



TOC Analyzer

FM-TOC-B103

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1. Safety Measures

1.1 Basic Procedures

For your safety and the instrument's normal operation, read this section carefully before operating the total organic carbon analyzer (TOC Analyzer). Then, follow all safety tips in this manual and the on-screen prompt from the PC software.

1.2 Symbols and Keywords

Symbols and keywords used in the instrument indicate hazards and descriptions.

Symbol	Description
	Caution: Indicates a potentially hazardous environment. Failure to comply may result in minor injury or property damage.
	Caution Hot Surface: Do not touch when hot.
	Caution Electric Shock: Do not touch when powered.

1.3 Operator requirements

- The TOC Analyzer should be operated by personnel with basic chemical knowledge and skills, trained in instrument operation, including familiarity with the main unit, system components, and accessories.
- Operation by untrained personnel or improper application can lead to danger.
- This user manual should be kept in a location accessible to operators at any time.
- Do not eat, drink, smoke, or rub your eyes in the instrument's workspace.
- Inspect the instrument for damage and ensure it is in good working condition before operation.
- Only trained personnel can install the instrument.

1.4 Precautions

- During heating, the center of the pyrolysis furnace (near the combustion tube entrance) is very hot. Do not touch to avoid burns.
- When replacing the combustion tube, wait until the pyrolysis furnace cools to room temperature to avoid burns.
- Do not turn on the instrument without installing the combustion tube. The sliding injection device of the TC injection port may deform from the pyrolysis furnace's heat radiation.

If the above misoperation happens, remove the sliding injection device of the TC injection port to prevent deformation, or block the pyrolysis furnace's center opening with quartz wool or other insulation materials.

- To reduce negative pressure, ensure the drainpipe connected to the instrument's left-side waste liquid discharge port does not touch the liquid surface in the waste liquid tank. The height of the external pipeline must always be lower than the drain port's height. Excessive negative pressure will hinder drainage, causing waste liquid overflow and component corrosion.
- When installing connection components connected to the six-way valve, hand-tighten them. Using tools may deform the valve interior or cause liquid leakage.
- When maintaining any transmission parts (e.g., connecting pipes to the six-way valve, or connecting/disconnecting pipes on the sampler), stop using the instrument. Operating these parts or disconnecting pipes while in operation may cause transmission parts to shift, leading to injury or liquid leakage.
- When cleaning the instrument, use a soft cloth to wipe the surface. Do not use chemical reagents.
- Do not spill samples or reagents on the control computer.
- Internal instrument repairs may cause danger, do not repair it by yourself.
- Do not modify or disassemble the instrument beyond the maintenance content described in this manual, as this may reduce the product's safety and accuracy.
- The waste liquid discharged from the instrument contains acids or other corrosive substances. Handle with care to avoid contact with hands or spills to prevent corrosion.
- When assembling and disassembling instrument parts, do not operate with power on to avoid electric shock.

2. Introduction

TOC Analyzer FM-TOC-B103 features advanced catalytic oxidation technology for precise total organic carbon analysis. Automated functions like sample dilution, acid addition, and gas purging streamline the testing process. The high-sensitivity NDIR detector ensures accurate and reliable measurements, making it suitable for a wide range of applications

3. Features

- ✓ TOC Analyzer with high throughput analysis
- ✓ Multifunctional PC Software
- ✓ Advanced gas flow control
- ✓ PID Temperature regulation
- ✓ Optional autosampler
- ✓ Consumables alert

4. Specifications

Model No.	FM-TOC-B103
Measurement range	0 to 1000 mg / l , can extend to 0 to 100 , 000 mg / L (Automatic dilution)
Detection limit	IC: 20 µg / L
Detection method	High-Temperature Catalytic Combustion
Analysis time	IC : Within 3 min
Gas requirement	Oxygen, purity ≥ 99.995%
Analysis parameter	TC, TIC, TOC , NPOC
Injection volume	IC – 100 To 2000 µL
Sample type	Solid Sample
Sample temperature	5 to 35°C
Humidity	IC: 100 to 2000µL
Repeatability	≤ 80% RH, no condensation
Maximum permissible Error	≤ 3%
Power	IC: ± 4%
Power Supply	700 W
Dimension	AC110 / 220V , 50 / 60 Hz
Packaging Dimension	631 × 450 × 478 mm
Net Weight	780 × 710 × 610 mm
Gross Weight	45 Kg

5. Applications

TOC Analyzer ideal for Environmental Monitoring , Chemical Industry , Wastewater Treatment , Research Laboratories.

6. Instrument Introduction

6.1 Structure of FM-TOC-B103

6.1.1 Front View of Main Unit



Figure-1

- 1) Dilution Cell Sliding Sample Injection
- 2) Dilution Cell
- 3) Drain Pump
- 4) Acid Pump
- 5) IC Cell Sliding Sample Injection
- 6) IC Reaction Cell
- 7) Filter 1
- 8) Halogen Removal Tube
- 9) Trap
- 10) Enhanced Halogen Removal Device (Optional)

6.1.2 Left View of Main Unit

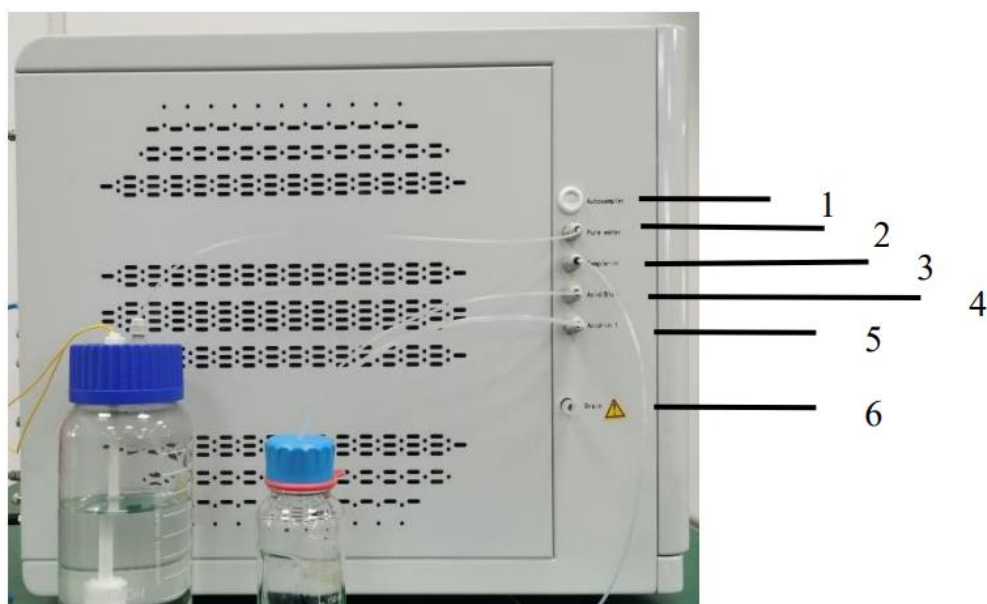


Figure-2

- 1) Automatic Sampler Injection Pipe Connection
- 2) Dilution Water
- 3) Injection Pipe
- 4) RD Dilution Cell Acid Inlet/RN Purge Pipe
- 5) IC Cell Acid Inlet Pipe
- 6) Drainpipe

6.1.3 Right View of Main Unit



Figure-3

- 1) Power Switch
- 2) Scrubber Side Cover Weld Plate

6.1.4 Rear View of Main Unit



Figure-4

- 1) Power Socket
- 2) Ethernet Communication Port
- 3) Solid Sampler Communication Port
- 4) Dust Cover
- 5) Main Unit Exhaust Port
- 6) Solid Sampler Exhaust Port
- 7) Solid Sampler Detection Gas
- 8) Solid Sampler Supply Gas
- 9) Total Gas Inlet
- 10) USB Communication Port
- 11) Liquid Level Sensor Interface

6.1.5 Internal Left View

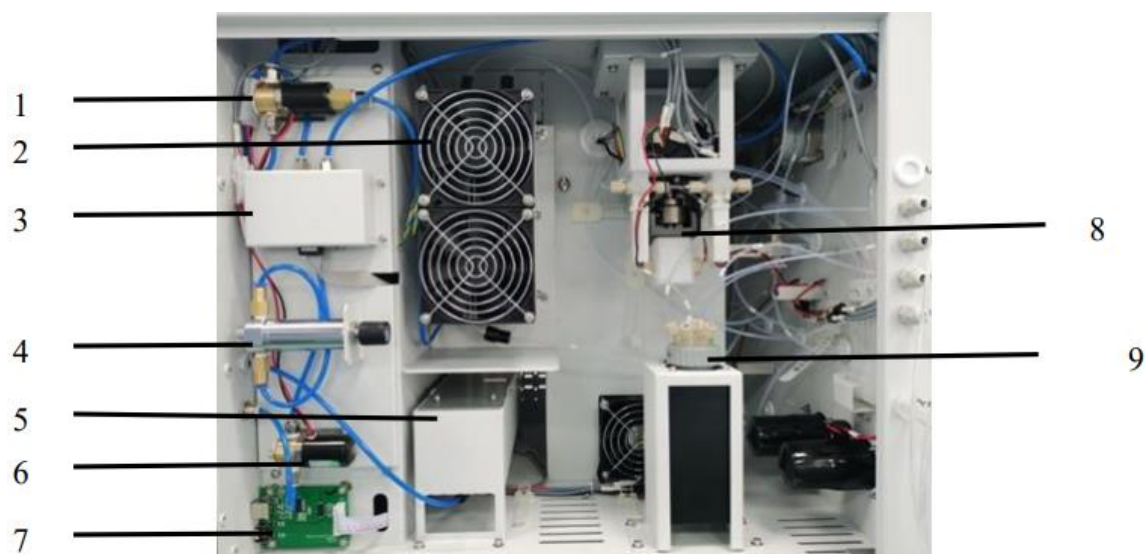


Figure-5

- 1) Three-way Gas Valve
- 2) Cooling Module
- 3) Flow Controller
- 4) Pressure Regulator
- 5) Detector
- 6) Two-way Gas Valve
- 7) Communication
Conversion Board
- 8) Injection Pump
- 9) Six-way Valve

6.1.6 Internal Right View



Figure-6

- 1) Filter
- 2) Pyrolysis Furnace
- 3) Power Switch
- 4) Float Flowmeter
- 5) Detector
- 6) Lower Windshield of Furnace Frame

6.2 Structure of enhanced halogen removal device (optional)

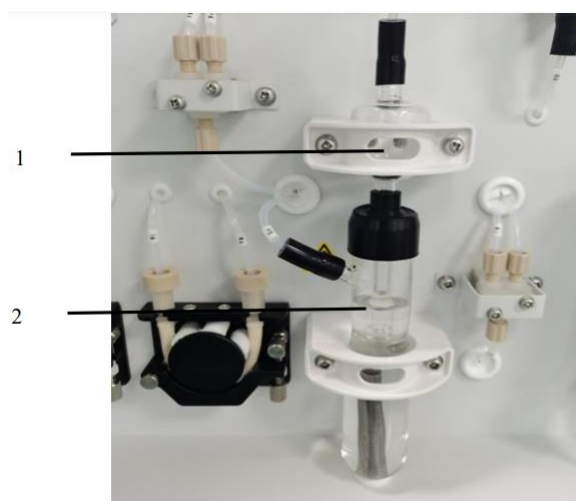


Figure-7

1. Trap
2. Enhanced Halogen Removal Tube

7. Installation

7.1 Installation Requirements

7.1.1 Power requirements

Connect to a stable power source of AC (220±22) V or AC (110±11) V, 50/60 Hz, with a single-phase capacity of 10A or above. Serious damage to the instrument may occur if the voltage exceeds this range.

7.1.2 Space requirements

- 1) **Laboratory bench dimensions:** Length: ≥200 cm, Width: ≥70 cm, Height: 70-80 cm. The bench surface should support at least 100 kg, be stable without vibration, and be heat and acid-resistant.
- 2) Ensure the distance between the power outlet and the back of the instrument (≤150 cm) allows for easy connection. Reserve space on the right side of the main unit for the computer and printer, and on the left side for the analyzer.

7.1.3 Environmental requirements

- 1) Do not install the instrument near windows or doors to avoid drafts, dust, corrosive gases, and vibrations.
- 2) Stay away from strong electromagnetic interference.
- 3) Avoid fire-prone areas as high internal component temperatures may cause fires.
- 4) **Environmental temperature:** 5-35°C.
- 5) **Operating humidity:** 10-80% RH.

7.1.4 Carrier Gas Requirements

- 1) Prepare an oxygen cylinder and connect it to the gas supply port.
- 2) **Gas type:** Oxygen, purity ≥ 99.995%; or Mixed air 79% nitrogen + 21% oxygen.
- 3) Ensure the pipeline has no severe bends.
- 4) Using a dedicated pipeline and sharing it with other instruments may affect measurement performance due to pressure fluctuations.

Caution:

- (1) Regarding high-pressure gases, there are strict regulations and restrictions on their operation, security management, etc., in the special equipment safety technical specifications and fire protection laws.
- (2) Although the gas used by this instrument is not dangerous itself, incorrect operation of high-pressure gas cylinders can be extremely dangerous. Please read and strictly adhere to the following precautions:
 - Gas cylinders must be placed in well-ventilated areas and out of direct sunlight.
 - Ensure to avoid exposing gas cylinders to temperatures above 40°C.
 - No smoking or open flames are allowed within 2 meters of the gas cylinders.
 - Do not invert or drop gas cylinders, they must be secured with ropes or other means.
 - After use, immediately close the gas cylinder valve.
 - Check the functionality of the pressure gauge every three months.

7.1.5 Reagent Requirements

No.	Name	Specifications
1	Pure Water	Water with TOC concentration not exceeding 0.5 mg/L
2	Potassium Hydrogen Phthalate	A standard reagent or superior grade
3	Anhydrous Sodium Carbonate	A standard reagent or superior grade
4	Sodium Bicarbonate	Superior grade
5	Hydrochloric Acid	Superior grade
6	Phosphoric Acid	Superior grade
7	Carbon Dioxide Absorbent	Chemical pure

7.2 Solution Preparation

7.2.1 Preparation of Test Solutions

7.2.1.1 Organic Carbon Standard Stock Solution ($\rho\text{TOC} = 1000 \text{ mg/L}$)

Accurately weigh 2.1255 g of potassium hydrogen phthalate (dried to constant weight at 110-120°C), dissolve in pure water, transfer to a 1000 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.2 Inorganic Carbon Standard Stock Solution ($\rho\text{IC} = 1000 \text{ mg/L}$)

Accurately weigh 4.4085 g of anhydrous sodium carbonate (dried to constant weight at 105°C) and 3.5000 g of sodium bicarbonate (dried in a desiccator), dissolve in pure water, transfer to a 1000 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.3 Phosphoric Acid Solution (20%)

Add 20 mL of phosphoric acid to a 100 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.4 Hydrochloric Acid Solution (0.05 mol/L)

Add 2.5 mL of hydrochloric acid (2.0 mol/L) to a 100 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.5 Hydrochloric Acid Solution (1 mol/L)

Add 50 mL of hydrochloric acid (2.0 mol/L) to a 100 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.6 TC Standard Working Solution ($\rho\text{TC} = 200 \text{ mg/L}$, $\rho\text{IC} = 100 \text{ mg/L}$)

Accurately pipette 20.00 mL each of organic carbon standard stock solution (7.2.1.1) and inorganic carbon standard stock solution (7.2.1.2) into a 200 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.7 IC Standard Working Solution ($\rho\text{IC} = 100 \text{ mg/L}$)

Accurately pipette 20.00 mL of inorganic carbon standard stock solution (7.2.1.2) into a 200 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.1.8 NPOC Standard Working Solution ($\rho\text{TOC} = 100 \text{ mg/L}$)

Accurately pipette 20.00 mL of organic carbon standard stock solution (7.2.1.1) into a 200 mL volumetric flask, dilute to the mark with pure water, and mix well.

7.2.2 Preparation of Calibration Curve Standard Solution

7.2.2.1 TC Calibration Curve

In a set of seven 100 mL volumetric flasks, accurately pipette 0.00, 2.00, 5.00, 10.00, 20.00, 40.00, and 100.00 mL of TC standard working solution (7.2.1.6), dilute to the mark with pure water, and mix well. Prepare a standard series solution with total carbon concentrations of 0.0, 4.0, 10.0, 20.0, 40.0, 80.0, and 200.0 mg/L. Measure the response value of the standard solutions according to the standard solution test steps. Draw the total carbon calibration curve based on the carbon content and instrument response values of the standard series solutions.

7.2.2.2 IC Calibration Curve

In a set of seven 100 mL volumetric flasks, accurately pipette 0.00, 2.00, 5.00, 10.00, 20.00, 40.00, and 100.00 mL of IC standard working solution, dilute to the mark with pure water, and mix well. Prepare a standard series solution with inorganic carbon concentrations of 0.0, 2.0, 5.0, 10.0, 20.0, 40.0, and 100.0 mg/L. Measure the response value of the standard solutions according to the standard solution test steps. Draw the inorganic carbon calibration curve based on the carbon content and instrument response values of the standard series solutions.

7.2.2.3 NPOC Calibration Curve

In a set of seven 100 mL volumetric flasks, accurately pipette 0.00, 2.00, 5.00, 10.00, 20.00, 40.00, and 100.00 mL of NPOC standard working solution, dilute to the mark with pure water, and mix well. Prepare a standard series solution with organic carbon concentrations of 0.0, 2.0, 5.0, 10.0, 20.0, 40.0, and 100.0 mg/L. Measure the response value of the standard solutions according to the standard solution test steps. Draw the organic carbon calibration curve based on the carbon content and instrument response values of the standard series solutions.

Note:

- The calibration curve concentration range can be adjusted according to the sample type.
- The above method is for standard series curve preparation. The TOC analyzer instrument with automatic dilution function can prepare standard solutions with TC-200.0 mg/L, IC-100.0 mg/L, and NPOC-100.0 mg/L and use single-point dilution to draw the standard curve.

7.2.3 Storage of Standard Solutions

Standard solution concentrations can change easily, especially at low concentrations. High-concentration standard stock solutions should be sealed and stored in a dark place and diluted when needed. Store in glass containers.

Storage period: Generally, 1000 mg/L standard stock solutions can be stored for about two months. Diluted 100 mg/L standard working solutions can be stored for about one week. Both should be sealed and stored in a 4°C refrigerator.

Note: IC standard solutions easily absorb atmospheric CO₂, so sealed storage is crucial. Reprepare standard solutions in the following cases:

- When the reproducibility of measurement values deteriorates, or sensitivity changes.
- When small impurities are found in the standard solution.

7.2.4 Sample Preparation

Collect water samples in brown glass bottles, filling the sample bottle without headspace. Test samples within 24 hours of collection. If not, acidify the sample with sulfuric acid ($\rho_{\text{H}_2\text{SO}_4}=1.84 \text{ g/mL}$) to $\text{pH} \leq 2$ and store at 4°C for up to 7 days. Generally, relatively clean surface water (e.g., source water), groundwater, and drinking water (e.g., tap water) can be tested directly. For more complex industrial wastewater (e.g., electroplating wastewater) and domestic sewage, perform pre-treatment based on the sample's specific characteristics. Here are four sample characteristics and treatments:

7.2.4.1 Samples Containing Suspended Substances

TOC in suspended substances can cause result variability, especially when different TOC Analyzers analyze the same sample. When collecting biological oxygen demand (BOD) and TOC correlation data, inconsistent suspended solid handling leads to poor correlation.

Since the instrument's injection pipe has a diameter of 1.0mm, suspended substances that cannot pass through the injection pipe cannot be tested. For particles that can pass through, uneven solid particles in the sample cause poor reproducibility. Therefore, the sample's suspended particles should be $\leq 0.2\text{mm}$.

Usually, the following treatment measures are taken for samples with suspended substances:

1) Supernatant TOC Measurement:

For less concern about suspended substances, allow the sample to settle and collect the supernatant for measurement.

2) Filtered TOC Measurement:

Actively separate suspended substances using glass fiber filters or membrane filters, measuring only the dissolved TOC. Pre-treat filters or filters to remove TOC (e.g., heating glass fiber filters or pre-washing).

3) Homogenized Suspended Substances TOC Measurement:

Use a high-speed homogenizer for more uniform particle sizes, improving reproducibility and accurately reflecting TOC in suspended substances. Use a homogenizer with high-speed stirring or ultrasonic methods (output power 150-300W).

Note: Different suspended substances have varying homogenization effects. Not all types can be homogenized. E.g., sludge samples are easier to handle than fibrous samples.

7.2.4.2 Acidic Sample Measurement

Dilute high-concentration acidic samples to $\leq 1000\text{mg/L}$. Neutralize hydrochloric or sulfuric acid samples to pH 2-3 with potassium hydroxide or sodium hydroxide before NPOC measurement.

Note: Nitrate salts decompose to produce acidic gases, making neutralization ineffective. Be cautious of organic contamination in basic reagents used for neutralization.

7.2.4.3 Alkaline Sample Measurement

Alkaline content in the sample system should be $\leq 1000\text{mg/L}$. Adjust alkaline samples to pH 2 to 3 for NPOC measurement.

Alkaline samples pose issues for TC measurement:

- 1) Rapid sensitivity declines and reproducibility deterioration.
- 2) Quick catalyst and combustion tube aging.

- 3) Possible high IC due to CO₂ absorption. Alkaline samples are better suited for NPOC measurement. Add dilute hydrochloric acid to adjust pH to 2-3 for NPOC measurement. The lower the salt concentration, the better, alkaline samples should also be diluted as much as possible.

7.2.4.4 Saline Sample Measurement

The salt content in the sample system should be $\leq 1000\text{mg/L}$. High salt content requires frequent maintenance of the combustion tube. To extend the life of the combustion tube or catalyst, dilute samples to reduce salt concentration.

7.3 Instrument Installation

7.3.1 Installation of Enhanced Halogen Removal Device (Optional)

7.3.1.1 Preparation

- 1) Take out relevant accessories from the box (**Figure 8**).



Figure-8

- 2) Add pre-prepared 1-part stainless steel mesh and about 40mL of hydrochloric acid (0.05mol/L) to the enhanced halogen removal tube (**Figure 9**).



Figure-9

- 3) Connect one end of a 6-to-2.2 soft connector to the gas pipe labeled "Ge" and the other end to the branch pipe of the enhanced halogen removal tube (**Figure 10**). Connect one end of a 21-to-6.5 soft connector to the enhanced halogen removal tube for later use (**Figure 11**).

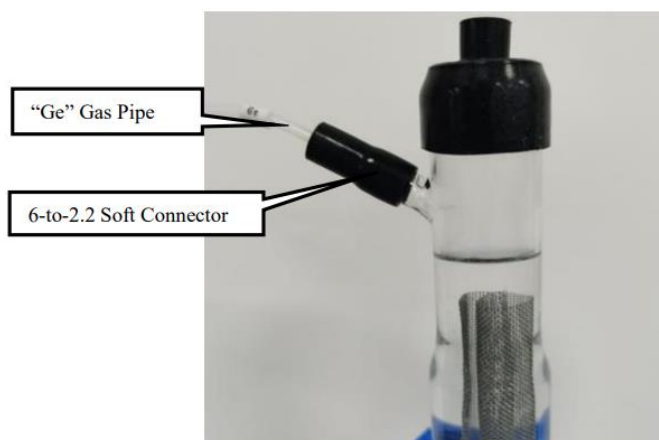


Figure-10



Figure-11

- 4) Connect one end of a 6-to-2.2 soft connector to the gas pipe labeled "Gc" and the other end to the upper end of the trap (**Figure 12**).



Figure-12

- 5) Connect the trap to the enhanced halogen removal tube through the 21-to-6.5 soft connector (**Figure 13**).



Figure-13

Notes:

- Ensure the hydrochloric acid solution level is at least 5mm below the branch pipe. Excess hydrochloric acid may overflow from the branch pipe during purging.
- Be careful when connecting the enhanced halogen removal tube to avoid spilling hydrochloric acid.
- Ensure the gas pipe protrudes 1-2mm inside the soft connector.
- When connecting the trap to the enhanced halogen removal tube, ensure the trap's bottom is below the liquid level but above the stainless steel mesh. The upper end should protrude about 5mm from the 21-to-6.5 soft connector.

7.3.1.2 Installation Instructions

- 1) Remove the PEEK connector from the IC sliding sample injection. (**Figure 14**)



Figure-14

- 2) Open the left side panel of the main unit and remove the gas pipe labeled "Gm" and the 9-to-2.5 soft connector from the cooling module. **(Figure 15)**

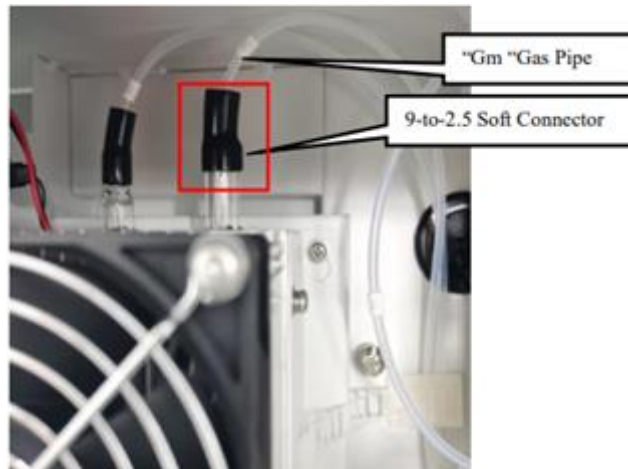


Figure-15

- 3) Open the two white clasps and remove the entire "Gm" gas pipe assembly. **(Figure 16).**



Figure-16

- 4) Secure the two fixed seats with M3 screws on the front panel of the instrument. **(Figure 17).**

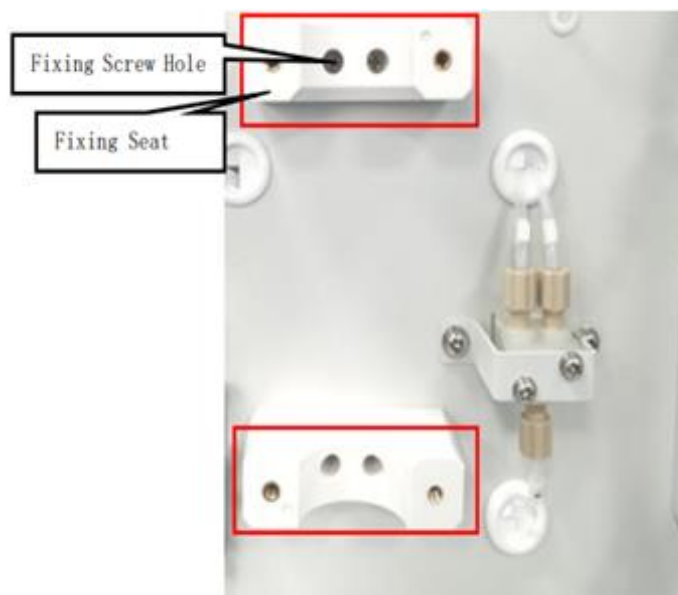


Figure-17

- 5) First secure one enhanced halogen removal tube fixing plate with M4 screws (do not tighten), place the prepared enhanced halogen removal tube in position (adjust so the bottom is about 5mm from the bottom of the instrument), and tighten the fixing plate screws, and secure the trap fixing plate. **(Figure 18)**

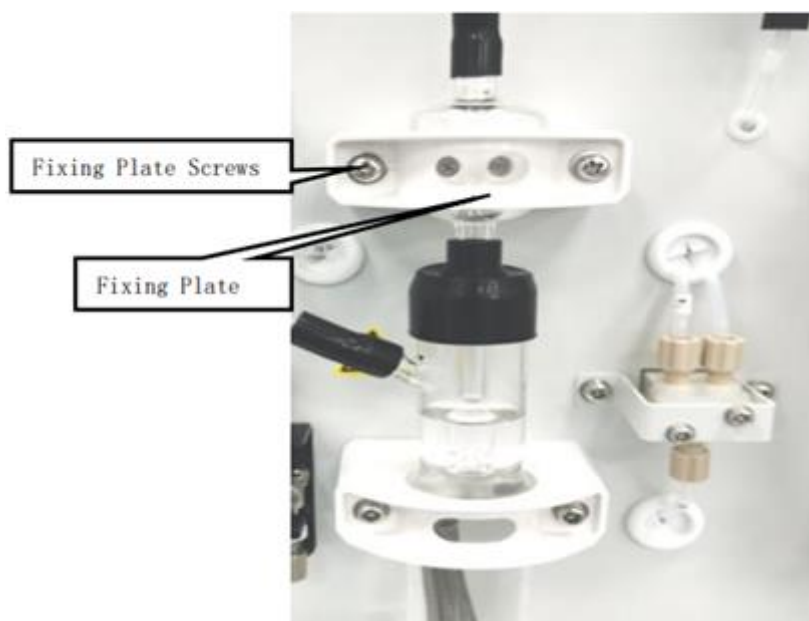


Figure-18

- 6) Connect the "**Gc**" gas pipe to the IC reaction cell with a PEEK connector, and thread the "**Ge**" gas pipe through the hole in the front panel for later use. (**Figure 19**).

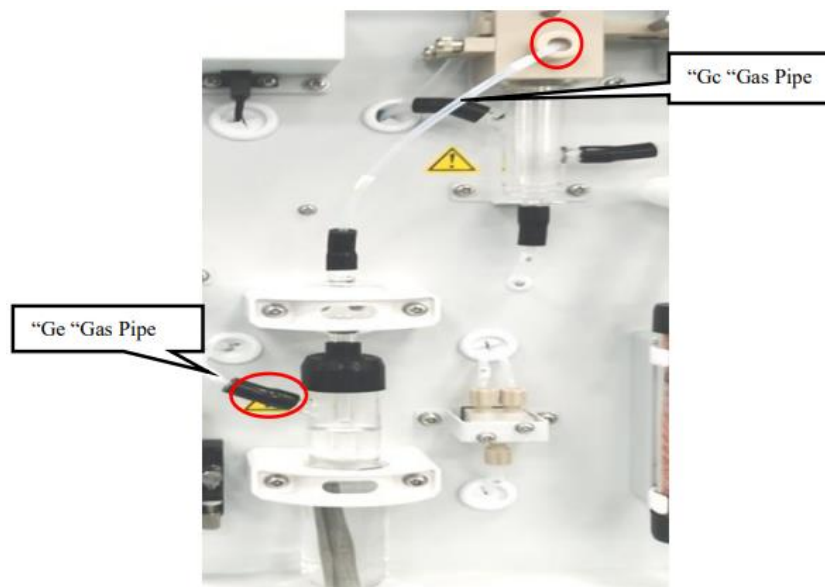


Figure-19

- 7) Connect the "**Ge**" gas pipe to the 9-to-2.5 connector and connect the other end to the cooling module. Secure the connected gas pipe with the two white clasps. (**Figure 20**).



