**Main Control Unit**

MCU-710M/S
(for use with AT-710)
Function Description
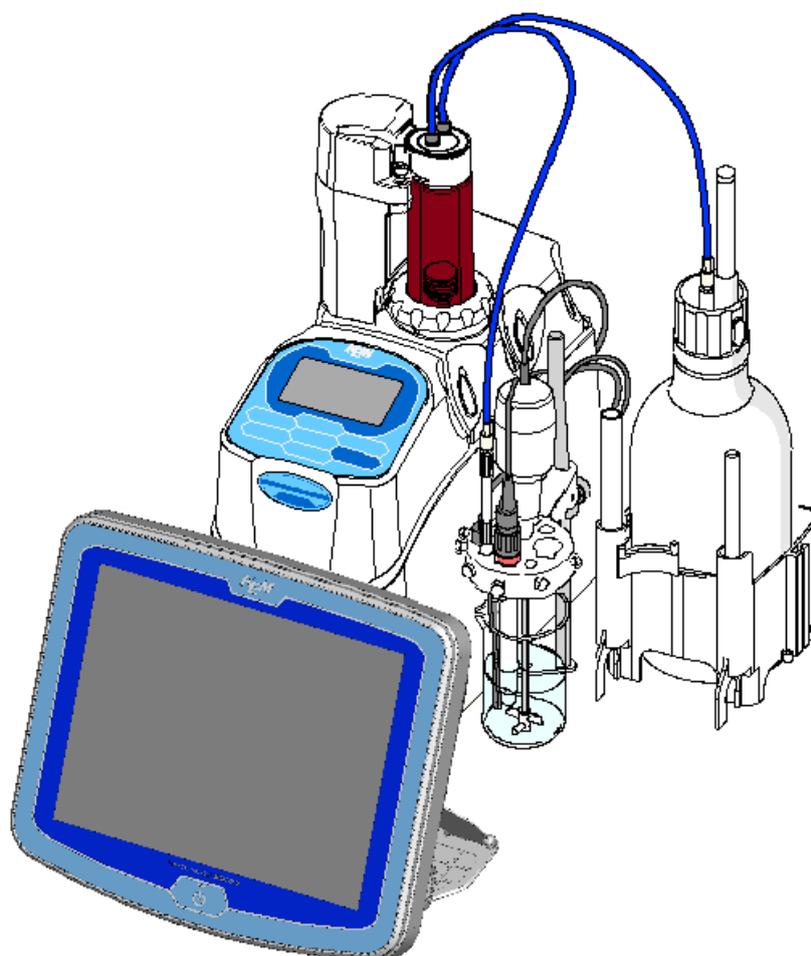
Please read this manual thoroughly in advance for the best performance of the equipment.

About the Manual

Read this operation manual thoroughly before use.
It describes all that are required for routine measurements.
Keep this manual beside your equipment so that you can refer to whenever necessary.

For detailed test methods, see the separate Function Description.

The following symbols indicate the important notes that raise your attention.

1. Note

> **Note**

Unless you observe the note, you may not be able to obtain specified performance of the unit, and your unit may not be covered by warranty.

2. Hint

This symbol notes technical tips which are convenient to your measurement work.

※It is prohibited to duplicate any part or all of manual without prior consent.

※This manual has been prepared to the best of our knowledge; however, if you should find any missing or ambiguous description, please contact your nearest dealer or sale representative.

※Maker will not be liable for any loss or damage caused by use of or the result of the product.

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※This manual describes usage according to standard specification. For special version, refer to the accompanying document.

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1. Method

For precise measurement effected in a short span of time, it is necessary to configure conditions appropriate for a sample and a method. The method consists of information on the measuring conditions, calculation of concentration, and the like. AT-710 can store standard methods (No. 001 through 120) and combined methods (No. 121 through 130; up to 5 combined methods for the methods No. 001 through 120). Each method can be named individually.

1-1. Method edit

1   Press [Method] button.
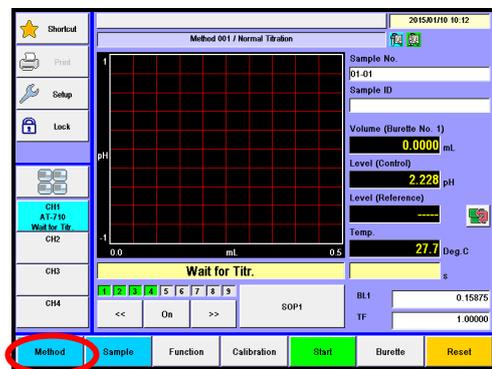
2   Select the method you wish to edit [▼], [▲] button.
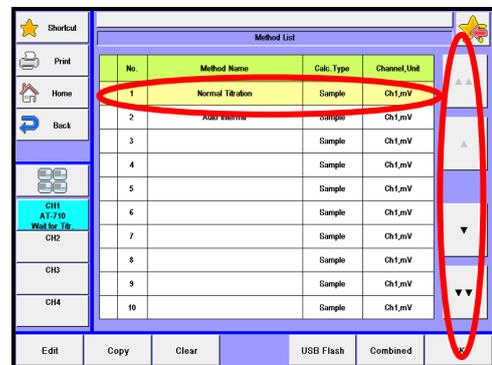
3   Press [Edit] button.
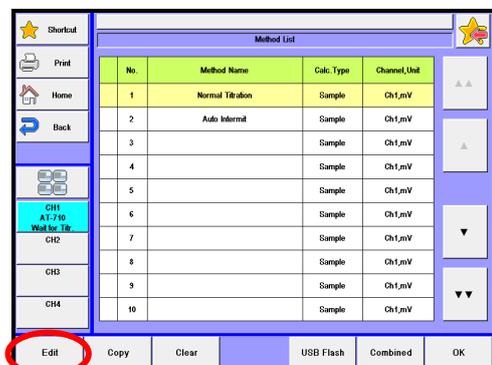
[▲], [▼]
Moves the cursor on the list.

[▲▲], [▼▼]
These keys are for page turning. The cursor moves to the top of the list after page break.

[Edit]
When "Method Edit" display appears, you can edit the Method (measurement parameters) where the cursor stays on.

[Copy]
On "Select Source" display, you can copy the Method where the cursor stays on. For details of Method copy, refer to "1-1-1. [Copy]."

[Clear]
The Method with cursor on is initialized to default preset at time of shipment in plant. For details of Method Clear, refer to "1-1-2. [Clear] (Method conditions)."

[USB Flash]
Save the method data into USB flash drive. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive. For the details on how to save methods into USB flash drive, see the section, "1-1-3. [USB Flash] (Method conditions)."

[Combined]
The user can configure Combined Method connecting other methods. The user can implement up to 5 combined Methods out of No.001 through 120 methods. The display "Combined Method List" will appear. The measurement results of Method combined with methods of the same burette, potential unit, detector, and preamplifier gain will be printed out in the same graphical way. For the details about combined method, see "1-12. [Combined]."

[OK]
The user can choose a Method used for measurements with [▲] or [▼] key and press this button to confirm the change.

1-1-1.[Copy]

The user can copy the currently selected method conditions.

1 Press [Copy] button.
When copy different channel, select source channel on "Select Source" dialog.

Select the source Method and press [Load] button.
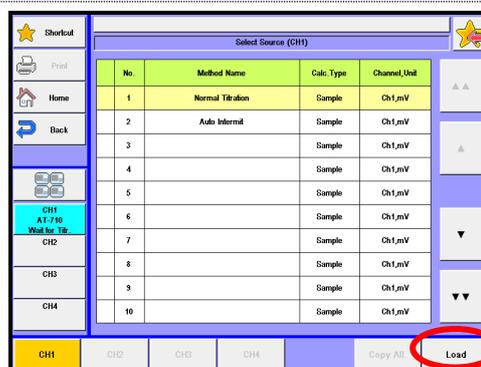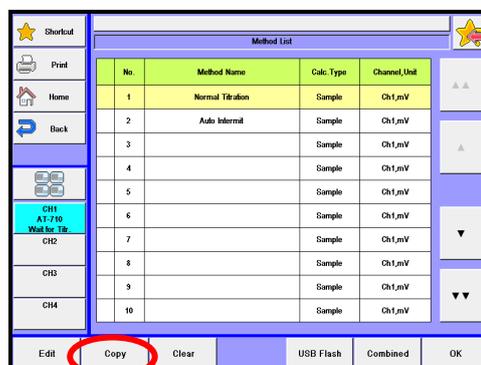
2 When "Select Destination" display appears, select a destination where the copied Method will be transferred. Press [Copy] button. Press [Yes] button once a confirmation message appears.

[▲], [▼]
Moves the cursor on the list.

[▲▲], [▼▼]
These keys are for page turning. The cursor moves to the top of the list after page break.

[CH1] 、[CH2] 、[CH3] 、[CH4]
Select the channel number with the method of the origin of copy.

[Copy All.]
Executes copying the all Method. This button gets enabled by the same type measuring unit connected.
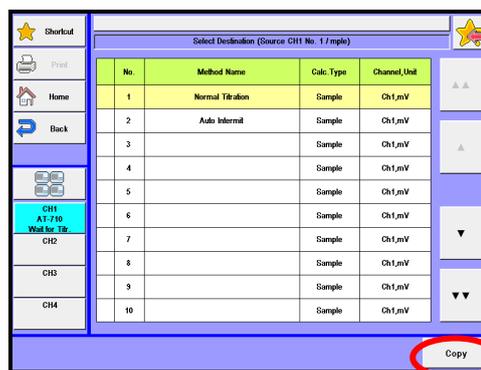
1. Method

[Load]
Select the source Method.

[Copy]
Executes copying the Method

The [Copy All.] for Method rides over the existing all Methods.

Note

The copied and transferred Method rides over the existing Method. It is recommended to print out the existing Method before it is erased.

Note

4

1-1-2.[Clear] (Method conditions)

The user can initialize the currently selected method conditions to the default.

1 Select the method you wish to clear [▼] button [▲]. Press [Clear] button.
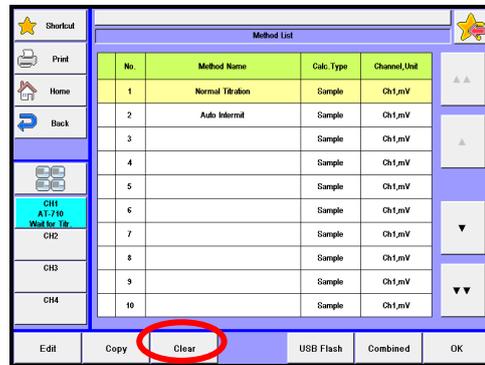
2 When "Method Clear" display appears, select an initialized default Method. Press [Yes] button once a confirmation message appears.
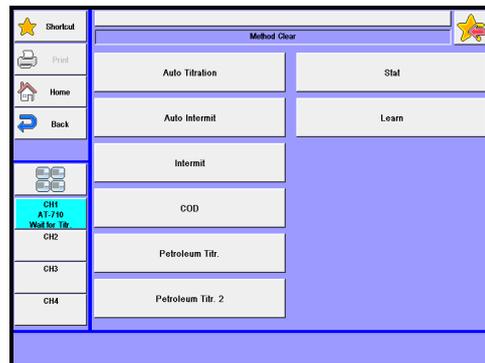
[Auto Titration]
Method conditions are initialized to "Auto Titration" method conditions.
[Auto Intermit]
Method conditions are initialized to "Auto Intermit" method conditions.
[Intermit]
Method conditions are initialized to "Intermit" method conditions.
[COD]
Method conditions are initialized to "COD" method conditions.
[Petroleum Titr.]
Method conditions are initialized to "Petroleum Titr." method conditions.
[Petroleum Titr.2]
Method conditions are initialized to "Petroleum Titr.2" method conditions.
[Stat]
Method conditions are initialized to "Stat" method conditions.
[Learn]
Method conditions are initialized to "Learn" method conditions.

1-1-3.[USB Flash] (Method data)

Save all methods into USB flash drive together. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

< How to save method >

1   Connect the USB Flash drive to the device.

Press [USB Flash] button to show "Saving Method Setup."
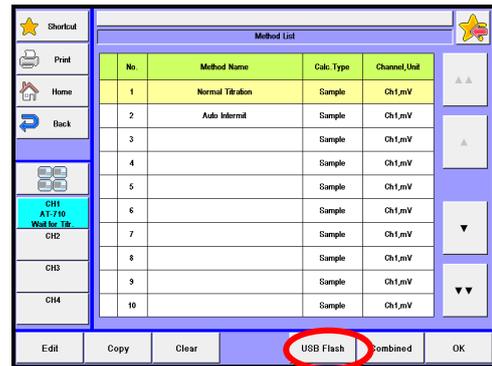
2   When entering comments with the method data to be saved, press the portion where comment is displayed. After confirming the right screen display, enter comments and press [OK] button. Press [Execute] button on the "Saving Method Setup" screen display. Confirming the verifying-entry message, press [Yes] button.
All methods are saved into USB flash drive and the screen display returns to the initial menu.

<Load/Delete the Method on USB flash drive>
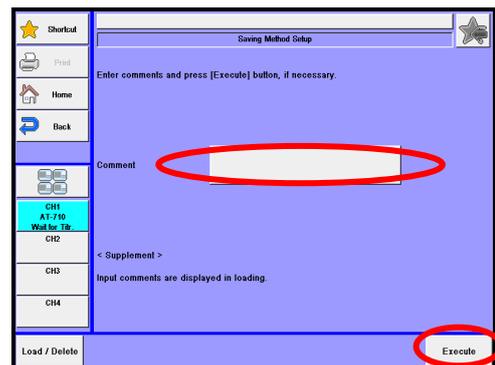
| 1 | Connect the USB Flash drive to the device.

Press [USB Flash] button to show "Save Method." | |

| 2 | Press [Load/Delete] button. | |
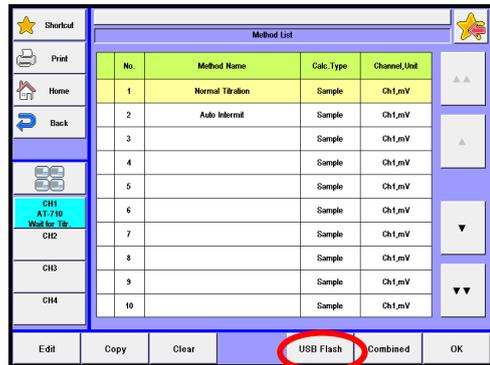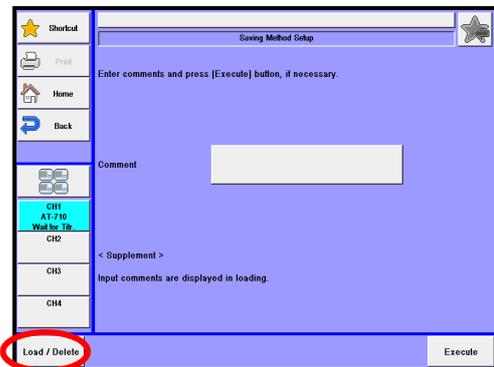
Item	Description
[Load/Delete]	Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

	Do not detach the USB flash drive from the slot when making access to it.
Note	

1. Method

< How to load the Method >

1   Select the method file to be loaded into the measuring unit on the "Loading/Deleting Method" screen display and then press [Load] button.
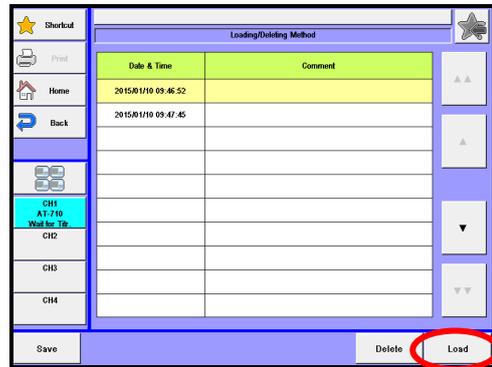
2   The screen of "Select method loaded from USB flash drive" will be displayed. Then, select the method to be loaded into the measuring unit and press [Load] button.
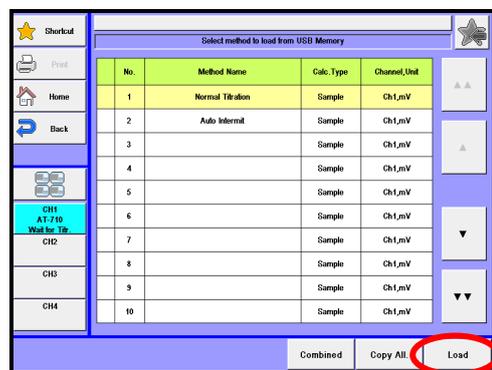
3   The screen of "Select copied place for method" will be displayed. Then, select the method copied to and press [Copy] button.
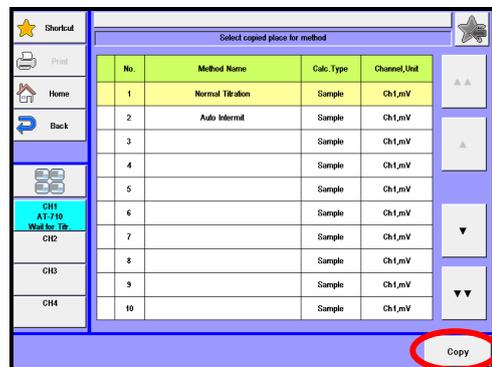
	The copied and transferred Method rides over the existing Method. It is recommended to print out the existing Method before it is erased.
Note	

4 When the confirmation screen is displayed, press [Yes] button.
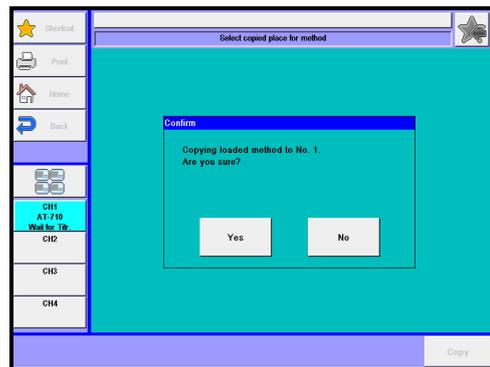
5 The method will be copied onto the method selected in the method list and the screen display will return to "Select method to load from USB flash drive". When loading further methods, repeat the above steps 2 through 4.
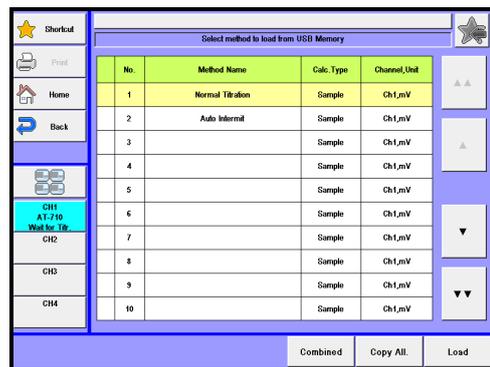
< How to delete method >

1 Select the method file to be deleted on the "Loading/Deleting Method" screen display and then press [Delete] button. The screen display will turn to the confirmation screen. Then, press [Yes] button.
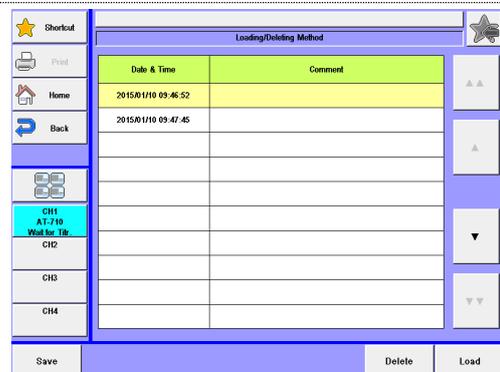
2 The method file selected on USB flash drive will be deleted and the screen display will return to "Loading/Deleting Method". When deleting further method files, repeat the above steps 1).

1-2. **Outline of Method**

A Method consists of [Titration Mode, Titration Form], [Predosing Parameter], [Titration Parameters], [Control Parameter], [Calculation Parameter], [Report Parameter], [Reagent Parameter] and [Option Parameter].

Item	Description
[Method Name]	Edit the name of the method.
[Titration Mode]	Set a titration mode to determine how to dose titrant.
[Titration Form]	Set a titration form mainly used to find endpoints.
[Predosing Parameter]	Predosing conditions on a sample before measurements is set. Samples can be previously dispensed with up to 10 burettes.
[Titration Parameters]	Settings for general titration.
[Control Parameter]	Set for your intended titration including titrant dose speed, data sampling mode, EP detection method and its conditions.
[Calculation Parameter]	Equation for concentration calculation is set.
[Report Parameter]	Settings for printing contents.
[Reagent Parameter]	Select a burette to be used in titration and fixed dose.
[Option Parameter]	The option parameter is necessary for user sequence when a multiple sample changer is used.

1-3. Method Name

Edit the name of the method.

1 Press Method Name button.
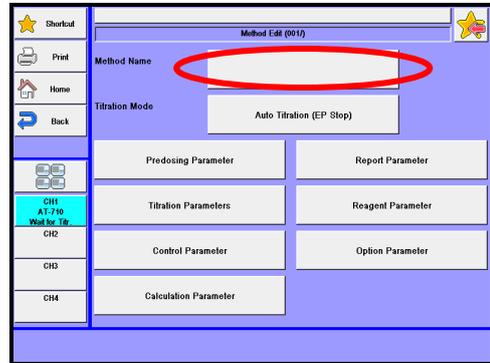
2 Enter the name of the method, please press the [OK] button. Up to 20 characters can be entered.
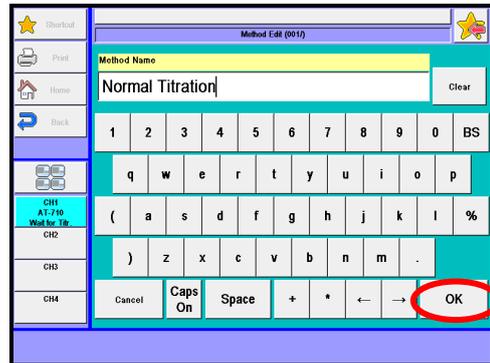
1-4. **Titration Mode, Titration Form**

The selection of titration mode, and the selection of the titration form.

1   Press Titration Mode button.
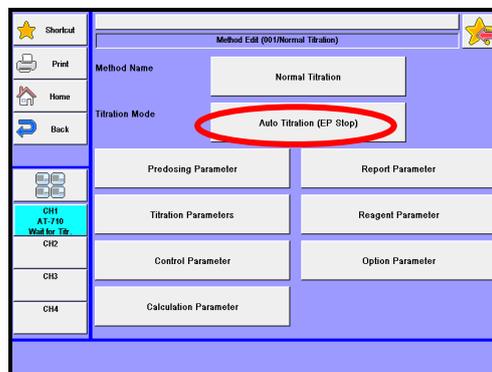
2   Press Titration Mode button. Select the mode of titration, please press the [OK] button.

Press Titration Form button. Select the form of titration, please press the [OK] button.
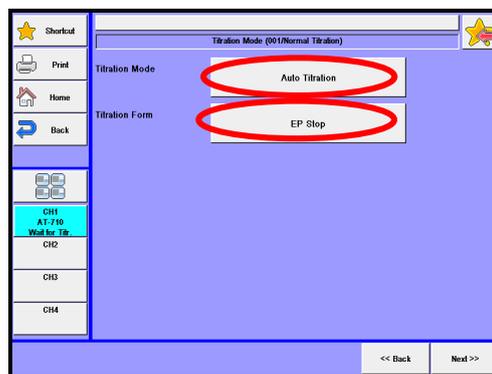
[Titration Mode]
Set a titration mode to determine how to dose titrant:
- Auto Titration : This mode allows titrating according to parameter-controlled rate, thereby it accelerates the titration where potential change is small and slows down where the change is large.
- Auto Intermit : This mode is appropriate for samples featuring slow chemical reaction that takes time before reaching stable potential while adding titrant.
  Dose volume is automatically set according to potential gradient. Blank mode programmed suitable to blank measurement can be selected by selecting this mode.
- Intermit : This mode is designed for cut-off or constant rate titration. For continuous constant rate titration, enter "0" for "Cut-off time" as control parameter. Titration rate can be set by "Dispense speed". Intermittent titration waits for "Cut-off time" each time titrant is dosed at the preset intervals.

- COD : This mode is specific to measurement of COD (Chemical Oxygen Demand) according to the JIS K0102 Testing method for industrial wastewater and requires the optional COD titration unit to perform the titration. When selecting this mode, the titration form is fixed to "COD" only.
- Petroleum Titr. : This is the titration mode according to the JIS K2501or ASTM D-664 for Petroleum products- determination of neutralization number. Titration starts dosing and data sampling when potential reading at Integral time is found lower than the preset level.　Unless the potential difference before and after dosing is larger than preset level, the set dose volume changes from 1st Delivery volume to 2nd Delivery volume.
- Petroleum Titr.2：This mode provides the titration mode for intermittent titration; intermittent quantity of dose volume and Cut-off Time are changed at set pH (mV), and titration is carried on. This measurement enables you to judge potential stability after titrant has been dosed. On this mode, select the titration form from EP stop, Level stop or Level & EP.
- Stat : Stat titration doses reagent up to maximum volume to the end while keeping Stat level that is preset on control parameter settings. The data are sampled each Lag time when data are read. Time vs. titrant consumption will be printed out as measurement results. The titration form is fixed to "Stat."
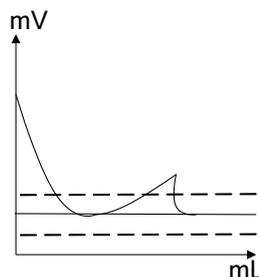
- Learn : The purpose of Learn titration is to select a control mode and parameters appropriate for a given sample. Titration will end up to the maximum titration volume.　When the number of endpoints detected reaches the preset number, the titration form and mode will be automatically changed to the optimal settings.　However, optimal parameters may not be obtained for those particular samples of which reaction is very slow or potential change is small, abrupt or the like. The titration results are stored in "Auto Intermit" mode and "Full" form. The titration form is fixed to "Learn" when selecting this mode.
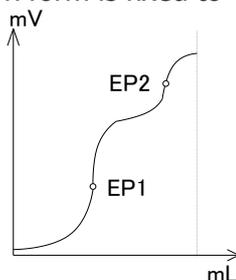
[Titration Form]

Here you can select a titration form mainly used to find endpoints.

- EP Stop : Titration can detect endpoints to the number (up to 5) of EP (endpoint) preset on Control parameters. If titration volume reaches the maximum volume, however, it ends halfway.
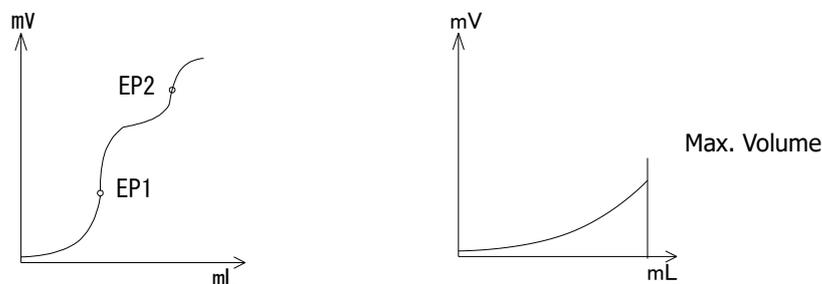
This EP Stop titration form is the typical titration form popularly used. It detects the highest inflection point as EP, and is least influenced by titration conditions, resulting in good repeatability. When the inflection point is unclear, it is recommended to detect the first endpoint by Separation level thereby the first and second EP are separated.

- Level Stop : Titration can detect endpoints to the number (up to 2 EP potential levels) of EP preset on Control parameters. When titration volume reaches the maximum volume, however, it ends halfway. This form is useful for those samples measured by such method as non-aqueous buffer method for petroleum products, M-alkali or P-alkali measurement or the like where the EP level is known. For titration with unclear inflection points, it is also recommended to determine endpoints using this titration form where the titration continues to the preset potential level.
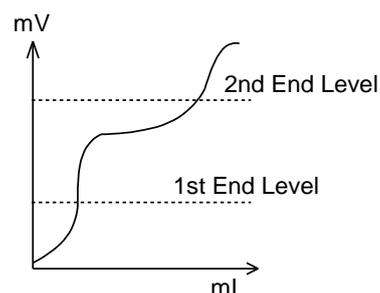
- Intersect : Titration can detect endpoints to the preset number (up to 3) of EP on control parameter. If titration reaches the maximum volume, however, it will end halfway. This form is used for titration like diazotation, conductivity and photometry. This form automatically detects the intersection point where two tangent lines cross when the angle changes more than preset degrees on titration curve. The angle is determined by converting titration volume and potential to the unit of length as shown below. Titration volume and potential level will be converted to the length of 10 mm as shown below:

1mL	1pH	$\rightarrow$	10mm
100mV	10%T	$\rightarrow$	10mm
0.1Abs	10μA	$\rightarrow$	10mm
	CMT each Range $\times$ 0.01μS/cm $\rightarrow$		10mm

For example;
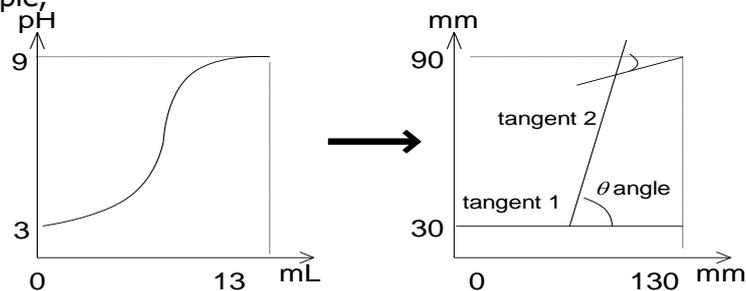
- Full : Titration goes on to the maximum volume as preset on titration parameter. This titration form can detect the endpoint by EP Stop form up to 5 EPs. This form is useful for samples where the number of EP is unknown.
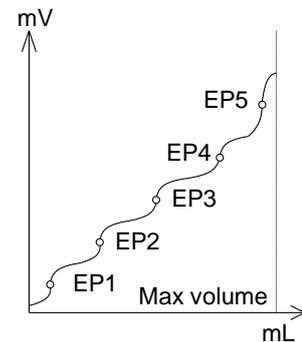
1. Method

- Level & EP : Titration is performed with EP stop. If no EP is obtained until the set potential with Detection EP Level, EP by Level stop will be regarded as EP. When the maximum titration volume is reached during titration and EP is obtained with Level stop, EP by Level stop will be regarded as EP and titration will come to an end.

Fig.1   Fig.2
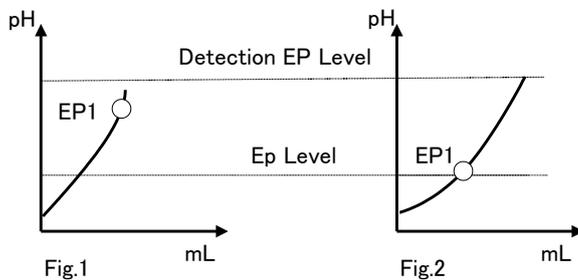
Note

For the use of the COD titration unit, see "9-7. Use COD titration unit."

When a titration form is changed, the control parameters of Method are initialized to the default as described in the Chapter "1-7-8. Initial values of Control parameters."

1-4-1. Titration, Electrode and Preamplifier

For correct titration, it is important to know the characteristics of reagent and reaction of solutions, and then to select appropriate titration control, detection electrode and preamplifier. The below chart shows the relations of titration, electrode, preamplifier and control.

Titration		Control	Remark	Electrode/Preamplifier
Blank titration of reagent		Auto Intermit (Blank mode)	For titration less than 0.3mL	
Strong acid − Strong base $HCl - NaOH$ $H_2SO_4 - NaOH$		Auto Titration	Increase control speed when reaction is fast.	Combination glass electrode C-171 STD preamplifier
Weak acid − Strong base Strong acid − Weak base Weak acid − Weak base Benzoic acid − KOH $HCl - Na_2CO_3$ $HClO_4$−Potassium hydrogen phthalate		Auto Titration	Slow down control speed if reaction is slow with less than 1/100mol/L. Also use Auto Intermit	Combination glass electrode C-171 or Combination double junction electrode C-173 STD preamplifier
Precipitation titration	$AgNO_3$ − I^- Br^- Cl^- CN^- S^{2-} SCN^- $Pb(ClO)_2-$ $SO_4{}^{2-}$	Auto Titration	Slow down control speed if reaction is slow with less than 1/100mol/L. Also use Auto Intermit	Silver electrode M-371 Ref. electrode R-272 For non-aqueous: Silver electrode M-371 Glass electrode H-171 STD preamplifier
Redox titration	$Na_2S_2O_3$ − I_2 $KMnO_4$ − Fe^{2+} I_2 − As_2O_3	Auto Titration	Use Auto Int. if reaction is slow and potential comes back.	Combination Pt electrode C-272 If inner solution affect; Silver electrode M-271 and Ref.electrode R-173 STD preamplifier
Petroleum neutralization titration	Acid value of fats/oil Neutralization of fatty acid Acid number of petroleum products Base number of petroleum products	Auto Intermit Petroleum titr. Petroleum titr. 2	For quick measurement, use Auto Intermit.	Combination glass electrode C-171 when noisy, use: Glass electrode H-171 Ref.electrode R-173 STD preamplifier
Chelatometric titration by ion electrode	$EDTA - Zn^{2+}$ $EDTA - Ca^{2+}$	Auto Titration	Use ionic electrode for detection	For $Zn^{2+} - Cu$-EDTA, Use copper ionic electrode. For Ca^{2+}, use calcium ionic electrode STD preamplifier
Chelatometric titration by photometric titration	$EDTA - Ca^{2+}$, Mg^{2+} $EDTA - Zn^{2+}$ $EDTA - Ni^{2+}$	Auto Intermit	Use preamplifier for photometric titration	$Ca^{2+}, Mg^{2+}, Zn^{2+}$−EBT indicator λ=630nm Ni^{2+} − MX indicator λ=530nm PTA preamplifier
Bromine titration	$KBr, KBrO_3$ − Olefin Back titration $Na_2S_2O_3 -$ Petroleum resin	Auto Intermit Back titration, use Auto Titr.	Use preamplifier for polarization titration	Twin Pt electrode M-511 For low current fluctuation: Twin Pt electrode M-512 POT preamplifier
Diazotation titration	$NaNO_2 -$ Sulfonamide acid, Aromatic primary amine	Auto Intermit Intermit	Use preamplifier for polarization or redox titration Use STD. for redox.	Twin Pt electrode M-511 For low current fluctuation: Twin Pt electrode M-512 POT preamplifier

1-4-2. **Preamplifiers**

There are five sorts of preamplifiers connectable with detecting electrode as shown in Table 1-4-2. Select a preamplifier appropriate for your titration.
At the time of the device purchase, three kinds of either are connected to the main body depending on an order other than STD preamplifier unit.

Table 1-4-2

Detector number / Titration type	1	2	3	Description
Standard preamplifier (STD)	pH / mV	mV	—	Acid base titration, Redox titration, etc. Detector 1: Range -20 - 20pH Resolution: 0.001pH(0.1mV) Detector 2: 0-±2000mV Resolution: 0.1mV
Photometric preamplifier (PTA)	—	—	%T / Abs	Analysis of hydraulic modulus, metal concentration in plating liquid. Detector 3: Transmittance range: 0-120%T Resolution: 0.1%T Absorbance : 0-9.999Abs Resolution: 0.001Abs

Polarization preamplifier (POT)	—	—	μA / mV	Diazotization of dye.
				Detector 3: Regulated current polar potential titration
				          Loaded current: 0-20μA
				          Voltage : 0-2V Resolution: 0.1mV
				       Regulated voltage polar current titration
				          Voltage : 0-500mV
				          Current : 0-100μA Resolution: 0.01μA

Conductivity preamplifier (CMT)	—	—	μS/cm	Electrical conductivity measurement.
				Detector 3: Measuring range: 1-100, 1-1000, 1-10000μS/cm
				          Resolution : 0.01% in each full scale
				          Temperature compensation coefficient: 2% / 1°C
				                                        (fixed)
				          Range of cell constant : **.*** - 0.****
				          Reference temperature : 25°C

pH dual input preamplifier (TET)	—	—	pH / mV	Acid base titration, Redox titration, etc. Detector 3: Range -20 - 20pH Resolution: 0.001pH(0.1mV)

1-5. Predosing Parameter

Predosing conditions on a sample before measurements is set. Samples can be previously dispensed with up to 10 burettes.

1   Press [Predosing Parameter] button.
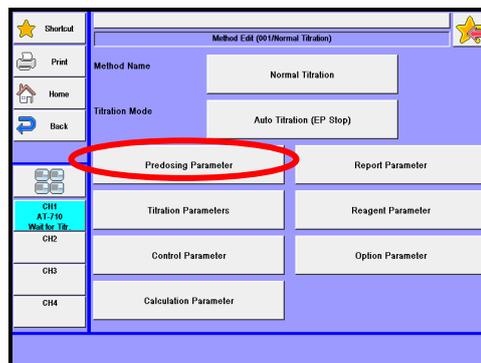
2   The screen on the right will appear.

[No.]
Here you can see the order of predosing for up to 10 burettes.

[Mode]
Display of the preset dose mode.

[Burette No.]
Display of the preset burette number.

[Reagent Name]
Display of the preset reagent name in reagent information.
You can relate a burette to reagent information preset in [Reagent Parameter].

[▲], [▼] button
You can move the cursor on the list of predosing parameters.

[Edit] button
Pressing this button leads to display the "Predosing parameter" screen where you can edit the predosing parameters on the position of the present cursor.

[Up] button
Moves up the selected pretreatment parameter by one line.

[Down] button
Moves down the selected pretreatment parameter by one line.
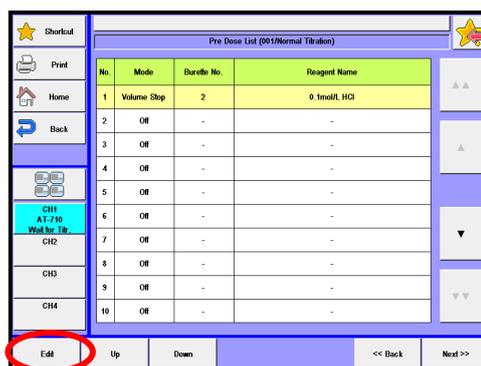
3   Press [Edit] button on "Pre Dose List" to
     display "Predosing Parameter.
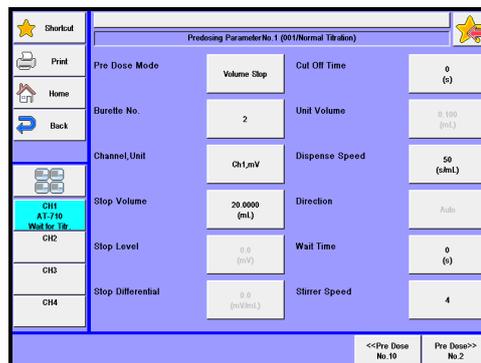
💡   Dosing reagent is set according to a titration parameter.

[Pre Dose mode]
Here you can select a dose mode from the followings:
- None   : No dosing is applied.
- Volume Stop   : Dose a reagent up to preset volume on "Stop Volume". When potential change of a sample is small, you can shorten measurement time by using "Volume Stop".
- Level Stop   : Dose up to the potential level preset on "Stop level". When the potential at inflection points is stable, you can predose by "Level stop" regardless of titration volume.
- Diff. Stop   : Doses until it detects differential point (potential difference against minute titration volume) preset on "Stop Differential". Where potential difference is stable on titration curve though starting level may move, you can doses by "Diff. Stop."
- Auto Dispense : Dispenses reagent of volume set on "Stop Volume" with the optional auto dispenser. Use this when dispensing solvents.
- Pot. Waiting : Titration will not start until the potential set on "Final Pot." is reached. Set up the "Detecting Direction."
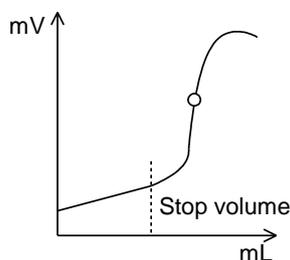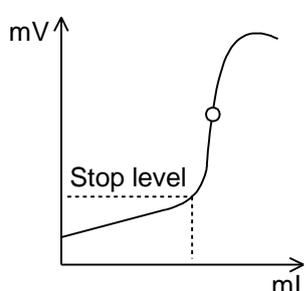
Typical plot for volume stop   Typical plot for Level stop   Typical plot for Differential stop
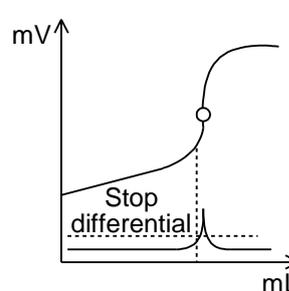
[Burette No.]

Here you can select the burette numbers for dosing. This dialog box appears only when "Pre Dose mode" is set to "Volume Stop", "Level Stop" or "Diff. Stop".

- 1 - 10

[Channel, Unit]

Here you can select the detector number and the unit of detected potential unit--settable unit depends on the preamplifier selected.

- Ch1, mV   : Use for detector 1 and unit in mV.
- Ch1, pH   : Use for detector 1 and unit in pH.
- Ch2, mV   : Use for detector 2 and unit in mV.
- Ch3, mV   : Use for detector 3 and unit in mV when POT- or TET- preamplifier is connected.
- Ch3, pH   : Use for detector 3 and unit in pH when TET- preamplifier is connected.
- Ch3, %T   : Use for detector 3 and unit in %T when PTA- preamplifier is connected.
- Ch3, Abs.   : Use for detector 3 and unit in Abs when PTA- preamplifier is connected.
- Ch3, μA   : Use for detector 3 and unit in μA when POT- preamplifier is connected.
- Ch3, 100μS   : Use for detector 3 and conductivity range in 100μS when CMT- preamplifier is connected.
- Ch3, 1000μS : Use for detector 3 and conductivity range in 1000μS when CMT- preamplifier is connected.
- Ch3, 10000μS : Use for detector 3 and conductivity range in 10000μS when CMT- preamplifier is connected.

[Stop Volume]

When "Volume Stop" or "Auto Dispense" is set for "Pre Dose mode", you select reagent volume to be dosed.

When either "Level stop" or "Diff. Stop" is set for "Pre Dose mode", you select the maximum dose volume for the burette to be used. When dosed volume reaches stop volume, the burette stops dosing regardless of "Stop Level" or "Stop differential" as shown below.

The setting range for stop volume differs according to the burette unit. See below chart:

Burette capacity	Setting range		Burette capacity	Setting range
1mL	0 ～ 1000mL		10,20,50mL	0 ～ 9999.0000mL
5mL	0 ～ 5000mL			

[Stop Level]

Here you can select potential level to end dosing when it reaches the set level. This dialog box appears only when "Pre Dose mode" is set to "Level stop". Dosing will stop when detected potential reaches the set level.

- See Chapter "1-7-9. Input range for potential parameter" about the input range.

[Final Pot.]

Set up the final potential. This will be displayed only when the "Pre Dose mode" is set on "Final Pot.." Wait time will end once the detection potential reaches the Final Pot..

- See Chapter "1-7-9. Input range for potential parameter" about the input range.

[Stop Differential]

Here you can select derivative level for ending dosing. This screen display will appear only when "Pre Dose mode" is set to "Diff. Stop". Dose will stop when the detected derivative gets to set value.

- See Chapter "1-7-9. Input range for potential parameter" about the input range.

[Cut Off time]

Here you can select a cut-off time for intermittent dosing. [Cut Off Time]=0 means continuous dosing.

- 0 - 9999s

[Unit volume]

Here you can select reagent volume for each cut-off time in intermittent dosing. You cannot set Unit volume when [Cut Off Time] is set at '0'. Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11. Settings of discharge amount of titrant" in this manual.

- 0.0005 - 9999.000mL

[Dispense speed]

Here you can select dispense speed. This speed differs depending on the burette unit. The range of speed should be set according to the table below:

Burette capacity	Setting range	Burette capacity	Setting range
1mL	20 ~ 999s/mL	20mL	1 ~ 999s/mL
5mL	4 ~ 999s/mL	50mL	1 ~ 600s/mL
10mL	2 ~ 999s/mL		

[Direction]

Here you can select the direction of EP detection:

- Auto : The endpoints of both directions (A and B) are detected regardless of the direction of change in potential.
- Positive : The endpoint like A below with positive direction of change in potential is selectively detected.
- Negative : The endpoint like B below with negative direction of change in potential is selectively detected.

[Detecting Direction]

Set up the direction of the EP of Final Pot.. This will be displayed only when the "Pre Dose Mode" is set on "Final Pot.."

- Auto : The endpoints of both directions (A and B) are detected regardless of the direction of change in potential.
- Positive : The endpoint like A below with positive direction of change in potential is selectively detected.
- Negative : The endpoint like B below with negative direction of change in potential is selectively detected.
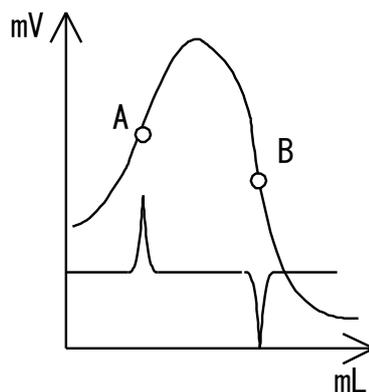
1. Method

[Wait time]

Here you can set a time to wait before starting dose. This is useful for viscous or hardly soluble samples.

- 0 - 9999s

[Limit Time]

Set up the time limit of Final Pot.. This will be displayed only when the "Pre Dose Mode" is set on "Final Pot.." Wait time will end once the "Limit Time" is reached even when "Final Pot." is not reached.

- 0 - 9999s

[Stirrer speed]

Here you can select a speed of the rotator bar for the stirrer. Speed can be selected from nine steps:

- 0 - 9

1-6. Titration Parameter

Settings for general titration.

1	Press [Titration Parameters] button.
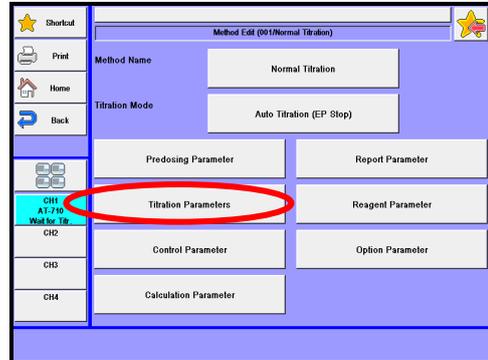
2	Please change the mode numbers and select the parameter you wish to edit. Each parameter is determined by the [OK] button.
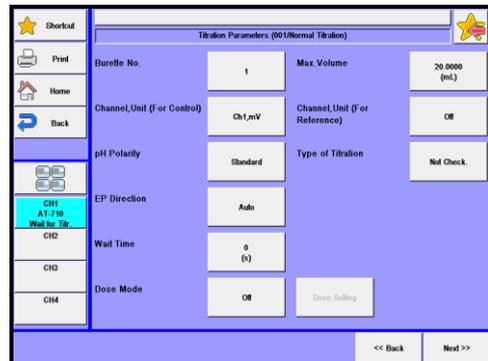
1. Method

[Burette No.]

Here you can select the burette number used for titration.
- 1 - 10

[Max. Volume]

Here you can set maximum titration volume. When it reaches the preset volume, titration will end regardless of the detection of EP or not. The selective range depends on the burettes selected.
The Max. volume should include dose volume.

Burette capacity	Setting range		Burette capacity	Setting range
1mL	0 - 1000mL		10,20,50mL	0 - 9999.0000mL
5mL	0 - 5000mL			

⚠ **Caution**	**Do not set an excessive volume that will overflow reagent out of a sample vessel like beaker.**

[Channel, Unit (For Control)] [Channel, Unit (For Reference)]

Here you can select the detector number and the unit of detected potential unit-- settable unit depends on the preamplifier selected. For "Channel, Unit (For Reference)", select the unit of potential and the detector number as well as "Channel, Unit (For Control)".   The control of titration will be performed on the settings selected in "Channel, Unit (For Control)".
- Off : No selection. Can configure in "Channel, Unit (For Reference)."
- Ch1, mV : Use for detector 1 and unit in mV.
- Ch1, pH : Use for detector 1 and unit in pH.
- Ch2, mV : Use for detector 2 and unit in mV.
- Ch3, mV : Use for detector 3 and unit in mV when POT- or TET- preamplifier is connected.
- Ch3, pH : Use for detector 3 and unit in pH when TET- preamplifier is connected.
- Ch3, %T : Use for detector 3 and unit in %T when PTA- preamplifier is connected.
- Ch3, Abs. : Use for detector 3 and unit in Abs when PTA- preamplifier is connected.
- Ch3, μA : Use for detector 3 and unit in μA when POT- preamplifier is connected.
- Ch3, 100μS : Use for detector 3 and conductivity range in 100μS when CMT- preamplifier is connected.
- Ch3, 1000μS : Use for detector 3 and conductivity range in 1000μS when CMT- preamplifier is connected.
- Ch3, 10000μS : Use for detector 3 and conductivity range in 10000μS when CMT- preamplifier is connected.
- Temp. : Select when the unit detected is temperature and "Channel, Unit (For Reference)" is selected.
  The channel is the same as in the "Channel, Unit (For Control)."

> **Note** "Channel, Unit (For Reference)" will not be displayed when it is the same as for Channel, Unit (For Control) or it is not selected along with Channel, Unit (For Control.).

Table 1-6. Combination of preamplifiers and detectors

Preamplifier	Detector 1	Detector 2	Detector 3
STD-	pH,mV,Temp.	mV	-
PTA-			%T,Abs
POT-	-	-	μA,mV
CMT-			μS/cm
TET-			pH,mV,Temp.

[pH Polarity]

Select the direction of the change in pH potential.

Here a pH glass electrode can be used for a reference electrode in order to avoid the effect of flowing-out inner filling in the reference electrode (e.g. determination of chlorine by non-aqueous titration). Here you need to inverse polarity of electrode potential.

- Standard : Detect potential in the normal direction.
- Reverse : Detect reversed potential.

> **Note** When titrating with other type of electrodes, set the parameter to "Standard". If "Reverse" mode is applied, a graph or data list will be recorded in inverted condition.

[Type of Titration]

Set up a titration type. The type is checked with the "Type of Titration" set the titration parameter of method and the set "Electrode Type" in the smart electrode. If they are different, an error will occur before measurement. This prevents you from using an incorrect reagent and electrode. This function is valid only when "Smart Burette Functionality" or/and "Check Titr. Type (Smart Electrode)" of Function-Other Settings is "Enable."

- Not Check. : Select this when a smart electrode is not used or when the type of electrode is not estimated.
- Acid-base Titr. : Select this when you use a glass electrode.
  (Glass Elec.)
- Redox Titr. : Select this when you use a Pt electrode.
  (Pt. Elec.)
- Precipitation Titr. : Select this when you use an Ag electrode.
  (Ag Elec.)
- Other : Select this when you use other electrodes.

1. Method

[EP Direction]

Here you can select the direction of EP detection:
- Auto : The endpoints of both directions (A and B) are detected regardless of the direction of change in potential. This setting will be unable when the titration form is set to "Level & EP."
- Positive : The endpoint like A below with positive direction of change in potential is selectively detected.
- Negative : The endpoint like B below with negative direction of change in potential is selectively detected.
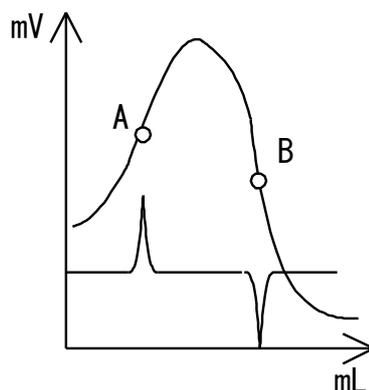
[Wait Time]

Here you can select time delay before titration starts. When the preset delay time elapses after pressing [Start] button, actual titration will start. This is useful when it takes a time in titrating hardly soluble samples or in stabilizing potential level. This setting will be unable when the titration mode is set to "COD."
- 0 - 9999s

[Dose mode]

Here you can select a dose mode from the followings. The burette for dosing reagent will be one set in "Burette No.". The dose amount set in this dose mode will affect the titration volume of measurement results.   This setting will be unable when the titration mode is set to "COD."
- Off : No dosing is applied.
- Volume Stop : Dose a reagent up to preset volume on "Stop Volume". When potential change of a sample is small, you can shorten measurement time by using "Volume Stop."
- Level Stop : Dose up to the potential level preset on "Stop Level." When the potential at inflection points is stable, you can predose by "Level Stop" regardless of titration volume.
- Diff. Stop : Doses until it detects differential point (potential difference against minute titration volume) preset on "Stop Differential". Where potential difference is stable on titration curve though starting level may move, you can doses by "Diff. Stop."
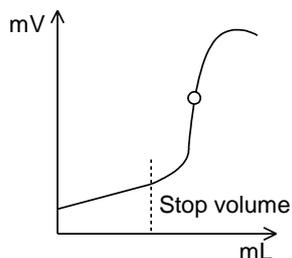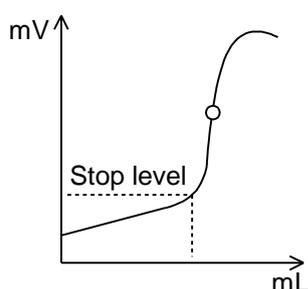
Typical plot for volume stop   Typical plot for Level stop   Typical plot for Differential stop
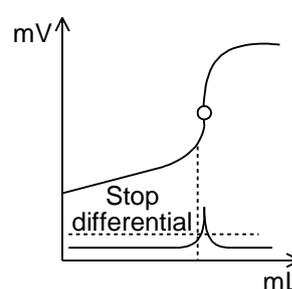
[Dose Setting]

When pressing this button, the display "Dose parameter" will appear where you can configure does setting. This is significant when "Dose mode" is set to other than "Off."

<Dose Parameter>

Make settings of parameters for dosing.
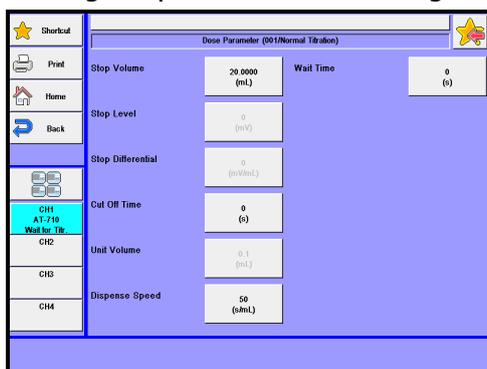
[Stop volume]

When "Volume stop" is set for "Dose mode", you select reagent volume to be dosed. When either "Level Stop" or "Diff. Stop" is set for "Dose Mode", you select the maximum dose volume for the burette to be used. When dosed volume reaches stop volume, the burette stops dosing regardless of "Stop Level" or "Stop Differential" as shown below.

The setting range for stop volume differs according to the burette unit. See below chart:

Burette capacity	Setting range		Burette capacity	Setting range
1mL	0 - 1000mL		10,20,50mL	0 - 9999.0000mL
5mL	0 - 5000mL			

[Stop Level]

Here you can select potential level to end dosing when it reaches the set level. This dialog box appears only when "Dose Mode" is set to "Level Stop". Dosing will stop when detected potential reaches the set level.

- See Chapter "1-7-9. Input range for potential parameter" about the input range.

[Stop Differential]

Here you can select derivative level for ending dosing. This screen display will appear only when "Dose Mode" is set to "Diff. Stop". Dose will stop when the detected derivative gets to set value.

- See Chapter "1-7-9. Input range for potential parameter" about the input range.

[Cut Off time]

Here you can select a cut-off time for intermittent dosing. [Cut Off time]=0 means continuous dosing.

- 0 - 9999s

[Unit Volume]

Here you can select reagent volume for each cut-off time in intermittent dosing. You cannot set Unit volume when [Cut Off time] is set at '0'. Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11. Settings of discharge amount of titrant" in this manual.

- 0.0005 - 9999.000mL

[Dispense Speed]

Here you can select dispense speed. This speed differs depending on the burette unit. The range of speed should be set according to the table below:

Burette capacity	Setting range	Burette capacity	Setting range
1mL	20 - 999s/mL	20mL	1 - 999s/mL
5mL	4 - 999s/mL	50mL	1 - 600s/mL
10mL	2 - 999s/mL		

[Wait Time]

Here you can set a time to wait before starting dose. This is useful for viscous or hardly soluble samples.

- 0 - 9999s

1-7. Control Parameter

Here you can configure various settings for your intended titration including titrant dose speed, data sampling mode, EP detection method and its conditions.

