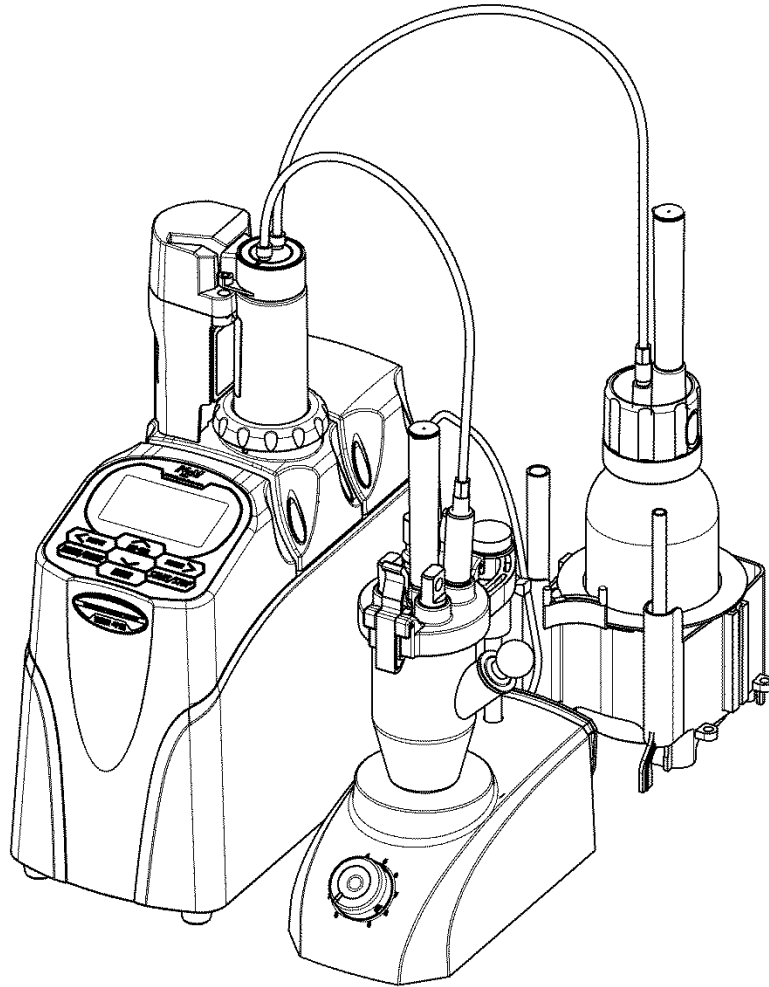


**Karl Fischer Moisture Titrator
(for volumetric method)**

MKV-710

Operation Manual



Please read this manual thoroughly in advance for the best performance of the equipment

KEM KYOTO ELECTRONICS
MANUFACTURING CO., LTD.

<http://www.kyoto-kem.com>

AN 59-00461-01Ver.00

Introduction

The MKV-710 you have purchased is Karl Fischer volumetric Moisture Titrator, by which you can measure micro amount of water content which exists in liquid or in solid sample material. The measurement is easy to perform, fast in operation with its results of high precision and accuracy.





【 Features 】

- 1) **Compact design**
Burette drive unit is designed more compact than before and can be installed in A4 size.
- 2) **Simple operation**
Measurement can be performed with PRE-TITR. key and START key only.
- 3) **Highly accurate burette**
A highly accurate burette of burette resolution 1/20,000 is installed. The piston head is improved, so the design becomes that air-bubble is not produced so much.
- 4) **USB flash drive is designed at external control**
The measurement result and the method are stored in USB flash drive, and data can be managed as an electron record. Moreover, the measurement result can be stored as PDF file, and the convenience of data has been improved. A keyboard for the input of number, a barcode reader for the sample setting and a foot switch that can start to measure without touching a device are installed as option. The working efficiency of measurement improved for customer's usage.
- 5) **Burette can be selected 1 unit and 2 unit type.**
MKV-710 is installed 1 burette, and in addition, can be installed one more burette. 2 burettes can be used without increasing space.
- 6) **Replaceable burette units**
Easy replaceable burette units lead to easy maintenance of burettes. Further, you can replace reagents with different factors by simply replacing the units.
- 7) **For several languages**
Chinese (Chinese classics), Korean, Russian and Spanish are installed besides English and Japanese.
- 8) **GLP/GMP conformed**
Operator names can be registered. And check results with standard substances and calibration results of electrodes can be recorded.
- 9) **Can be upgraded to high-end model.**
Measurement by moisture titrator and potentiometric titrator can simultaneously be performed by connecting with the MCU-710.
- 10) **SOFT-CAP(option)**
Data of Excel and CSV format can be edited directly by SOFT-CAP with PC.

Important:












You must observe the following rules in order to prevent physical or property damage of yourself as well as of the others.

Meaning of Symbols










	Warning	Danger of severe injury or possible death
	Caution	Risk of physical or property damage
		This symbol means Prohibition.
		This symbol means Mandatory.

Place for Installation




Use the devices indoors, and avoid a place under any of the following conditions to avoid malfunction.

 Caution		
 Operation of devices with strong electric motors using common power source	 Near strong magnetic/electric field  Under direct sun light	 Corrosive gas atmosphere
 Heavily loaded and fluctuated or near power source or magnetic field	 Excessive range of temperature other than specified	 Ambient humidity exceeding 85%RH 
 Under vibration	 Location with large temperature difference	




Power Source

 Warning			
	<p>You must ground earth wire of power cable. Danger of electric shock if not grounded to earth. The power supply from AC adapter other than that are specific to the equipment, we can not guarantee the safety of the product.</p>		
 Caution			
	Plug out power cord in case of unit malfunction or possible lightning. Otherwise, the unit may be broken.	Power source for this unit: AC100-240V Frequency: 50Hz/60Hz	 Do not share power as shown below.   Do not put any obstacle around power outlet just case of need for plugging out power cord to avoid the possible danger of the whole system in trouble. 
		Supply power direct from power outlet. 	




Test Sample

 Warning	
 <p>Some sample or chemical requires protective gloves, glasses and mask. Ventilate the room. Splashing chemical may injure the eyes or skin. Windpipe may be hurt if fume is inhaled.</p>	 <p>Do not use chemical which may generate inflammable gas or work in such atmosphere. Be aware of a risk of explosion inside the system.</p>





About place for storage

 Caution		
<p>If the unit is not used for an extended period of time, first clean the electrode and place it for storage. Also discard the reagent in the burette, and clean it with pure water or methanol before storage.</p>	<p>It is recommended to pack the main unit in the carton box in which the instrument was first delivered</p> 	 <p>Avoid the places for storage under inadequate ambient conditions such as extremely high/low temperature, high humidity or heavily dusty atmosphere</p>





About Use

 Caution	
 <p>When a reagent etc. is spilt to Main unit or the connectors, there is a possibility of malfunction. When switching valve is got wet, there is a possibility of malfunction.</p>	 <p>Do not give excessive forces such as falls at the main body, burette, switching valve. There is a possibility of malfunction.</p>

About reagents

 Caution	
 <p>Karl Fischer reagent is a toxic chemical. Use it in a well ventilated room, and handle it with utmost care.</p>	 <p>Note that Precautionary statements of the reagent label. Drained before the waste bottle is full the amount of waste. Dispose of in accordance with laws and regulations.</p>
 <p>If spilled reagent, after measurement may corrode the tube connector causing the dispenser malfunction.</p>	

Other Cautions

 Caution			
	<p>Do not attempt overhaul or repair the unit by unauthorized person except authorized by KEM. Danger of electric shock, fire or malfunction.</p>		<p>Do not use the unit in a way other than specified. Danger of fire, electric shock or malfunctioning of the unit.</p>
	<p>Do not use such a solvent as alcohol, acetone, thinner or the like for cleaning this instrument. Doing so may adversely affect the instrument, e.g. deformation, discoloration or cracks. When cleaning this instrument, wipe it with a soft cloth or tissue paper, after applying detergent diluted with water to the soft cloth or tissue paper and adequately wringing out excess water in order not to allow water drops to fall.</p>		
<p>Environment</p> <p>This equipment shall be used under the following conditions classified in the section 1.4.1 of the CE marking (Low Voltage Directive, 2006/95/EC, EN61010-1): altitude up to 2000m; over voltage CAT II; pollution degree 2.</p>			
<p>This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.</p>			

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



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.

※In this manual, [^], [V], [<SAMPLE] and [STIRRER>] key are explained the sign each of [↑ PRE-TITR.], [↓], [←]and [→].

※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.

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

※Internet Explorer and Microsoft Excel® is the registered trademark of US Microsoft Corporation in US and other countries.

※Google and Android are trademarks or registered trademarks of Google Inc.

※All other product and service names listed in this website are trademarks or registered trademarks of their respective companies.

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1. Preparations for measurement

1-1. Supplied parts

Check the supplied parts referring to the following parts list. If you should find any missing or broken parts including the measuring unit, accessories or manual, contact your sales representative or local dealer.

Part Number	Part Description	Qty	Remarks
-	Main unit	1	
12-05356-01	MS-710VP Magnetic Stirrer	Either 1	With Auto Solvent unit
12-05356-02	MS-710V Magnetic Stirrer		
12-05685-01	Manual Solvent Change Unit	1	Only when you are ordered
12-05641-11	EBU-710KF burette unit	1	
12-02811	Titration Cell Unit	1	
12-04251	Washing Bottle	1	
20-06257	Piston Removing Tool	1	
64-01386	Stirrer Cable 0.6m	1	
65-00028-01	Clamp Filter	1	
64-00898	AC Adapter Type4	1	
64-00633	Power Cord (EU,KR) with PlugC(WS-010)	1*	200-240 V
64-00633-01	Power Cord (US,TW) with PlugB(WS-001)		100-120 V
64-00633-02	Power Cord (GB) with PlugG(WS-012A)		220-240 V
64-00633-03	Power Cord (CN) with PlugI(WS-015D)		200-240 V
66-00141	Funnel	1	
12-05205	MKV-710 Operation Manual (CD-ROM)	1	
59-00461-06	MKV-710 Quick Manual	1	
59-00461-07	MKV-710 Quick Manual	1	
59-00405	Safety Instructions	1	
50-00761	Contact	1	
59-00472	Packing List	1	
20-05627	Inspection Certificate/Warranty	1	

*Make sure your country's power requirement.



Note

Please refer to the section "9-1. Parts list" when ordering these parts.

1. Preparations for measurement

Components of EBU-710KF burette unit (12-05641-11)

Part Number	Part Description	Qty	Remarks
-	Burette unit	1	10mL
12-00649-00	Nozzle with Diffusion Proof Type FEPφ3 x2 L=152	1	
12-01260	Desiccant Tube φ18x120 with Silica Gel	1	
12-03644	Connection Tube2×3 L=620 PFA (for Nozzle)	1	
12-03645	Connection Tube2×3 L=730 PFA (for Bottle)	1	
12-03926	Reagent Bottle Cap with Plug	1	
20-04047-00	Nozzle Adapter φ14 1/10 Taper PTFE	1	
20-04050-00	Nozzle FEPφ3x2-0.5 L=150	1	
20-04052-00	Nozzle Cover	1	
20-06823	Bottle holder(1)	1	φ85
20-06823-01	Bottle holder(2)	1	φ80
20-06823-02	Bottle holder(3)	1	φ68
20-09813	Bottle stand	1	

Components of Titration Cell Unit (12-02811)

Part Number	Part Description	Qty	Remarks
12-01257	Titration Vessel Top	1	
12-01260	Desiccant Tube φ18x120 with Silica Gel	1	
12-03755-01	Twin Platinum Electrode M-714	1	
12-04232	KF Grease (5g)	1	
20-05903	S-type Titration Vessel with Port Plug	1	
20-06280	Port Plug 15/20 PTFE	2	
66-00125-04	Stirrer Rotor L=25	1	

Components of MS-710VP Magnetic Stirrer (12-05356-01)

Part Number	Part Description	Qty	Remarks
12-05686	Bottle holder unit	1	with Desiccant Tube
69-00028-00	Polyethylene Bottle 1L	1	
12-03926	Reagent Bottle Cap with Plug	1	
12-02021-10	Solvent/Waste Bottle Cap	2	
12-02020-11	Injection Tube 2×3 L=1180mm PFA	1	
12-01260	Desiccant Tube φ18x120 with Silica Gel	1	
12-04538-01	Drain Tube to Cell 2×3 L=0.72m PFA	1	
12-04539	Drain Tube to Waste Bottle 2 × 3 L=1m PFA	1	
20-07187	Titration Vessel Plug (phi15 1/10 Taper Plug)	1	
60-00109-02	Tube 4x8 L= 1m Silicone	2	
12-06270	Suction Tube (Bottle Cap- Pump)	1	
20-06823	Bottle holder(1)	1	
20-06823-01	Bottle holder(2)	1	
20-06823-02	Bottle holder(3)	1	

1. Preparations for measurement

Components of Manual Solvent Change Unit (12-05685-01)

Part Number	Part Description	Qty	Remarks
12-05686	Bottle holder unit	1	with Desiccant Tube
69-00028-00	Polyethylene Bottle 1L	1	
12-03926	Reagent Bottle Cap with Plug	1	
12-03926-01	Reagent Bottle Cap for Injection	1	
12-04875	Rubber Globe for Suction	1	
12-04875-01	Rubber Globe for Drain	1	
12-02020-10	Injection Tube 2×3 L=1200mm PFA	1	
12-02020	Drain Tube 2×3 L=1150mm PFA	1	
20-07187	Titration Vessel Plug (phi15 1/10 Taper Plug)	1	
60-00109-02	Tube 4x8 L=1m Silicone	1	
20-06823	Bottle holder(1)	1	
20-06823-01	Bottle holder(2)	1	
20-06823-02	Bottle holder(3)	1	

Option: Components of Additional Burette (10mL) KF (12-05640-11)

Part Number	Part Description	Qty	Remarks
-	Burette unit	1	10mL
12-00649-00	Nozzle with Diffusion Proof Type FEPφ3×2 L=152	1	
12-01260	Desiccant Tube φ18x120 with Silica Gel	1	
12-03644	Connection Tube2×3 L=620 PFA (for Nozzle)	1	
12-03645	Connection Tube2×3 L=730 PFA (for Bottle)	1	
12-03926	Reagent Bottle Cap with Plug	1	
20-04047-00	Nozzle Adapter φ14 1/10 Taper PTFE	1	
20-04051-00	Nozzle FEPφ3×2-0.5 L=85	1	
20-04052-00	Nozzle Cover	1	
20-06823	Bottle holder(1)	1	φ85
20-06823-01	Bottle holder(2)	1	φ80
20-06823-02	Bottle holder(3)	1	φ68
20-09813	Bottle stand	1	



Please refer to the section "9-1. Parts list" when ordering these parts.

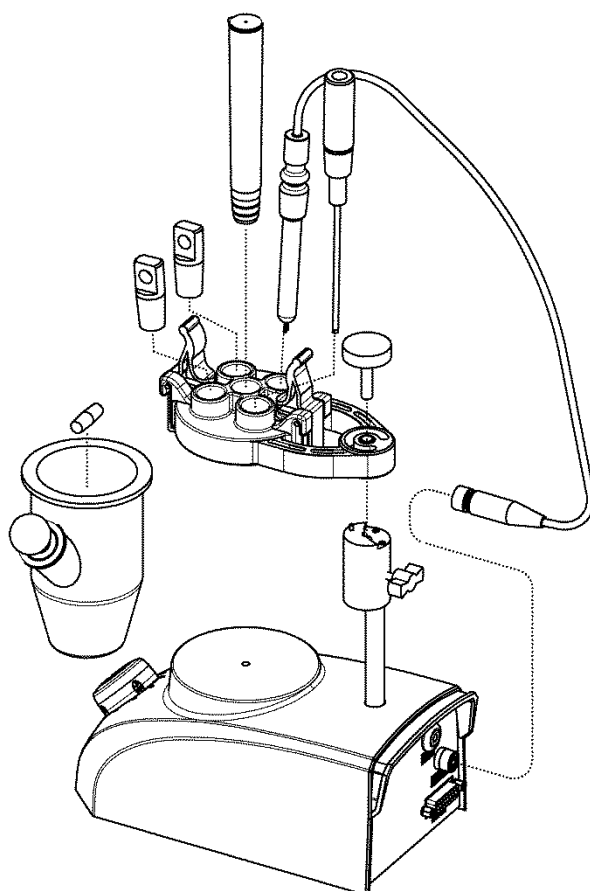
Note

1. Preparations for measurement

1-2. Installation and start-up

1-2-1. Assembly of titration cell

- 1) Fix the titration vessel stopper onto the magnetic stirrer with the screw.
- 2) Pull the lever on the titration vessel stopper to put the titration flask (S-type Titration vessel) with a stirrer rotor in it in place. At this point, apply a small amount of KF grease on contact area between flask top and lid.
- 3) Install the twin platinum electrode/KF, desiccant tube A and the port plug on the lid for titration flask. The position for installation is shown below. At this point, apply a small amount of KF grease on slide contact area.



Note

Make sure to apply KF grease around glass sliding area.

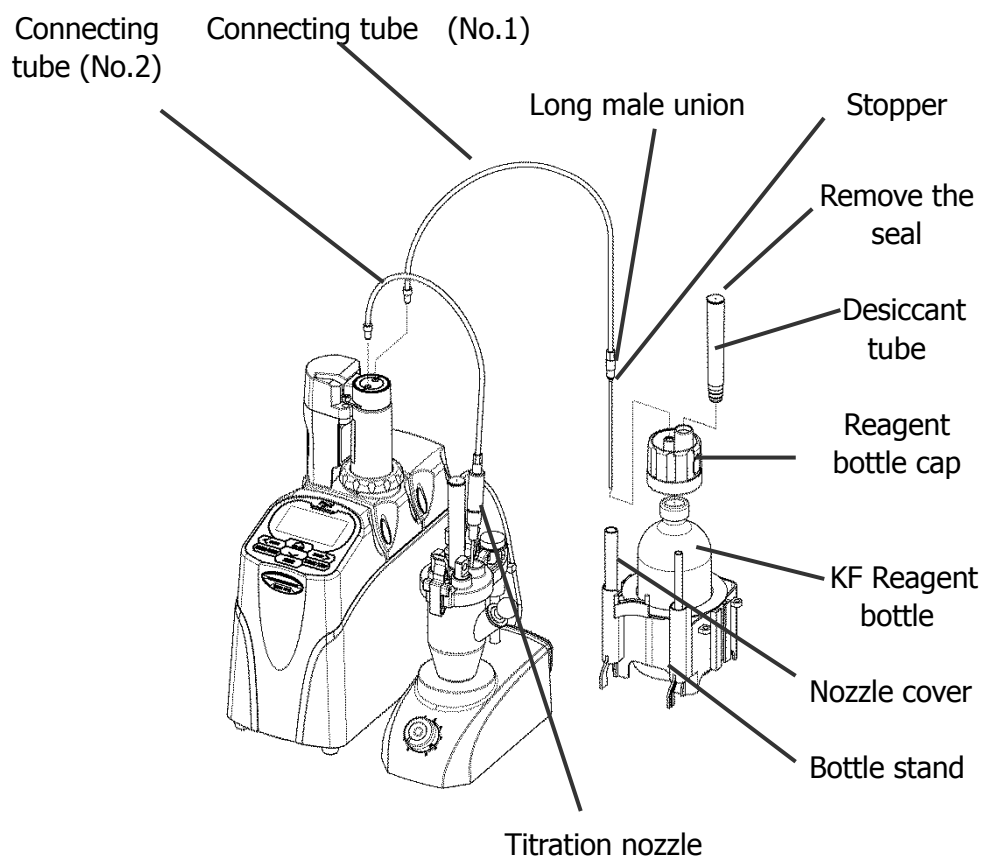
- 4) Plug in the electrode wire into the port, and secure its connection by turning the plug screw.

1-2-2.Assembly of burette unit

- 1) Install the nozzle cover to Bottle stand.
- 2) Tighten the connection tube (L=620mm) (No.2) to the position of No.2 of the switching valve. Place the diffusion proof nozzle with its discharge outlet facing outside.

When using the titration nozzle in order to perform constant dose, change the tip of diffusion proof nozzle (12-00649-00) to the Nozzle FEP ϕ 3 \times 2-0.5 L=150 before connecting it with the tube. (Refer to "6-2-6. Replace titration nozzle").

- 3) Pass through the connection tube (L=730mm) (No.1) to the reagent bottle cap and tighten to install it (Please check that the Long male union and the stopper are attached to the tube). Match the tube to the position that reaches the bottom of the reagent bottle. Tighten the tip of a reverse-side to the position of No.1 of the switching valve.
- 4) Peel off the seal on Desiccant Tube ϕ 18 \times 120 with Silica Gel, and install it onto the reagent bottle cap.



Note

Remove the seal on the Desiccant tube first.

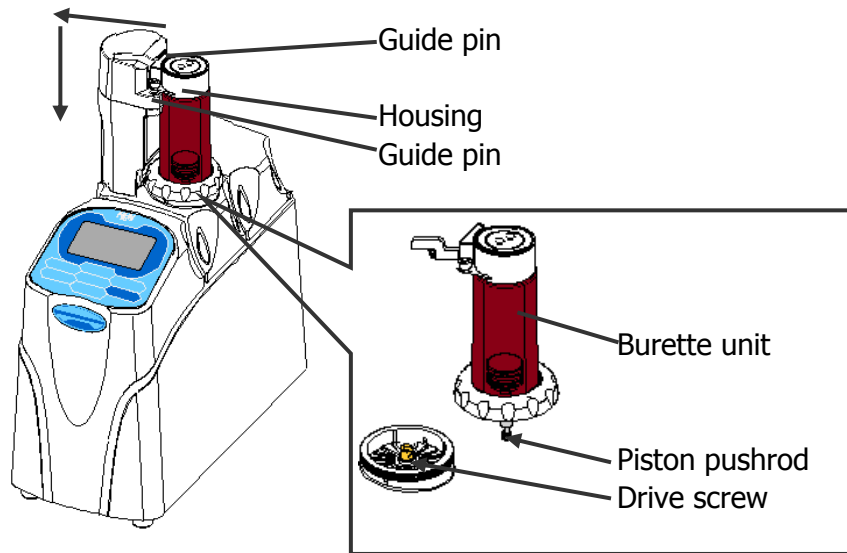
Hold the tube not to loosen and turn only the union when installing the tube to the switching valve. Be careful not to break the tube.

Install the burette No.2 refer to "12-6. Adding a Built-in Burette."

1. Preparations for measurement

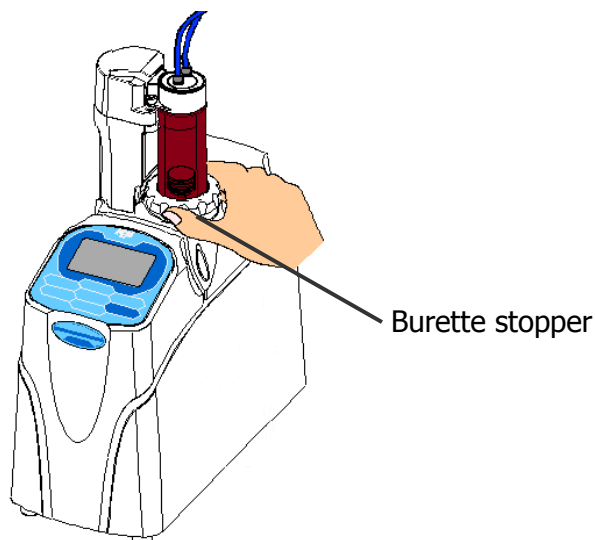
1-2-3. Installation of burette unit

- 1) As shown below, slide the burette unit from the right, and hitch the piston pushrod to the drive screw. If you put the housing on the guide pin and slide it, you will find it easier to adjust the height.
- 2) To place the burette unit, insert the hole of the housing of the burette unit into the two guide pins.



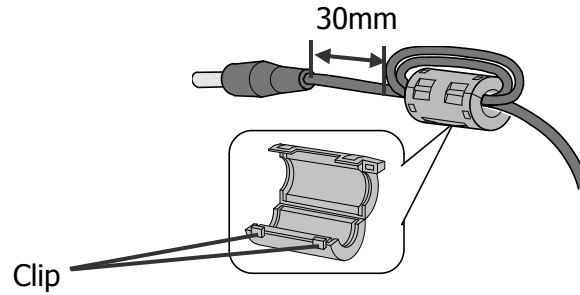
If the length of the piston pushrod out of the cylinder is too short or too long, the burette unit cannot be put to the shaft of the main unit. Refer to "3-13. Replacing burette unit" to adjust the length of the piston pushrod.

- 3) To fix the burette unit, hold down the top of the burette unit and tighten the burette stopper.



1-2-4. Installation of Clamp Filter

Install the clamp filter to AC adapter as figure below. Hold the clip of the clamp filter and open as figure below, and wrap treble remaining the tip by about 30mm.



Note

Installation of the clamp filter to AC adaptor is needed to satisfy the condition of EMC standard.

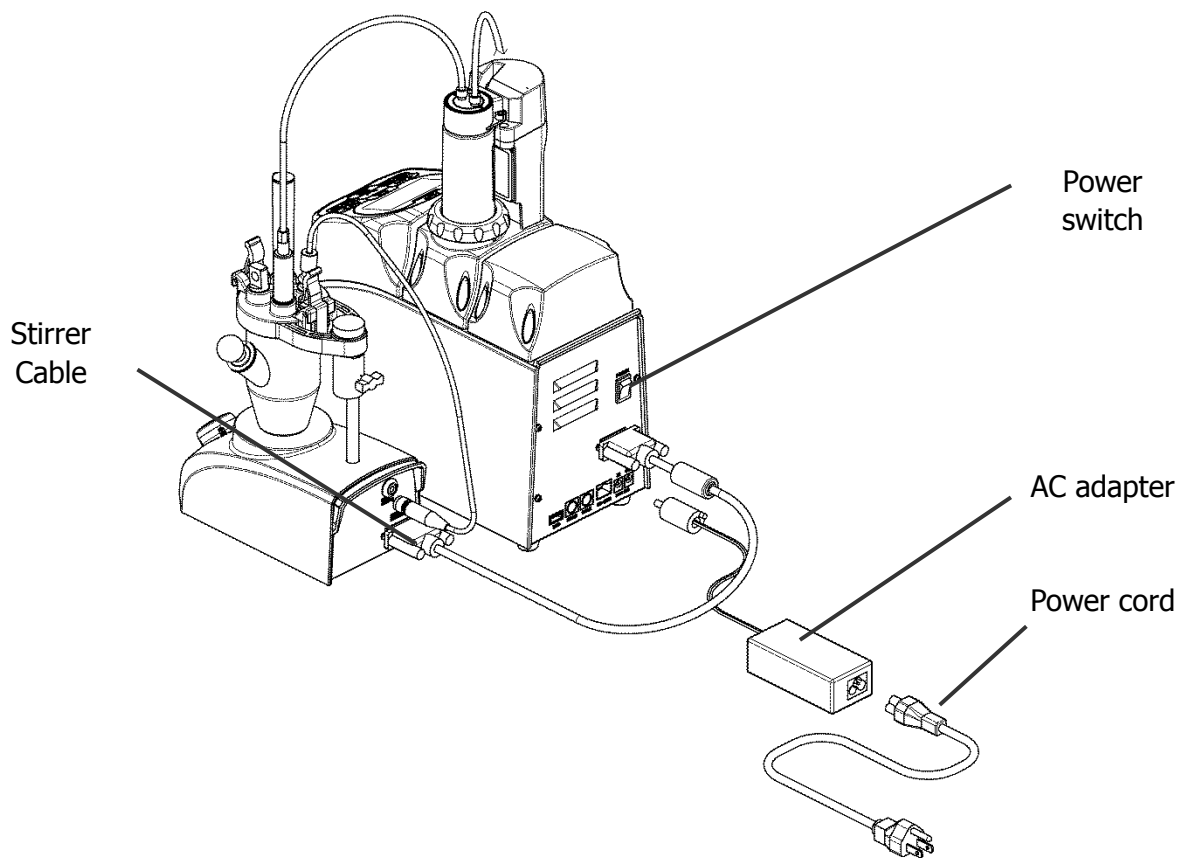
1. Preparations for measurement

1-2-5. Power cable

- 1) Make sure the power switch is in Off position as figure below.



- 2) Connect the cables as shown below. Install Power cord to AC adapter and plug in AC adapter on the back of main unit.

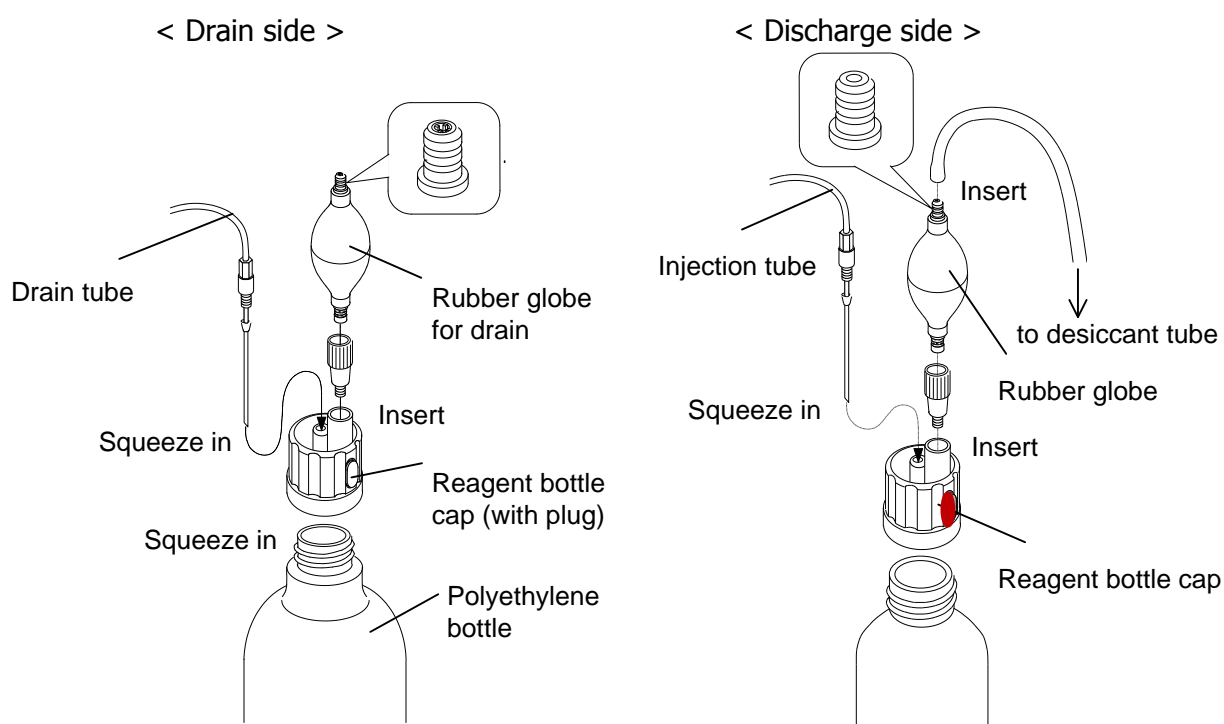


- 3) Connect Power cord to the power outlet.

1-3. Installation of Solvent Change Unit (Option)

1-3-1. Installation of Manual Solvent Change Unit

- 1) Insert the rubber globe onto the reagent bottle cap.
- 2) Connect the drain tube to the reagent bottle cap (with rubber stopper), and the injection tube to the reagent bottle cap.
- 3) Fix the cap (with plug) to the polyethylene bottle.
- 4) Fix the desiccant tube to the rubber globe.
- 5) Connect the reagent bottle to a commercially sold KF reagent bottle filled with anolyte.

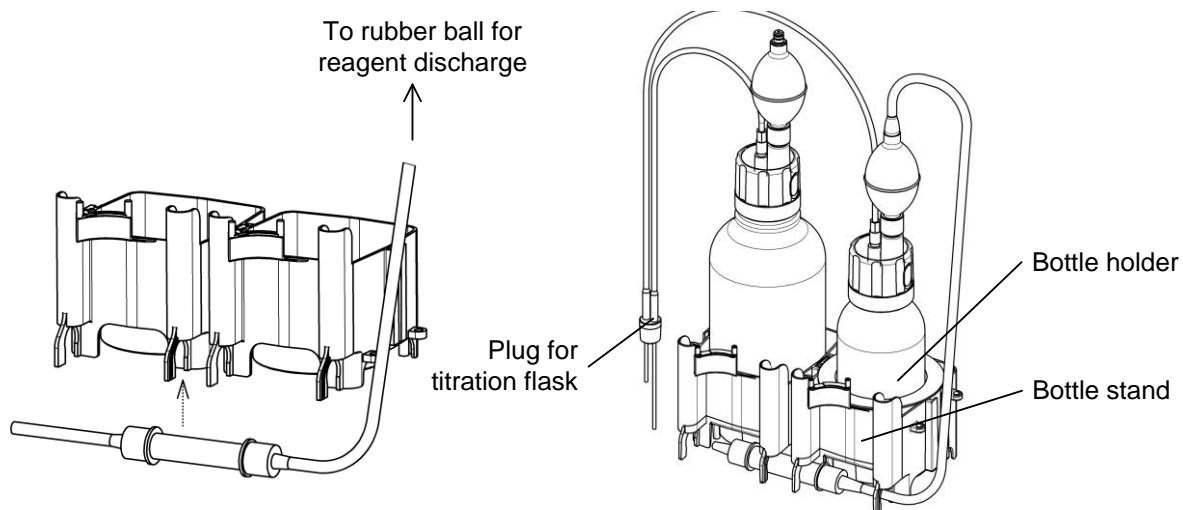


Note

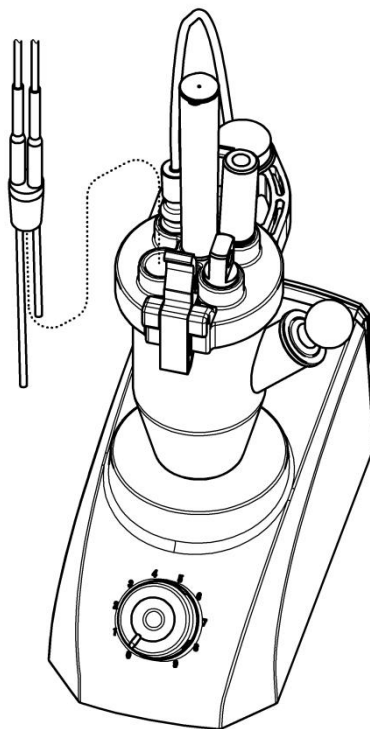
If loosely squeezed it in, pressurized air may leak and it may cause malfunction of dispensing KF reagent. There are two kinds of rubber globes, one for drain and the other for discharge of reagent. Both of them are indicated by the joint on top of each.

