Options

Bent-type Sampler for Powder
12-04576
MKV

"C" Bent-type Sampler for Powders phi18.5 1/10 Taper Glass
12-04454
MKV

Sampler for Light Weight Powder
12-04452
MKV

Finger Shaped Sampler
12-04184
MKV
ADP

Straight-type Sampler for Light Weight Powder
12-04574
MKV

Eggplant-shaped Sampler for Powders phi18.5 1/10 Taper
12-04453
ADP

Spoon Type Sampler for Viscous Sample
12-04575
MKV

Sampler for High Viscous Sample
12-02400
MKV

Sampler for Viscous Samples
12-05192
MKV

Syringe Inlet (with Septum)
12-00661-11
MKV
MKC

Liquefied Gas Sampler
12-05143
MKV
MKC

Micro Sampling Unit (for Coulometric)
12-00696-10
MKC

Micro Sampling Unit (for Volumetric)
12-05067
MKV

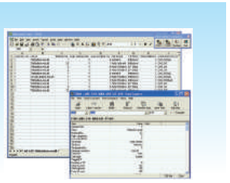
D-type Titration Vessel with Port Plug
12-03510
MKV

N-type Titration Vessel with Port Plug
12-01585
MKV

C-type Titration Vessel with Port Plug
12-02828
MKV

Titration Cell with Drain Cock
20-04042-00
MKC

Data Acquisition Software SOFT-CAP



SOFT-CAP receives measurement results from a titrator and exports it to Excel® or saves it in CSV format.

- LIMS software connects RS-232C port as well as SOFT-CAP Data Capture Software

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Karl Fischer Moisture Titrator [Volumetric method]

MKV-710 SERIES

Karl Fischer Moisture Titrator [Coulometric method]

MKC-710 SERIES

MKV-710M
Option: Additional Burette KF (10mL)

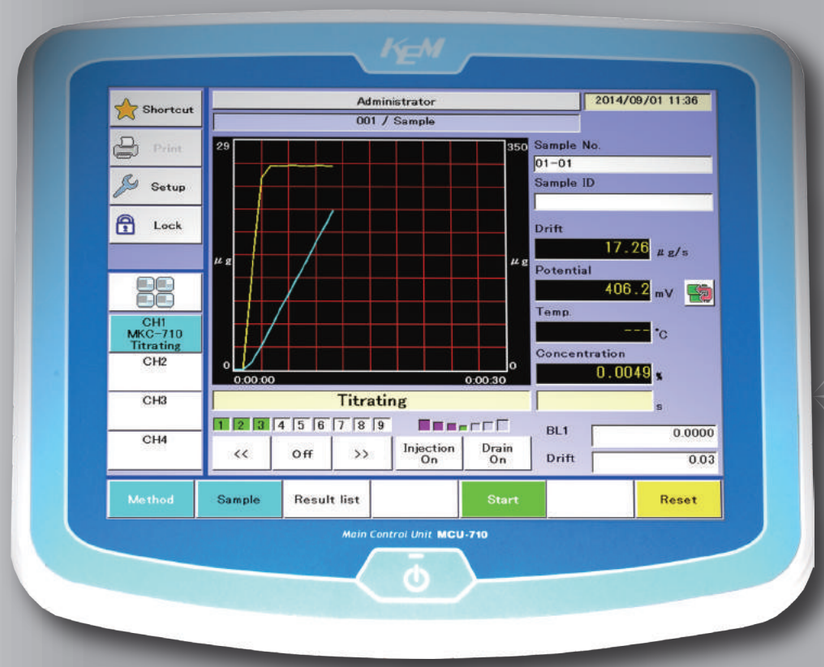
MKC-710M

KYOTO ELECTRONICS
MANUFACTURING CO.,LTD.

Summary/Connection example

MKV/MKC-710M
Unique flexibility – up to 4 simultaneous titrations of any type

Moisture measurement by Karl Fischer method has been adopted in the official analysis methods (ASTM and pharmacopeial standard) and is widely used to determine moisture content in various substances as the most reliable method.
The MKV/MKC-710M as a flagship model comes with a largest titration user interface available in the market: The main control unit of this model, MCU-710M, provides with its 8.4 inch LED touch panel an unique user experience and can be the common basis for up to four full-fledged titrators of any type, be it AT-710B potentiometric titrators or additional MKV-710B Volumetric or MKC-710B Coulometric Karl Fischer moisture titrators.



