

# Dekati Fine Particle Sampler FPS-4000

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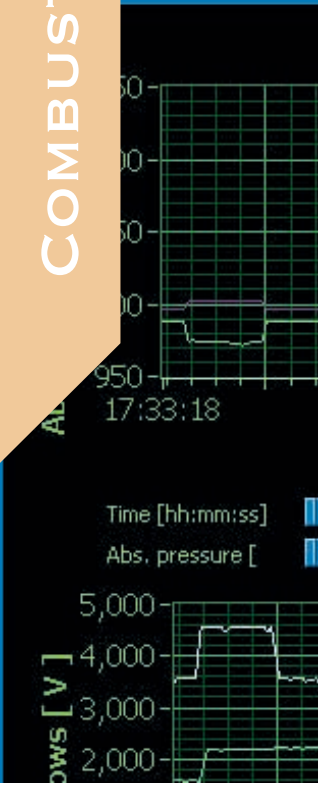
Dilution ratio control

Temperature control

Temperatures

Pressures and flows

Time 17:39:10 Version 15.0



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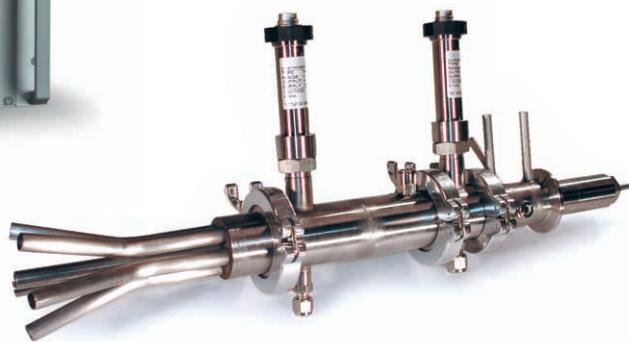


REAL-TIME PARTICLE MEASUREMENTS

# Dekati Fine Particle Sampler FPS-4000



The Dekati Fine Particle Sampler is a complete sampling system for particle measurements from high concentrations and from hot and humid conditions. The adjustable dilution ratio is in two phases; controlled temperatures and rapid dilution allow a well-defined sample transformation from vehicle exhaust or power plant stack conditions to suitable concentrations for most measurement devices.



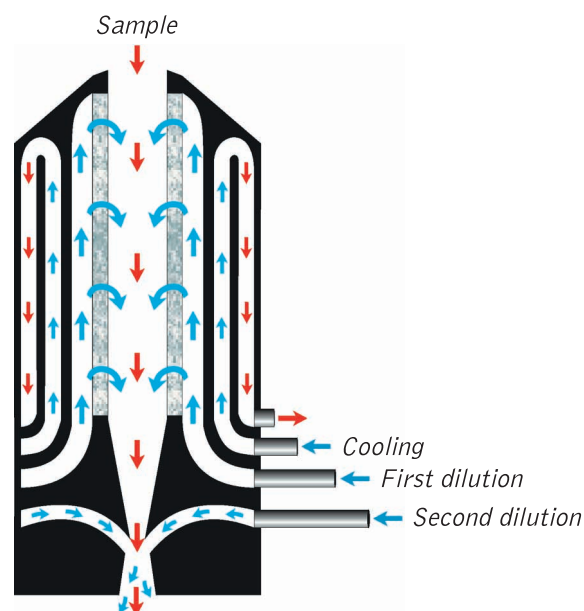
## Operation Principle

A sample is extracted from exhaust or flue gas flow with a perforated probe or a mini-cyclone, where a heated sampling line can be applied. Subsequently, the sample is diluted in two stages. The primary dilution can be performed heated or cooled and is carried out with a diffusion type perforated tube, where altering the dilution air flow controls the dilution ratio. In this probe, dilution air is introduced through small pores along a transport line in order to minimise losses inside the probe.

In the second stage, the dilution is carried out with an ejector type diluter, which sucks the diluter sample flow from the primary dilution. The secondary dilution stage suction is a function of inlet temperature and pressure. Since the dilution parameters are monitored and stored during operation, a real-time determination of a dilution ratio is achieved.

