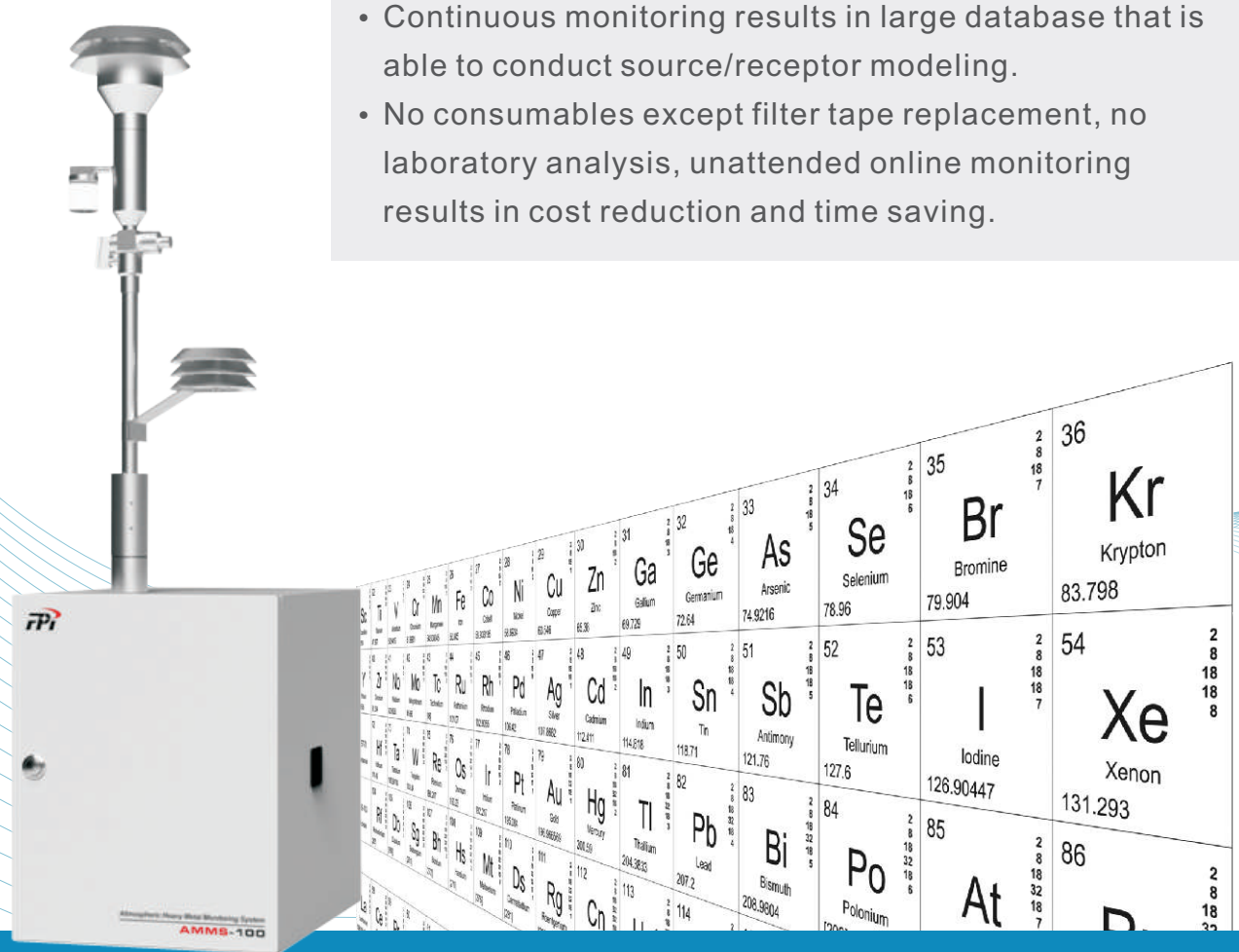
Focused Photonics Inc.