Main Control Unit MCU-710M

MKV-710B

MKV-710M / MKV-710S

MKC-710B

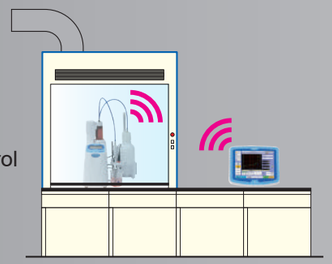
MKC-710M / MKC-710S

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

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

* Bluetooth® adapters are to be prepared locally.

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



FEATURES

No cables required between main control unit and titrator

MKV-710M MKC-710M

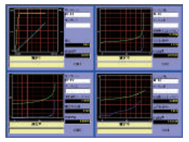
For safe operation

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

One screen for up to four titrators

MKV-710M MKC-710M

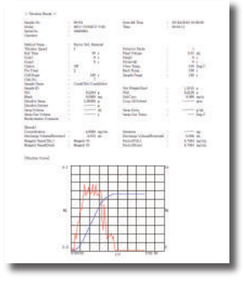
One main control unit can operate up to four titrators of any type (Potentiometric and Karl Fischer moisture titrators). It is thus possible to set up a system capable of running potentiometric and Karl Fischer moisture titrations simultaneously without wasting valuable bench space for several separate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



Result output as PDF files

MKV-710M MKV-710S MKV-710B MKC-710M MKC-710S MKC-710B

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

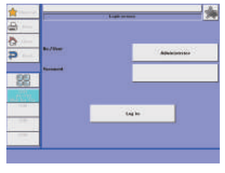


User groups and permissions

MKV-710M MKV-710S MKC-710M MKC-710S

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

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



Large color TFT-LCD with touch panel

MKV-710M MKV-710S MKC-710M MKC-710S

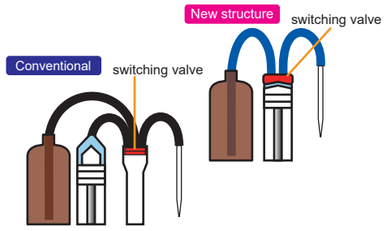
The main control unit is equipped with a large color TFT-LCD. The touch panel enables easy key entry.

MKV-710 (Volumetric method)

New burette unit

MKV-710M MKV-710S MKV-710B

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



Titrant information stored in burette unit

MKV-710M MKV-710S

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

No need to adjust settings for different types of solvent and samples

MKV-710M MKV-710S MKV-710B

Our proprietary technology (endpoint detection by compensating liquid resistance, Japanese Patent No.1896338) makes it unnecessary to change the detection electrode sensitivity and the endpoint voltage depending on the nature of each solvent and sample. This feature reliably prevents over titration and ensures highly accurate measurements.

Automatic factor calibration (timer controlled)

MKV-710M MKV-710S

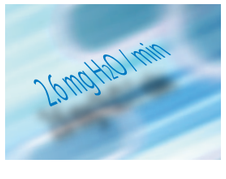
By adding an optional additional burette filled with a Water-Methanol standard solution, factor determinations are a matter of one single click.
Thanks to a built-in timer function, factor determinations of the Karl Fischer reagent can automatically be performed at regular intervals.

MKC-710 (Coulometric method)

Fast measurements

MKC-710M MKC-710S MKC-710B

Our proprietary technology achieves electrolytic speeds up to 2.6mg H_2O/min.
This shortens the time required for pre-titrations and sample measurements considerably.



Replaceable diaphragm

MKC-710M MKC-710S MKC-710B

Easy maintenance when measuring samples which tend to contaminate the diaphragm as eg. oils: Thanks to a unique mechanism, the ceramic diaphragm of the optional titration cell unit (12-03635-01) can be replaced.

Lineup/Measurement principle

Option: Additional Burette KF (10mL)

Flagship model

Unique flexibility - up to 4 simultaneous titrations of any type

Karl Fischer Moisture Titrator [Volumetric method]

MKV-710 M

Option: Additional Burette KF (10mL)

Midrange model

Easy operation by touch panel

Karl Fischer Moisture Titrator [Volumetric method]

