



AEROTRAK[®]+

REMOTE PARTICLE COUNTER

MODELS 7201/7301/7501/7310/7510

MODELS 6201/6301/6501

OPERATION MANUAL

P/N 6012577 REVISION C
MAY 2020



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Manual History

The following is a manual history of the AeroTrak®+ Remote Particle Counter, Models 7201/7301/7501/7310/7510/6201/6301/6501 Operation Manual (P/N 6012577).

Revision	Date
A	May 2019
B	December 2019
C	May 2020

Warranty

Part Number

6012577 / Revision C / May 2020

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(effective April 2014)

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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, 60 months laser replacement, and 12 months** for Part Number 7510-22050V, 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;
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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).

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Safety

This section gives instructions to promote safe and proper handling of the AeroTrak®+ Remote 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

The TSI AeroTrak®+ Remote Particle Counter (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

There are no user-serviceable parts inside this instrument. The instrument should only be opened by TSI or a TSI approved service technician.



WARNING

If the Particle Counter is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.




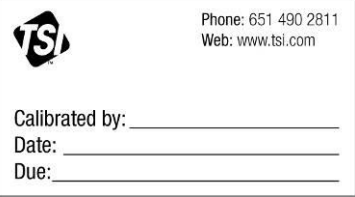


WARNING

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

When operated according to the manufacturer's instruction, this device is a Class I laser product as defined by U.S. Department of Health and Human Services standards under the Radiation Control for Health and Safety Act of 1968. A certification and identification label like the one shown below is affixed to each instrument.

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)	 <p>AeroTrak + 6201-24010 Channels: 2/3/5/1µm, 0.1CFM COMPLIES WITH 21 CFR 1040.10 AND 1040.11</p> <p>Manufactured : October 2018 S/N: 62011841004</p> <p>12-24V 30W RMN 6001 TSI Incorporated 500 Cardigan Road Shoreview, MN 55126, USA Class 1 Laser Product Made in USA</p>
2. Calibration label (right-side panel)	 <p>Phone: 651 490 2811 Web: www.tsi.com</p> <p>Calibrated by: _____ Date: _____ Due: _____</p>
3. Laser radiation label (internal)	<p>DANGER! VISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM WARNING: NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL</p>
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



CAUTION

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



WARNING

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 come into 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.

Reusing and Recycling

	<p>As part of TSI Incorporated's effort to have a minimal negative impact on the communities in which its products are manufactured and used:</p> <ul style="list-style-type: none">• DO NOT dispose of used batteries in the trash.• Follow local environmental requirements for battery recycling.• If instrument becomes obsolete, return to TSI for disassembly and recycling.
--	---

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: 001 651 490-2860
E-mail Address: technical.services@tsi.com
Web site: www.tsi.com

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CHAPTER 1

Introduction and Unpacking

The AeroTrak®+ Remote 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 can run with no pump (central vacuum is used along with an integrated critical orifice) or with an internal pump that is controlled to provide a constant volumetric flow rate for 0.1 cfm (2.83 L/min) models.

Sensor data and particle counter information is communicated to an external device via integrated Ethernet (TCP/IP), serial Modbus RTU communications, a digital contact. 4-20 mA or wireless outputs are available on select models. Oftentimes, this data is sent to a data logging and reporting software, like TSI Incorporated's Facility Monitoring System Software.

The following table shows the remote particle counter models covered by this manual.

* A denote 4-20 mA analog outputs

+ V denotes VHP resistant

* W denotes unit is capable of receiving the external wireless node



Part Number	Flow Rate	Size Channels (um)	No. Size Channels
7201-22003	2.8 L/min (0.1 cfm)	0.2/0.3 um	2
7201-22003W*	2.8 L/min (0.1 cfm)	0.2/0.3 um	2
7201-24010	2.8 L/min (0.1 cfm)	0.2/0.3/0.5/1.0 um	4
7201-24010A*	2.8 L/min (0.1 cfm)	0.2/0.3/0.5/1.0 um	4
7201-24010W*	2.8 L/min (0.1 cfm)	0.2/0.3/0.5/1.0 um	4
7301-22005	2.8 L/min (0.1 cfm)	0.3/0.5 um	2
7301-22005W*	2.8 L/min (0.1 cfm)	0.3/0.5 um	2
7301-24050	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0 um	4
7301-24050A*	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0 um	4
7301-24050W*	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0 um	4
7301-24100	2.8 L/min (0.1 cfm)	0.3/0.5/5.0/10 um	4
7301-24100A*	2.8 L/min (0.1 cfm)	0.3/0.5/5.0/10 um	4
7301-24100W*	2.8 L/min (0.1 cfm)	0.3/0.5/5.0/10 um	4
7301-26250	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0/10/25 um	6
7301-26250A*	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0/10/25 um	6
7301-26250W*	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0/10/25 um	6

Part Number	Flow Rate	Size Channels (um)	No. Size Channels
7501-22050	2.8 L/min (0.1 cfm)	0.5/5.0 um	2
7501-22050W*	2.8 L/min (0.1 cfm)	0.5/5.0 um	2
7501-24100	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10 um	4
7501-24100A*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10 um	4
7501-24100W*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10 um	4
7501-25250	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10/25 um	5
7501-25250A*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10/25 um	5
7501-25250W*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10/25 um	5
7501-24250	2.8 L/min (0.1 cfm)	0.5/5.0/10/25 um	4
7501-24250A*	2.8 L/min (0.1 cfm)	0.5/5.0/10/25 um	4
7501-24250W*	2.8 L/min (0.1 cfm)	0.5/5.0/10/25 um	4
7310-22005	28.3 L/min (1 cfm)	0.3/0.5 um	2
7310-22005W*	28.3 L/min (1 cfm)	0.3/0.5 um	2
7310-24050	28.3 L/min (1 cfm)	0.3/0.5/1.0/5.0 um	4
7310-24050A*	28.3 L/min (1 cfm)	0.3/0.5/1.0/5.0 um	4
7310-24050W*	28.3 L/min (1 cfm)	0.3/0.5/1.0/5.0 um	4
7310-24100	28.3 L/min (1 cfm)	0.3/0.5/5.0/10 um	4
7310-24100A*	28.3 L/min (1 cfm)	0.3/0.5/5.0/10 um	4
7310-24100W*	28.3 L/min (1 cfm)	0.3/0.5/5.0/10 um	4
7510-22050	28.3 L/min (1 cfm)	0.5/5.0 um	2
7510-22050V+	28.3 L/min (1 cfm)	0.5/5.0 um	2
7510-22050W*	28.3 L/min (1 cfm)	0.5/5.0 um	2
7510-24100	28.3 L/min (1 cfm)	0.5/1.0/5.0/10 um	4
7510-24100A*	28.3 L/min (1 cfm)	0.5/1.0/5.0/10 um	4
7510-24100W*	28.3 L/min (1 cfm)	0.5/1.0/5.0/10 um	4
7510-24250	28.3 L/min (1 cfm)	0.5/5.0/10/25 um	4
7510-24250A*	28.3 L/min (1 cfm)	0.5/5.0/10/25 um	4
7510-24250W*	28.3 L/min (1 cfm)	0.5/5.0/10/25 um	4
6201-24010	2.8 L/min (0.1 cfm)	0.2/0.3/0.5/1.0 um	4
6201-24010A*	2.8 L/min (0.1 cfm)	0.2/0.3/0.5/1.0 um	4
6201-24010W*	2.8 L/min (0.1 cfm)	0.2/0.3/0.5/1.0 um	4
6301-24100	2.8 L/min (0.1 cfm)	0.3/0.5/5.0/10 um	4
6301-24100A*	2.8 L/min (0.1 cfm)	0.3/0.5/5.0/10 um	4
6301-24100W*	2.8 L/min (0.1 cfm)	0.3/0.5/5.0/10 um	4
6301-26250	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0/10/25 um	6
6301-26250A*	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0/10/25 um	6
6301-26250W*	2.8 L/min (0.1 cfm)	0.3/0.5/1.0/5.0/10/25 um	6
6501-24100	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10 um	4
6501-24100A*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10 um	4
6501-24100W*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10 um	4

Part Number	Flow Rate	Size Channels (um)	No. Size Channels
6501-24250	2.8 L/min (0.1 cfm)	0.5/5.0/10/25 um	4
6501-24250A*	2.8 L/min (0.1 cfm)	0.5/5.0/10/25 um	4
6501-24250W*	2.8 L/min (0.1 cfm)	0.5/5.0/10/25 um	4
6501-25250	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10/25 um	5
6501-25250A*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10/25 um	5
6501-25250W*	2.8 L/min (0.1 cfm)	0.5/1.0/5.0/10/25 um	5

Unpacking the AeroTrak+ Remote Particle Counter




Carefully unpack the AeroTrak+ Remote 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 Particle Counter	7201 7301 7501 7310 7510	6201 6301 6501	
1	Operation Manual (6012577) and Configuration Utility on USB drive	7003732		
1	Calibration Certificate	N/A		
1	12-24 VDC / Relay Connector	6003398		

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	Reference Picture
Power Supply*	PSU-ARWP	
USB-C Cable	700360	
AeroTrak+ Wi-Fi® Node	700500	

*Manufacturer's Declaration for Korea: This product is intended to be powered by PoE+ or user-supplied 12–24V supply. PSU-ARWP power supply accessory not for use in the Korean market.

