

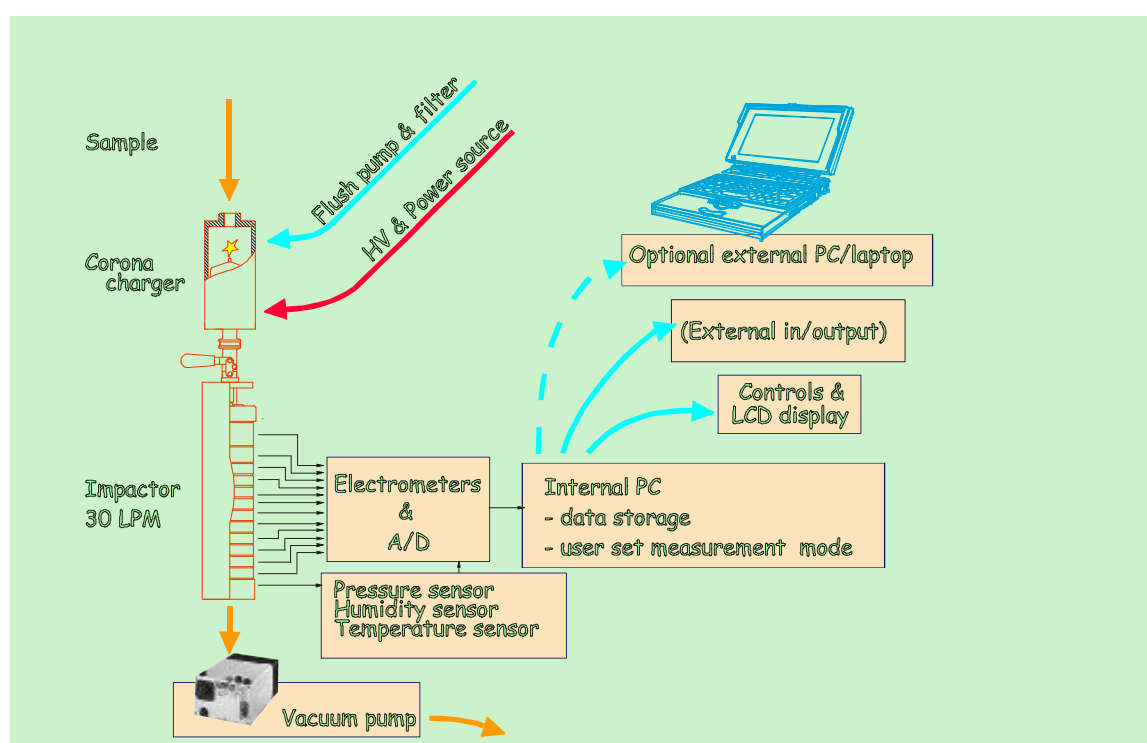
OUTDOOR AIR ELPI



~~Real-time~~ particle size distribution and concentration measurement system

Outdoor Air ELPI measures in real time and continuously the number distribution and total number concentration of particles in the size range of 30 nm up to 10 microns. Wide size range and continuous real time operation makes the Outdoor Air ELPI an ideal instrument for outdoor air particulate monitoring. Outdoor air ELPI is designed for long time independent operation in either remote or urban air measurement stations. Detection limit for ultrafine particles is less than 120 1/cm³.

Outdoor air ELPI operates independently. In case of power failure, system restarts itself to continue user set measurement mode after power is reconnected. Other features include user set data save and zero intervals, internal temperature and humidity sensor and for humid environments, heatable external impactor assembly set (an accessory).



Operation principle

The gas sample containing the particles is first sampled through a unipolar corona charger. The charged particles then pass into a low pressure impactor with electrically isolated collection stages. The electric current carried by charged particles into each impactor stage is measured in real time by a sensitive multichannel electrometer.

The particle collection into each impactor stage is dependent on the aerodynamic size of the particles. Measured current signals are converted to (aerodynamic) size distribution using particle size dependent relations describing the properties of the charger and the impactor stages.

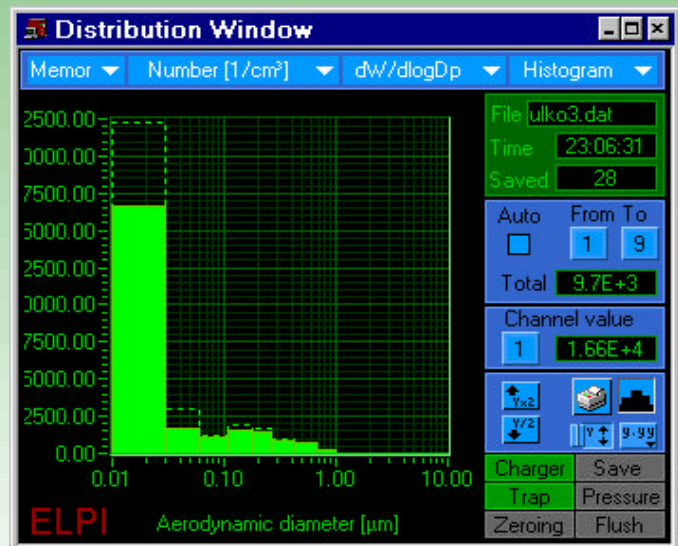
Measured current data is stored into a hard disk. User loads the measured data into a floppy disk for data analysis. Floppy disk is used also for measurement mode programming. Data analysis can be carried out e.g. with the included ELPIVI measurement software.

