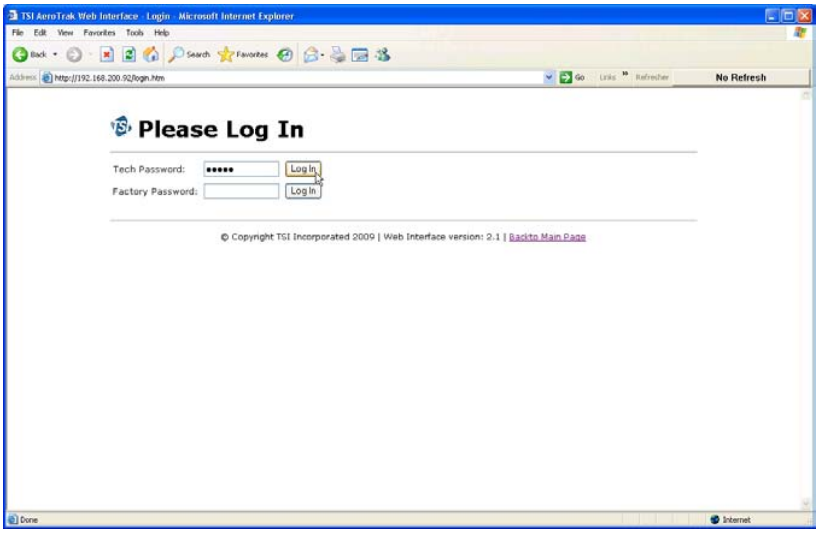
In addition to global settings such as IP address, time, date, and location, there are configuration settings that control sampling characteristics. Although these are typically set by FMS Software, they can also be set using the web interface.

To further configure the Airborne Particle Counter, follow the instructions above to set the IP Address first.

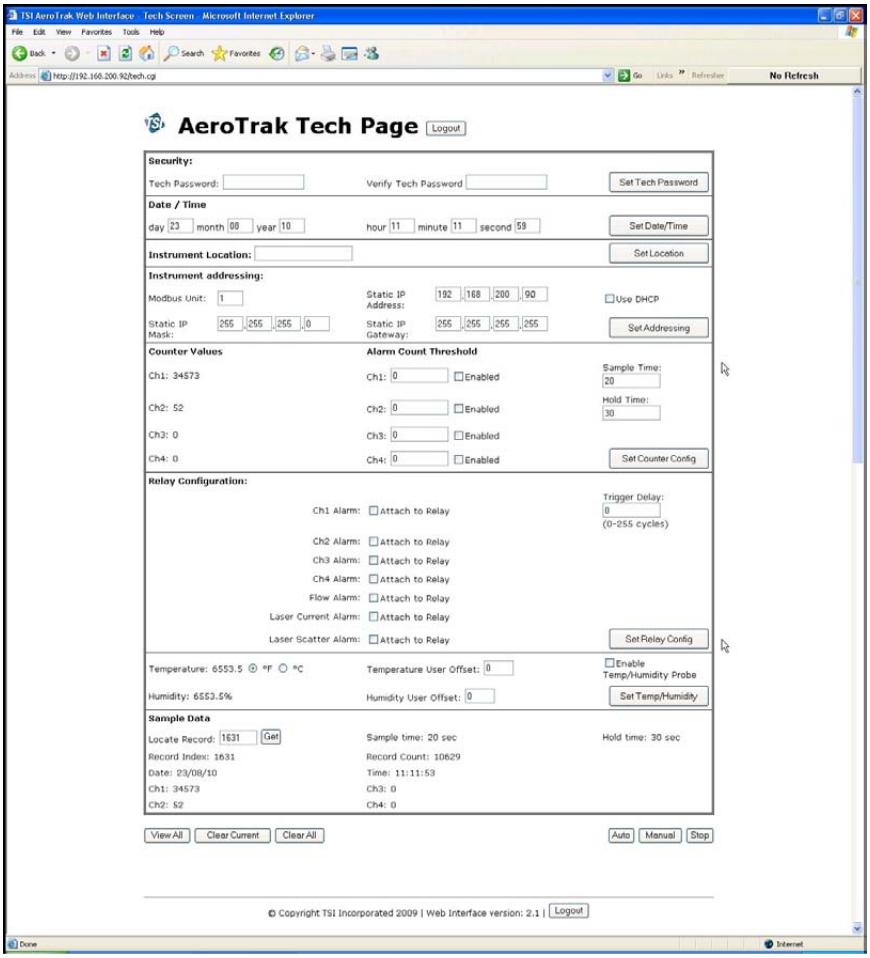
1. Open a web browser and enter the IP address that you configured in the steps above. You should see a screen similar to the one below. This screen provides important status and configuration information for the Airborne Particle Counter.



