C391-E067B

Access to your success
SHIMADZU

TOC-4110
TOCN-4110
TN-4110

Shimadzu
On-line Total Organic Carbon &
Total Nitrogen Analyzer 4110 Series

TOC-4110
TOC Measurement

TOCN-4110
TOC & TN Measurement

TN-4110
TN Measurement

The above instruments are equipped with Recorder set and Multi-Stream Suspended Solids Pretreatment Unit (both optional)

TOC-4110
TOCN-4110
TN-4110

Shimadzu On-line Total Organic Carbon & Total Nitrogen Analyzer 4110 Series

Quick, accurate analysis of Total Organic Carbon and Total Nitrogen in aqueous matrices

TOC (Total Organic Carbon) is an index of the total amount of organic substances in water. TOC is used in a variety of applications from management of waste water treatment plant influent and effluent, to drinking water supply management, and monitoring of impurities in process and surface waters. And, the range of applications in which this type of on-line technology is used is expected to continue expanding.

In addition, because nitrogen is considered to be one of the factors which contributes to the over-proliferation of organisms in enclosed bodies of water, management of these public water sources and of treatment plant influent and effluent also includes demand for monitoring of nitrogen levels.

The 4110 Series Shimadzu On-line Water Quality Analyzers, with their proven combustion technology, lead the way in on-line water quality analysis technology.

Applications

- Management of influent and effluent water for waste water treatment
- Management of various plant waters (washing, rinsing, cooling, circulating and other plant liquids)
- Monitoring of boiler and condensate water
- Monitoring of drinking water (source water, in-process water), highly processed water
- Monitoring of surface water (rivers, lakes and streams)
- Water quality monitoring for regulatory reporting
- Can be switched to off-line analysis mode

Contents

TOC-4110

Auto-dilution function enables TOC measurement up to 20,000ppm

The TOC-4110 is a high performance on-line TOC analyzer, based on proven 680˚C Catalyst-aided Combustion Technology. This technology has been proven over a large installed base of Shimadzu Total Organic Carbon Analyzers throughout the world, that have been applied to a broad field of industries.

- Any of 3 TOC measurement modes can be selected depending on sample characteristics.
  - TOC (NPOC) measurement using acidify/sparge process
  - TOC measurement via differential TC and IC components (TOC=TC-IC, option)
  - TOC measurement by adding POC to NPOC (TOC=POC+NPOC, option)
- A complete line of options designed to accommodate samples with suspended particles, slime or algae reduce the occurrence of trouble and remedial maintenance in on-line TOC measurement.
- TN analysis can be added (option).

TC (Total Carbon) Measurement

The combustion tube, filled with platinum catalyst, is heated to 680°C. Carrier / combustion gas (purified air) flows through the tube at 150mL/min. Sample is injected via the sample pretreatment / injection system into the combustion tube. The TC in the sample is oxidized to carbon dioxide and water. The carrier gas, containing the oxidation products, exits the combustion tube and passes through the dehumidifier where it is cooled and the moisture is removed. The gas then passes through the halogen scrubber to remove halides that may damage the detection cell. The gas then enters the sample side of the non-dispersive infrared detector (NDIR), where the carbon dioxide is detected.
The NDIR signal (analog signal) is converted to a peak profile, and the peak area is calculated by the data processor.
To express this peak area as a ratio of TC concentration in the sample, the relationship of TC concentration to peak area is determined using a TC standard solution (external standard calibration method).
TC is composed of TOC (total organic carbon) and IC (inorganic carbon).

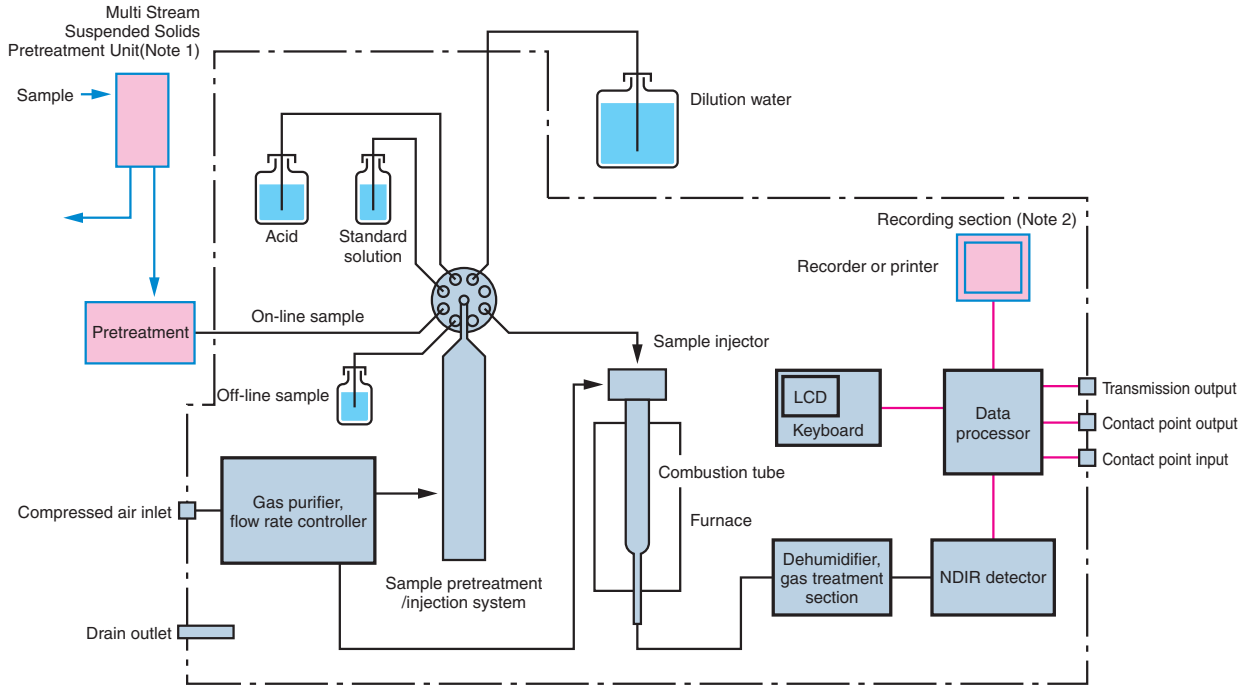
IC (Inorganic Carbon) Measurement

A small amount of hydrochloric acid is added to acidify the sample to convert all IC to carbon dioxide (CO_2).
Carrier gas (purified air) is sparged through the sample to sweep the CO_2 into the NDIR detector. The IC concentration in the sample is measured in a similar fashion as the TC.
The IC is a combination of carbonates and bicarbonates.