MKV-710 S

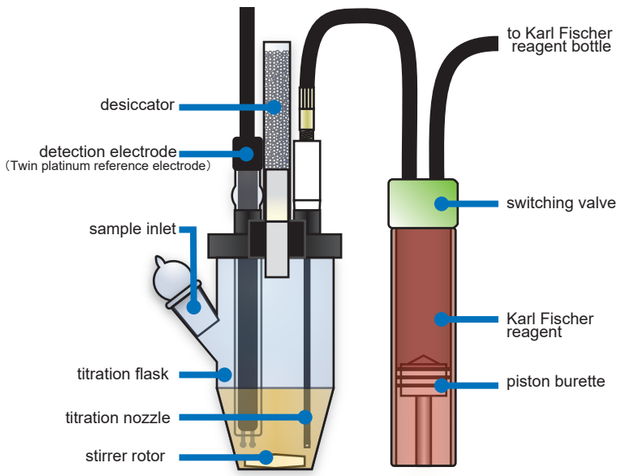
Standard: MS-710VP Magnetic Stirrer /
Automatic Solvent Change Unit

Entry model

Simple titration

Karl Fischer Moisture Titrator [Volumetric method]

MKV-710 B



–Volumetric titration method–

In moisture measurements by Karl Fischer titration method, water reacts with iodine and sulfur dioxide in the presence of a base and alcohol.

$H_2O + I_2 + SO_2 + CH_3OH + 3RN \rightarrow [RNH]SO_4CH_3 + 2[RNH]I$

In moisture measurements by volumetric titration method, solvent is put in the titration cell and titrated with Karl Fischer reagent to achieve dehydrated state. Then the sample is added.
The water content is then determined by adding Karl Fischer reagent whose factor (mgH_2O/mL) is pre-determined with a water standard as eg. a Water-Methanol standard solution.
During titration, the speed and amount of Karl Fischer reagent addition is controlled based on the measured electric polarization potential of the detection electrode.

Specifications

MKV-710 [Volumetric method]

Specification	Contents		
Type	Karl Fischer Moisture Titrator		
Model	MKV-710M	MKV-710S	MKV-710B
Product configuration	MCU-710M+MKV-710+IDP-100+ Automatic Solvent Change Unit	MCU-710S+MKV-710+IDP-100+ Automatic Solvent Change Unit	MKV-710+IDP-100+Automatic Solvent Change Unit
Measuring method	Karl Fischer Volumetric method		
Measuring range	1) Water content : 0.1 to 500mgH_2O (depends on KF reagent factor) 2) Concentration : 1ppm to 100%H_2O		
Burette precision	Volume : 10mL burette Discharge precision : 10mL ±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 preset end time End time range : 1 to 99s		
Titration form	Normal titration / Back titration (Option additional burette required)		
Required solvent	30 to100mL (in S-type titration vessel)		
Method	120		20
Key operation	Touch panel		Sheet key
Displays	1) 8.4-inch color LCD 800 × 600 dots		1) Black and white LED-backlit LCD
	2) English / Japanese / Mandarin Chinese / Korean / Russian / Spanish / German / French		2) English / Japanese / Mandarin Chinese / Korean / Russian / Spanish
	3) Simultaneous 4-channel display (Can also display Automatic Potentiometric Titrator simultaneously)	3) 1-channel display	3) 1-channel display
Calculation	Concentration of water content, statistics data processing (mean, SD and RSD) and automatic averaging of blank value and factor value		
Data storage	500 samples		100 samples
GLP conformance	Registration of operator / User group administration Titrant: Reminder of factor measurement date / Alarm to indicate remaining reagent / Reminder of piston replacement date / Reminder of reagent replacement date / History of factor measurement Check performance: Reminder of scheduled check date / Record of check results Management of conduction time : Display of operating time		Registration of operator / Record of check results / Record of factor measurement / Management of conduction time
External I/O	RS-232C port × 4		RS-232C port × 2
	for Dot matrix printer, Electronic balance, Data Capture Software (SOFT-CAP), Evaporator		for Dot matrix printer, Electronic balance, Data Capture Software (SOFT-CAP)
	USB × 1		USB × 1
	for USB flash drive, Thermal printer, A4 printer, Keyboard, Barcode reader, Foot switch, USB HUB		for USB flash drive, Thermal printer, Keyboard, Barcode reader, Foot switch, USB HUB, Android device
	SS-BUS × 1 : for APB		
	LAN × 1 : for Personal computer (PC)		
Extensibility	Measuring instrument : Automatic Potentiometric Titrator (AT-710), Karl Fischer Moisture Titrator (MKV-710/MKC-710/MKH-710); Three of these instruments can be added.		
	Automatic piston burette : Can control max 2 burette drives (Including two built-in burette drives)		
	Evaporator ADP-611		
Ambient condition	1) Temperature : 5 to 35℃ 2) Humidity : 85%RH or below (no condensation)		
Power source	AC100 – 240V ±10% 50/60 Hz		
Power consumption	Main unit : Approx. 30W Printer : Approx. 7W		Main unit : Approx. 20W Printer : Approx. 7W
Dimensions	Touch panel controller : 225(W) × 190(D) × 42(H) mm		
	Titration unit : 141(W) × 292(D) × 367(H) mm (not incl. tubing) Stirrer : 107(W) × 206(D) × 322(H) mm (not incl. Solvent Change unit) Solvent Change Unit : 240(W) × 140(D) × 400(H) mm (not incl. tubing) Printer : 106(W) × 180(D) × 88(H) mm		
Weight	Touch panel controller : Approx. 1.5kg		
	Titration unit : Approx. 4.0kg Stirrer : Approx. 2.0kg Solvent Change Unit : Approx. 0.6kg Printer : Approx. 0.4kg		
Conformity standard	CE marking EMC : EN61326-1 LVD: EN61010-1 RE Directive Burette unit EBU FCC Part15 SubpartC FCC ID: 2ABSVEBU01		

