

**Multiple Sample Changer
for Coulometric Karl Fischer Moisture Titrators**

CHK-501


Operation Manual

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

Ver.04
A/N 985950318

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1. Introduction

1-1. General description and features of CHK-501

Your patronage over KEM products by purchasing the CHK-501 Multiple Sample Changer for Karl Fischer Moisture Titrator is appreciated. This sampler is designed to heat and evaporate a plural number of solid or powder sample on rack in order to measure its water content by the connected KF titrator.

[Features]


- 1) The built-in cup sensor detects the end of multiple sample measurement, and turns off the power automatically.
- 2) This sampler is equipped with diagnosis function, which checks sequence program, keypad and display performance.
- 3) The commercially available sample vial is used, and can be easily obtained by user.
- 4) The auto-power off function saves power and nitrogen gas even when it is operated at night unattended. This function can be turned on while measurement is underway.
- 5) When MKC-510N titrator is connected, the optional stirrer can be used so that liquid sample can also be measured by switching from evaporation mode.
- 6) The patented sample vial purge before heating eliminates the blank effect of the vial, and increases measurement precision. (Japanese Patent Office: No. 3052970)
- 7) Heating range is 40 to 300°C.
- 8) Heating temperature can be set for each sample.
- 9) A plural number of measurements can be performed for one sample, and the coherent water and combined water can be measured at the same time.

1-2. About the manual


Please keep this manual near your system so that you can easily access to the necessary information you are looking for while operating or preparing for measurement.

The below three boxed messages show the basis symbols of warning, caution and note that you will see in this manual from time to time:

1. Where there exists a danger of physical injury or even possible death:

 Warning! There exists the danger of physical injury or even possible death if the instruction is disregarded.

2. Where there exists a danger of property damage:

 Caution! There exists the danger of property damage if the instruction is ignored.

3. When there exists a possibility of failure of instrument performance:





Note: There exists the possibility of failure of instrument performance. If ignored, warranty may not be covered.



- * It is prohibited to copy a part or all of this manual without authorization by copyright.
- * If you should find any part in this manual not clear to understand or missing article, contact your local dealer or sales representative.
- * Manufacturer will not be liable for any loss or damage directly or indirectly caused by use of the instrument or its consequences.
- * This manual describes the use of instrument when operated as a standard mode.
For use of a model with special feature or specification, please read the manual particular to it.

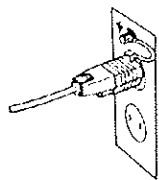
1-3. Safety symbols



Always observe these signs and instructions.



You must observe cautionary messages and warnings in order to protect yourself as well as prevent others from physical injury or property damages.

 Warning This symbol means "Danger of severe injury or possible death".	 This symbol means prohibition of an act.
 Caution This symbol means "Danger of injury or property damage".	 This symbol means mandatory.

 WARNING!	
You must ground earth wire of power cable.	
	Ground the green wire of adapter if power tap is 2-pin outlet. 3-pin plug has earth line to ground by itself when plugged in.
Danger of electric shock if not grounded to earth.	



 WARNING!	
Do not use volatile chemical or work in flammable gas.	
	
Danger of explosion inside the instrument.	

 WARNING!	
Wear safety glasses, gloves or protective mask if necessary, and well ventilate the room.	
	
Danger of injury on your skin or in the eyes by splashing chemical. Also your windpipe may get hurt if toxic gas is breathed in.	

 **WARNING!**

This equipment is heavy in weight.
It requires at least two persons to move it.



There exists a danger of physical injury in case it drops off the bench.

 **CAUTION!**

Unplug the power cord when the unit can be troubled or exposed to a lightning.



Failure to observe this caution may result in a damage to the instrument.

 **CAUTION!**

Do not operate in a way other than specified in the manual.



Danger of fire, electric shock or damage to the instrument.

 **CAUTION!**

Do not open housing case or overhaul the unit for repair except by an authorized service person.



Danger of fire, shock or malfunctioning of the unit.

About place for installation

Do not install the instrument under any of the following conditions, which may cause eventual defective performance and unsecured reliability of the system.

- Near or under vibration
- Under direct sunlight
- In corrosive gaseous atmosphere
- Power source of heavy load fluctuation or near strong magnetic field
- High humidity or sharp change in temperature (The ambient condition for this system is 5 to 35°C, below 85%RH)
- Place not leveled
- Any obstacle in front of the air intake fan.

About power source

- Power for this instrument is AC100-120/200-240V±10% and 50/60Hz.
- Supply power direct from the outlet, and do not share power from a tap.
- 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.

About a place for storage

- Before storage for an extended period of time, remove the bubbler tube and heating unit, and clean them. It is recommended to use the carton box in which the unit was first delivered.
- Avoid very hot or too cold or humid or dusty place.

About carrier gas

- The maximum heating temperature is 300°C. Use inactive gas (e.g. nitrogen), and the gas pressure must be controlled under 50kPa (approx. 0.5kgf/cm²).

About the component of high temperature

- The heater unit must be covered before use. For your safety and the unit, the power must be shut off when not in use for measurement.
- Be aware of hot nozzle and sample vials right after measurement. Take sufficient time after the power is turned off when necessary part or parts are changed for replacement.

Environmental condition

- This instrument is designed for the indoor use under the environmental conditions specified in the Section 1.4 of CE marking (LVD, 73/23/EEC, EN61010-1) and the use of the Category II of Overvoltage and the Pollution Level 2.

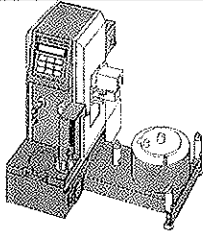
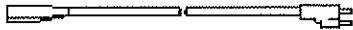
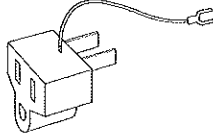

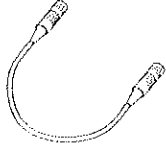




2. Preparation


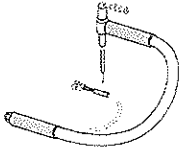
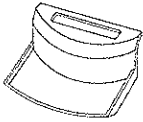

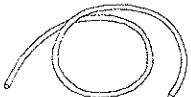





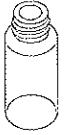
2-1. Supplied parts









The carton box that has been delivered contains the CHK-501 unit with its accessories and operating manual.

Check the supplied parts with the below parts list.

If you should find any missing or broken part, contact your local dealer or sales representative.

Part name	Part code	Qty	Sketch
Main unit	CHK-501	1unit	
Power cord with earth wire (AC100/120V area) (AC220/230/240V area) (for UK) (for China)	983203198 983203461 983204199 64000180048	1pce	
Adaptor for power connector (AC100V only)	983203199	1pce	
Ground wire (AC100V only)	984333331	1pce	
Connecting cable	980303388	1pce	
Tube adaptor	985506429	1pce	
Desiccator	984330020	2pcs	
Turntable	985500102	1pce	
Bubbler tube	987100049	1pce	

Part name	Part code	Qty	Sketch
Exhaust tube	987103051	1pce	
Heating tube unit set (Heating tube unit, Nozzle for carrying gas, Cap nut, Stopper, Spacer, Joint for carrier gas nozzle)	(984330125)	1set	
Vat	985600011	1pce	
Tube 1	985210053	1pce	 (L=200mm)
Tube 2	985210054	1pce	 (L=260mm)
Heat insulator	985500121	1pce	
Tube	985210060	1pce	 (L=1000mm)
Cover 1	985270008	1pce	
Cover 2	985270009	1pce	
Cover	985600063	1pce	
Vial	(987220004)	24pcs	

Part name	Part code	Qty	Sketch
Aluminium cap (with teflon packing)	(985500101)	24pcs	
Resin plug (24pcs/set)	985270007S	1set	
Aluminum seal (1000pcs/set)	985990011S	1set	
Finger shaped sampler	987100038	1pce	
Air intake filter	(985016864)	1pce	
Silica gel (500g)	988203269	1pce	
Zeolite (500g)	988103412	1pce	
Operation manual	985950318	1copy	

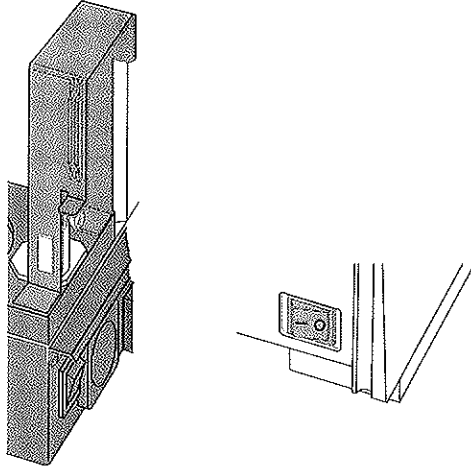
Note:

Parts with parenthesized part code have unique order units or packing forms different from others. Therefore, please refer to the section "7-1. Part list" when ordering these parts.

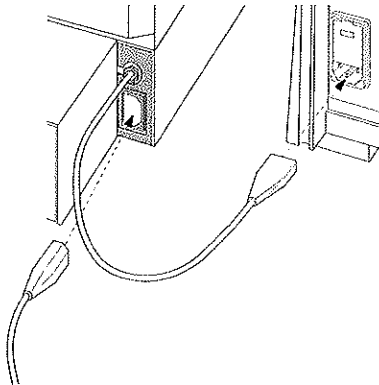
2-2. Installation and start-up preparation

2-2-1. Supplied power

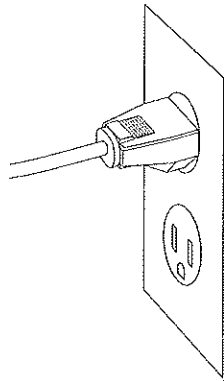
- 1) Make sure the power switch of Main unit and the KF titrator are in OFF position.



- 2) Connect the supplied power cord to the power receptacle on the back the unit. The power for KF titrator is supplied by the power cord plug from the rear port of CHK-501.

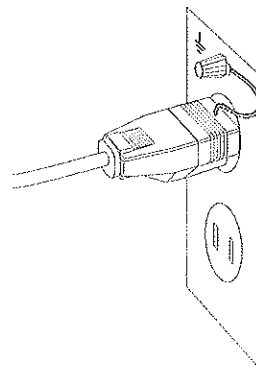


- 3) Plug in the other end of power cord.



<3-pin plug>

The 3 pins plug has an earth terminal and grounds to the earth by itself.



<2-pin plug>

Attach an adapter for power connector to the plug and ground the green wire to the earth terminal.

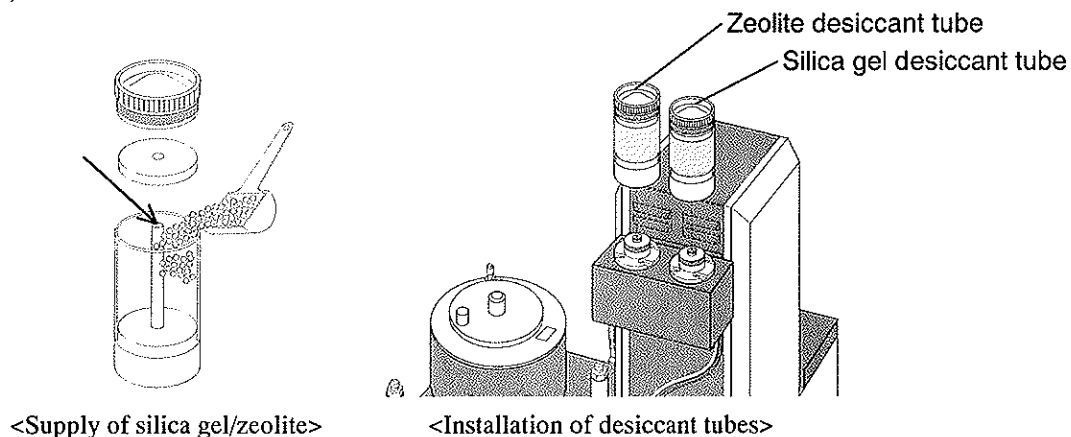


Warning!

The earth wire must be grounded. If not, there exists a danger of electric shock.

2-2-2. Installation of desiccant tube

- 1) Fill the desiccant tube with Silica gel (Zeolite). Note here that you should not allow Silica gel (Zeolite) to enter the indicated portion by plugging the part with a finger. After filling the tube with Silica gel (Zeolite), lay the sponge and cover the lid. The lid should be screwed in for secured attachment.
- 2) Install the desiccant tube onto Main unit.



Warning!

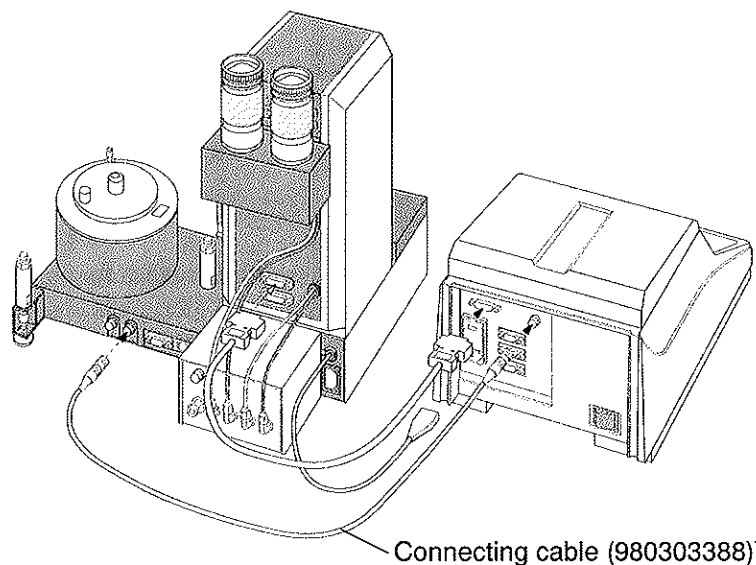
Fill the desiccant tube with silica gel/zeolite, giving a few mm gap on its top. If it is filled up, carrier gas may not flow smoothly.

Note:

Always use fresh silica gel and Zeolite. If they are old, correct measurement results cannot be expected. For how to change desiccant, refer to Section 5. Maintenance.

