

On-Line TOC Analyzer for Pure Water

eTOC series



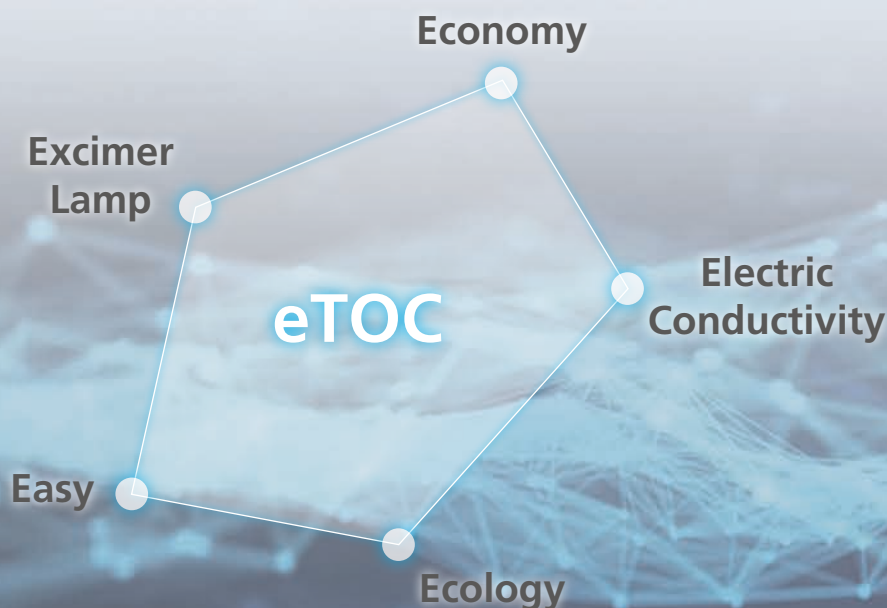
State-of-the-Art Technology in the Smallest Casing

Demands for highly purified water and its quality control are getting stronger in many industries, such as pharmaceutical, medical device, food/beverage, chemical, precision machinery, and semiconductor.

Shimadzu's eTOC has been designed to satisfy this demand.

It has very high sensitivity and low detection limits, reaching 0.1 µg/L, making it perfectly suitable for ultra-pure water measurement.

Technology, Usability and Reliability: the defining attributes of the ultra-small, high-value eTOC.



World's first technology in the world's smallest and lightest casing

- World-first*¹ TOC analyzer using mercury-free excimer lamp.
- "Active-Path" design to maximize the power of the lamp.
- Large color touch LCD screen on the smallest/lightest*² casing.

Easy-to-use and maintain design improves efficiency

- One-year maintenance free.*³ Tool-free maintenance.
 - Conditioned standard solutions and sampler to handle four solutions, facilitating calibration/validation.
 - Export data to USB memory in an easily readable/usable format.
- View/Acquire data on a web browser remotely through a network.



Reliability to support regulations

- Supports regulations in major pharmacopeias, such as the USP and EP.
- Security functions for FDA 21 CFR Part 11 compliance, such as user authentication, audit trail, etc.
- Transfer data to LabSolutions™ database for integrated management.

*1: According to August 2020 Shimadzu survey

*2: According to August 2020 Shimadzu survey of TOC analyzers with a multicolor display screen

*3: When the measurement period is five minutes or more

World's first technology in the world's smallest and lightest*1 casing

World-first*2 TOC analyzer using mercury-free excimer lamp

Excimer lamps emit high-energy 172 nm wavelength light by inducing a dielectric barrier discharge within a xenon gas. The eTOC is the first TOC analyzer in the world to use a mercury-free excimer lamp.

The eTOC also features new "Active-Path" technology for transferring energy from the lamp to the sample. It efficiently irradiates the sample inside the lamp with ultraviolet light to reliably oxidize organic matter.

This new Shimadzu technology achieves both high measurement performance and high environmental performance.

