

Total Nitrogen Analyzer Model TN-110



Trace amounts of nitrogen can be measured accurately and rapidly in various types of non-aqueous and solid samples including resins and petrochemical products. The use of database software for data processing allows data to be stored and retrieved easily. In addition, options accommodating various types of samples are also useful in analysis.

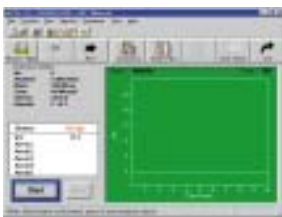
Features

1 Easy Measurement of Trace Amounts of Nitrogen in Solid Samples

The TN-110 demonstrates powerful capabilities in measurement of trace amounts of nitrogen in various types of solid and non-aqueous samples such as resins and petrochemical products. All measurement conditions can be set while viewing the PC display. In addition, the combustion conditions of the automatic boat controller (including sample boat introduction position and hold time) can be set while viewing the PC display. This analysis is used in the certified methods indicated below.

Oxidation decomposition and chemiluminescence
 JIS-K0102 and JIS-K2609,
 ASTM-D4629, D5176, D5762 and D6069

3 Outstanding Ease of Operation and Improved Functions Using Windows®95/98



The system can be operated easily by using a mouse. All measurement conditions are contained in the database, allowing samples to be measured simply by selecting the optimum conditions.

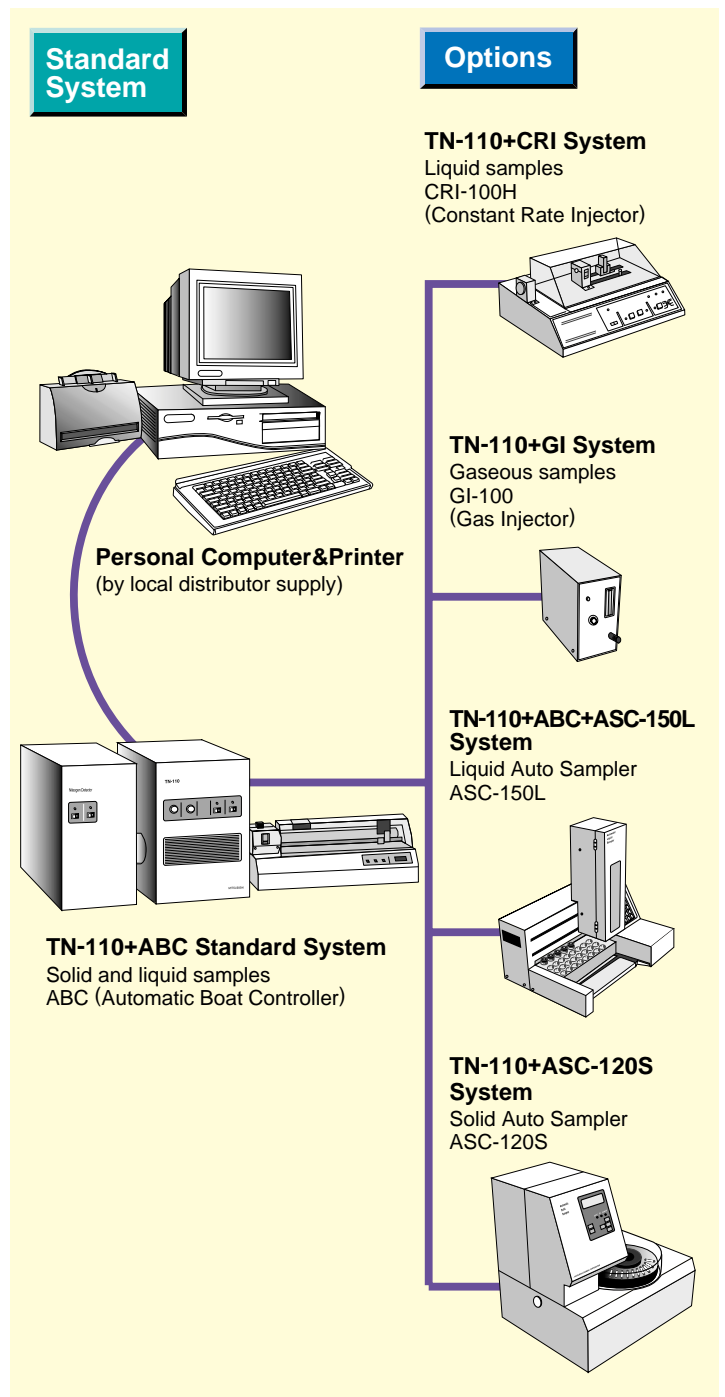
4 High-Speed Analysis Through the Use of Automatic Boat Controller (ABC)



Operation is started simply by placing a sample in the sample boat. Analysis is performed automatically in about 6-12 minutes. The standard system enables sample analysis to be performed with outstanding reproducibility. Since the sample inlet box is provided with a cooling function (electronic cooling), the sample boat can be cooled in a short time.

