TOA DKK

ISO9001·ISO14001 accredited

AUT-701

Automatic Titrator

2ch Simultaneous Titration Capability

Excellent Electrode Line up
Strong & Float-pH electrode,
Micro-titration pH electrode

Validation Support

USB Interface

LAN Interface

DKK-TOA CORPORATION

AUT-701
Unique & Powerful Titration System

Powerful functions can strongly support QA and R&D

Dual Titration System

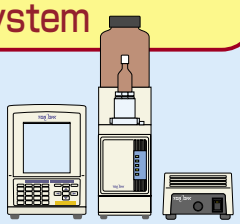
Allows Simultaneous Titrations

Simultaneous Dual Titration Capability

Adding a second burette and other items to the standard configuration (single titration system) provides capability to perform two different titration methods (such as neutralization and redox) at the same time. Simultaneous measurement of pH and neutralization titration is also possible. By connecting two Model TTT-510 turntables, simultaneous measurement of multiple samples is also possible.

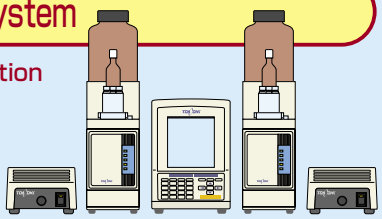
Single Titration System

Standard configuration



Dual Titration System

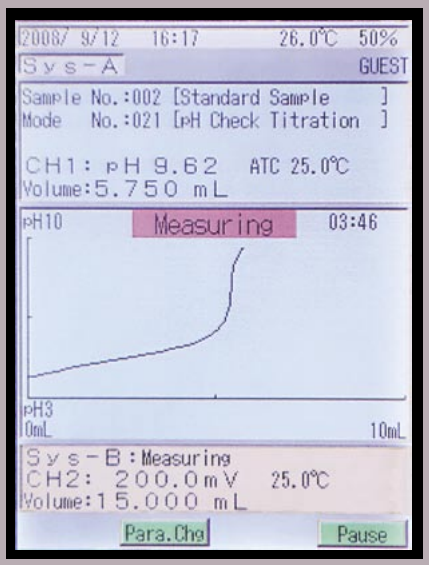
Two different titration methods can be performed simultaneously



Example of dual titration system (pH & ORP)

Standard (single) titration system with additional equipment added (ABT-7 Auto Burette, ST-7 Magnetic Stirrer, ORP Electrode, Electrode Stand & Electrode Holder).

Back lit Color LCD provides Excellent Ledgibility

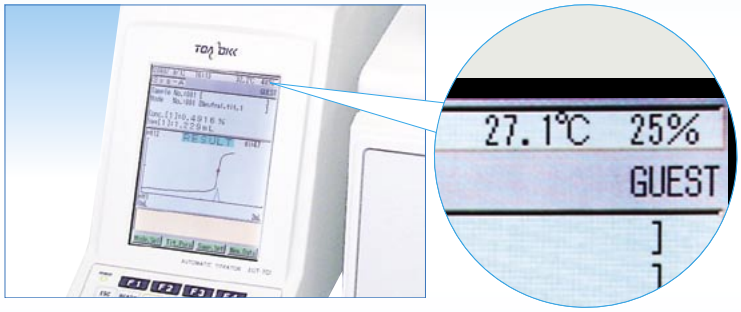


Complete Range of Titration Methods Available (up to 4 electrodes/ 10 burettes)

Standard configuration includes 2pH/mV inputs. Optional titration units (photometric, polarization, conductivity, potentiometric) can be connected to the third and forth units. In addition, up to 10 sets of burette can be connected. Multi-titration and advanced sequential mode titrations are also available.

Advanced validation support function (display and logging of ambient temperature & RH)

pH calibration history (max 20 calibrations) function, burette volume checking history function and logging of ambient temperature and relative humidity using optional temp/RH sensor can offer advanced quality control.



Temp/RH sensor

USB & LAN Interfaces Available as standard

Data acquisition software, 701, can collect and store data in CSV format for easy data management and transfer to other software applications.

Enriched Data Memory Function

100 data sets can be re-analyzed for single titration system.
(200 data sets for dual system)

Fast Titration Mode

Titration time can be shortened.
(Not applicable for some applications.)