2. To change configuration, click on the link at the bottom-right of the screen marked **Admin**. A Login screen should appear.



3. For the Tech Password, enter **admin** (must be all lower-case) and click the **Log In** button. The technician screen should display as shown below.



4. In the upper section you can set up a variety of parameters related to the Airborne Particle Counter.

Label	Function	Notes
Tech Password	Changes the password for access to this Tech page from its default to a password of your choosing.	**Warning**; once changed, this password cannot be reset! Make changes cautiously and **don't** forget the new password!
Date / Time	Sets counter date and time.	
Instrument Location	Readable description	Any alpha-numeric (ASCII) label up to 20 characters.
IP Address Setup	IP configuration	See details above.
Modbus® Unit Number	Modbus® address	From 1 to 256
Sample Time	Time the counter actually counts particles	1 to 65535 seconds
Hold Time	Time between samples	1 to 65535 seconds
Alarm Count Threshold	Alarm levels for each channel and checkboxes indicating whether the alarms should be enabled or not.	If the device is a 2-channel Airborne Particle Counter, only the first two values are used.

Label	Function	Notes
Relay Configuration	Settings to configure which alarm states activate the Relay Closure outputs of the device (See Device Operation Manual for relay closure connection pin-outs).	Select which alarm events will trigger a Relay Closure. “Trigger Delay” can be used to defer the relay closure until the alarm condition(s) have persisted for several sample periods. If the Trigger Delay is set to 0 (default), the relay closure will occur immediately when an alarm condition is committed into the sample buffer. If the Trigger Delay is set to 10, then the alarm condition must persist continually for 10 sample periods before the contact closure will be triggered.
Temperature/Humidity Probe Configuration	If the Airborne Particle Counter is configured with an optional temperature/humidity probe, it can be enabled and configured here.	

RS-485 Communications

The particle counter by default supports Modbus RTU over Multi-drop RS-485 serial communications using the RS-232/485 six-pin RJ-11 socket described above. Modbus RTU is a compact, binary representation of the data contained in a register within the instrument memory. Using the Modbus register map, TSI-provided software (such as FMS) can be used to control and collect data with the instrument or custom software may be written. No accessory software is provided with the instrument for communicating via RS-485.

To connect more than one particle counter to an RS-485 network (multi-drop) requires multi-drop adapters and connectors available from TSI. The instruments may then be “daisy-chained” together. When operating the particle counters in a network, care must be taken to ensure that the last communication node is properly terminated.

CHAPTER 4

Troubleshooting

The chapter contains suggestions for troubleshooting common issues with the AEROTRAK™ Remote Airborne Particle Counters.

Symptom	Possible Cause	Corrective Action
Instrument does not power up - Power/Service LED is off (should be green)	Ethernet is plugged in but is not a Power-Over-Ethernet device (POE)	Plug cable into a POE socket or device (some hubs have both POE and non-POE
	External DC power is not plugged in	Use a TSI supplied DC power supply
Power/Service LED is **yellow** indicating a flow error	Vacuum line may be disconnected, blocked, or kinked.	Check vacuum line to make sure it is connected, unblocked and not kinked.
	Inlet may be plugged.	Remove any obstructions from inlet.
	Vacuum level may be below minimum requirements for flow.	Use a vacuum gauge to make sure vacuum at outlet of particle counter is at least 15 inHg.
	Critical orifice may be blocked.	Contact service.
Power/Service LED is **red** indicating a service error	Instrument may require routine service due to a laser error, scatter error	Check service required date on calibration label. Arrange for service if required.
	Internal instrument error	Contact service
Counting LED is off	This is normal if counting is disabled	Use software to enable counting.

