

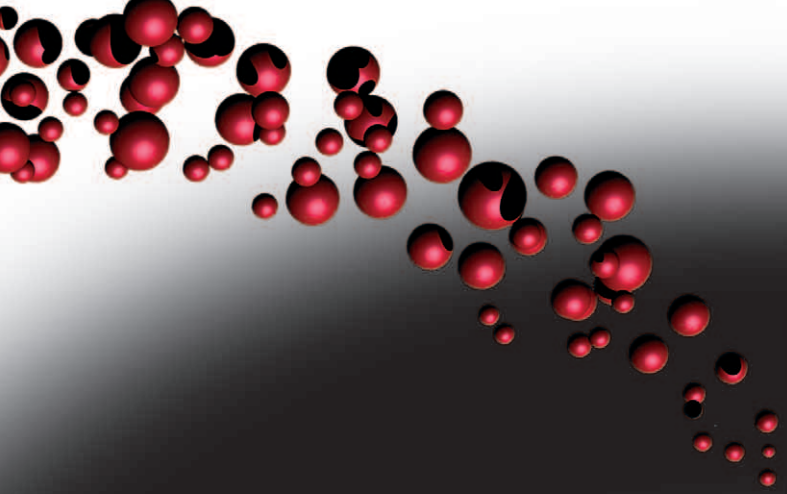
Dekati® ELPI+™

Electrical Low Pressure Impactor

Real-time particle size
distribution
Wide particle size range
Wide range of applications



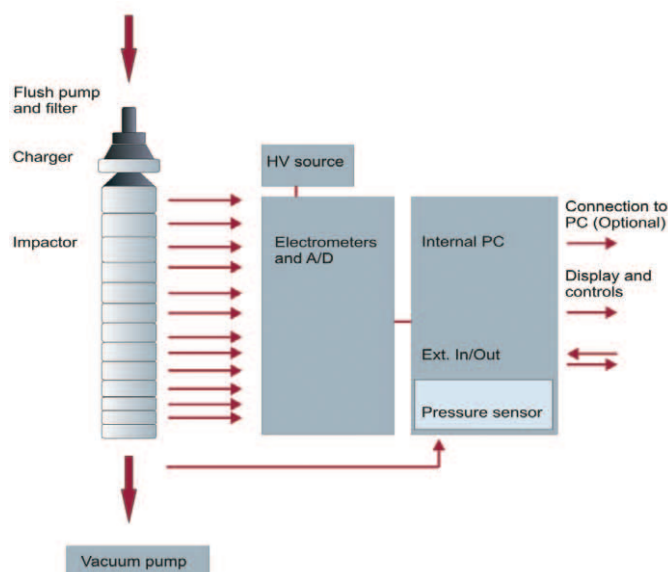
Excellence in Particle Measurements



Dekati® ELPI+™ Electrical Low Pressure Impactor

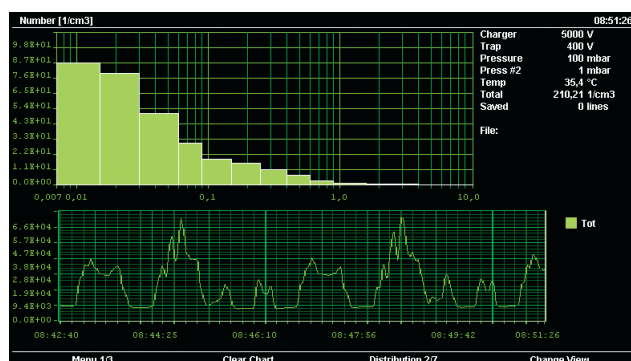
Description

ELPI+™ (Electrical Low Pressure Impactor) is a new, improved version of the widely used and well characterized ELPI™ system. ELPI+™ enables measurement of real-time particle size distribution and concentration in the size range of 6nm - 10µm with 10Hz sampling rate. The ELPI+™ features include real-time stand-alone operation, wide sample concentration range, wide particle size range and robust structure for operation even in harsh conditions. The use of impactor technology enables post-measurement chemical analysis of size classified particles. In addition, the ELPI+™ can be used for real-time particle charge distribution and gravimetric impactor measurements. All these features enable the use of the ELPI+™ instrument in wide range of particle measurement applications.



Operating Principle

The ELPI+™ operating principle can be divided into three major parts: particle charging, size classification in a cascade impactor and electrical detection with sensitive electrometers. The particles are first charged into a known charge level in the corona charger. After charging, the particles enter a cascade low pressure impactor with 14 electrically insulated collection stages. The particles are collected in the different impactor stages according to their aerodynamic diameter, and the electric charge carried by particles into each impactor stage is measured in real time by sensitive electrometers. This measured current signal is directly proportional to particle number concentration and size. The particle collection into each impactor stage is dependent on the aerodynamic size of the particles. Measured current signals are converted to particle size distribution using particle size dependent relations describing the properties of the charger and the impactor stages. The result is particle number concentration and size distribution in real-time. By switching the charger unit off, the ELPI+™ can be used for particle charge distribution measurements.