1. Preparations for measurement

- 6) Install the desiccant tube onto the reagent bottle holder.
- 7) Place the reagent bottle in the bottle holder. If the outside diameter of reagent bottle does not match the holder, use the bottle holder and bottle stand as shown below.
- 8) Connect the tube for drain and injection to the Plug for titration flask as shown below respectively.

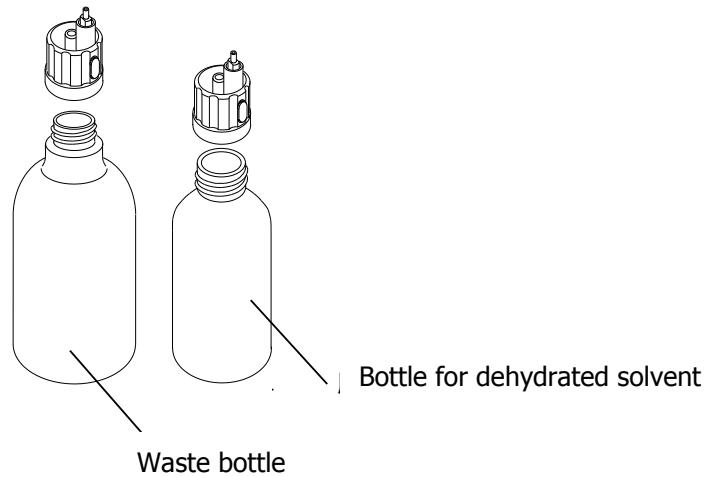


- 9) Insert the Plug for titration flask carefully into the titration cell. At this point, apply a small amount of KF grease on slide contact area.



1-3-2. Installation of Auto Solvent Change Unit

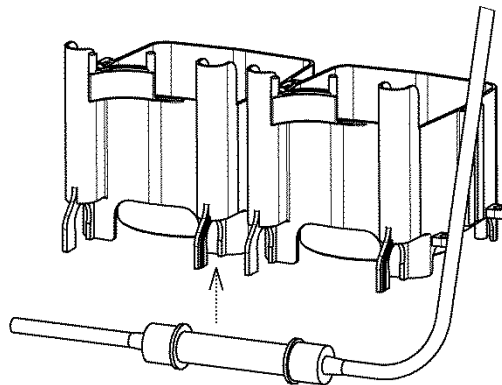
- 1) Fix the bottle for dehydrated solvent and bottle for waste with the cap (waste bottle cover) respectively.



Note

The bottle caps must be securely fixed in order to avoid air leak, which would prevent the dispenser from working properly in suction and draining.

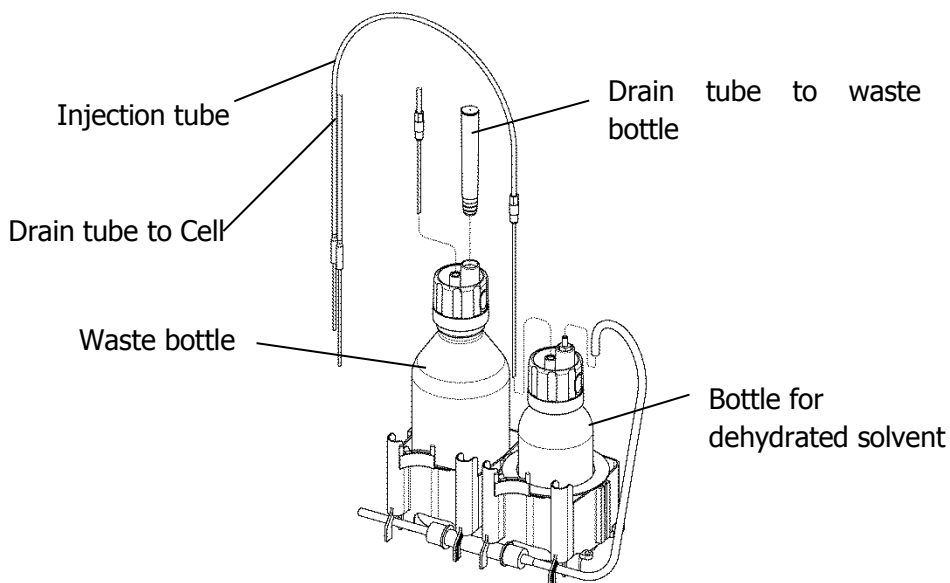
- 2) Connect the silicone tubes on both ends of desiccant tube, and put the tube in place as shown below



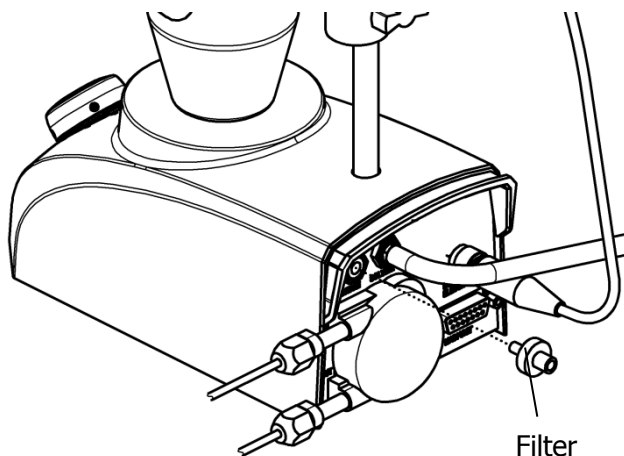
- 3) Put the above 1) bottle in reagent bottle holder. If the outside diameter of solvent bottle does not match the holder, use the bottle holder and stand as shown below.
- 4) Connect the silicon tubes, one to the top of solvent bottle.

1. Preparations for measurement

- 5) Connect the tubes, one for draining to waste bottle and the other for injection to the two bottles respectively.
- 6) Connect the drain tube to Cell and injection tube to the plug for titration flask.



- 7) Connect the drain tube (OUT) and the drain tube (IN) to magnetic stirrer back side pump.
- 8) Connect the silicone tube connected 2) to SOLVENT port on the rear panel of magnetic stirrer.
- 9) Attach an filter to INTAKE port on the rear panel of magnetic stirrer.

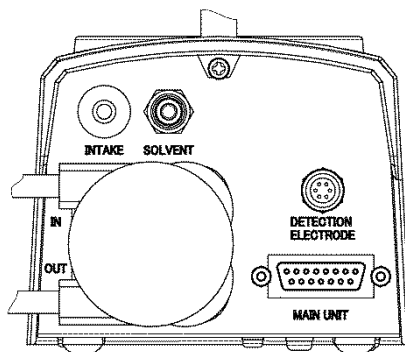


Note

Please attach a filter to INTAKE by all means. In other words it might break down in the electromagnetic valve in the flow when absorb dust.

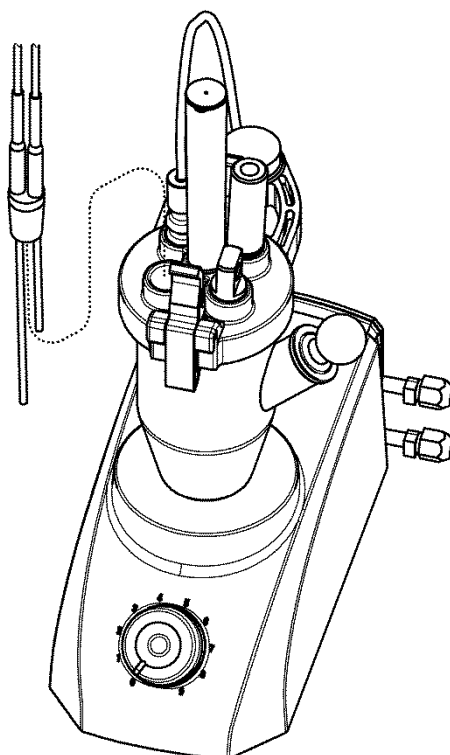
1. Preparations for measurement

< Rear view of magnetic stirrer >



- SOLVENT : Connecting port for pressurized transfer of solvent.
- INTAKE : Inlet port of air.

10) Insert the plug for titration cell carefully into the lid. At this point, apply a small amount of KF grease on slide contact area.



When handling this chemical, protect yourself with gloves and glasses. If it touches your skin, immediately rinse it with running water.

1. Preparations for measurement

The following chloroform-containing reagents (see table below) or oil-based samples deteriorate the drain pump.

<Do not use the standard drain pump with the following dehydrating solvents >

	KEM	Fluka (RdH) & HPC	Mitsubishi
Solvent	FAT	CM、CE	OLII

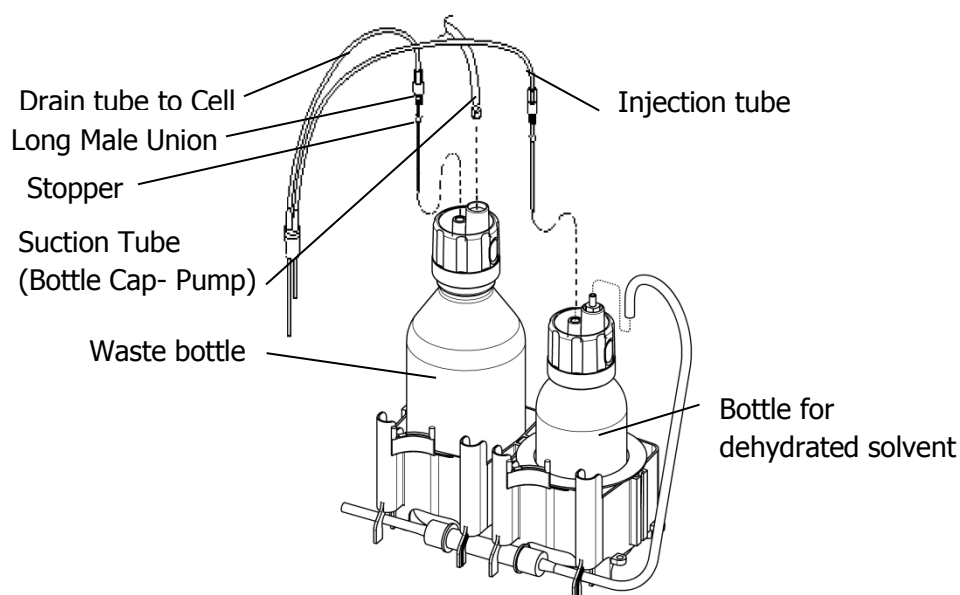
Therefore, when using such reagents or samples, change the connecting of the Auto Solvent Change Unit as follows.

<Installation (in the negative pressure)>

Connect the Drain tube to Cell to waste bottle. (Use Stopper and Long Male Union supplied to Drain tube to Waste Bottle.

Connect the Suction tube (Bottle Cap – Pump) to waste bottle.

Connect the Suction tube (Bottle Cap – Pump) to magnetic stirrer back side pump IN.



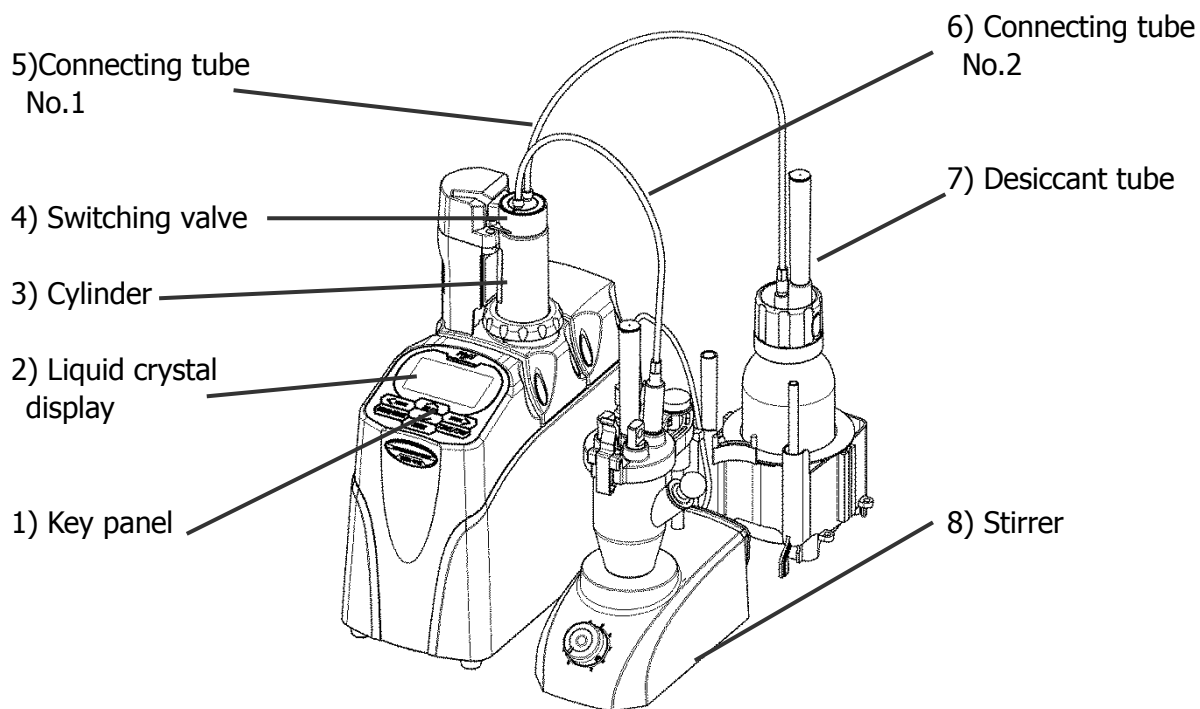
Note

Please refer to a previous page for the connection of other parts.

2. Parts configuration and eachfunction

2-1. Appearance and Name

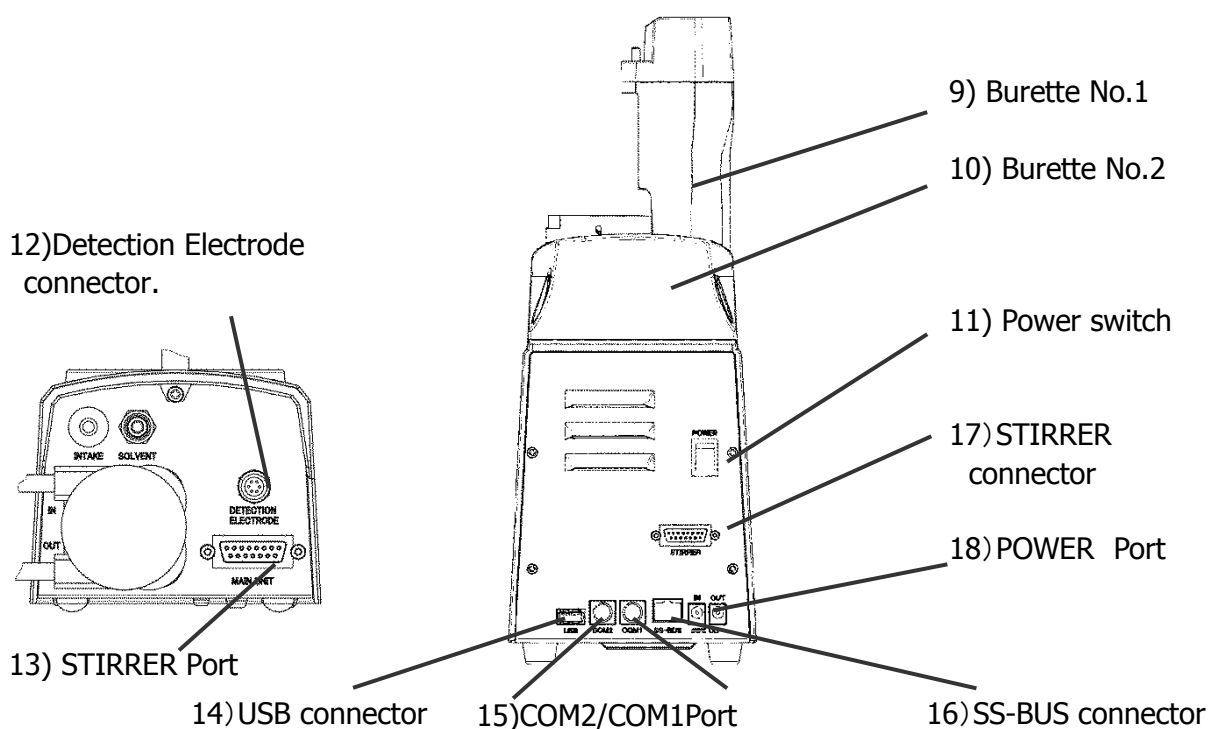
<Front>



- 1) Key panel
Use for each setting.
- 2) Liquid crystal display
Display the measurement result or parameters.
- 3) Cylinder
The glass cylinder contains Karl Fischer reagent supplied in it.
- 4) Switching valve
This valve changes the reagent line. It switches the line between Cylinder — Reagent bottle and Cylinder — Titration nozzle.
- 5) Connecting tube No.1
Transmit titrant solution from the reagent bottle to the cylinder.
- 6) Connecting tube No.2
Transmit titrant solution from the cylinder to the reagent nozzle.
- 7) Desiccant tube
The gas fume from titration cell is exhausted through this tube.
- 8) Stirrer
Measuring unit for Karl Fischer titration with a magnetic stirrer.
0(STOP) → 9(FAST)

2. Parts configuration and eachfunction

<Rear Connector>



9) Burette No.1

This burette can be used when the parameter of burette No. is set "1".

10) Burette No.2

This connects the second burette, and can be used when the parameter of burette No. is set "2".

11) Power switch

This switch turns on or off the unit

12) Detection electrode connector

The twin platinum electrode is connected here.

13) STIRRER connector

This connects the stirrer to stir sample solution.

14) USB connector

This connects USB flash drive to store the measurement result and method. Moreover, can be connected USB printer, the key board for inputting letters, the barcode reader for sample setting or the foot switch that can start to measure without touching the unit. The control with PC and the data communication with PC are possible by connecting PC (special data installation software "SOFT-CAP" is necessary).

15) COM1 and COM2 port

These ports are for connections to Dot printer, Balance or PC. Dot printer can be connected only COM1 port.

16) SS-BUS port

This is for connection of options such as Exchange Burette Unit.

17) Stirrer port

The connecting cable to the stirrer is plugged in here.

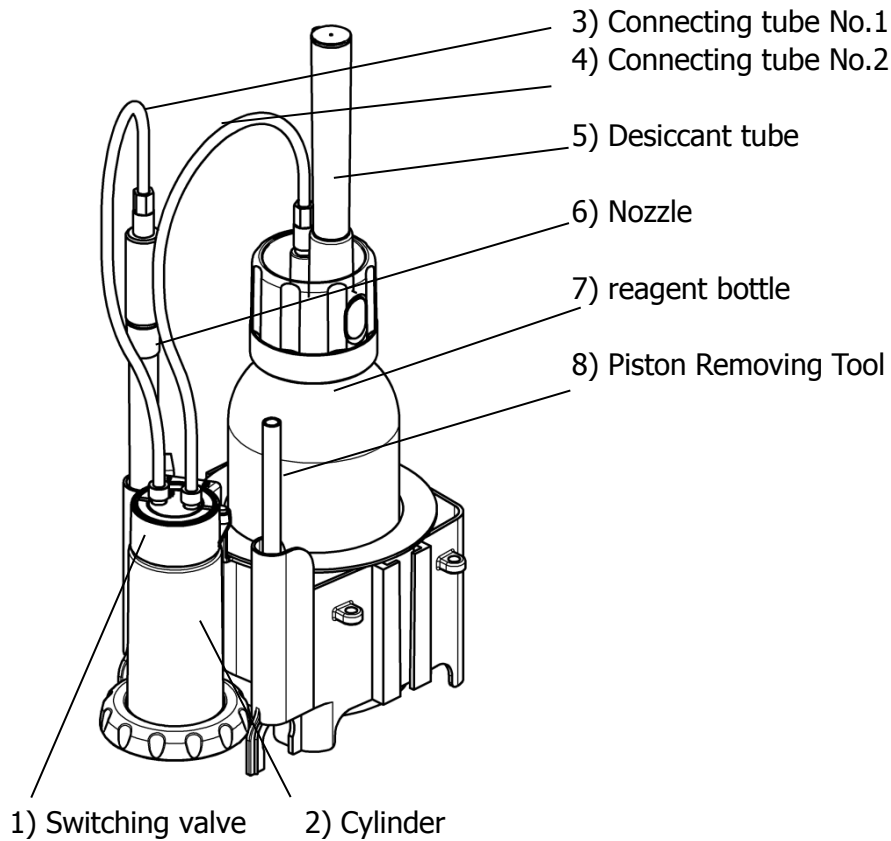
18) Power port(IN/OUT)

This is for connecting the power cable .Out port is connecting for MCU-710.

2. Parts configuration and eachfunction

<EBU-710-10KF>

A titrant-injecting burette, a switching valve and a titration reagent bottle are included in this burette unit.

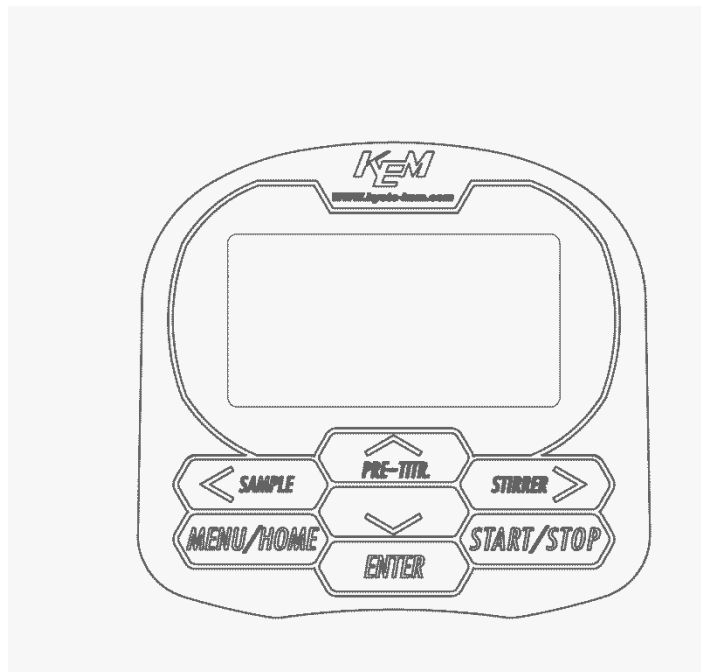


- 1) Switching valve
This valve changes the reagent line. It switches the line between Cylinder — Reagent bottle and Cylinder — Titration nozzle.
- 2) Cylinder
The glass cylinder contains Karl Fischer reagent supplied in it.
- 3) Connecting tube No.1
Transmit titrant solution from the reagent bottle to the cylinder.
- 4) Connecting tube No.2
Transmit titrant solution from the cylinder to the reagent nozzle.
- 5) Desiccant tube
The gas fume from titration cell is exhausted through this tube.
- 6) Nozzle
This is the titration nozzle.
- 7) Reagent bottle
Connect the reagent bottle to a commercially sold KF reagent bottle
- 8) Piston Removing Tool
It is used when operating the pistonhead of burette manually.

2. Parts configuration and eachfunction

2-2. Key functions (general)

Each key is positioned as shown below:



Description of each key

Key	Description
START/STOP	Key to start titration and to stop measurement on the main screen. Key to return to the previous screen on a screen other than the above.
MENU/HOME	Key to move to menu screen from the main screen and to set the parameter. Also key to return to the main screen from each input screen.
^ PRE-TITR.	Key to start/stop pretitration. Cursor key and to change number.
v	Cursor key and to change number.
<SAMPLE	Cursor key and to move to the sample setting screen from the main screen. Parameter regarding the sample such as number or size can be set on the sample setting screen.
STIRRER>	Cursor key and to operate On/Off of the stirrer on the main screen.
ENTER	Key to confirm.

2-2-1.Basic key operation

<Select menu>

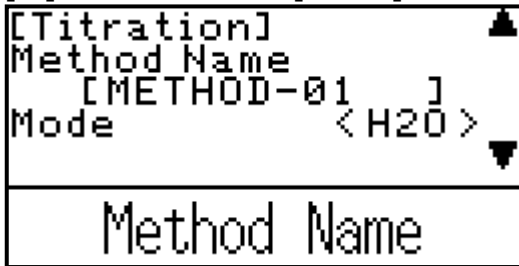
Menu screen displays when [MENU/HOME] is pressed. To select an item on the menu, move the cursor with [↑], [↓] and confirm with [ENTER].

▲ ▼ shows that the following screen exists.



<Select parameter>

To move parameters, use [↑], [↓]. When an item on the screen is shown by < ooo > parenthesized, it must be selected by key entry. To show item for selection, use [←], [→] and confirm with [ENTER].



<Entry of parameter and character>

Parameters shown by [△△△] in parenthesis on the screen are set the alphabetic with [↑][↓] after moving the cursor with [↑][↓] and pressing [ENTER] or [←][→]. The movement of inside [] is operated with [←] [→] and confirmed with [ENTER]. The character is changed with [↑] in order in the following tables, and with [↓] to the opposite direction in the following tables. Input only the number due to the position of " . " are fixed when inputting the number.

ex) To input C at the uninput cursor position, press [↑] 3 times. Moreover, to input [2] at the uninput cursor position, press [↓] 16 times. [-] is input with [↑][↓] when inputting the number after moving to the left with [←]. Input only the number due to the position of " . " is fixed when inputting the number after matching the digit with [←][→].

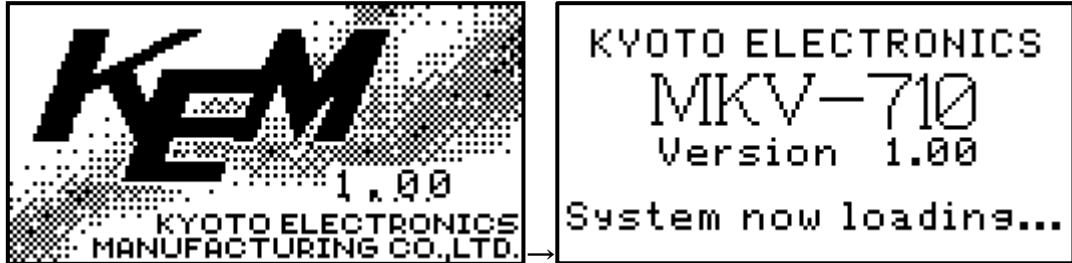
Table.2-2-1-1

Operation key	[↑]
Alphabetic parameter	(space)→A→B→C→D→E→F→G→H→I→J→K→L→M→N→O→P→Q→R→S→T→U→V→W→X→Y→Z→0→1→2→3→4→5→6→7→8→9→ . →-→+→/→x→ (→) →%→(space)
Numeric parameter	(space)→0→1→2→3→4→5→6→7→8→9→--→(space)

2. Parts configuration and eachfunction

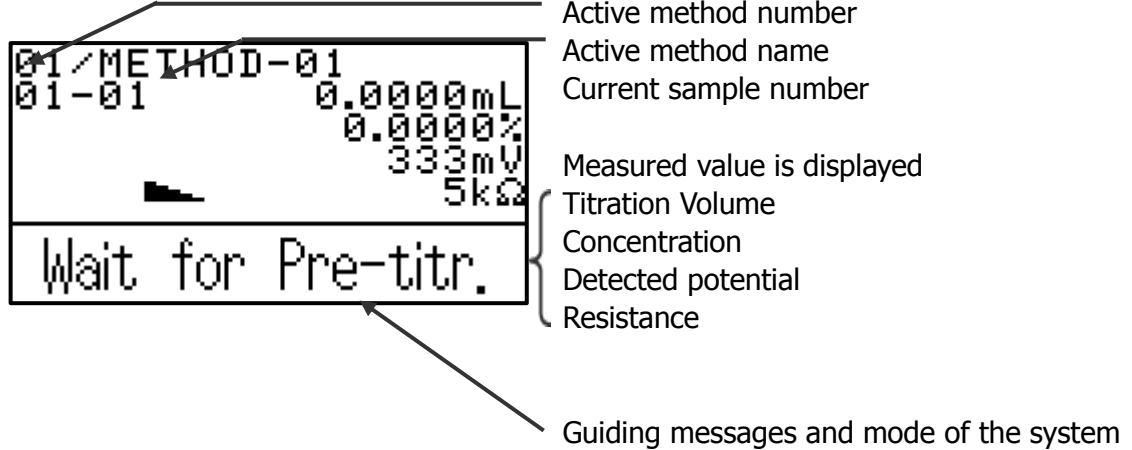
2-2-2. Description of display messages

When the power is turned on, the initial displays appear one after another as follows:



When the main screen displays, it is the standby mode ready for titration.

< Main screen >



2-3. Setting Language

Set language displayed on the screen.

1) Press [MENU/HOME].

```
[MENU]
1.Manual Operation
2.Data File
3.Method
4.Data Copy
5.History
6.Sample
7.Factor
```

2) Press [↑] twice, select 8.Setup and [ENTER] to confirm.

```
8.Setup
[Exit]
```

3) Press [↓] 5 times, select 6.Language and confirm with [ENTER].

```
[Setup]
1.Interface
2.Operator
3.Date & Time
4.Serial No.
5.LCD Contrast
6.Language
7.Reep
```

4) Select language with [←] [→] and confirm with [ENTER].

```
[Language]
Language
  < English >
  [Exit]
```

2-4. Setting date and time

Set date and time.

1) Press [MENU/HOME].

```
[MENU]
1. Manual Operation
2. Data File
3. Method
4. Data Copy
5. History
6. Sample
7. Factor
```

2) Press [↑] twice, select 8.Setup and [ENTER] to confirm.

```
8. Setup
[Exit]
```

3) Press [↓] 2 times, select 3.Date & Time and confirm with [ENTER].

```
[Setup]
1. Interface
2. Operator
3. Date & Time
4. Serial No.
5. LCD Contrast
6. Language
7. Beep
```

4) Select "Date Style" with [←][→] and confirm with [ENTER]. Press [ENTER] at "Date" and "Time", set with each of [↑][↓][←][→], and confirm with [ENTER].

Move the cursor to [Exit] and with [ENTER] to escape from the screen.

```
[Date & Time]
2011/03/01 00:00
Date Style
< YYYY/MM/DD >
Date
[ 2011/03/01 ]
Time [ 00:00 ]
[Exit]
```

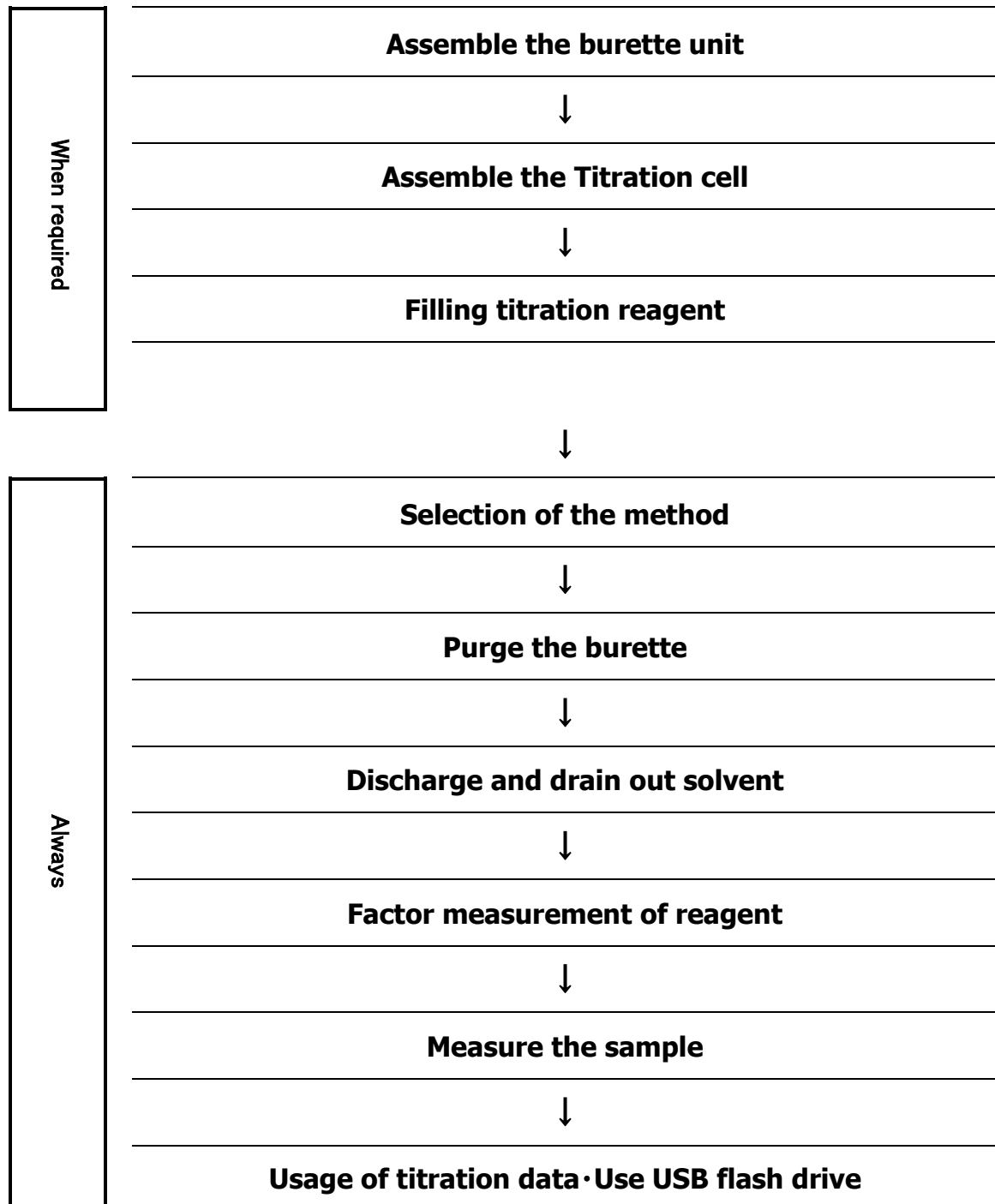


The time of clock starts when "Time" is confirmed with [ENTER].