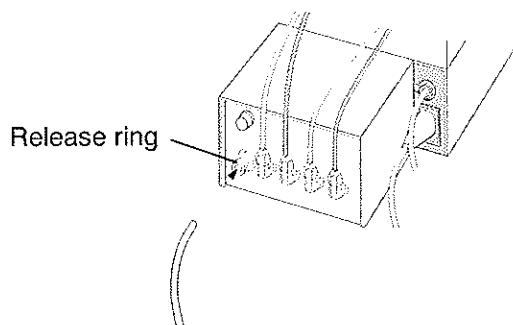
2-2-3. Connecting the cable

- 1) With the supplied cable (980303388), connect each EXT. port on the back of KF titrator and CHK-501.
- 2) The stirrer can be connected with the supplied cable to STIRRER port of KF titrator and Main Unit port on the back of CHK-501.



2-2-4. Connecting the tube

- 1) Prepare carrier gas tube of OD ϕ 6mm.
- 2) Insert the tube into Carrier Gas In joint port until it reaches the end. To remove the tube, pull it out while pushing the ring around the joint.



Note:

The nitrogen gas tank for carrier gas (purity 99.99%) and governor (50kPa=0.5kgf/cm²) need to be prepared by user. Use a gas tube made of copper, stainless or 4-fluoride ethylene, which does not absorb moisture.

Caution!

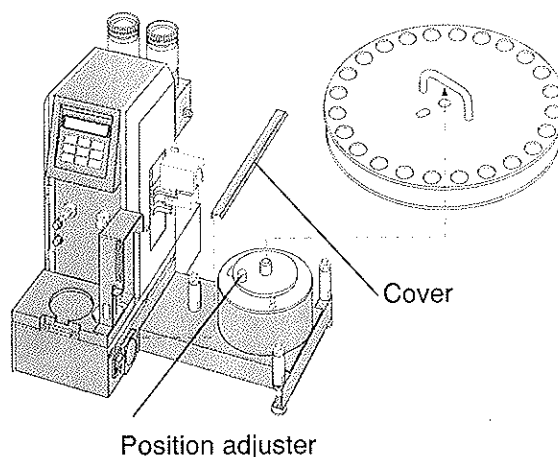
Supply carrier gas of reduced pressure below 50kPa (approx. 0.5kgf/cm²) controlled by the governor. If not reduced, it may break the tube or valve or remove the joint, and even it may hurt the operator.

Note:

If OD ϕ 6mm tube is not available, use the supplied nozzle (985506429) for connection.

2-2-5. Installation of the turntable

Install the cover and the turntable.

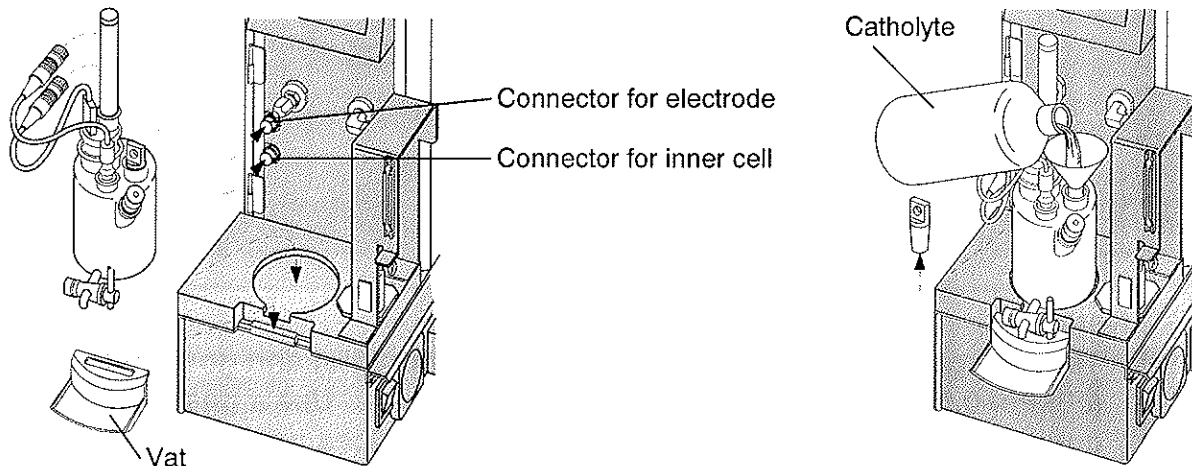


Note:

There is a hole for position adjustment. Make sure the center of turntable and the positioning hole sit in the table base.

2-2-6. Installation of titration cell

- 1) Install the supplied vat on stage of CHK-501.
- 2) Place the measuring cell of KF titrator on stage of CHK-501.
- 3) Connect the inner cell of titration cell and detection electrode to CHK-501.
- 4) Fill reagent in the cell. Approximately 10mL catholyte (e.g. Coulomat CG) for the inner cell and 150mL anolyte (e.g. Coulomat AG) for the outer cell.



2-2-7. Installation of heater tube

- 1) Turn on Main unit and move the arm toward the table by pressing [\triangleright] key 2 times, and then, lower the work holder by pressing [∇] key (Fig.1).

⚠ Caution!

When the power of this unit is turned on, the arm and turntable starts moving automatically to perform various function checks. It is dangerous to touch the system while it is in motion.

- 2) Turn off main unit.
- 3) Remove the nozzle cover (Fig.1).
- 4) Put the heat insulator in the vertical fitting as shown below, and insert the heater tube (Fig.2).
- 5) Fasten nozzle holder with screws 2 (Fig. 2). Fix the nozzle holder with the groove of heater tube (A as shown) fitted in.
- 6) Make sure the cap nut of nozzle is securely fixed (Fig.2).

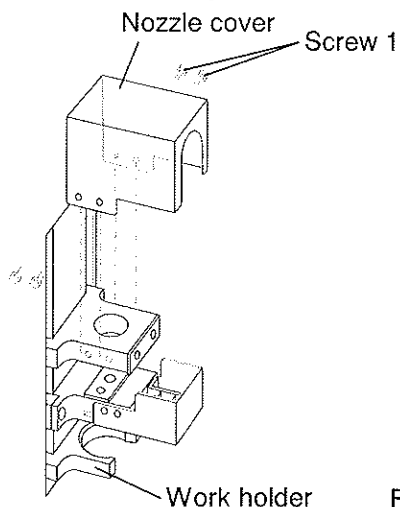


Fig.1

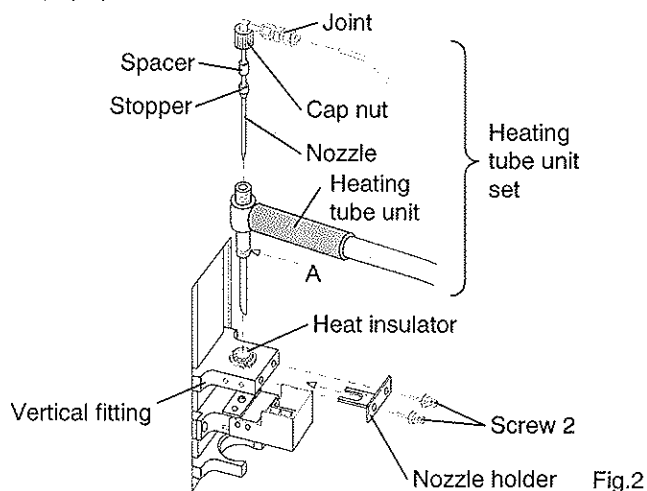


Fig.2

- 7) Install the bubbler tube onto the measuring cell (Fig.3).
- 8) Connect the heating tube unit to the bubbler tube, and fix the heating tube unit at the support prop (Fig.3).
- 9) Connect the supplied tube1 ($\phi 3 \times 2$) to the joint (showing "To Cell") in front of CHK-501 and to the bubbler tube (Fig.4).
- 10) Connect the supplied tube2 ($\phi 3 \times 2$) to the joint and "To Vial" in front of CHK-501 (Fig.4).
- 11) Remove the desiccant tube of measuring cell, and install the exhaust tube instead (Fig.3). Connect the supplied tube (985210060) to the tip of exhaust tube (Fig.3). The other end of tube (985210060) must be extended out where well ventilated enough to protect safety.
- 12) Install the nozzle cover by reverse (2) steps.
- 13) Connect the heating tube unit cable to the connector (Fig.3).

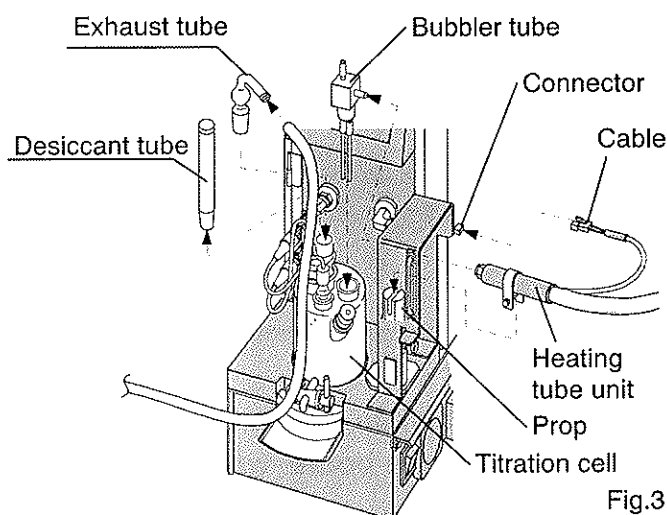


Fig.3

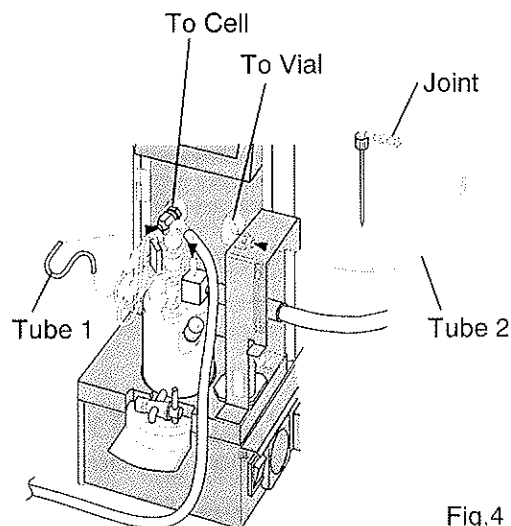


Fig.4

⚠ Caution!

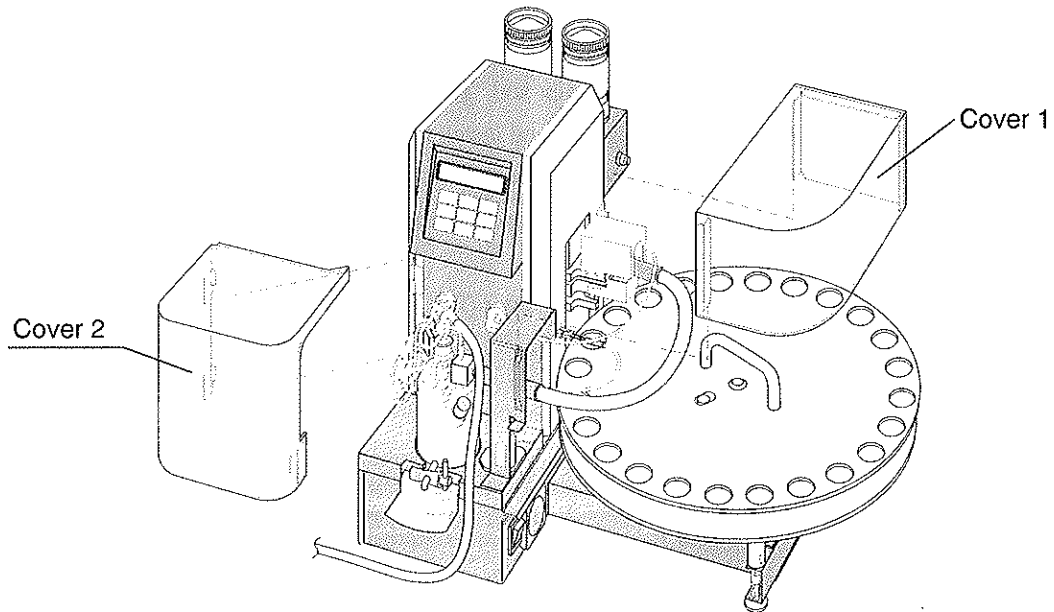
Apply KF grease around sliding area when installing the exhaust tube and bubbler tube. If the sliding is not well sealed, the measurement results may be affected.

Care must be taken not to bend and clog the tube connected to the exhaust tube.

If the tube is clogged, the reagent will flow backward through the tube and may damage the system.

2-2-8. Install the cover

Install cover 1 and 2 onto CHK-501.

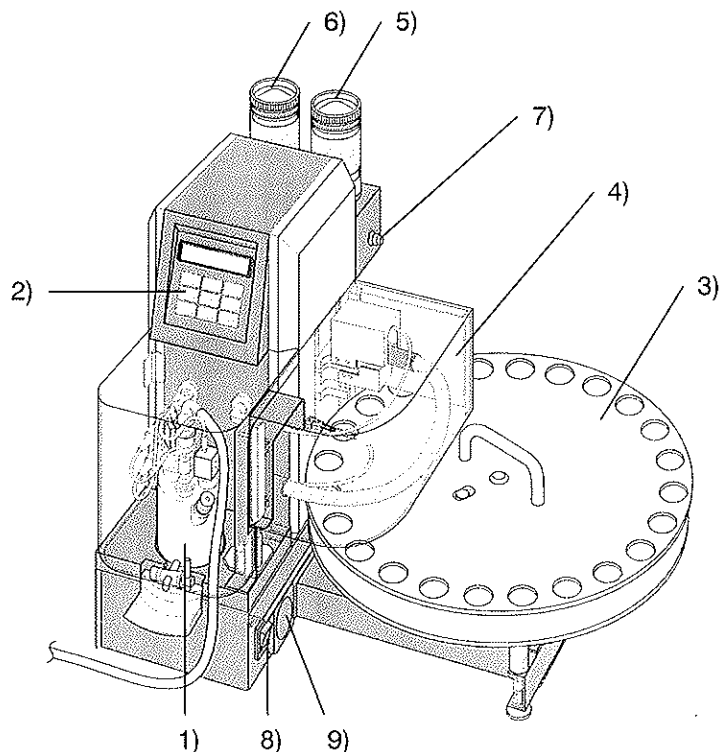


⚠ Caution!