Lineup/Measurement principle

Flagship model

Unique flexibility - up to 4 simultaneous titrations of any type

Karl Fischer Moisture Titrator [Coulometric method]

MKC-710 M

Midrange model

Easy operation by touch panel

Karl Fischer Moisture Titrator [Coulometric method]

MKC-710 S

Entry model

Simple titration

Karl Fischer Moisture Titrator [Coulometric method]

MKC-710 B

Standard: MS-710C Magnetic Stirrer/
Manual Solvent Change Unit

-Coulometric titration method-

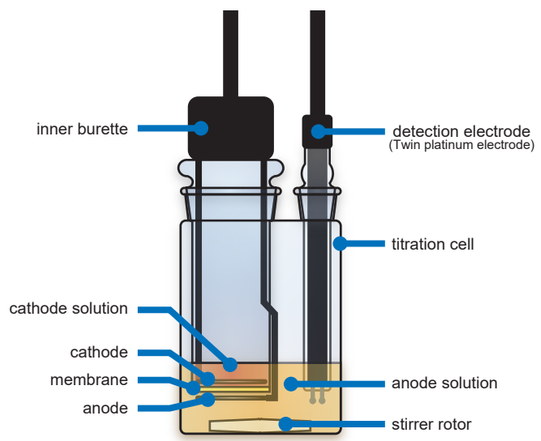
In moisture measurements by Karl Fischer titration method, water reacts with iodine and sulfur dioxide in the presence of a base and alcohol.

$H_2O + I_2 + SO_2 + CH_3OH + 3RN \rightarrow [RNH]SO_4CH_3 + 2[RNH]\,I$ (1)

In moisture measurements by coulometric titration method, iodine is generated through electrolysis of an anode solution containing iodide ions.

$2I^- \rightarrow I_2 + 2e^-$ (2)

The generated iodine (according to formula 2) is consumed by the water according to formula (1). The detection electrode serves to detect the amount of free iodine and to control the speed of electrolysis.
The generated iodine is proportional to the electric quantity according to the Faraday's law. The formula (1) shows that I_2 reacts with H_2O in the proportion of one to one.
The electric quantity required for the generation of the iodine based on the principle as described above is measured and converted to water content.



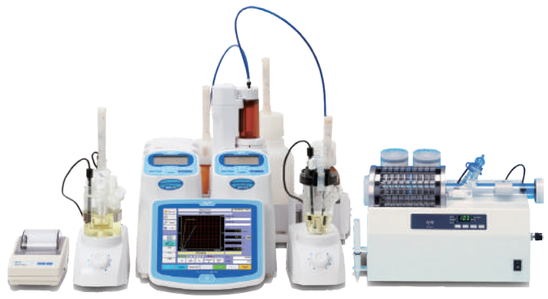
Specifications

MKC-710 [Coulometric method]

