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Quick Ammonia Meter AT-2000 Operation Manual



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1 The Principle of Measurement

The AT-2000 Ammonia meter applies the method of coulometric titration.

When the measurement of a sample added the electrolyte which contains bromine potassium, Ammonia in a sample reacts with BrO^- which is formed at the anode by electrolysis.

When Ammonia in a sample is fully react, the BrO^- increases and is detected by the indicator electrode.

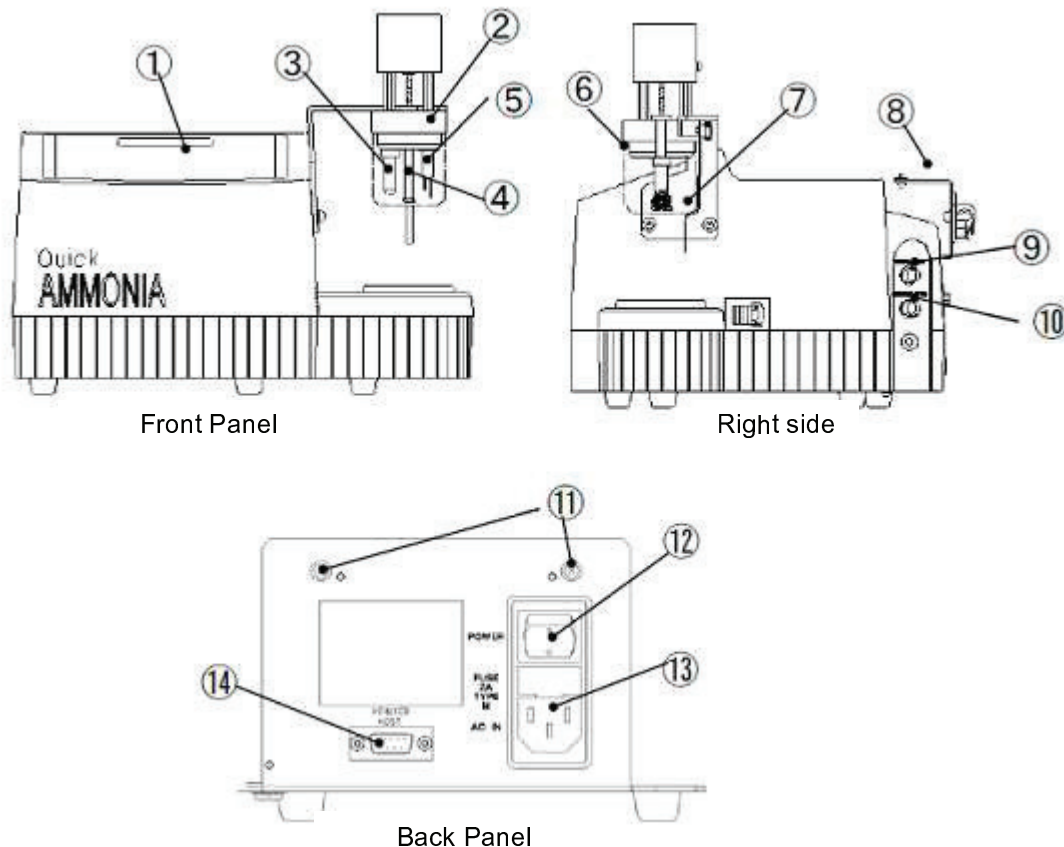
The Ammonia concentration (mg/L) is quantified from the quantity of electricity (current \times time) consumed in electrolysis up to the end point.

2 Specifications

Principle of measurement	Coulometric titration
Detection of the end point	Constant voltage electric current detection
Control of electrolysis	Constant current electrolysis control
Measurement range	0~2.00mg/L (sample amount is 10.0mL) 0~20.00mg/L (sample amount is 1.0mL) 0~200.0mg/L (sample amount is 0.1mL)
Measurement result	mg/L as $\text{NH}_4\text{-N}$ or NH_4^+
Precision	CV = within 3% (standard liquid)
Quantify under limit	0.05mg/L
Minimum reading	0.01mg/L
Display	Digital liquid crystal display
End measurement	Automatic electrolysis stoppage and bell signal
Calculations	1) $Y=aX+b$ 2) Statistics calculation (Average, Standard deviation, CV) 3) Automatic zero adjustment
Interface	RS-232C Start bits 1 Data bits 8 Stop bits 2 Parity None Baud rate 9600 Baud
Power supply	AC 100~240V, 50/60Hz
Power consumption	50VA
Dimensions	310W \times 270D \times 300H mm
Weight	approx.5kg

