



# Mercury Analyzer

MA-3000

Direct Thermal Decomposition Mercury Analyzer  
with Extended Range Triple-Detectors  
Sequential Dual-Cells Optics for Pure Performance



# Objective of Mercury Analysis --- Ease, Fast and Precise!

With world' growing industrialization, it is inevitable to environmental pollutions. Therefore, environmental laws, permits and legislations are in place and getting ever more stringent.

Mercury, being one of the most toxic and polluting metals, has been strictly monitored and controlled in various areas including environmental (water, waste and air), foods (fish, baby products & etc), commercial (cosmetics, plastics & etc) and many more. With such increase demands of mercury analysis in all kinds of sample matrices, new and improved analytical technologies and techniques are clearly needed to meet such requirements of EASE OF USE; AUTOMATION; SENSITIVITY & PRECISION; INTERFERENCE-FREE.

NIC MA-3000 is a dedicated mercury analyzer which focuses on superlative thermal decomposition, gold amalgamation, cold vapor atomic absorption spectroscopy detection, on virtually any sample matrix - solid, liquid, and gas, enable quick results without any tedious, time-consuming and elaborate sample preparation process. Running cost is reduced as no wet reagents are needed, and less sample re-run with most errors mostly incur during sample preparation. Technique is in compliance with USEPA 7473, ASTM D-6722-01, D-7623-10 test methods.

MA-3000 unique dual-cell detector (Patent-pending) design achieves ultra dynamic wide-range with high-precision measurement, without any spectral-interference from low concentration to high concentration range. In addition, the new combustion tube (Patented 5001419) with robust catalysts extends the running life especially with better tolerance to difficult matrices (containing Halogenated and Selenium compounds). Seamless integrated 100-positions auto sampler accomplishes economical efficiency, operational labor saving and laboratory productivity with unmatched versatility.

It is a perfect solution to today's increasing laboratory demand for easily, fast, accurate detection and analysis.



## Selective Option Attachments - Multi-Configurable

MA-3000 is available to equip with attachment accessories for Reduction Vaporization / Gas Tube Desorption analysis, allowing a single analyzer for multiple analytical techniques. Reduction vaporization attachment has options for automatic unit (reagent dispenser and auto sample changer) or manual unit for economical saving.

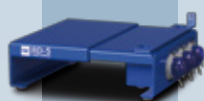
Auto Reduction vaporization attachment

Manual Reducing Vaporization attachment

Gas / Gas tubes analysis attachment



SC-5  
Auto sample changer



RD-5  
Auto reagent dispenser



S-MA  
Manual attachment  
(5mL)



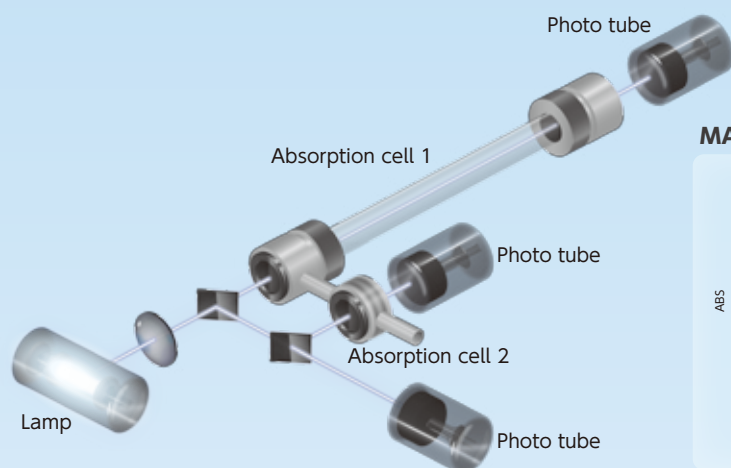
RH-MA3  
Desorption unit for  
Mercury collector tube



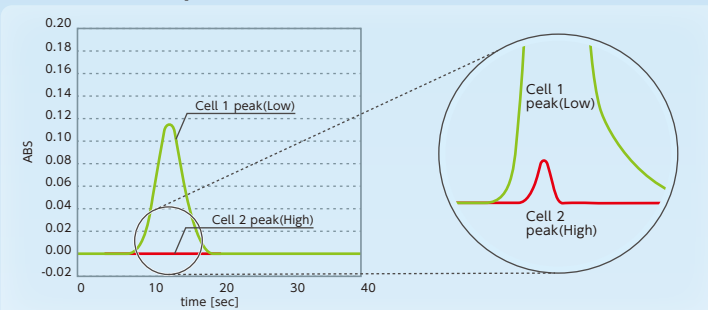
MB-1  
Mercury Vapor  
Calibration Box

# Ultra-Dynamic Extended-Range Detector with Uncompromised-Precision

The unique Dual-Cell Tri-Beam Detector achieves a seamless low to high concentration precise measurement range without cross-range interference seen in other competitive systems. Extended range of up to 70,000ng (or up to 1000ppm) measurement allows coverage of more types of applications and sample matrices, offering unmatched versatility.