1   Press [Control Parameter] button.
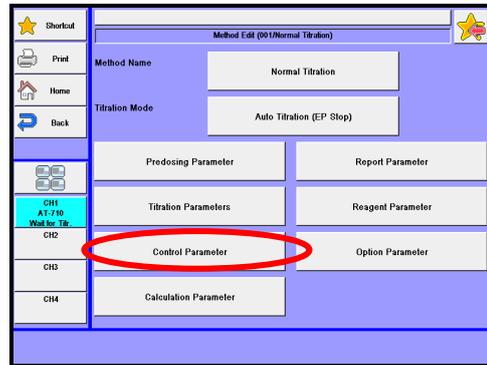
2   Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.
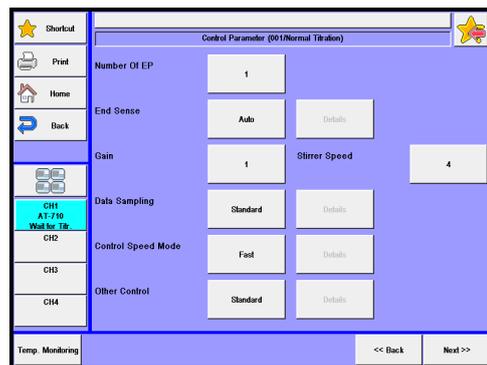
1. Method

Control parameters differ depending on the titration form and mode of the preset method as shown below.
For the details about each parameter, refer to the corresponding chapter.

```
[Control Parameter]
    Chapter 1-7
     ┬── Titration Form :  EP Stop ──┬── [Details] (End sense) ───┬── Titration Form  :  EP stop
     │   Chapter 1-7-1    Full       │                            │                      Full
     │                    Intersect  │                            └── Titration Form  :  Intersect
     ├── Titration Form :  Level & EP │
     │   Chapter 1-7-2               ├── [Details] (Data sampling)
     ├── Titration Form :  Level Stop ┘
     │   Chapter 1-7-3
     │                               ├── [Details] (Control speed mode) ─┬── Titration Mode :  Auto Intermit
     │                               │   Chapter 1-7-6                   ├── Titration Mode :  Auto Titration
     │                               │                                   └── Titration Mode :  Intermit
     │                               ├── [Details] (Control mode) ───────┬── Titration Mode :  Petroleam Titr.
     │                               │   Chapter 1-7-6                   └── Titration Mode :  Petroleam Titr.2
     │                               │
     │                               └── [Details] (Other control) ──────┬── Titration Form :  EP stop
     │                                                                   │                     Level stop
     │                                                                   │                     Full
     │                                                                   └── Titration Form :  Level＆EP
     ├── Titration Mode :  Stat ────── [Details] (Vol. sampling time)
     │   Chapter 1-7-4
     ├── Titration Mode :  Learn
     │   Chapter 1-7-5                 [Temp. Monitioring]
     └── Titration Mode :  COD            Chapter 1-7-7
         Chapter 9-7
```

1-7-1.< **When titration form is "EP Stop", "Intersect" or "Full"** >
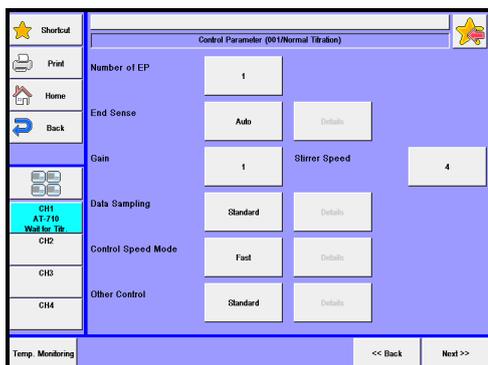
[Number of EP]

Here you can select the number of endpoints. Titration ends when it detects the preset number of endpoints. This setting will be unable when the titration form is set to "Full."

- 1 - 5 : When titration form is set to "EP Stop"
- 1 - 3 : When titration form is set to "Intersect"

> **Note** When titration form is set to "Full", a titration goes on up to the maximum volume regardless of the number of endpoints (up to 5) that are detected during a titration.

[Auto Intermit Mode]

This will be displayed when "Titration Mode" is "Auto Intermit" Set up details of "Auto Intermit Mode."

- Standard : Standard performance of "Auto Intermit" mode.
- Blank : Select this for blank test or measurement with limited amount of samples. This mode is optimally programmed for blank test, and detects one EP.
- Micro : Select this for measurement with limited amount of samples by one mode where "Standard" mode cannot detect EP. This mode performs control with the "Blank" mode until the set "Micro Titration Max. Volume" is reached, and performs Auto Intermit control of the "Standard" mode after that. This will be displayed when "Titration Form" is "EP Stop"or"Full."

1. Method

[Auto Intermit Mode] - [Details]

Set this up when Auto Intermit Mode is set to "Micro."

Item	Description
[Micro Titration Max Volume]	Enter maximum value of titration volume for "Blank" mode. Value should be smaller than "Max.Volume" of Titration Parameter.
[Micro Titration End Sense (Potential)]	Here you can select a normalized potential to detect EP until" Micro Titration Max Volume." The potential difference is the gap between E2 (normalized potential where maximum differential value is detected) and E1 (normalized potential where minimum differential value is detected). When the potential changes more than the preset end sense level, the point will be regarded as a possible endpoint. • 0.0 - 99999.9dE
[Micro Titration End Sense (Differential)]	Here you can select the differential difference in normalized potential to evaluate EP until "Micro Titration Max Volume." Select a differential difference between a maximum differential value (dE2/dmL) and a minimum value (dE/dmL). When the potential changes more than preset end sense level, the point is determined to be a possible endpoint. • 0.0 - 99999.9dE/dmL The endpoint is thus determined by preset two end sense levels when the requirements for both dE and dE/dmL are fulfilled.

[End Sense]

Here you can select Auto or Set for EP sensing method.
- Auto   : End sense is determined automatically. It starts EP sense by default value and then automatically changes EP sense if an endpoint is not found. The change EP sense is stored as "Set", and therefore, chose "Set" from second measurement onward.
- Set   : The endpoint is detected according the preset end sense value (dE, dE/dmL).

[End Sense] - [Details]

Here you can select how to detect EP. Press this button to show "EP Sense" dialog box on display. This is valid when "Set" is chosen in the "End Sense" setting.
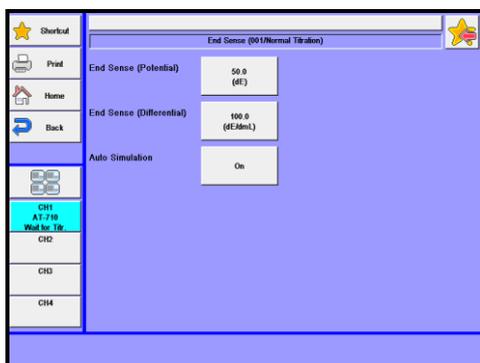
(When titration form is "EP Stop" or "Full")

Item	Description
[EP Sense (Potential)]	Here you can select a normalized potential to detect EP. The potential difference is the gap between E2 (normalized potential where maximum differential value is detected) and E1 (normalized potential where minimum differential value is detected). When the potential changes more than the preset end sense level, the point will be regarded as a possible endpoint. • 0.0 - 99999.9dE
[EP Sense (Differential)]	Here you can select the differential difference in normalized potential to evaluate EP. Select a differential difference between a maximum differential value (dE2/dmL) and a minimum value (dE/dmL). When the potential changes more than preset end sense level, the point is determined to be a possible endpoint. • 0.0 - 99999.9dE/dmL The endpoint is thus determined by preset two end sense levels when the requirements for both dE and dE/dmL are fulfilled.
[Auto Simulation]	Here you can select the redetection of endpoints using the automatic simulation. When a titration form is set to "Full" and at least one endpoint is detected, this function will not be implemented. This setting will be unable when the Auto intermit mode is set to "Micro." • Off : Auto simulation will not be put into effect after a titration is completed. • On : Auto simulation will be put into effect after a titration is completed.

1. Method

(When the titration form is set to "Intersect")

Item	Description
[EP Stop Mode]	Here you can select the EP stop mode from the following directions: • Both : The intersection points (A and B) of two tangent lines are determined to be the EP's. • Positive : The intersection, (A), of two tangent lines on a titration curve that are directed counterclockwise will be an EP. • Negative : The intersection, (B), of two tangent lines on a titration curve that are directed clockwise will be an EP.
[End Sense (Angle)]	Here you can set an angular difference (normalized) of crossing tangent lines to determine EP. When the actual angle by two tangent lines exceeds a preset value for detection, the intersection points will be EP's. • 0.0 - 180.0(Deg.) The endpoints will be determined on the preset end sense (dDeg) when they meet "End sense."
[Auto Simulation]	Here you can select the redetection of endpoints using the automatic simulation. • Off : Auto simulation will not be put into effect after a titration is completed. • On : Auto simulation will be put into effect after a titration is completed.
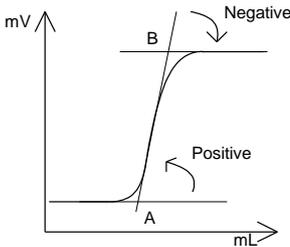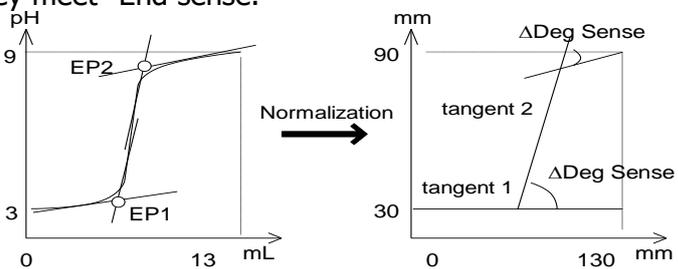
[Gain]

Here you can select the sensitivity of detection signal. Typically, use '1' for this setting.
When potential change is too small to detect, increase the gain.
- 1 - 10

[Data Sampling]

Here you can set the condition for data sampling. The data list will be made from measurement results under the following conditions on detection signal:
- Standard   : Sampling is made at 4.0mV sampling potential with 0.50 titration volume.
- Set   : You can set the data sampling potential and titration volume.
- Auto   : Potential is collected every time titrant is dosed. You can select this only when Titration mode is on "Auto Intermit" or "Intermit." Note, however, that when the titration mode is "Intermit" with cut off time of 0s, performance will be the same as that of "Standard" setting.

[Data sampling condition] - [Details]

Here you can select the sampling conditions. Press this button to display "Data sampling condition". This setting becomes valid when "Data sampling" is set to "Set".

Item	Description
[Data Sampling Pot.]	Here you can set potential variation for sampling detection signal. Select a narrower range (1-2 mV) when you want to increase the data density in the vicinity of an EP. Data sampling starts when potential deviation from previously sampled data exceeds a preset value. • 0.1 - 9999.9mV
[Data Sampling Vol.]	Here you can select titration volume for sampling detection signal. Select a narrower range (0.1-0.2mL) if potential change in the vicinity of inflection point is weak. Data sampling starts when volumetric deviation from previously sampled data exceeds preset volume. Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11. Settings of discharge amount of titrant" in this manual. • 0.0005 - 9999.0000mL

1. Method

> When a too narrow range of data sampling in potential or titration volume is set, the sampled data may exceed the memory capacity (Max. 512 points), causing failure in drawing graphical curve or performing simulation. Thus, care should be taken of setting these parameters in consideration of maximum possible titration volume and potential variation.

[Control Speed Mode]
Choose your desired speed out of the following modes:
- Fast   : For fast reaction like strong acid − strong base.
- Standard   : For typical measurements like weak acid − weak base · strong acid − weak base.
- Slow   : For slow reaction in dilute titrant (e.g. no more than 0.01mol/L).
- Set   : Manually set the control speed.

[Control Speed Mode] - [Details]
Here you can select the control speed mode. Press this button to display "Control speed mode". This setting becomes valid when "Control speed mode" is set to "Set".

> For setting the control speed, see Chapter "1-7-6. Control speed mode."

[Other Control]
Here you can configure potential level for the 1st EP level when separate 2nd EP levels or the range for detecting the 1st EP is set. This is not applicable when the titration form is set to "Intersect".
- Standard   : Cannot set other control parameters. "Titr. over volume" is equal to 0mL.
- Set   : Can set other control parameters.

[Other Control] - [Details]
Here you can select the control speed mode. Press this button to display "Other control". This setting becomes valid when "Other control" is set to "Set".

Item	Description
[Titr. Over Volume]	Here you can set the titration volume for which amount the titration continues even after the last endpoint is detected. In the case where titration volume exceeds the preset volume when the last endpoint is found, the titration will be completed as over-titration. This feature will be effective when the titration form is "EP Stop". • 0.00 - 9999.00mL
[EP Area]	Here you can select EP area setting to set a range (titration volume, potential) in which EP's are possibly found. This setting will be useful to avoid the effect of noise or carbonated gas during titration. • Off : Disable for EP area setting. • On : Enable for EP area setting.
[Volume Range (Lower Limit)]	Here you can set the lower limit of titration volume in EP area. • 0.0000 - 9999.0000 mL
[Volume Range (Upper Limit)]	Here you can set the upper limit of titration volume in EP area. • 0.0000 ~ 9999.0000 mL
[Potential Range (Lower Limit)]	Here you can set the lower limit of potential in EP area. • See the Chapter "1-7-9 Input range for potential parameters" about the input range.
[Potential Range (Upper Limit)]	Here you can set the upper limit of potential in an EP range. • See the Chapter "1-7-9 Input range for potential parameters" about the input range.

1. Method

Item	Description
[Separation]	Here you can select potential separation function that is "enable" when the titration form is set to "EP Stop". • Off : Disable for Separation • On : Enable for Separation
[Separation Level]	Here you can set the potential separation level. • See the Chapter "1-7-9 Input range for potential parameters" about the input range.
[Level Stop]	Here you can select the potential level stop function for the first endpoint (EP1). • Off : Disable 'Level stop' for EP1. • On : Enable 'Level stop' for EP1.
[EP Level]	Here you can set the potential for the first endpoint. • See the Chapter "1-7-9 Input range for potential parameters" about the input range. "Separation" where separation level is set in between inflection points or beyond determines the inflection point exceeding preset level to be the second endpoint (EP2) regardless of EP found at the start of titration. "Separation" will enable "Level stop" to function. The preset potential (End level) will become an endpoint when no inflection point is automatically found. Upper left fig. : The first endpoint is found with EP Stop mode before reaching "Separation level" since clear inflection points are detected. Upper right fig.: The preset end level will be regarded as EP1 since an unclear inflection point is found with EP Stop mode before reaching "Separation level".
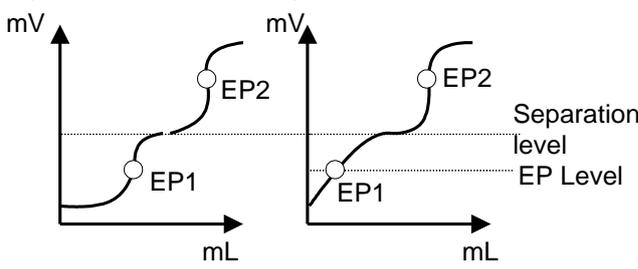
[Stirrer Speed]
Here you can select an initial stirrer speed for titration. You can select a speed appropriate for sample properties.
• 0 - 9

⚠ **Caution**	**Normally, set the stirrer speed at 4. When precipitation is anticipated during titration, set it at 6 to 8. Care should be taken not to allow the stirrer speed to be too high because the rotator bar may spin out of a beaker depending on the size of the bar, resulting in damages on electrodes.**

1-7-2.< **When titration form is "Level Stop"** >
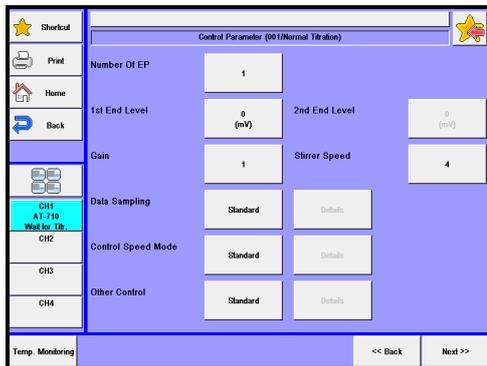
[Number of EP]
Here you can select a number of endpoints. Titration ends when the preset number of endpoints has been detected.
- 1 - 2

[1st End Level]
Here you can set the potential level of a first endpoint.
- See Chapter "1-7-9. Input range for potential parameters" about the input range.

[2nd End Level]
Here you can select the potential level of a second endpoint when the number of EP's is set to "2".
- See Chapter "1-7-9. Input range for potential parameters" about the input range.
It should be noted that a titration will be carried out in the following way depending on the "EP Direction" of "Titration parameters":
- Auto   : After a titration is initiated, the first endpoint potential level is to be EP1. Then, the second endpoint potential level is to be EP2. As shown in Fig. 2 below, a titration will continue to the maximum volume preset when the first endpoint is not detected.
- Negative   : In negative direction, all the endpoints shown below will be detected as EP.
            When the initial level is set between levels e.g. 1st and 2nd EP, [1st EP] = [Volume at start of titration], and when the initial potential level is lower than EP1 and EP2, [1st EP] = [2nd EP] = [Volume at start of titration].
- Positive   : When the initial level is set between levels e.g. 1st and 2nd EP, [1st EP] = [Volume at start of titration], and when the initial potential level is higher than EP1 and EP2, [1st EP] = [2nd EP] = [Volume at start of titration].

Fig.1   Fig.2

[Gain]

Here you can select the sensitivity of detection signal. Typically, use '1' for this setting.
When potential change is too small to detect, increase the gain.
- 1 - 10

[Data sampling]

Here you can set the condition for data sampling. The data list will be made from measurement results under the following conditions on detection signal:
- Standard   : Sampling is made at 4.0mV sampling potential with 0.50 titration volume.
- Set   : You can set the data sampling potential and titration volume.
- Auto   : Potential is collected every time titrant is dosed. You can select this only when Titration mode is on "Auto Intermit" or "Intermit." Note, however, that when the titration mode is "Intermit" with cut off time of 0s, performance will be the same as that of "Standard" setting.

[Data sampling] - [Details]

Here you can select the sampling conditions. Press this button to display "Data sampling condition". This setting becomes valid when "Data sampling" is set to "Set".

Item	Description
[Data Sampling Pot.]	Here you can set potential variation for sampling detection signal. Select a narrower range (1-2 mV) when you want to increase the data density in the vicinity of an EP. Data sampling starts when potential deviation from previously sampled data exceeds a preset value. • 0.1 - 9999.9mV
[Data Sampling Vol.]	Here you can select titration volume for sampling detection signal. Select a narrower range (0.1-0.2mL) if potential change in the vicinity of inflection point is weak. Data sampling starts when volumetric deviation from previously sampled data exceeds preset volume. Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11. Settings of discharge amount of titrant" in this manual. • 0.0005 - 9999.0000mL

> **Note**
> When a too narrow range of data sampling in potential or titration volume is set, the sampled data may exceed the memory capacity (Max. 512 points), causing failure in drawing graphical curve or performing simulation. Thus, care should be taken of setting these parameters in consideration of maximum possible titration volume and potential variation.

[Control Speed Mode]

Choose your desired speed out of the following modes:
- Fast   : For fast reaction like strong acid – strong base.
- Standard   : For typical measurements like weak acid – weak base · strong acid – weak base.
- Slow   : For slow reaction in dilute titrant (e.g. no more than 0.01mol/L).
- Set   : Manually set the control speed.

[Control Speed Mode] - [Details]

Here you can select the control speed mode. Press this button to display "Control speed mode". This setting becomes valid when "Control speed mode" is set to "Set".

> **Note**
> For setting the control speed, see Chapter "1-7-6. Control speed mode."

[Other Control]

Here you can set Titr. Over Volume and End Time.
- Standard   : Cannot set other control parameters. "Titr. over volume" is equal to 0mL.
- Set   : Can set other control parameters.

[Other Control] - [Details]

Here you can select the control speed mode. Press this button to display "Other control". This setting becomes valid when "Other control" is set to "Set".

1. Method

Item	Description
[Titr. Over Volume]	Here you can set the titration volume for which amount the titration continues even after the last endpoint is detected. In the case where titration volume exceeds the preset volume when the last endpoint is found, the titration will be completed as over-titration. • 0.00 - 9999.00mL
[End Time]	Sets up wait time, which is the time until EP is obtained after the set potential is reached. Set this up when there is a return of potential. • 0 - 9999s

[Stirrer Speed]

Here you can select an initial stirrer speed for titration. You can select a speed appropriate for sample properties.

• 0 - 9

⚠ **Caution**	**Normally, set the stirrer speed at 4. When precipitation is anticipated during titration, set it at 6 to 8. Care should be taken not to allow the stirrer speed to be too high because the rotator bar may spin out of a beaker depending on the size of the bar, resulting in damages on electrodes.**

1-7-3.< When titration form is "Level & EP" >

[Number of EP]
One (1) fixed.

[EP Sense value (Potential)]
Here you can select a normalized potential to detect EP. The potential difference is the gap between E2 (normalized potential where maximum differential value is detected) and E1 (normalized potential where minimum differential value is detected). When the potential changes more than the preset end sense level, the point will be regarded as a possible endpoint.
- 0.0 - 99999.9dE

[EP Sense value (Differential)]
Here you can select the differential difference in normalized potential to evaluate EP. Select a differential difference between a maximum differential value (dE2/dmL) and a minimum value (dE/dmL).
When the potential changes more than preset end sense level, the point is determined to be a possible endpoint.
- 0.0 - 99999.9dE/dmL

The endpoint is thus determined by preset two end sense levels when the requirements for both dE and dE/dmL are fulfilled.
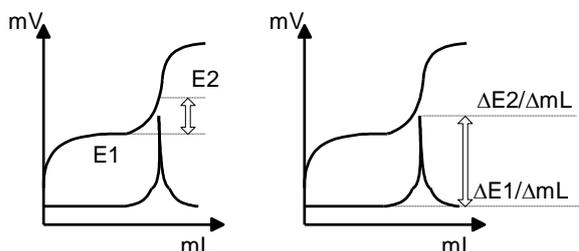
1. Method

[Gain]

Here you can select the sensitivity of detection signal. Typically, use '1' for this setting.

When potential change is too small to detect, increase the gain.

- 1 - 10

[EP Level]

Sets up the Ep Level of when there is no EP by EP Stop. It will automatically be entered when measuring buffer solution pH while a Multiple sample changer is in use.

- See Chapter "1-7-9. Input range for potential parameters" about the input range.

It should be noted that a titration will be carried out in the following way depending on the "EP Direction" of "Titration parameters"

- Positive   : In positive direction, when the initial potential level is higher than EP Level, [EP1] = 0mL.
- Negative   : In negative direction, when the initial potential level is lower than EP Level, [EP1] = 0mL.

Fig.1   Fig.2

[Data Sampling]

Here you can set the condition for data sampling. The data list will be made from measurement results under the following conditions on detection signal:

- Standard   : Sampling is made at 4.0mV sampling potential with 0.50 titration volume.
- Set   : You can set the data sampling potential and titration volume.
- Auto   : Potential is collected every time titrant is dosed. You can select this only when Titration mode is on "Auto Intermit" or "Intermit." Note, however, that when the titration mode is "Intermit" with cut off time of 0s, performance will be the same as that of "Standard" setting.

[Data sampling condition] - [Details]

Here you can select the sampling conditions. Press this button to display "Data sampling condition". This setting becomes valid when "Data sampling" is set to "Set".

Item	Description
[Data Sampling Pot.]	Here you can set potential variation for sampling detection signal. Select a narrower range (1-2 mV) when you want to increase the data density in the vicinity of an EP. Data sampling starts when potential deviation from previously sampled data exceeds a preset value. • 0.1 - 9999.9mV
[Data Sampling Vol.]	Here you can select titration volume for sampling detection signal. Select a narrower range (0.1-0.2mL) if potential change in the vicinity of inflection point is weak. Data sampling starts when volumetric deviation from previously sampled data exceeds preset volume. Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11. Settings of discharge amount of titrant" in this manual. • 0.0005 - 9999.0000mL

> **Note**
> When a too narrow range of data sampling in potential or titration volume is set, the sampled data may exceed the memory capacity (Max. 512 points), causing failure in drawing graphical curve or performing simulation. Thus, care should be taken of setting these parameters in consideration of maximum possible titration volume and potential variation.

[Control Speed Mode]

Choose your desired speed out of the following modes:
- Fast : For fast reaction like strong acid – strong base.
- Standard : For typical measurements like weak acid – weak base · strong acid – weak base.
- Slow : For slow reaction in dilute titrant (e.g. no more than 0.01mol/L).
- Set : Manually set the control speed.

1. Method

[Control Speed Mode] - [Details]
Here you can select the control speed mode.   Press this button to display "Control speed mode". This setting becomes valid when "Control speed mode" is set to "Set".

Note   For setting the control speed, see Chapter "1-7-6. Control speed mode."

[Other Control]
Here you can select the control speed mode. Press this button to display "Other control". Sets up potential to determine EP by EP Stop, etc.

Item	Description
[Titr. Over Volume]	Here you can set the titration volume for which amount the titration continues even after the last endpoint is detected. In the case where titration volume exceeds the preset volume when the last endpoint is found, the titration will be completed as over-titration. This feature will be effective when the titration form is "EP Stop". • 0.00 - 9999.00mL
[EP Area]	Here you can select EP area setting to set a range (titration volume, potential) in which EP's are possibly found. This setting will be useful to avoid the effect of noise or carbonated gas during titration. • Off : Disable for EP area setting. • On : Enable for EP area setting.
[Volume Range (Lower Limit)]	Here you can set the lower limit of titration volume in EP area. • 0.0000 - 9999.0000 mL
[Volume Range (Upper Limit)]	Here you can set the upper limit of titration volume in EP area. • 0.0000 ~ 9999.0000 mL
[Potential Range (Lower Limit)]	Here you can set the lower limit of potential in EP area. • See the Chapter "1-7-9 Input range for potential parameters" about the input range.

[Potential Range (Upper Limit)]	Here you can set the upper limit of potential in an EP range. • See the Chapter "1-7-9 Input range for potential parameters" about the input range. mV Upper Level Lower Level E1 mL Lower Volume Upper Volume
[Detection EP Level]	Here you can set the upper Level for detection EP. Set the "EP Direction" for titration parameters to either "Positive" or "Negative." If no EP is obtained until the Detection EP Level, EP by EP Level for Control parameter will be regarded as EP. • See the Chapter "1-7-9 Input range for potential parameters" about the input range.

[Stirrer Speed]

    Here you can select an initial stirrer speed for titration. You can select a speed appropriate for sample properties.
    • 0 - 9

⚠️ **Caution**	**Normally, set the stirrer speed at 4. When precipitation is anticipated during titration, set it at 6 to 8. Care should be taken not to allow the stirrer speed to be too high because the rotator bar may spin out of a beaker depending on the size of the bar, resulting in damages on electrodes.**

1-7-4.< **When titration mode and titration form are set to "Stat"** >

[Gain]

Here you can select the sensitivity of detection signal. Typically, use '1' for this setting.
When potential change is too small to detect, increase the gain.

- 1 - 10

[Cut-Off Time]

Here you can set a cut-off time for an intermittent dose. Continuous dose will be applied when

- 0 - 9999s

[Unit Volume]

Here you can set unit volume when the potential gets to the "Rel. Change Level."
This setting will be enable when [Cut-off time] = 0(s).
The corresponding speeds for control speed are as follows:
"1-7-11. Settings of discharge amount of titrant" in this manual.

- 0.0005 - 9999.000mL

[Dispense Speed]

Here you can set dispense speed after "Rel. Change Level." is reached.

- 1 - 999s/mL

[Rel. Change Level]

Here you can set Relative change level. Setting this level allows dose speed to alter.
"Rel. Change Level" is set as the potential level relative to "Stat Level".

- See the Chapter "1-7-9. Input range for potential parameters" about the input range.
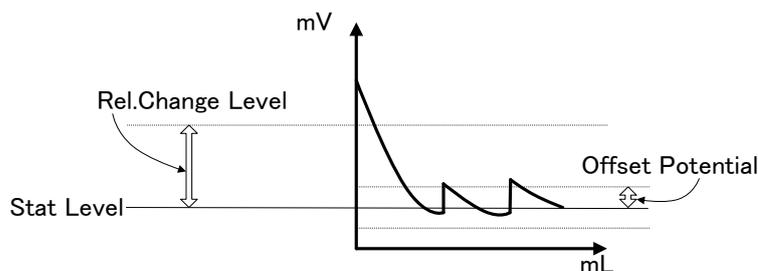
[Initial Dispense Speed]
Here you can select a dose speed until the potential reaches "Rel. Change Level."
- 1 - 9999s

[Lag Time]
Here you can select a data sampling lag time. The data (titration volume, potential, time) will be stored in the memory at preset intervals when Stat titration is performed.
- 1 - 9999s

[Stat Level]
The potential for Stat control can be set here.
- See the Chapter "1-7-9. Input range for potential parameters" about the input range.

[Limit Time]
Here you can set a time to limit titration. When titration time arrives at the preset time, a titration will be completed.
- 0 - 9999s

[Offset Potential]
Offset potential can be set here.
Dosing will stop when the potential falls within the offset potential even when there is a deviation between control potential and detection potential. "Offset Potential" is set as such potential level is relative to "Stat Level."
- See the Chapter "1-7-9. Input range for potential parameter" about the input range.

[Stirrer Speed]
Here you can select an initial stirrer speed for titration. You can select a speed appropriate for sample properties.
- 0 - 9

⚠ **Caution**	**Normally, set the stirrer speed at 4. When precipitation is anticipated during titration, set it at 6 to 8. Care should be taken not to allow the stirrer speed to be too high because the rotator bar may spin out of a beaker depending on the size of the bar, resulting in damages on electrodes.**

[Vol. Sampling Time] - [Details]
Here you can set dose volume sampling time (the time elapsed since Stat has started) used in the calculation formula where VT1 - VT5 can be applied. Pressing [Details] button will turn the screen display to "Vol. Sampling Time."

1. Method

Item	Description
[Vol. Sampling Time 1]	Here you can set a volume sampling time (time elapsed from starting Stat) used for VT1 in the calculation formula. • 0 - 99999s
[Vol. Sampling Time 2]	Here you can set a volume sampling time (time elapsed from starting Stat) used for VT2 in the calculation formula. • 0 - 99999s
[Vol. Sampling Time 3]	Here you can set a volume sampling time (time elapsed from starting Stat) used for VT3 in the calculation formula. • 0 - 99999s
[Vol. Sampling Time 4]	Here you can set a volume sampling time (time elapsed from starting Stat) used for VT4 in the calculation formula. • 0 - 99999s
[Vol. Sampling Time 5]	Here you can set a volume sampling time (time elapsed from starting Stat) used for VT5 in the calculation formula. • 0 - 99999s

1-7-5.< When titration mode and titration form are set to "Learn" >
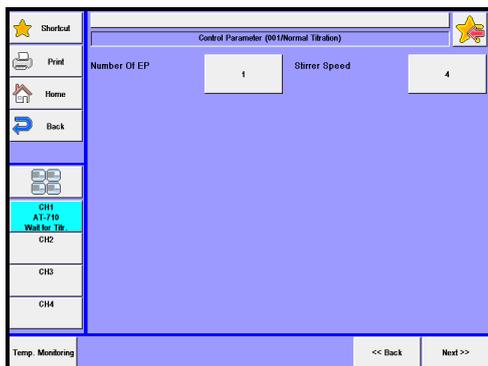
[End Point No.]

Here you can select a number of endpoints. Titration ends when the preset number of endpoints has been detected.

- 1 - 5

[Stirrer Speed]

Here you can select an initial stirrer speed for titration. You can select a speed appropriate for sample properties.

- 0 - 9

⚠ **Caution**	**Normally, set the stirrer speed at 4. When precipitation is anticipated during titration, set it at 6 to 8. Care should be taken not to allow the stirrer speed to be too high because the rotator bar may spin out of a beaker depending on the size of the bar, resulting in damages on electrodes.**

1-7-6. **Control speed mode**

Here you can manually set control speed mode.

〈When "Titration mode" is set to "Auto Intermit"〉
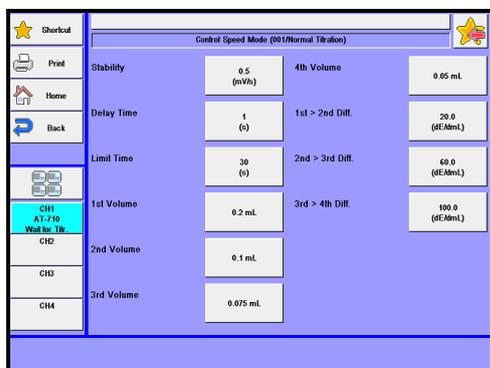
[Stability]

    Here you can select a stability level so that titrant can start to be dosed when the potential per unit time (1s) becomes lower than a preset level. The control speed mode corresponding to each stability is classified as follows:

      [Fast] = 10.0, [Standard] = 3.0 and [Slow] = 0.5

- 0.0 - 9999.9 mV/s

[Delay Time]

    Here you can set a delay time before stability is checked. For a slower reaction system, ordinarily set it at 0 to 30(s). The control speed mode corresponding to each delay time is classified as follows:

      [Fast] = 0, [Standard] = 0, [Slow] = 1.

- 0 - 9999s

[Limit Time]

    Here you can set a limit time for sensing the stability.   Titrant will be forced to be dosed even when the potential does not reach below a preset stability level. The control speed mode corresponding to each stability is classified as follows:

      [Fast] = 7, [Standard] = 15 and [Slow] = 30

- 0 - 9999s

[1st Volume]

    Here you can select dose volume of titrant until it reaches a first differential level for switching after titration starts. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 1/0.5/0.2/0.1/0.075/0.05/0.025/0.02/0.01/0.005/0.001/0.0005 mL

[2nd Volume]

    Here you can select dose volume of titrant until the potential reaches the second differential level for switching after getting to the first differential level. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 1/0.5/0.2/0.1/0.075/0.05/0.025/0.02/0.01/0.005/0.001/0.0005 mL

[3rd Volume]

Here you can select dose volume of titrant until the potential reaches a third differential level for switching after getting to the second differential level. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 1/0.5/0.2/0.1/0.075/0.05/0.025/0.02/0.01/0.005/0.001/0.0005 mL

[4th Volume]

Here you can select dose volume of titrant until the potential reaches a fourth differential level for switching after getting to the third differential level. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 1/0.5/0.2/0.1/0.075/0.05/0.025/0.02/0.01/0.005/0.001/0.0005 mL

Note
The minimum amount of [n volume] depends on the burette capacity.
Set at least 0.025mL for 50mL burette unit and 0.005mL for 20, 10 and 5mL burette units.
When less amount is set, the burette will identify its minimum capacity.

[1st >2nd Diff.]

Here you can set a differential level for switching a first titration volume to a second one. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 0.0 - 9999.9 dE/dmL

[2nd >3rd Diff.]

Here you can set a differential level for switching a second titration volume to a third one. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 0.0- 9999.9 dE/dmL

[3rd >4th Diff.]

Here you can set a differential level for switching a third titration volume to a fourth one. This setting will be unable when the auto intermit mode is set to "Blank" or "Micro."

- 0.0 - 9999.9 dE/dmL

1. Method

〈When Titration mode is set to "Auto titration"〉
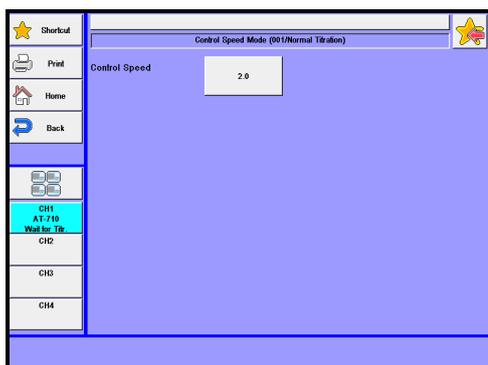
[Control Speed]

Here you can set a control speed. Control speed is determined by potential stability.
The lower (higher) value is set, the slower (faster) control speed is gained.
The speed corresponding to the setting is defined as follows:
 [Fast] = 4.0, [Standard] = 2.0 and [Slow] = 0.5
- 0.0 - 10.0

〈When titration mode is set to "Intermit"〉
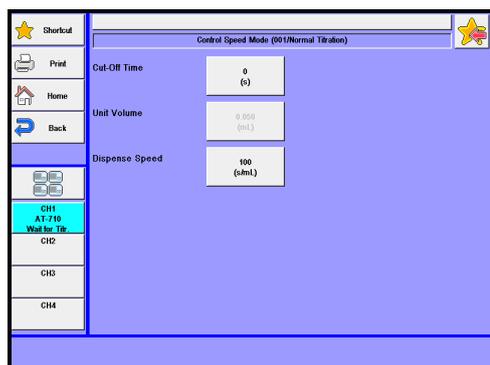
[Cut-Off Time]

Here you can set a cut-off time for an intermittent dose. Continuous dose will be applied when
[Cut-Off time] = 0. The corresponding speeds for control speed are as follows:
  [Fast] = 1, [Standard] = 5 and [Slow] = 10
* 0 - 9999s

[Unit Volume]

Here you can set unit volume. This setting will be enable when [Cut-off time] = 0(s). The corresponding speeds for control speed are as follows:
  [Fast] = 0.050, [Standard] = 0.020 and [Slow] = 0.010
Since the dischargeable amount of reagent depends on the installed burette, see the section
"1-7-11. Settings of discharge amount of titrant" in this manual.
* 0.0005 - 9999.000mL

[Dispense Speed]

Here you can set dispense speed. The corresponding speeds for control speed are as follows:
  [Fast] = [Standard] = [Slow] = 1
* 1 - 999s/mL

1. Method

〈When titration mode is "Petroleum Titr."〉
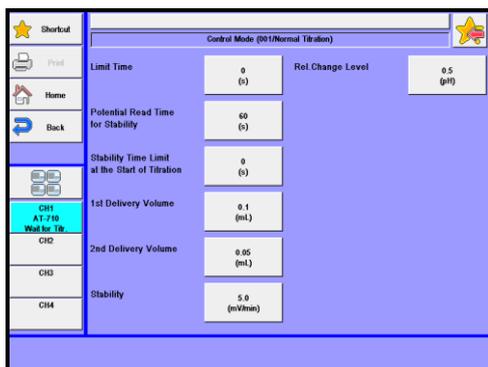
[Limit time]

Here you can set a limit time on sense stability. When the time exceeds a limit time, data will be forcefully sampled, followed by the start of dispensing titrant.

- 0 - 9999s

[Potential Read Time for Stability]

Here you can set the time to read potential of stability sense for petroleum products. When it is set at 60 seconds, for example, the stability is sensed on the potential change for 60 seconds, as specified in the standards like JIS K2501 and ASTM D664.

- 10 - 9999s

[Stability Time Limit at the Stat of Titration]

Here you can set the time to limit reading potential for stability sense at the start of titration.

When it is set at zero (0) second, there is no limit for that time.

- 0 - 9999s

[1st Delivery Volume]

Here you can set the first delivery volume. The set volume of titrant will be dosed when potential change after starting dosing is less than a set potential for Rel. change level.

- 0.05 - 0.20mL

[2nd Delivery Volume]

Here you can set the second delivery volume. The set volume of titrant will be dosed when potential change after starting dosing is more than a set potential for Rel. change level. Normally, set the second delivery volume as such it is less than the first delivery volume.

- 0.05 - 0.20mL

[Stability]

Here you can set the potential for stability sense potential. JIS K2501 and ASTM D664 describe it as 5.0(mV/min). Dosing starts when the potential change for one minute is less than 5.0mV.

Setting at least 60 seconds should be required by converting the value even when the time to read potential does not reach 60 seconds.

- 0.0 - 9999.9mV/min

[Rel. Change Level]

Here you can set the potential to change dose volume. When the potential change grows due to ongoing reaction and the potential after dosing titrant exceeds a preset value, one dose volume will be switched from the first dose volume to the second one.

- See the Chapter "1-7-9 Input range for potential parameters" about the input range.

1. Method

〈When titration mode is "Petroleum Titr.2"〉

[No.1 Intermit Time]
Set up cut-off time to change dose volume.
Titrant is dispensed (1st unit Volume) at 1st Disp. Speed at an interval of your choice.
Dose is made until reaching "Rel. Change Level."
- 1 - 9999s

[1st Delivery Volume]
Enter the first unit volume when the potential gets to the "Rel. Change Level."
- 0.0001 - 9999mL

[1st Dispense Speed]
Set up dispense speed of 1st unit volume.
- 1 - 9999s/mL

[No.2 Intermit Time]
Set up cut-off time between potential where dose volume is changed and end of titration.
Titrant is dispensed (2nd unit Volume) at 2nd Disp. Speed at an interval of your choice.
- 1 - 9999s

[2nd Delivery Volume]
Enter the second unit volume. This is the dose volume of after reaching "Rel. Change Level." Smaller value is usually set in 2nd delivery volume than in 1st delivery volume.
A data list is created with every dose of the titrant when Data Samp. Vol. is set to this 2nd delivery Volume.
- 0.0001-9999mL

[2nd Dispense Speed]
Set up dispense speed of 2nd unit volume.
- 1-9999s/mL

[Rel. Change Level]

Set up potential where dose volume is changed. Once it reaches set level (pH or mV), dose volume of intermittent titration will change from the 1st delivery volume to the 2nd delivery volume. When potential, where dose volume is changed, is already reached or exceeded at the start of titration, dose will be made at 2nd delivery volume if you specify the direction of titration parameters.

- See the Chapter "1-7-9 Input range for potential parameters" about the input range.

[Wait Time for Dispense After Change Level]

Set up time to wait until next titrant is dispensed after "Rel. Change Level."

- 0 - 9999s

[Stability]

Select stability judgment after dosing titration solvent (1st delivery Volume and 2nd delivery Volume).

- Off   : Performs intermittent titration with no stability judgment.
- Set   : After dosing titrant and waiting Cut-Off time, it is judged by every Potential Read Time for Stability to see if potential change is within Stability. Once within Stability, next titrant will be dispensed. Data sampling will automatically start and titrant will be dispensed if Limit Time of stability judgment is exceeded. Minimum titration dosing time for unit volume is total of Cut-Off Time plus Potential Read Time for Stability.

[Potential Read Time for Stability]

Set up readout time of potential for stability sense. This will be displayed when "Stability" is "Set."

- 10 - 9999s

[Stability]

Set up stability sense value. This will be displayed when "Stability" is "Set."

- 1 - 9999mV/min

[Limit Time]

Set up limit time (0−9999s) for stability sense.
0 (sec) means no limit time. This will be displayed when "Stability" is "Set."

- 0 - 9999s

1-7-7.[Temp. Monitoring]

In order to secure accuracy of titration or for safety reasons, dose of titrant will be aborted when temperature during titration exceeds the set temperature.

1   Press [Control parameter] button.
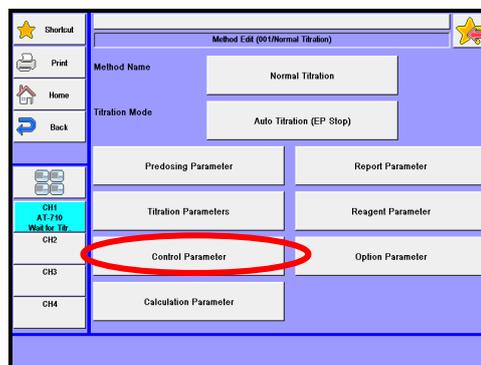
2   Press [Temp. Monitoring] button.
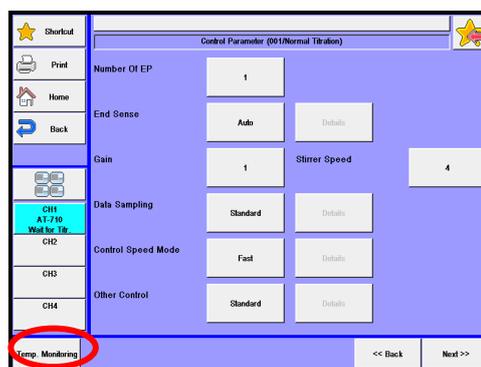
[Upper Limit Temperature Titration Stop]
You can set up temperature monitoring.
- Off   :Does not monitor temperature during titration.
- On   :Monitors temperature during titration.

[Upper Limit temperature to Stop Titration]
Set up the temperature upper limit at which you wish to abort titration. This will be displayed when "Upper Limit Temperature Titration Stop" is set to "On."
- 0 – 100 Deg.C

[Pause Off Temperature]
Set up the temperature at which you wish to resume titration. This will be displayed when "Upper Limit Temperature Titration Stop" is set to "On."
- 0 - 100 Deg.C

When the channel of your preamplifier does not have a connector for thermometer, connect the thermometer to channel 1 in order to use this function.

1-7-8. Initial values of Control parameters

Parameter	Setup range	Titration form and default				
		EP Stop	Full	Level Stop	Level.& EP	Intersect
Number of EP	1-5	1	—	—	—	—
	1-2	—	—	1	—	—
	1	—	—	—	1	—
	1-3	—	—	—	—	1
Auto Intermit Mode	Standard/Blank /Micro	Standard	Standard	—	—	—
	Standard/Blank			Standard	—	Standard
End Sense (Auto intermit mode-Blank)	Auto / Set	Set	Set	—	—	Set
(Other than blank)	Auto / Set	Auto	Auto	—	—	Auto
EP Sense Method (Potential)	0.0-99999.9dE	50.0	50.0	—	50.0	—
EP Sense Method (Differential)	0.0-99999.9dE /mL	100.0	100.0	—	100.0	—
1st End Level	*	—	—	0.0	0.0	—
2nd End Level	*	—	—	(0.0)	(0.0)	—
EP Stop Mode	Both / Positive/ Negative	—	—	—	—	Both
EP Sense Method (Angle)	0.0-180.0Deg.	—	—	—	—	30.0
Auto Simulation (Auto intermit mode-Blank)	Off / On	Off	Off	—	—	Off
(Other than blank)	Off / On	(On)	(On)	—	—	(On)
Gain	1-10	1	1	1	1	1
EP Level	*	—	—	—	0.0	—
Data Sampling	Standard / Set/Auto	Standard	Standard	Standard	Standard	Standard
Data Sampling Pot.	0.1-9999.9mV	(4.0)	(4.0)	(4.0)	(4.0)	(4.0)
Data Sampling Vol. (Auto intermit mode-Blank)	0.0005-9999.0 000mL	(0.1000)	(0.1000)	(0.1000)	(0.1000)	(0.1000)
(Other than blank)	0.0005-9999.0 000mL	(0.5000)	(0.5000)	(0.5000)	(0.5000)	(0.5000)
*1 Control Speed Mode						

*1 The titration mode will be set to 'Control mode' for "Petroleum Titr." and "Petroleum Titr.2". Settings on 'Control speed mode' or 'control mode' depend on the relevant titration mode. See the Chapters that follow.

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters".

1. Method

Parameter	Setup range	Titration form and default				
		EP Stop	Full	Level Stop	Level.&EP	Intersect
Other Control	Standard/Set	Standard	Standard	Standard	—	—
Titr.Over Volume	0.00-9999.00mL	(0.00)	—	(0.00)	0.00	—
EP Area	Off / On	Off	Off	—	Off	—
Volume Range (Lower Limit)	0.0000-9999.0000mL	(0.0000)	(0.0000)	—	(0.0000)	—
Volume Range (Upper Limit)	0.0000-9999.0000mL	(20.0000)	(20.0000)	—	(20.0000)	—
Potential Range (Lower Limit)	*	(-2400.0)	(-2400.0)	—	(-2400.0)	—
Potential Range (Upper Limit)	*	(2400.0)	(2400.0)	—	(2400.0)	—
Separation	Off / On	(Off)	—	—	—	—
Separation Level	*	(0.0)	—	—	—	—
Level Stop	Off / On	(Off)	—	—	—	—
End level	*	(0.0)	—	—	—	—
Direction EP Level	*	—	—	—	0.0	—
End Time	0-9999s	—	—	(0)	—	—
Stirrer speed	0-9	4	4	4	4	4
Upper Limit Temperature Titration Stop	Off / On	(Off)	(Off)	(Off)	(Off)	(Off)
Upper Limit temperature to Stop Titration	0-100Deg.	(50)	(50)	(50)	(50)	(50)
Pause Off Temperature	0-100 Deg.	(40)	(40)	(40)	(40)	(40)

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters".

< "Control speed mode" when <Titration mode> is 'Auto Intermit' >

Parameter	Setup range	Titration mode and default
		Auto Intermit
Control Speed Mode	Fast / Standard / Slow /Set	Standard
Stability	0.0-9999.9mV/s	(0.5)
Delay Time	0-9999s	(1)
Limit Time	0-9999s	(30)
1st Volume	1/0.5/0.2/0.1/	(0.2)
2nd Volume	0.075/0.05/0.025/	(0.1)
3rd Volume	0.02/0.01/0.005/	(0.075)
4th Volume	0.001/0.0005mL	(0.05)
1st＞2ndvDiff.		(20.0)
2nd＞3rd Diff.	0.0-9999.9dE/dmL	(60.0)
3rd＞4th Diff.		(100.0)

< "Control speed mode" when <Titration mode> is 'Auto Titration' >

Parameter	Setup range	Default
Control Speed Mode	Fast / Standard / Slow /Set	Standard
Control Speed	0.0-10.0	(2.0)

< "Control speed mode" when <Titration mode> is 'Intermit' >

Parameter	Setup range	Default
Control Speed Mode	Fast / Standard / Slow /Set	Standard
Cut-Off time	0-9999s	(0)
Unit Volume	0.0005-9999.0000mL	(0.0500)
Dispense Speed	1-999s/mL	(100)

< "Control mode" when <Titration mode> is 'Petroleum Titr.' >

Parameter	Setup range	Default
Control Mode	Standard / Set	Standard
Limit Time	0-9999s	(0)
Potential Read Time for Stability	10-9999s	(60)
Stability Time Limit at the Stat of Titration	0-9999s	(0)
1st Delivery Volume	0.05-0.20mL	(0.10)
2nd Delivery Volume	0.05-0.20mL	(0.05)
Stability	0.0-9999.9mV/min	(5.0)
Rel. Change Level	※	(30.0mV/0.5pH)

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters".

1. Method

< "Control mode" when <Titration mode> is 'Petroleum Titr.2' >

Parameter	Setup range	Default
Control Mode	Standard / Set	Standard
No.1 Intermit Time	1-9999s	(60)
1st Delivery Volume	0.0001-9999mL	(0.2)
1st Dispense Speed	1-9999s/mL	(1)
No.2 Intermit Time	1-9999s	(120)
2nd Delivery Volume	0.0001-9999mL	(0.05)
2nd Dispense Speed	1-9999s/mL	(1)
Rel. Change Level	※	(-150mV/9.5pH)
Wait Time for Dispense After Change Level	0-9999s	(60)
Stability	Off / On	(Off)
Potential Read Time for Stability	10-9999s	(60)
Stability	1-9999mV/min	(5)
Limit Time	0-9999s	(0)

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters".

< "Stat" is selected for 'Titration mode' and 'Titration form' >

Parameter	Setup range	Default
Gain	1-10	1
Cut-Off time	0-9999s	0
Unit Volume	0.0005-9999.0000mL	(0.0500)
Dispense Speed	1-999s/mL	100
Rel.Change Level	※	0
Initial Dispense Speed	1-999s/mL	50
Lag Time	1-9999	30
Stat Level	※	0.0
Limit Time	0-9999s	0
Offset Potential	※	0.0
Stirrer Speed	0-9	4
Vol.Sampling Time		
Vol. Sampling Time 1	0-9999s	0
Vol. Sampling Time 2	0-9999s	0
Vol. Sampling Time 3	0-9999s	0
Vol. Sampling Time 4	0-9999s	0
Vol. Sampling Time 5	0-9999s	0

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters".

< "Learn" is selected for 'Titration mode' and 'Titration form' >

Parameter	Setup range	Default
Number of EP	1-5	1
Stirrer Speed	0-9	4

< "COD" is selected for 'Titration mode' and 'Titration form' >

Parameter	Setup range	Default
Data Samp.Pot.	0.1-9999.9mV	1000.0
Data Samp.Vol.	0.0005-9999.0000mL	0.050
Rel.Change Level	0.0-9999.9mV	110.0
End Time	0-9999s	30
EP Level	-9999.9-9999.9mV	660.0
Initial Dispense Speed	1-999s/mL	50
Limit Time	0-9999s	240
Stirrer Speed	0-9	4

1-7-9. **Input range for potential parameters**

The input range for potential parameters depends on "Channel, Unit" of "Predosing parameter" or "Channel, Unit (For Control.)" of "titration parameter."

Table 1-7-9. Relation of Detector channel and unit with Potential parameters

Channel/unit	Input range	Potential unit	Differential unit
Ch1, mV Ch2, mV Ch3, mV	-9999.9 - 9999.9	mV	mV/mL
Ch1, pH Ch3, pH	-99.99 - 99.99	pH	pH/mL
Ch3, %T	-9999.9 - 9999.9	%T	%T/mL
Ch3, Abs.	-99.999 - 99.999	Abs.	Abs/mL
Ch3, uA	-999.99 - 999.99	μA	μA/mL
Ch3, 100uS	-9999.9 - 9999.9	100μS	100 μS/mL
Ch3, 1000uS	-99999 - 99999	1000μS	1000 μS/mL
Ch3, 10000uS	-99999 - 99999	10000μS	10000 μS/mL

1-7-10. **Normalized potential**

A normalized potential is a calculated potential for eliminating the difference in titration conditions on preamplifiers used. This parameter is utilized for control, data sampling, EP detection or the like. Sampled potential data will be actually converted according to the following table:

| Preamplifier	Unit	Actual potential range	Normalized potential range
STD	mV	-2,000 - 2,000 mV	-2,000 - +2,000 mV
TET	pH	-28 - 28 pH	-2,000 - +2,000 mV
PTA	%T	0 - 100 %T	0 - +1,000 mV
	Abs	0 - 1 Abs	0 - +1,000 mV
POT	µA	0 - 100 µA	0 - +1,000 mV
	mV	0 - 2,000 mV	0 - +1,000 mV
CMT	µS	0 - 100,1000,10000µS	0 - +1,000mV

1-7-11. Settings of discharge amount of titrant

The minimum discharge amount for the titrator depends on the capacity of the burette that is combined with the titrator.

| Type of burette unit (Capacity)	Minimum discharge amount
1mL	0.0005mL
5mL	0.0025mL
10mL	0.005mL
20mL	0.005mL
30mL	0.0075mL
50mL	0.025mL

1-8. Calculation Parameter

Equation for concentration calculation is set. Here you can freely set equations (Max. 5) for concentration calculation.

1   Press [Calculation Parameter] button.
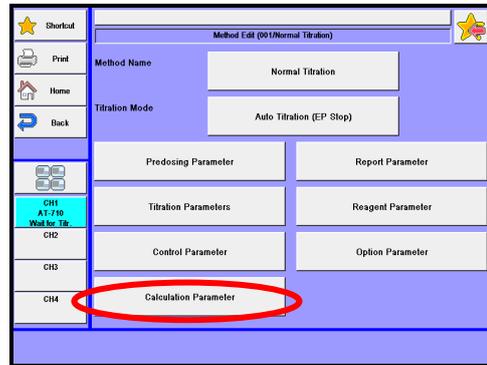
2   Please change the mode numbers and select the parameter you wish to edit.

    Each parameter is determined by the [OK] button.
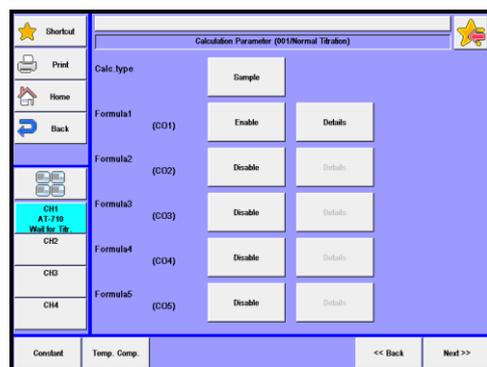
[Calc. Type]

Selection of calculation type:
- Sample : Set up a Method for sample measurement.
- Blank : Set up a Method for blank measurement.
- Factor : Set up a Method for factor measurement.
- Check : Set up a Method for check measurement with standard substance.

> **Note**
> When "Check" is chosen, the measurement results will be stored in memory as a check history.

[Formula1 (CO1)]

Here you can set a calculation formula 1.
- Disable : Disable formula 1
- Enable : Enable formula 1

[Formula1] - [Details]

Here you can set 'Formula 1' with this button to display "Formula" on the screen.
This setting will be valid when selecting "Enable" in the setting of Formula 1.

[Unit]

Enter a unit used for calculation. Max 10 characters can be set as unit.

[Formula]

Here you can set a calculation formula. You can directly input numeric numbers. You can use symbols such as [( ),[ ]] , symbols for four arithmetic operations and the coefficients shown in the tables '1-8-1-1' and '1-8-1-2' below. Example of calculation formula is shown in the table '1-8-1-3'. A maximum of 64 characters can be input in a calculation.
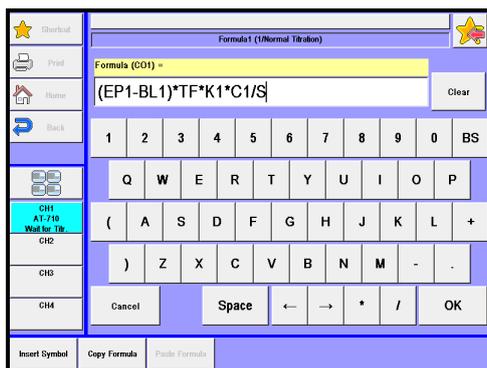
[Insert Symbol]

An available constant in the calculation can be selected.

[Copy Formula]

The current calculation is copied.

[Paste Formula]

Calculation copied on [Copy Formula] is pasted.

Table 1-8-1-1. Enabled symbols for calculation

EP1 - EP5	: Titration volume	TM	: Titrating time
CEP1 - CEP5	: Volume (Temp. comp.)	IP	: Initial potential
CO1 - CO5	: Concentration calculation	FP	: End potential
PK1 - PK5	: Acid dissociation constant	FCO1 - FCO5	: Latest concentration calculation
FV	: Final titration volume	FI	: Latest titration volume
EPN	: Number of EP		

Chart 1-8-1-2. Symbols

Symbol	Meaning	Reference chapter
TF	: Factor value of titrant	3-2
TN	: Titrant concentration	3-2
TMW	: Molecular weight of titrant	3-2
TEQN	: Equivalence of titrant	3-2
BL1 - BL10	: Blank value	3-5
S	: Sample size	2-1
S1	: Sample size 1	2-1
S2	: Sample size 2	2-1
SMW	: Molecular weight of sample	2-1
SEQN	: Equivalence of sample	2-1
PD1 - PD10	: Pre-dosed volume	1-5
DV	: Dosed volume	1-6
VT1 - VT5	: Volume sampling time	1-7-4
C1 - C5	: Concentration conversion factor	1-8
R	: Purity, dilution factor	1-8
K1 - K5	: Unit conversion factor	1-8
FA	: Local factor	1-8
BFS	: Buffer solution potential	

Table 1-8-1-3. Example of calculation formula

Calculation Type		Example of calculation formula
Sample	Normal titration	$(EP_n - BL_n) \times TF \times C_n \times K_n / S$ $(EP_n - EP_{n-1}) \times TF \times C_n \times K_n / S$
	Back titration	$(BL_n - EP_n) \times TF \times C_n \times K_n / S$
	Hydroxyl value	$((EP_n - BL_n) \times TF \times C_n \times K_n + S \times K_{n+1}) / ((EP_n - BL_n) \times TF \times C_n \times K_{n+2} + S \times K_{n+3}) + R$
	Acid dissociation constant	PKn The acid dissociation constant is defined as follows. $$pKa = pH - \log \frac{[B]}{[HB^+]}$$ $$BH^+ \rightleftharpoons B + H^+$$ From this Eq., [B]=[HB+], that is, half neutralized pH shows pKa. More precisely, approximately $[B] = [HB^+]$ at half equivalent point, however, due to little error at pKa3-11, the pH at half equivalent point is regarded as pKa.
Factor	Factor	Normal titration $\quad (S \times R \times K_n) / ((EP_n - BL_n) \times C_n)$ Back titration $\qquad (S \times R \times K_n) / ((BL_n - EP_n) \times C_n)$

1. Method

[EP No.]