3. Basic operation

Here is the description on basic measurement sequence.

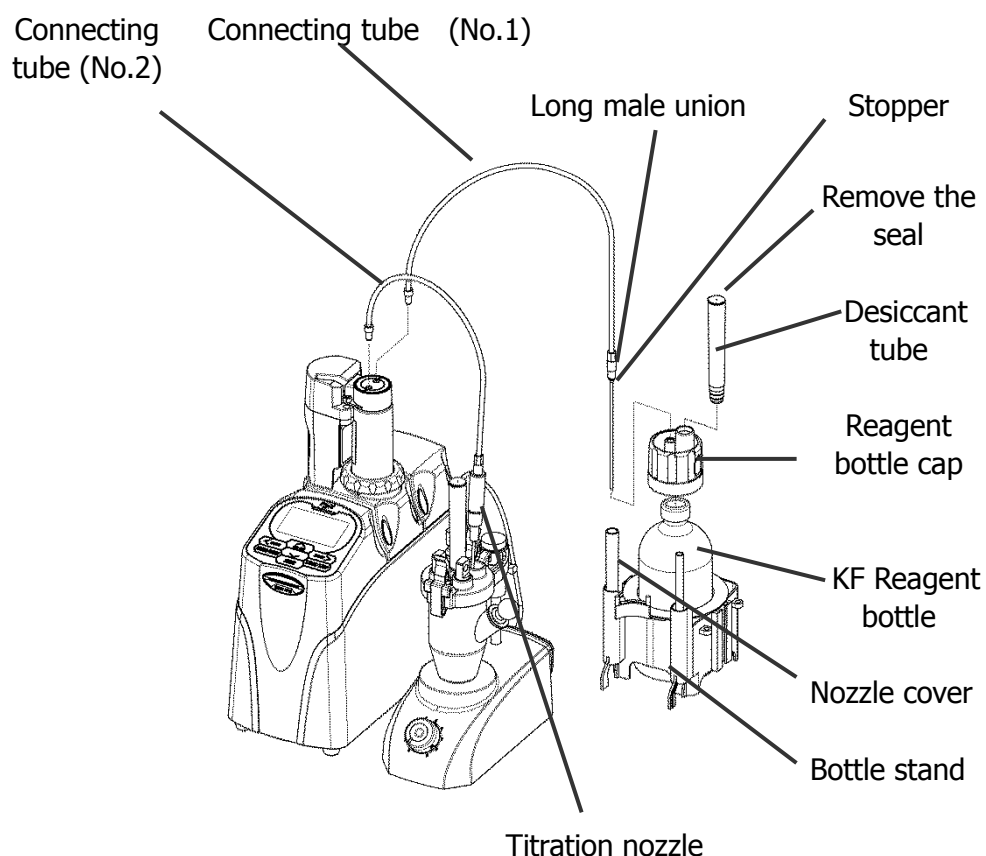
3-1. Sequence of measurement



3-2. Installation of burette unit

Assemble a burette to use for titration.

- 1) Install the nozzle cover to burette unit.
- 2) Tighten the connection tube (L=620mm) (No.2) to the position of No.2 of the switching valve. Place the diffusion proof nozzle with its discharge outlet facing outside.
When using the titration nozzle in order to perform constant dose, change the tip of diffusion proof nozzle (12-00649-00) to the Nozzle FEP ϕ 3 \times 2-0.5 L=150 before connecting it with the tube. (Refer to "6-2-6. Replace titration nozzle").
- 3) Pass through the connection tube (L=730mm) (No.1) to the reagent bottle cap and tighten to install it (Please check that the Long male union and the stopper are attached to the tube). Match the tube to the position that reaches the bottom of the reagent bottle. Tighten the tip of a reverse-side to the position of No.1 of the switching valve.
- 4) Peel off the seal on Desiccant Tube ϕ 18 \times 120 with Silica Gel, and install it onto the reagent bottle cap.

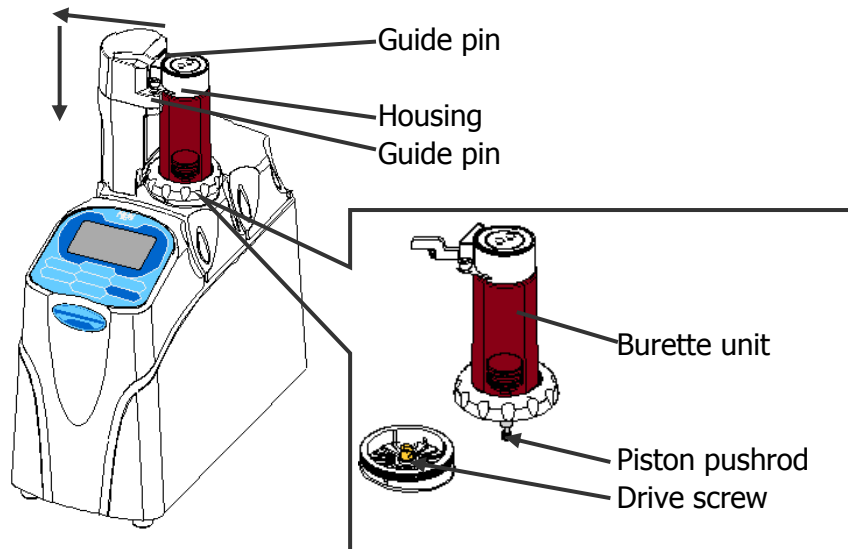


Note

Remove the seal on the Desiccant tube first.
Hold the tube not to loosen and turn only the union when installing the tube to the switching valve. Be careful not to break the tube.
Install the burette No.2 refer to "12-6. Adding a Built-in Burette."

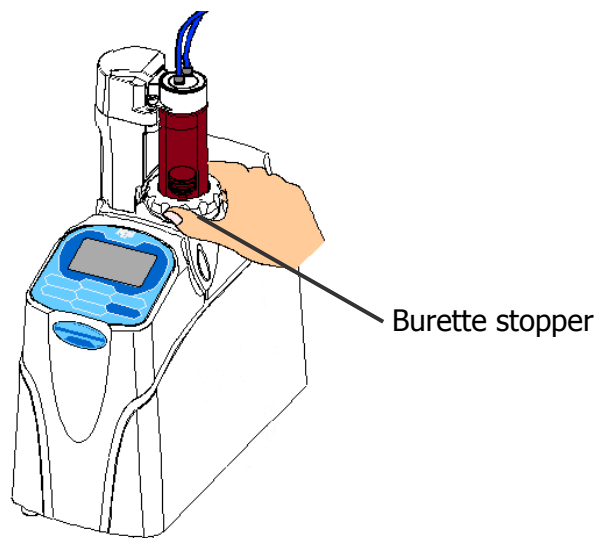
3. Basic operation

- 5) As shown below, slide the burette unit from the right, and hitch the piston pushrod to the drive screw. If you put the housing on the guide pin and slide it, you will find it easier to adjust the height.
- 6) To place the burette unit, insert the hole of the housing of the burette unit into the two guide pins.



If the length of the piston pushrod out of the cylinder is too short or too long, the burette unit cannot be put to the shaft of the main unit. Refer to "3-13. Replacing burette unit" to adjust the length of the piston pushrod.

- 7) To fix the burette unit, hold down the top of the burette unit and tighten the burette stopper.

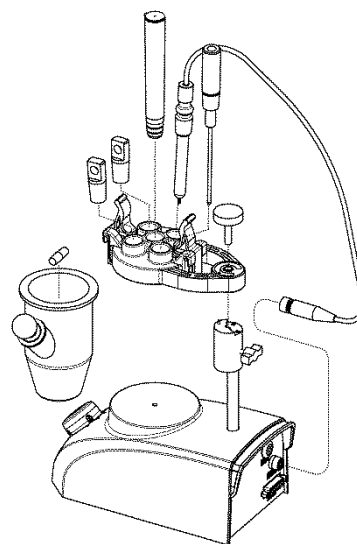


3. Basic operation

3-3. Assemble the Titration cell

Assemble the Titration cell

- 1) Fix the titration vessel stopper onto the magnetic stirrer with the screw.
- 2) Pull the lever on the titration vessel stopper to put the titration flask (S-type Titration vessel) with a stirrer rotor in it in place. At this point, apply a small amount of KF grease on contact area between flask top and lid.
- 3) Install the twin platinum electrode/KF, desiccant tube A and the port plug on the lid for titration flask. The position for installation is shown below. At this point, apply a small amount of KF grease on slide contact area.



Note

Make sure to apply KF grease around glass sliding area.

3-4. Filling titration solution

- 1) Press [MENU/HOME] key.
Select "1.Manual Operation" and press [ENTER] key.

```
[MENU]
1.Manual Operation
2.Data File
3.Method
4.Data Copy
5.History
6.Sample
7.Factor
```

- 2) Select "[Manual]" and press [ENTER] key.
Select "Burette No."

```
[Manual Operation]
[Manual]
[Dose]
[Pump]
[Exit]
```

Manual

- 3) Set Burette Speed to "Medium."

```
< Reset >
Burette No. < [1] >
Burette Speed
Purge Times < Fast > [10]
```

Burette No.

- 4) Set Purge Type to "to Nozzle."

```
< Reset >
Purge Type
< to Nozzle >
[Purge]
```

Purge Type

- 5) Allow the tip of the titration nozzle to move into
a beaker or the like.

```
< Reset >
Purge Type
< to Bottle >
[Purge]
```

Purge



Wear a protective pair of glass in order to avoid splashing reagent in case the tube union is loosened or disconnected.

3. Basic operation

3-5. Purge the reagent

Purging is necessary to eliminate the difference in concentration between the reagent in burette and in reagent bottle.

- 1) Press [MENU/HOME] and select "1. Manual Ope." and confirm with [ENTER].
- 2) Select [Manual] and confirm with [ENTER].
- 3) Set Burette No. and Purge Times according to Function Description "1-1. Manual Operation."
- 4) Set Purge Type to "to Bottle".
- 5) Select [Purge] and purge the reagent with [ENTER]. The piston head is moved vertically, and repeat to fill and discharge the reagent to the burette when selecting "to Burette."
- 6) Select [Exit] and press [ENTER] to back to the previous screen after the piston head is returned to the bottom.



Caution

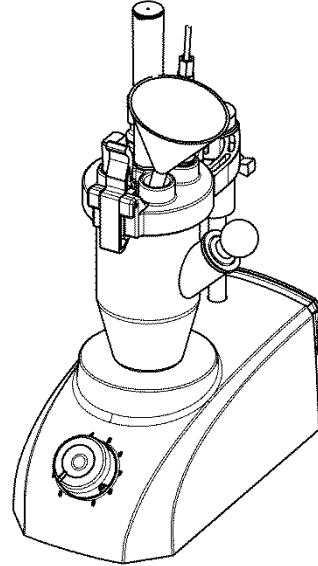
Wear a protective pair of glass in order to avoid splashing reagent in case the tube union is loosened or disconnected.

3-6. Filling reagent and draining

<When do not use the Auto Solvent Change Unit >

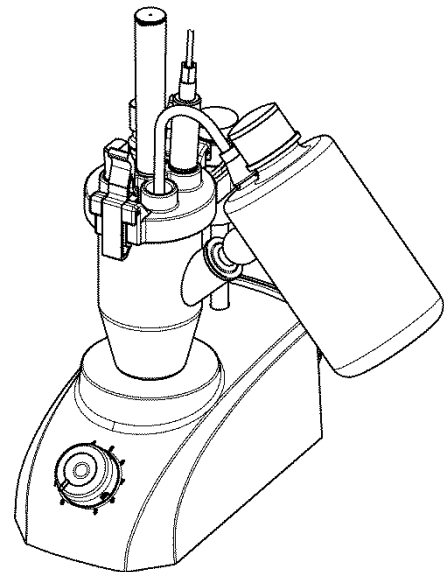
<injection>

- 1) With Funnel, pour a solvent into the titration cell 30mL. (just about the whole Pt element covered with the solvent when stirred)



<Drain>

- 1) To drain out the liquid, use the supplied washing bottle for draining.



3. Basic operation

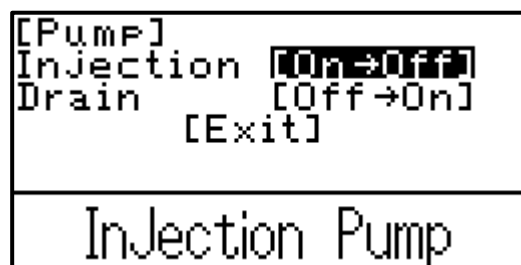
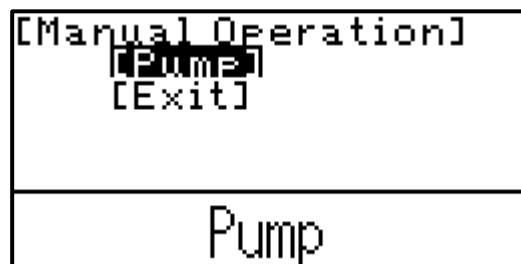
<When use the Auto Solvent Change Unit >

<injection >

- 1) Press [MENU/HOME] key.
Select "1.Manual Operation" and press [ENTER] key. Select [Pump].
Press Injection Pump [On] key to inject approx. 30mL of analyte into the titration cell. (just about the whole Pt element covered with the solvent when stirred)

[Off→On] key automatically changes to [On→Off] at this time.

Press Injection Pump again, and injection will stop.



<Drain>

- 1) Press Drain Pump [On] key to drain waste liquid.

```
[Pump]
Injection [Off→On]
Drain    [Off→On]
          [Exit]
```

Drain Pump

```
[Pump]
Injection [Off→On]
Drain    [On→Off]
          [Exit]
```

Drain Pump

**Note**

Do not use the Auto Solvent Change Unit for those samples which are hard to dissolve or insoluble in solvent in order to avoid clogging of drain tube. Such waste liquids, if spilled, after measurement may corrode the tube connectors causing the Auto Solvent Change Unit malfunction.

**Note**

Change the connecting of the Auto Solvent Change Unit for those samples which are oily in order to avoid damage of drain tube.

3. Basic operation

3-7. Pretitration

According to moisture titration by Karl Fischer method, it is necessary to extract water in the dehydrating solvent for accurate measurement of water in the sample. This step is called Pretitration.

Press [Pre-Titr.] key:

The above shows the display of pretitration. After pretitration is finished, the mode goes to standby mode.



In the case of the drift titration OFF.



In the case of the drift titration ON.

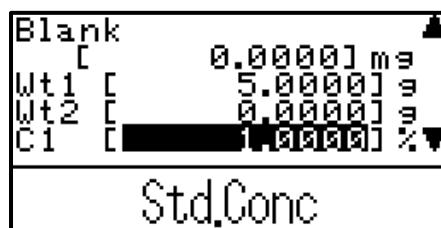
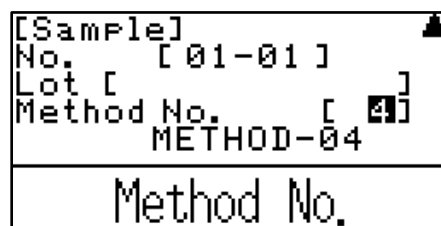
3-8. Factor measurement

Karl Fischer reagent in sealed container keeps concentration of iodine to a certain level, however, once it is opened and transferred to Titrator, it will absorb ambient moisture and its concentration will be lowered. Therefore, it is necessary to determine the concentration of KF reagent (called "Factor") before sample measurement. Please follow the procedure of Factor measurement according to the standard substance:

< Factor measurement by weighing standard >

Factor measurement by weighing other standards like pure water or sodium tartaric acid:

- 1) Press [SAMPLE] key and select Method (Initial value: No. 4) for measuring reagent factor. Enter C1 (moisture value of a reference material, %).
- 2) Set the calculating expression to '7' on Titration parameter in Method setup screen.
- 3) Weigh the reference material in a syringe or a sampler.
- 4) Pre-titrate until titration-ready state is achieved, followed by injecting the reference material in the titration cell. Then, press [START/STOP] key.



3. Basic operation

- 5) When the titration ends, the message prompts an operator to enter Wt1 (weight before injection) and Wt2 (weight after injection). Enter Wt1 and Wt2.
- 6) Repeating the above steps 3) through 6) up to the set number of times will automatically transfer the factor of the standardized KF reagent to 'Factor 1' parameter (this feature is enabled when "Auto Set, mean" is 'ON'—refer to '6-9').

Blank [0.0000] mg
 Wt1 [5.0000] g
 Wt2 [0.0000] g

Weight

[Factor(mg/ml)]
 1 [1.0000]
 [Exit]
 [Print]

< Factor measurement with standard water-methanol in burette >

The following procedures are for determining the factor of titration reagent using optional additional burette and reference material of standard water-methanol. In a case where additional burettes are not connected, determine the factor according to the procedures in the previous section, "Factor measurement by weighing other standards like pure water, water standard or standard sodium tartaric acid".

- 1) Enter the factor of standard water-methanol on the burette in which standard water-methanol is set in the menu 7. Factor.
- 2) Select Method (initial Method No.: 5) for measuring reagent factor. Select the number of the burette where KF reagent is set, as Titration parameter on the Method setup screen. Next, confirm "Dose Mode: On" and select "Dose burette is the number of the burette where standard water-methanol is set, on the setup screen for constant volume injection. Enter dosing volume of standard-water methanol in the field of "Dose Volume".
 Confirm Formula 8 on Calculation parameter.
- 3) After pre-titration, start standardization. Make measurements by pressing [START/STOP] key in "measurable state".
- 4) Repeating the measurement up to preset times will automatically transfer the factor of the standardized KF reagent to Factor parameter (this feature is enabled when "Auto Set, mean" is 'ON'—refer to '6-9').

[Factor(mg/ml)]
 1 [1.0000]
 2 [1.0000]
 [Exit]
 [Print]

[Sample]
 No. [01-01]
 Lot []
 Method No. [5]
 METHOD-05

Method No.

Data Sampling Time [5] s
 Dose Set [Executed]
 [Exit]

Dose Set

3. Basic operation



Note

In the case of precise measurement where a ball plug is detached before a sample is put in the flask, preliminarily run a blank test to set Blank value.

< Factor measurement of water-methanol standard with KF reagent >

The following procedures are for determining the factor of standard water-methanol by back titration using optional additional burette and reference material of titration reagent. Here, previously determine the factor of titration reagent according to the procedures in "Factor measurement by weighing other standards like pure water, water standard or standard sodium tartaric acid".

- 1) Select Method (initial Method No.: 6) for measuring reagent factor by back titration. Confirm Formula 8 on Calculation parameter.

```
[Sample]
No. [ 01-01 ]
Lot [
Method No. [ 6 ]
METHOD-06
```

Method No.

- 2) Enter the factor of KF reagent on the burette in which KF reagent is set in the menu 7. Factor.

```
Data Sampling Time
[ 5 ] s
Dose < Manual >
Set [Execute]
[Exit]
```

Dose

- 3) For Titr. Burette No. of Titration parameters, select the number of burette in which standard water-methanol is set. Next, confirm "Dose Mode: On" and select "Dose burette is the number of the burette where KF reagent is set, on the setup screen for constant volume injection. In the case where 'Manual' is selected for constant dosing, enter the dosing volume of KF reagent in the field of "Dose Volume" on the setup screen.

```
[Dose Set]
Burette No. < 7 >
Dose Volume
[ 3.000 ] mL
[Exit]
```

Burette No.

- 4) After pre-titration, start standardization. Make measurements by pressing [START/STOP] key in "measurable state".

```
[Factor(mg/ml)]
1 [ 1.0000 ]
2 [ 1.0000 ]
[Exit]
[Print]
```

- 5) Repeating the measurement up to preset times will automatically transfer the factor of the standardized 'standard water-methanol' to Factor parameter (this feature is enabled when "Auto Set, mean" is 'ON'—refer to '6-9').

3-9. Measure the sample

- 1) Press [↑ PRE-TITR.] key to start pretitration. The display will show the message of pretitration going on.

```

01/METHOD-01
01-02      0.0000mL
           0.0000%
           72mV
           4kΩ
Waiting titr.
  
```

```

01/METHOD-01
01-01      0.0000mL
           0.0000%
           73mV
           4kΩ
Drift
  
```

- 2) Weigh the syringe with sample in it, and record the weight (Wt1).
- 3) [Press [SAMPLE] key and enter the weight of 4) in [Wt1]. Sample name and sample ID can be entered in the same manner.

```

Blank
[      0.0000] mg
Wt1 [ ██████ 5.0000] g
Wt2 [      0.0000] g
Weight
  
```

- 1) Inject the sample into the cell.
- 2) And then, press [Start].

When 'Titration start mode' is set to 'AUTO', titration will start.

In the case of 'MANUAL', the message 'Sample injection standby' will be displayed. inject the sample into the cell, and then, press [Start].

- 3) weigh the syringe after sample is injected, and record the weight (Wt2)

```

Blank
[      0.0000] mg
Wt1 [ ██████ 5.0000] g
Wt2 [ ██████ 6.0000] g
[Exit]
Weight
  
```



Rotor speed must be adjusted by turning the dial of a stirrer.

3. Basic operation

※Press [START/STOP] again when the measurement is discontinued on the way.

- 4) When titration is finished by reaching an endpoint, the results will be shown on the screen.

Volume	3.0400mL▲
Mois.	3.0400mg
Result	0.0608
	⌘▼
Result	

Titr. Time	00:01:42 ▲
Re-Calculation	
	[Exit]
	[Print]
	▼
Re-Calc.	



A setup of font size is Please refer to 6-9. "Other "

3-10. Re-calculate titration data

Result of size, unit, blank and factor, and print format can be changed.

- 1) Press [MENU/HOME], select "2.Data File" with [↑] [↓] and press [ENTER].

```
[MENU]
1.Manual Operation
2.Data File
3.Method
4.Data Copy
5.History
6.Sample
7.Factor
```

- 2) Select the result with [↑] [↓] and press [ENTER].

```
[Data File]
01 08/23 16:06
   01-17
02 08/23 16:03
   01-16
03 08/23 16:02
   01-15
```

- 3) Select [Re-Calculation] and confirm with [ENTER].

```
Titr.Time 00:00:15
[Re-Calculation]
[Exit]
[Print]

Re-Calc.
```

- 4) Change the sample size, unit, print format with [↑] [↓] [←] [→], and move the cursor to [Execute] and press [ENTER] to re-calculate.
ex)Change the sample size

```
Blank
[ 0.0000] mg
Wt1 [ 5.0000] g
Wt2 [ 0.0000] g

Weight
```



Note

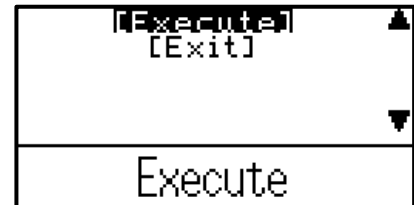
Move the cursor to [Exit] and press [ENTER] if the change is not executed.

3. Basic operation

- 5) Select "Size" with [↑] [↓] and press [ENTER]. Change the sample size with [↑] [↓] [←] [→] and press [ENTER].



- 6) [Move the cursor to [Execute] with [↑] [↓] and press [ENTER] to re- calculate. Move the cursor to [Exit] and with [ENTER] to escape from the screen.



3-11. Batch processing of titration data

Batch the calculated data on the list. The batch calculation determines Mean value, Standard deviation (SD) and Relative standard deviation (RSD).

- 1) Press [MENU/HOME], select "2.Data File" with [↑] [↓] and press [ENTER].

```
[MENU]
1.Manual Operation
2.Data File
3.Method
4.Data Copy
5.History
6.Sample
7.Factor
```

- 2) Move the cursor to [Statistics] with [↑] [↓] and press [ENTER].

```
16 08/21 18:55
   01-02
17 08/21 18:53
   01-01
[Statistics]
[Exit]
```

- 3) Sort out the data for batch calculation. Select High Sample No., Method No. and Date with [↑] [↓] [←] [→], and move the cursor to [Execute] and press [ENTER] to batch.

ex)Sort out Method No. and Date

```
[Statistics]
High Sample No.
Set < On > [ 0 ]
Method No.
Set < Off >
High Sample No.
```

- 4) Select "Method No." with [↓] and press [ENTER]. Change "On" with [←] [→] and press [ENTER]

```
[Statistics]
High Sample No.
Set < On > [ 0 ]
Method No.
Set < On > [ 1 ]
Method No.
```

- 5) Set Method No. with [↑] [↓] [←] [→] and press [ENTER].

```
Titration Date
Set < On >
[ 2010/01/01 ]~
[ 2010/01/01 ]
Titr.Date Set
```

3. Basic operation

- 6) Press [ENTER] to batch at [Execute] and the result is displayed.
Move the cursor to [Exit] and with [ENTER] to escape from the screen.

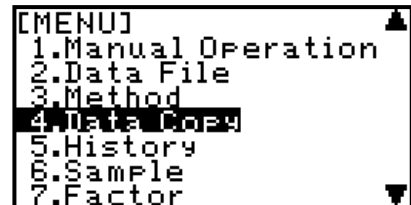


The result can be excluded from the batch calculation by pressing [←] on the result list. "*" is displayed ahead of the exclude result.

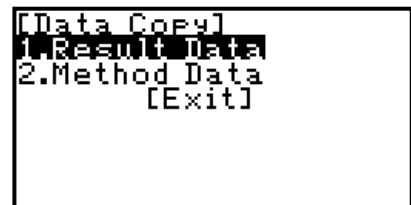
3-12. Read Data, Store in USB Flash Drive

Store the result data in USB and can be used on PC.

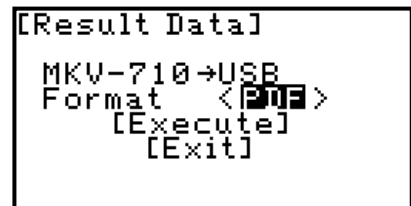
- 1) Press [MENU/HOME], select “4.Data Copy” with [↑] [↓] and press [ENTER].



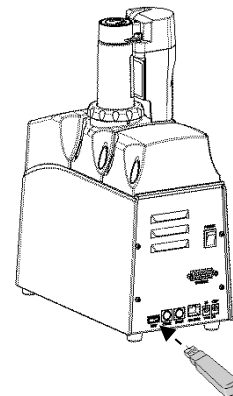
- 2) Select “1.Result Data” and press [ENTER].



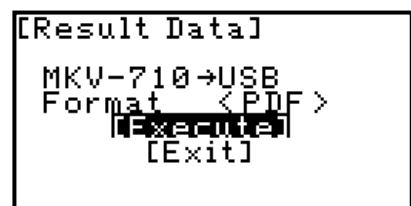
- 3) Select the stored format, which is CSV or PDF with [←] [→] and confirm with [ENTER].



- 4) Insert USB to the USB connector.

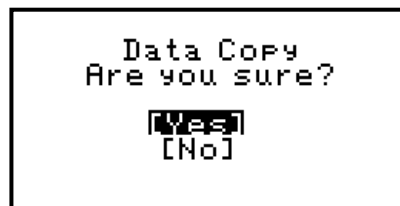


- 5) Move the cursor to [Execute] with [↑] [↓] and press [ENTER].



3. Basic operation

- 6) Select [Yes] with [↑] [↓] and press [ENTER] to store.



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.



All date of the result is collectively stored.

[Format]

- PDF : Select this when saving a file in PDF format or when using data with Tview6. Use this format when sending measurement results to KEM or your nearest distributor.
- CSV : Saved in CSV file. Select this if you wish to perform your own analysis or to make a report with a commonly-used application software product such as Microsoft® Excel®, Microsoft® Access®, Microsoft® Word, etc.
The same results as printout are saved except for titration parameters, control parameters and line chart.



Note

If you will save the 50 measurement results in PDF in USB memory, the capacity is about 2.5M byte.

For setup, refer to "4-3.Using method making software" how to operate.



Note

It takes about six (6) seconds to save one measurement data in PDF format to a USB flash drive.

3-13. Saving Method Conditions, Setting Up on PC

Method conditions can be saved to a USB flash drive. They can also be copied from a USB flash drive to the titrator.

Press [MENU/HOME] key on the main screen. Select "4. Data Copy" and press [ENTER].
Select "2.Method Data" and press [ENTER].



Note

This function is not available when method contents are locked. Follow the steps in 4-1 and unlock method first.

<pre>[Method Data] 1.Select Data 2.All Data [Exit]</pre>	<pre>[Select Data] Read: < MKV-710 > < 1 > METHOD-01 ↓ Write: < USB > < 1 > [Execute] [Exit]</pre>
---	---

Select how you wish to save method conditions.

Item	Description
1. Select Data	Copies each method individually. Select a method No. of either MKV-710 or the USB flash drive, and select the method No. of MKV-710 or the USB flash drive to which you wish to copy. Then execute copying.
2. All Data	Copies all data at a time. Select "MKV-710→USB" or "USB→MKV-710." Then execute copying.

[Execute]

Copies the titration method to a USB flash drive or to MKV-710 as you have desired. Move the cursor here and press [ENTER].

4. Method

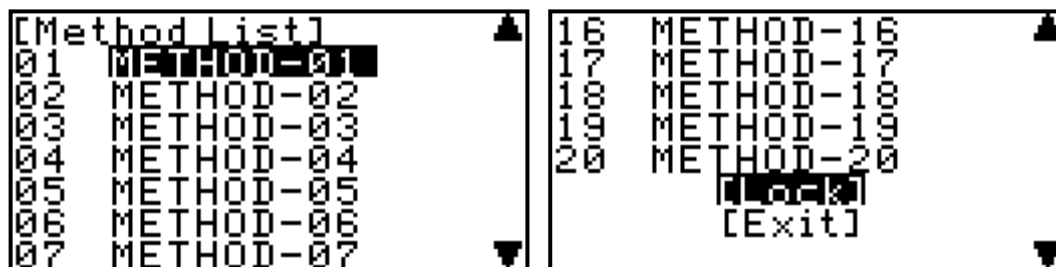
4-1. Method

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.

MKV-710 can store standard methods (No. 01 through 20). Each method can be named individually.

A Method consists of, [Titration parameter], [Calculation parameter] and [Report parameter].

To edit a method, press [MENU/HOME] on the Main screen to display "3.Method", and put the cursor on the method to be edited, followed by pressing [ENTER] key.



Each parameter can be selected with corresponding Key on display.



Note

For details of each parameter, refer to individual item in this manual.

[Lock]

Protects method contents.

Setting up a lock on method

- 1) Press [MENU/HOME].
- 2) Select "3. Method" and press [ENTER].

```
[MENU]
1.Manual Operation
2.Data File
3.Method
4.Data Copy
5.History
6.Sample
7.Factor
```

- 3) Select "Lock" with [↑][↓] and press [ENTER].

```
16 METHOD-16
17 METHOD-17
18 METHOD-18
19 METHOD-19
20 METHOD-20
[Lock]
[Exit]
```

- 4) Enter your password in "Password" with [↑][↓] [←] [→] and press [ENTER].
- 5) Move the cursor to [Lock] and press [ENTER].

```
[Method Lock]
Password
[ ]
[Lock]
[Cancel]
```

- 6) Select "Yes" with [↑] and press [ENTER].

```
Method Lock
Are you sure?
[Yes]
[No]
```

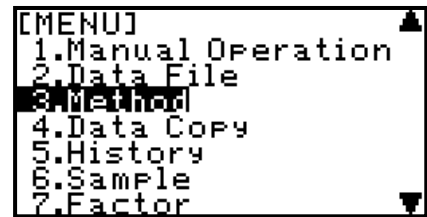
- 7) An icon of key will appear next to "Method List," and method contents are now protected.

```
[Key] Method List
01 METHOD-01
02 METHOD-02
03 METHOD-03
04 METHOD-04
05 METHOD-05
06 METHOD-06
07 METHOD-07
```

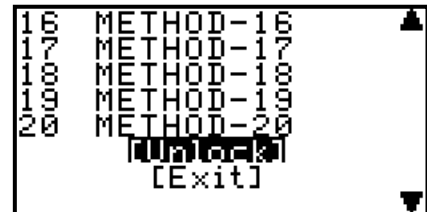
4. Method

Unlocking method

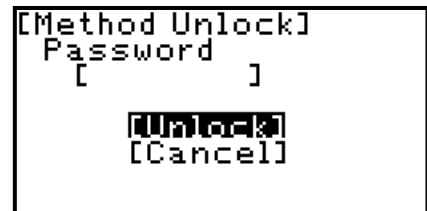
- 1) Press [MENU/HOME].
- 2) Select "3. Method" and press [ENTER].



- 3) Select "Unlock" with [↑][↓] and press [ENTER].



- 4) Enter your password in "Password" with [↑][↓] [←] [→] and press [ENTER].
- 5) Move the cursor to [Unlock] and press [ENTER].
Method is now unlocked.



Note

Once method is locked, "2. Method Data" on Menu 4. Data copy may not be used. Once method is unlocked, "2. Method Data" on Menu 4. Data copy may be used.

4-2. Titration Parameter

Setup the general parameters relevant to titration.

Select [Titration] on the screen where you have selected the method, and press [ENTER]. "Titration" screen will then appear.

```

[Titration]
Method Name
  [METHOD-01 ]
Mode      < Normal >
Burette No. < 1 >
-----
Method Name
  
```

[Method Name]

Setup Method Name. The character can be set up to 10.

```

[Titration]
Method Name
  [METHOD-01 ]
Mode      < Normal >
Burette No. < 1 >
-----
Titr.Mode
  
```

[Mode]

Titration mode is selective as follows

- Normal : Normal titration for routine measurement.
- Back : Back titration for slow water extraction by dehydrated solvent or slow reaction of KF reagent and water.

```

[Titration]
Method Name
  [METHOD-01 ]
Mode      < Normal >
Burette No. < 1 >
-----
Burette No.
  
```

[Burette No.]