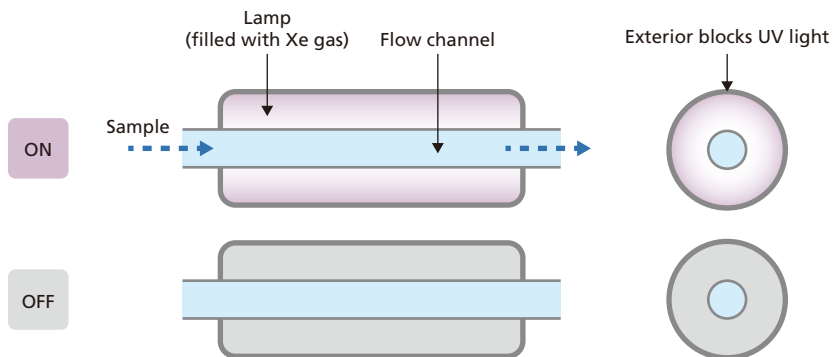
*1: According to August 2020 Shimadzu survey of TOC analyzers with a multicolor display screen

*2: According to August 2020 Shimadzu survey

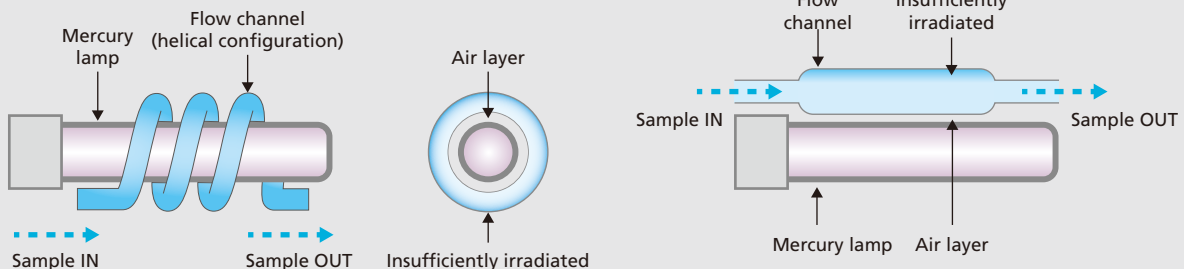


Active-Path

- The sample flow channel is integrated with the lamp.
- The lamp surrounds the flow channel to irradiate samples with UV light more efficiently.
- The simple shape of the flow channel minimizes contamination and carryover.
- The lamp's outer material blocks UV light, which prevents accidental eye injuries and unwanted ozone generation.



Problems with Typical Analyzers



- UV light does not reach samples efficiently, because it is absorbed by the air layer.
- Areas farther from the lamp are not irradiated sufficiently with light.
- UV light generates ozone inside the analyzer.

Large indicator and display screen on a small casing

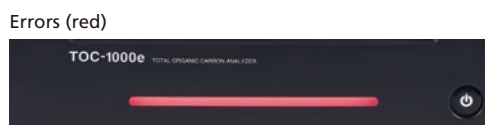
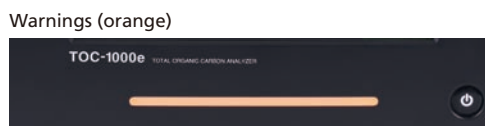
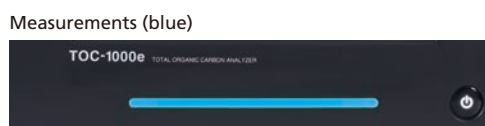
A smart user interface and the large touch-panel screen provide exceptional visibility and operability.

The indicator clearly shows the analyzer's status, such as standby, measurement in progress, or active warning.

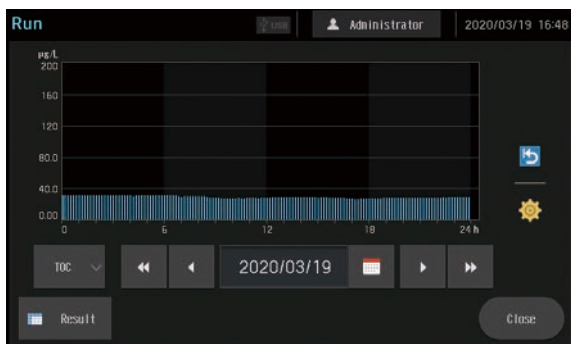
There is no need to squint at a small monochrome screen or go to a separately located monitor or controller to confirm data and perform operations.



