

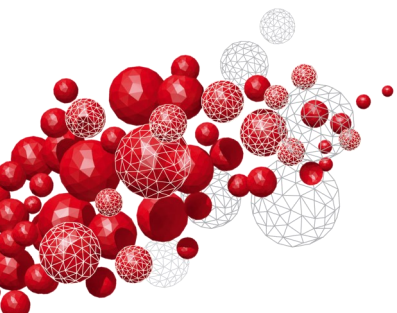


Aerosol dilution and sample conditioning is an essential part of any particle measurement system. Most aerosol particle measurement instruments cannot measure reliably when sample conditions differ from ambient nor when particle concentration is high. A well-designed dilution system not only reduces the concentration of the particles but also brings the sample conditions to a level that is acceptable for a measurement instrument without affecting the sample.

Dekati has over 25 years of experience in designing different dilution and sample conditioning systems and today our selection of instrumentation includes both complete aerosol dilution and conditioning systems as well as add on components to existing sampling lines – we can build a complete sample conditioning setup to take aerosol sample from practically any source!

The Dekati® Dilution instruments are all designed with slightly different specifications and they can all be combined with different sample conditioning accessories to build a complete sample conditioning setup for emission measurements. Dekati® Dilution Instruments include:

- Dekati® eDiluter™
- Dekati® eDiluter™ Pro
- Dekati® eDiluter™ Pro 1200C
- Dekati® Diluter
- Dekati® Double Diluter Setup
- And a wide range of accessories for a complete system



Reliable and easy-to-use

Dekati® eDiluter™ Setup

Dekati® eDiluter™ is a perfect choice for emission measurements when looking for the easiest way to condition the sample. The eDiluter™ dilutes the aerosol sample with a fixed dilution factor in two dilution stages. The first dilution stage can be heated to condition the sample in a controlled manner. The sample at the outlet of the system is at room temperature and pressure, and the high output flow rate allows several measurement instruments to be connected to the outlet of the system.

Dilution factor	1:60 standard, fixed. 1:25-1:225 available upon request
Sample T max	600 °C
Sample P range	900-1200 mbar abs*
Sample (inlet flow rate)	~7 lpm @ DF 60
Diluted sample flow rate	~60 lpm @ DF 60
Diluted sample	Ambient temperature and pressure

* Sample pressure affects DF, 10% accuracy in DF at ±15 mbar sample pressure



Optional parts for a complete sampling line

- Heated sampling line (1.5 or 3 m versions available) can be used between the source and the dilution system to transport the sample. Temperature controlled with the eDiluter™ additional, integrated temperature controller.
- Heated probe to take the sample from the source, max 600 °C
- Isokinetic sampling nozzles
- Dekati® Cyclone if large amounts of particles >10 µm exist in the sample, to be connected in front of the sampling line

Most advanced and flexible

Dekati® eDiluter™ Pro Setup

The Dekati® eDiluter™ Pro has all the benefits of the Dekati® eDiluter™, but additionally it gives more flexibility with adjustable dilution factor and automatic pressure compensation. This compensation takes automatically into account changes in sample conditions and eliminates the effect of sample pressure in the dilution factor.

Dilution factor	1:25-1:225, adjustable
Sample T max	600 °C
Sample P range	850-2200 mbar*
Sample (inlet flow rate)	4-10 lpm depending on DF
Diluted sample flow rate	50-80 lpm depending on DF
Diluted sample	Ambient temperature and pressure

*Absolute range varies depending on the used dilution factor and dilution air pressure.



Optional parts for a complete sampling line

- Heated sampling line (1.5 or 3 m versions available) can be used between the source and the dilution system to transport the sample. Temperature controlled with the eDiluter™ additional, integrated temperature controller.
- Heated probe to take the sample from the source, max 600 °C
- eDiluter™ Pro 1200C to take the sample from the source, max 1200 °C
- Isokinetic sampling nozzles
- Dekati® Cyclone if large amounts of particles >10 µm exist in the sample, to be connected in front of the sampling line

Dekati® eDiluter™ Pro 1200C

Dekati® eDiluter™ Pro 1200C consists of the Dekati® eDiluter™ Pro unit with the Dekati® High Temperature Sampling probe. This system is suitable for measurements from extremely high temperatures up to 1200 °C.

Dilution factor 1:25-1:225

Dilution factor adjustment Yes

Sample T max 1200 °C

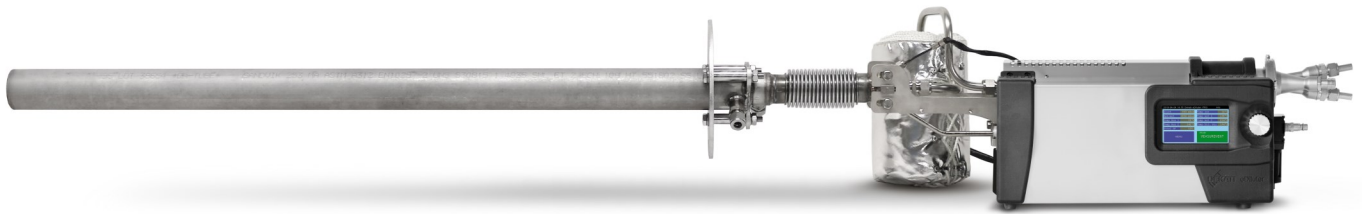
Dilution T max 400 °C

Sample P range 850-2200 mbar*

Sample (inlet flow rate) 4-10 lpm depending on DF

*Absolute range varies depending on the used dilution factor and dilution air pressure.