Here you can set the EP position to carry out computation:
- EP1   : Calculate at EP1.
- EP2   : Calculate at EP2.
- EP3   : Calculate at EP3.
- EP4   : Calculate at EP4.
- EP5   : Calculate at EP5.

[Decimal]

Enter a number of digits after decimal point for calculation results:
- 0 ~ 8 place

[Fraction]

Selection of fraction rounding in calculation:
- Round off   : Rounded down to nearest preset number of digits after decimal point
- Round   : Rounded to nearest preset number of digits after decimal point
- Round up   : Rounded up to nearest preset number of digits after decimal point

[Blank Replace No.]

Set the blank replace number. This setting takes effect when "Calc. type" of calculation parameters is set to "Blank."
- 1 - 99

[Evaluation]

The measurement results will be evaluated by this function:
- Off   : Not evaluated.
- On   : The measurement results are evaluated.

[Standard value]

Enter a standard value to make the evaluation in the following range.   This setting will take effect when "Evaluation" is set to "On".
- 0.00000000 - 99999.99999999

[Acceptance Range]

Enter permit error to determine if the calculation result is off the range against the standard value.
This setting will take effect when "Evaluation" is set to "On."
- 0.00000000 - 99999.99999999

[Formula 2 (CO2)], [Formula 3 (CO3)], [Formula 4 (CO4)], [Formula 5 (CO5)]

These formulas can be set in the same way (settings) as Formula 1 (COM1). This setting will be unable when the "Calc. type" is set to "Factor" or "Check".

[Constant] button

Here you can set constants Concentration conversion coefficient, Unit conversion coefficient or the like used in a Concentration calculation formula.
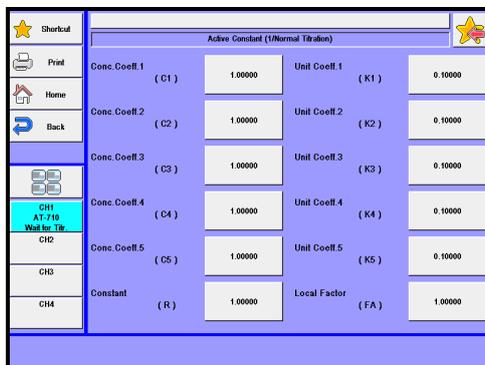
[Conc. Coeff. 1(CO1)]

Enter a concentration conversion coefficient for a measured sample.

For example, when NaOH is titrated with 1mol/L-HCl, the reaction is expressed as:

HCL + NaOH $\rightarrow$ NaCl + H2O

Since this reaction proceeds on 1-to-1 equivalence, 40.00mg of NaOH (Mw=40.00) is consumed per 1mL of 1mol/L-HCl.   Accordingly, C1 becomes 40.00mg/mL.

- 0.00000 - 99999.99999

[Conc. Coeff. 2], [Conc. Coeff. 3], [Conc. Coeff. 4], [Conc. Coeff. 5]

Same definition as for [Conc. Coeff. 1].

[Constant (R)]

Here you can set a constant of purity or dilution factor.

- 0.00000 - 99999.99999

[Unit Coeff. 1 (K1)]

Here you can set a unit conversion coefficient to convert a unit to like percent (%) or ppm.

For example, when NaOH is titrated with 1mol/L-HCl and the result is expressed in %, the calculation equation will be:

NaOH (%) = (EP1 $-$ BL1) $\times$ TF $\times$ C1 $\times$ K1 / S

Here, when EP1=10(mL), BL1=0.02(mL), TF=1.006, C1=40.00(mg/mL) and S=5.0000(g), K1 should be 0.1 $-$ becomes 1000 when expressed in ppm.

- 0.00000 - 99999.99999

[Unit Coeff. 2(K2)], [Unit Coeff. 3(K3)], [Unit Coeff. 4(K4)], [Unit Coeff. 5(K5)]

Same definition as for [Unit Coeff. 1(K1)].

1. Method

[Local Factor (FA)]

Here you can set a factor for the method, which is different from a factor (TF) set on reagent information:

- 0.00000 - 99999.99999

[Temp. Comp.] button

Here you can set "Temperature compensation function" for titrant.
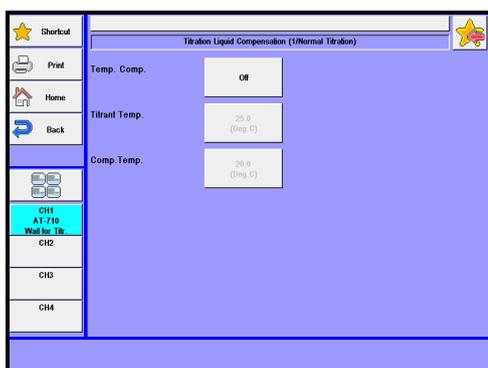
[Temp. Comp.]

Here you can select a method for titrant temperature compensation from:

- Off   : No compensation.
- Fixed   : Manual compensation.
- Auto   : Automatic compensation with the optional sensor for titrant temperature compensation.

[Titrant Temp.]

Here you can set titrant temperature when "Temp.comp." is set to "Fixed".

- 0.0 - 100.0 Dig.C

[Comp. Temp.]

Here you can set titrant compensation temperature when "Temp.comp." is set to either "Fixed" or "Auto."

- 0.0 - 100.0 Dig.C

< About Temperature compensation for titrant >

Titration volume needs to be corrected when organic solvent like Acetic acid, Dioxane or Ethanol is used for titrant. Normally, titrant is used at the temperature in factor calibration, however, when titrant temperature differs by more than $\pm 3°C$ compared with that in standardization, the volume titrated needs to be corrected:

Liquid temperature compensation formula:

$$V = V_0 \times (1 + A \times \Delta T \times 10^{-3} + B \times \Delta T^2 \times 10^{-6})$$

V : Compensated volume

V_0 : Titration volume

ΔT : (Compensated temperature − Titrant temperature)

Note For Temp. Comp. coeff. A and B, refer to "3-2-1. [Edit]-［Reagent information]."

# 1-9. Report Parameter

Settings for printing contents.

1   Press [Report Parameter] button.
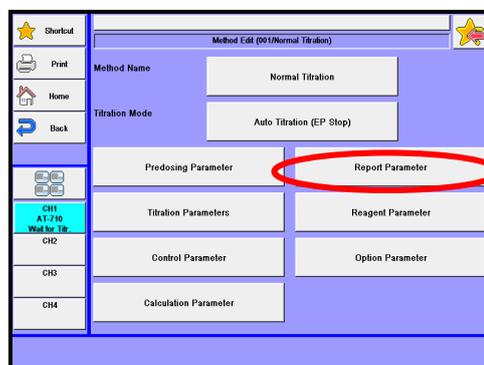
2   Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.
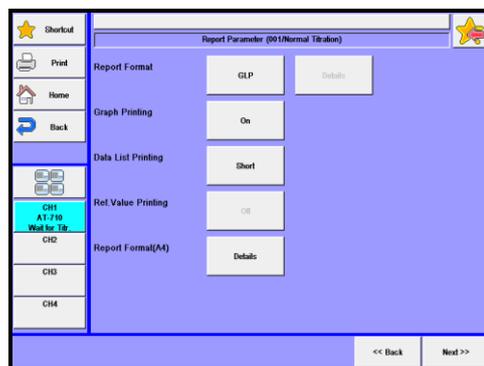
[Report format]

Selection of print format:
- Off : No printout.
- GLP : Prints all of measurement parameters and results.
- Standard : Prints sample number, measurement date, sample size, measurement results and titration time.
- Setting : You can choose from printing items from [Details] button when pressed.

[Report format] - [Details]

The display "Report format" appears where you can select those items you want to print out.
This buttons works only when the above "Setting" for report format is chosen.

＜Print contents＞

Item	Print format			
	Off	Standard	GLP	Setting
Model/Serial No.		Off		On/Off
Method Name		On		On/Off
Mode/Form		On		On/Off
Sample No.		On		On/Off
Sample Name		Off		On/Off
Sample ID		On		On/Off
Titration Date		On		On/Off
Reagent Name		On		On/Off
Titration Parameters		Off		On/Off
Control Parameter		Off		On/Off
Calculation Parameter		Off		On/Off
Reagent Constant		Off		On/Off
Blank	Off	Off	On	On/Off
Predose Result		Off		On/Off
Initial Information		Off		On/Off
Final Information		Off		On/Off
Dose Volume		Off		On/Off
Final Volume		Off		On/Off
Titration Time		On		On/Off
Sample Size		On		On/Off
Sample Constant		Off		On/Off
EP Data		On		On/Off
Conc.		On		On/Off
Operator		Off		On/Off
Print Date		On		On/Off

> **Note** For meanings of parameter name, report format and setup contents, refer to Parameter List at the end of this manual.

1. Method

< Graph >

```
Level(ctrl.)  [mV]        ←Unit of X axis
-300            300        ←Range of X axis
0 mL
```

Titration curve

<Data List>

Titration volume
Actual potential
Status
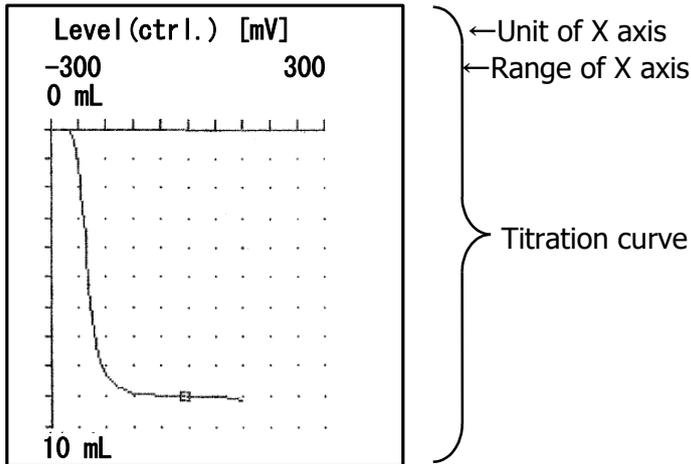
```
<Data List>
No.  Volume   Potential
     [mL]    [mV    ] St
 1   0.0000  - 40.0    0
 2   0.4300  -192.2    0
 3   0.4600  -196.3    0
 4   0.7950  -200.3    0
 5   1.1450  -204.4    0
 6   1.4750  -208.4    0
 7   1.8200  -212.9    0
 8   2.2000  -217.1    0
 9   2.5800  -221.3    0
10   2.9600  -225.1    0
11   3.4600  -100.0    0
12   3.5700     1.3    3
13   3.6400   228.8    0
14   3.8000   224.9    0
```

- Meaning of status -

1 : This status number means the max inflection point is not determined to be the EP since it is out of the preset range both in titration volume and potential.

2 : This status appears when the max inflection point has been found somewhere a little further than the inflection point that was first found. The status is labeled with 3, 6 or 7 in this case.

3 : The max inflection point satisfying the End Sense (dE) and End Sense (dE/dmL) is found, and its measurement results will be then printed out.

4 : When a max inflection point is not detected as EP with a titration in the set direction on the titration parameter.

6 : When a max inflection point is not detected as EP since the End Sense (dE) value is less than a preset End Sense (dE).

7 : When a max inflection point is not detected as EP since the End Sense (dE/dmL) value is less than a preset End Sense (dE/dmL).

```
18   5.3800   212.9    0
19   5.7600   208.6    0
20   6.1150   204.4    2
21   6.4700   200.2    0
22   6.8300   195.9    0
23   7.1600   191.5    0

    [dE]      [dE/dmL]  St
No. 12
1.660E+0024.910E+002   3

    Data count : 23
```

EP determined value

Total number of data

Note

Data list will save all measurement results.

\<Example of printing measurement results: GLP form>

Model : **AT-710(MCU-710)**	←Model	**[Titr.constant]**	
Serial No. : **193xxxxx**	←Serial No.	**TF : 1.00000**	←Reagent Constant
Print: 2014/09/01 10:00	←Print Date	**[Blank list]**	
		Blank1 : 0.00000	←Blank
*** R e s u l t ***			←（Dose result）
Method No./Name :	←Method	**Init.temp. : 26.0 ℃**	Initial
001/Auto Titration	Name	**Init.level : -784.8 mV**	Information
		Last Temp. : 25.8 ℃	Final
Titr.mode : Auto Titr.	←Mode	**Last Level : 1427.6 mV**	Information
Titr.form : EP Stop	←Form	**Dose.Vol. : 0.0000 mL**	←Dose Volume
Sample No. : 01-01	←Sample No.	**Last.Vol. : 8.1870 mL**	←Final Volume
Sample name:	←Sample Name	**Titr.Time : 00:04:30**	←Titration Time
Sample ID :19990801	←Sample ID	**Size : 5.1647 g**	←Sample Size For Balance
Date :2014/09/01 09:50	←Titration Date		input, "*" printed
Titr.Reagent Name :	←Reagent Name	**SMW : 1.0000**	Sample
		SEQN : 1.0000	Constant
[Titration parameter]			
Burette No.:1		**End Point 1**	
Max volume :20.0000 mL	Titration	**Volume : 8.1176 mL**	EP Data
** :**	Parameters	**Potential: 1.3mV**	
Dose mode : None			
[Control parameter]		**Conc1 : 33.895 %**	←Conc.
End Point No. : 1	Control		
** :**	Parameter		←（Evaluation）
Stir. Speed : 4			←Message
[Calculation parameter]		**Operator :Kyoto Taro**	←Operator
Calc. Type : Sample			
CO1 : On			
** :**			
CO5 : Off	Calculation		
Active constant	Parameter		
C1 : 40.00000			
K1 : 0.10000			
Temp.Comp. : Off			

1. Method

[Graph Printing]
Selection of graphic print together with measurement results when they are printed out.
Graphic printout is significant when it is set in "Graph" on "Function".
- Off   : No printout of graph
- On   : Printout of graph

[Date List printing]
Selection of printout of the data list, which is significant with the "Data Sampling "of "Control Parameter."
- Off   : No printout of data list.
- Short   : Prints the endpoint, data number, potential difference and differential difference.
- All   : Prints Data list and Short form.

[Rel. Value Printing]
Data list of Channel for Reference will be included in the printout of measurement results. Data list will be created during the "Data Sampling "of "Control Parameter."
"Rel. Value Printing" will be available when "All" is selected on "Date List printing."
- Off   :Does not print out data list of Channel for Reference.
- On   :Prints out data list of Channel for Reference.

[Report format (A4)]
Selection of print format of the A4 printer.

[Report format (A4)] - [Details]
The display "Report format (A4)" appears where you can select those items you wish to print out.
＜Item＞

Titration Results	: On/Off
Formula/Constant	: On/Off
Data List	: On/Off
End Sense	: On/Off

1-10. **Reagent Parameter**

Select a burette to be used in titration and fixed dose.

---

1 Press [Reagent Parameter] button.
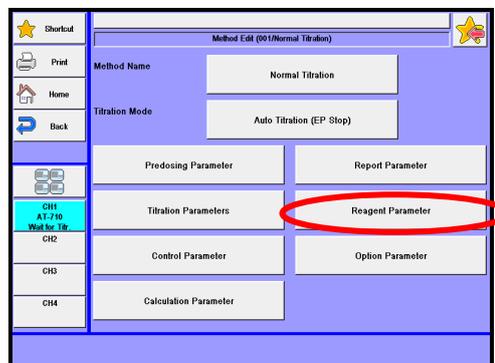
2 Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.
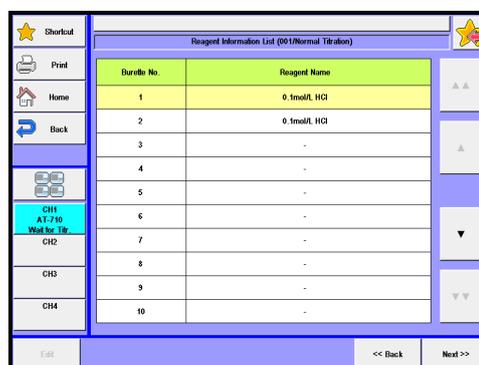
[Burette No.]
Display burette number where the reagent information is to be stored.

[Reagent Name]
Display reagent name registered in reagent information on the numbered burette. For the burette numbers not in use under the current method, "-" will be displayed in the reagent name column.

[▲], [▼]
You can move the cursor on the list of reagent parameters.

[Edit]
Here you can select the reagent information for the numbered burette. Put the cursor on the burette number set in reagent parameters and press this button to have "Reagent" screen display. Now, you can select the desired reagent information among from No.1 to No. 20 that has been preset on "Function"–"Reagent Information."

Notre When "Smart Burette Functionality" of Function-Other Settings is "Enable," information of set burette No. will automatically be displayed.

1-11. **Option Parameter**

The option parameter is necessary for user sequence when a multiple sample changer is used.

---

1   Press [Option Parameter] button.
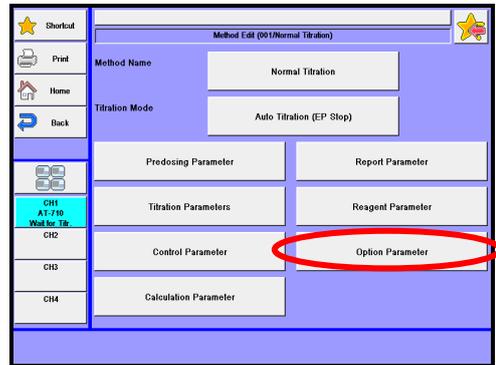
2   Please change the mode numbers and select the parameter you wish to edit.

       Each parameter is determined by the [OK] button.
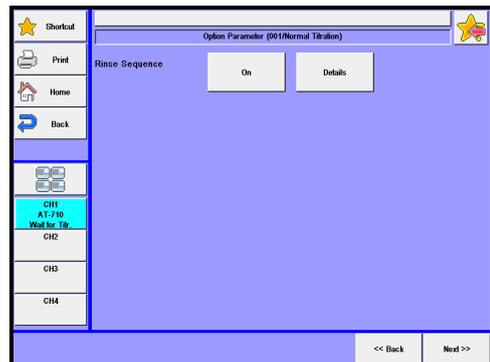
[Rinse Sequence]

Here you can set the user sequence for a sampler changer. The setup of operation time of user sequence comes from the information preset on "Function"–"Changer setup".

- Off   : Rinse sequence is not in use.
- On   : Rinse sequence is in use.

[Rinse sequence] - [Details]

Press this button to display "Rinse Sequence Setup" screen where you can set up details of Rinse sequence. This button will be enabled only when selecting "On" in the above setting for "Rinse Sequence".

Here you can set the operational sequence for a sampler changer in the user sequence.

Up to 20 commands can be preset in this setting.
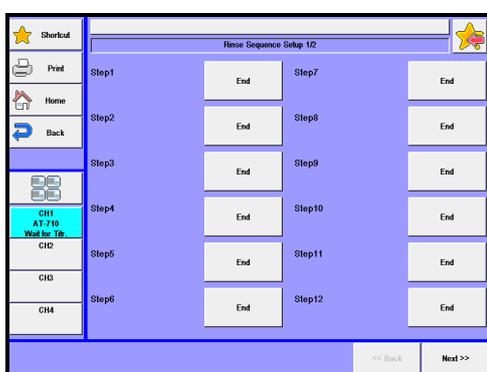
[Step 1]

Here you can select the operation for the first step of a user sequence:

- End   : End of sequence.
- Shower   : Rinse by showering in a rinse pot.
- Rinse   : Rinse solvent is dispensed in the rinse pot. Rinse time can be set on "Rinse time."
- Drain 1   : Drain rinse solvent used for shower rinsing. Drain time can be set on "Drain time 1."
- Drain 2   : Forcefully drain rinse solvent after shower rinsing with the optional drain pump. Drain time can be set on "Drain time 2."
- Wait   : Dip an electrode in the rinse pot. Can be used for depolarizing an electrode after a non-aqueous titration.
- W.Stir.On   : The stirrer at the rinse position is turned on.
- W.Stir.Off   : The stirrer at the rinse position is turned off.
- T.Stir.On   : The stirrer at the titration position is turned on.
- T.Stir.Off   : The stirrer at the titration position is turned off.

[Step 2] - [Step 20]

Here you can select commands for the second up to 20th step.
The command for the last step should be always "End."

	About the setup of operation time for each command, see the Chapter "2-4-5. [Changer Setup]."
Note	

	User sequence is the user-defined sequence. It is user's responsibility for measurement results if affected by your settings. Maker will not be liable for any unexpected results by such.
⚠ Caution	• **Example 1: Prolonged measurement time due to unstable potential, originated by insufficient regeneration time for the electrode after non-aqueous titration.** • **Example 2: Shortened time length for Drain 1 and 2 for separated draining causes the liquids mixed together with generation of unexpected gas.**

1-12. **[Combined]**

You can combine up to 5 methods out of Method No.1 to 120. Such method is called Combined Method, which is to be filed on any Method No. 121 through 130. The combined method can be used when more than one titration are performed for single sample.

1 Press [Combined] button.
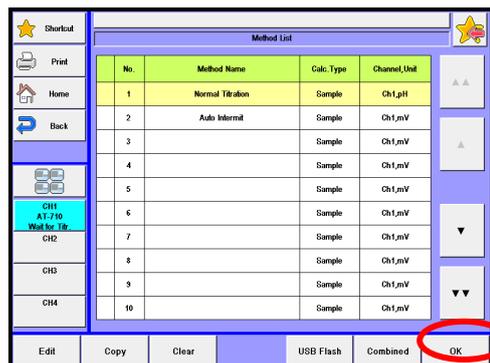
2 Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.
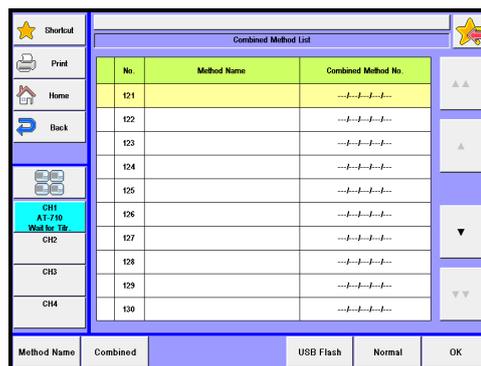
[▲], [▼]
You can move the cursor on the list.

[Method Name]
Here you can type a method name. Up to 20 characters can be used.

[Combined]
When "Edit combined Method" display appears, you can combine the methods with the Combined method where the cursor stays on.

[USB Flash]
Save the method data into USB flash drive. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive. For the details on how to save methods into USB flash drive, see the section, "1-1-3. [USB Flash] (Method conditions)."

1. Method

[Normal]
Return to the normal method list.

[OK]
You can change the combined method of use to measure. Select the method with [▲] or [▼] key and press [OK] button.

<Edit Combined Method>
Press [Method] – [Combined] – [Combined] button to display "Combined method edit" dialog box, where combined methods are displayed. "Combined method edit" screen display shows the connected methods, their conditions and the group number "G.No." for combined titrations.   When Titration parameters ("Burette No.", "Channel, Unit (For Control.)", "Control parameter" and "Gain") on combined methods are all the same, the same "G. No." will be assigned. The results with the same "G.No." number will be output on the same graph.

[▲], [▼]
You can move the cursor on the list across the screen.

[Edit]
You can change the method where the cursor is sitting over.

[Condition copy]
The current method is copied.

[Condition paste]
Method copied on [Condition copy] is copied to the method at the cursor.

[Clear]
Method at the cursor is deleted from Combined Method.

<Configure a combined method>

1 Press [Reset] button.
Confirm the message reads as "Wait for Titr.."
Press [Method] button.
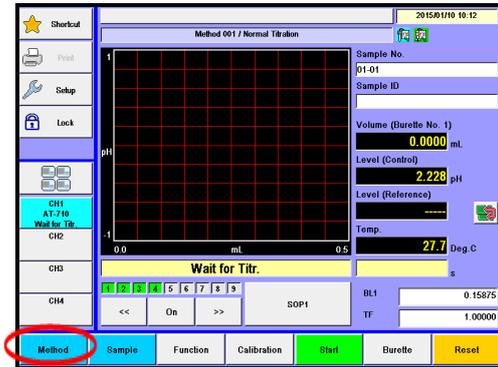
2 "Method List" dialog box appears.
With [▲], [▼], [▲▲], [▼▼] buttons, select the methods to combine from Method No. 01 to 120. (When the method is already a combined method, press [Normal] button on "Combined Method List."
Press [Edit] button.
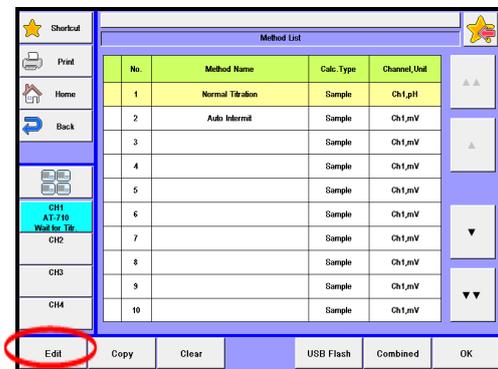
3 Here you configure parameters for measurement and control. If it is the first combined method, also configure parameters for calculation and print.
Press [Back] button.
Likewise as in step 1 to 2, configure all parameters for measurement and control used in combined methods.
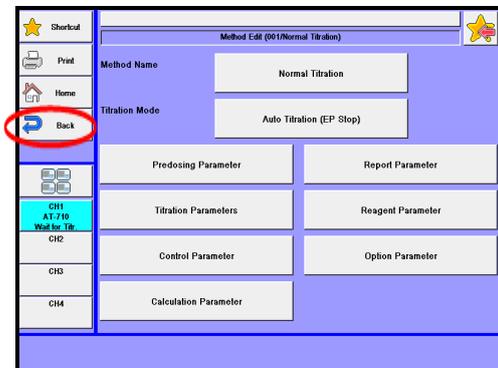
4 Press [Combined] button.
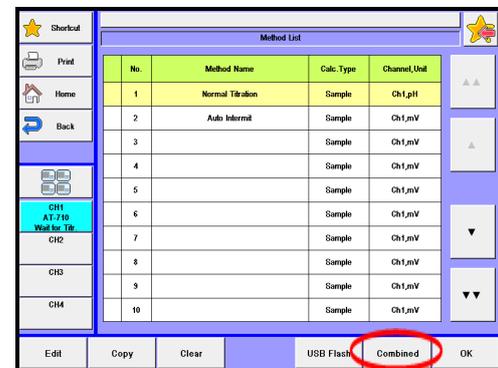
5 Here you see the dialog box "Combined Method List."
Select the methods to combine Method No. 121 to 130.
Press [Method Name] button.
Enter the name of the method, please press the [OK] button.

Press [Combined] button.

6 Here you see the dialog box "Combined Method Edit."
Select the No.1 method to [▼] button [▲].Press [Edit] button.

7 Press [Method] button. Select method (No. 1 to 120) you wish to use with the set Combined measurement, and press [OK].

8 Set up Branch, etc.

[Method]

Select method No. you wish to use.

- 1 - 120

[Branch]

Set up a branch condition for the next method.

- Off : Perform measurement of the next method without setting up a branch condition.
- On : Set up a branch condition.
- Exit : Finish with the current measurement regardless of setup of combined conditions.

[Condition1]

Set up a branch condition. When a branch condition is fulfilled, operation with the conditions set at "True" will follow. When a branch condition is not fulfilled, operation with the conditions set at "False" will follow. This will be displayed when it is set to "On" on "Branch." Refer to Table 1-12-1 for constants that can be set up in conditions.

Table 1-12-1 Enabled symbols

EP1-EP5	: Titration volume	FV	: Final titration volume
EPN	: Number of EP	TM	: Titrating time
CEP1-CEP5	: Volume (Temp. comp.)	IP	: Initial potential
CO1-CO5	: Concentration calculation	FP	: End potential
PK1-PK5	: Acid dissociation constant		

[Additional Conditions]

Set up the second branch condition.

- None : Does not set up the second branch condition.
- And : When the first branch condition and second one are both fulfilled, operation with the conditions set at "True" will follow.
- Or : When either one of the first branch condition or the second one is fulfilled, operation with the conditions set at "False" will follow.

[Condition 2]

Set up a branch condition. When a branch condition is fulfilled, operation with the conditions set at "True" will follow. When a branch condition is not fulfilled, operation with the conditions set at "False" will follow. This will be displayed when it is set to "And" or "Or" on "Additional Conditions. Refer to Table 1-12-1 for constants that can be set up in conditions.

[True]

Set up operation for the case where a branch condition is established.

- Exit : Finish measurement.
- 2nd : Operates on the second method set in the combined method.
- 3rd : Operates on the third method set in the combined method.
- 4th : Operates on the fourth method set in the combined method.
- 5th : Operates on the fifth method set in the combined method.

> **Note** Methods prior to the current one cannot be set up in the operating condition.

[False]
   Set up operation for the case where a branch condition is not established.
   - Exit : Finish measurement.
   - 2nd : Operates on the second method set in the combined method.
   - 3rd : Operates on the third method set in the combined method.
   - 4th : Operates on the fourth method set in the combined method.
   - 5th : Operates on the fifth method set in the combined method.

> **Note** Methods prior to the current one cannot be set up in the operating condition.

---

9   Likewise, you can set up 5 methods in succession.
   Press [Back] button.

10 Press [OK] button to switch it to the configured combined method. It will return to Main display and to the combined method.

> **Note** Combined titration does not apply to those methods like "Learn" titration mode.

2. Sample

2-1. Sample Settings

Setting for the sample parameters.

1   Press [Sample] button.

2   Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.

Item	Description
[Sample No.]	Here you select a number for the sample. The numbers consist of High order number and Low order number, and the samples when grouped are numbered with High order number. Lower number represents individual sample identification. • 00 - 99
[Sample Name]	Here each sample can be named with characters up to 20 letters.
[Sample ID]	The samples can be identified with ID or Lot number with up to 20 characters.
[Sample Unit]	Here enter the unit of sample weight. Up to 10 characters can be entered.
[Size (S1)]	Input "Tare + Sample weight". • -99999.99999999 - 99999.99999999g
[Size (S2)]	Input Tare weight after injecting a sample. • -99999.99999999 - 99999.99999999g
[Balance]	Here you can enter the weight direct from an electronic balance.
[Constant]	Here see the display for sample constant where you configure those constants like reagent molecular weight and equivalent number particular to the sample. Those constant numbers can be used for SMW and SEQN constants as calculation parameter in Method. For details of sample constant, refer to the Section "1-8. Calculation parameter."
[How to Set UP Sample]	You define sample settings. For details of sample setting, refer to the Section 2-2.
[Sample Mode]	You define sample mode. For details of sample mode, refer to the Section 2-3.
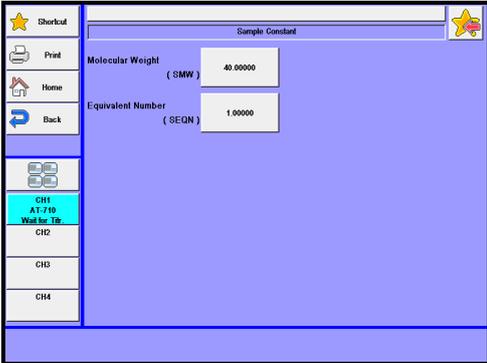
> **Note** The number of digits for SIZE differs depending on the sample size preset on [Function] – [Decimal Edit].

< Sample setup after titration starts >
While titrating, press [Sample] button to display the screen display as shown
below and make the entry of sample setup. After entering necessary setup
parameters, press [Exit] button.

2-2. **Sample setting method**

Settings for sample settings.

---

1   Press [Sample] button.
    Press [How to Set UP Sample] button on
    "Sample Setting."

---

2   The screen on the right will appear.

    Select and edit the item you wish to edit.

    Each parameter is determined by the
    [OK] button.

Item	Description
[Sample Before Input]	Here you select sampling mode before titration; • Off　　　　: Titration starts with [Start] button. • On　　　　: "Sample settings" display appears with [Start] button. 　　　　　　　On "Sample Setting", you enter the sample name and ID, sample size, etc.
[Weight After Input]	Here you select sample size entry mode after titration is over: • Off　　　　: Water content is calculated and displayed for the sample size currently defined. • On　　　　: After measurement is over, "Sample settings" display appears. • Auto　　　: After titration is started, it automatically determines if sample size is entered, and if not, the display for sample size entry appears. In the case of sample file mode, it is automatically judged whether a sample has been put between the time after the power was turned on and the time when a titration is completed.
[Size Input Mode]	Select entry method for sample quantity. The unit determines whether the sample quantity is already input or not. • Size 1　　: Entry of Size 1 reads as the sample quantity is already input. • Size 1, 2　: Entry of both Size 1 and Size 2 reads as the sample quantity is already input.

2-3. **Sample Mode**

Settings for sample mode.

| 1 | Press [Sample] button.
Press [Sample Mode] button on "Sample Setting." | |

| 2 | The screen on the right will appear.
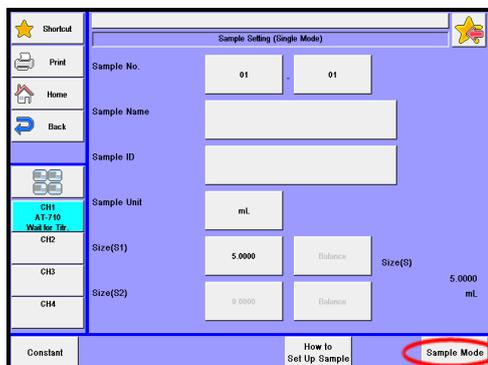
Select Sample Mode.

Each parameter is determined by the [OK] button. | |
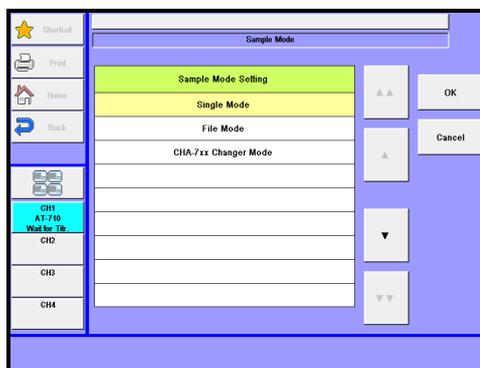
Item	Description
Single Mode	Sample setting display works to Single sample measurement. For details of sample mode, refer to the Section 2-1.
File Mode	Sample setting display works to Sample file mode. This mode is useful when multiple sample changer CHA-600 is connected and when you wish to preset sample parameters in advance. For details of file mode, refer to the Section 2-4.
CHA-7XX Changer Mode	Sample setting display works to Changer mode. This mode is useful when multiple sample changer CHA-7XX is connected. For details of changer mode, refer to the Section 2-5.

2-4. **Sample File Mode**

This mode is useful when multiple sample changer is connected and when you wish to preset sample parameters in advance. To use this mode, select "File Mode" for sample file on Sample Setup in Sample.

Set Sample File Mode.

1 Press [Sample] button.
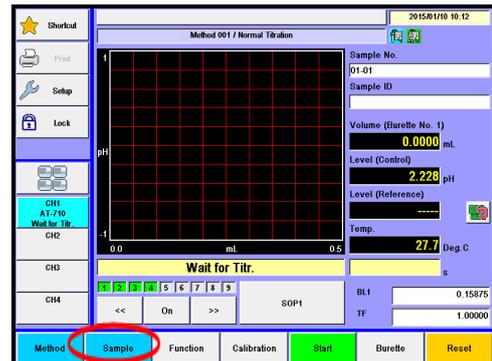
2 Press [Sample Mode] button.
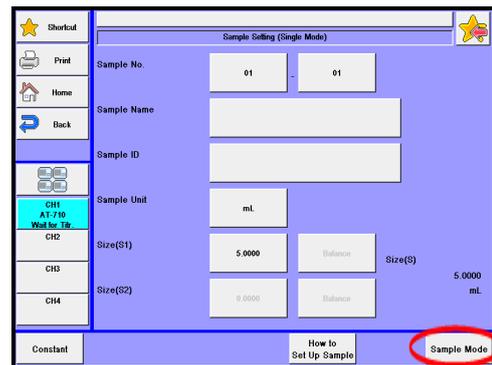
3 Select "File Mode."
Press [OK] button.
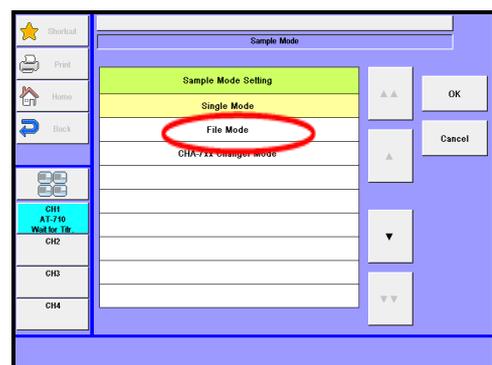
Outline of Sample File

The sample file consists of the following elements shown in the below chart.

Example: When you set the number of samples to 99, and 5 for the next measurement number:

No.	Sample No.		Sample Name	Sample ID	·····	Size 1	Size 2
Sample parameter							

	No.	Sample No.		Sample Name	Sample ID	·····	Size 1	Size 2
	1	01	01	Blank		·····	0.0000	0.0000
	2	01	02	Blank		·····	0.0000	0.0000
Max sample No.	3	01	03	Blank		·····	0.0000	0.0000
	4	12	01	Sample A	20030501	·····	5.5213	4.5123
Next sample No.->	5	12	02	Sample A	20030501	·····	5.5312	4.5111
	:	:	:	:	:	·····	:	:
	:	:	:	:	:	·····	:	:
	95	21	02	Sample A	20030506	·····	5.5216	4.5122
Measured samples	96	21	03	Sample A	20030506	·····	5.5315	4.5121
	97	33	01	Standard B	990123	·····	1.0201	0.0000
	98	33	02	Standard B	990123	·····	1.0121	0.0000
	99	33	03	Standard B	990123	·····	1.0341	0.0000

When measurement is started, it begins with sample parameters of No. 5, and continues the series of measurements up to No. 99 under the conditions preset in advance.

Item	Description
[Max. Sample No.]	Here you enter the largest number of samples for Sample File. • 1- 100
[Next Sample No.]	The number for the next measurement is selected here. ″*″ will appear on the sample setting (list) screen. • 1- 100
[Method]	Here you select the mode for measurement method. • Fixed : Measure with preset Method. • Variable : You can define individual Method for each sample. This is useful for continuous measurement of blank and sample.
[Sample Unit]	Here enter the unit of sample weight. Up to 10 characters can be entered.
[Changer]	Select "On" when using the optional sample changer. • Off : Changer is not used. • On : Changer is used.
[Sequence Mode]	Here you select a sequence for cleaning the optional sample changer. • Standard 1 : This standard 1 sequence shower cleans the sampler after each measurement. • Standard 2 : This sequence dip cleans the sampler after each measurement. • Standard 3 : This sequence shower cleans and dips the electrode in given solvent after measurement. • Standard 4 : This sequence shower cleans and dip cleans, and separates the drains. • User : This sequence is a sequence defined by user for desired maneuver of the sampler.

2. Sample

Item	Description
[pH Auto Calib. Before Titration]	Sets up auto pH calibration before titration. • Off : Conducts titration alone. • On : Conducts auto pH calibration before titration.
[pH Calib. Conditions]	Sets up pH calibration conditions.
[Buffer Solution pH Measurement]	Sets up auto buffer solution pH measurement of neutralization number of petroleum products. This setting will take effect when "pH Auto Calib. Before Titration" is set to "On". • Off : No buffer solution pH measurement. • On : Conducts auto buffer solution pH measurement after pH calibration. And it will automatically be entered "EP Level" of control parameter of the method.

.

[Buffer Solution pH Measurement] - [Details]

Item	Description
[Criterion Determination]	Sets up the evaluation of auto buffer solution pH measurement. When this setting is set to "on", only the value of "Criterion Determination" is set by "EP Level" of control parameter of the method. • Off : Not evaluated. • On : The measurement results are evaluated.
[Criterion]	Enter a criterion value to make the evaluation. This setting will take effect when "Criterion Determination" is set to "On". • -99.99 - 99.99pH
[Stability]	Enter the potential for stability sense for auto buffer solution pH measurement. PH measurement finish automatically, when the electric potential becomes stable within the set value. • 0.00 - 9.99pH/s
[Measurement Limit Time]	Enter auto buffer solution pH measurement limit time. When measurement time reaches the "Measurement Limit Time", however, it ends halfway. • 10 - 999s

Item	Description
[List]	Here the list for sample parameters appears where you select sample conditions for each sample. For details of sample list, refer to the Section 2-4-1.
[USB Flash]	The sample files can be stored in an optional USB flash drive. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive. For the details on how to save sample setting into USB flash drive, see the section, "2-4-3. [USB Flash] (Sample settings)."
[Copy]	Executes copying the sample setting. This button gets enabled by the same type measuring unit connected.
[How to Set UP Sample]	You define sample settings. For details of sample setting, refer to the Section 2-2.
[Changer setup]	Set to automate rinsing by CHA-600 sample changer. There are 4 standard sequences plus one user sequence. For details of changer setup, refer to the Section 2-4-5.
[Sample Mode]	You define sample mode. For details of sample mode, refer to the Section 2-3.

2-4-1.**Sample List**

You can batch edit sample parameters and sample numbers (S.No.).
To use this mode, select "File Mode" for Sample mode on Sample.

1   Press [List] button on "Sample Setting (File Mode)."
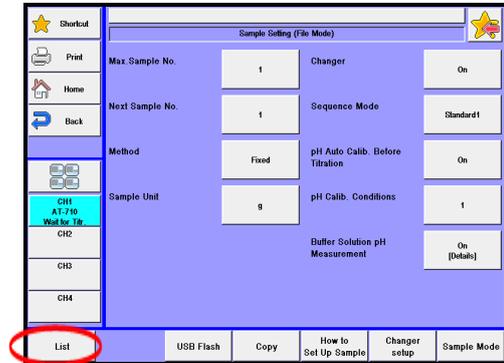
2   The screen on the right will appear.
Select and edit the item you wish to edit.

[▲], [▼]
Use these keys to move the cursor on the list.

[▲▲], [▼▼]
These keys begin a new page of the list.
The cursor moves to the top number on the list after page break.
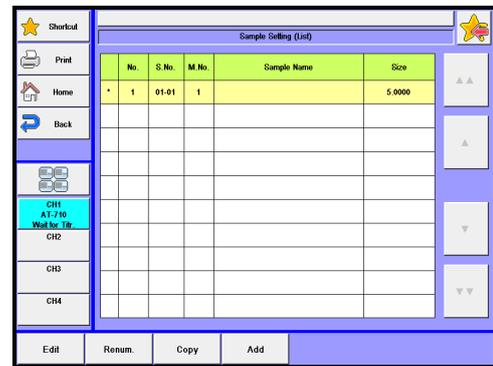
[Edit]
Here you can edit sample parameters. Point the cursor on the number where you want to edit the list. The display will change to "Sample" with this button.
For details of edit sample list, refer to the Section 2-4-2.

[Renum.]
You can batch edit sample numbers (S.No.).
The batch edit begins with the sample number on the list with cursor on and selects numbers in series down to the sample of lower in number.

[Copy]
This key allows the user to apply the sample conditions for the number that the cursor lies in the list to the sample conditions for the rest samples from it.

[Add]
Sample conditions can be added with the sample conditions for the number that the cursor line.

2-4-2.Edit sample list

Settings for Sample list.
To use this mode, select "File Mode" for Sample mode on Sample.

1   Press [Edit] button on "Sample Setting
     (List)." Sample volume (S1) can directly
     be input on the Sample Setting (List)
     screen by pressing a number of the
     sample volume (Size). Sample volume
     (S1) can be input for Balance to point the
     cursor on the number on the Sample
     Setting (List) screen.

2   The screen on the right will appear.

     Select and edit the item you wish to edit.

     Each parameter is determined by the
     [OK] button.

2. Sample

Item	Description
[Sample No.]	Here you select a number for the sample. The numbers consist of High order number and Low order number, and the samples when grouped are numbered with High order number. Lower number represents individual sample identification. • 00 - 99
[Sample Name]	Here each sample can be named with characters up to 20 letters.
[Sample ID]	The samples can be identified with ID or Lot number with up to 20 characters.
[Method No.]	Here you select Method number, which becomes significant only when "Variable" is chosen for method on sample file parameter. • 01 - 130
[Size (S1)]	Input "Tare + Sample weight". • -99999.99999999 - 99999.99999999g
[Size (S2)]	Input Tare weight after injecting a sample. • -99999.99999999 - 99999.99999999g
[Balance]	Here you can enter the weight direct from an electronic balance.
[Constant]	Here see the display for sample constant where you configure those constants like reagent molecular weight and equivalent number particular to the sample. For details of sample constant, refer to the Section "1-8. Calculation parameter."
[Next >>]	The next of sample setup display appears with this button.
[<< Back]	The preceding page appears with this button when pressed.

> **Note** The number of digits for SIZE differs depending on the sample size preset on [Function] – [Decimal Edit].

2-4-3. [USB Flash] (Sample settings)

Save the sample settings into USB flash drive together. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

< How to save sample settings >

1   Press [USB Flash] button to show "Sample Parameter Save." When entering comments with the sample settings to be saved, press the portion where comment is displayed.

2   After confirming the right screen display, enter comments and press [OK] button.
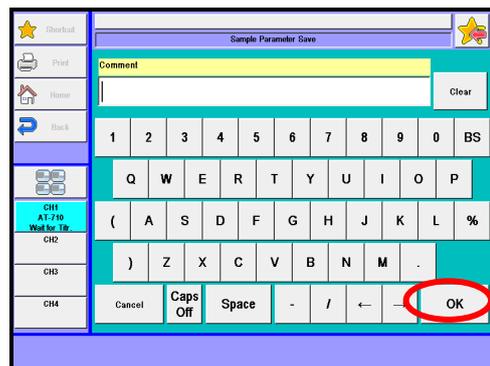
3   Press [Execute] button on the "Sample Parameter Save" screen display. Confirming the verifying-entry message, press [Yes] button.
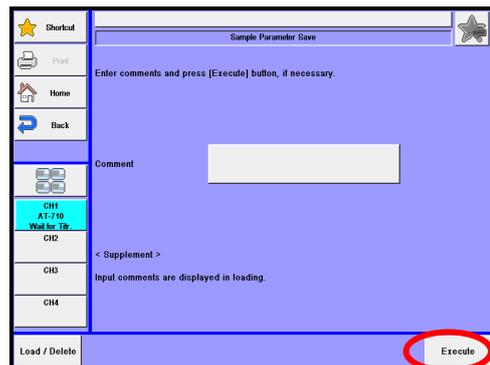
4   The sample settings are saved into USB flash drive and the screen display returns to the initial menu.

2. Sample

<Load/Delete the sample settings on USB flash drive>

| 1 | Connect the USB Flash drive to the device.

Press [USB Flash] button to show "Sample Parameter Save." | |

| 2 | Press [Load/Delete] button. | |

Item	Description
[Load/Delete]	Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

Do not detach the USB flash drive from the slot when making access to it.

Note

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< How to load the sample setting >

1 Select the sample setting to be loaded into the measuring unit on the "Loading/Deleting Sample" screen display and then press [Load] button.

2 When the confirmation screen is displayed, press [Yes] button.
The sample setting will be copied onto the sample setting and the screen display will return to "Loading/Deleting Sample."
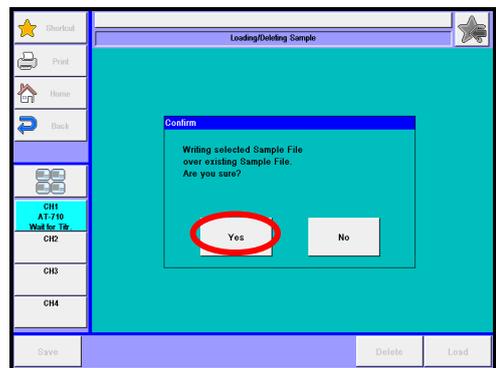
< How to delete the sample setting >

1 Select the file to be deleted on the "Loading/Deleting Sample" screen display and then press [Delete] button. The screen display will turn to the confirmation screen. Then, press [Yes] button.
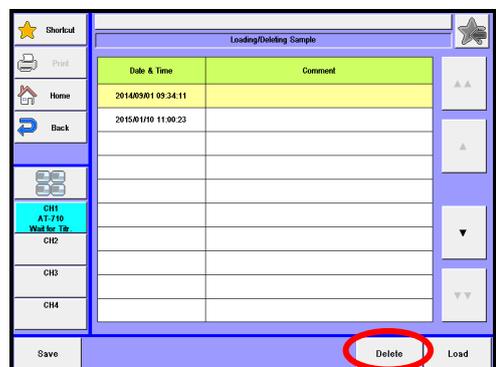
2 The file selected on USB flash drive will be deleted and the screen display will return to "Loading/Deleting Sample". When deleting further files of sample setting, repeat the above steps 1).

2-4-4.Sample setup after starting titration

With a File Mode in use, configure sample setup and add samples with [Sample] button after starting a titration.

1   After starting a titration, pressing [Sample] button will lead to the "Sample settings" screen display, where you can change "Max. sample No.."

Press [List] button.

2   When the "Sample (list)" screen appears, point the cursor on the sample setup to edit.
Use [▲], [▼], [▲▲] or [▼▼] button to move the cursor or you can select a sample setup directly on the list.
Press [Edit] button. (When changing the max sample number, press [Max No.] button to return to the above Step 1.)

3   Enter setup parameters.
Press [Next] button for sample setup in the same manner as above.
Press [List] button to return to "Sample (list)" screen.
Press [Exit] button.

> **Note**   Sample No. and Method No. for currently ongoing measurement cannot be modified. Those samples added during ongoing measurement cannot undergo pre-treatment process. Also, for the samples added during the last measurement underway, pre-dosing and measuring of the following added sample alone won't be performed.

2-4-5. [Changer Setup]

To automate rinsing by CHA-600 sample changer, select a cleaning sequence on this unit.
There are 4 standard sequences plus one user sequence.

1   Press [Sample] button.
    Press [Changer setting] button on "Sample Setting."
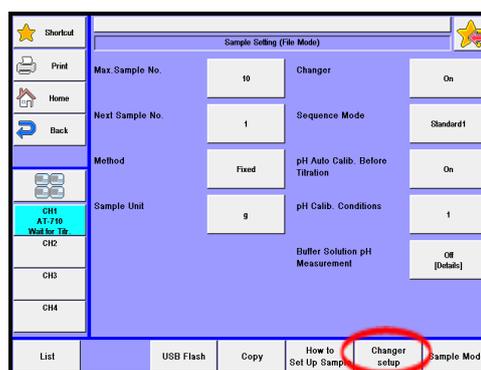
2   The screen on the right will appear.

    Select and edit the item you wish to edit.

    Each parameter is determined by the [OK] button.
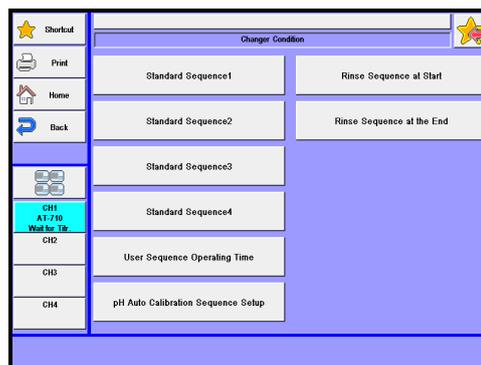
[Standard Sequence 1]
    Select the time on display to start each sequence on "Standard 1" mode preset on sample setup.

[Standard Sequence 2]
    Select the time on display to start each sequence on "Standard 2" mode preset on sample setup.

[Standard Sequence 3]
    Select the time on display to start each sequence on "Standard 3" mode preset on sample setup.

[Standard Sequence 4]
    Select the time on display to start each sequence on "Standard 4" mode preset on sample setup.

[User Sequence Operating Time]
Select the time on display to start each sequence on "User sequence" mode preset on sample setup. Also you select rinse sequence at start and at end.

[pH Auto Calibration Sequence Setup]
Select the time on display to start each sequence on pH Auto Calibration.

[Rinse Sequence at Start]
Select rinse sequence at start on display before titration begins in user sequence mode.

[Rinse Sequence at the End]
Select rinse sequence at end on display after titration finishes in user sequence mode.

> User sequence setup can be configured on each Method.
> Refer to "1-11. Option Parameter."
> **Note** For rinse sequence at the start and the end, refer to "1-11. Option parameter."

＜Acting time setup＞

Select sequence rinse and dose time for the multiple sample changer.

(Example: Standard sequence 1)

[Shower]

Set shower time to rinse the electrode in rinse pot, activated by "Shower" command.

- 0 - 9999s

[Rinse]

Set feeding time for solvent to the electrode rinse pot, activated by "Rinse" command.

- 0 - 9999s

[Drain 1]

Set draining time for solvent from the electrode rinse pot, activated by "Drain 1" command.

- 0 - 9999s

[Drain 2]

Set draining time for solvent from the electrode rinse bath, activated by "Drain 2" command.

- 0 - 9999s

[Wait Time]

Set immersing or depolarization time for electrodes in rinse pot, activated by "Wait" command.

- 0 - 9999s

[Sample Drain Time]

When the sample drain option is connected, set sample drain time activated by "Sample drain" command.

- 0 - 9999s

[Pre-Treat]

Select pre-treat mode for the multiple sample changer.
Pre-treat mode allows the unit to dose measured amount of reagent to all sample vials on the sample rack by the auto piston burette (APB-610, APB-620) and peristaltic pump unit before a titration starts. Pressing this button will lead to the display of "Setup for pre-treat" screen.

＜Setup for "Pre-Treat"＞

Press [Pre-Treat] button on the "Sequence parameter" screen display. The "Pre-Treat" screen will then be displayed.
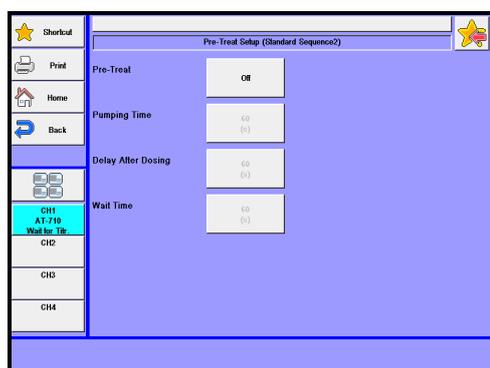
[Pre-Treat]

Select pre-treat mode for the multiple sample changer.
Pre-treat mode allows the unit to dose measured amount of reagent to all sample vials on the sample rack by the auto piston burette (APB-610, APB-620) and peristaltic pump unit before a titration starts.

- Off   : No pre-treat
- APB   : Pre- treat by auto piston burette
- PUMP   : Pre- treat by peristaltic pump
- APB > PUMP   : Pre- treat by peristaltic pump after dosing reagent by auto piston burette
- PUMP > APB   : Pre- treat by auto piston burette after dosing reagent by peristaltic pump

> **Note** When more than one peristaltic pumps are linked, all of them can operate simultaneously.

[Pumping Time]

Set peristaltic pumping time in pre-treat. This will be on when "PUMP" is chosen in the "Pre-Dose" setting. When pre-treat by auto piston burette is carried out, set a fixed dose amount on the auto piston burette.

- 0 - 9999s

[Delay After Dosing]

Set the time to allow a sample to be dissolved or the time for the reaction of a sample after a dose.
This will be displayed when "Pre-Treat" is set to other than "Off."
- 0 - 9999s

[Wait Time]

Set up the time required for resolving sample or allowing reactions after all constant-dosing operations are completed. This will be displayed when "Pre-Treat" is set to other than "Off."
- 0 - 9999s

[Pre-Dose]

Select pre-dose mode for the multiple sample changer. The reagent is pre-dosed by the auto piston burette (APB-610, APB-620) and the peristaltic pump unit at the position of one step before titration.
Pressing this button will lead to the display of "Setup for pre-dose" screen.

＜Setup of "Pre-Dose"＞

Press [Pre-Dose] button on the "Sequence parameter" screen display. The "Pre-Dose" screen will then be displayed.
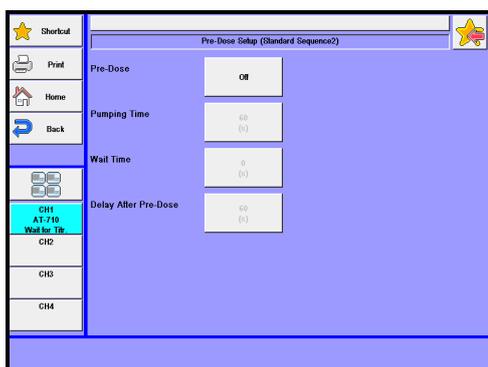
[Pre-Dose]

Select pre-dose mode for the multiple sample changer.
The reagent is pre-dosed by the auto piston burette (APB-610, APB-620) and the peristaltic pump unit at the position of one step before titration:
- Off : No pre-dosing
- APB : Pre-dose by auto piston burette
- PUMP : Pre-dose by peristaltic pump
- APB > PUMP : Pre-dose by peristaltic pump after dosing a reagent by auto piston burette
- PUMP > APB : Pre-dose by auto piston burette after dosing a reagent by peristaltic pump

> **Note** When more than one peristaltic pumps are hooked up, all of them can operate simultaneously.

[Pumping Time]

You peristaltic pumping time in pre-dose. This functions when "PUMP" is chosen on "Pre-Dose."

When pre-dose by auto piston burette is preferred, set the fixed dose amount on the auto piston burette.

- 0 - 9999s

[Wait Time]

Set the time to allow a sample to be dissolved or the time for the reaction of a sample before a dose. This setting is not used in CHA-600.

This will be displayed when "Pre-Dose" is set to other than "Off."

- 0 - 9999s

[Delay After Pre-Dose]

Set the time to allow a sample to be dissolved or the time required for reaction of a sample after a dose.

This is displayed when "Pre-Dose" is set to other than "Off."

