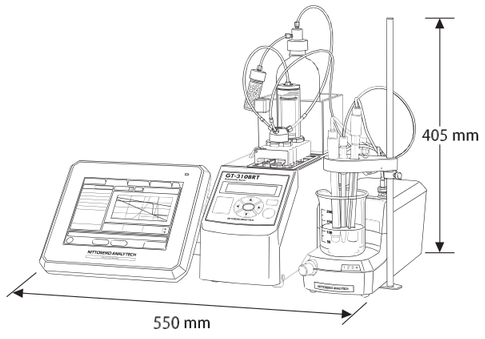
■Standard Specifications: Automatic Titrator GT-310

Titration types	Potentiometric titration (neutralization, redox, chelatometry, precipitation) Option: Polarization, Conductivity, Photometry
Detection ranges	0 to 14 pH +2000 mV to -2000 mV
End point detection	● General titration Inflection point (INF), Set potential (Set-P), Inflection point/ set potential (INF/SP), Front intersection (Front-int), Back intersection (Back-int), V intersection (V-int) ● Petroleum neutralization number-official method (OIL-A) ● Petroleum neutralized number-common method (OIL-J) ● Return time (R-TIM E) ● Stat titration (STAT) ● Potential adjustment (ADJUST) ● Test titration (TEST) ※ pKa can be measured.
Test titration	Parameters are automatically determined for unknown samples. ※Some items need manual entry.
Presets	Up to three stages for one titration file.
Combination titration	Up to 9 titration files can be set
Stirring system	Magnetic stirrer
Display	8.4-inch color liquid crystal display
Display contents	Measurement conditions, measurement results (chart), etc.
Number of files	9999 results, 99 samples, 99 reagents, 99 blanks, 99 schedules, 99 calculation formulas (total of 4 channels)
Calculation functions	Concentration calculations, statistical calculations, recalculations, parameter reanalysis, graph reanalysis
Printer (Option)	Thermal printer, dot impact printer, A4 printer
External input/output	*USB-A: 4, *USB-B: 1, *RJ45: 100 Base-T, *Balance port: 1, *Printer port:1
Additional function	Data Integrity Support (GLP/ GMP Assist), Audit trail, Troubleshooting
Operating Environment	Temperature: 15 to 40 °C Relative humidity: 80 % or less, no condensation
Power Consumption	AC100/120/220/240 V 50/60 Hz 80 VA
Dimensions and mass	CA-310MC: Approx. 245 (W) x160 (D) x215 (H) mm Approx. 2.0 kg GT-310STR: Approx. 120 (W) x340 (D) x215 (H) mm Approx. 2.5 kg

■GT-Buret GT-310BRT

Buret volume	Standard 20 mL
Buret accuracy	Repetition precision: +/- 0.01 mL Resolution: 0.001 mL
Flow path switching	Automatic switching using fluororesin valves
Wetted part materials	Fluororesin, glass
Reagent bottle stand	Compatible size 500 mL, l L
Connection line	Diameter 3 mm / 1.5 mm Fluororesin tube
Injection / suction speed	10 to 600 µL/sec (Set value is different depending on the buret volume.)
Power supply	Stirrer, GT buret, Supplied from Buret Extension Unit
Dimensions	Approx. 130 (W) x380(D) x260(H) mm
Mass	Approx. 3.5 kg

Dimensions



Nittoseiko Analytech Co.,Ltd.

Note: Follow instructions in manuals to correctly install, connect and operate the instruments. Contents of catalogues are subject to change without prior notice when improvements are made in performance.The actual color of the goods may appear different from color printed. All screen images are simulated.
*Company and product names contained herein are the trademarks or registered trademarks of the company concerned.

⚠ Safety Precautions	●Read through the user's manual first before installing, piping, wiring and operating this monitor, then always follow to the manual to correctly operate the monitor.

