



# AEROTRAK®+ REMOTE PARTICLE COUNTER MODELS 7201/7301/7501/7310/7510 MODELS 6201/6301/6501

---

OPERATION MANUAL

P/N 6012577 REVISION C  
MAY 2020



# START SEEING THE BENEFITS OF REGISTERING TODAY!

---

Thank you for your TSI instrument purchase. Occasionally, TSI releases information on software updates, product enhancements and new products. By registering your instrument, TSI will be able to send this important information to you.

**<http://register.tsi.com>**

As part of the registration process, you will be asked for your comments on TSI products and services. TSI's customer feedback program gives customers like you a way to tell us how we are doing.



UNDERSTANDING. ACCELERATED

**TSI Incorporated** - Visit our website **[www.tsi.com](http://www.tsi.com)** for more information.

<b>USA</b>	<b>Tel:</b> +1 800 874 2811	<b>India</b>	<b>Tel:</b> +91 80 67877200
<b>UK</b>	<b>Tel:</b> +44 149 4 459200	<b>China</b>	<b>Tel:</b> +86 10 8219 7688
<b>France</b>	<b>Tel:</b> +33 1 41 19 21 99	<b>Singapore</b>	<b>Tel:</b> +65 6595 6388
<b>Germany</b>	<b>Tel:</b> +49 241 523030		

# AEROTRAK<sup>®</sup>+

## REMOTE PARTICLE COUNTER

### MODELS 7201/7301/7501/7310/7510

### MODELS 6201/6301/6501

---

OPERATION MANUAL

P/N 6012577 REVISION C  
MAY 2020

**SHIP TO/MAIL TO:**

TSI Incorporated  
500 Cardigan Road  
Shoreview, MN 5512A-3996  
USA

**U.S.**

**Technical Support:**

(800) 680-1220/(651) 490-2860

**Fax:**

(651) 490-3824

**E-mail address:**

[technical.services@tsi.com](mailto:technical.services@tsi.com)

**Website:**

<http://www.tsi.com>

**INTERNATIONAL**

**Technical Support:**

(001 651) 490-2860

**Fax:**

(001 651) 490-3824

# Manual History

The following is a manual history of the AeroTrak<sup>®</sup>+ 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

**Copyright**

©TSI Incorporated / 2019-2020 / All rights reserved.

**Address**

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

**E-mail Address**

[answers@tsi.com](mailto:answers@tsi.com)

**Limitation Of Warranty And Liability**  
(effective April 2014)

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

Seller warrants the goods, excluding software, sold hereunder, under normal use and service as described in the operator's manual, to be free from defects in workmanship and material for **24 months, 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;
- e. This warranty does not cover calibration requirements, and seller warrants only that the instrument or product is properly calibrated at the time of its manufacture. Instruments returned for calibration are not covered by this warranty;
- f. This warranty is **VOID** if the instrument is opened by anyone other than a factory authorized service center with the one exception where requirements set forth in the manual allow an operator to replace consumables or perform recommended cleaning;
- g. This warranty is **VOID** if the product has been misused, neglected, subjected to accidental or intentional damage, or is not properly installed, maintained, or cleaned according to the requirements of the manual. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

The foregoing is **IN LIEU OF** all other warranties and is subject to the **LIMITATIONS** stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. WITH RESPECT TO SELLER'S BREACH OF THE IMPLIED WARRANTY AGAINST INFRINGEMENT, SAID WARRANTY IS LIMITED TO CLAIMS OF DIRECT INFRINGEMENT AND EXCLUDES CLAIMS OF CONTRIBUTORY OR INDUCED INFRINGEMENTS. BUYER'S EXCLUSIVE REMEDY SHALL BE THE RETURN OF THE PURCHASE PRICE DISCOUNTED FOR REASONABLE WEAR AND TEAR OR AT SELLER'S OPTION REPLACEMENT OF THE GOODS WITH NON-INFRINGEMENTS GOODS.**

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF SELLER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO SELLER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN THE CASE OF SOFTWARE, SELLER WILL REPAIR OR REPLACE DEFECTIVE SOFTWARE OR IF UNABLE TO DO SO, WILL REFUND THE PURCHASE PRICE OF THE SOFTWARE. IN NO EVENT SHALL SELLER BE LIABLE FOR LOST PROFITS, BUSINESS INTERRUPTION, OR ANY SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against Seller more than 12 months after a cause of action has accrued. The goods returned under warranty to Seller's factory shall be at Buyer's risk of loss, and will be returned, if at all, at Seller's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of Seller.

### **Service Policy**

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

### **Trademarks**

TSI, the TSI logo, and AeroTrak are registered trademarks of TSI Incorporated. Teflon is a registered trademark of DuPont. Modbus is a registered trademark of Modicon, Incorporated. Windows and Internet Explorer are registered trademarks of Microsoft Corporation. Wi-Fi is a registered trademark of the Wi-Fi Alliance.