2.83 L/min, 0.1 cfm Models (7201, 7301, 7501, 6201, 6301, 6501)

Item Description	Part/Model	Reference Picture
0.1 CFM Zero Filter	AR-PF-001	
Mounting Bracket	700008	
Isokinetic Inlet (2.8 L/min, 0.1 cfm) Stainless Steel	ISPDm-00145	
Isokinetic Barb Sampling Probe AI 0.1 cfm	700477	
Isokinetic Barb Sampling Probe SS 0.1 cfm	700478	

® Wi-Fi is a registered trademark of the Wi-Fi Alliance.

Item Description	Part/Model	Reference Picture
Adapter, Isokinetic Zero Cap, 0.1 cfm	700481	
Sample Tubing Superthane Tubing – 1/8 ID 1/4 OD 100 FT	700009	
Superthane Tubing – 1/8 ID 1/4 OD 1000 FT	700010	

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

Item Description	Part/Model	Ref.
1 CFM Zero Filter	AR-PF-010	
Mounting Bracket	700008-1	
Stainless Steel Isokinetic inlet (28.3 L/min, 1.0 cfm)	ISPDM-01045	
Isokinetic Barb Sampling Probe AI 1.0 cfm	700479	
Isokinetic Barb Sampling Probe SS 1.0 cfm	700480	
Isokinetic Cap	700252	

Item Description	Part/Model	Ref.
Adapter, Isokinetic Zero Cap, 1.0 cfm	700482	
Sample Tubing Superthane Tubing – 1/4 ID 3/8 OD 100 ft Superthane Tubing – 1/4 ID 3/8 OD 1000 ft	700011 700012	

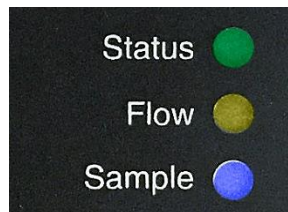
CHAPTER 2

Installation and Getting Started

This chapter describes the features, connections, and installation of the AeroTrak®+ Remote Particle Counter.

Indicator LEDs

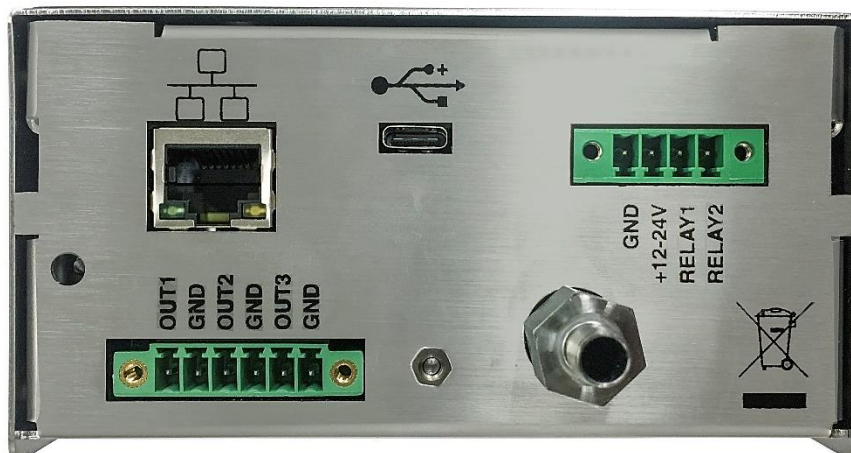
The three LEDs on the front of the Remote Particle Counter provide indication of the particle counter's operation as described in the table below.



Indicator	Status	Function
Status	Green	No errors are detected.
	Red	Device is in a service alert from 1 or more of the following conditions: <ul style="list-style-type: none">• Laser current error• Laser scatter error• Flow error• Calibration error• Ambient condition error
Flow	Yellow—solid	Device flow is good.
	Yellow—flashing	Device has a flow error.
	Off	No flow detected.
Sample	Blue—solid	Device is sampling and no particles are detected.
	Blue—blinking	Blinking rate is indicative (a guide) of particle count activity in real time. NOTE: The maximum blinking rate is 50 times per second.

Electrical Connections

The state-of-the art AeroTrak+ Remote Particle Counter supports multiple communications and connectivity options. A brief description of each of the connections is listed below.



Device Connections

- [12-24 VDC/Relay Output Connector](#)
- [Ethernet Connector](#)
- [USB-C Connector](#)
- [AeroTrak+ Wi-Fi Node Operation](#)
- [4-20 mA Analog Output/Wireless Connector](#)

12-24 VDC / Relay Connector

This connector can be used as either a 12–24 VDC power connection when Power-Over-Ethernet (PoE+) is not available and as a relay connection.

If used as a power connector, only a TSI-supplied 12 VDC power supply (such as TSI model PSU-ARWP) should be used.

Terminal	Direction
1	GND
2	12–24 VDC
3	RELAY1 – Contact 1 for internal relay
4	RELAY2 – Contact 2 for internal relay

If used as a relay, the alarm contact is used to indicate an alarm condition. The alarm contact closure is normally open. The contact closes upon an alarm, which could be a high particle alarm, a laser error, a detector error, or a flow error, depending on the configuration of the particle counter. The relay contact is rated for a 2A @ 30 VDC load. This relay can be controlled by external software (i.e., FMS) and is configured on the Configuration Utility.



Ethernet Connector

The particle counter should be connected to a 10/100 Mbps network that supports Power-Over-Ethernet (802.3at PoE+). 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 (802.3at PoE+) devices. PoE+ is typically 48 VDC.

USB-C Connector

This connection is used to communicate with the particle counter via a USB-C cable connected to a Windows® operation system computer running the Configuration Utility. The particle counter can be powered by USB-C for configuration. The particle counter cannot be powered by USB-C for sampling.

AeroTrak+ Wi-Fi Node Operation



The AeroTrak+® Remote Particle Counter has an option for Wi-Fi communications. There is a separate node that connects to the AeroTrak+ Remote Particle Counter. The Wi-Fi Node (TSI part number 700500) connects to the 6-pin connector, located on the bottom of the AeroTrak+ Remote Particle Counter. The connector is designated for either 4-20 mA Analog Output/Wireless connector. When the customer orders an AeroTrak+ Remote Particle Counter with wireless option, the connector will not output 4-20 mA levels.

NOTE

With Wi-Fi® Node connected, the PoE+ port (Ethernet port) is not accessible because the Wi-Fi Node will block the port.

Further instructions for setup and configuration may be found in the *AeroTrak+ Remote Particle Counter Wireless (Wi-Fi) Node Model 700550 Quick Start Guide* TSI part number 6014172).

4-20 mA Analog Output / Wireless Connector

This 6-pin connector is used for either a 3-channel 4–20 mA output or to connect to a TSI wireless node, depending on the model used.

Two (2) of the analog outputs are configurable, via the Configuration Utility, to linear/log scale and linked to a particle channel.

Terminal	Channel	Direction
1	A	Output
2	A	Return
3	B	Output
4	B	Return
5	Status	Output
6	Status	Return

The last analog output is dedicated to status information. The output will go to a nominal current value that corresponds to the condition listed in table.

Current	Flow Status	Laser Status
8 mA	OK	OK
12 mA	OK	Alarm
16 mA	Alarm	OK
20 mA	Alarm	Alarm

Tubing Connections

Inlet

The direct-mount sampling inlet at the top of the device can be configured to sample standalone, connected to a sample tube, or connected to an isokinetic sampling inlet. See the table of [optional accessories](#) in Chapter 1 for more information.



Installation

Installation of the AeroTrak+ Remote 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. Remote particle counters are designed so that they can be located close to critical locations determined by risk analysis. The Remote Particle Counter should be mounted such that the sensor assembly can be easily installed and removed for calibration. It is generally convenient to mount the particle counter to a vertical flat surface such as a wall, but the particle counter can also be mounted below the critical work area, inside a vented hood, or a convenient location close to the point of measurement.