AMMS-100
Atmospheric Metal Monitoring System

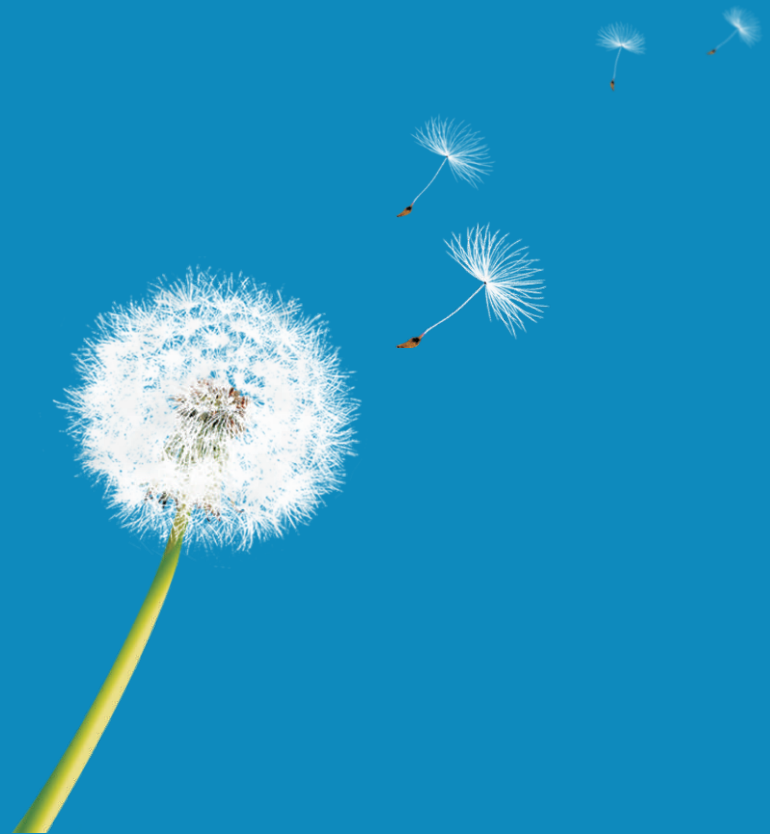
- USEPA Method IO-3.3 compliant
- Measure 28 toxic metals simultaneously
- Magnitude of detection limit 0.01-0.1ng/m^3
- Associate measurements with time of day or meteorological conditions, makes particular source tracing possible.
- Continuous monitoring results in large database that is able to conduct source/receptor modeling.
- No consumables except filter tape replacement, no laboratory analysis, unattended online monitoring results in cost reduction and time saving.



Product Brief

Toxic air pollutants monitoring has been the subject of interest and concern for many years. Traditionally a high-volume sampler is most commonly used for collecting air particulate sample. The sample is weighed to determine concentration of TSP and is usually analyzed using a bench-top ICP-MS or XRF to determine concentration of air borne metal elements. The laboratory method set a benchmark for atmospheric metal monitoring, and is adopted by USEPA Method IO-3.3 and used worldwide as reference method.

AMMS-100, the latest XRF based metal analyzer of FPI, fully abides by USEPA Method IO-3.3 and realizes continuous & unattended monitoring. The AMMS-100 uses an automated movable filter tape to collect particulate sample. The sample is drawn through a PM size-selective inlet and concentrated on a small spot on the tape. The tape then advances, placing the collected sample spot in X-ray section for analysis. The process of sampling and analysis is fully automated and flow automatically controlled, left only the replacement of filter tape periodically.