Each dilution unit is individually calibrated. Units are accompanied with a calibration document with constants for dilution ratio calculation. The results of the calculation, as well as measured data can be saved over periods of 1 s - 2 h.

The control and valve units control and monitor dilution air flows, cooling and heater operation, temperatures and pressures. These units can be operated without a PC or laptop, while data saving is unnecessary.



# Applications

The Dekati Fine Particle Sampler is a cost-effective and powerful tool for all particulate measurements requiring dilution. Applications include:

- Automotive exhaust particle concentration and size distribution studies
- Power plant stack measurements
- A variety of combustion studies
- Process industry monitoring
- Pilot reactor studies

# Software

The FPS-4000 control unit contains electronics for temperature and pressure measurements, heater and cooler controls, data logging and transfer. A standard RS-232 serial port is used to connect the unit to a PC computer or laptop. Additional input can be logged to the FPS data and an analog signal indicating the real-time dilution ratio can be connected to another data logging system.

LabVIEW™ based software provides flexible data acquisition and graphical displays on a PC or laptop. The dilution ratio as well as heater and cooler temperature settings can be controlled with this software which allows continuous monitoring of dilution parameters and real-time dilution ratio calculations. The software shows measured values and saves the data in a file defined by the user.



# FPS Provides

- Advanced sampling system for fine particle sampling
- Flexible and monitored dilution ratio
- Hot and cold primary dilution for a variety of applications
- Controlled dilution air characteristics
- Continuous recording of dilution parameters

# FPS Accessories

Dekati Thermodenuder for removal of volatile material from automotive exhaust (ELA-423, ELA-411)

## Other accessories include

- Residence time chamber, ELA-400
- Pressurized air filtration and drying unit, FPS-4001
- Heaters for heated sampling
- Minicyclone with isokinetic nozzles for isokinetic sampling



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## Dilution specifications

Dilution ratios*	1:15-1:200
Primary diluter	1:3-1:20
Secondary diluter	1:5-1:10
Purified pressurised air for dilution	
Particle concentration	recommended < 10 / cc
RH	non-condensing at -40°C
Pressure (absolute)	max. 8 bar operating pressure 4.5 bar
Flow rate (at 1.013 bar, 20°C)	max. 240 lpm
Flows (at 1.013 bar, 20°C)	
Sample flow	0-10 lpm
Primary dilution air flow	2-40 lpm
Secondary dilution air flow	50-160 lpm
Diluted sample flow	60-200 lpm
Cooling agent pressurised air or water	
Pressurised air for cooling	3-8 bar, 600 lpm, moisture free

\* dilution ratio calculation accuracy within  $\pm 10\%$  of reading

## Data acquisition

Computer requirement	Pentium processor, 16 MB RAM, MS-WINDOWS 95, 98, NT 4.0, XP or 2000
PC/Laptop connection	RS232
Analog input	2 x 1-5 V
Analog output (dilution ratio)	1-5 V
K-type thermocouples	8 channels
Pressures	3 x 4-20 mA

## Coolers and heaters

Primary probe cooler	Vortex™ type cooler
Heaters	Maximum temperature 350°C
Probe heater	350 W
Dilution air heater	1000 W
Thermodenuder heater	350 W

## Specifications

Dimensions	560 mm x 410 mm x 310 mm (can be mounted in a 19" rack)
Weight	30 kg
Material	AISI 316
Power consumption	One earthed outlet max. 2000W
Connections	
Probe inlet	NW40 flange, pre-probe diameter 6 mm
Probe outlet	NW40 flange or 1-5 pcs. of 12x1 mm tube
Pressurised air and water inlets	Connector for 10mm plastic tube



### REAL-TIME PARTICLE MEASUREMENTS

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The Dekati Fine Particle Sampler has been specially designed to comply with the standard criteria of the European Union DG-TREN Particulates Project for harmonized particle measurements. It incorporates the requirements of modern particle sampling instruments for both scientific research and industrial quality control measurements.