Mounting the Remote Particle Counter

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

TSI provides an optional mounting bracket (TSI P/N 700008 for 0.1 cfm models and 700008-1 for 1 cfm models) that allows the particle counter to be easily mounted and removed on a surface (see figures).

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 in figure).

To remove the Remote 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.



Mounting Bracket (optional)



Remote Particle Counter Mounted on Optional Bracket

Supplying Power to the Remote Particle Counter

The AeroTrak®+ Remote 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 (802.3at PoE+). In some cases; however, this is not possible or practical, so the particle counter can also be powered by the optional TSI Model PSU-ARWP power supply. The unit can also be powered with a user supplied 12–24-volt supply. The AeroTrak+ Remote Particle Counter can operate with both PoE+ and AUX connected at the same time for redundancy and backup continuous monitoring.



WARNING

If the Remote 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 802.3at PoE+ 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. The Status LED on the particle counter should illuminate green.



WARNING

For proper operation, please use TSI model PSU-ARWP power supply or a 12–24 VDC power supply with a minimum 30W output power. Using another power supply could seriously damage your particle counter.

Using DC Power

To supply DC power to the particle counter:

1. Connect the TSI model PSU-ARWP power supply or a 12–24 VDC power supply with a minimum of 30 watts output to the instrument at the power connector as shown in the figure below.

NOTE

If the voltage is too low (9V) or too high (26V), the unit will not turn on. If the power capability of the external power supply is too low, the unit could reboot when it starts to sample.

2. Plug the power supply into a suitable AC outlet. The Status LED on the particle counter should illuminate green.



Remote Particle Counter Using DC Power

Connecting the Remote Particle Counter to a Computer

You can communicate with the particle counter using Modbus TCP over Ethernet.

Modbus[®] TCP over Ethernet

Modbus[®] TCP over Ethernet is the preferred method of communications with the particle counter. Using the 8-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. 802.3at PoE+ carries both power and communications through an Ethernet cable to the Remote Particle Counter. If DC Power is used, the PoE+ option will not be required to power the unit but the unit will operate fine with PoE+ also present. No need to disable PoE+ for units running with DC power.

Tubing Installation

Connecting Vacuum Tubing (Models 7201, 7301, 7501, 7310, 7510 only)

The 7201, 7301, 7501, 7310, 7510 models do not have an integrated 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 measured directly at the outlet of the counter.

Connect the vacuum tubing to the particle counter outlet shown in the figure. This requires tubing such as specified in the [optional accessories table](#) in Chapter 1 or PVC thick-walled tubing.



Connecting Vacuum Tubing to Remote Particle Counter

NOTE

Models 6201, 6301, and 6501 have an integrated pump so no vacuum source is needed. For these models, the outlet can be left disconnected or connected to exhaust tubing with a maximum length of 3 m (10 ft.).

Connecting Sample Tubing

It is not always possible to position the particle counter close to the monitoring location. In this case 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 (no more than 3 meters or 10 feet when measuring particles $\geq 1 \mu\text{m}^*$) with minimum number of bends (Minimum bend radii is 15 cm or 6 inches*) 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 Particle Counter

* per ASTM F50-07

®Teflon is a registered trademark of DuPont.

CHAPTER 3

Communications and Configurations

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 Monitoring System Software (TSI® FMS Software) running on a computer. FMS Software can be configured to communicate with the particle counter through Modbus TCP over Ethernet or via TSI wireless communication. Consult the FMS Software manual for more information.

NOTE

Technical documentation for integrating the TSI Particle Counter into custom applications, including details of the Modbus® implementation, is available upon request. Contact TSI Customer Service (see [“Contacting Customer Service”](#)).

Setting the IP Address of the Particle Counter

By default, each Particle Counter is shipped with a static Ethernet address of 192.168.200.90. Since the IP address is fixed, before the remote 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 the configuration utility.

NOTE

In a typical application, 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 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.

Viewing Device Information

Your device information can be viewed using the Configuration Utility on a Windows® operating system computer. To connect your Particle Counter with the Configuration Utility, you will need the following:

- A Windows® operating system computer (PC) or laptop with a USB port
- A USB-C cable
- Particle Counter to be configured

Connect the Remote Particle Counter to the Windows® operating system PC using the USB-C cable. The USB-C cable will power the particle counter.


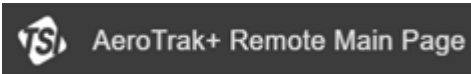



NOTE

USB-C power is designed for instrument configuration viewing and setup, not for operation.

Title Bar



The title bar has the following functionality:

	Main Menu	Access to Main Menu.
	AeroTrak+ Remote Main Page	App name.
	Alarm Icon	This icon will be displayed in main menu if the instrument has an instrument alarm.
	USB Connection	This icon is shown when USB connection has been established.
	Connect/Disconnect	Allows you to connect and disconnect from instrument.

Main Page—Counts Tab

Once the unit is powered, launch the Configuration Utility and you will arrive at the Main Page—Counts tab. The following list of items can be viewed on this page:

Label	Function
Sample #	Current Sample Number
Sample Time (s)	Elapsed time in the current sample interval
Hold Time (s)	Elapsed hold time between sample intervals
Particle Size (um)	Minimum size threshold for each channel in μm
Counts (raw cumulative)	Number of particle counts in each channel
Model	Device model number
Serial	Device serial number
Location Name	Device location name
Date (yyyy-mm-dd)	Device date
Time	Device time
Alarm	Device threshold alarm status
Current Flow (lpm)	Device flow rate
Run Mode	Device current run mode
Sample length (s)	Sample interval length
Sample delay (s)	Delay time before sampling begins
Sample hold (s)	Time between samples

The screenshot displays the AeroTrak+ Remote App interface. At the top, there's a header bar with the app name, a menu icon, and a 'DISCONNECT' button. Below the header, there are three tabs: 'Counts' (selected), 'Instrument', and 'Communication'. The 'Counts' tab shows a table with columns for Sample#, Sample Tm (s), Hold Tm (s), Channel, Particle Size (um), and Counts (raw Σ). The table lists data for channels Ch1 through Ch6. To the right of the table, there are two panels: 'Instrument Information' and 'Status'. The 'Instrument Information' panel displays fields for Model, Serial, Location Name, Date, and Time. The 'Status' panel displays fields for Threshold Alarm, Current Flow (lpm), Run Mode, Sample Length (s), Start Delay (s), and Hold Time (s).

Sample#	Sample Tm (s)	Hold Tm (s)
Ch1	0.3	
Ch2	0.5	
Ch3	1	
Ch4	5	
Ch5	10	
Ch6	25	

Channel	Particle Size (um)	Counts (raw Σ)
Ch1	0.3	
Ch2	0.5	
Ch3	1	
Ch4	5	
Ch5	10	
Ch6	25	

Instrument Information

Model: 7301-26250

Serial: 730118500001

Location Name: LOCATION

Date: 2018-11-05
(yyyy-mm-dd)

Time: 02:29:24

Status

Threshold Alarm:

Current Flow (lpm): 2.83

Run Mode: MAN

Sample Length (s): 10

Start Delay (s): 0

Hold Time (s): 0

Main Page—Instrument Tab

The Instrument tab shows device information as described in the table below:

Label	Function
Firmware version	Current firmware version programmed on the device
Last Cal Date (yyyy-mm-dd)	Last date the device was calibrated
Nominal Flow (lpm)	Nominal flow rate of the device
Laser Run-Time (hrs)	Time that the laser has been on since manufacture
Instrument Temperature (C)	Device temperature measured inside the enclosure
Laser Current (mA)	Current being supplied to the laser
Background Light Level (V)	Laser scatter in optics chamber

The screenshot shows the AeroTrak+ Remote App interface. At the top, there's a header bar with the app name, a menu icon, a bell icon, and a disconnect button. Below the header, there are three tabs: Counts, Instrument (selected), and Communication. The Instrument tab displays a table of device information on the left and two summary boxes on the right.