Selection of a burette for titration:

- 1 : The supplied first burette
- 2 : The additional second burette

4. Method

End Time [30] s ▲
Final Volume [0.01] mL
Titration Speed < 3 >
Detector Mode < 1 > ▼
End Time

[End Time]

If over-dosing of reagent in the vicinity of endpoint continues longer than preset time length, the titration ends as it is regarded as the endpoint. EP will not be sensed if [End time] = 0.

•0~99s

End Time [30] s ▲
Final Volume [0.01] mL
Titration Speed < 3 >
Detector Mode < 1 > ▼
Final Volume

[Final Volume]

Enter the minimum amount of KF reagent dosed in the vicinity of endpoint. Titration time may be shortened if a larger amount is preferred but the error will increase. Whereas, selection of smaller amount will decrease the error but it will end the titration in a longer time.

•.0.01~9.99mL

End Time [30] s ▲
Final Volume [0.01] mL
Titration Speed < 3 >
Detector Mode < 1 > ▼
Titration Speed

[Titration Speed]

Optimum titration speed depends on selection of reagent, dehydrated solvent or the sample to be measured. If titration speed is found to cause over-titration, slow down the speed. Recommended: 1 ~6 for normal titration and 1 ~ 3 for back titration.

End Time	[30] s ▲
Final Volume	[0.01] mL
Titration Speed	< 3 >
Detector Mode	< 1 > ▼
Detector Mode	

[Detector Mode]

Selection of electric current for the electrode depending on dehydrated solvent or sample type:

- 1 : Typical unless otherwise specified
- 2 : For titration using oils or ketones dehydrated solvent or in case of no ending of titration even with excessive KF reagent dosed.

t(stir)	[0] s ▲
t(wait)	[0] s
t(max)	[0] s
t(interval)	[0] s ▼
t(stir)	

[[t(stir)]

Select a time length to wait for titration start after a sample is discharged into the titration flask, particularly for those samples which are hard to dissolve in the dehydrated solvent and difficult to extract moisture.

- **0~99999s**

t(stir)	[0] s ▲
t(wait)	[0] s
t(max)	[0] s
t(interval)	[0] s ▼
t(wait)	

[t(wait)]

Enter the shortest time length for a measurement from start to end. This parameter is necessary when, for example, there are two inflection points but endpoint is determined in between the two points since dehydration is maintained between the two peaks.

- **15~99999s**

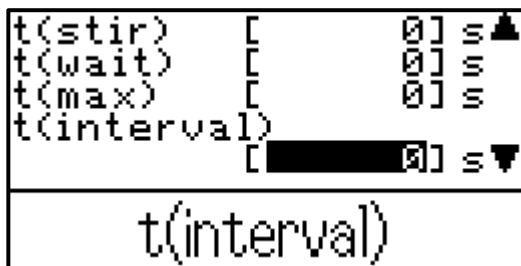
4. Method

t(stir)	[0]	s	▲
t(wait)	[0]	s	
t(max)	[0]	s	
t(interval)	[0]	s	▼
t(max)				

[t(max)]

Limit a time length for a titration. This means the total time length from start to end is [t(stir)] + [t(wait)]+ [t(max)]. The printing covers the measuring process [t(wait)] + [t(max)]. The event during [t(stir)] will not be printed out. [t(max)=0] means titration will not terminate by time limit. This is useful when an Evaporator is connected or when micro amount of moisture continues to be extracted from solvent even after most of water has been titrated.

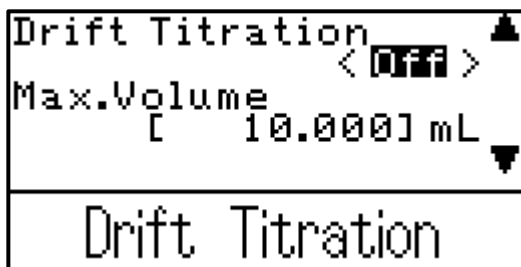
• **0~99999s**

**[t(interval)]**

Enter an intermittent time for dosing reagent. The "t(interval)" appears only when [t(wait)] = 0 is preset. For example, when a titration is started and End time (e.g. 30s) has elapsed where conditions for finding an endpoint are satisfied, the system will wait for preset [t(interval)] length since then. If water is detected during that intermittent time, it will further continue titration, however, if water is not detected, then, the titration will be finished after [t(max)] time has elapsed succeeding End time and intermittent time. If selected [t(interval)] length is longer than titration [t(max)], titration will be finished when the limit time has elapsed. In case [t(max)] = 0 is preset, press [Reset] button to terminate titration.

This is useful to complete KF titration for such a sample of which reaction with reagent is slow.

- 0~9999s

**[Drift Titration]**

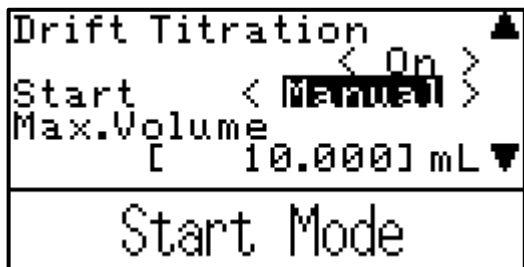
Selection of drift titration as follows:

- Off : Once the titration flask is dehydrated, it will not be re-dehydrated even when water is detected during titration wait-time. For example, when "Drift titration" is set to "On" and "Start mode" is set to "Auto" and in this situation if water content in a sample is extremely of a small amount, the water in the sample, when injected into the flask, is regarded as drift water and, dehydration continues without measurement is performed. In this case, "Off" is preferred for drift titration.

Discharge the sample immediately after dehydration in order to avoid increasing positive error due to the drift.

- On : This setting is for normal situation where titration starts automatically as soon as water is detected during titration wait time while maintaining the titration flask dehydrated.

4. Method



[Start]

Selection of titration start. This appears only when "Drift. titr." is set to "On".

- Manual : Use this mode for blank test or for samples with a small amount of water.
- Auto : Titration starts automatically by sensing water increase in the sample after discharged into the flask.



[Max. Volume]

Titration will end when it reaches preset amount of titrated volume regardless of potential changes or time length elapsed in titration for endpoint detection.

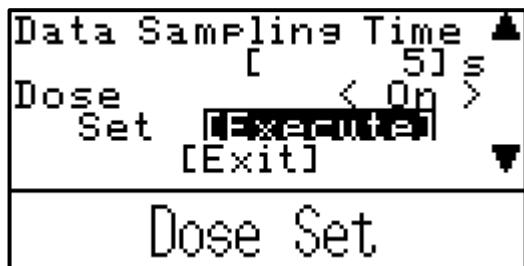
- 0.000~999.000mL



[Data Sampling Time]

Select a time interval for data sampling. Titration volume and accumulated amount will be automatically sampled at the interval of an input time.

- 1~9999s

**[Dose]**

Selection of fixed dose of reagent or water methanol standard before titration is started:

- Off : No fixed dose. This appears only when "Titr. mode" is set to "Normal".
- Set : The reagent is dosed into the burette for the preset amount of [Dose volume] volume.
- Auto : Fixed dose activates by automatically sensing over-dose of KF reagent. This appears only when "Titr. mode" is set to "Back".

The following setup screen will appear when '[Execute] -> [Enter]' is selected in 'constant dosing' setting.

[Dose burette No.]

Selection of a burette for fixed dose. This appears only when "Dose mode" is set to "Set" or "Auto".

- 1 : The supplied first burette
- 2 : The additional second burette

[Dose volume]

Enter the amount of fixed dose, which appears only when "Dose mode" is set to "Set".

- 0.00~999.00mL

4-3. Calculation Parameter

Equation for concentration calculation is set.

```
[Method 01]
1.Titration
2.Calculation
3.Report
   [Exit]
   [Print]
```

```
[Calculation] ▲
Type < Sample >
Calculation No. < 2 >
Unit < % >
Weight < Variable > ▼
```

Calculation Type

[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.

```
[Calculation] ▲
Type < Sample >
Calculation No. < 2 >
Unit < % >
Weight < Variable > ▼
```

Calculation No.

[Calculation No.]

Here you select the numbered equation.

- 0, 2~6 : For Calc. type of "Sample" or "Check"
- 1 : For Calc. type of "Blank", "Sample" or "Check"
- 7, 8 : For Calc. type of "Factor"



Note

For calculation units and numbers, refer to "4-4. Calculation formula".

```

[Calculation] ▲
Type < Sample >
Calculation No. < 2 >
Unit < % >
Weight < Variable > ▼
Unit

```

[Unit]

Here you select a unit used in calculation.



For calculation units and numbers, refer to "4-4. Calculation formula".

Note

```

[Calculation] ▲
Type < Sample >
Calculation No. < 2 >
Unit < % >
Weight < Variable > ▼
Weight Input

```

[Weight Input]

Select how to enter weight of sample.

- Fixed : "Fixed" is concentration calculation by constant sample weight.
- Variable : "Variable" is calculation by individual sample weight at each time.

This setting is for Calc.No.2, 3, 6, 7 only, and not available for Calc.No.0, 1, 4, 5, 8.
The weight is entered by [Sample] key.

```

Drift Comp. ▲
< Manual >
[ 0.00 ] ug/min
[Exit] ▼
Drift

```

[Drift Comp.]

Selection of drift compensation:

- Off : No compensation is made. Select this to know total water content including drift.
- Manual : Enter offset value. This is used when drift value or blank is determined in titration without sample.
- 0.00~99.99ug/min

4. Method

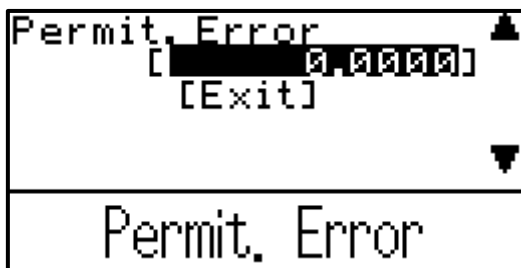


A screenshot of a menu screen. The top section contains the text "Drift Comp. < Off >" and "Standard Value" followed by a cursor and a value field showing "0.0000". Below this is a horizontal line, and the bottom section contains the text "Standard Value".

[Standard Value]

Enter a standard value to make the evaluation in the following range:

- 0.0000~99999.9999



A screenshot of a menu screen. The top section contains the text "Permit. Error" followed by a cursor and a value field showing "0.0000". Below this is the text "[Exit]". Below this is a horizontal line, and the bottom section contains the text "Permit. Error".

[Permit. Error]

Enter permit error to determine if the calculation result is off the range against the standard value.

- 0.0000~99999.9999

4-4. Calculation formula

Calc. No.	Purpose	Equation
0	Titration volume of burette	Data Unit: mL
1	Calculation of water content	$\text{Data} \times \text{TF} - \text{Drift} \times t - \text{Blank}$ Unit: mg
2	Concentration of liquid or solid by weighing	$\frac{\text{Data} \times \text{TF} - \text{Drift} \times t - \text{Blank}}{W_{t1} - W_{t2}} \times k$ Unit: %(k=0.1), mg/kg, ppm(k=1000), mg/g(k=1)
3	Concentration of a weighed part of water in liquid or solid dissolved with solvent extraction	$\left(\frac{\text{Data} \times \text{TF} - \text{Drift} \times t - \text{Blank}}{W_{t1} - W_{t2}} \times \frac{B + W_{t0}}{W_{t0}} - \frac{A \times B}{W_{t0}} \times 10^{-3} \right) \times k$ Unit: %(k=0.1), mg/kg, ppm(k=1000), mg/g(k=1)
4	Concentration when the volume of liquid sample is measured	$\frac{\text{Data} \times \text{TF} - \text{Drift} \times t - \text{Blank}}{V1 \times \text{Dens}} \times k$ Unit: %(k=0.1), mg/kg, ppm(k=1000), mg/g(k=1)
5	Concentration when the volume of gas sample is measured	$\frac{(\text{Data} \times \text{TF} - \text{Drift} \times t - \text{Blank}) \times 22.4}{V2 \times 18} \times \left(1 + \frac{\text{Temp.}}{273} \right) \times k$ Unit: %(k=0.1), mg/kg, ppm(k=1000), mg/g(k=1)
6	Concentration of a weighed part of water in solid dissolved with solvent extraction (Sample is not soluble)	$X = \frac{\text{Data} \times \text{TF} - \text{Drift} \times t - \text{Blank}}{W_{t1} - W_{t2}} \times \left(\frac{B}{W_{t0}} + \frac{X}{10^3} \right) - \frac{A \times B}{W_{t0}} \times 10^{-3}$ $\therefore X \times k$ Determine X from this equation Unit: %(k=0.1), mg/kg, ppm(k=1000), mg/g(k=1)
7	Factor measurement of KF reagent with pure water or standard	$\frac{C1 \times (W_{t1} - W_{t2})}{\text{Data}} \times 10 \times k$ Unit: mg/mL(k=1)
8	Factor determination for the Karl Fischer reagent with Water-Methanol Standard or factor determination for Water-Methanol Standard with the Karl Fischer reagent	$\frac{\text{Dose} \times \text{DF}}{\text{Data}} \times k$ Unit: mg/mL(k=1)

< Calculation of back titration >

The section of $\text{Data} \times \text{TF}$ in Eq. 1 to 6 is replaced with:

$$\text{Dose} \times \text{DF} - \text{Data} \times \text{TF}$$

< Calculation of titration after fixed dose of KF reagent >

The section of $\text{Data} \times \text{TF}$ in Eq. 1 to 6 is replaced with:

$$\text{Dose} \times \text{DF} + \text{Data} \times \text{TF}$$

4. Method

< Symbols used in calculation formulas >

Data (mL) : The amount of the reagent titrated in the titration flask.

Dose (mL) : The amount of the reagent dosed in the titration flask.

TF (mg/mL) : Factor of the reagent titrated

DF (mg/mL) : Factor of the reagent dosed

Drift (mg/s) : Drift level which changes by ambient moisture and carrier gas permeating into the titration flask

t (s) : Titration time length from start to the end of titration after sample is discharged. When titration ends by preset time, it runs for [t(stir)] + [t(wait)] + [t(max)].

Blank (mg) : Blank level. This is the moisture coming in from other source than sample itself, and must be deducted from titrated water volume.

Wt1 (g) : The total weight of sample and sampler before sample is discharged. The sample actually discharged is $\cdot Wt1 \cdot Wt2 \cdot$.

Wt2 (g) : The total weight of sampler and sample residue after sample is discharged. The sample actually discharged is $\cdot Wt1 \cdot Wt2 \cdot$.

Wt0 (g) : The amount of sample discharged into extracting solvent, a part of which is taken out for measurement

B (g) : Weight of solvent extraction to dissolve a sample, a part of which is taken out for measurement by Indirect method

A (ppm) : Water concentration of solvent extraction before the sample is discharged into the solvent in Indirect method.

V1 (mL) : The amount of sample discharged by volume

Dens (g/mL) : Density of sample discharged by volume

V2 (L) : The volume of gas sample

Temp. (°C) : Temperature of gas sample when measured

k : Unit conversion coefficient

C1 (%) : Concentration (%) of standard

4-5. Report parameter

Report is set when printer is connected.

```

[Report]
Format < GLP >
Data List < On >
Graph < Form1 >
      [Exit]
-----
Format
  
```

[Format]

Selection of print format:

- Short : Prints sample number, measurement date, sample size, measurement results, titration time except measurement condition.
- GLP : Prints all of measurement parameters and results.
- Off : No printout.

[Data List]

Selection of printout of the data list.

- Off : No printout of data list.
- On : Printout of data list.

[Graph]

Selection of graphic print together with measurement results when they are printed out.

- Off : No printout of graph
- Form1 : The accumulated titrated water is printed in graphic form. The axis of accumulated amount is shown in percent, and the evaporation rate against 100% water at EP is shown on display or printed out.
- Form2 : Titration volume (electrolysis) per set time and accumulated amount are shown in graph on display or printed out.

4. Method

<Print contents>

Item	Print format		
	Off	Short	GLP
Model/Serial No.		On	
Printed date		On	
Method name		On	
Sample No.		On	
LOT No.		On	
Titration date		On	
Titration reagent factor		Off	
Calculation No.		Off	
Drift compensation		Off	
Moisture	Off	Off	On
Result		On	
Titration volume		Off	
Titration time		On	
End time		Off	
Initial potential		Off	
Initial resistance		Off	
Blank		Off	
Sample size		Off	
Operator		On	

< Example of printout: GLP >

Model
Serial number

Printed date

Method name

Sample number
LOT No.

Titration date

Titration Reagent Factor

Calculation number

Drift

Moisture

Result

Titration Volume

Titration time

End time

Initial potential

Initial resistance

Blank

Net weight

A comment appears when titration is reset
halfway or sample size is input after
titration.

Operator: when re-calculated, its person's
name appears hereModel

Model	: MKV-710
Serial No.	: 10100001
Print	: 2014/01/01 00:00
Recalculation	
Method No./Name	: 01/ METHOD-01
Sample No.	: 01-01 (#)
LOT No.	: ABCDEFGHIJ
Date	: 2014/01/01 00:01
Reagent Factor [mg/mL]	
Burette 1	: 1.0000
Burette 2	: 1.0000
Calc. No.	: 2
Drift	: 0.00ug/min
Moisture	: 1.0000 mg
Result	: 122.36 mg
Burette 1	: 1.0000mL
Titration time	: 00:01:00
End Time	: 30 s
Init. Pot.	: 100mV
Init. REs.	: 5k ohm
Blank	: 0.0000 mg
Wt1	: 5.0000 mg
Wt2	: 1.0000 mg
Net	: 5.0000 g

(Stop by reset)

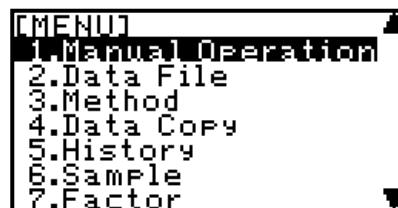
Operator : KEMTARO

5. Function Tools

5-1. Function

Menu window is a convenient tool to practice exciting features of the unit. To start with, let us learn about Menu window itself.

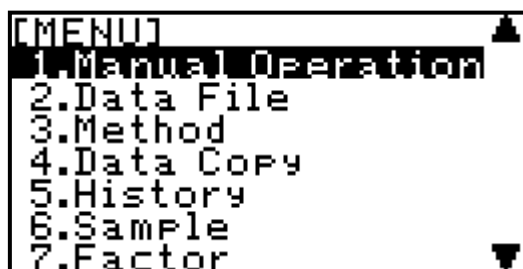
- 1) Press [MENU/HOME].
- 2) Select.

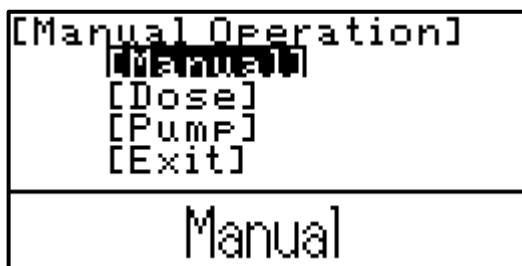


Menu has the following items.

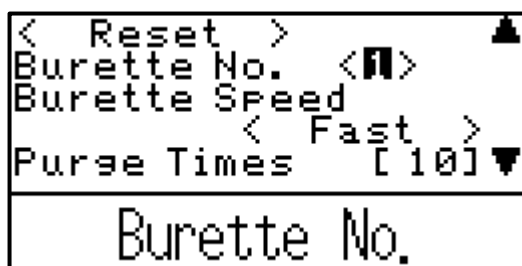
Item	Description
1. Manual Operation	Enables you to operate burette manually. This is to fill reagents, to purge burette or to manually dose fixed amount of reagents.
2. Data File	Shows and prints out titration results. Also conducts recalculation and statistic calculation.
3. Method	Edits methods to be used in titration.
4. Data Copy	Saves measurement results in a USB flash drive. Also transfers data to edit methods on PC.
5. History	Reviews check records or calibration records.
6. Sample	Sets up sample-related parameters.
7. Factor	Sets up about reagent Factor information.
8. Setup	Sets up system-related settings.

5-1-1. Manual Operation



**[Manual]**

Filling the burette with reagent and purging the burette can be operated manually.

**[Burette No.]**

Select the burette for use in titration:

- 1,2: The supplied one burette works.

[Burette Speed]

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.

[Purge Times]

Select a number of purge cycles.

- 1 - 99

[Purge Type]

You can select a purge type:

- 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.



The other burette can be operated when a burette No. is changed.

5. Function Tools

Explanation of Key

Key	Operation
[Purge]	Move the cursor to [Purge] and once press [ENTER], it purges for a number of preset times, and stops by filling the burette with reagent. When pressed [ENTER] again, it stops purging and sets in standby for discharge position.
[Up]	Move the cursor to [Up] and once press [ENTER], 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 [ENTER] again. The switching valve is turned to discharge direction during this event.
[Down]	Move the cursor to [Down] and once press [ENTER], move down to REPLACE position to aspirate the reagent from the bottle. When pressed again, the piston is RESET.
[Exit]	Move the cursor to [Exit] to return to main screen.

Explanation of State display

Display	Burette Condition
RESET	Piston is the lowest limit bottom position where the burette unit can be removed.
TOP	Piston is in upper limit top position.
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.
- - - -	The burette is not connected for use.



Be aware of discharge rate when pressing key. The reagent may be splashed out of the nozzle when reagent is dispensed into the nozzle with [UP] [Purge] key.



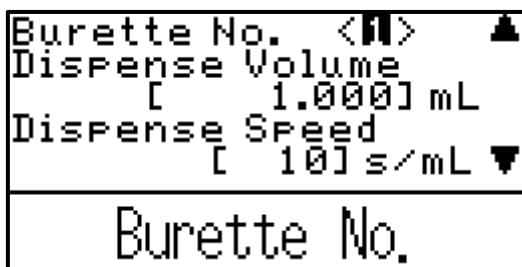
The burette can be reset with pressing [START/STOP] key on the burette manual screen when the reagent is splashed out of the nozzle.



State display is based on the burette No.

[Dose]

The reagent is dosed by the manual operation.

**[Burette No.]**

Select the burette to activate:

- 1.2 : The supplied one burette works.

[Dispense Volume]

Set dispensing volume from a burette. Since the dischargeable amount of reagent depends on the installed burette.

- 0.000~999.000mL

[Dispense Speed]

Set dispense speed. The higher a set value becomes, the slower dispense rate becomes.

- 1 - 999s/mL



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.

[Start]

Dosing starts and dispenses up to the preset "Dispense volume." Check the change of potential when dosing starts.

[Reset]

Stop dosing reagent and allow the burette to be reset.

[Exit]

Return to the main screen display.



The burette can be reset with pressing [START/STOP] key on the burette manual screen when the reagent is splashed out of the nozzle.

State display

Display the potential when dosing starts. The potential value can be printed by pressing [Print] and [ENTER].

5. Function Tools

[Pump]

When connecting with the auto dispensing system, you can turn on or off the injection pump and the drain pump. Refer to 3-6. Filling reagent and draining <When use the Auto Solvent Change Unit> for details.

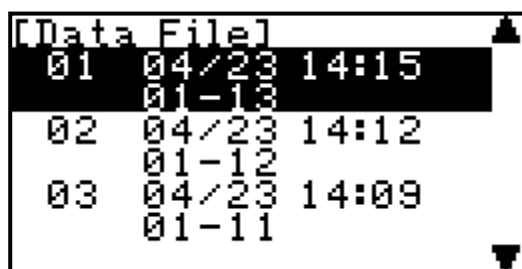
5-1-2. Data File

Press [MENU/HOME], select "2.Data File" with [↑][↓] and press [ENTER]

[Display of Titration result and Recalculation]

Move the cursor to a result you wish to display and press [ENTER] to display a result. The result of After Titr is displayed respectively. Select the result and press [ENTER]. The results can be re-calculated.

Move the cursor to [Print] and press [ENTER] to reprint and recalculate the result. The results of recalculation are printed out with sample number (Sample No.) headed with (#) mark.



[Data File]		
01	04/23	14:15
	01-13	
02	04/23	14:12
	01-12	
03	04/23	14:09
	01-11	



Note

Up to 100 samples measurement results can be stored. As for After Titr. result, 2 results are stored.

When it exceeds 100, note that data will be erased on the first-in first-out basis.

[Re-Calculation]

Move the cursor to [Re-Calculation] and press [ENTER] to recalculate. Sample size and unit of the result and print format can be changed.

- Lot : Change a LotNo.
- Blank : Change a blank value

Report

- Format : Change a print format of result
- Data List : Change a print format of data list
- Graph : Change a print format of titration curve

[Execute]

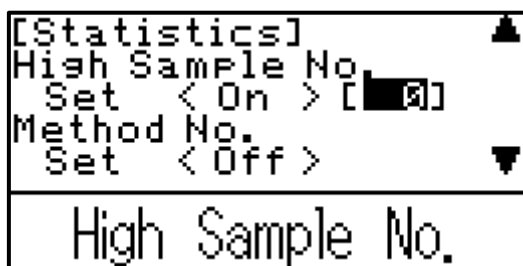
Execute to recalculate. A result screen is displayed.

[Exit]

Cancel to recalculate. A result screen is displayed without recalculation.

[Statistics]

Move the cursor to [Statistics] and press [ENTER].

**< Search conditions >**

You can narrow down the data by selecting the following conditions. Set to narrow down the condition as for being intended when condition is "On".

- High sample No. : The high order number for grouping the samples.
- Method No. : The number of Method particular to it.
- Titration Date : The date of measurement when it was performed.

[Execute]

The selected data under the conditions as above will appear as a list of results on display. And the result can be excluded from a statistic calculation by pressing [←] on a result display screen. "*" is displayed on the excluded result before displaying a result.

[Statistics]

Press [Statistics] on "Results list". The data on the list are going to be batch calculated. Move the cursor to [Print] and press [ENTER] to print out the result.

5. Function Tools

< 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):

$$\text{Mean value} \quad \bar{X} = \frac{(X_1 + X_2 + \dots + X_n)}{n}$$

$$\text{Standard deviation} \quad SD = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}}$$

$$\text{Relative SD} \quad RSD(\%) = \frac{SD}{\bar{X}} \times 100$$

[List Print]

You can choose from Yes or No to print the statistical data:

- Off : No printout
- On : Print the results list



Note

If the mean value is zero "0", RSD will appear on display and be printed out as "--" symbols not as zero "0".

In addition, when the number of digits of statistical calculation results is greater, all digits may not be displayed. Refer to "3-11. Batch processing of titration data" in the operation manual how to operate.

5-1-3.Method

Please refer to "the method" of Chapter 4.

5-1-4. Data Copy

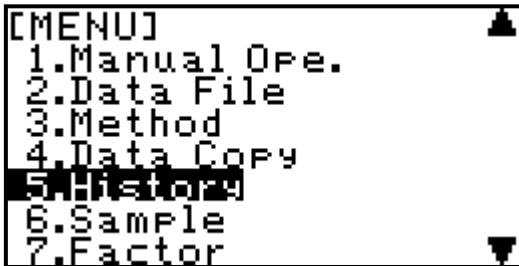
Please refer to "3-12. Read Data, Store in USB Flash Drive" and "3-13. Saving Method Conditions, Setting Up on PC".

5-1-5. History

Check history/record and calibration history/record can be reviewed.

Press [MENU/HOME], select "5.History" with [↑][↓] and press [ENTER]

Calibration results can be reviewed if you print out with [Print] key.



Item	Contents
1. Check	Shows history/record of a periodic check. The measurement result will appear that set up a Method for check measurement.
2. Reagent	The exchange history of an anolyte and a catholyte is displayed.



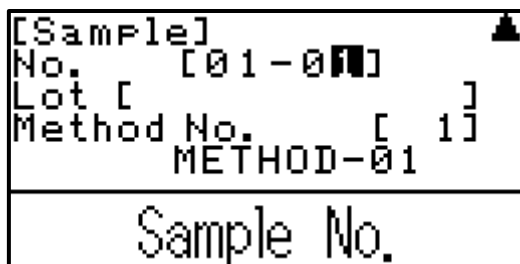
Note

Up to 10 data can be saved. When exceeding, data will be deleted from the oldest.

5-1-6. Sample

Sets up sample-related parameters.

Select [SAMPLE] on main screen. Or press [MENU/HOME], select "6.Sample" with [↑][↓] and press [ENTER].



[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

5. Function Tools

[Lot]

You can No. a Lot with characters up to 10 letters.

[Method No.]

Sets up the method No. you wish to use in measurement. Once set, the method name will appear in "Method Name."

- 01~20



[Blank]

Enter Blank value of sample.

- 0~99999.9999mg

[Wt1/Wt2]

Enter tare weight+sample weight in Wt1 and tare weight after injecting the sample in Wt2. If a balance is connected, you can follow its instructions. Absolute values are entered with a balance connected.

- 0~9999.9999g

<Sample setting after titration has started>

If you press [SAMPLE] key during titration, the following display will appear and you can enter sample setting. Enter items you wish to set up. Then move the cursor to [Exit] and press [ENTER] key.



Note

Sample No. and Method No. cannot be changed once measurement as started.

```

[MENU] ▲
1.Manual Operation
2.Data File
3.Method
4.Data Copy
5.History
6.Sample
7.Factor ▼

```

5-1-7. Factor

Here, reagent factor is set up.

The [MENU/HOME] key is pressed, 7.Factor is chosen by the [↑] and [↓] key, and it decides by the [ENTER] key.

Here you enter factor values. Enter factor values with [↑][↓][←][→] keys, and press [ENTER].

Such numbered factor values can be selected and used in concentration calculation on Method parameter for calculation parameter.

```

[Factor(mg/ml)]
1 [██████████████]
  [Exit]
  [Print]

```

5-2. Balance setting

Connecting a balance enables the sample size (weight) to automatically be input. A correct setting of the balance is required for automatic input.

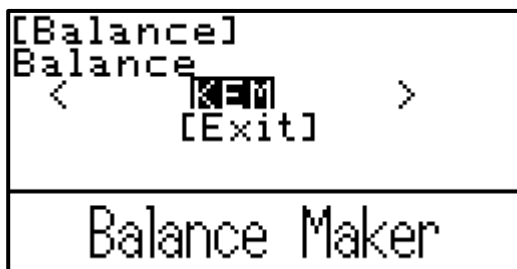


Note

Make sure to contact your local dealer to see if any particular connecting cable may be required.

Balance setting

Select "3. Balance" with [↑][↓] and press [ENTER].



[Balance maker (Balance)]

Select the maker's name of your balance. Select "NONE" if no balance is connected. For details data format, refer to the Table5-2.

- NONE
- KEM
- Mettler
- A&D
- Shimadzu
- Sartorius
- Mettler-Old



Note

Make sure to contact your local dealer to see if any particular connecting cable may be required.

Table 5-2. Balance setting

Balance	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

[Interface]

Select a COM port on which you wish to output the balance. Only one balance can be connected. Select where a printer or RS-232C is not connected.

- COM1 : Output of balance is set to COM1.
- COM2 : Output of balance is set to COM2.

[Mode]

Select the receive mode from the balance.

- Continuous : Select "Continuous" mode on the balance to enter the weight of the balance from the titrator.
- Print : Press "Print" key of the balance to enter the weight from the balance.

<Inputting sample size>

- 1) Select [Sample] on main screen. "Sample" screen will appear.



- 2) Move the cursor to "Wt1" and press [Enter].
- 3) Tare the balance and then place the sample. Once the balance becomes stable, press [Enter] to fix the sample size. (When "Continuous" is selected on output mode of the balance.)



After tarring the balance, place the sample and then press the "Print" key of the balance. The sample size will be entered in "Size" of the current sample setting. (When "Print" is selected on output mode of the balance.)

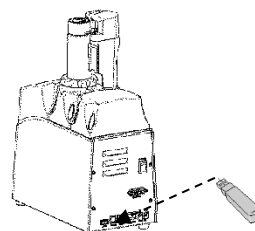
5-3. Connecting USB Devices

The MKV-710 can be connected with various USB devices such as printers, keyboards and foot switches.

Connecting USB devices

Connect the devices you wish to use to the USB port at the back of the MKV-710.

See below for details of USB devices which can be connected.



Connected device	Contents																
USB Flash Drive	Measurement results or methods can be transferred to a USB flash drive, which enables you to use the data on your PC.																
USB Keyboard (USB Numeric Keypad) USB Printer	<p>Parameters of methods can be entered with a keyboard. A 101-key PC keyboard can be used.</p> <p style="text-align: center;">Table of Keys</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Key on MKV-710</th> <th>Keyboard</th> </tr> </thead> <tbody> <tr> <td>START/STOP</td> <td>F5</td> </tr> <tr> <td>MENU/HOME</td> <td>Esc</td> </tr> <tr> <td>∧</td> <td>↑</td> </tr> <tr> <td>∨</td> <td>↓</td> </tr> <tr> <td><SAMPLE</td> <td>←</td> </tr> <tr> <td>STIRRER></td> <td>→</td> </tr> <tr> <td>ENTER</td> <td>Enter</td> </tr> </tbody> </table> <p>The Thermal Printer "DP-600" can be connected to print out parameters and measurement results.</p>	Key on MKV-710	Keyboard	START/STOP	F5	MENU/HOME	Esc	∧	↑	∨	↓	<SAMPLE	←	STIRRER>	→	ENTER	Enter
Key on MKV-710	Keyboard																
START/STOP	F5																
MENU/HOME	Esc																
∧	↑																
∨	↓																
<SAMPLE	←																
STIRRER>	→																
ENTER	Enter																
USB Barcode Scanner	A barcode scanner can be connected to import a sample ID. If you use a barcode scanner on main screen, a sample ID can be imported into the sample ID on current sample conditions.																
USB Foot Switch	Pressing the foot switch can start a measurement.																
USB Flash Drive	Measurement results or methods can be transferred to a USB flash drive, which enables you to use the data on your PC.																



Note

Make sure that the USB setup on MENU > 8. Setup > 1. Interface > 4. USB is "Host" when using USB devices.

Some USB devices may not be recognized. Do not use USB devices if performance of the MKV-710 is slowed down after connecting such devices.



