

Dekati® BOLAR™ Bipolar Charge Analyzer

- Bipolar electrical charge measurement
- Particle charge and mass distribution determination
- Particle size classification



Excellence in Particle Measurements



Dekati® BOLAR™

Bipolar Charge Analyzer

Dekati® BOLAR™
construction



Description

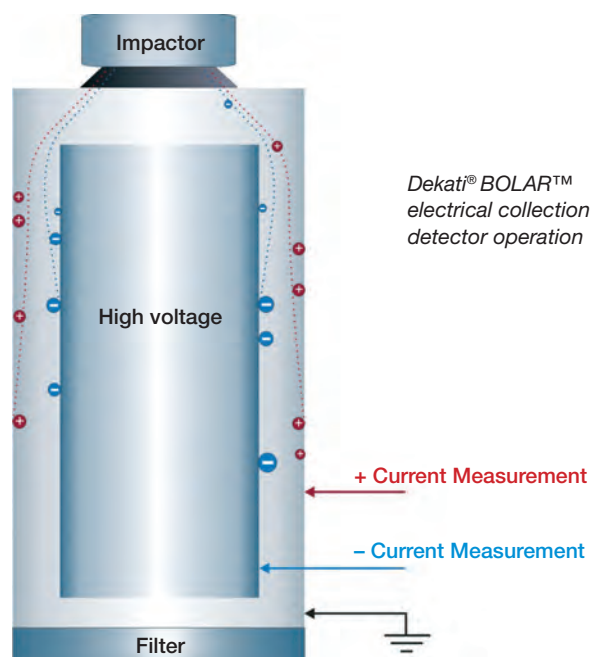
The electrical charge carried by inhalation aerosols has been found to affect device performance and lung deposition of Dry Powder Inhalers (DPI), Metered Dose Inhalers (MDI) and nebulizers. The Dekati® ELPI™ (Electrical Low Pressure Impactor, Dekati Ltd.) has been widely used to determine the net charge size distribution of inhalation aerosols. However, where the ELPI™ method gives the net charge of the particles, the new Dekati® Bipolar Charge Analyzer (Dekati® BOLAR™) is the first commercially available instrument capable of measuring bipolar electrical charge size distribution of inhalation aerosols.

The Dekati® BOLAR™ gives a new level of information for the development of inhalable medicine and delivery devices. The positive and negative charge levels carried by particles can vary significantly between different inhaler devices depending on the materials used in the device, the design of the device, carrier and drug particles used in the device and operating conditions. Until now, the measurement of size classified bipolar electrical charge levels has not been possible, which makes the Dekati® BOLAR™ a completely unique tool for inhaler device development. The Dekati® BOLAR™ can separate positively and negatively charged particles in different size fractions and detect each fraction individually. After the charge measurement, negatively and positively charged particles can be separately dissolved for analysis from the instrument collection detectors giving the mass and composition of the particles in different particle size fractions and polarities.

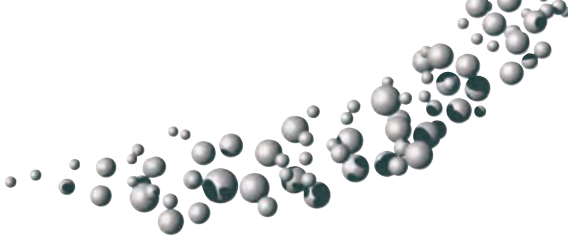
Operating principle

The Dekati® Bipolar Charge Analyzer measures particle bipolar electrical charge size distribution in real-time. The instrument consists of two main components: a flow divider and electrical collection detectors. The flow divider is carefully designed to divide the sample evenly into six branches. Five of these branches lead the sample to electrical collection detectors and the sixth one is connected to a filter holder to verify the operation of the flow divider. Each of the five branches has a pre-separator impactor placed in front of the electrical collection detector. The impactor has a different cut point in each of the five branches enabling detection of different particle size fractions in different detectors.

The collection detector itself consists of two concentric cylinders. The inner cylinder is at high positive potential creating an electrical field between these two cylinders. The particle sample travels in a gap between the two cylinders where positively charged particles drift to the outer cylinder and negatively charged particles drift to the inner cylinder. Both cylinders are connected to electrometers that measure separately the amount of negative and positive charge carried by the particles. A back-up filter is placed at the end of each detector to collect possible neutral particle that may go through the detector itself. The collection detectors can be uncoupled after measurement and particles collected in different detectors can be analyzed. This way the device can be used to measure bipolar charge distribution in respect of particle mass and particle composition in five different size fractions.



