FLOW ADJUSTMENT ACCESSORY FOR FAST SIZERS— FMPS™ SPECTROMETER AND EEPS™ SPECTROMETER

APPLICATION NOTE EEPS-004

Fast nanoparticle sizers like the Engine Exhaust Particle Sizer™ (EEPS™) spectrometer and Fast Mobility Particle Sizer™ (FMPS™) spectrometer from TSI have a high intake flow rate of 10 L/min. This fast flow rate allows changes in the aerosol distribution to be followed while minimizing particle losses. For some applications though, the intake flow maybe a challenge and the operator may prefer a lower sampling flow. Examples in which an operator may require a lower sampling flow include:

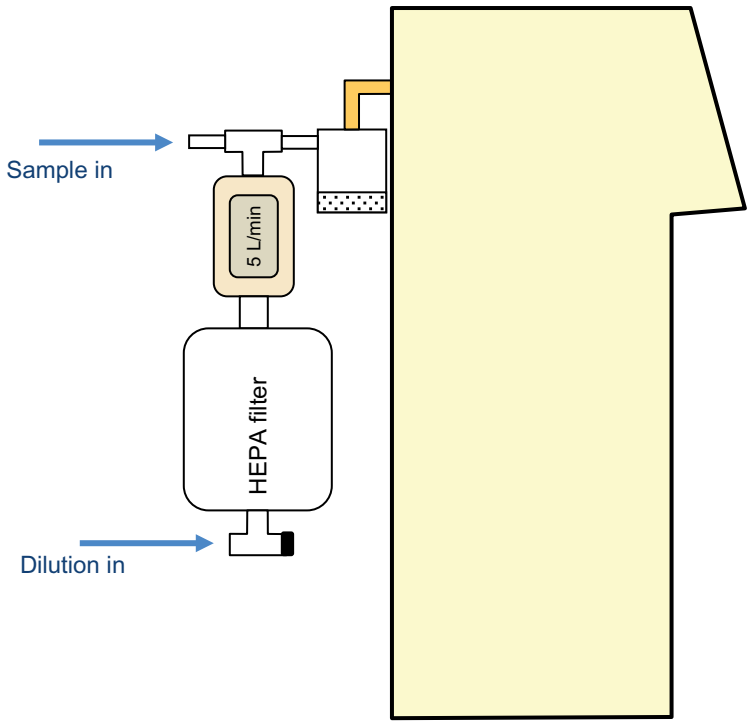
- Sampling aerosol from a small scale reactor or chamber.
- Coupling the fast sizer to another device like an aerosol dilutor (e.g., the Rotating Disk Thermodilutor Model 379020A), which operates with lower flow rates.

To accommodate lower flow requirements, TSI has designed the interface needed, a flow adjustment accessory kit (Part Number 1137021), that serves as an advanced flow equalizer assembly based upon the SMPS™ spectrometer's specifications. The accessory kit consists of a T-connector, HEPA filter, valve, and flowmeter which, when assembled, fit directly into the cyclone at the inlet of the EEPS™ spectrometer or FMPS™ spectrometer.

So while the intake flow of the fast sizers remains constant at 10 L/min, this accessory allows the operator to adjust the sample flow to their needs by opening the valve of the accessory and adding a HEPA filtered dilution air to the sampling flow. The sample flow plus the dilution flow add up to the total intake flow of the fast sizer. The dilution flow value can be read from the mass flowmeter display included in the accessory kit. The ratio of the sample flow to the sizer intake results in the dilution factor which can be entered into the sizer's software to automatically correct for the sample dilution.

Operating Range

The dilution air flow range is typically 0 to 8.5 L/min—when the dilution in port is open to room air. The sample in flow is then 10 to 1.5 L/min, resulting in a dilution factor up to 6.6.



Schematic of the flow adjustment accessory attached to the cyclone inlet of a fast sizer.

Application Example

Some aerosols require immediate dilution and conditioning to freeze the size distribution, e.g., when sampling from fireworks, combustion emissions, etc. A Rotating Disk Dilutor (RDD) like TSI's Model 379020A can be used as sample conditioner, allowing a sensor flow rate of 0.5 to 5 L/min. The flow adjustment accessory is the solution to couple a FMPS™ spectrometer to the RDD and adjusting the flows to match the operation conditions of the two instruments.

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