- 0 - 9999s

2-5. CHA-7XX Changer Mode

Set changer parameters when connecting CHA-700. To use this mode, select "CHA-7xx Changer Mode" for Sample mode on Sample.

Set CHA-7xx Changer Mode.

1 Press [Sample] button.
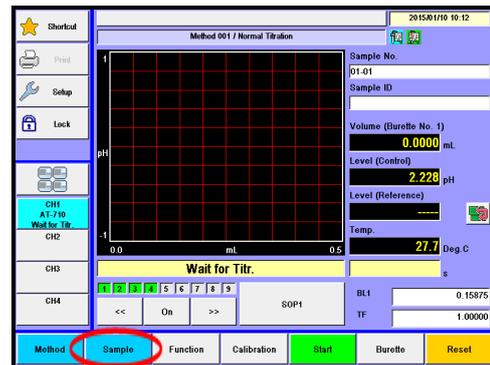
2 Press [Sample Mode] button on "Sample Setting."
Select "CHA-7XX Changer Mode."
Press [OK] button.

3 The screen on the right will appear.   (Example: CHA-700 connected)
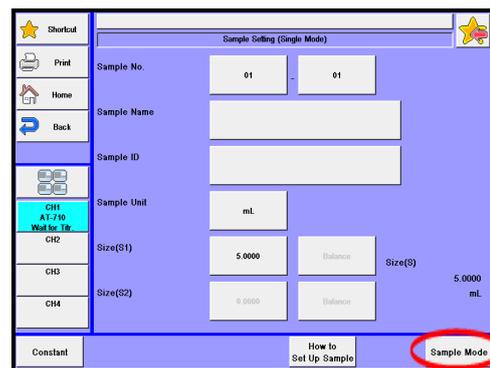
The current table No,(T.No.) will be marked with "*" while measurement is in progress.

< CHA-700 connected >

Item	Description
[▲], [▼]	Use these keys to move the cursor on the list.
[▲▲], [▼▼]	These keys begin a new page of the list. The cursor moves to the top number on the list after page break. This will be on when CHA-700 is eleven table model.
[Edit]	Here you can edit sample parameters. Point the cursor on the number where you want to edit the list. The display will change to "Sample Setting" with this button. For details of edit sample list, refer to the Section 2-5-1.
[Renum.]	You can batch edit sample numbers (S.No.). The batch edit begins with the sample number on the list with cursor on and selects numbers in series down to the sample of higher in number.
[Copy]	This key allows the user to apply the sample conditions for the number that the cursor lies in the list to the sample conditions for the rest samples from it.
［Size list］	Will be enabled when "On" is selected on the use of the sample volume list of the sample setting. For details of size list, refer to the Section 2-5-4.
[How to Set UP Sample]	You define sample settings. For details of sample setting, refer to the Section 2-5-4.
[Changer setup］	Sets up operation of the Multiple Sample Changer CHA-700. For details of Changer setup, refer to the Section 2-5-5.
[Sample Mode]	You define sample mode. For details of sample mode, refer to the Section 2-3.

|	
Note	See the operation manual of the multiple sample changer for details of the sequence contents. See the operation manual of the multiple sample changer for setting the CHA-740/760.

2-5-1.**Edit sample list**

Settings for Sample list.
To use this mode, select "CHA-7xx Changer Mode" for Sample mode on Sample.

1   Press [Edit] button on "Changer Table List."

Sample volume (S1) can directly be input on the changer table list screen by pressing a number of the sample volume (Size). Sample volume (S1) can be input for Balance to point the cursor on the number on the Sample Setting (List) screen.

2   The screen on the right will appear.

Select and edit the item you wish to edit.

Each parameter is determined by the [OK] button.

2. Sample

Item	Description
[Sample No.]	Here you select sample number. The sample number consists of a high order and low order number. The high order number is a group number for batch calculation. The low order number counts up after each measurement. • 00 - 99
[Sample Name]	Here each sample can be named with characters up to 20 letters.
[Sample ID]	The samples can be identified with ID or Lot number with up to 20 characters.
[Method No.]	Here you select Method number, which becomes significant only when "Variable" is chosen for method on sample file parameter. • 01 - 130
[Size (S1)]	Input "Tare + Sample weight". • -99999.99999999 - 99999.99999999g
[Size (S2)]	Input Tare weight after injecting a sample. • -99999.99999999 - 99999.99999999g
[Balance]	Here you can enter the weight direct from an electronic balance.
[Constant]	Here see the display for sample constant where you configure those constants like reagent molecular weight and equivalent number particular to the sample. For details of sample constant, refer to the Section "1-8. Calculation parameter."
[Next >>]	The next of sample setup display appears with this button.
[<< Back]	The preceding page appears with this button when pressed.

Note   The number of digits for SIZE differs depending on the sample size preset on [Function] – [Decimal Edit].

2-5-2.**Sample setup after starting titration**

With a CHA-7xx Changer Mode in use, configure sample setup and add samples with [Sample] button after starting a titration.

1   After starting a titration, pressing [Sample] button will lead to the "Changer Table List" screen display.
"*"is displayed for the Table No. of the sample that is currently measured and then "N" is displayed for the Table No. of the sample that is measured next.

2   Point the cursor on the sample setup to edit.
Use [▲], [▼], [▲▲] or [▼▼] button to move the cursor or you can select a sample setup directly on the list.
Press [Edit] button.

3   Enter setup parameters.
Press [Next] button for sample setup in the same manner as above.

Press [Back] button to return to "Changer Table List" screen.
Press [Exit] button.

Note   The sample setting for currently ongoing measurement cannot be modified. Those samples added during ongoing measurement cannot be measured.

2-5-3.Use of size list

When mass is input from the balance by "Print" mode, the sample size can be input up to 12 samples on the balance side. The sample is measured in order of setting No. at Next No. before starting measurement. This sample size is measured in order of sample size of the table measured next regardless of table No.. This will be enabled when "On" is selected on the Use of the Size List of the sample setting.

| Item	Description
Next	The next List No. will be marked with "⇒".
List No.	No. of the sample volume list.
[Size (S1)]	Input "Tare + Sample weight". • -99999.99999999 - 99999.99999999g
[Size (S2)]	Input Tare weight after injecting a sample. • -99999.99999999 - 99999.99999999g
[Next]	The sample is measured in order of setting No. at Next No. before starting measurement. Press this button to change the Next No..
[▲], [▼]	Use these keys to move the cursor on the list.
[▲▲], [▼▼]	These keys begin a new page of the list. The cursor moves to the top number on the list after page break.

> **Note** Size (S1) can directly be input on the size list screen by pressing a number of the Size.

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2-5-4.Sample setting method (Changer Table List)

Settings for sample settings.

1   Press [Sample] button. Press [Sample setup] button on "Changer Table List."

2   The screen on the right will appear.

Select and edit the item you wish to edit.

Each parameter is determined by the [OK] button.

2. Sample

| Item	Description
[Method]	Set the adaption mode of measurement method. • Variable : A sample condition individual can be specified a method. • Fixed : Measure by current method. Use for measurement at the same sample condition.
[Sample Unit]	Here enter the unit of sample weight. Up to 10 characters can be entered.
[Size Input Mode]	Select entry method for sample quantity. The unit determines whether the sample quantity is already input or not. • Size 1 only : Entry of Size 1 reads as the sample quantity is already input. • Size 1, 2 : Entry of both Size 1 and Size 2 reads as the sample quantity is already input.
[Use of Size List]	Set the sample size beforehand collectively at the balance. • Off : Input the sample size individually on sample setting screen. • On : Input several sample size beforehand collectively. When this setting is "On", [Size list] button is activated n sample setting screen so that sample size can be stored up to 12.

2-5-5.[Changer Setup]

Setting of CHA-700 movement.

1 Press [Sample] button. Press [Changer setup] button on "Changer Table List."

2 The screen on the right will appear.

Select and edit the item you wish to edit.

Each parameter is determined by the [OK] button.

2. Sample

| Item	Description
[Start Mode]	Set the operation mode at the starting measurement. • In Order of Putting : Measure in order of putting on the table after turning on the power. • Ascending Order Only at Time of Start : Measure in order of small number of table No. put on the table at the starting measurement, and in order of putting on the table after measurement.
[Shower Mode]	Set the rinsing mode. • Rise Mode : Rinsing unit is not used. Only dip cleaning can be used. • Bath Mode : Use for installation of rinsing pot and rinsing with solution. After measurement, operate shower rinsing and dip cleaning with solution in rinsing pot. • Ring Mode : Use for installation of shower ring, rinsing with nonaqueous solution and soaking with solution. After measurement, operate shower rinsing at measurement position and dip cleaning with the beaker set at home position.
[Drain Time]	Sets up drain time by optional drain pump. Zero ("0") means no operation. This will be displayed when "Shower Mode" is set to "Bath Mode" or "Ring Mode." • 0 - 9999s
[Shower]	Sets up shower rinsing time by optional shower pump. Executes drain as well during shower rinsing. Zero ("0") means no operation. This will be displayed when "Shower Mode" is set to "Bath Mode" or "Ring Mode." • 0 - 9999s
[Wait Time (Rinse)]	Sets up electrode dip time by rinse bath. A propeller stirrer operates during immerse rinsing. Zero ("0") means no operation. • 0 - 9999s
[Immersion Stirrer Speed]	Here you can select a stirrer speed for electrode dip by rinse bath. • 0 - 9

Item	Description
[pH Auto Calib. Before Titration]	Sets up auto pH calibration before titration. • Off : Conducts titration alone. • On : Conducts auto pH calibration before titration.
[pH Calib. Conditions]	Sets up pH calibration conditions.
[Drain Time (pH Auto Calib.)]	Sets up drain time on pH Auto Calibration by optional drain pump. Zero ("0") means no operation. This will be displayed when "Shower Mode" is set to "Bath Mode" or "Ring Mode." • 0 - 9999s
[Shower Time (pH Auto Calib.)]	Sets up shower rinsing time on pH Auto Calibration by optional shower pump. Executes drain as well during shower rinsing. Zero ("0") means no operation. This will be displayed when "Shower Mode" is set to "Bath Mode" or "Ring Mode." • 0 - 9999s
[Delay (Rinse) (pH Auto Calib.)]	Sets up electrode dip time on pH Auto Calibration by rinse bath. A propeller stirrer operates during immerse rinsing. Zero ("0") means no operation. • 0 - 9999s
[Stirrer Speed (pH Auto Calib.)]	Here you can select a stirrer speed on pH Auto Calibration for electrode dip by rinse bath. • 0 - 9

3. Function

## 3-1. Selection of the function

Selection of the function.

1   Press [Function] button on Main display.
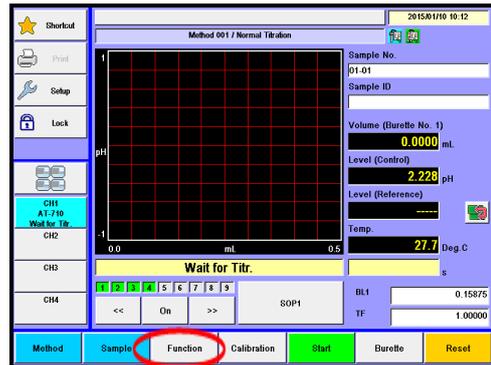
2   The screen on the right will appear.

        Please change the mode numbers and select the parameter you wish to edit.
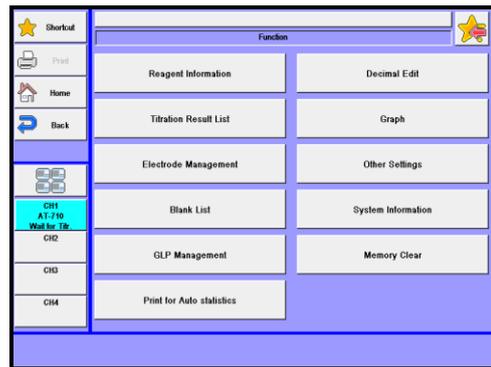
Item	Description
[Reagent Information]	Here you set in the information on reagents including their names, reagent factor, replacement date, etc.
[Titration Result List]	You can view the list of measurement results where you can re-calculate or batch-calculate them.
[Electrode Management]	Sets up electrode information.
[Blank list]	This is the list of blank values including 99 different ones you can store.
[GLP Management]	Here you set up functions to meet with GLP requirements including periodic check, advance notice of check date at intervals, etc.
[Print for Auto statistics]	The series of measurements performed under the same conditions (Method) can be automatically printed out by this function.
[Decimal Edit]	This function includes setting the number of decimal places for a sample size, Statistics, Blank and Factor when printed out or displayed on screen as well as how to round off in calculation.
[Graph]	Set parameters for graphing the results. Can draw graphs by plotting "Titr. volume vs Pot.", first-derivative values and the like.
[Other Settings]	This includes the auto input of averaged values and the alarm function, etc.
[System Information]	You can view the list of equipment presently connected to the channels in work as well as the information on software version.
[Memory Clear]	With this function, you can erase measurement results, methods or sample parameters selectively by individual sample.

3-2. Reagent Information

By setting reagent information, you can control and manage the information on each burette unit including reagent name, concentration, factor and calculation constant. Up to 20 information files on reagents can be stored. Reagent information of a smart burette can be set up when its functionality is set to "On."

1   Press [Reagent Information] button on "Function".
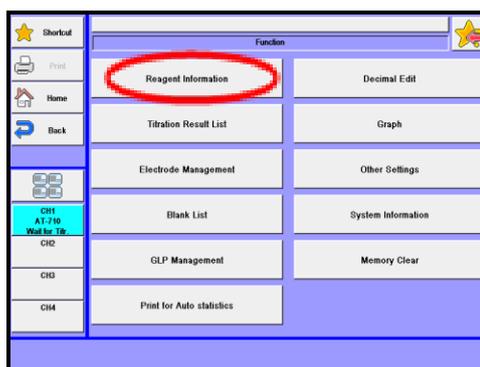
2   The screen on the right will appear.

"-" will be shown on the burette No. not currently recognized as the smart burette.

[▲], [▼]
Moves the cursor on the list.

[▲▲], [▼▼]
These keys are for page turning. The cursor moves to the top of the list after page break.

[Edit]
With this button, the display of "Reagent information" appears where you can edit the information on the reagent with the cursor pointed on. Such information includes reagent name, reagent factor, consumption volume, alarm setting, replacement date, etc.

(Function – Other settings – When smart burette is "On")

(Function – Other settings – When smart burette is "Off")

[Write] (Only with "list of smart burette reagent information")
Initializes information recorded on the smart burette.

[Burette]
Switches to the "Reagent Information List" screen.

[Smart Burette]
Switches to the "Reagent Information List of Smart Burette" screen.

	When functionality of the smart burette is "Enable," "Reagent Information List of Smart Burette" will be displayed. When functionality of the smart burette is
Note	"Disable," "Reagent Information List" will be displayed.

3-2-1.[Edit] – [Reagent information]

Set the Reagent information.

1　Select the Reagent Information, press [Edit] button.

2　Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.

[Reagent Name]
Here you enter the name of reagent. Press the button with reagent name for entry. Up to 20 characters can be entered.

[Reagent Rest]
Enter the amount of remaining reagent at the present time.
- 0 - 9999mL

[Reagent Factor (TF)]
Can enter reagent factor. This value can be used for TF constant for calculation parameter on Method.
- 0.00000 - 99999.99999

[Concentration (TN)]
Can enter reagent concentration. This value can be used for TN constant for calculation parameter on Method.
- 0.00000 - 99999.99999

[Molecular Weight (TMW)]
Can enter reagent molecular weight. This value can be used for TMW constant for calculation parameter on Method.
- 0.00000 - 99999.99999

[Equivalent Number (TEQN)]
Can enter reagent equivalent number. This value can be used for TEQN constant for calculation parameter on Method.
- 0.00000 - 99999.99999

[Unit No. (Optional)] (Only with "list of smart burette reagent information")
Set up a control No. of the unit. Enter No. in order to distinguish when there is more than one unit.
- 1 - 99

[Temp. Comp. Coeff. A]
Can enter temperature compensation coefficient A. The meaning of this temperature compensation of titrant is a volumetric correction using the temperature of the titrant.
- -99999.99999 - 99999.99999

[Temp. Comp. Coeff. B]
Can enter temperature compensation coefficient B.
- -99999.99999 - 99999.99999

> For calculation of Temp. Comp. coeff., refer to "1-8.Calculation Parameter."
>
> **Note**

[Titr. Type] (Only with "list of smart burette reagent information")

Sets up a titration type. The type is checked with the "Type of Titration" set the titration parameter of method. If they are different, an error will occur before measurement. This prevents you from using an incorrect reagent. This function is valid only when "Smart Burette Functionality" of Function-Other Settings is "Enable."

- Unclassified : Does not classify.
- Acid-base Titration : Select this for acid-base titration.
- Redox Titration : Select this for redox titration.
- Precipitation Titration : Select this for precipitation titration.
- Other : Select this for other titrations.

[Burette Capacity Comp.] display

The current burette volume will be displayed. Set up the volume by Burette-Burette capacity setup.

[Alarm]

Select the alarm type with this button. When pressed, it shows currently significant alarms.

<[Alarm] setting>

1	Press [Alarm] button on "Reagent information" display.	

2	The screen on the right will appear. Please change the mode numbers and select the parameter you wish to edit. Each parameter is determined by the [OK] button.	

| Item	Description
[Reagent Rest Alarm]	Select to activate this alarm or not. • Disable : No alarm • Enable : Alarm is on
[Reagent Rest Limit]	Select the alarm of lower limit of remaining reagent. • 0 ~ 9999mL
[Replacement Alarm]	Here you can choose from on or off for alarming reagent replacement. • Disable : No alarm • Enable : Alarm is on
[Replacement Date]	Here you can set up a time length by a number of days for next replacement of reagent. • [xx (Days)] : Set a time interval by a number of days • [[Update] : Set the next date for replacement as preset intervals
[Piston Alarm]	Select the alarm about the date for changing the burette piston or not. • Off : No alarm • On : Alarm is on.
[Piston Replacement Date]	Here you can set up a time length by a number of days for next replacement of piston. • [xx (Days)] : Set a time interval by a number of days • [Update] : Set the next date for replacement as preset intervals
[Piston Stroke Count]	The number of operation of the piston will be displayed. The number can be reset to "0" by pressing ［Clear］. Press [Clear] when piston head is replaced.
[Stroke Count Alarm]	Select the alarm about the number for the piston or not. • Off : No alarm • On : Alarm is on.
[Stroke Count Upper Limit]	Set the alarm of the movement number of strokes. • 0 - 60000

Item	Description
[Cylinder Alarm]	Select the alarm about the date for changing the burette piston cylinder or not. • Off : No alarm • On : Alarm is on.
[Cylinder Replacement Date]	Here you can set up a time length by a number of days for next replacement of piston cylinder. • [xx (Days)] : Set a time interval by a number of days • [[Update] : Set the next date for replacement as preset intervals
[Cylinder Stroke Count]	The number of operation of the piston cylinder will be displayed. The number can be reset to "0" by pressing ［Clear］. Press [Clear] when glass cylinder is replaced.
[Stroke Count Alarm]	Select the alarm about the number for the piston cylinder or not. • Off : No alarm • On : Alarm is on.
[Stroke Count Upper Limit]	Set the alarm of the movement number of strokes. • 0 - 60000

> To use the alarm function, make "Alarm" turned "On" when you set up on [Function] – [Other Settings].

[A compensation value of the current burette]

A compensation value of the current burette cylinder volume will be displayed. "Burette volume compensation" screen will be displayed by pressing this button. A compensation value per each discharge volume (mL) is displayed in volume conversion value (mL). A volume compensation value can be set up on the screen of burette-Validation-volume compensation.

[Cancel] (Only with "list of smart burette reagent information")

   Cancel the information set up in the reagent setting on a smart burette.

[Write] (Only with "list of smart burette reagent information")

    Write the information set up in the reagent setting on a smart burette. Once writing is completed, the display will return to "Reagent Information List of Smart Burette" screen.

3-3. **Titration Result List**

You can view the list of measurement results where you can re-calculate or batch-calculate them. Up to 500 samples measurement results can be stored.

---

1   Press [Titration Results List] button on "Function."
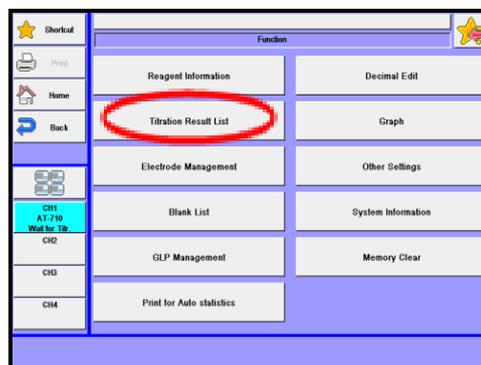
2   The screen on the right will appear.

Select and edit the result you wish to edit.

Each parameter is determined by the [OK] button.

[▲], [▼]
Moves the cursor on the list.

[▲▲], [▼▼]
These keys are for page turning.   The cursor moves to the top of the list after page break.

Note   As for combined titration results, the number of combined methods is stored. When it exceeds 500, note that data will be erased on the first-in first-out basis.

Item	Description
[Pick Out]	On this screen you can select the results you are looking for among the data in the list.

> For details of Pick out, refer to "3-3-1. [Pick Out]."

[Statistics]	The measurement results in the list are batch calculated. If the data are selected in Pick Out, those selected data will be calculated.

> For details of Statistics, refer to "3-3-2. [Statistics]."

[Disable]	You can delete the data to void batch calculation.　Point the cursor on the data and press this button. Those data will be marked with "*"on display.
[Show]	You can view the data with cursor pointed on.　This is useful in re-calculation or for re-print.
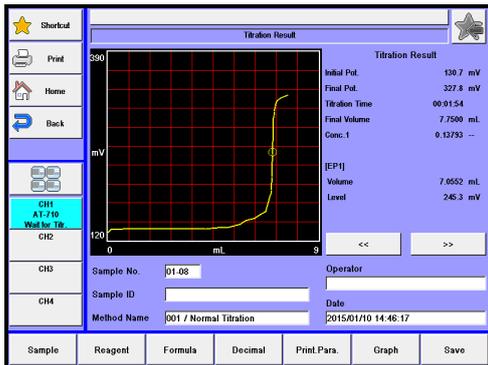
> For details of resulting data, refer to "3-3-3. View Titration results・recalculation."

[Simulation]	This feature allows the unit to redetect the endpoint when the first endpoint has not been found due to very small inflection ratio.　This feature is not applicable to the results of a combined titration.

> For details of the redetection of EP, refer to "3-3-4. [Simulation]."

Item	Description
[USB Flash]	Save the measurement data on USB flash drive. When data is narrowed with [Pick Out], the narrowed data will be saved on USB flash drive.

> For the details on saving measurement data on USB flash drive, refer to "3-3-5 [USB Flash] (Titration results)."

[All] or [Sift]	Here you choose from All or Sift in search for measurement results. For setting search conditions, press the [Pick Out] button.

3-3-1.[Pick Out]

Set the pick out condition of measurement result data.
You can narrow down measurement results with Calc. type, High Sample No., Method No., Sample ID, Titration date or Unit.

1　Press [Pick Out] button on "Titration Results List."

2　The screen on the right will appear.

Select the condition you wish to edit.

Each parameter is determined by the [OK] button.

Matching data will be picked out from the list by pressing [Execute].
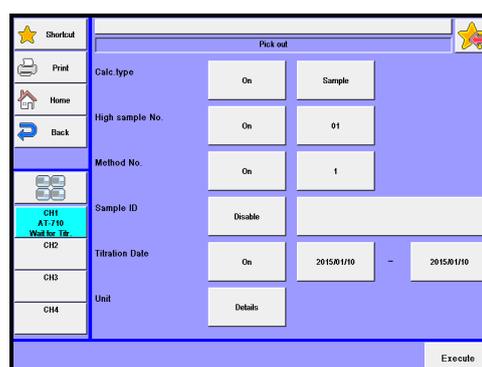
< Search conditions >

You can narrow down the data by selecting the following conditions:

Item	Description
Calc. type	The titration parameters preset on Calculation Parameter.
High sample No.	The high order number for grouping the samples.
Method No.	The number of Method particular to it.
Sample ID	The identification code particular to the sample.
Titration Date	The date of measurement when it was performed.
Unit	The unit used in calculation results. Press [Details] button for setting the unit. Unit N allows you to narrow down searched data with the unit used in the Formula N.

3-3-2.[Statistics]

Calculate the statistics of titration data.

1 Select the data on [Pick Out].

Press [Statistics] on "Titration Result List" screen to execute.

If you wish to view all results, press [All].

2 The screen on the right will appear.

The statistics result is printed by pressing [Print].

Return to main display by pressing [Home].

< About statistics >
The batch calculation determines Mean value, Standard deviation (SD) and Relative standard deviation (RSD), which is the same as coefficient variance (CV).
Those values are calculated by the built-in processor as follows:

Where n number of data (X1, X2, ….. , Xn):

Mean value
$$\overline{X} = \frac{(X_1 + X_2 + \cdots + X_n)}{n}$$

Standard deviation
$$SD = \sqrt{\frac{\sum\limits_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{n-1}}$$

Relative SD
$$RSD(\%) = \frac{SD}{\overline{X}} \times 100$$

| Item	Description
[List printing]	You can choose from Yes or No to print the statistical data: • Off : No printout. • On : Print the results list.
[Exclusion of max/min]	Sets up exclusion of maximum value and minimum value of statistic data. • On : Excludes maximum value and minimum value. • Off : Does not exclude maximum value and minimum value.

> **Note** Statistics calculation should set up and perform search conditions.
> If the mean value is zero "0", RSD will appear on display and be printed out as "− −" symbols not as zero "0".

[Setup(BL)]	Save the mean value obtained through statistical calculation to the blank value after selecting [Function] − [Blank List]. Selecting the blank value number to be saved and pressing [Execute] button allows to store the mean value on the Blank value n.

3. Function

Item	Description
[Setup(TF)]	Save the mean value obtained through statistical calculation to the factor value after selecting [Function] – [Reagent Information]. Selecting the Reagent information number to be saved and pressing [Execute] button allows to store the mean value on the Reagent information factor of No. n.
[Setup (FA)]	Here you can register the average value of statistical results as the local factor of Method calculation parameter. Select a number (No.) to be registered and press [Execute] button. An average value n will be registered on the Local Factor (FA) of the Method No. N.

＜Registering the statistic result to the blank＞

1   Press [Setup (BL)] on "Statistics" screen if you wish to set the average value of statistic results in the blank.
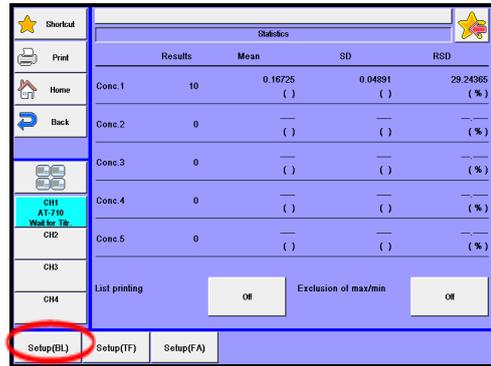
2   "Registration of Mean (Blank)" screen will appear.

Press button on the right of the average value.

3   Press a blank value in the list and move the cursor to "Blank1 (BL1)."

Press [OK] button.
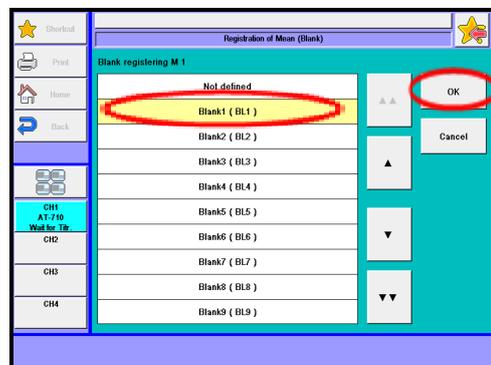
4   Press [Execute] button.

The average value is registered to "Blank1 (BL1)" on [Function] - [Blank List].

＜Registering the statistic result to the factor＞

1 Press [Setup (TF)] on "Statistics" screen if you wish to set the average value of statistic results in the factor.
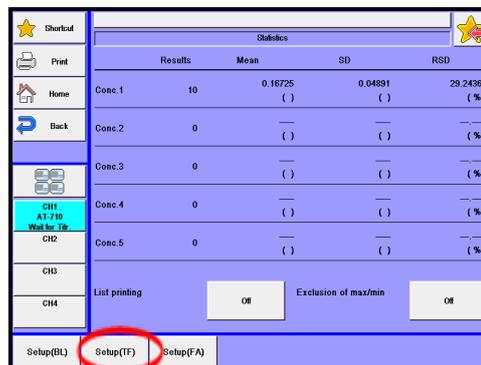
2 "Registration of Mean (Reagent Info Factor)" screen will appear.

Press button on the right of the average value.
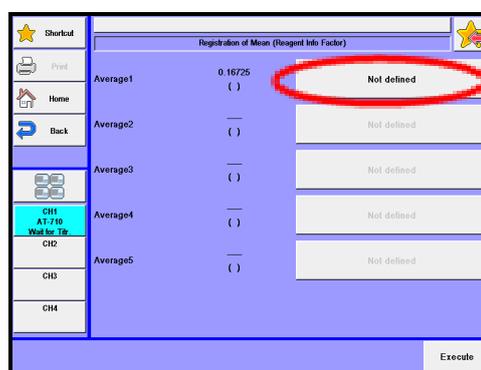
**3** Press a factor in the list and move the cursor to "B.No.01/Reagent01."

Point the cursor to "R.No.01/ Reagent01" with a normal burette.

Press [OK] button.
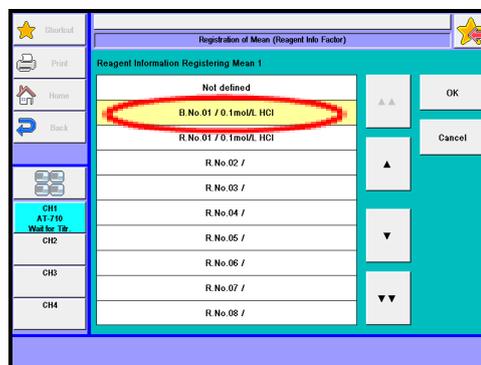
4 Press [Execute] button.

The average value is registered to "No.01" on [Function] - [Reagent Information].
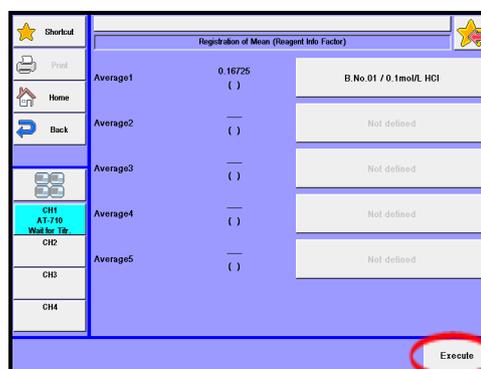
3-3-3.[Titration results・recalculation]

Check the record of result data.

1 Press [Pick Out] button. Here you sort out the data for batch calculation.

Press the [Show] button on "Titration Result List."

If you wish to view all of the results, press [All] button.

2 The results of measurements will appear, and press the items for recalculation accordingly.
The results of a combined titration show the combined results. When you want to display individual results, press [N result] button. The result can be re-calculated.

Example: Press [Sample] button.
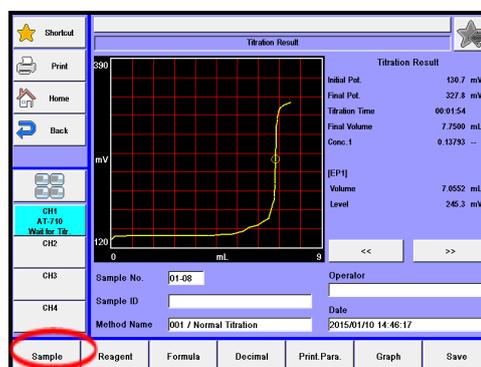
3 When "Sample Setting" is displayed, press [Size (S1)] button. Enter the amount in volume or weight.
Press [Re-Calc.] button.

4 The screen display will turn "Recalculation result" dialog box. Then, press [Save] button.

The screen display will turn to the confirmation screen. Then, press [Yes] button.
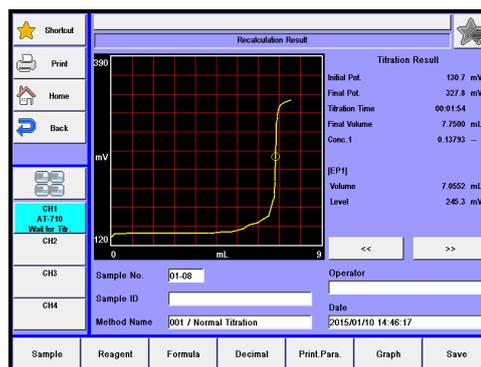
**Note** To save the contents once changed with [Re-Cal.] or [Apply] button, press [Save] button.
Press [Print] button to print out the results of titration or recalculation. The results of recalculation are printed out with sample number (Sample No.) headed with (#) mark.

[<<] [>>]

With these keys you can see the contents of titration results in the order of calculation results, detailed results of Calculation 1, detailed results of Calculation 2, detailed results of Calculation 3, detailed results of Calculation 4, detailed results of Calculation 5.

<Data list of titration results>
When anywhere on the line graph is pressed, the data list of the touched area will appear. Press [Back] to return to the previous page ("Titration result").

[▲], [▼]
Press these to move up/down the data one by one.

[▲▲], [▼▼]
Press these to go to the previous/next page.

| Item	Description
[Sample]	Sample conditions can be changed with this key, that is, sample name, sample ID, sample unit, sample size, constant (reagent molecular weight, equivalent number) etc. except sample number that cannot be changed. After changes, if any, are made, press [Re-Calc.] button to confirm the changes. Those changes are displayed as recalculation results. For details of settings, refer to the Section "2. Sample."
[Reagent]	Here you can change settings of reagent information. After settings are changed, confirm the changes with [Re-Calc.] button. Those changes are displayed as recalculation results. For details of setting, refer to the Section "3-2. [Reagent Information]."
[Formula]	Here you can change the calculation parameter and constant, which were used in titration including calculation formula, constant (C1 - C5, R, K1 - K5, FA), blank level (BL1 - BL99), titration liquid compensation parameter, etc. After settings are changed, confirm the changes with [Re-Calc.] button. Those changes are displayed as recalculation results. For the details of settings, refer to the Sections, "3-5. [Blank List]" and "1-8. Calculation parameter."
[Decimal]	You can change the number of digits after decimal point for sample size. After settings are changed, confirm the changes with [Re-Calc.] button. Those changes are displayed as recalculation results. For details of setting, refer to the Section "3-8. Decimal edit."
[Print. Para.]	Print parameters used in titration are shown here. After settings are changed, confirm the changes with [Apply] button. Those changes are displayed as titration results. For details of setting, refer to the Section "1-9. Report Parameter."
[Graph]	You can change the settings for graph printout. After settings are changed, confirm the changes with [Apply] button. Those changes are displayed as titration results. For details of setting, refer to the Section "3-9. Graph."
[Save]	Those changes that have been made are saved in memory.
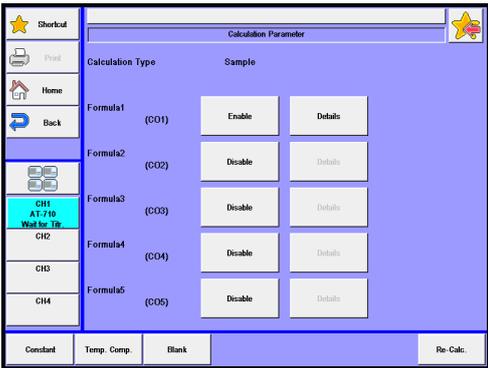
3-3-4. [Simulation]

Simulation of titration data.

1　Press [Simulation] button after selecting titration results on "Result list."

2　You can redetect the titration results. There are four (4) ways for EP re-detection. After making re-detection on each parameter, press [Save] button to store the results of re-detection.
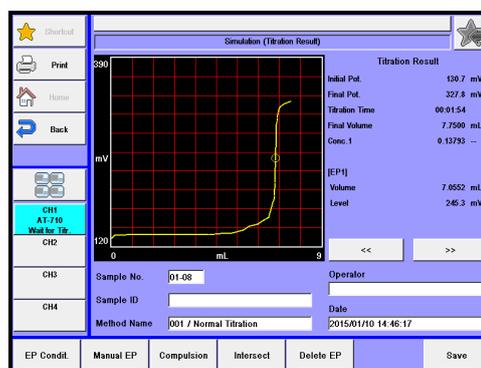

Note　Redetection of EP is not applicable to titration mode such as "Stat" or "Combined titration."

[EP Condit.]

This function determines the endpoint for which conditions you have preset in advance.

Enter the number of endpoints and EP levels and press [Execute] button. The desired endpoint is redetected and printed out as the result of recalculation according to the preset print parameters when [Print] button is pressed. Those recalculated results appear on printout with sample number with (#) mark as postfix.


Note	Regarding parameters for "Set EP conditions", refer to the Section "1-7. Control Parameter."

[Manual EP]

This function allows you to set an EP at any desired point on a titration curve.
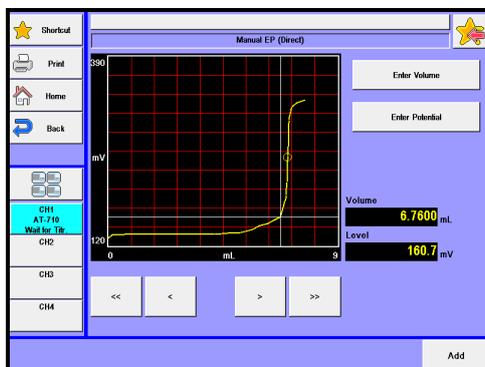
Move the cursor line to the vicinity of a desired EP point with [<<], [<], [>] or [>>] button.

Titration volume and EP potential level will be shown on the point to which the cursor points.

When you want to configure more detailed titration volume or EP potential, press [Enter Volume] or [Enter Potential] button to enter an EP value.

The entry of an EP can be confirmed when [Add] button is pressed. The addition of endpoints will lead to the display of recalculated results. Pressing [Save] button will allow the result of re-detecting EP value to be stored in the memory.

Press [Print] button in order to print out recalculation results. The results will be printed according to the preset format.

The Sample No. on this printout is headed with "#" mark to show that the results have been processed.

[Compulsion]

This key features the detection of an EP between two (2) points that are input on a data list.
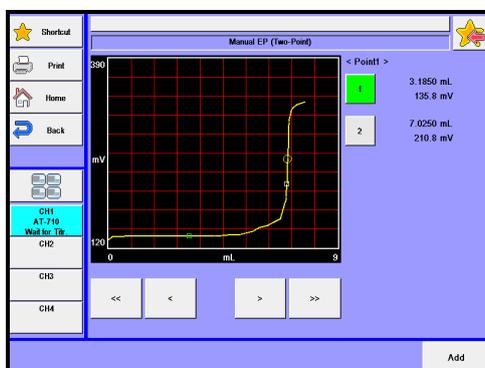

Here you can set a range where you want to find a desired EP as follows:
First, after [1] button is pushed, drag the cursor over to the desired range on the graph using [<<], [<], [>], [>>] button. Next, after [2] button is pushed, move the cursor to the targeted range in the same manner as for [1]. Then, pressing [Add] button will assign the most appropriate point as an endpoint in the range between 'point 1' and 'point 2'. The addition of endpoints will lead to the display of recalculated results. Pressing [Save] button will allow the result of re-detecting EP value to be stored in the memory.
Press [Print] button in order to print out recalculation results. The results will be printed according to the preset format.
The Sample No. on this printout is headed with "#" mark to show that the results have been processed.

[Intersect]

This button features the detection of an EP at the intersection where two (2) tangent lines cross over each other.
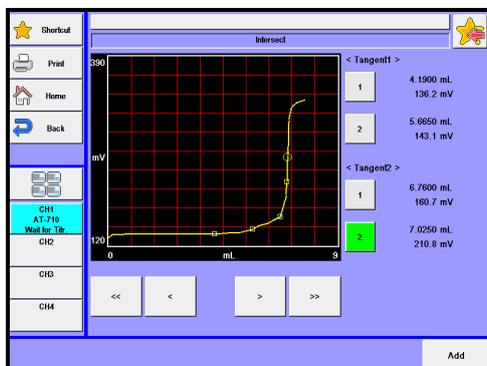
Here you can select two tangent lines by moving the cursor:
First, after [1] button of "Tangent 1" is pushed, drag the cursor over to the starting point that pulls the tangent 1 using [<<], [<], [>] or [>>] button. Next, after [2] button of "Tangent 1" is pushed, drag the cursor over to the terminal that pulls the tangent 1 using [<<], [<], [>] or [>>] button. Similarly, draw another line as "Tangent 2". Then, eventually pressing [Add] button will yield the point (EP1) where these two tangents cross over.   The addition of endpoints will lead to the display of recalculated results. Pressing [Save] button will allow the result of re-detecting EP value to be stored in the memory.
The results can be printed out with [Print] button according to the preset format. The Sample No. on this printout is headed with "#" mark to show that the results have been processed.
In the case of two (2) or three (3) endpoints, repeat this procedure by drawing tangent lines as described above for each endpoint.

[Delete EP]

Here you can delete EP's.

Select the EP with [<] or [>] button, and press [Delete] button.
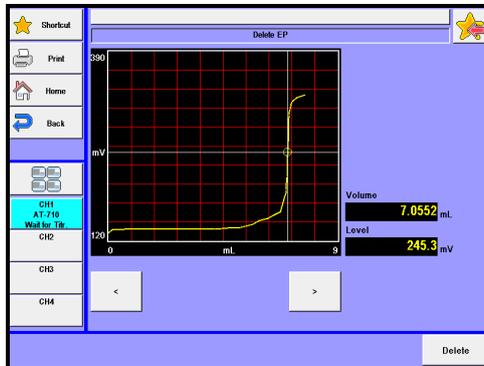
[Save]

Here you can store the results of EP re-detection.

3-3-5. [USB Flash] (Titration results)

Save the titration results on USB flash drive.
There are three file formats available, "AT-710 type", "PDF type" and "CSV type. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

< How to save titration results >

1   Select the data on [Pick Out].

     Press [USB Flash] button.
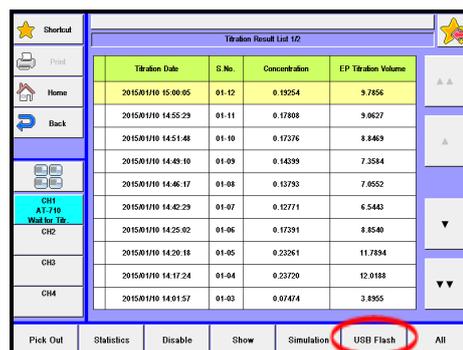
2   "Save Titration Results" screen will appear.

     Select the file format to save.
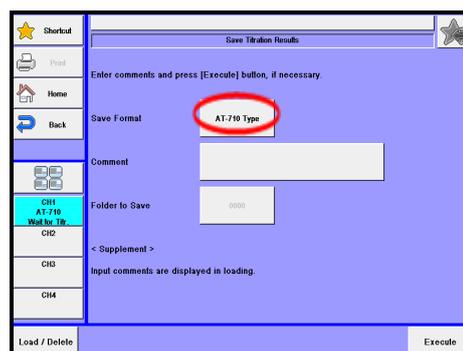
[File format]
Select a file saving format.
- AT-710 type   : Select this if you wish to check data on the MCU-710.
- PDF type   : Saved in a PDF file.
- CSV Type   : Saves in a CSV file format. Select this if you wish to perform your own analysis or to make a report with commercially available spreadsheet software (Microsoft® Excel® etc.), database software (Microsoft® Access®, etc.) or word-processing software (Microsoft® Word, etc.). The same results as printout are saved except for titration parameters, control parameters and line chart.
- CSV Type (List)   : Saves in a CSV file format into a list form in one file. Select this if you wish to perform your own analysis or to make a report with commercially available spreadsheet software (Microsoft® Excel® etc.), database software (Microsoft® Access®, etc.) or word-processing software (Microsoft® Word, etc.). The same results as printout are saved except for titration parameters, control parameters and line chart.

3   If you wish to enter your comment regarding the titration results to be stored, press the comment column on display.

The display shows the right screen. And then, press [OK].
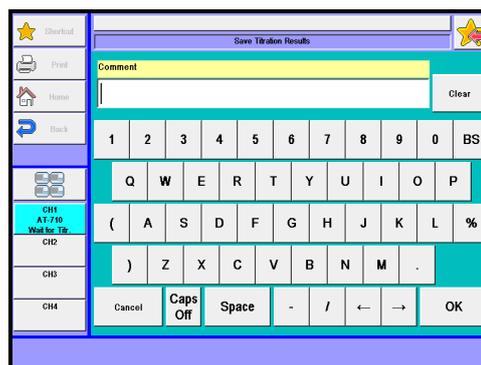
4   When saving in a CSV format, enter the folder name (input range: 0000 - 9999). Press [Execute] button on the "Save titration results" screen display. Then, the confirmation screen will be displayed and press [Yes] button.

Narrowed titration results are saved on USB flash drive, followed by returning to the "Result List" screen display.
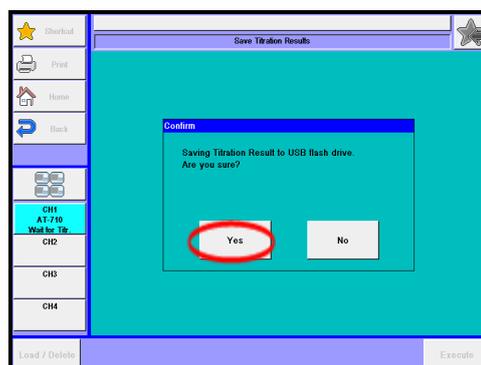
|	
Note	USB of FAT16 and FAT32 format can be used. However all operation of USB is not guaranteed. Remove USB only after saving data is complete. When data reading is underway, all buttons stop functioning. Never remove it halfway. Otherwise, it may be broken. There is no guarantee of data stored in USB flash memory regardless of any failure source. Make sure to backup data routinely as necessary with your responsibility.

Load/Delete the Titration results on USB flash drive>

| 1 | Connect the USB Flash drive to the device.

Press [USB Flash] button to show "Save Titration Results." | |

| 2 | Press [Load/Delete] button. | |

| Item	Description
[Load/Delete]	Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

Do not detach the USB flash drive from the slot when making access to it.

Note

< How to load the titration results >

1   Select the titration result to be loaded into the measuring unit on the "Loading/Deleting Titration Result" screen display and then press [Load] button.

2   The screen of "Titration Results List (USB Flash Drive)" will be displayed. Then, select the titration result to be displayed on the measuring unit and press [Load] button.

3   The selected titration results will be displayed on the measuring unit.

| Note | Read results can be printed out by changing [Print Setting]. Note that the changed [Print Setting] cannot be saved. |

3. Function

< How to delete titration results >

1 Select the file to be deleted on the "Loading/Deleting Titration Result" screen display and then press [Delete] button. The screen display will turn to the confirmation screen. Then, press [Yes] button.
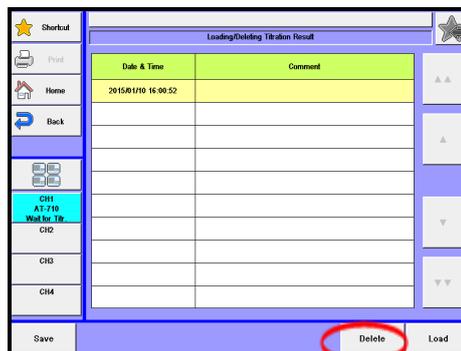
2 The file selected on USB flash drive will be deleted and the screen display will return to "Loading/Deleting Titration Result". When deleting further files of titration results, repeat the above steps 1).

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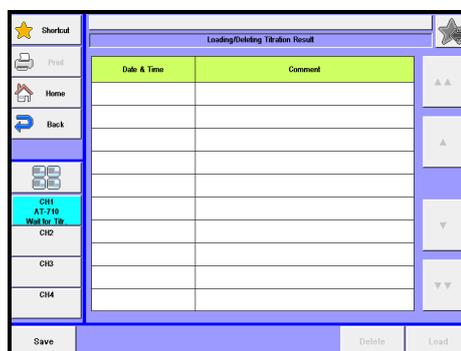
3-4. Electrode Management

By setting electrode management, you can control and manage the information on each electrode. Up to 20 information files on electrodes can be stored. Electrode information of a smart electrode can be set up.

1   Press [Electrode Management] button on "Function".
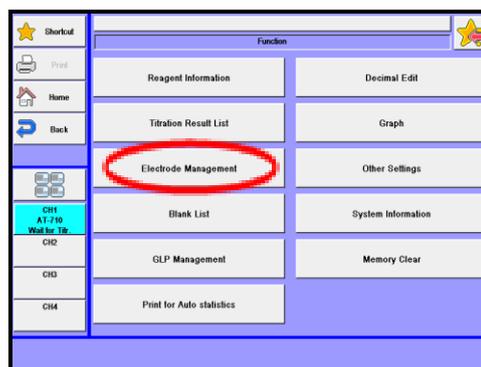
2   The screen on the right will appear.

Select the electrode information, press [Edit] button.
When set Smart electrode information, press [Smart Electrode].

[▲], [▼]
Moves the cursor on the list.

[▲▲], [▼▼]
These keys are for page turning. The cursor moves to the top of the list after page break.

[Edit]
Edit the electrode registration information at the cursor. In the electrode control, an electrode serial No., an electrode model, a type of electrode, etc. can be set up. "Electrode Registration" screen will appear by pressing this button. For details of Electrode Registration, refer to "3-4-1. [Edit]-[Electrode Registration].

Item	Description
[Smart Electrode]	Switches to the "Smart Electrode" screen. Sets up the information of the smart electrode.

💡 See "3-4-2. [Smart Electrode]" for how to set up the smart electrode.

| Item	Description
[Replace Electrode]	Deletes the electrode's serial No. and check record in the electrode registration information at the cursor. Use this when registering information of a new electrode. Press [OK] button once a confirmation message appears.
[Check Record]	Displays the electrode's check record in the electrode registration information at the cursor. **[Show]** Displays the check record. **[Graph]** Displays a chart of the check record.
[Execute Check.]	When the electrode type is Pt Electrode or Ag Electrode, electrode check is conducted using Standard solutions.
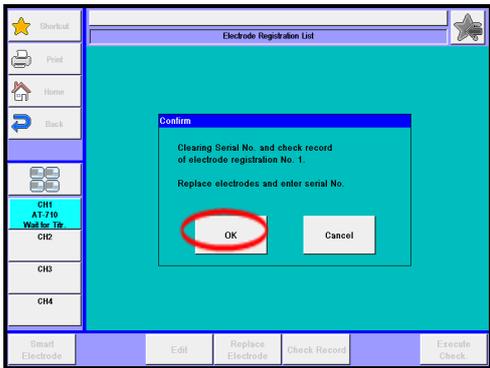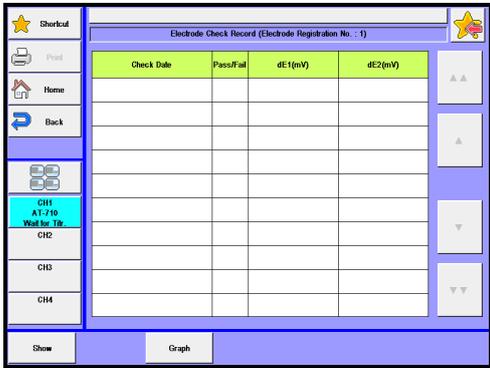
💡 For details of Execute Check., refer to "3-4-3. [Execute Check]."

3-4-1.[Edit]- [Electrode Registration]

Setting up the electrode information. At registering electrodes possessed, displays the replacement alarm or check alarm in the electrode. And you can execute of the electrode check or check the record in the electrode.

1   Select the Electrode information, press [Edit] button.

2   Please change the mode numbers and select the parameter you wish to edit.

Each parameter is determined by the [OK] button.

| Item	Description
[Electrode Serial No.]	Sets up an electrode serial No. The entry screen will appear by pressing the button which shows the electrode's serial No. Up to 19 letters can be entered.
[Electrode Model]	Sets up an electrode model. The entry screen will appear by pressing the button which shows the electrode's model. Up to 19 letters can be entered.
[Electrode Type]	Selects the electrode type. The setting screen of criteria for periodic check will switch by changing the electrode type. • Glass Electrode : Select this when you use a glass electrode. • Pt Electrode : Select this when you use a Pt electrode. • Ag Electrode : Select this when you use an Ag electrode. • Reference Electrode : Select this when you use a reference electrode • Conductivity Cell : Select this when you use a conductivity cell • Ion Selective Electrode : Select this when you use an ion selective electrode • Other : Select this when you use other electrodes.
[Asymmetry Potential Criterion]	Sets up criteria for asymmetry potential of the glass electrode. The default is 8mV±35mV. When a reading is out of this range, electrode calibration result will show NG. This is displayed when the glass electrode is selected on the electrode type. • 0 - 99mV
[pH7-4 Pot. Diff. Criterion]	Sets up criteria for the potential difference of the glass electrode in standard solutions of pH7 and pH4. When a reading is out of this value, electrode calibration result will show NG. The default is 150mV. This is displayed when the glass electrode is selected on the electrode type. • 0 - 999mV
[pH7-9 Pot. Diff. Criterion]	Sets up criteria for the potential difference of the glass electrode in standard solutions of pH7 and pH9. When a reading is out of this value, electrode calibration result will show NG. The default is 120mV. This is displayed when the glass electrode is selected on the electrode type. • 0 - 999mV
[Slope Criterion]	Sets up the slope per 1pH of the glass electrode. When a reading becomes smaller than the set value, result will show NG. The default is 90%. This is displayed when the glass electrode is selected on the electrode type. • 0 - 100%

> ☀ When the "Glass electrode" is selected on the electrode type, electrode check will be conducted by doing pH calibration. The result will be displayed on the check record screen.

Item	Description
[Standard 1-2 Pot. Diff. Criterion]	Sets up criteria for the potential difference of the Pt Electrode / Ag Electrode. When a reading becomes smaller than the set value, result will show NG. The default is 150mV for the Pt Electrode, and 25mV for Ag Electrode. This is displayed when the "Pt Electrode" or the "Ag Electrode" is selected on the electrode type. • 0 - 999mV
[Standard 1 EMF Criterion]	Sets up criteria for the EMF of the Ag Electrode in standard solution 1. When a reading is out of this value, electrode check result will show NG. The default is 440mV±40mV. This is displayed when the Ag Electrode is selected on the electrode type. • 0 - 999mV
[Standard 2 EMF Criterion]	Sets up criteria for the EMF of the Ag Electrode in standard solution 2. When a reading is out of this value, electrode check result will show NG. The default is 382mV±40mV. This is displayed when the Ag Electrode is selected on the electrode type. • 0 - 999mV

Item	Description
[Type of Titration]	Sets up a titration type. • Unclassified ： Does not classify. • Acid-base Titration ： Select this for acid-base titration. • Redox Titration ： Select this for redox titration. • Precipitation Titration： Select this for precipitation titration. • Other ： Select this for other titrations.
[Electrode Replacement Alarm]	Here you can choose from on or off for alarming electrode replacement. • Disable ： No alarm • Enable ： Alarm is on
[Electrode Replacement Date]	Here you can set up a time length by a number of days for next replacement of reagent. • [xx (Days)]： Set a time interval by a number of days • [[Update]： Set the next date for replacement as preset intervals
[Electrode Check Alarm]	Here you can choose from on or off for alarming electrode check. • Disable ： No alarm • Enable ： Alarm is on
[Do of Next Electrode Checking]	Here you can set up a time length by a number of days for next electrode check. • [xx (Days)]： Set a time interval by a number of days • [Update] ： Set the next date for replacement as preset intervals

3. Function

| Item	Description
[Internal Solution]	Sets up the information of the reference fill of a combined electrode or a reference electrode. Up to 20 letters can be entered.
[Internal Solution Alarm]	Here you can choose from on or off for alarming internal solution. • Disable : No alarm • Enable : Alarm is on
[Next Inner Solution Replacement]	Here you can set up a time length by a number of days for next inner solution replacement. • [xx (Days)] : Set a time interval by a number of days • [Update] : Set the next date for replacement as preset intervals
[Remarks]	Sets up information you would like to record with the electrode. Up to 64 letters can be entered.

To use the alarm function, make "Alarm" turned "On" when you set up on [Function] – [Other Settings].

3-4-2.[Smart Electrode]

Setting up the smart electrode information.

1	Press [Smart Electrode] button.

2	Please change the mode numbers and select the parameter you wish to edit. Each parameter is determined by the [OK] button.

| Item	Description
[Initialization]	Enables you to register information of a new electrode. Press the [Initialization] button, and you will be able to register an electrode serial No., an electrode model, an electrode type and a channel No.

Item	Description
[Execute Initialization]	Registers an electrode serial No., an electrode model, an electrode type and a channel No. in a smart electrode, and initializes the check record. The [Execute Initialization] button will be enabled when the [Initialization] button is pressed.
[Check Record]	Displays the record checked by a smart electrode. **[Show]** Displays the check record. **[Graph]** Displays a chart of the check record.

Item	Description
[Execute Check.]	When the electrode type is Pt Electrode or Ag Electrode, electrode check is conducted using Standard solutions.

For details of Execute Check., refer to "3-4-3. [Execute Check]."

Item	Description
[Electrode Serial No.]	Sets up an electrode serial No. The entry screen will appear by pressing the button which shows the electrode's serial No. Up to 19 letters can be entered. This parameter will be enabled when the [Initialization] button is pressed.