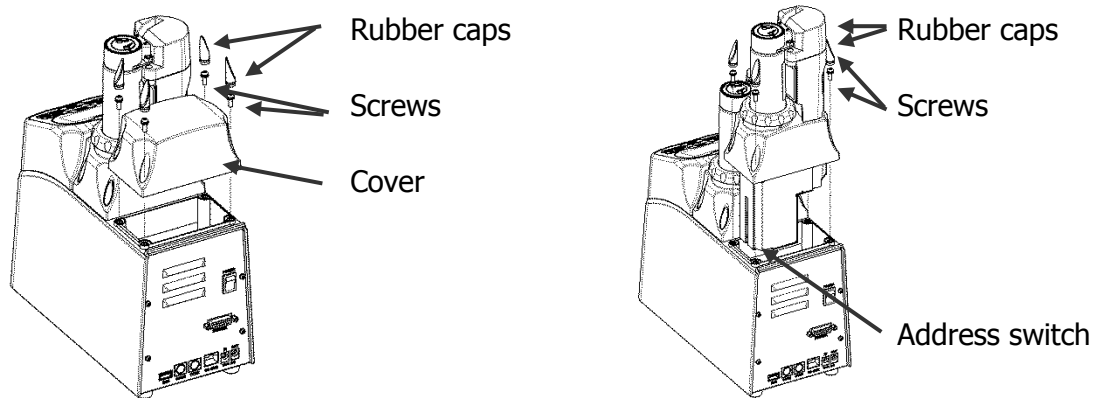
Several USB devices may be used at a time with a self-powered USB hub. Some USB hubs may not be recognized.

5-4. Adding a Built-in Burette


Up to two (2) burettes can be connected to the MKV-700.


When your MKV-710 has one (1) burette, one more burette can be added and controlled from the MKV-710. Follow the steps below. See "1-1. Supplied parts" of this Operation Manual for details of the supplied parts.

- 1) Remove the rubber caps and the screws as shown below.
- 2) Remove the cover, and install the additional burette. Make sure that the address switch of the burette is No. 2 at this time.
- 3) Once you have put the burette thoroughly, fix the cover with the screws and then put the rubber caps.



- 4) See "1-2-2. Installation of burette unit" of MKV-710 Operation Manual for how to assemble.
- 5) Turn on the equipment.

Caution!  **Be sure to turn off the unit before plugging in or out the cable.**

Note  Adjust the tube length of inserted side to the reagent bottle with cutter when using only MKV -700. Also adjust the cover length covered to the tube.

5-5. Connecting Android devices

Android devices can be connected to this instrument via USB port, and the weight can be input. A titration curve will be shown on the Android device during titration.

Android devices can be connected to the MKV-710 via USB port, and the weight can be input with a special app.

System requirements

- **Android Ver. 4.0 or later**
- **USB port required**

* Internet access is required at the time of software installation.

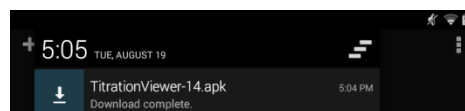
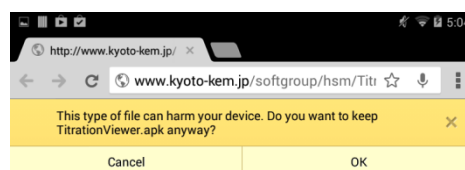
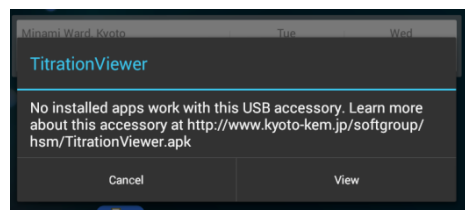


Caution!

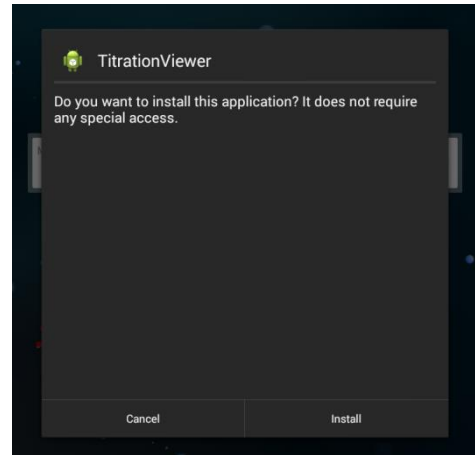
KEM warranty does not cover malfunction or breakdown of Android devices regardless of the cause. Operation check was performed per ADK Protocol Ver.1.0 stipulated in the Android specifications. Some Android devices, however, may not be connected.

5-5-1. Connecting to instrument

- 1) Connect an Android device and the MKV-710 with a USB cable.
- 2) Some messages will appear on the display, and press "View."
- 3) When you access the download URL on the browser, a confirmation message will appear on the top. Press "OK" to start download. Description and position of the message may differ on some browsers.
- 4) When download is completed, an installer for the app will appear on the notification bar. Click the installer.



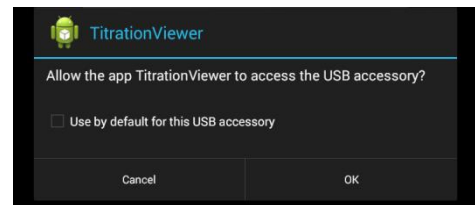
- 5) A confirmation message for install will appear, and press "Install" to start installation of the app.
- 6) Press "OK" when installation is completed.



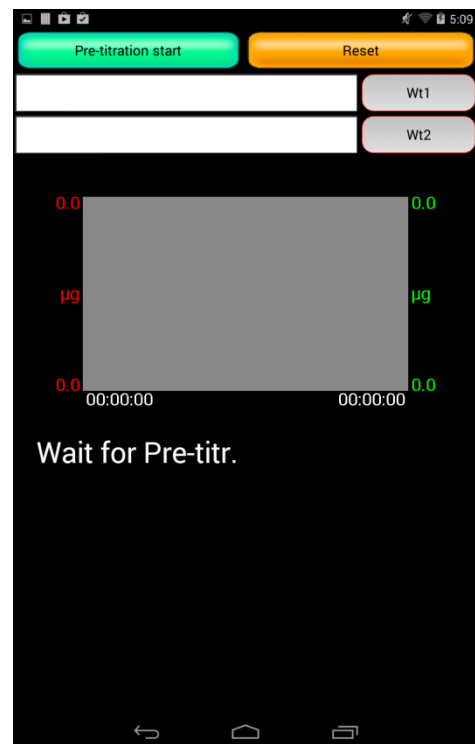
 This app will not appear in the app list of the menu even after installation. (It will appear in the app management.)

5-5-2.Starting app

- 1) Connect an Android device and the MKV-710 with a USB cable.
- 2) A confirmation message will appear when you start the TitrationViewer. Press "OK."
- 3) If you wish to start the TitrationViewer every time you connect the Android device to the MKV-710, check "Use by default for this USB accessory."
- 4) The TitrationViewer will start.



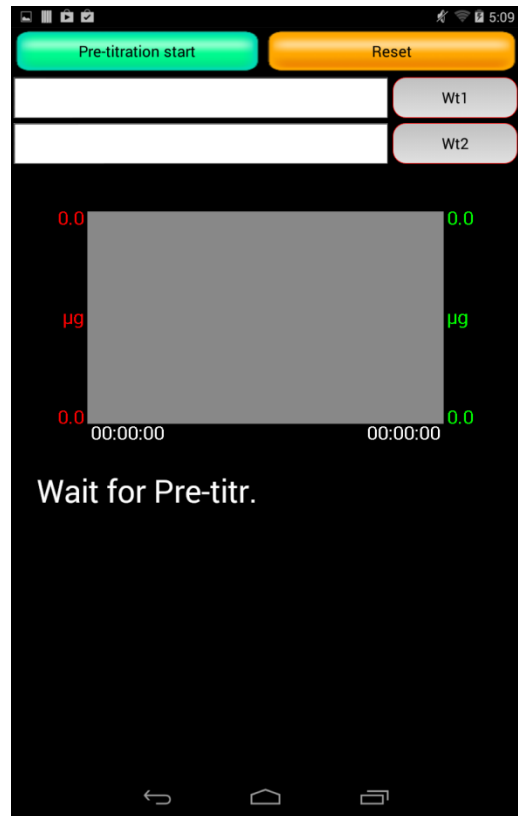
* This app cannot be started from the app list or start record (recently used apps). Always follow the steps above.



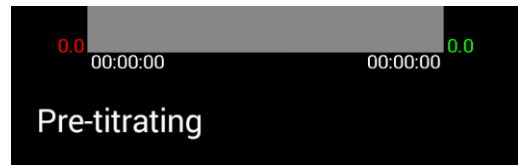
5. Function Tools

5-5-3.Starting Pre-titration

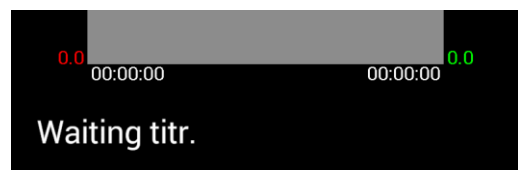
- 1) When the instrument is in pre-titration standby state, the upper green button changes to 'Pre-titration start'. Then, press [Pre-titration start] button.



- 2) When pre-titration starts, the display changes to 'Pre-titrating' during pre-titration.

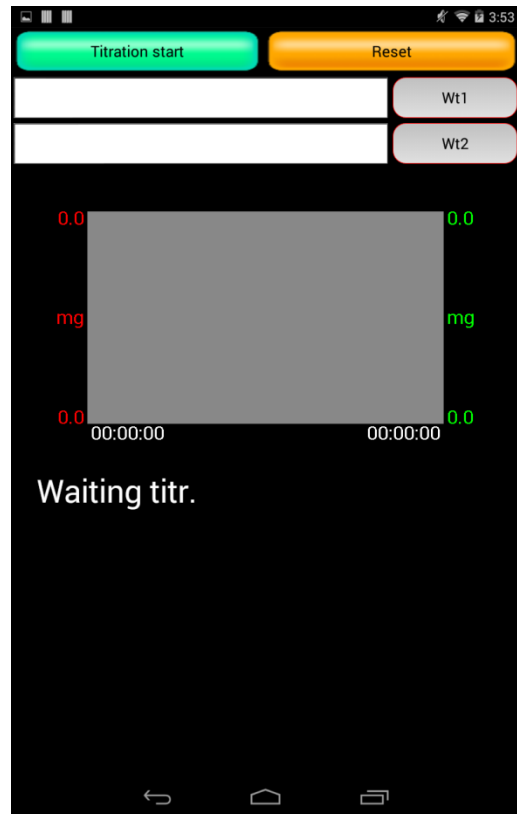


- 3) When pre-titration is terminated, the display changes to 'Waiting titr.' (or Drift titrating).



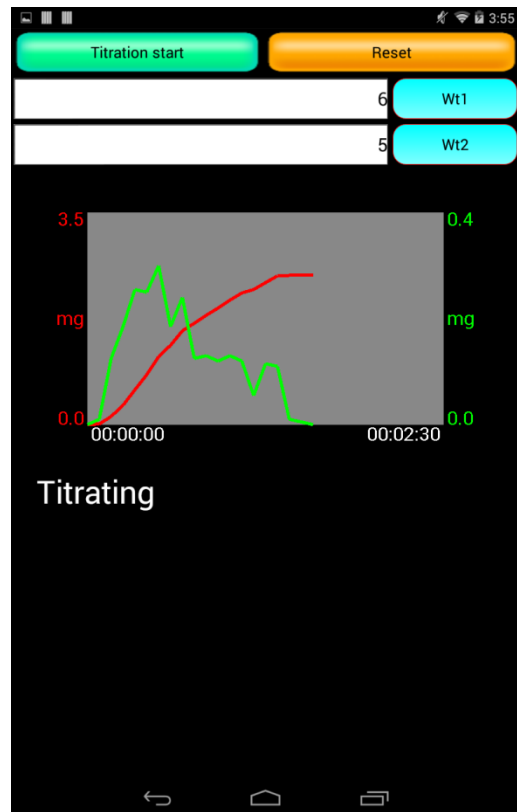
5-5-4.Starting measurement

- 1) When the instrument state becomes 'Waiting titration' or 'Drift titrating' mode, the upper green button changes to "Titration start". Then, press [Titration start] button.



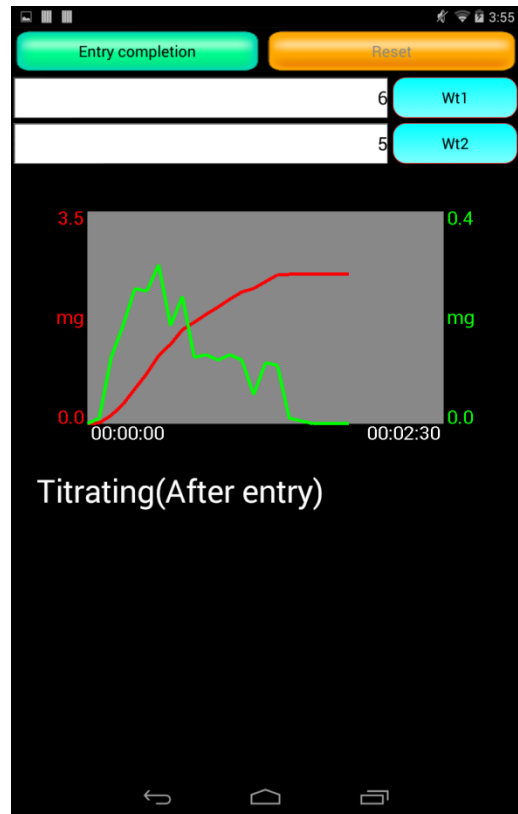
- 2) This operation depends on the instrument settings – in some cases, the instrument state becomes 'Wait reagent injection' mode. In this case, inject reagent and press [Titration start] button as required.

- 3) Titration starts.



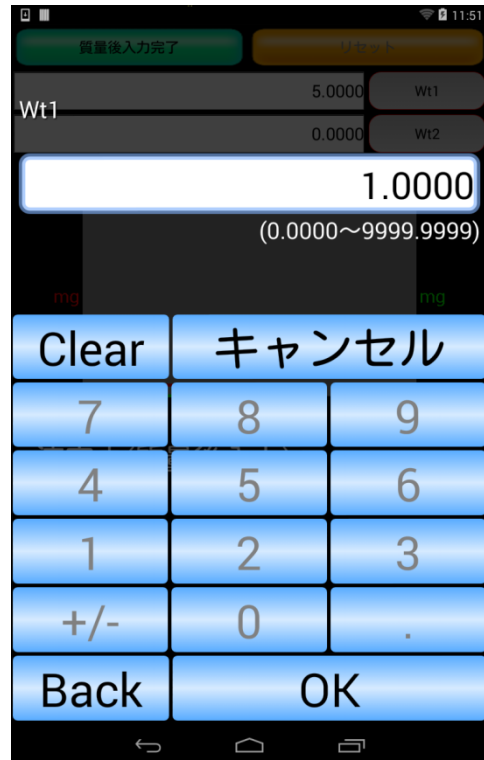
5. Function Tools

- 4) After titration is terminated, the instrument state becomes 'post entry completion standby' mode. And the upper green button changes to "Entry completion".



- 5) Enter weight and send it.
- 6) Press [Entry completion] button to complete 'after entry'.

- 7) Entering weight and pressing [Entry completion] button before sending the weight will show the right dialog box.



5. Function Tools

***When sending entered weight to complete after entry:**

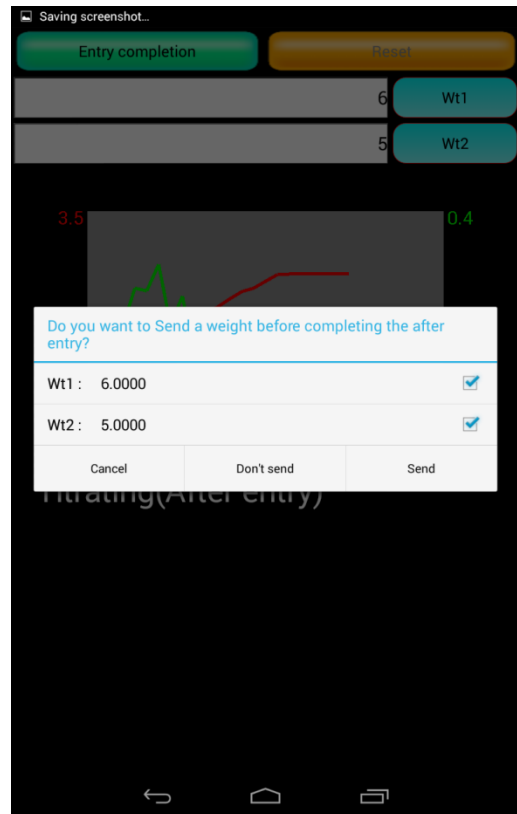
- Check sent weight box and press [Send] button.

***When completing after entry without sending entered weight:**

- Press [Don't send] button.

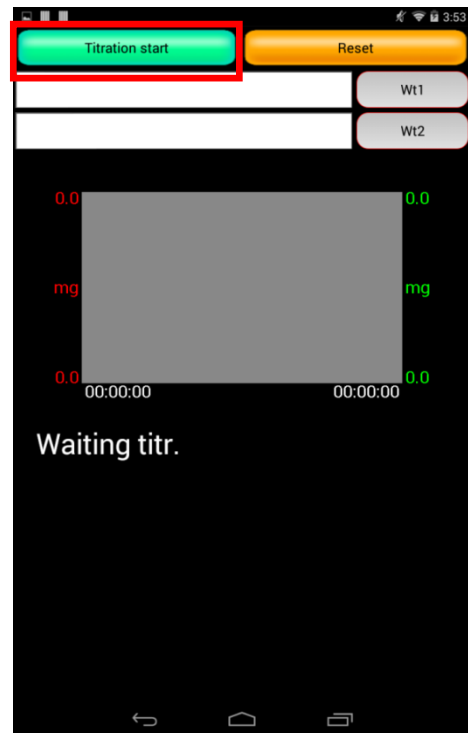
***When re-entering weight:**

- Press [Cancel] button.



5-5-5.Starting measurement

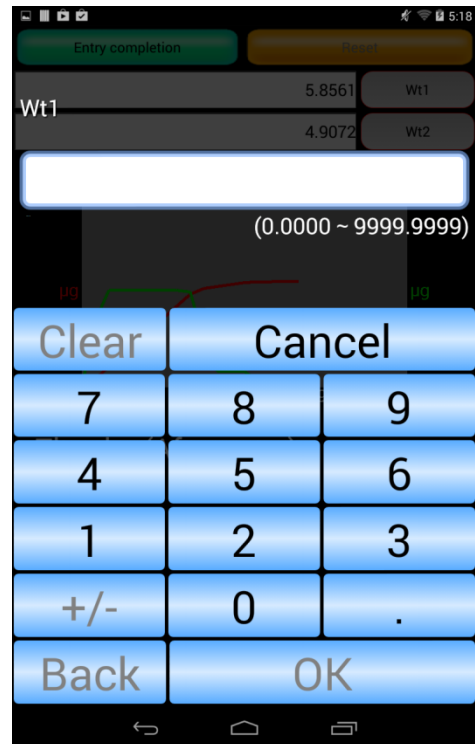
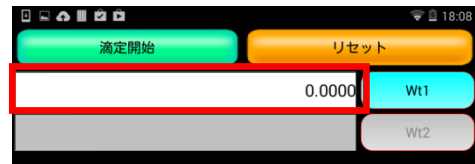
- 1) Press "Titration start."
- 2) Titration will start. During titration, a titration curve will appear on the display.
- 3) If you press "Titration start" or "Reset," or if titration starts, display of titration results will be cleared.



5. Function Tools

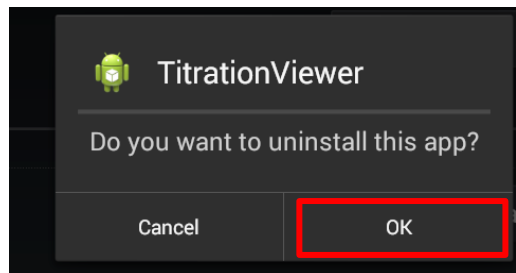
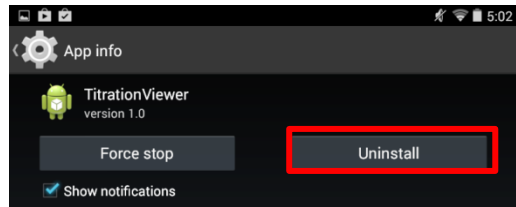
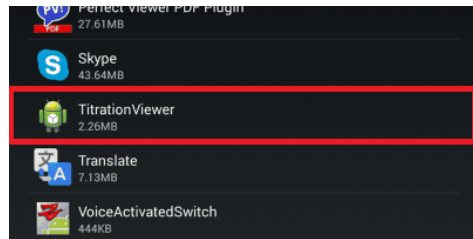
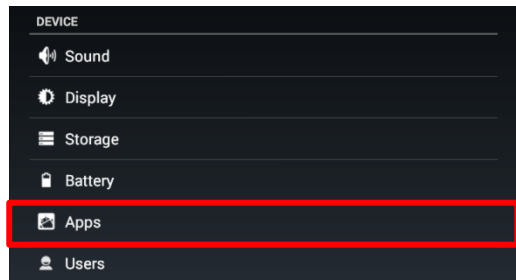
5-5-6.Entering weight

- 1) If you touch the edit box on the top of the display, soft keys will appear. Enter the weight.
- 2) If the weight remains unsend, transmission button will turn light blue.
- 3) Once you have entered the weight, press "Wt1" button to send the weight.
- 4) Once the weight has been sent, the transmission button will turn gray.



5-5-7.Uninstall Android apps

- 1) Apps or Application manager (this may differ depending on your device).
- 2) Touch the app you'd like to uninstall [TitrationViewer].
- 3) Select Uninstall. The messages will appear on the display, and press "OK."

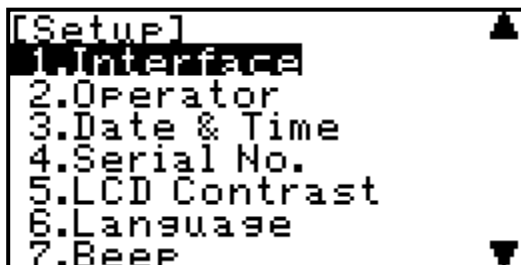


6. Setup

6. Setup

Sets up system-related settings.

Press [MENU/HOME], select "8.Setup" with [↑][↓] and press [ENTER].



Items and contents, please see below.

Items	Contents
1. Interface	Set up the use of printers, balance , Personal computers and / or USB.
2. Operator	Here the operator is defined for identification.
3. Date&Time	Date and clock time can be set.
4. Serial No.	The connected device, burette, the version number of the auto sampler and software version number can be checked.
5. LCD Contrast	The contrast for LCD can be adjusted.
6. Language	Languages can be set.
7. Beep	Beep tone for alarm can be selected on this display.
8. Parameter Clear	It is necessary to initialize preset parameters and setting in order to reset the system to default value. In this instrument, partial initialization (measurement date only, etc.) is possible.
9.Other	Automatically sets up blank, factor or display size of results.

6-1. Interface

Select "1.Interface" with [↑][↓] and press [ENTER].

6-1-1.RS-232C setting

Select "1.RS-232C" with [↑][↓] and press [ENTER].



[Interface]

Select a COM port on which you wish to output RS-232C. Only one RS-232C can be connected. Select where a printer or a balance is not connected.

- COM1 :RS output is set to COM1.
- COM2 :RS output is set to COM2.

[Baud Rate]

Select baud rate:

- 300 bps / 600 bps / 1200 bps / 2400 bps / 4800 bps / 9600 bps

[Parity]

Select parity:

- NONE/EVEN/ODD

[Stop Bits]

Select stop bits:

- 1bit / 2bits

[Data Bits]

Select data bits:

- 7bits / 8bits



Note

When you want to transfer the output data to a personal computer, you need to purchase our optional Data Acquisition Software (SOFT-CAP). 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.

6. Setup

6-1-2. 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 date>

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 date>

The personal computer can send commands including titration start and reset.



Note

For details, see the operation manual for Data Acquisition Software (SOFT-CAP).

6-1-3. Printer setting

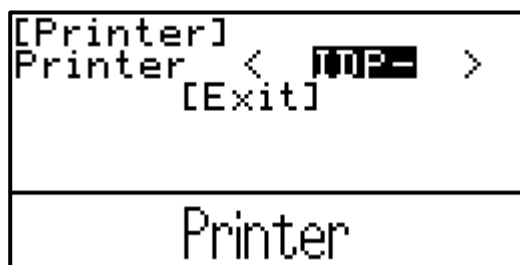
<IDP-100>

Connect the IDP-100 to COM1.

<DP-600>

Connect the DP-600 to the USB port.

Select "2. Printer" with [↑][↓] and press [ENTER].



[Printer]

Select a type of printer you are going to use: Select "NONE" if no printer is connected.

- NONE : No printer.
- OTHER : Other printer than the below.
- DP-USB : Select this when connecting our thermal printer (DP-600) to the USB port.
- IDP- : KEM's impact dot printer model IDP-100.

**Note**

Connect to COM1 when selecting 'IDP-' or 'OTHER'. Connecting to COM2 leads to failure in printing.

**Note**

For printer type and configurations, refer to the Table 6-2-3-1. 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.

[Baud Rate]

If you use other printer as defined on [Printer], you have to select baud rate for your printer:

- 300 bps / 600 bps / 1200 bps / 2400 bps / 4800 bps / 9600 bps

[Parity]

If you use "Other" printer as defined on [Printer], you have to select parity for your printer:

- NONE/EVEN/ODD

[Stop Bits]

If you use "Other" printer as defined on [Printer], you have to select stop bits for your printer:

- 1bit / 2bits

[Data Bits]

If you use "Other" printer as defined on "Printer", you have to select data bit for your printer:

- 7bits / 8bits

Table 6-2-3-1

Printer	Cables	Titrator setup		Printer settings
Citizen	Connecting	Printer	IDP-	Digital configurations for printer:
CBM-910	cable			Baud rate : 4800
CBM-910	12-02013			Parity : none
Type II	64-00625			Stop bits : 1
				Data bits : 8

6. Setup

How to print

Printing out measurement results

Set the report format on "Method" to "Short" or "GLP."

When measurement is done, results will automatically be printed out.

Printing out parameters

Move the cursor to [Print] on wherever [Print] is shown. Press [ENTER] to start printing.

```
[Interface]
1.RS-232C
2.Printer
3.Balance
4.USB
      [Exit]
      [Print]
```

6-1-4.Balance setting

For details on balance setting, refer to "5-2. Balance setting".

6-1-5.USB setting

Select "4. USB" with [↑][↓] and press [ENTER].

```
[USB]
Mode   < Host >
      [Exit]
```

```
Mode
```

[Mode]

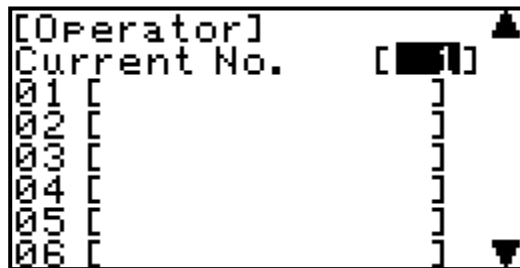
Select USB mode. Normally select "Host." Once setup is completed, restart the titrator.

- Host : Select this when connecting USB devices.
- MCU : Select this when connecting MCU and the KF-Win through USB.

6-2. Operator

Up to 10 operators can be registered with individual names. The registered name will be automatically printed out together with measurement results. (Characters: alphanumeric capital letters)

Select "2. Operator" with [↑][↓] and press [ENTER].



[Current No.]

Select the number of the operator you wish to put on the measurement data. Select with [←] [→] keys and press [ENTER].

To enter an operator: Move the cursor with [↑] [↓] keys to the number (01 to 10) you wish to enter. Press [ENTER]. Then enter a name with [↑] [↓] [←] [→] keys, and press [ENTER] again. Up to twenty (20) letters can be input.

6-3. Date & Time

Date and clock time can be set.

Select "3.Date & Time" with [↑] [↓] and press [ENTER].

```
[Date & Time]
2011/03/01 00:00
Date Style
< YYYY/MM/DD >
Date
[ 2011/03/01 ]
Time [ 00:00 ]
[Exit]
```

[Date Style]

Here you select and update the date of year, month and day. Select with [←][→] and press [ENTER].

- 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

[Date]

Input the present date (2001/1/1 - 2099/12/31). Input with [↑] [↓] [←] [→] keys, and press [ENTER].

[Time]

Input the present time (00:00 - 23:59). Input with [↑] [↓] [←] [→] keys, and press [ENTER].



Note

See "2-4. Setting date and time" of this Operation Manual for how to set.

6-4. Serial No.

Serial No. and the software version of the titrator are shown.

Select "4. Serial No." with [↑][↓] and press [ENTER].

```
[Serial No.]
MKC-710
Serial No.
 10100000
Version No.
 1.00
[Exit]
[Print]
```

[Serial No.]

When the multiple sample changer is connected, its serial No. and software version will also be shown.



Note

Make sure to advise your distributor of the serial No. and the software version should you require servicing.

[Running Time]

Multiplication of the operation time for measuring equipment is displayed.

6-5. LCD Contrast

The contrast for LCD can be adjusted.

Select "5. LCD Contrast" with [↑][↓] and press [ENTER].

```
[LCD Contrast]
Light          Dark
←             ■             →
               [Exit]
```

[LCD Contrast]

Adjust contrast of LCD with 14 steps by [←], [→] key and confirm by [ENTER] key.

6. Setup

6-6. Language

Select the language you wish to use.

Select "6. Language" with [↑][↓] and press [ENTER].

```
[Language]
Language
  < English >
  [Exit]
```

[Language]

Move the cursor with [←] [→] keys to the language you wish to use, and press [ENTER].

- English : Shows in English.
- Japanese : Shows in Japanese.
- Mandarin : Shows in Mandarin Chinese.
- Korean : Shows in Korean.
- Russian : Shows in Russian.
- Spanish : Shows in Spanish.

**Note**

See "2-3. Setting Language" of this Operation Manual for how to set.

6-7. Beep

Select the beep at the end of measurement.

Select "7. Beep" with [↑][↓] and press [ENTER].

```
[Beep]
Beep  < Set >
Type  < Type2 >
      [Exit]
```

[Beep]

Select the beep.

- Off : Turns off the beep. Turns off the beep during measurement as well.
- Set : Sets up the beep. Select from types below

[Type]

Select the beep from the five (5) types below.

Move the cursor with [←] [→] keys to the type you wish to use, and press [ENTER].

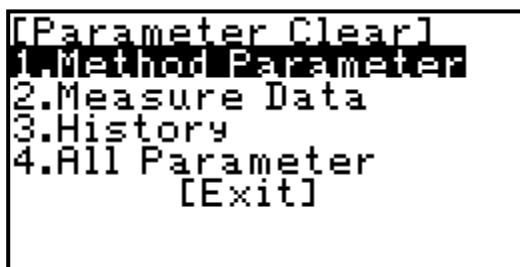
- Type1 : Beep sound lasts for about two seconds: "pi, pea-pea-pea-pea"
- Type 2 : Beep sound lasts for about four seconds: "pi-pi-pi-pi-pi-pi"
- Type 3 : Beep sound lasts for about ten seconds: "pi, pea-pea-pea-pea"
- Type 4 : Beep sound lasts for about one second: "pi-pi-pi-pi-pi-pi"
- Type 5 : Beep sound lasts for about one second: "pi, pea-pea-pea"
- ◦

6. Setup

6-8. Parameter Clear

It is necessary to initialize preset parameters and settings in order to reset the system to default value. In this instrument, partial initialization (measurement data only, etc.) is possible.


Select "8. Parameter Clear" with [↑][↓] and press [ENTER].



Select the item to initialize by [↑], [↓] key and confirm by [ENTER] key. See items that can be initialized in below.

Items	Contents
1. Method Parameter	Initialize Parameters (Titration, Control, Result) of each Method.
2. Measure Data	Erase all measurement results data stored in Data File.
3. History	Erase all the calibration records and the check records in History.
4. All Parameter	Initialize all of the above items once for all.

When initialization is chosen, the confirming message appears. Select Yes/No by [↑], [↓] key and confirm by [ENTER] key.

 **Note** 1. Method Parameter and 4. All Parameter are not available when method contents are locked. Follow the steps in 4-1 and unlock method first.

6-9. Other

Display/printout format and automatic setting of mean values can be set up.

Select "9.Other" with [↑][↓] and press [ENTER].



[Character Display (Font size)]

Select the font size of measurement results on screen. Select with [←] [→] keys, and press [ENTER].

- Normal : Results are shown in normal size.
- Large : Results are shown in twice the size of "Normal."

[Print Header]

Make setting of header printing. The header includes 'Model name', 'Serial No.' and 'Print date'. Select with [←] [→] keys, and press [ENTER].

- Off : No header is printed.
- On : Header is printed.

[Print Footer]

Make setting of footer printing. The footer includes a printing operator. Select with [←] [→] keys, and press [ENTER].

- Off : No footer is printed.
- On : Footer is printed.

[Auto Set., 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. Select "Auto Set. mean" with [←] [→] keys, and press [ENTER].

- Off : No setting. Each measurement result is put in the blank or factor.
- On : Auto set in the blank or factor. A mean value of up to five (5) results is obtained. The value for "Auto Set. mean" is cleared when the method No. is changed on sample setting or when the titrator is turned off.

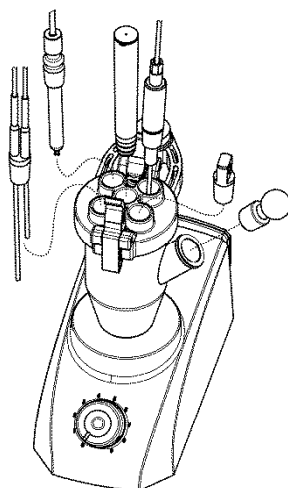
7. Maintenance

7-1. Daily Maintenance

In order to maintain the system in good conditions for a long period of time, it is important to observe the following instructions.