Figure-20

Reverse the operation to disassemble the Enhanced Halogen Removal Device. **Notes:** Replace the hydrochloric acid solution in the enhanced halogen removal device every three months to maintain halogen absorption efficiency.

7.3.2 Installation and Disassembly of Combustion Tube

7.3.2.1 Filling the Combustion Tube

Fill the combustion tube with catalyst, quartz wool, and quartz balls according to the following steps.

- 1) Fill the combustion tube with 15g of catalyst. **(Figure 21)**

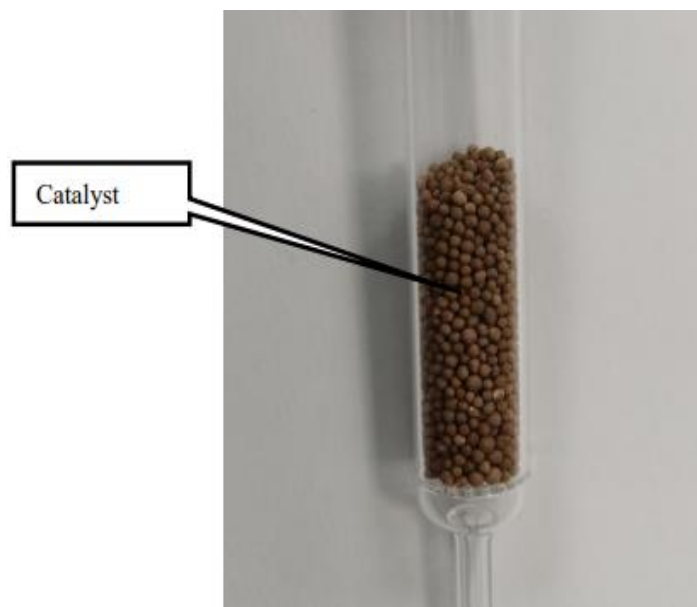


Figure-21

- 2) Tear about 0.05g of quartz wool into thin pieces and fill it into the combustion tube with the help of a stainless steel tube (ensure the quartz wool height is about 15mm in a loose state, without compression). **(Figure 22)**

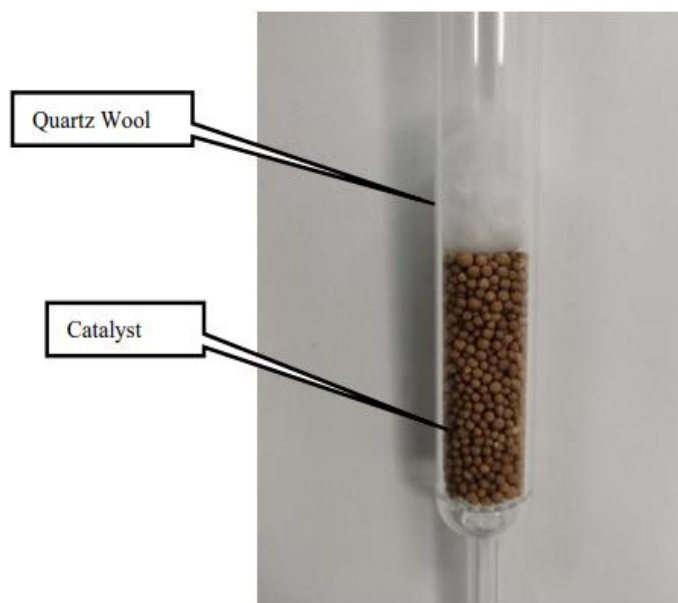


Figure-22

- 3) Fill the combustion tube with 6g of quartz balls. **(Figure 23)**

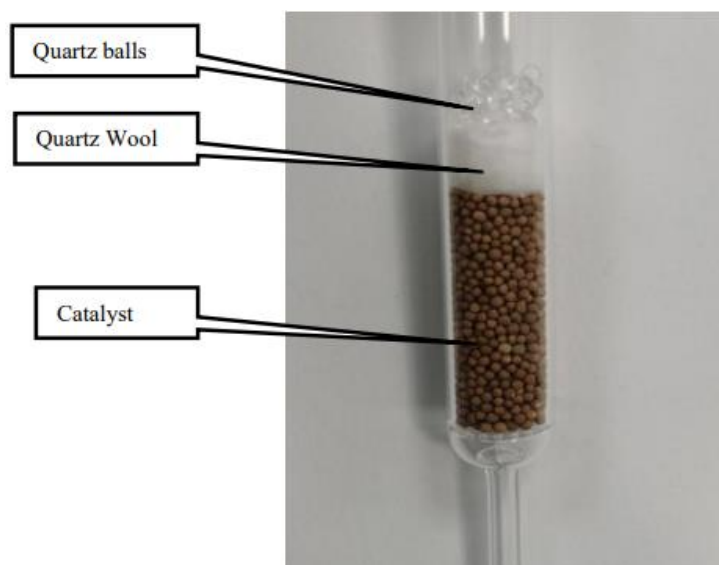


Figure-23

Notes:

- Wear gloves when handling the catalyst to avoid contamination, which can cause high blank values and abnormal analysis values.
- Clean the combustion tube with alcohol after filling to avoid contamination.
- The first analysis with a new catalyst may show a large blank peak. Clean the catalyst before TC analysis (clean 100 times for the first use or after long periods of inactivity, 5 times for normal startup).
- Wear a mask when handling quartz wool to avoid inhalation.

7.3.2.2 Installation and disassembly of combustion tube

- 1) Unscrew the TC sliding sample injection hand screw and slide the TC sliding sample injection plate to the left to remove it. **(Figure 24)**

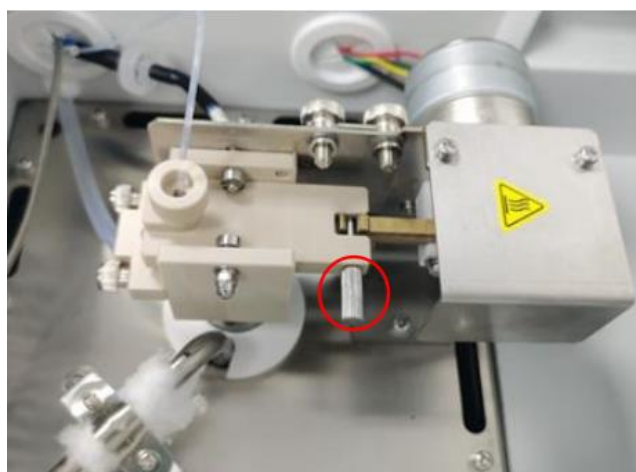


Figure-24

- 2) Unscrew the PEEK connector from the gas inlet, unscrew the two hand screws on the sample injection waste plate, and loosen the two hand screws on the sample injection support plate. **(Figure 25)**

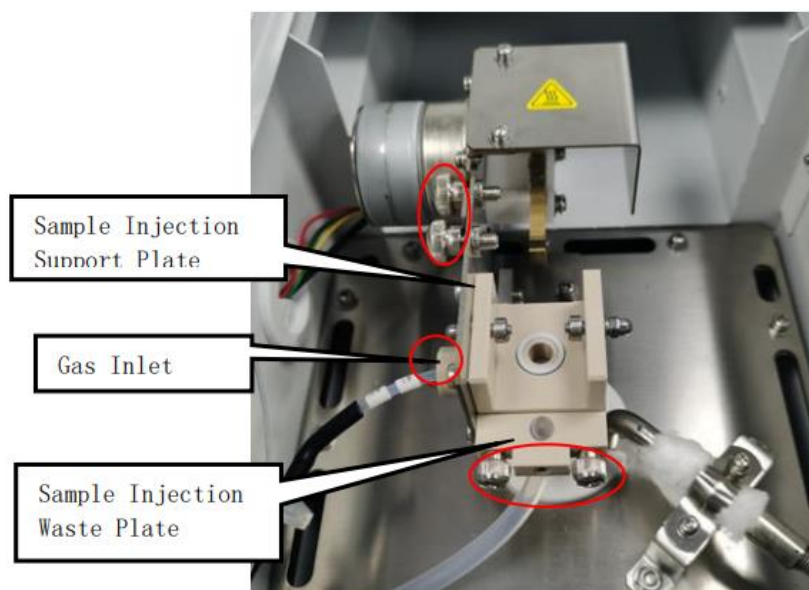


Figure-25

- 3) Pull out the TC sliding sample injection module and remove the old combustion tube from the bottom of the TC sliding sample injection module. **(Figure 26)**



Figure-26

- 4) Firmly insert the top of the newly filled combustion tube into the bottom opening of the TC sliding sample injection module. **(Figure 27)**

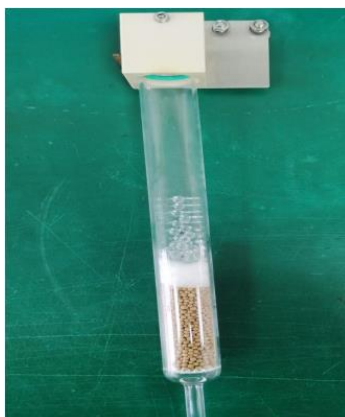


Figure-27

- 5) Insert the assembled TC sliding sample injection module into the heating hole at the center of the pyrolysis furnace and insert the bottom of the combustion tube into the gas inlet at the combustion tube holder. **(Figure 28)**



Figure-28

Notes: Adjust the position of the High-temperature cotton at the bottom of the pyrolysis furnace and the position of the combustion tube holder as needed to ensure the combustion tube is naturally installed vertically. Otherwise, uneven heating of the combustion tube or misaligned sample injection may occur, affecting the precision and accuracy of the test data.

Reverse the operation to install the combustion tube.

Notes:

- Perform installation and disassembly of the combustion tube after exiting the program and turning off the instrument for at least 6 hours until the pyrolysis furnace cools to room temperature.
- Handle the quartz combustion tube with care to avoid breakage and injury.
- Ensure the sample injection support plate is level with the sample injection motor support plate during installation to prevent the combustion tube from breaking due to uneven forces.

7.3.3 Installation of Scrubber

- 1) Open the scrubber side cover weld plate on the right side of the main unit. **(Figure 29)**

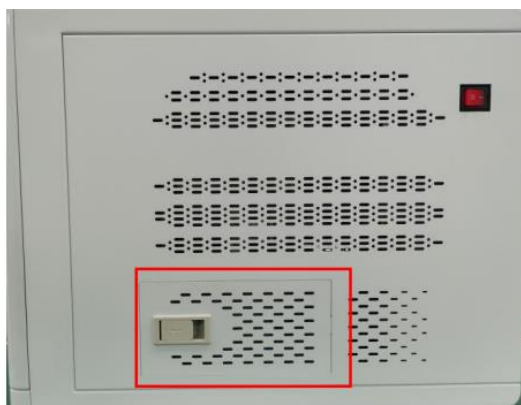


Figure-29

- 2) Pull out the lower windshield of the furnace frame. **(Figure 30)**

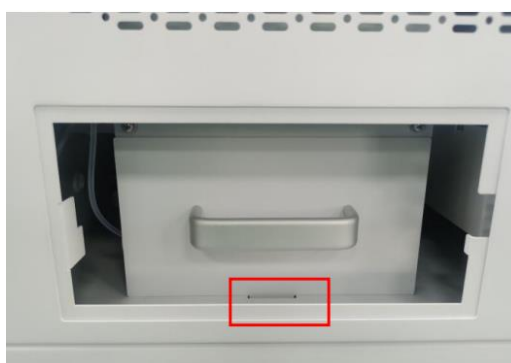


Figure-30

Caution: There is a slot inside the lower windshield of the furnace frame. When removing, gently lift it upwards.

- 3) Add pure water to the scrubber through the scrubber branch pipe (ensure the pure water level is above the bottom of the scrubber inner tube and at least 5mm below the branch pipe). **(Figure 31)**



Figure-31

- 4) Connect the gas pipe labeled "Ga" to the scrubber using a 6-to-2.2 soft connector. **(Figure 32)**

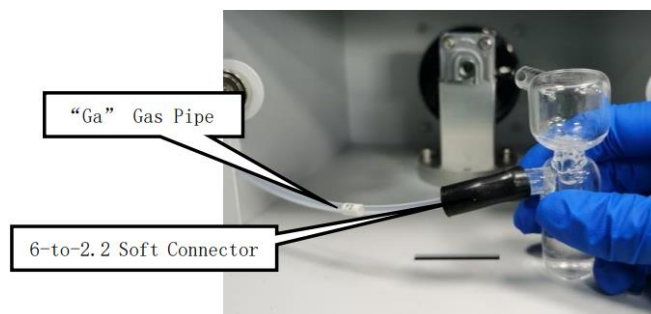


Figure-32

- 5) Insert the scrubber's upper gas inlet into the combustion tube holder's gas outlet. **(Figure 33)**



Figure-33

7.3.4 Pipe Connections

TOC Analyzer Instrument Connections

7.3.4.1 Carrier Gas Connection

- 1) Take out the oxygen pressure regulator from the accessory box and tighten it onto the oxygen cylinder with a wrench.
- 2) Use the gas connection pipe to connect the oxygen pressure regulator's outlet **(Figure 34)** to the gas inlet "Gas in" on the back of the main unit. **(Figure 35)**



Figure-34



Figure-35

7.3.4.2 Connection of Dilution Water Bottle and Waste Liquid Tank

- 1) Insert the dilution water injection pipe into the dilution water bottle. **(Figure 36)**

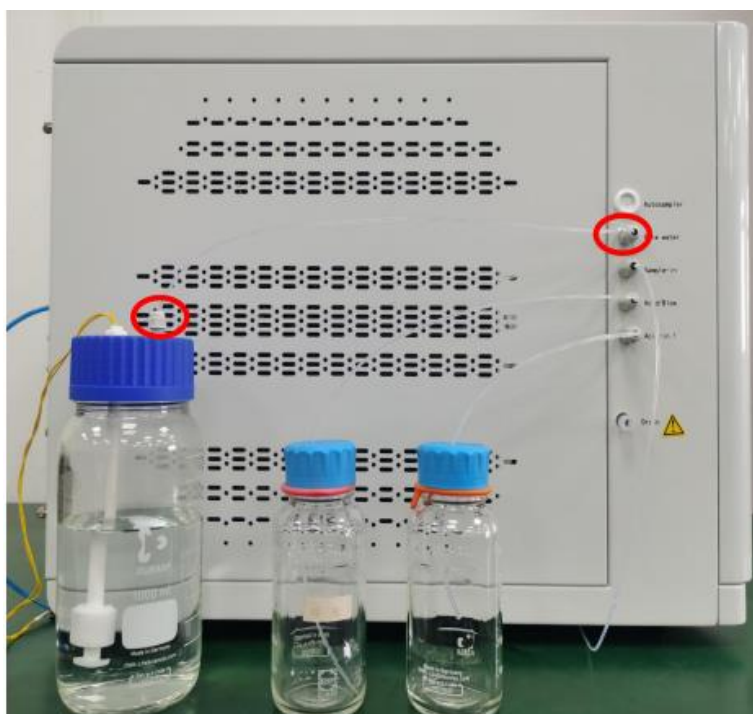


Figure-36

- 2) Connect one end of the drainpipe to the instrument's drain port (**Figure 37**) and the other end to the waste liquid tank. (**Figure 38**)

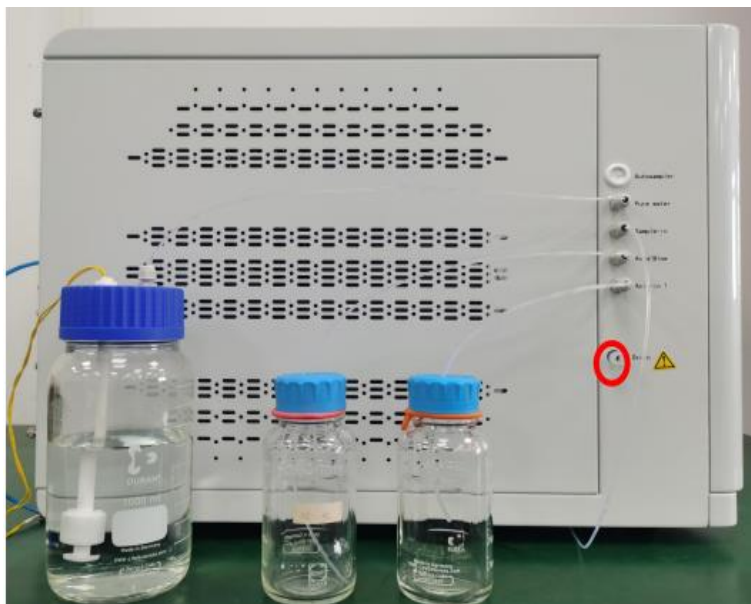


Figure-37



Figure-38

- 3) Connect the "**PURE**" labeled dilution water sensor cable and the "**WASTE**" labeled waste liquid sensor cable to the respective connectors on the liquid level monitoring cable. (**Figure 39**)

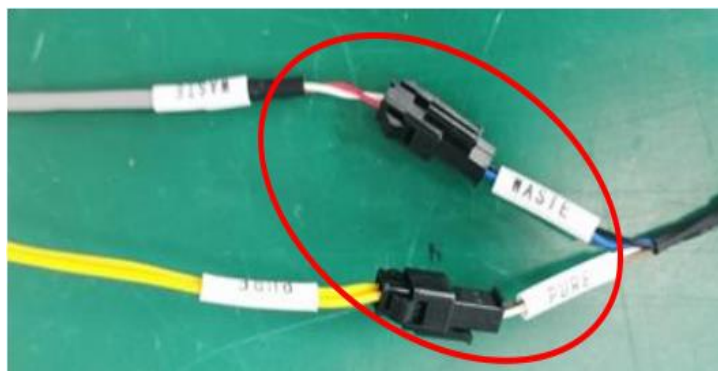


Figure-39

- 4) Connect the other end of the liquid level monitoring cable to the "**Sensor**" port on the back of the main unit. **(Figure 40)**



Figure-40

Notes: Place the waste liquid tank below the instrument (e.g., on the floor) to ensure proper drainage. Placing it higher than the instrument may cause leaks.

7.3.4.3 Acid Bottle Connection

Place the acid bottle on the left side of the instrument and insert the NPOC acid inlet pipe into the acid bottle containing 1mol/L hydrochloric acid. **(Figure 41)** Insert the IC acid inlet pipe into the acid bottle containing 20% phosphoric acid. **(Figure 42)**

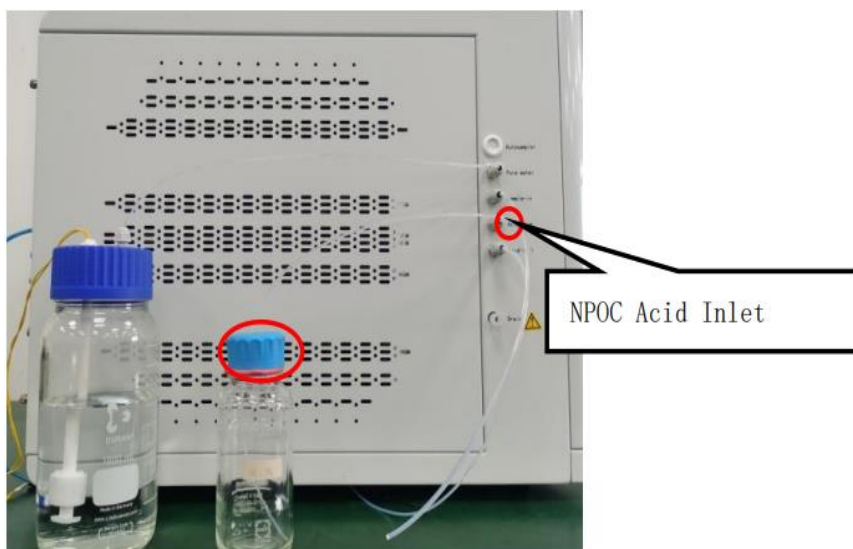


Figure-41

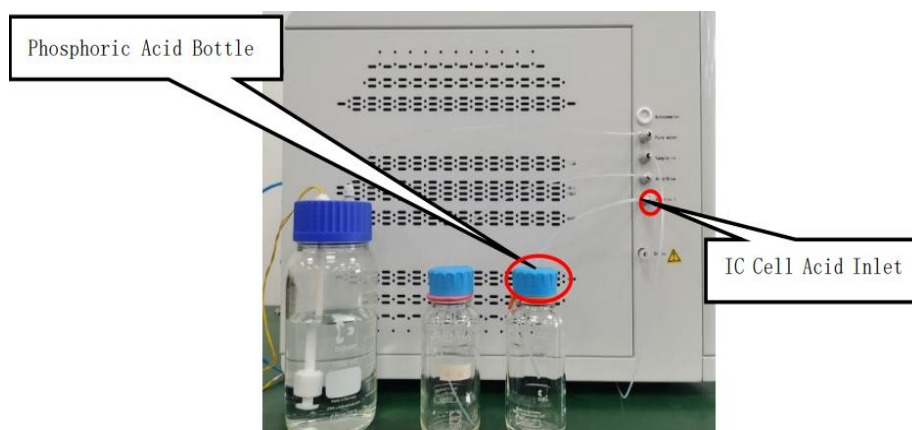


Figure-42

7.3.4.4 Power and Communication Cable Connections

- 1) **Power Cable Connection** Connect the power cable to the power socket. (Figure 43)



Figure-43

- 2) **Communication Cable Connection**
Connect one end of the USB communication cable to the USB port on the back of the main unit and the other end to the computer's USB port. (Figure 44)



Figure-45

3) Ethernet Connection

Connect one end of the Ethernet cable to the Ethernet port on the back of the main unit and the other end to the computer's network port. **(Figure 45)**



Figure-45

7.3.4.5 Connection of CO2 Absorber

Take out the CO2 absorber from the box, open the lid, and remove the seal cover. **(Figure 46, Figure 47)** Close the lid and insert the exhaust pipe into the bottle. **(Figure 48)**



Figure-46



Figure-47



Figure-48

8. Software Installation

8.1 Computer Requirements

- 1) **Hardware:**
CPU: 3GHz or above
Memory: 4G or above
Hard Disk: 500GB or above (at least divided into two partitions).
- 2) **External Interface:** USB 2.0 or higher or Ethernet port.
- 3) **Operating System:** Windows 10 Ultimate Edition.
- 4) **Preinstalled Software:** PDF reader with PDF printing capabilities.
- 5) **Monitor:** Resolution 1600×900.

8.2 Installation Notes

- 1) The Windows version required for the software to run should be Windows 10. Confirm whether Windows is 32-bit or 64-bit.
- 2) The computer system hard disk should have at least two partitions, typically C and D drives. Install the software folder on the D drive and ensure software operation permissions (can run without administrator rights). If needed, open the software with administrator rights.

Note: Since the installation software has an embedded encryption program for use only with this instrument, keep the USB drive safe.

8.3 USB Communication Driver Installation

- 1) Open the USB driver installation file from the software installation package (e.g., Windows 64-bit, open  CDM21226_Setup). Click "Extract." (Figure 49)

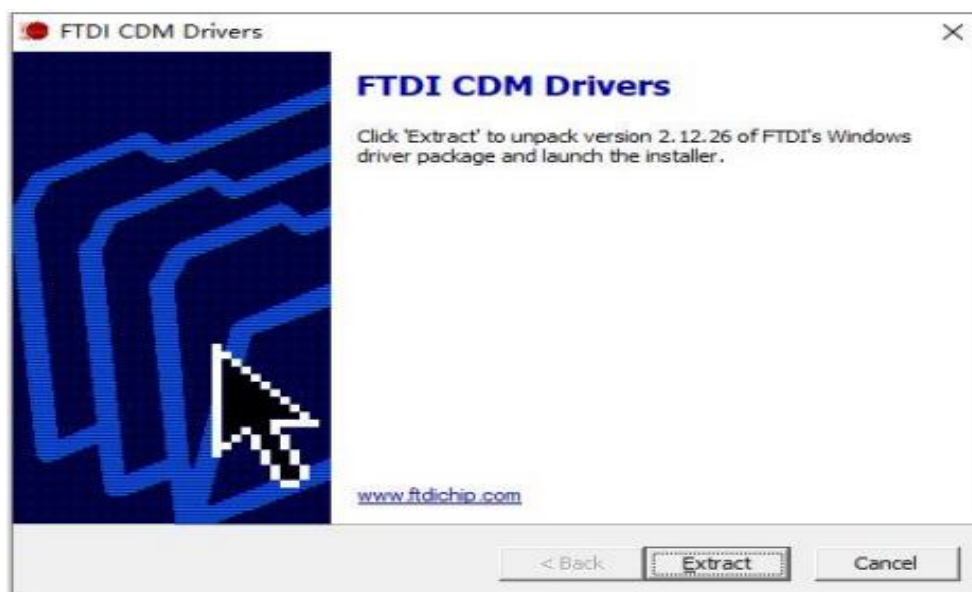


Figure-49

2) Click "Next." (Figure 50)



Figure-50

3) Select "I accept this agreement" and click "Next." (Figure 51)

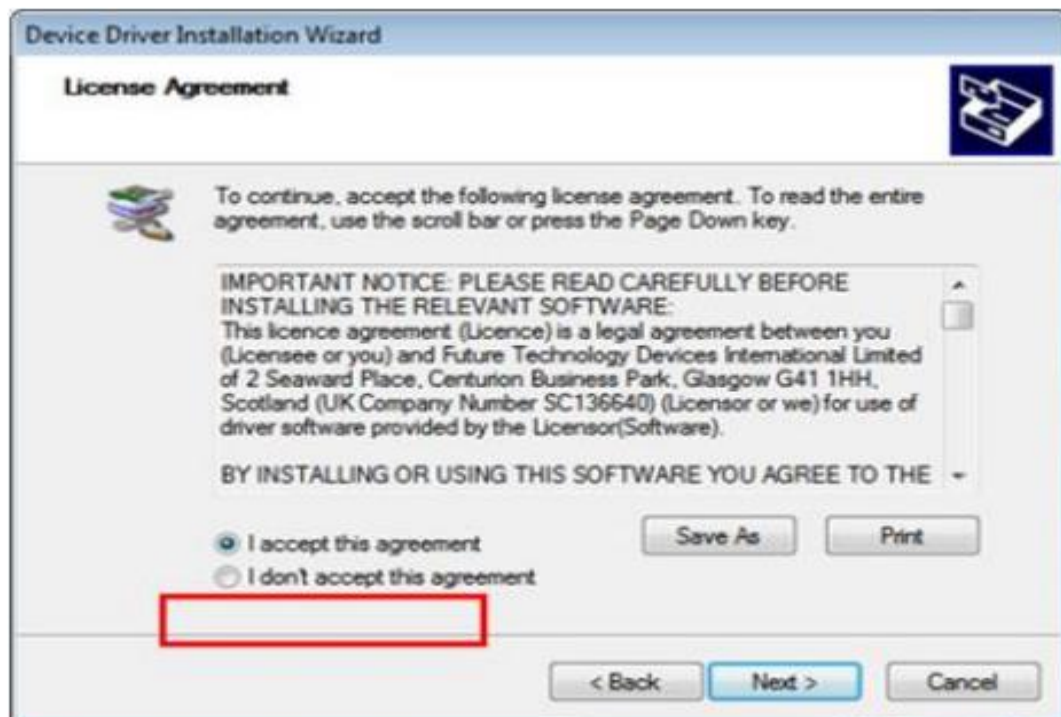


Figure-51

- 4) Wait for the installation to complete. **(Figure 52)**



Figure-52

8.4 Software Installation Instructions

- 1) Open the installation file  from the software package and double-click to open it. **(Figure 53)**

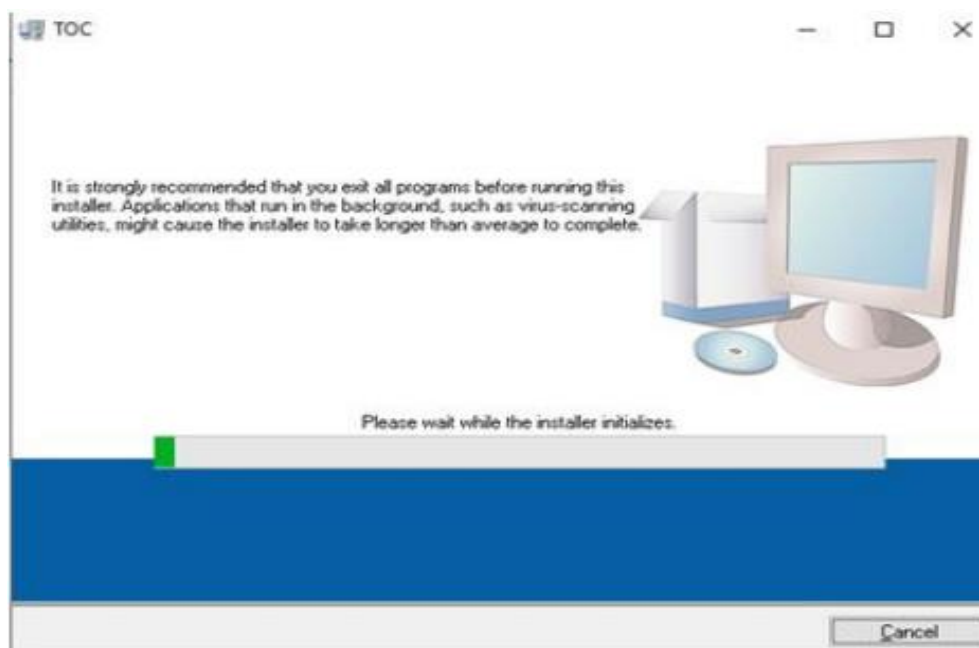


Figure-53

- 2) The default installation path is the D drive. Set it to a drive with running authorization if needed. **(Figure 54)**

