

# Dekati<sup>®</sup> High Resolution ELPI<sup>®</sup>+

- Real-time particle size distribution
- High size resolution
- Wide particle size range



Excellence in Particle Measurements



# Dekati<sup>®</sup> High Resolution ELPI<sup>®</sup>+

## Description

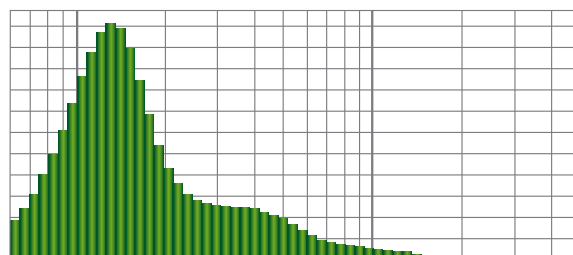
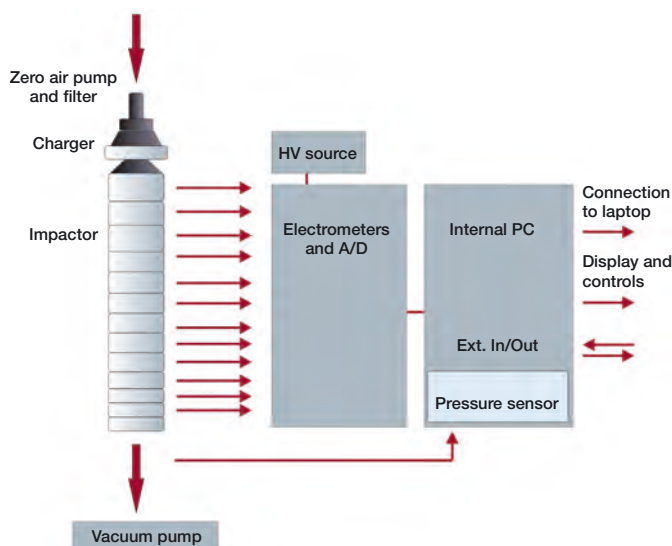
The Dekati<sup>®</sup> High Resolution ELPI<sup>®</sup>+ (HR-ELPI<sup>®</sup>+) is a completely new version of the widely used ELPI<sup>®</sup>+ instrument. The High Resolution ELPI<sup>®</sup>+ combines features of the ELPI<sup>®</sup>+ with data inversion algorithm that gives real-time particle number size distribution in up to 500 size classes 6 nm – 10 µm. Other High Resolution ELPI<sup>®</sup>+ features include wide particle sample concentration range, robust structure and possibility to characterize chemical composition of size classified particles after the real-time measurement.