> Errors of the smart electrode are managed with this serial number.
> **Note**

[Electrode Model]	Sets up an electrode model. The entry screen will appear by pressing the button which shows the electrode's model. Up to 19 letters can be entered. This parameter will be enabled when the [Initialization] button is pressed.
[Electrode Type]	Setting up the type of the electrode. Check the electrode type set in the method. If different, an error will occur during measurement. This prevents you from using an incorrect electrode. When this parameter is changed, the settings of check criterion are changed. This parameter will be enabled when the [Initialization] button is pressed. • Glass Electrode : Select this when you use a glass electrode. • Pt Electrode : Select this when you use a Pt electrode. • Ag Electrode : Select this when you use an Ag electrode. • Reference Electrode : Select this when you use a reference electrode • Conductivity Cell : Select this when you use a conductivity cell • Ion Selective Electrode : Select this when you use an ion selective electrode • Other : Select this when you use other electrodes.
[Channel No.]	Setting up the detector number you are using. The number is checked with the set one in the method. If they are different, an error will occur before measurement. This prevents you from using an incorrect electrode. This parameter will be enabled when the [Initialization] button is pressed. • 1 : Select this when you use with the detector 1. • 2 : Select this when you use with the detector 2. • 3 : Select this when you use with the detector 3.
[Asymmetry Potential Criterion]	Sets up criteria for asymmetry potential of the glass electrode. The default is 8mV±35mV. When a reading is out of this range, electrode calibration result will show NG. This is displayed when the glass electrode is selected on the electrode type. • 0 - 99mV

3. Function

> When the "Glass electrode" is selected on the electrode type, electrode check will be conducted by doing pH calibration. The result will be displayed on the check record screen.

Item	Description
[pH7-4 Pot. Diff. Criterion]	Sets up criteria for the potential difference of the glass electrode in standard solutions of pH7 and pH4. When a reading is out of this value, electrode calibration result will show NG. The default is 150mV. This is displayed when the glass electrode is selected on the electrode type. • 0 - 999mV
[pH7-9 Pot. Diff. Criterion]	Sets up criteria for the potential difference of the glass electrode in standard solutions of pH7 and pH9. When a reading is out of this value, electrode calibration result will show NG. The default is 120mV. This is displayed when the glass electrode is selected on the electrode type. • 0 - 999mV
[Slope Criterion]	Sets up the slope per 1pH of the glass electrode. When a reading becomes smaller than the set value, result will show NG. The default is 90%. This is displayed when the glass electrode is selected on the electrode type. • 0 - 100%
[Standard 1-2 Pot. Diff. Criterion]	Sets up criteria for the potential difference of the Pt Electrode / Ag Electrode. When a reading becomes smaller than the set value, result will show NG. The default is 150mV for the Pt Electrode, and 25mV for Ag Electrode. This is displayed when the "Pt Electrode" or the "Ag Electrode" is selected on the electrode type. • 0 - 999mV
[Standard 1 EMF Criterion]	Sets up criteria for the EMF of the Ag Electrode in standard solution 1. When a reading is out of this value, electrode check result will show NG. The default is 440mV±40mV. This is displayed when the Ag Electrode is selected on the electrode type. • 0 - 999mV
[Standard 2 EMF Criterion]	Sets up criteria for the EMF of the Ag Electrode in standard solution 2. When a reading is out of this value, electrode check result will show NG. The default is 382mV±40mV. This is displayed when the Ag Electrode is selected on the electrode type. • 0 - 999mV

Item	Description
[Type of Titration]	Sets up a titration type. • Unclassified : Does not classify. • Acid-base Titration : Select this for acid-base titration. • Redox Titration : Select this for redox titration. • Precipitation Titration : Select this for precipitation titration. • Other : Select this for other titrations.
[Electrode Replacement Alarm]	Here you can choose from on or off for alarming electrode replacement. • Disable : No alarm • Enable : Alarm is on
[Electrode Replacement Date]	Here you can set up a time length by a number of days for next replacement of reagent. • [xx (Days)] : Set a time interval by a number of days • [[Update] : Set the next date for replacement as preset intervals
[Electrode Check Alarm]	Here you can choose from on or off for alarming electrode check. • Disable : No alarm • Enable : Alarm is on
[Do of Next Electrode Checking]	Here you can set up a time length by a number of days for next electrode check. • [xx (Days)] : Set a time interval by a number of days • [Update] : Set the next date for replacement as preset intervals
[Remarks]	Sets up information you would like to record with the electrode. Up to 63 letters can be entered.

> To use the alarm function, make "Alarm" turned "On" when you set up on [Function] − [Other Settings].

> **Note** Information to be recorded in a smart electrode includes the Electrode Serial No. registered at the time of initialization, the Electrode Model, the Electrode type, the Channel No., the preamplifier and the starting date. Other information is managed on the smart electrode screen and is not changed even after replacement of smart electrodes.

3-4-3. **[Electrode Check.]**

Operation of the electrode can be checked. When the electrode type is Pt Electrode or Ag Electrode, electrode check is conducted using Standard solutions.

1 Select the electrode information, press [Execute Check.] button.
   For the Smart electrode, press [Smart Electrode].Then, press [Execute Check.] button.
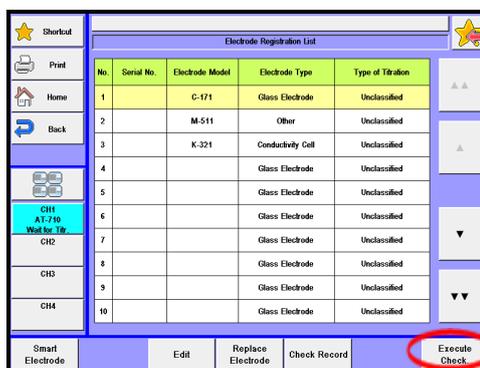
2 The screen on the right will appear.

   Perform check measurement. Press [Next button with a message of a screen.

   Exit：End of check measurement.
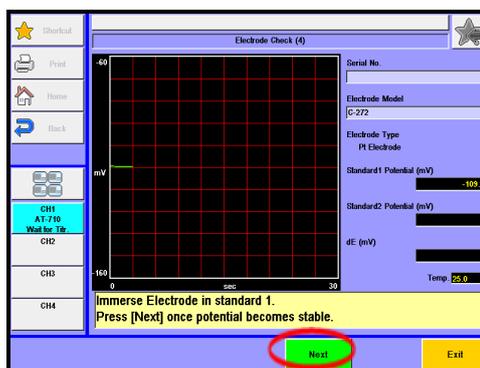
3-5. Blank List

Blank list is used to correct the value of the blank test.
Up to 99 blank values can be preset.

1   Press [Blank List] button on "Function."

2   The screen on the right will appear.

Select and edit the value you wish to edit.

Each parameter is determined by the [OK] button.

Item	Description
[BL1], …[BL99]	Here you enter blank values. Such numbered blank values can be selected and used in concentration calculation on Method parameter for calculation parameter. • 0.00000 - 9999.99999

3-6. **GLP Management**

"GLP Management", where you can check on precision of your instrument periodically. This function works when "Check" is preset on "Calc. type" for calculation parameter on Method parameter.

1	Press [GLP Management] button on "Function."	
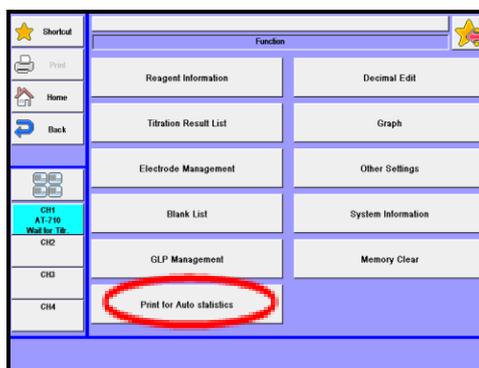
2	The screen on the right will appear. Select and edit the item you wish to edit. Each parameter is determined by the [OK] button.	
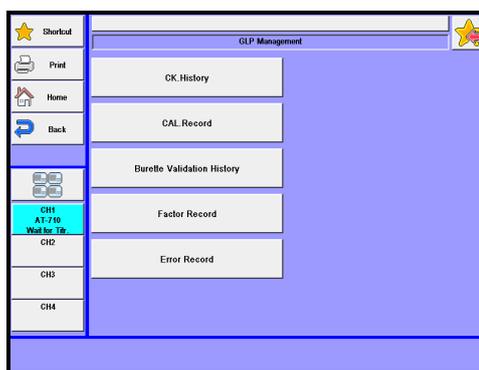
Item	Description
[CK. History]	You can view the periodic check record. Up to 100 check records can be stored.
[CAL. Record]	Can have a view of the calibration records of detectors and electrodes. Up to 100 calibration records can be stored for each calibration channel.
[Burette Validation History]	Can have a view of the history of burette precision validation.
[Factor Record]	Can have a view of the history of factor measurements record. Up to 100 check records can be stored.
[Error Record]	Can have a view of the history of error record. Up to 100 check records can be stored.
Note When it exceeds 100, the data will be erased in the order of occurrence.	

3. Function

CK. History -[Alarm]
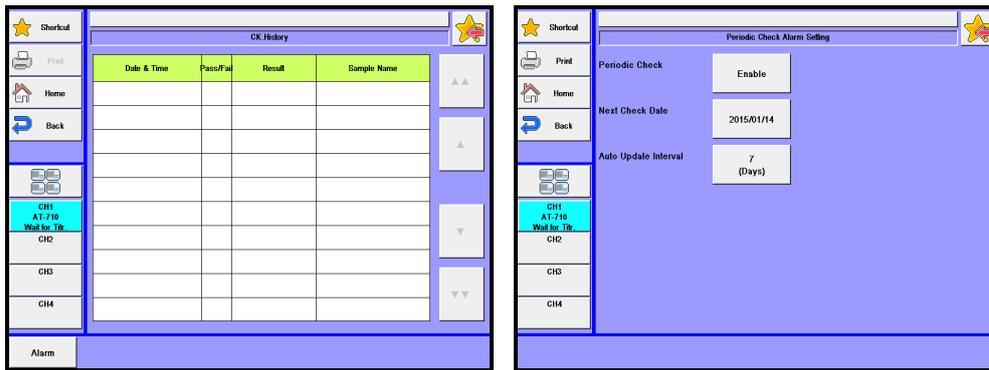
Item	Description
[Periodic Check]	Here you can set check alarm at intervals: • Disable : No alarm will work for periodic check. • Enable : Advance notice of check appears when the date becomes due. The check results can be viewed with [CK. History] button.
[Next Check Date]	You can select a next check day.
[Auto Update Interval]	The next check day is updated automatically at preset intervals.

> To use the alarm, turn on "Alarm" on [Function] – [Other Settings].

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3. Function

CAL. Record

Item	Description
[Graph]	Displays graphically the trend of the potential in the record of the most recent 10 factors.
[Show]	Displays contents of the record at the cursor.
[Ch1/pH]	Switches to the "Calibration record (Ch1/pH)".
[Ch3/pH]	Switches to the "Calibration record（Ch3/pH）".
[Ch3/Pol]	Switches to the "Calibration record（Ch3/Pol）".
[Ch3/μS]	Switches to the "Calibration record（Ch3/μS）".
[Ch3/%T]	Switches to the "Calibration record（Ch3/%T）".
[Smart Electrode]	Switches to the Calibration record for smart electrode.

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Burette validation history

Item	Description
[**Details**]	Displays contents of the record at the cursor.

## Factor record

Item	Description
[**Graph**]	Displays graphically the trend of the factor in the record of the most recent 10 factors.

3-7. Print for Auto statistics

The series of measurements performed under the same conditions (Method) can be automatically printed out by this function.

1   Press [Print for Auto statistics] button on "Function."

2   The screen on the right will appear.

Select and edit the value you wish to edit.

Each parameter is determined by the [OK] button.

| Item	Description
[Auto statistics]	Here the results of measurements performed under the same conditions are automatically batch calculated: • On : The results of measurement performed under different conditions will be batch calculated as soon as the measurement is over. Otherwise, the results of measurements performed under the same conditions are automatically batch calculated. After batch calculated, the following data will be calculated. Once power is turned off, this setting will be cleared off. • Off : No batch calculation.
[List printing]	Here you can choose from on or off for printout of statistics data list. • On : Print out the list. • Off : No printout
[Exclusion of Mac/Min]	Sets up exclusion of maximum value and minimum value of statistic data for statistic calculation. • On : Calculation is performed to the exclusion of maximum value and minimum value of statistic data. • Off : Calculation is performed with statistic data.
< Conditions for statistics >	A series of consecutive measurements will be batch calculated and printed out provided the following parameters are preset under the sample conditions: • Calc. Type : Calculation parameter preset on Method • High Sample No.: High order number for sample group • Method No.: The Method number used in measurement • Sample ID : The identification code present on Sample settings • Unit 1 - 5 : Preset as a calculation parameter on Method
[Statistics Reset]	You can erase the statistical data.

> 💡 For details of statistics, refer to "3-3-2. [Statistics]."

3-8. **Decimal Edit**

This function includes setting the number of decimal places for a sample size when printed out or displayed on screen as well as how to round off in calculation.

1   Press [Decimal Edit] button on "Function."

2   The screen on the right will appear.

Select and edit the value you wish to edit.

Each parameter is determined by the [OK] button.

| Item	Description
[Sample Size]	Here you select a number of decimal place and fraction rounding for sample size as follows: • Round : rounded to nearest preset number of digits after decimal point. • Round Off : rounded down to nearest preset number of digits after decimal point. • Round Up : rounded up to nearest preset number of digits after decimal point.
[Statistics]	Here you select a number of decimal place and fraction rounding for sample size as follows: • Round : rounded to nearest preset number of digits after decimal point. • Round Off : rounded down to nearest preset number of digits after decimal point. • Round Up : rounded up to nearest preset number of digits after decimal point.
[Blank]	Here you select a number of decimal place and fraction rounding for sample size as follows: • Round : rounded to nearest preset number of digits after decimal point. • Round Off : rounded down to nearest preset number of digits after decimal point. • Round Up : rounded up to nearest preset number of digits after decimal point.
[Factor]	Here you select a number of decimal place and fraction rounding for sample size as follows: • Round : rounded to nearest preset number of digits after decimal point. • Round Off : rounded down to nearest preset number of digits after decimal point. • Round Up : rounded up to nearest preset number of digits after decimal point.

The above setting of a number of decimal place appears on display and in printing.

3-9. **Graph**

Arrange graphic display and printout.

1	Press [Graph] button on "Function."

2	The screen on the right will appear. Select and edit the value you wish to edit. Each parameter is determined by the [OK] button.

Item	Description
[Range Mode]	The graphic range mode can be selected as follows. • Auto : Graphic range is automatically set up. • Fixed : You can choose a fixed range by pressing [Details] button. • Auto Horizontal Axis : Locks vertical axis of Graph range. Press [Details] button, and "Graph Range" screen will appear. Set up locked range.
[Range Mode] -[Details]	Set the fixed range for graph. With this button, "Graph Range" screen will be displayed. This becomes significant when "Fixed" or "Auto Horizontal Axis" is chosen for "Range Mode."

＜Graph range setup＞

[Low Volume], [Max Volume]

    Set the minimum and maximum titration volume.
- 0.0000 - 9999.9999mL

[Low Level (mV)], [High Level (mV)]

    Set the lowest and highest potential level.
- -9999.9 - 9999.9mV

[Low Level (pH)], [High Level (pH)]

    Set the lowest and highest pH level.
- -99.99 - 99.99pH

[Low Level (μA)], [High Level (μA)]

    Set the lowest and highest potential level.
- -999.99 - 999.99μA

[Low Level (%T)], [High Level (%T)]

    Set the lowest and highest potential level.
- -9999.9 - 9999.9%T

[Low Level (Abs.)], [High Level (Abs.)]

    Set the lowest and highest potential level.
- -99.999 - 99.999Abs.

[Low Level (μS)], [High Level (μS)]

    Set the lowest and highest potential level.
- -99999.9 - 99999.9μS

[Low Temp. (C)], [High Temp. (C)]
>   Set the lowest and highest temperature.
>   - 0.0 - 120.0 Deg.C

[Low Total Volume (Stat Titr.)], [High Total Volume (Stat Titr.)]
>   Set the minimum and maximum titration volume.
>   - 0.0000 - 9999.9999mL

[Low Volume (Stat Titr.)], [High Volume (Stat Titr.)]
>   Set the minimum and maximum titration volume.
>   - 0.0000 - 9999.9999mL

[Short Time (Stat Titration)], [Long Time (Stat Titration)]
>   Set the shortest and longest time in stat titration.
>   - 0 - 1728000s

Item	Description
[Primary Diff. Curve]	Select the display for differential curve of normalization potential to determine the endpoint. • Off : No primary differential curve is displayed on graph. • On : Primary differential curve will be displayed on graph.
[Plot Display]	Select form of titration curve you wish to view or print out. • Off : Plot titration curve by connecting each point of data list. • On : Plot stepped titration curve per titration volume.
[Ref. Channel]	Select the option of displaying reference channel on the graph: • Off : No reference channel will be displayed on the graph. • On : Reference channel will be displayed on the graph.
[Division of X-Axis]	Select the division number of X-axis on a graph. • 2 - 20
[Division of Y-Axis]	Select the division number of Y-axis on a graph. • 2 - 20
[Vertical Axis]	Select graphical data for ordinate (vertical axis) in stat titration. • Total volume, Potential : Total titration volume and actual potential are plotted on the ordinate. • Volume, Potential : Titration volume and actual potential are plotted on the ordinate. • Volume : Titration volume is plotted on the ordinate.

3-10. Other Settings

Set the auto input of average values, and the alarm function, etc.

1 Press [Other Settings] button on "Function."

2 The screen on the right will appear.

Select and edit the value you wish to edit.

Each parameter is determined by the [OK] button.

Item	Description
[Print of Header]	Make setting of header printing. The header includes 'Model name', 'Serial No.' and 'Print Date'. The header print for titration results can be set on the report parameter of Method parameters. • On : Header is printed. • Off : No header is printed.
[Print of Footer]	Make setting of footer printing. The footer includes a printing operator. The footer print for titration results can be set on the report parameter of Method parameters. • On : Footer is printed. • Off : No footer is printed.
[Auto Setting, Mean]	The average value of a plural number of blank levels or factor that have been measured will be automatically set into the blank value to be used in sample setup or the factor value to be used in reagent information respectively. • On : Auto set in the blank or factor. • Off : No setting. Each measurement result is put in the blank or factor.

> **Note**
> In the automatic setting of the mean value, the data of the unexpected value is not adopted. (As for the factor value, neither a negative value nor the value of 100 or more is adopted. As for the blank value, neither a negative value nor the value of 100,000 or more is adopted.)

< Auto factor input >

When measurements are made by setting "Calc. Type" to "Factor" by selecting [Method] – [Edit] – [Calculation Parameter], the mean value is automatically input as the factor (TF) of reagent information ([Reagent Parameter]) that is preset in "Burette No." of [Titration Parameters] every time measurements are made.

< Auto blank input >

When measurements are made by setting "Calc. Type" to "Blank" by selecting [Method] – [Edit] – [Calculation Parameter], the mean value is automatically input to "Blank value n" of the "Blank input number" that is preset in [Calculation Parameter] – [Formula] – [Details] every time measurements are made.

> **Note**
> A value to be used for auto setting of average value will be cleared when measuring after changing the method contents or after switching methods, or when turning off power.

Item	Description
[Alarm]	This gives the alarm about calibration of detector, periodic check, etc. • On : Alarm is on. • Off : No alarm.
[Result Disp.]	You can select the display time length of measurement results. Zero "0" second means the display is to be held on screen. • 0 - 3600s
[Smart Burette Functionality]	Selects use of functionality of smart burette. • Enable : Enables functionality of smart burette. • Disable : Disables functionality of smart burette.
[Suction Speed]	Set the speed of filling the built-in burette with reagent or when reset. Slow down the speed for titration liquid like alcoholic solution that can easily generate air bubbles. • Fast : Burette operates at its maximum speed. Ordinary setting. • Medium : Burette operates at its medium speed. • Slow : Burette operates at its low speed.
[Re-Titration]	This function is useful when titration may reach maximum volume in halfway, and be ended. • Off : No further titration is performed. • On : Titration continues.

< When Re-Titration is selected to "On" >

· When the titration does not end up with EP detection by the set EP number.
When the titrant consumed reaches a maximum volume, the titration falls in a pause mode.
In order to continue the titration, press [Max. Volume] button, reenter a maximum volume titrated, and then press [Pause Off] button.
When terminating the titration immediately, just press [Reset] button.

· When the titration ends up with EP detection by the set EP number.
AT-710 will suspend the operations when the set number of EP is detected.
Here, for the case where the setting of "Titr. over volume" is effective, the titration will suspend after the dose of "Titr. over volume" of the titrant.
In order to continue the titration, press [Max. Volume] button, reenter a maximum volume titrated, and then press [Pause Off] button.
When terminating the titration immediately, just press [Reset] button.

> **Note** When a multiple sample changer is used, Re-titration cannot be carried out. When the titration mode is set to "Learn" or "COD", "Re-titration" cannot be carried out.

Item	Description
[Free button]	From shortcuts, select one you wish to place to the position of the shortcut button on the main screen. "Unit Replacement" is set as default. • Unit Replacement : Places a button for replacing burette units to the position of the shortcut button on the main screen. When pressed, it will reset. • Shorcut1-12 : Places a button registered on each shortcut to the position of the shortcut button on the main screen. • SOP1-5 : Places a button registered on the SOP setting of the shortcut to the position of the shortcut button on the main screen.
[Titration Kist Item]	Sets up display items of the titration result list. • Method : Displays a method. • Result/Volume : Displays the result and the titration volume.
[Smart Electrode Check]	Press the [Check] button, and the titrator will check if the smart electrode works normally.
[Check Titr. Type (Smart Electrode)]	Sets up the setting of the error determination functionality of the smart electrode. Select "Disable" when you wish to conduct error determination on the smart burette alone.

3-11. System Information

You can view the list of equipment presently connected to the channels in work as well as the information on software version.

1   Press [System Information] button on "Function."
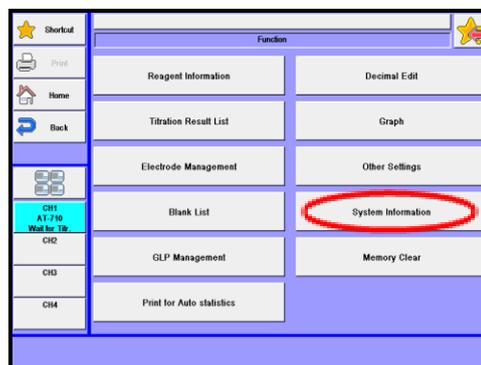
2   The screen on the right will appear.
The information on the list of equipment presently connected to the channel and the software version.

3   Press [Next] button. The operating time of the titrator, the stroke count of the burette and the stroke count of the cylinder are displayed.

3-12. **Memory Clear**

With this function, you can erase measurement results, methods or sample parameters selectively by individual sample.

1   Press [Memory Clear] button on "Function."
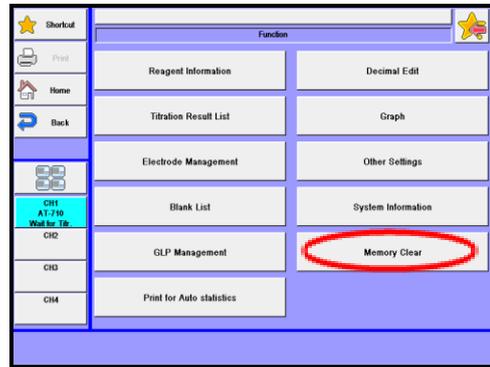
2   The screen on the right will appear.
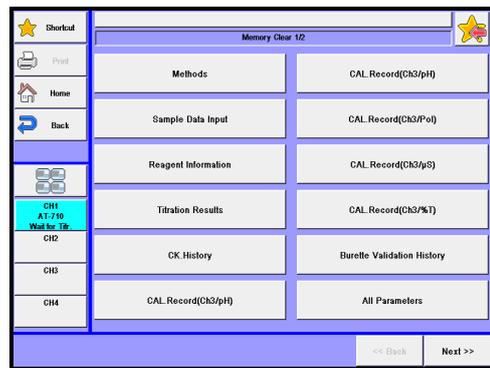
Item	Description
[Methods]	You can erase all of the Methods. Set values (default) are "Auto titration" for "Titration mode" and "EP Stop" for "Titration form."
[Sample Data Input]	All the set up contents are erased.
[Reagent Information]	You can erase all the information about reagents.
[Titration Results]	All the titration results are erased.
[CK.History]	All the check records are erased.
[CAL. Record (Ch1/pH)]	All the "Calibration record (Ch1/pH)" are erased.
[CAL. Record (Ch3/pH)]	All the "Calibration record (Ch3/pH)" are erased.
[C CAL. Record (Ch3/Pol)]	All the "Calibration record (Ch3/pol)" are erased.
[CAL. Record (Ch3/µS)]	All the "Calibration record (Ch3/µS)" are erased.
[CAL. Record (Ch3/%T)]	All the "Calibration record (Ch3/%T)" are erased.
[Burrete Validation History]	All the check records for burette inspection are erased.
[All Parameters]	All the information and data other than setup contents are erased.
[Factor Record]	All the factor histories are erased.
[Error Record]	All the error records are erased.

4. Calibration

4-1. Calibration condition setup

Up to 5 conditions can be stored. "Calibration condition name" and "Channel/Unit" will be displayed as preset in the calibration condition setup.

1 Press [Calibration] button.
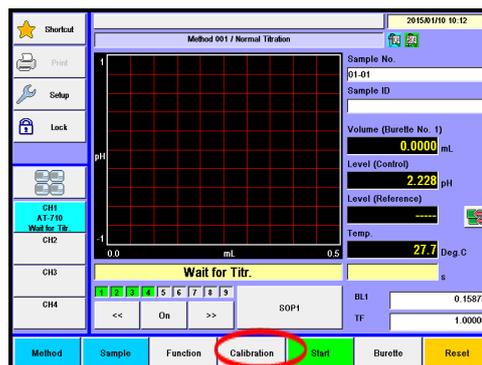
2 The screen on the right will appear.

Select and edit the item you wish to edit.
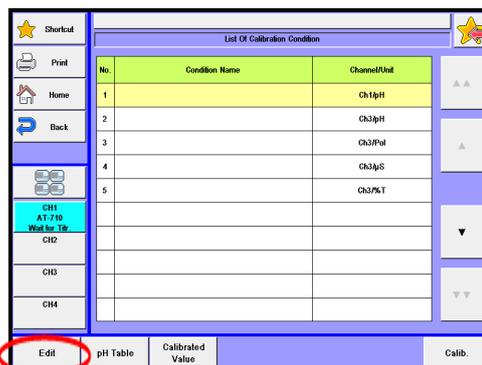
(CHA-600 connected)

[▲], [▼]
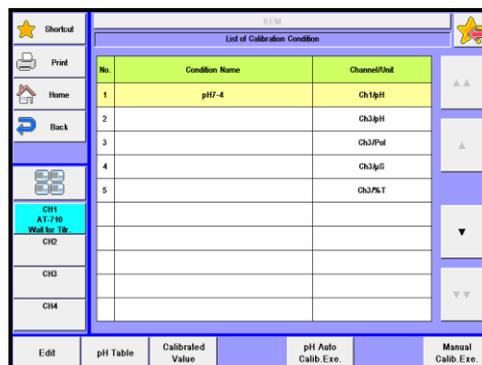
    Move the cursor on the screen display for 'List of calibration conditions'.

[Edit]

    Display each calibration condition setup screen. Can set "Calibration condition name" and calibration conditions. Calibration condition differs depending on the detector number and unit of a preamplifier.
    For details of calibration condition setup, see "4-2. [Configure sensor calibration conditions]."

[pH Table]

    Can see the pH table setup screen display. AT-710 is equipped with the table for temperature compensation at pH7/pH4/pH9 based on the JIS standard. For other pH standard solutions, you can configure vicinity temperature and pH value for the pH standard solutions so that temperature compensation is automatically carried out for calibration. For pH table setup, refer to Section "4-7. [pH Table]."

[Calibrated Value]

    You can view the present calibration record.

[Calib.]

    Calibration is performed according to the present calibration conditions.

**[pH Auto Calib. Exe.]**

    When a multiple sample changer is used, Calibration is performed according to the present calibration conditions.

[Manual Calib. Exe.]

    When a multiple sample changer is used, Manual calibration is performed according to the present calibration conditions.

4-2. [Configure sensor calibration conditions]

Set calibration conditions.
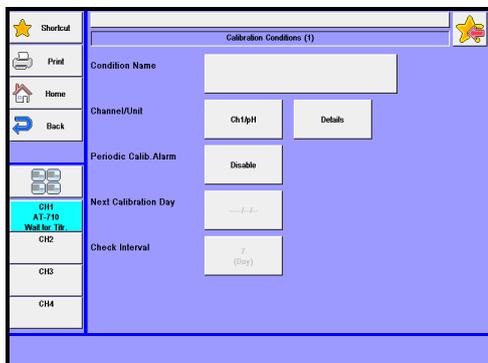
[Condition Name]

Set sensor name or electrode type used for calibration. Up to 20 characters can be entered.

[Channel/Unit]

Set detector channel and unit for calibration.

- Ch1/pH
  : pH calibration by Detector 1 common to all preamplifiers. The screen for calibration conditions setup (Ch1/pH) appears when pressing [Details] button.
- Ch3/pH
  : pH calibration by Detector 3 when TET- preamplifier is connected. The screen for calibration conditions setup (Ch3/pH) appears when pressing [Details] button.
- Ch3/Pol
  : Regulated current/potential calibration by Detector 3 when POT- preamplifier is connected. The screen for calibration conditions setup (Ch3/Pol) appears when pressing [Details] button.
- Ch3/µS
  : Cell conductivity calibration by Detector 3 when CMT-preamplifier is connected. The screen for calibration conditions setup (Ch3/µS) appears when pressing [Details] button.
- Ch3/%T
  : Transmittance, %T, by detector 3 when PTA- preamplifier is connected. The screen for calibration conditions setup (Ch3/%T) appears when pressing [Details] button.

Table 4-2. Combination of preamplifiers and detectors

Preamplifier	Detector 1	Detector 2	Detector 3
STD-			–
PTA-			%T, Abs
POT-	pH, mV, Temp.	mV	μA, mV
CMT-			μS/cm
TET-			pH, mV, Temp.

[Details]

The user can see the screen display for various calibration conditions on the channel/unit setup.

For detailed setup of calibration conditions for "Ch1/pH" or "Ch3/pH" Channel/Unit, see 4-3. Configure sensor calibration conditions (Ch1/pH, Ch3/pH).

For detailed setup of calibration conditions for "Ch3/Pol" Channel/Unit, see 4-4. Configure sensor calibration conditions (Ch3/Pol).

留意　For detailed setup of calibration conditions for "Ch3/μS" Channel/Unit, see 4-5. Configure sensor calibration conditions (Ch3/μS).

For detailed setup of calibration conditions for "Ch3/%T" Channel/Unit, see 4-6. Configure sensor calibration conditions (Ch3/%T).

[Periodic Calib. Alarm]

Periodic calibration alarm can be implemented here.

- Disable　: No alarm is implemented.
- Enable　: Periodic calibration alarm is implemented by letting you know calibration to be performed on the scheduled day. Calibration results can be viewed with [CAL. record] button.

[Next Calibration Day]

The user can schedule next calibration day for a periodic calibration.

[Check Interval]

The user can schedule check interval for next calibration day. Carrying out periodic calibration will allow the next calibration date to be automatically renewed at the preset intervals.

4-3. Configure sensor calibration conditions (Ch1/pH, Ch3/pH)

Set calibration conditions for pH electrode.
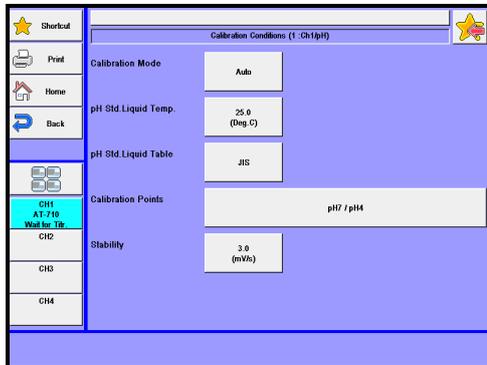
[Calibration Mode]

Set calibration mode for pH calibration:

- Auto : This mode automatically calibrates from the table of correlation of the built-in pH standard with temperature. Up to 9 calibration points can be selected.
- Manual : This mode calibrates to the pH value manually entered. Up to 9 calibration points can be selected.

— Parameters for Auto calibration mode —

[pH Std. Liquid Temp.]

Set the temperature of the standard solution. This setting will be invalid when connecting a temperature compensating electrode and allows to read the temperature automatically during a calibration.

- 0.0 - 100.0· Deg.C

[pH Std. Liquid Table]

The user can select a table of temperature compensation for standard solution as follows:

- JIS : Table of temperature and pH relation as specified in JIS Z8802
- ASTM : Table of temperature and pH relation as specified in ASTM E70-97 for pH4/pH7/pH9
- BS : Table of temperature and pH relation as specified in BS 1647 for pH4/pH7/pH9
- NF : Table of temperature and pH relation as specified in NF T90-008 for pH4/pH7/pH9
- DIN : Table of temperature and pH relation as specified in DIN19 266 for pH4/pH7/pH9
- NIST : Table of temperature as specified in US ORION's pH "All in One" buffer kits (Cat. No. 910105)
- User : Table of temperature and pH relation as preset on pH table setup display

Refer to table 4-3-1 for the relation of each country's pH standard solution.

Refer to table 4-3-2 for the NIST's relation between temperature and standard solution.

Table 4-3-1

Standard	pH liquid	Spec. No.	Standard components
JIS	pH1.7	JIS Z8802	0.05mol/kg-Potassium trihydrogen dioxalate
	pH4		0.05mol/kg-Potassium hydrogen phthalate
	pH7		0.025mol/kg-Potassium hydrogenphosphate - 0.025mol/kg-Sodium hydrogenphosphate
	pH7.4		0.008695mol/kg-Potassium hydrogenphosphate - 0.03043mol/kg-Sodium hydrogenphosphate
	pH9		0.01mol/kg-Sodium tetraborate
	pH10		0.025mol/kg–Sodium hydrogen carbonate - 0.025mol/kg-Sodium carbonate
ASTM	pH4	E70-97	0.05mol/kg-Potassium hydrogen phthalate
	pH7		0.025mol/kg-Potassium hydrogenphosphate - 0.025mol/kg-Sodium hydrogenphosphate
	pH9		0.01mol/kg-Sodium tetraborate
DIN	pH4	19 266	Dissolve 10.21g ($KHC_8H_4O_4$) in 1000mL (25°C) water.
	pH7		Dissolve 3.38g (KH_2PO_4)+3.53g (Na_2HPO_4) in 1000mL (25°C) water.
	pH9		Dissolve 3.814g ($Na_2B_4O_7 \cdot 10H_2O$) in 1000mL (25°C) water.
BS	pH4	1647	Dissolve 10.21g ($KHC_8H_4O_4$) in 1000mL (20°C) water.
	pH7		Dissolve 3.39g (KH_2PO_4)+3.54g (Na_2HPO_4) in 1000mL(20°C) water.
	pH9		Dissolve 3.80g ($Na_2B_4O_7 \cdot 10H_2O$) in 1000mL (20°C) water.
NF	pH4	T90-008	Dissolve 10.21g ($KHC_8H_4O_4$) in 1000mL water.
	pH7		Dissolve 3.402g (KH_2PO_4) + 3.549g (Na_2HPO_4) in 1000mL water.
	pH9		Dissolve 3.81g ($Na_2B_4O_7 \cdot 10H_2O$) in 1000mL water.

4. Calibration

Table 4-3-2

Standard		pH		
NIST	temperature	pH4	pH7	pH10
	0	4.00	7.11	10.32
	5	4.00	7.08	10.25
	10	4.00	7.06	10.18
	20	4.00	7.01	10.06
	25	4.01	7.00	10.01
	30	4.02	6.98	9.97
	40	4.03	6.97	9.89
	50	4.06	6.97	9.83
	60	4.08	-	-
	70	4.13	-	-
	80	4.16	-	-
	90	4.21	-	-
	95	4.24	-	-

[Calibration Points]

Select a combination and order of pH standard solutions used for calibration.

When pH Std. Liquid Table is anything other than "User":
- pH7/4 /9/10/1.7/7.4

When buffer solution temp. table is "User":
- Std.1/Std.2/Std.3/Std.4/Std.5/ Std.6/Std.7/Std.8/Std.9

[Stability]

Here you can set the potential for stability sense potential for calibration. Calibration proceeds to the next step automatically, when the electric potential becomes stable within the set value.
- 0 - 100mV/s

− Parameter for manual calibration mode −
[Calib. Point]

Select the number of calibration points for manual calibration:
- 2 - 9

[Std. Buffer 1]

Set pH value for the first calibration point.
- 0.00 - 14.00

[Std. Buffer 2]

Set pH value for the second calibration point.
- 0.00 - 14.00

[Std. Buffer 3]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is more than three (3).
- 0.00 - 14.00

[Std. Buffer 4]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is more than four (4).
- 0.00 - 14.00

[Std. Buffer 5]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is more than five (5).
- 0.00 - 14.00

[Std. Buffer 6]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is more than six (6).
- 0.00 - 14.00

[Std. Buffer7]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is more than seven (7).
- 0.00 - 14.00

[Std. Buffer 8]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is more than eight (8).
- 0.00 - 14.00

[Std. Buffer 9]

Set pH value for the third calibration point. This will be displayed when "Calib. Point" is nine (9).
- 0.00 - 14.00

Note	For the details of calibration method, see Operation Manual "3-3. Calibration of detectors (preamplifiers) and electrodes."

4-4. Configure sensor calibration conditions (Ch3/Pol)

Set the conditions of polarization when a preamplifier for polarization titration is used:
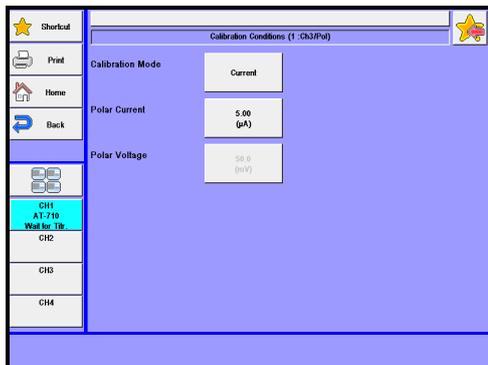
[Calibration Mode]

Select a polarization mode:

- Constant current polarization
- Constant voltage polarization

[Polar Current]

Set a polar current for constant polar current mode:

- 0.00 - 20.00 μA

[Polar Voltage]

Set a polar voltage for constant voltage polarization mode:

- 0.00 - 500mV

> **Note**
>
> For more details about calibration method, see Operation Manual "4-1-2. Preamplifier for polarization titration (POT-)".

4-5. Configure sensor calibration conditions (Ch3/μS)

Set conditions of conductivity cell when a preamplifier for conductometric titration is used:
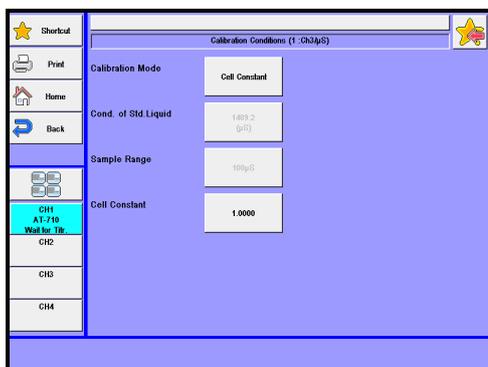
[Calibration Mode]

　　Select a calibration mode:
- Cell Constant
- Std. Solution

[Cond. of Std. Liquid]

　　Set the conductivity of standard solution:
- 0.0 - 9999.9μS

[Sample Range]

　　Set a sample range depending on conductivity of standard solution.
- 100μS/ 1000μS/ 10000μS

[Cell Constant]

　　Set the cell constant indicated on a conductivity cell.
- 0.0000 - 99.9999

> **Note** For the details on calibration, see Operation Manual "4-1-3. Preamplifier for conductometric titration (CMT-)."

4-6. Configure sensor calibration conditions (Ch3/%T)

Set calibration conditions on transmittance of an adapter used for photometric titration when a preamplifier for photometric titration is used:
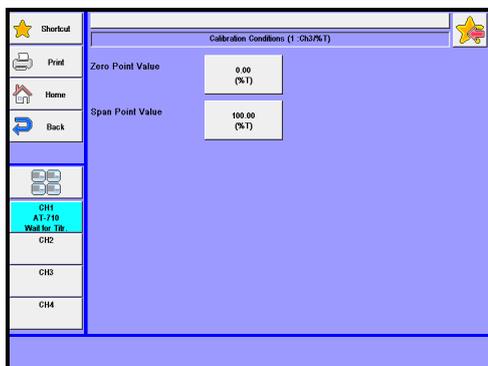
[Zero Point Value]

Set a zero calibration value for the photometric titration adaptor.   Ordinarily, set it at 0%T when light-transmittance is prevented.

- 0.00 ~ 120.00%T

[Span Point Value]

Select span calibration value for the photometric titration adaptor.   Ordinarily, set it at 100%T for the transmittance of pure water.

- 0.00 ~ 120.00%T

Note	For the details on calibration method, see Operation Manual "4-1-1. Preamplifier for photometric titration (PTA-)."

4-7. [pH Table]

The user can view the table menu screen (as shown below) for setting temperature-pH relation by selecting [Configure sensor calibration conditions (Ch1/pH)] or [Configure sensor calibration conditions (Ch3/pH)] – [pH Std. liquid table] or configuring the user defined table.
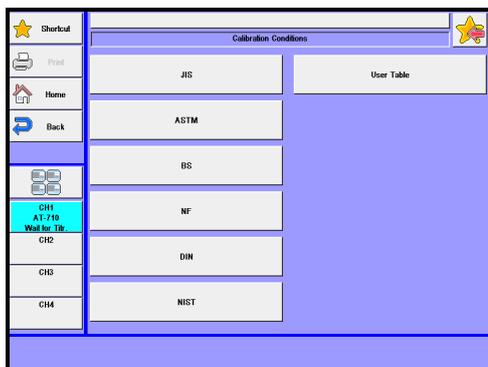
[JIS]

> Table for temperature-pH relation as specified in JIS Z8802

[ASTM]

> Table for temperature-pH relation as specified in ASTM E70-97 on pH4/pH7/pH9

[BS]

> Table for temperature-pH relation as specified in BS 1647 on pH4/pH7/pH9

[NF]

> Table for temperature-pH relation as specified in NF T90-008 on pH4/pH7/pH9

[DIN]

> Table for temperature-pH relation as specified in DIN19 266 on pH4/pH7/pH9

[NIST]

> Table for temperature-pH relation as specified in NIST; Actually the temperature table on the US ORION's pH "All in One" buffer kits (Cat. No.910105)

[User Table]

> Table for temperature-pH relation as specified where the user sets up a table of its own.
> User table setup screen will be displayed.

4-8. [pH Table] – [User Table]

When pressing [pH Table] – [User Table], the "User Table Setting" screen will appear.

AT-710 has various pH tables (pH 4/7/9etc.) on the corresponding standards. When using pH standard solutions other than the built-in ones, configuring necessary vicinity temperatures and pH values in using the pH standard solution will allow the temperature in calibration to be automatically compensated to perform calibration.
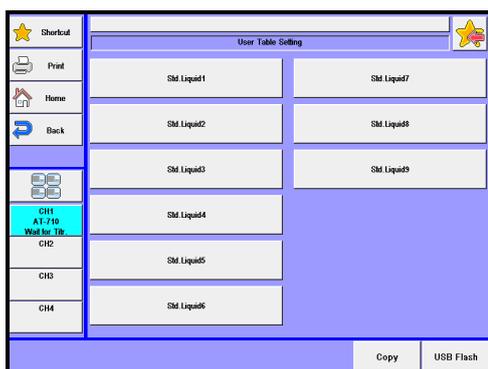
[Std. Liquid 1]

The user can set up the lowest pH table on "User table setting 1/3 (Standard 1)" screen.

[Std. Liquid 2]

The user can set up the second lowest pH table on "User table setting 1/3 (Standard 2)" screen.

[Std. Liquid 3]

The user can set up the third lowest pH table on "User table setting 1/3 (Standard 3)" screen.

[Std. Liquid 4]

The user can set up the fourth lowest pH table on "User table setting 1/3 (Standard 4)" screen.

[Std. Liquid 5]

The user can set up the fifth lowest pH table on "User table setting 1/3 (Standard 5)" screen.

[Std. Liquid 6]

The user can set up the sixth lowest pH table on "User table setting 1/3 (Standard 5)" screen.

[Std. Liquid 7]

The user can set up the seventh lowest pH table on "User table setting 1/3 (Standard 7)" screen.

[Std. Liquid 8]

The user can set up the eighth lowest pH table on "User table setting 1/3 (Standard 8)" screen.

[Std. Liquid 9]

The user can set up the highest pH table on "User table setting 1/3 (Standard 9)" screen.

[Copy]

Copies calibration conditions to a different channel.

[USB Flash]

The User tables can be stored in an optional USB flash drive. Also reads the saved calibration conditions from a USB flash drive and deletes the saved data in a USB flash drive. For the details on how to save user table into USB flash drive, see the section, "4-8-1. [USB Flash] (User Table)."

< About "User table setting x/3 (Standard X)" screen display >

The user can enter a set of 17 points for temperature (0.0 - 100.0°C) and pH (0.000 - 14.000).

Note	This table gets enabled by setting pH table to "User" when calibration mode is "Auto" in the Calibration method.

[<<Back], [Next>>]

Move the screen display by one page backward or forward.

4-8-1. [USB Flash] (User Table)

Save the User table into USB flash drive together. Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

< How to save user table >

1 Press [USB Flash] button to show "Sample User Table." When entering comments with the user table to be saved, press the portion where comment is displayed.
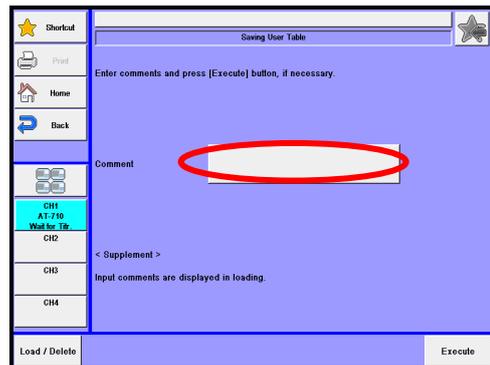
2 After confirming the right screen display, enter comments and press [OK] button.
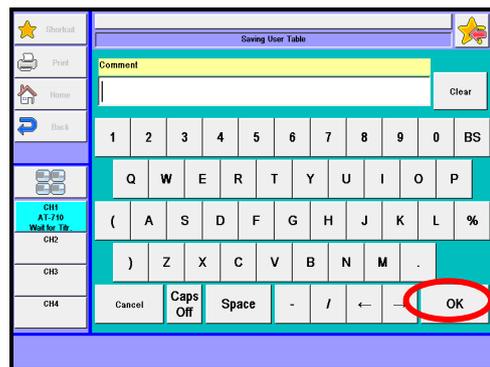
3 Press [Execute] button on the "User Table Save" screen display. Confirming the verifying-entry message, press [Yes] button.
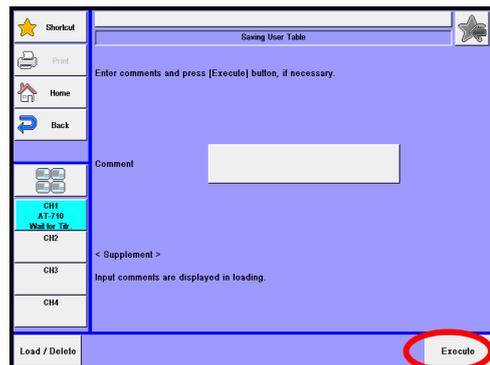
4 The user tables are saved into USB flash drive and the screen display returns to the initial menu.

<Load/Delete the user table on USB flash drive>

1	Connect the USB Flash drive to the device. Press [USB Flash] button to show "User Table Save.
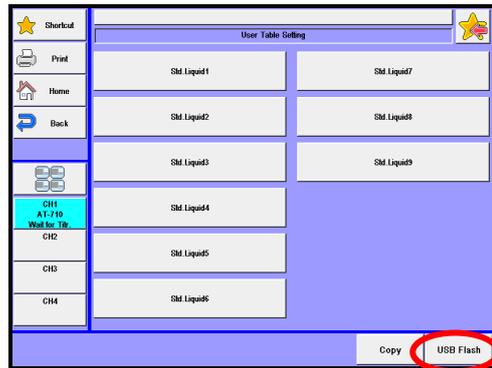
2	Press [Load/Delete] button.
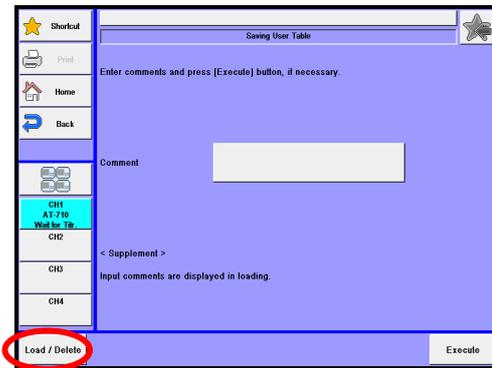
Item	Description
[Load/Delete]	Either load the data stored on USB flash drive into the measuring unit or delete the data stored on USB flash drive.

> **Note** Do not detach the USB flash drive from the slot when making access to it.

4. Calibration

< How to load the sample setting >

1 Select the sample setting to be loaded into the measuring unit on the "Loading/Deleting User Table" screen display and then press [Load] button.

2 When the confirmation screen is displayed, press [Yes] button.
The user tables will be copied onto the user table and the screen display will return to "Loading/Deleting User Table."
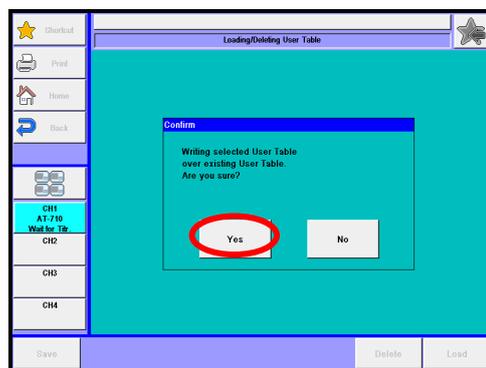
< How to delete the user table >

1 Select the file to be deleted on the "Loading/Deleting User Table" screen display and then press [Delete] button. The screen display will turn to the confirmation screen. Then, press [Yes] button.
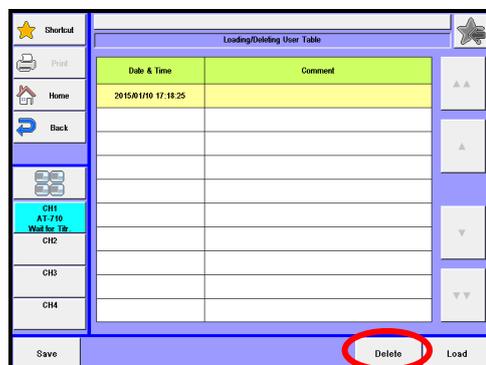
2 The file selected on USB flash drive will be deleted and the screen display will return to "Loading/Deleting User Table". When deleting further files of sample setting, repeat the above steps 1).

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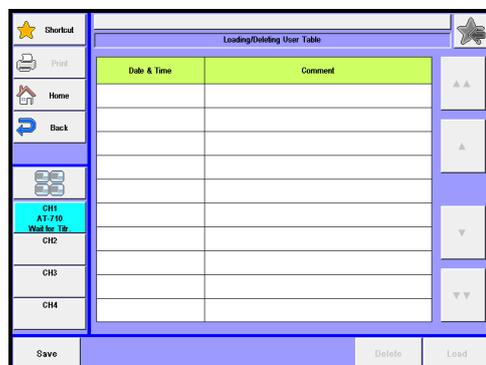
5. Burette

The burette can be manually operated for filling or fixed dosing the burette with reagent or to purge the burette.

5-1. Manual Operation

The burette can be manually operated for filling the burette with reagent or to purge the burette.
You can manually operate the burette like these only when the unit is in "Wait for Titr." mode.

1	Press [Burette] button on Main display.	
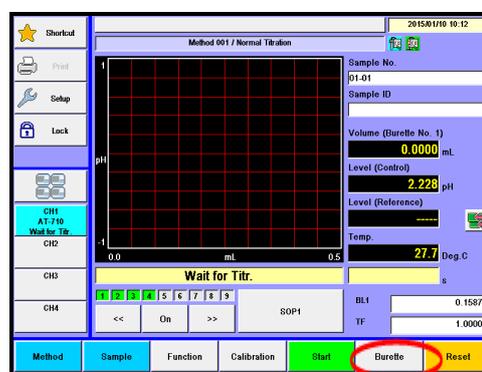
2	The screen on the right will appear. Select the items you wish to set up, and operate the burette.	
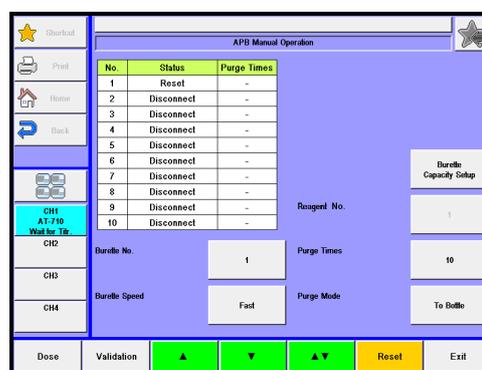
Item	Description
[Burette No.]	Select the burette for use in titration: • All : All burettes can be activated. • 1,2 : The supplied one burette works. • 3 - 10 : Additionally installed second burette works. • D. : The optional auto dispenser is activated. Burette speed may not be changed.
[Burette Speed]	A Select the rate of suction, discharge or purge on the APB manual operation screen display. • Fast : Burette operates at its maximum speed. Ordinary setting. • Medium : Burette operates at its medium speed. • Slow : Burette operates at its low speed.
[Reagent No.]	Sets up the No. of the reagent information list which has been set on Function-Reagent Information. When volume compensation is set, the titrator will operate on the condition of this reagent information. When a smart burette is used, the No. will automatically be set up and you do not have to set it up.
[Purge Times]	Select a number of purge cycles. • 1 - 99
[Purge Mode]	You can select a purge mode: • To bottle : Reagent moves back and forth between the reagent bottle and burette in order to degas the burette and to homogenize the reagent. • To nozzle : Nozzle is degassed and the reagent is discarded. The operation is the same as discharge and can be repeated by the preset number of purge cycles.
[Burette Capacity Setup]	Capacity of the burette you are going to use can be set. Select the burette currently connected to the titrator, and select the capacity of the burette. Correct measurement results will not be obtained with incorrect capacity entered. For the details on how to set, see Operation Manual "1-4-3. Setting Burette Volume."

Item	Description
[Dose]	"APB dose mode" display will appear and allow to dispense the fixed amount of reagent.
[Validation]	"Burette capacity validation" screen will be displayed, allowing to check the capacity of the burette on the presetting.
[▲]	This button once pressed pushes out the reagent to the nozzle, and stops the piston when it reaches the upper limit top position. The piston also stops when pressed again. The switching valve is turned to discharge direction during this event.
[▼]	This button lowers the piston to aspirate the reagent from the bottle. When pressed again, the piston stops.
[▲▼]	Once pressed, it purges for a number of preset times, and stops by filling the burette with reagent. When pressed again, it stops purging and sets in standby for discharge position.
[Reset]	This button stops discharge or suction, and returns to reset condition.
[Exit]	Returns to Main display.

Item	Description
Status displays	The various burette positions are shown below: • Reset : Piston is in the wait for titration position. Piston is in a position where the burette unit can be removed. • Up : Piston is moving upward to discharge reagent. • Down : Piston is moving downward to aspirate reagent. • Stop : Piston is stopping at any point in burette. • Purge : Piston is moving for purge event. • Resetting : Piston is resetting now. • Disconnect : The burette is not connected for use.
Purge Times	Display the current purge number of times at the built-in burette connection.

| ⚠ <u>Caution</u>	**Be aware of discharge rate when pressing [▲], [▼] or [▲▼] button.** **The reagent may be splashed out of the nozzle when reagent is dispensed into the nozzle with [▲] or [▲▼] button.**

＜**The replacement of a burette unit**＞
Refer to the Section Operation Manual"3-15. Replacement of burette unit."

5-2. **Dosing reagent**

The burette can be manually operated for fixed dosing the burette with reagent.

1   Press [Burette] button on Main display.
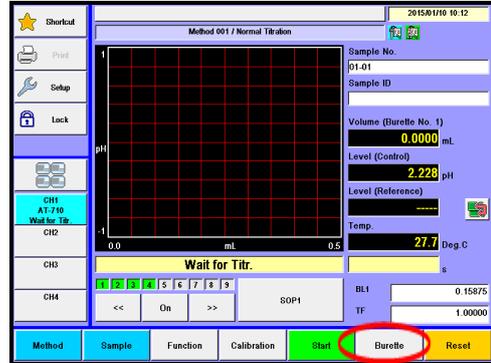
2   The screen on the right will appear.

Press [Dose] button.

3   The screen on the right will appear.

Please change the mode numbers and select the parameter you wish to edit.

Item	Description
[Burette No.]	Select the burette for use in titration: • 1,2　　　　: The supplied one burette works. • 3 - 10　　: Additionally installed second burette works. • D.　　　　: The optional auto dispenser is activated. Burette speed may not be changed.
[Sample No.]	Sets up the No. of the reagent information list which has been set on Function-Reagent Information. When volume compensation is set, the titrator will operate on the condition of this reagent information. When a smart electrode is used, the No. will automatically be set up and you do not have to set it up.
[Stop Volume]	Set dispensing volume from a burette.　Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11 Settings of discharge amount of titrant" in this manual. • 0.0000 - 9999.0000mL
[Dispense Speed]	Set dispense speed. The higher a set value becomes, the slower dispense rate becomes. • 1 - 999s/mL
[Validation]	Capacity precision on a burette can be checked under the preset conditions. This feature is utilized when checking the burette capacity or for other purpose.
[Manual]	This button allows to display the screen for APB manual operation.
[Dose Start]	Dosing starts and dispenses up to the preset "Stop volume."
[Reset]	Stop dosing reagent and allow the burette to be reset.
[Exit]	Return to the main screen display.

| ⚠️ **Caution**	**There is a danger that a reagent splashes out of the nozzle when burette dispensing rate is too high; set the dispensing rate at about 5 to 10s/mL.**

Item	Description
No. display	Display of the burette number.
Sampling Volume display	Display of the dosing volume.
Level display	Display of the level. The unit is displayed by the unit of the method currently defined.