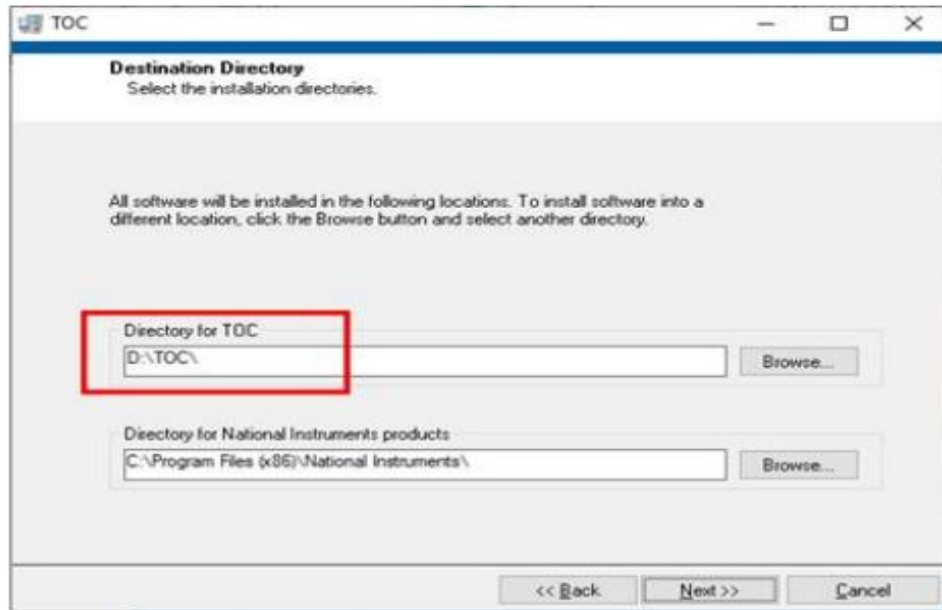


Figure-54

- 3) Select **"I accept the above two license agreements"** and click **"Next."** **(Figure 55)**

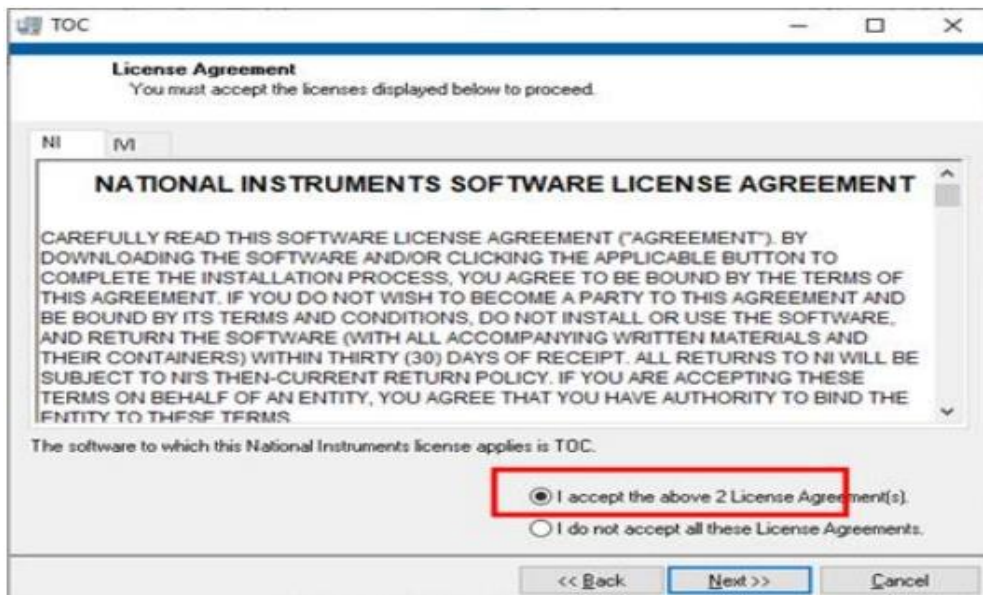


Figure-55

- 4) Click **"Next."** (Figure 56)

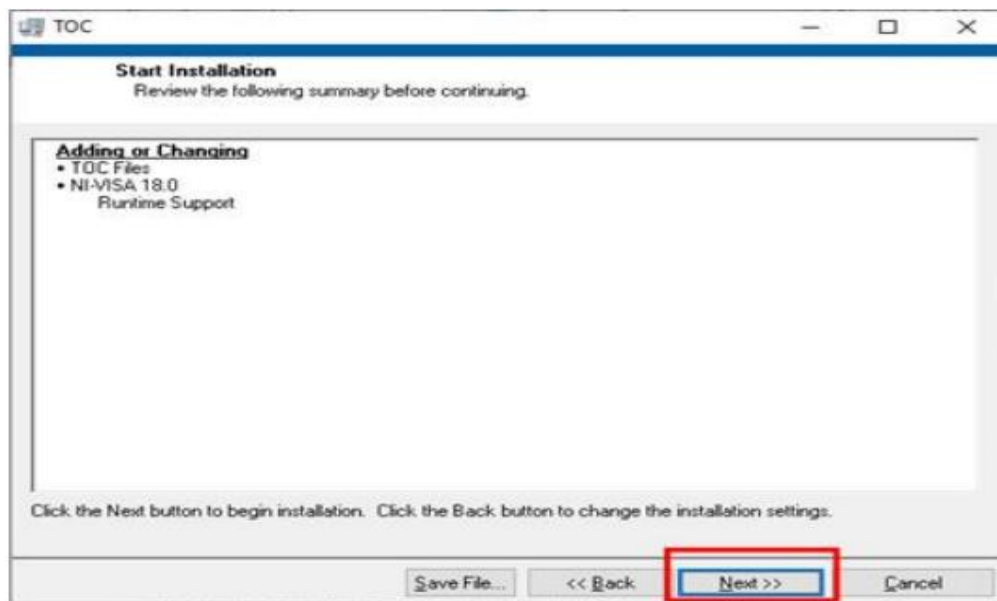


Figure-56

- 5) Wait for the installation to complete. (Figure 57)

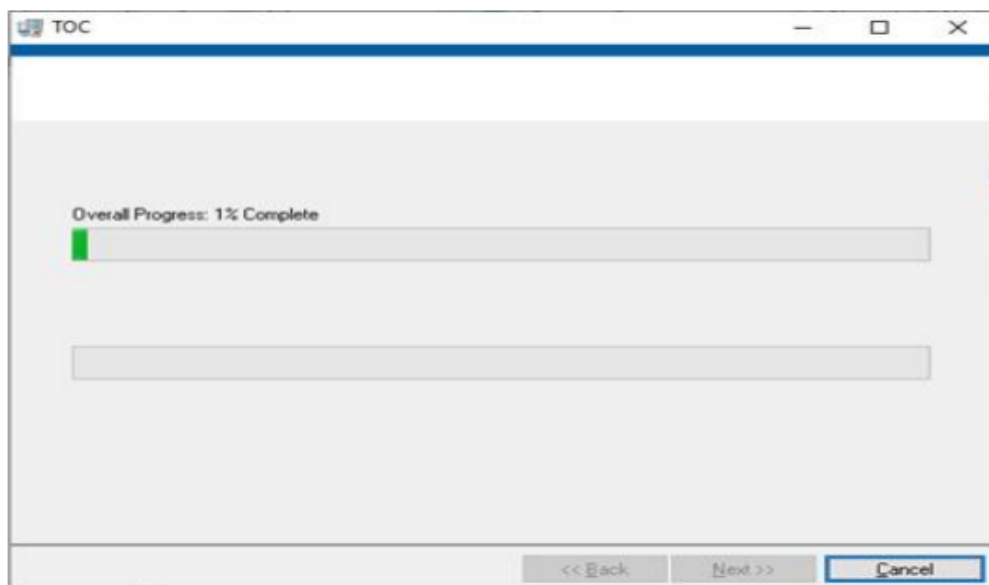


Figure-57

- 6) After installation, follow the prompts to click **"Next"** and restart the computer. A software shortcut will appear on the desktop.

9. Working Principle

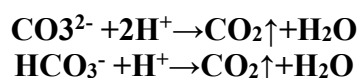
Measurement Principle

9.1 Total Carbon (TC) Measurement Principle

The TOC analyzer uses carrier gas at a flow rate of 180mL/min through a combustion tube pre-filled with an oxidation catalyst (default temperature 680°C, adjustable up to 1000°C based on sample digestion difficulty). The sample injection system injects the sample into the combustion tube, decomposing TC into carbon dioxide. The mixed gas containing reaction products passes through a scrubber, enhanced halogen removal tube (optional), electronic cooler, and filter, and then through the halogen removal tube to remove halogens before reaching the NDIR detector for CO₂ concentration detection. The NDIR signal (analog) is processed to display a peak on the computer, and the peak area is calculated. The peak area correlates with TC concentration, allowing the calculation of TC concentration in the sample based on the standard curve obtained using external standard methods.

9.2 Inorganic Carbon (IC) Measurement Principle

IC consists of carbonates, bicarbonates, and dissolved carbon dioxide. Adding a small amount of phosphoric acid or hydrochloric acid to the sample to reduce the pH below 3 causes all CO₂ from carbonates to be released.



The carrier gas purges the sample, volatilizing the CO₂. The mixed gas containing reaction products passes through the enhanced halogen removal tube (optional), electronic cooler, filter, and halogen removal tube before reaching the NDIR detector for CO₂ concentration detection. The NDIR signal is processed to display a peak on the computer, and the peak area is calculated. The peak area correlates with IC concentration, allowing the calculation of IC concentration in the sample based on the standard curve obtained using external standard methods.

9.3 Non-Purgeable Organic Carbon (NPOC) Measurement Principle

After acidifying the sample (pH 2-3) with acid (e.g., hydrochloric acid), the carrier gas purges the sample, removing IC as CO₂. The treated sample is then tested using the TC measurement principle. In the presence of volatile organic compounds (POC), POC may be lost during purging, so the TOC obtained by removing IC is termed NPOC. For natural environment water and public water with low volatile organic compounds, NPOC can be considered as TOC.

9.4 Total Organic Carbon (TOC) Measurement Principle

The TOC Analyzer FM-TOC-B103 adopts two TOC measurement methods:

- 1) **Difference Method (TOC mode):** TOC is obtained by subtracting IC from TC. The system first measures the TC concentration, then the IC concentration, and subtracts IC from TC to get the TOC concentration. Note: For samples where TOC is much less than IC, the TOC measurement error is larger; the NPOC method is recommended.
- 2) **Direct Method (NPOC mode):** Using NPOC as TOC. The system directly measures NPOC, treating its concentration as TOC.

Note: Do not use the direct method for samples containing volatile organic compounds, as they may be purged out with CO₂. Use different methods in such cases.

10. Operations

Instrument Operation

1) Power On

Turn on the computer, connect the main unit's power cable, and turn on the power switch on the right panel of the main unit. **(Figure 58)**



Figure-58

2) Open Gas Supply

Open the main valve of the oxygen cylinder and adjust the pressure regulator knob to set the output pressure to 0.2-0.3 MPa. **(Figure 59)**

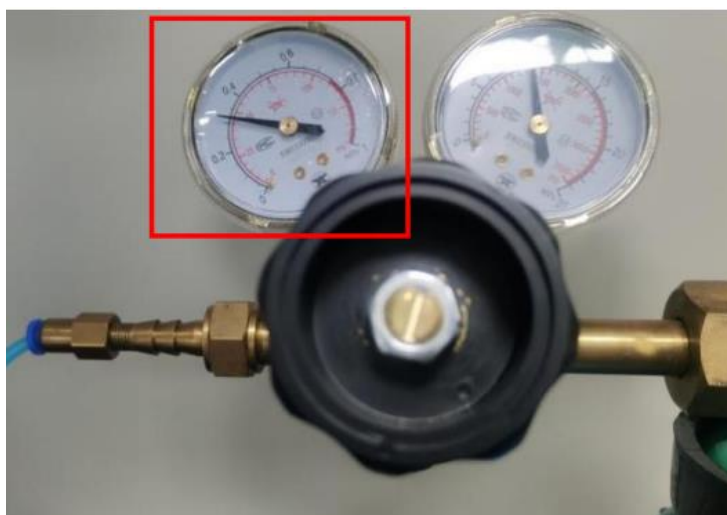


Figure-59

11. Software Operations

11.1 Open Software

Double-click the software icon  TOC-Control.exe to enter the main interface. **(Figure 60)**

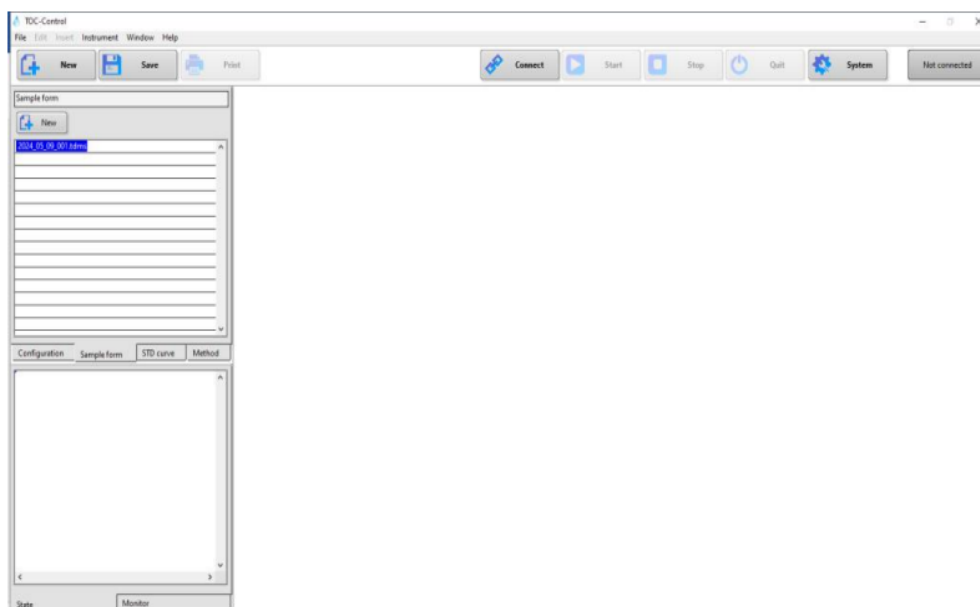


Figure-60

11.2 Create Hardware Configuration

- 1) Click **"Hardware Configuration"** under the **"File Browser"** tab and select **"New."** **(Figure 61)**

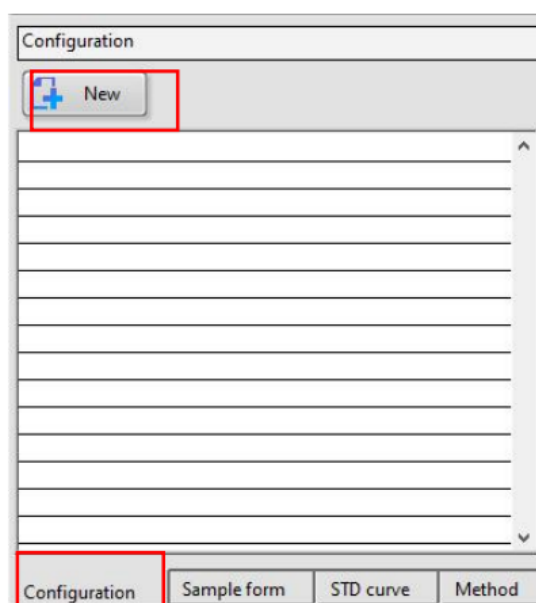
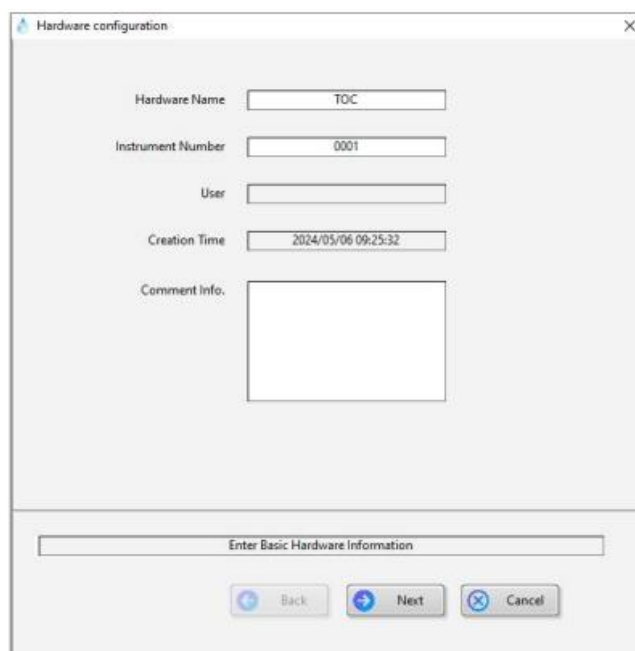


Figure-61

- 2) In the "Instrument Settings Wizard" interface, enter "Hardware Name," "Instrument Serial Number" and "Annotation". Click "**Next**" after setting. (**Figure 62**)

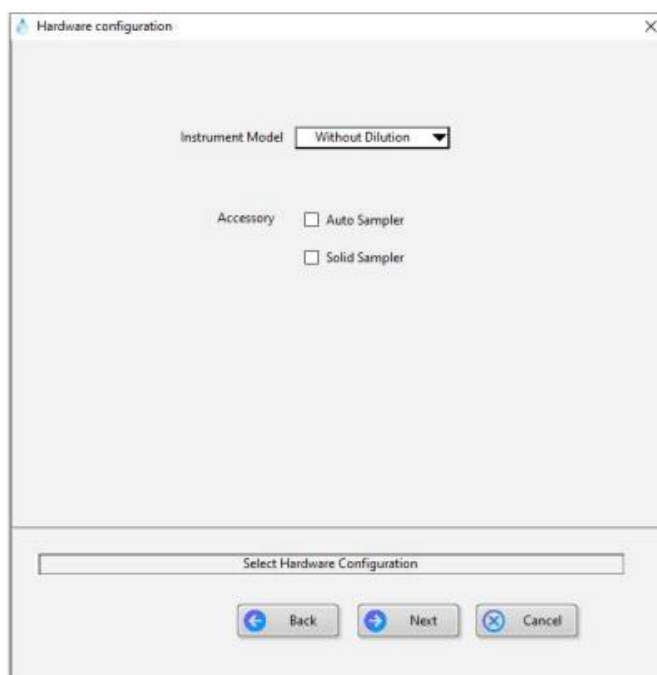


The "Hardware configuration" dialog box contains the following fields and controls:

- Hardware Name: Text input field with "TOC" entered.
- Instrument Number: Text input field with "0001" entered.
- User: Text input field.
- Creation Time: Text input field with "2024/03/06 09:25:32" entered.
- Comment Info: Text area.
- Progress bar: Labeled "Enter Basic Hardware Information".
- Buttons: "Back", "Next", and "Cancel".

Figure-62

- 3) Select the "**Instrument Model**" and "**Accessory Settings**" as needed. Click "**Next**" after setting. (**Figure 63**)

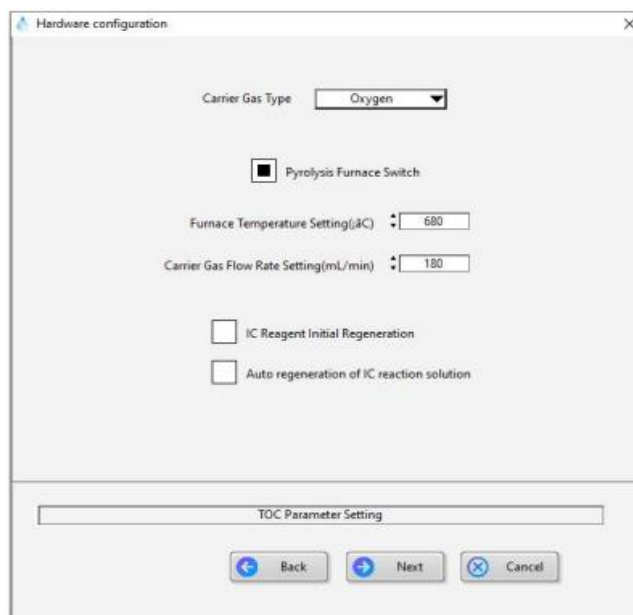


The "Hardware configuration" dialog box contains the following fields and controls:

- Instrument Model: Dropdown menu with "Without Dilution" selected.
- Accessory: Two checkboxes, "Auto Sampler" and "Solid Sampler", both unchecked.
- Progress bar: Labeled "Select Hardware Configuration".
- Buttons: "Back", "Next", and "Cancel".

Figure-63

- 4) Set instrument parameters according to test requirements, such as "Carrier Gas Type," "Pyrolysis Furnace Switch," "Pyrolysis Furnace Temperature," "Carrier Gas Flow Rate," "IC Reaction Solution Initial Regeneration Switch," and "IC Reaction Solution Automatic Regeneration Switch." Click **"Next"** after setting. **(Figure 64)**



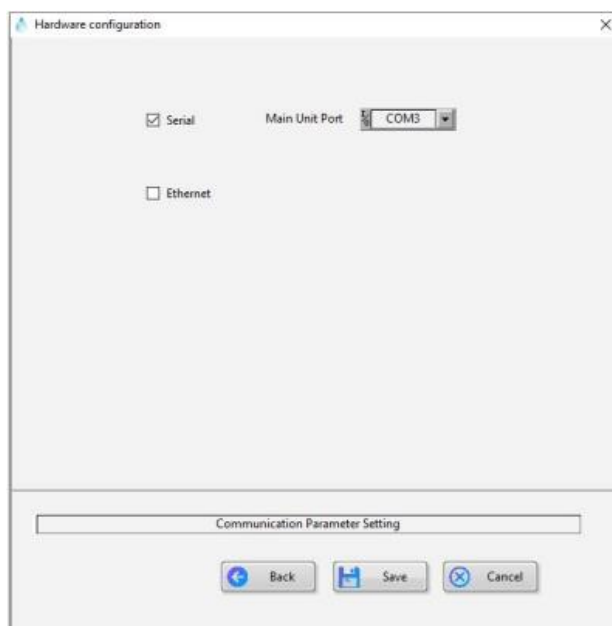
The screenshot shows a 'Hardware configuration' window. It contains the following settings:

- Carrier Gas Type: Oxygen (selected in a dropdown menu)
- Pyrolysis Furnace Switch: ☒ (checked)
- Furnace Temperature Setting(°C): 680 (in a numeric input field)
- Carrier Gas Flow Rate Setting(mL/min): 180 (in a numeric input field)
- IC Reagent Initial Regeneration: ☐ (unchecked)
- Auto regeneration of IC reaction solution: ☐ (unchecked)

At the bottom, there is a 'TOC Parameter Setting' label above a horizontal bar, and three buttons: 'Back', 'Next', and 'Cancel'.

Figure-64

- 5) Set instrument communication parameters, choosing either serial port or Ethernet communication. For serial port communication, set the **"Main Unit Port."** Click **"Save"** after setting. **(Figure 65)**



The screenshot shows a 'Hardware configuration' window. It contains the following settings:

- Serial: ☒ (checked)
- Main Unit Port: COM3 (selected in a dropdown menu)
- Ethernet: ☐ (unchecked)

At the bottom, there is a 'Communication Parameter Setting' label above a horizontal bar, and three buttons: 'Back', 'Save', and 'Cancel'.

Figure-65

Notes:

- Do not use serial and Ethernet communication simultaneously. Avoid connecting both communication cables to the instrument.
- For Ethernet communication, set the local network IP as follows:

(1) Select "**Settings**" from the Windows start menu.

(2) Choose "**Network and Internet.**" (Figure 66)

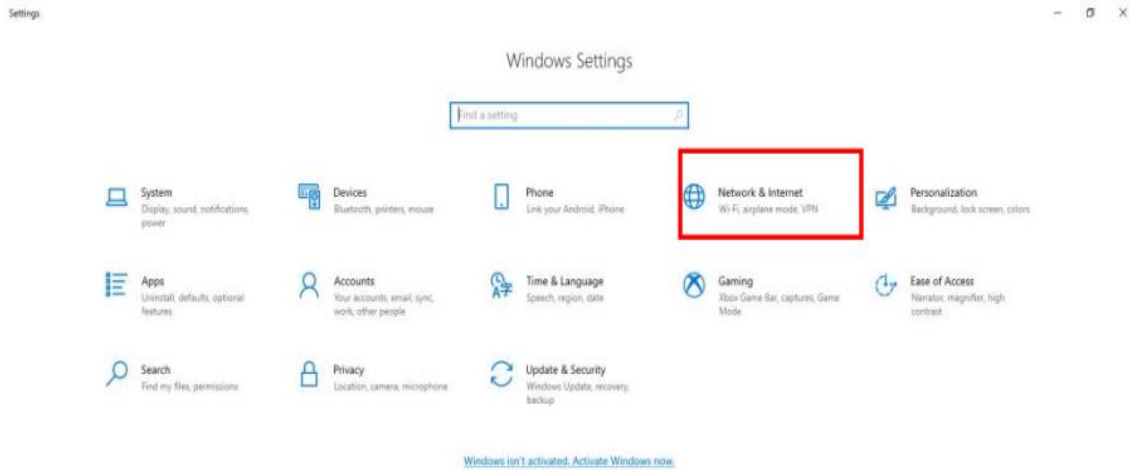


Figure-66

(3) Select "Status - Advanced Network Settings - Change Adapter Options." (Figure 67).

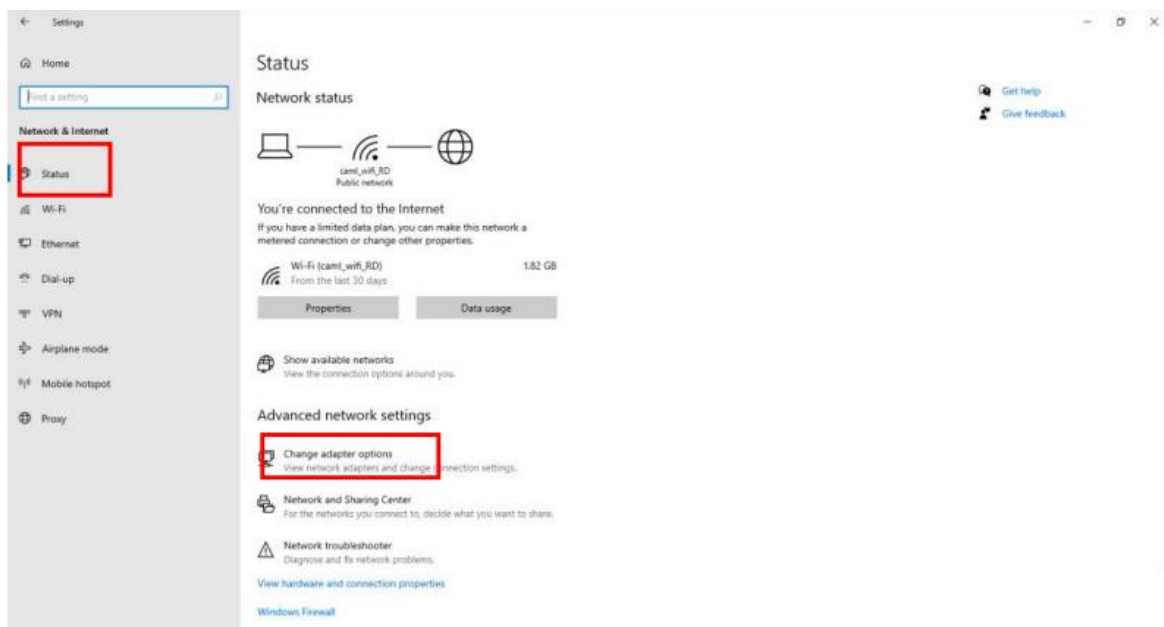


Figure-67

(4) Double-click **"Ethernet."** (Figure 68)

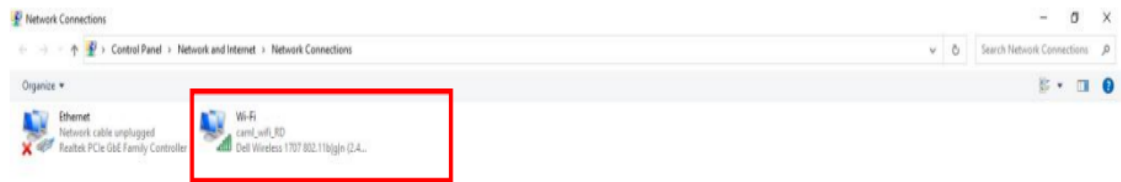


Figure-68

(5) Double-click **"Internet Protocol Version 4 (TCP/IPv4)."** (Figure 69)

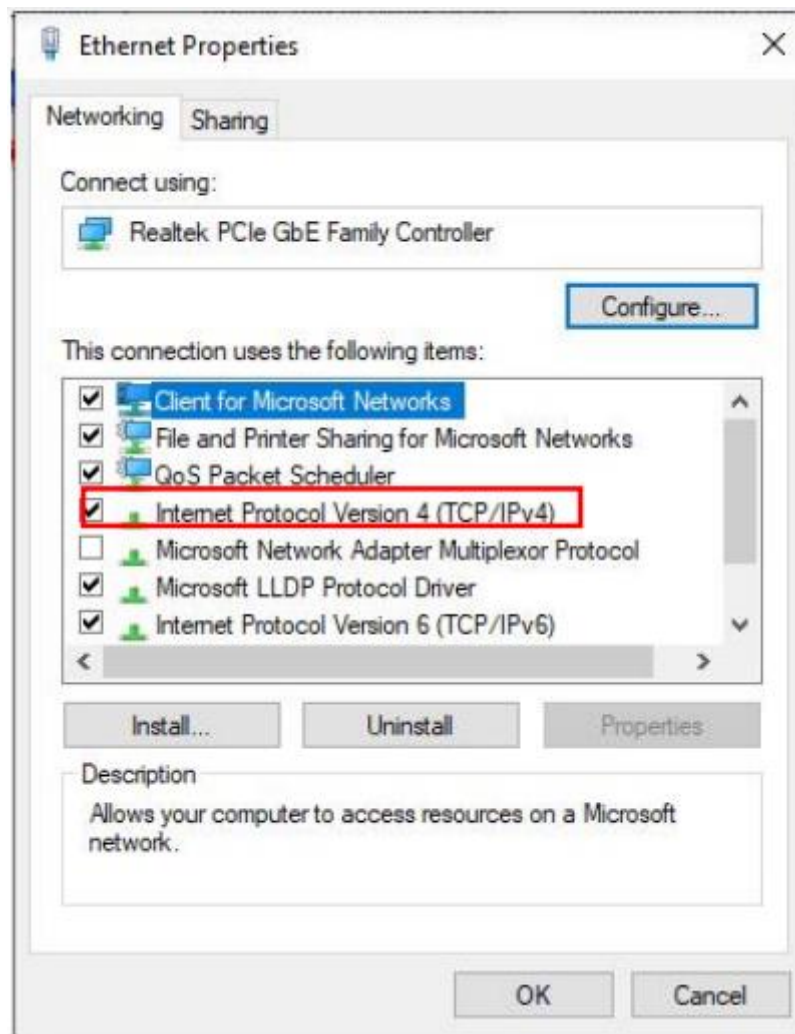


Figure-69

- (6) Set the IP address to 192.168.0.201 and the subnet mask to 255.255.255.0. Click **"OK"** to complete the settings. (Figure 70)

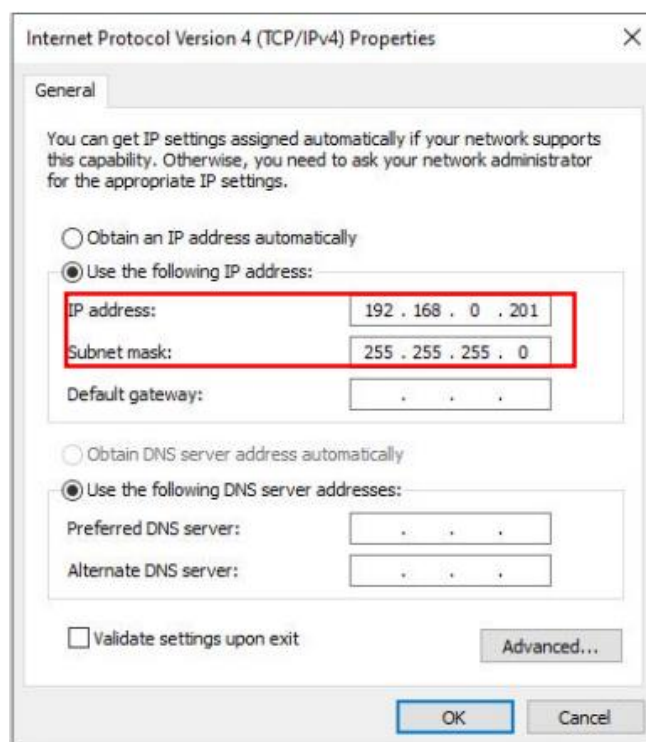


Figure-70

- 6) The saved hardware configuration file will appear under **"Hardware Configuration"** in the **"File Browser"** tab. (Figure 71)

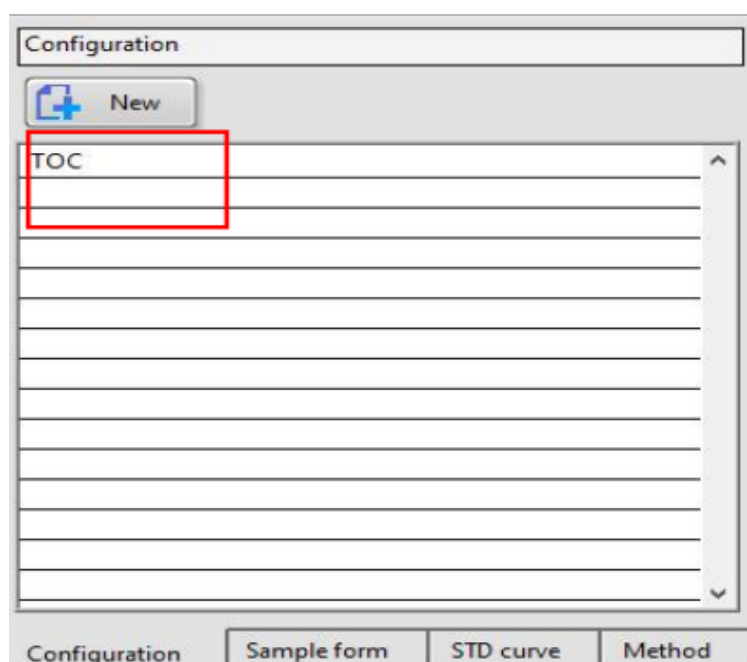


Figure-71

11.3 Create Analysis Parameter File

Creating a standard curve file sets analysis parameters for standard solution measurements. Creating a method file sets analysis parameters for unknown sample measurements. Combine multiple measurement items (e.g., TC-IC for TOC analysis) through the method file.