CAT No.21030822051E

Automatic Titrator
GT-310

High functionality Good usability

Advanced high precision Titrator

Visual Intuitive Operability

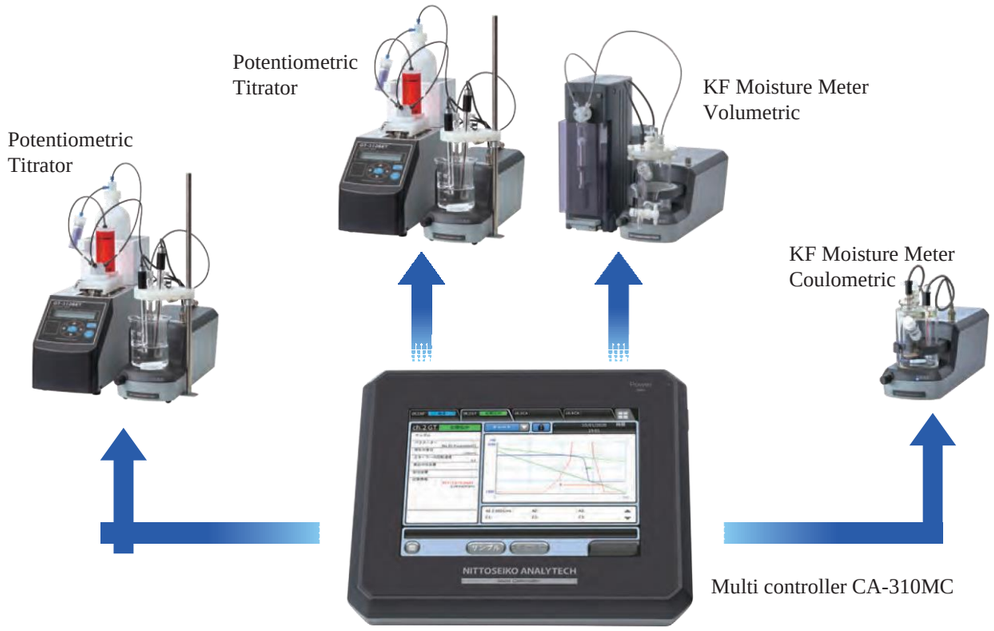
Nittoseiko Analytech Co.,Ltd.

Automatic Titrator GT-310

High-precision automatic buret and a new titration control system have enabled high-precision titration. Good operability by a bright and legible 8.4-inch color touch screen and guidance displayed on the screen. By connecting an optional moisture meter, potentiometric titration and Karl Fischer moisture measurement can be performed with one unit. It can be used in a wide range of applications.

4 channel simultaneous measurement and result evalution

Up to four titration units can be connected to one multi controller which enables simoultaneous measurement of any combination of general titration (e.g., neutralization, precipitation, redox and chelatometric titration) and Karl Fischer (KF) moisture measurement.Also, the connected channel can be easily switched by a tab always showing the measurement status.



Multi controller CA-310MC

Precise injection volume control

More flexible parameter settings are possible.

● Improved operability!

Injection volume and potential stability criteria can either be set in intuitive categories or precisely customized.

● Improved titration accuracy!

Prevent excessive injection by subdividing injection volumes and reaction "on the fly".

Reanalysis functions

Reanalysis can be performed to calculate correct and optimum end points.

e.g.) Inflection point to Set potential

It is also possible to specify any point on the titration curve as the end point.

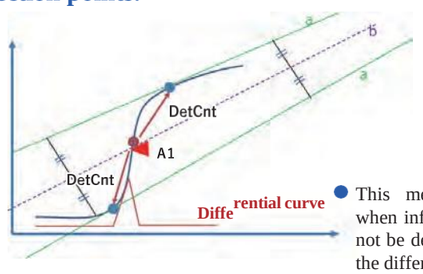
End point detection

● Individual parameters can be set for multiple inflection points.

When a titration curve has two or more inflection points, suitable end-point type can be set for each point separately.

● Graphical evaluatio

Contains methods that allow graphical evaluation as known from manually plottet titration.
Inflection point detection by use of tangential lines of the titration curve.



● This method is usable when inflection point can not be determined just by the differential curve.

LIMS connection

Data of measurement results and audit trail can be automatically output to folders on the network.

Automation

Routine analytical procedures, such as ‘pH calibration → blank measurement → sample’, can be registered as schedules.
In addition, a multi-sample titrator (GT-310MST) automates a series of routine procedures.

Wireless connection

A wireless adapter makes it possible to install burets, stirrers and measuring units in glove boxes or fume hoods.

pH Calibration

Automatic judgment of stability is possible during pH calibration with buffer solution.
(Conventional manual judgment of stability is also possible.)

Bar code reader

By connecting a commercially available bar code reader, information such as sample name can be read.

External start switches

You can start the measurement using an optical or a foot start switch. It is convenient to start on-site, such as when working in fume hoods.

Test titration

Preparation for testing become much easier even for unknown samples by beginners.
Suitable parameters are defined through a titration automatically

Designed to meet GLP/ GMP /Data Integrity requirements

Compliant with FDA 21CFR Part11 and Pharmacopoeias (USP, Ph.Eur., JP)

■ User Management

Up to 99 valid users are authorized. Along with free name settings such as "Administrator", "Manager" or "Operator", each function of the device can be set to each user respectively.