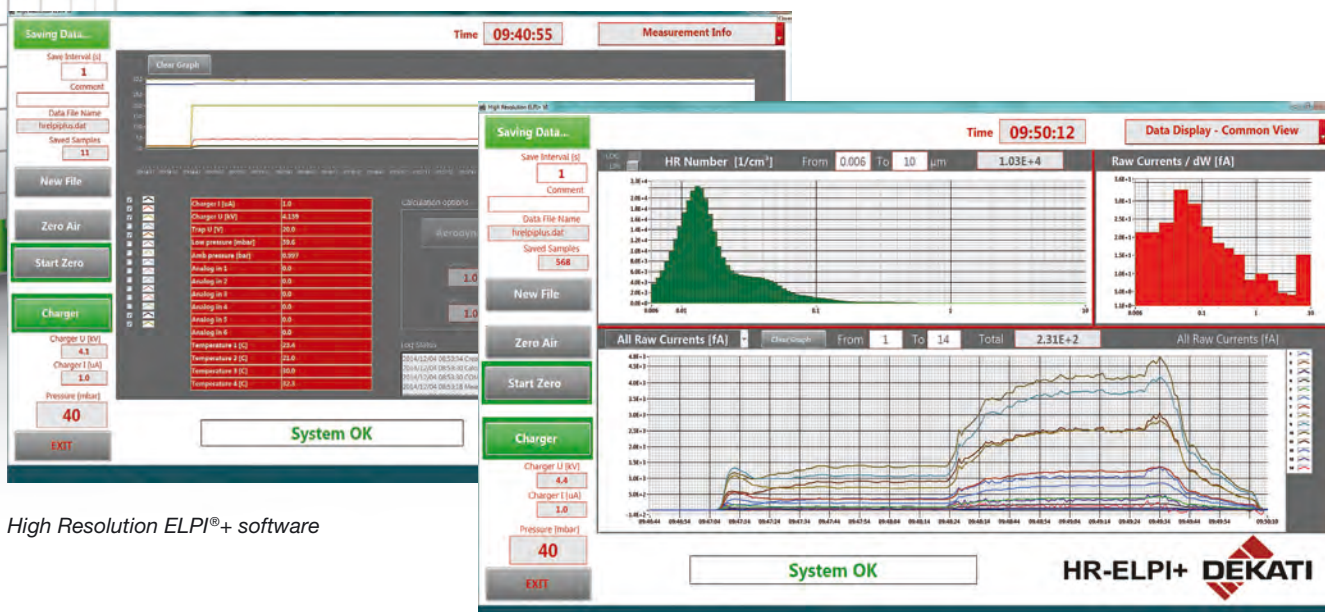
## Operating principle

High Resolution ELPI<sup>®</sup>+ operating principle is the same as ELPI<sup>®</sup>+ operation added with data inversion software. The particles are first charged into a known charge level in

a corona charger after which they are size classified in a 14-stage impactor with electrically insulated impactor stages. Each impactor stage is connected to an electrometer that measures the current signal produced by the charged particles as they are collected on the impactor stage. The primary particle collection efficiencies and the amount of diffusion and image charge deposition have been determined for each impactor stage allowing determination of impactor Kernel functions.\* The data inversion calculation method used in the ELPI<sup>®</sup>+ is based on these Kernel functions and iterative calculation routine resulting in an accurate and reliable determination of particle size distribution with high size resolution. The inversion calculation runs in real-time and doesn't require any adjustments nor optimizations from the user of the instrument.

\*Järvinen, A., Aitoma, M., Rostedt, A., Keskinen, J. & Yli-Ojanperä, J. 2014. Calibration of the new electrical low pressure impactor (ELPI+). 2014 J. Aerosol Sci. 69, pp. 150-159.





High Resolution ELPI<sup>®</sup>+ software

## HR-ELPI<sup>®</sup>+ Applications

High Resolution ELPI<sup>®</sup>+ can be used in various different types of measurement applications. The HR-ELPI<sup>®</sup>+ can be combined with Dekati<sup>®</sup> Sample Conditioning Instruments to take the sample from variable sample temperatures, pressures and humidities.

HR-ELPI<sup>®</sup>+ applications include

- Combustion studies
- Outdoor and indoor air quality measurements
- Occupational health studies
- Engine exhaust measurements
- Blow-by gas measurements
- Nanoparticle measurements

## HR-ELPI<sup>®</sup>+ Features

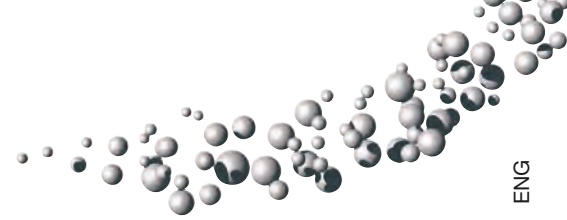
- Wide particle size range 6 nm - 10 µm with one single instrument
- Real-time particle number size distribution in up to 500 size classes
- Possibility of post-measurement chemical characterization of size classified impactor samples
- Wide operational concentration range
- Can also be used with traditional ELPI<sup>®</sup>+VI software to get information on particle active surface, mass and natural charge
- Simple and robust construction
- Insensitivity to variations in sample pressure
- Sophisticated calibration made for each manufactured unit
- Integrated flow control and pressure adjustment
- 6 analogue inputs and 3 outputs