11.3.1 FM-TOC-B103 Instrument Standard Curve File Creation

Follow these steps to input the main parameters of the standard curve file. (This section describes basic parameter settings only. For details, refer to the software interface introduction on creating standard curve files.

- 1) Click **"New"** under **"STD Curve"** in the **"File Browser"** tab. (**Figure 72**)

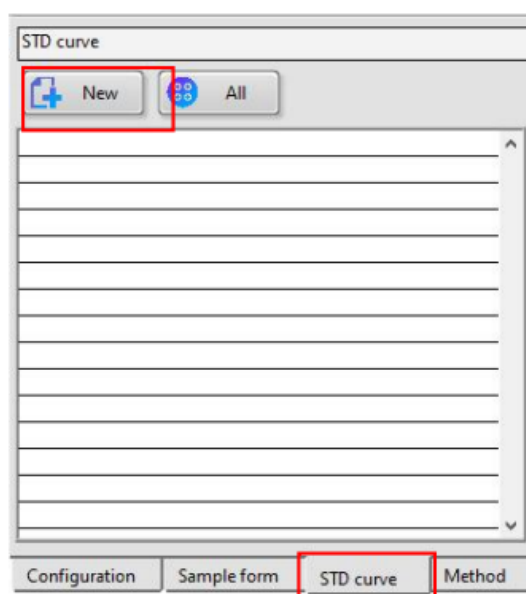


Figure-72

- 2) In the **"New Standard Curve Parameter"** interface, select the applicable **"Hardware"** for the standard curve. Click **"Next"** after setting. (**Figure 73**)

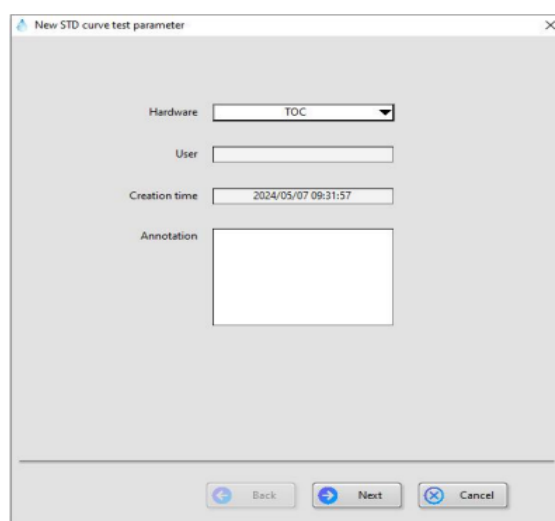


Figure-73

- 3) Select the "Analysis Type," "Standard Form," and check "Zero Shift." Enter the standard curve file name in "Standard Curve File Name" and click **"Next."** (Figure 74)

New STD curve test parameter

Analysis: TC

Sample Name: Unnamed

Sample ID: Unnamed

☐ Zero point displacement

STD sample form:
☐ Standard
☒ Dilution

STD curve file name:

Back Next Cancel

Figure-74

- 4) Configure the parameters according to the test requirements, then click **"Next."** (Figure 75)

New STD curve test parameter

Analysis: TC

Min.measurement times: 2 [1-20]

Max.measurement times: 3 [1-20]

Max.SD: 0.1 [0-999]

Max.RSD (%): 2 [0-100]

Flush times: 2 [2-5]

Preparation volume: 10mL

Back Next Cancel

Figure-75

- 5) Click "Add." (Figure 76)

New STD curve test parameter

Analysis TC Injection volume (mL) 0.2

STD curve point parameters

No.	STD solution conc.(mg/L)	Dilution multiple	STD point conc.(mg/L)	Times

Add
Edit
Delete
Delete all

Back
Next
Cancel

Figure-76

- 6) In the **"Edit Standard Point Parameters"** window, set the parameters and then click **"OK"** to complete adding the standard point. Depending on the form of the standard sample, the parameters are set as follows: For the single-point dilution window interface (**Figure 77**), the main parameters are **"Standard Solution Concentration," "Standard Point Concentration," "Minimum Measurement Times," "Maximum Measurement Times," "Maximum SD," "Maximum RSD,"** etc. For the standard solution window interface (**Figure 78**), the main parameters are **"Standard Point Concentration," "Minimum Measurement Times," "Maximum Measurement Times," "Maximum SD," "Maximum RSD,"** etc.

Edit Standard Point Parameters

Serial number: 1

STD solution conc.(mg/L): 0

Dilution multiple: 1

STD point conc.(mg/L): 0

Min.measurement times: 2

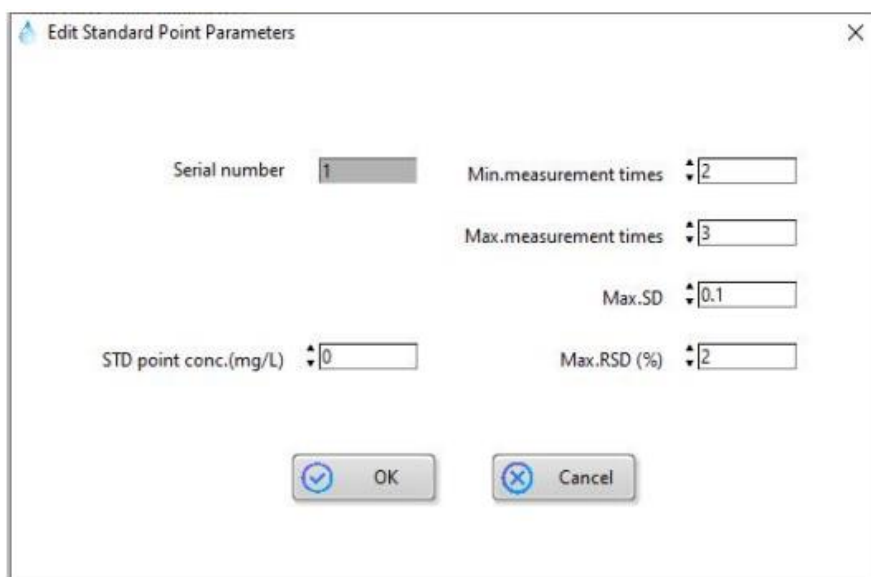
Max.measurement times: 3

Max.SD: 0.1

Max.RSD (%): 2

OK Cancel

Figure-77



Serial number: 1

Min.measurement times: 2

Max.measurement times: 3

Max.SD: 0.1

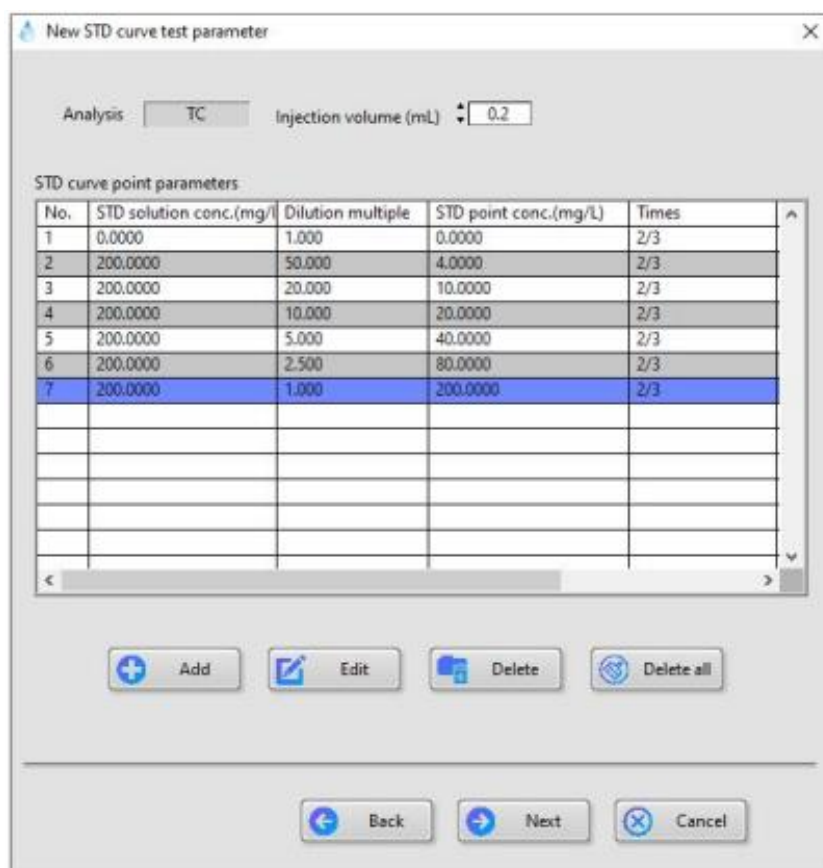
STD point conc.(mg/L): 0

Max.RSD (%): 2

OK Cancel

Figure-78

- 7) In the "Edit Standard Point Parameters" window, set the parameters and click "OK" to add the standard point. Repeat steps 5 and 6 to add all standard points, then click "Next." (Figure 79).



Analysis: TC Injection volume (mL): 0.2

STD curve point parameters

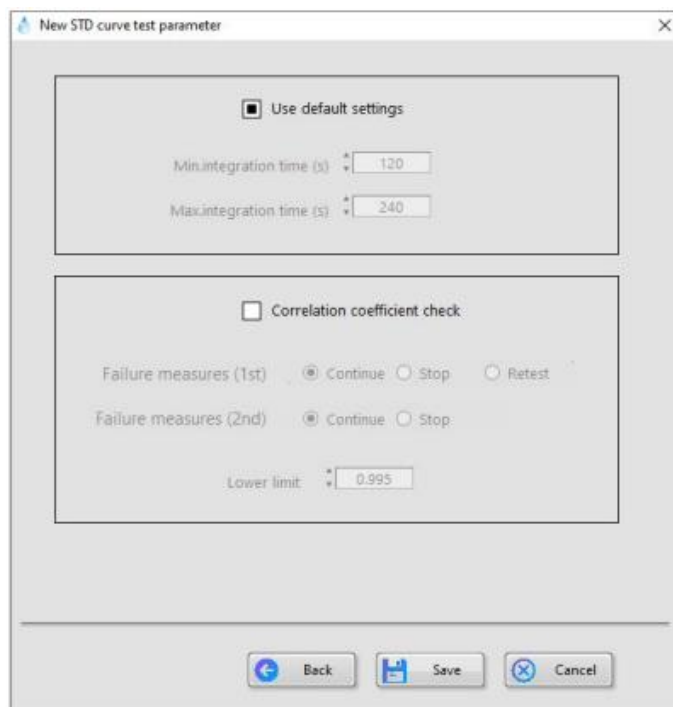
No.	STD solution conc.(mg/l)	Dilution multiple	STD point conc.(mg/L)	Times
1	0.0000	1.000	0.0000	2/3
2	200.0000	50.000	4.0000	2/3
3	200.0000	20.000	10.0000	2/3
4	200.0000	10.000	20.0000	2/3
5	200.0000	5.000	40.0000	2/3
6	200.0000	2.500	80.0000	2/3
7	200.0000	1.000	200.0000	2/3

Add Edit Delete Delete all

Back Next Cancel

Figure-79

- 8) Configure the integration time and correlation coefficient check as needed, then click **"Save"** to complete the standard curve setup. **(Figure 80)**



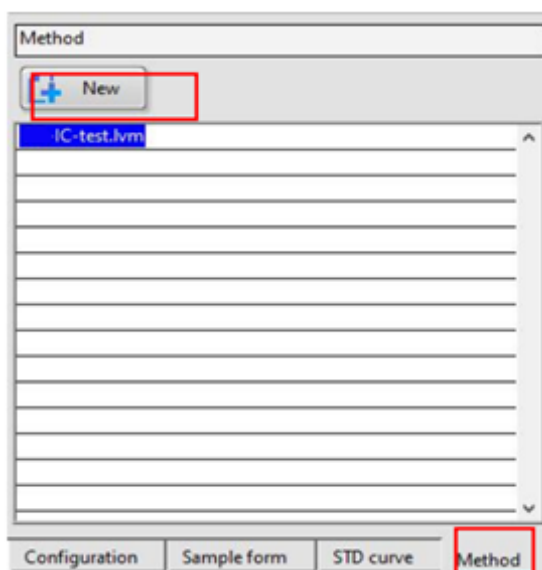
The dialog box titled "New STD curve test parameter" contains two main sections. The first section, "Use default settings", is checked and includes input fields for "Min.integration time (s)" set to 120 and "Max.integration time (s)" set to 240. The second section, "Correlation coefficient check", is unchecked and includes radio buttons for "Failure measures (1st)" and "Failure measures (2nd)", both set to "Continue". It also includes a "Lower limit" input field set to 0.995. At the bottom are "Back", "Save", and "Cancel" buttons.

Figure-80

11.3.2 FM-TOC-B103 Method File Creation

Follow these steps to create a method file for the FM-TOC-B103 instrument. (This chapter only explains the basic parameter settings. For details, refer to the content on creating method files in the software interface introduction.)

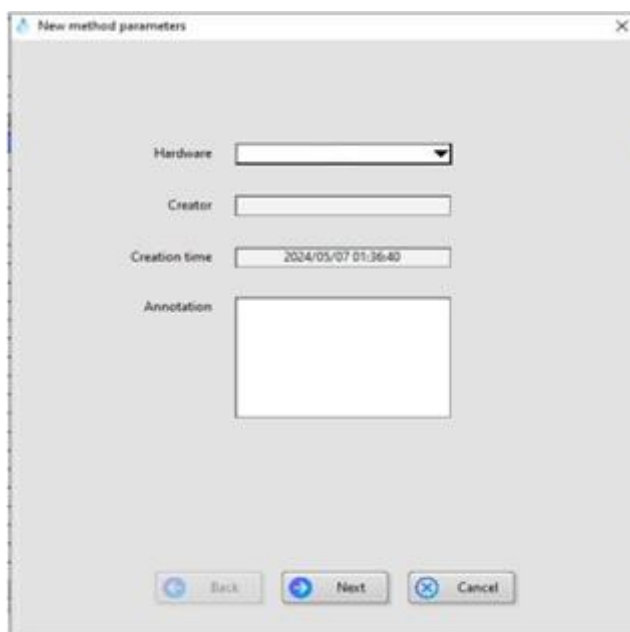
- 1) Click **"New"** under **"Method"** in the **"File Browser"** tab. **(Figure 81)**



The "Method" dialog box shows a list of method files. The "New" button is highlighted with a red box. The list contains "iC-test.lvm" and several empty rows. At the bottom, the "Method" tab is selected and highlighted with a red box, alongside "Configuration", "Sample form", and "STD curve" tabs.

Figure-81

- 2) In the **"New Method Parameter"** interface, select the applicable **"Hardware"** for the method. Click **"Next"** after setting. **(Figure 82)**



The screenshot shows a window titled "New method parameters". Inside, there are four labeled fields: "Hardware" with a dropdown arrow, "Creator" with a text input box, "Creation time" with a text input box containing the date and time "2024/05/07 01:36:40", and "Annotation" with a large empty text area. At the bottom of the window, there are three buttons: "Back" (with a left arrow), "Next" (with a right arrow), and "Cancel" (with an 'X').

Figure-83

- 3) The **"New Method"** interface will pop up. Select **"Analysis Type"** according to the test requirements, enter the method file name in **"Method File Name,"** and then click **"Next"** **(Figure 84)**. The **"TOC"** in the analysis type represents TOC analysis after the combination of TC and IC.



The screenshot shows a window titled "New method parameters". Inside, there are four labeled fields: "Analysis" with a dropdown menu showing "IC", "Sample name" with a text input box showing "Unnamed", "Sample ID" with a text input box showing "Unnamed", and "Method file name" with a text input box and a file icon button. At the bottom of the window, there are three buttons: "Back" (with a left arrow), "Next" (with a right arrow), and "Cancel" (with an 'X').

Figure-84

- 4) Select a suitable standard curve based on the estimated sample concentration or select three standard curves with different ranges. The software will automatically select the optimal curve for calculation. Click **"Next"** (Figure 85).

The image shows a software window titled "New method parameters". Inside, there is a tab labeled "Analysis" with a sub-tab "IC" selected. Below this, there are three text input fields labeled "Reference STD curve 1", "Reference STD curve 2", and "Reference STD curve 3". Each field has a small icon to its right. At the bottom of the window, there are three buttons: "Back", "Next", and "Cancel".

Figure-85

- 5) The default settings entered on this page can meet basic analysis needs. Verify these parameter settings, configure the parameters as needed, and then click **"Next"** (Figure 86).

The image shows the same "New method parameters" window. The "Analysis" tab is still selected, and "IC" is the chosen method. Below the reference curve fields, there are several parameter settings, each with a value and a range in brackets:

- Injection volume (mL): 0.2 [0.1-2]
- Min.measurement times: 2 [1-20]
- Max.measurement times: 3 [1-20]
- Max.SD: 0.1 [0-999]
- Max.RSD (%): 2 [0-100]
- Flush times: 2 [2-5]
- Dilution multiple: 1 [1-100]
- Preparation volume: 10ml

 At the bottom, the "Back", "Next", and "Cancel" buttons are present.

Figure-86

- 6) After setting the integration time, click **"Save"** to complete the settings (**Figure 87**).



Figure-87

11.4 Create Sample Table

Follow these steps to create a sample table for the **FM-TOC-B103** instrument.

- 1) Click **"New"** under **"Sample Table"** in the **"File Browser"** tab (**Figure 88**).

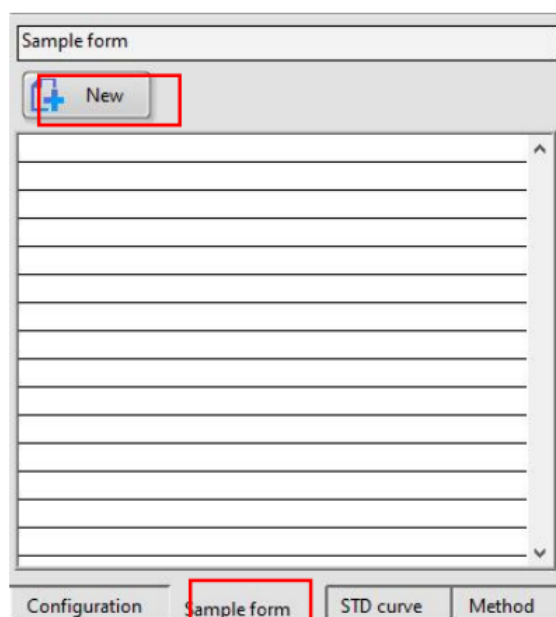


Figure-88

- 2) In the “**New Sample Table Parameter**” interface, select the applicable “**Hardware**” and “**Method**” for the sample table. After setting, click “**Next**” (**Figure 89**).

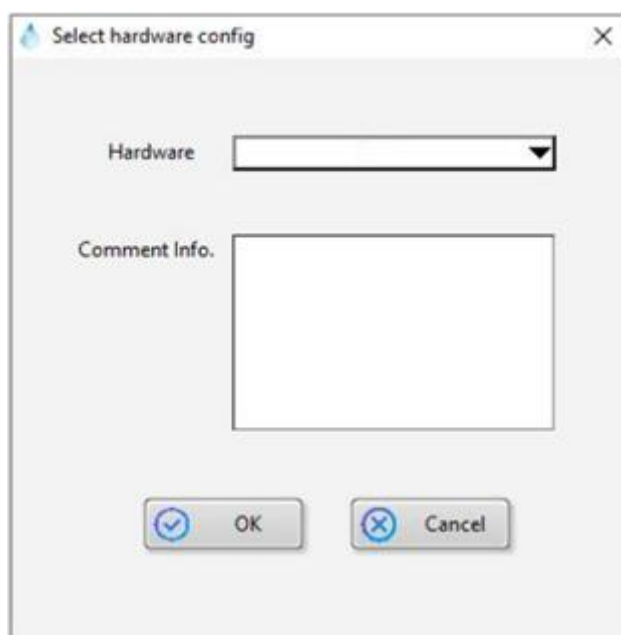


Figure-89

- 3) The new sample table is created, and the sample table is displayed in the area. (**Figure 90**)

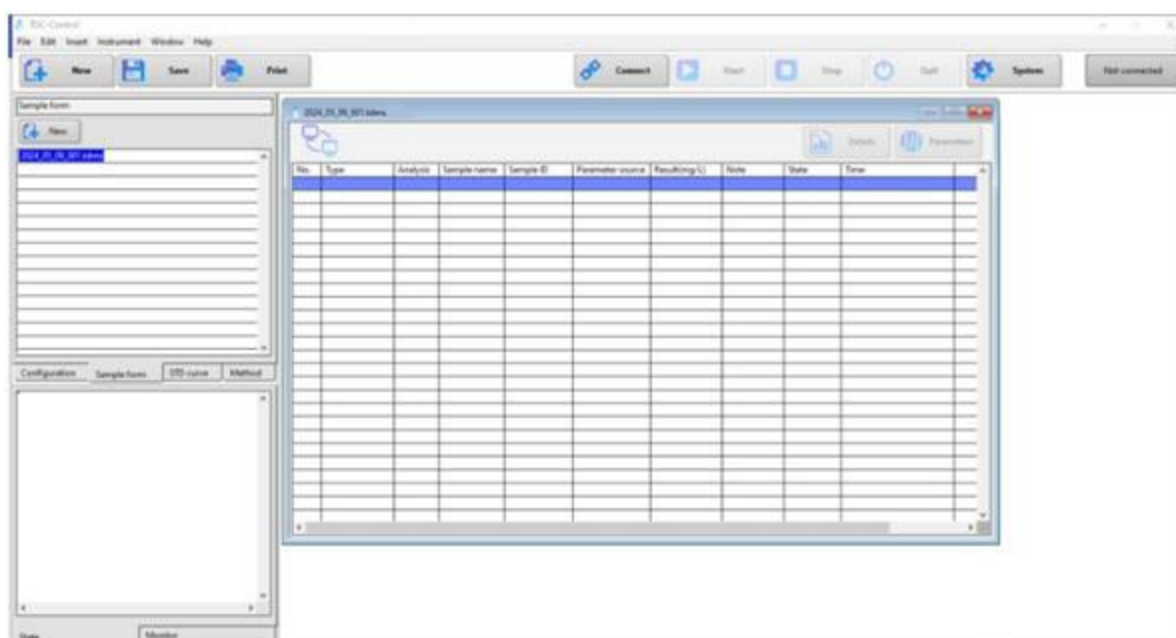


Figure-90

11.5 Edit Sample Table

11.5.1 Insert Standard Curve into Sample Table

- 1) Select the newly created sample table window, right-click on the blank area of the sample table and choose **"Insert Standard Curve"** from the shortcut menu. (Figure 91)

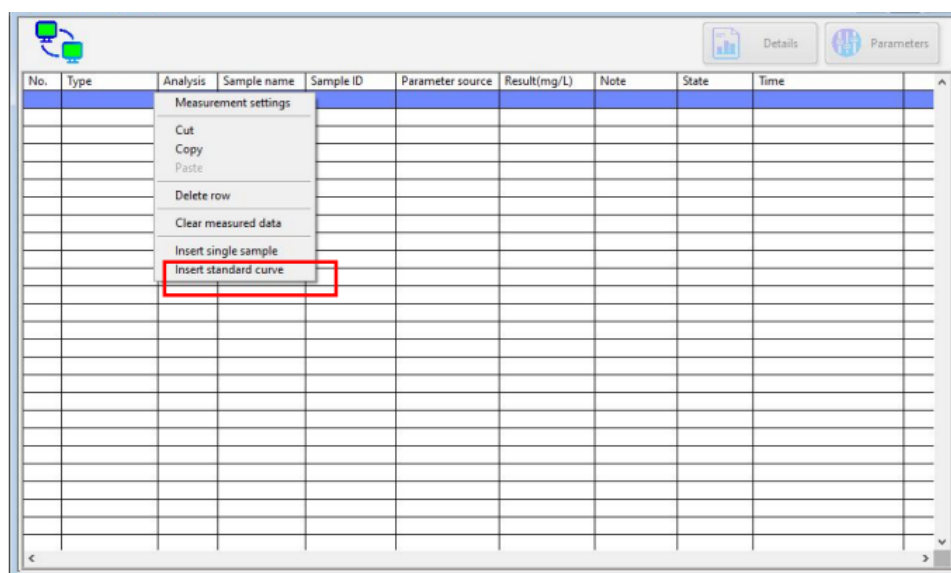


Figure-91

- 2) In the pop-up window, select the pre-configured standard curve file, and click **"OK"**. (Figure 92)

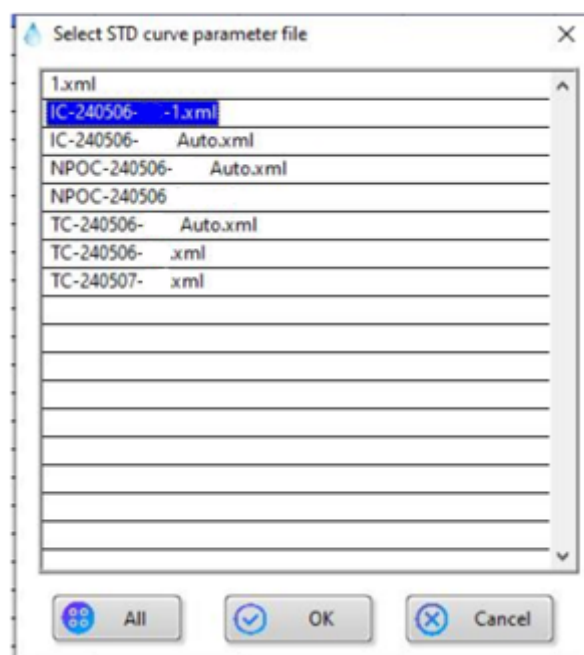


Figure-92

- 3) The standard curve test is added to the sample table. **(Figure 93)**

The screenshot shows a software interface titled "Unnamed.fidms". At the top left, there's a logo consisting of two overlapping green squares connected by curved arrows. To its right, the title bar says "Unnamed/Unnamed IC STD conc. 100.0000mg/L". On the far right of the header area are three icons: a folder icon labeled "Details", a circular pattern icon labeled "Parameters", and another unlabeled icon. Below this header is a large table with columns: No., Type, Analysis, Sample name, Sample ID, Parameter source, Result(mg/L), Note, State, Time, and an empty column. The first row has blue headers. The second row contains the following values: "", "Standard curve", "IC", "Unnamed", "Unnamed", "IC-249506", "", "", "Custom", "", and "". There are many more rows below, all appearing blank except for the headers. A vertical scrollbar is visible on the right side of the table.