# Contents

<b>Manual History .....</b>	<b>ii</b>
<b>Warranty .....</b>	<b>iii</b>
<b>Contents .....</b>	<b>v</b>
<b>Safety .....</b>	<b>vii</b>
Laser Safety.....	vii
Labels .....	viii
Description of Caution/Warning Symbols .....	viii
Caution.....	viii
Warning.....	ix
Caution or Warning Symbols .....	ix
Reusing and Recycling .....	ix
Getting Help.....	ix
<b>CHAPTER 1 Introduction and Unpacking .....</b>	<b>1-1</b>
Unpacking the AeroTrak+ Remote Particle Counter .....	1-3
Optional Accessories .....	1-4
All Models .....	1-4
2.83 L/min, 0.1 cfm Models (7201, 7301, 7501, 6201, 6301, 6501).....	1-4
28.3 L/min, 1.0 cfm Models (7310, 7510) .....	1-5
<b>CHAPTER 2 Installation and Getting Started .....</b>	<b>2-1</b>
Indicator LEDs .....	2-1
Electrical Connections .....	2-2
Device Connections .....	2-2
12-24 VDC / Relay Connector .....	2-2
Ethernet Connector.....	2-3
USB-C Connector .....	2-3
AeroTrak+ Wi-Fi Node Operation .....	2-3
4-20 mA Analog Output / Wireless Connector.....	2-4
Tubing Connections.....	2-4
Inlet.....	2-4
Installation.....	2-5
Determine the Installation Location.....	2-5
Mounting the Remote Particle Counter.....	2-5
Supplying Power to the Remote Particle Counter.....	2-6
Using Power-Over-Ethernet (PoE+) .....	2-6
Using DC Power .....	2-6
Connecting the Remote Particle Counter to a Computer .....	2-7
Modbus® TCP over Ethernet.....	2-7
Tubing Installation .....	2-7
Connecting Vacuum Tubing (Models 7201, 7301, 7501, 7310, 7510 only) .....	2-7
Connecting Sample Tubing .....	2-8
<b>CHAPTER 3 Communications and Configurations.....</b>	<b>3-1</b>
Setting the IP Address of the Particle Counter.....	3-1
Viewing Device Information .....	3-2
Title Bar .....	3-2
Main Page—Counts Tab.....	3-3

Main Page—Instrument Tab .....	3-4
Main Page—Communication Tab .....	3-5
Configuring the Particle Counter .....	3-6
Tech Page—Configuration (Config) Tab.....	3-8
Tech Page—Alarm Tab.....	3-9
Tech Page—Relay Tab.....	3-10
Tech Page—Analog Tab.....	3-11
Tech Page—Instrument (Instr) Tab .....	3-12
Non-Pump Models .....	3-13
Pump Models .....	3-13
Tech Page—Data Tab .....	3-14
Tech Page—Password (Passwd) Tab .....	3-15
Tech Page—Reset Tab.....	3-15
Loading or Saving a Configuration.....	3-16
Particle Counter Report Page.....	3-16
Saving a Configuration Report.....	3-17
About Page .....	3-18
<b>CHAPTER 4 Troubleshooting.....</b>	<b>4-1</b>
<b>CHAPTER 5 Contacting Customer Service .....</b>	<b>5-1</b>
Technical Contacts .....	5-1
International Contacts .....	5-1
Service .....	5-1
Technical Support.....	5-2
Returning for Service.....	5-2
<b>APPENDIX A Specifications .....</b>	<b>A-1</b>
Specific Model Specifications.....	A-2
Compliance.....	A-3
Dimensional Diagram Models 7201, 7301, 7501, 7310, 7510 .....	A-3
Dimensional Diagram Models 6201, 6301, 6501 .....	A-4
<b>Index</b>	



# 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.




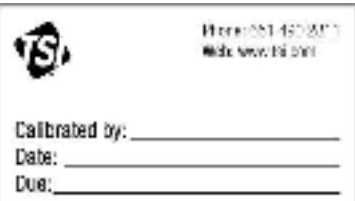


## WARNING

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)	
2. Calibration label (right-side panel)	
3. Laser radiation label (internal)	<b>DANGER!</b> VISIBLE 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



#### 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"><li>• <b>DO NOT</b> dispose of used batteries in the trash.</li><li>• Follow local environmental requirements for battery recycling.</li><li>• If instrument becomes obsolete, return to TSI for disassembly and recycling.</li></ul>
--	---

---

## 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](mailto:technical.services@tsi.com)  
Web site: [www.tsi.com](http://www.tsi.com)

*(This page intentionally left blank)*

## 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	

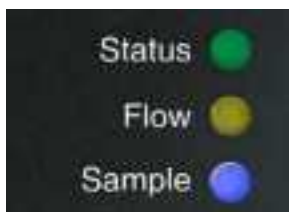
## CHAPTER 2

# 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"><li>• Laser current error</li><li>• Laser scatter error</li><li>• Flow error</li><li>• Calibration error</li><li>• Ambient condition error</li></ul>
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. <b>NOTE:</b> 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:

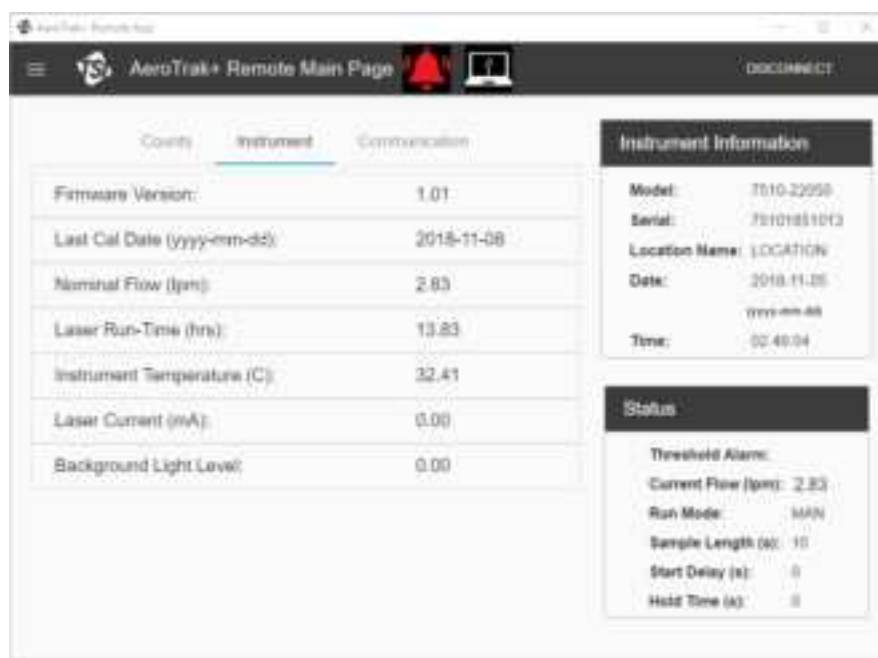
Label	Function
Sample #	Current Sample Number
Sample Time (s)	Elapsed time in the current sample interval
Hold Time (s)	Elapsed hold time between sample intervals
Particle Size (um)	Minimum size threshold for each channel in $\mu\text{m}$
Counts (raw cumulative)	Number of particle counts in each channel
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



## 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



## 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 shows the AeroTrak Remote App interface. The top navigation bar includes the app name, a hamburger menu, the title 'AeroTrak Remote Main Page', a red alarm icon, a laptop icon, and a 'DISCONNECT' button. Below the navigation bar are three tabs: 'Config', 'Instrument', and 'Communication'. The 'Communication' tab is selected and displays a table of network settings. To the right of the table are two panels: 'Instrument Information' and 'Status'.

