



Automatic Potentiometric Titrator

**AT-710 SERIES**

Multiple Sample Changer

**CHA-700**

**CHA-600**



**KYOTO ELECTRONICS  
MANUFACTURING CO.,LTD.**

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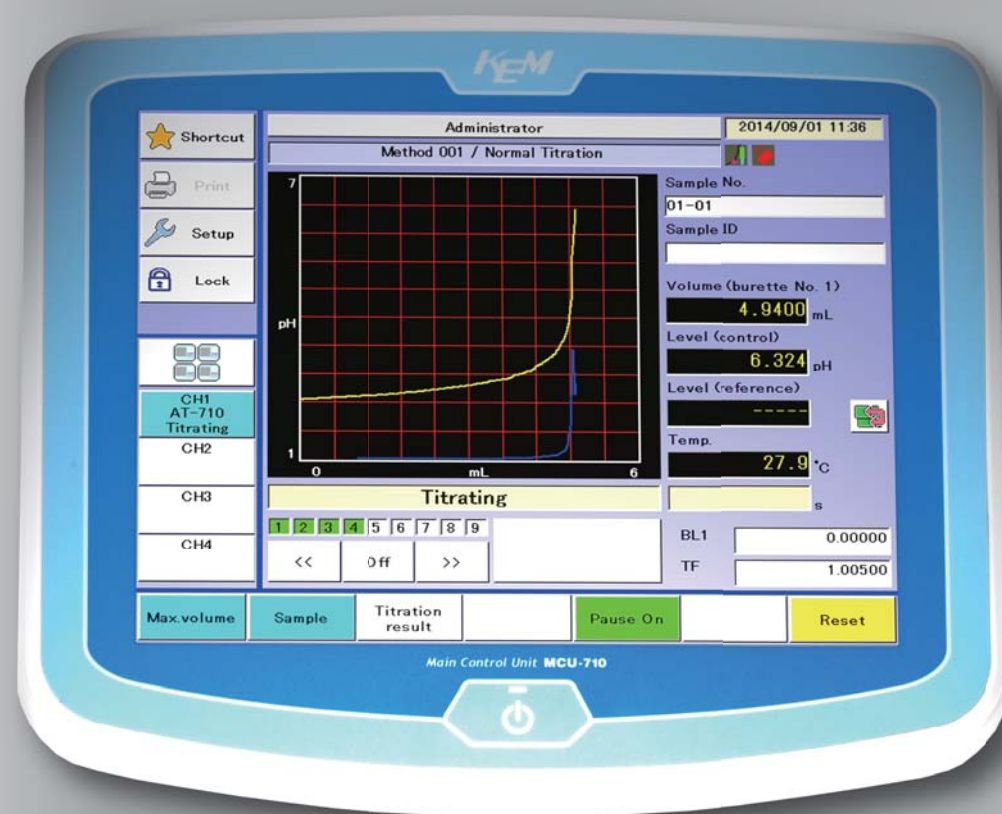
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# SUMMARY/CONNECTION EXAMPLE

## AT-710M

### Unique flexibility – up to 4 simultaneous titrations of any type

The AT-710M as a flagship model comes with a largest titration user interface available in the market: The main control unit of this model, MCU-710M, provides an unique user experience with its 8.4 inch LCD touch panel and can be the common basis for up to four full-fledged titrators of any type, be it MKV-710B Volumetric or MKC-710B Coulometric Karl Fischer moisture titrators or additional AT-710B potentiometric titrators. This saves space and avoids tangled cables. The connections between the main control unit and the titrators can be setup wireless. The main control unit can be connected to a PC with a LAN cable.

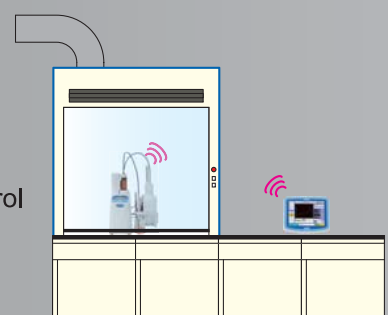


Main Control Unit  
MCU-710M

### Wireless Bluetooth® communication – increased workplace safety when measuring toxic samples

\* Bluetooth® adapters are to be prepared locally.

