



Dekati® PM10 Impactor for ISO23210 Measurements

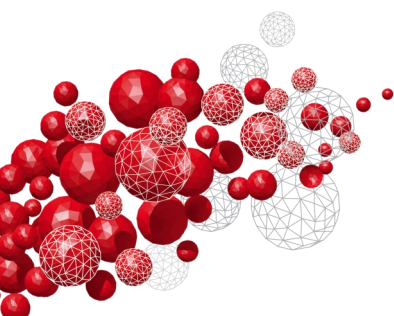
**Dekati® Solutions for
ISO 23210: Stationary source emissions - Determination of PM10/PM2.5 mass concentration in flue gas — Measurement at low concentrations by use of impactors**



ISO standard 23210:2009 defines a standard reference method for simultaneous measurement of PM10 and PM2.5 mass concentrations from stationary emission sources with a two-stage impactor. The method is similar to standards about particle collection on a filter, but instead of a filter an impactor unit is used to collect size classified particles on filters. This method is aimed for low-concentration measurements below 40 mg/m^3 defined as 30 minute averages in standard conditions of 273 K, 1013 hPa and dry gas. The measurement method can be used in stack gas measurements of any industry such as combustion, cement or steel production as long as the requirements for the stack gas conditions and PM are fulfilled. The standard may not be used in conditions where the stack gas is saturated with water vapor or when there is a significant fraction of particles above $10 \text{ }\mu\text{m}$. A further limitation of the standard is that it may not be used for the determination of total mass concentration of the dust.

The ISO23210 requirements for the impactor are set so that the measurement results with any two systems are comparable. The collection efficiency curves of the impactor stages must agree as specified with the ISO 7708:1995 standard. The particulate matter is collected on quartz filters which are weighed before and after the PM collection to determine the amount of collected PM in each size fraction.

The Dekati® PM10 Impactor model PMS-510 fulfils all requirements set in the standard for the impactor and can therefore be used to make standard PM10 and PM2.5 measurements according to ISO23210. The impactor is made of stainless steel and is a robust solution even for harsh measurement conditions. The system can also be upgraded with an additional PM1 impactor stage which enables additional measurement of PM1 size fraction. The Dekati® PM10 impactor calibration and measurement results are described in the ISO23210 under second validation study.



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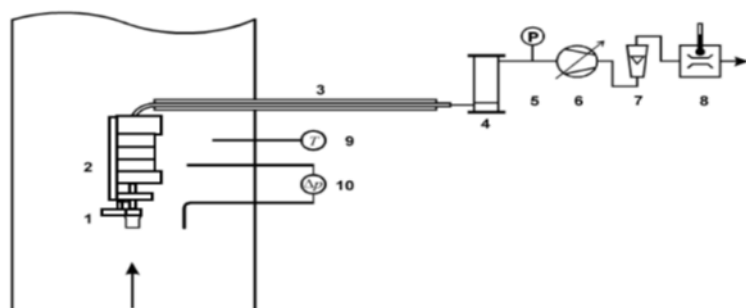
Dekati® PM10 Impactor

Dekati® PM10 Impactor features

- ISO23210 compliant for PM10 and PM2.5 measurements from stationary sources
- PM10 and PM2.5 detection. Option to add PM1 in the same instrument
- 25 mm substrates used in the impactor stages, 47 mm filters at the final stage for smallest particle size fraction
- Calibrated with aluminium and quartz fiber filters
- 10 lpm sample flow rate, 30 lpm version also available
- Stainless steel construction for operation even in harsh environments
- Can be heated up to 200 °C
- Provided with calculation spread sheet
- Each unit manufactured and calibrated in Finland
- Complete measurement setups available for both in-stack and out-stack measurements

Dekati® PM10 Impactor setup according to ISO23210

The ISO23210 standard recommends that the impactor is placed inside the stack directly against the flue gas flow. Goose-neck and out-stack sampling is allowed only if extensive loss analysis is made, and the deposited material is carefully retrieved from the probe. The impactor must be operated at the specified flow rate and the sample must be taken isokinetically from the flue gas. The recommended setup is shown below.



Recommended measurement setup according to ISO23210.

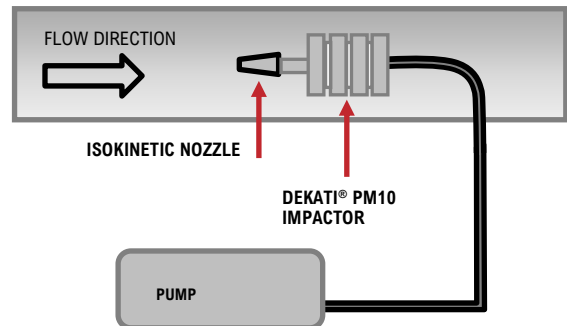
1. Isokinetic nozzle
2. Two-stage impactor
3. Suction tube
4. Drying column
5. Manometer
6. Pump
7. Flow meter
8. Gas volume measurement device with thermometer
9. Temperature measurement device
10. Pitot tube with differential pressure meter

In practice, it is often preferred to place the impactor outside the stack since placing the impactor inside the stack may be difficult to arrange. In this case, the Dekati® PM10 impactor will be heated up to the sample temperature with a heating jacket placed around the impactor. Dekati provides complete setups both for in-stack and out-stack measurements with all the needed accessories to operate the impactor. Additional accessories allow the use of the Dekati® PM10 impactor in different environments including sampling from high concentrations and environmental air quality monitoring.