- eDiluter™ Pro combined with Dekati® High Temperature Sampling Probe
- Sampling from up to 1200 °C
- Three dilution stages: one in the sampling probe and two in the eDiluter™ Pro
- Adjustable dilution factor and dilution temperature



Commonly used

Dekati® Double Diluter Setup

Dekati® Double Diluter Setup is a widely used system in emission measurements. The setup includes two Dekati® Diluters with stainless steel and robust construction. This setup has a fixed dilution factor and the dilution factor can be further increased by adding extra Dekati® Diluters in the setup. The sample at the outlet of the system is at room temperature and pressure, and the high output flow rate allows several measurement instruments to be connected to the outlet of the system at the same time.

Dilution factor 1:64, fixed

Sample T max 450 °C

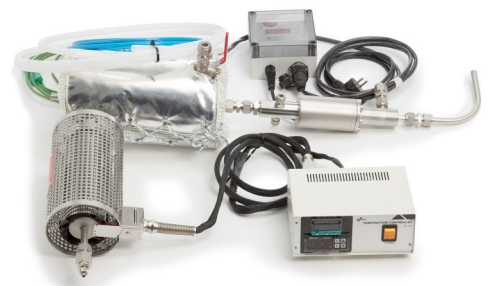
Sample P range ~920-1050 mbar abs*

Sample (inlet flow rate) ~6 lpm

Diluted sample flow rate ~45 lpm

Diluted sample Ambient temperature and pressure

*Sample pressure affects DF



Optional parts for a complete sampling line

- Heated sampling line (1.5 or 3 m versions available) can be used between the source and the dilution system to transport the sample
- Heated probe to take the sample from the source, max 600 °C
- Isokinetic sampling nozzles
- Dekati® Cyclone if large amounts of particles >10 µm exist in the sample, to be connected in front of the sampling line

Robust and reliable choice

Heated Dekati® Diluter

Single heated Dekati® Diluter is a good choice for measurements where low dilution factor is needed and the used measurement instrument can measure high temperature aerosols.

Dilution factor	1:8, fixed
Sample T max	450 °C
Sample P range	~920-1050 mbar abs*
Sample (inlet flow rate)	~6 lpm
Diluted sample flow rate	~45 lpm
Diluted sample	Ambient pressure, temperature depends on the heater temperature



*Sample pressure affects DF

Optional parts for a complete sampling line with heated Dekati® Diluter

- Heated sampling line (1.5 or 3 m versions available) can be used between the source and the dilution system to transport the sample
- Heated probe to take the sample from the source, max 600 °C
- Isokinetic sampling nozzles
- Dekati® Cyclone if large amounts of particles >10 µm exist in the sample, to be connected in front of the sampling line

Dekati® Dilution Systems

	eDiluter™	eDiluter™ Pro/ eDiluter™ Pro 1200C	Dekati® Diluter	Dekati® Double Diluter setup	HT-ELPI®+
DF	1:60, standard. 1:25-1:225 available	1:25-1:225	1:8	1:64	NA
DF adjustment	No	Yes	No	No	NA
Max sample T, °C	600	600, 1200 with eDiluter™ Pro 1200C	450	450	180
Max dilution T, °C	400	400	400	400	-
Sample P, mbar	900-1200*	850-2200 mbar, absolute range varies depending on the used dilution factor and dilution air pressure.	~920-1050*	~920-1050*	750-1200
Sample flow rate (inlet), lpm	~7 @ DF 60	4-10 depending on DF	~6	~6	10
Diluted sample flow rate (outlet), lpm	~60 @ DF 60	50-80	~45	~45	-
Dilution air (clean and dry air) requirement, bar abs	5 bar, ~100 lpm	5-7 bar, max 200 lpm	3 bar, 40 lpm	3 bar, 80 lpm	0

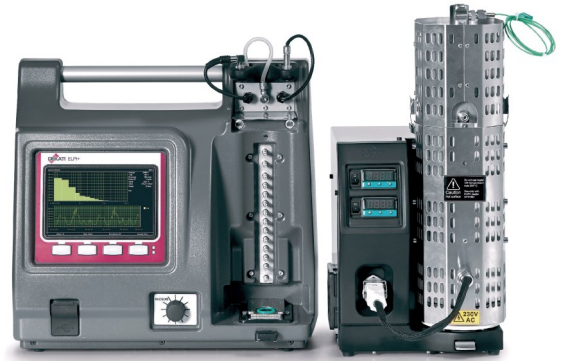
*Sample pressure affects DF



Emission Sample Conditioning Instruments

And don't forget High Temperature ELPI®+

High Temperature ELPI®+ allows direct measurement from up to 180 °C without the need to use an additional sample conditioning system. The HT-ELPI®+ can be connected directly to the emission source with the included heated sampling line to measure real-time particle size distribution in flue gas conditions.