TOC (TC-IC) Measurement

Subtracting the IC concentration from the TC concentration will determine the TOC concentration by difference.

TOC-4110 Measurement system diagram



Note 1) For the sampling section, select the multi-stream suspended solids pretreatment unit, the single stream suspended solids pretreatment unit,the backwash strainer sample pretreatment unit or the sample stream set (option).
Note 2) For the recording section, select either the recorder or the printer (both option).

NPOC (Non-purgeable Organic Carbon or TOC via acidify/sparge) Measurement

A small amount of hydrochloric acid is added to acidify the sample to convert all IC to carbon dioxide (CO_2).
Carrier gas is sparged through the sample to remove the CO_2 from the sample solution. The carbon remaining in the sample is NPOC and is measured in a similar fashion as the TC.
NPOC measurement is accepted as being equivalent to TOC by many regulatory agencies (EPA, JIS, ASTM) if the original sample contains little or no purgeable organic carbon (POC) compounds. POC will be lost during the sparging treatment. When POC is present in significant quantities, a true TOC measurement should be performed.

POC (Purgeable Organic Carbon) Measurement

POC measurement is the measurement of the organic carbon exhausted along with the IC component in the sparging process described in NPOC measurement.
The CO_2 component in the sparge gas is eliminated when the sparge gas passes through the CO_2 absorber (LiOH). This gas now contains only the POC component from the original sample. It passes through the POC combustion tube where the POC is oxidized to form CO_2, which is then detected by the NDIR.
Data processing is conducted just as in TC measurement.

TOC(NPOC+POC)Measurement

The TOC concentration is obtained by adding the NPOC concentration to the POC concentration.

TOCN-4110

Simultaneous measurement of TOC and TN with a single instrument.

The TOCN-4110 is a compact, unique water quality analyzer allowing both TOC analysis by the combustion oxidation / infrared detection method, and TN analysis by the combustion / chemiluminescence detection method, all in a single unit.

- TOC and TN are simultaneously measured and results are obtained in as little as 4 minutes.
- The automatic dilution function, automatic calibration function and various input/output functions provided standard, along with options like the multi-stream suspended solids pretreatment unit, allow use in a wide range of applications.

TN (Total Nitrogen) Measurement

TOCN-4110 / TN-4110

The combustion tube, filled with combustion catalyst, is heated to 720°C. Carrier gas (purified air) flows through the tube at 150mL/min. Sample is injected into the combustion tube, and the TN in the sample is converted into nitrogen monoxide. The carrier gas, including the nitrogen monoxide, exits the combustion tube and passes through the dehumidifier where it is cooled and the moisture is removed. The gas then enters the chemiluminescence detector, where the nitrogen monoxide is detected.
The chemiluminescence detector uses the gas phase chemiluminescence of ozone and nitrogen monoxide, so that the nitrogen monoxide detection signal (analog signal) is converted to a peak profile, and the peak area is calculated by the data processor. To express this peak area as a ratio of TN concentration in the sample, the relationship of TN concentration to peak area is determined using a TN standard solution (calibration curve method).

TOC/TN Measurement

TOCN-4110

Sample, from which the IC has been removed by acidification/sparging is injected into the combustion tube, so that combustion of TN, and at the same time, combustion of TOC (NPOC), yields the oxidation product carbon dioxide and nitrogen monoxide. This carbon dioxide is detected by the NDIR detector, nitrogen monoxide with the chemiluminescence detector connected in series. Since the chemiluminescence detector and NDIR detector are directly connected, the nitrogen monoxide and carbon dioxide which are formed can be detected simultaneously, using a single injection of sample.

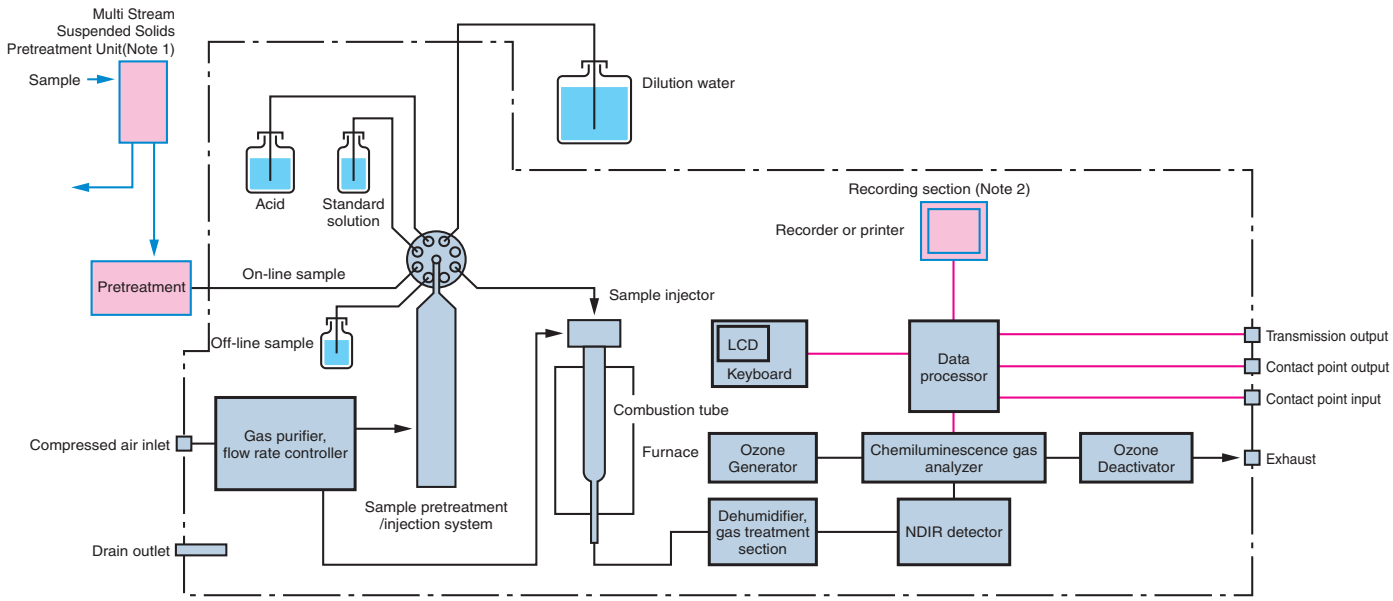
TN-4110

Quick TN measurement up to 4,000ppm full scale.