7-1-1.Karl Fischer grease


Twin platinum electrode, desiccant tube, port plug, and plug for titration flask are removed from a titration flask. Apply KF grease around glass contact areas. Check those parts once a week to ensure they rotate smoothly. If not, apply thin coating of grease. Do not apply too much grease as it may penetrate the titration flask and increase the background owing to the water content of the grease.



 **Check the glass joints from time to time so that applied grease will not solidifies.**
Caution!

If grease on the contact areas becomes hard and the respective parts are difficult to separate, taken the following steps;

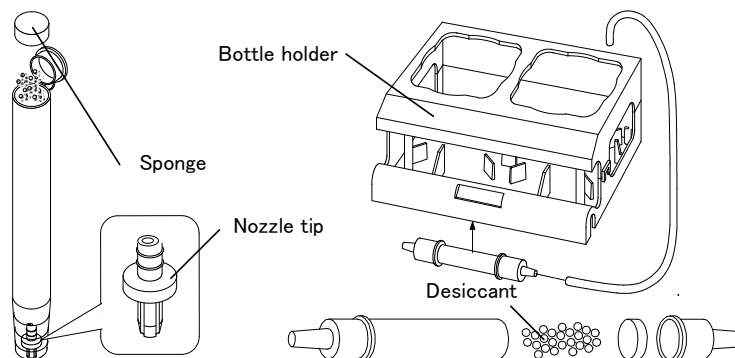
- 1) Drain the solution in titration flask.
- 2) Heat the contact areas with a hair dryer to melt the grease.

 **Care should be taken not to get burned when heating the unit. Do not tap or try to remove solidified area by force.**
WARNING! Titration flask or electrode may break and cause injury.

7-1-2.Changing the desiccant

The desiccant tube is removed from a titration cell like the clause of an application of KF grease.And the desiccant tube is removed from a bottle holder.

Replace the desiccant with new one when its moisture absorption turns down to reddish color.Be sure to apply KF grease around sliding area between the titration cell and desiccant tube .



< Desiccant tube >



Note

If the nozzle chip slips from the desiccant tube when replacing the desiccant, ensure that you return the nozzle chip in the tube with its trenches downward as shown above.

7-1-3.Check the instrument

Make sure the instrument is not dirty nor stained by visual check. If any dirt is found, wipe it off with clean gauze. Do not use solvent but use water only.

7-1-4.Check the cable

Make sure by visual check all the cables including power cord, various cables and electrode lead to see if any dent or bent is found. Replace the cable if it is dent or bent.

7-1-5.Check the connectors

Make sure the connectors are not dusty or rusted. If dusty clean it by a vacuum cleaner. If rusted, repair is necessary.

7-1-6.Check any leaking

Make sure there is no leaking from the nozzle, tube lines, switching valve or unions. If any leaking is found, tighten the unions. If it does not improve, replace with new one.

7. Maintenance

7-1-7. Check burette performance

Press [MENU/HOME] on main screen. Select "1. Manual Operation" and press [ENTER]. Select "UP" and press [ENTER] to check to see if the piston burette operates properly. Do the same thing with "DOWN" and "Purge" as well. If it does not work properly, correct it by referring to "8. Troubleshooting."

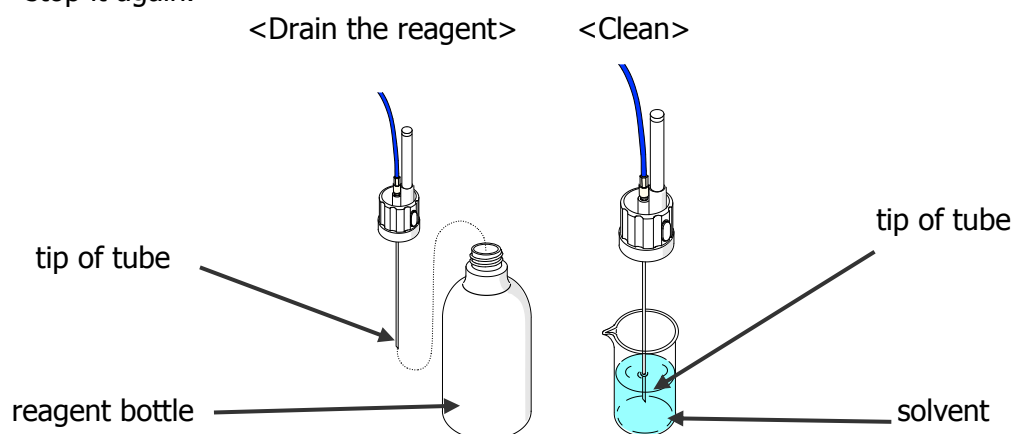
7-1-8. Check the nozzle

Check the nozzle to see any damage or clogging. If it is broken, replace it with new one. If it is clogged, remove the clogging article by a thin wire or with hot water.

7-1-9. How to clean the burette and how to replace the reagent

<Drain the reagent>

- 1) Remove the tip of the tube inserted in the reagent bottle (hereinafter: the tip of the tube).
- 2) Ensure the titration nozzle is in a beaker.
- 3) Press [MENU/HOME]. Select "1. Manual Operation" and press [ENTER]. Select [Manual] and press [ENTER].
- 4) Set "Burette No." to the number of the burette you wish to clean. Set "Purge Type" to "to Nozzle."
- 5) Move the cursor to [Purge] and press [ENTER] to drain the reagent in the burette cylinder to a beaker. After the reagent comes out of the tube, press [ENTER] to stop it again.



<Clean>

- 6) Prepare the solvent (pure water or ethanol) in a beaker. Insert the tip of the tube into a beaker to prevent it from splashing reagent.
- 7) Move the cursor to [Purge] and press [ENTER] to fill the solvent in the burette cylinder and drain it to a beaker from titration nozzle. Repeat this operation several times to replace inside of the burette to the solvent.
- 8) Remove the tip of the tube from the solvent, move the cursor to [Purge] and press [ENTER] to drain the solvent. After the solvent comes out of the tube, press [ENTER] to again.

<Fill the solvent>

- 9) Prepare the reagent to fill and insert the tip of the tube into the reagent bottle.
- 10) Move the cursor to [Purge] and press [ENTER] to suck the reagent, and press [ENTER] again after filling the reagent.
- 11) Remove the tip of the tube from the reagent bottle. Move the cursor to [Purge] and press [ENTER] to come out the reagent. After the reagent comes out of the tube, press [ENTER] again.
- 12) Set the reagent to fill again, and move the cursor to [Purge] and press [ENTER] to suck the reagent, and press [ENTER] again after filling the reagent.

**NOTE**

When next setting reagent that gives an influence to solvent, follow "7-2-4. Replacing Piston Burette Unit" to remove piston burette and clean/dry cylinder, tube, piston head and head holder after procedure 8).

7. Maintenance

7-2. Other Maintenance

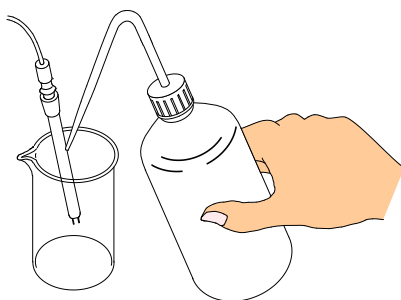
7-2-1. Storage of the instrument

Store the instrument, if it is not going to be operated for a long period of time in a place where there is no direct sunlight or under no vibration, and the place is dry, not humid. It is recommended to pack it in the carton box in which the instrument was first delivered.

Keep the rinsed electrodes detached from the titrator.

7-2-2. Cleaning the electrode

If the electrode is heavily stained and the potential is unstable and measurement reading fluctuates, cleanse it with nitric acid, and after cleaning by methanol, wipe off with clean gauze.



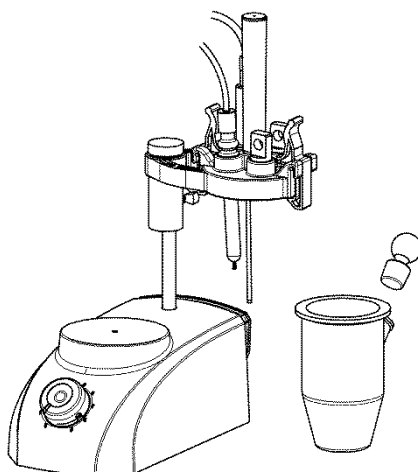
7-2-3. Cleaning the titration flask

Here you drain out the liquid in the titration flask.

Turn the flask to the right 90° clockwise, and release the lever on titration vessel stopper to remove the flask.

Remove the port plug, and cleanse the flask with commercially sold neutral detergent.

Dry the flask in a heater dryer or the like, and leave it in a desiccator to cool it down.



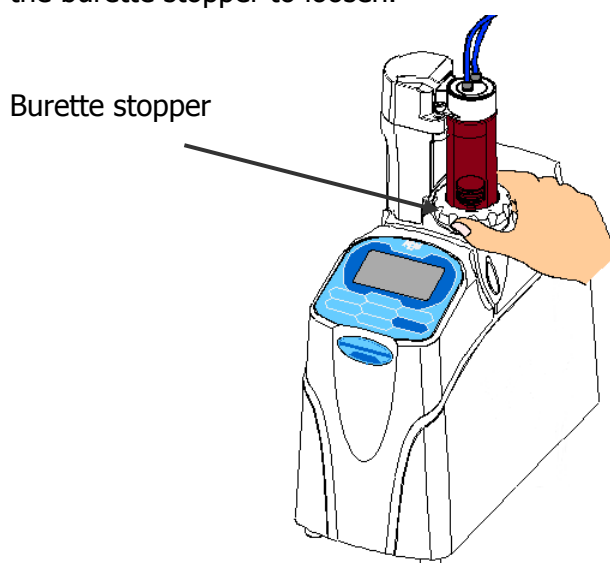
7-2-4.Replacing burette unit

When drying completely in the cylinder or replacing the cylinder, disassemble the burette unit.

Remove each part according to the following procedure.

<How to remove the burette unit>

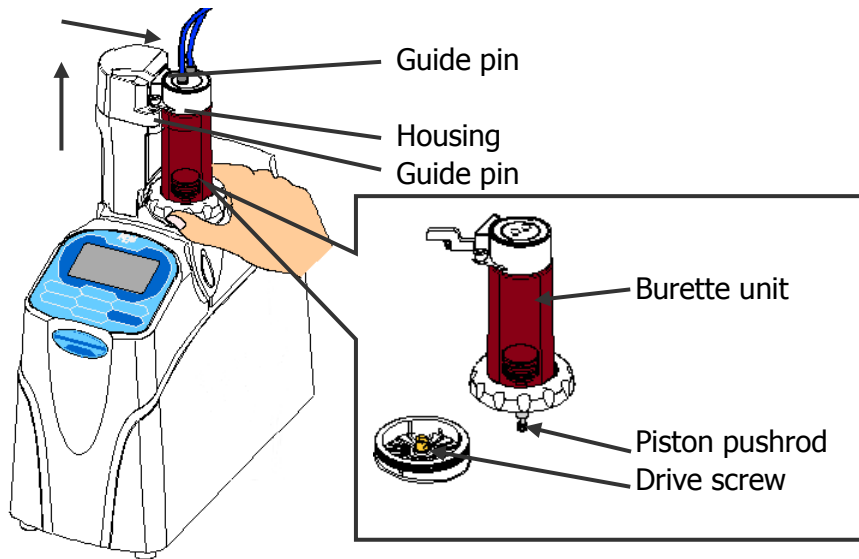
- 1) Turn on the equipment.
- 2) Go from "MENU" to "1. Manual Operation" → [Manual]. Then move the cursor to "Down" and press [ENTER]. Make sure that "Reset" appears on "State" screen.
- 3) Turn the burette stopper to loosen.



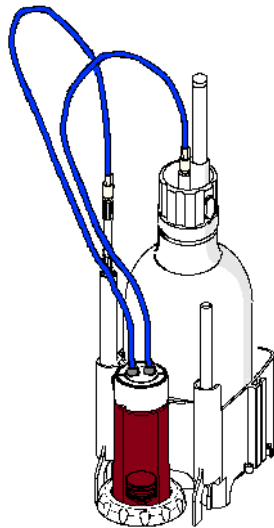
Caution  Do not manually uplift the burette when the burette stopper is not fixed. Doing so may break the burette.

- 4) Uplift the burette and once the burette is removed from the two guide pins, slide the burette to the right to take it away.

7. Maintenance

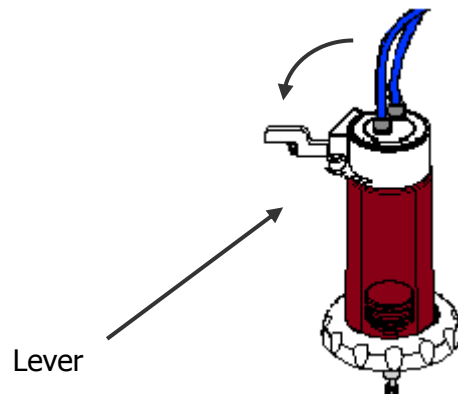


5) As shown below, hitch the removed bureette to the bottle stand to store.

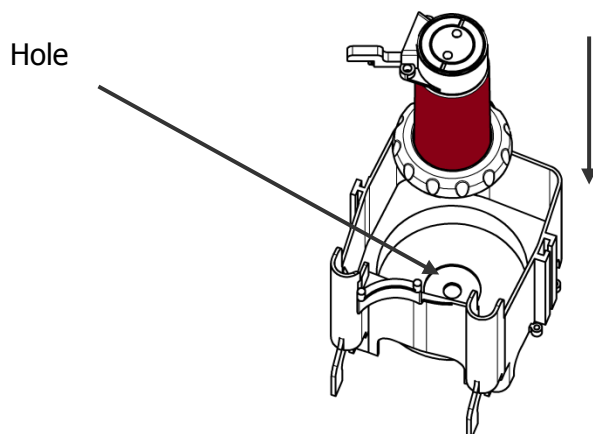


<How to install the burette unit>

1) As shown, turn the lever counterclockwise.



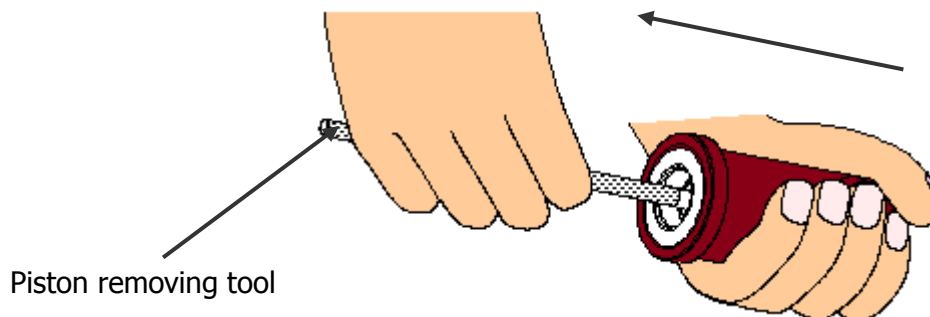
- 2) Adjust the height of the Piston pushrod of the burette.
 <When the burette is viewed from right beside and the scribe line of the Piston pushrod can be seen>
 Place the burette on the center hole of the bottle stand and push down, and push the Piston removing tool into the glass cylinder.



Caution

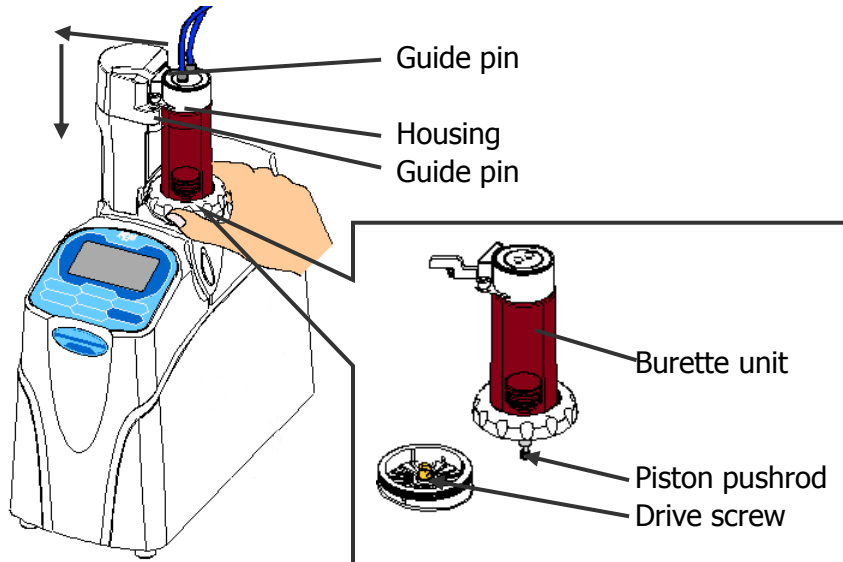
Wear a protective pair of glass in order to avoid splashing reagent in case the tube union is loosened or disconnected. When the piston pushrod of the burette is pushed in, reagent will move to the tubing on the reagent bottle side. Put a reagent bottle to the tip of the tubing on the reagent bottle side. Reagent may spatter and splash in your eyes.

- <When the burette is viewed from right beside and the scribe line of the Piston pushrod cannot be seen>
 Put the piston removing tool to the Piston pushrod and pull out the Piston pushrod until scribe line of the Piston pushrod can be seen. Then place the burette on the center hole of the bottle stand and push down, and push the Piston pushrod into the glass cylinder.

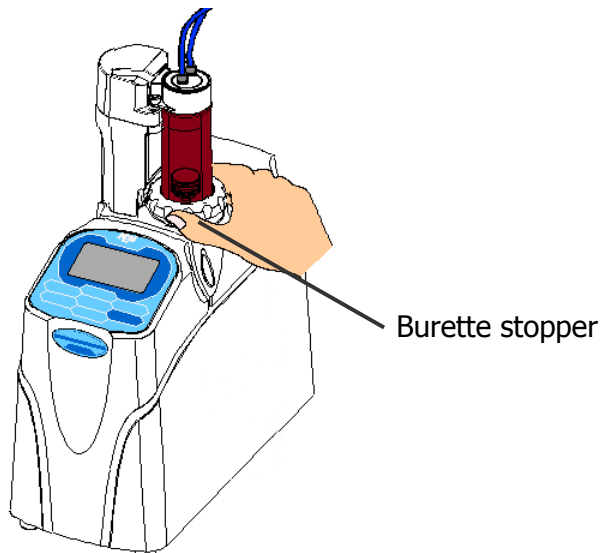


7. Maintenance

- 3) As shown below, slide the burette unit from the right, and hitch the piston pushrod to the drive screw. If you put the housing on the guide pin and slide it, you will find it easier to adjust the height.
- 4) To place the burette unit, insert the hole of the housing of the burette unit into the two guide pins.



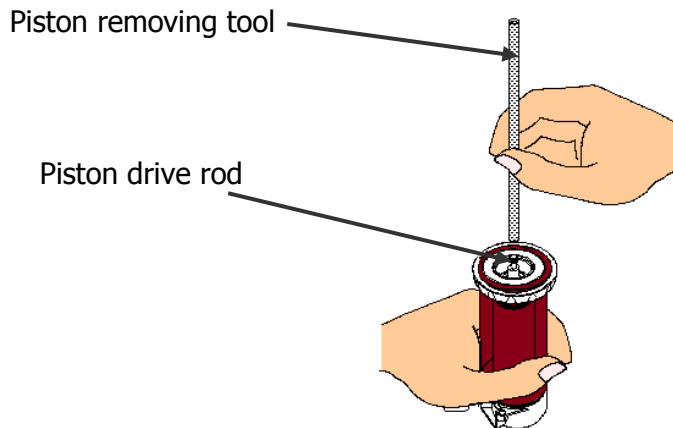
- 5) To fix the burette unit, hold down the top of the burette unit and tighten the burette stopper.



Caution  Do not manually uplift the burette when the burette stopper is not fixed. Doing so may break the burette.

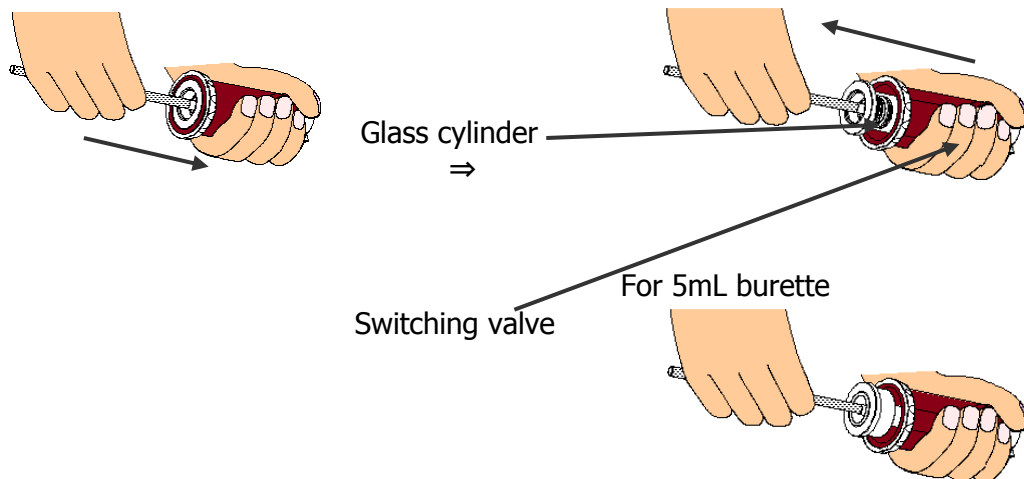
<How to remove the glass cylinder>

- 1) Turn the burette upside down with the tubing attached, and screw the piston removing tool into the piston drive rod.

**Note**

Do not tighten piston removing tool too much otherwise it cannot be loosed.

- 2) Push the piston head into the cylinder to remove the remaining reagent from the burette.
- 3) Pull out the glass cylinder and the piston head together from the switching valve.

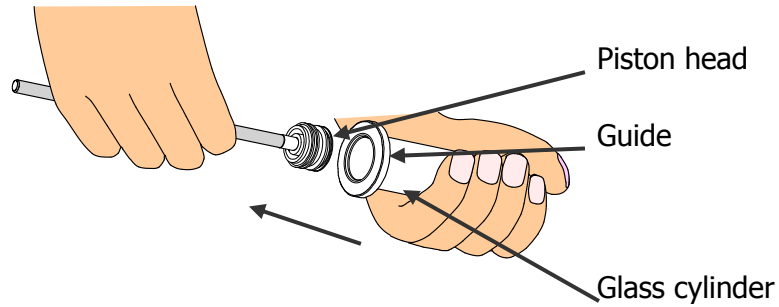
**Caution**

Wear a protective pair of glass (and appropriate protector) in order to avoid splashing reagent in case the tube union is loosened or disconnected.

7. Maintenance

<How to remove the piston head>

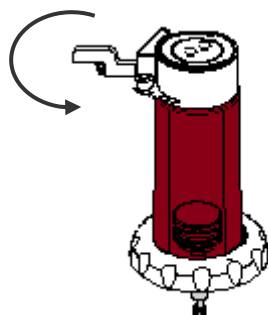
- 1) Pull out the piston head from the glass cylinder.
- 2) Remove the piston removing tool from the piston head.
- 3) Remove the guide.




**When piston head and glass cylinder are washed, care should be taken not to cause wound or dent at their surface, otherwise it might cause a leak.
Do not hold the glass cylinder too tight. Doing so may break the glass.**

<How to remove the switching valve>

You will need to remove the switching valve when the piston head alone is pulled out while removing the glass cylinder. Turn the lever counterclockwise. Hold the lower part to prevent the glass cylinder from falling down, and then take away the switching valve and the stopper from the burette cover.

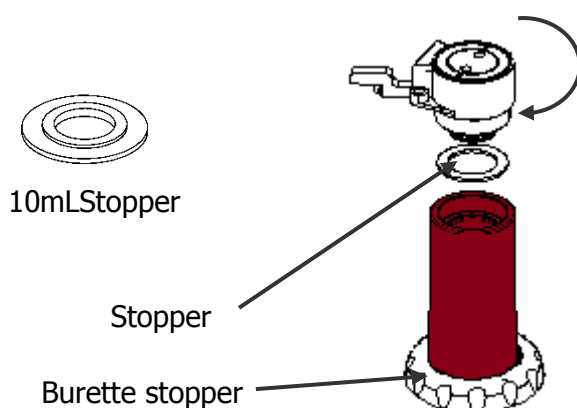


Caution  Be reminded that the glass cylinder goes out from the opposite side of the switching valve once the switching valve is removed from the burette cover.

Caution  Wear a protective pair of glass in order to avoid splashing reagent in case the tube union is loosened or disconnected.

<How to replace the switching valve>

- 1) Attach the burette stopper to the burette cover.
- 2) Attach the stopper to the switching valve. Attach the stopper for 5mL and 10mL as shown in the figure.
- 3) Screw the switch cock of 2) into the burette cover clockwise.



7. Maintenance

<How to remove the piston head>

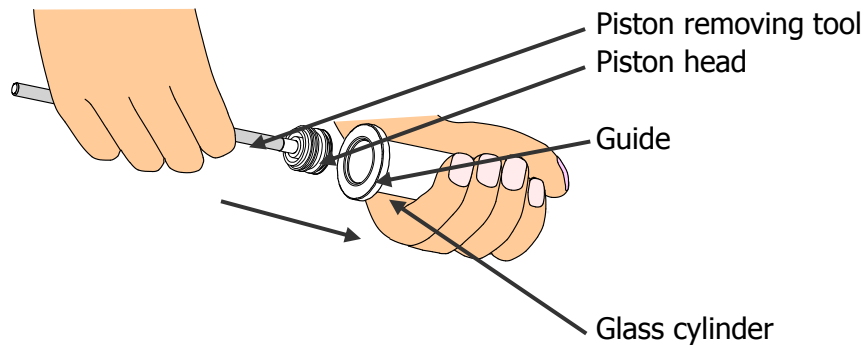
- 1) Install the guide to the groove side of glass cylinder.
- 2) Screw the piston removing tool into the piston drive rod



Note

Do not tighten piston removing tool too much otherwise it cannot be loosed.

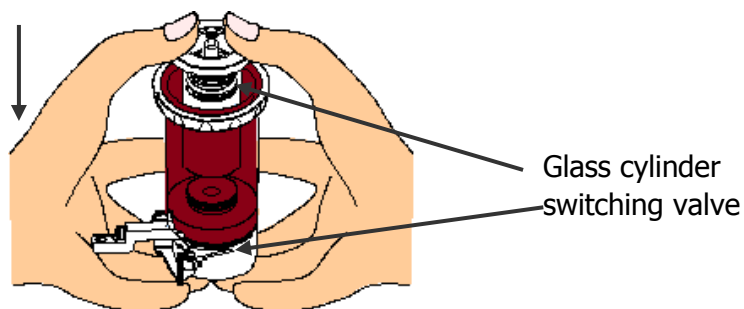
- 3) Push the piston head to the glass cylinder with opposite operation of removing.



**Take utmost care not to damage the piston head, and insert the head by keeping the piston screw in parallel with the burette wall.
Do not hold the glass cylinder too tight. Doing so may break the glass.**

<How to install the switching valve>

- 1) Remove the extraction rod from the glass cylinder installed the piston head.
- 2) Push the glass cylinder and the piston head to the head holder together.

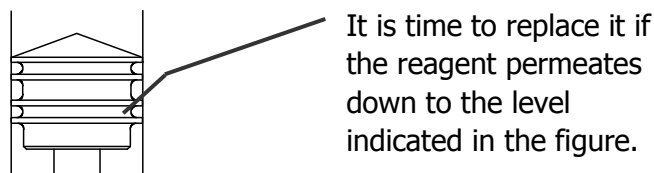


< Fitting the burette unit>

Refer to "3-2. Replacing burette unit" to attach the burette unit.

7-2-5. Replacement of piston head

The piston head is subject to wear due to abrasion during the course of an extended period of use, thus causing eventual leak. If it leaks, replace it with a new head (both the cylinder and the piston head). It is time to replace it if the reagent permeates down to the level indicated in the figure below after a few cycles of movement with the burette cleaned up, dried and refilled with reagent.



Operate to remove the glass cylinder up to 「7-2-4. How to remove and assemble the burette unit」 <How to remove the glass cylinder>.

Replace the guide to the new glass cylinder, and assemble according to since 「7-2-4. How to remove and assemble the burette unit」 <How to remove the glass cylinder>.

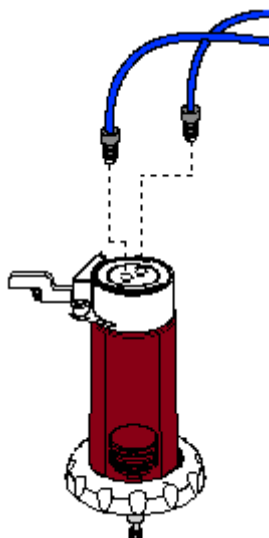
7-2-6. Change switching valve

Replace the switching valve if it leaks due to crystallization or after use for an extended period of time.

Replace the guide to the new glass cylinder, and assemble according to since 「6-2-3. How to remove and assemble the burette unit」 <How to remove the glass cylinder>.

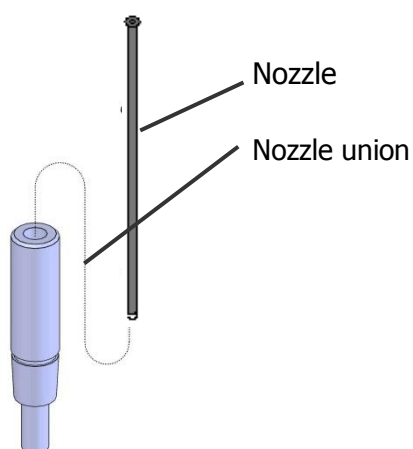
- 1) Operate to remove the Burette unit up to 「6-2-3. How to remove and assemble the burette unit」 <How to remove the burette unit>.
- 2) Remove the tube.
- 3) Operate to remove the switching valve up to 「6-2-3. How to remove and assemble the burette unit」 <How to remove the switching valve>.
- 4) Refer to <How to install the switching valve> of "How to remove and assemble the burette unit" to attach the switching valve.
- 5) Reconnect the tube lines.

7. Maintenance



7-2-7. Replace titration nozzle

- 1) Pull out nozzle from the nozzle union.
- 2) Squeeze a new nozzle into the nozzle union.
- 3) Attach the nozzle union again.




Caution

**Wear safety glasses and protective gloves during operation.
There is a danger that reagents can contact your hands or the like.
In addition, reagents can fly into your eyes.**

7-2-8. Replace tube

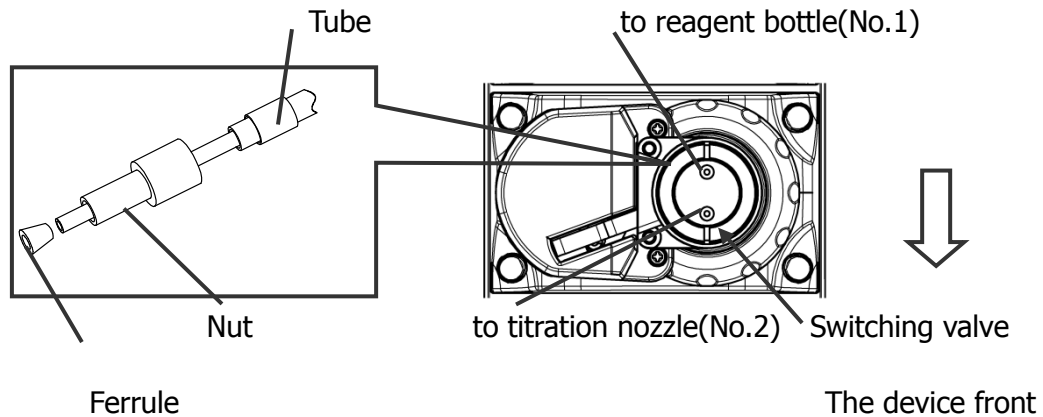
Replace the tube if it is bent or leaks in the connection portion.

 Caution	<p>When replacing the tube, connect it facing union surface vertically straight. Keep dust or dirt away from the union surface.</p> <p>Failure may cause a leakage.</p>
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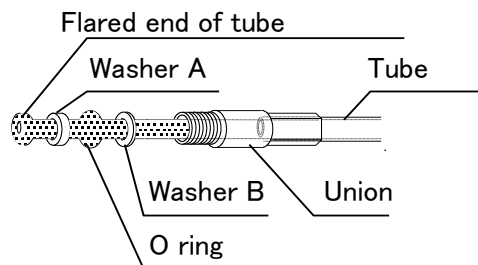
The assembly of tube end is as shown below.

<The assembly of switching valve>

<The plan view in the device>



<The assembly of titration nozzle>



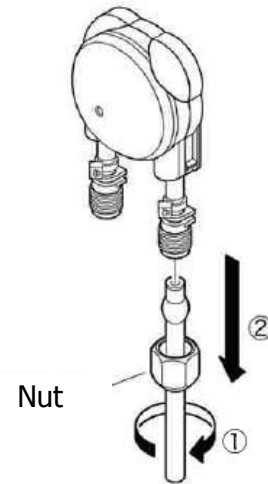
7. Maintenance

7-2-9.Replacement of pump tube

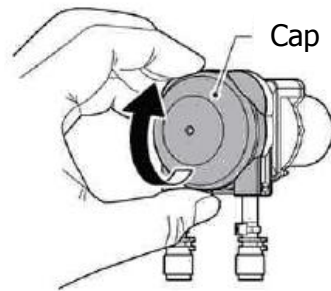
Initial pump flow rate is about 20mL/10 sec at the fastest, which may be reduced when the tube is used for a long time. This may result in leakage of samples at the time of measurement.

Follow the instructions below.

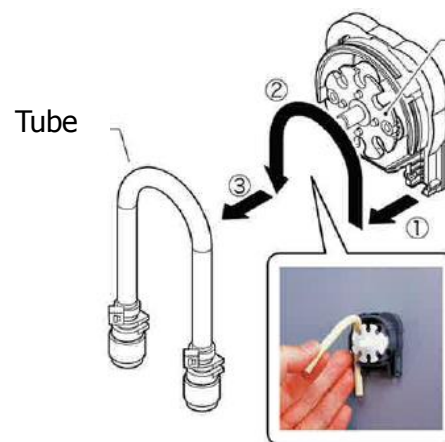
- 1) Remove the tubes connected to cassette.