Counts	Instrument	Communication
Firmware Version:	1.01	
Last Cal Date (yyyy-mm-dd):	2018-11-08	
Nominal Flow (lpm):	2.83	
Laser Run-Time (hrs):	13.83	
Instrument Temperature (C):	32.41	
Laser Current (mA):	0.00	
Background Light Level:	0.00	

Instrument Information

Model: 7510-22050
Serial: 75101851013
Location Name: LOCATION
Date: 2018-11-05
(yyyy-mm-dd)
Time: 02:49:04

Status

Threshold Alarm:
Current Flow (lpm): 2.83
Run Mode: MAN
Sample Length (s): 10
Start Delay (s): 0
Hold Time (s): 0

Main Page—Communication Tab

The Communication tab shows device information for communication purposes as described in the table below:

Label	Function
IP Address/Mask/Gateway	Device IP address/mask/gateway
MAC Address	Device MAC address
Modbus Ver	Modbus map version.
DHCP	DHCP enabled or disabled
Multicast Address and Port	IP address used for multicast broadcasts. This feature enables auto-discovery in FMS.
SNTP Address and time zone	IP address of Network Time Protocol that will be used to automatically reset time / date at 3:00AM if unit's time is off by 6 seconds. The time is based on the time zone selected.

The screenshot displays the AeroTrak+ Remote App interface. At the top, there's a header bar with the app name, a menu icon, and a 'DISCONNECT' button. Below the header, there are three tabs: 'Counts', 'Instrument', and 'Communication'. The 'Communication' tab is selected and highlighted. It contains a table with the following data:

Label	Value	Label	Value
IP Address:	192.168.200.90	DHCP:	OFF
IP Mask:	255.255.255.0	IP Gateway:	192.168.200.1
Multicast Addr:	239.100.100.1	Multicast:	ON
Multicast Port:	5000		
SNTP Addr:	10.1.0.249	SNTP:	ON
Time Zone:	(UTC Offset) 0.0		
MAC Addr:	0:30:20:0:0:B	Modbus Ver:	Ver 2

To the right of the Communication tab, there are two panels. The 'Instrument Information' panel shows:

- Model: 7301-26250
- Serial: 730118500001
- Location Name: LOCATION
- Date: 2018-11-05 (yyyy-mm-dd)
- Time: 02:30:58

The 'Status' panel shows:

- Threshold Alarm:
- Current Flow (lpm): 2.83
- Run Mode: MAN
- Sample Length (s): 10
- Start Delay (s): 0
- Hold Time (s): 0

Configuring the 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 Configuration Utility.

All units ship with the default measurement settings for sample interval and delay time.

- **Sample time:** 60 seconds
- **Hold time:** 0 seconds
- **Delay time:** 0 seconds

Your device settings can be configured using the Configuration Utility on a Windows® operating system computer. To connect your Particle Counter with the Configuration Utility, you will need the following:

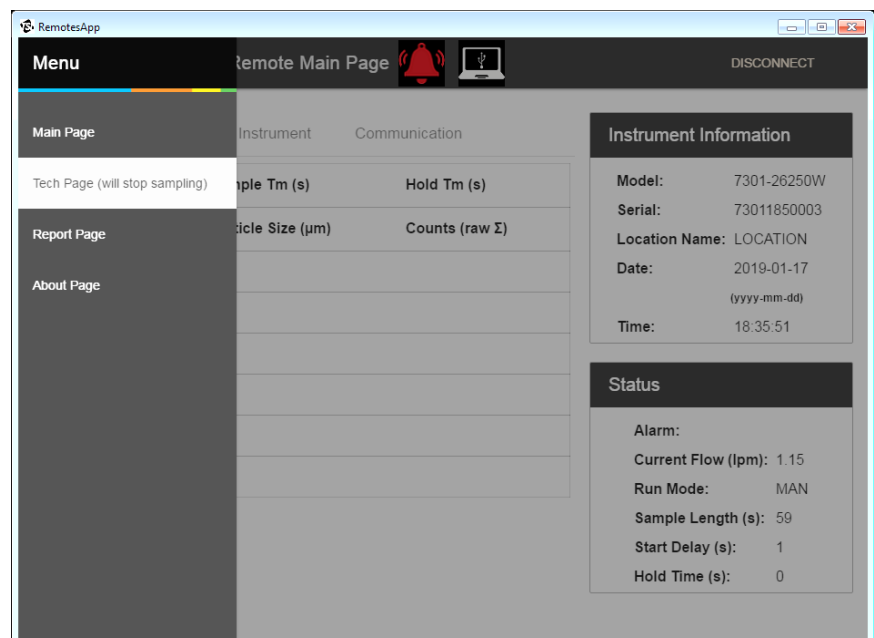
- A Windows® operating system computer or laptop with a USB port
- A USB-C cable
- Particle Counter to be configured

Connect the Particle Counter to the Windows® operating system computer using the USB-C cable. The USB-C cable will power the particle counter.

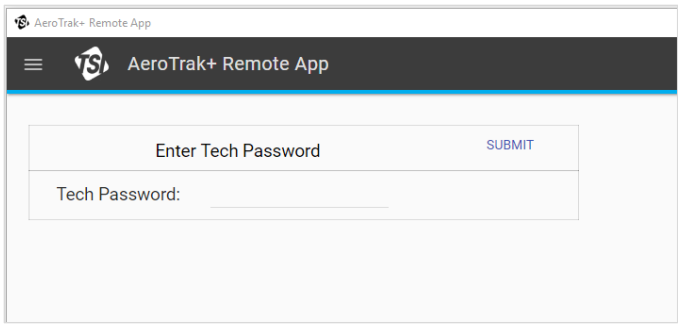
NOTE

USB-C power is designed for instrument configuration viewing and setup, not for operation.

Launch the App and you will arrive at the Main Page. Open the menu at the upper left-hand corner and click on **Tech Page**. This will stop the instrument from sampling.



To enter the Tech Page, you will need to enter the Tech Password. The default password is **admin**.

The screenshot shows the AeroTrak+ Remote App interface. At the top, there is a dark header bar with the app's logo and name. Below the header, there is a light gray box containing the text "Enter Tech Password" and a blue "SUBMIT" button. Below this box, there is a label "Tech Password:" followed by a text input field.

The Tech Page allows you to configure all device settings under eight tabs:

• Config	• Instr
• Alarm	• Data
• Relay	• Passwd
• Analog	• Reset

(continued on next page)

Tech Page—Configuration (Config) Tab

The Configuration page is used to input the sampling parameters and set the system clock.

Label	Function
Sample Interval (s)	Sets the length of time for each sample
Start Delay (s)	Sets the delay time before a sample begins
Hold Time (s)	Sets the delay time between consecutive samples
Run Mode	<p>Select between Auto or Manual run modes.</p> <p>Auto model uses Sample Interval, Start Delay and Hold Time.</p> <p>Manual mode will start a sample and log the sample when sample is stopped manually.</p>
Date and Time	<p>Sets the device date and time. To sync the device time with the computer time, click Sync to computer. The Saved button in the “Date and Time” row is used if time and date is manually entered to send the new time and date to the remote.</p> <p>NOTE: The Save button in the Sample Configuration row is used to send the new Sample Length, Start Delay, Hold Time, and Run mode to the remote.</p>

Tech Page—Alarm Tab

The Alarm tab is used to configure the device alarms based on alarm thresholds for each particle size channel. The alarm threshold is the minimum particle count in each sample interval before an alarm is triggered.

Alarms come in two types:

Alarm	Function
Sample Alarm	This alarm will trigger at the end of a sample if the count during the sample exceeds the Threshold value.
1-Sec Alarm	<p>This alarm will trigger if the rolling buffer count exceeds the threshold value. The alarm will trigger immediately once threshold is exceeded.</p> <p>You can select the length of the rolling buffer which is the length of time in seconds that the unit will sum counts for the 1-Sec alarm.</p>
Rolling Buffer	<p>Rolling buffer configures the time window for the 1-sec alarm. For example, a rolling buffer of 60 seconds will maintain a rolling sum of the previous 60 seconds of particle counts, updated each new second. If the total number of particle counts in the rolling buffer equals or exceeds the alarm limit threshold for the given channel, then a 1-sec alarm will immediately trigger.</p> <p>The rolling buffer default setting is 60 seconds.</p>

Save must be pressed for the configurations to be saved to the instrument.

AeroTrak+ Remote App

AeroTrak+ Remote Tech Page

Config Alarm Relay Analog Instr Data Passwd Reset

SAVE

Rolling Buffer Length (1-60): 60

Channel	Size (μm)	Threshold (Σ)	Sample (Off/On)	1-Sec (Off/On)
Ch 1	0.3	0	<input type="checkbox"/>	<input type="checkbox"/>
Ch 2	0.5	0	<input type="checkbox"/>	<input type="checkbox"/>
Ch 3	1	0	<input type="checkbox"/>	<input type="checkbox"/>
Ch 4	5	0	<input type="checkbox"/>	<input type="checkbox"/>
Ch 5	10	0	<input type="checkbox"/>	<input type="checkbox"/>
Ch 6	25	0	<input type="checkbox"/>	<input type="checkbox"/>

Tech Page—Relay Tab

The Relay tab allows you to set which conditions enable the relay output, described in the following table.