METAL

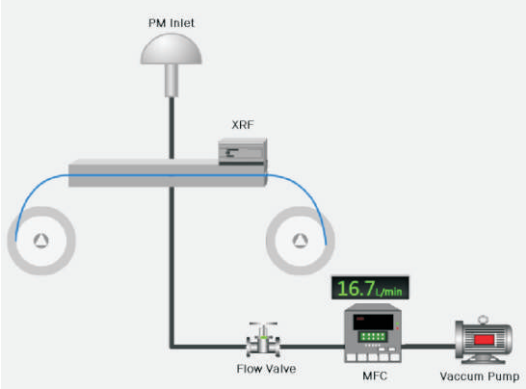
AMMS-100 V2.0

METAL+PM

AMMS-100 V3.0

Principe of Technology

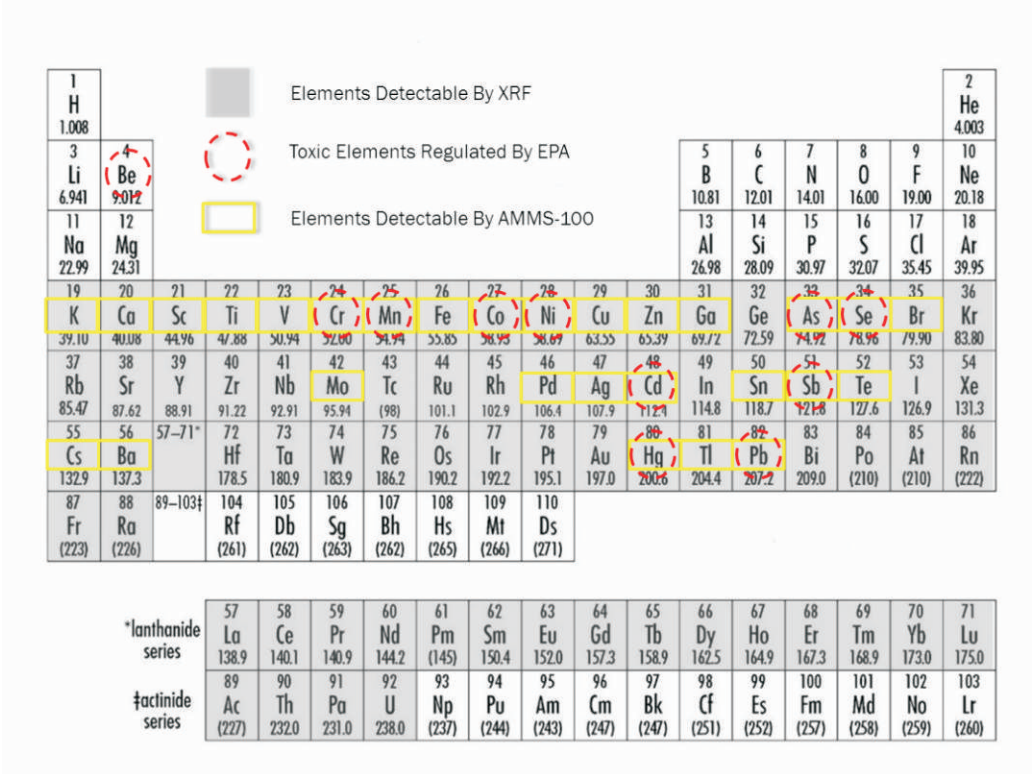
The AMMS-100 works based on the principle of X-ray fluorescence (XRF), in which X-rays bombard the atom and expel tightly held electrons from the inner orbitals of the atom. The removal of an electron in this way makes the electronic structure of the atom unstable, and electrons in higher orbitals fall into the lower orbitals to fill the vacancy left behind. In falling, energy is released in the form of a photon, which has wavelength characteristic of the atom present. 1) Mass of metals in the sample is obtained by detecting the intensity of X-ray fluorescence, and 2) Volume of the sample is regulated by MFC (mass flow controller). Finally the concentration of metal in the sample is calculated through the equation below.



$$C = \frac{M}{V} = \frac{A \cdot X}{Q \cdot \Delta t}$$ unit: ng/m^3

C: Concentration of Metals in the Sample
M: Mass of Metals in the Sample (ng)
V: Volume of the Sample (m^3)
A: Sample Deposit Area (cm^2)
X: Mass of the Metal Detected (ng/cm^2)
Q: Flow of Sampling (m^3/h)
Δt: Sampling Time (h)