Monitor view



Indicator



Trend view

Time	Stream	TOC (mg/L)	RMK	Cond. (µS/cm)	RMK	Temp. (°C)	T/144
00:00:00	1	29.0		0.5109		26.1	
00:10:00	1	29.0		0.5122		26.2	
00:20:00	1	29.1		0.5139		26.2	
00:30:00	1	29.2		0.5149		26.2	
00:40:00	1	29.0	NC	0.5158	NC	26.2	
00:50:00	1	29.1		0.5165		26.2	
01:00:00	1	29.2		0.5174		26.3	
01:10:00	1	29.2		0.5172		26.2	

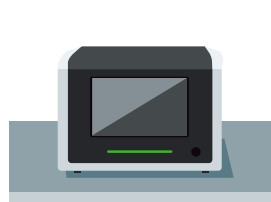
Table view

Small, lightweight casing provides installation flexibility

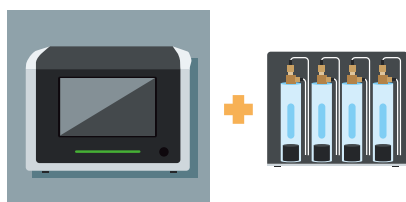
The small and lightweight eTOC can be installed on a tabletop or mounted to a wall or pole using an optional bracket kit.

In either case, a sampler can be attached to the side to calibrate the analyzer onsite.

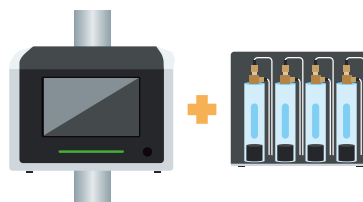
That offers the flexibility to choose the most convenient location for installation.



Tabletop



Wall-mounted



Pole-mounted

Easy-to-use and maintain design improves efficiency

One-year maintenance-free.*¹ Tool-free maintenance.



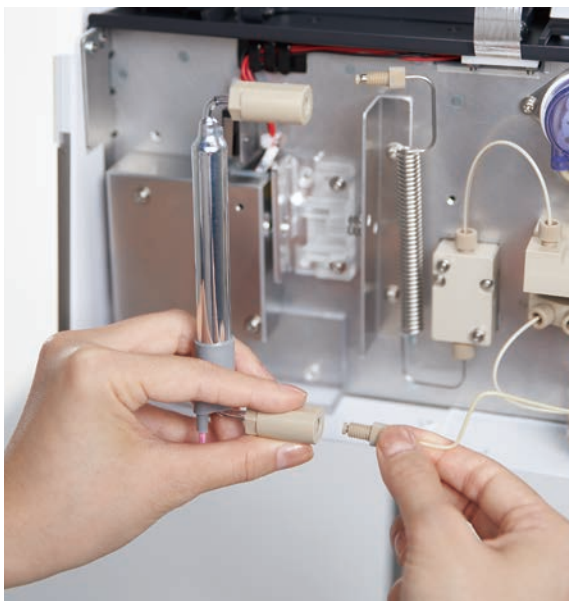
The simple configuration is designed to be maintenance-free for a year.*²

The only parts that need to be replaced during regular maintenance are the excimer lamp and pump head.

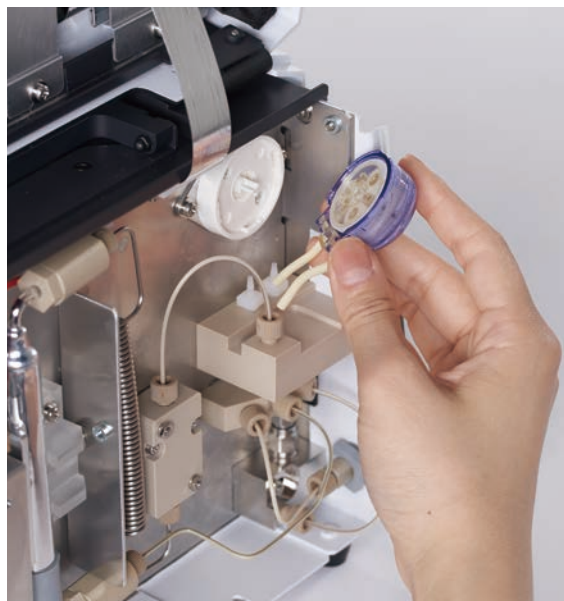
Both parts can be accessed via the front door of the analyzer and easily removed or installed without any tools.