2 System Configuration Corresponding to the Purpose of Use

The system can be configured exactly as required by using various options according to the particular sample.



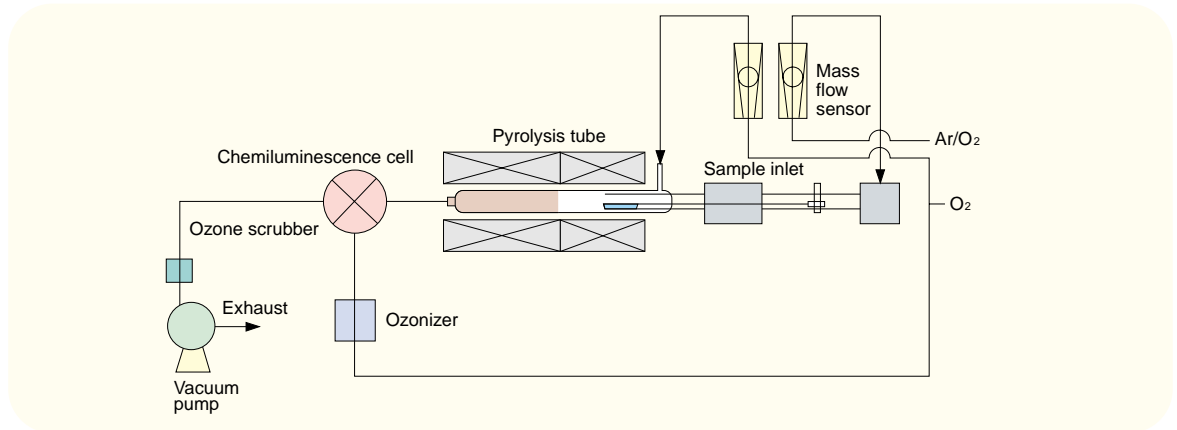
Measurement Principle

Nitrogen compounds in the sample are broken down by oxidation and converted to NO by introducing a sample boat into the reaction tube heated to a high temperature (800-900°C) using oxygen and argon for the carrier gases (N₂ and N₂O are not converted to NO). The resulting NO is then introduced into the NO detector followed by addition of O₃ gas generated from oxygen gas where the following oxidation reaction takes place:



Light at a wavelength of 590-2500 nm is emitted during the course of this reaction.

Since the intensity of the light is proportional to NO concentration over a broad range, the emitted light is captured with a photomultiplier tube, amplified, the resulting data is sent to the PC where nitrogen concentration is calculated using a calibration curve prepared in advance with a standard solution. Furthermore, although substances such as SO_x and CO₂ are formed during the course of decomposition into NO depending on the sample, the use of a reduced pressure, chemiluminescence method by this analyzer minimizes their effects.



Applications

Sample Name	Sample Size(mg)	No. of Measurements	Measured Value(ppm)	RSD (%)
Gas oil	20 μl	3	52	2.1
Crude oil	20 μl *1	3	2,350	1.6
Lubricating oil	20 μl *1	3	375	1.8
Polyethylene	12	5	27	3.8
Polycarbonate	23	5	2.5	4.5
Epoxy resin	11	5	31	1.2
Paper (pulp)	3	5	3,750	2.1
Toner	8	5	355	1.5

*1 Sample diluted with toluene

Automated Measurement System



TN-110 Total Nitrogen Analyzer System Configuration for Measurement of Non-Aqueous Samples

TN-110 Main Unit ND-100 Nitrogen Detector Automatic Boat Controller Liquid Auto Sampler ASC-150L (option) Personal Computer&Printer (by local distributor supply)

Windows®95/98 operating system and database management software combine to demonstrate a wide range of function ranging from basic to the latest functions.

TN-110 System Program

Combining the TN-110 main unit with a personal computer makes it possible to set up all devices required for measurement. The use of Windows®95/98 for the operating system of the personal computer lets the system be operated easily by practically anyone.