Wireless communication offers substantial benefits in terms of safety and space requirements. Operation is easier and safer when toxic samples have to be measured as the main control unit can be located outside the hood.



AT-710B

AT-710M



AT-710M + MKV-710B + MKC-710B



AT-710M + AT-710B + CHA-600

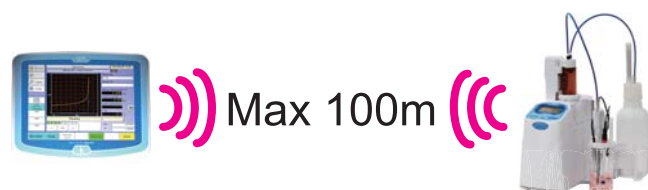
# FEATURE

## No cabled connections required between main control unit and titrator

AT-710M

For safe operation

With Bluetooth® adapters, there is no need to connect main control unit to titrator with cable. This offers substantial benefits in terms of safety as the main control unit can be located outside the hood when toxic samples have to be measured. The main control unit can be equipped with a battery and therefore be held in the hand. Additionally, it can be equipped with a monitor arm and therefore be located in the most suitable spot. (Arm mount: VESA standard 75mm x 75mm)

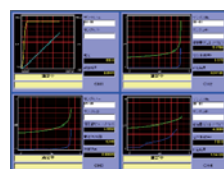


## One screen for up to four titrators

AT-710M

Japanese Patent no. 2138712

One main control unit can operate up to four titrators of any type (Potentiometric and Karl Fischer moisture titrators). It is thus possible to set up a system capable of running potentiometric and Karl Fischer moisture titrations simultaneously without wasting valuable bench space for several separate displays.



## Titrant information stored in burette unit

AT-710M

AT-710S

Relevant titrant information is stored in an IC chip in the burette unit. Mounting the burette unit from one titrator to another does not require re-entry of the titrant information. This prevents titration with incorrect titrant.



## User groups and permissions

AT-710M

AT-710S

Two different user levels let you easily define the operation permissions of each operator.

An administrator (protected with password) has access to all functions whereas a normal operator can only perform burette operation, calibration, measurement, method number (sample file) change and reading of method.



## Overheating protection built-in

AT-710M

AT-710S

For safe operation

Temperature is monitored during titration and titrant addition is interrupted when the temperature exceeds the specified upper limit. This ensures safe measurements even when titrating strong acids with strong bases during which the temperature tends to rise.

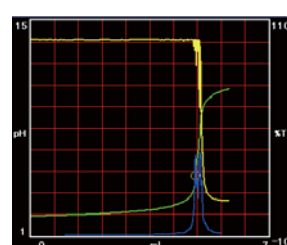


## Two different potentials in one run

AT-710M

AT-710S

Two different potentials from different detection methods, such as pH/ temperature, pH/ conductivity, can be logged simultaneously. This enables you to study behavior of conductivity against pH change, the correlation of color change with indicator and pH change etc.



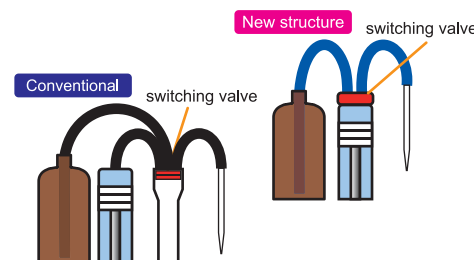
## New burette unit

AT-710M

AT-710S

AT-710B

The new burette unit has the switching valve mounted directly on top of the cylinder. Less dead space between the switching valve and the cylinder and it inside of the cylinder left less residual titrant when replacing it.