Figure-93

Note: You can also select the standard curve to be tested in the "**Standard Curve**" section and drag it into the sample table to add the standard curve test to the sample table.

11.5.2 Insert Unknown Sample Test into Sample Table

- 1) Select the newly created sample table window, right-click on the blank area of the sample table and choose **"Insert Single Sample"** from the shortcut menu. **(Figure 94)**

The screenshot displays the 'Data' window of a software application. At the top, there is a toolbar with a 'Details' button and a 'Parameters' button. Below the toolbar is a table with the following columns: No., Type, Analysis, Sample name, Sample ID, Parameter source, Result(mg/L), Note, State, and Time. A right-click context menu is open over the first row of the table. The menu options are: Measurement settings, Cut, Copy, Paste, Delete row, Clear measured data, Insert single sample (which is highlighted with a red rectangle), and Insert standard curve. The table is currently empty of data rows.

Figure-94

- 2) In the pop-up single sample parameter setting window, you can choose "**Method**," "**Standard Curve**," or "**Manual Edit**" to complete the addition of the unknown sample test. For both the "**Method**" path and the "**Standard Curve**" path, you can check "**Skip remaining wizard pages, use source test parameters**," and click "**Finish**". (Figure 95)

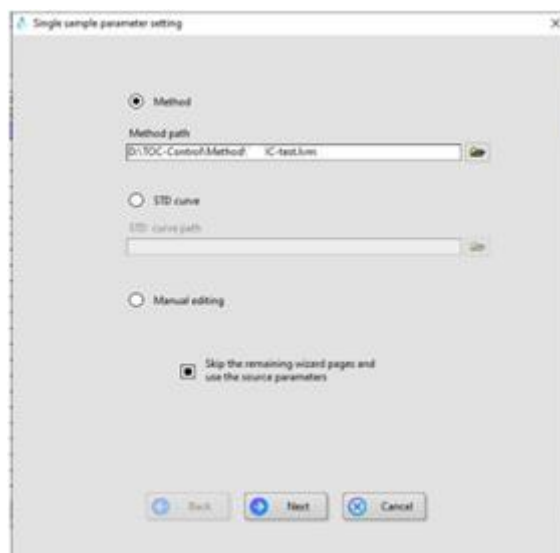


Figure-95

- 3) The unknown sample test is added to the sample table. (Figure 96)

No.	Type	Analysis	Sample name	Sample ID	Parameter source	Result(mg/L)	Note	State	Time
1	Standard curve	IC	Unnamed	Unnamed	Unnamed	0.1709		Completed	2024/05/07 00:15:30
2	Unknown sample	IC	Unnamed	Unnamed	Unnamed	Custom		Completed	2024/05/07 01:31:46
3	Unknown sample	IC	Unnamed	Unnamed	Unnamed	Custom		Custom	2024/05/07 01:31:46

Figure-96

Note: The **FM-TOC-B103** instrument has an automatic acid addition and purging function, so this operation is not required. When analyzing multiple samples under the same conditions, you can reinsert samples into the sample table by using "Copy" and "Paste". The steps are as follows:

- (1) Select the sample row you need in the table, right-click and choose **"Copy"** (Figure 97). Right-click on the blank row in the table and choose **"Paste"** (Figure 98) to complete the sample setting. (Figure 99)

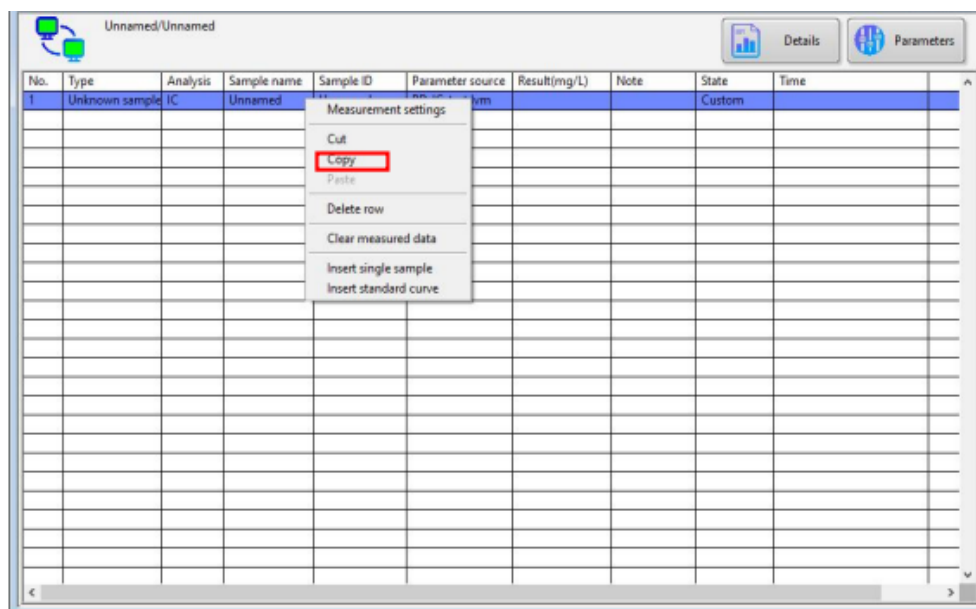


Figure-97

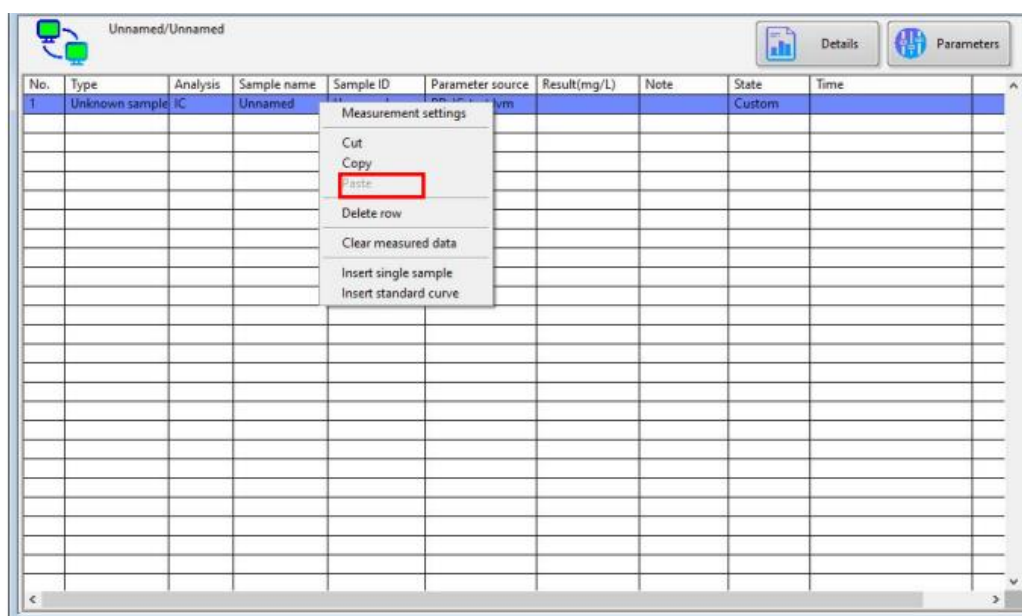


Figure-98

[illegible]

Figure-99

11.6 Connect

- 1) Open the sample table to be used. Click "**Connect**" on the main interface (**Figure 100**).

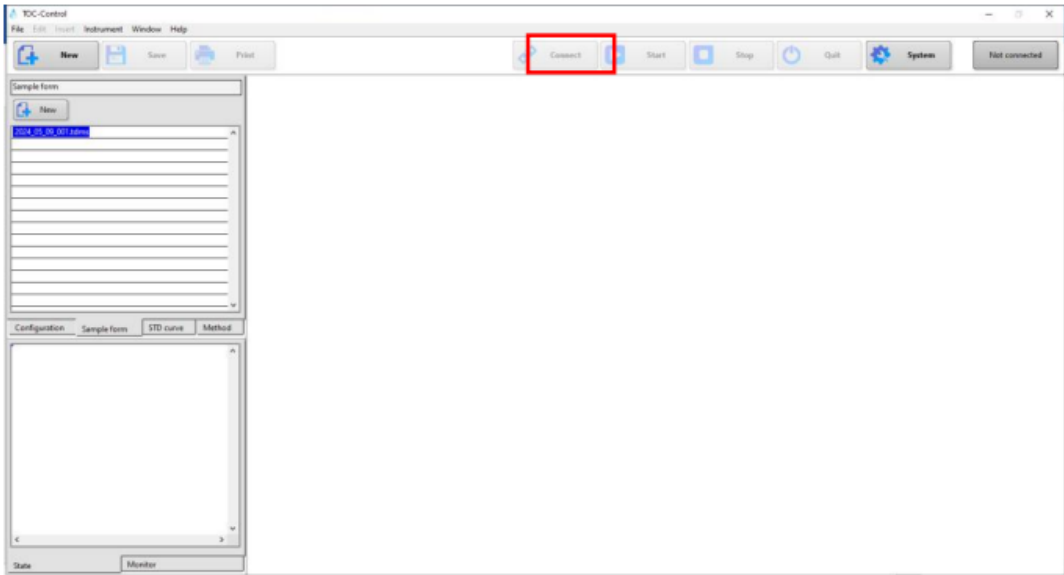


Figure-100

- 2) Wait for the instrument to complete the online initialization (**Figure 101**).

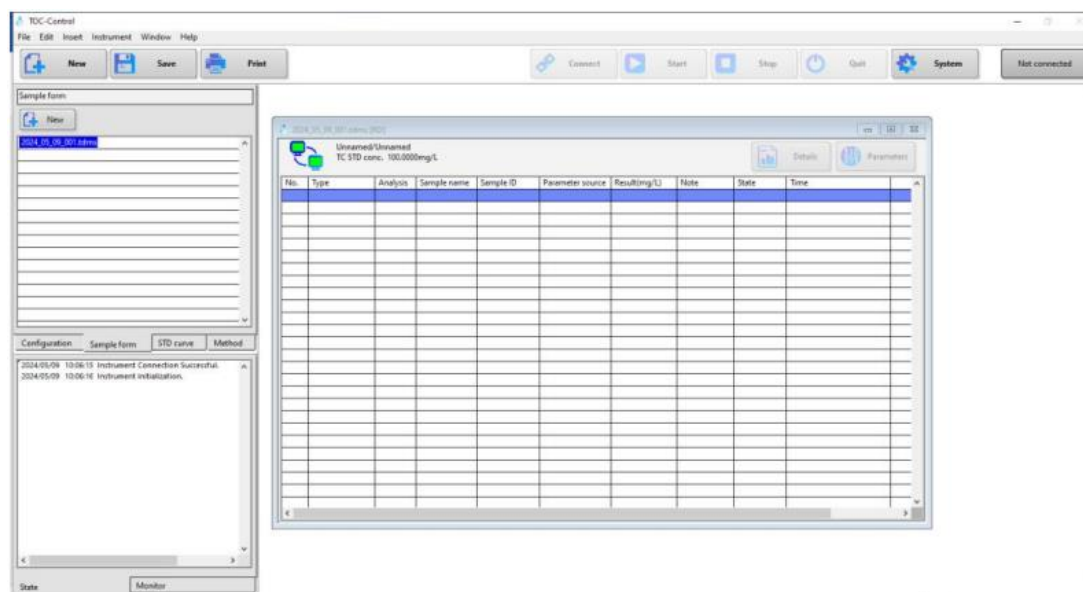


Figure-101

- 3) The **"Status"** in the lower left corner of the software will indicate "Instrument Initialization Completed," and the buttons in the main interface menu bar will change from disabled to operable. (**Figure 102**)

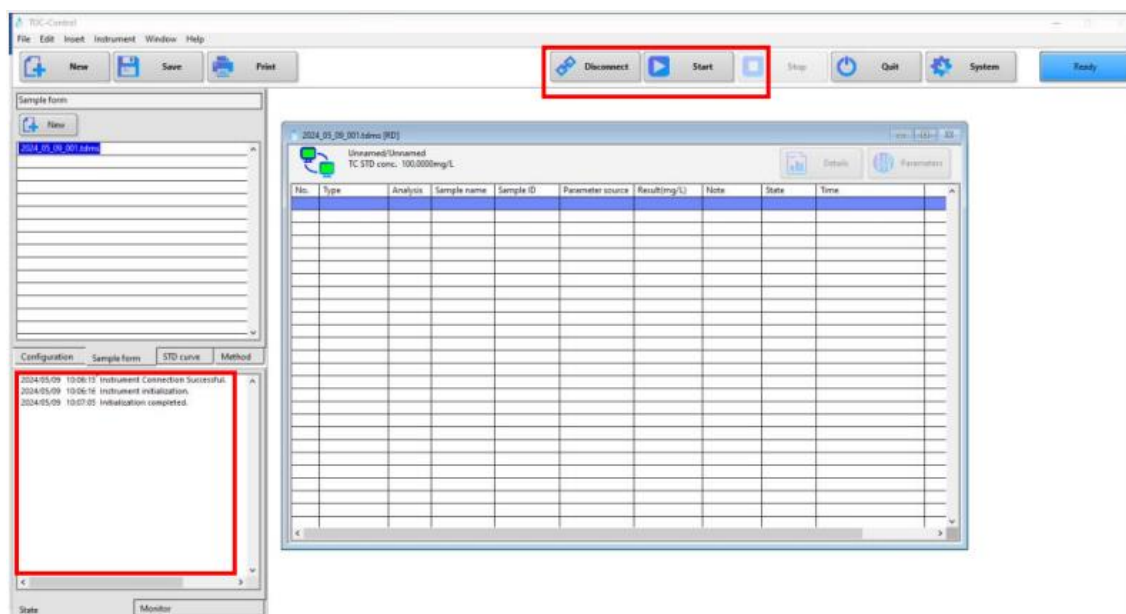


Figure-102

Note: After initialization is completed, wait for the detector to stabilize for 30 minutes before testing.

11.6.1 Sample Analysis

- 1) After the sample table is successfully connected to the instrument, select the test content and click **"Start"** (Figure 103).

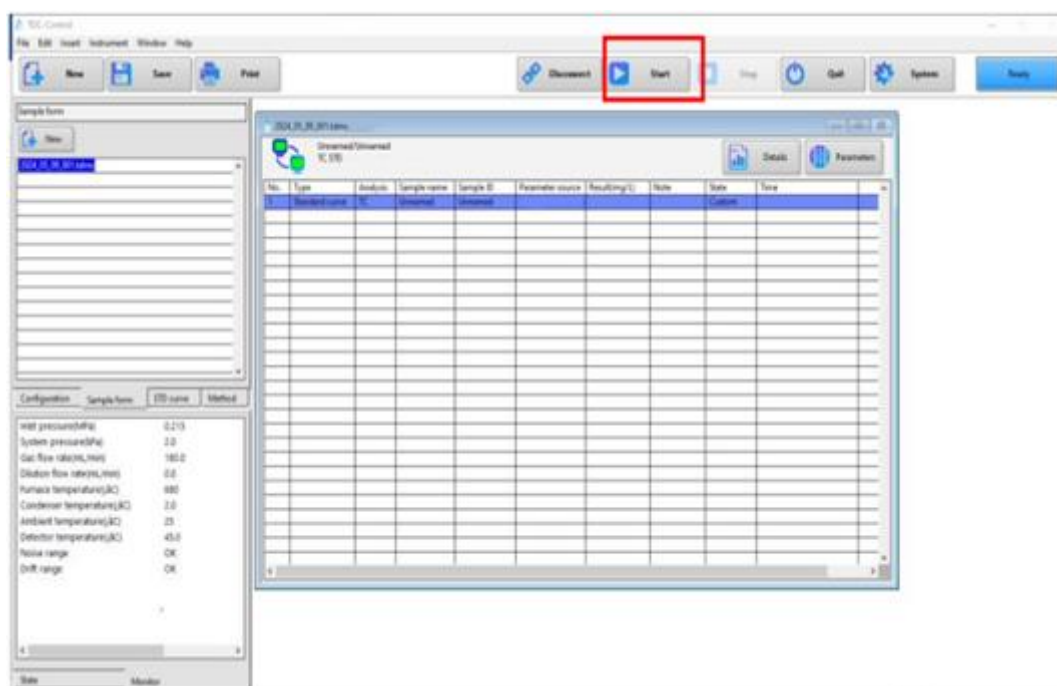


Figure-103

- 2) In the pop-up window, select the appropriate test method, and click **"OK"** after selecting. (Figure 104)

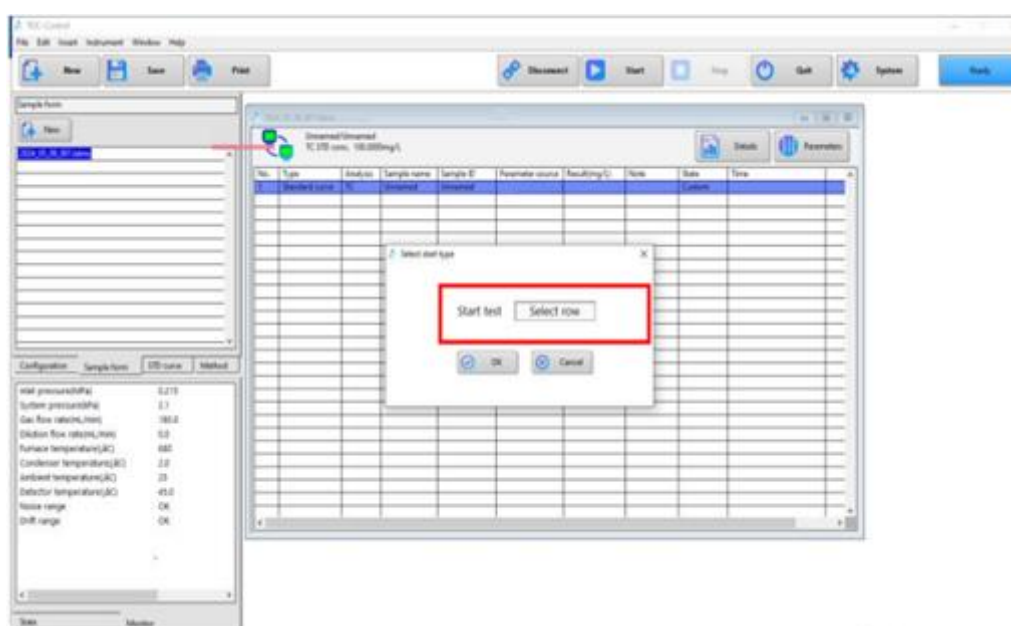


Figure-104

- 3) The instrument enters the analysis step state, waiting for the analysis results to be displayed. **(Figure 105)**

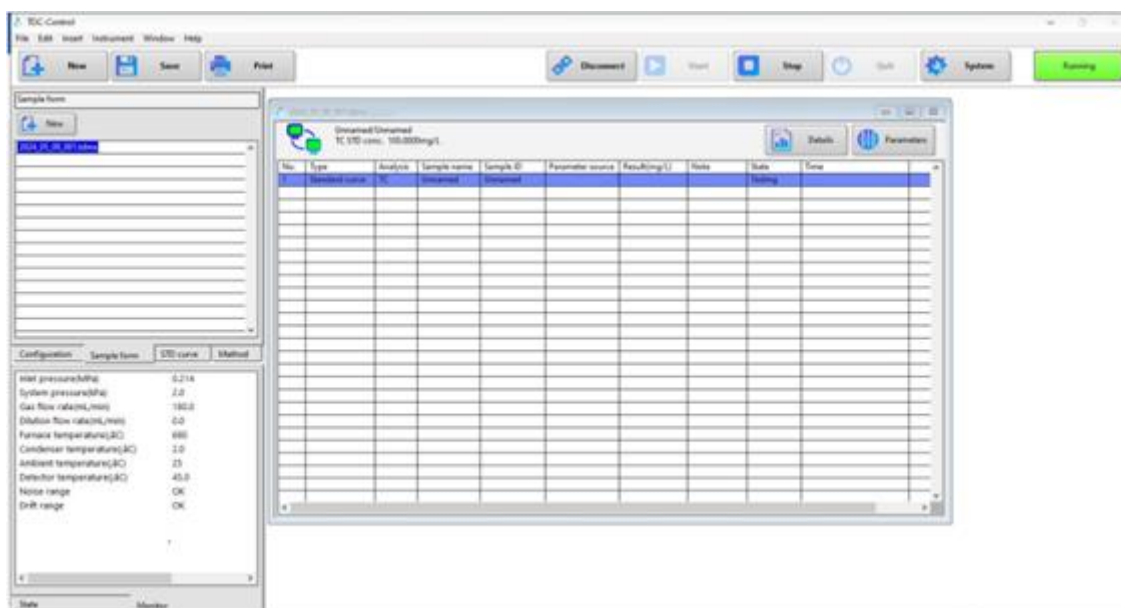


Figure-105

- 4) When the current test is completed, the pop-up window will display the test results. **(Figure 106)** You can operate according to the actual situation.

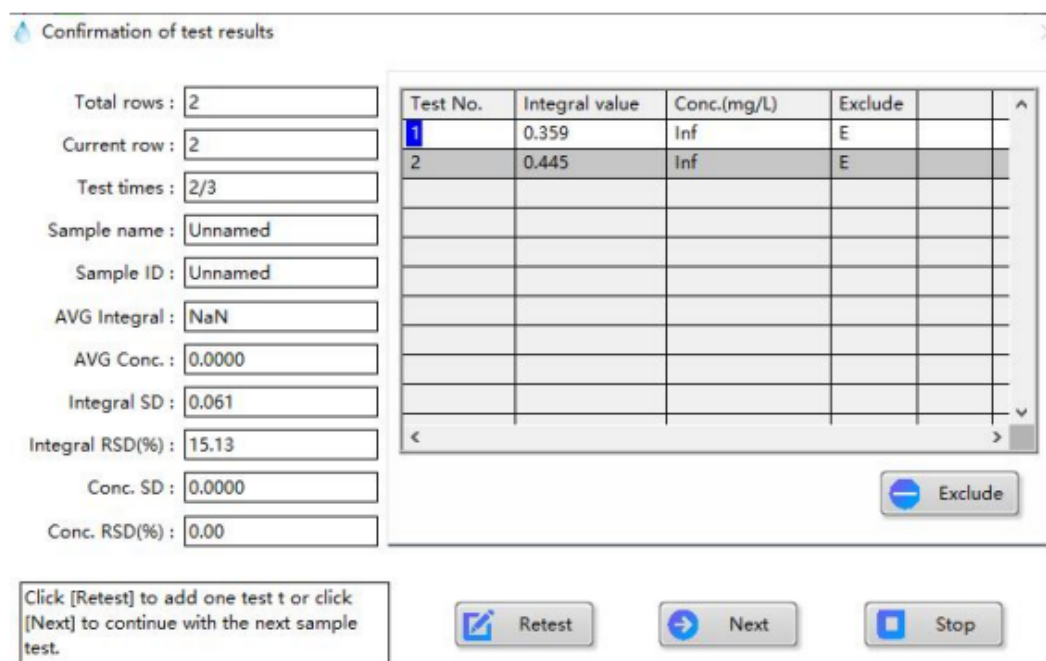


Figure-106

5) Click "Detailed Data" (Figure 107) to view detailed test data (Figure 108).

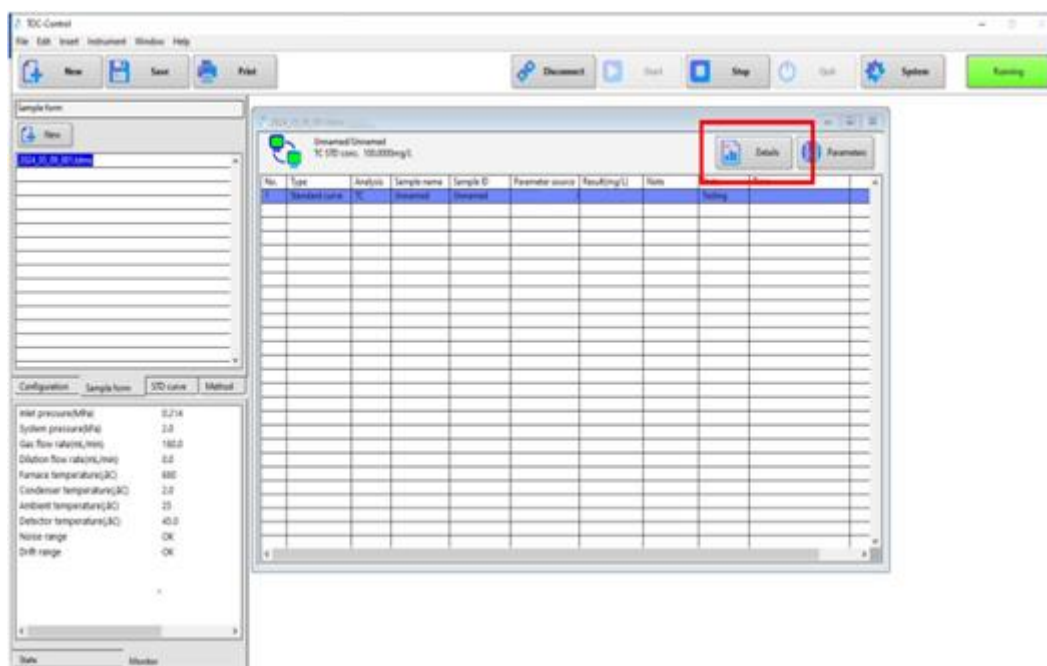


Figure-107

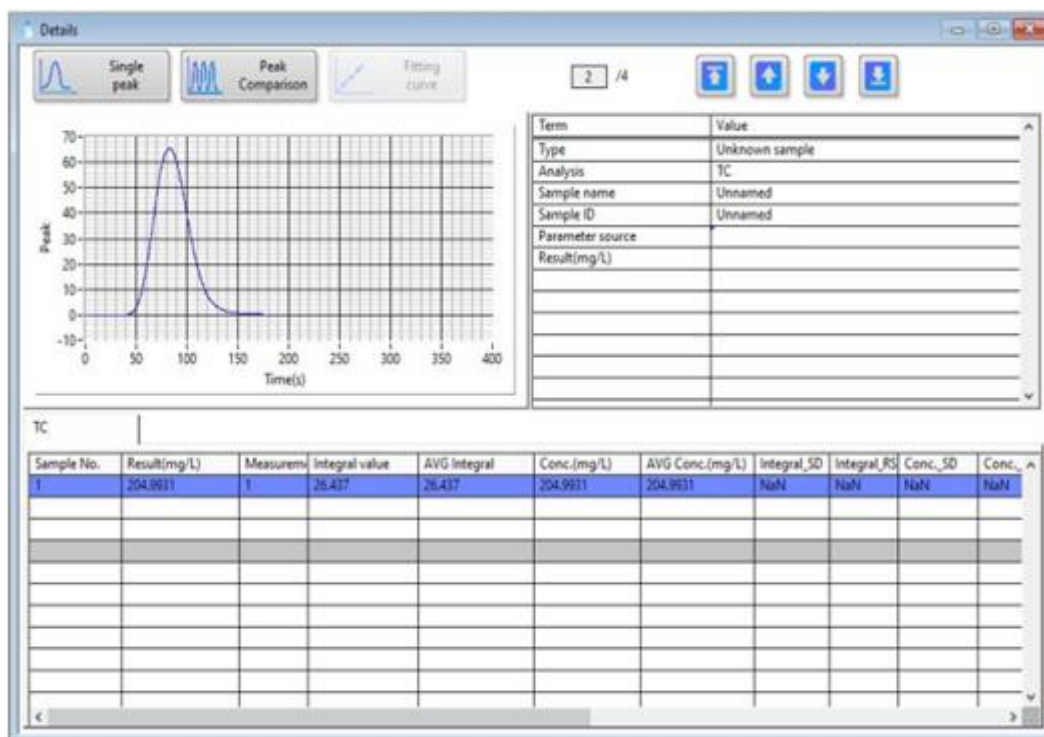


Figure-108

11.6.2 Data Export

- 1) Open the sample table to be printed and exported and click **"Print"** (Figure 109).

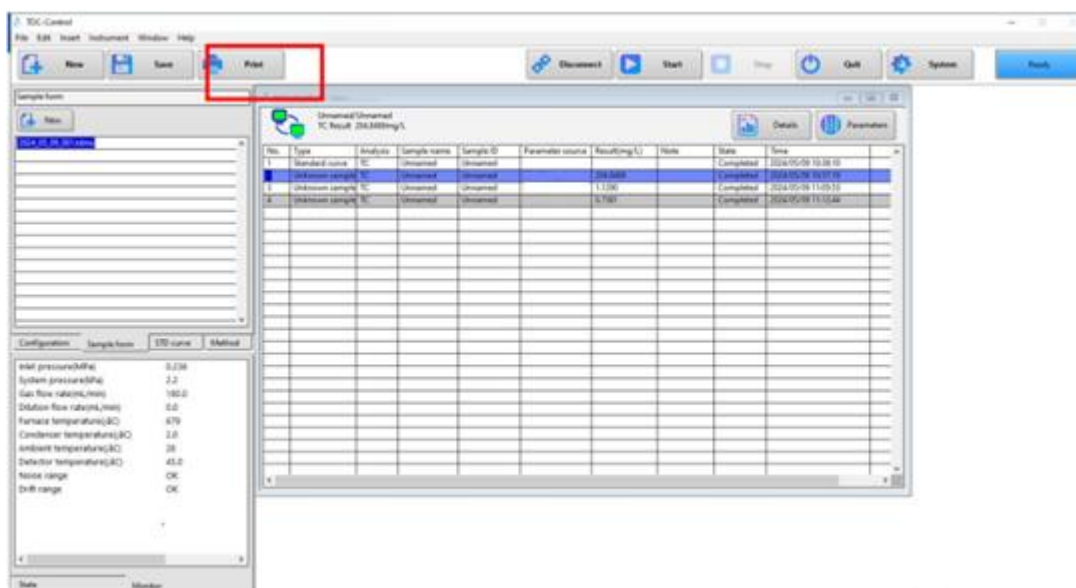


Figure-110

- 2) Configure the print parameters in the pop-up window, select **"Print Content,"** **"Printer Name,"** **"Number of Copies,"** and click **"Print"** (Figure 111). PDF and WORD formats can be selected for report export paths.