Applicable Elements



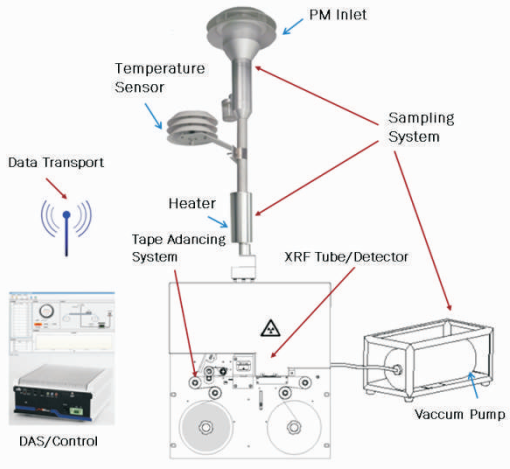
Features & Benefits

All-in-one Architecture

Filter tape advancing system, XRF tube/detector module and flow/electrical control system are fully integrated within an enclosure.

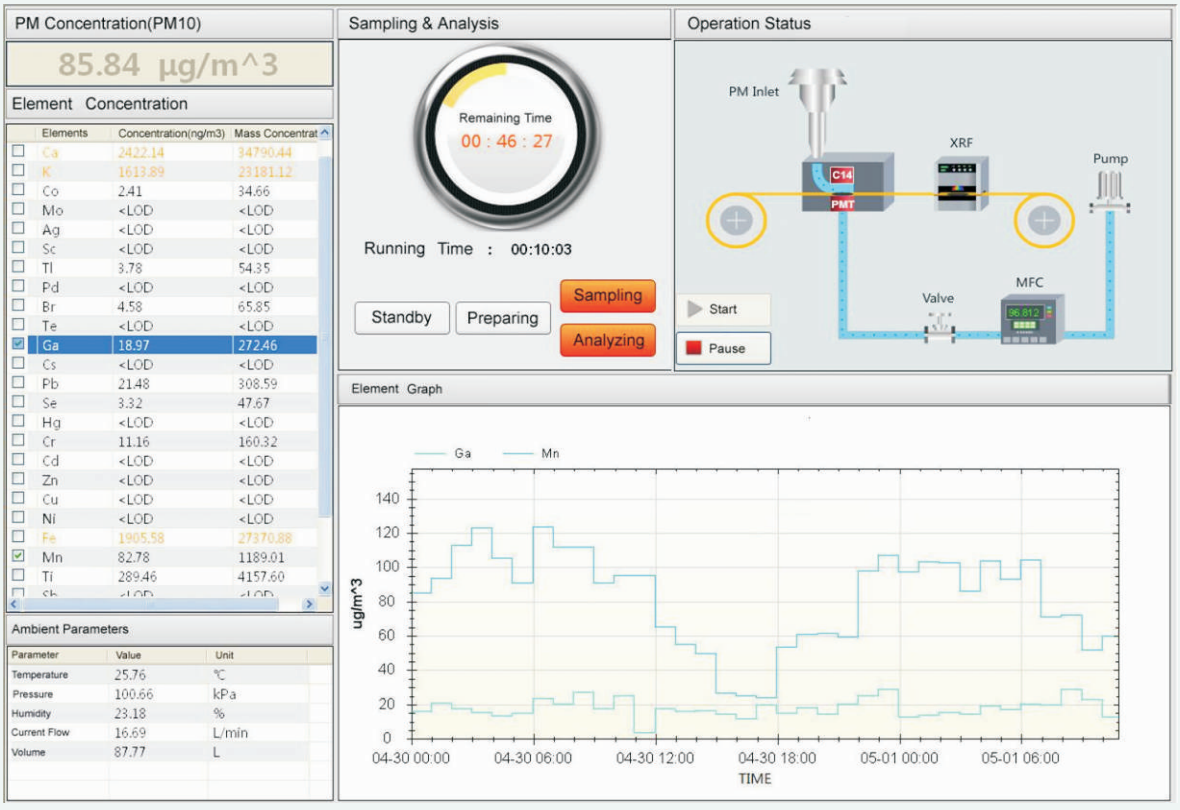
Built-in PM Option

Very low ownership of extended TSP/PM10/PM2.5 monitoring that can be used for source identification analysis.