You may get hurt if you touch the drive unit while the arm is in motion. Also you may get burnt if you touch the sample bottle, which is very hot right after measurement is over. Always install the covers to protect yourself in order to avoid injury by touching those parts without paying much attention.

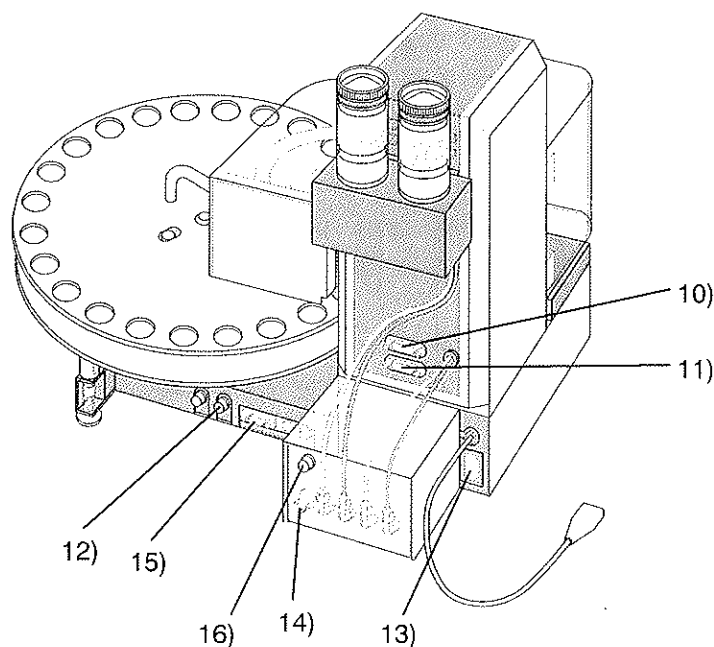
2-3. Parts configuration

< layout in front >



- 1) Titration cell
Sulfuric acid and water reacts in here for measurement.
- 2) Operating panel
The keypad and display screen are placed here for operating the unit.
- 3) Turntable
This is the rack called turntable to place vials for samples.
- 4) Cover
Protective cover to avoid touching erroneously the moving arm or vials.
- 5) Zeolite
Removes moisture of carrier gas passing through silica gel. Use Zeolite 5A.
- 6) Silica gel
Absorbs moisture of carrier gas. Silica gel turns to reddish color when its capacity runs down.
- 7) Flow rate control knob
Controls flow rate of carrier gas by turning the knob.
- 8) Power switch
Turns on/off the main unit.
When the power is turned on, it automatically checks the arm and turntable.
- 9) Air intake fan
Air intake with filter to cool off the device inside the unit.

< Rear layout >



10) Main unit port

This port is for Stirrer of KF titrator.

11) EXT. Cell port

When optional 2 channels unit is used, the stirrer cable for the additional unit is connected here. The additional unit is available only for MKC-520/MKC-510N coulometric KF titrator.

12) EXT. port

The optional cable for communication with KF titrator is connected here. The other end of cable goes to EXT. port of KF titrator.

13) ~ LINE

The power cord is connected here.

14) Carrier Gas In

Use a tube made of $\phi 6 \times \phi 4$ mm fluoride tube or stainless tube, and supply carrier gas of which pressure is reduced below 50kPa (0.5kgf/cm²).

15) RS232C I/O port

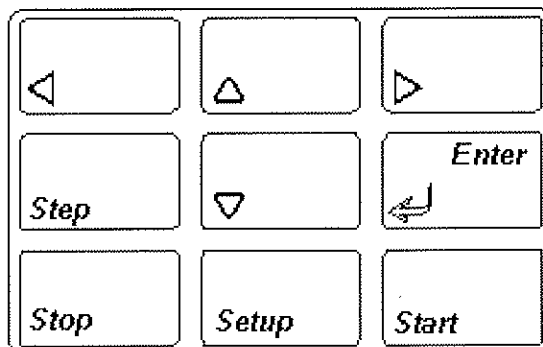
This port is for Printer or an external PC. This connector is D-sub 9 pin male.

16) EXT. Pump port

The optional automatic dispenser is connected here.

2-4. Function of each key (general)

The keypad has the layout of each key as below.



Here is the general description of each key:



Left/Right key

Key to move the arm backward/forward as well as select parameters.



Up/Down key

Key to move the arm vertically as well as select parameters.



Enter key

Key to confirm the key entry.



Step key

Key to turn the rack. It moves for one step when this key is pressed once. If pressed on, the turntable moves until it reaches home position.



Stop key

Key to stop movement or abort measurement.



Start key

Key to start measurement



Setup key

Key to select parameters.

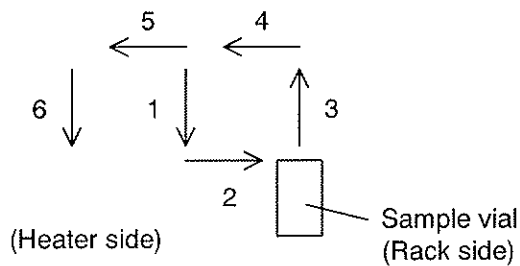
This key has the following functions:

1. Preparation : Preparation before measurement
2. Auto Power Off : Selection of automatic power-off
3. Valve Control : Switching gas line manually
4. Oven Temp. Set : Heating temperature setup
5. Sequence Mode : Event mode setup
6. Flow Rate Set : Gas flow rate setting and alarm
7. Interface : Print and external I/O setup
8. Beep : Beep setup
9. LCD Contrast : Display contrast
10. Serial/Version No. : Production number and software version
11. Maintenance : Maintenance check

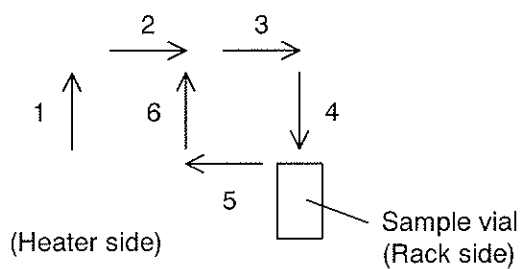
< Manual operation of the arm >

The arm moves by pressing the up/down and left/right key to the following order:

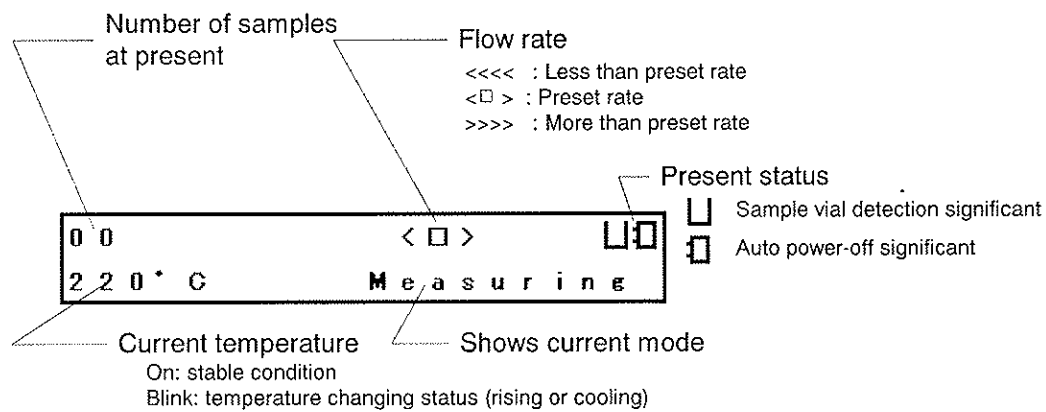
- 1) When placing a sample vial on the rack to heating position



- 2) When returning the sample vial from heating position to the rack



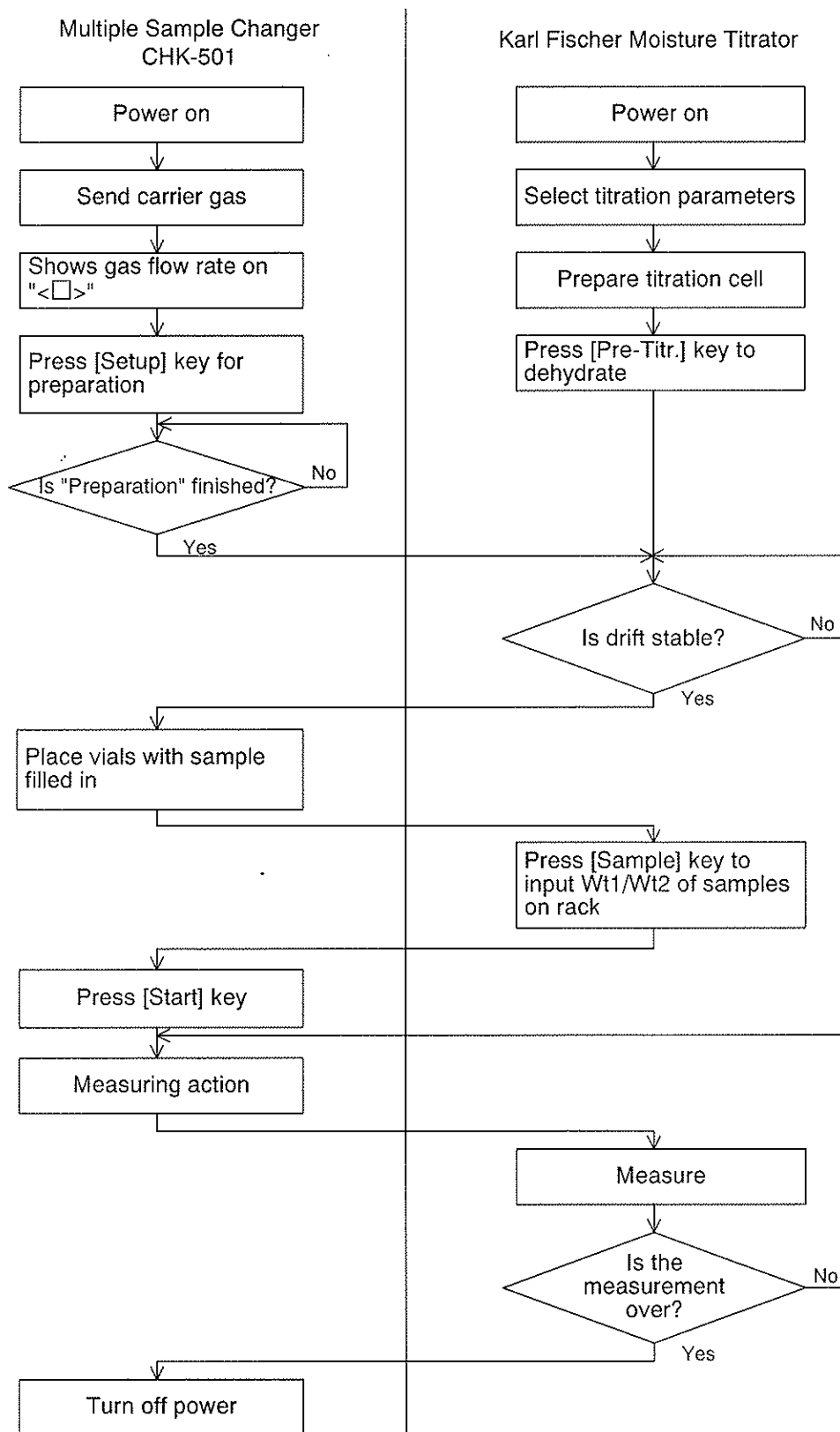
2-5. Description of display messages



3. Basic procedure of measurement

3-1. Flow of measurement proceedings

Measurement goes on according to the following steps. For details of each step, refer to the descriptions after this page.



3-2. Preparation of Karl Fischer moisture titrator

This sampler is connected to KF titrator, for which parameters need to be selected, including Titration parameter, Results parameter and Function. As an example, the below parameters are configured when Riedel-de Haen water standard is measured in KF-Oven mode.

Key	Parameter	MKC-520/MKC-510N	MKC-510
Titration	t (stir)	0s	0s
	t (wait)	15s	15s
	t (max) ^{*1}	1800s	1800s
	Drift Stop	Rel 0.01µg/s	Rel 0.01µg/s
	Control Gain	5.0	5.0
	Stable	0.1Δµg/min	0.1Δµg/min
	Start ^{*2}	Auto	Auto
	Oven ^{*3}	CHG-	CHG-
	Oven Temp. ^{*4}	220°C	220°C
	Cell Purge ^{*5}	0s	0s
	Sampler Purge ^{*6}	300s	300s
Result		Calculation	Calculation
	Calc. No. (1-6) ^{*7}	2	2
	Unit	%	%
	Weight	Variable	Variable
	Drift Comp.	Auto ^{*8}	Auto ^{*8}
Function	(Function 4)	Sample	Sample
	Sample File	On	On
	Size Only	On	On
	Weight←Conc.	5.55	5.55

*1) t (max) means maximum evaporation time.

Evaporating time needs to be changed depending on water content of sample

*2) Select Auto when this unit is connected.

*3) Select CHG- when this unit is connected.

*4) Oven Temp. means sample heating temperature. Heating temperature needs to be changed depending on the character of water to be measured and the sample.

*5) Select purge time for bypass line (See 4-1-4). When Sampler Purge is set to 0s, approximately 60s is recommended.

*6) Select purge time for sample vial. Set it to 0s when measuring coherent water over sample surface or evaporated sample at around room temperature.

*7) When CHG- is chosen on Oven, Calc. No.2 is fixed.

*8) When this unit is connected, the compensated values on Auto are as follows:

When only Sampler Purge is set : Drift level of carrier gas line at start (See 4-1-4)

Other than the above : Drift level of bypass line at start (See 4-1-4)

Note:

This sampler is used when KEM Karl Fischer moisture titrator is connected, and details of parameter settings are described in its manual.

