



Dekati Ltd Technical Note

ELPI+™ IMPROVEMENTS

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Introduction

ELPI™ (Electrical Low Pressure Impactor, Dekati Ltd.) is used to measure airborne particle size distribution and concentration in real time. ELPI+™ is an improved version of the widely used ELPI™ instrument with new features and improved performance. This paper lists the new features and improvements made in the ELPI+™ instrument compared to the previous ELPI™ models.

ELPI+™ Features

Previously Dekati has provided four different ELPI™ models: Standard ELPI™ model at either 10 or 30lpm flow rate, and Outdoor Air ELPI™ model at either 10 or 30lpm flow rate. The features of standard and Outdoor Air ELPI™ models have been combined into one in the new ELPI+™ system. In addition, several new features have been added to improve the instrument performance and make it easier to operate. A summary of the ELPI+™ features compared to the old models is presented in table 1 at the end of this document.



ELPI+™

ELPI+™ improvements: Performance

- Improved size resolution, 14 stages between 6nm - 10µm
- Sample residence time between impactor stages taken into account in the concentration calculation improving the time constant of the whole system
- New impactor design with decreased volume resulting in lower sample residence time and reduction in induction currents
- More durable PEAK™ insulators in the impactor and charger to reduce problems related to handling of Teflon
- 10Hz sampling rate
- Improved electrometer design – improved sensitivity
- Automatic Q/N and Q/M measurement operation

- Improved charger design with lower particle losses
- Sample temperature and pressure measurement
- 6 analogue inputs and 3 outputs in all units (All 0-10V)

ELPI+™ improvements: Usability

- Lighter construction, total weight 22kg
- Simplified impactor construction with fewer parts
- Automatic impactor tightness adjustment
- Impactor-charger construction easily removable from the ELPI+™. Separate carry case available.
- Impactor low pressure adjustment via ELPI+™
- Standalone operation – WVGA display for data presentation and instrument control
- Simplified ELPI+VI software (Optional)
- Data calculation inside ELPI+™ and ELPI+VI
- One measurement range up to 500 000fA
- Automated and faster electrometer calibration function (Zeroing)
- Impactor calibration values installed inside the ELPI+™ and automatically uploaded to ELPI+VI
- Simplified control electronics – easy maintenance/repair
- More durable flush pump filter
- USB port for stored data output
- Ethernet or RS-232 connection to PC
- Pump control via ELPI+™ possible



ELPI+™ Impactor and Charger Unit

ELPI+™ future developments

Further development with the ELPI+™ is being made and the following features will soon be available:

- Data inversion
- Heated ELPI+™ setup
- Automatic particle density measurement
- Sintered collection plates

Similar to ELPI™, the ELPI+™ is compatible with all Dekati® sample conditioning instruments.

Table 1. Comparison ELPI™ vs ELPI+™

Feature	ELPI™	ELPI+™
Particle Size range	7nm -10 µm	6nm -10 µm
Number of size classes	12	14, filter stage standard, additional impactor stage at 17nm
Filter stage	Option	Standard
Sample flow rate	10 or 30lpm	10lpm
Unit dimensions	570 x 400x 230	400 x 420 x 220
Unit weight	35kg	22kg
Impactor low pressure	100mbar	40mbar
Pump requirements	7m ³ /h @ 100mbar (10lpm) 21m ³ /h @ 100mbar (30lpm)	16m ³ /h @ 40mbar
Versions	Standard ELPI 10 or 30lpm OELPI 10 or 30lpm	ELPI+ 10lpm
Charger type	Diode corona charger, 1 µA, 5kV. Separate from the impactor.	Diode corona charger, 1 µA, 3.5 kV. Integrated in the uppermost impactor stage.
Impactor insulation	Teflon	PEEK™
Charger insulation	Teflon	PEEK™
Collection foil diameter	25mm	25mm
Filter stage filter	47mm	No additional filter needed
Low pressure control	External valve for pressure adjustment	Integrated valve option for pressure adjustment
Control of the unit	Via ELPIVI	Independent and/or via ELPI+VI
Connection to PC	RS-232	RS-232 or Ethernet
Data Output	Via ELPIVI Floppy disk/USB drive in Outdoor Air ELPI™.	USB port for data saving Analogue outputs, 3pcs Via ELPIVI
Inputs/outputs	Accessory ELPIVOLT for 3 analogue inputs	6 inputs, 3 outputs standard. All 0-10V
Electrometers	12 electrometers operating in four measurement ranges, max 400 pA	7 electrometers boards, 14 channels operating in one measurement range, max 500 pA
Sampling rate	1 Hz	10Hz
Temperature measurements	RH & T sensor available as accessory	Sample temperature measurement standard
Pressure measurements	Impactor low pressure measurement	Impactor low pressure and sample pressure measurement
Charge measurement	Manual	Automatic function for Q/N measurements
Impactor residence time	Not taken into account in the calculation	Taken into account in the calculation
Restart after power failure	OELPI feature	NA
Power requirements	110/ 220-240V, 50-60Hz, 300W	100-250V, 50-60Hz, 200W
Operating temperature	5-40 °C	10-35 °C
Operating humidity	0-90%RH Non condensing	0-90% RH Non condensing
Heated set-up	Available as an accessory	Future option
Possibility for collection of particles	Yes	Yes
Sintered collection plates	Available as an accessory	Future option
ELPI Display	LCD, only current values and instrument status	7" WVGA display with graphic user interface. Data display and instrument controls.

Feature	ELPI™	ELPI+™
Setup values	Inserted in ELPIVI init.bin file before the measurement	Installed inside ELPI+™ unit and automatically uploaded to ELPI+VI
Data calculation	ELPIVI	Inside ELPI+™ and ELPI+VI
Data processing software	ELPIxls	ELPIPlusCalc.xls
Data format	Text file *.dat	Text file *.dat
Inlet	R3/8"	R3/8"
Outlet	R3/8, NW16 flange connection provided	R1/2", R3/8" or NW16 flange

For more information on the ELPI+™, please contact Dekati Ltd. at support@dekati.fi