Label	Function
Channel Sizes (0.3, 0.5, etc.)	Toggles to the right of the channel sizes will activate the relay if those channels go into alarm.
Instrument status alarms (Flow Alert, Laser Alert, Laser Scatter, Ambient Conditions, Instrument Error, Calibration Corrupt)	Toggles to the right of the instrument status alarms will activate the relay if those instrument status items go into alarm.
Relay Delay	Number of samples the alarm has to be in prior to the relay triggering

Save must be pressed for the configurations to be saved to the instrument.

The screenshot shows the AeroTrak+ Remote App interface. At the top, there's a header bar with the AeroTrak+ logo, the text "AeroTrak+ Remote Tech Page", and icons for a laptop, upload, download, and a "DISCONNECT" button. Below the header is a navigation bar with tabs: Config, Alarm, Relay (selected), Analog, Instr, Data, Passwd, and Reset. The main content area displays the Relay configuration table, which has columns for Alarm, Relay (Off/On), Alarm, and Relay (Off/On), with a "SAVE" button at the top right. The table lists various alarm conditions and their corresponding relay status toggles.

Alarm	Relay (Off/On)	Alarm	Relay (Off/On)	
0.3	<input type="checkbox"/>	Flow Alert	<input type="checkbox"/>	SAVE
0.5	<input type="checkbox"/>	Laser Alert	<input type="checkbox"/>	
1	<input type="checkbox"/>	Laser Scatter	<input type="checkbox"/>	
5	<input type="checkbox"/>	Ambient Conditions	<input type="checkbox"/>	
10	<input type="checkbox"/>	Instrument Error	<input type="checkbox"/>	
25	<input type="checkbox"/>	Calibration Corrupt	<input type="checkbox"/>	
Relay Delay (Number of samples before relay is triggered) 0				

Tech Page—Analog Tab

The analog tab allows for the configuration of the analog output for models supporting this feature.

Label	Function
Ch A, Ch B	Select which size channels to output on analog out channel A and B
Ch A Scale, Ch B Scale	Choose the span scaling of channel A and channel B.

Save must be pressed for the configurations to be saved to the instrument.

The screenshot displays the 'AeroTrak+ Remote App' interface. At the top, there's a navigation bar with a menu icon, the app name, a USB icon, and a 'DISCONNECT' button. Below this is a tabbed interface with 'Config', 'Alarm', 'Relay', 'Analog', 'Instr', 'Data', 'Passwd', and 'Reset'. The 'Analog' tab is active. The main content area is titled 'Analog Out Settings' and includes a 'SAVE' button. It contains two columns of settings for 'Ch A' and 'Ch B'. For 'Ch A bin channel', the selected option is '0.5'. For 'Ch B bin channel', the selected option is '0.3'. Both channels have 'Log Scale' selected under the 'Ch A Scale' and 'Ch B Scale' sections. The scale options include 'Linear Scale' with various values (10, 100, 1000, 10000, 100000, 1000000, 10000000, 100000000) and 'Log Scale'.

Tech Page—Instrument (Instr) Tab

The Instrument tab is used to configure the device communication settings as described in the table below. This tab also allows you to change Modbus map version, location name and seconds before flow error.

Label	Function
Static IP Address / Mask / Gateway	Sets the IP address, mask, and gateway. This can only be configured if DHCP is disabled.
DHCP (Off/On)	Enable or disable DHCP.
Multicast Address / Port	Sets the IP address used for multicast broadcasts. This feature enables auto-discovery in FMS.
SNTP	Configure use of network time protocol. Set IP address of the network time server, turn on and off and offset time zones from UTC.
Modbus Map Ver	<p>Sets the Modbus Map version, either 2.x or v15. Modbus Map version v15 allows the particle counter to behave and be configured in the same way as older AeroTrak remote particle counter models.</p> <p>2.x is the default setting and only functions in conjunction with TSI's monitoring software FMS 5.5 or newer, enabling AeroTrak+ Remote Particle Counter new features and configuration of AeroTrak+ Models 6X01.</p>
Location Name	Sets a location name to identify the device.
Seconds before flow error	Set the number of seconds the unit needs to be out of flow tolerance prior to triggering a flow status error. The default setting is 10 seconds
Seconds before flow block error (pump versions only)	<p>Set the number of consecutive seconds an instrument needs to be in flow error to consider the flow to be blocked. At this time, the pump will be stopped.</p> <p>For example, if the flow error is set at 1 second and the flow block error set at 30 seconds, the Remote Particle Counter's pump will turn off if the instrument is in flow error for (1 + 30) 31 seconds.</p>
Seconds between Flow Block Error and Pump Off (pump versions only)	Once a flow block error occurs and the pump is shut off, the pump will stay off for the number of seconds set in the seconds between Flow Monitoring Error and Pump off. After this time has elapsed, the instrument will turn the pump back on and attempted to establish its target flow. The flow error and flow block error will be reset.
Number of Flow Block Repeats (pump versions only)	Set the number of retries for re-establishing flow after flow block errors. If the instrument does not regain flow after set number of retries, it will keep the pump turned off until instrument is rebooted.

Non-Pump Models

AeroTrak+ Remote App

AeroTrak+ Remote Tech Page

Config Alarm Relay Analog **Instr** Data Passwd Reset

Instrument Settings SAVE

Static IP Address:	192.168.200.90	DHCP (Off/On):	<input type="checkbox"/>
Static IP Mask:	255.255.255.0	Static IP Gateway:	192.168.200.1
Multicast Address:	239.100.100.1	Multicast (Off/On):	<input checked="" type="checkbox"/>
Multicast Port:	5000		
SNTP IP Address:	10.1.0.249	SNTP (Off/On):	<input type="checkbox"/>
SNTP Time Zone:	<input type="range"/>	UTC Offset: 0.0	
Modbus Map Version:	2.x		
Location Name:	LOCATION		
Seconds before Flow Error (10-60):	1		

Pump Models

AeroTrak+ Remote App

AeroTrak+ Remote Tech Page

Config Alarm Relay Analog **Instr** Data Passwd Reset

Instrument Settings SAVE

Static IP Address:	192.168.200.90	DHCP (Off/On):	<input type="checkbox"/>
Static IP Mask:	255.255.255.0	Static IP Gateway:	192.168.200.1
Multicast Address:	239.100.100.1	Multicast (Off/On):	<input checked="" type="checkbox"/>
Multicast Port:	5000		
SNTP IP Address:	10.1.0.249	SNTP (Off/On):	<input checked="" type="checkbox"/>
SNTP Time Zone:	<input type="range"/>	UTC Offset: 0.0	
Modbus Map Version:	2.x		
Location Name:	LOCATION		
Seconds before Flow Error (1-60):	1		
Seconds before Flow Block Err (0-60):	30		
Seconds between FB Error and Pump Off (60-3600):	600		
Number of Flow Block Repeats (1-100):	10		

Tech Page—Data Tab

The Data tab is used to retrieve historical sample data by inputting the first record number, the number of consecutive records following the first record, and the filename. Clicking **Get Records** will output a CSV data file containing sample data from the requested records.

Regular data files will retrieve data based on the programmed sample length.

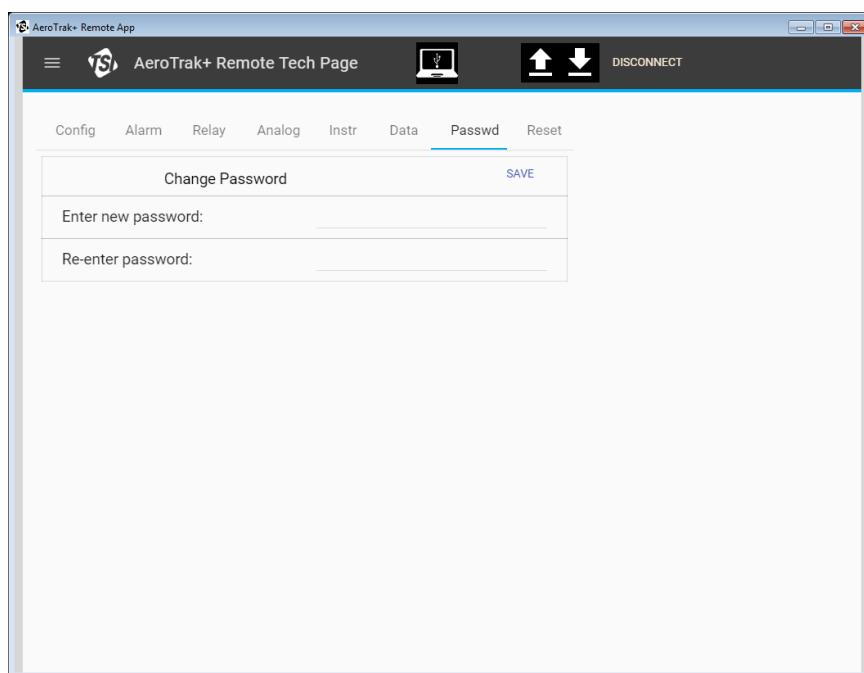
1-Second sample data is a circular buffer of 1-second samples (3072 total samples).