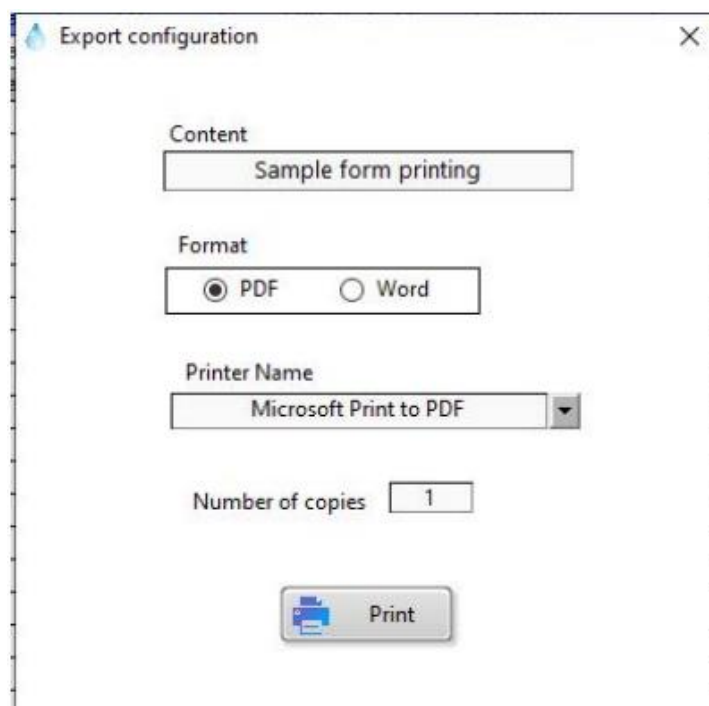


Figure-111

11.6.3 End Analysis

- 1) Click **"Shutdown"** on the main interface (**Figure 112**).

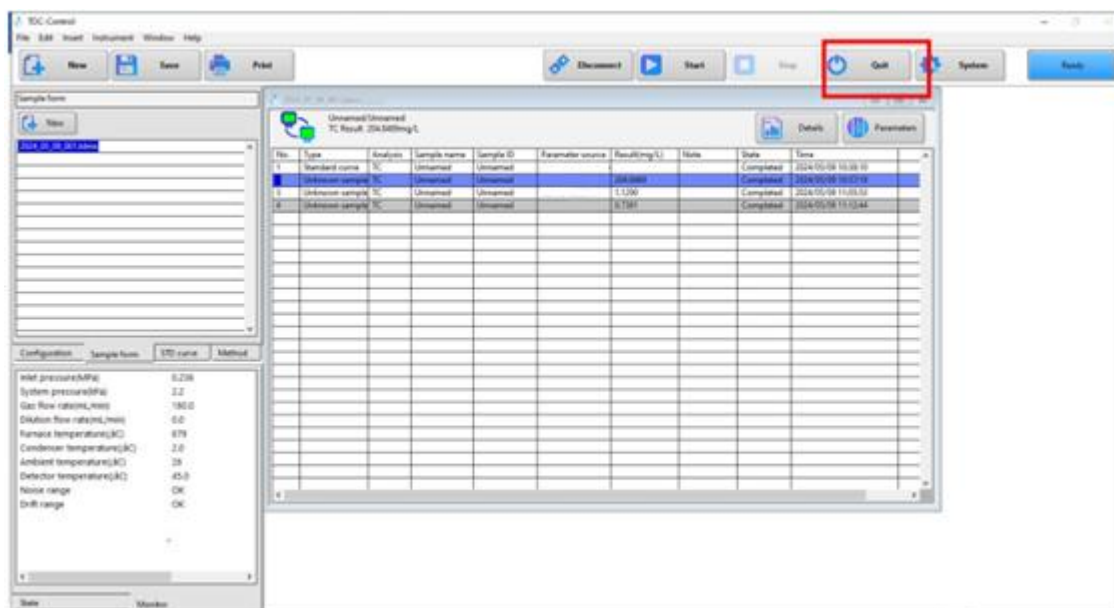


Figure-112

- 2) Click **"Shutdown"** as prompted (**Figure 113**). The interface will prompt you to insert the sample injection tube into pure water (**Figure 114**).

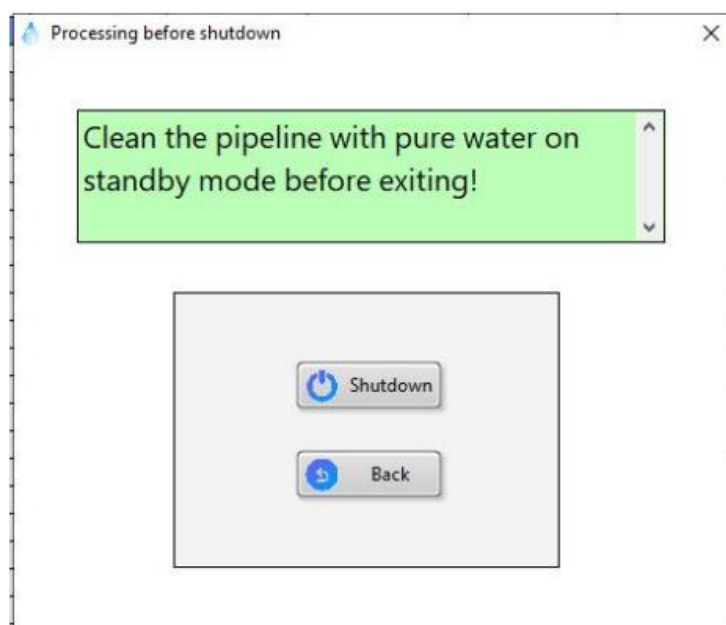


Figure-113

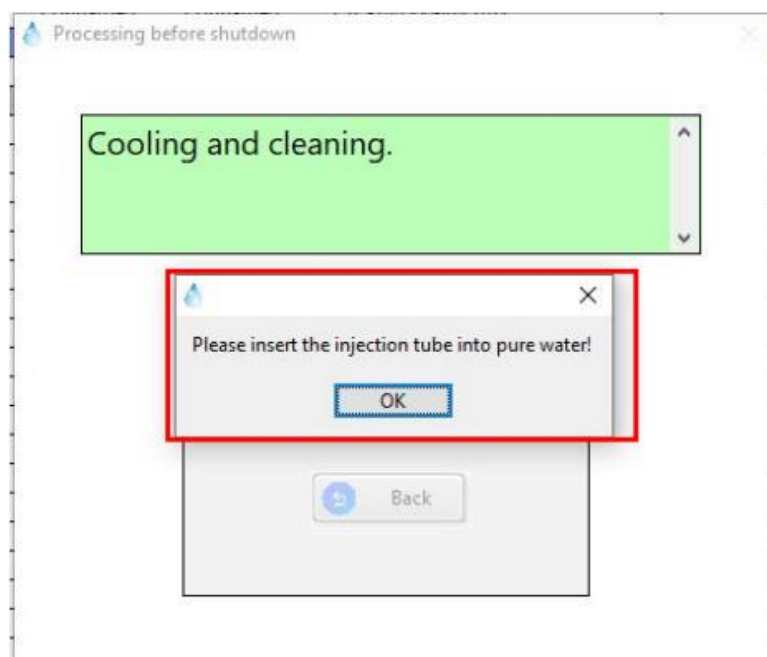


Figure-114

- 3) During the cleaning process before shutdown, the interface is locked (**Figure 115**).

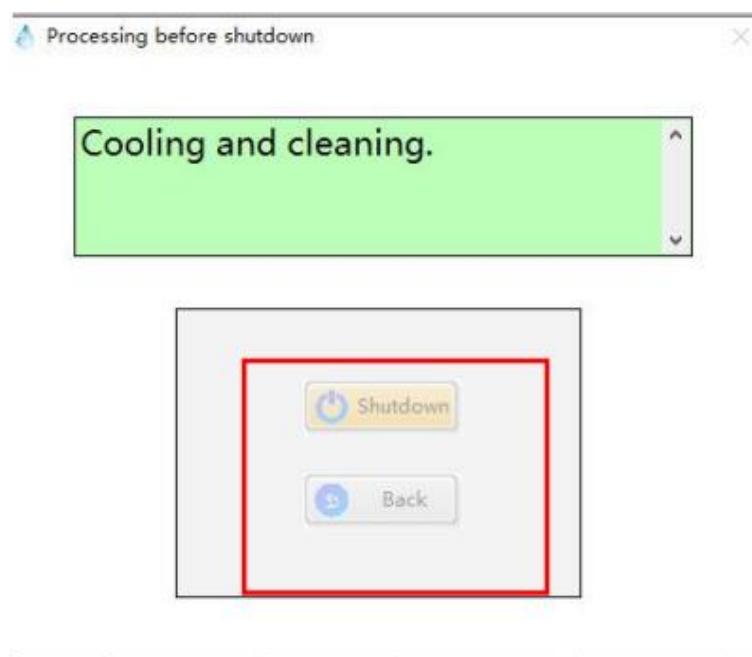


Figure-115

- 4) After the cleaning process is completed, you can stay on this interface to wait for the furnace temperature to drop to 400°C, or you can click "**Return**" to wait for the furnace temperature to drop below 400°C (**Figure 116**).

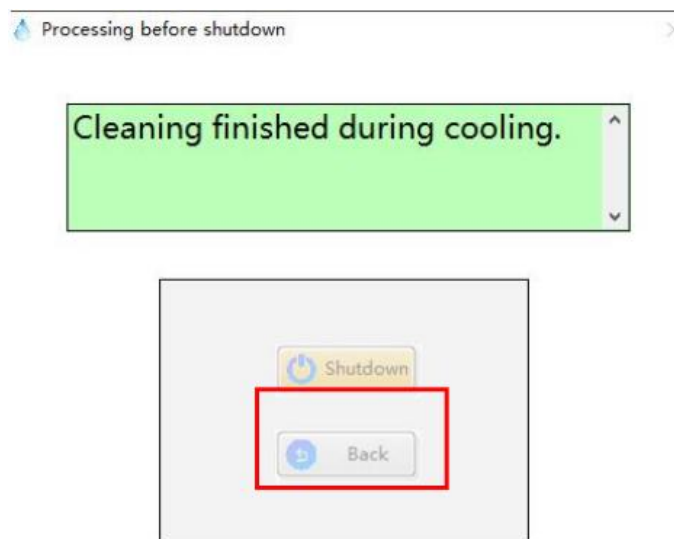


Figure-117

- 5) After the furnace temperature drops to 400°C, the software will prompt "**Cooling complete, you can turn off the instrument power**" (**Figure 118**). You can click "**Disconnect**" to disconnect the instrument and close the software (**Figure 119**).

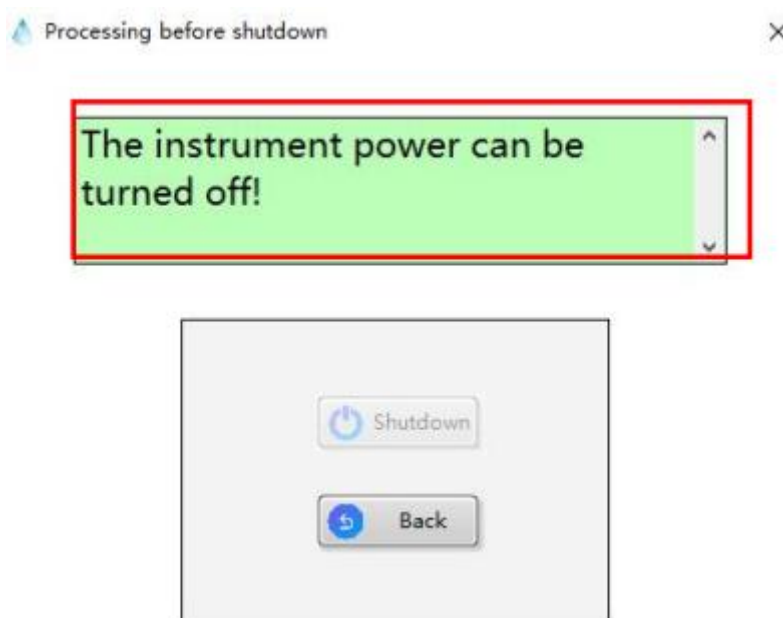


Figure-118

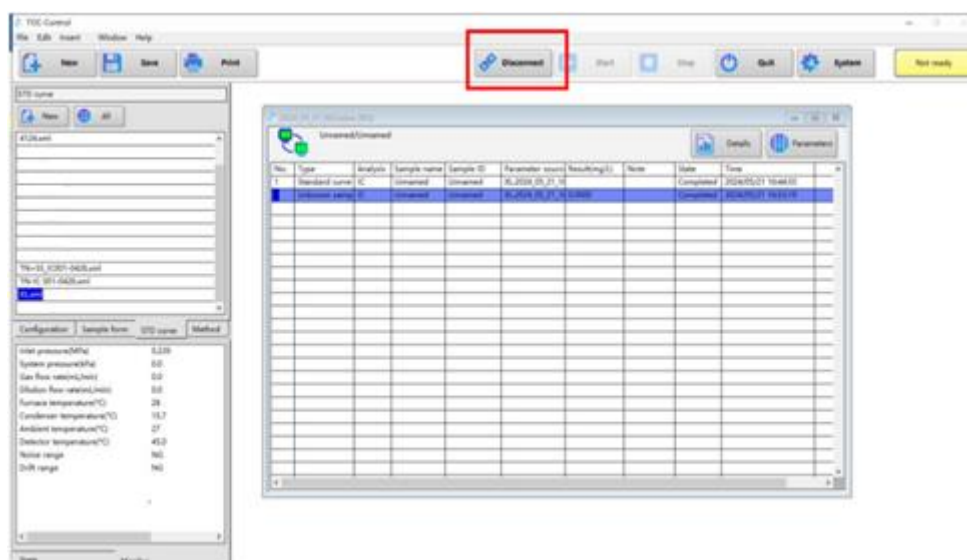


Figure-119

Note: If the instrument is turned off before the pyrolysis furnace has cooled to a safe temperature, the cooling fan for the pyrolysis furnace will stop operating, causing accelerated aging of the TC sliding injection module and O-rings due to the high temperature inside the furnace. However, this rule does not apply in emergencies.

- 6) Tighten the main valve of the gas cylinder. Release the residual gas in the pipeline until the pointers of the total pressure gauge and the partial pressure gauge both return to zero.

11.7 Software Detailed Description

11.7.1 Introduction to Software Main Interface

The main interface of the FM-TOC-B103 software is divided into several sections: (Figure 120).

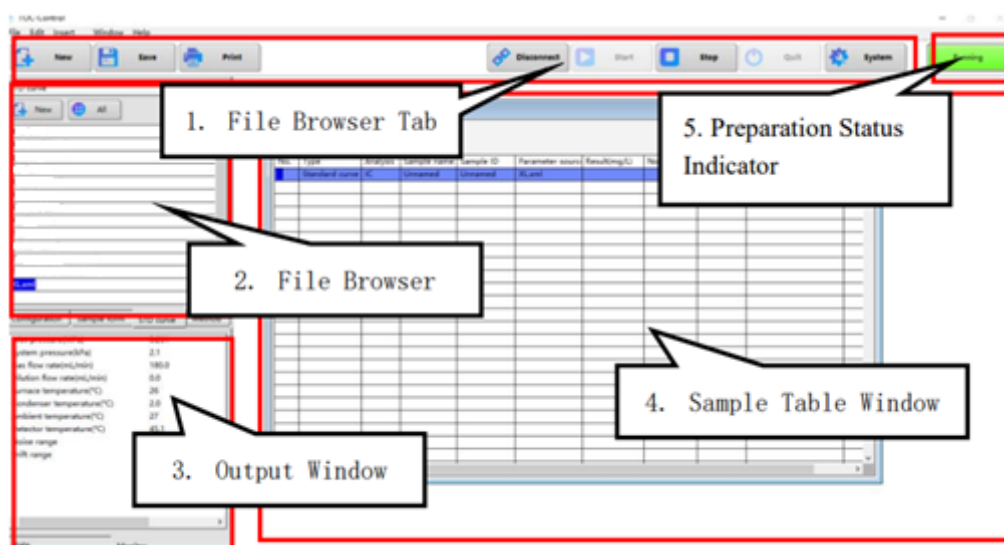


Figure-120

Item	Description
File Browser Tab	The main operations for software control and operation are conducted in this area.
File Browse	There are 4 tabs, and you can switch the displayed content by clicking the tab name. The file list in the tab lists the names of saved files. When the number of saved files exceeds the number of rows in the file list, you can scroll through the list by dragging the vertical slider (scrolling the mouse wheel). Double-clicking a file name in the list will open the saved file.
	<ol style="list-style-type: none"> 1. In the "Hardware Configuration" tab, "New" can create a new hardware configuration. 2. In the "Sample Table" tab, "New" can create a new sample table. 3. In the "Standard Curve" tab, "New" can create a new standard curve test file, and "All" displays the configuration files and measured standard curve data content. 4. In the "Method" tab, "New" can create a new sample test configuration file.
Output Window	2 tabs display the main operations and monitoring information of the instrument in the communication connection state.
	The "Status" display tab shows the main instrument action processes and execution times.
	The "Background Monitoring" tab shows real-time displays of the instrument's "Inlet Pressure," "System Pressure," "Air Flow," "Dilution Air Flow," "Pyrolysis Furnace Temperature," "Condenser Temperature," "Ambient Temperature," "Detector Temperature," "Noise Range," and "Drift Range."
Sample Table Window	Displays the content of the opened sample table.
Connection Status	Displays the communication status and operation status of the instrument.
	<ol style="list-style-type: none"> 1. Not connected, the computer is not connected to the instrument. 2. Not ready, the instrument is successfully connected, but the "Inlet Pressure," "Air Flow," "Pyrolysis Furnace Temperature," "Condenser Temperature," and "Detector Temperature" are not within the set range. 3. Ready, the instrument is successfully connected, and the "Inlet Pressure," "Air Flow," "Pyrolysis Furnace Temperature," "Condenser Temperature," and "Detector Temperature" are within the set range. 4. Running, the connected sample table is in the test state.

11.7.2 Introduction to Sample Table Window

The sample table window is used to manage and edit sample information. It includes the following sections: **(Figure 121)**

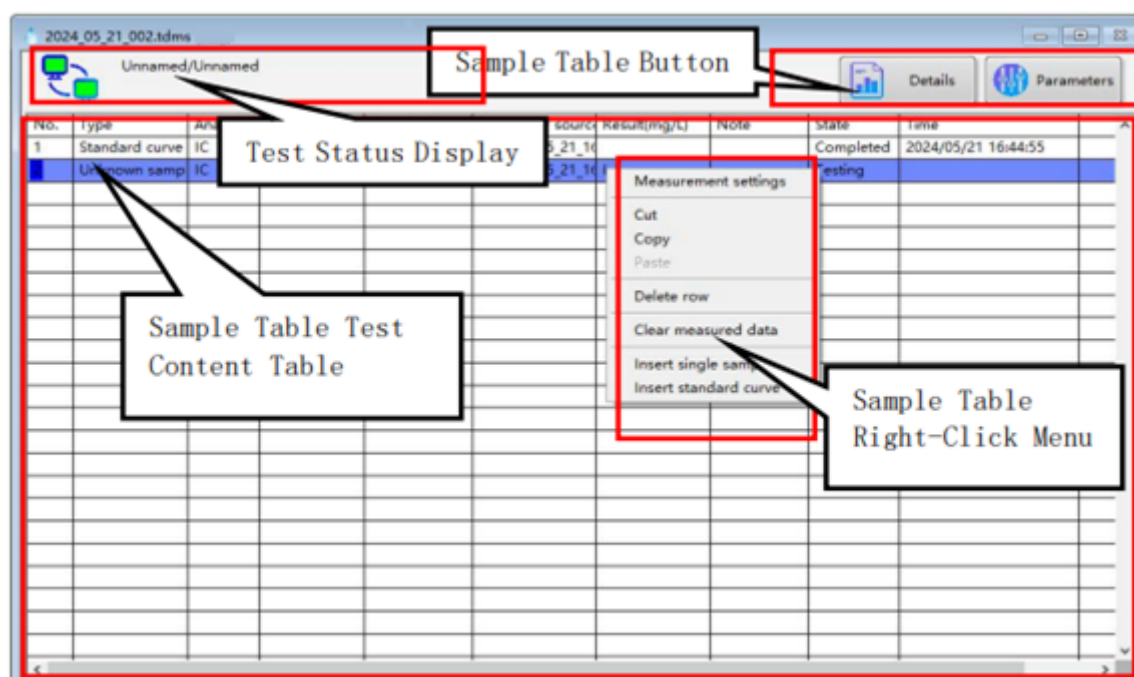
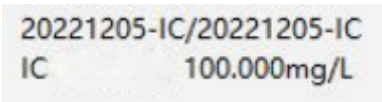


Figure-121

Item	Description
Test Status Display	 : Sample Table Connection Status Display, green indicates a successful connection.  : Displays important parameters of the selected row/test row in the sample table.
Sample Table Button	Detailed Data: Click to enter the detailed data view interface of the selected row. Test Parameters: Click to enter the test parameter view interface of the selected row. Some parameters can be modified for unknown sample tests in " Custom " status.
Sample Table Right-Click Menu	Measurement Settings: Click to enter the test parameter view interface of the selected row. Cut: Click to cut the selected row data to the clipboard. Copy: Click to copy the selected row data to the clipboard. Paste: Click to insert the data from the clipboard into the sample table. If the selected row is empty, the pasted data is added to the last row of the sample table by default. Delete Row: Click to delete the selected row.

	<p>Clear Measured Data: Click this item in the selected row to delete all stored test data. The test status of the selected row will change to "Custom" allowing for retesting.</p> <p>Insert Single Sample: Click to enter the "Single Sample Parameter Setting" window. After configuration, a single unknown sample test can be created. For details, refer to the "Single Sample Window Setting" content.</p> <p>Insert Standard Curve: Click to enter the "Select Standard Curve File" window. After configuration, a single standard curve test can be created. For details, refer to the "Select Standard Curve File" content</p>
Sample Table Test Content Table	<p>Serial Number: The test serial number in the sample table. Type: Displays the test type, divided into "Standard Curve" and "Unknown Sample."</p> <p>Analysis: Displays the analysis type, divided into TC, IC, NPOC, and TOC.</p> <p>Sample Name: Displays the sample name. Sample ID: Displays the sample ID.</p> <p>Parameter Source: Displays the file name of the measurement parameter file referenced by the settings.</p> <p>Result: Displays the concentration value obtained from the sample test. This item is not displayed for standard curves. Status: Displays the test status, "Custom" means the test has not been performed, "Testing" means the test is in progress, "Stopped" means the test was paused before completion, and "Completed" means the test has been completed.</p> <p>Time: Displays the date and time the test was completed.</p>

11.7.3 Sample Table Detailed Data Interface Introduction

The main components of the detailed data window are as follows (Figure 122).

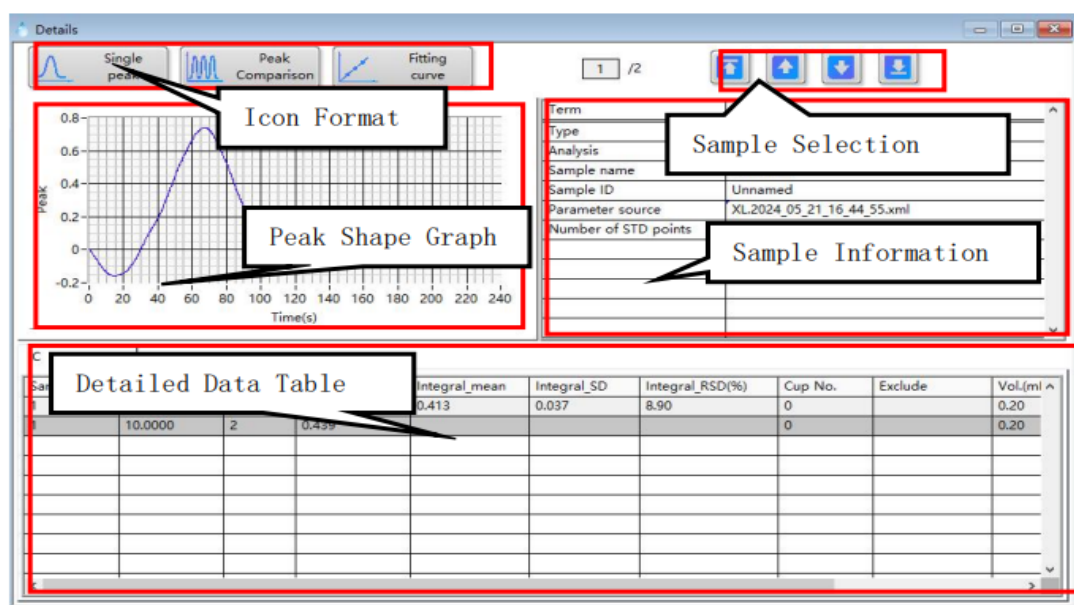


Figure-122

Item	Description
Icon Format	<p>Select icon format: Single Peak, Peak Comparison, Fitted Curve. Single Peak: Displays the real-time peak shape of the test or the peak shape of the selected row.</p> <p>Peak Comparison: Displays all test peak shapes for the current sample number/standard number.</p> <p>Fitted Curve: Displays the fitted curve after the completion of standard point tests when drawing the standard curve.</p>
Sample Selection	<p>Click to switch to view detailed data of the test row you need.</p> <p> : Displays detailed test data for the first sample in this sample table.</p> <p> : Displays detailed test data for the previous sample.</p> <p> : Displays detailed test data for the next sample.</p> <p> : Displays detailed test data for the last sample in this sample table.</p>
Sample Information List	Displays the main parameter information of the selected row.
Detailed Data Table	<p>When drawing a standard curve</p> <p>Standard Number: Displays the standard point number.</p> <p>Standard Concentration: Displays the standard point concentration value.</p> <p>Injection Times: Displays the test times number.</p> <p>Integral Value: Displays the test integral value result.</p> <p>Average Integral Value: Displays the average integral value of the test results.</p> <p>Integral SD: Displays the standard deviation of the test integral value. Integral RSD (%): Displays the relative standard deviation of the test integral value.</p> <p>Exclude: If displayed as "E," it indicates that the data of this row is excluded and not involved in data calculation.</p> <p>Injection Volume (mL): Displays the test injection volume.</p> <p>Automatic Dilution: Displays the instrument dilution factor.</p> <p>Time: Displays the completion time of the test.</p> <p>During Sample Testing</p> <p>Sample Number: Displays the sample test number.</p> <p>Result: Displays the concentration value of the sample analysis result.</p> <p>Injection Times: Displays the test times number.</p> <p>Integral Value: Displays the test integral value result.</p> <p>Average Integral Value: Displays the average integral value of the test results.</p> <p>Concentration: Displays the test concentration result.</p>

	<p>Average Concentration: Displays the average concentration used for calculation.</p> <p>Integral SD: Displays the standard deviation of the test integral value. Integral RSD (%): Displays the relative standard deviation of the test integral value.</p> <p>Concentration SD: Displays the standard deviation of the test concentration value.</p> <p>Concentration RSD (%): Displays the relative standard deviation of the test concentration value.</p> <p>Exclude: If displayed as "E" it indicates that the data of this row is excluded and not involved in data calculation.</p> <p>Injection Volume (mL): Displays the test injection volume.</p> <p>Automatic Dilution: Displays the instrument dilution factor.</p> <p>Standard Curve: Displays the standard curve file selected for concentration value calculation.</p> <p>Time: Displays the completion time of the test.</p>
--	---

11.7.4 File Creation and Editing

11.7.4.1 Create Hardware Configuration

The hardware configuration file is used to establish the parameter strategy for instrument connection, containing relevant information for computer-to-instrument communication.

- 1) Click "**Hardware Configuration**" - "New" in the "File Browser" tab (**Figure 123**).

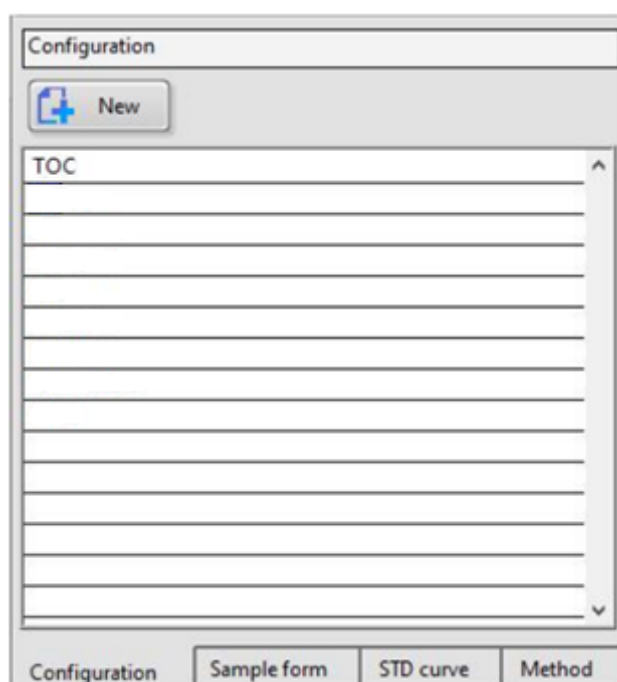


Figure-123

- 2) In the "Instrument Settings Wizard" interface, enter the basic information for the hardware. After setting, click **"Next."** (Figure 124)

The screenshot shows a 'Hardware configuration' window with the following fields:

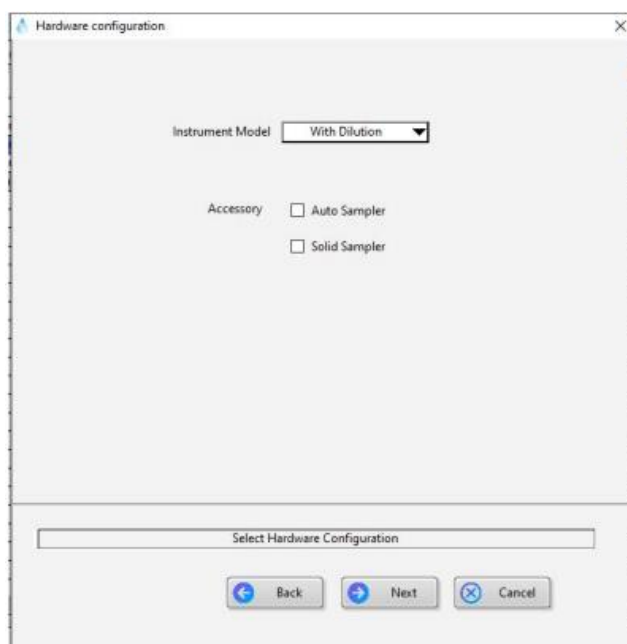
- Hardware Name:
- Instrument Number:
- User:
- Creation Time:
- Annotation:

At the bottom, there is a progress bar labeled 'Enter Basic Hardware Information' and three buttons: 'Back', 'Next', and 'Cancel'.