< Examples of heating temperature for various samples >

Sample type	Sample name	Temp. (°C)
Plastics, Rubber	Phenol resin	110
	Polyethylene vinyl	130
	Styrene form	130
	Nylon-6 (for fabrics)	150
	Polyethylene	150
	Polycarbonate	150
	Polyvinyl alcohol	150
	Synthetic paper	150
	Rubber compound	150
	ABS resin	180
	Polypropylene	180
	Polyester	180
	Acetic fabric resin	180
	α -polyoximethylene	180
	Carbon black	200
	Polyacetal	200
	Nylon-66	230
	Polystyrene	230
	Polyethyleneteftarate	230
Epoxy resin	230	
Cosmetics	Carbonated calcium	100
	Zinc oxide	300
	Acetyl acid	300
Ores · Rocks Inorganic	Sodium nitrite	150
	Coal	180
	Ferrite	200
	Copper nitrate	250
	Titanium oxide	300
	Zinc oxide	300
	Iron oxide	300
	Carbonated manganese	300
	Carbonated calcium	300
	Grains, Starch	Soybean flour
Wheat flour starch		140
Raw rice grain flour		150
Wheat flour		150

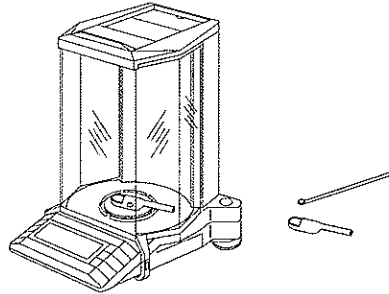
 **Caution!**

The above heating temperatures are examples and may not be applied to the similar sample. Always check heating temperature with the sample to be measured.

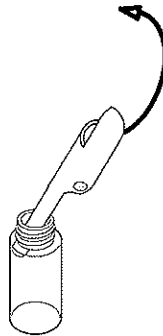
3-3. Preparation of sample

After sample is taken into the vial, seal and place it on the rack. Prepare a number of samples necessary for a series of measurements.

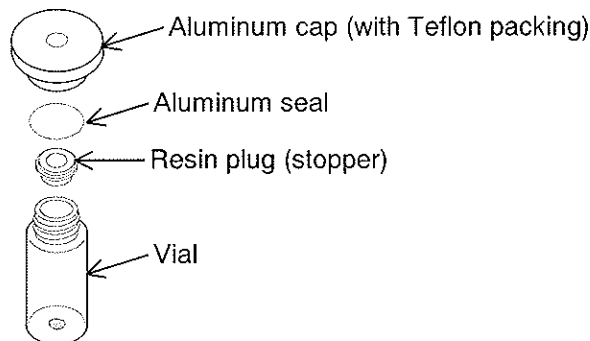
- 1) Prepare sample vials, resin plugs, aluminum seals and caps (with Teflon packing).
- 2) Attach aluminum seal on aluminum cap.
- 3) Put sample liquid in the sampler vessel. Weigh the sample + vessel. This weight is Wt_1 to be input into the titrator.



- 4) Turn the sampler vessel, and put the sample into sample bottle. Weigh the sampler with sample in it, and input its weight (Wt_2) into the titrator.



- 5) Sampling way may differ according to the character of the sample. Refer to the chart on the next page where precautions are listed and summarized.
- 6) Put resin stopper onto sample bottle, and seal it with aluminum cap.



- 7) Place sample vial on the turntable. Likewise, put other sample vials on the rack.

Character of sample	Remarks
When humidity is high	<ul style="list-style-type: none"> • Take due care of storage of reagent under nitrogen gas. • Sampling requires as low humidity as possible using a thermal bath or globe box. (Humidity can be reduced by nitrogen gas)
When sample is powder	<ul style="list-style-type: none"> • Do not splash sample liquid over inside wall of vial. • If a sample bottle falls down before measurement, repeat sampling again because part of the sample may stick to aluminum seal, which would cause less water content.
When sample is pellet	<ul style="list-style-type: none"> • Pellet sample may stick to sample bottle when melted by heating. Place a piece of aluminum sheet at the bottom of the bottle for sampling. In this case, moisture coherent to the aluminum may be considered, however, this method is effective where the sample with relatively large amount of water in it is melted by heating. The aluminum sheet needs to be placed at the bottom of the sample bottle.

3-4. Setting sample conditions

Make sample condition setting by “On” on “Sample File” by pressing “4. Sample” of [Function] key, which is described in 3-2. Preparation of Karl Fischer moisture titrator.

With sample file On, press [Sample] key.

Further on MKC-520/MKC-510N, select operator’s name and press [↵] key.

```

      <  SAMPLE  >
Meas. No. [  5 ]
Next Meas. [  1 ]
Method      : Fixed      Variable
Statistics : Off        On
Blank      [  0 ] µg

```

Display changes as above and set up conditions for sample file. Select item by cursor using [↑], [↓], [←], [→] key.

- Meas No. : the number of sample for measurement.
- Next Meas : the next number of sample to be measured
- Method : Select Fixed or Variable on Measurement Method
- Statistics : Select or not for batch data processing the samples of which high order number has been changed in Sample file.
- Blank : Enter bland value of sample vial

Press [Page down] key.

```

      <  SAMPLE  >
No. [  1 ]
Sample No. [ 01 ] - [ 01 ]
Form      : Sample Blank
Lot No.   [          ]
Wt 1      [  0.0978 ] g
Wt 2      [  0.0 ] g

```

Display changes as above and set up parameters by cursor using [↑], [↓], [←], [→] key.

To exit, press [Sample] key.

- No. : the number of sample being set up.
- Method : Select measurement Method. This will be displayed when Method Variable is selected on previous display.
- Sample No. : Sample number being set up.
- Form : Select measurement of Sample or Blank. (If it is Blank measurement, its results will be input to Bland automatically. If it is plural number of blank measurement, the average value will be input to Blank.)

Note:

This unit is used in conjunction with KEM KF moisture titrator. For parameter setting, refer to the section of sample file in its manual. With this combination, Calc. No. is fixed to 2.

3-5. Moisture measurement method

Auto measurement starts by pressing [Start] key on CHK-501.

When [Start] key is pressed during auto measurement, only CHK-501 stops.

When [Start] key is pressed again, it cancels the stop and resume measurement.

Function setup and Manual operation on CHK-501 are inhibited during measurement.

To abort measurement, press [Stop] key on CHK-501.

If measurement is stopped during sample heating, remove the sample vial according to 2-4. <Manual operation of the arm>.

Caution!

Before pressing [Start] key, make sure the desiccator has been replaced with the exhaust tube. Also, make sure the tube to the exhaust tube is not bent or clogged. If the tube is clogged, the reagent will flow backward through the tube and may damage the system.

3-6. Maintenance after measurement is over.

- 1) Look into the heater unit to check no sample vial remains inside. If any vial remains inside the heater, remove the sample bottle from heating unit according to 2-4. <Manual operation of the arm>.
- 2) Remove the exhaust tube and install the desiccant tube instead.
- 3) Close the nitrogen gas flow or shut off the pump and turn off the power of CHK-501.
- 4) Before storage for an extended period of time, install the bubbler tube back to sample inlet or ball stopper, which was once removed according to 2-2-7.

Caution!

In order to avoid danger from high heat of oven, turn off its power after measurement is over.

Be careful of partially hot sample vial and heater tube right after measurement.

Shut off main valve of Nitrogen gas after measurement.

4. Making the best use of the unit

4-1. Setup function

4-1-1. Outline

The CHK-501 is equipped with the following 11 kinds of special features:

Setup	1	Preparation	Preparation before measurement
Setup	2	Auto Power Off	Selection of automatic power-off
Setup	3	Valve Control	Switching gas line manually
Setup	4	Oven Temp. Set	Heating temperature setup
Setup	5	Sequence Mode	Event mode setup
Setup	6	Flow Rate Set	Gas flow rate setting and alarm
Setup	7	Interface	Print and external I/O setup
Setup	8	Beep	Beep setup
Setup	9	LCD Contrast	Display contrast
Setup	10	Serial/Version No.	Production number and software version
Setup	11	Maintenance	Maintenance check

4-1-2. Preparation before measurement (Setup 1: Preparation)

This unit is equipped with automatic purge of tube lines before measurement starts.

Setup(01-11) Preparation	01	1) Press [Setup] key. 2) Use [△][▽] key to show the message on the left, and press [↵] key.
-----------------------------	----	------------------------------------------------------------------------------------------------

Preparation? Set>		3) Use [◀][▶] key to show "Set>" or "Run>". 4) Confirm with [↵] key.
----------------------	--	-------------------------------------------------------------------------

Set> : Pre-start event setup
Run> : Activate pre-start event

When "Set>" is selected

Preparation? Set>		Set up parameters for pre-start event.
----------------------	--	----------------------------------------

Carriage? 0600s		1) With [◀][▶][△][▽] keys, select purge time for carrier gas line.
--------------------	--	--------------------------------------------------------------------

2) Confirm with [↵] key.

Bypass? 0600s		3) With [◀][▶][△][▽] keys, select purge time for bypass line.
------------------	--	---------------------------------------------------------------

4) Confirm with [↵] key.

Times? 03		5) With [◀][▶][△][▽] keys, select a number of event cycles for Carrier and Bypass.
--------------	--	------------------------------------------------------------------------------------

6) Confirm with [↵] key.

7) To return to Main, press [Setup] key again.

When “Run>” is selected

Preparation?
Run>

The pre-start event purges the tube lines.

Set Cup on No.1
and Press [↵] Key

- 1) Place an empty vial on No.1 position on the rack.
- 2) Press [↵] key to execute the command.

The turntable will start revolving, and the arm moves the sample vial to heating position. At heating position, it purges carrier gas line and bypass line alternately to the preset number of times.

- 3) To return to Main, press [Setup] key again.

4-1-3. Selection of Automatic Power-off (Setup 2: Auto Power Off)

This unit is equipped with automatic power-off when the measurement sequence is over.

Setup(01-11) 02
Auto Power Off

- 1) Press [Setup] key.
- 2) Use [△][▽] key to show the message on the left, and press [↵] key.

Auto Power Off?
Yes>

- 3) Use [◀][▶] key to select “Yes>” or “No>”.
- 4) Press [↵] key to execute the command.

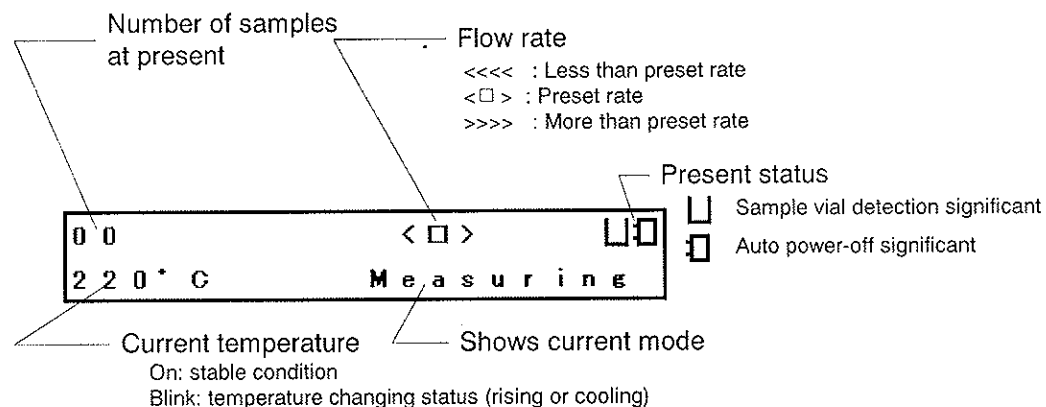
Yes> : Power and gas flow turns off after the sequence is over.

No> : Power does not turn off.

When Auto Power Off is on, its symbol appears on display.

- 5) To return to Main, press [Setup] key again.

Messages on Main display



Note:
Auto Power Off can be set in or canceled while the sequence is underway.

4-1-4. Switching gas line manually (Setup 3: Valve Control)

The system lines of this unit can be switched manually.

Setup (01-11)	03
Valve Control	

- 1) Press [Setup] key.
- 2) Use [Δ][∇] key to show the message on the left, and press [\leftarrow] key.

Valve Control?
Sample>

- 3) Use [\leftarrow][\rightarrow] key to change the line.

The line changes over when it is on display

Sample> : The line changes over to carrier gas line.

Bypass> : The line changes over to bypass line.

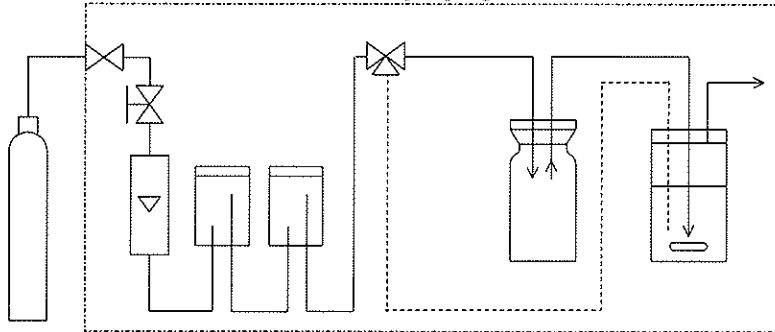
Shut> : The line closes.

(See below charts for each line)

- 4) To return to Main, press [Setup] key again.

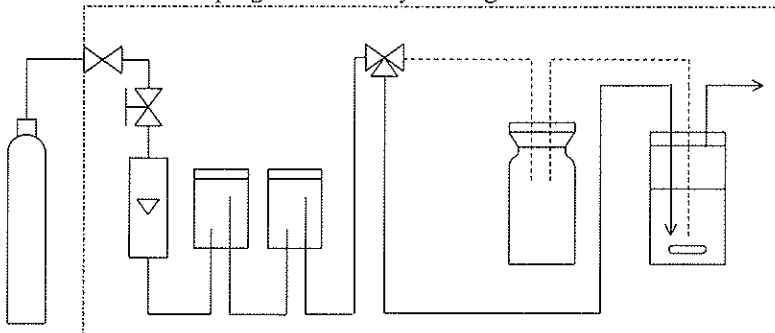
< Carrier gas line : Sample >

It switches to this line for measurement and sample purge.



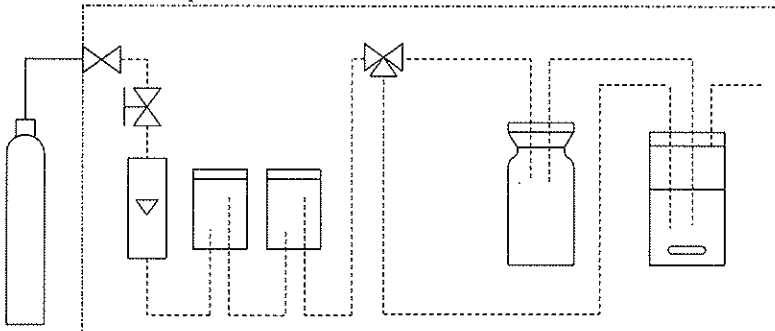
< Bypass line: Bypass >

It switches to this line for cell purge and stability waiting.