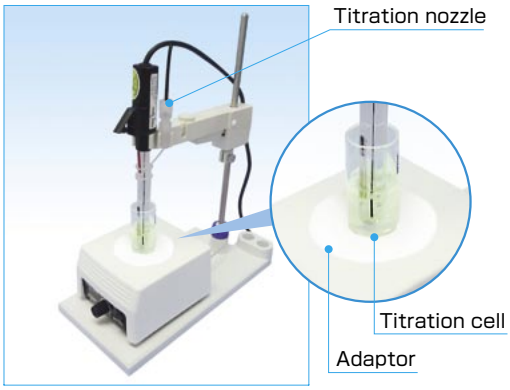
Electrode & Titration Kit can be Applied to Various Titrations

Micro-titration kit (option)

Micro-titration kit is ready with combined pH electrode for micro solution and silver combined electrode.
Waste water can be reduced.
(Not applicable for some applications.)

Minimum volume : approx. 10 mL
Maximum volume : approx. 20 mL

●Content
Adaptor, Titration nozzle, Titration cell (50 pcs.), O-ring P-5 (2 pcs.), O-ring P12 (2 pcs.) ,Stirring bar (2 pcs.)

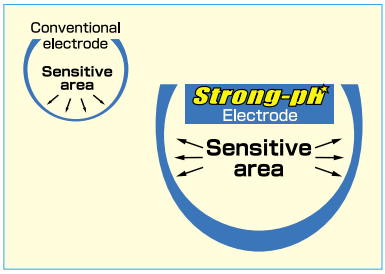


Worry-free operation with durable glass electrode

Strong & Float-pH electrodes

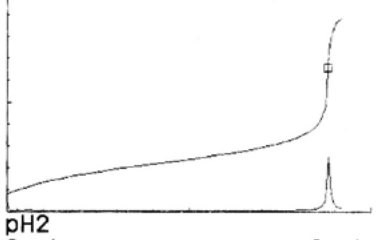
Strong : Tip part is reinforced. (more than ten times tougher than our conventional type)

Float : Built-in float enables recognition of inner solution concentration at a glance.



Print sample

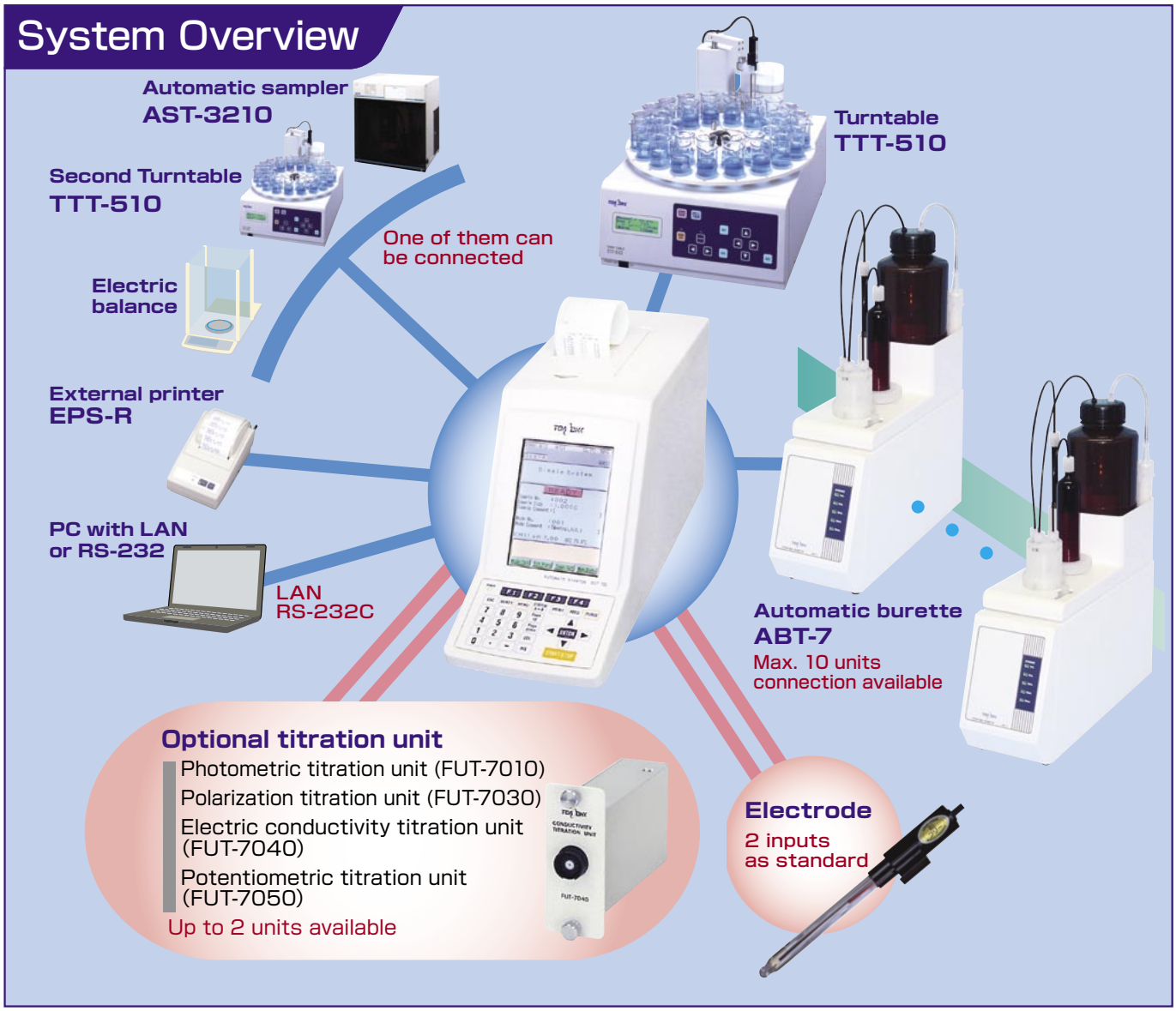
```
System [A]
Sample No.009
ｻｸｾﾝ
Date      2008/ 1/24 11:21
TIT.T.    00:04:19
Op.Name   GUEST
Size      3.0000

Unit      pH(ATC)
Ini.P     pH 3.48
Ini.T     17.2°C
Fin.P     pH 10.62
Fin.T     17.5°C
Max.D.1   2594.0 dmV/dmL
EP0T1     pH 8.62
VEQ1      5.285 mL
Fin.V     5.500 mL
Conc.1    0.6423 %

pH11
```