The screenshot shows the 'AeroTrak+ Remote Tech Page' interface. At the top, there is a navigation bar with a hamburger menu, the AeroTrak+ logo, and the title 'AeroTrak+ Remote Tech Page'. To the right of the title are icons for a USB drive, upload, download, and a 'DISCONNECT' button. Below the navigation bar is a tabbed interface with tabs for 'Config', 'Alarm', 'Relay', 'Analog', 'Instr', 'Data' (which is selected), 'Passwd', and 'Reset'. The 'Data' tab contains two main sections: 'Regular Sample Data' and 'One-Second Sample Data'. Each section has a 'Total Records' count (106 for Regular, 303 for One-Second). Below each count is a text input field for 'REGULAR DATA FILE PATHNAME' and 'ONE-SECOND DATA FILE PATHNAME' respectively. Under the 'Regular Sample Data' section, there are radio buttons for 'All Samples' and 'Last N Samples' (which is selected), followed by a 'Count:' label and a text input field, and a 'GET RECORDS' button. The 'One-Second Sample Data' section has identical controls.

Tech Page—Password (Passwd) Tab

The Password tab is used to change the Tech Page password. The default password is admin

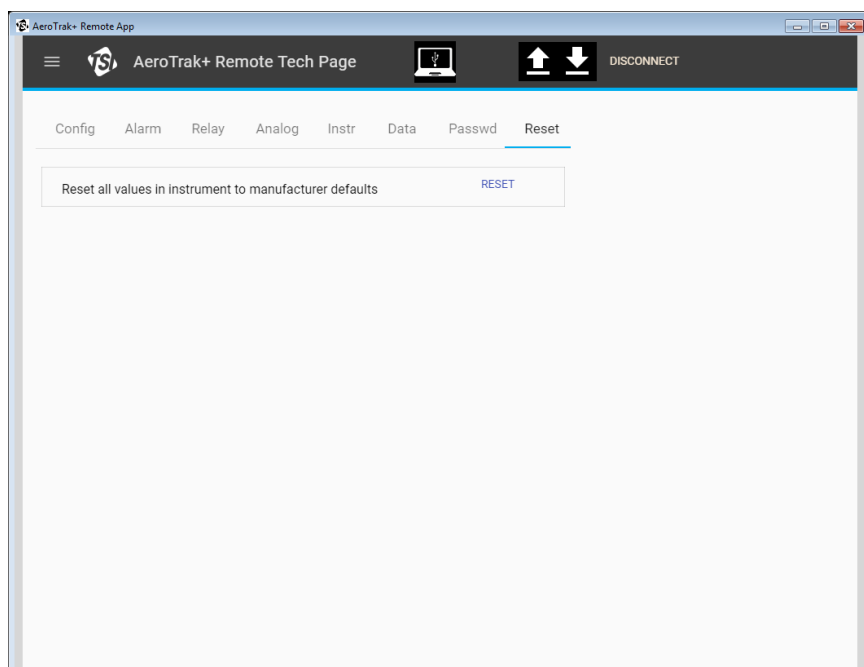
Save must be pressed for the configurations to be saved to the instrument.



The screenshot shows the 'AeroTrak+ Remote App' window. The title bar includes the app name and standard window controls. The main header bar contains a menu icon, the app name, a USB icon, upload/download arrows, and a 'DISCONNECT' button. Below the header is a horizontal menu with tabs: Config, Alarm, Relay, Analog, Instr, Data, **Passwd**, and Reset. The 'Passwd' tab is active. The main content area displays a 'Change Password' form with two input fields labeled 'Enter new password:' and 'Re-enter password:', and a blue 'SAVE' button in the top right corner of the form.

Tech Page—Reset Tab

This will reset the instrument to its original factory settings.



The screenshot shows the 'AeroTrak+ Remote App' window with the 'Reset' tab selected in the horizontal menu. The main content area displays a single button labeled 'RESET' next to the text 'Reset all values in instrument to manufacturer defaults'.

Loading or Saving a Configuration

The Configuration Utility allows you to easily save and load the device configuration. This is useful when configuring multiple devices with the same configuration. Use the **Up** button at the top of the page to load a configuration or use the **Down** button to save a configuration.



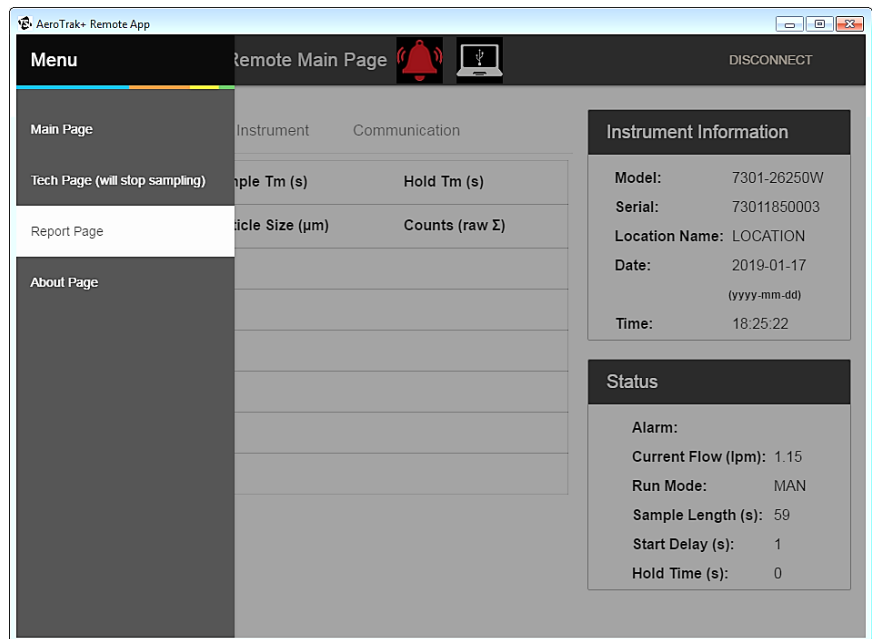
The configuration is saved in an XML file format.

The parameters set in the previous tabs will be stored to the XML file for easy transfer. This file is compatible with FMS and can be used to import sensor configurations into TSI's FMS monitoring software.

Particle Counter Report Page

All critical parameters on the instrument can be seen grouped in the configuration report.

To enter the report page, open the menu at the upper left-hand corner and click on **Report Page**.



The report page will show a configuration report on all the instruments configurable parameters.

AeroTrak+ Remote Report Page
DISCONNECT

Configuration Report

Instrument Information

Model:	7301-26250W	Location Name:	LOCATION
Serial #:	73011850003	Modbus Map Ver:	2
Firmware Version:	0.38	Static IP Address:	192.168.200.90
Last Cal Date (yyyy-m-d):	2019-01-04	Static IP Mask:	255.255.255.0
Nominal Flow (lpm):	2.83	Static IP Gateway:	192.168.200.1
Laser Run Time (hrs):	6.00	DHCP (Off/On):	OFF
Instr. Temperature (C):	40.18	Multicast Address:	239.100.100.1
Sample Length (s):	59	Multicast Port:	5000
Start Delay (s):	1	Multicast (Off/On):	1
Hold Time (s):	0	SNTP Address:	10.1.0.249
Laser Current (mA):	0.00	SNTP (Off/On):	OFF
Bkgrnd Light Level:	0.00	SNTP UTC offset:	0.0
MAC Address:	0:30:20:0:E9:F6		

Alarm Settings

Rolling Buffer Length (sec):	60	Threshold (Σ)	Sample Off/On	1-Sec Off/On
Channel	Size (μm)			
Ch 1	0.3	0	OFF	OFF
Ch 2	0.5	0	OFF	OFF
Ch 3	1	0	OFF	OFF
Ch 4	5	0	OFF	OFF
Ch 5	10	0	OFF	OFF
Ch 6	25	0	OFF	OFF