< Closing line: Shut >

It closes the line when it stops.



4-1-5. Heating temperature setup (Setup 4: Oven Temp. Set)

Here the control temperature for heater is set up. Setting can be made either auto or manual.

Setup (01-11)	04
Oven Temp. Set	

- 1) Press [Setup] key.
- 2) Use [Δ][∇] key to show the message on the left, and press [\downarrow] key.

Oven Temp. Set	
Auto>	

- 3) Use [\leftarrow][\rightarrow] key to select heating mode.
- 4) Press [\downarrow] key to execute the command.

Auto> : The temperature is set to the degree preset on KF titrator within its titration parameter. Temperature change is made on KF titrator.

Set> : Regardless of temperature preset on the connected unit, the heater temperature is significant when set up on this unit.

Off> : Heater is turned off.

Heating temperature setup

Oven Temp.?	
220°C	

- 1) With [\leftarrow][\rightarrow][Δ][∇] keys, select heater temperature.
- 2) Execute with [\downarrow] key to raise temperature.
- 3) To return to Main, press [Setup] key again.

Note:

When changing oven temperature according to the sorts of samples, select 'Auto' for 'Oven Temp. Set.'

4-1-6. Event mode setup (Setup 5: Sequence Mode)

This unit is equipped with various event modes including start positioning, starting condition setup, the number of measurements, stopping method and cup sensor detection as follows.

- | | |
|---------------|----|
| Setup (01-11) | 05 |
| Sequence Mode | |
- 1) Press [Setup] key.
 - 2) Use [Δ][∇] key to show the message on the left, and press [\leftarrow] key.

Start position setup

- | | |
|-----------------|--|
| Start Position? | |
| Home> | |
- 3) Use [\leftarrow][\rightarrow] key to select a position to start.
 - 4) Press [\leftarrow] key to execute the command.
 - Home> : The sequence starts from No. 1 position on the rack.
 - Variable> : The turntable revolves, and measurement starts from the first vial.

Start condition setup

- | | |
|-----------------|--|
| Start Mode? | |
| Prep. + Sample> | |
- 5) Use [\leftarrow][\rightarrow] key to select conditions to start.
 - 6) Press [\leftarrow] key to execute the command.
 - Prep. + Sample> : The first vial is pre-treated under the preset condition, and then goes to sequential sample measurements
 - Sample> : Measurement sequence starts from the first sample.

Number of measurements setup

- | | |
|------------------|--|
| Measuring Times? | |
| 01 | |
- 7) With [\leftarrow][\rightarrow][Δ][∇] keys, select a number of measurements.
 - 8) Execute with [\leftarrow] key.

The number of measurements means a plural number of measurements can be performed for one sample. Coherent water and combined water can be measured separately. (See 4-2)

Stopping method

- | | |
|------------|--|
| Stop Mode? | |
| Auto> | |
- 9) Use [\leftarrow][\rightarrow] key to select stop conditions.
 - 10) Press [\leftarrow] key to execute the command.
 - Auto> : The measurement stops when no more sample vial is found on the rack.
 - Set> : Measurement stops after all the samples preset on KF titrator are finished.

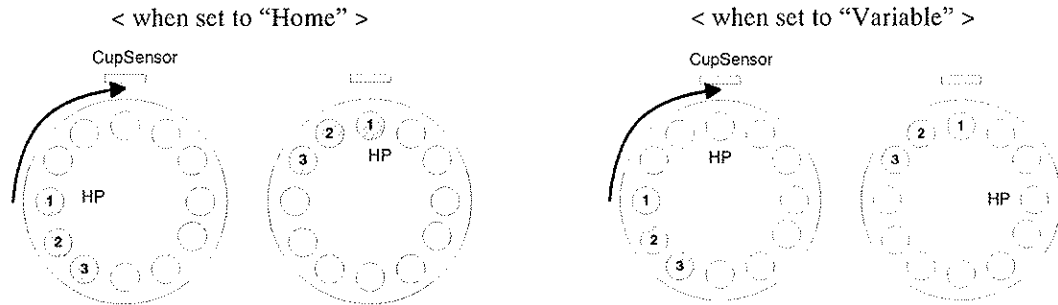
Cup sensor setup

- | | |
|-------------|--|
| Cup Sensor? | |
| Cup Err> | |
- 11) Use [\leftarrow][\rightarrow] key to select the event by cup sensor.
 - 12) Press [\leftarrow] key to execute the command.
 - Cup Err> : When a sample vial is not found, it takes for Cup err, and goes to the next sample.
 - Skip> : The rack keeps turning round, and stops for measurement when it finds a sample vial.
 - Off> : Regardless of sample vial on the rack, it simply performs measurement sequence.

*This appears when Stop mode is Set>.

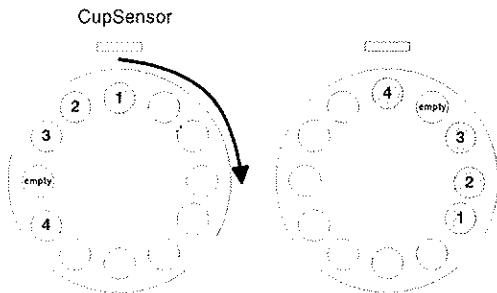
< About Sequence mode and Rack motion >

1. Start Position event



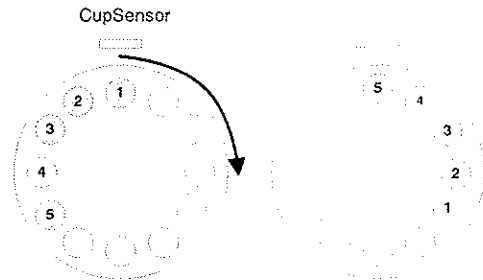
2. Stop mode and Cup sensor action

Stop Mode = "Set"
Cup Sensor = "Skip"



Skip : Measurement is performed only for a vial on rack, and skips those positions without vial. It continues until it finishes the preset number of measurements.

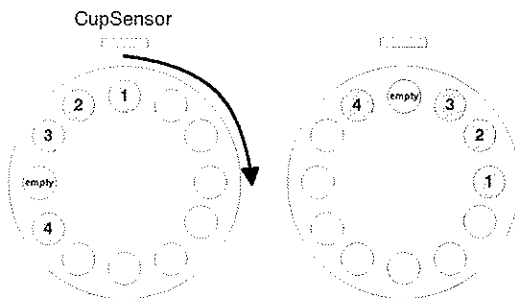
Stop Mode = "Set"
Cup Sensor = "Cup Err" or "Off"



Cup Err : If No.4 position is empty, it takes for Cup err, and goes to the next vial. (next vial of Sample file)

Off : Regardless of vial on No. 4 position, it performs measurement action, and the rack turns round for the preset number of measurements.

Stop Mode = "Auto"
Cup Sensor = no setting



When no more vial is found, it stops and sets in maintenance events.

Note:

When 'Stop Mode' is set on 'Auto' and the turntable is fully loaded with vials, the turntable will not stop.

4-1-7. Gas flow rate setting and alarm (Setup 6: Flow Rate Set)

Set gas flow rate. When the flow rate changes from the center of preset flow rate bar on display, it beeps for alarm. Normally, the center flow rate is set to 200mL/min.

- | | |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Setup(01-11) 06
Flow Rate Set | 1) Press [Setup] key.
2) Use [Δ][∇] key to show the message on the left, and press [\leftarrow] key. |
| Flow Rate?
200mL/min | 3) Use [\leftarrow][\rightarrow][Δ][∇] key to enter center flow rate.
4) Press [\leftarrow] key to confirm. |
| Low Rate Warning?
Off> | 5) Use [\leftarrow][\rightarrow] key to select beep alarm when flow rate goes down below the setting.
6) Press [\leftarrow] key to execute the command.
On> : It beeps.
Off> : No beep sounds. |
| “When On> is selected”
Low Rate Limit?
060mL/min> | 7) Use [\leftarrow][\rightarrow][Δ][∇] key to enter flow rate for alarm.
8) Press [\leftarrow] key to confirm. |
| Over Rate Warning?
Off> | 9) With [\leftarrow][\rightarrow] keys, set alarm when flow rate goes higher than the setting.
10) Press [\leftarrow] key to execute the command.
On> : It beeps.
Off> : No beep sounds. |
| “When On> is selected”
Over Rate Limit?
350mL/min> | 11) Use [\leftarrow][\rightarrow][Δ][∇] key to enter flow rate for alarm.
12) Press [\leftarrow] key to confirm.
13) Press [Setup] key again and return to Main display. |

Note:

Setup 8: Beep must be set to Yes for beep alarm.

4-1-8. Print and external I/O setup (Setup 7: Interface)

This unit is standard equipped with RS232C interface, and the serial port is used to control by an external computer or print out parameters.

- | | |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Setup(01-11) 07
Interface | 1) Press [Setup] key.
2) Use [Δ][∇] key to show the message on the left, and press [\leftarrow] key. |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|

Port Mode?
Printer>

- 3) With [◀][▶] keys, select port mode.
- 4) Press [↵] key to execute the command.
 - Printer> : Parameters can be printed out by KEM impact dot printer Model IDP-100. (See 4-4)
 - Computer> : Configure communication protocol to control this unit by an external PC.
- 5) Press [↵] key to show the next display.

When "Printer>" is set to print parameters

Print?
Yes>

- 1) With [◀][▶] keys, select printing or not.
- 2) Press [↵] key to execute the command.
 - Yes> : Printing is on.
 - No> : No printing.

When "computer>" is selected

Baud Rate?
4800>

- 1) With [◀][▶] keys, select communication protocol as shown below.
- 2) Press [↵] key to confirm.
 - Baud Rate : 300>, 600>, 1200>, 2400>, 4800>, 9600>
 - Parity : None>, Odd>, Even>
 - Stop Bits : 2>, 1>
 - Data Bits : 8>, 7>

4-1-9. Beep setup (Setup 8: Beep)

Here, the beep is selected at time of key entry, and when alarm sequence is over.

Setup (01-11)	08
Beep	

- 1) Press [Setup] key.
- 2) Use [△][▽] key to show the message on the left, and press [↵] key.

Beep?
Yes>

- 3) Use [◀][▶] key to select setting.
- 4) Press [↵] key to confirm.
 - Yes> : It beeps.
 - No> : No beep sounds at all.
- 5) Press [Setup] key and return to Main display.

4-1-10. Display contrast (Setup 9: LCD Contrast)

The brightness of screen is adjusted here.

Setup (01-11)	09
LCD Contrast	

- 1) Press [Setup] key.
- 2) Use [△][▽] key to show the message on the left, and press [↵] key.

LCD Contrast?
Dark:<0-6>:Light 3

- 3) Use [△][▽] key to select LC brightness.
- 4) Press [↵] key to confirm.
- 5) Press [Setup] key again and return to Main display.

4-1-11. Production number and software version (Setup 10: Serial/Version No.)

Here you can check the unit serial number and software version, both of which are necessary if case for contact KEM or its distributor.

Setup (01-11) 10 Serial/Version No.	1) Press [Setup] key. 2) Use [△][▽] key to show the message on the left, and press [↵] key.
Serial :QWA00000 Version :1.00	3) Press [↵] key to return to Main display.

4-1-12. Maintenance check (Setup 11: Maintenance)

This function gives precautions on erroneous settings or malfunctioning.

Setup(01-11) 11 Maintenance	1) Press [Setup] key. 2) Use [△][▽] key to show the message on the left, and press [↵] key. 3) Use [△][▽] key to select maintenance check.
-------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------

Maintenance checks the following items:

- | | |
|-------------------|------------------------------------------------------------------------------------|
| 1. Memory Clear | All parameters are initialized to default at time of shipment. |
| 2. Sequence Check | Checks configured contents by test running. |
| 3. Keypad Check | Checks the function of keypad. |
| 4. Display Check | Checks missing or distorted characters on display. |
| 5. Sensor Check | Checks the performance of each sensor |
| 6. Connect Check | Checks connection to KF titrator |
| 7. RS Check | Checks the performance of serial port. An optional Tester for RS-232C is necessary |

< Memory Clear >

The parameters are initialized to default.

Memory Clear? Yes>	1) Use [△][▽] key to show the message on the left. 2) Use [◀][▶] key to select "Yes>".
-----------------------	-------------------------------------------------------------------------------------------

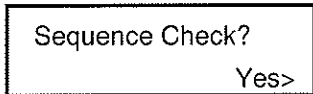
Turn Off Switch and Turn On Again	3) Press [↵] key to show the display on the left. 4) Turn off power once, and on again. Beep will sound to initialize all parameters.
--------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------

Note:

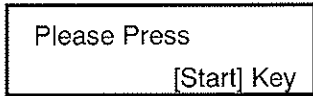
Communication protocol will not be initialized when Memory Clear is executed. Each digital configuration needs to be changed.

< Sequence Check >

Testing sequence under preset conditions



- 1) Use [Δ][∇] key to show the message on the left.
- 2) Use [\triangleleft][\triangleright] key to select "Yes>".

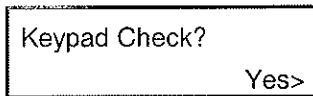


- 3) Press [\downarrow] key to show the display on the left.
- 4) Place 3 to 5 empty vials and press [Start] key.

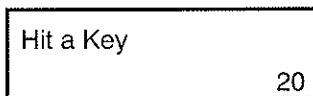
It will test-run according to the preset mode.

< Keypad Check >

Testing sequence under preset conditions



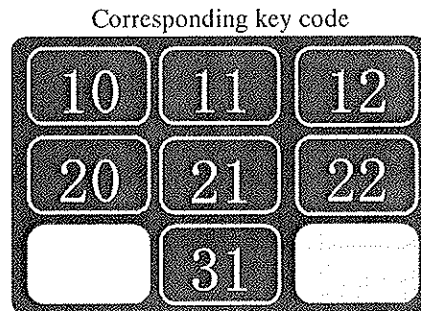
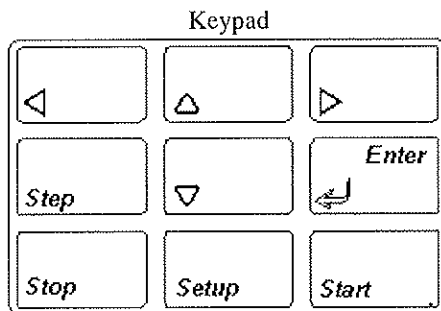
- 1) Use [Δ][∇] key to show the message on the left.
- 2) Use [\triangleleft][\triangleright] key to select "Yes>".