Printing items can be set.

Modular Concept Allows Expansion for Your Future Needs

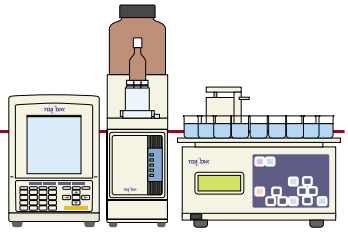
System Overview



System Examples

●Automatic Multiple Sample Titration System

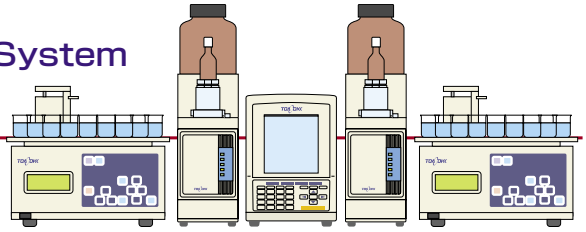
AUT-701 + TTT-510



Multiple sample titration can be done automatically by setting pretreated samples on the Turntable. Flex function allows operator to change titration condition of each sample.
(For example, Table #1 to #5: pH measurement, over #6: neutralization titration)

●Dual Automatic Multiple Sample Titration System

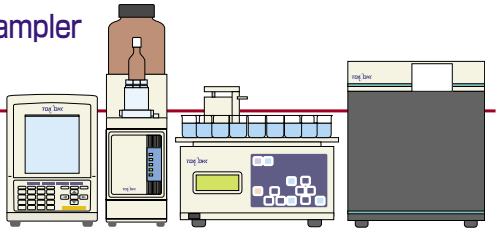
AUT-701(Dual System) + TTT-510 × 2



Different two kinds of multiple titration system can be configured.

●Automatic Multiple Sample Titration System with Automatic Sampler

AUT-701 + TTT-510 + AST-3210



Series of multiple sample operations (measurement – dilution – reagent dispense– titration – cleaning) can be performed automatically after setting samples on the Turntable.

Peripheral Equipment

Automated Continuous Multiple Sample Measurement Capability

Turntable
TTT-510

●Chemical resistant cleaning reservoir

●Various electrode cleaning methods

※Optional air pump, reagent pump and others are required for above cleaning methods except for pure water shower.

●Electrode holding tank available for overnight operation

After the final measurement, the electrode is stored in a storage tank filled with pure water, so there are no concerns that the electrode will dry out.