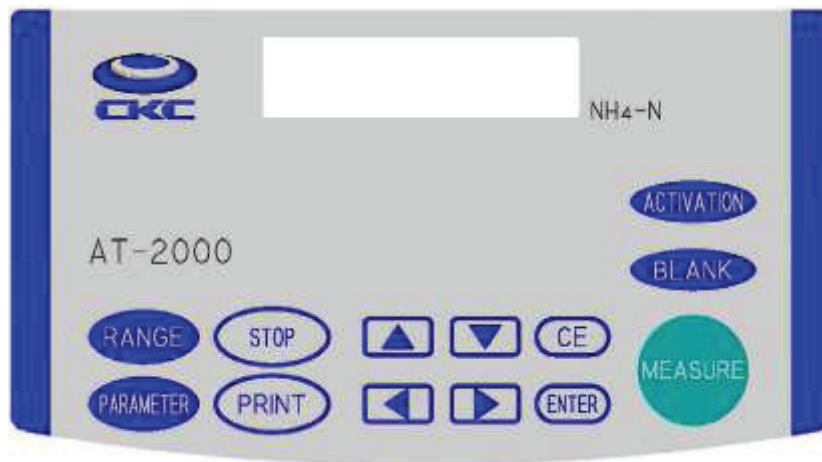
3 Overview


3 – 1 Main Unit



- | | | |
|---|-------------------------------------|---|
| ① | Control panel | : See in section 3-2 |
| ② | Electrode holder | : Holds the electrodes |
| ③ | Indicator electrode | : Detects the reaction endpoint |
| ④ | Stirrer | : Stirs a sample during the measurement |
| ⑤ | Electrolysis electrode | : Electrolyzes the electrolyte |
| ⑥ | Beaker | : Use when measuring |
| ⑦ | Beaker guide | : Put the beaker on |
| ⑧ | Printer mounting bracket | : Fixes the printer |
| ⑨ | Indicator electrode connector | : Connect the indicator electrode |
| ⑩ | Electrolysis electrode connector | : Connect the electrolysis electrode |
| ⑪ | Screws for printer mounting bracket | : Use for setting the bracket |
| ⑫ | Power key | : Power on/off |
| ⑬ | AC IN connector | : Connect the power supply code |
| ⑭ | Communication connector | : Connect the RS-232C cable |

3 – 2 Keypad



- | | | |
|---|---|---|
| ① | <u>ACTIVATION</u> | : Activates the electrodes |
| ② | <u>BLANK</u> | : Starts the blank measurement
When push again, the measurement stops |
| ③ | <u>MEASURE</u> | : Starts the sample measurement
When push again, the measurement stops |
| ④ | <u>CE</u> | : Cancels the input data |
| ⑤ | <u>ENTER</u> | : Use for inputting data |
| ⑥ |  | : Use for inputting and selecting data |
| ⑦ | <u>STOP</u> | : Stops the measurement |
| ⑧ | <u>PRINT</u> | : Prints the results and the parameters |
| ⑨ | <u>RANGE</u> | : Sets the measurement range |
| ⑩ | <u>PARAMETER</u> | : Sets the parameter 1 and 2 |

4 Installation

4 – 1 Operating Environment

The following conditions are necessary to ensure correct instrument operation and accurate results:

Power supply : AC100~240V / 50~60 Hz

Ambient temperature : 5~35°C (20~30°C desirable)

Relative humidity : 0~90% (45~85% desirable)

Place the instrument : Indoor

Firmly on an even surface

Dustless

Don't place near the device which produces a strong line of magnetic force

4 – 2 Power Connecting

Plug the power supply cord into the connector on the back panel of the instrument, then plug the supply into a power outlet (100~240 V / 50~60 Hz).

4 – 3 Electrodes

4 – 3 – 1 Remove the electrodes

When remove the electrodes, turn the electrode fixing screw behind the electrode holder. Then remove the electrode connectors from the instrument.