- 3) Press [\downarrow] key to show the display on the left.
- 4) Press [Setup] key on keypad.

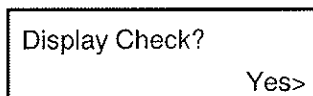
If the keypad is normal, keycode:20 or the like will appear. See below key code chart.

- 5) By pressing on [Step] key, the display returns to Setup menu.

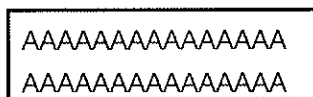


< Display Check >

Display is tested here.



- 1) Use [Δ][∇] key to show the message on the left.
- 2) Use [\triangleleft][\triangleright] key to select "Yes>".



- 3) Press [\downarrow] key to show the display on the left
Display shows characters like 0 to 9, A to Z or a to z.
- 4) To finish, turn off the power once, and on again.

< Sensor Check >

Here the performance of each sensor is checked.

Sensor Check?
Yes>

- 1) Use [Δ][∇] key to show the message on the left.
- 2) Use [\triangleleft][\triangleright] key to select "Yes>".

Set Cup on No.1
and Press [\downarrow] Key

- 3) Press [\downarrow] key to show the display on the left. Place a sample vial on No.1 position, and press [\downarrow] key again.
The rack will turn to move the vial to transfer position.

Result Sensor Check
OK

- The arm activates for a series of events.
- 4) When the performance is found to be normal, the left message will appear. If an error is found, the sensor number will be shown.
- 5) Press [\downarrow] key to return to Setup menu.

< Connect Check >

The connection to other device is checked here.

Connect Check?
Yes>

- 1) Use [Δ][∇] key to show the message on the left.
- 2) Use [\triangleleft][\triangleright] key to select "Yes>".

Result Connect Check
OK

- 3) Press [\downarrow] key to show the left message.
If any malfunctioning is found, NG will appear.
- 4) Press [\downarrow] key to return to Setup menu.

Note:

This function checks are available with the cable (980303388) for connecting device which is compatible with this unit.

< RS Check >

Here the performance of serial port is checked. This check requires the optional Tester for RS-232C (980900007).

RS Check?
Yes>

- 1) Use [Δ][∇] key to show the message on the left.
- 2) Use [\triangleleft][\triangleright] key to select "Yes>".

Result RS Check
OK

- 3) Press [\downarrow] key to show the left message.
If any malfunctioning is found, NG will appear.
- 4) Press [\downarrow] key to return to Setup menu.

Note:

This check requires the optional Tester for RS-232C (980900007). Contact your local dealer or sales representative for purchasing the checker.

4-2. Separate measurement of coherent and combined water

In order for separate measurement of coherent and combined water, the number of measurements on “Setup 5: Sequence Mode” has to be changed. Also, make sure “Setup 4: Oven Temp. Set” (See 4-1-5) is set to Auto.

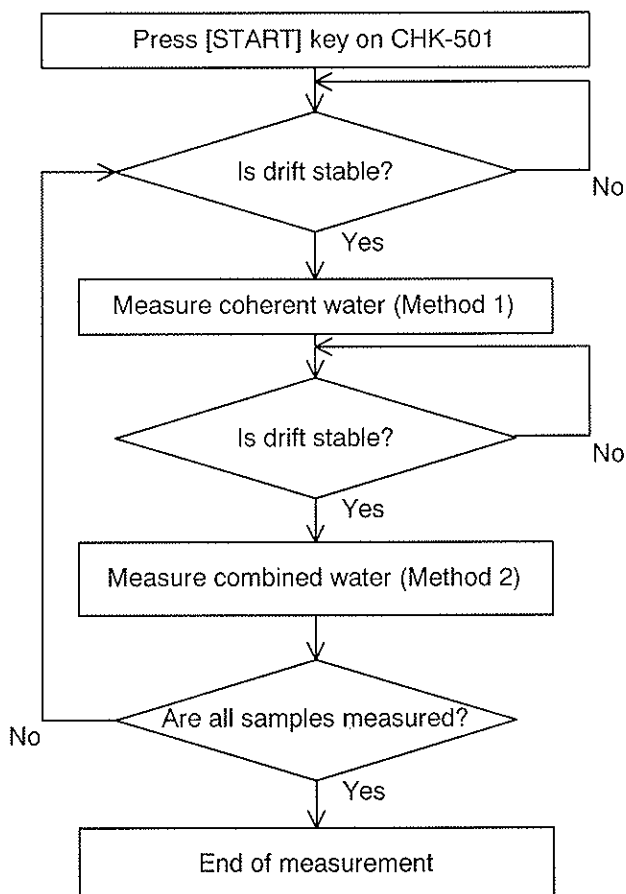
4-2-1. Setting a number of measurements

Setup (01-11) 05 Sequence Mode	1) Press [Setup] key. 2) Use [Δ][∇] key to show the message on the left, and press [\downarrow] key.
Measuring Times? 02	3) Use [\leftarrow][\rightarrow] key to show the left screen. 4) With [\leftarrow][\rightarrow][Δ][∇] keys, select a number of measurements.

4-2-2. Preparation for Karl Fischer titration and reagent

- 1) Select a number of measurements for Method parameter of KF titrator. (See 3-2)
- 2) With Sample file is On, press [sample] key to set up parameters. (See 3-4) Select Meas. No. by Number of measurements \times Number of samples, and select Variable for Method. Press [Page Down] key to change Method.

For example, below flow chart shows measurement parameter for coherent water is set on Method 1 and combined water on Method 2.

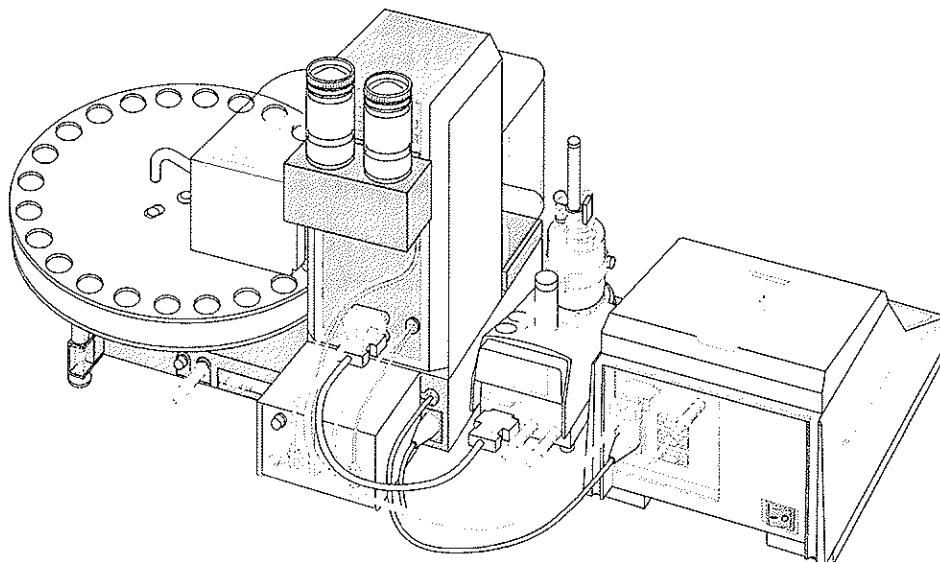


4-3. Optional 2 channels kit

When MKC-520/MKC-510N KF titrator is connected, both evaporation method with the sample changer and the titration cell method with sample fed directly in it can be performed by switching with additional 2 channels kit.

4-3-1. Connecting 2 channels kit

- 1) Turn off the main power.
- 2) With the stirrer cable (0.3m), connect EXT.Cell on the back of Main and Main port on the back of Stirrer supplied with the KF titrator.



The titration cell on added stirrer side is the second channel. On Method setup for KF titrator, define the channel. Method can be changed for use.

Note:

For method configuration, refer to the manual for KF titrator.

Note:

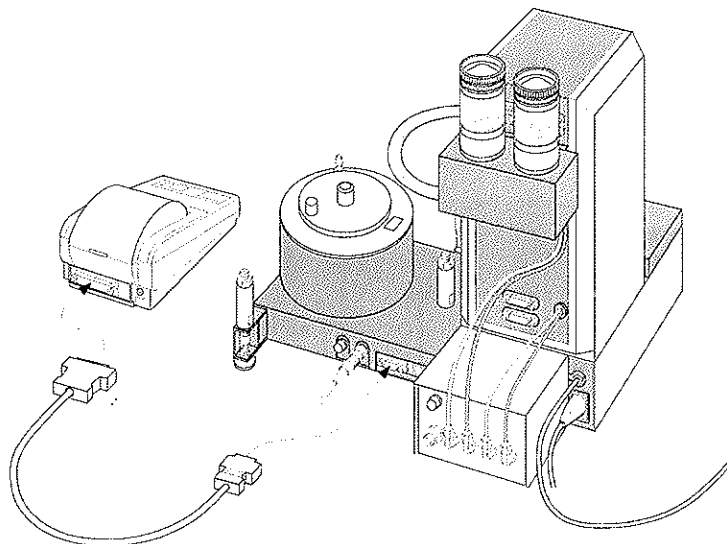
Use the stirrer cable 0.3m (980300020) for additional channel.

4-4. Optional printer (IDP-100)

4-4-1. Connecting printer

The optional printer (IDP-100) can print out parameters. Connect it as follows:

- 1) Remove the turntable.
- 2) With the connecting cable, connect the printer and RS232C port of this unit.
- 3) Connect the adapter (AC) for power supply to Printer.
- 4) Make sure the power for printer is off, connect AC adapter to power outlet.



⚠ Caution!

The AC adapter differs from line power voltage. Make sure of the rating of AC adapter.

If a wrong adapter is used, it may cause malfunction of the device and fire hazard.

Note:

The communication conditions for IDP-100 should be:

Baud rate	4800
Parity	no
Stop bit	1bit
Data bit	8bits (Default for IDP-100)

For the setup of communication conditions on IDP-100, see the Operation manual for IDP-100.

4-4-2. Print the parameters

To print out parameters, use “Setup 7: Interface”. Follow the below steps:

- | | |
|------------------------------------|------------------------------------------------------------------------------------------------|
| Setup (01-11) 07
Interface | 1) Press [Setup] key.
2) Use [△][▽] key to show the message on the left, and press [↵] key. |
| Port Mode?
Printer> | 3) Use [◀][▶] key to select “Printer>”.
4) Press [↵] key to show the left screen. |
| Print?
Yes> | 5) With [◀][▶] key, choose “Yes>”.
6) Press [↵] key to start printing. |

< Example of printout >

<pre> Model :CHK-501 Serial No. :QWA00000 Version No. :1.00 ****SETUP**** <Preparation> Carriage :**** s Bypass :**** s Times :** <Auto Power Off> Auto Power Off :No <Oven Temp.> Oven Temp. Set :Set Oven Temp. :**** C <Sequence Mode> Start Pos. :Variable Start Mode :Prep.+Samp Meas. Times :** Stop Mode :Set Cup Sensor :Cup Err </pre>	<pre> <Flow Rate Set> Flow Rate :**** mL/min Low Rate Warning :On Limit :**** mL/min Over Rate Warning :On Limit :**** mL/min <Interface> Port Mode :Printer Printer :IDP- <Beep> Beep :Yes <LCD Contrast> LCD Contrast :3 Date _____ Name _____ </pre>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

4-5. RS-232C interface

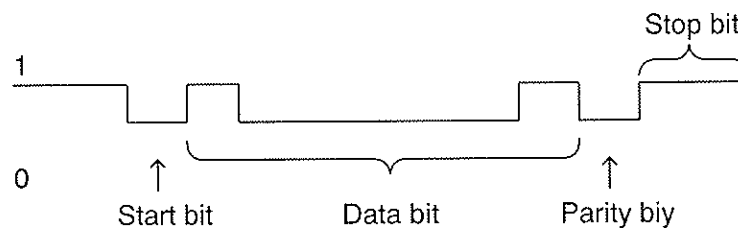
This unit is equipped with RS232C, which is one of the standard bit serial communication interfaces with computers.

RS-232C is the standardized interface for data transfer between a modem (modulated device) and a terminal (peripheral).

This unit is set to terminal mode for a peripheral for external computer. Most of the present personal computers on the market are equipped with RS-232C interface and set to terminal mode, however, data communication between peripherals can be made by way of connecting technique. (Some computers can switch the mode from/to modem and terminal.)

< Signal level >

Logic	Signal level
1	-3 ~ -15 [V]
0	+3 ~ +15 [V]



< Connector >

The pin shape is p-pin male type.

Pin number	Signal name	Direction
2	RXD (Receive Data)	IN
3	TXD (Transmit Data)	OUT
4	DTR (Terminal Ready)	OUT
5	SG (Signal Ground)	
6	DSR (Data Set Ready)	IN
7	RTS (Request To Send)	OUT
8	CTS (Can Transmit Signal)	IN

[Caution]

TXD and RXD data signals are negative logic. RTS, CTS, DSR, DTR control signals are positive.

< Data I/O via RS232C >

For details of commands and data format for data input and out by RS232C, please refer to the manual for RS232C.

< Communication protocol >

This unit can be controlled by an external computer by way of RS232C. Make settings according to "Setup 7: Interface" described earlier.

Note:

The communication protocol between PC and Main unit must accord. If not correctly configured, the data may be lost or the communication may stop halfway.