Dekati® PM10 Impactor for ISO23210 Measurements

Dekati® PM10 impactor setup for in-stack measurements

- Dekati® PM10 impactor unit
- Pump with flow control
- Connection between the impactor and the pump
- Collection substrates (25 mm) for the impactor stages
- 47 mm filters for the back-up filter stage
- Isokinetic sampling nozzles. The nozzle size needs to be selected so that the flow velocity inside the stack is equal to the flow velocity inside the nozzle. The calculation can be made using the impactor calculation sheet provided with the Dekati® PM10 Impactor.

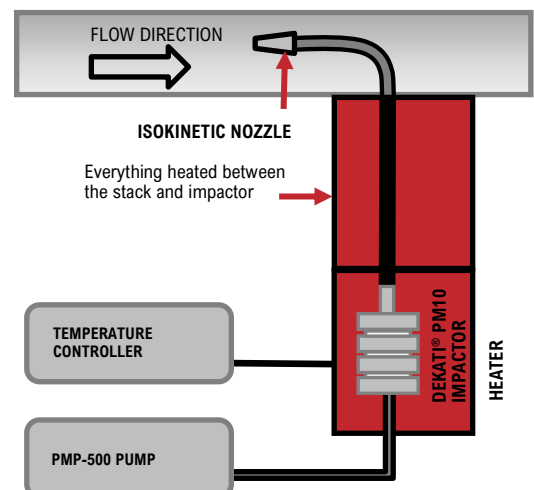


Dekati® PM10 impactor setup for out-stack measurement

- Dekati® PM10 impactor unit
- Pump with flow control
- Connection between the impactor and the pump
- Collection substrates (25 mm) for the impactor stages
- 47 mm filters for the back-up filter stage
- PM10 impactor heating jacket and temperature controller unit for the heating jacket
- Isokinetic sampling nozzles with connection to the impactor. The nozzle size needs to be selected so that the flow velocity inside the stack is equal to the flow velocity inside the nozzle. The calculation can be made using the impactor calculation sheet provided with the PM10 Impactor.



Dekati® PM10 Impactor placed inside a heating jacket to heat the impactor in out-stack measurement setup





Dekati® PM10 Impactor for ISO23210 Measurements

Dekati® PM10 Impactor specifications (PMS-510)

Sample flow rate	10 lpm
Particle size range	0-10 µm
Number of size fractions	3 (>10 µm, 10-2.5 µm, <2.5 µm).
Ambient temperature	Max 200 °C
Sample temperature	Max 200 °C.
	Accessories available for heating the impactor up to 400 °C
Weight	2.4 kg
Dimensions	Ø65 x H150 mm
Impactor material	Stainless steel
Particle collection area	25 mm, 47 mm for the smallest size fraction



Other Dekati® PM10 Impactor Models

The Dekati® PM10 Impactor is available in six different models with different sample flow rates and different number of particle size fractions. The impactor model PMS-510 fulfills all the requirements of the ISO23210 standard but other impactor models are also well suited for emission measurements with similar setups as for the PMS-510. The 30 lpm sample flow rate models are a good choice when sample concentrations are low and/or sampling times are short.

10 lpm sample flow rate versions

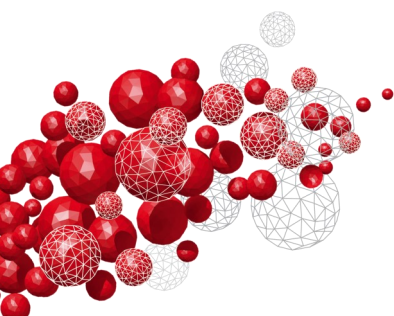
PMS-410	Impactor with PM10, PM2.5 and PM1 stages
PMS-510	Impactor with PM10 and PM2.5 stages
PMS-610	Impactor with PM10 and PM1 stages

30 lpm sample flow rate versions

PMS-430	Impactor with PM10, PM2.5 and PM1 stages
PMS-530	Impactor with PM10 and PM2.5 stages
PMS-630	Impactor with PM10 and PM1 stages

Accessories

- Pumps with flow control to operate the Dekati® PM10 Impactor
- Collection substrates and filters for the impactor
- Spare sets of collection plates
- Impactor heating jackets with temperature controllers
- Sampling probes with or without isokinetic sampling nozzles
- Sampling lines and connections



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