Specifications

Display unit	LCD display
Operating keys/switch	Flat keyboard
Number of samples /beakers used	12 samples 200 mL, 300mL tall beaker 18 samples 100 mL tall beaker (Manufacturer's designation) 36 samples 30 mL, 50 mL tall beaker (Manufacture's designation) 60 samples/(100 samples) 20 mL cell (Manufacturer's designation)
Cleaning mode	① Pure water shower → Air blow ② Pure water bubbling → Pure water shower → Air blow ③ Liquid chemical shower → Pure water shower → Air blow ④ Liquid chemical bubbling → Pure water shower → Air blow ⑤ Liquid chemical bubbling → Pure water bubbling → Pure water shower → Air blow ⑥ Liquid chemical bubbling → Liquid chemical shower → Air blow ⑦ Liquid chemical shower → Air blow ⑧ Liquid chemical bubbling → Pure water bubbling → Liquid chemical shower → Air blow Note : ・Air blow cleaning is effective when the optional air pump is attached. ・Liquid chemical cleaning is effective when the optional liquid chemical pump is attached. ・Bubbling is effective when the optional bubbling pump and the waste water valve are attached.
Cleaning time	1 – 9,999 seconds (Setting possible)
Air blow frequency	1 – 9 times (Setting possible)
End detection	Using endpin or setting final sample number by key operation
Cleaning tank material	Teflon, Daiflon
Electrode storage tank	Standard
Stirring time before measurement	0 – 9,999 seconds
Waiting time before measurement	0 – 9,999 seconds
Alarm	Cleaning water 1 (Pure water) Empty, Cleaning water 2 (Chemical) Empty, Waste water Full
Ambient temperature	5 – 40℃
Power source	AC100V – 240V 50/60Hz
Power consumption	Max. approx. 55VA (without optional pump & valve) Max. approx. 175VA (with optional pump & valve)
External dimensions	Main unit : Approx. W380 mm × H392 mm × D622 mm Maximum size when moving : Approx. W 415mm (with table plate) × H518 mm × D622 mm
Weight	Approx. 18kg (not including table and electrodes)

Standard Accessories

Table (designated for 12, 18, 36 and 60 samples)
Electrode holder (designated samples / use)
Pure water tank (10 L, with float switch)
Waste water tank (10 L, with float switch)
Pure water tube
Waste water tube
End pin
Polyethylene Beaker (200 mL)
Instruction Manual

＊The attachment cable for the titrator is sold separately based on the model designation.

Options

Description	Code
Connection cable (2m)	7075670K
Air pump	P000023
Liquid chemical pump	P000022
Bubbling pump	0FA00001
Waste water valve (pinch valve)	0QA00001
Waste water valve (solenoid valve)	0QA00002

Full Automatic Operation ~ Measurement to Cleaning

Automatic Sampler
AST-3210

Sample measuring principle	Three-way stopvalve switching measuring tube
Sample volume	About 0.2 – 20 mL (fixed loop volume [measuring tube])
Measurement repeatability	0.5% or less for 10 mL sample as CV value
Measurement vessel	Material : hard glass, Number of electrode : Max. 4 Max. volume : approx.150 mL, Number of titration nozzle : Max. 4 Min. required volume : about 100 mL
Alarm indication	Pure water empty, Waste water full, System abnormal
Tanks for waste water & pure water	20 L plastic tank
Power source	AC line 50/60Hz
Power consumption	Approx. 100VA
External dimensions & Weight	Approx. W565 mm × H635 mm × D480 mm, approx. 45 kg

＊The attachment cable for the titrator, trunk cable for electrode and others are sold separately based on the model designation

For System Expansion (For Example Dual Titration)

Automatic Burette
ABT-7

Magnetic Stirrer
ST-7

Data Acquisition Software for PC

Data Acquisition Software 701
7075650K

Capable of importing data to PC in the CSV format using USB memory, LAN or RS-232.

For Plain Paper Printing

External printer
EPS-R

Optional Units

Photometric Titration Unit

Two wave length auto switching available

FUT-7010 (Immersion electrode OPE-21A attached)

Used to detect the color variation of indicator and used for quantitative analysis of metallization like plating solution.

*The adaptor is built into the titrator and the amp. unit is standalone.

Amp. unit dimension : Approx. W102 X H153 X D119 mm
Standard interference filter : 530 nm, 630 nm

Polarization Titration Unit

FUT-7030 (Twin platinum electrode HDP-303 attached)

Used for iodide value or diazo titration.