*1: It may vary depending on the sample properties and measurement conditions.

*2: When the measurement period is five minutes or more



Replacing the Lamp



Replacing the Pump

Onsite calibration/validation using a vial sampler Conditioned standard solutions are also available

Using an optional vial sampler, the analyzer can be calibrated or validated at the operating site.

The sampler can hold four standard solutions for creating up to four-point calibration curves.

Conditioned standard solutions, which are suitable for calibration, validation, or system suitability test, are also available. (Refer to p. 10.)

The sampler and the conditioned solutions can make calibration and validation easier and more reliable.



TOC-1000e with Vial Sampler (Optional)



Conditioned Standard Solutions



Export data in an easily readable/usable format

The eTOC can output data to a USB flash drive in text (CSV) or PDF format.

Text File

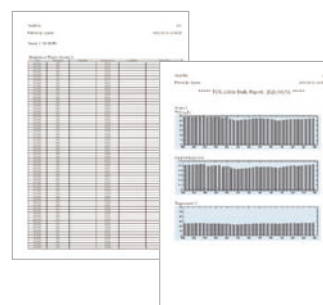
Comma-separated values (CSV) or tab-delimited values.

Readable with spreadsheet software.

Time	Stream No.	TOC (μg/L)	TOC Remark	Cond. (μS/cm)
2020/06/17 00:01:30	1	12.4	0.7842	2
2020/06/17 00:04:00	1	12.2	0.7846	2
2020/06/17 00:06:30	1	12.3	0.7838	2
2020/06/17 00:09:00	1	12.1		
2020/06/17 00:11:30	1	12.2		
2020/06/17 00:14:00	1	12.1		
2020/06/17 00:16:30	1	12.2		
2020/06/17 00:19:00	1	12.1		
2020/06/17 00:21:30	1	12.1		
2020/06/17 00:24:00	1	12.1		
2020/06/17 00:26:30	1	12.1		

Daily Report (PDF file)

Measurement results are listed in a table and shown in a trend graph.



Print Output

The eTOC can export values to a printer (optional).

For information about compatible printers, contact a Shimadzu representative.



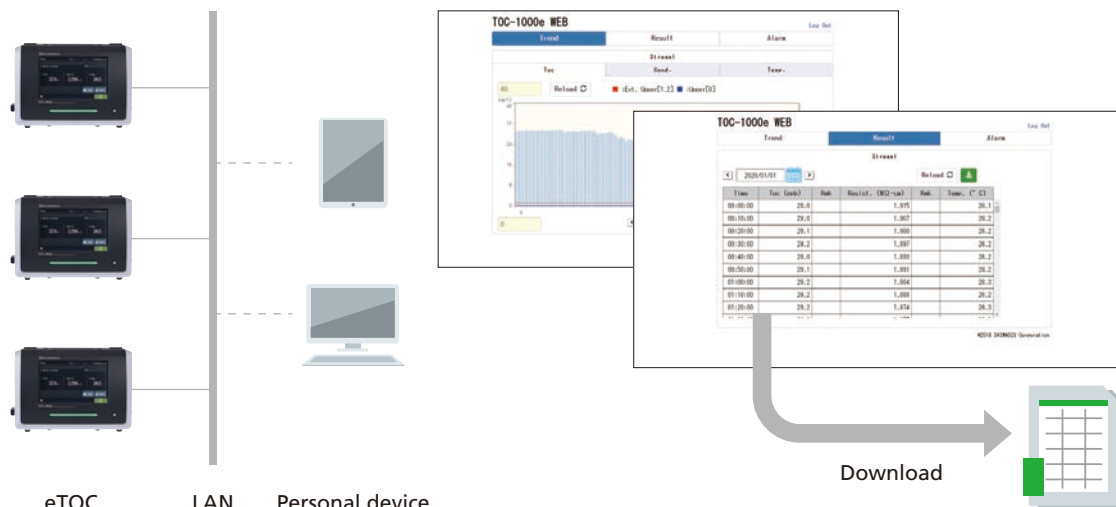
External Input/Output

By using an external input/output kit (optional), measurement values can be exported as an analog output (4 to 20 mA) or a contact output to notify the user of measurement results, alarms or events.