## Information stored in the electrode cable

AT-710M

AT-710S

AT-710B

The optional smart electrode cable with IC chip stores calibration results, replacement date etc. of an electrode. Time consuming recalibration can be avoided when multiple electrodes are used.



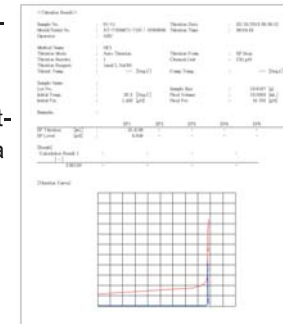
## Result output as PDF files

AT-710M

AT-710S

AT-710B

Paper saving and environmentally friendly – results no longer need to be printed. Measurement results are converted to PDF and can be stored in a USB flash drive.

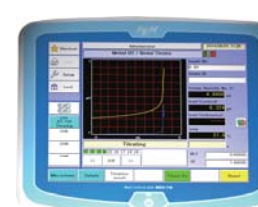


## Large color TFT-LCD with touch panel

AT-710M

AT-710S

The main control unit is equipped with a large color TFT-LCD. The touch panel enables easy key entry.



## Propeller stirrer equipped as standard

AT-710M

AT-710S

AT-710B

For safe operation

No more forgotten or lost stirrer bars. The propeller stirrer reduces risks of contact with solvent (c.f. Organic solvents) during drainage.





## Flagship model

Unique flexibility - up to 4 simultaneous titrations of any type

Automatic Potentiometric Titrator

# AT-710M

## Mid range model

Easy operation by touch panel

Automatic Potentiometric Titrator

# AT-710S

## Entry model

Simple titration

Automatic Potentiometric Titrator

# AT-710B



Each model is also available with magnetic stirrer (option).