■ Support for SOP preparation

Standard Operating Procedures can be easily created by converting actual operations to text data and image data.

■ Data Integrity support software

GT-310 comes with strong and smart support for data protection and management without a dedicated PC for strict quality control based on Good Manufacturing Practices (GMP) standard.
Audit trail function is provided as an option.

■ Functions for data security

You can back up all the data to a USB flash drive, an external hard disk drive, or a network storage. By forced archiving function, data is kept safe.

■ Electronic signature

Signatures can be made on measurement results with multiple levels of permissions, and all actions are automatically recorded in the audit trail.

■ Audit trail (Option)

All operation logs of the instruments containing the measurement results from login to log out are recorded. By checking the logs, intentional or inadvertent data modification is monitored to ensure the reliability of the measurement data.

Features of GT-310 versatile equipment

GT-Buret GT-310BRT

High-precision buret controls down to 1 µL

With the new high-precision buret that can control down to 1 µL highly accurate measurement results can be realized. In addition, the GT buret can be manually operated independently for reagent replacement and dispensing specified number of reagents by the key operation on the front side.

Buret cassette

With minimizing dead volume in the new buret, reagents are replaced efficiently. The buret cassette is a one-touch slide type which allows easy and smooth replacement (Conventional buret cassettes can also be used.)

Specifications

	20 mL Standard Buret Cassette
Repeatability	± 0.01 mL
Accuracy	1.000 mL ± 0.01 mL 10.000 mL ±0.01 mL 20.000 mL ± 0.03 mL
External dimensions	Approx. 69 (W) x l21 (D) x l31 (H) mm

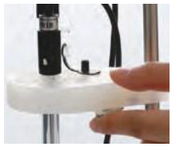
Options	1 mL buret cassette
	5 mL buret cassette
	10 mL buret cassette
	20 mL buret cassette with temperature sensor

Stirrer GT-310STR

Smart on/off stirrer

The stirrer rotation can be synchronized with start and end of titration.

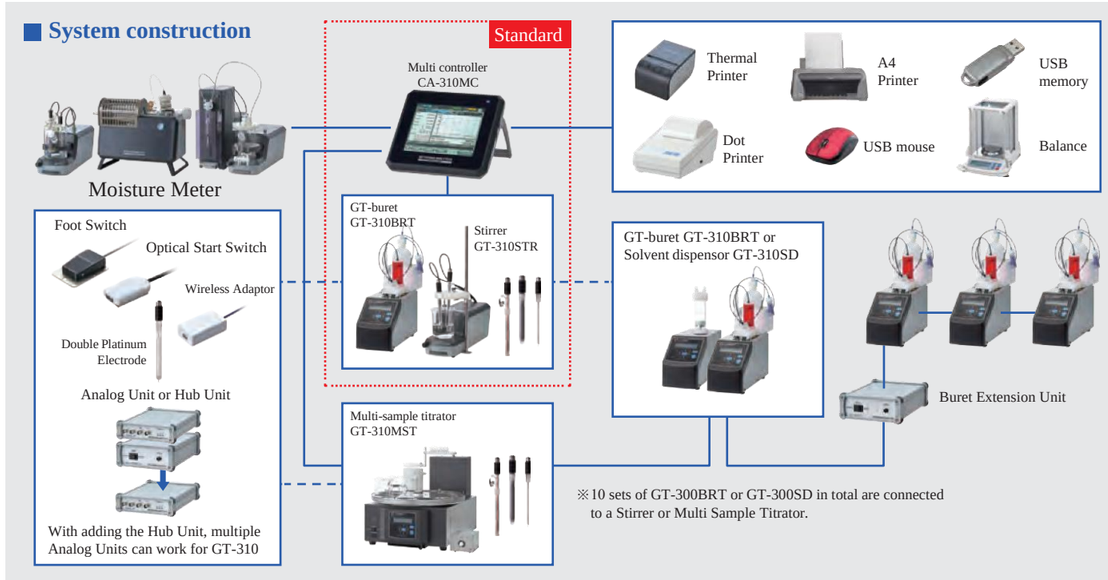
One-touch electrode holder



Airtight titration flask (Option)

Air tight titration flasks are also available for samples effected by air or laboratory environmental conditions.

System construction



Multi Sample Titrator GT-310MST

Automatic and sequential titration for Multi-item and Multi-sample. 12 or 24 positions. Allows a variety of applications when connecting different kinds of burets, solvent dispensers (option) and pumps.

