

AeroTrak[®] High Pressure Diffuser Model 7950/7955/7960



Operation Manual

P/N 6010783, Revision F
April 2023



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AeroTrak[®]

High Pressure Diffuser

Model 7950/7955/7960



Operation Manual

P/N 6010783, Revision F
April 2023

SHIP TO/MAIL TO:

TSI Incorporated
500 Cardigan Road
Shoreview, MN 55126-3996
USA

U.S.

Technical Support:

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

Fax:

(651) 490-3824

E-mail address:

answers@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® High Pressure Diffuser, Model 7950/7955/7960 Operation Manual (P/N 6010783).

Revision	Date
A	May 2017
B	June 2017.
C	December 2017
D	May 2018
E	May 2018
F	April 2023

Warranty

Part Number

6010783 / Revision F / April 2023

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Address

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

E-mail Address

answers@tsi.com

Limitation of Warranty and Liability_(effective April 2014)

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

Seller warrants the goods, excluding software, sold hereunder, under normal use and service as described in the operator's manual, to be free from defects in workmanship and material for **12 months**, or if less, the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions and exceptions:

- a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment;
- b. Pumps are warranted for hours of operation as set forth in product or operator's manuals;
- c. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment;
- d. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies;
- e. This warranty does not cover calibration requirements, and seller warrants only that the instrument or product is properly calibrated at the time of its manufacture. Instruments returned for calibration are not covered by this warranty;
- f. This warranty is **VOID** if the instrument is opened by anyone other than a factory authorized service center with the one exception where requirements set forth in the manual allow an operator to replace consumables or perform recommended cleaning;
- g. This warranty is **VOID** if the product has been misused, neglected, subjected to accidental or intentional damage, or is not properly installed, maintained, or cleaned according to the requirements of the manual. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

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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-INFRINGEMENT 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 in the United States and may be protected under other country's trademark registrations.

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Safety Information








This section gives instructions to promote safe and proper handling of the AeroTrak® High Pressure Diffuser.

IMPORTANT NOTICE

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.

Labels

Advisory labels and identification labels are attached to the bottom of High Pressure Diffuser.

1. Serial number label (<i>bottom panel</i>)	 <p>Model: 7955 Date: JUNE 2017 SN: 7955172301</p>  <p> 500 Cardigan Road Shoreview, MN 55126 www.tsi.com Made in U.S.A. </p>
2. Check out Label (<i>bottom panel</i>)	 <p>Checked out by: _____ Date: _____ Due: _____</p> <p> 500 Cardigan Road Shoreview, MN 55126 www.tsi.com Made in U.S.A.</p>
3. European symbol for non-disposable item. Item must be recycled.	

Description of Caution/Warning Symbols

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

Caution



C A U T I O N

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

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: answers@tsi.com

Web site: www.tsi.com

Introduction and Unpacking

Introduction

Particle counters cannot sample high pressure gas; they require High Pressure Diffusers to reduce the pressure of compressed gases to assess the cleanliness level of compressed gas systems.

The TSI® AeroTrak® Model 7950 High Pressure Diffuser (HPD) allows 0.1 cfm (2.83 L/min) TSI® AeroTrak® Particle Counters to sample compressed gases. When used with an AeroTrak® Model 9001 Cleanroom Condensation Particle Counter, the Model 7950 HPD is an ideal solution for detecting nanometer scale particles in compressed gases.

The TSI® AeroTrak® Model 7955 High Pressure Diffuser (HPD) allows 1 cfm (28.3 L/min) TSI AeroTrak Particle Counters to sample compressed gases for electronic manufacturing applications using very low dewpoint air. This model adds a small volume of filtered room air in order to raise the humidity of the sample prior to entering the Particle Counter.

The TSI AeroTrak® Model 7960 High Pressure Diffuser (HPD) allows 1 cfm (28.3 L/min) TSI AeroTrak Particle Counters to sample compressed gases in pharmaceutical applications or electronics applications with higher dewpoint air.