| Specification         | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                 |                                                                                                                                                         |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                  | Automatic Potentiometric Titrator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                 |                                                                                                                                                         |
| Model                 | AT-710M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | AT-710S                                         | AT-710B                                                                                                                                                 |
| Product configuration | MCU-710M + AT-710 + IDP-100 + Propeller stirrer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MCU-710S + AT-710 + IDP-100 + Propeller stirrer | AT-710 + IDP-100 + Propeller stirrer                                                                                                                    |
| Detection range       | 1) Potentiometric : ~2000mV to +2000mV<br>2) pH : ~20,000 to 20,000pH<br>3) Temperature : 0 to 100°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                 |                                                                                                                                                         |
| Titration mode        | Auto Titration, Auto Intermit, Intermit, Stat<br>Petroleum Titration, COD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                 |                                                                                                                                                         |
| Method                | Standard method 120, Combined method 10 (Max 5 methods can be linked)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                 | 20 (Max 2 methods can be linked)                                                                                                                        |
| Kinds of titration    | Potentiometric (acid/base, redox, precipitation), Photometric, Polarization, Conductivity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                 |                                                                                                                                                         |
| Titration form        | Full titration (Auto EP detection), EP Stop, Level Stop<br>Intersect, EP Stop/Level Stop                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                 |                                                                                                                                                         |
| Special application   | Measurement of electrode potential (pH, potential), Acid dissociation constant (pKa)<br>Simultaneous recording of 2-way input potential<br>(e.g. Titer vs pH+T, Titer vs pH+ μS), Learn                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                 |                                                                                                                                                         |
| Key operation         | Touch panel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                 | Sheet key                                                                                                                                               |
| Displays              | 1) 8.4-inch color LCD 800 × 600 dots<br>2) English / Japanese / Mandarin Chinese / Korean / Russian / Spanish / German / French<br>3) Simultaneous 4-channel display<br>(Can also display Karl Fischer Moisture Titrator simultaneously)                                                                                                                                                                                                                                                                                                                                                                                           |                                                 | 1) White LED-backlit LCD<br>2) English / Japanese / Mandarin Chinese / Korean / Russian / Spanish<br>3) 1-channel display                               |
| Calculation           | Concentration of content, statistics data processing (mean, SD and RSD) and automatic averaging of blank and factor value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                 |                                                                                                                                                         |
| Data storage          | 500 samples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                 | 50 samples                                                                                                                                              |
| GLP conformance       | Registration of operator / User group administration<br>Titrant: Reminder of date of factor measurement / Alarm to indicate remaining reagent / Reminder of piston replacement date / Reminder of reagent replacement date / History of factor measurement<br>Check performance: Reminder of scheduled check date / Record of check results<br>Management of electrode: Reminder of calibration date / Record of calibration history / Electrode check / History of electrode check<br>Verification of burette capacity: Verification / Record of verification results<br>Management of conduction time: Display of operating time |                                                 | Registration of operator / Record of check results / Record of electrode calibration / Verification of burette capacity / Management of conduction time |
| Burette size          | 20mL glass burette with brown cover (Standard)<br>Optional burette units: 10mL, 5mL, or 1mL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                 |                                                                                                                                                         |
| Burette accuracy      | 50mL burette(Auto dispenser) ± 0.5mL<br>20mL burette ± 0.02mL ; reproducibility ± 0.01mL<br>10mL burette ± 0.015mL ; reproducibility ± 0.005mL<br>5mL burette ± 0.01mL ; reproducibility ± 0.003mL<br>1mL burette ± 0.005mL ; reproducibility ± 0.001mL                                                                                                                                                                                                                                                                                                                                                                            |                                                 |                                                                                                                                                         |
| Preamplifier          | 1) STD : pH (mV) and mV, 2 inputs (Standard)<br>2) PTA : pH (mV), mV and photometric, 3 inputs<br>3) POT : pH (mV), mV and polar, 3 inputs<br>4) CMT : pH (mV), mV and conductivity, 3 inputs (factory setting required)<br>5) TET : pH (mV) 2 ways and mV, 3 inputs (factory setting required)                                                                                                                                                                                                                                                                                                                                    |                                                 |                                                                                                                                                         |
| External I/O          | RS-232C port × 3<br>for Dot matrix printer, Electronic balance, Data Capture Software (SOFT-CAP)<br>SS-BUS × 1 : for Multiple sample changer, APB<br>ELE. × 1 : for Smart electrode<br>TEMP.COMP. × 1 : Input terminal for temperature sensor to correct reagent volume, sensor Pt100, temperature reading accuracy: ±0.5°C (burette 1 only)<br>USB × 1<br>for USB flash drive, Thermal printer, A4 printer, Keyboard, Barcode reader, Foot switch, USB HUB<br>LAN × 1 : for Personal computer (PC)                                                                                                                                |                                                 | RS-232C port × 2<br>USB × 1<br>for USB flash drive, Thermal printer, Keyboard, Barcode reader, Foot switch, USB HUB, Android device                     |
| Extensibility         | Measuring instrument : Automatic Potentiometric Titrator (AT-710), Karl Fischer Moisture Titrator (MKV-710/MKC-710); Three of these instruments can be added.<br>Automatic piston burette : Can control max 10 burette drives (Including two built-in burette drives)<br>Multiple sample changer : CHA-600, CHA-700                                                                                                                                                                                                                                                                                                                |                                                 | Multiple sample changer : CHA-700                                                                                                                       |
| Ambient condition     | 1) Temperature : 5 to 35°C<br>2) Humidity : 85%RH or below (no condensation)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                                                                                                                                                         |
| Power source          | AC100 - 240V ±10% 50/60 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                 |                                                                                                                                                         |
| Power consumption     | Main unit : Approx. 30W<br>Printer : Approx. 7W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                 | Main unit : Approx. 20W<br>Printer : Approx. 7W                                                                                                         |
| Dimensions            | Touch panel controller : 225(W) × 190(D) × 42(H)mm<br>Titration unit : 141(W) × 296(D) × 367(H)mm (not incl. tubing)<br>Printer : 106(W) × 180(D) × 88(H) mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                                                                                                                                                         |
| Weight                | Touch panel controller : Approx. 1.5kg<br>Titration unit : Approx. 4.0kg<br>Printer : Approx. 0.4kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                 |                                                                                                                                                         |
| Conformity standard   | CE marking EMC: EN61326-1 LVD : EN61010-1 RE Directive<br>Burette unit EBU FCC Part15 SubpartC FCC ID : 2ABSVEBU01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                 |                                                                                                                                                         |