The TN-4110 is a high performance TN analyzer which uses the combustion / chemiluminescence detection technique.

- The automatic dilution function (provided as standard) enables TN measurement of concentrations up to 4000ppm.
- With the short 4 minutes measurement cycle, not only can sudden changes in TN concentration be caught, but effective monitoring can be accomplished by switching among multiple streams.
- Measurement of sea water is also possible.

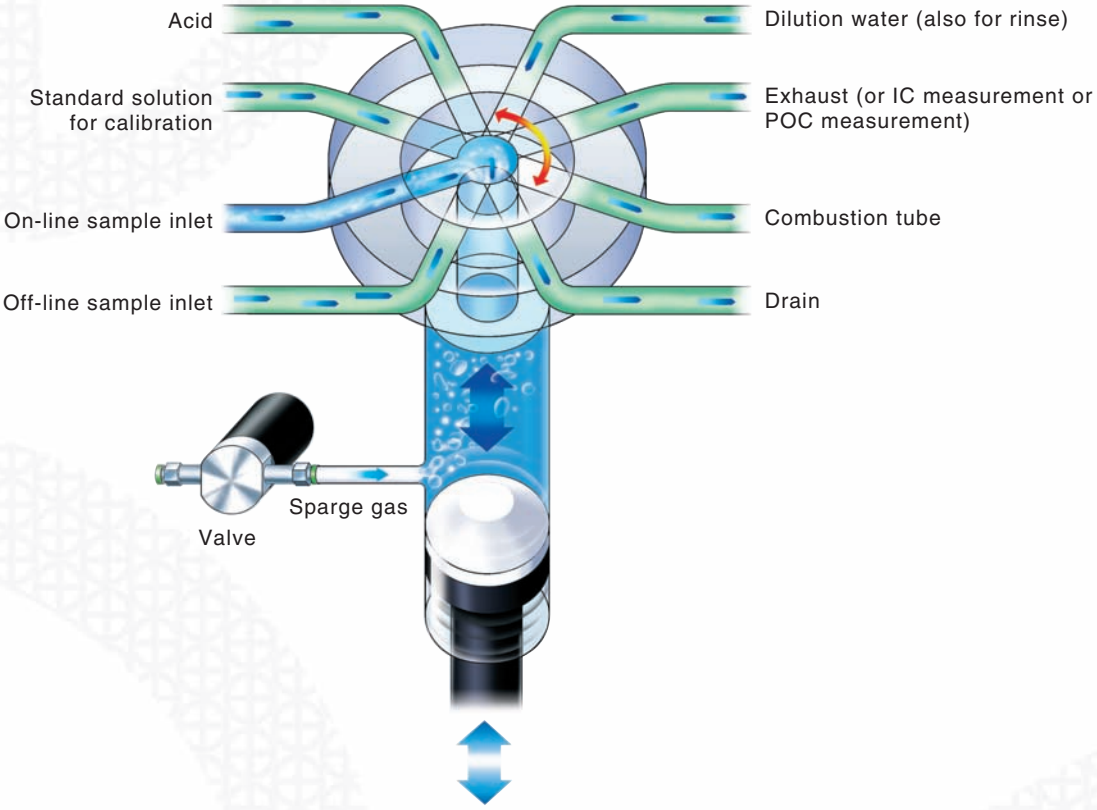
TOCN-4110 / TN-4110 Analysis System Flow Diagram



Notes 1) For the sampling section, select the multi-stream suspended solids pretreatment unit, the single stream suspended solids pretreatment unit, the backwash strainer sample pretreatment unit or the sample stream set (option).
Notes 2) For the recording section, select either the recorder or the printer (both option).

The 4110 Series analyzer are equipped functions and injection systems.

Supported by abundant experience and superb technology.



Cylinder gas unnecessary

- On-board carrier / combustion gas purification allows use of typical house air (instrument grade), eliminating need for expensive and dangerous cylinder gases.

Variety of input/output functions

- Contact output for various event signals and measurement value warnings are provided as standard.
- Remote operation is possible.
- Measurement values can be output as analog signals for each flow line.

Variety of measurement schedule functions

- Sophisticated measurement schedules can be set up, including automatic calibration and catalyst regeneration.
- A pause period can be set.

Compact size conserves space

- The compact instrument base enables installation in a small space.

with a variety of sample treatment

- The unique sample injection system utilizes a sliding valve injection port in conjunction with the high accuracy and precision of a syringe. This combination slide valve / syringe yields the highest reproducibility for TOC/TN type analizers.

- The stable automatic dilution function is provided as standard feature for automatic dilution of high TOC and TN samples. This is useful not only when TOC concentrations are high, but also when the sample contains high concentrations of salt, acid or alkali, thereby extending the life of the catalyst and combustion tube.
  In addition, this automatic dilution function has the following features.
  - The syringe is used for measuring and diluting, enabling high precision and stability, and reducing the amount of dilution water used.
  - The dilution factor is easily set on the screen.
  - Dilution is conducted at the same time as water sampling, shortening the required time for dilution.
  - The dilution feature can also be used for calibration, enabling use of one standard solution for several level calibration curves.