Features and Benefits

Model 7950	Model 7955	Model 7960
Compatible with 0.1 cfm AeroTrak Particle Counters (remote and handheld models) and the AeroTrak Cleanroom Condensation Particle Counter Model 9001.	Compatible with 1 cfm AeroTrak Particle Counters (portable models) with the capability to humidify the gas stream via make-up air.	Compatible with 1 cfm AeroTrak Particle Counters (portable models)
For monitoring and testing to ISO 8573-1, ISO 14644-1 and SEMI E49.8 limits.	For monitoring and testing to ISO 8573-1, ISO 14644-1 and SEMI E49.8 limits.	For monitoring and testing to ISO 8573-1 and ISO 14644-1 limits

Model 7950	Model 7955	Model 7960
0.1 cfm (2.83 L/min) nominal flow rate.	1 cfm (28.3 L/min) nominal flow rate with humidified make-up air.	1 cfm (28.3 L/min) nominal flow rate.
Reduces gas pressure of up to 120 psi (8.27 bar) to near atmospheric pressure.		
For use with Clean Dry Air (CDA), Nitrogen (N ₂) and Argon (Ar).		
No manual adjustments or calibration required.		
Passivated stainless steel enclosure resists cleanroom chemicals.		
Exhaust HEPA filter protects diffuser from contamination when disconnected from compressed gas source.		



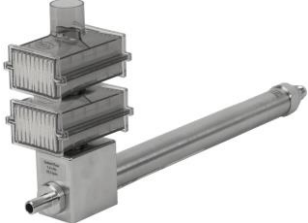



NOTICE

When air is drawn into the High Pressure Diffuser through the exhaust HEPA filter, particles in the filter from normal venting operation may be drawn into the High Pressure Diffuser. The High Pressure Diffuser may require purging and/or cleaning to remove these particles to properly zero count.

Unpacking

Carefully unpack the diffuser from the shipping container and verify that all the items shown in the photos below and listed in the following tables are present. Contact TSI® immediately if items are missing or broken (see [Contacting Customer Service](#) for more information).

AeroTrak® High Pressure Diffuser Parts List

Qty.	Item Description	Part/Model	Reference Picture
1	High Pressure Diffuser	7950	
1	High Pressure Diffuser	7955	
1	High Pressure Diffuser	7960	
1	Certificate of Testing	N/A	
1	Operation Manual	6010783	
2	¼-inch VCR Gaskets	700258	

Getting Started

This section describes the features, connections, and installation of the AeroTrak® High Pressure Diffuser (HPD). It includes:

- [Instrument Description](#)
- [Instrument Operation](#)

Instrument Description

The High Pressure Diffuser is used in series with a particle counter and it reduces the incoming compressed gas pressure to atmospheric pressures. Sampling of gases by a particle counter without the use of HPD can damage the particle counter and may lead to false readings by the particle counter.

The AeroTrak® Model 7950 High Pressure Diffuser is designed to be used in conjunction with AeroTrak Cleanroom Condensation Particle Counter Model 9001.

The AeroTrak® Model 7955 High Pressure Diffuser is designed to be used in conjunction with AeroTrak Portable Particle Counter 9110 for sampling low-humidity compressed gases used in electronics manufacturing.

The AeroTrak Model 7960 High Pressure Diffuser is designed to be used in conjunction with AeroTrak Portable Particle Counters with a 1 cfm (28.3 L/min) flow rate such as the Model 9310 or Model 9510. The AeroTrak Model 7960 High Pressure Diffuser can be used with AeroTrak Portable Particle Counters with 50- or 100 L/min flow rates, if higher inlet pressure is available.



Instrument Operation

The AeroTrak® Models 7950, 7955 and 7960 High Pressure Diffusers have a gas inlet located on the back of the instrument and an outlet located on the front of the instrument. To operate the instrument, connect the gas line to be sampled to the back of the instrument. This port on the back of the HPD is labeled as the “inlet”. Prior to running high pressure gas through the High Pressure Diffuser, a pressure regulating valve must be used to reduce the gas pressure to specification limits. The maximum gas pressure during sampling is 120 psi (8.27 bar).

TSI® AeroTrak® particle counters normally “zero” the flow measurement when sampling begins. If the compressed gas is turned on prior to sampling then the gas flow through the instrument causes flow inaccuracies. TSI® requires the following start-up procedure:



CAUTION

Ensure the High Pressure Diffuser is installed in a location with sufficient exhaust to limit exposure to the vented gas.

Gas Flow Rates

TSI® High Pressure Diffusers are available in a number of different configurations:

Outlet Flow Rate		Minimum Inlet Pressure	
cfm	L/min	psi	bar
Model 7950:			
0.1–0.12	2.83–3.50	30	2.1
Model 7955:			
1.0	28.3	30	2.1
Model 7960:			
1.0	28.3	25	1.7
1.8	50	40	2.8
3.5	100	80	5.5

Connecting the High Pressure Diffuser

1. Ensure the compressed gas supply is turned off.
2. Connect the particle counter to the barbed outlet of the High Pressure Diffuser using a clean hose.