Relay Settings

Alarm	Off/On	Alarm	Off/On
Ch 1	OFF	Laser Alert	OFF
Ch 2	OFF	Laser Scatter	OFF
Ch 3	OFF	Cal Corrupt	OFF
Ch 4	OFF	Ambient Cond	OFF
Ch 5	OFF	Flow	OFF
Ch 6	OFF	External Alarm	OFF

Analog Out Settings

Analog Out Ch A:	Ch 1	Scale Ch A:	Log
Analog Out Ch B:	Ch 2	Scale Ch B:	Log

Date (yyyy-m-d) 2019-01-17

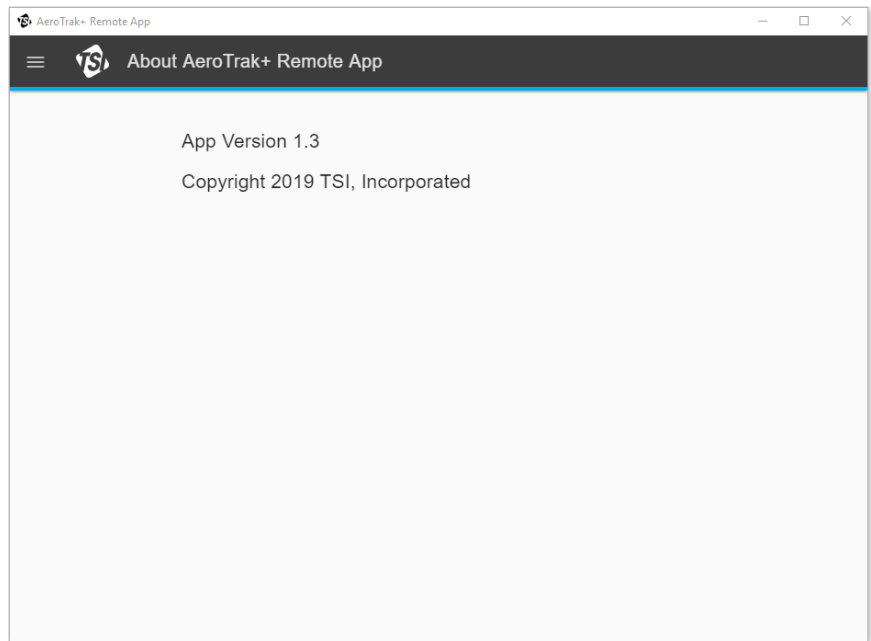
Time (hh:mm:ss) 18:26:09

Saving a Configuration Report

The configuration report can be saved to a PDF file by pressing the up arrow at the top of the report and selecting a name and location for the file.

About Page

The About Page is accessed by the menu in the upper left hand of the application. The about page shows the current version of the software application.



CHAPTER 4

Troubleshooting

This chapter contains information for troubleshooting common issues with the AeroTrak®+ Remote Particle Counter.

Symptom	Possible Cause	Corrective Action
Instrument does not power up - Status LED is off (should be green or red)	Ethernet is plugged in but is not a Power-Over-Ethernet device (802.3at 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.
Flow LED is flashing or off, indicating a flow error (7201, 7301, 7501, 7310, 7510)	Vacuum line may be disconnected, blocked, or kinked.	Check vacuum line to make sure it is connected, unblocked and not kinked.
	Inlet may be restricted.	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.
Flow LED is flashing or off, indicating a flow error (6201, 6301, 6501)	Inlet may be restricted.	Remove any obstructions from inlet.
	Pump may be not be functioning.	Contact service.
Status LED is red indicating a service error or alarm threshold being met.	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.
	A set alarm threshold is met.	
Sample LED is off	This is normal if counting is disabled.	Use software to enable counting.
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 filter assembly.	Check that the zero filter is attached securely

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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 Particle Counter for service.

Technical Contacts

- If you have any difficulty setting up or operating the AeroTrak+ Remote 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+ Remote 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.

International Contacts

Service

TSI Instruments Singapore Pte Ltd 150 Kampong Ampat #05-05 KA Centre Singapore 368324 Telephone: +65 6595-6388 Fax: +65 6595-6399 E-mail: tsi-singapore@tsi.com	TSI Instrument (Beijing) Co., Ltd. Unit 1201, Pan-Pacific Plaza No. 12 A, Zhongguancun South Avenue Haidian District, Beijing, 100181 CHINA Telephone: +8A-10-8219 7688 Fax: +8A-10-8219 7699 E-mail: tsibeijing@tsi.com
TSI Instruments Ltd. Stirling Road Cressex Business Park High Wycombe, Buckinghamshire HP12 3ST UNITED KINGDOM Telephone: +44 (0) 149 4 459200 E-mail: tsiuk@tsi.com	

Technical Support

TSI Instruments Singapore Pte Ltd 150 Kampong Ampat #05-05 KA Centre Singapore 368324 Telephone: +65 6595-6388 Fax: +65 6595-6399 E-mail: tsi-singapore@tsi.com	TSI Instrument (Beijing) Co., Ltd. Unit 1201, Pan-Pacific Plaza No. 12 A, Zhongguancun South Avenue Haidian District, Beijing, 100181 CHINA Telephone: +8A-10-8219 7688 Fax: +8A-10-8219 7699 E-mail: tsibeijing@tsi.com
TSI GmbH Neuköllner Strasse 4 52068 Aachen GERMANY Telephone: +49 241-52303-0 Fax: +49 241-52303-49 E-mail: tsigmbh@tsi.com	TSI Instruments Ltd. Stirling Road Cressex Business Park High Wycombe, Buckinghamshire HP12 3ST UNITED KINGDOM Telephone: +44 (0) 149 4 459200 E-mail: tsiuk@tsi.com
TSI France Inc. Hotel technologique BP 100 Technopôle de Château-Gombert 13382 Marseille cedex 13 France Telephone: +33 (0) 1 41 19 21 99 Fax: +33 (0) 1 47 86 00 07 E-mail: tsifrance@tsi.com	

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, 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.

APPENDIX A

Specifications

All specifications are subject to change without notice.

Light Source	Laser Diode
Laser Warranty	Five Years
Instrument Warranty	Two Years
Calibration Frequency.....	One Year
Vacuum Source	External vacuum > 15 in. (38.1 cm) of Hg (For non-pump versions only)
Optional—Wireless.....	Wi-Fi Technology
External Surface	Stainless steel
Analog Output Options	3 Channels 4-20 mA output: 2 User-selectable particle sizes-linear or log scale 1 Status channel
Standards.....	CE, JIS B9921, ISO 21501-4
Operating Range.....	50° to 104°F (10° to 40°C) / 20% to 95% noncondensing
Zero Count	<1 count / 5 minutes (<2 particles / ft ³) (per ISO 21501-4 and JIS)
Sampling Frequency	1 second to 24 hours Standard sample period data collection plus parallel per second sampling to detect adverse trends
Communication	Ethernet (TCP/IP) Modbus RTU, Option: Wi-Fi Technology
Status Indicator	Power, Flow, Sample and Ethernet
Alarm Output	Normal open dry contact rated 0 to 30 V AC/DC 2 Amp
Analog Output	The Analog Output 4-20 mA is rated to drive a load resistance less than or equal to 500 Ω
Data Storage	256,000 Sample Records, 3072 Records of 1 second data
Dimensions (H x W x D).....	7XXX: 2.9 in. x 4.5 in. x 2.4 in. (7.3 cm x 11.4 cm x 6.0 cm) 6XXX: 5.6 in. x 4.5 in. x 2.6 in. (14.2 cm x 11.4 cm x 6.7 cm x 14.2 cm)
Weight	7XXX: 1.3 lb (0.59 kg) 6XXX: 2.3 lb (1.05 kg)
Power.....	Power-over-Ethernet (PoE+ compliant with IEEE 802.3at) or 12-24 VDC @ 30W
Storage Range	14° to 122°F (-10° to 50°C) / Up to 98% noncondensing

Included Accessories.....	Power and alarm relay connector, operating manual and configuration utility USB Flash Drive
Optional Accessories.....	Power supply, isokinetic inlets, purge filter, alarm cable, sample tubing, vacuum tubing and mounting bracket

Specific Model Specifications

	7201	7301	7310
Size Resolution	<15% @ 0.3 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)
Counting Efficiency	50% at 0.2 µm; 100% for particles > 0.3 µm (per ISO 21501-4 and JIS)	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)
Concentration Limit	4,860,000 particles/ft ³ (172,000,000/m ³) @ 10% coincidence loss	4,860,000 particles/ft ³ (172,000,000/m ³) @ 10% coincidence loss	486,000 particles/ft ³ (17,200,000/m ³) @ 10% coincidence loss