5. Maintenance

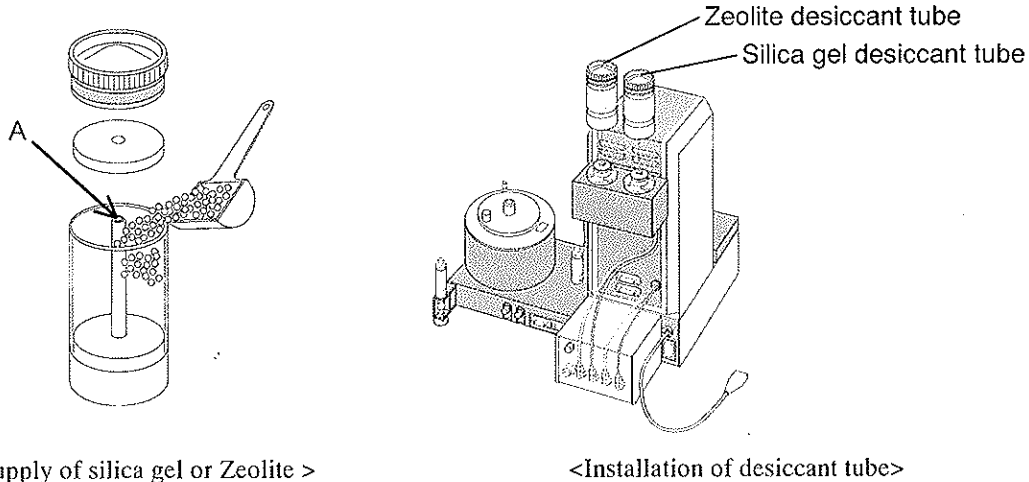
5-1. Daily check

5-1-1. Replacement of silica gel and Zeolite

Change silica gel with new one when the silica gel in container looks reddish, which shows its hygroscopic capacity is running down.

When the hygroscopic capacity of Zeolite runs down, the background or drift level of carrier gas for KF titrator jumps up 2 to 3 times than before. Change such Zeolite with new one.

When changing the desiccant, hold part A as shown in below figure.



Note:

The background or drift level of KF titrator goes up due to reagent life or leak from tube lines. Check these factors as well as Zeolite capacity.

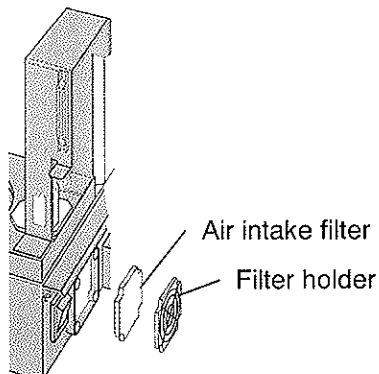
Caution!

Fill silica gel or Zeolite with a few mm air gap at top. If squeezed in too much, it may cause unstable flow of carrier gas.

5-1-2. Changing air intake fan filter

When it gets dirty, change the filter:

- 1) Remove the holder of fan. (Just pull out the holder. No need to undo screws.)
- 2) Change the filter and reassemble it.



5-1-3. Cleaning and drying sample vials

The sample vials must be cleaned after use. If stains remain inside, use a brush to remove them. After dried, keep them in a desiccant container.

5-2. Other maintenance tips

5-2-1. Replacement of heater tube

When the heater tube is bent or clogged, gas flow is weakened, and the heater tube needs to be changed. Remove the heater tube as follows. For installation, see 2-2-7.

Note:

If the stopper is deformed and unable to be removed, change the stopper.

- 1) Disconnect the cable from heater tube (Fig.1).

! Caution!

Before changing the heater tube, plug out the connector and wait until it cools off.

- 2) Turn on the power, and with [\triangleleft][\triangleright] key, move the arm onto the table, and then, lower the work holder with [∇] key (Fig.2).

! Caution!

When the power of this unit is turned on, the arm and turntable starts moving automatically to perform various function checks. It is dangerous to touch the system while it is in motion.

- 3) Turn off main unit.
- 4) Loosen the screw to remove the heater tube from the prop. (Fig.1)
- 5) Remove the heater tube from bubbler tube (Fig.1).
- 6) Undo the screw 1 on both sides of the arm, and remove the nozzle cover (Fig.2).

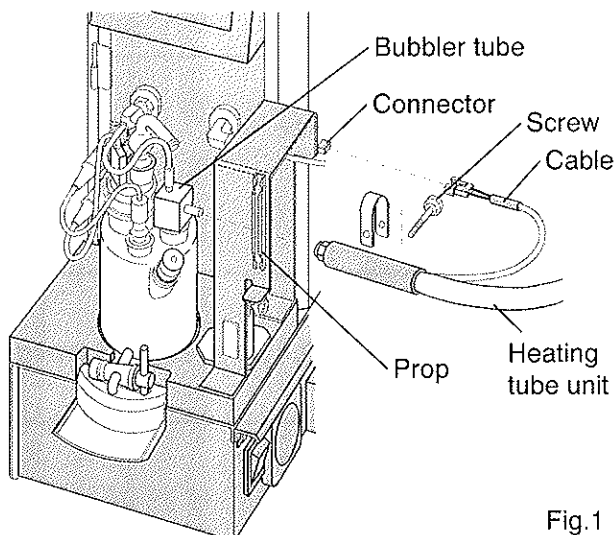


Fig.1

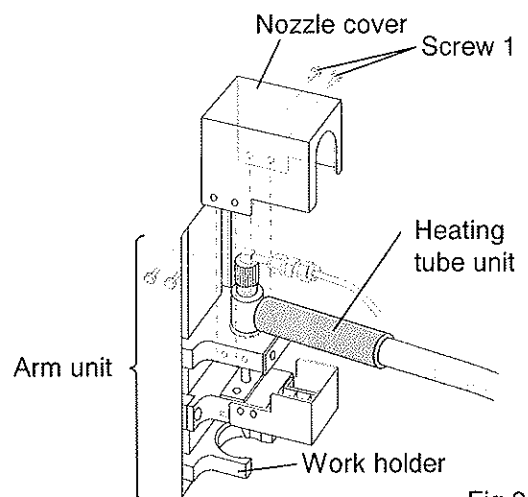
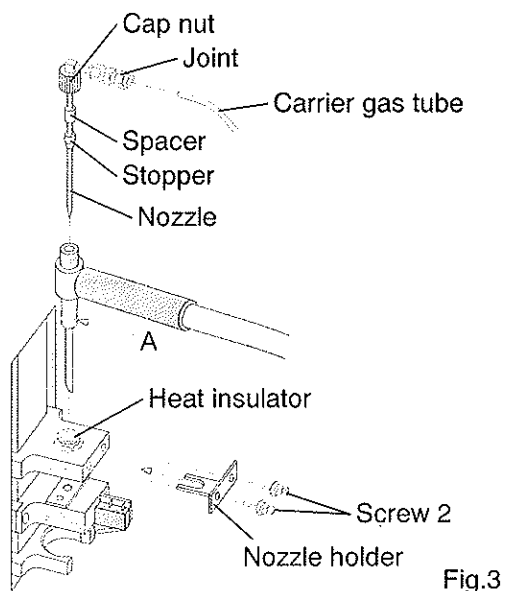


Fig.2

- 7) Remove carrier gas line from the joint (Fig.3).
- 8) Undo the screw2 of the arm in front, and remove nozzle holder (Fig.3).
- 9) Remove the heater tube (Fig.3).
- 10) Loosen the cap nut and pull out the nozzle upward. (Fig.3)
- 11) Remove the spacer and stopper from heater tube.



5-2-2. Cleaning heater tube

When the heater tube is clogged with stains, carrier gas may stop flowing or the drift level of KF titrator may not be stable, and the heater tube needs to be cleaned.

- 1) Remove the heater tube according to 5-2-1. Replacing the heater tube.

Note:

If it is difficult to remove the stopper from heater tube, do not attempt to do so. Instead, clean it first.

- 2) With a syringe or cleaning bottle, inject ethyl alcohol into the heater tube.
- 3) Repeat this 3 to 4 times.
- 4) Dry the heater tube by blowing dry air or nitrogen gas.

Note:

If the drift level of KF titrator remains more than $0.4\mu\text{g/s}$, repeat purge drying.

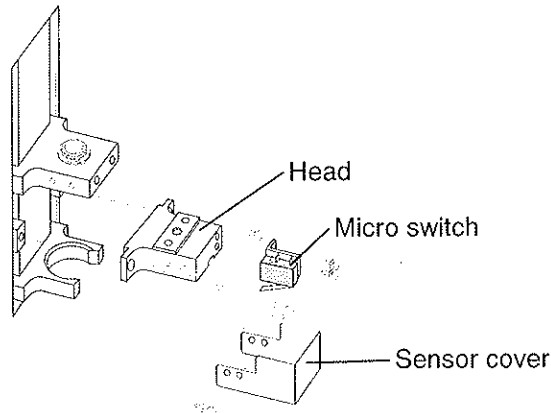
5-2-3. Changing packing seals

The packing materials used in this unit are important in moisture titration. They must be replaced periodically.

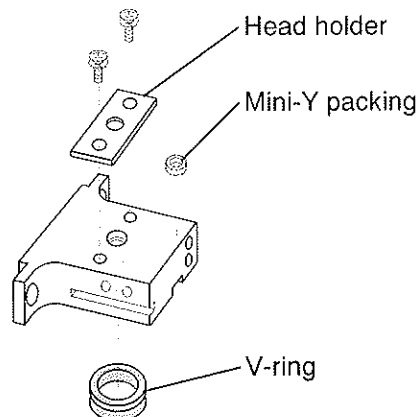
Caution!

Replacing job must be performed after the arm unit cools down.

- 1) Turn on the unit and move the arm onto the table by manual operation ([▷] key).
- 2) Remove the heater tube according to 5-2-1 Replacing the heater tube.
- 3) Turn off main unit.
- 4) Remove the sensor cover.
- 5) Remove the micro switch.
- 6) Undo the screw on the head to remove it.



- 7) Remove the head holder.
- 8) Change the mini-Y packing. (Mini-Y packing with groove is the bottom side)
- 9) Apply KF grease inside mini-Y packing.
- 10) Change the V-ring on the back of the head. (Push on V-ring to install. Care must be taken not to scratch V-ring face)



- 11) Install the head holder.
- 12) Install the head and micro switch, and then push in the cable into the groove, and put on sensor cover.
- 13) Install the heater tube and nozzle cover according to 2-2-7. Installation of Heater Tube.

Note:

**Care must be taken not have scratch or dust over the surface of packing.
Scatched or dusty face will cause leak.**

6. Troubleshooting

6-1. Error messages and remedies

Display	Trouble	Remedies
Cup Error	Sample vial is not positioned for measurement on table.	Place sample vial and press [Start] key.
Arm Error	Attempted to move the arm, which is not ready to move.	Press [Stop] key to cancel error, and return the vial to the rack. If the arm does not move, contact your dealer.
Arm Timeout	The arm action did not finish within 30 seconds.	Press [Stop] key to cancel error, and remove any obstacle. If the arm does not move, contact your dealer.
Table Error	Attempted to move the rack, which is not ready to move.	1) Press [Stop] key to cancel error. 2) Lift the arm with [△] key. With [◁] key move the arm off table. 3) Press [Step] key to turn the rack for 1 step.
Table Timeout	The turntable did not finish its event within the time limit.	Press [Stop] key to cancel error, and remove any obstacle. If it does not work, contact your dealer.
Connect Error	Communication failure with KF titrator.	1) Make sure the power for KF titrator is on. 2) Check the cable connection. 3) Perform Connect Check on Maintenance function of Setup menu. 4) Change the connecting cable.
Low Flow Rate	This message appears when carrier gas flow rate goes down below preset level while measurement is underway.	1) Make sure the flow rate knob is adjusted to correct level. 2) Check connection of carrier gas tube line. 3) Check gas pressure. 4) Check any clogging in air hole of desiccant tube.
Over Flow Rate	This message appears when carrier gas flow rate goes up above preset level while measurement is underway.	1) Check the gas pressure. 2) Check the flow rate control knob.
Table Not Found	This appears when the rack is not correctly installed.	Check the installation and correct it.
MKC Error	This error is on MKC-520 (MKC-510N, MKC-510).	Look up to the manual for MKC-520 (MKC-510N, MKC-510).
Temp. Error	This appears when temperature did not reach present degree within the time.	Contact your local dealer or sales representative.

Note:

If other Error than “Cup error” and “Table Not Found” error appears, Cup error appears, the power for heater turns off for safety.
After remedied as above, turn on the power again.

6-2. When carrier gas (nitrogen) does not flow

Trouble	Remedy
1) Tubes are not connected correctly.	1) Correct the connection.
2) Main valve of gas is not opened.	2) Open the gas.
3) Gas pressure is low.	3) Replace the gas cylinder.
4) Governor pressure is low.	4) Adjust the pressure.
5) Flow control valve is closed.	5) Adjust flow to 200mL/min.
6) Bubbler is clogged.	6) Remove obstacles.
7) The line is not changed over.	7) Check gas line by manual switching (Setup 3).
8) The desiccant tube is off in place.	8) Install the desiccant tube correctly.
9) Other	9) Contact your local dealer or sales representative.