- Automatic calibration is possible with the standard solutions mounted inside the instrument. The dilution feature may also be used with the automatic calibration function.
- An off-line measurement port is incorporated. While serving as an on-line analyzer, manual sampling and measurement can be conducted without modifying tubing, etc.

- In addition to TOC measurement via IC removal (widely used in on-line TOC analyzers: NPOC is also referred to as non-purgeable TOC), it is also possible to switch to TOC measurement via the differential TC and IC method (option required).*

- The POC measurement function (purgeable TOC) may also be added as an option. This allows measurement of true TOC (NPOC + POC), by allowing measurement of the volatile TOC (organic solvents) normally lost in the acidification / sparging process of IC removal.

* Refers to TOC measurement functions.

TOC Measurement Features

Wide Measurement Range
(5ppm full scale ~ 20,000ppm full scale)

- Can be used for measurement of low TOC public drinking water to wastewater with high TOC.

Variety of TOC Measurement Methods

- TOC (NPOC) measurement using acid addition and sparging.
- TOC measurement by differential method (TC–IC) (option).
- TOC measurement by addition method (NPOC+POC).

Automatic Catalyst Regeneration Built-in

- By including a catalyst regeneration step in the measurement schedule, catalyst regeneration is performed automatically.

TN Measurement Features

Wide Measurement Range
(1ppm full scale ~ 4,000ppm full scale)

- Can be used for measurement of low TN public drinking water to high TN wastewater.

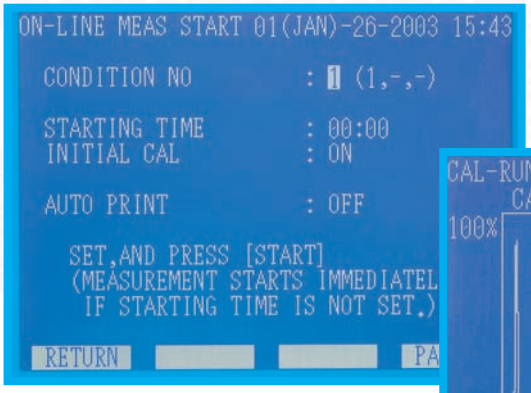
Combustion Reaction at Relatively Low Temperature

- Extends life of catalyst and combustion tube.

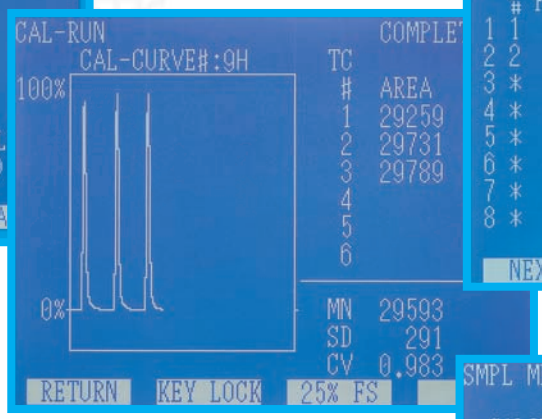
Features compared to wet method decomposition

- Oxidizing reagent unnecessary, facilitating maintenance.
- Wide measurement range at high concentrations, providing high accuracy measurement over complete measurement range.
- The short measurement time ensures that sudden changes in concentration will be caught. Flow lines can also be switched between sample streams.
- Sea water can also be measured, enabling measurement of seaside factory wastewater.