Communication			
IP Address:	192.168.200.98	DHCP:	OFF
IP Mask:	255.255.255.0	IP Gateway:	192.168.200.1
Multicast Addr:	226.100.100.1	Multicast:	ON
Multicast Port:	5000		
SNTP Addr:	10.1.1.246	SNTP:	ON
Time Zone:	UTC (Offset) 0.0		
MAC Addr:	0.30.200.0.0	Modbus Ver:	Ver 2

**Instrument Information**

Model: T3011-20250

Serial: T30118000001

Location Name: LOCATION

Date: 2018-11-15

Time: 02:30:38

**Status**

Threshold Alarm:

Current Flow (gpm): 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:

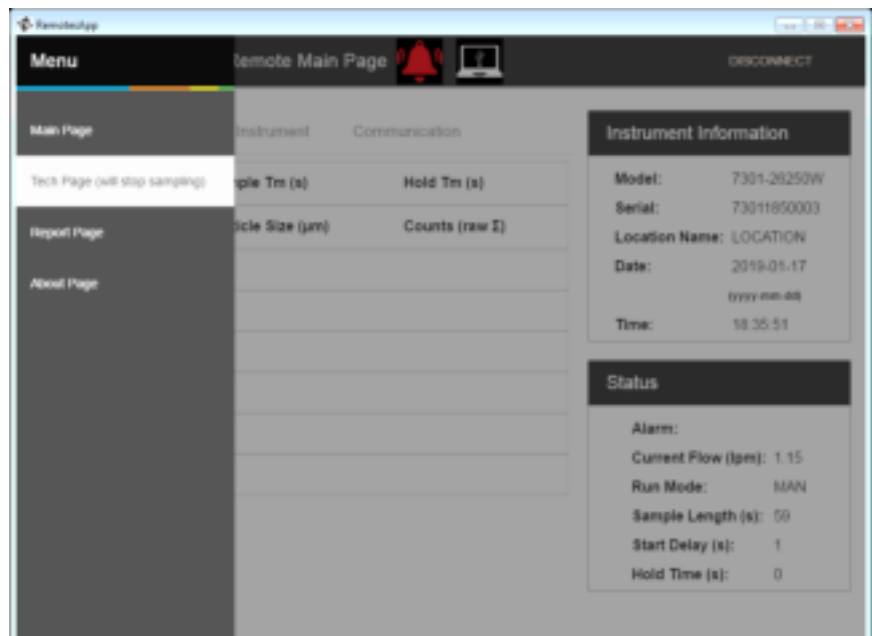
- A Windows® operating system computer or laptop with a USB port
- A USB-C cable
- Particle Counter to be configured

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

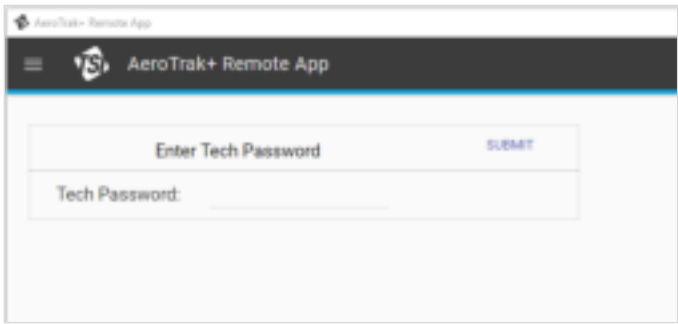
USB-C power is designed for instrument configuration viewing and setup, not for operation.

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 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 <b>Sync to computer</b>. 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><b>NOTE:</b> The <b>Save</b> 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>

The screenshot displays the 'AeroTrak+ Remote Tech Page' with the 'Config' tab selected. The interface includes a top navigation bar with icons for home, up, down, and disconnect. Below the navigation bar, there are tabs for Config, Alarm, Relay, Analog, Input, Data, Password, and Reset. The main content area is divided into two sections: 'Sample Configuration' and 'Date and Time'. The 'Sample Configuration' section contains input fields for 'Sample Length (s)' (set to 60), 'Start Delay (s)' (set to 0), and 'Hold Time (s)' (set to 0). It also has a 'Run Mode' section with radio buttons for 'Auto' and 'Manual' (selected). A 'Save' button is located to the right of this section. The 'Date and Time' section contains input fields for 'Date (yyyy-mm-dd)' (set to 2018-01-17) and 'Time (hh:mm:ss)' (set to 17:12:48). A 'Sync to computer' button is located below these fields. A 'Save' button is also present to the right of the Date and Time section.