## HR-ELPI<sup>®</sup>+ Accessories

- Aluminium and polycarbonate impactor collection foils, 25 mm
- Collection substrate spray (DS-515) with stencil
- Vacuum pumps
- Spare impactor and collection plate sets
- Dekati<sup>®</sup> Dilution Systems for conditioning sample from combustion flue gas and engine exhaust
- Dekati<sup>®</sup> Dryer for removing water from ambient aerosol
- Sample inlets for air quality measurements



ELPI<sup>®</sup>+ main unit, charger and impactor



# Dekati® High Resolution ELPI®+

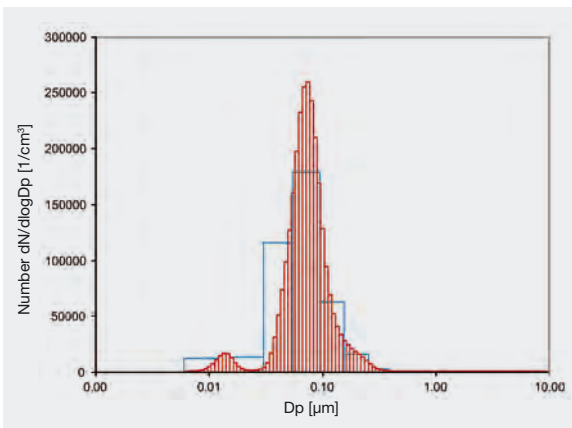
## HR-ELPI®+ Specifications

Particle size range	6 nm - 10 µm
Number of size classes	100 or 500 30 or 150 per decade
Sample flow rate	10 lpm
Sensitivity	250 #/cm <sup>3</sup> for 10 nm particles 20 #/cm <sup>3</sup> for 100 nm particles 1.0 #/cm <sup>3</sup> for 1 µm particles 0.1 #/cm <sup>3</sup> for 5 µm particles
Dimensions	H407 x W454 x D242 mm
Collection plate diameter	25 mm
Unit weight	15 kg without impactor 22 kg with impactor in its place
Pump requirements *	20 m <sup>3</sup> /h @ 40 mbars
Operating temperature	10-35 °C
Operating humidity	0-90 % RH Non-condensing
Sampling rate	1 Hz
Power	100-250 V, 50-60 Hz, 200 W
Computer requirements	MS-Windows 7™, MS-Windows 8™
Connection to PC	RS-232 or Ethernet
6 analogue inputs	0-5 V
3 analogue outputs	0-10 V

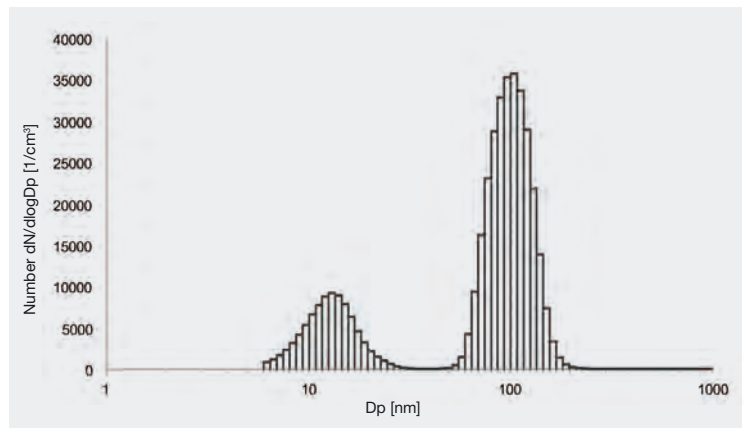
\* Suitable pumps available at Dekati Ltd.



HR-ELPI®+ impactor and charger unit.



ELPI®+ data in blue, HR-ELPI®+ data in red colour



Example High Resolution ELPI®+ data

## 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 thousands of customers. ●