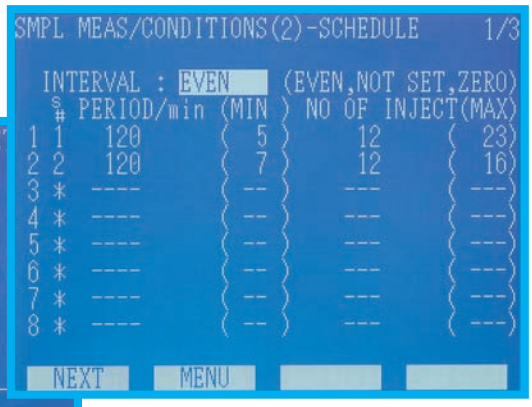
Wide Screens with Abundant Displays



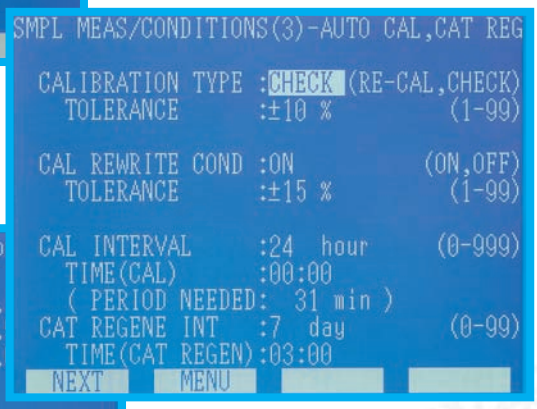
On-line Start Screen



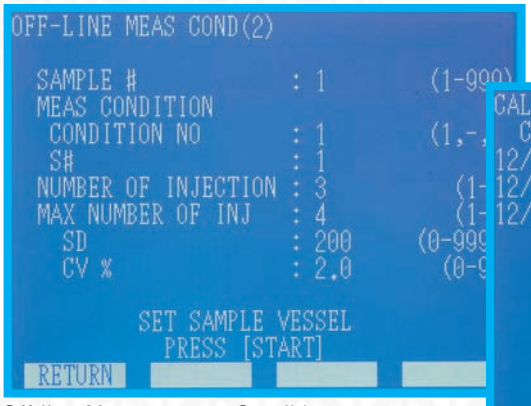
Calibrating Screen



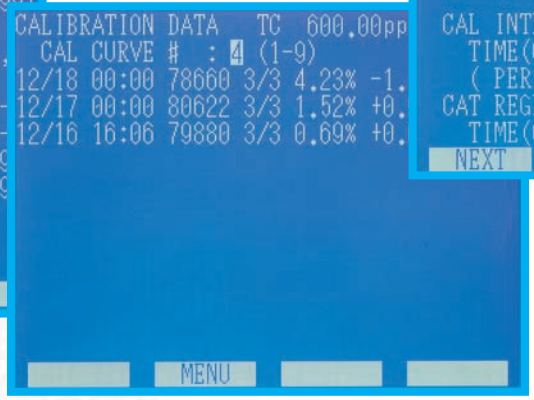
Measurement Conditions (2) Screen



Measurement Conditions (3) Screen



Off-line Measurement Conditions (2) Screen



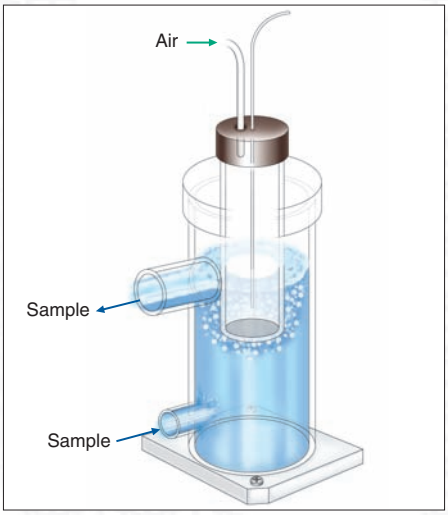
Calibration Data Record Screen

- The CPU provides high level data processing and a variety of functions. The sophisticated schedule used when performing analysis with multiple flow line switching can be set as desired on a wide screen.
- After setting the measurement conditions, just a few key strokes are required to execute measurement start and stop.
- With the screen for monitoring the various instrument modules and a real time peak monitor screen, it is easy to verify the overall operating status.
- The measurement and calibration result histories can be verified on the screen.
- Key operations can be used to verify the operation status of the various instrument components.
- Various counters are provided to indicate the amounts remaining in the standard solutions, etc., as a reminder of when to replenish solutions and replace consumable parts.
- The screen backlight automatically shuts off if operations are not performed within a specified period of time, thereby extending the life of the display.
- The printer (option) can print out the contents of the screen.

Sample Pretreatment Equipment with Superior Feature (optional equipment)

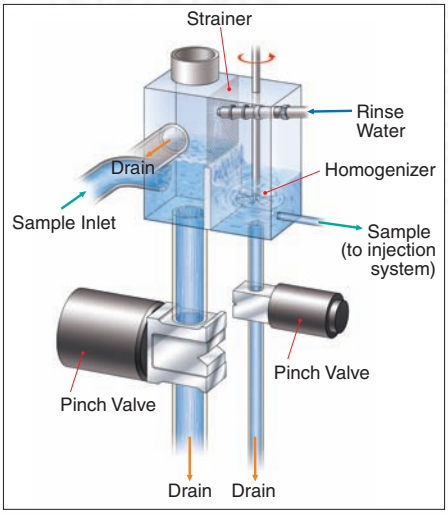
Backwash Strainer Sample Pretreatment Unit

- This sample pretreatment unit is simple and effective.
- Air pushes the sample material out of the sampler to prevent adhesion of contaminants, slime and algae, and acts to back wash the strainer to prevent the strainer from clogging.
- In order to obtain a sample, when water is taken in, the sample passes through the strainer and enters the sampler.



Single Stream Suspended Solids Pretreatment Unit

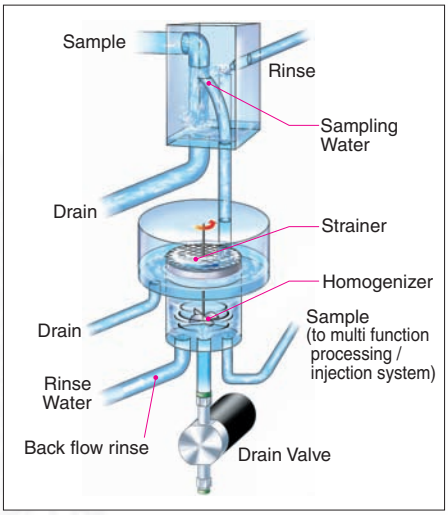
- This unit will reduce trouble with flow blockage, which is the biggest problem for on-line analysis.
- The design is suited to measuring samples of suspended particles.
  - The electrically operated single stream suspended solids pretreatment unit does not require a compressed air source.
  - Stable measurement values are obtained by means of a 2-stage pretreatment process consisting of removing foreign matter with the strainer and pulverizing the suspended particles and making them uniform with the homogenizer.
  - Samples are sent via the strainer to the pretreatment section only when obtaining samples. Furthermore, all sample contact components are rinsed with rinse water immediately after samples are obtained. By introducing only as much sample as is necessary and promptly washing, it also reduces slime and algae problems.



Multi-Stream Suspended Solids Pretreatment Unit

- This Unit will reduce flow blockage trouble and maintenance frequency, which is the biggest problem for on-line analysis.
- The design is suited to measuring samples of suspended particles.
  - It has a unique sampling mechanism that does not use solenoid valves.
  - By obtaining only the minimum sample quantity necessary, not only are problems with suspended particles reduced, but problems with slime and algae are reduced as well.
  - A strainer-equipped homogenizer is included.
  - All sample contact components are rinsed with rinse water and the strainer is back washed immediately after samples are obtained.
- It allows multi-stream measurement. Contamination between streams can be minimized with this pretreatment unit.

* Compressed air and rinse water (tap water) are required.