*This unit is built into the titrator.

Measuring method : constant-current voltage method, constant-voltage current method
Detecting electrode : twin platinum electrode (HDP-303)
Applied voltage : 0 +/– 1,000 mV (settable at optimum voltage)
Applied current : 0 +/– 1,000 μA (settable at optimum voltage)

Potentiometric Titration Unit

FUT-7050 (Electrode is option)

*This unit is built into the titrator.

mV : 0 +/- 2,000.0 mV
Temperature : 0–100.0℃

Electric Conductivity Titration Unit

FUT-7040 (Conductivity cell CT-57101B attached)

Can be used for electric conductivity measurement.

*This unit is built into the titrator.

Measuring method : AC two electrode method
Measuring range : 0–200.0S/m (depends on cell) Manual ranging when titration set by titrator. Auto ranging when electric conductivity measurement
Temperature : 0–100.0℃

Electrodes

Application	Description	Code	Remarks
Neutralization titration	pH combined electrode (general purpose) Strong-pH	GST-5741C	One of standard accessories of AUT-701
	pH combined electrode (precision measurement) Strong-pH	ELP-035	
	pH combined electrode (double junction)	ELP-062	Junction is replaceable. Effective against KCl inner solution outflow problem
Redox titration	ORP combined electrode (general purpose)	PS-5111C	
	ORP combined electrode (double junction)	ELM-016	Junction is replaceable. Effective against KCl inner solution outflow problem
Salinity titration	Silver combined electrode (general purpose)	ELX-006	Junction is replaceable
Non-aqueous titration	Glass electrode (general purpose)	HGS-2005	Optional electrode adapter (OJD00001) and electrode holder (S-HLD-S) will be required.
	Reference electrode (double junction)	HS-305DS	
Photometric titration	Immersion electrode	OPE-21A	Attached with photometric titration unit
Polarization titration	Twin platinum electrode	HPD-303	Attached with polarization titration unit
Electric conductivity titration	Electric conductivity cell	CT-57101B	Attached with electric conductivity titration unit

Parts & Solutions

Parts for titrator

Description	Code	Remarks
Magnetic stirrer	ST-7	Standard accessories of AUT-701 For dual system separate order would be required
Electrode stand with stopper	6948810K	
Electrode holder	0IB00001	
Electrode attachment (G)	0IB00004	
Electrode attachment (J)	0IB00005	
Electrode attachment (N)	0IB00008	
Electrode adapter	0JD00001	Required for using glass electrodes and reference electrodes
Electrode holder	S-HLD-S	
Electrode relaying lead wire (1m)	0GB00001	
Electrode relaying lead wire (3m)	0GB00002	
Micro-titration kit	7075600K	Content : Adaptor, Titration nozzle, Titration cell (50 pcs.), O-ring P-5 (2 pcs.), O-ring P12 (2 pcs.) , Stirring bar (2 pcs.)
Turntable connection cable (2m)	7075670K	For TTT-510 connection
AST connection cable (2m)	7075710K	For AST-3210 connection
RS-232 cable (2m)	0GC00002	For PC connection (D-sub9p for PC connection)
Reference electrode inner solution, 100mL (saturated KCl solution)	143F237	For reference electrode (HS-305DS and others)
Reference electrode outer solution RE-2, 100mL	143F238	For electrode for salinity titration
Printer chart paper (5 rolls/pack)	PAP-HCS	For internal printer, one of standard accessories of AUT-701

Parts for burette

Description	Code	Remarks
Unit plate (for 1mL to 20mL syringe)	7075610K	
Unit plate (for 50mL syringe)	7075620K	
20mL brown syringe	AUT-045P	
50mL brown syringe	P000010	
10mL brown syringe	AUT-046P	
5mL brown syringe	AUT-047P	
1mL brown syringe	AUT-048P	
Degassing nozzle (for 1mL to 20mL syringe)	P000070	
Degassing nozzle (for 50mL syringe)	P000071	
Titration nozzle (for micro titration)	AST-P008	
Reagent bottle with tube joint	7075630K	1,000mL translucent brown plastic bottle
Carbon dioxide adsorbent with tube	7075640K	One of standard accessories of ABT-7
Teflon tube, black, 2m (for 5mL to 20mL syringe)	AUT-022P	For 5mL to 50mL syringe
Teflon tube, black, 2m (for 1mL syringe)	AUT-024P	Only for 1mL syringe