MA-3000 Peak profile



## Extending Analysis and Application to its Limit

The new concept combustion tube (Patented 5001419) with robust catalyst formulation extends analysis applications including samples of complicated matrices with halogens and high selenium, enabling long term stability, low operating cost and minimal maintenance.

### Results of Standard Reference Materials

Sample name	Certificated values (Total Hg)	N	AV (mg/kg)	CV (%)	Recovery
Coal (NIST 1632c)	0.0901~0.0975 mg/kg	5	0.0954	2.8	99%
Dogfish liver (DOLT-4)	2.36~2.80 mg/kg	5	2.59	3.2	100%

### Results of Difficult Samples

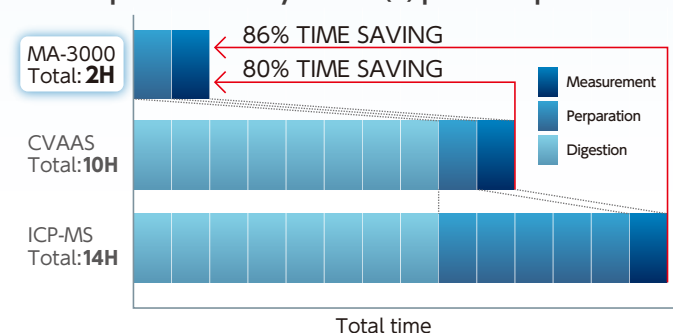
Sample	Sample name	Sample size (mg)	Results		STD addition	
			AVE	CV (%)	Recovery (%)	CV (%)
Salt	NaCl (For experiment use)	190~220	3.81 µg/kg	5.3	102	1.2
High Se containing sample (Se is contained 34~46wt%)	NIST1515* + SeO <sub>2</sub>	50~60	0.0453 mg/kg	1.9	*NIST1515 0.044±0.004 mg/kg	

## No Sample Pretreatment /Quick Precise Results

MA-3000 measures samples without tedious and cumbersome acid / alkali pretreatment. It uses environmental friendly technique which eliminates hazardous operation. Typical measuring time in as little as 5 minutes.

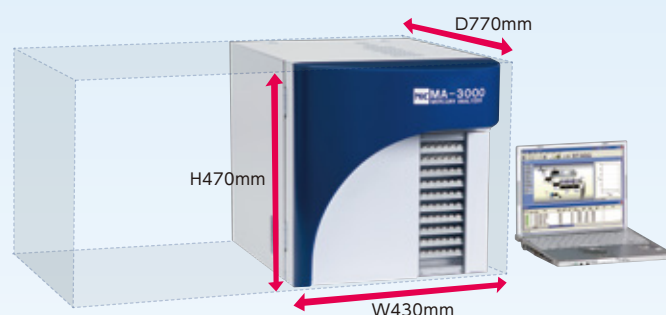
Total running cost is saving 80~86%, compared to CV-AAS and ICP-MS.

### The Comparison of Analysis Time(H) per 6 Samples



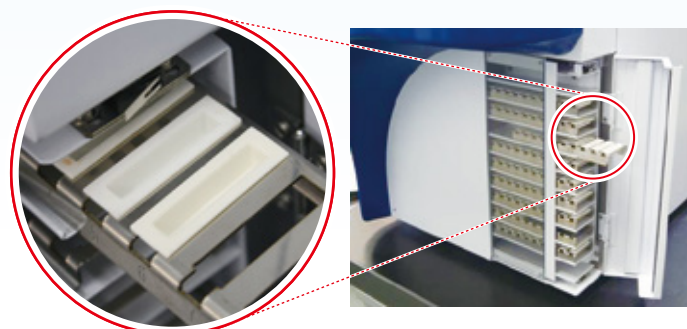
## Bench-Top Configuration with Small Foot-Print

Unprecedented multi-tier concept auto sample changer and combustion chambers creates design compactness, allowing overall dimension to be 50% less than previous model and other similar analyzers, maximizing bench space.