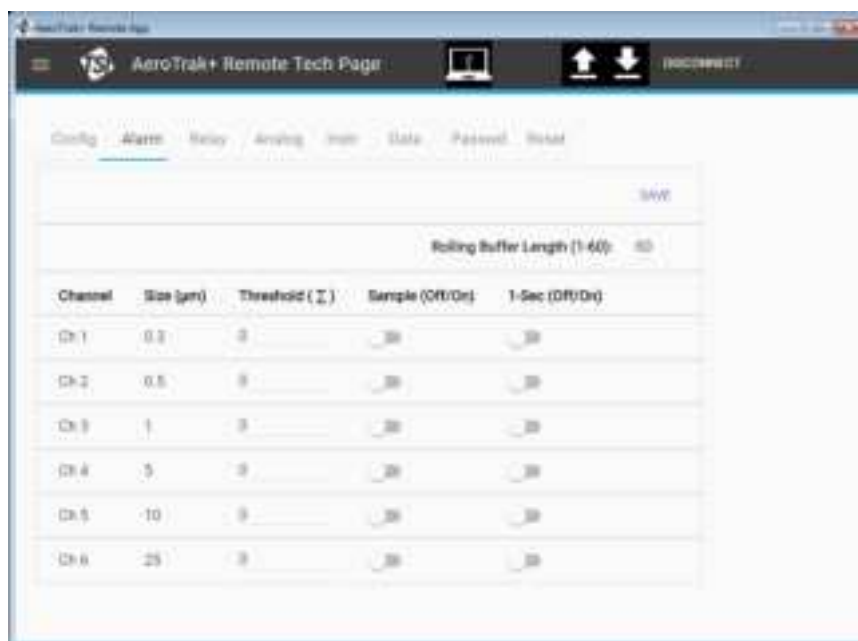
## Tech Page—Alarm Tab

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.



## 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 'Relay' tab in the AeroTrak+ Remote Tech Page. The page has a navigation bar with tabs: Config, Alarm, Relay (selected), Analog, Setup, Data, Paused, and Reset. Below the navigation bar is a table with columns: Alarm, Relay (Off/On), Alarm, Relay (Off/On), and a 'Save' button. The table contains rows for channel sizes (0.3, 0.5, 1, 5, 10, 25) and instrument status alarms (Flow Alert, Laser Alert, Laser Scatter, Ambient Conditions, Instrument Error, Calibration Corrupt). Each row has a 'Relay (Off/On)' toggle switch. At the bottom of the table is a 'Relay Delay' field with the text '(Number of samples before relay is triggered)' and a value of 0.

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 shows the 'AeroTrak+ Remote Tech Page' interface. The 'Analog' tab is selected, displaying 'Analog Out Settings'. The interface includes a 'Save' button in the top right corner. The settings are organized into two columns for 'Ch A' and 'Ch B'.

**Ch A Settings:**

- Ch A bin channel:** Radio buttons for 0.3, 0.5, 1, 5, 10, and 25. The '0.5' option is selected.
- Ch A Scale:** Radio buttons for Linear Scale 10, 100, 1000, 10000, 100000, 1000000, 10000000, and 100000000. The 'Log Scale' option is selected.

**Ch B Settings:**

- Ch B bin channel:** Radio buttons for 0.3, 0.5, 1, 5, 10, and 25. The '0.3' option is selected.
- Ch B Scale:** Radio buttons for Linear Scale 10, 100, 1000, 10000, 100000, 1000000, 10000000, and 100000000. The 'Log Scale' option is selected.

## 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 Tech Page**

Config Alarm Setup Arming **Setup** Data Password Reset

**Instrument Settings** [Save](#)

Static IP Address:	192.168.200.91	DHCP (Off/On):	<input type="radio"/>
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="radio"/>
SNTP Time Zone:	<input type="range"/> UTC Offset: 0.0		
Modbus Map Version:	1.0		
Location Name:	LOCATION		
Seconds before Flow Error (10-600)	1		

## Pump Models

**AeroTrak+ Remote Tech Page**

Config Alarm Setup Arming **Setup** Data Password Reset

**Instrument Settings** [Save](#)

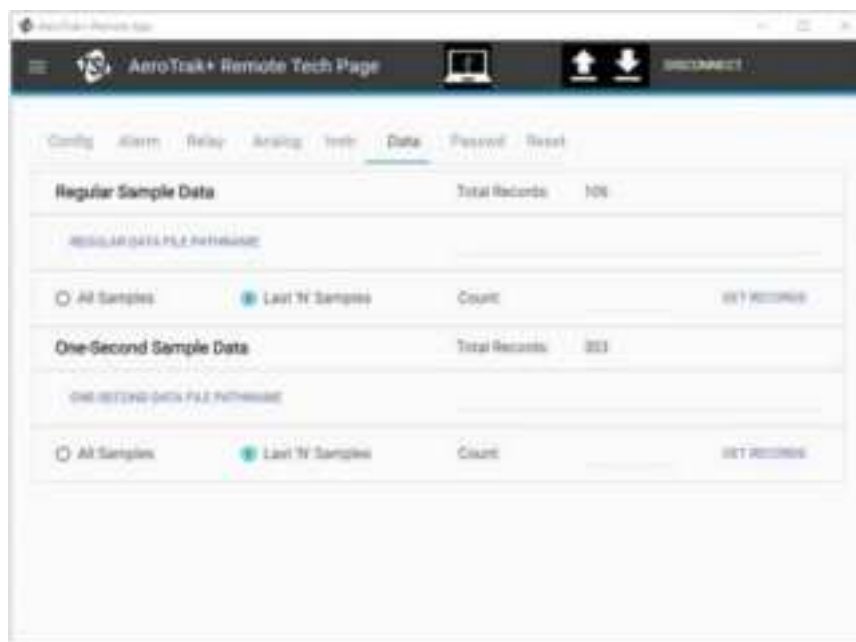
Static IP Address:	192.168.200.90	DHCP (Off/On):	<input type="radio"/>
Static IP Mask:	255.255.255.0	Static IP Gateway:	192.168.200.1
Multicast Address:	239.100.100.1	Multicast (Off/On):	<input checked="" type="checkbox"/>
Multicast Port:	5000		
SNTP IP Address:	10.1.0.249	SNTP (Off/On):	<input checked="" type="checkbox"/>
SNTP Time Zone:	<input type="range"/> UTC Offset: 0.0		
Modbus Map Version:	1.0		
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).