- 2) Remove the pump tube cap, as shown on the right.

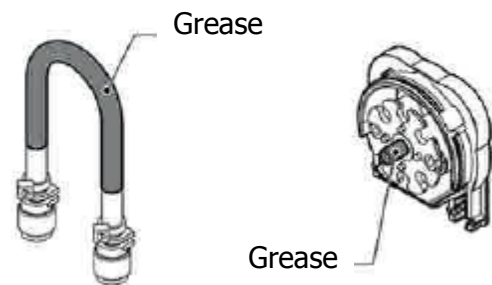


- 3) Remove the pump tube, as shown on the right.

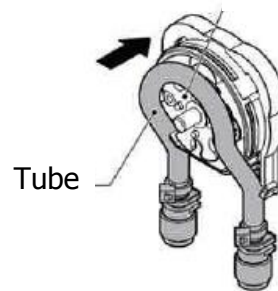


7. Maintenance

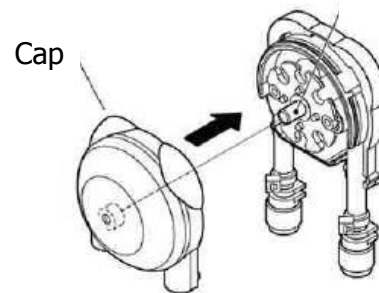
- 4) Apply the supplied grease around the new tube and axle of cassette.



- 5) Fit the new pump tube onto the rotor. To fit, draw the rotor toward you as shown in figure.



- 6) Fix the cap and connect the tubes.



In addition, when using chloroform-containing reagents or oil-based samples, you can use the 64-01473 pump tube (option). And you can use the 12-03961-01 extraordinary chemical resistance pump tube (option).

7-2-10.Replacement of the filter

Place the filter for injection pump as a dustproof to the back of auto dispensing part. Since the filter might be dirty when the flow of injection pump becomes lower, change the filter.



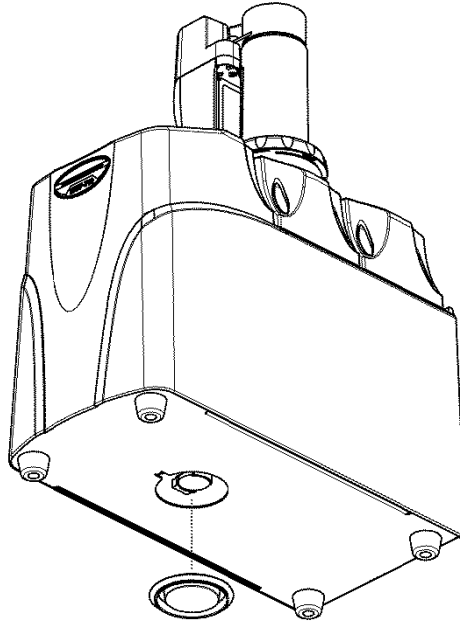
Note

With no filter, dust may go into the tubing of the injection pump, which may break the inner switching valve.

7. Maintenance

7-2-11.Replacing the clock battery

If the clock does not function correctly, the inside battery needs to be replaced with new one. Ask your local dealer for its replacement.



Open the battery cover on the bottom of the main unit with a slotted screwdriver.
Replace the old battery with a new one (CR2032).



Follow your national, regional and local regulations for disposal of batteries.

8. Troubleshooting

8-1. Error messages and remedies

<Error messages on MKV-710>

Error message	Probable causes	Countermeasures
Electrode Open	Connecting cable is not connected. Electrode cable is broken or loosely connected.	Check on connection between the detection electrode and stirrer. Replace the electrode.
Over Titr	Over titrated. Reagent with too much iodine is flask. Foreign particles or stains.	Discharge water into the flask. Slow down speed to refrain from excessive iodine. Remove dirt or stains.
Regist.Over!	Sample resistance is high.	<ul style="list-style-type: none"> •Change the mode to 2. •Reduce sample size.
PreTitr. Over!	Pre-titration exceeded 40mL. Wrong solvent is used. Reagent is deteriorating. Too much water adhered to titration flask.	Change reagent and solvent with new ones.
Parameter Error	•Selected a burette No. which was not available with the burette connected, and started a titration.	<ul style="list-style-type: none"> •Change "Burette No." of the titration parameter of the method you are using or the "Pre Dose" parameter to the burette No. you wish to use. •Connect the burette of the burette No. of the titration parameter or the Pre Dose parameter you are going to use.
Burette EBU Err	<ul style="list-style-type: none"> •Burette unit not connected. •Valve of burette unit not on initial position. 	•Attach burette unit. Then press [Start/Stop] button to reset error.
Burette Err03	•Valve drive motor does not stop within 10 seconds. (time out for valve)	<ul style="list-style-type: none"> •Cock is fixed and does not operate. Refer to "7-3. When valve of switching valve stops at irregular positions" for what to do. • Valve monitor sensor may be

8. Troubleshooting

		defective. (Contact your local dealer)
Burette Err06	•Burette error.	• Malfunction of burette memory possible. Contact your local dealer.
Burette Err08	•RFID board error.	•Malfunction of RFID board of smart burette possible. Contact your local dealer.

8-2. Clogging of titration nozzle or switching valve

Some reagents may be crystallized as the time goes by, and such crystallization may cause clogging or stains inside titration nozzle or switching valve. Follow the below steps for cleaning:

< When titration nozzle (diffusion proof nozzle) is clogged >

- 1) Remove the titration nozzle.
- 2) Dissolve the reagent by dipping it in the solvent. (An ultrasonic cleaning is effective.)
- 3) Then, rinse well by pure water.
- 4) Connect the titration nozzle to the tube.
- 5) Fill titration reagent up to the tip of nozzle.



A diffusion type titration nozzle may be clogged easily. Fill the nozzle pocket with pure water to keep its tip from being dried.

< When the switching valve is clogged or stained >

- 1) Remove all the connecting including titration nozzle, burette, and the tube. If reagent flows out, wipe it off with waste cloth.
- 2) Fill the cock with solvent to dissolve the reagent using a dripping pipette.
- 3) Suck out the fluid in the switching valve with a dropping pipette or the like, followed by cleaning the valve with waste or the like.
- 4) Repeat step 2) and 3) if necessary.
- 5) Reassemble all the connections.



If a reagent bottle is left unused for more than a week, make sure to check any crystallization in it. If any should be found, perform cleaning as above. Dispensing without cleaning may cause leaking.

<It is blocked example of reagent>

Potassium hydroxide(ethanol solution)

Potassium hydroxide (2-propanol solution)

Potassium permanganate

Perchloric acid (acetic acid solution)



Note

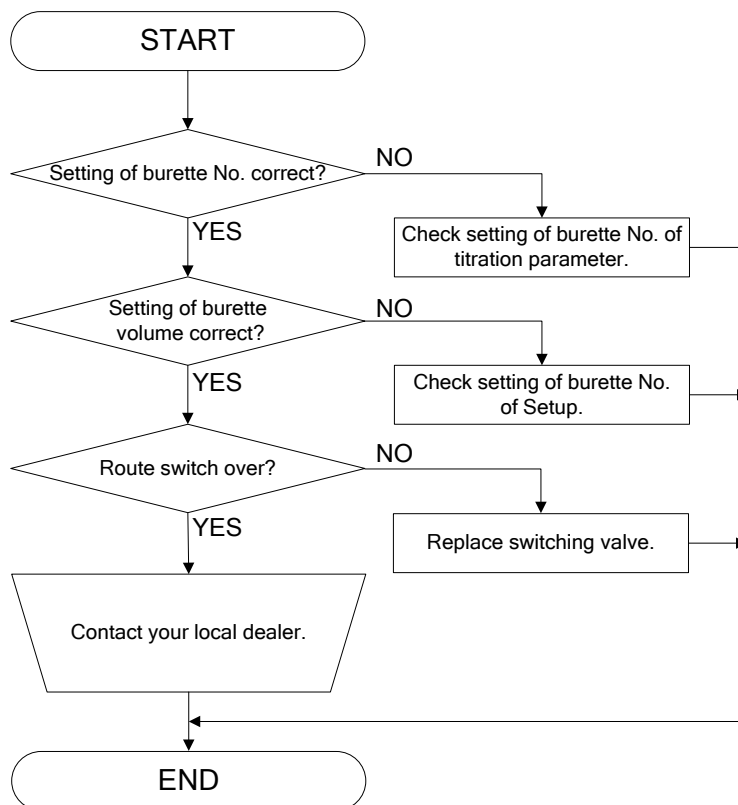
When switching valve is found erroneous by using the reagent containing solid/foreign article or the crystallized reagent, it is not covered by warranty. Please use it with caution sufficiently.

8. Troubleshooting

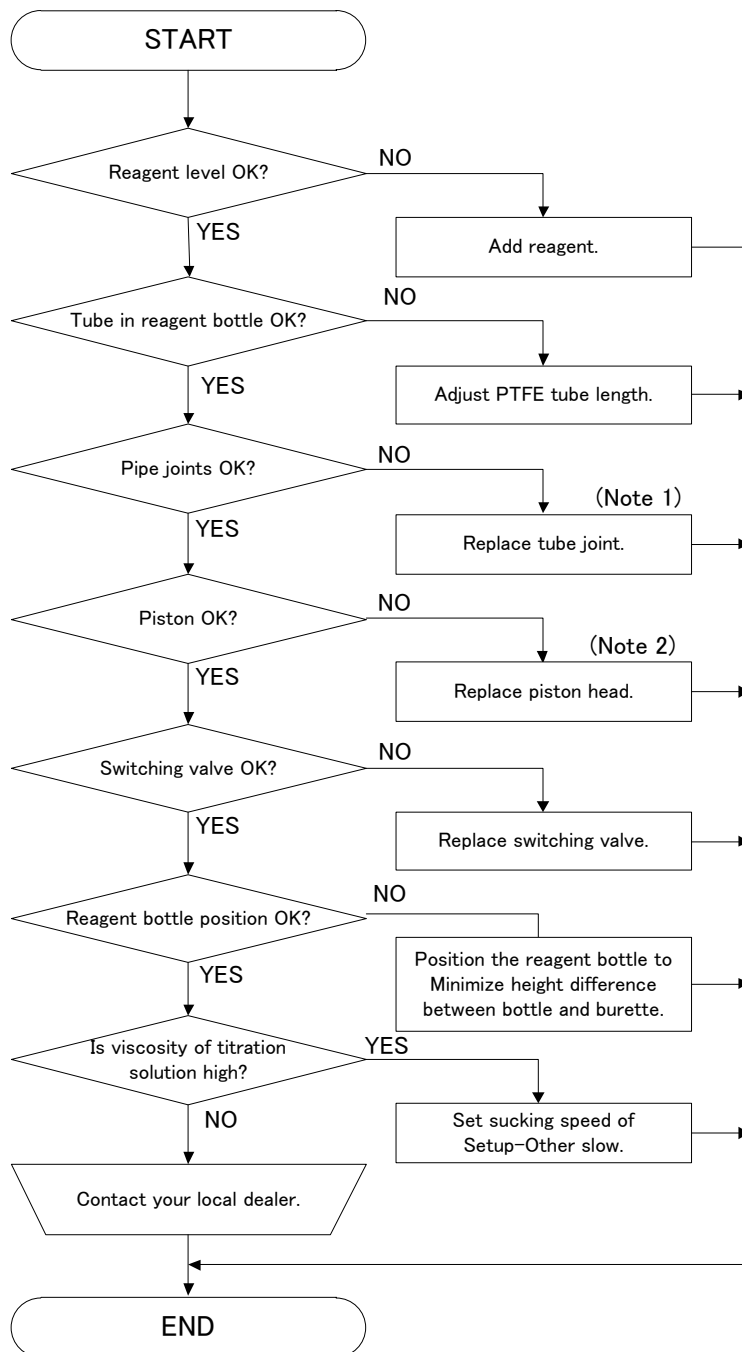
8-3. When valve of switching valve stops at irregular positions

When the switching valve clogs or is fixed, the valve may stop at an irregular position or become unable to operate (Burette Err03). In this case, refer to "7-2.Clogging of titration nozzle or switching valve" and rinse the switching valve. Then turn on the instrument while pressing [↑] and [ENTER] keys at a time. The lever of the burette unit will start to operate.

8-4. Piston burette does not work properly



8-5. Air bubbles are trapped in the piston burette



(Note 1) Refer to "7-2-8. Replace tube" in this manual.

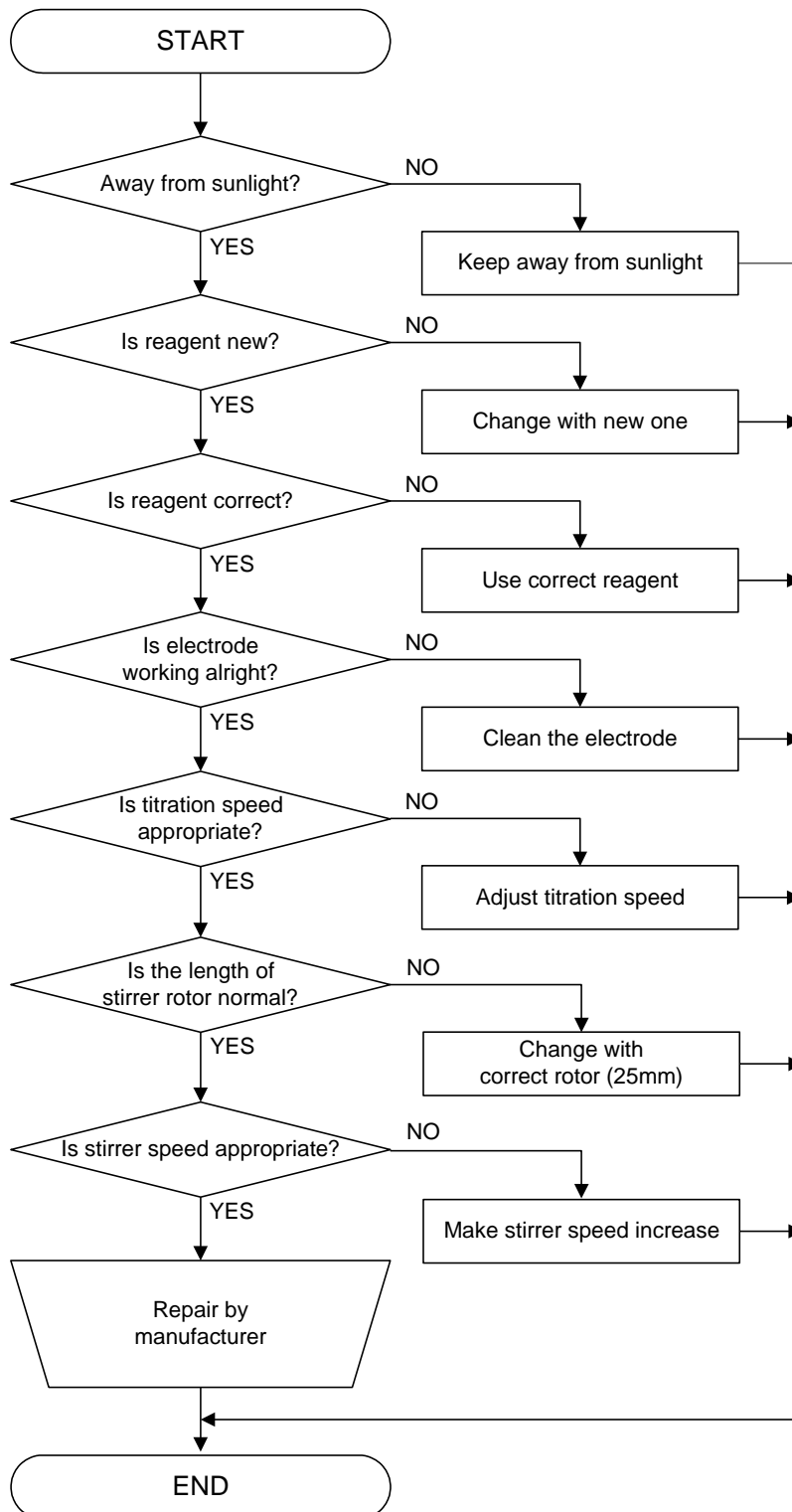
(Note 2) Refer to "7-2-5. Replacement of piston head" in this manual.

**Note**

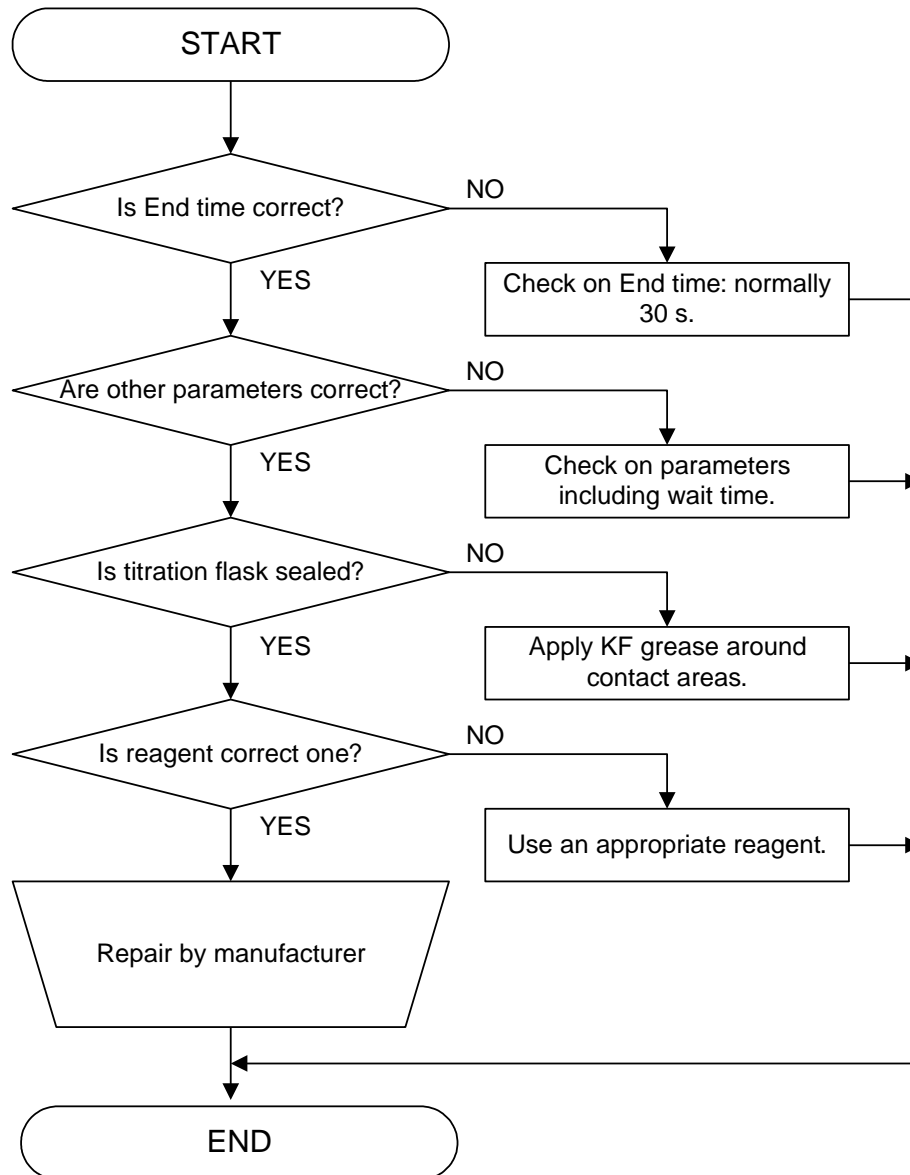
Karl Fischer reagents contain sulfur dioxide. This type of chemicals easily evaporates, bearing air bubbles when transferred from a dark place to a warm room.

8. Troubleshooting

8-6. It runs into over-titration

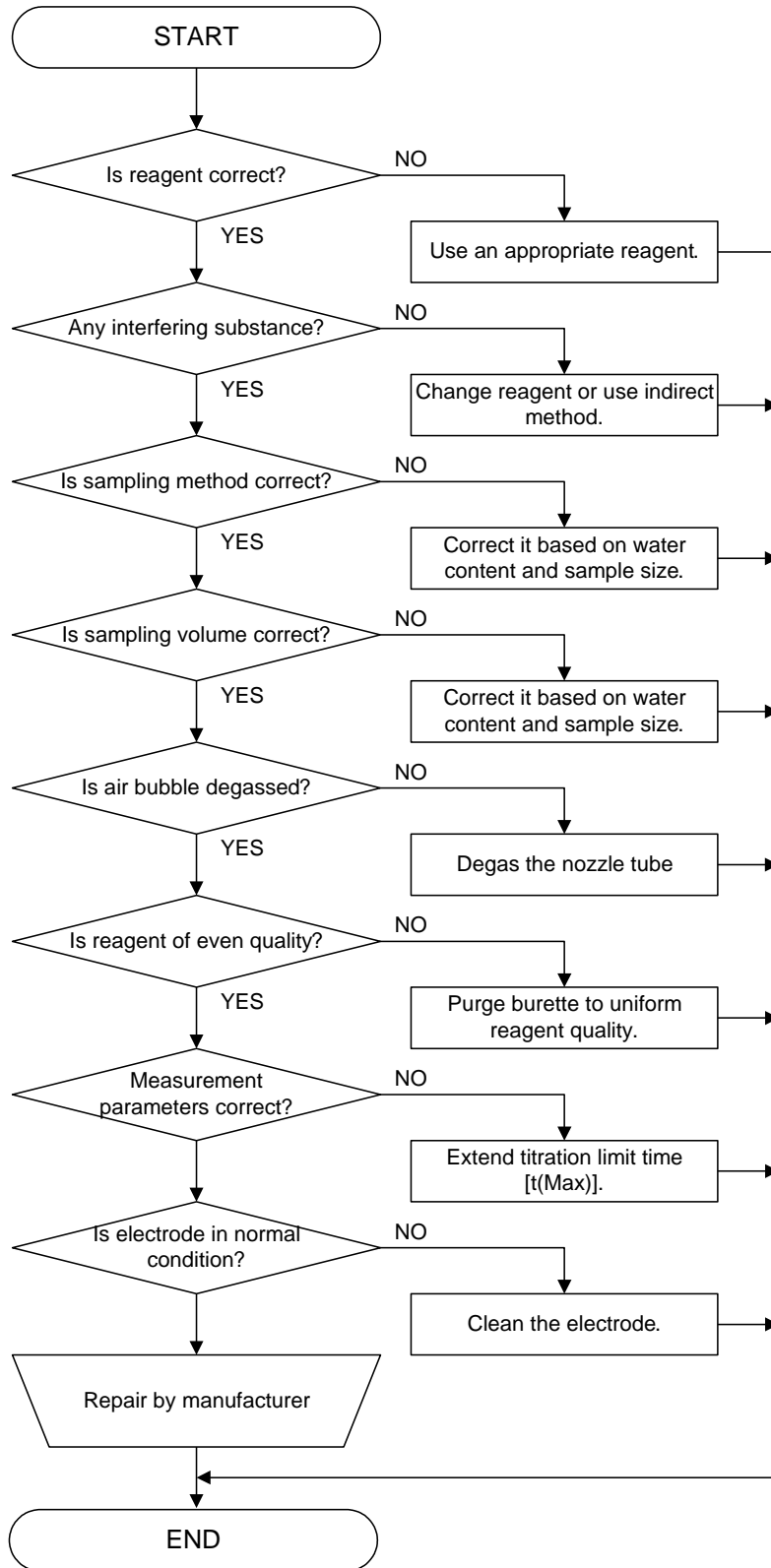


8-7. No endpoint is found or it takes a long time to find EP:

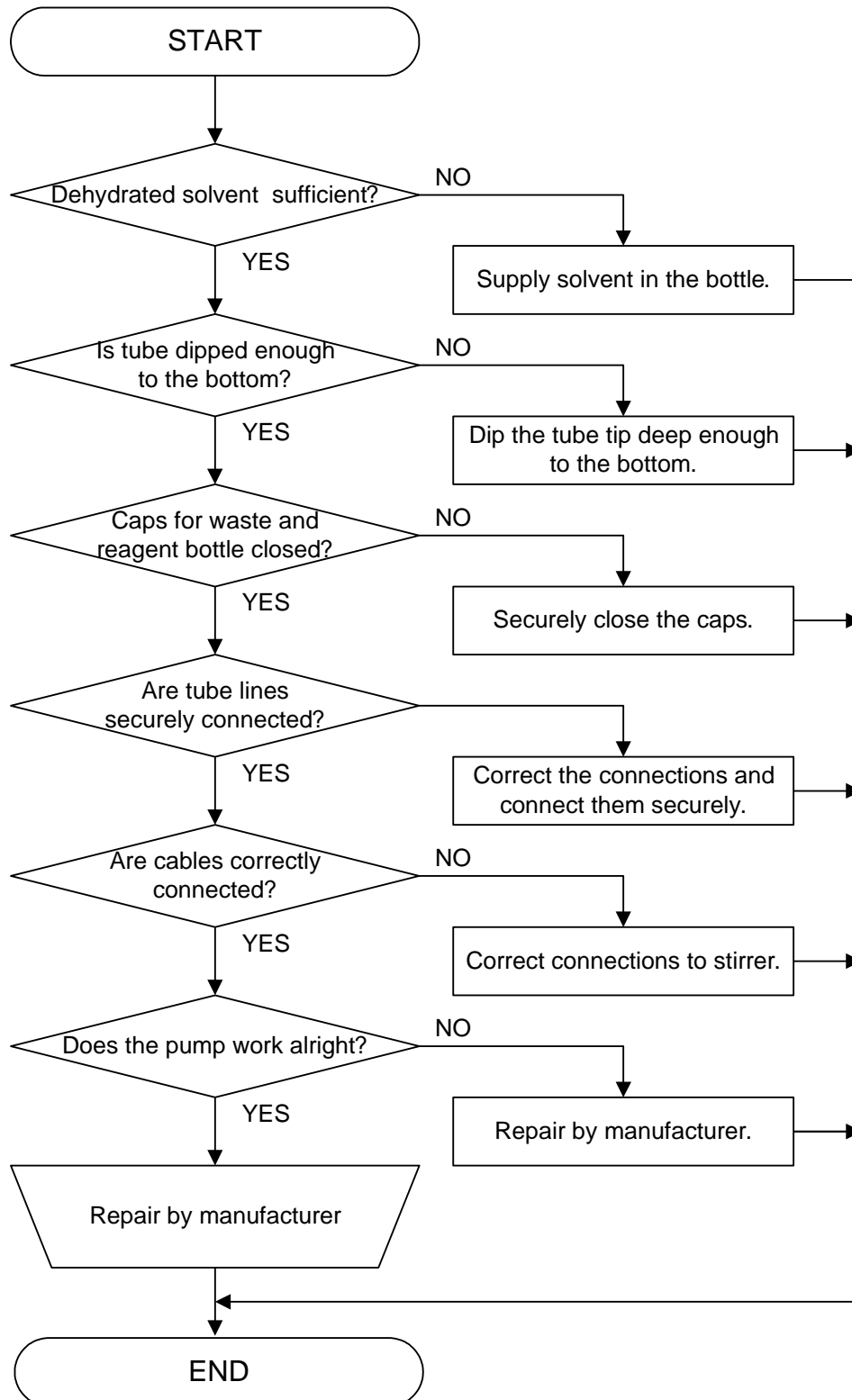

Note

For measurement of those samples which contain interfering substance like Ketone, Aldehyde, Amine, etc., it may be necessary to change the dehydrated solvent, and add a masking agent.

8-8. Poor repeatability or no EP found



8-9. Dispenser does not work



8. Troubleshooting

<Relation of water content and sample size>

For your reference, below chart shows the relation of water concentration (10ppm ~ 100%) and sample size for repeatability expected in volumetric method. For this purpose, the titration volume must be more than 3mL.

Water concentration	Reagent factor 5mg/mL	Reagent factor 3mg/mL	Reagent factor 1mg/mL
50 ~ 100%	0.03 ~ 0.015g	0.012 ~ 0.006 g	0.006 ~ 0.003g
10 ~ 50 %	0.15 ~ 0.03 g	0.06 ~ 0.012 g	0.03 ~ 0.006g
1 ~ 10 %	1.5 ~ 0.15 g	0.6 ~ 0.06 g	0.3 ~ 0.03 g
0.1 ~ 1 %	15 ~ 1.5 g	6 ~ 0.6 g	3 ~ 0.3 g
100ppm ~ 0.1 %	150 ~ 15 g	60 ~ 6 g	30 ~ 3 g
10ppm ~ 100ppm			300g ~ 30 g



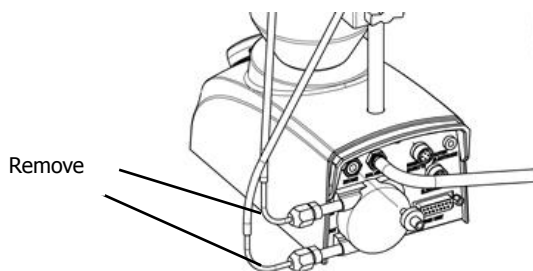
Note

For measurement of those samples which contain interfering substance like Ketone, Aldehyde, Amine, etc., it may be necessary to change the dehydrated solvent, and add a masking agent.

8-10. When the drain pump is clogged

The sample which can not be dissolved in the solvent, clogged the piping and pump tube. Please remove the clogging by the following steps when the drainage volume is lowered.

- 1) Remove the tube.



- 2) Insert the dropping pipette to the tip of the pump tubing or tube , remove the clogging.



Caution

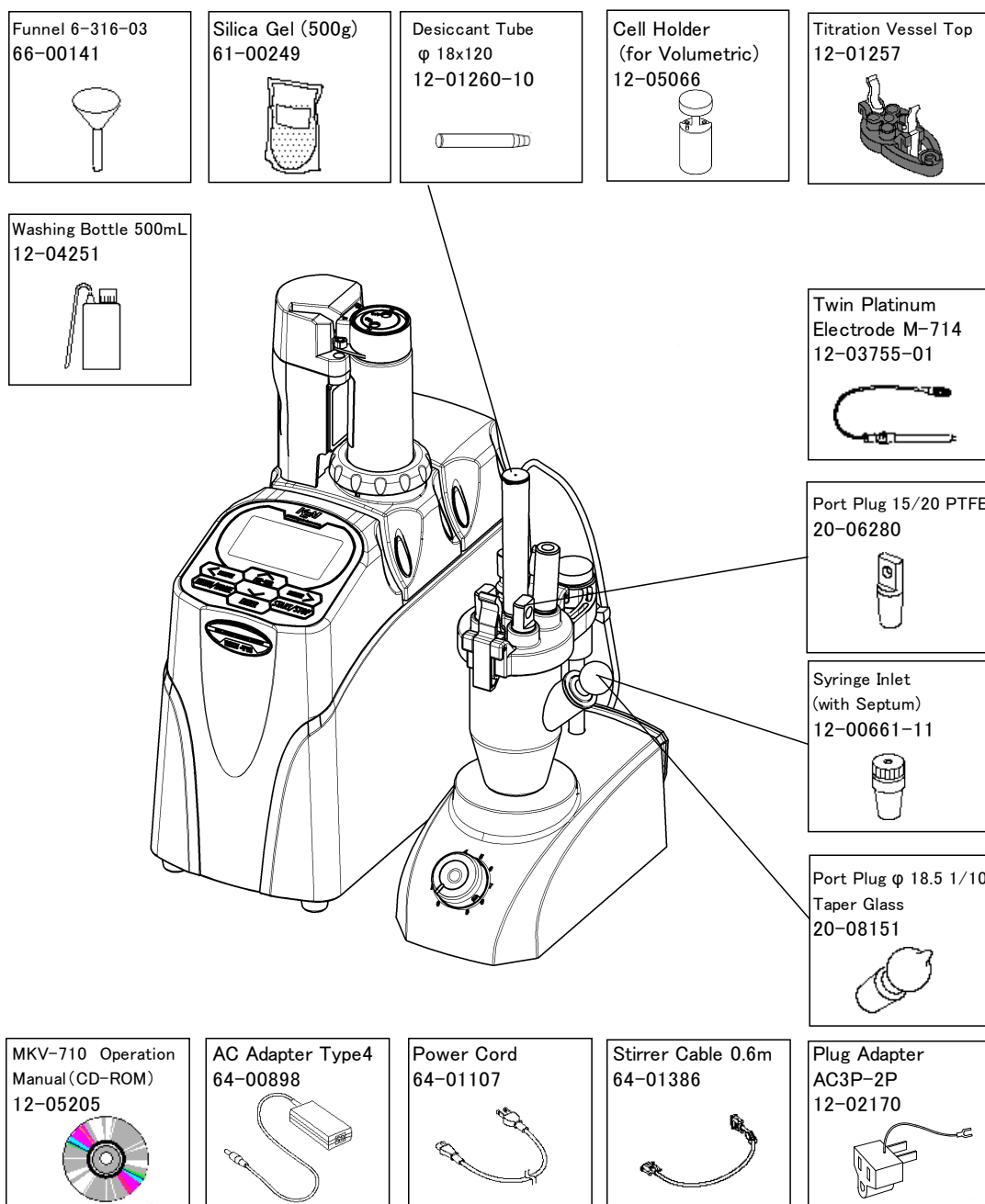
When removing the tube, please attach the eye protection and gloves. Please be careful because there is a possibility that the drainage jump out.