Specification	Contents		
Type	Karl Fischer Moisture Titrator		
Model	MKC-710M	MKC-710S	MKC-710B
Product configuration	MCU-710M+MKC-710+IDP-100+Manual Solvent Change Unit	MCU-710S+MKC-710+IDP-100+Manual Solvent Change Unit	MKC-710+IDP-100+Manual Solvent Change Unit
Measuring method	Karl Fischer Coulometric titration		
Measuring range	Water content : 1μg to 300mg (depends on reagent) / Bromine index : 8μg to 300mg		
Measurement cell	2-Component or 1-Component		
Precision	Relative standard deviation : less than 0.3% (n=10) *Per KEM standard measurement conditions and standard liquids		
Display resolution	0.1ug		
Control method	Constant current pulse time control		
Endpoint detection	Alternate current polarization method with a twin platinum electrode		
EP sense method	Selective drift stability or limit measurement time		
Required solvent	Anolyte 100mL (max 150mL) Catholyte 5mL		
Method	120		20
Key operation	Touch panel		Sheet key
Displays	1) 8.4-inch color LCD 800 × 600 dots		1) Black and white LED-backlit LCD
	2) English / Japanese / Mandarin Chinese / Korean / Russian / Spanish / German / French		2) English / Japanese / Mandarin Chinese / Korean / Russian / Spanish
	3) Simultaneous 4-channel display (Can also display Automatic Potentiometric Titrator simultaneously)	3) 1-channel display	3) 1-channel display
Calculation	Concentration of water content, statistics data processing (mean, SD and RSD) and automatic averaging of blank value		
Data storage	500 samples		100 samples
GLP conformance	Registration of operator / User group administration Check performance with standard substance: Reminder of scheduled check date / Record of check results Reagent life control: Reminder of expiration / Reminder of reagent replacement date Management of conduction time : Display of operating time		Registration of operator / Check performance with standard substance / Reagent life control / Management of conduction time
External I/O	RS-232C port × 4		RS-232C port × 2
	for Dot matrix printer, Electronic balance, Data Capture Software (SOFT-CAP), Evaporator, Multiple sample changer		for Dot matrix printer, Electronic balance, Data Capture Software (SOFT-CAP)
	USB × 1		USB × 1
	for USB flash drive, Thermal printer, A4 printer, Keyboard, Barcode reader, Foot switch, USB HUB		for USB flash drive, Thermal printer, Keyboard, Barcode reader, Foot switch, USB HUB, Android device
	LAN × 1 : for Personal computer (PC)		
Extensibility	Measuring instrument : Automatic Potentiometric Titrator (AT-710), Karl Fischer Moisture Titrator (MKV-710/MKC-710/MKH-710); Three of these instruments can be added.		
	Evaporator : ADP-611		
	Multiple sample changer : CHK-501		
Ambient condition	1) Temperature : 5 to 35℃ 2) Humidity : 85%RH or below (no condensation)		
Power source	AC100 - 240V ±10% 50/60 Hz		
Power consumption	Main unit : Approx. 30W Printer : Approx. 7W		Main unit : Approx. 20W Printer: : Approx. 7W
Dimensions	Touch panel controller : 225(W) × 190(D) × 42(H) mm		
	Titration unit : 141(W) × 292(D) × 244(H) mm		
	Stirrer : 107(W) × 206(D) × 340(H) mm (not incl. Solvent Change unit)		
	Solvent Change Unit : 240(W) × 140(D) × 405(H) mm (not incl. tubing)		
	Printer : 106(W) × 180(D) × 88(H) mm		
Weight	Touch panel controller : Approx. 1.5kg		
	Titration unit : Approx. 3.0kg		
	Stirrer : Approx. 2.0kg		
	Solvent Change Unit : Approx. 0.6kg		
	Printer : Approx. 0.4kg		
Conformity standard	CE marking EMC : EN61326-1 LVD: EN61010-1		

Options

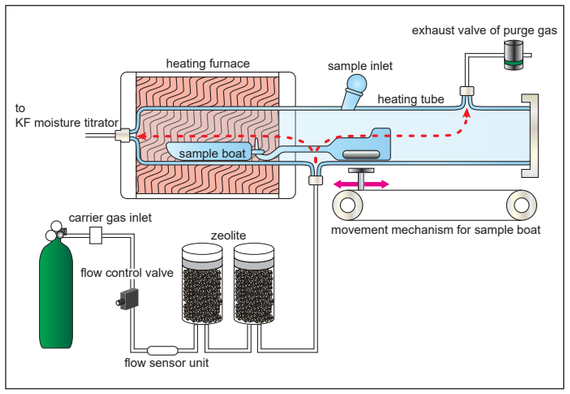
Evaporator ADP-611



Together with Karl Fischer moisture titrator, this evaporator allows to measure the moisture content in powders or solid samples that cause side reactions and therefore cannot be titrated directly.
The samples are heated and the vaporized moisture is carried into the titration cell by a carrier gas.
The sample boat moves in a closed tube driven by a magnet. This makes it possible to perform reliable measurements of trace moisture eliminating the risk of contamination from atmospheric moisture.
A patented scan mode automatically determines the optimal evaporation temperature based on the relation between released water and heating temperature.
The heating tube is easy to be cleaned thanks to its simple structure.