View/Acquire data from a web browser through the network

By connecting eTOCs to a network, you can check results remotely from the web browser of a PC or tablet. No special software is required. Data can also be downloaded as a file.

Even if there are multiple analyzers in different locations, routine checking can be carried out from one place.

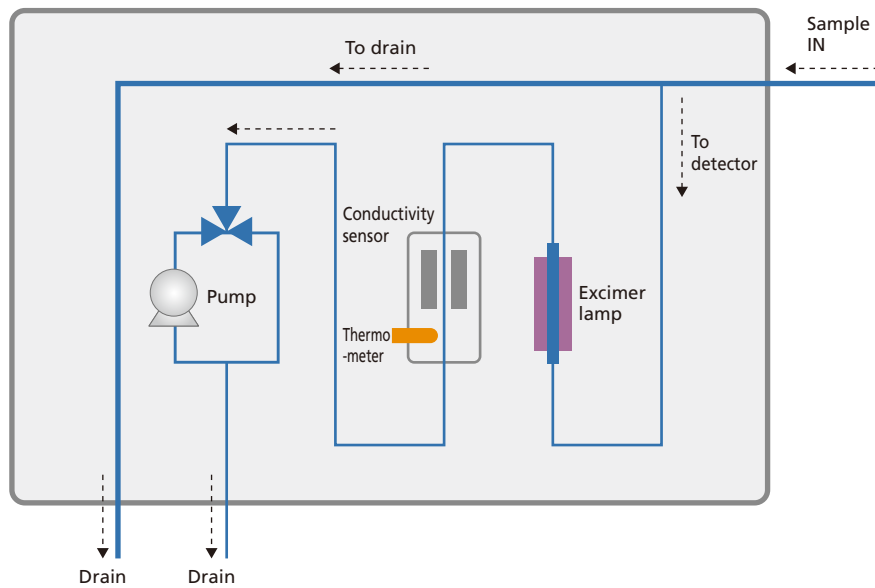


Reliability to support regulations

Measurement reliability supports regulatory compliance requirements

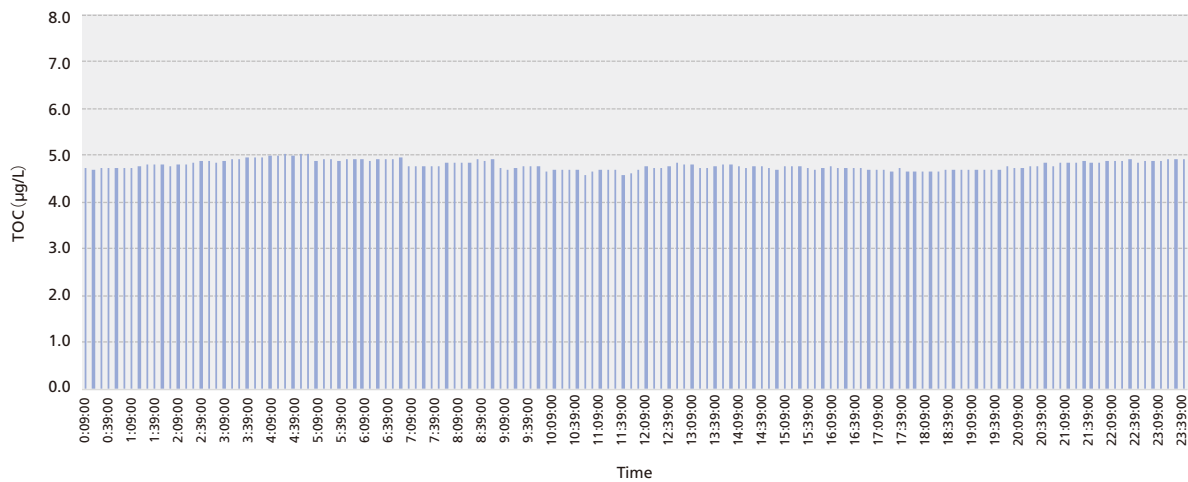
The UV oxidation-conductivity method enables highly sensitive measurements with a simple analyzer design. The system achieves high sensitivity with a detection limit of 0.1 µg/L, which is suitable for ultra-pure water quality control. It is also compliant with the pharmacopoeia requirements of various countries, such as the USP and EP.