CAUTION

At least 3.3 ft. (1 m) of tubing must be installed between the Model 7955 High Pressure Diffuser and an AeroTrak® Model 9110 particle counter. Shorter lengths of tubing may result in false particle counts.

3. Connect the high-pressure sample line to a 1/4" VCR Fitting.
4. Place the 1/4-inch VCR gasket (TSI® P/N 700258) onto the male end of the gland.
5. TSI® recommends replacing the 1/4-inch VCR gasket with every "disconnect and reconnect".
6. Align the nut on the female gland end with the male gland end and VCR gasket. Finger-tighten the nut to the connection body.
7. Using a wrench or other tool to stabilize the system connection, turn the nut an additional 1/8-turn.
8. If using a Model 7960 High Pressure Diffuser, install the second exhaust HEPA filter to the inlet of the first exhaust HEPA filter.

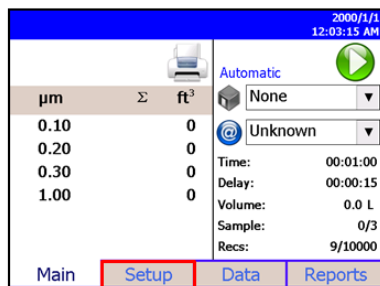
For AeroTrak® Model 9110 and 9310 Particle Counters used for Continuous Monitoring

NOTICE

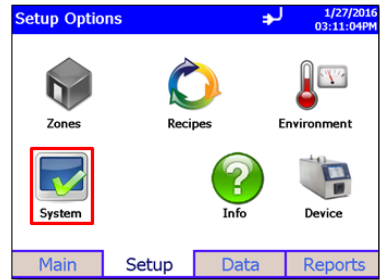
TSI® recommends taking a sample to zero the flow measurement then using Manifold Mode to disable the flow zero during sampling.

Take a Sample to Zero the Flow Measurement

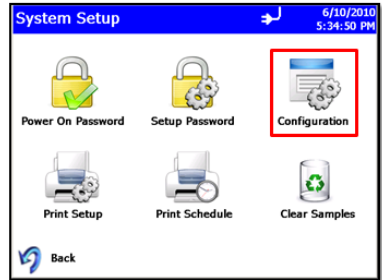
1. Turn on the AeroTrak® Particle Counter.
2. Select the **Setup** tab.



3. Select the **System** icon.



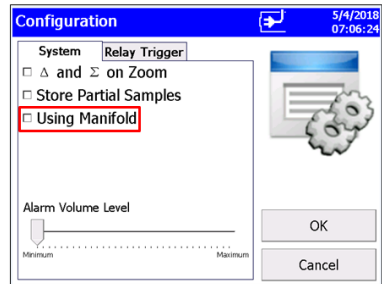
4. Select the **Configuration** icon.



5. Uncheck the **Using Manifold** box if already checked.

6. Return to Main tab.

7. Take a sample.



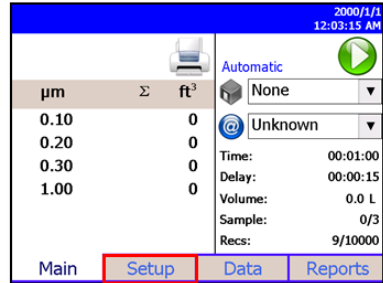
CAUTION

Failure to set the Particle Counter to Manifold Mode prior to sampling compressed gas from a High Pressure Diffuser may cause the Particle Counter to overheat.

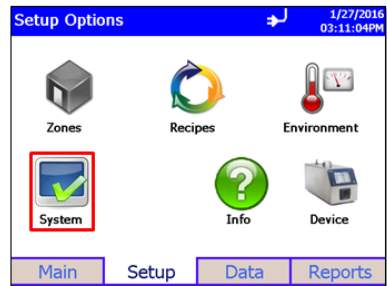
Enable Manifold Mode on the AeroTrak® Particle Counter

Enabling the “Manifold Mode” allows the AeroTrak® Particle Counter to maintain its flow rate independent of the compressed air pressure.