Specifications

TOC Measurement Functions (TOC-4110 and TOCN-4110)		
Types of measurement	NPOC (acidify/sparge removal of IC) and TC*. Following measurement modes available as options.	
	NPOC, TOC (TC-IC)	
	NPOC, TOC (TC-IC and POC+NPOC)	
Method principle	TC	Combustion catalytic oxidation/CO_2 detection
	NPOC	IC removal (acidify/sparge pretreatment), followed by same method as for TC measurement
	POC	Acidify/sparge/CO_2 absorption, followed by same method as for TC measurement
	IC	Acidify/sparge pretreatment followed by CO_2 detection
Measurement range	From 0~5ppm to 0~1000ppm full scale (0~20,000 ppm full scale possible with dilution function)	
Reproducibility	Within ±2% full scale	
Span stability	Within ±2% full scale/day (ambient temperature fluctuation within 5 °C)	
Zero stability	Within ±2% full scale/week	
Linearity	Within ±2% full scale	
Analysis cycle	4 minutes minimum (NPOC)**	
IC removal	Acidify/sparge within syringe	

TN Measurement Functions (TOCN-4110 and TN-4110)	
Types of measurement	TN
Method principle	Combustion decomposition / chemiluminescence detection
Measurement range	From 0~1ppm to 0~200ppm full scale (0~4000 ppm full scale possible with dilution function)
Reproducibility	Within ±4% full scale at less than 4ppm full scale Within ±2% full scale at greater than 4ppm full scale
Span stability	Within ±2% full scale/day(ambient temperature fluctuation within5°C)
Zero stability	Within ±2% full scale/week
Linearity	Within ±2% full scale
Analysis cycle	4 minutes minimum**

Common Specification

Sample injector	Syringe pump/slide type injector
Sample dilution	Dilution within syringe, dilution factor 2 ~ 20
Auto-calibration	1~2 point calibration (with 2, dilution water is used as zero standard). Up to 6 solutions possible with optional standard solution switching valve for multiple curves.
Multiplexing	1 stream standard; dual stream and up to 6 streams possible with multi stream suspended solids pretreatment unit (Up to 3 streams with TOCN-4110)
Display	LCD (back-light), 40 character columns x 14 rows
Recorder (option)	Recorder width 100mm, max. 6 impact point
Printer (option)	Thermal type, 40 columns, chart width 110mm. Allows full screen printing.
Analog output	Selectable between 0~1VDC, 4~20mA or 0~16mA (isolated output)
Alarm output	Selectable among upper / lower limit, upper upper limit and lower lower, and instrument trouble alarm
Event signals	Ready state, operating on-line, measuring, sample measurement completed, calibrating, regenerating catalyst, data output trigger, active flow line being sampled, power off

Input signals	Calibration start, sample measurement start, measurement stop, alarm reset
Carrier gas	Air or oxygen, supply pressure: 250~300kPa, free of dust, oil mist, water droplets, etc.
Sample conditions	Required flow rate: with Sample Flow Line set: 1~3L/min with Backwash Strainer Sample Pretreatment Unit: Approx. 3L/min. with Single Stream Suspended Solids Pretreatment Unit: Approx. 1L/min. with Multi-Stream Suspended Solids Pretreatment Units: Approx. 10L/min. Temperature: 1~40 °C (34~104 °F) Other: Suspensions and slurries requires use of suspended solids pretreatment unit. On-board straining (#50 mesh) requires tap water connection at pressure > 300kPa for rinsing.
Power supply	AC100, 110, 115, 120, 220, 230, 240V as ordered, 5A, 50-60Hz
Ambient temperature	0~40 °C (32~104 °F)
Construction	Indoor wall mounting (optional stand available)
Weight	70kg approx. (main unit only)

* When performing TN and TC or TN and TOC (TOC=TC-IC) analysis, the IC concentration in the sample should be ≦ 5ppm.

** The analysis cycle varies with the measurement condition settings and the sample characteristics. (The indicated time is based on repeat measurements performed using the same stream and normal measurement conditions.

note) The installation manual shall be referred, and the analyzers shall be installed following the manual.

Standard Accessories Set

Part Name	TOC-4110	TOCN-4110	TN-4110
Combustion tube	1	1	1
Platinum catalyst ST type, 33g	1	1	1
L-shaped combustion tube	1	1	1
Platinum mesh, 2 pc. incl.	1	1	1
Quartz wool (1g)	1	1	1
Ceramic fiber		1	1
Micro syringe, 5mL	1	1	1
Silicon grease (for high vacuum)	1	1	1
CO_2 absorber	2	3	2
Catalyst filling rod		1	1
Potassium hydrogen phthalate, 25g	1	1	
Potassium nitrate, 25g		1	1
Ozone deactivator		1	1
Container, 2L (for acid)	1	1	1
Container, 500mL (for solution)	1	1	1
Container, 10L (for dilution water)	1	1	1
Key	2	2	2
Bolt, SUS M12 x 30	4	4	4
Nut	4	4	4
Washer, SUS spring M12	4	4	4
Key wrench	1	1	1
Hexagonal wrench	1	1	1
Power cord	1	1	1
Instruction manual	1	1	1

Consumable Parts

Part Name	Part Number	Remark	TOC-4110	TOCN-4110	TN-4110
Combustion tube	638-41323		○	○	○
Platinum Catalyst, ST type 33g	638-60116	Combustion catalyst	○	○	○
Quartz wool (1g)	630-00557	For L-shaped combustion tube maintenance	○	○	○
Ceramic fiber	638-60074	For TN catalyst		○	○
O-ring, 4DP10A	036-11209-84	For injection port, 5 pc.	○	○	○
O-ring, Teflon P10	036-11408-84	For injection port, 5 pc.	○	○	○
O-ring, AS568A- 116	630-01566	For connecting combustion./ decomposition tube, 1pc.	○	○	○
Plunger tip, 5mL	638-59231-01	For syringe	○	○	○
Halogen scrubber	630-00992		○	○	
CO_2 absorber	630-00999	For carrier gas purifier	○	○	○
		For optical system purge	○	○	
		For sparge (option)	(○)	(○)	
		For short cell purge (option)	(○)	(○)	
		For NOx gas absorption		○	○
Packing	631-43818	For chemiluminescence detector		○	○
Ozone deactivator catalyst, 300g	638-65232			○	○
Polypropylene cotton	630-00325	For ozone deactivator, 100g		○	○
Printer chart paper	630-08913-01	For printer (option), 10 rolls	(○)	(○)	(○)
Recorder chart paper, EM-100	080-82564-51	For recorder (option), 0~100 graduations, 5 packs	(○)	(○)	(○)
Ink pad, 6 dot	080-82564-55	For recorder (option)	(○)	(○)	(○)
Viton tube set	638-42015	For chemiluminescence detector		○	○
Platinum mesh	630-00105-01	2sh/pk	○	○	○

Special Accessories

Recorder
(100V : P/N 638-54023-01, 115V : P/N 638-54023-16, 230V : P/N 638-54023-17)

6-dot impact printer that mounts in the instrument (width 100mm). Measured analytes may be recorded separately-TC, TN, TOC values, or separate recording of different streams when using multiplexer. This recorder or a printer may be installed.