Symptom	Possible Cause	Corrective Action
Instrument does not meet zero count specification (<1 particle/5 mins)	May require cleaning	Contact service
	An internal component has become damaged due to operation outside specifications	Contact service
	The zero filter is not connected properly and room air is leaking into the HEPA filter assembly	Check that the rubber O-ring on the inlet of the instrument has not become dislodged. Check that the zero filter is screwed tight

CHAPTER 5

Contacting Customer Service

This chapter gives directions for contacting people at TSI Incorporated for technical information and directions for returning the AEROTRAK™ Remote Airborne Particle Counter for service.

Technical Contacts

- If you have any difficulty setting up or operating the AEROTRAK™ Remote Airborne Particle Counter, or if you have technical or application questions about this system, contact an applications engineer at TSI Incorporated, 1-800-874-2811 (USA) or (651) 490-2811 or e-mail technical.service@tsi.com.
- If the AEROTRAK™ Remote Airborne Particle Counter, does not operate properly, or if you are returning the instrument for service, visit our website at http://rma.tsi.com, or contact TSI Customer Service at 1-800-874-2811 (USA) or (651) 490-2811.

International Contacts

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Web: www.tsiinc.fr

Returning for Service

Visit our website at http://rma.tsi.com and complete the on-line "Return Merchandise Authorization" form or call TSI at 1-800-874-2811 (USA), (651) 490-2811, or 001 651 490-2811 (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, remove the cyclone, cap or seal the inlet orifice, and cover all connector ports to prevent debris from entering the instrument. Package instrument for shipment ensuring the front display and the inlet orifice inlet are protected.

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APPENDIX A

Specifications

All specifications meet or exceed JIS B 9921 and are subject to change without notice.