Figure-124

Item	Description
Hardware Name	You can enter the name of the hardware configuration. Other parameter files need to be indexed based on this parameter.
Instrument Number	You can enter the instrument serial number. The entered instrument serial number must match the one displayed on the main unit nameplate.
User	The username for the file to be created for audit trail software login. For detailed information about audit trail software, refer to the audit trail software manual.
Creation Time	Displays the creation time of the file.
Annotation	You can enter comment information for the file.

- 3) Select the hardware configuration. After selecting, click **"Next"**.



Hardware configuration

Instrument Model: With Dilution

Accessory: ☐ Auto Sampler
☐ Solid Sampler

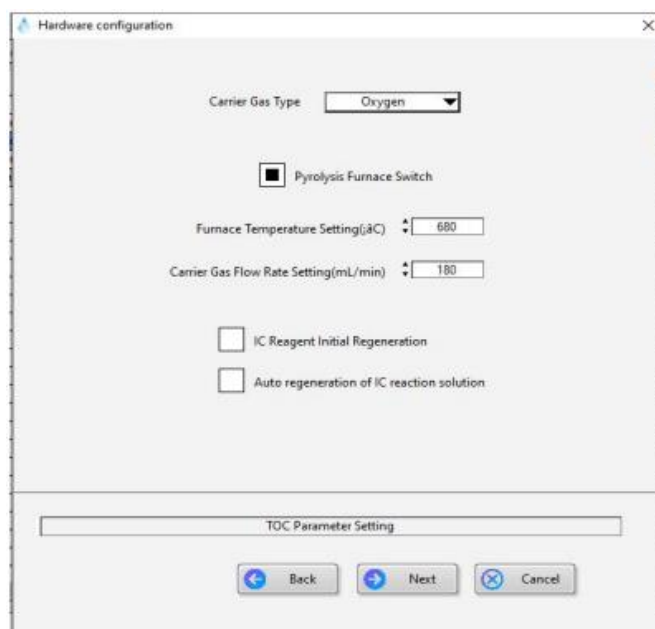
Select Hardware Configuration

Back Next Cancel

Figure-125

Item	Description
Instrument Model	Select according to the instrument model being used.
Accessory	Select the accessory to be used as needed.

4) Set the instrument parameters. After setting, click **"Next"** (Figure 126).



Hardware configuration

Carrier Gas Type: Oxygen

☒ Pyrolysis Furnace Switch

Furnace Temperature Setting(°C): 600

Carrier Gas Flow Rate Setting(mL/min): 180

☐ IC Reagent Initial Regeneration
☐ Auto regeneration of IC reaction solution

TOC Parameter Setting

Back Next Cancel

Figure-126

Item	Description
Carrier Gas Type	Selectable carrier gas types: Oxygen and Air.
Pyrolysis Furnace Switch	Pyrolysis furnace heating switch. If not selected, the pyrolysis furnace will not heat after the instrument is connected.
Furnace Temperature Setting	Set within the range of 400-1000°C as per actual requirements (default setting is 680°C).
Carrier Gas Flow Rate Setting	Carrier gas flow rate setting, default is 180mL/min, range is 100-250mL/min.
IC Reagent Initial Regeneration	Whether to regenerate the IC reaction solution during instrument initialization. The default is disabled.
Auto Regeneration of IC reaction solution.	Whether to enable automatic regeneration of the IC reaction solution. When enabled, the IC reaction solution will automatically regenerate after a cumulative sample injection of 10mL during the test.

- 5) Set the communication port for connecting the computer to the host. After setting, click **"Save"**. (Figure 127)

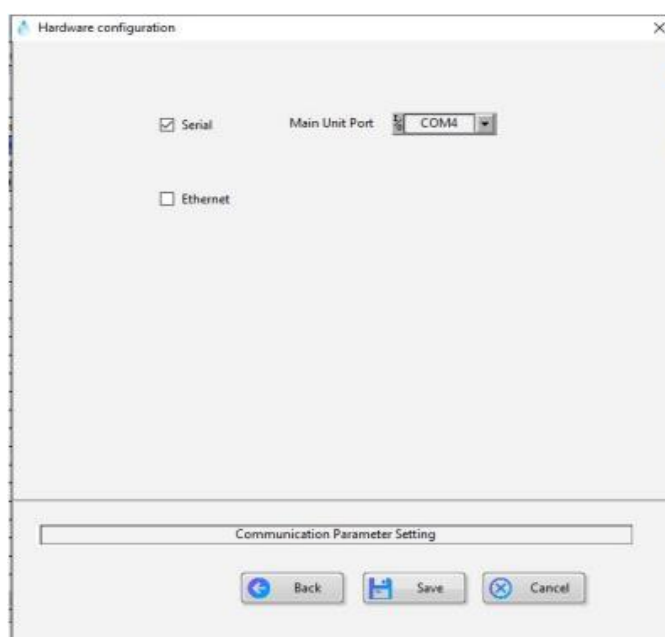


Figure-127

Item	Description
Serial Communication	When enabled, the computer and host are connected via a serial port. Cannot be selected simultaneously with Ethernet communication.
Main Unit Port	When serial connection is enabled, the serial port number for connecting the instrument must be entered.
Ethernet Communication	When enabled, the computer and instrument are connected via Ethernet. Cannot be selected simultaneously with serial communication.

11.7.4.2 Create Standard Curve File

The standard curve file is used to plot the standard curve. It contains information such as the concentration of the standard solution and measurement parameters.

- 1) Click **"STD Curve" - "New"** in the "File Browser" tab (**Figure 128**).



Figure-128

- 2) In the "New Standard Line Test Parameters" interface, select "Analysis ", and "Zero-point displacement" according to specific test requirements. Enter the standard curve file name in "STD Curve File Name" and click **"Next"** (**Figure 129**).

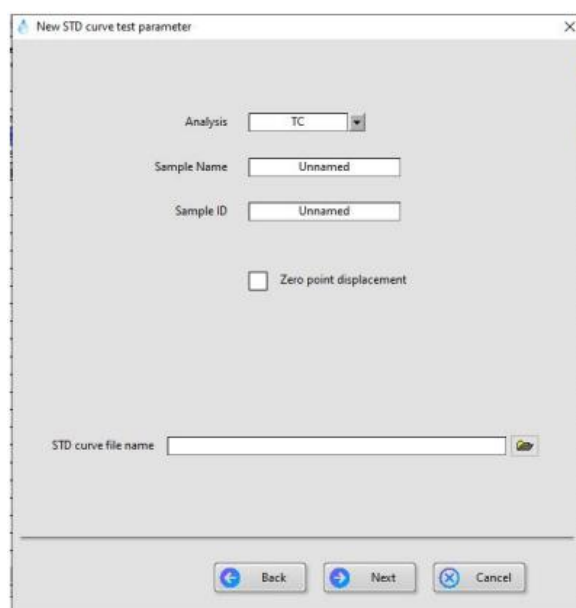


Figure-129

TOC Analyzer FM-TOC-B103

Item	Description
Analysis Type	Click the drop-down menu and select the analysis type to be tested. Options include TC, IC, and NPOC.
Sample Name	Enter the sample name.
Sample ID	Enter the sample ID.
Zero-point displacement	If selected, the standard curve fitting equation will pass through the origin.
Standard Sample Form	Select the standard sample test form, the default is single-point dilution. Standard Solution: The instrument uses self-prepared standard solutions for all points required for the standard curve. Single-Point Dilution: Prepare the highest concentration point required for the standard curve, use the instrument's automatic dilution function, and the instrument will use the automatically diluted target concentration standard solution for testing. (Note: This item is not displayed on the FM-TOC-B103 .)
STD Curve File Name	Enter the standard curve file name.

3) Configure parameters as needed for the test, then click **"Next"** (Figure 130).

New STD curve test parameter

Analysis: NPOC

Min.measurement times: 2 [1-20]

Max.measurement times: 3 [1-20]

Max.SD: 0.1 [0-999]

Max.RSD (%): 2 [0-100]

Flush times: 2 [2-5]

Preparation volume: 10mL

Blowing flow (mL/min): 200 [200-300]

Blowing time (mins): 5 [1-10]

Acid ratio (%): 2 [0-5]

Back Next Cancel

Figure-130

Item	Description
Analysis Type	Selected analysis type displayed.
Min. Measurement Times	Minimum number of measurements for analyzing sample injection results. If either SD or RSD meets the criteria within this set number of times, the analysis is considered complete.
Max. Measurement Times	Maximum number of sample measurements if SD and RSD criteria are not met.
Max SD	Enter the maximum SD value. This limit is used to evaluate the analysis results. If the SD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 0.1.
Max RSD (%)	Enter the maximum RSD value. This limit is used to evaluate the analysis results. If the RSD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 2%.
Flush Times	Number of times to clean the flow path before the first sample injection. The default is 2 times.
Preparation Volume	The volume of solution prepared in the dilution reservoir when diluting. (Note: This item is not displayed on the FM-TOC-B103 .)
Blowing Flow (mL/min)	The flow rate of gas used for acid purging in NPOC mode. (Note: This item is not displayed on the FM-TOC-B103 .)
Blowing Time (mins)	The time used for acid purging in NPOC mode. (Note: This item is not displayed on the FM-TOC-B103 .)
Acid Ratio (%)	The volume ratio of acid used in NPOC mode. (Note: This item is not displayed on the FM-TOC-B103 .)

4) Standard Point Parameter Setting Interface (**Figure 131**).

Figure-131

Item	Description
Analysis Type	Selected analysis type displayed.
Injection Volume (mL)	The sample volume was injected for each analysis. The default is 0.2, the TC (NPOC) range is 0.1-0.5, IC range is 0.1-2.
STD Curve Point Parameter	Displays the table of set standard point parameters.
Add	Add new standard point parameters to the table.
Edit	Edit the selected standard point parameters.
Delete	Delete the selected standard point.
Delete All	Delete all standard points in the table.

5) Standard Series Add/Edit Standard Point Window (Figure 132)

The screenshot shows a window titled "Edit Standard Point Parameters". It contains the following fields and values:

- Serial number: 1
- Min.measurement times: 2
- Max.measurement times: 3
- Max.SD: 0.1
- STD point conc.(mg/L): 0
- Max.RSD (%): 2

At the bottom, there are two buttons: "OK" and "Cancel".

Figure-132

Item	Description
Serial Number	Displays the current edited standard point number.
Min. Measurement Times	Minimum number of measurements for analyzing sample injection results. If either SD or RSD meets the criteria within this set number of times, the analysis is considered complete.
Max. Measurement Times	Maximum number of sample measurements if SD and RSD criteria are not met.
Max. SD	Enter the maximum SD value. This limit is used to evaluate the analysis results. If the SD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 0.1.

Max. RSD (%)	Enter the maximum RSD value. This limit is used to evaluate the analysis results. If the RSD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 2%.
STD Point Concentration (mg/L)	Enter the concentration of the standard point to be tested.

- 6) Single-Point Dilution Add/Edit Standard Point Window (This interface is not displayed on the FM-TOC-B103 instrument) (**Figure 133**)

The screenshot shows a software window titled "Edit Standard Point Parameters". It contains the following fields and values:

- Serial number: 1
- Min.measurement times: 2
- STD solution conc.(mg/L): 0
- Max.measurement times: 3
- Dilution multiple: 1
- Max.SD: 0.1
- STD point conc.(mg/L): 0
- Max.RSD (%): 2

At the bottom of the window are two buttons: "OK" and "Cancel".

Figure-133

Item	Description
Serial Number	Displays the current edited standard point number.
Min. Measurement Times	Minimum number of measurements for analyzing sample injection results. If either SD or RSD meets the criteria within this set number of times, the analysis is considered complete.
Max. Measurement Times	Maximum number of sample measurements if SD and RSD criteria are not met.
Max. SD	Enter the maximum SD value. This limit is used to evaluate the analysis results. If the SD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 0.1.
Max. RSD (%)	Enter the maximum RSD value. This limit is used to evaluate the analysis results. If the RSD value of the test integral is less than the set value, the analysis ends. If

	not, testing continues until the maximum number of sample measurements is reached. The default is 2%.
STD Solution Concentration (mg/L)	Enter the concentration of the prepared standard solution.
Dilution Multiple	Displays the calculated automatic dilution factor.
STD Point Concentration (mg/L)	Enter the concentration of the standard point to be tested.

7) Click **"Next"** to enter the other parameter setting interface **(Figure 134)**.

Figure-134

Item	Description
Use Default Settings	Minimum and maximum integration times are set to default values and cannot be changed.
Min. Integration Time	Minimum integration time for testing.
Max. Integration Time	Maximum integration time for testing.
Correlation Coefficient Check	Selecting this will check the correlation coefficient after completing the standard curve test.
Failure Measure (First Time)	Measures taken when the correlation coefficient is below the lower limit for the first time. Continue: Record the error in the sample table and proceed to the next analysis (useful only for whole table tests). Stop: Record the error in the sample table and stop the analysis.

	Repeat: Do not record the error data and retest the current standard curve.
Failure Measure (Second Time)	Measures taken when the correlation coefficient is below the lower limit for the second time if "Repeat" was chosen the first time. Continue: Record the error in the sample table and proceed to the next analysis (useful only for whole table tests). Stop: Record the error in the sample table and stop the analysis.
Lower Limit	Enter the correlation coefficient threshold. If it falls below the lower limit, failure measures are triggered. The default is 0.995.

8) Click **"Save"**. The new standard curve file is created.

11.7.4.3 Create method File

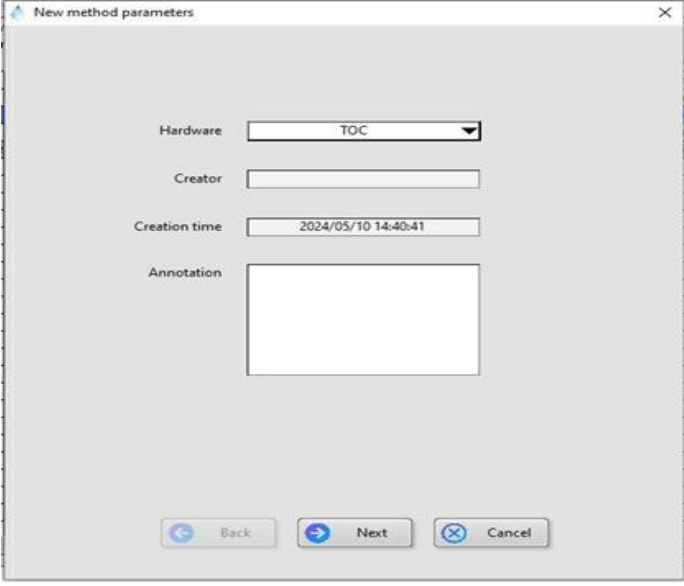
A method file is used for directly setting parameters when testing unknown samples.

1) Click **"Method" - "New"** in the "File Browser" tab **(Figure 135)**.



Figure-135

- 2) In the "New Method" interface, select the hardware configuration to be connected to the instrument. After completing, click **"Next"** (Figure 136).



The screenshot shows a dialog box titled "New method parameters". It contains the following fields:

- Hardware:** A dropdown menu with "TOC" selected.
- Creator:** An empty text input field.
- Creation time:** A text input field displaying "2024/05/10 14:40:41".
- Annotation:** A large empty text area.

At the bottom, there are three buttons: "Back" (with a left arrow), "Next" (with a right arrow), and "Cancel" (with an X).

Figure-136

- 3) Enter the basic information of the method. After completing, click **"Next"** (Figure 137).



The screenshot shows the same "New method parameters" dialog box, but with different values entered:

- Analysis:** A dropdown menu with "TC" selected.
- Sample name:** A text input field containing "Unnamed".
- Sample ID:** A text input field containing "Unnamed".
- Method file name:** A text input field that is empty, followed by a folder icon button.

At the bottom, there are three buttons: "Back" (with a left arrow), "Next" (with a right arrow), and "Cancel" (with an X).

Figure-137

Item	Description
Analysis Type	Select the analysis type from the drop-down menu. Four types are available: TC, IC, NPOC, and TOC.
Sample Name	Enter the sample name. When this test is added to the sample table, it is displayed in the sample name column for record-keeping.
Sample ID	Enter the sample ID. When this test is added to the sample table, it is displayed in the sample ID column for record-keeping.
Method File Name	Enter the method file name.

- 4) Click **"Next"** to enter the analysis standard line configuration interface (**Figure 138**).

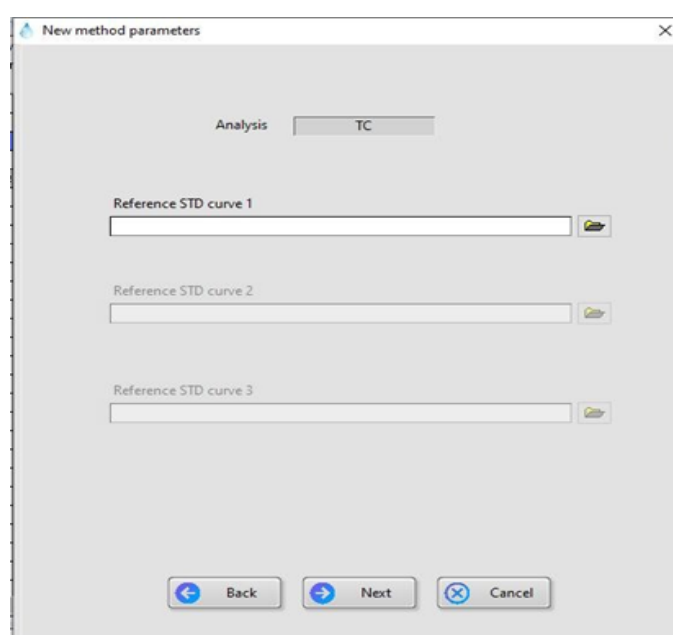


Figure-138

Item	Description
Analysis Type	Displays the selected analysis type.
Reference STD Curve 1 Reference STD Curve 2 Reference STD Curve 3	Select the standard curve used for analyzing unknown samples. If multiple standard curves are selected, the software will use the standard curve whose integral value at half the maximum concentration is closest to the unknown sample's integral value for optimal concentration calculation.

5) Click **"Next"** to enter the analysis parameter setting interface (**Figure 139**).

Analysis: NPOC

Min.measurement times: 2 [1-20]

Max.measurement times: 3 [1-20]

Max.SD: 0.1 [0-999]

Max.RSD (%): 2 [0-100]

Flush times: 2 [2-5]

Preparation volume: 10mL

Blowing flow (mL/min): 200 [200-300]

Blowing time (mins): 5 [1-10]

Acid ratio (%): 2 [0-5]

Buttons: Back, Next, Cancel

Figure-139

Item	Description
Analysis Type	Displays the selected analysis type.
Injection Volume(mL)	The sample volume was injected for each analysis. The default is 0.2, TC (NPOC) range is 0.1 to 0.5, IC range is 0.1 to 2.
Min. Measurement Times	Minimum number of measurements for analyzing sample injection results. If either SD or RSD meets the criteria within this set number of times, the analysis is considered complete.
Max. Measurement Times	Maximum number of sample measurements if SD and RSD criteria are not met.
Max. SD	Enter the maximum SD value. This limit is used to evaluate the analysis results. If the SD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 0.1.
Max. RSD (%)	Enter the maximum RSD value. This limit is used to evaluate the analysis results. If the RSD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 2%.
Flush Times	Number of times to clean the flow path before the first sample injection. The default is 2 times.

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Dilution Multiple	(This item is not displayed on the FM-TOC-B103 instrument) Enter the sample dilution factor. The default is 1, range is 1-100.
Preparation Volume	(This item is not displayed on the FM-TOC-B103 instrument) The volume of solution prepared in the dilution reservoir when diluting.
Blowing Flow (mL/min)	(This item is not displayed on the FM-TOC-B103 instrument) The flow rate of gas used for acid purging in NPOC mode.
Blowing Time (mins)	(This item is not displayed on the FM-TOC-B103 instrument) The time used for acid purging in NPOC mode.
Acid Ratio (%)	(This item is not displayed on the FM-TOC-B103 instrument) The volume ratio of acid used in NPOC mode.

6) Click **"Next"** to enter the other parameter setting interface (**Figure 140**).



Figure-140

Item	Description
Analysis Type	Displays the selected analysis type.
Use Default Settings	Minimum and maximum integration times are set to default values and cannot be changed.
Min. Integration Time	Minimum integration time for peak detection.
Max. Integration Time	Maximum integration time for testing.

7) Click **"Save"** to complete the creation of the method file.

Note: When setting the TOC analysis mode, steps 3), 4), and 5) need to be set separately for the TC and IC parts. The operation process is the same.

11.7.4.4 Viewing and Modifying Hardware Configuration

- 1) Find the saved file in the "Hardware Configuration" list in the "File Browser" tab and double-click to open it (Figure 141).

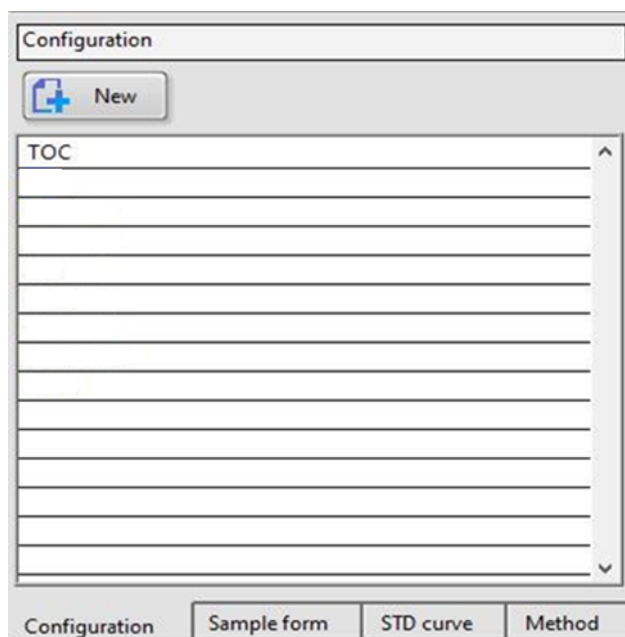


Figure-141

- 2) In the popped-up instrument settings view window, click the corresponding tab to view and edit.
"Hardware Information" Tab (Figure 142).

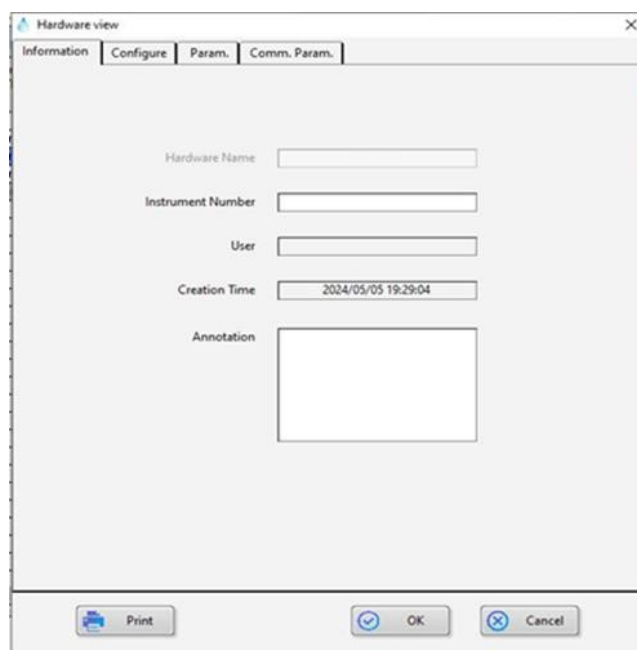


Figure-142

Item	Description
Hardware Name	Displays the hardware name entered when the hardware configuration was created. Cannot be changed.
Instrument Number	Displays the instrument serial number entered when the hardware configuration was created.
User	Displays the username of the file creator.
Creation Time	Displays the file creation time.
Annotation	Displays the comment information of the hardware configuration, which can be modified.

“Configure Hardware” Tab (Figure 143)

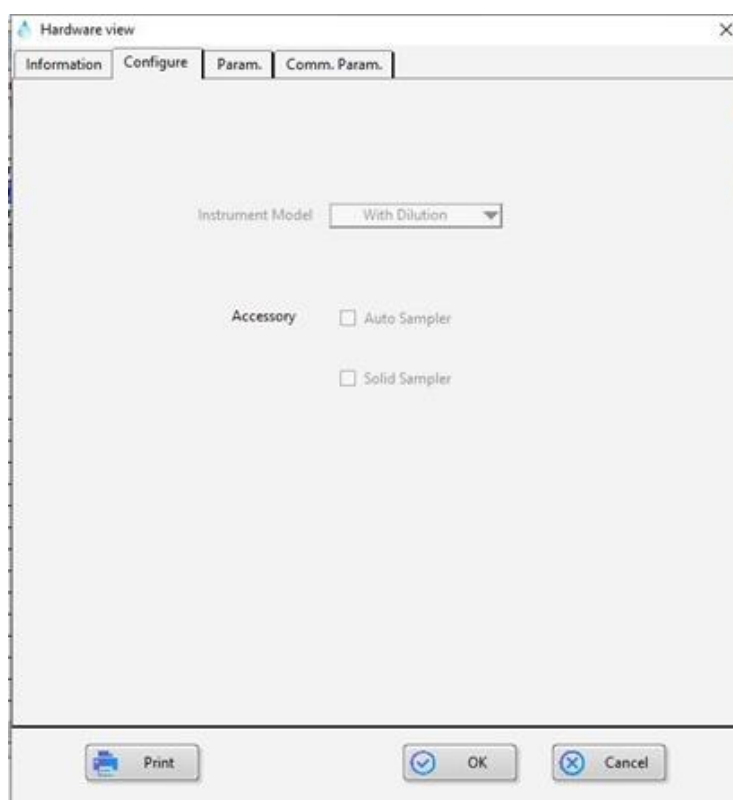


Figure-143

Item	Description
Instrument Model	Displays the instrument model adapted and controlled by the software. Cannot be changed.
Accessory	Displays the selected accessory information.

“Hardware Parameters” Tab (Figure 144)

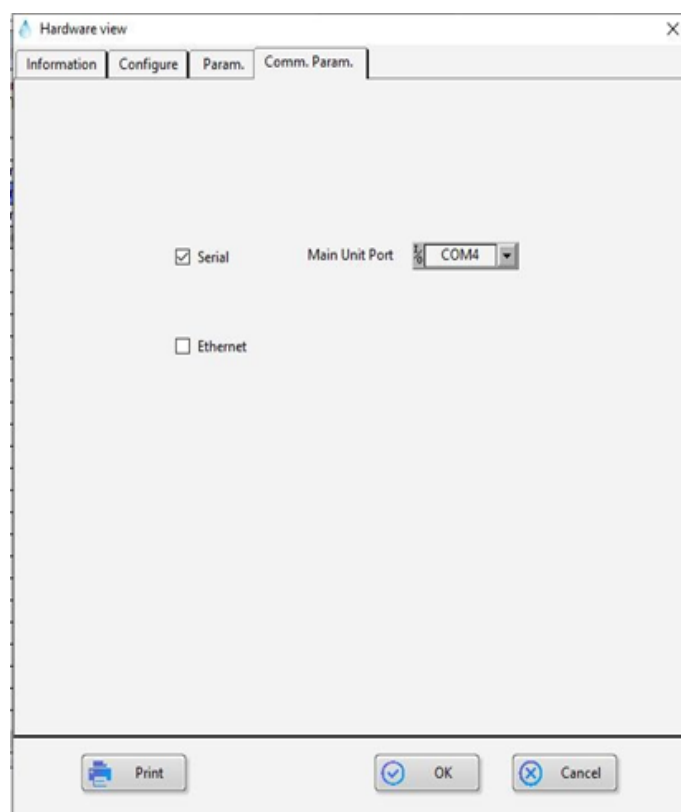
The screenshot shows a software window titled "Hardware view" with a close button (X) in the top right corner. Below the title bar are four tabs: "Information", "Configure", "Param.", and "Comm. Param.". The "Param." tab is selected. The main area contains the following settings:

- Carrier Gas Type:** A dropdown menu showing "Oxygen".
- Pyrolysis Furnace Switch:** A checkbox that is checked.
- Furnace Temperature Setting(°C):** A numeric input field with the value "680".
- Carrier Gas Flow Rate Setting(mL/min):** A numeric input field with the value "180".
- IC Reagent Initial Regeneration:** An unchecked checkbox.
- Auto regeneration of IC reaction solution:** An unchecked checkbox.

At the bottom of the window are three buttons: "Print" (with a printer icon), "OK" (with a checkmark icon), and "Cancel" (with an X icon).

Figure-144

Item	Description
Carrier Gas Type	Displays the selected carrier gas type: Oxygen, Air.
Pyrolysis Furnace Switch	Displays the pyrolysis furnace heating switch setting.
Furnace Temperature Setting	Displays the set temperature of the pyrolysis furnace.
Carrier Gas Flow Rate Setting	Displays the carrier gas flow rate setting.
IC Reagent Initial Regeneration	Displays the IC reaction solution regeneration setting during instrument initialization.
Auto Regeneration of IC reaction solution	Displays the setting for enabling automatic regeneration of the IC reaction solution. When enabled, the IC reaction solution is regenerated after a cumulative sample injection of 10mL during the test.

“Communication Parameters” Tab (Figure 145)**Figure-145**

Item	Description
Serial Communication	Displays whether the computer and instrument are connected via serial port. Cannot be selected simultaneously with Ethernet communication.
Main Unit Port	Displays the serial port number configured for serial communication.
Ethernet Communication	Displays whether the computer and instrument are connected via Ethernet. Cannot be selected simultaneously with serial communication.

11.7.4.5 Viewing and Modifying Standard Curve Files

- 1) Find the saved file in the **"Standard Curve"** list in the **"File Browser"** tab and double-click to open it **(Figure 146)**.