5-3. **Validation of burette precision**

The burette cylinder is vilified.

1   Press [Burette] button on Main display.

2   The screen on the right will appear.

         Press [Validation] button.
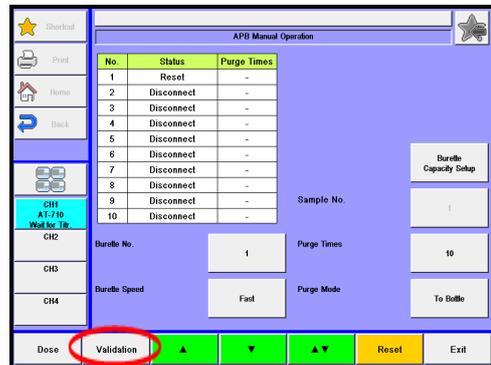
3   The screen on the right will appear.

         Please change the mode numbers and select the parameter you wish to edit.
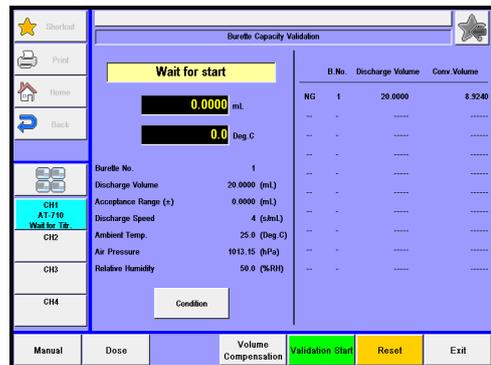
Item	Description
[Condition]	The screen for "Parameter Settings for Burette Capacity Validation" appears. Set the conditions for the verification of burette capacity.
[Manual]	The menu for APB manual operation appears.
[Dose]	The screen for APB dose mode appears to allow to activate a dose under the preset conditions in order to degas the burette.
[Validation Start]	Verification of burette capacity starts under the conditions present under "Condition."
[Reset]	Stops dosing reagent and allow the unit to be reset.
[Exit]	Return to the main screen display.

Item	Description
Status screen display	Display the operational status during burette capacity check (Operation, Dispensed volume, Titrant temperature, Check conditions).

Configure conditions for validating burette precision.
Pressing [Condition] button in "Burette capacity validation" screen will allow to display "Parameter settings for burette capacity validation".

| Item	Description
[Burette No.]	Select the burette to activate for precision check: • 1,2 : The built-in burette is activated. • 3 - 10 : The additional burettes can be activated.
[Discharge Volume]	Set a volume of discharging amount from the burette. Since the dischargeable amount of reagent depends on the installed burette, see the section "1-7-11. Settings of discharge amount of titrant" in this manual. • 0.0000 - 9999.0000mL
[Acceptance Range]	Set a range of criterion for precision check. When the measured value is out of this permissible value to the reference value, the result is judged as 'out of range.' • 0.0000 - 9999.9999mL
[Discharge Speed]	Select the rate of burette discharging amount. The higher a set value becomes, the slower dispense rate becomes. Typically, set at: 80 / [Burette capacity] (s/mL) • 1 - 999s/mL
[Ambient Temp.]	Set the ambient temperature in the inspection. • 0.0 - 40.0 Deg.C
[Air Pressure]	Set atmospheric pressure in the inspection. • 500.00 - 1500.00hPa
[Titrant Temp.]	Set the temperature of pure water in reagent bottle. • 0.0 - 40.0 Deg.C
[Relative Humidity]	Set the relative humidity in the inspection. • 0.0 - 100.0%RH
[Sample No.]	Sets up the No. of the reagent information list which has been set on Function-Reagent Information. When volume compensation is set, the titrator will operate on the condition of this reagent information. When a smart electrode is used, the No. will automatically be set up and you do not have to set it up.
[OK]	Complete conditional settings, allowing the screen display to return to "Burette capacity validation."

< Capacity conversion >

In the burette capacity check, weight is converted to volume according to JIS K0050 and JIS K0061 as in the conversion calculation:

$$V (mL) = W \times \{1 + \rho \times(1 / dt - 1 / d')\} / [\{1 + a \times (Temp - 20)\} \times dt]$$

W (g)   : Dispensed weight of pure water

ρ(g/cm³)   : Barometric pressure and air density at the relative humidity given by the below formula

dt (g/cm³) : Density of water at the temperature in inspection

d'(g/cm³)   : Density of the weight (= 8.0g/cm³ fixed)

a (K⁻¹)   : Cubical expansion coefficient (= 97.5×10^{-7} fixed) of burette glass material

Temp (℃) : Water temperature in inspection

$$\rho(g/cm³) =   0.001293 \times \{273 \cdot 15 / (273.15 + t)\} \times \{(P - 0.378 \times e) / P0\}$$

t (℃)   : Ambient temperature

P (kPa)   : Atmospheric pressure in the inspection
              (P = 0.1 × pressure in inspection (hPa))

e (kPa)   : Water vapor pressure (e = 0.01 × RH% × e0)
              e0 is referred to saturated water vapor pressure from
              Table 2 shown in the Appendix of JIS K0061

P0 (kPa)   : Standard atmospheric pressure (= 101.325kPa)

5. Burette

<Validation of Burette by precision check>

1 Click on [Validation Start] button to allow the burette to dose.
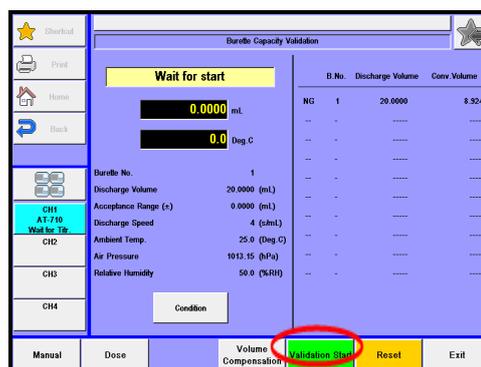
2 After the preset volume is dispensed, the screen "weight input" appears.   Weigh the dispensed water and click on [OK] button.
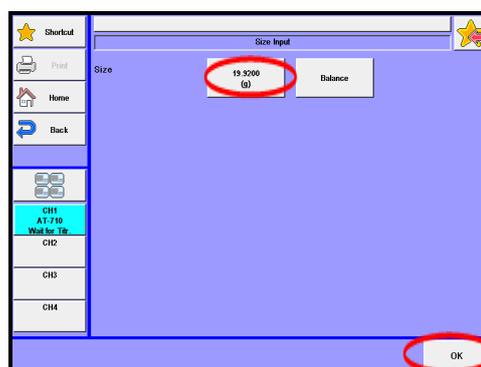
3 The validation results appear on the right of the screen display.
B. No.: Burette number used in validation
Dis. volume: Dispensed volume as preset
Conv. volume: Actually dispensed volume

The validation history can be viewed by selecting "Function" – "GLP Management" – "Burette Validation History".
When continuing to perform the validation of burette precision, click [Validation Start] button again.

Note	When Titrant temperature compensation sensor (12-00166-00) is connected, sensor reading is applied to the compensation instead of solution temperature. The precision of sensor reading is ±0.5・ ℃ For precision check, a thermometer with resolution of ±0.1℃ is required.

Note	When an electronic balance is connected, the unit sets in auto input mode with [Balance] button. When the weight reading is stable, press [OK] button to settle it down. For details of input from balance, refer to Section "9-1-2 Input on balance at the time of burette validation". For accurate test results, ±0.0002g of balance precision is to be required.

Note	The precision check is performed on user's responsibility. The resulting precision is warranted only when it's performed on the KEM's quality assurance system. For accurate precision check, it is recommended that users ask our service department for precision check of the burettes.

5-4. **Volume adjust of burette**

Volume of burette cylinder can be corrected.

1　　Press [Burette] button on Main display.
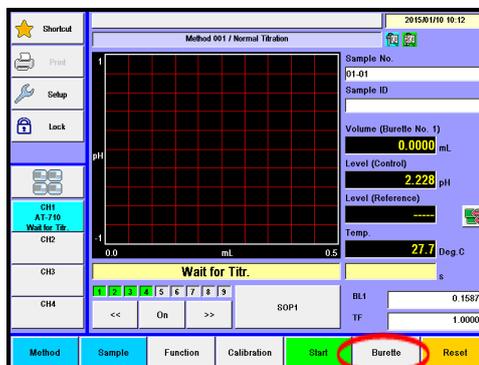
2　　The screen on the right will appear.

　　Press [Validation] button.
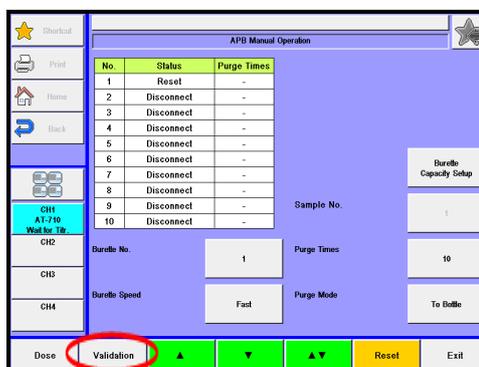
3　　The screen on the right will appear.

　　Press [Volume Compensation] button.
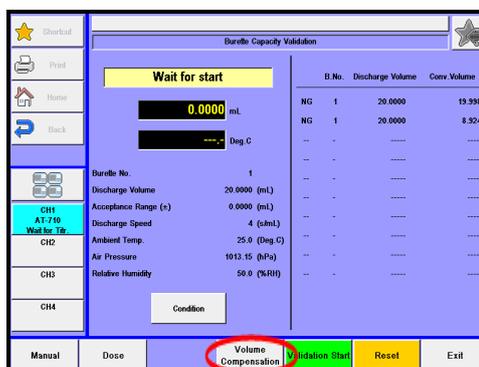
4　　The screen on the right will appear.

　　Please change the mode numbers and select the parameter you wish to edit.
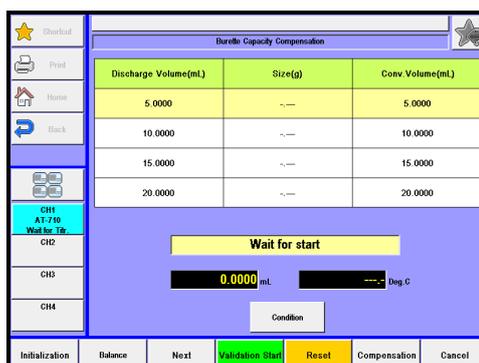
Item	Description
[Condition]	The screen for "Parameter Settings for Burette Capacity Validation" appears. Set the conditions for the verification of burette capacity. For the setting item, see 5-3.
[Initialization]	Clear the "Size(g)."
[Balance]	Can enter the weight direct from an electronic balance.
[Next]	Moves down the cursor of the "Burette Capacity Compensation" table.
[Validation Start]	Verification of Burette Capacity starts under the conditions present under "Condition."
[Reset]	Stops dosing reagent and allow the unit to be reset.
[Compensation]	Registers the validation results with the reagent information.
[Cancel]	Returns to Burette Capacity Validation for Validation of burette precision.

5. Burette

＜Volume adjust of burette＞

1   Click on [Validation Start] button to allow the burette to dose.
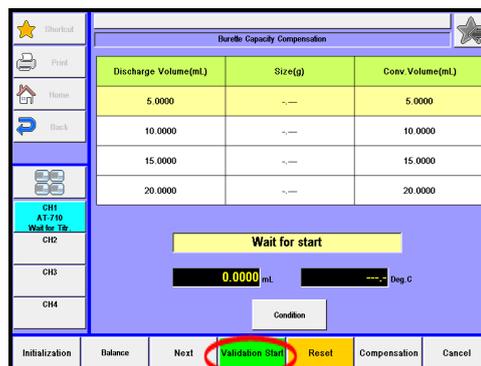
2   After the preset volume is dispensed, the screen "Size input" appears. Weigh the dispensed water and click on [OK] button.
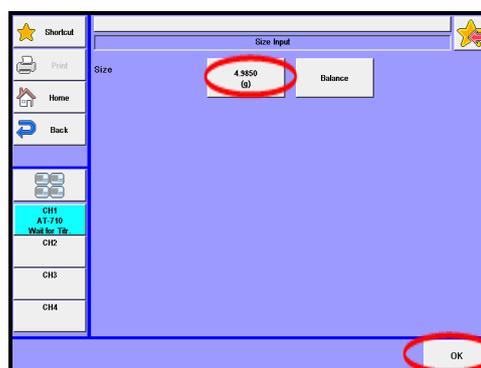
3   The validation results appear on the right of the screen display.

> **Note**   When Titrant temperature compensation sensor (12-00166-00) is connected, sensor reading is applied to the compensation instead of solution temperature. The precision of sensor reading is ±0.5℃. For precision check, a thermometer with resolution of ±0.1℃ is required.

> **Note**   When an electronic balance is connected, the unit sets in auto input mode with [Balance] button. When the weight reading is stable, press [OK] button to settle it down. For details of input from balance, refer to Section "9-1-2 Input on balance at the time of burette validation".
> For accurate test results, ±0.0002g of balance precision is to be required.

4 Press [Next] button. Click on [Validation Start] button to allow the burette to dose.
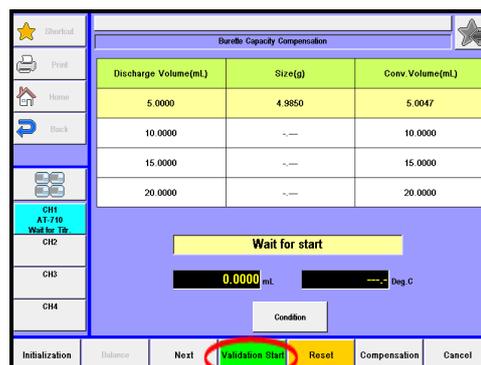
5 After the preset volume is dispensed, the screen "weight input" appears. Weigh the dispensed water and click on [OK] button.
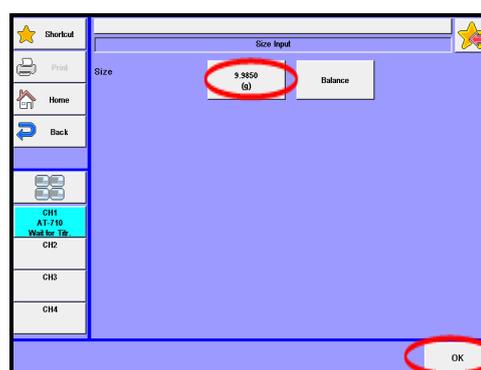
6 The validation results appear on the right of the screen display.
After validated all volume, press [Compensation] button.
When "Smart Burette Functionality" is "Enable", registers the validation results with the reagent information of Smart burette. When "Smart Burette Functionality" is "Enable", registers the validation results with the reagent information of burette No. setting of [Condition].
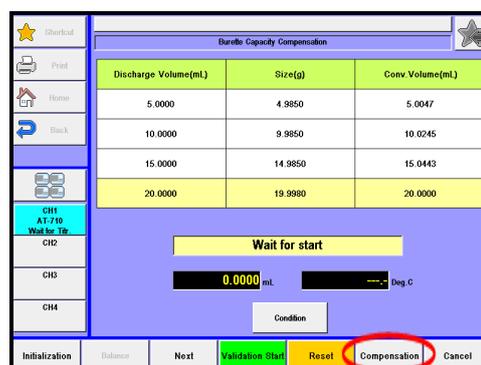
Note The precision check is performed on user's responsibility.
The resulting precision is warranted only when it's performed on the KEM's quality assurance system. For accurate precision check, it is recommended that users ask our service department for precision check of the burettes.

Note When you want to clear capacity revision, input a value same as "Discharge Volume" to "Conv. Volume." Then press [Compensation] button.

Conc. volume can directly be input on the Burette Capacity Compensation screen by pressing a Size (g)." In this case, "Conv. Volume" is automatically revised.

6. Shortcut

Use registered shortcuts or SOP (Standard Operating Procedures), and set up SOP (Standard Operating Procedures).

6-1. Register/Delete shortcut

Register/Delete shortcut buttons.

<Registration>

1   Display a screen to be registered as shortcut.

Example: Register the screen of Sample size (S1) as shortcut by pressing [Sample] button and then the button of Sample size (S1).
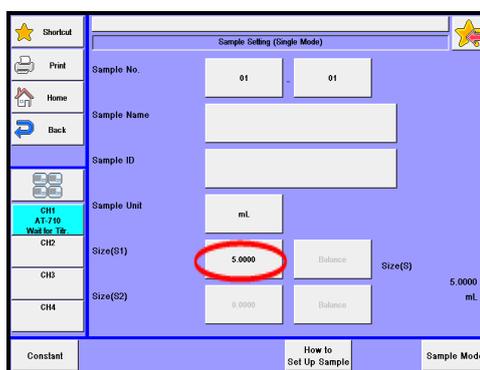
2   Press the button in the upper right corner.
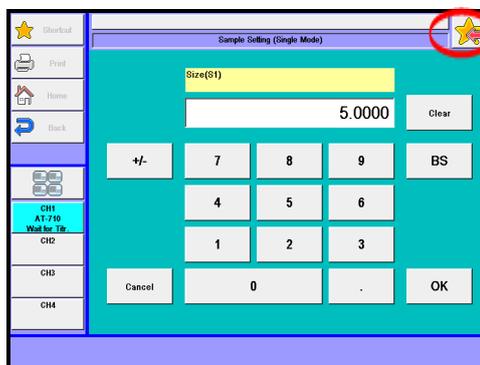
3   When the screen for shortcut registration is displayed, choose a positon of shortcut to be registered.

4   Enter a name to be registered as shortcut and press [OK] button. (In initial registration, the title of screen display is displayed.)

[Copy Title]: Copy the title name of the present item to a name field.
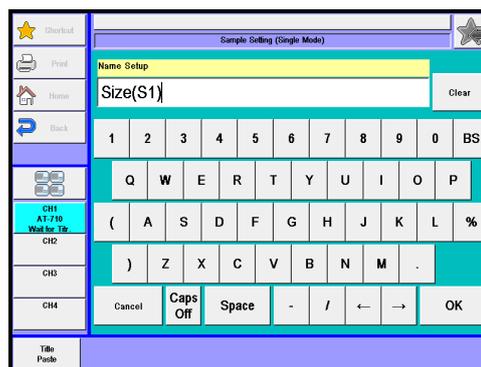
5   Press [OK] button.
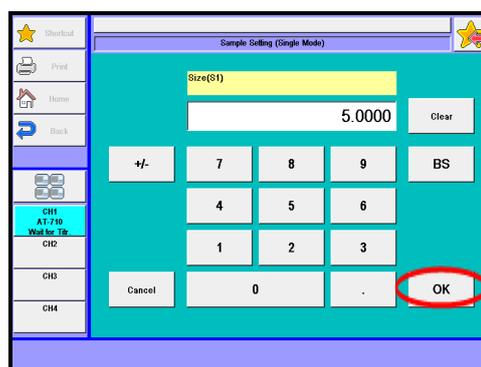
6. Shortcut

<Deletion>

1 Press [Shortcut] button on Main display.
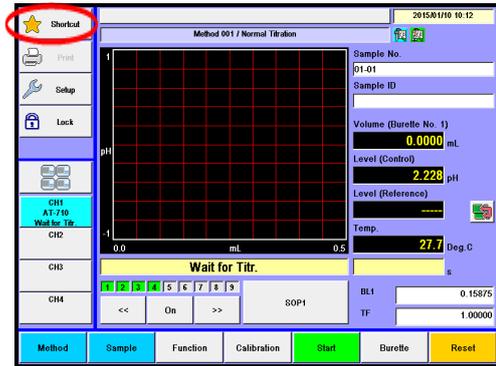
2 Registered shortcut buttons will be displayed.
Press [Delete] button.
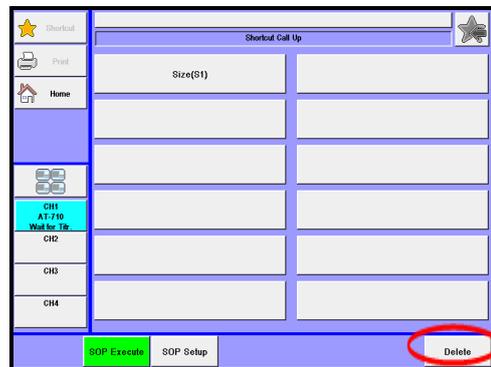
3 Press shortcut button to be deleted.
Press [Yes] button.
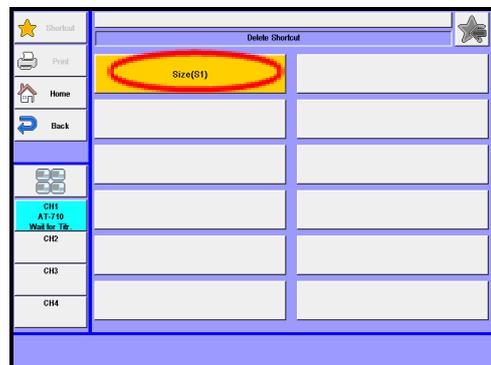
6-2. Usage of registered shortcuts

Usage of registered shortcuts.

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1   Press [Shortcut] button on Main display.
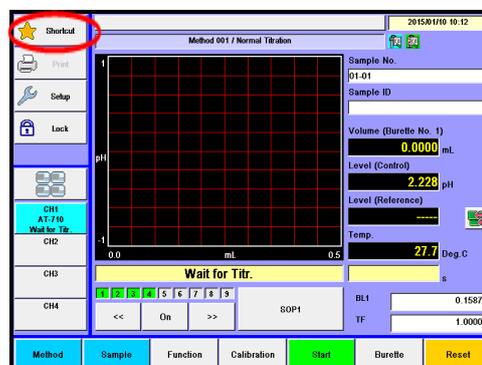
2   Registered shortcut buttons will be displayed. Press a button to be used.
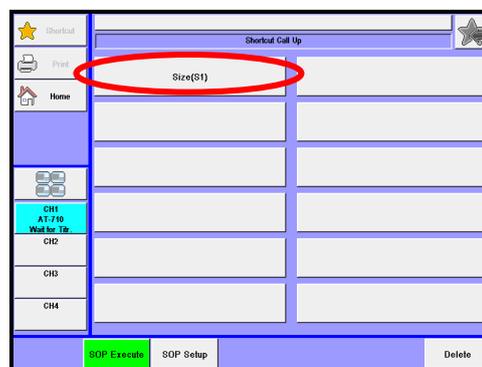
6-3. **Register / Delete SOP**

Register or delete SOP (Standard Operating Procedures).

<Registration>

1 Display a screen to be registered as SOP. Note that only screens for item selection or entry can be registered in SOP.

Example: Register the screen of Sample size (S1) in SOP1 by pressing [Sample] button and then the button of Sample size (S1).
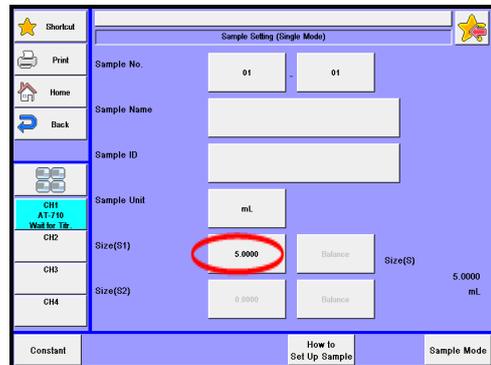
2 Press the button in the upper right corner.
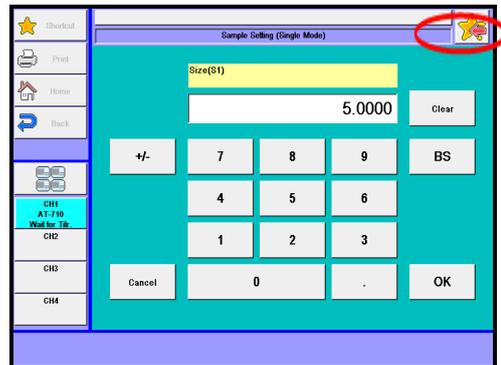
3 Registration screen for shortcut will be displayed.
Press [SOP1] button.
When a screen for item selection or entry is not chosen, buttons, [SOP1] through [SOP5], will not be displayed.
In SOP, pressing [Name Setup] button allows to set the name of SOP to be used.

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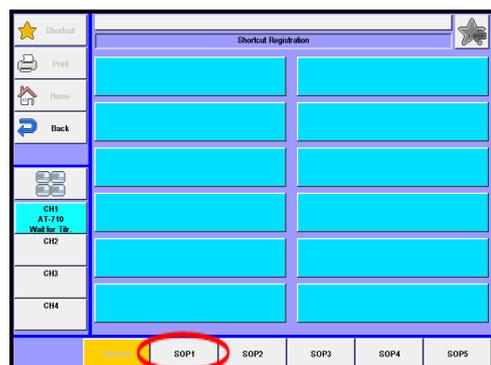
4   Screen for SOP registration will be displayed. Choose the position of shortcut to be registered.
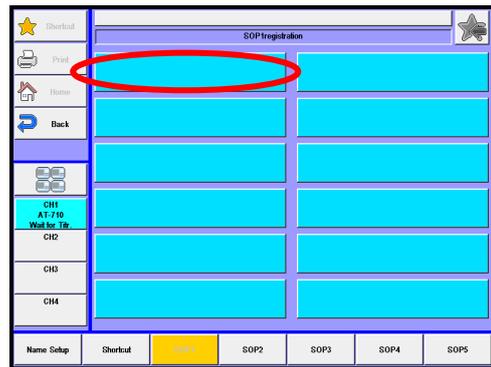
5   Set the name to be registered in SOP and press [OK] button. (In initial registration, the title of screen display is displayed.)

[Copy Title]: Copy the title name of the present item to a name field.
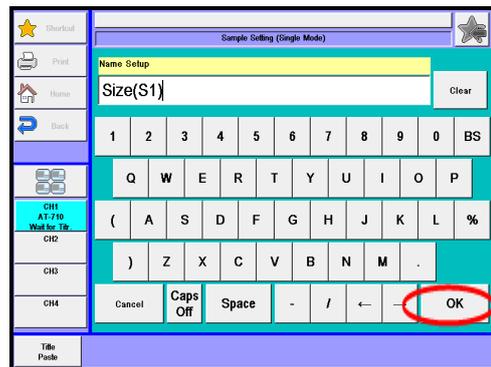
6   Press [Name setup] button. Enter the name of SOP and press [OK] button.
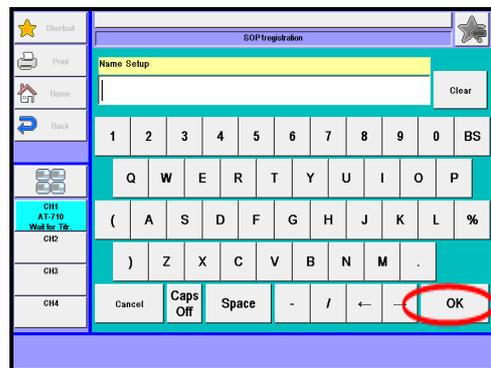
7   Press [Back] button.
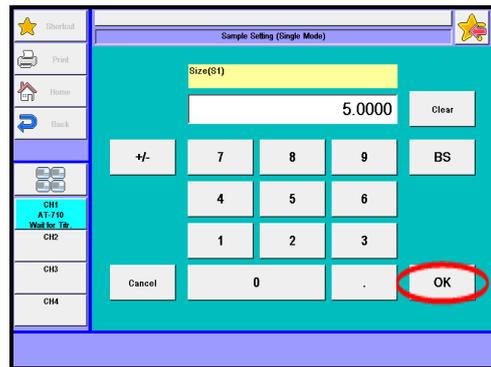
8   Press [OK] button.

9   Press [Shortcut] button.
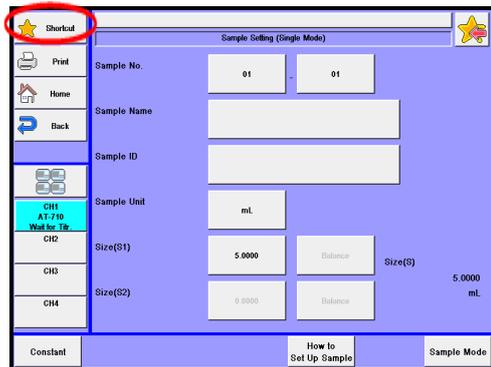
10   Press [SOP setup] button.
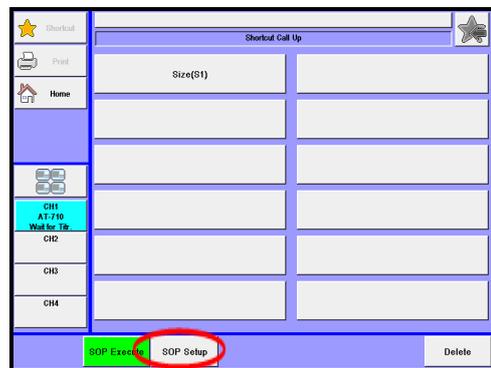
11 The right screen will be displayed.
Press Start-setup button.
Set operations and press [OK] button.

None : Perform only SOP operations

Start : After SOP operations, titration will start.

Calibration : After SOP operations, the display will move to "List of calibration condition" screen with [Calibration] button.

Note: Pressing [Details] button allows to confirm SOP to be set at present.
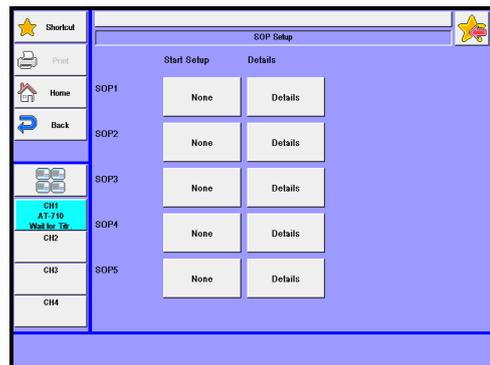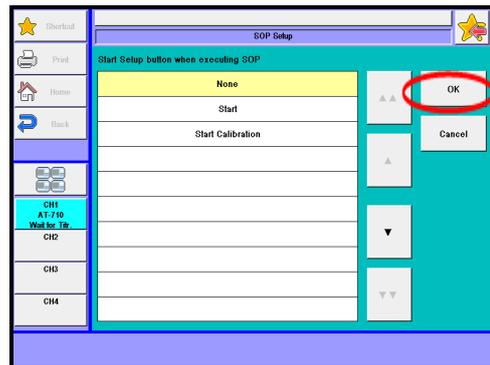
12 Press [Back] button.

<Deletion>
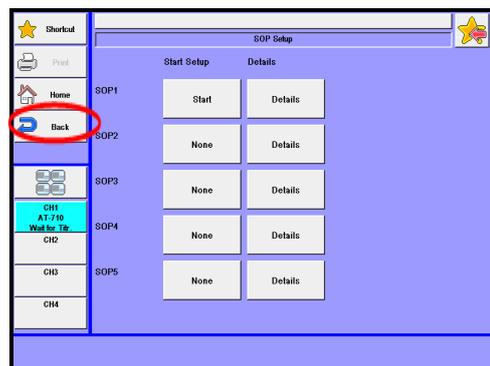
1   Press [Shortcut] button on Main display.
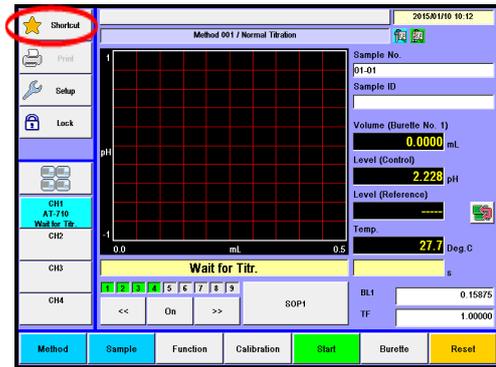
2   Press [SOP setup] button.
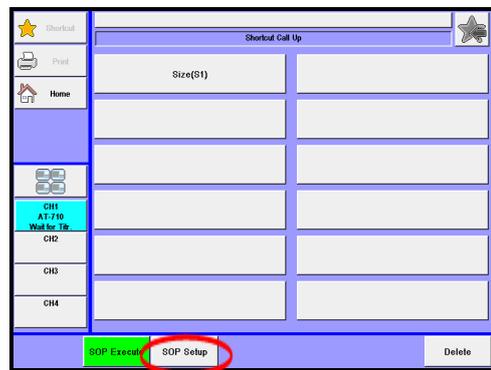
3   The screen for SOP setup will be displayed.
Press [Details] button.
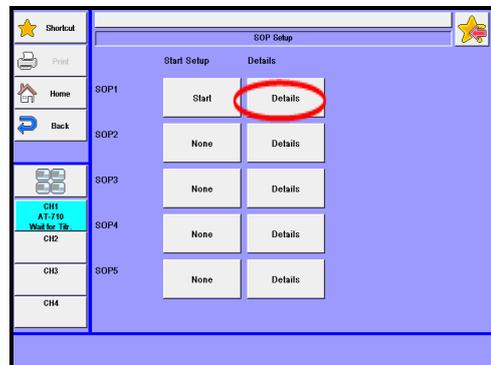
4 The registered SOP button will be displayed.
Press [Delete] button.
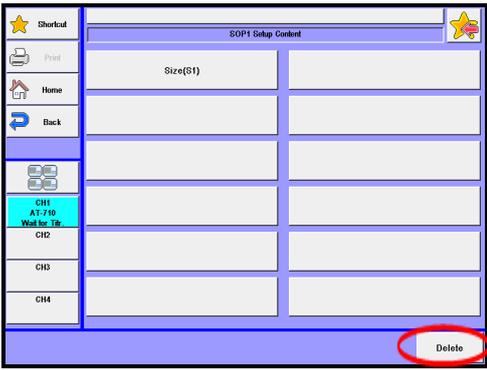
5 Press shortcut button to be deleted.
Press [Yes] button.
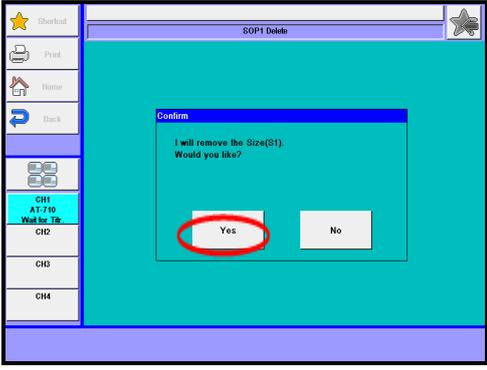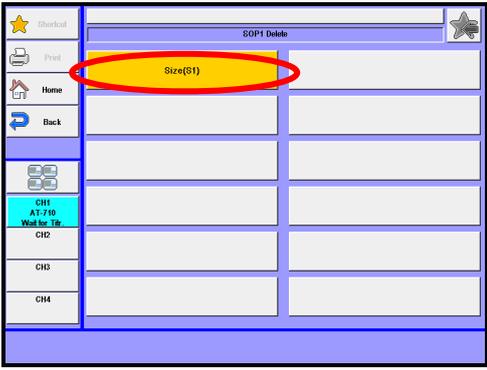
6-4. Usage of SOP (Standard Operating Procedures)

Execute preset SOP (Standard Operating Procedures).

1   Press [Shortcut] button on Main display.
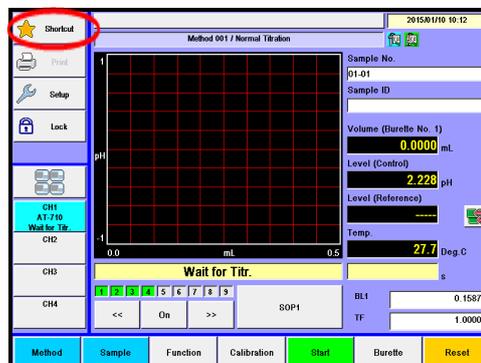
2   Press [SOP exe.] button.
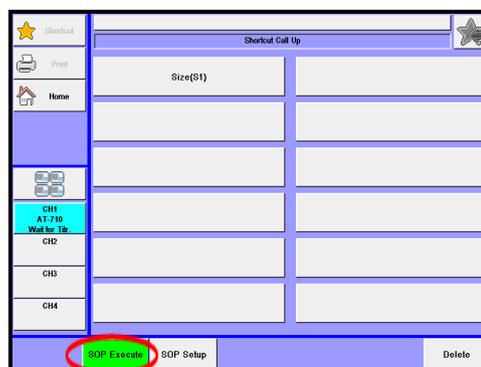
3   Execute the registered SOP by pressing the corresponding SOP button.

        SOP1   : Perform SOP1.
        SOP2   : Perform SOP2.
        SOP3   : Perform SOP3.
        SOP4   : Perform SOP4.
        SOP5   : Perform SOP5.
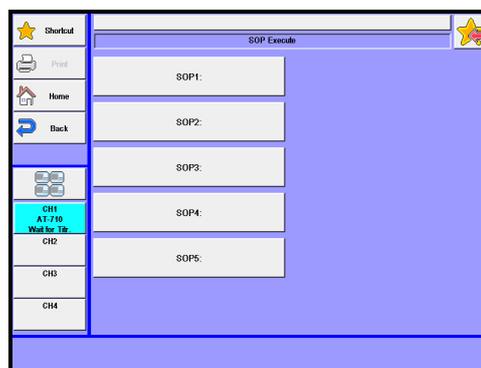
6-5. Registration of free button

From shortcuts, select one you wish to place to the position of the shortcut button on the main screen.

1 Press [Function] button on Main display.
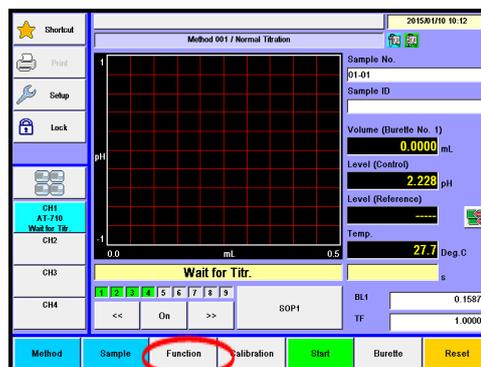
2 Press [Other Settings] button.
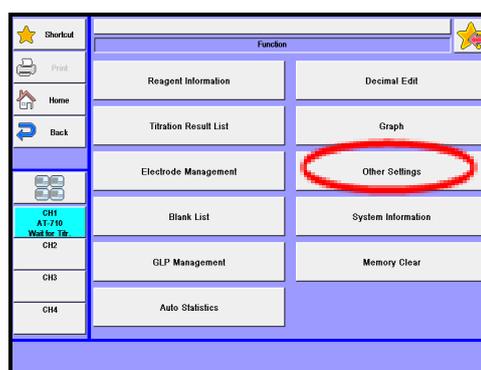
3 Press the button for Free button.
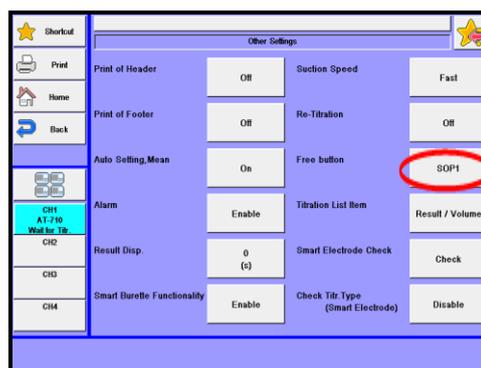
4   Choose the registered shortcut or SOP, and then press [OK] button.
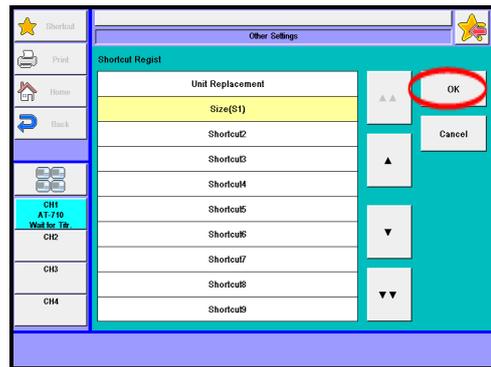
5   Press [Home] button.
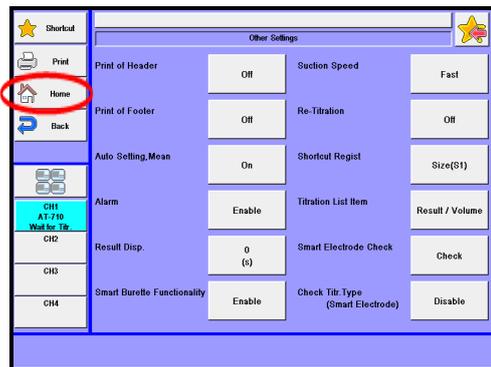
6   The right screen will be displayed, and the set item is registered on Main display.
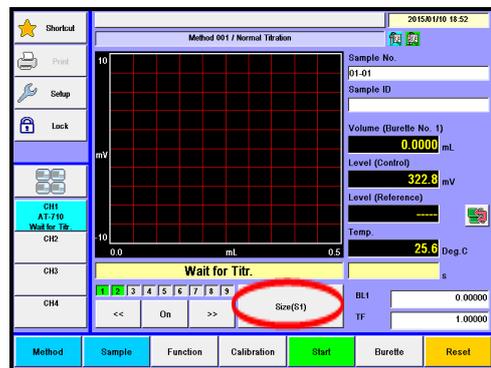
7. **Setup**

7-1. **About Setup**

You can configure system setup using the function of Setup.

1   Press [Setup] button.
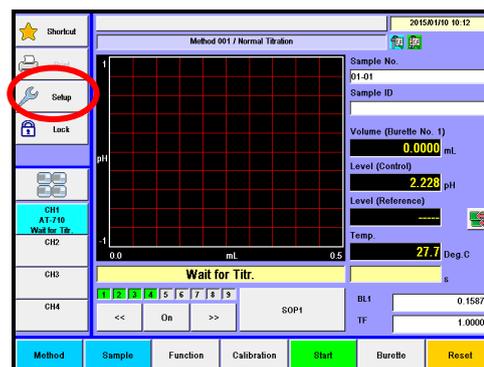
2   Here you will see the screen on display.

Please select the parameter you wish to edit.
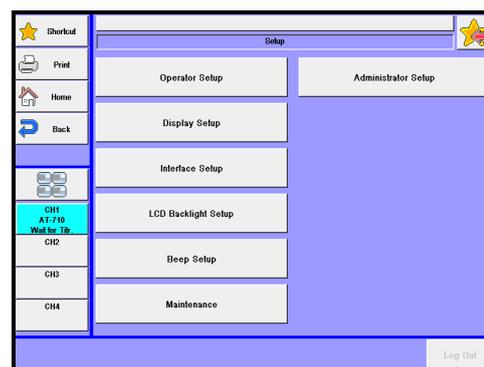
Item	Description
[Operator Setup]	Here the operator is defined for identification.
[Display Setup]	Languages, date and clock time can be set.
[Interface Setup]	Here you configure settings for your printer, output to a PC, the balance, a LAN and Bluetooth.
[LCD Backlight Setup]	Here the backlight of LCD can be adjusted.
[Beep Setup]	Beep tone for alarm can be selected on this display.
[Maintenance]	Deletes information of the instrument connected to CH1-CH4 or clears all memories. Also calibrates the touchscreen.
[Administrator Setup]	Sets up the functionality of hierarchical management for operation menus by user ID or password.

7-2. **Operator Setup**

Up to 50 operators can be registered with individual names.
The registered name will be automatically printed out together with measurement results. (Characters: alphanumeric including capital and small letters)

1   Press [Operator Setup] button.

2   Press [Entry] button on "Operator List" to display "Operator Registration" dialog box.
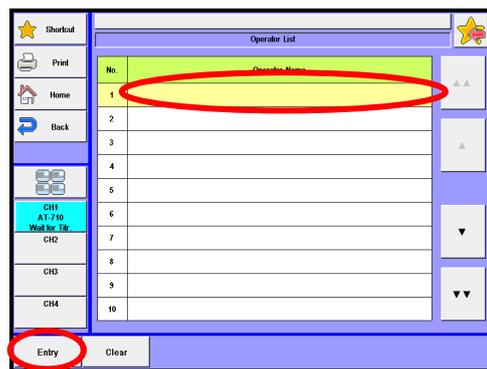
[▲], [▼]
Moves the cursor on the list page.

[▲▲], [▼▼]
The list page turns with these buttons. The cursor moves to the top number after page break.

[Entry]
Here the operator is registered. The display for "Operator Registration" will appear with this button after pointing the cursor on the operator's number on the list.

[Clear]
With the cursor pointed on the number you wish to clear, the display will appear to prompt your confirmation.

3 Enter the operator's name in below display, and press [OK] button.
Press [CAP.] button to use capital letter and [cap.] button for small letter.
Up to 64 characters can be entered.
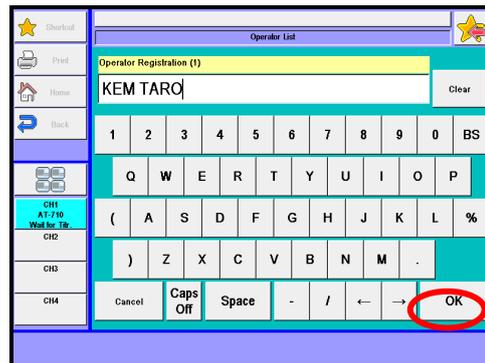
| Note | When there is a lot of character of registered name, a part of the character can not be displayed on "Operator List" screen or the main screen. |

7-3. **Display Setup**

Languages, date and clock time can be set.

---

1   Press [Display Setup] button.
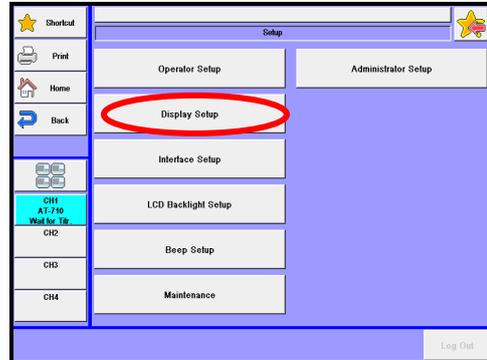
2   **[Language]**
Choose a language either English or Japanese you wish to view and use in operation, and press [OK] button.
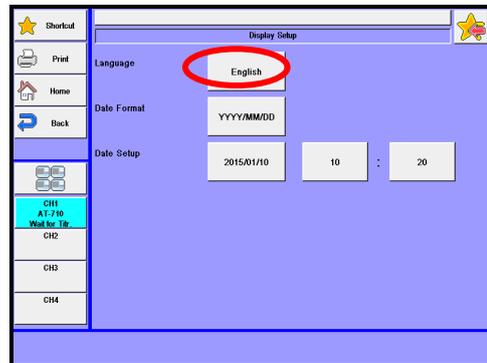
The language you have selected will appear after the power is turned off and on again.

English   : Shows in English.
日本語   : Shows in Japanese.
Korean   : Shows in Korean.
中国語   : Shows in Mandarin Chinese.

русский : Shows in Russian.

Español   : Shows in Spanish.

Deutsch   : Shows in German.
Français   : Shows in French.

> ☝ **Note**   If there is no language you'd like to choose, contact your local dealer.

---

3   **[Date format]**
Here you select and update the date of year, month and day. Press [OK] button.
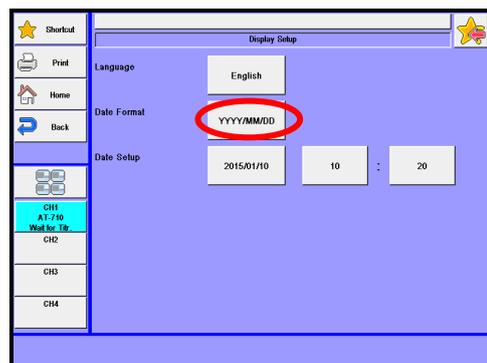
YYYY/MM/DD : Christian year/month in number/day of the month
MM/DD/YYYY : month in number/day of the month/Christian year
DD/MM/YYYY : day of the month/month in number/Christian year

4   [Date&Time]

Here the date and time are updated. Press the date button for calendar and select the present date and time. The hour and minute can be entered with numerals which appear on display. Then, press [OK] button.

Date ： 2010/01/01 - 2099/12/31
Time ： 00：00 - 23:59
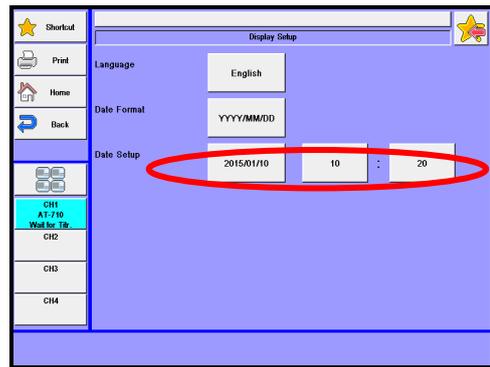
7-4. Interface Setup

Here you configure settings for your printer, output to a PC, the balance, a LAN and Bluetooth.

1   Press [Interface Setup] button on "Setup."
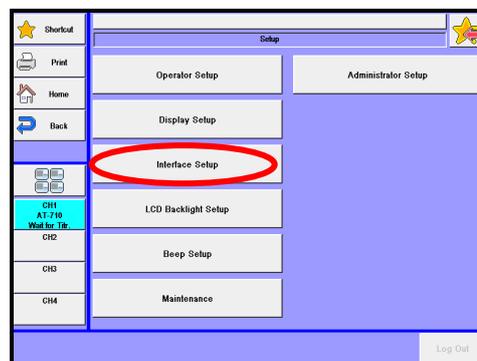
2   Press interface button you wish to set up.
     Printer   : Refer to Section 7-4-1.
     PC connection   : Refer to Section 7-4-2.
     Balance   : Refer to Section 7-4-3.
     LAN   : Refer to Section 7-4-4.
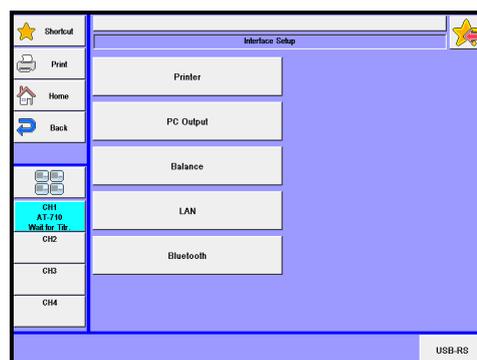
3   **[USB-RS]**
     The USB port can be used as RS-232C (COM) port by connecting an optional USB serial converter (US232R-10 [64-00177-00]) to the USB port of MCU-710.
     When your titrator recognizes the USB serial converter, it displays "USB-RS1."

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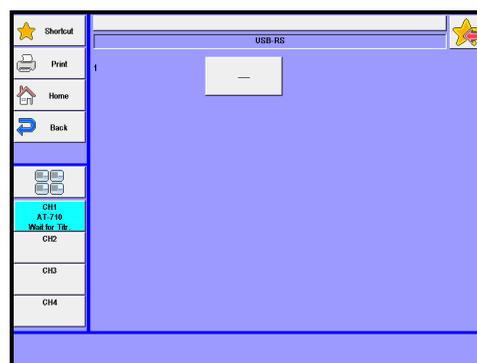
7-4-1. **[Printer]**

Set up a printer, and print out results and parameters.

1   Press [Printer] button on "Interface Setup." Set up a printer per each channel.
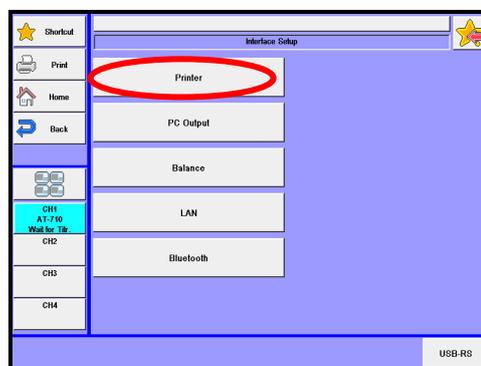
2   **[Printer]**
Select a type of printer you are going to use.

None	:Printer is not connected.
IDP-	:KEM's impact dot printer model IDP-100.
DP-USB	:KEM's thermal printer (DP-600) to USB port.
A4Printer	: KEM's recommended A4-sized printers to USB port.
Other	:Other printer than the above.
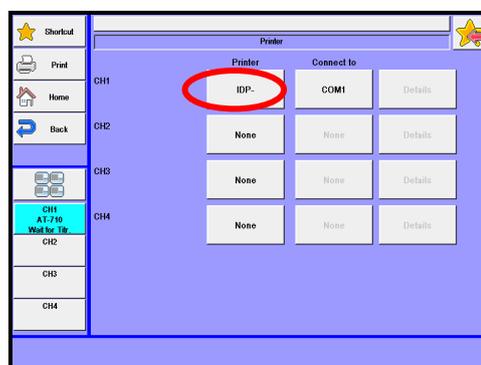
Note   For printer type and configurations, refer to the Table 7-4-1. The communication protocol between your printer and titration unit must match. Otherwise, printing may fail and halt halfway. For digital configurations for your printer, refer to the operation manual for the printer.

When any other printer is to be connected, check with your local dealer to see if it can be used with this instrument. The "other" printer will not print out graphs.

3
[Connect to]

Select the destination of output data for printing. Only ports without PC or balance connection settings can be selected. Note that COM2 port cannot be used for printer connection.

This settings is enabled when "IDP" or "Other" is selected in [Printer] settings.

Unit : Make printer settings on COM1 port of measuring unit (AT-710, MKC-710, MKV-710 or MKH-710).

COM1 : Make printer settings on COM1 port of MCU-710. When more than one units are connected, measurement results will be printed in the order that they are output.

USB-RS1 : This will be displayed when the optional USB-RS converter is connected to the USB port of MCU-710. Make printer settings on the USB-RS converter. When more than one units are connected, measurement results will be printed in the order that they are output.

4
[Details] - [Baud Rate]

If you use other printer as defined on "Printer", you have to select baud rate for your printer. When "Connect to" setting is "Unit", 19200 bps and 38400 bps cannot be selected.

1200 bps/ 2400 bps/ 4800 bps/ 9600 bps/ 19200 bps/ 38400 bps

5
[Details] - [Parity]

If you use other printer as defined on "Printer", you have to select parity for your printer.

None / Even Number/ Odd Number

6
[Details] - [Stop Bit]

If you use other printer as defined on "Printer", you have to select parity for your printer.

1bit /1.5bit / 2bit

7
[Details] - [Data Bit]

If you use other printer as defined on "Printer", you have to select data bit for your printer

7bit / 8bit

8 **[Details] - [Color/ Black and white]**

If you use Monochrome printer in A4 Printer as defined on "Printer", you have to select Color/ Black and white for your printer

Color/ Black and white

Table 7-4-1

Printer	Cables	Titrator setup	Printer settings

Citizen
  CBM-910
  CBM-910
    Type Ⅱ
	Connecting
	cable
	    64-00625
	    12-02013
		Printer IDP-	Digital configurations for printer:
			Baud rate : 4800
			Parity : none
			Stop Bit : 1
			Data Bits : 8

Citizen
  CBM-270
	Connecting
	cable
	    64-00625
	    12-02013
		Printer Other	No titration curve is available.
			Match protocol between printer and
			unit.

EPSON A4 Printer	USB Cable for Printer	Printer A4 Printer	Can print measurement results on A4-sized paper. Connect a cable to USB port of MCU-710.

7-4-2. **[PC Output]**

Make settings for outputting data to PC.

> 💡 When you want to transfer the output data to a personal computer, you need to purchase our optional Data Acquisition Software (SOFT-CAPE). But you have to check the version of the Data Acquisition Software because some software cannot be compatible with the titrator. For more information, please contact your sales representative nearest to or local dealer.

1 Press [Pc Output] button on "Interface Setup." Set up output to a PC per each channel.
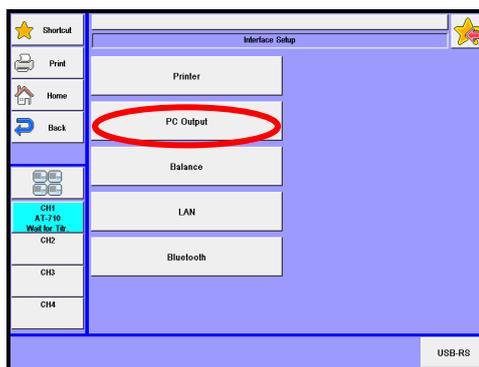
2 **[Connect to]**
Select the destination of output data to PC. Can select only ports where output settings for printer or balance is not made.

None   : Does not set up output.
COM1   : Sets up PC output on the COM1 port of the MCU-710.
COM2   : Sets up PC output on the COM2 port of the MCU-710.
USB-RS1   : Displayed when an optional USB-RS converter is put to the USB port of the MCU-710. Sets up PC output on the USB-RS converter.
LAN1   : Displayed on the MCU-710M only. Sets up PC output on the LAN port.
LAN2   : Displayed on the MCU-710M only. Sets up PC output on the LAN port.
LAN3   : Displayed on the MCU-710M only. Sets up PC output on the LAN port.
LAN4   : Displayed on the MCU-710M only. Sets up PC output on the LAN port.
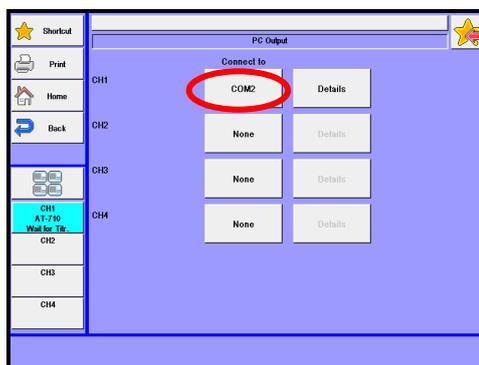
> 💡 If you set up channels you wish to use on the same port, you will be able to obtain all results on one PC.

3 [Details] - [Baud Rate]

Set up communication protocol (baud rate) between a connected PC and the instrument. This settings is enabled when "COM1, COM2, USB-RS1" is selected in [Destination] settings.

1200 bps/ 2400 bps/ 4800 bps/ 9600 bps/ 19200 bps/ 38400 bps

4 [Details] - [Parity]

Set up communication protocol (parity) between a connected PC and the instrument. This settings is enabled when "COM1, COM2, USB-RS1" is selected in [Destination] settings.