Specifications for Standard Configuration

Single Titration System Automatic Titrator AUT-701 + Automatic Burette ABT-7+ Magnetic Stirrer ST-7

Automatic Titrator AUT-701

Display		Color graphic LCD with back light
Displayed Item		Simultaneous indication of titration curve, titration volume, pH(mV), temperature and titration time Changing over display of System A/System B display when dual system Ambient temperature and relative humidity when optional Temp. & RH sensor used
Operational key/ operating method		Flat key Dialog method by function keys and ten keys
Titration/ measuring method		Inflection point detection titration Set point titration Full volume titration (inflection point detection/set point) Intersection detection titration Stat titration Preliminary titration pka measurement pH/mV measurement pH adjustment Electric conductivity measurement
Number of titration steps		Up to 5 steps (up to 2 steps for intersection titration)
Titration mode		Standard mode : 20/system User mode : 40/system Link mode (for sequential titration) : 20/system
Titration control system		Single titration system (system A) Dual titration system (system A/system B) Simultaneous titration/measurement available
Measuring item/ range		pH : 0.00–14.00 mV : 0.0+/–2,000.0mV Temperature : 0.0–100.0℃ Constant voltage current method : 0–2.000μA 0–20.00μA 0–200.0μA 0–1000μA (by range selection) Constant current voltage method : 0.0+/–2000.0mV Electric conductivity : by cell Displayed ranges are below : 0–200.0μS/m(0-2.000μS/m) 0–2.000mS/m(0-20.00μS/m) 0–20.00mS/m(0-200.0μS/m) 0–200.0mS/m(0-2.000mS/m) 0–2.000S/m(0-20.00mS/m) 0–20.00S/m(0-200.0mS/m) 0–200.0S/m(0-2.000S/m) (Fixed range for titration, auto ranging for EC measurement) Transmittance (photometric titration) : 0.0–100.0% Ambient temp. : 0.0–50.0℃ RH : 5–90%
Number of electrode inputs		Max. 4 channels 2 pcs. of pH/mV input installed as standard 3rd & 4th channels are for optional titration units
Number of connectable auto. burettes		Max. 10 units
pH calibration		Automatic 3-point calibration (manual calibration only for user's standard solutions)
pH standard solution		JIS standard solutions/US standard solutions/User's specified standard solutions
User's pH stand. sol. setting		Given standard solution table input : 3 points
Temperature compensation range for pH measurement		0.0–100.0℃
Electric conductivity temperature compensation	Temperature compensation range	ATC (auto. temp. compensation) : 0.0–100.0℃ MTC (manual temp. compensation) : 0.0–100.0℃ TC off available
	Stand. temp. setting	0.0–100.0℃
	Temp. coefficient	0.0–10.0%/℃
Validation support function		Ambient condition display, record (ambient temp., relative humidity) pH calibration history : Max. 20 calibrations Self check up history : Max. 6 (by checking input) Periodical check up history : Max. 10 (by standard solution) Burette volume checking history : Max. 6 (data in burette) Electrode management alarm (date management) Reagent replacement alarm (date management) Syringe replacement alarm (date or numbers of strokes management) Reagent empty alarm (alarm point setting available)
Data memory (re-analysis available)		100 data sets in case of single titration system 200 data sets in case of dual titration system
Printer		Internal line thermal printer
Communication		RS-232 × 5ch. #1: Automatic burette (Max. 10 units connectable) #2: PC #3: Turntable (TTT-510) #4: One from among Auto sampler AST-3210, electric balance and Turntable TTT-510 #5: External printer EPS-R LAN × 1 USB(host) × 1
Ambient temp. & RH		5-35℃ , 85% or less (without condensation)
Power source		AC100V–240V 50/60Hz
Power consumption		Max. 35VA
Dimensions & weight		Approx. W150 × H200 × D385 mm, Approx. 3.6 kg

Standard Accessories

Description	Code
Magnetic stirrer	ST-7
pH electrode (Strong pH combined electrode)*	GST-5741C
pH4.01 standard solution, 500mL*	143F191
pH6.86 standard solution, 500mL*	143F192
3.3mol/L KCl solution, 50mL*	RE-4-05
Electrode stand with stopper	6948810K
Electrode holder	0IB00001
Electrode attachment (G)	0IB00004
Electrode attachment (J)	0IB00005
Electrode attachment (N)	0IB00008
Printer chart paper (2 rolls)	–
Instruction manual	–