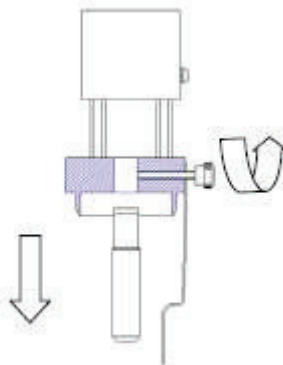


Fig.1 Remove the electrodes

4 – 3 – 2 Set the electrodes

The indicator electrode is left side and the electrolysis electrode is right side. When set the electrodes, insert the electrode (turn a cut of the electrode to the electrode holder) to the electrode holder. Then tighten the screw to fix the electrodes and connect the electrode connectors to the instrument.

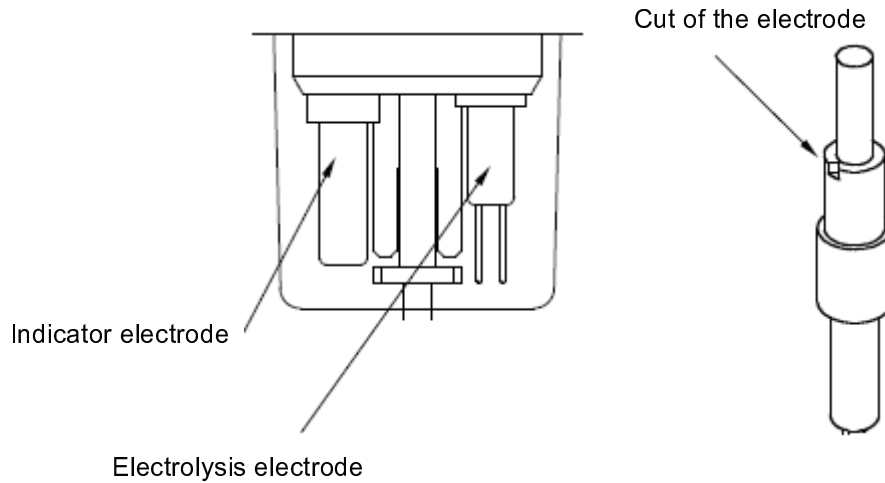


Fig.2 Set the electrodes

[Notes]

Take care to handling the electrodes. Don't bend or break the electrodes. Especially keep the spiral parts to parallel.

Don't bend the stirrer. If bend the stirrer, it can't work normally because of the decentering.

4 – 4 Printer Connecting

4 – 4 – 1 Set the printer paper

- ① Turn the printer on and check that the POWER LED lights green.
- ② Push the cover open button to open the cover.
- ③ Set the printer paper toward a.
- ④ Draw the paper toward b from an outlet, and set straight it.
- ⑤ Colse the cover and check that the ERROR LED is off.

[Notes]

In the case the paper is out of straight, repeat again.

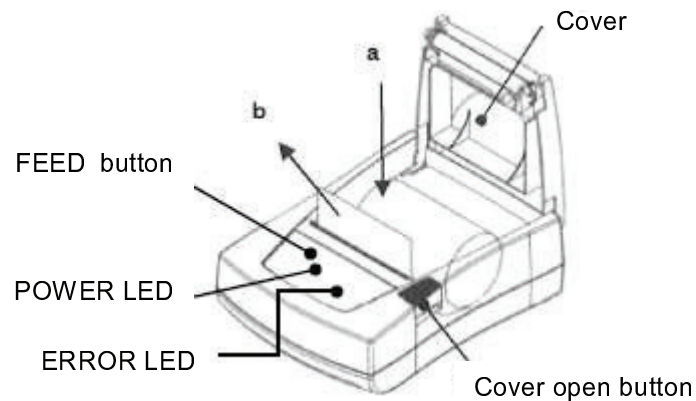


Fig.3 Set the printer paper

4 – 4 – 2 Set the printer

- ① Set the printer mounting bracket by two screws at the back panel.
Set the printer on the printer mounting bracket.
- ② Connect the RS-232C cable to the printer and the communication connector in the back panel of the instrument of the instrument.
Check that the printer is selected at the parameter 1.

[Notes]

See the manual of the attachment for details about the printer.

5 Measurement

<Notes>

In order to measure with accuracy, wash the electrodes and the beaker before the measurement.

5 – 1 Blank Measurement

Determine the blank value at RG1 (0~20mg/L) before measuring the sample.