9. Others

9-1. Parts list

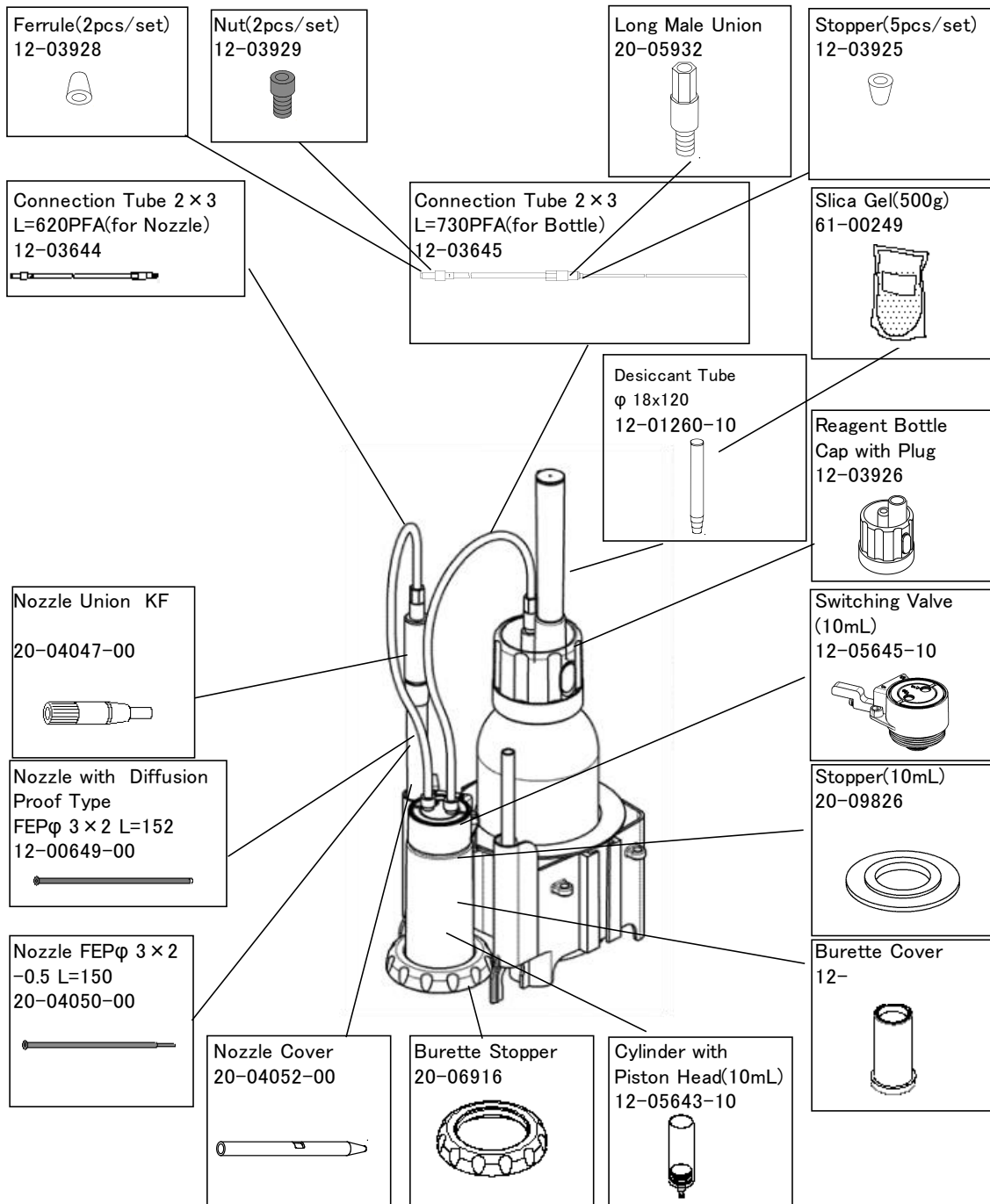
The supplied parts, consumable parts and optional components are shown in the following lists, and you can obtain any of these parts at your dealer or from sales representative.

MKV-710

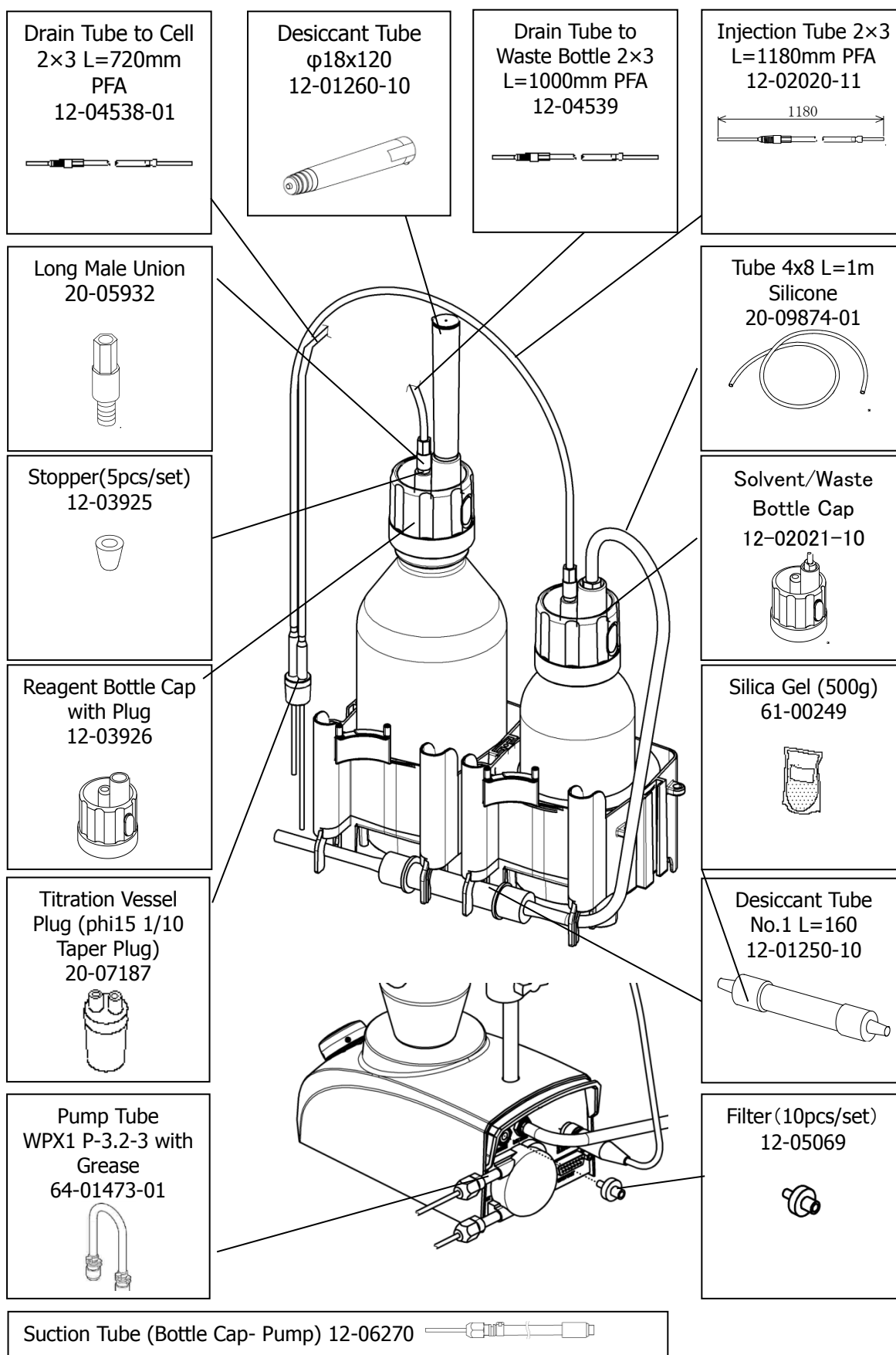


9. Others

EBU-710-10KF

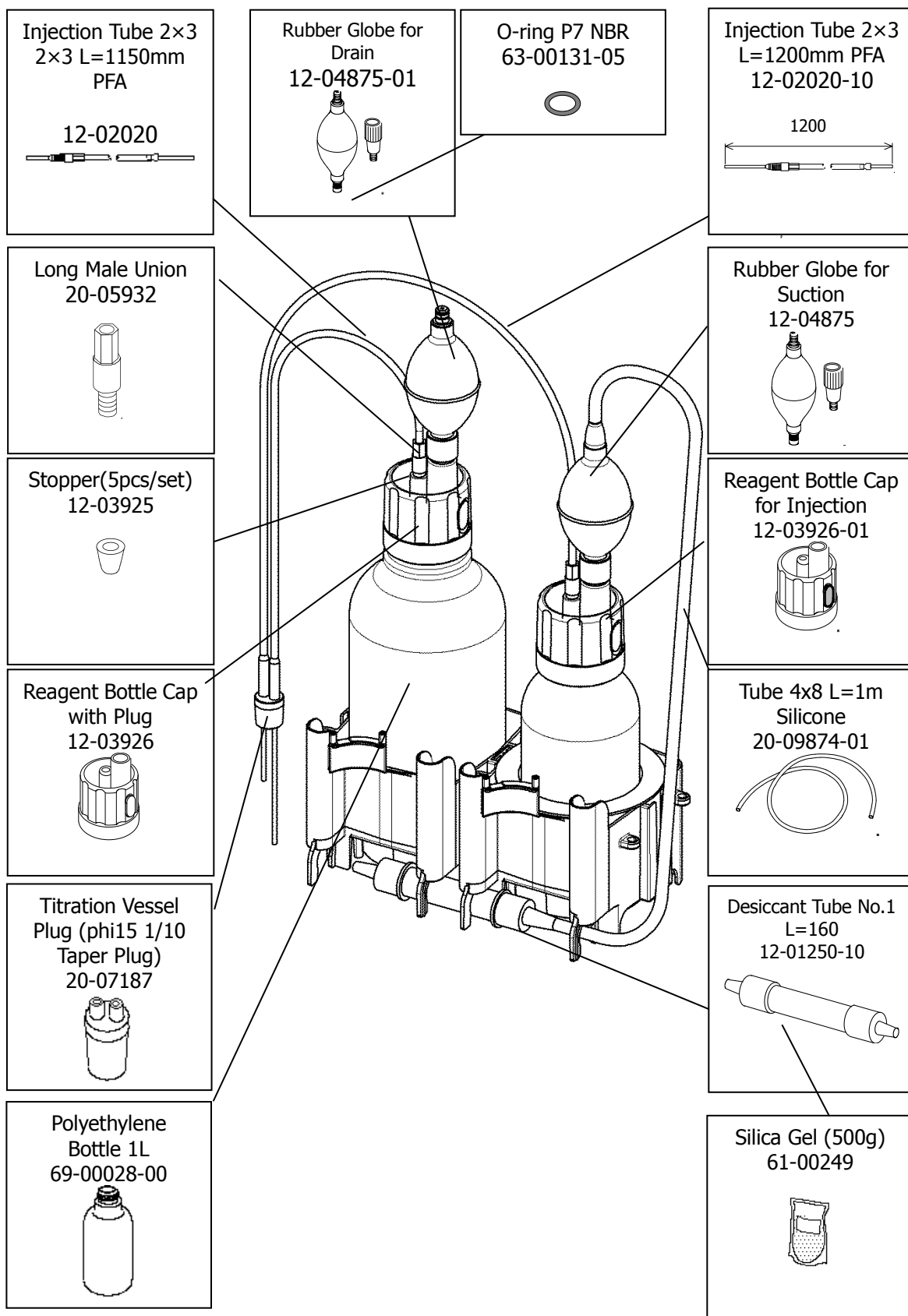


Auto Solvent Change Unit



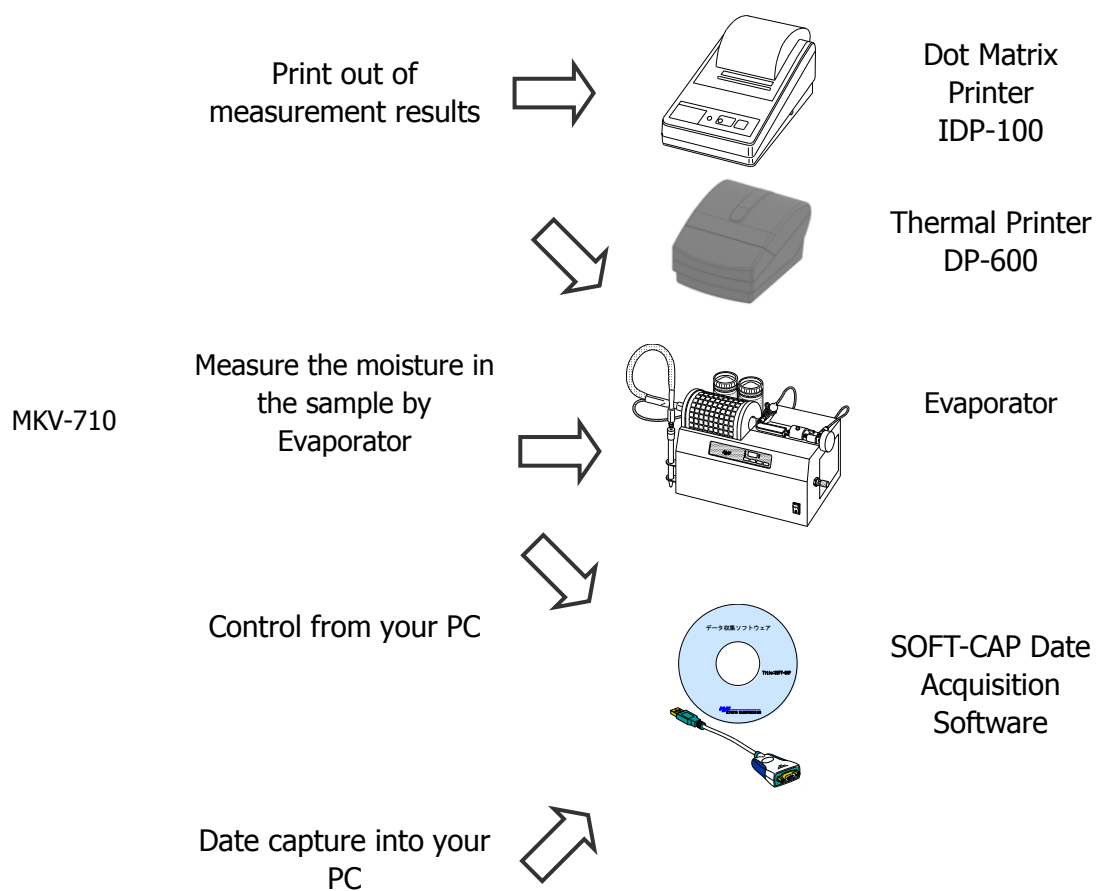
9. Others

Manual Solvent Change Unit



9-2. Options

Various convenient peripherals are available as shown below. These options can be purchased from KEM. Contact your local dealer or sales representative


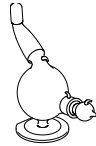
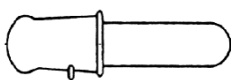
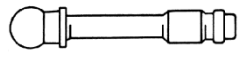
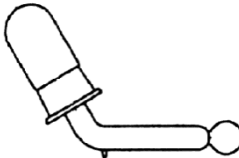
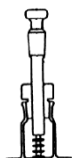


9. Others



Sampler

Part code	Part name	Remarks	Sketch
12-05067	Micro Sampling Unit (phi14 1/10 Taper)		<p>Micro Sampling Unit kit components: 微細粉体投入器 (Micro powder input device) カップ蓋×5個 (Cup lid x 5 pieces) カップ×30個 (Cup x 30 pieces) ピンセット (Tweezer)</p>
12-04577-10	Silicone Rubber (5pcs/set)		
12-04577-02	Syringe 2mL with Needle		
12-04577-01	Syringe 20mL with Needle		
12-04184	Finger Shaped Sampler		
12-04576	Bent-type Sampler for Powder		
12-04575	Spoon Type Sampler for Viscous Sample		
12-03880	Sampler for Oils		

9. Others


12-04454	Bent-type Sampler for Powders ϕ 18.5 1/10 Taper Glass		
12-04453	Eggplant-shaped Sampler for Powders ϕ 18.5 1/10 Taper		
12-04574	Straight-type Sampler for Light Weight Powder		
12-02400	Sampler for High Viscous Sample		
12-04452	Sampler for Light Weight Powder		
12-05192	Sampler for Viscosity Sample		

Printer

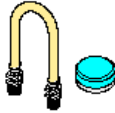
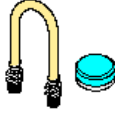
Part code	Part name	Remarks	Sketch
12-02028-01 12-02028-02	Dot Matrix Printer	AC120V AC230V	
12-02618-01 12-02618-02 12-02618-03 12-02618-04	Thermal Printer	(EU/KR) (GB) (US/TW) (CN)	

9. Others

Software

Part code	Part name	Remarks	Sketch
12-03265	Data Acquisition Software		

Pump Tube

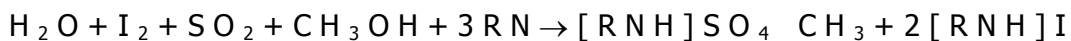
Part code	Part name	Remarks	Sketch
64-01473	Pump Tube WPX1 F-3.2-3 with Grease	Fluorine tube	
12-03961-01	Pump Tube (ePTFE+FKM) WP1000 C3.2-4-K-φ3with Grease	Extraordinary chemical resistance	

9-3. Specification

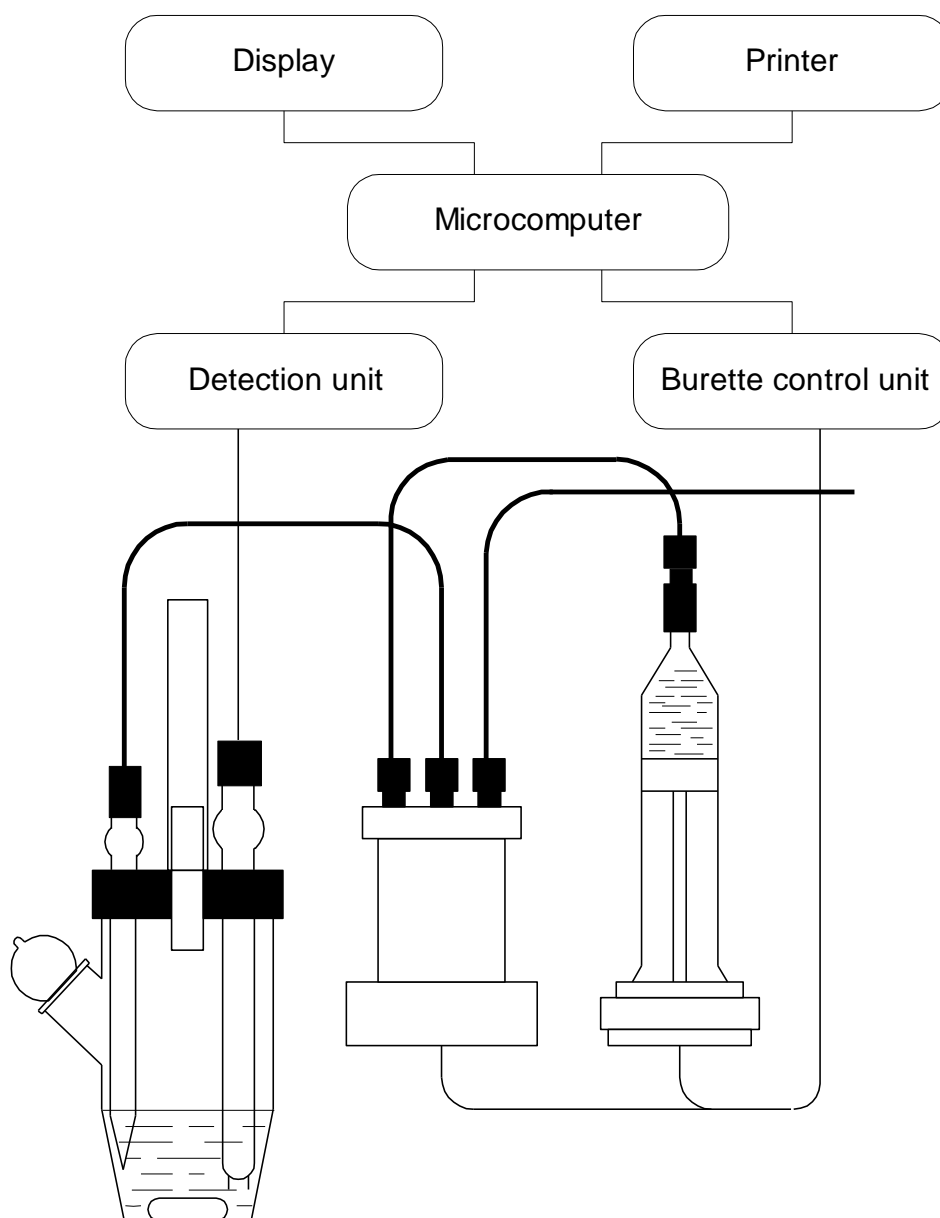
Specification	Contents
Type and Model	MKV-710 Karl Fischer Moisture Titrator
Measuring method	Karl Fischer Volumetric titration
Measuring range	Water content : 0.1 ~ 500mgH ₂ O(depends on KF reagent factor) Concentration : 10ppm ~ 100%H ₂ O
Burette precision	Volume : 10mL burette Discharge precision : ±0.015mL Repeatability : ±0.005mL
Endpoint detection	By polarized potential level detected with a twin Platinum electrode
EP sense method	Detection of potential level maintained during End preset time. End time range : 1 ~ 99s.
Titration form	Normal titration/Back titration/ Add the optional additional burette unit.
Required solvent	30 ~ 100mL(in S-type titration vessel)
Number of methods	Up to 20
Displays	White LED-backlit LCD
On-screen display	1) Potential, titration volume/ Measurement Results/ Titration conditions / Parameters 2) Japanese / English / Mandarin Chinese / Korean / Russian / Spanish
Calculation	Concentration of water content, statistics data processing (mean, SD and RSD) and automatic averaging of blank value
Data memory	100samples
GLP support	Registration of operator Check performance with standard substance
External I/O	RS-232C ×2: for dot matrix printer, electronic balance, Data Acquisition Software (SOFT-CAP) USB ×1: for USB flash drive, thermal printer, keyboard, barcode reader, foot switch SS-BUS ×1: for APB
Ambient conditions	Temperature :5 to 35°C Humidity :85%RH or below (no condensation)
Power supply	DC24V 1.9A(Main unit) AC100 - 240V ±10% 50/60 Hz (Comes with AC Adapter)
Power consumption	Approx. 20W
Dimensions	Main unit: 141 (W) × 292 (D) × 367 (H) mm(not incl. tubing) MS-710V:107 (W) × 206 (D) × 322 (H) mm(not incl. Solvent Change Unit)
Weight	Aprox. 5kg
Conformity standard	CE marking EMC : EN61326 LVD : EN61010-1 RE Directive Burette unit EBU FCC Part15 FCC ID:2ABSVBU01

9-4. Principle of measurement

Water content in the presence of base and alcohol reacts with iodine and sulfur dioxide quantitatively as follows:



Karl Fischer moisture determination is based on this reaction. Add sample solution after the solvent in titration vessel is dehydrated by KF reagent. Quantitative titration of water is complete with KF reagent, of which factor is determined in advance (mg H₂O/mL) by standard water-methanol. Titration is progressed by detecting polar potential of the electrode while controlling titration speed.



9-5. Karl Fischer reagent

In the volumetric Karl Fischer water determination, adequate KF reagents should be chosen depending on measured samples. The tables below show the typical uses of each manufacturer's commercial KF reagents.

< Kyoto electronics manufacturing co.,ltd.>

Dehydrated Solvent	Application	Titration Reagent
KEMAQUA Solvent MET	for general samples	KEMAQUA Titrant TR-1
KEMAQUA Solvent OIL	for oils	KEMAQUA Titrant TR-3
KEMAQUA Solvent FAT	for fats and oil	KEMAQUA Titrant TR-5
KEMAQUA Solvent KET	for ketones	
KEMAQUA Solvent SA	for sugars	

< Fluka (Riedel-de Haën) & HPC (= Hayashi Pure Chemical) >

Dehydrated Solvent	Application	Titration Reagent
Solvent ML	for general samples	Composite 1 (RdH)
Solvent MI		Composite 2 (RdH)
Solvent MS		Composite 5 (RdH)
Compo Solver (RdH)		
Solvent CM	for oils	
Solvent Oil (RdH)		
Solvent FM	for sugars	
Solvent FM II		
Solvent ME	for gases	
Solvent CE	for ketones	Composite 5K (RdH)
Keto Solver (RdH)		

< Merck AG >

Dehydrated Solvent	Application	Titration Reagent
Methanol	for general samples	109234 Titer: 5

9. Others

< Mitsubishi Chemical >

Dehydrated Solvent	Application	Titration Reagent	
Dehydrated Solvent MS	for general samples	SS	0.7 ~ 1.2mgH ₂ O/mL
Dehydrated Solvent CM	for oils	SS	2.5 ~ 3.5mgH ₂ O/mL
Dehydrated Solvent FM	for sugars	SS	8 ~ 12mgH ₂ O/mL
Dehydrated Solvent CP	for ketones		
Dehydrated Solvent PP	for aldehydes		
Dehydrated Solvent GEX	for general samples	SS-Z	0.7 ~ 1.2mgH ₂ O/mL
Dehydrated Solvent OLX	for oils	SS-Z	2.5 ~ 3.5mgH ₂ O/mL
Dehydrated Solvent OL II	for fats and oil		
Dehydrated Solvent KTX	for ketones	SS-Z	4.5 ~ 5.5mgH ₂ O/mL
Dehydrated Solvent SU	for sugars		



Note

When the titration reagents and dehydrated solvents are selected, the combination should be the reagent maker's recommended one. Failure to this (combination of different reagent maker's products) may lead to abnormal measurement results. Additionally, when reagents not listed in the above tables are used, contact respective reagent makers.

When using the reagent bottle by Merck Ltd. directly, Reducer (PE) (9.67206.0001) is required between a reagent bottle and a lid.

Separately, purchase from Merck Ltd..

In addition, the above data is a reference material.

9-6. Parameter list

9-6-1. Setup parameters

[Interface]

Parameter and default			Printout	
Item	Default	Selection range	Item	Printing
RS-232C	NONE	NONE/COM1/COM2	RS-232C	As displayed
Baud rate	4800bps	300bps/600bps/1200bps/ 2400bps/4800bps/9600bps	Baud Rate	As displayed
Parity	-	None/Even/Odd	Parity	As displayed
Stop bits	1	1/2	Stop Bits	As displayed
Data bits	8	7/8	Data Bits	As displayed
Printer	NONE	NONE/ OTHER /DP-USB/ IDP-	Printer	As displayed
Balance	NONE	NONE/KEM/Mettler/A&D /Shimadzu/Sartorius /Mettler-Old	Balance	As displayed
Interface	COM1	COM1/COM2	Interface	As displayed
Mode	Continuous	Continuous/Print	Mode	As displayed
USB	Host	Host/MCU	Mode	As displayed

[Beep]

Parameter and default		
Item	Default	Selection range
Beep	Set	Set/off
Type	Type1	Type1 /Type2/Type3 /Type4/Type5

[Operator]

Parameter and default			Printout	
Item	Default	Selection range	Item	Printing
Current No.	1	01-10	Current No.	As displayed
Operator	-	Within 20 characters A-Z, +, -, /, *, (,), ,, %,	Operator	As displayed

9. Others

[Display setup]

Parameter and default		
Item	Default	Selection range
Date Style	YYYY/MM/DD	YYYY/MM/DD MM/DD/YYYY DD/MM/YYYY
Date	2001/01/01	2001/01/01 ~2099/12/31
Time	00:00	00:00~23:59
Language	English	Japanese/English/ Mandarin/Korean/ Russian/Spanish

[Other setup]

Parameter and default			Printout	
Item	Default	Selection range	Item	Printing
Character Disp.lay	Large	Normal/Large	Character Disp.	As displayed
Print Header	On	Off/On	Print Header	As displayed
Print Footer	On	Off/On	Print Footer	As displayed
Auto set.,mean	On	Off/On	AutoSet. Mean	As displayed

9-6-2.Method parameters

[Parameter and default]

Method No.	01	02	03	04	05	06	07-20
[Titration Parameter]							
Titration Mode	Normal	Normal	Back	Normal	Normal	Normal	Normal
Titr.burette No.	1	1	2	1	1	1	1
End time	30s	30s	10s	0s	30s	30s	30s
Final volume	0.01mL	0.01mL	0.01mL	0.01mL	0.01mL	0.01mL	0.01mL
Titration speed	3	3	3	3	3	3	3
Detector mode	1	1	1	1	1	1	1
t(stir)	0s	0s	120s	0s	10s	0s	120s
t(wait)	0s	0s	0s	0s	0s	0s	0s
t(max)	0s	0s	0s	1200s	0s	0s	0s
t(interval)	0s	0s	0s	0s	0s	0s	0s
Drift Titration	Off	Off	On	On	Off	Off	Off
Start mode			Manual	Auto			
Max. volume	10.0000 mL	10.0000 mL	10.0000 mL	10.0000 mL	10.0000 mL	10.0000 mL	10.0000 mL
Data sampling time	5s	5s	5s	5s	5s	5s	5s
Dose mode	Off	Off	Auto	Off	On	Off	Off
Dose burette No.			1		2		
Dose volume					3.00mL		
[Calculation parameter]							
Calculation type	Sample	Sample	Sample	Sample	Factor	Check	Sample
Calculation No.	2	2	2	2	8	2	2
Unit	%	%	%	%	mg/mL	%	%
Weight Input	Variable	Variable	Variable	Variable		Variable	Variable
Drift Comp.	Off	Off	Off	Off	Off	Off	Off
Drift							
Standard Value						0.0000	
Permit. Error						0.0000	
[Report]							
Format	Short	Short	Short	Short	Short	Short	Short
Data List	Off	Off	Off	Off	Off	Off	Off
Graph	Off	Off	Off	Off	Off	Off	Off

**Note**

Default for Method 07 through Method 50 is the same as that for Method 01.

9. Others

9-6-3. Selection of Method parameters and printout

[Titration Parameter]

Displays		Printout	
Item	Selection	Item	Printing
Titration Mode	Normal/Back	Mode	As displayed
Burette No.	1-2	Burette No.	
End time	0-99s	End time	
Final vol.	0.01-9.99mL	Final vol.	
Titr.speed	1-6	Titr.speed	
Detector mode	1-2	Detector mode	
t(stir)	0-99999s	t(stir)	
t(wait)	0-99999s	t(wait)	
t(max)	0-99999s	t(max)	
t(int.)	0-99999s	t(int.)	
Drift titr.	Off/On	Drift titr.	
Max.volume	0.0000-999.0000mL	Max.volume	
Samp.time	1-99999s	Samp.time	
Dose mode	Off/On	Dose mode	
Dose mode	Manual/Auto	Dose mode	
Burette No.	1-2	Burette No.	
Dose volume	0.00-999.00mL	Dose volume	

[Calculation Parameter]

Displays		Printout	
Item	Selection	Item	Selection
Calculation Type	Sample/Blank/ Factor/Check	Calc. Type	As displayed
Calculation No.	0-6/7,8	Calc. No.	
Unit	% , ppm , mg , mL mg/g , mg/kg , mg/mL	Unit	
Weight Input	Variable/Fixed	Weight	
Drift Comp.	Off/Manual	Drift comp.	
Drift	0.00-99.99 μ g/min	Drift	
Standard Value	-9999.9999-9999.9999	Std.value	
Permit. Error	0.0000-99999.9999	Permit.err.	

[Report parameter]

Displays		Printout	
Item	Selection	Item	Selection
Format	Off/GLP/Short	Format	As displayed
Data List	Off/On	Data List	Off/On
Graph	Off/On	Graph	Off/On

9-7. International standards

List of supported standards

Standard	Country
Pharmacopoeia	Eur., Japan, U.S.A.
ASTM (American Society for Testing and Materials)	U.S.A.
ASTM D 1744 (Standard Test Method for Determination of Water in Liquid Petroleum Products by Karl Fischer Reagent)	U.S.A.
ISO 760 (Determination of water -- Karl Fischer method (General method))	International

10. Warranty and After-sales Service

1. Warranty Period

Three (3) years from the date of receipt of this product or the date of installation by KEM service personnel or by authorized personnel.

2. Warranty Details, After-sales Service

This product passed the strict inspections of KEM and, except for consumables, KEM warrants this product, under normal use, for three (3) years from the date of receipt of this product or the date of installation by KEM service personnel or by authorized personnel. (Parts and consumables will be supplied for at least seven (7) years after discontinuation of this product.)

Should an initial failure occur during the warranty period, KEM will decide whether to replace the product or to correct defects.

This product can be repaired at user's site by KEM service personnel or by authorized personnel. Note that secondhand or pre-owned products are not covered by warranty.

3. Exclusion

Warranty shall be void where:

- any part is replaced or any repair or remodeling is performed by unauthorized personnel;
- unauthorized service parts, spare parts and/or consumables are used;
- the user does not follow the instructions for installation, correct use, maintenance and/or storage, resulting in malfunction;
- the user does not follow the ranges and/or conditions stated in the product brochure, flyer or specifications;
- periodic checks and/or maintenance is not performed;
- breakage and/or malfunction is caused by careless handling such as, but not limited to, exposing to or submerging in water, or dropping down;
- breakage and/or malfunction is caused by excessive force applied to glassware or plastics;
- malfunction or leakage is caused by sample properties (corrosively, solid materials, etc.);
- malfunction is caused by any device, part and/or chemical other than those supplied by KEM;
- overuse has led to fatigue or wear of parts;
- items are consumables or wearing parts;
- this product has been moved or transported to another place once accepted and installed;
- breakage and/or malfunction is caused by conditions beyond control of KEM including, but not limited to Acts of God such as fire, earthquake, lightning strike, flood, etc.;
- parts including, but not limited to the touch screen LCD, are broken due to improper or inadequate handling such as spilling chemicals;
- items are consumables, accessories or wearing parts, or parts which are in direct contact with samples and/or reagents and are considered consumables due to normal wear.

KEM is also unable to offer warranty and related services of repairs and maintenance checks of any kind once specifications, capability, features and/or functions of this product as well as its parts are changed, altered or remodeled by unauthorized personnel.

4. Disclaimer

KEM is not held liable, during or after the warranty period, regardless of whether loss or damage is caused by any event beyond control of KEM, or it is the user's opportunity loss and/or lost earnings caused by failure or malfunction of KEM products, or with or without predictability of KEM, for loss or damage resulting from a particular reason, secondary loss or damage, accident compensation, damage to products other than those supplied by KEM, and any other incidental compensation.

KEM is also not held liable for physical and/or economic loss or damage resulting from the use of KEM products, or loss of stored data during repair or servicing of such product.