Printer (P/N 638-54024-01)
Thermal printer, with 40 character columns at a chart width of 110mm. It can print out measurement date and time, measurement values, measurement conditions, calibration data, a bar graph of the measurement values, and duplicate screen information. This printer or a recorder may be installed.

Multi-Stream Suspended Solids Pretreatment Unit (P/N 638-93129-01 ~ 06)
This system is specifically designed to address flow blockage problems, which tend to occur when analyzing samples that contain suspended particles. It is equipped with a strainer with automatic back wash and an blade rotation type homogenizer, and is capable of switching between a maximum of six flow lines.

Single Stream Suspended Solids Pretreatment Unit (P/N 638-93163)
This system has functions equivalent to the Multi-Stream Suspended Solids Pretreatment Unit, but is specialized for a single flow line.

Backwash Strainer Sample Pretreatment Unit (P/N 638-41507-03)
This is a type of pretreatment unit that uses compressed air to clean the strainer.

Sample Flow Line Set (P/N 638-41397, 638-41397-03)
This is used to analyze samples that do not contain suspended particles. It can be equipped with either one or two flow lines. Note that it cannot be used in conjunction with other pretreatment units.

Standard Solution Switching Set - 2 port
(P/N 638-57041)

One additional standard solution may be used (total 2). If diluent is used for zero calibration, separate 2-point calibrations may be performed for multiple analysis (e.g., TC and IC for TOC (TC-IC) analysis, or NPOC and POC for TOC (NPOC+POC) analysis).

Standard Solution Switching Set -6 port
(638-56107-01)

Allows use of up to 6 standard solutions.

Stand (638-10168)
A special stand for the main unit. Anchor bolts are included.

Option Board Case (638-52518)
Required for installing optional boards in the main unit.

Relay Board Set (638-72495-01)
This is for increasing the number of contact point outputs. One board provides 16 additional outputs.

Analog Output Board Set (638-72496)
This allows analog output selection among 0-1VDC, 0-16mA and 4-20mA insulated output. One board provides 2 output circuits. A maximum of 3 boards may be installed.

DF Option (638-57070-01) (TOC-4110 and TOCN-4110 only)
This allows selection between NPOC and TOC (TC-IC) measurement modes in multi-stream analysis.

AD-DF Option (638-57070-02)
(TOC-4110 and TOCN-4110 only)

This allows selection among NPOC, TOC (TC-IC) and TOC (NPOC+POC) measurement modes in multi-stream analysis.

Cable ASSY, CN-9 (638-70593)
Required for installation of the Standard Solution Switching Set (2 port), DF option or AD-DF Option.

TN Measurement Option Set (638-92247)
(TOC-4110 only)

This allows addition of the TN measurement function to the TOC-4110. (Specifications become same as those for TOCN-4110.)

Notes :

1. The Option Board Case (638-52518) is required for installation of the recorder board set, analog output board set and relay board set. One Option Board Case will accommodate all of the option boards.
2. The Cable ASSY.CN-9 (638-70593) is required for installation of the Standard Solution Switching set (2 port), DF Option and AD-DF Option. One Cable ASSY. CN-9 will allow connection of all of the above optional accessories.
3. The contact output listed below are available. The contact output to be used is designated on the screen.

Warning1, 2	Regeneration (catalyst)
Fatal error	Pausing
Ready	Data output trigger
On-line measuring	Sample stream CH1~6
External operation measuring	Power off
Complete external op. measuring	Upper limit alarm *
Off-line measuring	Upper-upper limit alarm *
Stand by (TOC/TN)	Lower limit alarm *
Sample measuring	Lower-lower limit alarm *
Calibrating	

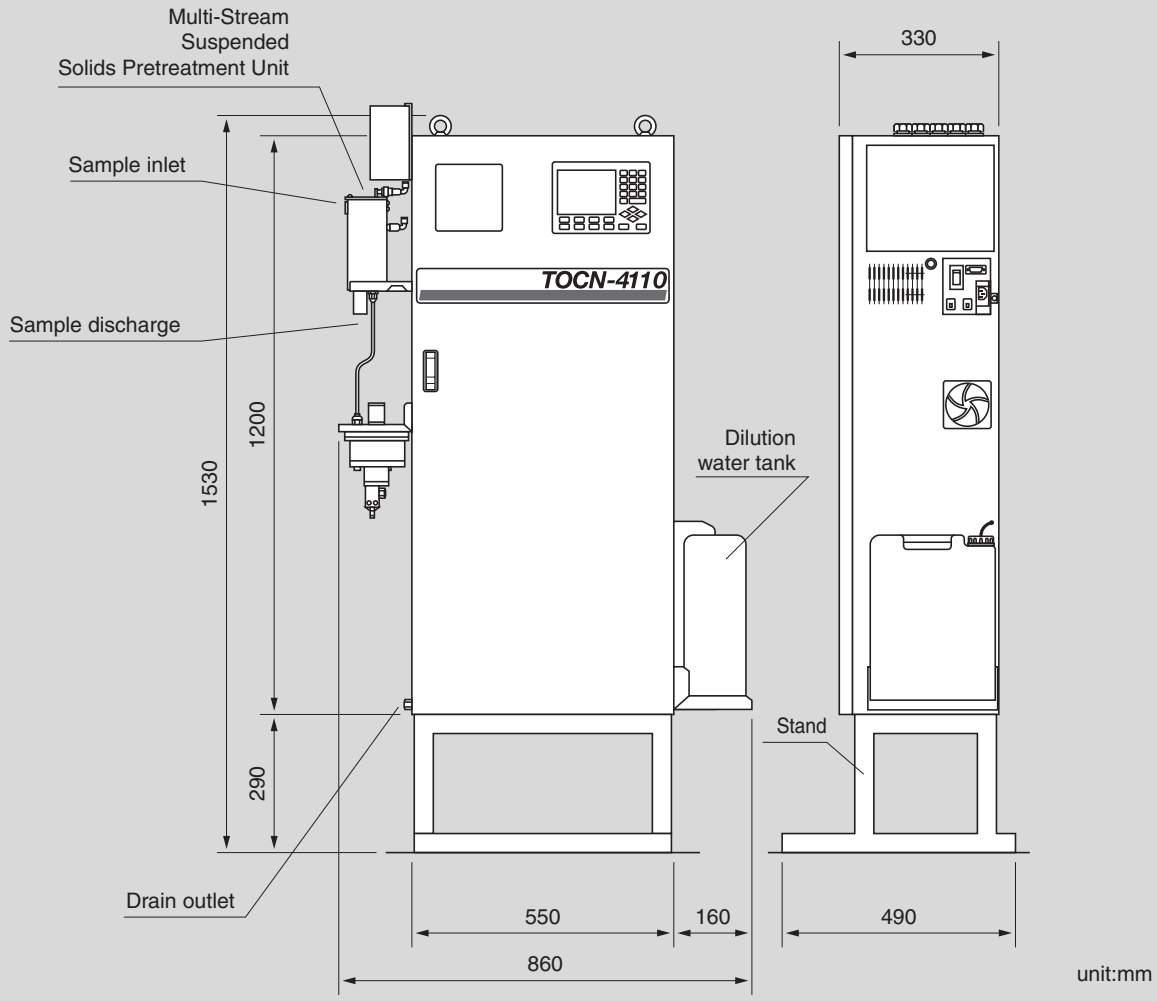
*Output is possible with respect to each stream and to both C and N analytes.