## Up to 100-positions for unmanned automated analysis

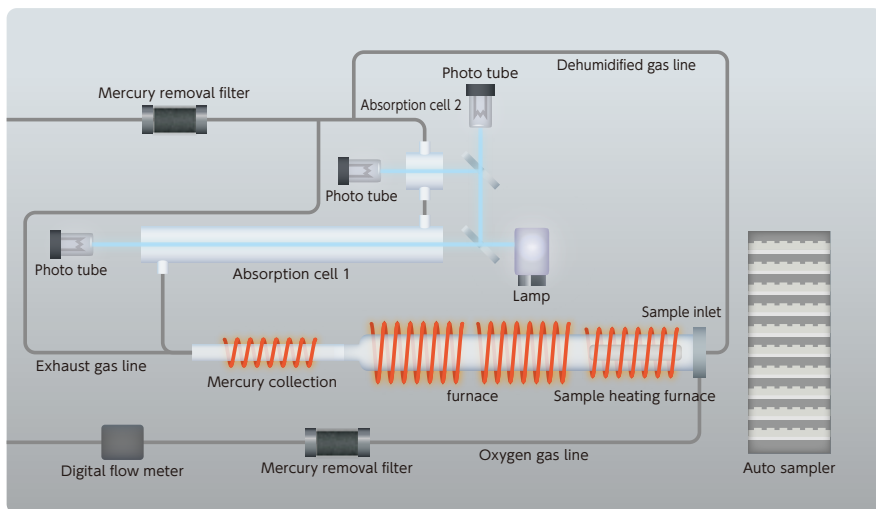
MA-3000 is integrated with a high analysis throughput auto boat sample changer, fully controlled and operated via a user-friendly intuitive graphical interface (GUI) software loaded with numerous beneficial features and 21 CFR Part II compliance to improve laboratory productivity.



Boat size 39 × 11 × 7.2 (mm)



## SCHEMATIC DIAGRAM



## APPLICATIONS / TEST METHODS

**Thermal decomposition :**

Sediment, Soil, Food, Biological tissue, Blood, Urine, Ore, Coal, Plastics, Crude Oil, Waste water and more.

Methods : USEPA 7473; ASTM D 6722-01; ASTM D 7623-10; UOP 1009-15

Reduction vaporization :

Drink water, River water, Sea Water, Waste water, Digested Liquid and more.

Methods : USEPA 245.1, 245.2, 245.5, 7470A, 7471B, ASTM D 3223-02, EN 1483; APHA 3112, JIS K0102

**Gas analysis :**

Ambient air, Working environment air, Fuel gas, Natural Gas, LPG and more.

Methods : ASTM D 5954-98; ISO 6978 ,  
JLPGA-S-07

## SPECIFICATIONS

Mercury detecting section	Measurement principle	Non-dispersive dual-cell tri-beam CVAAS	Patented (JP No.5596995)
	Wave length	253.7nm	
	Detectors	Photo tubes (Reference-background ; Absorption cell 1 ; Absorption cell 2)	
	Detection limit	< 1pg (< 0.001ng)	
	Maximum measurement range	70,000ng	
	Measuring time	Approx. 5 minutes	
Sample decomposition section	Combustion tube	Quartz (Filled with catalyst)	Patented (JP No.5001419)
	Sample boat	Ceramic (standard supply)	
	Maximum decomposition temp.	Up to 1,000°C	
Auto sample changer section	Sample position	100 positions	
	Sample boat capacity	Solid : up to 1,500mg	
		Liquid : up to 1,400μL (Depend on sample matrices/boat type)	
Data processing system (PC-Win / MA-3000) 21 CFR Part II compliance	OS	Windows 8	
	Display	Peak profile, Calibration, Raw data, Statistics, Flow graphics& Status	
	Device control	Analysis condition (Temperature, Decomposition time), Blank check, Standard check	
	Data processing	Calibration curve (Linear & Cubic fits), Peak Height & Peak area tabulation, simultaneous LOW & HIGH concentration tabulation, Unit selection, Concentration conversion, Baseline correction, Statistics (mean, S.D., CV%)	
	Printing	Memo, Analysis condition, Calibration curve, Measured and Statistical data, Peak profiles	
Dimension & Utility	Dimension	430W × 770D × 470H (mm)	
	Weight	55kg	
	Power supply	AC100 ~ 240V, 15A (MAX)	
	Power capacity	1.5kVA	
	Gas	Oxygen (>90% purity), 0.1 ~ 0.29MPa (or Compressed purified air-dependent on applications)	

## OPTION

Reduction vaporization attachment	Auto Reagent dispenser	RD-5
	Auto sample changer	SC-5
	Manual attachment	S-MA (5mL)
	Detection limit	1ppt (5mL)
	Maximum measurement range	Up to 100ppb (5mL)
Gas analysis attachment	Heating unit for mercury collector tube	RH-MA3
	Detection limit	0.001ng
	Maximum measurement range	Up to 1,000ng

## ACCESSORIES

Ceramic sample boat, Large capacity ceramic sample boat, Nickel sample boat, Combustion tube (pre-packed with catalysts), Mercury collector tube, Teflon joint set.



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ISO 9001 : 2008 CERTIFIED Tech-center, Factory & Osaka office/2003. 1. 30  
ISO 14001 : 2004 CERTIFIED Tech-center, Factory & Osaka office/2007. 6. 8

Identify the right mercury analyzer for you  
**<http://www.hg-nic.com>**



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