Internal structure and measurement principle



- Switch OFF the lamp, start the sample flow, and measure the conductivity of the unoxidized sample.
- Stop the sample flow and switch the lamp ON to oxidize organic matter in the sample.
- Switch OFF the lamp and start the sample flow to measure the conductivity of the oxidized sample.
- Calculate the TOC value based on the conductivity difference between oxidized and unoxidized samples.

Stable and Accurate Data Measurement



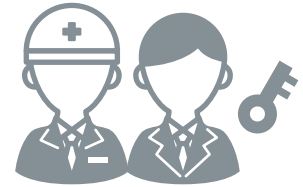
24-Hour Continuous eTOC Measurement Data of Ultra-Pure Water
It shows that results are stable enough to check the quality of ultra-pure water around 5 µg/L TOC.

Security functionality for supporting data management

User authentication and access rights control

Users can be authenticated based on an ID and password.

User access rights are controlled according to four user levels: "Administrator", "Main User", "User", or "Guest".



Operation/Event log

All operations performed by operators, measurement value alarms, instrument errors, and other operating events are recorded.

Filters by "Category", such as "Measurement Alarms" or "Instrument Errors", can be applied for browsing the log history.

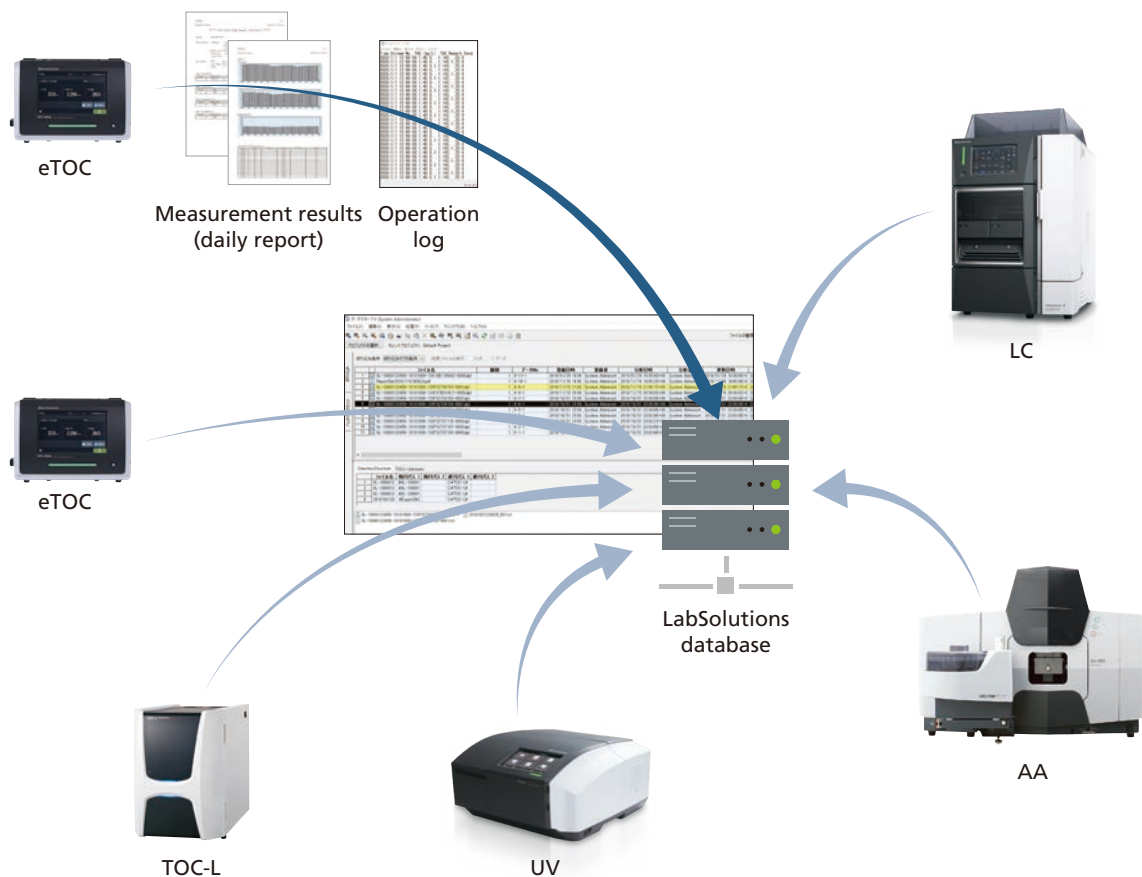
Descriptions and reasons for frequently performed operations can be registered in advance and then recalled later.