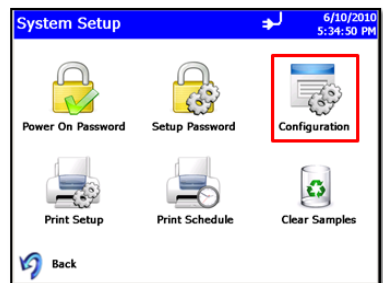
1. Turn on the AeroTrak® Particle counter.
2. Select the **Setup** tab.



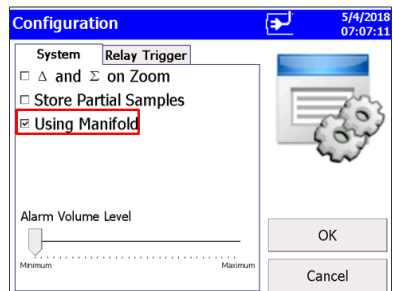
3. Select the **System** icon.



4. Select the **Configuration** icon.



5. Check the **Using Manifold** box.
6. Return to the Main screen.
7. Gradually open the pressure valve for the compressed gas, ensuring not to over pressurize the High Pressure Diffuser.





CAUTION

Exceeding the pressure rating of the High Pressure Diffuser may damage the instrument and/or cause bodily injury.



CAUTION

Replace the end caps on the High Pressure Diffuser after disconnecting from the compressed gas supply and particle counter. Contamination can enter the unprotected openings to the High Pressure Diffuser.

For AeroTrak® Particle Counters used for Periodic Monitoring and Other Particle Counters used for Continuous Monitoring

NOTICE

TSI® recommends beginning to sample while the gas is shut off to zero the flow measurement for best accuracy. Turning on the gas before sampling may result in errors in the measured particle concentration and particle sizes.

1. Begin sampling with the compressed gas shut off.
2. Gradually open the pressure valve for the compressed gas, ensuring not to over pressurize the High Pressure Diffuser.
3. Continue sampling.



CAUTION

Exceeding the pressure rating of the High Pressure Diffuser may damage the instrument and/or cause bodily injury.



CAUTION

Replace the end caps on the High Pressure Diffuser after disconnecting from the compressed gas supply and particle counter. Contamination can enter the unprotected openings to the High Pressure Diffuser.

NOTICE

Samples taken before the compressed gas is turned on must be discarded for test accuracy.

Maintenance

The section contains maintenance and troubleshooting solutions for the Models 7950, 7955 and 7960 AeroTrak® High Pressure Diffuser.

To clean the internal parts of the High Pressure Diffuser, purge it with filtered compressed air. The instrument should be purged for a minimum of 15 minutes with gas pressure of up to 150 psi.

NOTICE

DO NOT connect a particle counter to the High Pressure Diffuser while purging.

Purging the High Pressure Diffuser may take more than 1 hour. If purging does not remove suspected contamination from the High Pressure Diffuser, return it to TSI for service.

Annual replacement of the filters is recommended.

NOTICE

There are no user-serviceable parts inside this instrument. Opening the instrument case may void the warranty. TSI® recommends that the Models 7950, 7955 and 7960 AeroTrak® High Pressure Diffuser be returned to the factory for any required service. Cleaning can be done without removing the instrument case.

Cleaning the Instrument Enclosure

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

Troubleshooting

Symptom	Possible Cause	Corrective Action
Fails zero check	High Pressure Diffuser is contaminated.	Purge with clean compressed gas.
		Return to TSI® or an authorized service facility for cleaning.
	Sample gas lines are contaminated	Purge with clean compressed gas.
Improper flow rate	Compressed gas pressure outside specified range.	Check the gas inlet pressure as well as the pressure regulating devices.

Contacting Customer Service

This section gives directions for contacting people at TSI® Incorporated for technical information and directions for returning the AeroTrak® High Pressure Diffuser for service.

Technical Contacts

- If you have any difficulty setting up or operating the AeroTrak® High Pressure Diffuser, 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® High Pressure Diffuser, 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: +86-10-8219 7688 Fax: +86-10-8219 7699 E-mail: tsibeijing@tsi.com
TSI Instruments Ltd. Stirling Road Cressex Business Park High Wycombe, Bucks 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: +86-10-8219 7688 Fax: +86-10-8219 7699 E-mail: tsibeijing@tsi.com
TSI Instruments Ltd. Stirling Road Cressex Business Park High Wycombe, Bucks 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 E-mail: tsifrance@tsi.com

Technical Support *(continued)*

TSI GmbH

Neuköllner Strasse 4
52068 Aachen
GERMANY

Telephone: +49 241-52303-0

E-mail: tsigmbh@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) or (651) 490-2860 for specific return instructions. Customer Service will need this information when you call:

Customer Service will need the following information:

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

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

Specifications

All specifications are subject to change without notice.