5 – 1 – 1 Procedure

- ① Press the **RANGE** key.
Using <▲><▼>, select RG1 and confirm it pressing the **ENTER** key.
- ② Add the electrolyte 10mL and distilled water 10mL to the provided beaker.
- ③ Set the beaker to the electrode part.

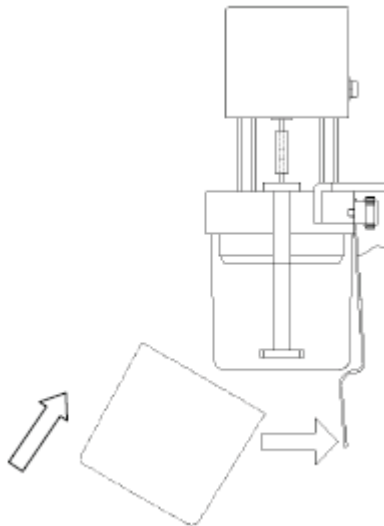


Fig.4 Setting the beaker to the electrode part

- ④ Press the **BLANK** key.
Blank measurement begins.
- ⑤ When the measurement is complete, the beep sounds and the blank value is displayed.
The latest value is stored and the sample measurement is corrected based on this value.

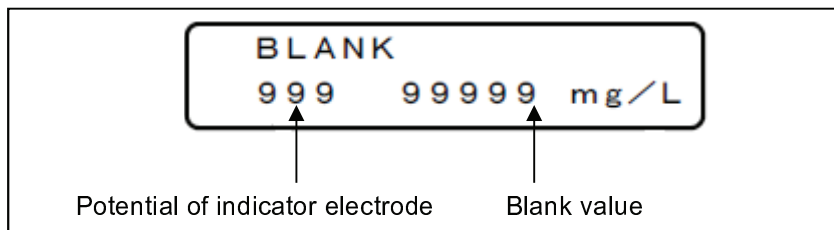


Fig.5 Blank measurement display

5 – 2 Sample Measurement

In the measurement, take the sample of quantity decided every range of measurement. (See the below list)

	Measurement range	Quantity of sample[mL]
RG1	0.0~2.0	10.0
RG2	0.0~20.0	1.0
RG3	0.0~200.0	0.1

5 – 2 – 1 Procedure in 0~2mg/L (RG1)

- ① Press the **RANGE** key.
Using <▲><▼>, select RG1 and confirm it pressing the **ENTER** key.
- ② Add the electrolyte 10mL and the sample 10mL to the provided beaker.
- ③ Set the beaker to the electrode part.
- ④ Press the **MEASURE** key.
The stirrer rotates and the measurement begins.
- ⑤ When the measurement is complete, the beep sounds and the measurement value is displayed.

5 – 2 – 2 Procedure in 0~20mg/L (RG2)

- ① Press the **RANGE** key.
Using <▲><▼>, select RG1 and confirm it pressing the **ENTER** key.
- ② Add the electrolyte 10mL, distilled water 10mL and the sample 1mL to the provided beaker.
- ③ Set the beaker to the electrode part.
- ④ Press the **MEASURE** key.
The stirrer rotates and the measurement begins.
- ⑤ When the measurement is complete, the beep sounds and the measurement value is displayed.

5 – 2 – 3 Procedure in 0~200mg/L (RG3)

- ① Press the **RANGE** key.
Using <▲><▼>, select RG1 and confirm it pressing the **ENTER** key.
- ② Add the electrolyte 10mL, distilled water 10mL and the sample 0.1mL to the provided beaker.
- ③ Set the beaker to the electrode part.
- ④ Press the **MEASURE** key.
The stirrer rotates and the measurement begins.
- ⑤ When the measurement is complete, the beep sounds and the measurement value is displayed.

5 – 3 After Measurement

After the measurement, rinse the electrodes and the provided beaker. Wipe away any water drops. Set the provided beaker to the electrode part for the protection of the electrodes.