Model	Evaporator ADP-611	
Heating method	Electrically conductive clear heater glass	
Heating temperature range	50℃ to 300℃	
Temperature control	Setting range: 50℃ to 300℃ (Minimum setting: 1℃) Temperature sensor: K-thermocouple (Precision: ±2℃/ Setting temperature: At higher than 100℃)	
Temperature/ Flow display	LED digital 3 digits	
Heated tube	Pyrex glass tube: φ30 (O,D)mm x 335 (L)mm	
Sample boat	Pyrex glass: 68 (L) x 25 (W) x 15 (H)mm Capacity 16mL	
Carrier gas	Nitrogen gas: Not included as a standard accessory Air: Air Pump Unit (option)	
Gas dryer	Zeolite container (100g) x 2pcs	
Gas flow	100 to 300mL/min	
External control input/ output	Communication with Karl Fischer Moisture Titrator : RS232C Mini DIN 8pin	
Dimensions	370 (W) x 195 (D) x 217 (H)mm	
Power source	AC 100–120V 50/60Hz	AC 220-240C 50/60Hz (Pre-adjusted before shipment from the factory)
Power consumption	Approx. 300W	
Weight	Approx. 5kg	Approx. 7kg
Option	Stand	

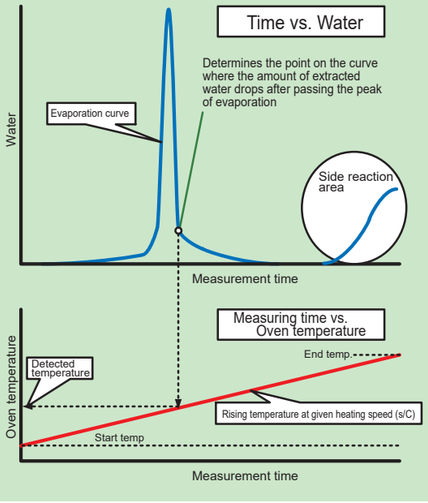
※ When nitrogen gas is in use, regulator (adjustable to 50kPa) is required.

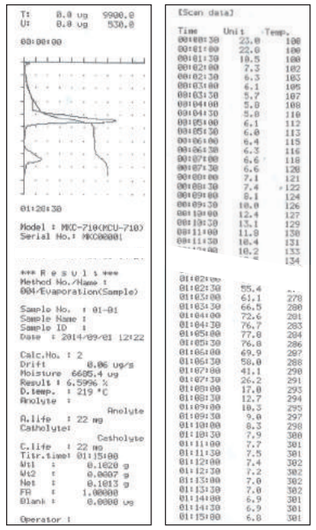


Scan mode

Japanese Patent no. 4247093

The scan mode automatically determines the optimum evaporator temperature. It is used when the vaporizing temperature of a sample is unknown or if the sample tends to thermal decomposition.
In the scan mode, the temperature in the heating furnace is increased at a constant rate and the evaporated moisture curve is analyzed. The optimum evaporator temperature is determined based on the decay observed in the evaporated moisture curve.





Multiple Sample Changer CHK-501

Multiple sample evaporator for Coulometric Karl Fischer Moisture Titrators, suitable for the continuous measurement of up to 24 samples . The heating temperature can be set for each sample individually, different kinds of sample can thus be measured automatically one after the other. An auto power off function after measurement ensures safe operation.
(NON-CE)