*Not attached when no electrode & no standard solution assigned

Automatic Burette ABT-7

Indication	Syringe size indication : LED
Syringe size setting	Digital rotary switch
Syringe	Fine inner grinding position type 20mL brown glass syringe 1mL, 5mL, 10mL and 50mL syringes are option
Wetted material	Teflon, Daiflon, hard glass
Using tube	ID2mm × OD3mm black Teflon tube (ID1mm × OD3mm black Teflon tube when 1mL syringe)
Absorption time	Approx. 20 seconds for full stroke
Discharge rate	50mL syringe : 2–150mL/min 20mL syringe : 0.6–60.0mL/min 10mL syringe : 0.3–30.0mL/min 5mL syringe : 0.2–15.0mL/min 1mL syringe : 0.03–3.00mL/min
Minimum dropping volume	50mL syringe : 0.0025mL 20mL syringe : 0.001mL 10mL syringe : 0.0005mL 5mL syringe : 0.00025mL 1mL syringe : 0.00005mL
Accuracy of burette	In case of 20mL syringe Whole volume error : +/–0.1% Repeatability : +/–0.01mL
Validation support	Burette volume checking history : Max. 6
Outlet for peripheral equipment	One for burette and one for magnetic stirrer
Ambient temp. & RH	5-35℃ , 85% or less (without condensation)
Power source	AC100V–240V 50/60Hz
Power consumption	Approx. 30VA
Dimensions & weight	Approx. W110 × H396 × D346 mm, Approx. 5.4 kg

Standard Accessories

Description	Code
Unit plate (for 1mL to 20mL syringe)	7075610K
Reagent bottle with 1,000mL translucent brown plastic bottle	7075630K
Carbon dioxide adsorbent with tube	7075640K
20mL brown syringe	AUT-045P
Syringe attachment	AUT-066P
Degassing nozzle (for 1mL to 20mL syringe)	P000070
Nozzle cleaning attachment	AUT-067P
Nozzle purge tube	P000108
Teflon tube, black, 2m	AUT-022P
Burette connection cable, 0.9m	118B641
Instruction manual	–

Magnetic Stirrer

Usable beaker	Up to 200mL beaker
External connection terminal	Power for overhead rod type stirrer
Power source	AC100V–240V 50/60Hz
Power consumption	Approx. 5VA
Dimensions & weight	Approx. W110 × H73 × D135 mm, Approx. 0.8 kg

Standard Accessories

Description	Code
Stirring bar	107D039

Analysis Solutions for a Wide Range of Applications

Chemistry

Composition analysis, saponification value, acid value, epoxy equivalence, diazotization titration

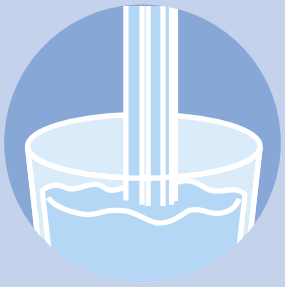
Food Processing

Acidity, salinity, vitamin C, peroxide value

Pharmaceuticals

Potentiometric titration, gastric acidity analysis

Environmental



Acidity, alkalinity, hardness, residual chlorine

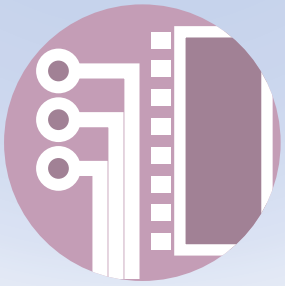
Metal Plating

Acid/alkali in nickel planting liquid, metal composition analysis

Petrochemicals

Neutralization number and bromine number of petrochemical product, hydrogen sulfide in desulfurization waste water

Electronics



Free acid in etching liquid for printed circuit card, free acid in surface treatment liquid

DKK-TOA CORPORATION

⚠ CAUTION Do not operate producuts before consulting instruction manual.

International Operations:
DKK-TOA Corporation
29-10, 1-Chome, Takadanobaba, Shinjuku-ku, Tokyo 169-8648 Japan
Tel : +81-(0)3-3202-0225 Fax : +81-(0)3-3202-5685

Representative Office (Europe):
DKK-TOA European Representative
St. Johns Innovation Centre, Cowley Rd., Cambridge CB4 0WS UK.
Tel : +44 (0)1223-526471 Fax : +44 (0)1223-709239

http://www.dkktoa.net

Issued on 1/10/2008 A-1-20E