Specifications

Number of beakers	12 Samples, 24 samples (100 mL, 200 mL)
Beaker size	Optional spacer ring available for blow beakers Tall beaker: 100 mL, 200 mL and 300 mL 100 mL Erlenmeyer flask, disposable container
Table rotation system	Turntable Up to 99 samples can be measured with one schedule
Electrode cleaning method	Water pump for aqueous measurement Solvent pump for non-aqueous measurement
Controller	Detachable (cable length 400 mm)
Power consumption	AC85 V ~ 260 V, 50/60 Hz 210 VA
Dimension and mass	12: 440(W) × 520(D) × 425(H) mm 18.9 kg 24: 475(W) × 590(D) × 425(H) mm 19.5 kg

Pump

Pump 1 for water

Electrode cleaning for aqueous samples or, electrode conditioning for non-aqueous samples.

Pump 2 for solvents

Electrode cleaning for non-aqueous samples.

Pump 3 for Waste Draining

After measurement, the waste can be automatically drained out from the beaker.

Solvent Dispenser GT-310SD

Specifications

Driving unit	Detection method	Automatic buret
	Power supply	Supplied by GT-310STR, GT-310MST or Buret Extension Unit
	Dimensions and mass	Approx. 130 (W) x315 (D) x350 (H) mm Approx. 4.5 kg
Buret	Buret volume	50 mL glass buret
	Channel switching	Check valve
	Accuracy	± 2 mL +/- Injection volume × 2 %
	Wetted materials	Glass, Fluororesin, Polypropylene, Polyethylene, Stainless steel and Ceramics
	Wetted materials	Polyethylene tube: outer dia. 4, inner dia. 6 (mm)

Analogue Unit GT-310PS

For conductivity / polarization titration
To connect extra electrodes for potentiometry

Specifications

Constant current polarization	Current from 0 to 25.00 uA
Constant voltage polarization	Voltage from 0 to 2,000 mV
Conductivity	5-step switching
Power Consumption	Supplied by GT-310STR,GT-310MST or Hub unit
External dimensions and mass	Approx. 150 x 220 x 45 mm, 0.7 kg

Buret Extension Unit

Power resource from the third buret.

Photometric Detector, GT-LDII

Specifications

Detection method	Immersion probe type using optical fiber
Light source	Tungsten lamp
Interference filter (Option)	530 and 620 nm * Other wavelengths are also available as custom orders. (Visible Range Arbitrary Wavelength Replacement Method)
Power Consumption	ACl00/120 V 50/60 Hz approx. 10 VA

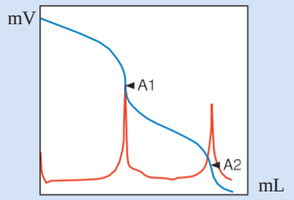
Hub Unit

For connecting two or more Analogue Unit to a system.

Versatile end-point detection on GT-310

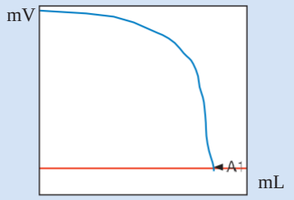
General titration

Inflection point (INF)



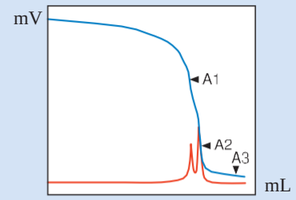
Results are calculated by inflection points detected from the shape of titration curve using tangential lines of the curve.

Set potential (SET-P)



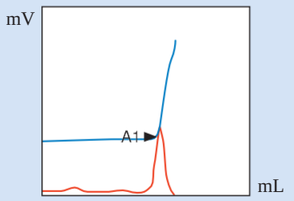
End points are set to fixed potentials or pH. When the value approaches to the set points, titrant injection volume is controlled precisely for accurate measurement.

Inflection point / Set potential (INF/SP)



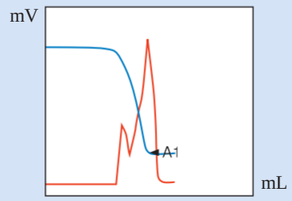
End points are decided by inflection points basically. If the points are not detected, titration continues to a set potential or pH.

Front intersection (Front-int)



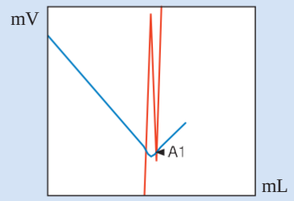
An end point is decided by changing slope of straight lines along the waveform. End point is the first intersection of the two straight lines.

Back intersection (Back-int)



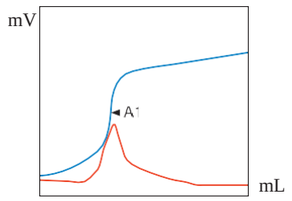
An end point is decided by changing slope of the straight lines. When the slope becomes flat, intersection of the two lines is end point. The second intersection is the end point.