None / Even Number/ Odd Number

5 [Details] - [Stop Bit]

Set up communication protocol (Stop Bit) between a connected PC and the instrument. This settings is enabled when "COM1, COM2, USB-RS1" is selected in [Destination] settings.

1bit/ 1.5bit/ 2bit

6 [Details] - [Data Bit]

Set up communication protocol (Data Bit) between a connected PC and the instrument. This settings is enabled when "COM1, COM2, USB-RS1" is selected in [Destination] settings.

7bit/ 8bit

7-4-3. **[Balance]**

Connection of balance allows to input sample size automatically

> ☝ Make sure to contact your local dealer to see if any particular connecting cable
> **Note** may be required.

1 Press [Balance] button on "Interface Setup."
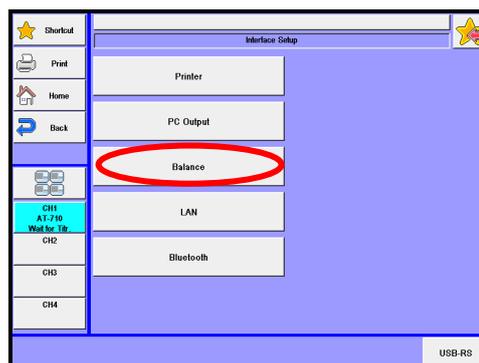
2 **[Maker]**
Select the maker of balance to be connected. For details of communication protocol, refer to table 7-4-3.

None
KEM
Mettler
A&D
Shimadzu
Sartorius
Mettler-Old
User   : Set communication conditions individually. Since [Details] button becomes effective, press [Details] and set the communication conditions.
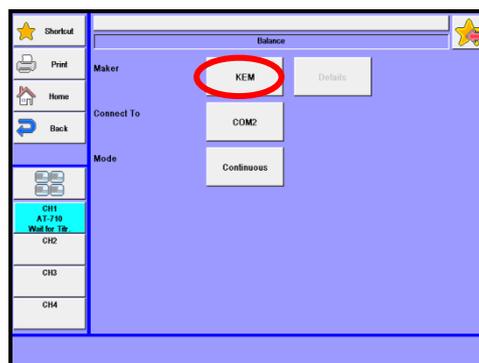
3 [**Connect to**]
Select the destination of output data from balance.
Can select only ports where output settings for printer or PC is not made.

COM1   : Make balance settings on COM1 port of MCU-710.
COM2   : Make balance settings on COM2 port of MCU-710.
USB-RS1 : Displayed when the optional USB-RS converter is connected to the USB port of MCU-710. Make balance output settings on USB-RS converter.

4 [**Mode**]

Select receiving mode from balance.

Continuous : Input mass on balance from the titrator by setting at "Continuous" mode on balance.

Print : Input mass from balance by pressing "Print" key on balance.

> **Note** For some types of balances, "Print" mode will not work when it is set up.

Table 7-4-3. Balance setting

Maker	KEM	Mettler	Mettler-Old	A&D	Shimadzu	Sartorius
Baud Rate	2400	9600	2400	2400	1200	1200
Parity	Even	None	Even	Even	None	Odd
Data Bits	7	8	7	7	8	7
Stop Bits	1	1	1	1	1	1
Handshake					H-oFF	
Delimiter	CR/LF	CR/LF	CR/LF	CR	CR	CR/LF

---

5 [Maker] - [Details] - [Baud Rate]

This buttons works only when the above "User" for Maker is chosen. Selection of baud rate for your Balance.

1200 bps/ 2400 bps/ 4800 bps/ 9600 bps/ 19200 bps/ 38400 bps

---

6 [Maker] - [Details] - [Parity]

This buttons works only when the above "User" for Maker is chosen. Selection of parity for your Balance.

None / Even Number/ Odd Number

---

7 [Maker] - [Details] - [Stop Bit]

This buttons works only when the above "User" for Maker is chosen. Selection of stop bit for your Balance.

1bit /1.5bit / 2bit

8

[Maker] - [Details] - [Data Bit]

This buttons works only when the above "User" for Maker is chosen. Selection of data bit for your Balance.

7bit / 8bit

9

[Maker] - [Details] - [Delimiter]

This buttons works only when the above "User" for Maker is chosen. Selection of delimiter for your Balance.

CR/ LF/ CRLF

7-4-4. **[LAN]**

LAN connection allows to control instruments or acquire measured data using the browser (Internet Explorer) - a standard accessory of Windows® OS.

1   Press [LAN] button on "Interface Setup."
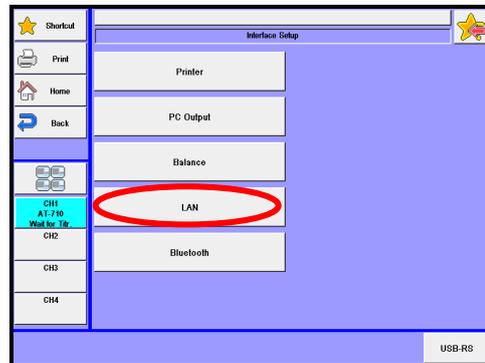
2   Make settings for LAN connection.

[IP Address Auto Acquisition]
Off   : Manual settings of IP address
On   : Automatic acquisition from
           DHCP server

The settings below will be enabled when "Off" is selected in [Automatic acquisition of IP address] settings.
[IP Address]
0.0.0.1 - 255.255.255.254
[Subnet Mask]
0.0.0.1 - 255.255.255.254
[Default Gateway]
0.0.0.0 - 255.255.255.254
[DHCP Server]
Enable   :Enable DHCP server.
Disable   :Disable DHCP server.
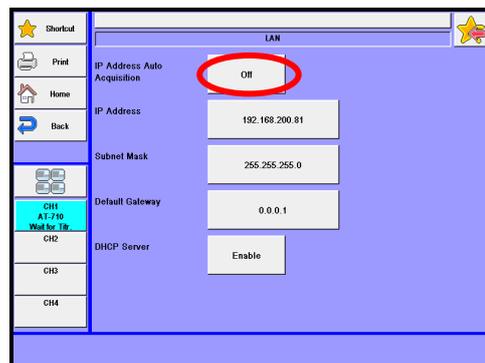
> Basic setup is that "Off" is selected at [Automatic acquisition of IP address] and "On" is selected at [DHCP server]. Further, Select "Obtain an IP address automatically" to configure "Internet Protocol (TCP/IP) Properties" in Windows. (Default of Windows)

3   Connect the unit with a PC using a LAN crossing cable.

At least Category 5 10Base-T cable must be used.
Plug in the LAN cable to the LAN port on the back of the unit.

> Some combination of PC and LAN cable cannot establish connection. In this case, use HUB with straight cable for connection.

4 Start Internet Explorer, and enter IP address (e.g. http://192.168.200.81/) or "http://MCU-710" in the address bar. Then, the screen for MCU-710 Network Operation will be displayed.

> "http://MCU-710" can be used when "DHCP server" is set at "On."
>
> **Note**

5 Click on the Channel button to operate.

6 Controls the titrator or imports measurement data.

[Start]
Starts titration.
Performs the same function as the titration button of the titrator. When "Start" is not work, press Fn+F5 and refresh the display.

[Reset]
Aborts measurement.
Performs the same function as the reset button of the titrator. When "Reset" is not work, press Fn+F5 and refresh the display.

[Capture]
Captures a screen displayed on the MCU-710. The screen currently on the titrator will be captured and displayed on Internet Explorer. You may use the captured image when creating your own manual. Select a screen you wish to capture, and click [Capture]. Point the cursor to the screen image. Right-click and select "Save Picture As…" to save the screen image. Press Fn+F5 and refresh the display to capture the next screen image.

[CSV]
Obtains a CSV file of the result list.

[Delete]
Deletes all result data of the channel currently selected. Click [Delete] and then select [Yes]. Results will be deleted.

7-4-5. **[Bluetooth]**

Set up Bluetooth. The MCU-710M only.

1 Press [Bluetooth] button on "Interface Setup."
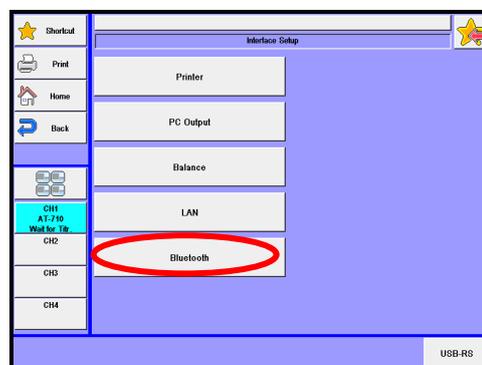
2 Screen of Bluetooth list will be displayed. Turn on the device to which a Bluetooth adapter is connected, and then press the [Search] button. When connectable Bluetooth in the vicinity of the MCU-710 is retrieved and then the AT-710, the MKV-710, the MKC-710 and the MKH-710 are retrieved, they will be displayed on the screen list.

3 Select a Bluetooth enabled device you wish to use, and press the [Entry] button to register. (You can select more than one.)
Return to the "Bluetooth List" screen, and devices will be connected.
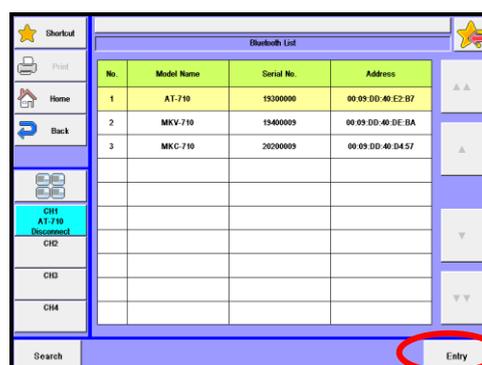
	When you turn on the power but the registered equipment (AT-710, MKV-710, MKC-710, MKH-710) with the MCU-710 is not connected, select the equipment once again and press the [Entry] button.
Note	

	When you have more than one MCU-710M units and register a measuring unit for another MCU-710, you have to turn off and on the measuring units.
Note	

	Registration of the registered equipment will be cancelled if you press the [Entry] button without selecting such equipment.

7-5. LCD Backlight Setup

Here the brightness of backlight for LCD and its auto dimmer can be adjusted.

1 Press [LCD Backlight Setup] button on "Setup."

2 **[Brightness]**
Adjust brightness of backlight.
Enter number directly by pressing numerical button or adjust brightness with [<< Dark] or [Bright >>] button.

(Dark) 1/2/3/4 (Bright)
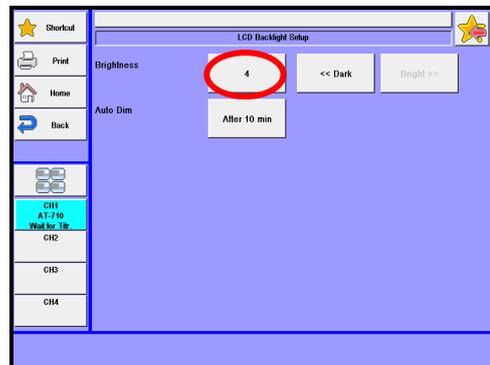
3 **[Auto Dim]**
Select auto dimming time for display backlight.
The backlight of display will automatically dim after the preset time elapses without operation.

Off / After 10min / After 20min /
After 30min / After 1 hour / After 2 hours

When 'Auto Dim' is selected and no key entry has been made for three hours, the backlight will eventually go out following auto dimmer feature. In this event, the backlight feature will recover to the state before the dimmer utility was on by touching the screen panel.

7-6. **Beep Setup**

Here you can select the beep and its tone as follows.

1 Press [Beep Setup] on "Setup."

2 **[Beep Sound]**
Sets up a touchscreen tone and a beep of at the end of measurement.
Enable : Enables the beep.
Disable : Disables the beep.
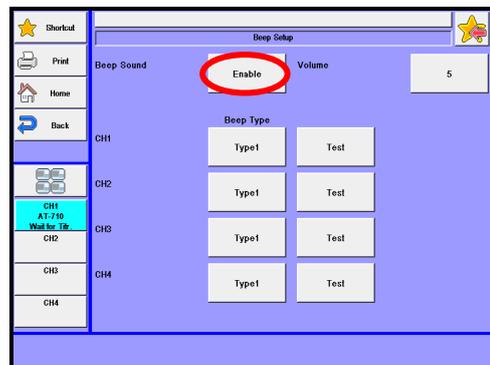
3 **[Beep Type]**
There are five types of beep tone you can choose from
Set up the beep per each channel. You can set this up only when selecting "Enable" on the [Beep Sound] setting.
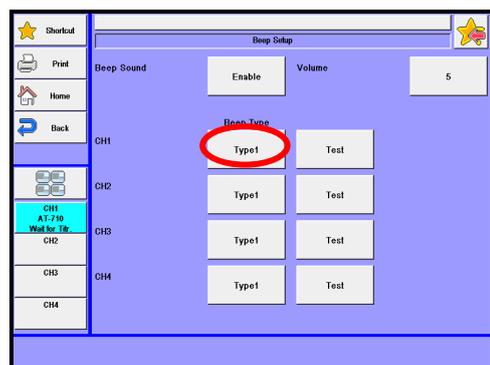
Off : Setting of beep sound is cancelled. Beep sound is muted even for key operations.
Type 1 : Beep sound lasts for about two seconds: "pi, pea-pea-pea-pea"
Type 2 : Beep sound lasts for about four seconds: "pi-pi-pi-pi-pi-pi"
Type 3 : Beep sound lasts for about ten seconds: "pi, pea-pea-pea-pea"
Type 4 : Beep sound lasts for about one second: "pi-pi-pi-pi-pi-pi"
Type 5 : Beep sound lasts for about one second: "pi, pea-pea-pea"

4 **[Volume]**
Select the volume of beep sound by pressing the button.
(Low) 0/1/ 2/ 3/ 4/ 5(High)

Press [Test] button.
The selected beep tone can be tested here.
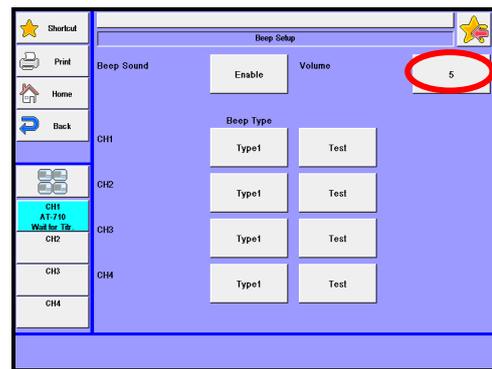
7-7. **Maintenance**

Initializes the measurement unit, and clears all memories. Also calibrates the touchscreen.

---

1   Press [Maintenance] on "Setup."

---
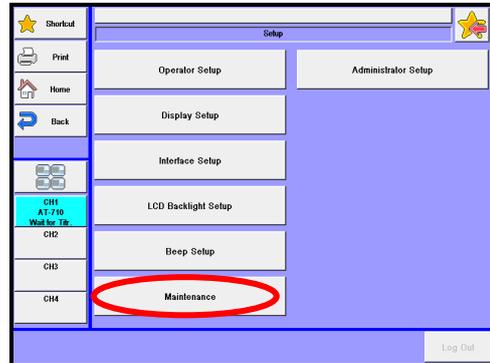
2   **[Measuring Unit to be initialized]**
The following procedures are necessary when a different measuring unit or units are registered where CH1, CH2, CH3 and CH4 are occupied by measuring units such as AT-710, MKC-710, MKV-710 or MKH-710 and another measuring unit is newly registered.
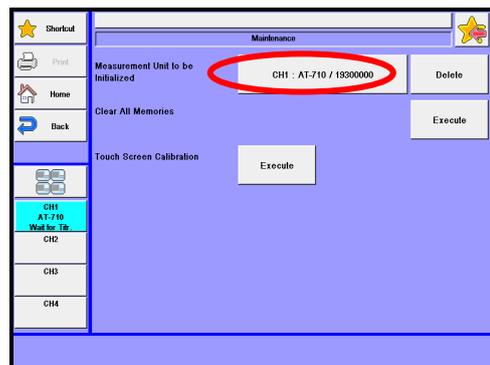
The first step is the selection of information on the measuring unit to be initialized

CH1   :(Unit name)/ (Serial No.): Select information set on CH1.
CH2   :(Unit name)/ (Serial No.): Select information set on CH2.
CH3   :(Unit name)/ (Serial No.): Select information set on CH3.
CH4   :(Unit name)/ (Serial No.): Select information set on CH4.

Pressing [Delete] button will lead to deleting the device information on the selected measuring unit.

3 [Clear All Memories]

Here you can initialize all data stored on the measuring units occupying from CH1 to CH4.

Pressing [Execute] button will allow to initialize all data on the units.
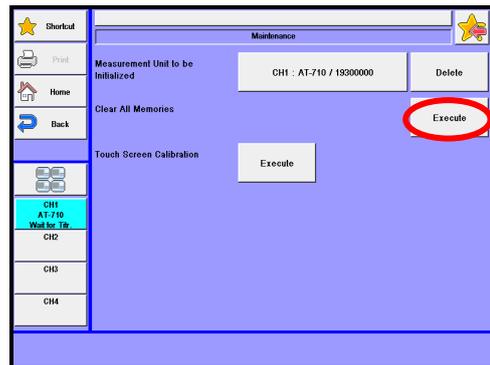
> Be sure to save all necessary measurement and method data to a USB flash drive before initializing measuring units or executing all memory clear.

4 [Touch Screen Calibration]

Use this function when the touch position deviates from the corresponding screen position during touch panel operations.
Press [Execute] button.
Confirmation message for execution will be displayed. Select "Yes."
Touch '+' mark position in order following the instructions on the screen.
After confirming all positions, touch any place on the touch panel. Touch panel calibration will then be completed.
If the calibration fails, '+' mark will be displayed again. Then, retry to perform the calibration.
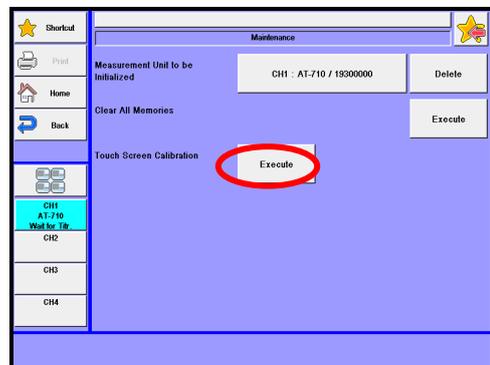
7-8. **Administrator Setup/User Setup**

This functionality clearly distinguishes the administrator (one person) and operators. The administrator and operators can separately be set up with clear distinction of the user level. With this functionality, it is always required to log off or log on every time users (those who use the equipment) are changed.

Users may use this functionality to protect the equipment with a password for security. Like PCs, users can be changed or a unique password can be used for log-on and log-off.

7-8-1. **Setting up user management**

1 Press the [Administrator Setup] button on the [Setup] screen. (When user management is already enabled and you have logged in as an operator, the [User Setup] button will appear.)
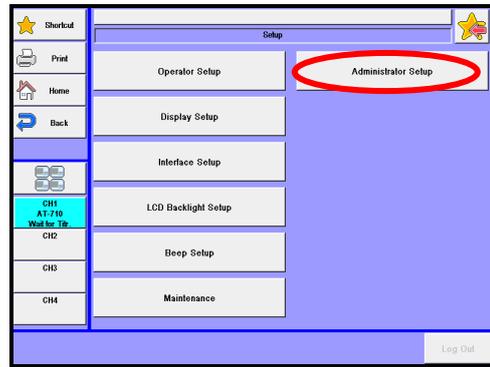
2 User management screen will be displayed.
Press button of user management.
Select "Disable" and press [OK] button.
[Administrator Setup]
Disable : Disables administrator authority.
Enable : Enables administrator authority.
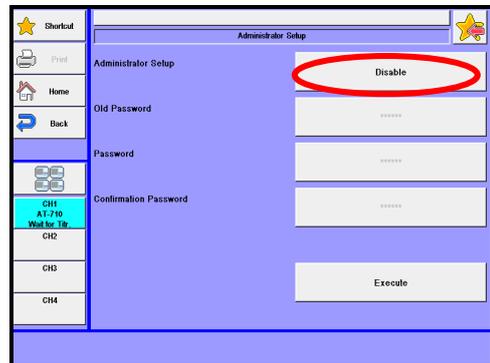
3 Enter your password.

Press the password button. Enter a new password and press the [OK] button.

Enter the same password in confirmation password to prevent false input.

Press the button of confirmation password. Enter the password and press the [OK] button.

No need to enter the previous password when changing user management from "Disable" to "Enable."
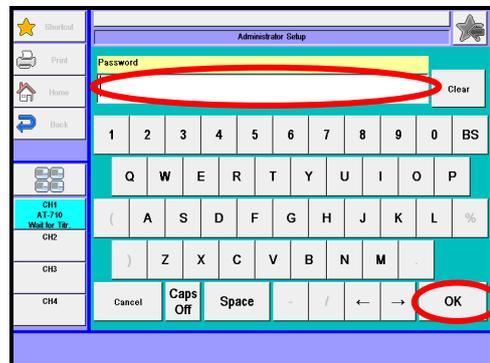
4 [Execute] button will be enabled after confirmation password is correctly entered. Press [Execute] button.
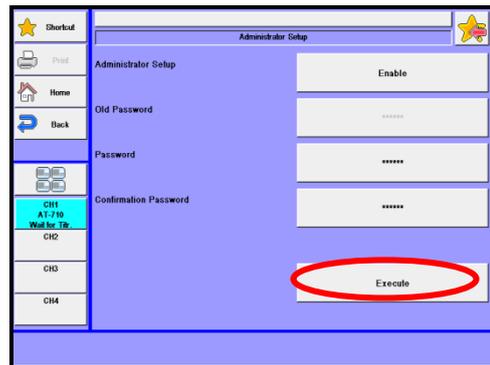
In order to enable user management, you are required to set up a password of the administrator.

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5 A screen shown on the right will be displayed.

Press [Yes] button. Enter confirmation password and press [OK] button.
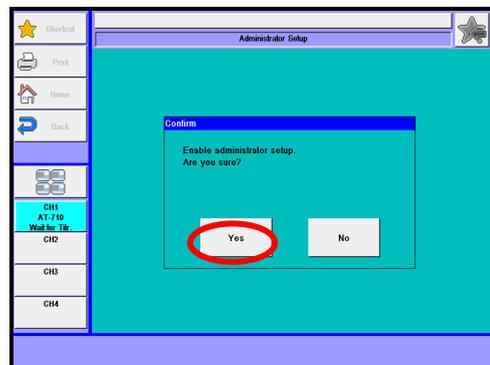
6 You will be asked if you wish to clear registered shortcut. Select [Yes][No].
Operator name will be "Administrator," and you can now change everything.
Refer to Table.6-8 for range of administrator authority.
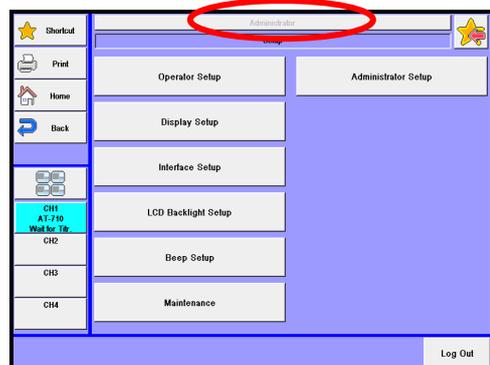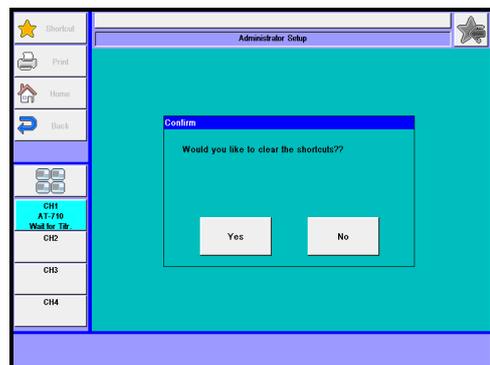
> **Note** If you set a function to a shortcut as Administrator, the set function can be operated by any operator.

Table.7-8. Limits of changeable measurement parameters

Item		Operator	Administrator
Method	Selection	○	○
	Edit	×(only inspect)	
Sample	Edit	○	○
	Mode switching	×	
	Sample mode	×	
	Changer settings	×	
Function	Reagent Information - Factor Settings	△	○
	Blank List	△	
	Other Settings	△	
	Other Items	×	
Setup	Management settings	×	○
	User settings	○	
	Login / Logout	○	
	Other items	×	
Calibration	Calibration Execution	○	○
	Various settings	×	
Burette		○	○
Titration / Reset		○	○
Lock		○	○
Shortcut		○	○

> **Note** If you set a function to a shortcut as Administrator, the set function can be operated by any operator.

7-8-2.Log out

1 The right screen will be displayed when [Setup] button is pressed while the management setting is executed. Press [Log Out] button.

[Log Out]
This button is enabled when the management settings is set to 'On.'
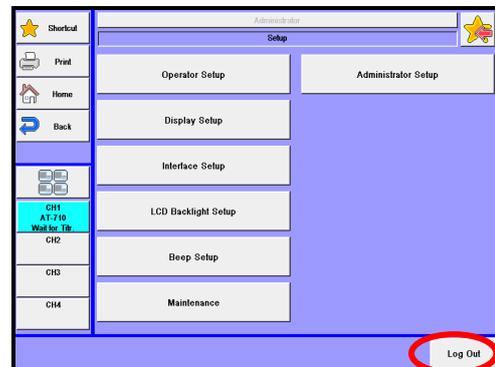
2 The right screen - login prompting screen – will be displayed.
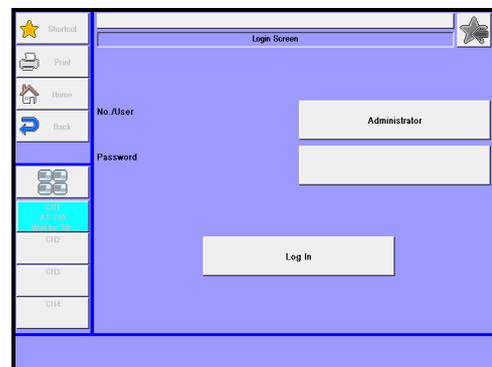
7-8-3.**Log in**

1   Press 'User name' button, select a user name, and press [OK] button.
Be sure to preset user names of operators other than the Administrator, referring to '7-2. Operator Setup.'
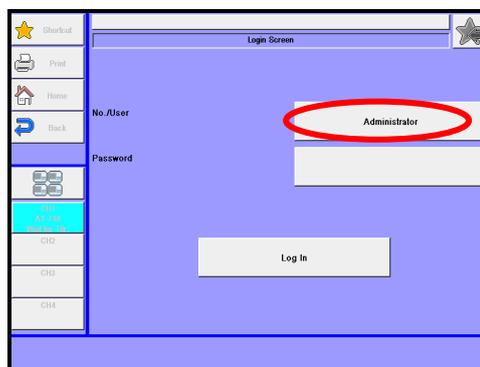
2   Enter a password.
Press 'Password' button, enter the preset password, and press [OK] button.
When an operator logs in the first time, a password will not be required.
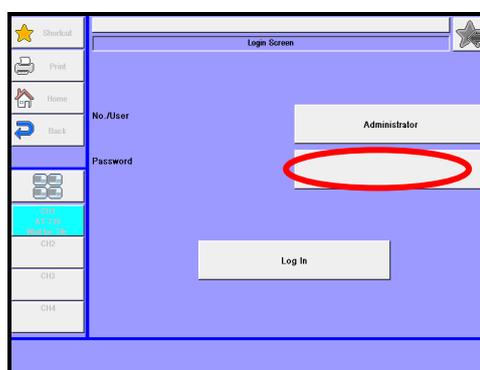
3   Press [Log In] button.
On login, the display will go back to the main screen.
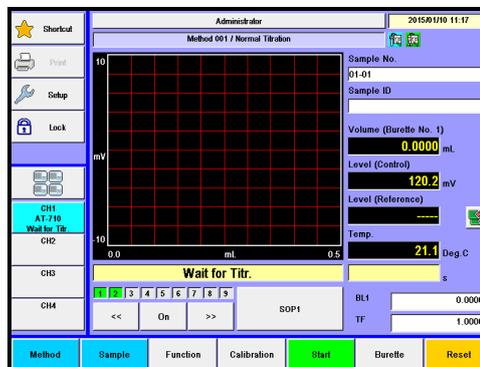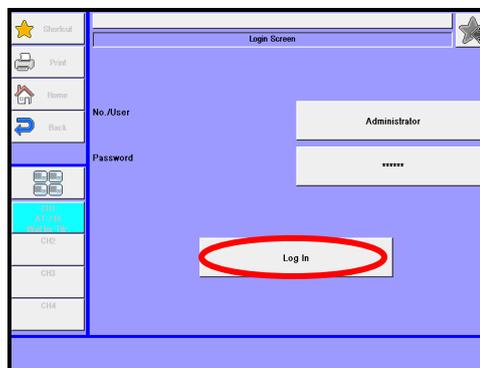
7-8-4. **Set up operator password**

1 The right screen will be displayed when [Setup] button is pressed on the "Home" screen in the operator login status. Press [User Setup] button.
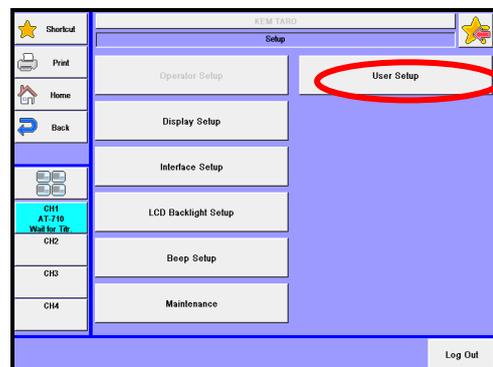
2 Press 'Old password' button, enter an old password, and press [OK] button.
Press 'Password' button, enter a new password, and press [OK] button.
In order to prevent an erroneous password entry, enter the same password in password confirmation field.
Press button for password confirmation, enter the password, and press [OK] button.
Press [Execute] button. When confirmation screen is displayed, select [Yes].
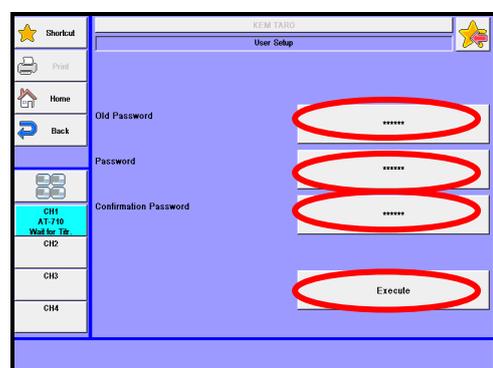
The initial password for operator is set to "Blank."

Note

7-8-5. **Cancel administrator settings**

1 Press [Setup] button on the [Home] screen while keeping the Administrator login status. Press [Administrator Setup] button.

2 The screen for management settings will be displayed.
Press 'Administrator Setup' button.
Select "Disable" and press [OK] button.

3 Press [Execute] button.
Confirmation screen will be displayed and select [Yes].

Note All passwords will be deleted when the management settings is set to "Disable."

8. **Lock**

Operations on the screen display are banned. This feature prevents erroneous operations in careless screen touching.

1	Press [Lock] button on the main screen.	
2	The right screen will be displayed. Press [Yes] button. When [No] button is selected, the display returns to the main screen.	
3	The right screen will be displayed and the operation has been locked. While the screen display is locked, only resetting operation can be done by pressing [CH1 Reset], [CH2 Reset], [CH3 Reset] or [CH4 Reset] button.	
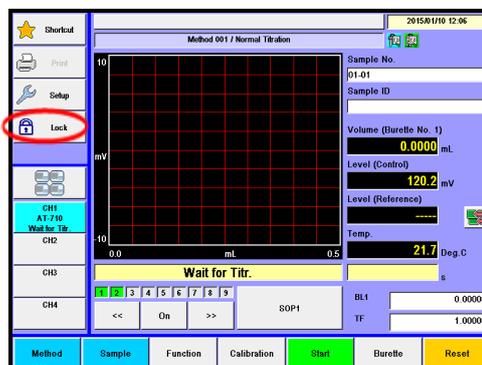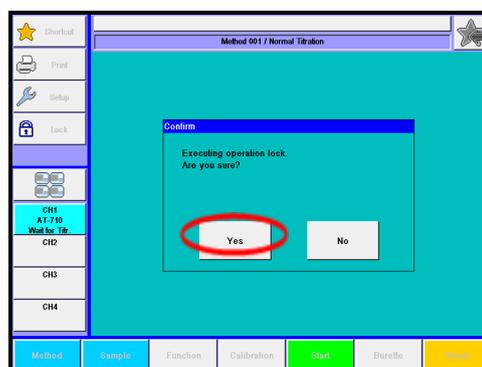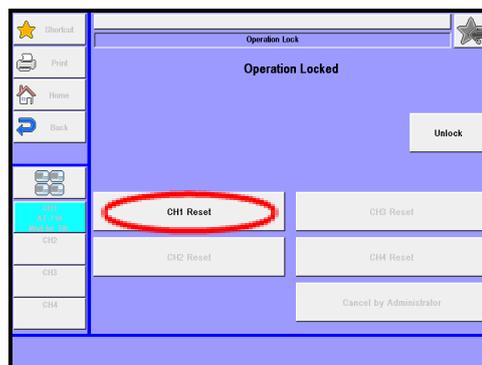
8. Lock

Release lock
<The case where the administrator authority is preset>

1 Press password entry button.

When an operator locks the system, the Administrator presses [Cancel by Administrator] button.
Press password entry button.
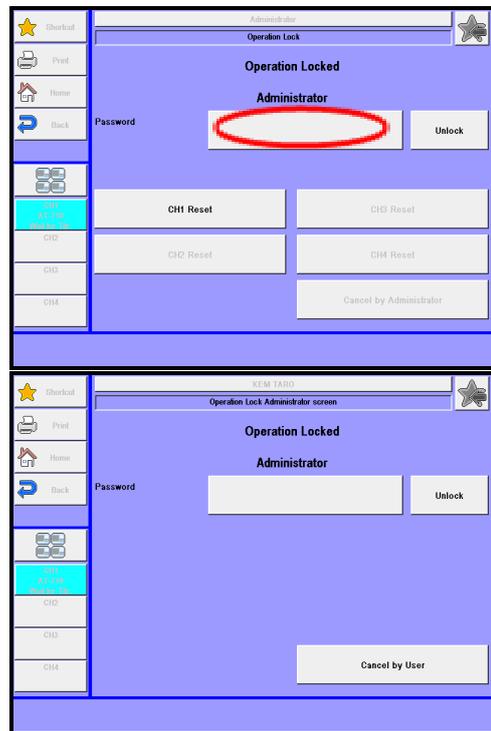
2 The right screen will be displayed.
Enter the password and press [OK] button.
You can switch lowercase and uppercase characters using [Caps On] or [Caps Off] button.
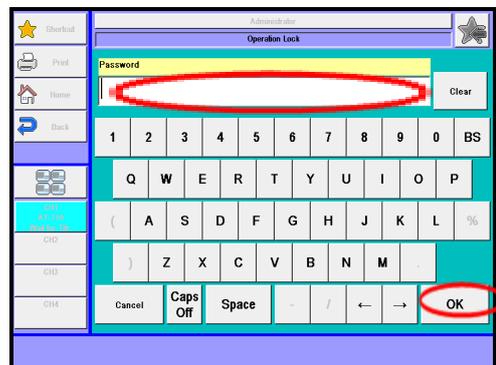
3 The right screen will be displayed.
Press [Unlock] button.

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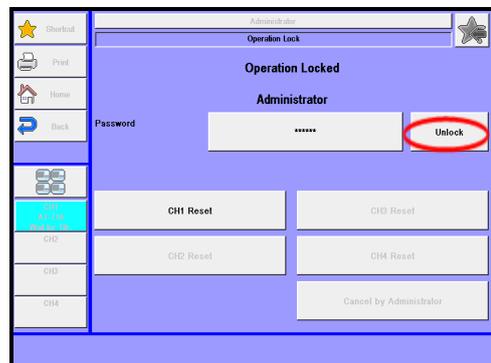
4 When the password is correct, the lock will be released.
If the password is incorrect, the message "Incorrect password" will be displayed.
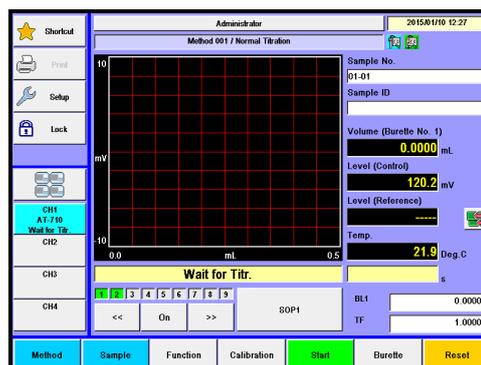
Note If you forget your lock password, contact your local dealer.

<The case where the administrator authority is not preset>

1 Press [Unlock] button.
Lock will be released.
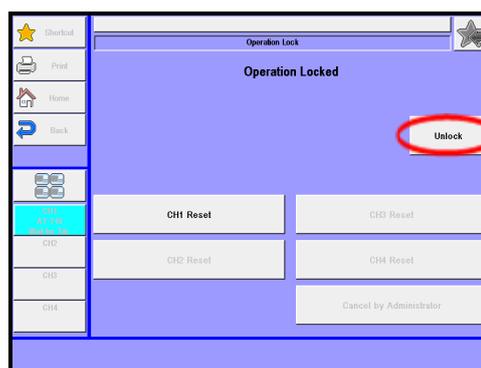
9. Other usage

9-1. Connecting Balance

When an electronic balance is connected and set up appropriately, the sample size (weight) is automatically input into the measuring unit.

1   Press [Setup] button on Main display.
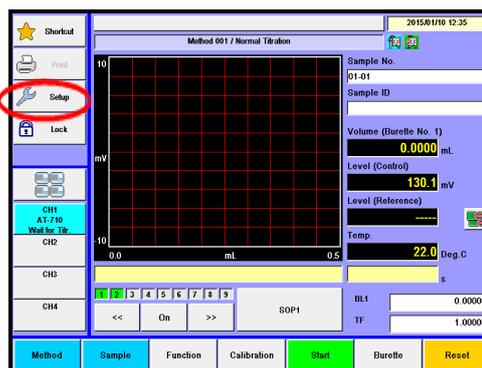
2   The screen on the right will appear.

Press [Interface Setup] button.
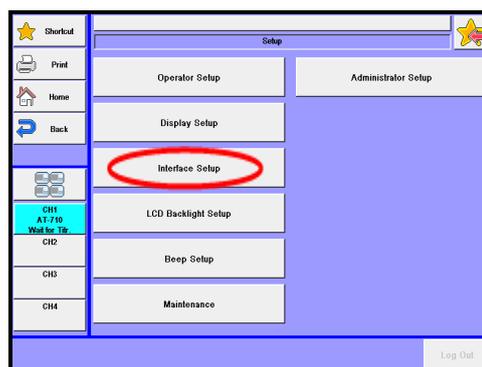
3   Press [Balance] button on "Interface Setup."
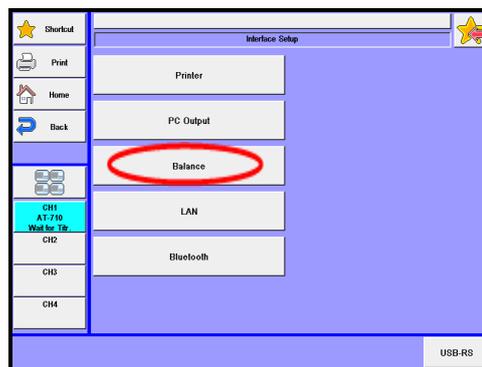
4   Choose the maker of your balance from the list on display.
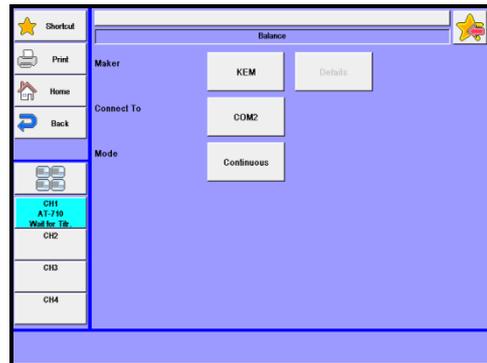
Note	Check with your local dealer to see if your balance needs a special cable to be connected.

9-1-1.**Input sample size on balance**

Sample size (weight) can automatically be input.

1   Press [Sample] button on Main display to show "Sample settings."
Press [Balance] button for sample size (S1).

2   The present input data in balance appears on "Sample settings" on display.

When the reading becomes stable, press [OK] button. The display returns to "Sample settings."

3   When "Size 1, 2" is selected in "Sample Input Mode" by choosing [Sample] – [How to Set Up Sample] and sample weight is continuously input, press [Size 2] button on the (Size 2) row and allow the weight to be input from the balance.

When the "Weight After Input" is selected on sample mode, the display for sample size input appears after titration is over. Press [Balance] button likewise for balance input**.**

9-1-2.Input on balance at the time of burette validation

1 Press [Burette] button on Main display.
Press [Validation] button.
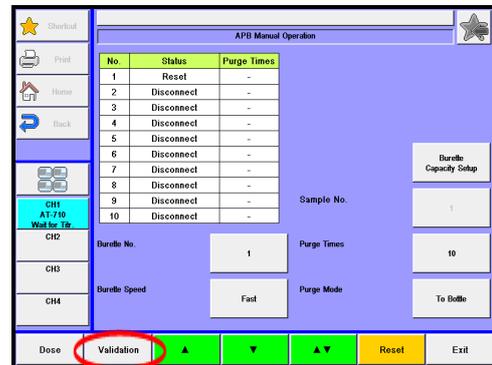
2 Put a beaker on the balance to cancel tare. Then the display will show 0.0000g.

3 Press [Start] button. The burette starts action to discharge water into the beaker.
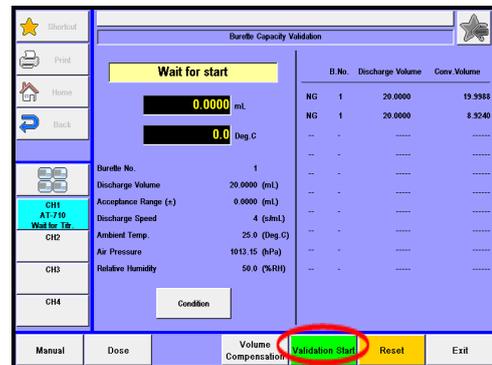
4 When the display for weight input appears on screen, press [Balance] button. Place the beaker with water discharged from the burette on the balance. When the display stabilizes, press [OK] button. The discharged weight is input at this moment.

(Screen Display for weight input by balance)
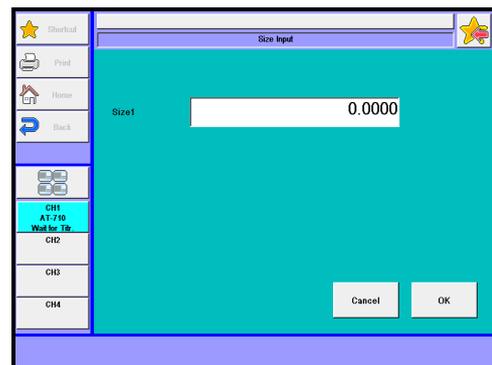
9-2. **Usage of a multiple sample changer CHA-600**

When a multiple sample changer is connected to this titration unit, it can perform continuous titration of a series of the same sample liquids or different kinds of samples repeatedly. It also automatically performs sequential events like pre-dosing, electrode cleaning after measurement and draining out the liquid in beaker.

9-2-1. **Selection of sampler**

1 Press [Sample] – [Sample Mode] button, and select "File Mode" on "Sample Mode."
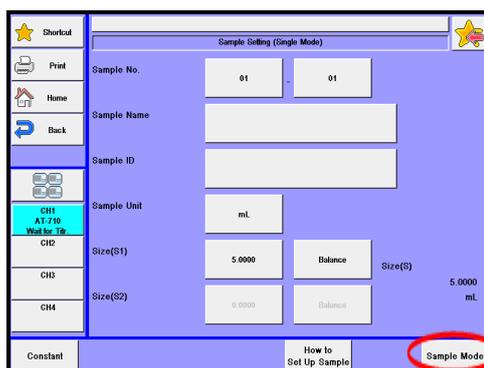
2 Select "On" on "Changer."
On "Sequence mode", you select how to clean the sampler.
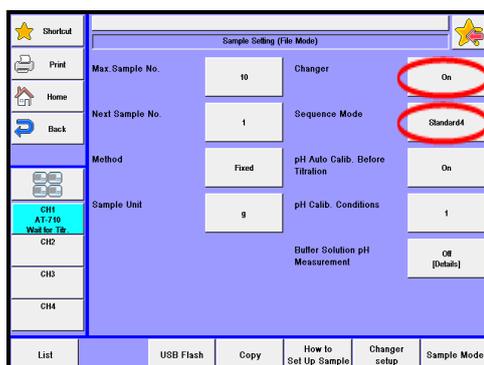
9-2-2. **Standard sequence setup**

1 Five (5) sequential modes are available including Standard sequence (1 to 4) and User sequence (user). Below description explains the sequence setup when a standard mode is chosen among from standard sequence modes 1 to 4 in Section "9-2-1. Selection of sampler."
Press [Sample]–[Changer Setting] button, and select an action time for "Standard sequence n."
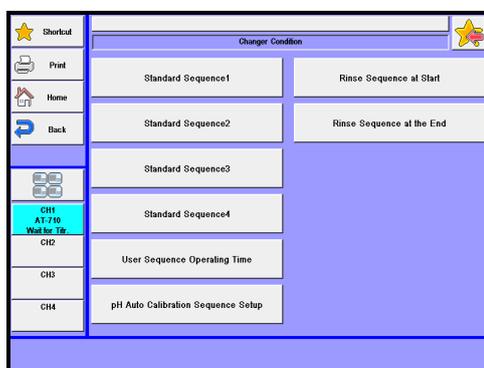
For details of action time, see Section "2-4-5. [Changer Setting]."

9-2-3.User sequence setup

The user sequence when "User" mode is chosen consists of three (3) different kinds of actions including the cleaning sequence at time of starting the sampler, cleaning after individual sample titration and after all the samples on rack are finished.

1 Press [Sample]–[Changer setup] button, and press [Rinse sequence at start] button to select rinsing steps (up to 20) for cleaning before a series of titrations starts. For setup procedure, see Section "1-11. Option Parameter."
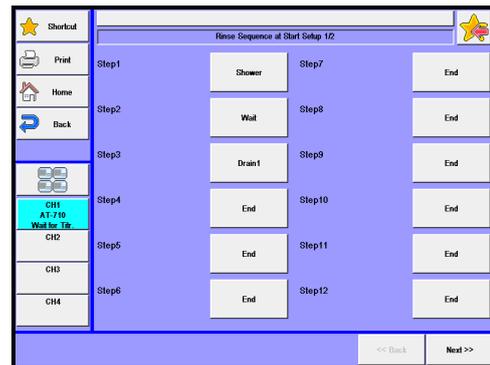
2 Press [Back] button, and then, press [Rinse sequence at end] button to select rinsing steps (up to 20) for cleaning after the last titration in series is completed. For the setup procedure, see Section "1-11. Option Parameter."

3 Press [Back] button, and select "User sequence" to set up each acting time for commanded event in user sequence. For acting time setup, see Chapter "2-4-5. [Changer Setup]."
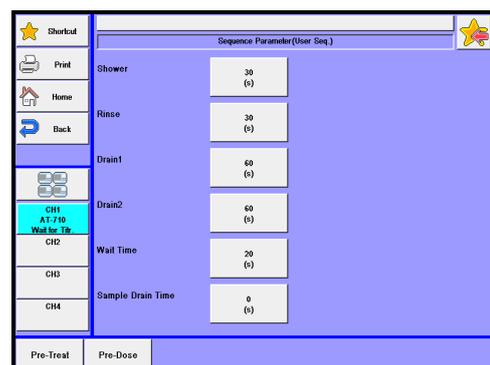
4   Press [Method] button on Main display, and select the method to be used. Then, press [Edit] button.
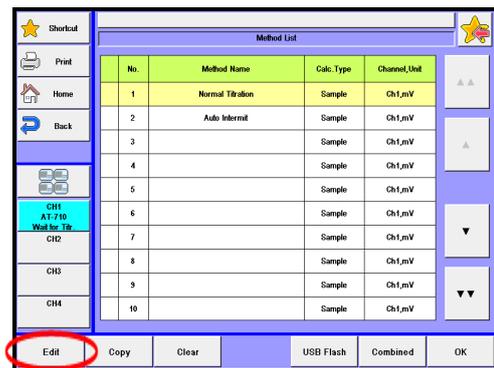
5   Press [Option Parameter] button to set the "Rinse sequence" to "On."
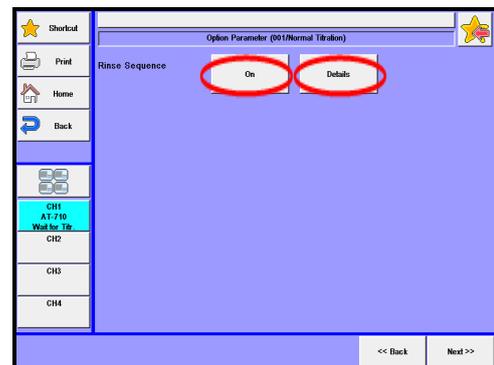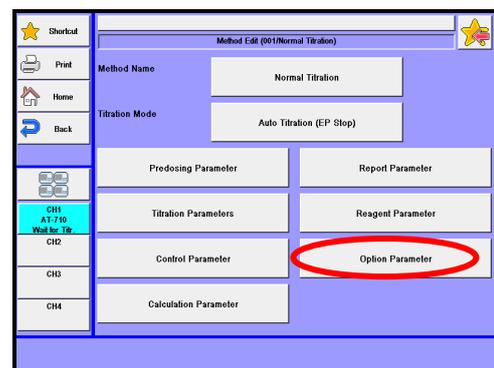
6   Press [Details] button and select rinse steps (Max. 20) after completing a titration.   See Section "1-11. Option Parameter." Rinse sequence after titration needs to be set up for each method individually.

9-2-4.Setup sample conditions

1   Press [Sample] button on the main screen display to configure samples for the number of measurements. About the sample setup, see Section "2-4.Sample File Mode."
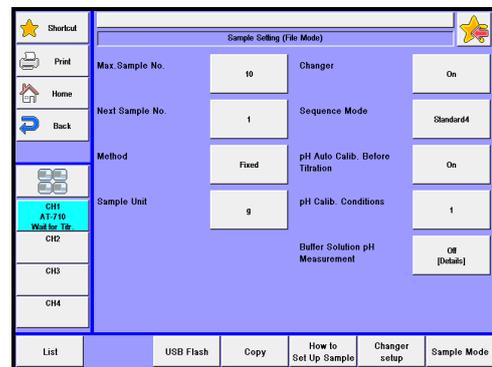
9-3. Adding a Built-in Burette

This titration unit can control max 10 burette drives. Up to two (2) burettes can be connected to the AT-710.

1   Remove the rubber caps and the screws as shown below.

Rubber caps

Screws
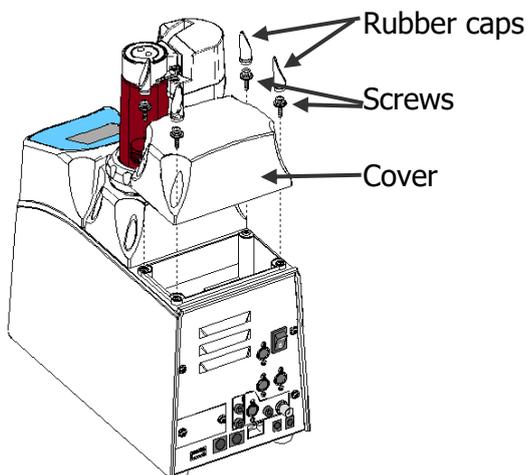
Cover

2   Remove the cover, and install the additional burette. Make sure that the address switch of the burette is No. 2 at this time.

Rubber caps

Screws

Address switch
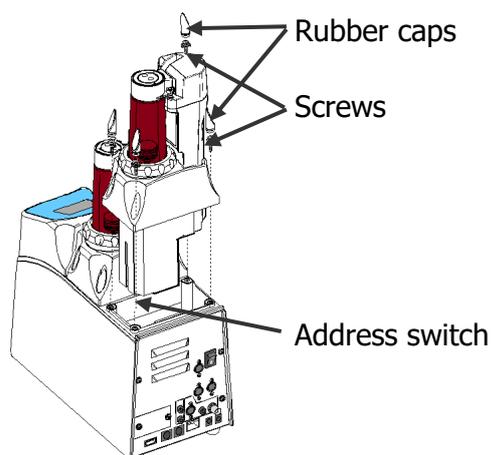
⚠ **Caution**	**Be sure to turn off the unit before plugging in or out the cable.**

9-4. Connecting additional burette

This titration unit can control max 10 burette drives. This titration unit can command and activate up to 8 Auto piston burettes.

1 Connect each SS-BUS port on the back of measuring unit and additional burette with connection cable.
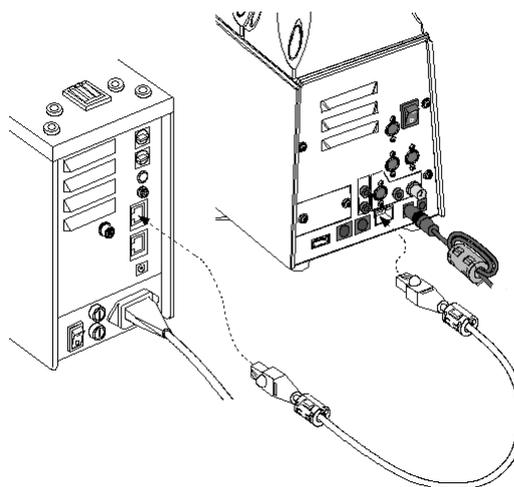
2 Select "Mode No." and "APB No." switch on the back of additional burettes. For details, see the instruction manual for the Auto piston burette to be connected. (Example: "Mode No."8, "APB No."3)
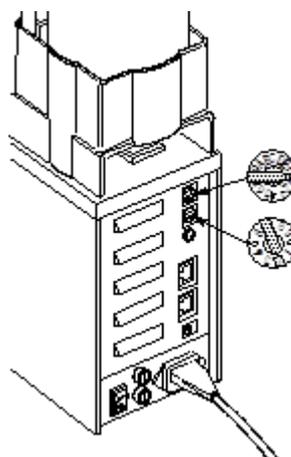
🔔 **Note** When software of additional burette is old, an upgrade is necessary.

9-5. **Adding auto dispenser**

One auto dispenser can be installed on this titrator, which is for dispensing solvents other than titrants.

The auto dispenser dispenses 50ml in ten (10) seconds with one operation, which enables you to dispense a lot of solvents in a short time.

9-5-1.**Supplied parts**

Part Number	Part Description	Qty	Remarks
-	Main Unit	1	
-	Switching Valve	1	
20-04052-00	Nozzle Cover	1	
-	PTFE Tubing 4×6 1m	2	
-	Silicon Rubber Cap	1	
-	Reagent Bottle Cap	1	
12-01260-01	Zeolite Tube	1	
-	Cable Cover	1	
69-00658	Screw Driver	1	
20-07468	Detaching Tool	1	

9-5-2.**Installation of auto dispenser**

1) Remove the rubber caps and the screws as shown below.
2) Remove the cover, and install the auto dispenser. Make sure that the address switch of the burette is No. 2 at this time.
3) Once you have put the dispenser thoroughly, fix the cover with the screws and then put the rubber caps.
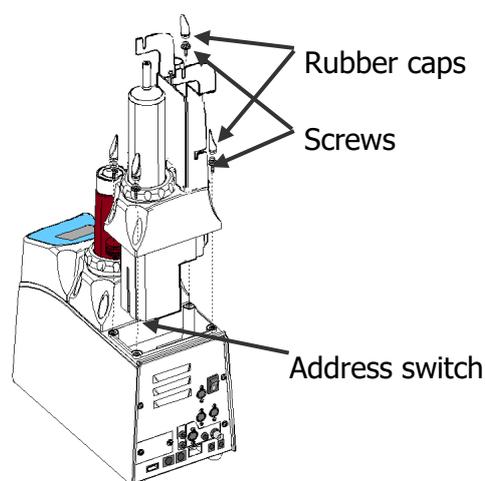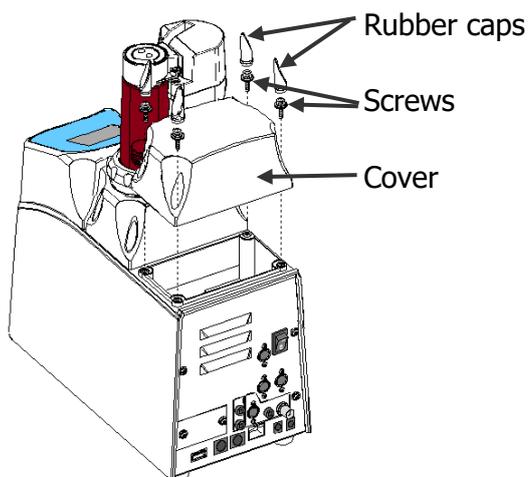
⚠️ **Caution**	**Be sure to turn off the unit before plugging in or out the cable.**

9-5-3.**Assembling burette unit**

1) Loosen the hex cap nut on the switching valve. Match the positions of upper portion of the cylinder and two screws, and put the switching valve onto the titrator. Tighten the screws on the switching valve by hands. Afterwards, tighten more about 45degrees with the supplied detaching tool. Tighten the cap nut on the cylinder.
2) Put the cable of switching valve into the titrator.
3) Place the cable cover on the titrator through the guide.