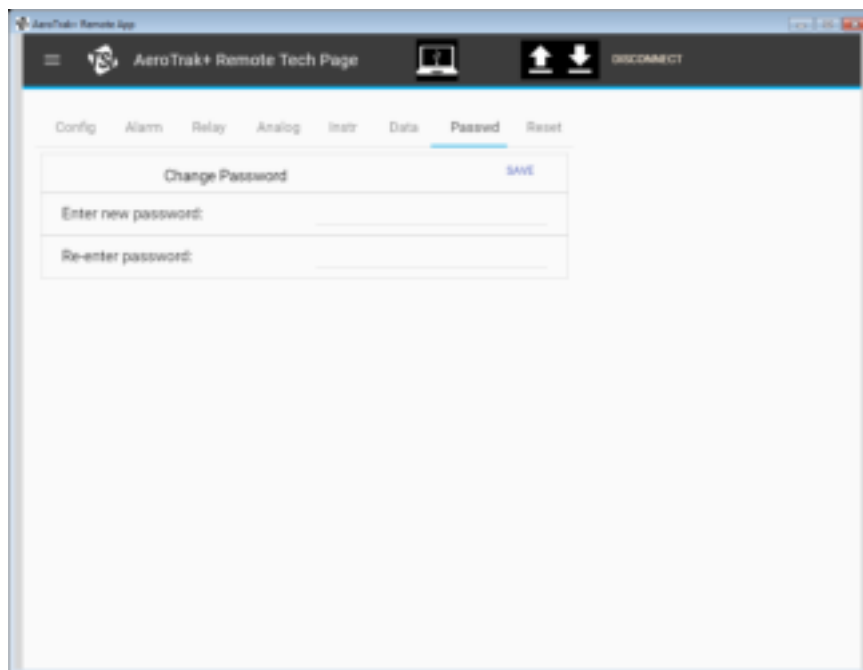




## Tech Page—Password (Passwd) Tab

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.



## Tech Page—Reset Tab

This will reset the instrument to its original factory settings.



## 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.

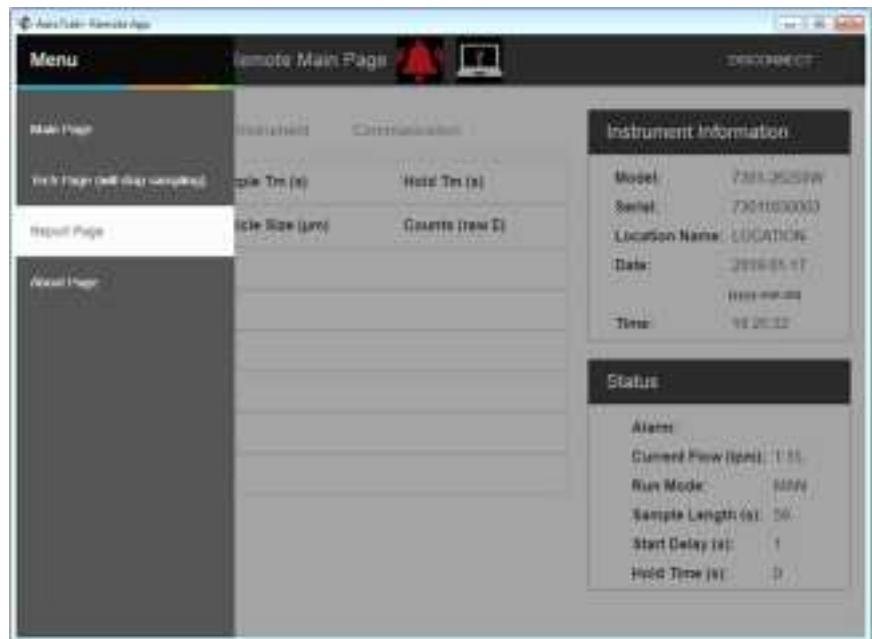
The parameters set in the previous tabs will be stored to the XML file for easy transfer. This file is compatible with FMS and can be used to import sensor configurations into TSI's FMS monitoring software.

---

## 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	Location Name	LOCATION
T301-28250W	Modbus Map Ver	3
Serial #	Static IP Address	192.168.200.90
Firmware Version	Static IP Mask	255.255.255.0
Last Cal Date (yyyy-mm-dd)	Static IP Gateway	192.168.200.1
Nominal Flow (gpm)	DHCP (On/Off)	OFF
Upper Rpt Time (hrs)	Multicast Address	239.100.100.1
Inlet Temperature (C)	Multicast Port	8000
Sample Length (s)	Multicast (On/Off)	1
Start Delay (s)	SNTP Address	10.1.0.249
Hold Time (s)	SNTP (On/Off)	OFF
Laser Current (mA)	SNTP UTC offset	0.0
Signal Light Level		
MAC Address		

**Alarm Settings**

Channel	Size (gpm)	Threshold (I)	Sample On/Off	1-Sec On/Off
Ch 1	0.5	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	On/Off
Ch 1	OFF
Ch 2	OFF
Ch 3	OFF
Ch 4	OFF
Ch 5	OFF
Ch 6	OFF

**Analog Out Settings**

Alarm	On/Off
Laser Alert	OFF
Laser Scatter	OFF
Cal Corrupt	OFF
Ambient Cond	OFF
Fine	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-mm-dd): 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 <b>red</b> 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

*(This page intentionally left blank)*

## 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](mailto: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](http://tsi.com/service), or contact TSI Customer Service at 1-800-680-1220 (USA) or (651) 490-2860.

## International Contacts

### Service

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

## Technical Support

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

## Returning for Service

Visit our website at [tsi.com/service](http://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.