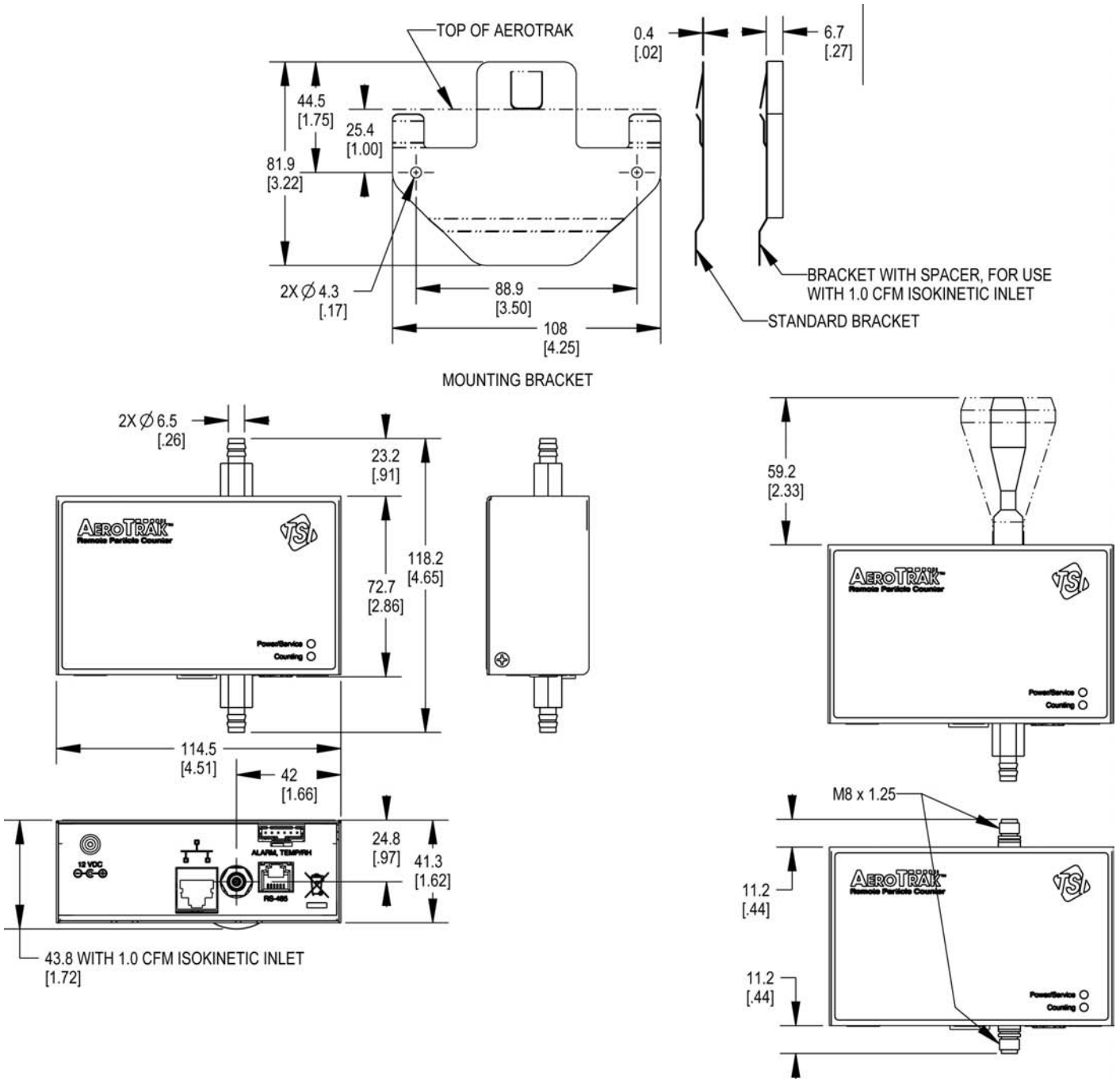
Specification	Description
Size Range	7201: 0.2 to 10 µm 7301: 0.3 to 25 µm 7501: 0.5 to 25 µm 7310: 0.3 to 25 µm 7510: 0.5 to 25 µm
Counting Efficiency (per JIS)	7201: 50% at 0.2 µm; 100% for particles >0.3 µm 7301: 50% at 0.3 µm; 100% for particles >0.45 µm 7501: 50% at 0.5 µm; 100% for particles >0.75 µm 7310: 50% at 0.3 µm; 100% for particles >0.45 µm 7510: 50% at 0.5 µm; 100% for particles >0.75 µm
Concentration Limits	7201: 500,000 particles/ft^3 at 5% coincidence loss 7301: 2,000,000 particles/ft^3 at 5% coincidence loss 7501: 2,000,000 particles/ft^3 at 5% coincidence loss 7310: 100,000 particles/ft^3 at 5% coincidence loss 7510: 200,000 particles/ft^3 at 5% coincidence loss
Light Source	Laser diode
Zero Count Level	<1 count / 5 minutes (<2 particles/ft^3) Meets JIS B9921
Flow Rate	7201, 7301, 7501: 0.1 CFM (2.83 L/min) with ±5% accuracy 7310, 7510: 1.0 CFM (28.3 L/min) with ±5% accuracy
Calibration	NIST traceable
Sample Time	1 second to 24 hours
Vacuum Requirements	External vacuum > 15" (38.1 cm) of Hg
Communication Mode	Ethernet (TCP/IP) and serial Modbus output
Data Storage	3,000 sample records
Status Indicators	Power, service, counting and Ethernet
External Alarm Output	Normal open dry contact rated 0 to 60 V AC/DC, 0.5 Amp continuous, 1.5 Amp peak.
Environmental Sensors	Optional Temp/RH probe 32° to 113°F (0° to 45°C) ± 2°F (±1°C); 10 to 90% RH ±5%
External Surface	Stainless steel
Power	Power-over-Ethernet (PoE compliant with IEEE 802.3af) or 12 VDC
Dimensions (L x W x H)	4.5 in. x 1.6 in. x 2.8 in. (11.5 cm x 4.1 cm x 7.2 cm)
Weight	0.95 lb (0.43 kg)

Specification	Description
Applicable Standards	CE, JIS B9921, ISO 21501-4
Warranty	2 years. Extended warranties available
Operating Conditions	50° to 104°F (10° to 40°C) 20% to 95% non-condensing
Storage Conditions	14° to 122°F (-10° to 50°C) / Up to 98% non-condensing

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



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