Milli sleeve

Hex cap nut

Screw

Switching valve

Cable

Detaching tool

Cable cover

Cylinder
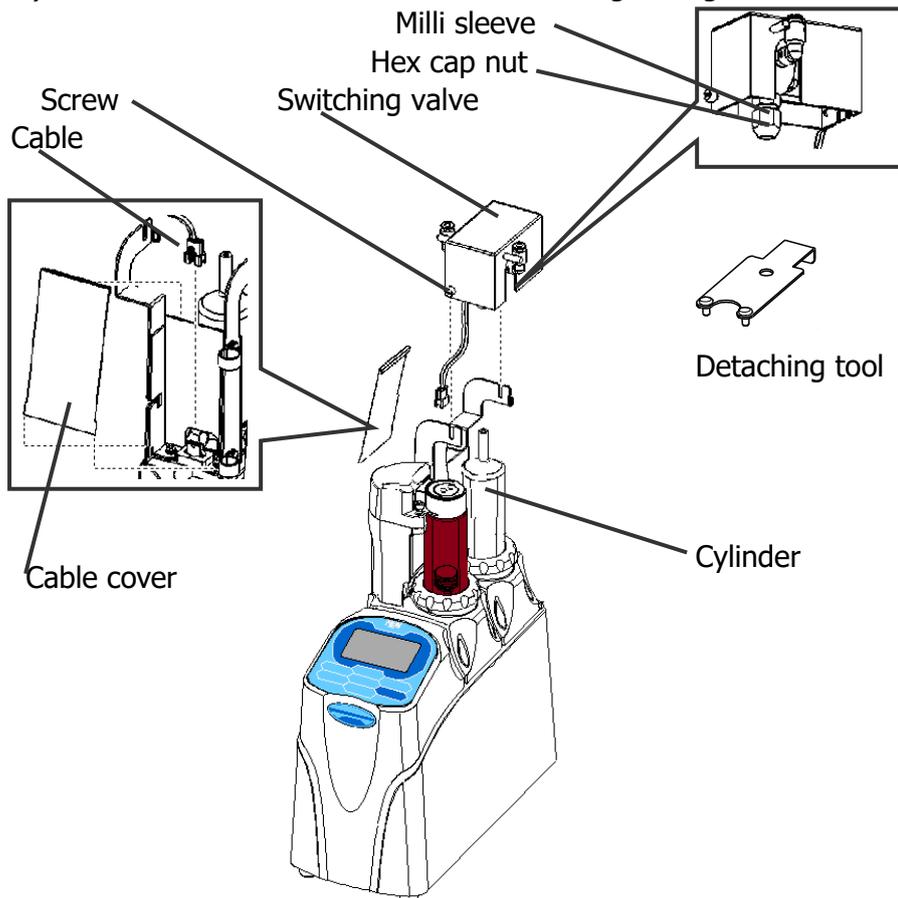
4) Install the nozzle cover to burette unit.
5) Insert the PTFE tubing into the joint on the right side of the switching valve. Put the other end to the multi electrode holder or the electrode holder on the CHA-700.
6) Put the PTFE tubing with the silicone rubber cap through the reagent bottle cap. Match the tube to the position that reaches the bottom of the reagent bottle. Put the other end to the joint on the left side of the switching valve.
7) Peel off the seal on Zeolite tube, and install it onto the reagent bottle cap.

PTFE tubing

Joint

Joint

Nozzle cover

Silicon rubber cap

Seal

Zeolite tube

Reagent bottle cap

Reagent bottle
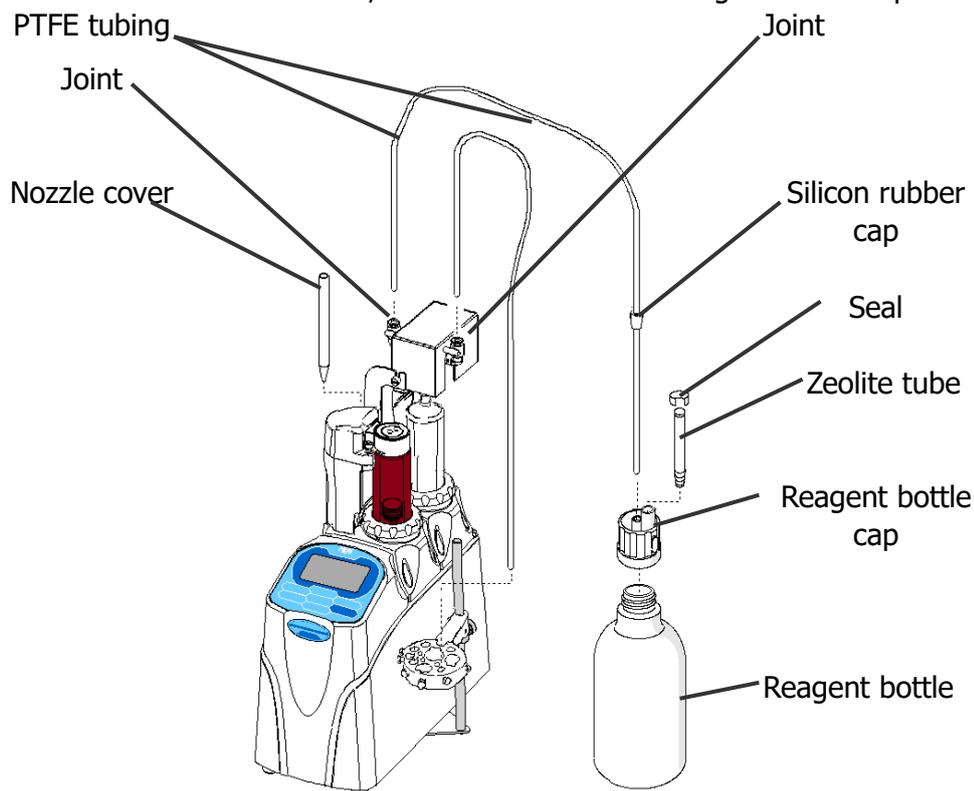
⚠ **Caution**	**Make sure to put the tubing so that the joint faces toward the upper surface of the equipment. If the tubing separates from the joint, reagents may spill and you may get them in your eye.**

Note	Adjust the length of the PTFE tubing by cutting as necessary. Put the PTFE tubing on the uncut end into the joint. Make sure to remove the sticker on the zeolite container when in use.

8) Turn on the titrator.
9) Make sure that "Dispenser" is added from "Function" – "System Information."

9-5-4. **Setting up operation**

Auto dispenser can be used by selecting "Dispenser" from Method - Predosing Parameters - Mode.
If you wish to operate the automatic dispenser manually, select "D." on Burette No. of "Burette" – "Manual or "Dose."

9-5-5. **Maintenance**

To remove the switching valve, loosen its cap nut. Then loosen its stop screws (2 pcs) with the supplied detaching tool. Lift the switching valve.
Follow "6-2-3.How to remove and assemble the burette unit" of MCU-710 Operation Manual to remove the burette unit.

Screw   Switching valve   Hex cap nut

Detaching tool
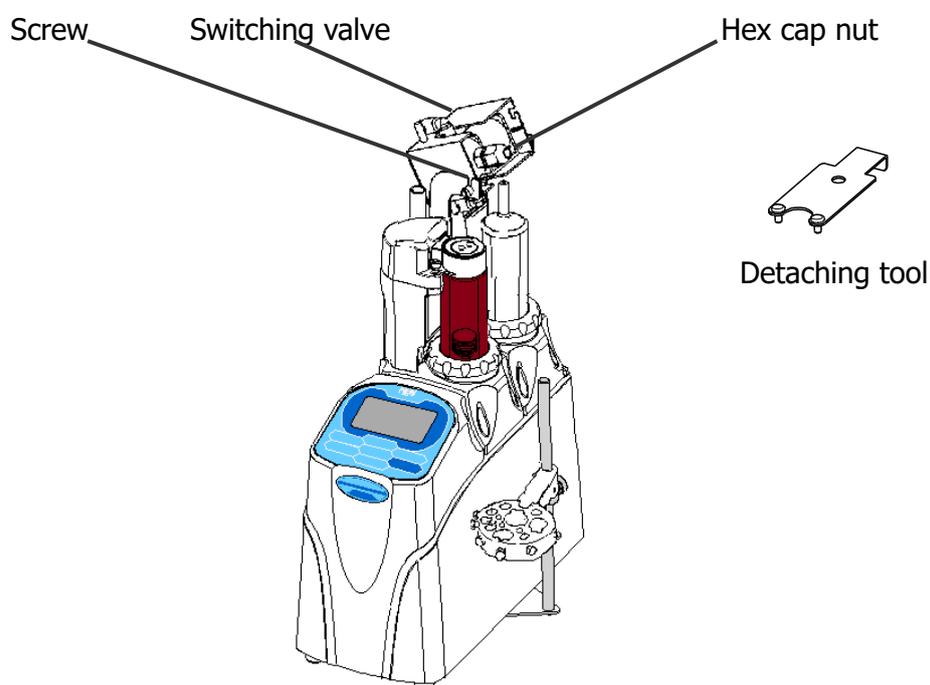
9-5-6. **Specification**

Part Description	Auto Dispenser
Burette capacity	50mL
Dispense speed	Approx.10seconds/50mL
Suction speed	Approx.10seconds/50mL
Burette accuracy	100mL±1mL ±2% when dispense volume is 100mL or more
Liquid contact part	Glass , fluorocarbon polymer , PP , PPS , PTFE, fluoro rubber
Dimensions(Overall dimensions when installed to AT-710)	143 (W) × 309 (D) × 450 (H) mm(not incl. tubing)

9-6. **Connecting a plural number of measuring unit**

Four (4) measuring units can be connected by MCU-710M.

1   Connect the USB cable of the additional measuring units to USB hub to the USB
     port on the back side of MCU-710.

Note   Make sure that power of peripheral equipment is on before turning on the
MCU-710.
Do not turn ON simultaneously the power supply of plural measuring units.
Do not turn ON simultaneously the power supply of measuring units and
optional peripherals.

All channels can be displayed as shown below.

< When AT-710/MKV-710/MKC-710/MKH-710 are connected >
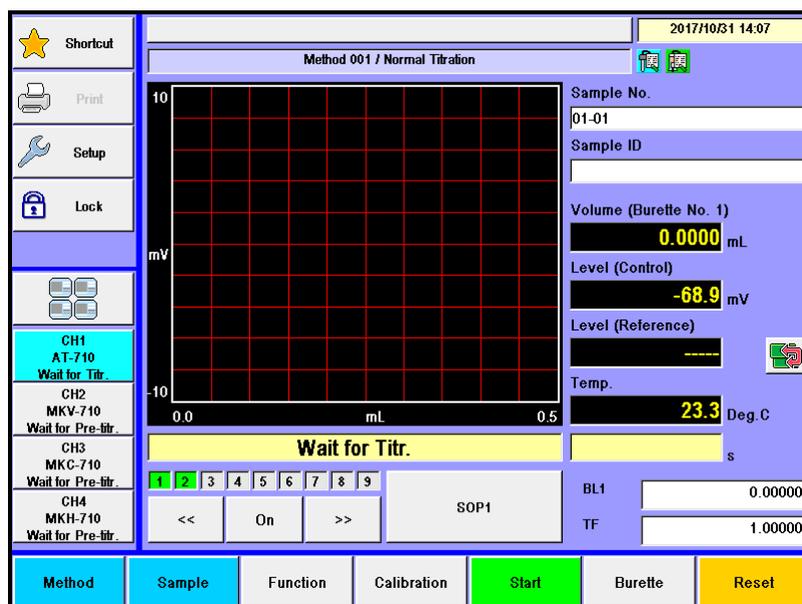
9-7. Use COD titration unit

When the COD titration unit is connected with Main unit, this titration unit can measure chemical oxygen demand specified in JIS K0102 Testing method for Potassium permanganate number at 100°C.

9-7-1.Supplied parts

Part Number	Part Description	Qty	Remarks
12-06219	Base	1	
62-00085-04	SUS-Spring Washer M4	1	
20-07250	Extension Rod	1	
67-00001-15	COD Combined Platinum Electrode (C-598)	1	
12-00537-00	Electrode Holder	1	
20-10577	Holder	1	
20-10578	Nozzle Holder	1	
20-07472	Nozzle FEP phi3×2-0.5 L=235	1	

9-7-2. **Connecting the COD titration unit**

1	Make sure the power switch is in OFF position as shown.

2	Remove the stand bar.

3	Place Base on the magnet stirrer.

4	Install extension rod to the COD unit.

5	Attach the stand bar to the extension rod.

Stand bar

Extension rod

SUS-Spring washer M4

Base
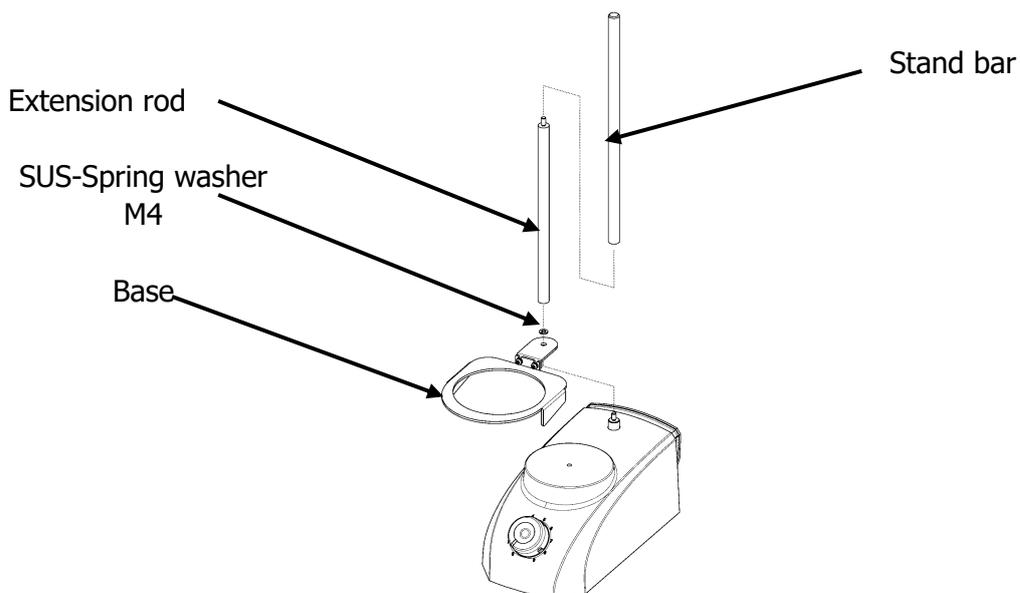
6   Fix Nozzle holder (20-10578) and Holder (20-10577) to Combined platinum electrode (67-00001-15).

7   Install Electrode holder (12-00537-00) onto extension rod.

8   Install combined platinum electrode onto its holder.
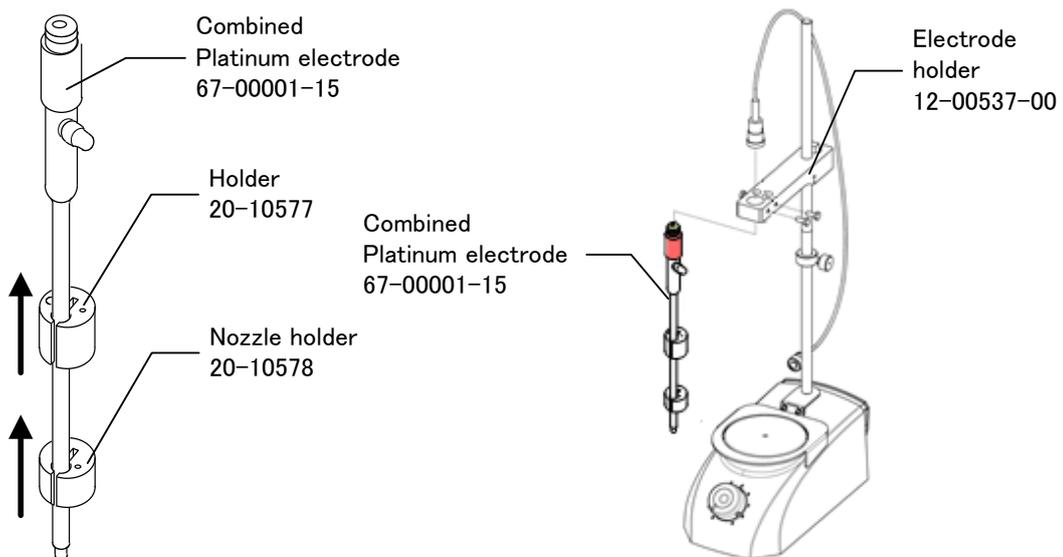
9   Remove the degas nozzle tube from the degas chamber, and put the head of the provided titration nozzle/LL (20-07472) instead.

10   Put the titration nozzle through the electrode holder, the nozzle holder and the holder, and fix it to the electrode holder as shown below.

11   Hook the electrode cable to the combined platinum electrode.

> Use the electrode cable, which is supplied with the titration unit.
>
> **Note**

12   Connect the other end of cable to G1 terminal of preamplifier in the rear of magnetic stirrer.

Connecting cable

Burette unit (ex. EBU-710-20B)

Degas chamber

Titration nozzle

Joint

Titration nozzle tip/LL 20-07472
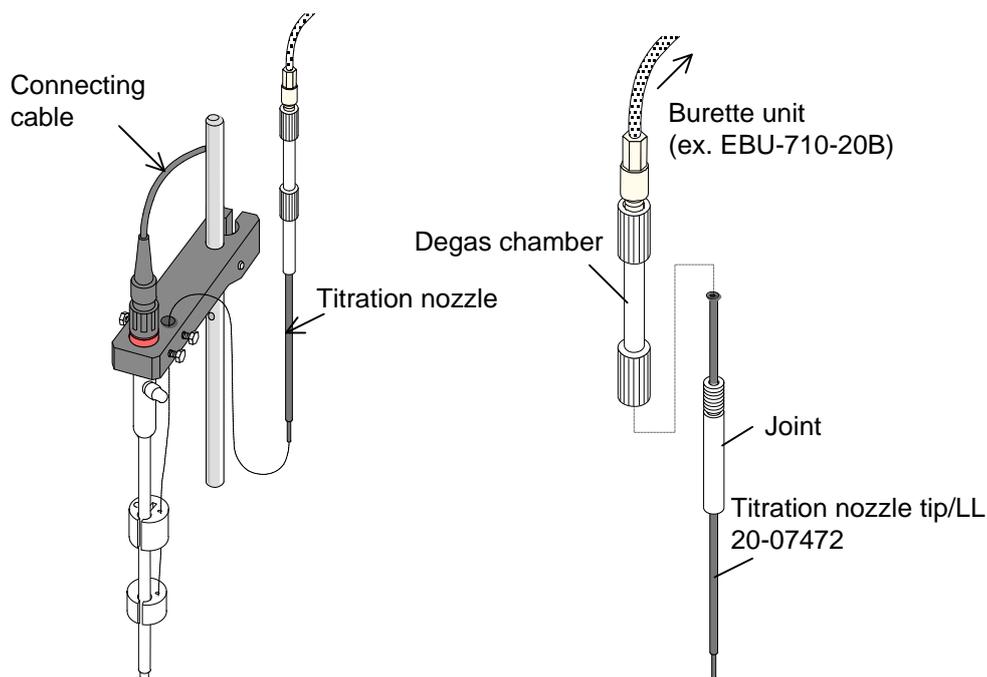
9-7-3. Parameter setup

Here you have to configure parameters necessary for COD titration on the measuring unit, where COD titration mode is pre-installed.

< Titration mode: COD >
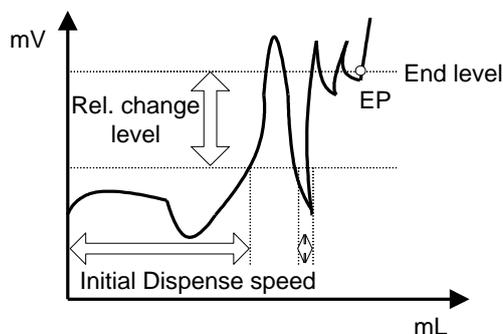
- When detection potential is lower than "Rel. change level", it doses titration liquid continuously until it reaches "Initital Dispense speed". When it exceeds "Rel. change level", it switches to intermit titration until it reaches "EP level".
- When the potential decreases to the level of lower than "Rel. change level", it doses until it reaches "Initital Dispense speed".
- An endpoint will be detected when titration exceeds "End level" and satisfies "End time".

Table 9-7-3

Settings	Parameters
Method name	Name the method.
Titration mode	Select "COD."
Burette No.	Select the burette number among from No. 1 to 10.
Channel, Unit (For Control.)	Select the detector number and potential unit. Choose "Ch1, mV."
pH polarity	Select the direction of pH potential.
Direction	Select the direction of titration. Here choose "Positive" direction.
Max. volume	Select max titration volume (0 to 9999.0000mL).
Channel, Unit (ref.)	Fixed to "Off."

9. Other usage

〈Control Parameter: when titration mode and form are set to "COD"〉

[Data Sampling Pot.]
Here you can select data sampling potential. The potential in COD titration changes rapidly during titration. A wide range of data sampling potential is recommended. Typically, set at 1000mV.
- 0.1 - 9999.9mV

[Data Sampling Vol.]
Here you can select data sampling volume. Typically set the titration volume in COD to approximately 0.05mL.
- 0.0005 - 9999.0000mL

[Rel. Change Level]
Here you set the potential level where constant speed titration and intermit titration is switched.
"Rel. Change Level" is the relative potential to "EP Level". Typically set it to 110mV in COD.
- 0.0 - 9999.9mV

[End Time]
Here you set the end sense time. EP is found when the potential exceeds "End Level" within this preset time. Typically, set it at 30 seconds for the COD titration.
- 0 - 9999s

[EP Level]
Here you set the endpoint potential level. Typically set it to 660mV for the COD titration.
- $-$9999.9 - 9999.9mV

[Initial Dispense Speed]
Here you can set dispense speed before reaching the "Rel. Change Level."
- 1 - 999s/mL

[Limit Time]
Here you can set a limit time for titration. When it elapses the preset time, titration will be stopped.
- 0 - 9999s

[Stirrer Speed]
The spinning speed of stir bar in the stirrer can be selected according to sample type. The range for selection of its speed is in nine steps:
- 0 - 9

9-7-4. Calculation formulas for COD measurement

COD measurement requires an equation to calculate concentration. For the details of its setup, see the Chapter "1-8. [Calculation Parameter]." The typical calculation formulas are shown in the table below:

Table 9-7-3

Object of Analysis	Calc. type	Calculation formula	Constants
Blank (mL)	Blank	BL1	
Factor	Factor	(S*Kn)/(EP1*Cn)	Kn = Sodium oxalate purity (%) Cn = 1.675(mg / mL)
Sample (ppm)	Sample	(EP1-BL1)*TF*Cn*Kn/S	Kn = 1000 Cn = 0.2(mg / mL)

9-7-5. Measurement operation

1) According to JIS K0102 Testing method for Potassium permanganate number at 100°C, prepare the sample in a 300mL conical flask.

<Pre-treatment>
I. Transfer the prepare 100mL sample solution to 300mL conical flask.
II. Add 10mL sulfuric acid (1+2) to the sample, and add silver nitrate solution equivalent to chloride ion masking+1g.
III. Add 10mL of 5m mol/L-potassium permanganate solution.
IV. Put the sample in boiling water and heat it for 30 minutes.
V. Cool down to room temperature, and add 10mL of 12.5mmol/L-sodium oxalate solution.
VI. Heat the sample up to about 60°C, and wait until the sample liquid turns to transparent after the reaction of sodium oxalic added at step V.

2) Heat the sample up to approximately 70°C.
3) Put a stirrer bar in the sample, and dip the electrode in it.
4) Press [Start] button on the titration unit to start titration.

9-7-6.Maintenance

When the inner filling of C-598 electrode goes down, change it or refill.

Prepare saturated potassium sulfate.

Fill in the saturated potassium sulfate through the inlet with a syringe.

Fill just up to a little before the inlet opening.

⚠ **Caution**	**Mercury nitrate (II) is used in C-598 electrode.** **Wear protective gloves and glasses in a well ventilated room.** **For disposing of the electrode, dilute the solution with water and add sodium sulfate solution, and wait for precipitation of mercury sulfate, which is to be solidified with cement or ask a vendor specialized in chemical disposal.**

9-8. Use POV titration unit

This unit you have purchased is designed for the purpose of obtaining peroxides value of food products containing fat or oil.

9-8-1. Supplied parts

Part Number	Part Description	Qty	Remarks
12-06219	Base	1	
62-00085-04	SUS-Spring Washer M4	1	
20-07250	Extension Rod	1	
12-03100	Combined Pt Electrode for Micro Titration	1	
12-00537-00	Electrode Holder	1	
20-07249	Fixing Ring	2	
12-00169-05	Nozzle	1	

9-8-2.Connecting the POV titration unit

1	Make sure the power switch is in OFF position as shown.

2	Remove the stand bar.

3	Place Base on the magnet stirrer.

4	Install extension rod to the POV unit.

5	Attach the stand bar to the extension rod.

Extension rod

SUS-Spring washer
M4

Base

Stand bar

6

Electrode holder (12-005-3700-48), Nozzle (12-00169-05), Combined Pt electrode (12-03100), Fixing ring (20-07249) and electrode cable are installed.

Electrode holder
12-00537-00

Nozzle

Fixing ring

9-8-3.**Parameter setup**

After the POV titration unit is set up in AT-710, the method parameter for the titration is set.
Please set it according to the manual of the potential diff

Table.1 example of basic setting - with AT-710: Of for Safflower oil

[Mode]		[Control parameter]		[Calculation parameter]	
Titr.mode	Auto Int.	Number of EP	1	Calc. Type	Sample
Titr.form	EP Stop	End sense	Auto	Formula	EP1
		Gain	10	CO1	(EP1-BL1)*TF*R/S
[Titration parameter]		Data sampling	Set	Active constant	R=10
Burette No.		Data samp.pot.	4.0[mV]	Unit	meq/kg
Max volume	2.0000[mL]	Data samp.vol.	0.1[mL]	EP position	EP1
Channel,Unit ctrl.	Ch1,mV	Ctl.speed mode	Std.	Decimal	3
Channel,Unit ref.	Off	[Stability=0.5mV/s]		Evalution	Off
pH polarity	Standard	[Delay time=0s]			
Direction	Auto	[Limit time=0s]			
Wait time	0[s]	Other control	Std.		
Dose mode	None	[Titr.over vol.=0.00mL]			
		[EP area=Off]			
		[Separation=Off]			
		Stir. Speed	4		

9-8-4. **Preparation for sample**

The sample which measures the peroxide value is prepared.
At this time, the preprocessing (extraction of oils and fats) is needed according to the shape of the sample.

Table.2

Sample type	Example	Pretreatment
Liquid	Vegetable oil	Not necessary
Solid	Lard, beef tallow, etc.	Not necessary
Contains fat and oil	Fried noodle and cakes	Extract fat and

9-8-5. **Measurement of peroxide value**

The measurement sample is prepared, and the peroxide value is measured.
The sample measures according to the table below and takes the amount of the collection corresponding to the presumption peroxide value.

Table.3

POV[meq/kg]	Sample size
Less than 10	5
10 ~ 50	5 ~ 1
More than 50	1 ~ 0.5

(Standard Methods for the Analysis of Fat, Oils and Related Materials excerpt)
Please refer to the application note (1. Peroxide value of edible safflower oil) for the measuring method of the peroxide value.

9-8-6. **Notes when measuring it**

1） Please note the following so that the oxidation of the sample should not progress while gathering it when you gather the sample in Erlenmeyer flask.

- It substitutes it for air through <Erlenmeyer flask for the titration> chokedamp before the sample is gathered.
- A necessary amount of the sample is quickly put in Erlenmeyer flask. At this time, when the sample is a liquid, contact with air can be made a minimum by using and gathering Shiringe etc.
- When the titration solvent is poured, it quietly puts it along the wall of Erlenmeyer flask etc.

2） Please make the saturation you making potassium solution and the titration solvent newly again when the sample solution discolors to yellow when the saturation you making potassium solution is poured while measuring it the blank.

9-9. **PC**

When the optional software SOFT-CAP in PC is installed, the measurement results to Microsoft® Excel® workbook can be export. And the data in CVS format can be stored.

9-9-1.**Data acquisition software (SOFT-CAP)**

The optional software SOFT-CAP is Windows®-based application and can download the measurement data to Microsoft® Excel® workbook or store in CSV format through RS232C port.
By this software, starting titration or reset can be commanded by the computer.

＜**Receiving data**＞
The SOFT-CAP software can export the measurement results as follows:
  1) It transfers the data to Microsoft® Excel® workbook.

  2) It stores the data in CSV format so that spreadsheet can be used.

＜**Sending data**＞
The personal computer can send commands including titration start and reset.

For details, see the operation manual for Data Acquisition Software (SOFT-CAP).
Note

9-9-2.**RS-232C output**

＜**Outline of RS232C**＞
This instrument is equipped with RS232C interface which is the standard bit serial data communication.
The RS232C interface is proved to correct communication between modem and terminal (peripheral).
This unit is set to terminal mode as a peripheral of computer. Most of the existing personal computers are equipped with RS232C interface and set to terminal mode.
However, even between the peripherals, data communication is possible by way of appropriate configuration. (some computers can switch modem from/to terminal mode)

＜**Signal level**＞

It conforms to JIS C6361.

Logics	Signal level
1	-3 - -15[V]
0	+3 - +15[V]

The above pattern shows the letter "A" (ASCII code 41H).

＜**Connector**＞

The connector conforms to JIS X5101 and male type 9 pins, and its configuration is as follows:

Pine number	Signal	Direction
2	RXD (Receiving Data)	IN
3	TXD (Sending Data)	OUT
4	DTR (Data terminal Ready)	OUT
5	SG (Signal Ground)	
6	DSR (Data Set Ready)	IN
7	RTS (Request To Send)	OUT
8	CTS (Clear To Send)	IN

【Caution】
The data signals for TXD and RXD are negative logic, and the control signals for RTS, DSR and DTR are positive logic.

＜**RS-232C data input/output**＞

For details of command and data format for input and output by RS232C, refer to the manual for RS232C.

10. **Others**

10-1. **System Configuration**

<MCU-710M+AT-710>

AT-710+MCU-710M Supplied parts

Automatic Potentiometric Titrator
AT-710
*Standard 12-05633-10
*Photometric
  12-05633-11
*Polarization
  12-05633-12
*Conductometric
  12-05633-13
*Dual input titration
  12-05633-14

USB

USB Cable (A-A)
64-00643-33

AT-710/ MKV-710/
MKC-710/ MKH-710/2nd
*For Connecting a plural number of measuring unit
  When connecting more than one measuring unit,
  USB cable(A-A) required

USB Hub
64-01481
*Four (4) measuring units
  can be connected

Bluetooth USB Adapter

Bluetooth USB Adapter
*Four (4) measuring units
  can be connected

AT-710/ MKV-710/
MKC-710/ MKH-710/2nd
*For Connecting a plural number of measuring unit
  When connecting more than one measuring unit,
  USB cable(A-A) required

USB

MCU-710M
12-05344-01

COM1(RS-232C)

Connection Cable
64-00625
*MiniDIN8P-DSUB9PM

RS-232C Connection Cable
12-02013
*Dsub9-Dsub25

Impact dot printer(IDP-100)(AC 120V)
12-02028-01
*W/Connecting cable(12-02013、64-00625)

Impact dot printer(IDP-100)(AC 230V)
12-02028-02
*W/Connecting cable(12-02013、64-00625)

COM1(RS-232C)
COM2(RS-232C)

Connection Cable
64-00625
*MiniDIN to D-Sub9 male

Cable (Mettler)
RS9-RS9mf
*Purchased from Mettler

Analytical balance(Mettler)
XS204DR
*Recommended instrument
  (need a cable separately)

Connection Cable
64-00625
*MiniDIN to D-Sub9 male

RS-232C Connection Cable
12-02012
DSub9-DSub9

Date Acquisition Software(SOFT-CAP)
12-03265
*Software version 3.50 or higher

USB

USB hub can be connect
*When connecting more
  than one device, use a
  USB hub with power
  supply

USB cable
64-00643-03

Thermal printer (EU/KR)
12-02618-01
*W/USB cable

For commercial use
USB flash drive

Thermal printer (GB)
12-02618-02
*W/USB cable

For commercial use
USB key board

Thermal printer (US/TW)
12-02618-03
*W/USB cable

For commercial use
USB barcode reader

Thermal printer (CN)
12-02618-04
*W/USB cable

For customized
USB foot switch

USB cable

For commercial use
A4 printer(EPSON)

USB serial transducer
64-00177-00

RS-232C
*RS-232C connection model (IDP-100, Balance, SOFT-CAP) can be connect

LAN

For commercial use
Communications cable (cross)

Personal computer

For the connection except the USB, refer to AT-710+MCU-710S system configulation

＜MCU-710S+AT-710＞

AT-710+MCU-710M Supplied parts

Automatic Potentiometric Titrator AT-710
*Standard 12-05633-10
*Photometric 12-05633-11
*Polarization 12-05633-12
*Conductometric 12-05633-13
*Dual input titration 12-05633-14

USB	USB cable(A-A) 64-00643-33	USB	MCU-710S 12-05344

COM1(RS-232C)	Connecting cable 64-00625 *MiniDIN8P-DSUB9PM	Connecting cable 12-02013 *Dsub9-Dsub25	Impact dot printer(IDP-100)(AC 120V) 12-02028-01 *W/Connecting cable(12-02013、64-00625)
			Impact dot printer(IDP-100)(AC 230V) 12-02028-02 *W/Connecting cable(12-02013、64-00625)

COM1(RS-232C) COM2(RS-232C)	Connecting cable 64-00625 *MiniDIN to D-Sub9 male	Cable(Mettler) RS9-RS9mf *Purchased from Mettler	Analytical balance(Mettler) XS204DR *Recommended instrument (need a cable separately)
	Connecting cable 64-00625 *MiniDIN to D-Sub9 male	RS-232C Connection Cable 12-02012 DSub9-DSub9	Date Acquisition Software(SOFT-CAP) 12-03265 *Software version 3.50 or higher

USB
USB hub can be connect
*When connecting more than one device, use a USB hub with power supply

USB cable 64-00643-03	Thermal printer (EU/KR) 12-02618-01 *W/USB cable	
For commercial use USB flash drive	Thermal printer (GB) 12-02618-02 *W/USB cable	
For commercial use USB key board	Thermal printer (US/TW) 12-02618-03 *W/USB cable	
For commercial use USB barcode reader	Thermal printer (CN) 12-02618-04 *W/USB cable	
For customized USB foot switch		
USB cable	For commercial use A4 printer (EPSON)	
USB serial transducer 64-00177-00	RS-232C	*RS-232C connection model (IDP-100, Balance, SOFT-CAP) can be connect

COM1(RS-232C)	Connecting cable 64-00625 *MiniDIN to D-Sub9 male	Connecting cable 12-02013 *Dsub9-Dsub25	Impact dot printer(IDP-100)(AC 120V) 12-02028-01 *W/Connecting cable(12-02013、64-00625)
			Impact dot printer(IDP-100)(AC 230V) 12-02028-02 *W/Connecting cable(12-02013、64-00625)

COM2(RS-232C)

Temp. Comp.	Thermo Sensor for Titration Solution 12-00166-00

Stirrer	Propeller Stirrer 12-03566	*For use 200tall bealker、300mLtall beaker、200mL erlenmeyer flask, select magnetic stirrer.
	MS-710A Magneic stirrer 12-05356	

SS-Bus
*Max 8 units(APB-600,610) can be added
Furthermore, CHA- can be added

Connection Cable 64-00430	Multiple sample changer (CHA-700) *W/Connecting cable *Software version 1.10 or higher	
	Multiple sample changer (CHA-600) *W/Connecting cable *Software version 1.10 or higher	
Connection Cable 64-00430	Automatic piston burette APB-600-AT *W/Connecting cable *Software version 1.20 or higher	Buret unit
Connection Cable 64-00430	Automatic piston burette APB-610 *W/Connecting cable *Software version 1.30 or highe	Buret unit *Compatible with EBU-610-20B APB-510-xxB, APB-410-xxB

Burette unit	EBU-710-20B(20mL) 12-05641-20	Additional burette(20mL) 12-05640-20 *W/EBU-710-20B
	EBU-710-10B(10mL) 12-05641-10	Additional burette（10mL) 12-05640-10 *W/EBU-710-10B
	EBU-710-05B(5mL) 12-05641-05	Additional burette (5mL) 12-05640-05 *W/EBU-710-05B

Additional burette		Auto dispenser(50mL) 12-04591

※Not connect Thermo Sensor for Titration Solution

Standard preamplifier STD	Electrode/PCD-500

Additional preamplifier	Photometric preamplifier (PTA) *W/Photometric sensor	Photometric Sensor 12-00110-00
	Polarization preamplifier (CMT) (factory setting required) *W/Conductivity cell	Conductivity Cell(K-321) 12-01762
	Conductometric preamplifier (POT) *W/Twin platinum electrode	Twin Platinum Electrode (M-511) 12-03840
	pH dual input preamplifier (TET) (factory setting required)	

10-2. **Parameter list**

10-2-1. **Setup parameters**

[Operator Setup]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Operator Name	-	Within 64 characters A-Z,a-z,+,-,/,*,(,),.,‚,,%	Operator	As displayed

[Display Setup]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Language	-	English / 日本語/ Korean / 中国語/ русский / Español/ Deutsch/ Français	Language	English / Japanese/ Korean/ Chinese / Russian / Spanish /German / French
Date Format	YYYY/MM/DD	YYYY/MM/DD MM/DD/YYYY DD/MM/YYYY	Date Format	As displayed
Date &Time	Present date and time	2010/01/01 00：00 -2099/12/31 23:59	Date & Time	As displayed

[Interface Setup]-[Printer]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Printer	None	None/IDP-/DP-USB/A 4 Printer/Other	COMn	As displayed
Connect to	-	Unit/COM1/USB-RS1	Port to Con.	As displayed
Baud Rate	4800bps	1200bps/2400bps /4800bps/9600bps /19200bps /38400bps	Baud Rate	As displayed
Parity	None	None /Even Number /Odd Number	Parity	None/Even/Odd
Stop Bit	1	1/1.5/2	Stop Bits	1bit/1.5bit/2bit
Data Bit	8	7/8	Data Bits	7bit/8bit
Color/ Black and white	Color	Color/ Black and white	Color/ Black & White	Color/ BLK & WHT

[Interface Setup]-[PC Output]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Connect to	None	None /COM1/COM2 /USB-RS1/LAN1 /LAN2/LAN3 /LAN4	Port to Con.	As displayed
Baud Rate	4800bps	1200bps/2400bps /4800bps/9600bps /19200bps /38400bps	Baud Rate	As displayed
Parity	None	None /Even Number /Odd Number	Parity	None/Even/Odd
Stop Bit	1	1/1.5/2	Stop Bits	1bit/1.5bit/2bit
Data Bit	8	7/8	Data Bits	7bit/8bit

[Interface Setup]-[Balance]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Maker	None	None /KEM /Mettler/A&D /Shimadzu /Sartorius /Mettler-Old/User	Maker	As displayed
Connect to	None	None /COM1/COM2 /USB-RS1	Port to Con.	As displayed
Mode	Continuous	Continuous/Print	Mode	As displayed
Baud Rate	2400bps	1200bps/2400bps /4800bps/9600bps /19200bps /38400bps	Baud Rate	As displayed
Parity	Even Number	None /Even Number /Odd Number	Parity	None/Even/Odd
Stop Bit	1	1/1.5/2	Stop Bits	1bit/1.5bit/2bit
Data Bit	7	7/8	Data Bits	7bit/8bit
Delimiter	CRLF	CR/LF/CRLF	Delimiter	As displayed

[Interface Setup]-[LAN]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
IP Address Auto Acquisition	Off	Off/On	LANIP Auto.	As displayed
IP Address	192.168.11.21	0.0.0.1 - 255.255.255.254	IP Address	As displayed
Subnet Mask	255.255.255.0	0.0.0.1 - 255.255.255.254	SubNET MASK	As displayed
Default Gateway	0.0.0.0	0.0.0.0 - 255.255.255.254	Def. GateWay	As displayed
DHCP Server	Enable	Enable / Disable	DHCP Server	As displayed

[LCD Backlight Setup]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Brightness	4	1/2/3/4	Brightness	As displayed
Auto Dim	After 10min	Off / After 10min / After 20min / After 30min / After 1 hour / After 2 hours	A.dimaming	As displayed

[Beep Setup]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Beep Sound	Enable	Enable / Disable	Mode	As displayed
Volume	5	0 -5	Volume	As displayed
Beep Type	Type 1	Off / Type1 / Type 2/ Type 3 / Type 4/ Type 5	Type	As displayed

10-2-2.Function parameters

[Reagent Information]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Reagent Name	-	Within 20 characters A-Z,a-z,+,-,/,*,(,),.,,%	Reagent Name	As displayed
Reagent Rest	1000mL	0-9999mL	Reagent Rest	As displayed
Reagent Factor (TF)	1.00000	0.00000-99999.99999	TF	As displayed
Concentration (TN)	1.00000	0.00000-99999.99999	TN	As displayed
Molecular Weight (TMW)	1.00000	0.00000-99999.99999	TMW	As displayed
Equivalent Number (TEQN)	1.00000	0.00000-99999.99999	TEQN	As displayed
Unit No.	1	1-99	Unit No.	As displayed
Temp.Comp. Coeff.A	0.00000	-99999.99999-99999.99999	Temp.Comp. Coeff.A	As displayed
Temp. Comp. Coeff.B	0.00000	-99999.99999-99999.99999	Temp. Comp. Coeff.B	As displayed
Reagent Rest Alarm	Disable	Disable/ Enable	Rest Alarm	As displayed
Reagent Rest Limit	50mL	0-9999	Rest Limit	As displayed
Replacement Alarm	Disable	Disable/ Enable	Rep. Alarm	As displayed
Replacement Date	-	Day intervals	Rep. Date	As displayed
Interval	(7Days)	1-999 Days	Interval	As displayed
Piston Alarm	Disable	Disable/ Enable	Piston Alarm	As displayed
Piston Replacement	-	Day intervals	Rep. Date	As displayed
Interval	(7Days)	1-999 Days	Interval	As displayed
Stroke Alarm	Disable	Disable/ Enable	Stroke Alarm	As displayed
Stroke Limit	1000	0-60000	Stroke Limit	As displayed
Cylinder Alarm	Disable	Disable/ Enable	Cylinder Alarm	As displayed
Rep. Date	-	Day intervals	Rep. Date	As displayed
Interval	(7Days)	1-999 Days	Interval	As displayed
Stroke Alarm	Disable	Disable/ Enable	Stroke Alarm	As displayed
Stroke Limit	1000	0-60000	Stroke Limit	As displayed

[Blank List]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
BL1-99	0.00000	0.00000-99999.99999	Blank1-99	As displayed

[GLP Management]- [CK. History]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Periodic Check	Disable	Disable/ Enable	Periodic Check	As displayed
Next Check Date	-	Day intervals	Next Check	As displayed
Auto Update Interval	(7Days)	1-999 Days	Interval	As displayed

[Print for Auto statistics]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Auto Statics	Off	Off/On	Auto Statis.	As displayed
List printing	(Off)	Off/On	List Printing	As displayed
Exclusion of Mac/Min	(Off)	Off/On	EX.of Max/Min	As displayed
Calc. Type	(Disable)	Disable/ Enable	Calc. Type	As displayed
High Sample No.	(Enable)	Disable/ Enable	High Samp. No.	As displayed
Method No.	(Disable)	Disable/ Enable	Method No.	As displayed
Sample ID	(Disable)	Disable/ Enable	Sample ID	As displayed
Unit 1-5	(Disable)	Disable/ Enable	Unit 1-5	As displayed

[Decimal Edit]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Sample Size	4	0-8	＜Sample size＞ Decimal	As displayed
	Round	Round up /Round /Round off	Fraction	As displayed
Statistics	5	0-8	＜ Statistics ＞ Decimal	As displayed
	Round	Round up /Round /Round off	Fraction	As displayed
Blank	5	0-8	＜Blank＞ Decimal	As displayed
	Round	Round up /Round /Round off	Fraction	As displayed
Factor	5	0-8	＜Factor＞ Decimal	As displayed
	Round	Round up /Round /Round off	Fraction	As displayed

[Graph]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Range Mode	Auto	Auto/Fixed/ Auto Horizontal Axis	Range Mode	Auto/Fixed/ X-Auto
Primary Diff. Curve	Off	Off/On	Primary Diff.	As displayed
Plot Display	Off	Off/On	Plot Display	As displayed
Ref. Channel	Off	Off/On	Ref. Channel	As displayed
Division of X axis	10	2-20	Division of X Axis	As displayed
Division of Y axis	10	2-20	Division of Y Axis	As displayed
Vertical Axis	Total volume, Potential	Total volume, Potential / Volume, Potential / Volume	Vertical Axis	Total vol.vs Pot./ Vol.vs Potential/ Volume

10. Others

[Other Settings]

Item	Default	Selection	Item	Printing
Parameter and default			Printout	
Print of Header	Off	Off/On	Print Header	As displayed
Print of Footer	Off	Off/On	Print Footer	As displayed
Auto.Setting,Mean	On	Off/On	A.Set Mean	As displayed
Alarm	Enable	Disable / Enable	Alarm	As displayed
Result Disp.	0s	0-3600	Result Disp.	As displayed
Smart Burette Functionality	Enable	Disable / Enable	Smart Burette	As displayed
Suction Speed	Fast	Fast/Medium/Slow	Suction Speed	As displayed
Re-Titration	Off	Off/On	Re-Titration	As displayed
Free Button	Unit Replacement	Unit Replacement / Shorcutn/ SOPn	Shortcut Reg.	Unit/ ShortCutn/ SOPn
Titration List Item	Method	Method/ Result/Volume	Items (Results List)	As displayed
Check Titr. Type (Smart Electrode)	Disable	Disable / Enable	Type Check	As displayed

10-2-3.Sample parameters

[Sample] ― [How to Set Up Sample]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Sample Before Input	Off	Off/On	Before Enter	As displayed
Weight After Input	Auto	Off/On/Auto	After Enter	As displayed
Size Input Mode	Size1 only	Size 1 only/ Size 1,2	Size Input	Size 1 / Size 1,2

[Sample] ― [Changer Setting] ― [Standard Sequence n]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Shower	30s	0-9999	Shower	As displayed
Rinse	30s	0-9999	Rinse Time	As displayed
Drain1	60s	0-9999	Drain1	As displayed
Drain2	60s	0-9999	Drain2	As displayed
Wait	20s	0-9999	Wait	As displayed
Sample Drain Time	0s	0-9999	Sample Drain Time	As displayed
Pre-Treat	Off	Off /APB/PUMP/ APB＞PUMP/ PUMP＞APB	Pre-Treat	As displayed
Pumping Time	(60s)	0-9999	Pumping Time	As displayed
Delay After Dosing	(60s)	0-9999	Time After Dosed	As displayed
Wait Time	(60s)	0-9999	Wait Time	As displayed
Pre-Dose	Off	Off /APB/PUMP/ APB＞PUMP/ PUMP＞APB	Pre-Dose	As displayed
Pumping Time	(60s)	0-9999	Pumping Time	As displayed
Time After Dosed	(60s)	0-9999	Time After Dosed	As displayed
pH Calib Stir. Spd	4	0-9	pH Calib Stir. Spd	As displayed

10-2-4.**Method parameters**

Selection of Method parameters and printout
[Method name, Titration mode, Titration form]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Method Name	-	Within 20 characters A-Z,a-z,+,-,/,*,(,),.,,%	Method Name	As displayed
Titr. Mode	Auto Titration	Auto Titration/ Auto Intermit/ Intermit/ Petroleum Titr./ Petroleum Titr.2/ COD/Stat/ Learn	Titr. Mode	Auto Titr./ Auto Int./ Intermit/ Petroleum/ Petroleum2/ COD/Stat/ Learn
Titr. Form	EP Stop	EP Stop/Level Stop/ Intersect/ Full/ Level&EP	Titr. Form	As displayed

[Predosing parameter]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Pre Dose mode	None	None/Volume Stop/Level Stop/Diff. Stop /Auto Dispenser/ Pot.Waiting	Dose Mode	None/Volume Stop/Level Stop/Diff. Stop /Dispenser/ Pot.Wat.
Burette No.	1	1-10	Burette No.	As displayed
Channel,Unit	Ch1,mV	Ch1,mV/Ch1,pH/ Ch2,mV/ Ch3,mV/Ch3,pH/Ch3,%T/ Ch3,Abs./Ch3,µA /Ch3,100µS/Ch3,1000µS/Ch3,10000µS	Channel,Unit	As displayed
Stop Volume	20.0000mL	0.0000-9999.0000	Stop Volume	As displayed
Stop Level	(0.0mV)	※	Stop Level	As displayed
Stop Differential	(0.0mV/mL)	※	Stop Diff.	As displayed
Cut Off Time	0s	0-9999	Cut Off Time	As displayed
Unit Volume	(0.1000mL)	0.0005-9999.0000	Unit Volume	As displayed
Dispense Speed	50s/mL	1-999	Disp. Speed	As displayed
Direction	Auto	Auto/Positive/ Negative	Direction	As displayed
Wait Time	0s	0-9999	Wait Time	As displayed
Final Pot.	(0.0mV)	※	Last Pot.	As displayed
Direction	Auto	Auto/Positive/ Negative	Direction	As displayed
Limit Time	0s	0-999	Limit Time	As displayed
Stir. speed	4	0-9	Stir. Speed	As displayed

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters."

[Titration parameter]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Burette No.	1	1-10	Burette No.	As displayed
Max Volume	20.0000mL	0.0000-9999.0000	Max Volume	As displayed
Channel, Unit (For Control)	Ch1,mV	Ch1,mV/Ch1,pH/Ch2,mV/ Ch3,mV/Ch3,pH/Ch3,%T/ Ch3,Abs./Ch3,µA/ Ch3,100µS/Ch3,1000µS/ Ch3,10000µS	Channel/ Unit Ctrl.	As displayed As displayed
(For Reference)	Off	Off/Ch1,mV/Ch1,pH/Ch2, mV/ Ch3,mV/Ch3,pH/Ch3,%T/ Ch3,Abs./Ch3,µA/ Ch3,100µS/Ch3,1000µS/ Ch3,10000µS/Temp.	Ref.	As displayed
pH Polarity	Standard	Standard/ Reverse	pH Polarity	As displayed
Type of Titration	Not Check.	Not Check./ Acid-base Titr. (Glass Elec.)/ Redox Titr. (Pt. Elec.)/ Precipitation Titr. (Ag Elec.)/ Other	Titr. Type Check	No Check /Glass/ Platinum/ Silver/ Other
EP Direction	Auto	Auto/Positive/ Negative	Direction	As displayed
Wait Time	0s	0-9999	Wait Time	As displayed
Dose Mode	Off	Off/Volume Stop/Level Stop/Diff. Stop	Dose Mode	As displayed
Stop Volume	20.0000mL	0.0000-9999.0000	Stop Volume	As displayed
Stop Level	0.0mV	※	Stop Level	As displayed
Stop Differential	0.0mV/mL	※	Stop Diff.	As displayed
Cut Off Time	0s	0-9999	Cut Off Time	As displayed
Unit Volume	(0.1000mL)	0.0005-9999.0000	Unit Volume	As displayed
Dispense Speed	50s/mL	1-999	Disp. Speed	As displayed
Wait Time	0s	0-9999	Wait Time	As displayed

About the input range for "*" in the above table, see the Chapter "1-7-9 Input range for potential parameters."

[Control parameter]

(<Titration mode> is "Auto Titration", "Auto Intermit" and "Intermit")

Parameter and default	Printout	
Item	Item	Printing
Number of EP	End Point No.	As displayed
End Sense	End Sense	Auto/Set
EP Sense value (Potential	dE	As displayed
EP Sense value (Differential)	dE/dmL	As displayed
1st End Level	1st End Level	As displayed
2nd End Level	2nd End Level	As displayed
EP stop mode	EP stop mode	As displayed
EP Snse Method (Angle)	dAngle	0.0-180.0degrees
Auto Simulation	Auto Simulation	As displayed
Gain	Gain	As displayed
Data Sampling	Data Sampling	As displayed
Data Samp.Pot.	Data Samp.Pot.	As displayed
Data Samp.Vol.	Data Samp.Vol.	As displayed
Control Speed Mode	Ctl.speed Mode	As displayed
Stability	Stability	As displayed
Delay Time	Delay Time	As displayed
Limit Time	Limit Time	As displayed
1st Volume	1st volume	As displayed
2nd Volume	2nd volume	As displayed
3rd Volume	3rd volume	As displayed
4th Volume	4th volume	As displayed
1st＞2ndvDiff.	1st＞2nd diff.	As displayed
2nd＞3rd Diff.	2nd＞3rd diff.	As displayed
3rd＞4th Diff.	3rd＞4th diff.	As displayed
Control speed	Control speed	As displayed
Cut-Off time	Cut-off time	As displayed
Unit Volume	Unit volume	As displayed
Dispense Speed	Disp. speed	As displayed
Other Control	Other control	As displayed
Titr.Over volume	Titr.over vol.	As displayed
EP Area	EP area	As displayed
Volume Range (Lower Limit)	Lower vol.	As displayed
Volume Range (Upper Limit)	Upper vol.	As displayed
Potential Range (Lower Limit)	Lower pot.	As displayed
Potential Range (Upper Limit)	Upper pot.	As displayed
Separation	Separation	As displayed
Separation Level	Sepa. level	As displayed
Level Stop	Level stop	As displayed
End level	End level	As displayed
Auto Intermit Mode	Auto Int.Mode	As displayed
Stirrer speed	Stir. speed	As displayed

[Control parameter] - [Temp. Monitoring]

Parameter and default	Printout	
Item	Item	Printing
Upper Limit Temperature Titration Stop	Titr.Temp.Control	As displayed
Upper Limit temperature to Stop Titration	Upp.Limit Temp.	As displayed
Pause Off Temperature	Restart Temp.	As displayed

("Speed control mode" when <Titration mode> is 'Petroleum Titr.')

Parameter and default	Printout	
Item	Item	Printing
Control Mode	Control Mode	As displayed
Limit Time	Limit Time	As displayed
Potential Read Time for Stability	Integral Time	As displayed
Stability Time Limit at the Stat of Titration	Start Limit	As displayed
1st Delivery Volume	1st Dose Vol.	As displayed
2nd Delivery Volume	2nd Dose Vol.	As displayed
Stability	Stability	As displayed
Rel. Change Level	dE(1st-2nd)	As displayed

("Speed control mode" when <Titration mode> is 'Petroleum Titr.2')

Parameter and default	Printout	
Item	Item	Printing
Control Mode	Ctl. mode	As displayed
No.1 Intermit Time	1st Cut Off Time	As displayed
1st Delivery Volume	1st Dose Vol.	As displayed
1st Dispense Speed	1st Dose Spd.	As displayed
No.2 Intermit Time	2nd Cut Off Time	As displayed
2nd Delivery Volume	2nd Dose Vol.	As displayed
2nd Dispense Speed	2nd Dose Spd.	As displayed
Rel. Change Level	dE(1st-2nd)	As displayed
Wait Time for Dispense After Change Level	Inject.Latency	As displayed
Stability	Stable Decision	As displayed
Potential Read Time for Stability	Integral Time	As displayed
Stability	Stability	As displayed
Limit Time	Limit Time	As displayed

("Stat" is selected for <Titration mode>)

Parameter and default	Printout	
Item	Item	Printing
Gain	Gain	As displayed
Cut-Off time	Cut Off time	As displayed
Unit Volume	Unit Volume	As displayed
Dispense Speed	Disp. Speed	As displayed
Rel.Change Level	Rel.Change Lev.	As displayed
Initial Dispense Speed	Init. Disp. Speed	As displayed
Lag Time	Lag Time	As displayed
Stat Level	Stat Level	As displayed
Limit Time	Limit Time	As displayed
Offset Potential	Offset Pot.	As displayed
Stirrer Speed	Stirrer Speed	As displayed
Vol.Sampling Time Vol. Sampling Time 1	Vol.Sampling Time VT1	As displayed
Vol. Sampling Time 2	VT2	As displayed
Vol. Sampling Time 3	VT3	As displayed
Vol. Sampling Time 4	VT4	As displayed
Vol. Sampling Time 5	VT5	As displayed

("COD" is selected for <Titration mode>)

Parameter and default	Printout	
Item	Item	Printing
Data Samp.Pot.	Data Samp.Pot.	As displayed
Data Samp.Vol.	Data Samp.Vol.	As displayed
Rel.Change Level	Rel.Change Lev.	As displayed
End Time	End Time	As displayed
EP Level	EP Level	As displayed
Initial Dispense Speed	Init Disp. Speed	As displayed
Limit Time	Limit Time	As displayed
Stirrer Speed	Stirrer Speed	As displayed

[Calculation parameter]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Calc. Type	Sample	Sample/Blank/ Factor /Check	Calc. Type	As displayed
Formula1(CO1)	Enable	Disable / Enable	CO1	As displayed
Unit	-	Within 10 characters A-Z,a-z,+,-,/,*,(,),.,,%	Unit	As displayed
Formula	(EP1-BL1)* TF*K1*C1/ S	Within 64 characters A-Z,a-z,+,-,/,*,(,),.,,%	Formula	As displayed
EP No.	EP1	EP1/EP2/EP3/EP4/EP5	EP No.	As displayed
Decimal	5	0-8	Decimal	As displayed
Fraction	(Round)	Round Off/ Round/ Round up	Fraction	As displayed
Blank Replace No.	(1)	1-10	Blank Replace No.	As displayed
Evaluation	Off	Off/On	Evaluation	As displayed
Standard Value	(0.00000000)	0.00000000-99999.99999999	Std.Value	As displayed
Acceptance Range	(0.00000000)	0.00000000-99999.99999999	Acceptance Range	As displayed
Formula2-5(CO2-5)	Enable	Disable / Enable	CO2-5	As displayed

[Report parameter]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Report Format	Standard	Off/GLP/ Standard/ Setting	Report Format	As displayed
Graph Printing	Off	Off/On	Graph	As displayed
Data List printing	Off	Off/Short//All	Data List	As displayed
Rel. Value Printing	Off	Off/On	Rel. Value Printing	As displayed
Report Format(A4)				
Titration Results	On	Off/On	Titr.Results	As displayed
Formula/Constant	Off	Off/On	Formula/ Const	As displayed
Data List	Off	Off/On	Data List	As displayed
End Sense	Off	Off/On	End Sense	As displayed

[Option parameter]

Parameter and default			Printout	
Item	Default	Selection	Item	Printing
Rinse Sequence	Off	Off/On	Rinse Seq.	As displayed