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

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

## Specific Model Specifications

	<b>7201</b>	<b>7301</b>	<b>7310</b>
<b>Size Resolution</b>	<15% @ 0.3 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)
<b>Counting Efficiency</b>	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)
<b>Concentration Limit</b>	4,860,000 particles/ft <sup>3</sup> (172,000,000/m <sup>3</sup> ) @ 10% coincidence loss	4,860,000 particles/ft <sup>3</sup> (172,000,000/m <sup>3</sup> ) @ 10% coincidence loss	486,000 particles/ft <sup>3</sup> (17,200,000/m <sup>3</sup> ) @ 10% coincidence loss

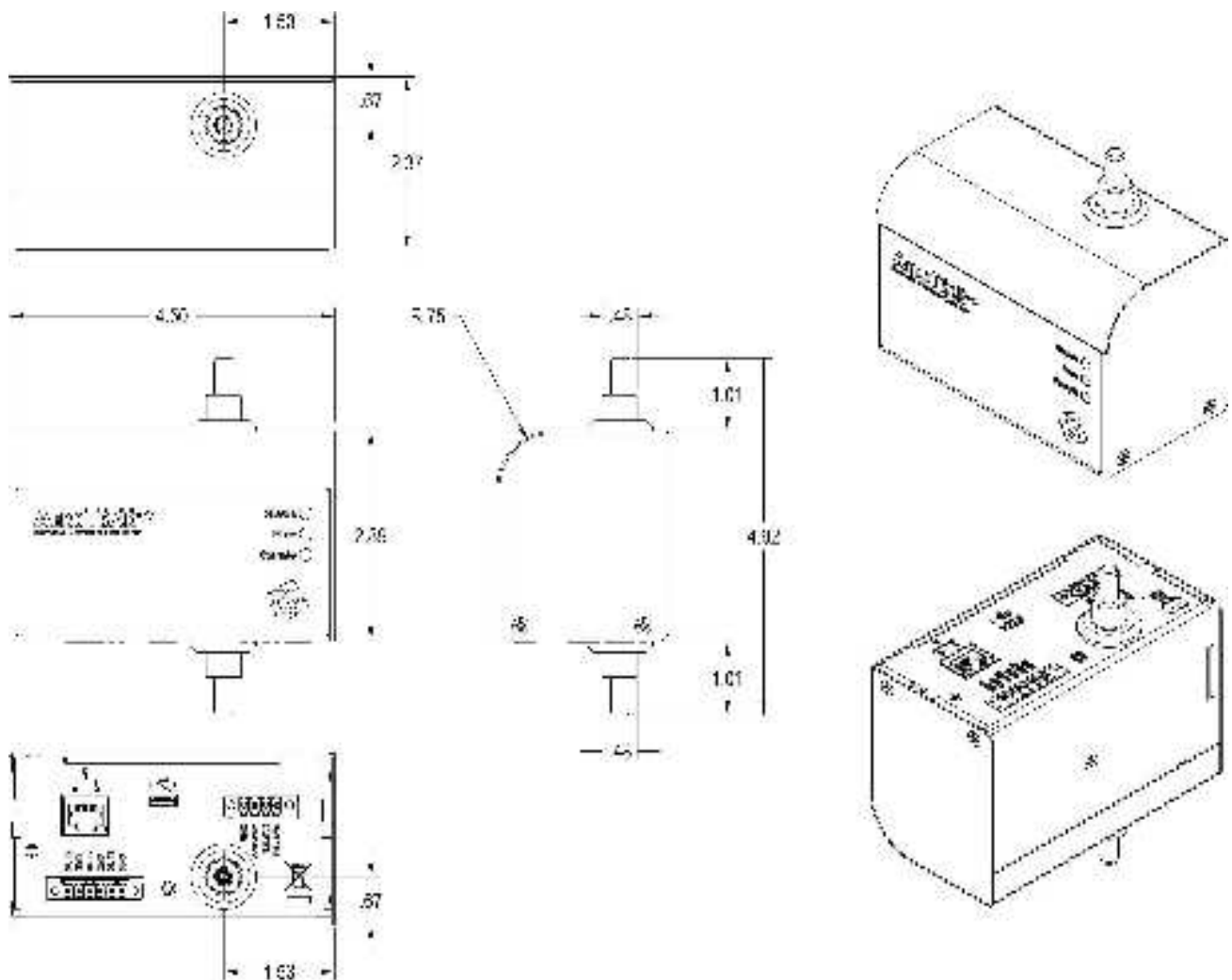
	<b>7501</b>	<b>7510 VHP resistant model available</b>
<b>Size Resolution</b>	<15% @ 0.5 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)
<b>Counting Efficiency</b>	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and JIS)	50% at 0.3 µm; 100% for particles > 0.45 µm (per ISO 21501-4 and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

	<b>6201</b>	<b>6301</b>	<b>6501</b>
<b>Size Resolution</b>	<15% @ 0.3 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)	<15% @ 0.5 µm (per ISO 21501-4)
<b>Counting Efficiency</b>	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)
<b>Concentration Limit</b>	4,860,000 particles/ft <sup>3</sup> (172,000,000/m <sup>3</sup> ) @ 10% coincidence loss	4,860,000 particles/ft <sup>3</sup> (172,000,000/m <sup>3</sup> ) @ 10% coincidence loss	4,860,000 particles/ft <sup>3</sup> (172,000,000/m <sup>3</sup> ) @ 10% coincidence loss

