

PRODUCT

INFORMATION

Model 3302A Aerosol Diluter

The Model 3302A Aerosol Diluter interfaces directly with TSI Aerodynamic Particle Sizer® (APS) spectrometers. It reduces particle concentrations in high-concentration aerosols, providing researchers with a representative sample that meets the recommended operational requirements for these high-resolution time-of-flight spectrometers.

The Model 3302A uses a closed system of operation. It isolates a small sample of particles in an aerosol flow and reunites it with filtered, “clean” gas from the same original aerosol. This eliminates the effects of introducing unknown gas characteristics such as temperature, pressure, relative humidity, or elemental makeup into the aerosol. The 3302A minimizes particle loss during the dilution process by constantly transporting the aerosol sample in a downward direction and optimizing the geometry of the flow path. This helps reduce particle losses due to sedimentation and turbulent deposition, and provides a sample that is highly representative of the original aerosol.

The diluter outlet mates directly with the spectrometer* inlet for on-line dilution and analysis of high-concentration aerosols. Because aerosol introduced for dilution is drawn through the Model 3302A by the spectrometer, the diluter requires no power or compressed gas.

An Aerosol Diluter for TSI's APS spectrometers

Key features of the TSI Model 3302A Aerosol Diluter:

- Standard dilution ratios of 100 to 1 and 20 to 1 (two Diluters may be used in tandem for ratios up to 10,000 to 1)
- Very low particle loss in the 0.5- to 10-micrometer size range
- Highly repeatable performance
- Original aerosol's gas characteristics maintained during operation
- Totally self-contained design
- No outside power or compressed-gas requirements
- Durable, rugged construction
- Simple maintenance procedures
- Dual pressure gauges (indicate correct operation or signal need for maintenance)

OPERATION

Aerosol is drawn through the diluter by the time-of-flight spectrometer at a total flow rate of 5 liters per minute. Upon entering the diluter inlet, the concentrated aerosol flow divides into two paths. In one path, the majority of the original aerosol is cleansed of virtually all particles. In the other, the remaining small fraction of the aerosol retains its particle concentration. These two paths then recombine to produce the desired dilution.

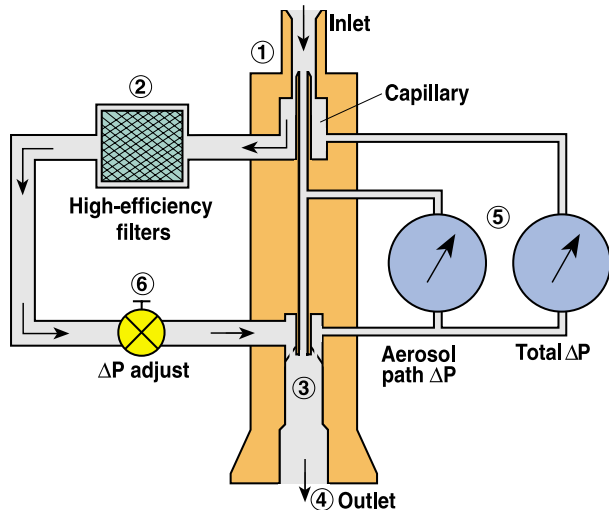
*Model 3302A works with all APS spectrometers. However, TSI recommends the earlier Model 3302 for use with Models 3300, 3310, and 3310A.



Inside the Model 3302A (using a 100-to-1 capillary):

- ① At the point where the original aerosol flow path is split in two, a flow of 0.05 liter per minute enters a capillary tube isokinetically and passes through.
- ② The remaining 4.95 liters per minute of aerosol travels through a high-efficiency particulate air (HEPA) filter where particles are removed.†
- ③ The filtered portion of the gas flow then recombines with the aerosol flow released from the capillary tube, achieving a 100-to-1 dilution ratio of the original aerosol.‡ A mixing cone ensures a uniform distribution in the diluted aerosol.
- ④ Well-mixed, diluted aerosol exits the Model 3302A and enters the APS spectrometer.
- ⑤ The aerosol-path ΔP gauge measures flow through the capillary. The total ΔP gauge measures pressure drop across the whole system. This two-gauge approach allows detection of conditions like a clogged capillary, loaded filter, or leak in the instrument.
- ⑥ To obtain the correct dilution ratio, the operator simply adjusts the regulating valve until the desired reading is indicated on the aerosol-path- ΔP gauge.

The manifold and filters require periodic maintenance as particles are deposited continually during repeated dilution procedures. Flow paths and internal



components are designed for easy, trouble-free cleaning. This highly human-engineered instrument can be serviced in less than one-half hour by an experienced operator.

SPECIFICATIONS

Dilution ratio: 100:1 and 20:1 standard

Flow rate: 5 L/min total flow (drawn by APS spectrometer)

Penetration efficiency: >93% for respirable particles, lower efficiency can be expected for larger particles (efficiency correction curves are built into the spectrometer software)

Pressure drop: Approximately 1.2 cm H₂O (0.47 in. H₂O) total

Construction materials: Anodized aluminum, stainless steel, Buna-N, fiberglass, nylon

Power and compressed-air requirements: None (flow created by APS spectrometer)

Dimensions (LWH): 28 cm × 37 cm × 22 cm
(11 in. × 14.5 in. × 8.5 in.)

Weight: 5.9 kg (13 lbs)



TO ORDER

Specify	Description
3302A	Aerosol Diluter

The Model 3302A interfaces easily with Model 3320 and 3321 APS spectrometers. The spectrometer, which creates the flow through the diluter, must be ordered separately.

†The manufacturer's rating of HEPA filters in the diluter is less than 0.03% penetration for particles of 0.3-micrometer diameter. Performance tests done by TSI Incorporated indicate actual penetrations less than 0.001%.

‡A 20-to-1 dilution ratio is achieved by changing the capillary-tube assembly. This combines 4.75 liters per minute of cleansed aerosol with 0.25 liter per minute of original aerosol.

Specifications are subject to change without notice. TSI, the TSI logo, and Aerodynamic Particle Sizer are registered trademarks of TSI Incorporated.



TSI Incorporated
Particle Instruments
P.O. Box 64394
St. Paul, MN 55164 USA

Shipping address:
500 Cardigan Road
Shoreview, MN 55126 USA

Toll Free: 1 800 677 2708
Tel: 651 490 2833
Fax: 651 490 3860
E-mail: particle@tsi.com
Web: www.tsi.com

Europe:
TSI GmbH
Neuköllner Strasse 4
D-52068 Aachen
Germany
Tel: +49 (241) 523030
Fax: +49 (241) 5230349
E-mail: Particle-Europe@tsi.com

For current information
www.tsi.com