5 – 4 Notes on Measurement

- ① The sample pH for this test must be between 5 and 9. If required, adjust the pH.
- ② The organic matters, proteins, amines and reducing agents contained in the samples cause the positive interferences.
- ③ When the samples including the oxidizers, sulfur compounds and cyan ion are measured, 「EP Over」 is displayed because the bromide ion of the electrolyte is oxidized and bromine is formed.
- ④ When measure again the sample which is completed the measurement, the measurement doesn't start and 「EP Over」 is displayed because the sample contains the bromine excessively.
- ⑤ When the sample including the ammonia more than the measurement ranges, the measurement isn't over within measurement time and 「Time Over」 is displayed.
- ⑥ The electrolyte and the sample must be measured accurately using the pipet.
- ⑦ If the measurement result is abnormal, measure the ammonia nitrogen standard solution and check the causes. (the interfering substances in the sample, the deposits at the electrodes)

6 Maintenance

6 – 1 Maintenance of Instrument

When the instrument is dirty, wipe using the soft cloth. Don't use the organic solvent because the equipment is damaged.

6 – 2 Activation of Electrodes

Activate the electrodes before use the meter for the first time, when exchange the electrode to new, or when don't use the meter for long time.

The reverse current (about 25mA, for the electrolysis) flows intermittently for 8 min for the activation.

After 8 min, the waiting time (2min) begins. When the operation is finished, the activation is complete.

6 – 2 – 1 Procedure of Activation

- ① Add the electrolyte 10mL and the sample 10mL to the provided beaker.
Set the beaker to the electrode part.
- ② Press the **ACTIVATION** key and the activation begins.
The stirrer rotates and the electrolysis current flows for 8 min.



- ③ After 8 min, the beep sounds and the current flow stops and the cleaning process starts.
The stirrer is rotating.



- ④ After 2 min, the beep sounds and the stirrer stops. The Activation is complete.
- ⑤ After the activation, wash the electrodes.
When measure without washing the electrodes, 「EP Over」 is displayed. (It means that the potential is over the end point of the titration.)

7 Parameter

Set the parameter if necessary.

Press the **PARAMETER** key. Using <▲><▼>, select the parameter that you want to set.

When press the **ENTER** key, it is possible to change the setting.

Parameter 1

- ① Sample No. : Setting the sample No.
- ② I.Electrode : Setting the exchange day of the indicator electrode
- ③ G.Electrode : Setting the exchange day of the electrolysis electrode
- ④ Communication : Selects the communication device
- ⑤ Print Format : Selects the format of the print data
- ⑥ Trans Format : Selects the format of communication data
- ⑦ Device No. : Setting the instrument No.
- ⑧ Date : Setting the date
- ⑨ Time : Setting the time
- ⑩ Key Buzzer : Switches the buzzer on / off
- ⑪ NH4+ / NH4-N : Switches NH4+ / NH4-N
- ⑫ Interval Time : Setting the waiting time of the end point detection
- ⑬ Start Timer S : Setting the delay time of the measurement start at sample measurement
- ⑭ Start Timer B : Setting the delay time of the measurement start at blank measurement
- ⑮ Blank : Setting the blank
- ⑯ Reg Line : Correct the measurement value

Parameter 2

Pressing the **PARAMETER** key for 10 sec, Parameter 2 is displayed.

All Clear : Initializes the instrument

8 Troubleshooting

Symptom	Cause	Checkpoint	Remedy
The display doesn't illuminate.	No power supply		Check the power supply.
	The fuse is broken.		Change the fuse.
	The power supply is out of order.		Change the power supply code. Please contact the service.
The part of display doesn't illuminate.	Display is out of order.		Please contact the service.
Don't stop the measurement.	The wrong connection of the electrode cable.	Check the connection. 「EP Over」 is displayed.	Polish the indicator electrode using the cleanser. Then perform the activation and immerse the electrodes in the electrolyte for 3 hours.
	The connection of the electrode cable is insufficient.		insert a connector to the depths
	The electrolysis electrode is broken.	Check the platinum lead.	Change the electrode.
	The platinum leads of the electrolysis electrode are contact.	Check the platinum lead.	Keep the leads to parallel.
The measurement result is abnormal. The repeatability is wrong.	The interfering substances in the sample		
	The deposits at the electrodes		Polish the indicator electrode using the cleanser. Then perform the activation and immerse the electrodes in the electrolyte for 3 hours.
	Don't use the indicator electrode for long time.		Perform the activation.
The stirrer doesn't rotate.	The motor is out of order.		Please contact the service.
	The stirrer is contact with the beaker.		Press the fixing tube and lift the stirrer up.
	The stirrer is contact with the electrodes.		Turn the electrode fixing screw and lift the electrodes up.
「The battery is run down!」 is displayed.	The life time of the battery is 5~7 years.		Change the battery. Please contact the service.