Additional components for the sampling line

Dekati® Cyclone SAC-65

The Dekati® Cyclone is an all stainless-steel cyclone that is used as a part of a sampling system for removing large particles from an aerosol sample stream before the sample enters the dilution system or measurement instrument. The cutpoint of the Dekati® Cyclone is 10 µm at 10 lpm sample flow. The Dekati® Cyclone is manufactured according to EPA 201A standard and comes with a calculation sheet to easily calculate the cyclone cutpoint in different operating conditions.



Dekati® Isokinetic Sampling Nozzles SAC-100

SAC-100 is a set of isokinetic sampling nozzles that can be used to take the sample isokinetically into a particle measurement system. The correct size nozzle needs to be chosen so that the flow velocity inside the nozzle matches the flow velocity in the source, e.g. flue gas. The dimensions of the nozzles (mm) included in the SAC-100 set are: 9.90 - 8.69 - 7.62 - 6.71 - 5.92 - 5.46 - 5.00 - 4.57 - 4.16 - 3.81 - 3.45.



Heated sampling lines

Heated sampling lines can be used to transport high temperature aerosol sample without a risk of thermophoretic losses and condensation. Dekati provides heated sampling lines in two different lengths; 1.5m or 3.0 m. The temperature of the heated sampling line can be controlled directly with the High Temperature ELPI®+ external heater controller unit, Dekati® eDiluter™ systems or with the temperature controller unit DR-1623.



Dekati® Oxidation Flow Reactor DOFR™

Dekati® Oxidation Flow Reactor, DOFR™, is a constant flow oxidation flow reactor for secondary aerosol (SA) formation studies. The formation of secondary aerosols can take several days in the atmosphere and the purpose of the oxidation flow reactor is to speed up these processes. In the Dekati® DOFR™, the formation processes are accelerated by creating highly oxidative conditions for the aerosol sample and the timescale is reduced from days to less than one minute. The flow through the oxidation chamber is kept constant and laminar, resulting in minimal particle losses. All these features make the DOFR an ideal tool for PAM (Potential Aerosol Mass) measurements and SA formation research.



Additional components for the sampling line

Sample gas dryer

If the emission measurement is made from a wet stack i.e. after a wet scrubber, the sample humidity is typically very high and a particle dryer may be needed to remove this water. The Dekati® Stack Dryer can be used for this purpose. The Dekati® Stack Dryer is available in two different lengths; 120 cm and 120+60 cm and it can be used in combination with all the Dekati® Dilution Instruments.

Dekati® Stack Heater



Dekati® Stack Heater is a heated probe for transferring high temperature samples. The inlet and outlet pipes have an outer diameter of 12 mm so the heater can be easily combined with other Dekati® Products such as the Dekati® Cyclone or Dekati® Diluter. The probe has a 1 meter long heated section and it can be heated up to 300 °C. The maximum sample temperature is 600 °C.

The temperature of the probe can be controlled directly with the High Temperature ELPI®+ external heater controller unit or with the temperature controller unit DR-1623.



Heaters, Heating Jackets and Temperature Controllers

Heaters and heating jackets are used to control the temperature of parts of the sampling line. Dekati provides heaters and digital temperature controllers for different parts in the sampling line, e.g. for the Dekati® Diluter and the Dekati® Cyclone.



Dekati® Pressurised Air Cleaning and Drying Units

When aerosol from a combustion or other source is diluted, it is important that the dilution air is dry and particle free. Dekati provides two different pressurized air drying and filtration units that remove water and impurities from pressurised air before it is used for dilution. The DI-1010b and DI-1032 units can be used to condition dilution air e.g. for Dekati® eDiluter and Dekati® Diluter. Both units include particle and oil filters to remove impurities from pressurised air. DI-1010b unit uses a molecular sieve and silica gel for drying while DI-1032 has a membrane dryer to dry the air.



Other parts

- Sampling probes with or without isokinetic sampling nozzles
- Thermocouples for measuring temperature in different parts of the sampling lines
- Stainless steel and flexible, conductive sampling lines
- Etc. Etc.



Contact us for details and we can recommend the best solution for your measurements!

► Dekati Ltd. is a world leader in designing and manufacturing innovative fine particle measurement solutions. We have over 25 years of experience in providing measurement instruments and complete measurement solutions to a wide variety of environments and sample conditions. All Dekati® Products are developed and manufactured in Finland and are available with up to five-year warranty.

ISO 9001

BUREAU VERITAS
Certification



N° FIHSK11145824A