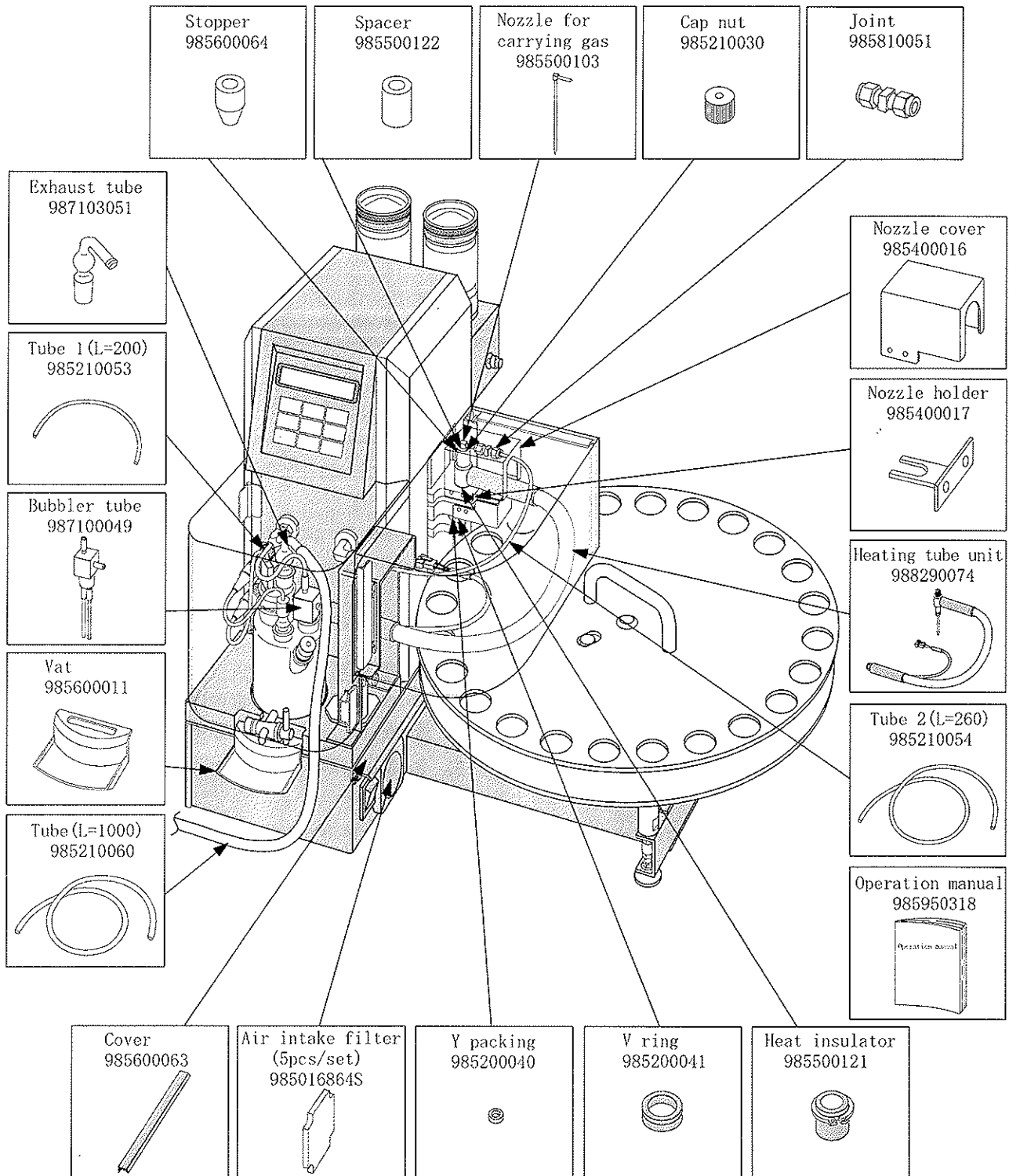
6-3. When drift level is not stable

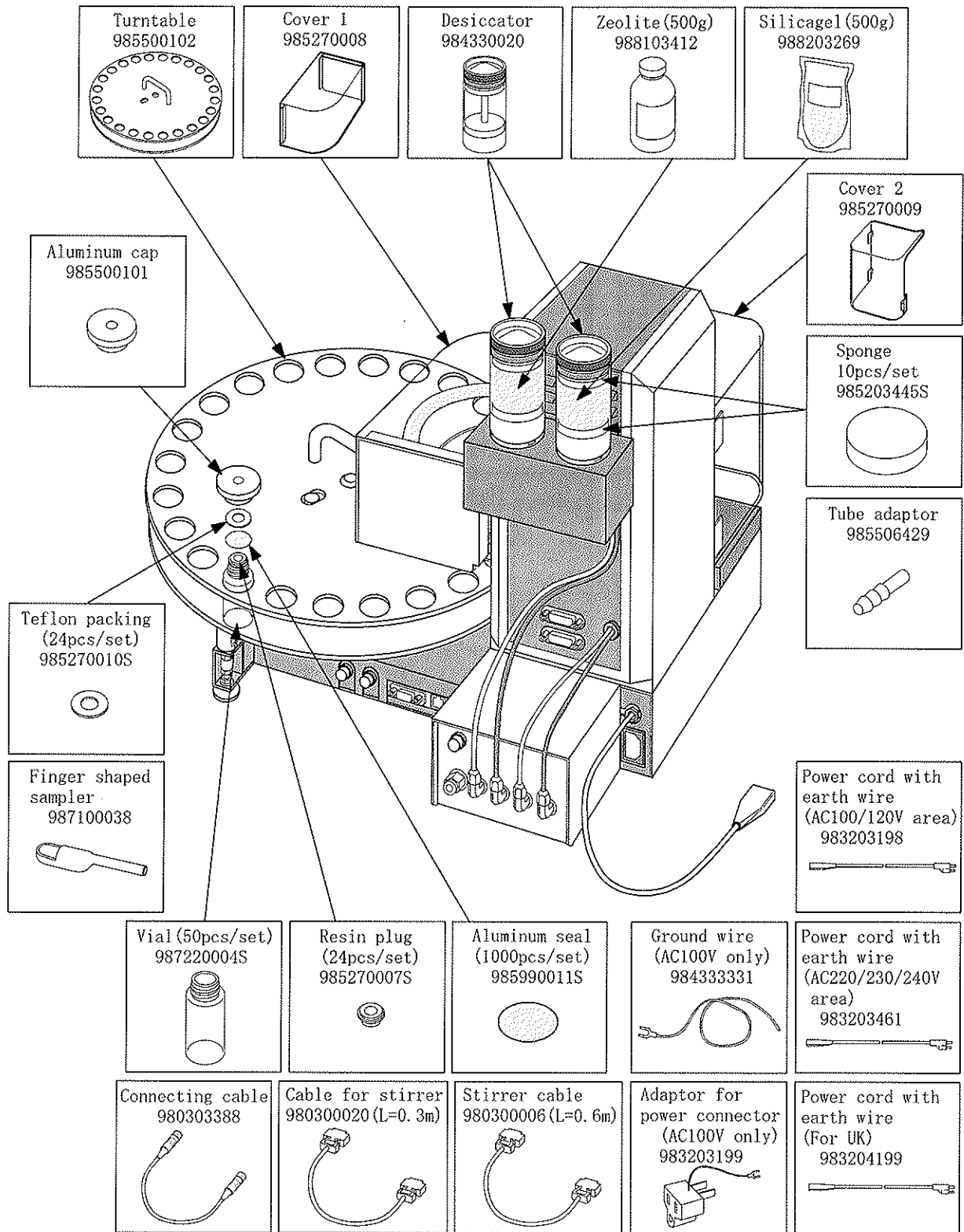
Trouble	Remedy
1) When nitrogen gas cylinder is related: a) Cylinder pressure is low. b) Pressure control is not correct.	1) a) Replace the gas cylinder. b) Adjust pressure to 0.5kgf/cm ² by governor.
2) When tube line is related: a) Tube line is not connected correctly. b) Tube line is not dried. c) Hygroscopic capacity of desiccant powder is low. d) Silica gel and Zeolite tubes are placed on wrong position.	2) b) Correct the connection. c) Purge dry tube line manually. (Refer to "4-1-4. Switching gas line manually") d) Replace silica gel and zeolite. e) Correct their positions.
3) MKC-510 is related: a) Reagent life is low. b) Titration cell is contaminated. c) Electrode and bubbler are not correctly installed.	3) a) Replace reagent. b) Clean the cell. c) Install them correctly.
4) Other	4) Contact your local dealer or sales representative.

7. Others

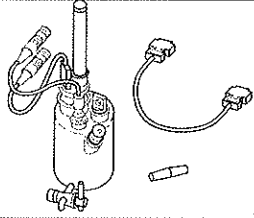
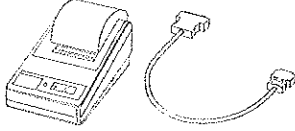
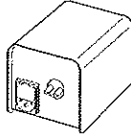


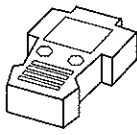

7-1. Part list

- Consumable parts · Maintenance parts -

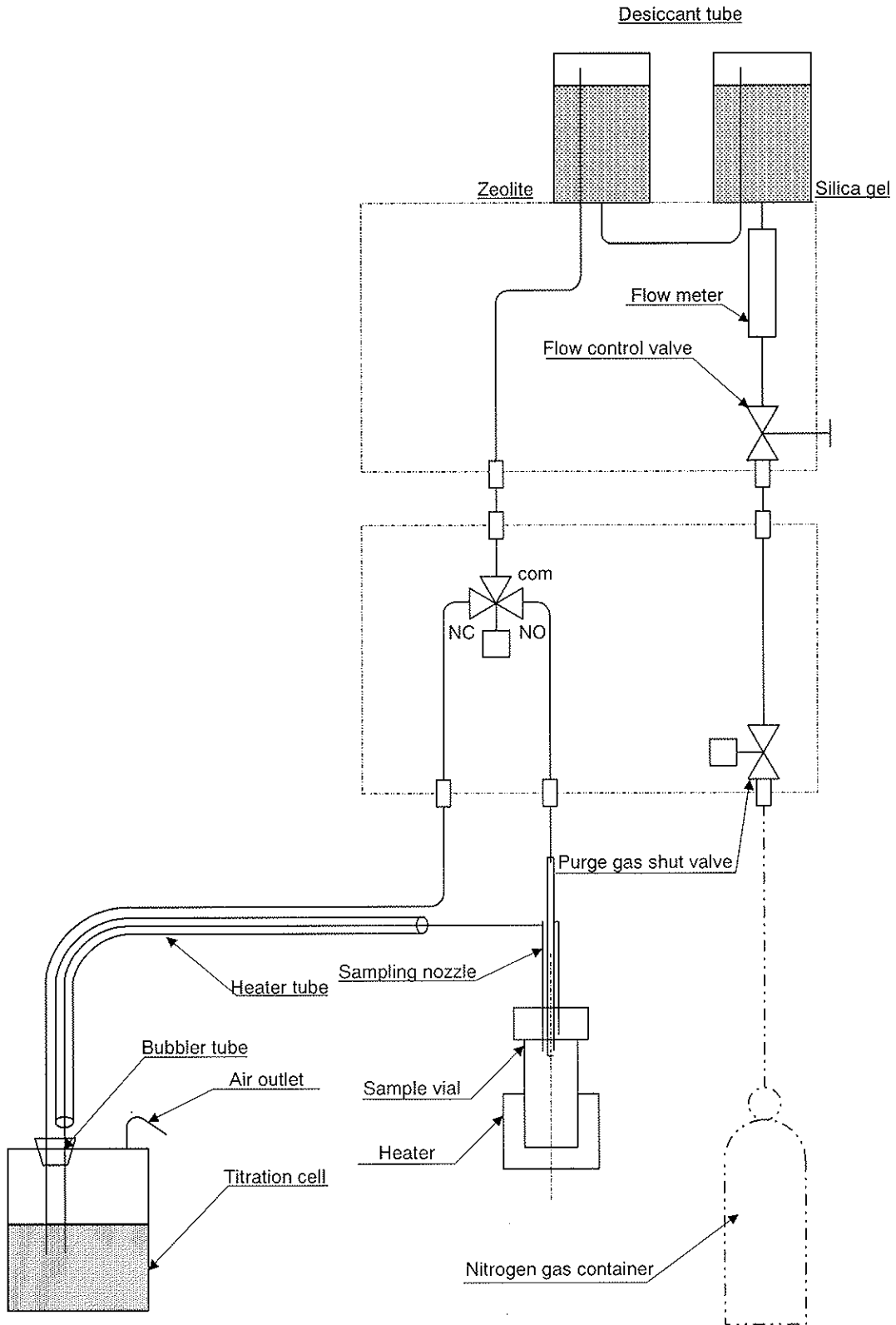




- Option -

Part code	Part name	Qty	Remarks	Sketch
987410006	2ch additional kit (2 solution)	1set	Titration cell with stirrer cable (0.3m)	
IDP-100-10 -11 -12	Printer	1set	100v 120v 230v With connecting cable	
987400003	Air pump for carrier gas	1pce	With tubing	
980300002	Connecting cable	1pce	(9pin female-9pin female) IBM-PC	
980300012	Connecting cable	1pce	(9pin female-25pin male) NEC	
980900007	Tester for RS-232C	1pce		
985950320	Operation manual (RS-232C)	1copy		

7-2. Tube lines flow chart



7-3. Technical data

Type and model	CHK-501 Multiple Sample Changer for KF titration
Number of vials	24 vials
Sample vial size	20mL
Heating temperature	Range : room to 300°C Minimum setting degree : 1°C Control precision : ±3°C measured with thermocouple
Heater tube	Self-control up to more than 100°C
Heating method	By electric oven heating over outside surface and bottom Special heater made of integrated mica with 50W capacity
Sample vial detection	By optical bean sensor
Auto power off	Power is shut off automatically after measurement is over.
Pre-treatment	Programmable automatic purge of system lines
Sample transfer system	By revolving turntable with sample vials on it, and the arm maneuvers sample vials from turntable to heater oven.
Carrier gas	Flow range : 100 to 300mL Other : dehydration with silica gel and Zeolite
Display	20 digits by 2 lines LCD with back light
Alarms	Alarm warning activates when transfer mechanism malfunctions, temperature control failure, carrier gas suspension and operational error
Ambient condition	Temperature : 5 to 35 °C Humidity : 0 to 85%RH
Power source	Power source : AC100-120/200-240V±10% 50/60Hz Consumption : Approx. 820W (Main unit 100W)
Dimension	W (452) × D (400) × H (362) [mm]
Weigh	Approx. 20kg
Compatible KF titrator	MKC-520/MKC-510N/MKC-510

7-4. Warranty and After-Sale Service

1. The product you have purchased passed factory inspection and testing prior to shipment, and its quality is guaranteed by free of charge replacement during warranty period except consumable parts provided the instrument has been under normal use and operation, however, depending on operational and environmental condition under which the instrument has been in use may require chargeable service work.
2. For service during and after warranty period, please contact your local dealer or distributor.
3. Read the manual thoroughly before you decide to call for service.
When you should need servicing, please provide with the following information:
 - Production number of unit
 - Description of the trouble
 - Person to contact
4. Parts and spares can be purchased separately and will be available for seven (7) years after termination of production of the model.
5. This warranty does not cover claims due to any of the following conditions:
 - 1) Any modification or specification change by an unauthorized person
 - 2) Damage by splashed water (the instrument is not water-proof)
 - 3) Use in range or condition other than specified
 - 4) Operated in other way than specified in the manual or negligence of maintenance
 - 5) Physical force given to the instrument during transportation or move
 - 6) Use of parts or reagent other than specified
 - 7) Caused by use under extreme ambient or environmental condition
 - 8) By fire, riots, earthquake, lightning, or Act of God in any form or manner
6. Escape clause
Under no circumstances will Manufacturer be liable for any damage, whether incidental, consequential or other, or for any other remedy arising from any loss, damage, expenses or inquiry in connection with use of the article.