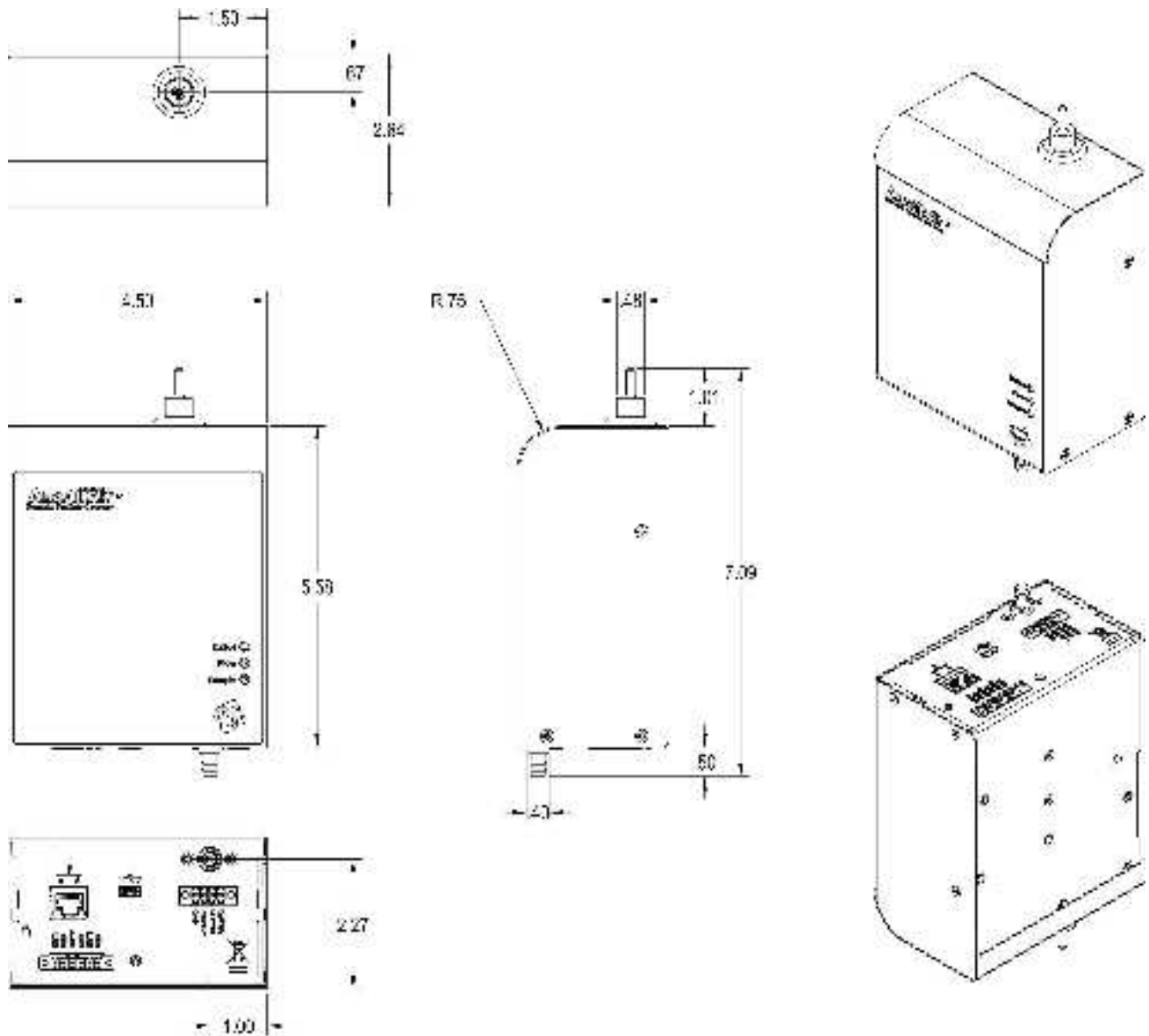
# Compliance

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



# Index

## 1

1-sec alarm, 3-9

## A

about page, 3-18

screen, 3-18

accessories

included, A-2

optional, 1-4, A-2

adapter, 1-5, 1-6

alarm, 3-3

alarm contact, 2-2

alarm icon, 3-2

alarm output, A-1

alarm tab, 3-9

analog output, 2-4, A-1

analog output connector, 2-4

analog output options, A-1

analog tab, 3-11

## B

background light level, 3-4

battery disposable, ix

## C

calibration certificate, 1-3

calibration frequency, A-1

calibration label, viii

caution

description, viii

symbol description, viii

CE marking, A-3

cfm filter assembly, 4-1

cfm zero filter, 1-4, 1-5

channel A, 3-11

channel A scale, 3-11

channel B, 3-11

channel B scale, 3-11

channel sizes, 3-10

Class I, vii

communication, A-1

communications, 3-1

compliance, A-3

concentration limit, A-2

configuration, 3-6

configuration (config) tab, 3-8

configuration report

saving, 3-17

configuration report page, 3-17

configuration utility, 2-4, 3-2, 3-3, 3-6, 3-16

configurations, 3-1

connect, 3-2

connecting sample tubing to counter, 2-8

connecting to computer, 2-7

connecting vacuum tubing to counter, 2-8

connections, 2-1

contact information, iii

contacting TSI

email address, iii

contacts, 5-1

counting efficiency, A-2

counts, 3-3

current flow, 3-3

customer service, 5-1

## D

data storage, A-1

data tab, 3-14

date, 3-3

date and time, 3-8

DC power, 2-6, 2-7

delay time, 3-6

device information, 3-2

DHCP, 3-5, 3-12

dimensional diagram, A-3, A-4

dimensions, A-1

disconnect, 3-2

disposal of battery, ix

dynamic host configuration protocol, 3-1

## E

earth ground symbol, ix

electrical connections, 2-2

ESD symbol, ix

Ethernet, 1-1

communications, 2-7

connector, 2-3

Ethernet address, 3-1

external surface, A-1

## F

facility monitoring system software, 1-1, 3-1

features, 2-1

firmware version, 3-4

flow, 2-1

flow LED

yellow, 4-1

flow rate, 1-1

FMS software, 3-1

## G

get records, 3-14

getting help, ix

getting started, 2-1

## H

help

contacts, ix

hold time, 3-3, 3-6, 3-8

## I

indicator

LEDs, 2-1

inlet, 2-4

installation, 2-1, 2-5

connecting counter to computer, 2-7

DC power, 2-6

determining location, 2-5

supplying power, 2-6

vacuum tubing, 2-7

instrument not meeting zero count

specification, 4-1

instrument not powering up, 4-1

instrument status alarms, 3-10

instrument tab, 3-12

instrument temperature, 3-4

instrument warranty, A-1

international contacts, 5-1

introduction, 1-1

IP address, 3-1

IP address/mask/gateway, 3-5

isokinetic barb sampling probe, 1-4

isokinetic cap, 1-5

isokinetic inlet, 1-4

isokinetic sampling probe, 1-5

isokinetic zero cap, 1-5, 1-6

## J

JIS, A-1, A-2

## K

kinked vacuum line, 4-1

Korea

manufacturer's declaration, 1-4

Korean standard, A-3

## L

label

advisory, viii

identification, viii

laser current, 3-4

laser on time, 3-4

laser radiation label, viii

laser safety, vii, A-3

laser symbol, viii

laser warranty, A-1

last cal date, 3-4

light source, A-1

load configuration, 3-16

location name, 3-3, 3-12

## M

MAC address, 3-5

main menu, 3-2

main page, 3-6

communication tab, 3-5

screen, 3-5

counts tab, 3-3

instrument tab, 3-4

screen, 3-4

screen, 3-3

- tech page, 3-6
  - password, 3-7
  - screen, 3-6
- manual history, ii
- manufacturer's declaration for Korea, 1-4
- mercury, 2-8
- modbus map ver, 3-12
- modbus map version, 3-5
- modbus RTU, 1-1
- modbus TCP over Ethernet, 2-7
- model, 3-3
- mounting, 2-5
  - bracket, 2-5
- mounting bracket, 1-4, 1-5, 2-5
- multicast address and port, 3-5