Dekati® BOLAR™
electrical collection
detector operation



First commercial device for separate determination of positively charged and negatively charged particles

Features

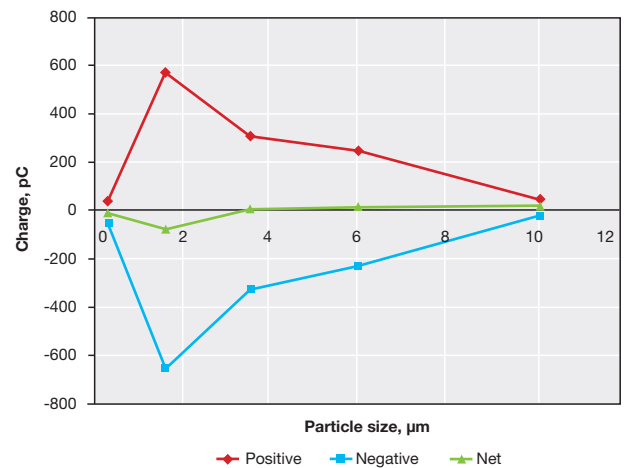
- Bipolar electrical charge size distribution in 5 particle size fractions
- Separate detection of positively and negatively charged particles
- Real-time measurement
- Analysis of collected particles, positively and negatively charged particles separately
- Automated self-check before each measurement
- Automated measurement sequence
- Stand alone operation
- Sample flow rate 30-90 lpm
- Standard USP inlet connection
- Large 7" display with user interface
- Data stored on a USB drive
- Easy data analysis options for reviewing and analysing charge and mass data

Benefits

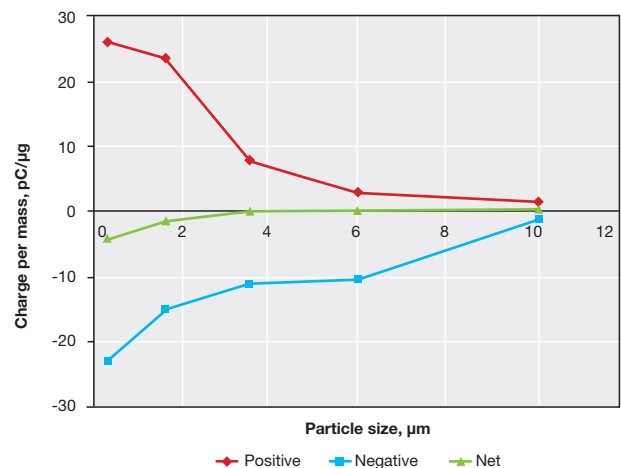
- First commercial device for separate determination of positively charged and negatively charged particles
- Unique information for inhaler device development
- Device optimization for better drug lung deposition
- Designed specifically for needs of pharmaceutical industry
- Suitable for DPI, MDI and nebulizer development
- Easy to use
- Robust structure

Accessories

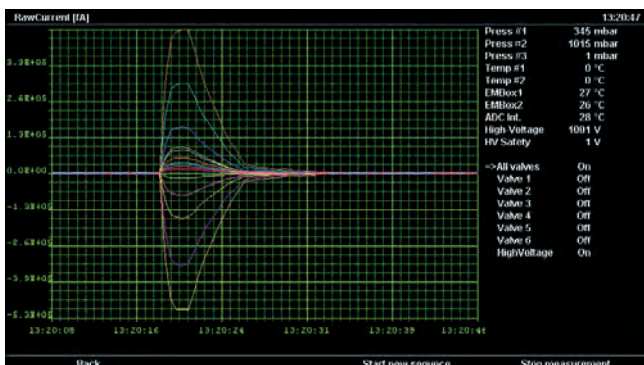
- Pump to operate the Dekati® BOLAR™
- Inhaler device holder
- Impactor collection cup grease
- Filters



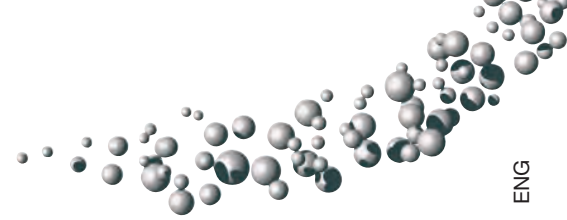
Measured charge data from DPI measurement



Charge/mass data from DPI measurement



Dekati® BOLAR™ software, real-time view



Dekati® BOLAR™

Bipolar Charge Analyzer

Specifications

Particle size range	0-12.8 µm
Number of size fractions	5
Number of electrometers	17
Sampling rate	10 Hz
Sensitivity	10 pC
Flow rate	30-90 lpm
Connection to PC	RS-232 Serial
Data storage	USB or via Ethernet to a network drive
Pump requirements*	35-95 slpm @ 400 mbar depending on the used sample flow rate
Dimensions	670 x 552 x 595 mm
Unit weight	90 kg
Operating conditions	10-35 °C
	0-90%RH, non-condensing
Inlet connection	Standard USP inlet

* Suitable pumps available at Dekati Ltd.

Branch	D50%
1	0.94 µm
2	2.84 µm
3	4.47 µm
4	8.07 µm
5	12.79 µm

Acknowledgements

The BOLAR™ has been designed and developed in co-operation with Tampere University of Technology, Department of Physics, Aerosol Physics Laboratory, Finnish Meteorological Institute and GlaxoSmithKline.



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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. ●