# APPLICATION

## Total acid number of petroleum product

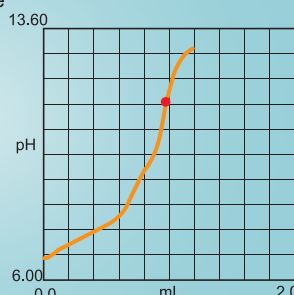
~Acid-base titration by potentiometric titration~

■Main unit: AT-710M  
Preamplifier: STD  
Electrode: Glass electrode, Reference electrode, Temperature compensation electrode

■Procedure:  
1) Take sample into a beaker.  
2) Add 125mL solvent (mixture of toluene, 2-propanol and pure water.)  
3) Titrate with 0.1mol/L potassium hydroxide 2-propanol.

■Measurement results:  
Sample size: 10.0545g  
Titrant: 0.9965mL  
Conc.: 0.5271mg/g

Reference: ASTM D664 Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration



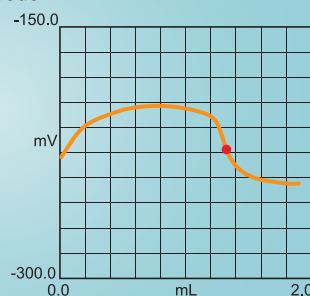
## Vitamin C in soft drink

~Redox titration by potentiometric titration~

■Main unit: AT-710M  
Preamplifier: STD  
Electrode: Combined platinum electrode

■Procedure:  
1) Take sample into a beaker.  
2) Add 100mL pure water.  
3) Add 5 drops acetic acid.  
4) Titrate with indophenol.

■Measurement results:  
Sample size: 1.0364g  
Titrant: 1.4030mL  
Conc.: 0.0367%



## Isocyanate content of urethane

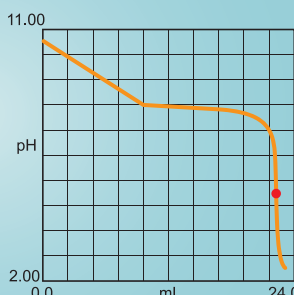
~Acid-base titration by potentiometric titration~

■Main unit: AT-710M  
Preamplifier: STD  
Electrode: Combined glass electrode

■Procedure:  
1) Take sample into a beaker.  
2) Add 25mL dry toluene.  
3) Add 10mL di-n-butylamine.  
4) Add 100mL IPA.  
5) Titrate with 0.5mol/L hydrochloric acid.

■Measurement results:  
Blank: 47.5365mL  
Sample size: 2.9985g  
Titrant: 22.8065mL  
Conc.: 17.328%

Reference: JIS K 7301 Test Method for Tri-range Isocyanic Prepolymer for Heat-curable Urethane Elastomer



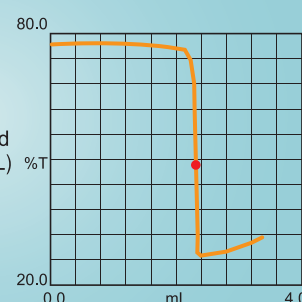
## Calcium in tablets

~Chelatometric titration by photometric titration~

■Main unit: AT-710M  
Preamplifier: PTA  
Electrode: Photo sensor (Filter wavelength: 630nm)

■Procedure:  
1) Take sample into a beaker.  
2) Add 50mL pure water.  
3) Add 15mL potassium hydroxide and 3 drops potassium cyanide (1g/10mL)  
4) Add 10 drops NN indicator.  
5) Titrate with 0.05mol/L EDTA.