Input of Measurement Data Using the Method File

Operation

Calibration and sample measurement information are processed by this method file. Operating data for multiple sample types can be entered easily in cases, for example, of using an auto sampler.

Complete Data Management

Database

All data relating to measurement is stored in a database. In addition to calibration and measurement data, data queries can be made using the names of accessories used. This database allows data to be used by commercially available spreadsheet software, enabling reports to be prepared in any desired format.



System Diagnostic Function

QC Programs

Two QC programs are provided for determining system status. These programs contain a system check that confirms the linearity of reaction values, and a drift check that monitors circadian variations in reaction values. These QC programs are especially useful when assessing the time for maintenance.



Constant Rate Injector Model CRI-100H

Liquid samples are injected at a constant rate using a microsyringe. Even samples that burn with difficulty can be measured with high accuracy by controlling the injection rate.



Syringe	50 μl , 100 μl , 250 μl (gas-tight microsyringes)
Injection rate	0.4–2.0 $\mu\text{l}/\text{sec}$
Injection volume	250 μl
Power supply	AC 100/115/230/240V, 50/60Hz, 40VA
Dimensions	Approx. 320(W) x 270(D) x 173(H)mm
Weight	Approx. 6kg

(Sample injection rate is normally 1.0 $\mu\text{l}/\text{sec}$.)

Gas Injector Model GI-100

This system is used for analysis of sulfur and nitrogen in gaseous samples.



Applicable samples	Gaseous samples
Sample size	Standard sample size: Max. 20 μl (gas-tight microsyringe) Gas sample: Max. 10m l (gas-tight microsyringe)
Gas requirements	Argon (purity: 99.98% or more, 290-490 kPa)
Power supply	AC 100/115/230/240 V, 50/60 Hz, 30 VA
Dimensions	Approx. 120(W) x 250(D) x 235(H) mm
Weight	Approx. 4 kg

Liquid Auto Sampler Model ASC-150L

Liquid samples are measured, injected and rinsed automatically using a microsyringe. Up to 50 sample vials can be placed in the sampler, and 50 samples can be processed automatically, including sampling, measurement, data processing and report generation. Furthermore, this sampler is used in combination with the Automatic Boat Controller provided as standard equipment.



Sample	Aqueous and/or Nonaqueous Samples
Syringe	SGE 25 μl , 50 μl , 100 μl /Gastight Microsyringe(Special made) Standard attachment; 50 μl
Precision	Within 1%/ Full scale
Injection Rate	Low; 0.4-2.0 $\mu\text{l}/\text{sec}$ High; 10-50 $\mu\text{l}/\text{sec}$
Fill Rate	2, 5, 10, 20 $\mu\text{l}/\text{sec}$
Sample Vial	5 ml / 50 places
Rince Vial	28ml / 1 or 2 places
Sample Inj. Times	1-30 times / 1 vial
Multi Inj. Times	1-10 times / 1 vial
Rincing Function	Initial Rinse ; 0-5 times Sample Rinse ; 0-5 times Normal Rinse ; 0-5 times
Injection Mode	Flush, Spike
Power Supply	AC 100/115/230/240 V, 50/60 Hz, 60VA
Dimensions	Approx. 460(W) x 320(D) x 450(H)mm
Weight	Approx. 16 kg

Solid Auto Sampler Model ASC-120S

Up to 20 solid samples can be measured automatically. The main unit contains a built-in automatic boat controller, and samples weighed in the quartz boats are measured according to predetermined combustion conditions.



Sample	Solids/ Viscous Liquid Samples
Sample Size	Less than 30mg
Sample Boat	20 Places Quartz Sample Boat or Ceramic Sample Boat
Sample Introduction	Built-in Automatic Boat Controller (ABC)
Stop Points	3 Points + End Point + Cooling Point
Boat Cooling	Peltier Cooler
Power Supply	AC 100/115/230/240V, 50/60 Hz, 60VA
Dimensions	Approx. 440(W) x 360(D) x 430(H) mm
Weight	Approx. 20 kg