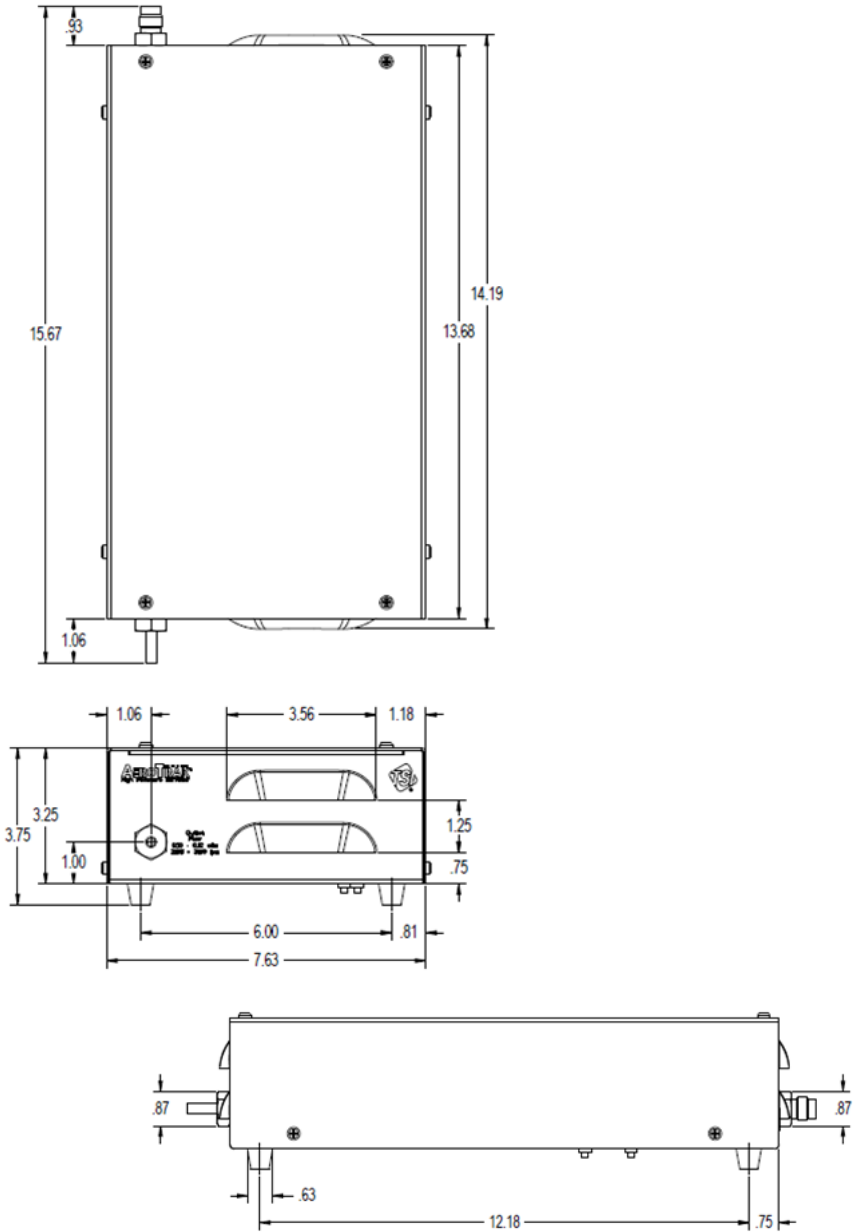
	Model 7950	Model 7955	Model 7960
Flow Rate	0.1–0.12 cfm (2.83–3.50 L/min)	1.0 cfm (28.3 L/min)	1.0 cfm (28.3 L/min) 50 L/min (Minimum inlet pressure of 40 psi) 100 L/min (Minimum inlet pressure of 80 psi)
Pressure Range	30–120 psi (2.1–8.3 bar)		25–120 psi (1.7 – 8.3 bar)
Max Purge Pressure	150 psi (10.3 bar)		
Zero Count Performance	≤1 count per 5 minutes @ 10 nm	≤1 count per 5 minutes @ 0.1 μm	≤1 count per 5 minutes @ 0.5 μm
Sample Gas Types	CDA, N ₂ , Ar		
Dimensions	15.67 x 7.63 x 3.75 in. (39.8 x 19.4 x 9.5 cm)	19.03 x 7.63 x 5.99 in. (48.3 x 19.4 x 15.2 cm)	13.74 x 7.50 x 2.49 in. (34.9 x 19.1 x 6.3 cm)
Weight	7.4 lb. (3.4 kg)	12.3 lb. (5.6 kg)	2.5 lb. (1.1 kg)
Exhaust Filter	HEPA (>99.97% for 0.3 μm particles)		
Bleed Air Filter	N/A	HEPA (>99.97% for 0.3 μm particles)	N/A
Bleed Air Flow	N/A	0.1–0.2 cfm (2.83–5.86 L/min)	N/A
Inlet Fitting	¼-inch VCR Fitting (316SS)		
Outlet Fitting	¼-inch tube connector (316L VAR)	½-inch tube connector (316L VAR)	3/8-inch tube connector (304SS)
Material	Enclosure & Body: Passivated 304 Stainless Steel VCR Gaskets: Nickel		
Orifice Material	316L VAR Stainless Steel	Ruby	Ruby