Integrated data management

A daily report summarizing measurement results from each day (p.7) and an operation log can be exported daily to a LabSolutions database via a network.

Data from multiple eTOC analyzers and data from other analytical instruments can be managed centrally together.



Options

Description	P/N	Remarks
Vial Sampler	638-57230-41	Four 40-mL vials
Bracket Kit	638-23033-41	Enables mounting to either a wall or pole.
External I/O Kit	638-79217-41	Enables analog output and contact input/output.
Power Supply Terminal Block Kit	638-68186-41	
Sample Filter	040-22305-45	60- μ m element for 1/8-inch OD tubing
Needle Valve for Adjusting Sample Flowrate	040-22308-03	For adjusting sample flowrate in 1/8-inch OD tubing
Sample Flow Shutoff Valve	040-07042-01	Used during maintenance, etc. with 1/8-inch OD tubing
Reducer Union	035-60414-50	Tubing OD adapter from 1/8 to 1/4-inch

Routine Consumable Parts

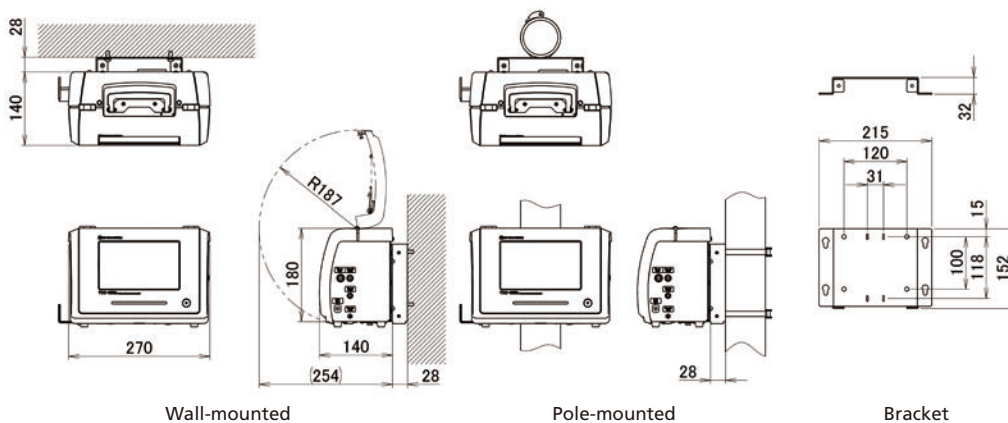
Description	P/N	Remarks
Excimer Lamp	638-69201-41	
Pump Head	638-59384-41	
Sample Filter Element	040-22305-80	
Printer Paper	078-15046-51	3 pcs

Conditioned Standard Solutions

Application	P/N	Remarks
Blank Water	638-60252-91	Four vials of blank water for thermometer validation and rinsing
Set of 147 μ S/cm Potassium Chloride Standard Conductivity Solutions	638-60254-91	Two vials of 147 μ S/cm KCl and one vial of blank water for conductivity calibration
Set of 0-250-500 μ g/L Sucrose Standard TOC Solutions	638-60255-91	One vial of blank water and one vial each of 250 and 500 μ g/L sucrose for TOC calibration and validation
Set of 0-500 μ g/L Sucrose Standard TOC Solutions	638-60256-91	One vial of blank water and one vial of 500 μ g/L sucrose for TOC calibration
Set of 0-500-1000-2000 μ g/L Sucrose Standard TOC Solutions	638-60257-91	One vial of blank water and one vial each of 500, 1000, and 2000 μ g/L sucrose for TOC calibration and validation
Set of 0-2000 μ g/L Sucrose Standard TOC Solutions	638-60258-91	One vial of blank water and one vial of 2000 μ g/L sucrose for TOC calibration
USP 643 System Suitability Test Set, Confirmed (USP Standard)	638-60259-91	One vial of blank water, one vial of 500 μ g/L sucrose, and one vial of 500 μ g/L 1,4-benzoquinone for TOC system suitability test
USP 643 System Suitability Test Set, Equivalent	638-60260-91	One vial of blank water, one vial of 500 μ g/L sucrose, and one vial of 500 μ g/L 1,4-benzoquinone for TOC system suitability test