User Friendly Software

Robust main interface with dynamic display of sampling & analysis status, selectable metal concentration output in forms of figures and graphs. All data traceable and can be exported in different formats. Daily, weekly, monthly, yearly reports and graphs can be produced.



Lower Cost of Ownership and Service

Attributing to FPI's proprietary technologies and superior supply chain management, the cost of the analyzer, and cost of the replacement of X-ray tube and filter tape is reduced.

Detection Limit

LDL (ng/m^3), 1 Standard Deviation (σ)										
Element	Atomic Number	Sampling & Analysis Time (mins)				Element	Atomic Number	Sampling & Analysis Time (mins)			
		60	120	180	240			60	120	180	240
K	19	6.06	2.14	1.17	0.76	Se	34	1.01	0.36	0.20	0.13
Ca	20	0.75	0.26	0.14	0.09	Br	35	0.98	0.35	0.19	0.12
Sc	21	0.51	0.18	0.10	0.06	Mo	42	3.29	1.16	0.63	0.41
Ti	22	1.70	0.60	0.33	0.21	Pd	46	2.33	0.82	0.45	0.29
V	23	0.79	0.28	0.15	0.10	Ag	47	3.05	1.08	0.59	0.38
Cr	24	0.61	0.21	0.12	0.08	Cd	48	4.06	1.44	0.78	0.51
Mn	25	1.12	0.40	0.22	0.14	Sn	50	11.43	4.04	2.20	1.43
Fe	26	1.51	0.53	0.29	0.19	Sb	51	10.55	3.73	2.03	1.32
Co	27	1.20	0.42	0.23	0.15	Te	52	10.60	3.75	2.04	1.33
Ni	28	1.61	0.57	0.31	0.20	Cs	55	1.67	0.59	0.32	0.21
Cu	29	4.26	1.51	0.82	0.53	Ba	56	3.64	1.29	0.70	0.45
Zn	30	6.54	2.31	1.26	0.82	Hg	80	4.52	1.60	0.87	0.56
Ga	31	1.22	0.43	0.24	0.15	Tl	81	1.41	0.50	0.27	0.18
As	33	0.77	0.27	0.15	0.10	Pb	82	1.22	0.43	0.24	0.15

Modes of Deployment

MOBILE STATION

STANDARD

INCORPORATED

Technical Data

Specification	Metal	PM
Method of Detection	XRF (USEPA Method IO 3.3)	Beta-ray Attenuation
Range	0-100 μg/ m^3	0-200/0-500/0-1000/0-5000 μg/m^3
Detection Limit	0.01-1ng/m^3 with 240 mins sampling and analysis time, 16.7L/min flow rate	2 μg/m^3
Repeatability	< 1.5% (Pb calibration standard < 5μg/cm^2)	< 2% (against reference foil value)
Elements	Pb, Cd, Hg, As, Cr, Cu, Zn, Ni, Ba, Fe, Ag, Se, Br, Te, Sb, Sn, Ti, Co, Mn, Pd, Tl, Sc , Mo, V, Ca, K, Ga, Cs, 28 metal elements.	
Linearity	Correlation coefficient > 0.99 (Pb)	
Sample Flow Rate	4-20L/min adjustable, 16.7L/min standard	
Sampling & Analysis Time	10-300 mins selectable	
Filter Tape Replacement	2 months (a roll of 100m filter tape, sampling & analysis time 1 hour)	
Size & Weight	V2.0: 444mm(H) * 430mm(W) * 520mm(D) , about 40kg	
	V3.0: 534mm(H) * 430mm(W) * 520mm(D) , about 50kg	
Operating Conditions		
Power Supply	220 (1±10%) V AC, (50±1) Hz	
Power Consumption	<1500 W	
Operating Temperature	-20-50℃ with air conditioned to keep main analyzer work at 5-35℃	
Outputs	RS232, RS485, Ethernet, GPRS	
Modes of Deployment	Rack Mounted, Vehicle Borne, or Incorporated with Criteria Ambient Monitoring Station	

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