Compliance

CE Marking	EN61326-1: 2013 EN6110-1:2010
RoHS Marking	Yes

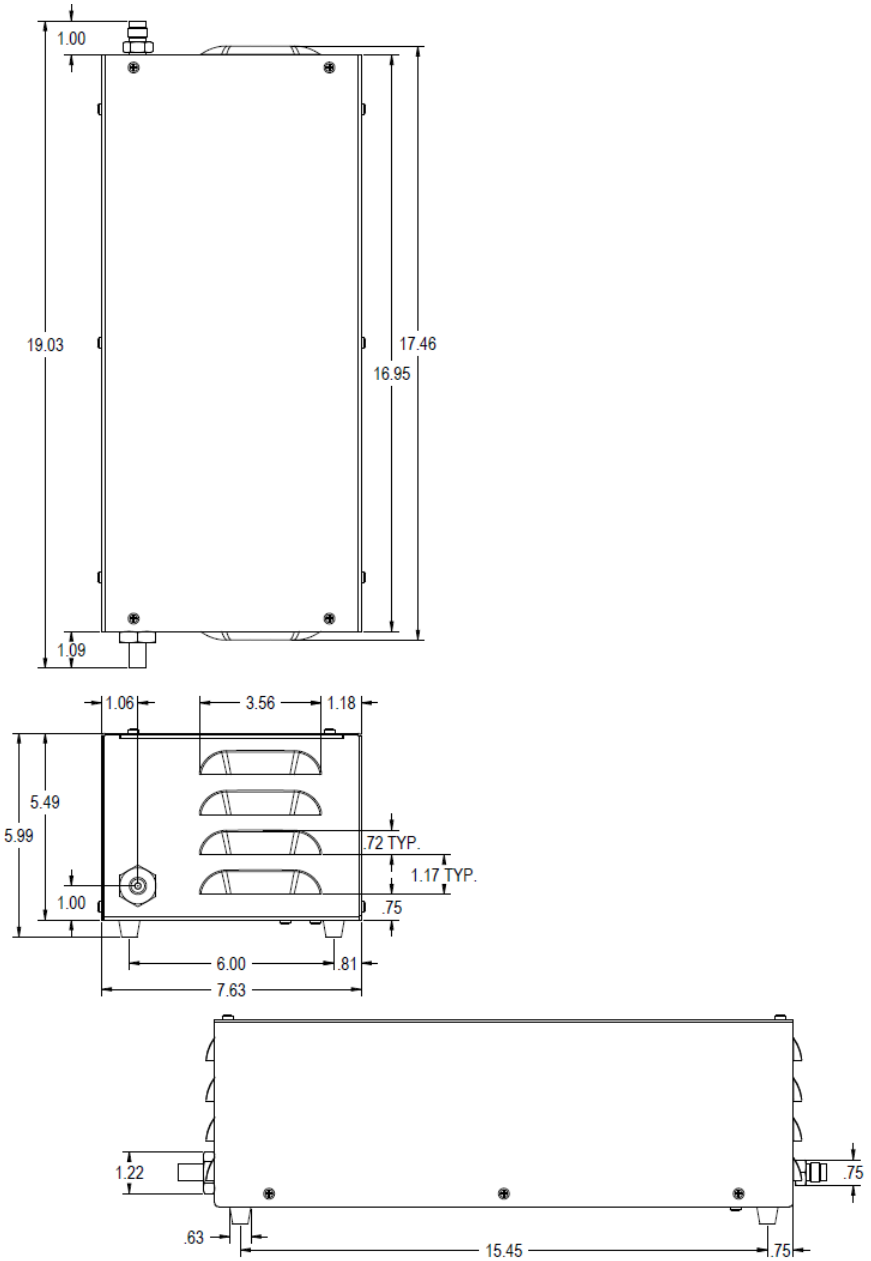
Dimensional Diagram Model 7950

Dimensions are given in inches.



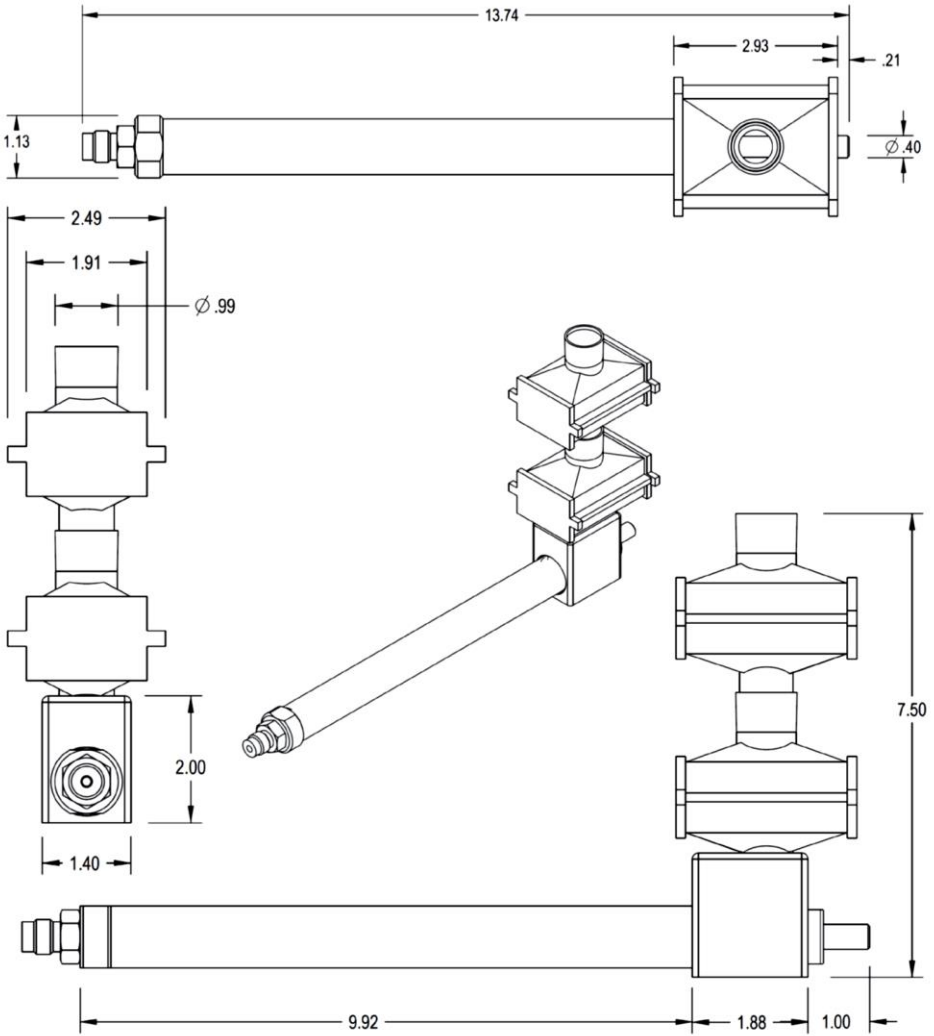
Dimensional Diagram Model 7955

Dimensions are given in inches.



Dimensional Diagram Model 7960

Dimensions are given in inches.





Knowledge Beyond Measure.

TSI Incorporated – Visit our website www.tsi.com for more information.

USA **Tel:** +1 800 680 1220
UK **Tel:** +44 149 4 459200
France **Tel:** +33 1 41 19 21 99
Germany **Tel:** +49 241 523030

India **Tel:** +91 80 67877200
China **Tel:** +86 10 8219 7688
Singapore **Tel:** +65 6595 6388

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