■Measurement results:  
Sample size: 3.0661g  
Titrant: 2.2811mL  
Conc.: 14.879%



## Chlorine Ion in hardened concrete

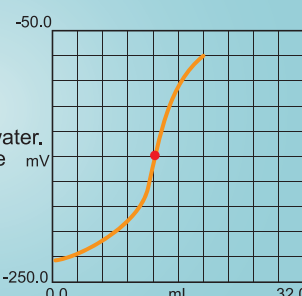
~Precipitation titration by potentiometric titration~

■Main unit: AT-710M  
Preamplifier: STD  
Electrode: Chloride Ion Selective electrode, Reference electrode

■Procedure:  
1) Add nitric acid (1+6) and hydrogen peroxide to sample and extract chlorine ion by boiling.  
2) Take sample and add 50mL pure water.  
3) Titrate with 0.005mol/L silver nitrate solution.

■Measurement results:  
Sample size: 2.0167g  
Titrant: 11.9358mL  
Conc.: 605.46ppm

Reference: JIS A 1154 Test Method for Chlorine Ion in Hardened Concrete



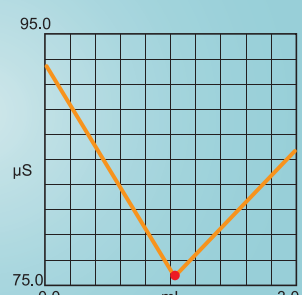
## Sodium sulfate concentration of surfactant

~Precipitation titration by potentiometric titration~

■Main unit: AT-710M  
Preamplifier: CMT  
Electrode: Conductivity electrode

■Procedure:  
1) Take sample into a beaker.  
2) Add 50mL Solvent (pure water: 2-propanol=1:1).  
3) Titrate with 0.005mol/L barium acetate.

■Measurement results:  
Sample size: 1.1840g  
Titrant: 1.5823mL  
Conc.: 0.9482%



# OPTION

## Automatic Burette APB-600-AT / APB-610



APB-600-AT

APB-610

## COD Titration Unit 12-06136



This unit is used for the titration with potassium permanganate in the last process of COD measurement.

## Micro Titration Cell Unit MTA-118



The ideal solution for samples, which are available on small quantities only

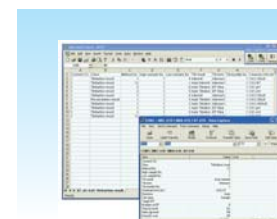
The Micro Titration Cell Unit has a water jacket for heating and cooling. It is suitable for sample amount as small as 1, 5, and 25mL.

## Thermo Sensor for Titrant 12-00166-00



Titer volume needs to be corrected when titrant based on organic solvents like Acetic acid, Dioxane or Ethanol are used and if the titrant temperature differs by more than  $\pm 3^{\circ}\text{C}$  compared to the temperature during standardization.

## Data Acquisition Software SOFT-CAP



Soft-Cap receives a measurement result from a titrator and exports it to Excel or saves it in CSV format.

## Combined Surfactant Electrode S-173



The surfactant measurement has long been made based on the Epton Method, which uses the toxic chloroform as solvent. This electrode, however, does not require the use of harmful chloroform and can quickly measure the concentration of both cationic and anionic surfactants.

## Sealed Cell Flask Assembly SCU-118



The Sealed Cell Flask Assembly SCU-118 facilitates the problem-free titration of samples which are

- Highly volatile
- Oxygen sensitive and cannot be exposed to the atmosphere.
- Nitrogen purging is possible inside of the assembly

## PP 70mL Cup for Microquantity Titration



With this special cup, sample amounts as small as 10mL can be measured, titrant volume up to 50mL can be added. This cup is thus useful to measure samples which cannot be diluted.

6 or 11 samples

## Multiple Sample Changer CHA-700

AT-710M AT-710S AT-710B



The CHA-700 with 6 or 11 positions performs titration automatically. The arm moves to a sample container and the table lifts up to perform a titration. The titrator can be mounted on the CHA-700 to save working space.