Model	Multiple Sample Changer CHK-501
Number of vials	24 vials
Vial	20mL vial
Heating temperature	Setting range : Room temp. to 300℃ Minimum setting : 1℃ Control precision:±3℃ Measurement with Thermocouple (At setting temperature higher than 100℃)
Heating tube	Higher than 100℃ with self-control
Heating method	Electric oven heating over outside surface and bottom Special heater made of integrated mica with 50W capacity
Vial detection	Optical beam sensor
Auto power off	Power is shut off automatically after measurement is over.
Pre-treatment	Programmable automatic purge of system lines
Sample transfer system	Revolve turntable with vials and transfer a vial from turntable to heater oven.
Carrier gas	Flow range : 100 to 300mL/min Other : Dehydration with silica gel and zeolite
Display	20 digits x 2 lines LCD with back light
Alarm	Transfer mechanism malfunctions, temperature control failure, carrier gas suspension, operation error etc.
Ambient condition	Temperature : 15 to 35℃ Humidity : 0 to 85%RH
Power source	AC 100-120V/ 220-240V±10% 50/60Hz
Power consumption	Approx. 100W
Dimensions	452(W) x 400 (D) x 362 (H)mm
Weight	Approx. 20kg

※ When nitrogen gas is in use, regulator (adjustable to 50kPa) is required.

Evaporator for Oil Samples ADP-513

This unit evaporates moisture of samples dissolved in a heated base oil. This unit is primarily used for moisture measurements in lubricant oil, grease, tar products, paints and other viscous liquids.
(NON-CE)

Model	Evaporator for Oil Samples ADP-513
Heating oven	Room temp. to 200℃ Temperature indicator controller PID control Plate heater Cartridge type structure
Gas flow	100 to 300mL/ min
Carrier gas	Nitrogen gas/ Supply pressure below 50kPa
Power source	AC 100-120V/ 200-240V±10% 50/60Hz
Power consumption	Approx. 400W
Dimensions	320 (W) x 210 (D) x 330 (H)mm
Weight	Approx. 6kg

※ When nitrogen gas is in use, regulator (adjustable to 50kPa) is required.
・Complies to "JIS K 2275 Crude oil and petroleum products－Determination of water content"
・Equipped with specially designed drain-out system for easy drainage of base oil.
・Equipped with fuse to prevent excessive temperature rise.

Heat Extractor for Sugar Samples ADP-344

The ideal solution sugary samples:
This mantel heater for volumetric Karl Fischer titration cells ensures the complete extraction of the moisture content of samples like chocolates, caramels and other samples containing sugars.
(NON-CE)

Model	Heat Extractor for Sugar Samples ADP-344
Heating method	Mantel heater
Heating temperature range	Room temp. to 60℃
Thermo sensor	Thermistor
Temperature control	±3℃ (At setting temperature higher than 40℃) ON/ OFF control
Dimensions	100(W) x 150 (D) x 133 (H)mm
Weight	Approx. 1.8kg

Evaporator for Ores ADP-512

Evaporator for High Temperature ADP-512S

This unit is suitable for the determination of adhesive moisture or combined moisture of iron ores, manganese ores, clay or inorganic compounds according to the ISO standard.
The sample is heated in the electric furnace and the evaporated moisture is carried into the titration cell by nitrogen gas.
Powerful furnace ― short warm-up time: This evaporator attains a temperature of 1000°C in 30 minutes and reaches stable measuring conditions in another 30 minutes. An overheat protection mechanism for this evaporator is available.
(NON-CE)

Model	Evaporator for Ores ADP-512
Electric furnace	High temperature furnace 50 to 1000℃ Temperature indicator controller PID control Temperature setting precision: Set value ±10℃ (At room temperature 25℃/ At setting temperature higher than 300℃) Low temperature furnace 50 to 130℃ Temperature indicator controller PID control
Gas flow	100 to 300mL/min
Carrier gas	Nitrogen gas/ Supply pressure below 50kPa
Power source	AC 100-120V/ 200-240V±10% 50/60Hz
Power consumption	Approx. 600W
Dimensions	1150 (W) x 340 (D) x 334 (H)mm
Weight	Approx. 30kg

※ When nitrogen gas is in use, regulator (adjustable to 50kPa) is required.

Model	Evaporator for High Temperature ADP-512S
Electric furnace	50 to 1000℃ Temperature indicator controller PID control Temperature setting precision: Set value ±10℃ (At room temperature 25℃/ At setting temperature higher than 300℃)
Gas flow	100 to 300mL/min
Carrier gas	Nitrogen gas/ Supply pressure below 50kPa
Power source	AC 100-120V/ 200-240V±10% 50/60Hz
Power consumption	Approx. 600W
Dimensions	835 (W) x 340 (D) x 334 (H)mm
Weight	Approx. 30kg

※ When nitrogen gas is in use, regulator (adjustable to 50kPa) is required.