Special Accessory Selection Guide

Item for Selection	Selection Criteria	Optional Parts Required	√ box
Recording device built into main system	Include recorder	Recorder Set (638-54023-01) Recorder Set (638-54023-16) Recorder Set (638-54023-17)	
	Include printer	Printer Set (638-54024-01)	
	Include neither	none (standard configuration)	
	Two or more sample streams are recorded with one color per stream (2 - 6 colors)	Recorder Board Set (638-72497)	B
Sample Pretreatment Unit (SS = suspended solids)	1 stream without SS(equiv. to tap water) in sample	Sample Flow Line Set (1 stream) (638-41397)	
	2 streams without SS (equiv. to tap water) in sample	Sample Flow Line Set (2 streams) (638-41397-03)	
	1 stream with SS in sample	Backwash Strainer Sample Pretreatment Unit (638-41507-03)	
	1 stream with large amounts of SS in sample	Single Stream Suspended Solids Pretreatment Unit (638-93163)	
	1 stream with large amounts of SS in sample*	Multi-Stream Suspended Solids Pretreatment Unit #1 (638-93129-01)	
	2 streams with large amounts of SS in sample	Multi-Stream Suspended Solids Pretreatment Unit #2 (638-93129-02)	
	3 streams with large amounts of SS in sample	Multi-Stream Suspended Solids Pretreatment Unit #3 (638-93129-03)	
	4 streams with large amounts of SS in sample	Multi-Stream Suspended Solids Pretreatment Unit #4 (638-93129-04)	
	5 streams with large amounts of SS in sample	Multi-Stream Suspended Solids Pretreatment Unit #5 (638-93129-05)	
	6 streams with large amounts of SS in sample	Multi-Stream Suspended Solids Pretreatment Unit #6 (638-93129-06)	
Types of measurement (TOC-4110 and TOCN-4110 only)	NPOC and TC analysis	none (standard configuration)	
	NPOC, TC and TOC (TC-IC) analysis (for analysis w/ switching between 2 or more streams, analyte can be selected for each stream)	DF Option (638-57070-01)	A
	NPOC, TC, TOC (TC-IC) and TOC (NPOC + POC) analysis (for analysis w/ switching between 2 or more streams, analyte can be selected for each stream)	AD-DF Option (638-57070-02)	A
# of internal std. solutions for span calibration (water diluent is used for zero calibration solution)	one solution	None (standard configuration)	
	two solutions **	Standard Solution Switching Set (2-port) (638-57041)	A
	six solutions **	Standard Solution Switching Set (6-port) (638-56107-01)	
# of Analog Outputs	2 circuits at 0 - 1 VDC, 0 - 16 mA or 4 - 20 mA	none (standard configuration)	
	3 - 7 circuits	Analog Output Board Set (638-72496) 2 circuits can be added per board (max. 3 circuits w/ original board plus 1 additional board) and max. 3 boards can be added (max. 6 circuits).	B
# of Contact Outputs	12 contacts	None (standard configuration)	
	28 contacts	Relay Board Set (638-72495-01) Only 1 board (16 additional outputs) may be installed.	B
Installation Method	None (wall mounted)	None	
	Needed	Stand Assembly (638-10168)	
Other	If options with an “A” symbol in the check box are selected above	Cable Assembly, CN9 (638-70593) (1 assembly is included, regardless of number of “A” symbols.	
	If options with an “B” symbol in the check box are selected above	Option Board Case (638-52518)*** (1 case is included, regardless of number of “B” symbols.	

* If the number of streams are expected to be increased in the future, then normally, the Multi Stream Suspended Solids Pretreatment Unit #1(638-93129-01)should be selected.
** For example, if two standard samples (or 2 - 6 samples) are required for a TC calibration curve and an IC calibration curve.
*** Already included with TOCN-4110 and TN-4110 systems, so additional cases are not necessary.

External Dimensions Diagram



The dimensions and shape of all units in the On-Line Total Organic Carbon & Total Nitrogen Analyzer Series 4110 are the same.
(The above diagram displays the TOCN-4110 with stand and Multi-Stream Suspended Solids Pretreatment Unit.)

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Founded in 1875, Shimadzu Corporation, a leader in the development of advanced technologies, has a distinguished history of innovation built on the foundation of contributing to society through science and technology. We maintain a global network of sales, service, technical support and applications centers on six continents, and have established long-term relationships with a host of highly trained distributors located in over 100 countries. For information about Shimadzu, and to contact your local office, please visit our Web site at **www.shimadzu.com**

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