OUTDOOR AIR

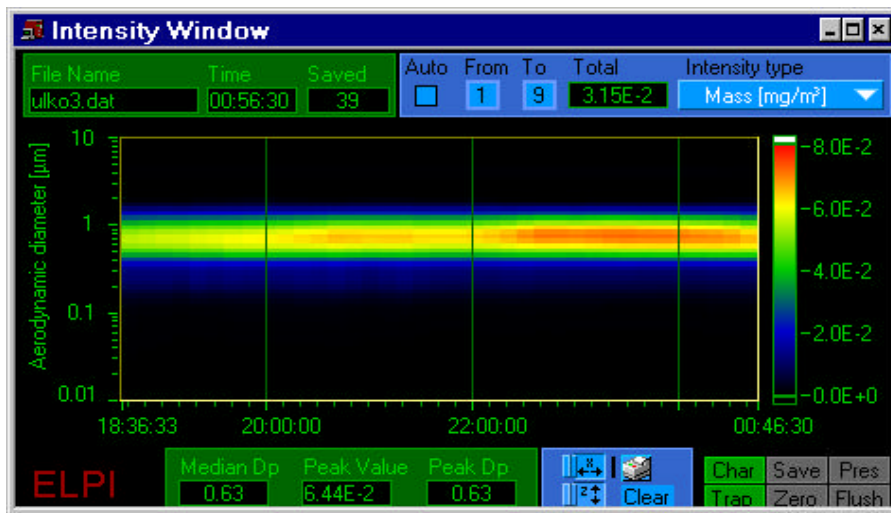
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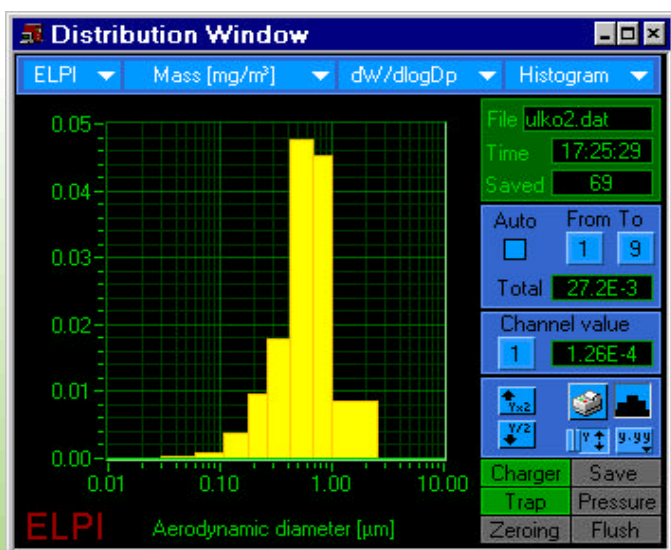
Console window



Comparison of two instantaneous number distribution at rural roadside



PM 2.5 mass intensity distribution in the evening



PM 2.5 mass distribution at rural roadside

Applications

The low pressure impactor is a very robust and easy to operate detector, which can be applied to rough environments. The measured particles are collected and can be further analysed for mass or composition. Field of applications include:

- Outdoor air, both urban and background
- Indoor air

SPECIFICATIONS

Particle size range:	0.030 - 10 μm
Number of Stages:	12 with electrical detection, total 13
Volumetric flow rate:	30 l/min
Impactor dimensions:	\varnothing 65 mm x 300 mm
Collection plate diameter:	25 mm
Lowest stage pressure:	100 mbar
Pump requirements:	21 m ³ /h at 100 mbar
Operation temperature:	5 - 40°C
Operation humidity:	0 - 60 % R.H.
Response time:	below 5 seconds
ELPI dimensions:	H 570 x W 420 x D 260 mm
Weight:	37 kg
Charger voltage:	5 kV
Charger current:	1 μA
Computer requirements:	486 DX2, 16 MB RAM, MS-WINDOWS 95, -98, -NT

ACCESSORIES

- Heatable (max 200 °C) external impactor assembly set for humid environments
- Tandem-ELPIVI software for parallel instrument operation, e.g. one heated unit and one at reference temperature

D50%	Di	Number min per stage	Number max* per stage	Mass min per stage	Mass max* per stage
[μm]	[μm]	[1/cm ³]	[1/cm ³]	[$\mu\text{g}/\text{m}^3$]	[mg/m ³]
10.00					
6.70	8.2	0.03	1E+03	7.5	370
4.0	5.2	0.05	2E+03	3.5	170
2.5	3.2	0.09	4E+03	1.5	73
1.0	1.6	0.22	1E+04	0.50	22
0.61	0.78	0.54	2E+04	0.14	6.7
0.38	0.48	1	5E+04	0.06	2.9
0.26	0.32	2	8E+04	0.03	1.4
0.15	0.20	4	1E+05	0.02	0.65
0.090	0.12	7	3E+05	0.006	0.27
0.060	0.071	13	6E+05	0.003	0.11
0.030	0.040	27	1E+06	0.0009	0.04
FILTER		120	5E+06	0.0004	0.01

**with monodisperse aerosol*

Acknowledgement

This instrument has originated from work carried out at the Aerosol physics laboratory at Tampere University of Technology in co-operation with Finnish Meteorological Institute, Aerosol Research, Helsinki, Finland.

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