

Application News

No. 081

Total Organic Carbon Analysis

Online Measurement of Ultra-pure Water Using TOC-1000e

When used in the pharmaceutical and semiconductor industries, it is important to continuously control the quality of pure water to keep the impurities at low level. For optimum quality control of ultra-pure water, the online total organic carbon analyzer TOC-1000e enables highly sensitive analysis with a lower detection limit as low as 0.1 µg/L based on the UV oxidation-conductivity measurement method.

This article introduces an example of online measurement of ultra-pure water using TOC-1000e.

M. Tanaka

■ Features of TOC-1000e

Technologies

- Instead of mercury, the device uses an excimer lamp which emits high energy ultraviolet light with a wavelength of 172 nm as a light source.
- The device adopts “Active-Path™,” a unique new structure which integrates the lamp and sample flow path to ensure that energy from the lamp is transmitted to the sample, and effectively irradiates the sample with ultraviolet light to ensure oxidation of organics.
- Its extremely compact body includes a large color touch panel.

Functions

- The device requires annual maintenance and periodic replacement of the excimer lamp and pump head only. Replacement is easy and requires no tools.
- Use of vial sampler (optional), which can take up to four vials of standard solution, enables on-site calibration and validation.
- Measurement data can be output to USB flash drive in CSV or PDF format.
- Measurement data can be viewed and retrieved through a web browser on a PC or a tablet by connecting the device to a LAN.
- The device enables user authentication by ID/password and can record the operational history. It can also transmit measurement data to LabSolutions™.



Fig. 1 TOC-1000e

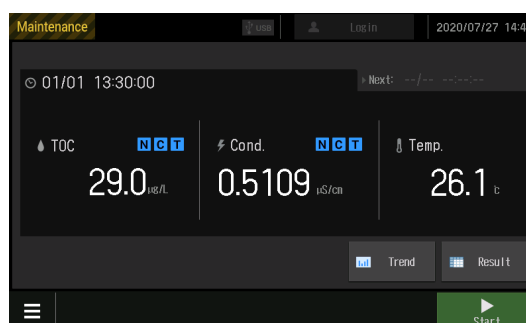


Fig. 2 Color Touch Panel Screen on TOC-1000e

■ Measurement of Ultra-Pure Water

Using TOC-1000e, ultra-pure water was measured online at 10-minute intervals. The measurement conditions are shown in Table 1.

Table 1 Measurement Conditions

Analyzer	: Shimadzu TOC-1000e online total organic carbon analyzer
Range	: 500 ppb
Calibration curve	: 0-250-500 ppb Sucrose standard solution
Measurement interval	: 10 minutes

■ Measurement Results

Table 2 shows the daily reported measurement results. This report lists the measurement times, total organic carbon (TOC) levels, conductivities and temperatures. Fig. 3 shows the trend graph of measured TOC values. This graph indicates that the TOC levels remain stable within a range of 4.7 - 5.0 ppb.

■ Conclusion

Use of TOC-1000e enables online monitoring of the concentrations of small amounts of TOC contained in ultra-pure water. The device can transmit a daily report which summarizes the measurement values and operational history via the network to the LabSolutions database to enable centralized management of these data as well as those from other analyzers.

Table 2 Daily Report

Measurement Results (Stream 1)

Time	TOC(ppb)	TOC.RMK	Cond.(μ S/cm)	Cond.RMK	Temp.(°C)
00:09:00	4.72		0.0487		19.0
00:19:00	4.70		0.0488		19.0
00:29:00	4.72		0.0488		19.0
00:39:00	4.73		0.0488		19.0
00:49:00	4.72		0.0485		18.8
00:59:00	4.74		0.0484		18.7
01:09:00	4.72		0.0487		18.8
01:19:00	4.78		0.0487		18.8
01:29:00	4.81		0.0488		18.9
01:39:00	4.80		0.0490		18.9
01:49:00	4.79		0.0490		18.9
01:59:00	4.77		0.0490		18.8
02:09:00	4.81		0.0490		18.8
02:19:00	4.80		0.0491		18.8
02:29:00	4.84		0.0491		18.8
02:39:00	4.86		0.0493		18.9
02:49:00	4.87		0.0495		18.9
02:59:00	4.84		0.0496		19.0

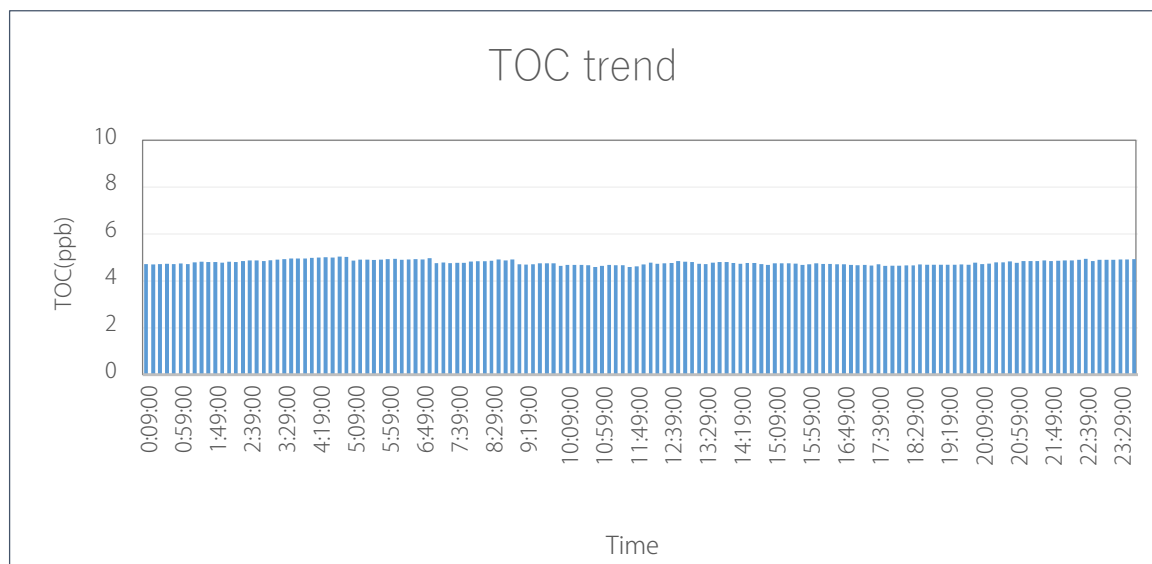


Fig. 3 Trend Graph of Measured TOC Values

Active-path and LabSolutions are trademarks of Shimadzu Corporation in Japan and/or other countries.

First Edition: Oct. 2020



For Research Use Only. Not for use in diagnostic procedure.

This publication may contain references to products that are not available in your country. Please contact us to check the availability of these products in your country.

The content of this publication shall not be reproduced, altered or sold for any commercial purpose without the written approval of Shimadzu. Shimadzu disclaims any proprietary interest in trademarks and trade names used in this publication other than its own. See <http://www.shimadzu.com/about/trademarks/index.html> for details.

The information contained herein is provided to you "as is" without warranty of any kind including without limitation warranties as to its accuracy or completeness. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication. This publication is based upon the information available to Shimadzu on or before the date of publication, and subject to change without notice.

Shimadzu Corporation

www.shimadzu.com/an/