TN-110 Standard Specifications

Model	TN-110		
Samples	Solid, non-aqueous and gaseous samples * ₁		
Analytical method	Oxidative pyrolysis-chemiluminescence method		
Catalyst	Platinum oxidation catalyst		
Sample introduction method	Automatically introduced using sample boats (using automatic boat controller)		
Sample size	Solid samples: 1-30mg, non-aqueous samples: 5-50 μl * ₂ , gaseous samples: 1-10ml		
Measuring range	0.5 - 5,000ppm		
Measurement precision	Concentration	Sample size	RSD (%)
	500 $\mu\text{g} / \text{ml}$	20 μl	3
	100 $\mu\text{g} / \text{ml}$	20 μl	3
	10 $\mu\text{g} / \text{ml}$	20 μl	5
	1 $\mu\text{g} / \text{ml}$	40 μl	8
	(Data when using pyridine/toluene for the standard solution)		
Measurement time	3-10 min./measurement		
Data processing function	TN-110 using a personal computer		
Display function	TN-110 displaying on System PC		
Printing function	TN-110 printing out on an external printer		
Keyboard	TN-110 using a PC full keyboard		
Interface	TN-110 using balance input (RS232C)		
Furnance temperature	Max. 1,100°C (sample introduction unit and catalyst unit can be set separately)		
Analog output	DC 0-1 V		
Gas requirements	Argon (purity: 99.98% or more, 290-490 kPa) Oxygen (purity: 99.7% or more, 290-490 kPa) * ₃		
Power supply	Main unit:	AC 100/115/230/240 V, 50/60 Hz, 1,000 VA	
	ND-100:	AC 100/115/230/240 V, 50/60 Hz, 500 VA	
	Automatic boat controller:	AC 100/115/230/240 V, 50/60 Hz, 40 VA	
Dimensions and weight	Main unit:	Approx. 450(W) x 360(D) x 430(H) mm, approx. 17 kg	
	ND-100:	Approx. 260(W) x 400(D) x 430(H) mm, approx. 17 kg	
	Automatic boat controller:	Approx. 440(W) x 250(D) x 180(H) mm, approx. 11 kg	

Personal Computer (System Requirements to run TN-110 System)

Processor	Pentium®133MHz (Windows®95/98 pre-installed) or higher
RAM	32MB or higher
HD	Requires at least 100MB of available disk space
Drive	3.5-inch floppy disk drive and CD-ROM drive
Display	Display resolution at least 640x480
Printer	Windows®95/98-compatible printer

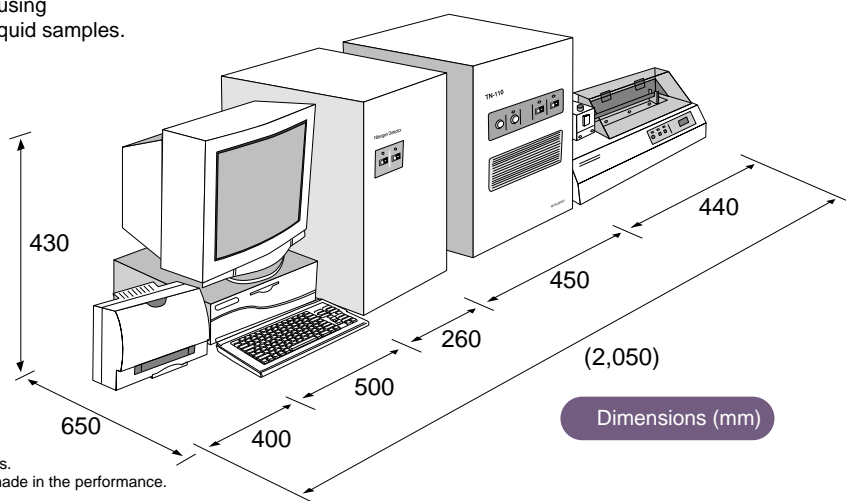
* 1: The optional gas injector (GI-100) is required when measuring gaseous samples.

* 2: The amount of sample injected can be increased up to 200 μl by using the optional constant rate injector (CRI-100H) when measuring liquid samples.

* 3: 1 kg/cm² = 98.066 kPa

* All company and product names listed in these specifications are the trademarks or registered trademarks of each firm.

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Note:

Follow the instructions on the Manual to correctly install, connect and operate the instruments.
Content of the Catalogue is subject to change without prior notice when improvements are made in the performance.
The actual colors of the machine may appear different from colors printed in the Catalogue.

MITSUBISHI CHEMICAL CORPORATION

Instruments Department

370 Enzo, Chigasaki-shi, Kanagawa, 253-0084, Japan

TEL : +81-467-86-3864 FAX : +81-467-86-3862

URL : <http://www.dins.co.jp>