Installation Space

TOC-1000e



Specifications*

Model	TOC-1000e
Measurement Items	TOC, conductivity (or specific resistance), and temperature
Measurement Principle	UV oxidation-conductivity method
Sample Water Conditions	Temp.: 10 to 50 °C Flowrate: 30 to 500 mL/min Conductivity: 2 µS/cm or lower
Measurement Cycle	2.5 min, 5 min, 10 min, 15 min, 30 min, 1 hr, 2 hrs, 4 hrs, 12 hrs, or 24 hrs
Measurement Range	TOC: 0 to 2000 µg/L Conductivity: 0.023 to 206 µS/cm (without temperature correction) Temp.: 10 to 50 °C
Detection Limit	TOC: 0.1 µg/L
Accuracy	TOC: ±5 % (500 µg/L sucrose) Conductivity: ±2 % (147 µS/cm at 25 °C) Temp.: ±0.5 °C (at 25 °C)
Repeatability	TOC: CV ≤ 1 % or SD ≤ 0.3 µg/L, whichever is greater
Linearity	TOC: R ² ≥ 0.98
Calibration* ²	Creates a 4-point calibration curve automatically
Outputs	USB flash drive, printer, LAN (file or Internet), Modbus (TCP/IP), analog* ³ , or contact* ³
Analog Output* ³	4 to 20 mA output, three channels from TOC, conductivity, specific resistance, or temperature
Contact Output* ³	Alarm: Measurement value alarm, device alarm, serious failure, or power supply interruption Event: Ready for measurement, measuring, and analog synchronization signal
Contact Input* ³	Start measurement
Display	7-inch color touch panel
Ingress Protection Rating	IP33
Installation Site Requirements	Indoors, with 10 to 40 °C ambient temperatures Tabletop, wall-mounted* ⁴ or pole-mounted* ⁴
Power Supply	100 to 240 V AC, 50/60 Hz
Dimensions	W270 × D140 × H180 mm
Weight	Approx. 2.88 kg

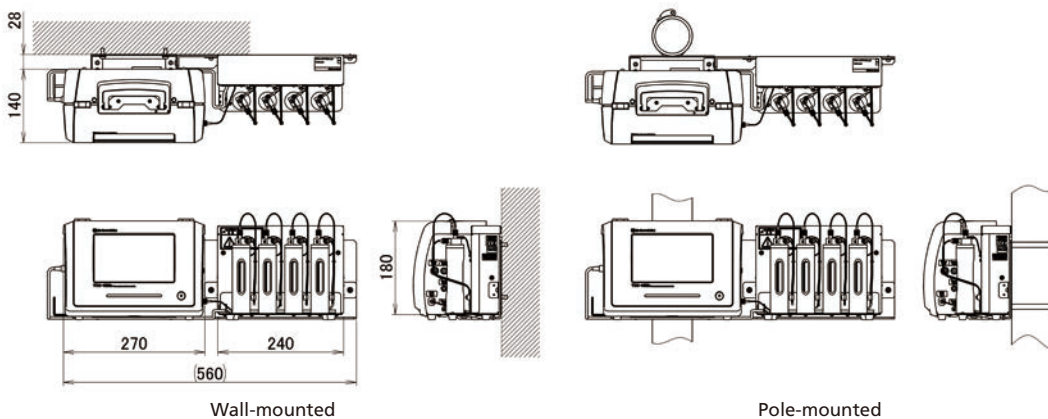
*1: The specification above is available when managed and operated appropriately by trained people.

*2: Using an optional vial sampler

*3: Using an optional external I/O kit

*4: Using an optional bracket kit

TOC-1000e with Vial Sampler (Optional)



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