12 or 18 samples

## Multiple Sample Changer CHA-600

AT-710M AT-710S



The CHA-600 with 12 or 18 positons offers much performance and flexibility in addition to automation fundamental motions, pretreatment, titration, electrode cleaning etc. Electrode cleaning procedure is selectable for each sample thus, CHA-600 can handle titration of both aqueous and non-aqueous samples.

## Software for Titrators

# AT-Win

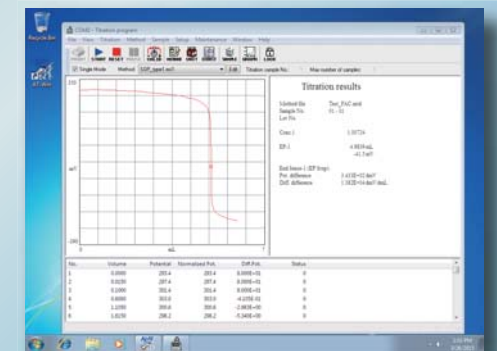
AT-710B

Japanese Patent No. 2138712

## Multi-Channel software perfectly supporting titration

- Can run up to four titrations simultaneously.
- Can display four screens simultaneously.

The AT-Win titration software upgrades your titrator to a personal computer controlled titration system. Parameter settings, titration control and data analysis can be made on a PC.



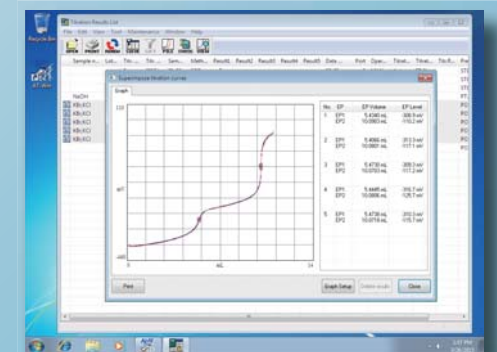
■Example of titration display

## Intuitive User Guidance

Just by selecting the intended main criteria including international standard (e.g JIS, ASTM, ISO), sample type, analysis item and measuring range, titration conditions can be set up automatically. An intuitive dialogue based wizard makes the setup of new titration methods a snap.

## Enhanced Security

- Comprehensive user management with user name / password prevent unauthorized modifications of measuring conditions. Permissions are configurable for each user.



■Example of superimpose display

## Main Specifications

| Specification     | Contents                                                                                                                                           |                                     |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Number of samples | 6                                                                                                                                                  | 11                                  |
| Sample container  | Standard:<br>200mL disposable cup, 250mL beaker or 200mL beaker<br>Option:<br>100mL disposable cup, 50mL beaker, 100mL beaker or 100mL tall beaker | 100mL disposable cup or 50mL beaker |
| Power supply      | AC100-240V±10% 50/60Hz                                                                                                                             |                                     |
| Power consumption | Approx. 20W                                                                                                                                        |                                     |
| Dimensions        | 365 (W) x 443 (D) x 315 (H)mm                                                                                                                      |                                     |
| Weight            | Approx. 8kg                                                                                                                                        |                                     |

## Main Specifications

| Specification     | CHA-600-12                                                                                                                             | CHA-600-18                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Number of samples | 12                                                                                                                                     | 18                                  |
| Sample container  | Standard:<br>200mL disposable cup, 200mL beaker or 300mL tall beaker<br>Option:<br>50mL beaker, 100mL beaker or 200mL erlenmeyer flask | 100mL disposable cup or 50mL beaker |
| Power supply      | AC100-120V/AC200-240V±10% 50/60Hz                                                                                                      |                                     |
| Power consumption | Approx. 50W                                                                                                                            |                                     |
| Dimensions        | 520 (W) x 434 (D) x 509 (H)mm                                                                                                          |                                     |
| Weight            | Approx. 18kg                                                                                                                           |                                     |



AT-710M/S + CHA-700



AT-710M/S + CHA-600