ELPI+™ display shows particle size distribution in real-time.



Excellence in Particle Measurements

ELPI+™ Features

Real-time particle size distribution and total concentration measurement

- Wide particle size range; 6nm - 10µm
- 14 size fractions
- Possibility for chemical characterization of size classified samples
- Wide operational concentration range
- Automated charge distribution measurements
- Automatic flow control and pressure adjustment
- Independent stand-alone operation or control via laptop using ELPIVI software
- Large 7" display with graphic user interface
- 6 analog inputs, 3 outputs, all 0-10V

ELPI+™ Benefits

Improved version of the well known ELPI™ technology

- Improved sensitivity
- 10Hz sampling rate
- Optimized charger operation
- Improved impactor design with more size resolution
- Optimized calculation procedures
- Simplified user interface
- Stand-alone operation
- Wide particle size and concentration range
- Sophisticated calibration of each instrument
- Simple construction
- Robust structure

ELPI+™ Accessories

- Aluminium and polycarbonate impactor collection foils, 25mm
- Collection substrate spray (DS-515) with a stencil (DS-125)
- Vacuum pumps
- Spare impactors and collection plate sets
- Sintered collection plate sets for high concentration measurements
- Dekati® Dilution Systems for conditioning sample from combustion flue gas and automotive exhaust
- Dekati® Dryer (DD-600) for removing water from ambient aerosol
- Sample inlets for air quality measurements

ELPI+™ Applications

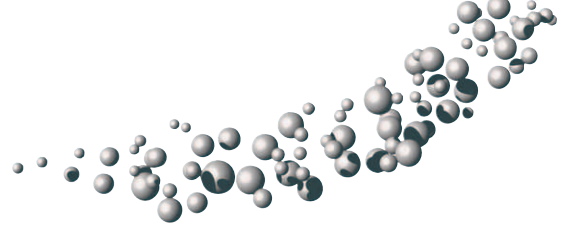
The ELPI+™ is suitable for various different types of measurement applications where the requirements for the instrument include wide particle size range and fast response time. Together with Dekati® Sample Conditioning instruments, Dekati is able to provide complete measurement solutions for many different types of applications.

Typical applications for the ELPI+™ include:

- Combustion studies
- Outdoor and indoor air quality measurements
- Automotive exhaust measurements
- Blow-by gas measurements
- Pharmaceutical inhaler studies
- Particle charge distribution measurements
- Filter grade efficiency studies
- Nanoparticle measurement

Dekati® ELPI+™

Electrical Low Pressure Impactor



ELPI+™ Specifications

Particle Size range	0.006 - 10 µm
Number of size classes	14
Sample flow rate	10 lpm
ELPI+™ dimensions	H400 x W420 x D220 mm
Collection plate diameter	25mm
Unit weight	15 kg without impactor 22 kg with impactor in its place
Pump requirements*	7 m³/h @ 50 mbars
Operating temperature	10-35 °C
Operating humidity	0-90% RH Non-condensing
Sampling rate	10Hz
Power	100-250V, 50-60 Hz, 200W
Computer requirements	MS-Windows XP™, Vista™, 7™
Connection to PC (optional)	RS-232 or Ethernet
6 analog inputs, 3 outputs	0-10V

* Suitable pumps available at Dekati Ltd.



ELPI+™ impactor and charger unit.

Stage	D50% [µm]	Di [µm]	Number min [1/cm³]	Number max [1/cm³]	Mass min [µg/m³]	Mass max [mg/m³]
15	10					
14	6,8	8,2	0,10	2,4E+04	30	10000
13	4,4	5,5	0,10	2,4E+04	10	3000
12	2,5	3,3	0,15	5,4E+04	3,0	1000
11	1,6	2	0,3	1,1E+05	1,4	450
10	1	1,3	0,5	1,9E+05	0,7	210
9	0,64	0,8	1	3,5E+05	0,3	100
8	0,4	0,51	2	6,4E+05	0,1	50
7	0,26	0,32	3	1,2E+06	0,07	20
6	0,17	0,21	5	2,1E+06	0,03	10
5	0,108	0,14	10	3,7E+06	0,02	5
4	0,06	0,08	20	7,3E+06	0,005	2
3	0,03	0,042	50	1,7E+07	0,002	0,5
2	0,017	0,022	100	3,4E+07	0,001	0,25
1	0,006	0,01	250	8,3E+07	0,0004	0,13

Each ELPI+™ unit is individually calibrated before delivery; the calibration includes detailed determination of the exact sample flow rate and D50% values. The values presented in this table are nominal values.

Acknowledgements

The ELPI instrument originated through work carried out at the Aerosol Research Group at the Tampere University of Technology, Tampere, Finland.



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Dekati Ltd. is specialized in the design and manufacture of innovative fine particle measuring and sampling devices. Since its founding in 1994, Dekati has become the technological market leader in producing fine particle measurement instrumentation for various applications and hundreds of customers. ●