- multicast address/port, 3-12

## N

- nominal flow, 3-4
- non-disposable item symbol, viii
- non-pump models, 3-13
- number of flow block repeats, 3-12

## O

- operating range, A-1
- optional accessories, 1-4

## P

- particle size, 3-3
- password tab, 3-15
- PoE+, 2-2, 2-3, 2-6, 2-7
  - device, 2-6
  - warning, 2-6
- power, A-1
- power supply, 1-4, 2-6
- product registration, ii
- pump models, 3-13

## Q

- questions, 5-1
- quick start guide, 2-3

## R

- recycling, ix
- regulatory compliance testing
  - standards, A-3
- relay connector, 1-3, 2-2
- relay delay, 3-10
- relay tab, 3-10
- report page, 3-16
  - configuration report, 3-17
  - screen, 3-16
- reset tab, 3-15
- returning for service, 5-2
- reusing, ix
- RoHS marking, A-3
- rolling buffer, 3-9
- run mode, 3-8

## S

- safety, vii
  - laser, vii
  - maintenance, vii
  - repair, vii
- safety information, vii
- sample, 2-1
- sample #, 3-3
- sample delay, 3-3

- sample hold, 3-3
- sample interval, 3-8, 3-9
- sample LED off, 4-1
- sample length, 3-3
- sample status, 3-3
- sample time, 3-3, 3-6
- sample tubing, 1-5, 2-8
- sampling frequency, A-1
- sampling inlet, 2-4
- save button, 3-8
- save configuration, 3-16
- saving configuration report, 3-17
- seconds before flow block error, 3-12
- seconds before flow error, 3-12
- seconds between flow block error
  - and pump off, 3-12
- serial, 3-3
- serial number label, viii
- service
  - international contacts, 5-1
  - service policy, iv
- size channels, 1-1
- size range, 1-1
- size resolution, A-2
- SNTP, 3-12
- SNTP address, 3-5
- specifications, A-1
- stainless steel isokinetic inlet, 1-5
- standards, A-1
- start delay, 3-8
- static IP address/mask/gateway, 3-12
- status, 2-1
- status indicator, A-1
- status LED
  - green, 4-1
  - red, 4-1
- storage range, A-1
- superthane tubing, 1-6
- supplying power, 2-6
- symbols
  - description, ix

## T

- tech page, 3-6
  - alarm tab, 3-9
  - screen, 3-9
- analog tab, 3-11
  - screen, 3-11
- config tab, 3-8
- configuration (config) tab
  - screen, 3-8
- data tab, 3-14
  - screen, 3-14
- instrument tab, 3-12
  - non-pump models, 3-13
  - pump models, 3-13
- password, 3-7
- password tab, 3-15
  - screen, 3-15
- relay tab, 3-10
  - screen, 3-10
- reset tab, 3-15
  - screen, 3-15
- technical contacts, 5-1
- technical support, 5-1
  - international, 5-2
- Teflon tubing, 2-8
- time, 3-3
- time zone, 3-5

- title bar, 3-2
- trademarks, iv
- troubleshooting
  - cleaning, 4-1
  - critical orifice, 4-1
  - inlet, 4-1
  - power, 4-1
  - pump, 4-1
  - vacuum line, 4-1
  - zero filter, 4-1
- tubing connections, 2-4
- tubing installation, 2-7

## U

- unpacking, 1-1, 1-3
- USB connection, 3-2
- USB drive, 1-3
- USB-C cable, 1-4, 3-2, 3-6
- USB-C connector, 2-3
- USB-C power, 3-2, 3-6

## V

- vacuum
  - gauge, 2-7
- vacuum source, A-1
- vacuum tubing
  - connecting, 2-7

## W

- warning, 2-6
  - description, ix
  - hazardous optical radiation, vii
  - power supply, 2-6
  - symbol description, viii
- warranty, iii
- weight, A-1
- Wi-Fi node, 1-4, 2-3
  - Ethernet port, 2-3
  - operation, 2-3
- Wi-Fi technology, A-1
- wireless, A-1

## X-Y

- xml file format, 3-16

## Z

- zero count, A-1
- zero filter, 4-1





**TSI Incorporated** – Visit our website [www.tsi.com](http://www.tsi.com) for more information.

<b>USA</b>	<b>Tel:</b> +1 800 680 1220	<b>India</b>	<b>Tel:</b> +91 80 67877200
<b>UK</b>	<b>Tel:</b> +44 149 4 459200	<b>China</b>	<b>Tel:</b> +86 10 8219 7688
<b>France</b>	<b>Tel:</b> +33 1 41 19 21 99	<b>Singapore</b>	<b>Tel:</b> +65 6595 6388
<b>Germany</b>	<b>Tel:</b> +49 241 523030		

P/N 6012577 Rev C

©2020 TSI Incorporated

Printed in U.S.A.



FCC ID: 2AC7Z-ESP32WROOM32