V intersection (V-int)



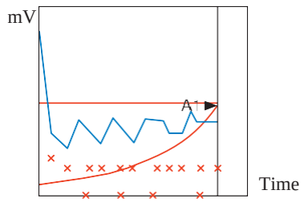
An end point is decided by changing slope of straight lines along the waveform. Titration curve looks V-shape. End point is the first intersection of the two lines.

Petroleum neutralization number standard testing method (OIL-A)



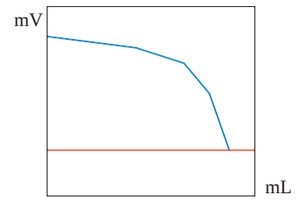
After detecting an inflection point, continue the titration until the slope of the curve become below the set value.

Stat titration (STAT)



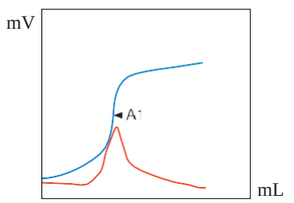
By the titration, control the potential or pH on a reference value. The titration ends at the maximum titration time.

Potential adjustment (ADJUST)



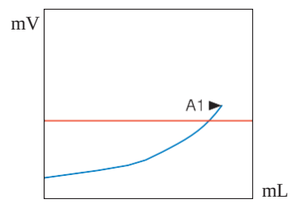
Control the potential or pH by titration to reach a reference value.
e.g.) Using for pH control before analysis.

Petroleum neutralization number common method (OIL-J)



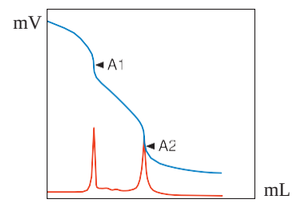
Idiomatic method of the standard method (OIL-A). Titration time can be reduced.

Return time (R-TIME)



End point is decided by a set time. Titration ends after keeping a reference potential or pH value for the time.

Test titration (TEST)



Valuable for testing unknown samples. After a titration, suitable parameter is produced automatically.

Line-up of the electrodes

Application and selection Guide

Titration Method		Electrodes: Detection	Electrodes: Reference	Electrodes: Combined (det & ref)	Option	Application
Potentiometry	Acid-Base	Glass, GTPH1B	GTRE10B GTRS10B	GTPC1B, GTPC1C	—	Acidity (Food), Isocyanate (Urethane), HF, HNO_3, CH_3COOH (Mixed Acid), Purity (Acid). H_2SO_4 (Waste acid)
	Acid-Base (petro)	Glass, GTPH1B	GTRS10B	—	—	TAN/TBN (Petroleum),
	Redox	Pt, GTPT1B	GTRE10B	GTPR1B, GTPR1C	—	Vitamin C (Juice), Iodine value (Edible oil, Biodisel oil, fat), Fe (Plating), Peroxide value (Palm oil),
	Precipiation	Ag, GTAG1B Cl, GTCl1B	GTRE10B	GTAC1B, GTAC1C	—	Halogen (Water), Salt (Food), Cl (Oil, Plating). NaCN (Plating), Cl^- (Concrete)
	Chelatometric	Ion selective F, GTFI1B Cu, GTDI1B Ag, GTAI1B Ca, GTEI1B Pb, GTPI1B	GTRE10B	—	—	Impurity metal in various plating bath (Ni, Cu, Pb, Zn), Hardness (Water), CaO, MgO (Cement),
	Surfactant	GTSS11B	—	—	—	Anion & Cation (Surfactant)
Amperometry	Polarization (Constant current)	Double Pt, GTWH10B	—	—	PS board	Bromine Index, Bromine Number (Oil), *Amperometry or Potentiometry depending on the testing method.
	Polarization (Constant voltage)	Double Pt, GTWH10B	—	—	PS board	
Conductivity	Acid-Base	Double Pt, GTWH10B	—	—	PS board	Basicity of Chemicals (Resin Solution etc.)
	Precipitation	Double Pt, GTWH10B	—	—	PS board	Methacrylic acid (Dye, potentiometry also applicable)
Photometry	Acid-Base	—	—	—	GTLDII	TAN/TBN (Oil), Acidity (Food), Isocyanate (Urethane), Purity (Acid).
	Chelatometric	—	—	—	GTLDII	Metal (Ni, Cu, Pb, Zn etc. Plating), Hardness (Water), CaO, MgO (Cement),

Dimensions of Electrodes

Temperature range: 0 – 60 °C. Cable:1500 mm accompanied