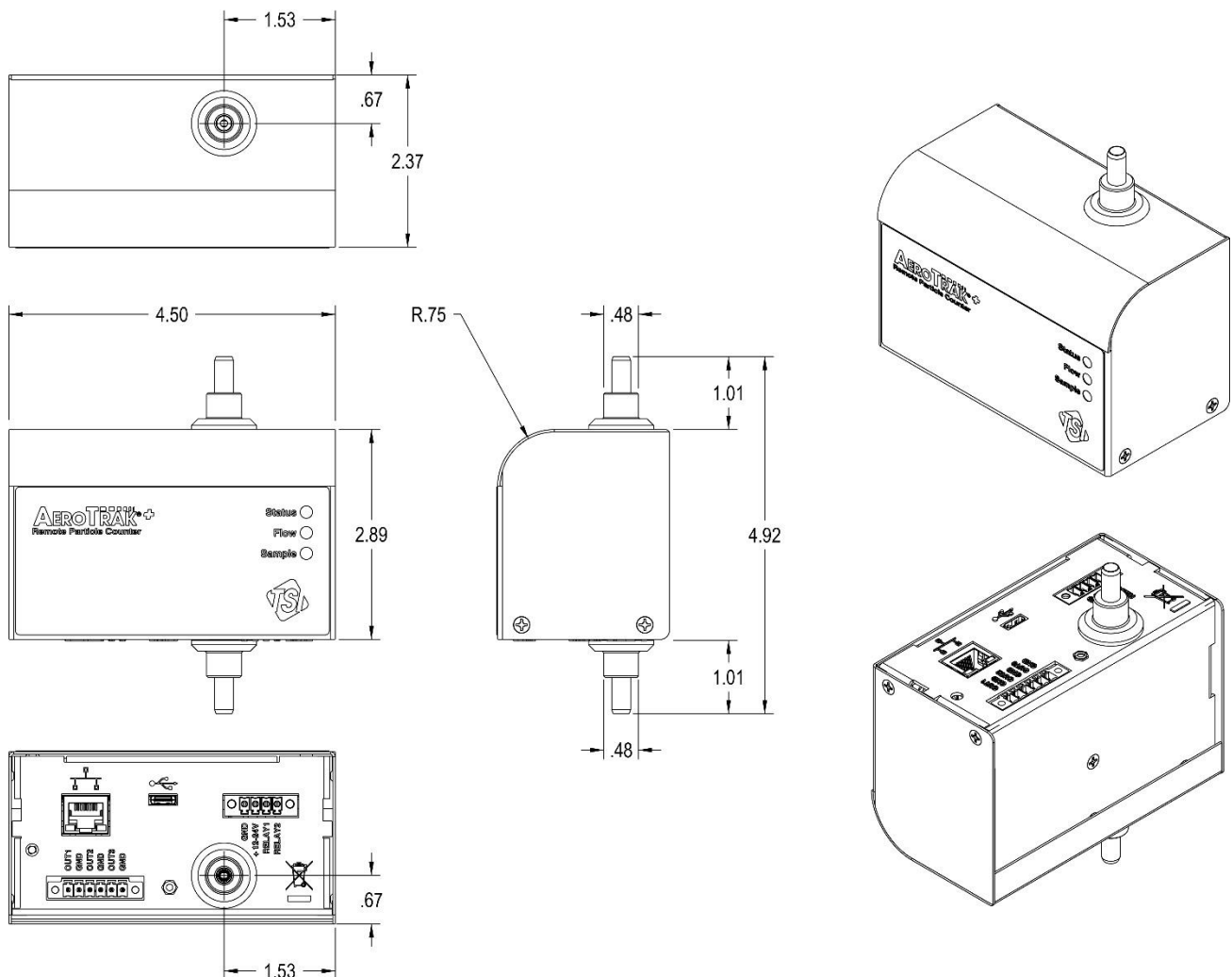
	7501	7510 VHP resistant model available
Size Resolution	<15% @ 0.5 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)
Counting Efficiency	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)
Concentration Limit	4,860,000 particles/ft ³ (172,000,000/m ³) @ 10% coincidence loss	486,000 particles/ft ³ (17,200,000/m ³) @ 10% coincidence loss

	6201	6301	6501
Size Resolution	<15% @ 0.3 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)
Counting Efficiency	50% at 0.2 µm; 100% for particles > 0.3 µm (per ISO 21501-4 and JIS)	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)
Concentration Limit	4,860,000 particles/ft ³ (172,000,000/m ³) @ 10% coincidence loss	4,860,000 particles/ft ³ (172,000,000/m ³) @ 10% coincidence loss	4,860,000 particles/ft ³ (172,000,000/m ³) @ 10% coincidence loss

Compliance

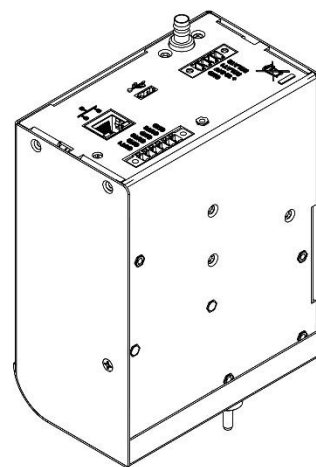
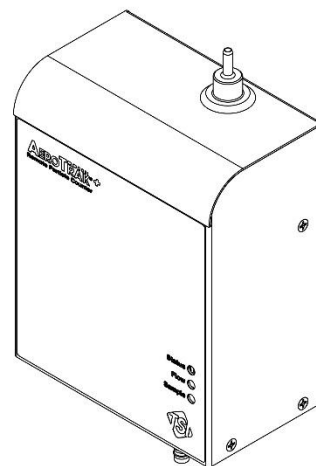
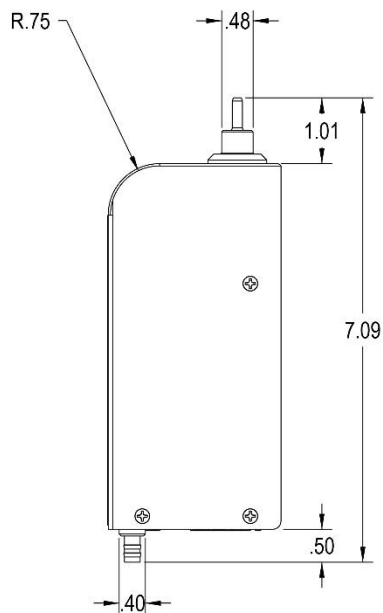
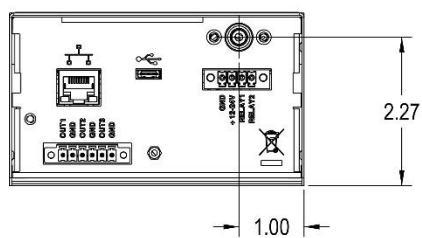
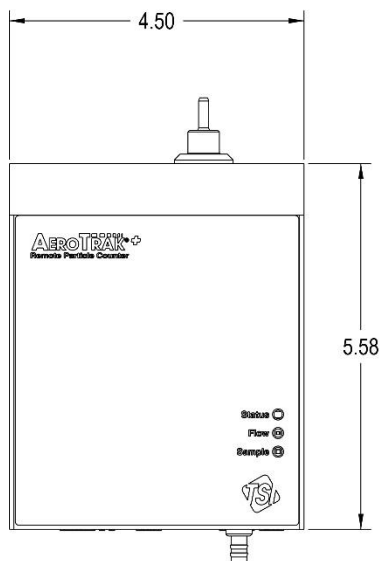
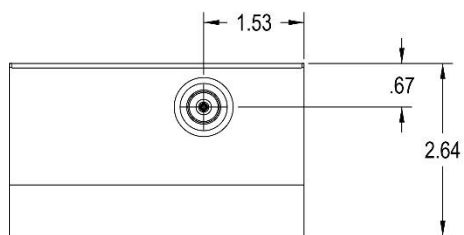
Regulatory Compliance Testing Standards	European Standard EN 61326-1: 2013 European Standard EN 55011: 2009 + A1: 2010 European Standard EN 61326-1: 2013 Korean Standard KN 11 with RRA Public Notification 2017-19 and RRA Announce 2017-71 Korean Standard KN 61000-6-1 with RRA Public Notification 2017-19 and RRA Announce 2017-71 FCC Part 15 Subpart B
RoHS Marking	Yes
Laser Safety	Complies with 21 CFR 1040.10 and 1040.11 IEC 60825-1:2014

Dimensional Diagram Models 7201, 7301, 7501, 7310, 7510



Dimensional Diagram

Models 6201, 6301, 6501



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UNDERSTANDING, ACCELERATED

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