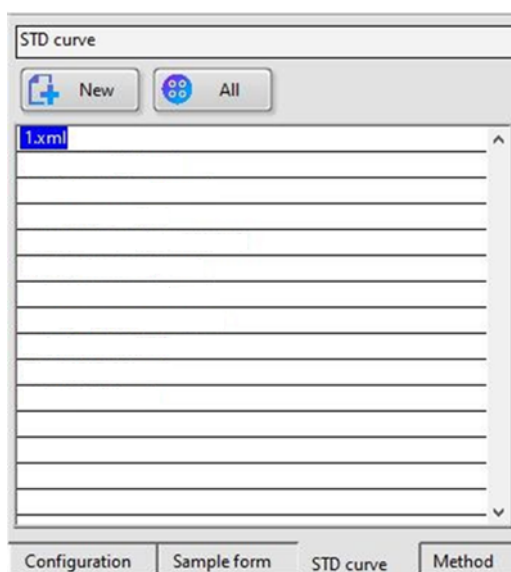


Figure-146

- 2) In the popped-up standard line parameter view window, click the corresponding tab to view and edit.
“General” Tab (Figure 147)

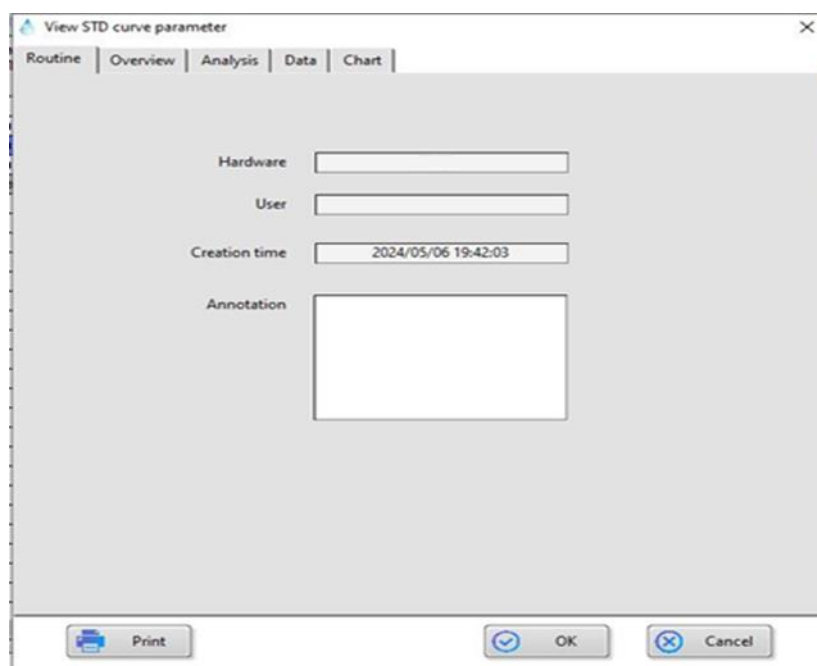


Figure-147

Item	Description
Hardware	Displays the hardware configuration name used for the standard line test.
User	Displays the username of the standard curve creator.
Creation Time	Displays the parameter creation time.
Annotation	Displays the parameter comment information.

“Overview” Tab (Figure 148)

View STD curve parameter

Routine Overview Analysis Data Chart

Analysis: TC

Sample name: Unnamed

Sample ID: Unnamed

Number of STD points: 2

☒ Zero point displacement

STD curve file name:

Print OK Cancel

Figure-148

Item	Description
Analysis Type	Displays the analysis type set for the standard curve.
Sample Name	Displays the sample name.
Sample ID	Displays the sample ID.
Number of STD Points	Displays the number of standard points set.
Zero Point Displacement	Displays whether the fitted curve passes through the origin.
Standard Sample Form	(This item is not displayed on the FM-TOC-B103 instrument) Displays the selected standard sample test form. Standard Solution: Tests using a series of self-prepared standard solutions. Single-Point Dilution: The instrument automatically dilutes a single high-concentration standard solution to the desired target concentration for testing.
STD Curve File Name	Displays the standard curve file name.

“Analysis” Tab (Figure 149)

The screenshot shows the 'View STD curve parameter' dialog box with the 'Analysis' tab selected. The dialog contains the following settings:

- Flush times:** 2
- Preparation volume:** 10ml
- Acid ratio (%):** 2
- Blowing flow (mL/min):** 200
- Blowing time (mins):** 5
- Use default settings:** ☐
- Min.integration time (s):** 120
- Max.integration time (s):** 180
- Correlation coefficient check:** ☐
- Failure measures (1st):** ☒ Continue ☐ Stop ☐ Retest
- Failure measures (2nd):** ☒ Continue ☐ Stop
- Lower limit:** 0.995

At the bottom, there are buttons for 'Print', 'OK', and 'Cancel'.

Figure-149

Item	Description
Flush Times	Displays the number of times to clean the flow path before the first sample injection.
Preparation Volume	(This item is not displayed on the FM-TOC-B103 instrument) Displays the volume of solution prepared in the dilution reservoir when diluting.
Blowing Flow (mL/min)	(This item is not displayed on the FM-TOC-B103 instrument) The flow rate of gas used for acid purging in NPOC mode.
Blowing Time (mins)	(This item is not displayed on the FM-TOC-B103 instrument) The time used for acid purging in NPOC mode.
Acid Ratio (%)	(This item is not displayed on the FM-TOC-B103 instrument) The volume ratio of acid used in NPOC mode.
Use Default Settings	Minimum and maximum integration times are set to default values and cannot be changed.
Min. Integration Time(s)	Minimum integration time for testing.
Max. Integration Time (s)	Maximum integration time for testing.
Correlation Coefficient Check	Selecting this will check the correlation coefficient after completing the standard curve test.
	Measures taken when the correlation coefficient is below the lower limit for the first time. Continue: Record the error in the sample table and proceed to the next analysis (useful only for

Failure Measure (First Time)	<p>whole table tests).</p> <p>Stop: Record the error in the sample table and stop the analysis.</p> <p>Repeat: Do not record the error data and retest the current standard curve.</p>
Failure Measure (Second Time)	<p>Measures taken when the correlation coefficient is below the lower limit for the second time if "Repeat" was chosen the first time.</p> <p>Continue: Record the error in the sample table and proceed to the next analysis (useful only for whole table tests).</p> <p>Stop: Record the error in the sample table and stop the analysis.</p>
Lower Limit	<p>Displays the correlation coefficient threshold. If it falls below the lower limit, failure measures are triggered. The default is 0.995.</p>

“Data” Tab (Figure 150)

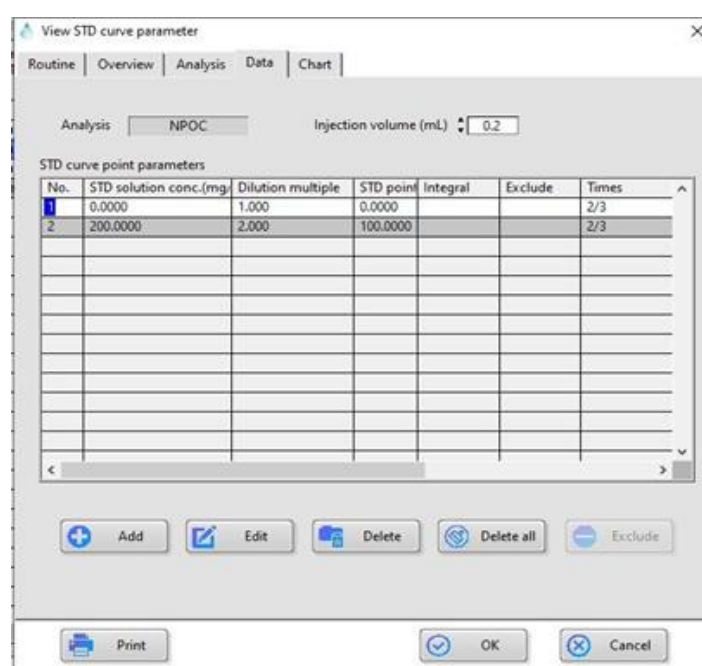


Figure-150

Item	Description
Analysis Type	Displays the selected analysis type.
Injection Volume (mL)	Displays the set sample volume for each analysis. Can be modified, TC (NPOC) range is 0.1 to 0.5, IC range is 0.1 to 2.
STD Curve Point Parameter	Displays the table of set standard point parameters.
Add	Add new standard point parameters to the table.
Edit	Edit the selected standard point parameters.
Delete	Delete the selected standard point.

Delete All	Delete all standard points in the table.
Exclude	Exclude the selected standard point from the analysis results. This function can only be enabled when the standard curve status is complete, and the corresponding standard curve is found in the "Standard Curve" tab.

“Chart Tab” (Figure 151)

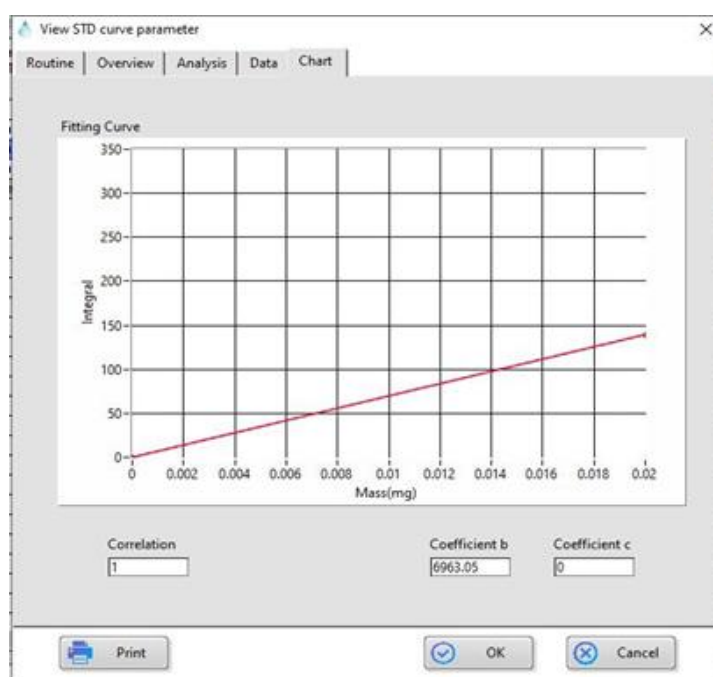


Figure-151

Item	Description
Fitted Curve	Displays the fitted curve of the standard point test data.
Correlation	Displays the correlation coefficient of the fitted standard line for the test data.
Coefficient b Coefficient c	Displays the parameters of the fitted standard line equation.

3) Click **"OK"** to complete viewing and editing the standard curve attributes.

11.7.4.6 Viewing and Modifying Method Files

- 1) Find the saved file in the **"Method"** list in the "File Browser" tab and double-click to open it **(Figure 152)**.



Figure-152

- 2) In the pop-up method parameter view window, click the corresponding tab to view and edit.

“General” Tab (Figure 153)

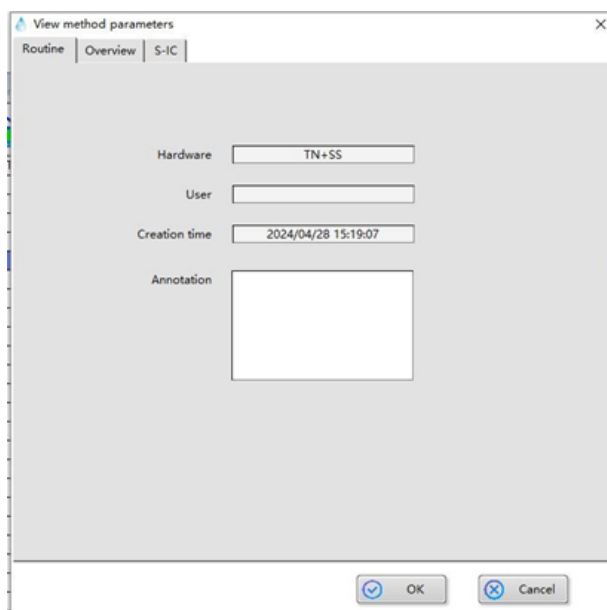


Figure-153

Item	Description
Hardware	Displays the hardware configuration name used for the method test.
User	Displays the username of the method creator.
Creation Time	Displays the parameter creation time.
Annotation	Displays the parameter comment information. Can be modified.

“Overview” Tab (Figure 154)

View method parameters

Convention Overview IC

Analysis: IC

Sample name: Unnamed

Sample ID: Unnamed

Method file name: D:\TOC-Control\Method\RD-IC-test.lvm

OK Cancel

Figure-154

Item	Description
Analysis Type	Displays the analysis type used for the method.
Sample Name	Displays the sample name.
Sample ID	Displays the sample ID.
Method File Name	Displays the method file name and directory folder.

The analysis tab displays according to the analysis type (**Figure 155**).

View method parameters

Convention Overview IC

Injection volume (mL): 0.2

Min.measurement times: 2

Max.measurement times: 3

Max.SD: 0.1

Max.RSD (%): 2

Flush times: 2

Dilution multiple: 2

Preparation volume: 10ml

☐ Use default settings

Min.integration time (s): 120

Max.integration time (s): 120

Reference STD curve 1: [Field]

Reference STD curve 2: [Field]

Reference STD curve 3: [Field]

OK Cancel

Figure-155

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Item	Description
Injection Volume(mL)	The sample volume was injected for each analysis. Default is 0.2, TC (NPOC) range is 0.1 to 0.5, IC range is 0.1 to 2.
Min. Measurement Times	Minimum number of measurements for analyzing sample injection results. If either SD or RSD meets the criteria within this set number of times, the analysis is considered complete.
Max. Measurement Times	Maximum number of sample measurements if SD and RSD criteria are not met. Range: minimum measurement times value to 20.
Max. SD (%)	Enter the maximum SD value. This limit is used to evaluate the analysis results. If the SD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 0.1.
Max. RSD (%)	Enter the maximum RSD value. This limit is used to evaluate the analysis results. If the RSD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. Default is 2%.
Flush Times	Number of times to clean the flow path before the first sample injection. The default is 2 times.
Dilution Multiple	(This item is not displayed on the FM-TOC-B103 instrument) Enter the sample dilution factor. Default is 1, range is 1-100.
Dilution Volume	(This item is not displayed on the FM-TOC-B103 instrument) The volume of solution prepared in the dilution reservoir when diluting.
Blowing Flow(mL/min)	(This item is not displayed on the FM-TOC-B103 instrument) The flow rate of gas used for acid purging in NPOC mode. The default is 200 mL/min.
Blowing Time(mins)	(This item is not displayed on the FM-TOC-B103 instrument) The time used for acid purging in NPOC mode. The default is 5 mins.
Acid Ratio (%)	(This item is not displayed on the FM-TOC-B103 instrument) The volume ratio of acid used in NPOC mode. The default is 2%.
Use Default Settings	Minimum and maximum integration times are set to default values and cannot be changed.
Min. Integration Time	Minimum integration time for testing.
Max. Integration Time	Maximum integration time for testing.
Reference STD Curve 1 Reference STD Curve 2 Reference STD Curve 3	Displays the standard curve used for analyzing unknown samples.

3) Click **“OK”** to complete viewing and editing the method attributes.

11.7.5 Editing the Sample Table

11.7.5.1 Inserting a Standard Curve Test

Standard curve tests can be inserted into the sample table by dragging and dropping saved standard curve files.

Standard curve tests can also be inserted into the sample table via the right-click menu. The process is as follows:

- 1) Right-click in the open sample table to open the menu bar and select "Insert Standard Curve" (**Figure 156**).

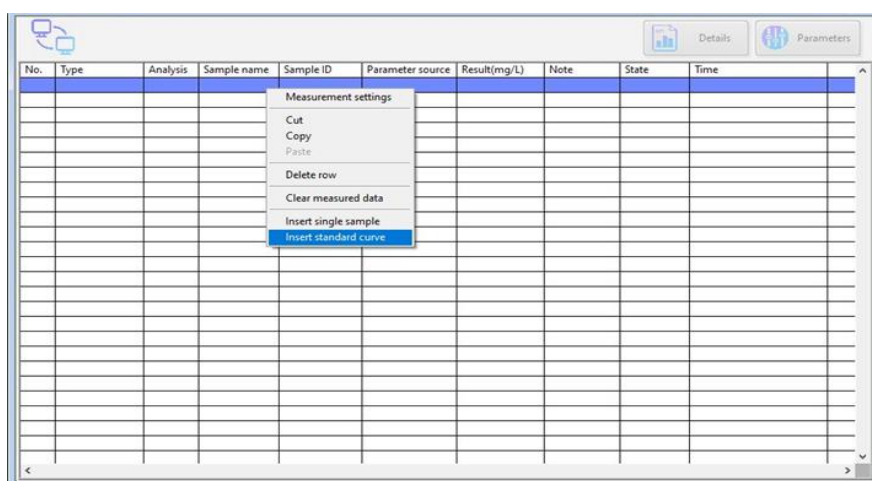


Figure-156

- 2) In the pop-up window for selecting the standard curve, select the standard curve file (**Figure 157**).

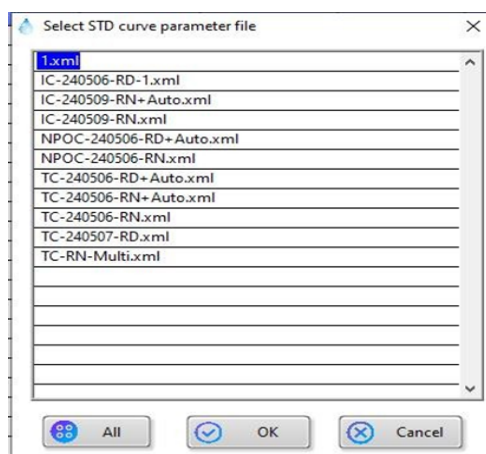


Figure-157

Item	Description
Standard Line Files List	Displays the saved standard line files.
All	Displays both saved files and completed standard line files in the list.

- 3) After clicking "**Confirm**" the standard curve test is added to the sample table.

Note: If the hardware configuration parameters of the inserted standard curve or method test do not match the hardware parameters configured in the sample table, an error prompt will be displayed (**Figure 158**).

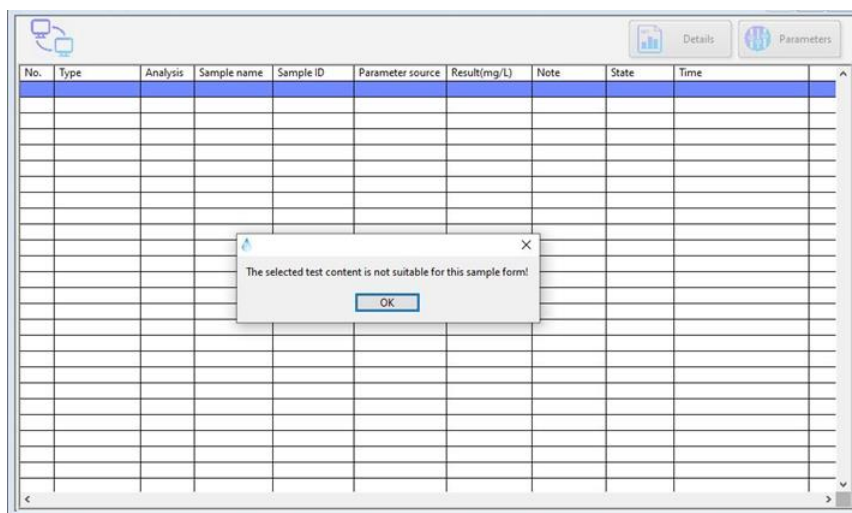


Figure-158

11.7.5.2 Inserting a sample test

Sample tests can be inserted into the sample table by dragging and dropping saved method files.

Sample tests can also be inserted into the sample table via the right-click menu. The process is as follows:

- 1) Right-click in the open sample table to open the menu bar and select "Insert Single Sample" (**Figure 159**).

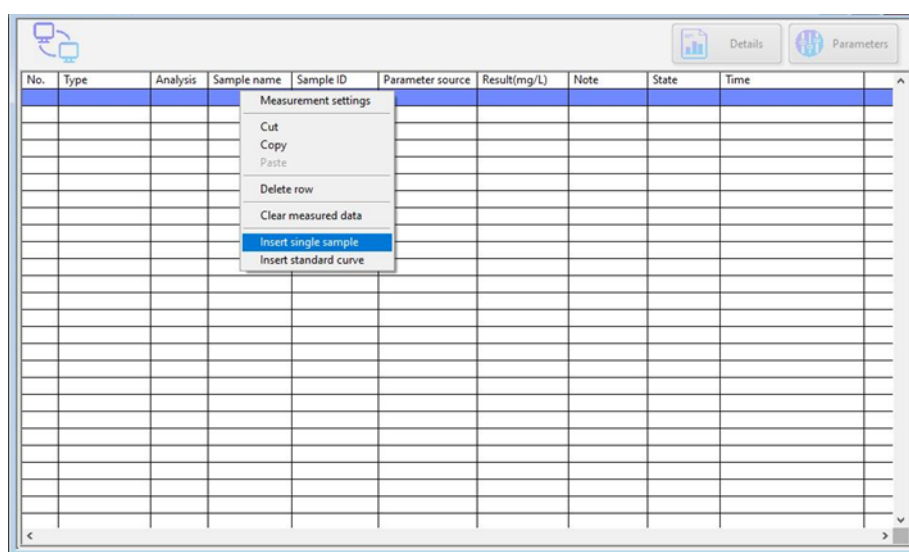


Figure-159

2) A window for setting single sample parameters will pop up (**Figure 160**).

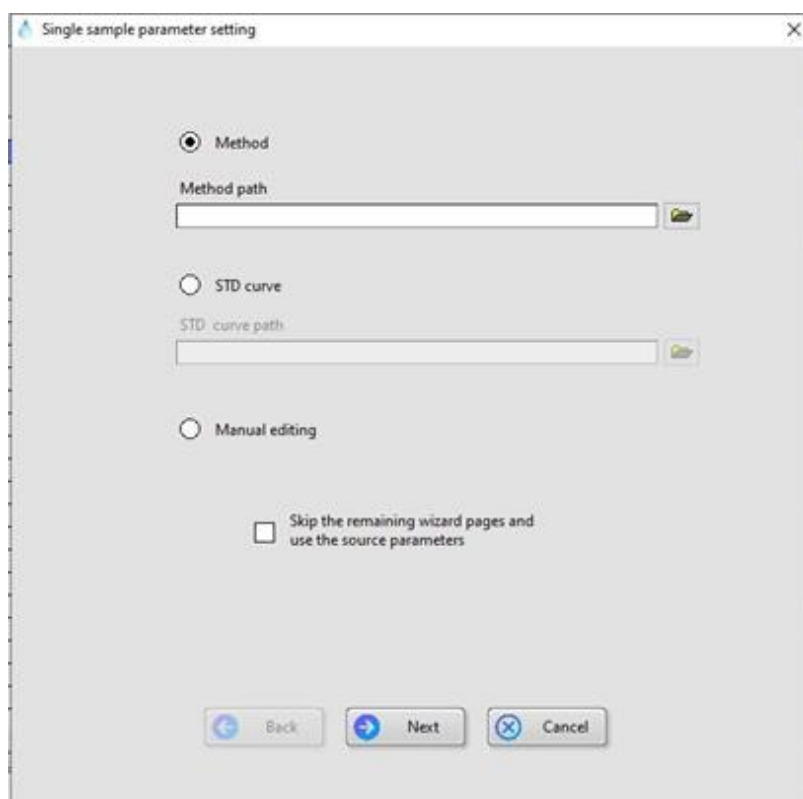


Figure-160

Item	Description
Method	When checked, the method path is enabled, and analysis parameters are selected from the saved method parameters file.
Standard Curve	When checked, the standard curve path is enabled, and analysis parameters are selected from the completed standard curve file.
Manual Edit	Manually set analysis parameters without using parameters from existing files.

Note: "Skip remaining wizard pages and use source test parameters" can be selected when the "Method" or "Standard Curve" path is checked, skipping the wizard process and directly completing the insertion.

- 3) Click **"Next"** to enter the interface for setting basic sample information (**Figure 161**).

Single sample parameter setting

Analysis: TC

Sample name: Unnamed

Sample ID: Unnamed

Back Next Cancel

Figure-161

Item	Description
Analysis Type	Select the type of analysis to be tested from the dropdown menu. Four types are available: TC, IC, NPOC, and TOC.
Sample Name	Enter the sample name. When adding this test to the sample table, it will be displayed in the sample name column for recording the test.
Sample ID	Enter the sample ID. When adding this test to the sample table, it will be displayed in the sample ID column for recording the test.

- 4) Click **"Next"** to enter the interface for selecting the standard curve file for quantification (**Figure 162**).

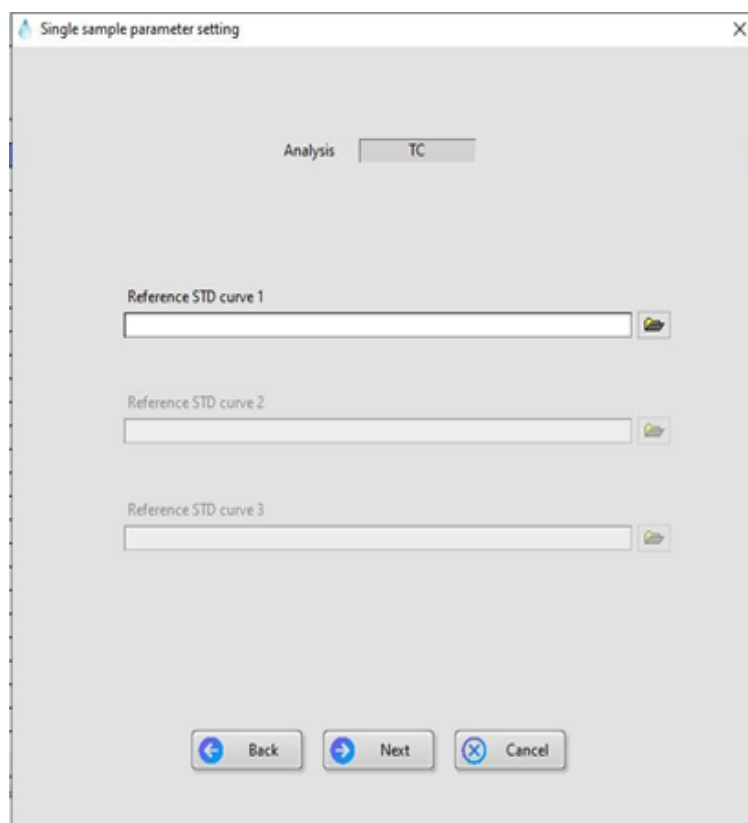


Figure-162

Item	Description
Analysis Type	Displays the selected analysis type.
Reference STD Curve 1 Reference STD Curve 2 Reference STD Curve 3	Select the standard curve used for analyzing unknown samples. If multiple standard curves are selected, the software will use the one whose maximum concentration corresponds to the nearest 1/2 of the unknown sample's integration value to calculate the concentration.

- 5) Click **"Next"** to enter the interface for setting analysis parameters (**Figure 163**).

Analysis: NPOC

Min.measurement times: 2 [1-20]

Max.measurement times: 3 [1-20]

Max.SD: 0.1 [0-999]

Max.RSD (%): 2 [0-100]

Flush times: 2 [2-5]

Preparation volume: 10mL

Blowing flow (mL/min): 200 [200-300]

Blowing time (mins): 5 [1-10]

Acid ratio (%): 2 [0-5]

Buttons: Back, Next, Cancel

Figure-163

Item	Description
Analysis	Displays the selected analysis type.
Injection Volume (mL)	The volume of the sample injected for each analysis. The default is 0.2. TC (NPOC) range is 0.1 to 0.5, IC range is 0.1 to 2.
Min. Measurement Times	The minimum number of measurements for analyzing sample injection results. If either SD or RSD meets the criteria within this set number of times, the analysis is considered complete.
Max. Measurement Times	The maximum number of sample measurements if SD and RSD criteria are not met.
Maximum SD	Enter the maximum SD value. This limit is used to evaluate the analysis results. If the SD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 0.1.

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Maximum RSD (%)	Enter the maximum RSD value. This limit is used to evaluate the analysis results. If the RSD value of the test integral is less than the set value, the analysis ends. If not, testing continues until the maximum number of sample measurements is reached. The default is 2%.
Flush Times	The number of times to clean the flow path before the first sample injection. The default is 2 times.
Automatic Dilution Factor	(Not displayed on FM-TOC-B103 instrument) Enter the sample dilution factor. Default is 1; range is 1-100.
Dilution Volume	(Not displayed on FM-TOC-B103 instrument) The volume of solution prepared in the dilution reservoir when diluting. The default is 10 mL.
Blowing Flow(mL/min)	(Not displayed on FM-TOC-B103 instrument) The flow rate of gas used for acid purging in NPOC mode. The default is 200 mL/min.
Blowing Time(mins)	(Not displayed on FM-TOC-B103 instrument) The time used for acid purging in NPOC mode. The default is 5 mins.
Acid Ratio (%)	(Not displayed on FM-TOC-B103 instrument) The volume ratio of acid used in NPOC mode. The default is 2%.

6) Click **"Next"** to enter the other parameter setting interface (**Figure 164**).

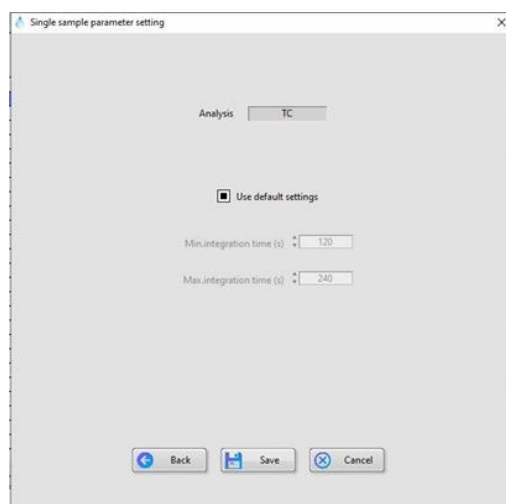


Figure-164

Item	Description
Analysis Type	Displays the selected analysis type.
Use Default Settings	Minimum and maximum integration times are set to default values and cannot be changed.
Min. Integration Time	Minimum integration time for testing.
Max. Integration Time	Maximum integration time for testing.

- 7) Click **"Finish"** to insert the unknown sample test into the sample table.
Note: If the hardware configuration parameters of the inserted standard curve or method test do not match the hardware parameters configured in the sample table, an error prompt will be displayed (**Figure 165**).

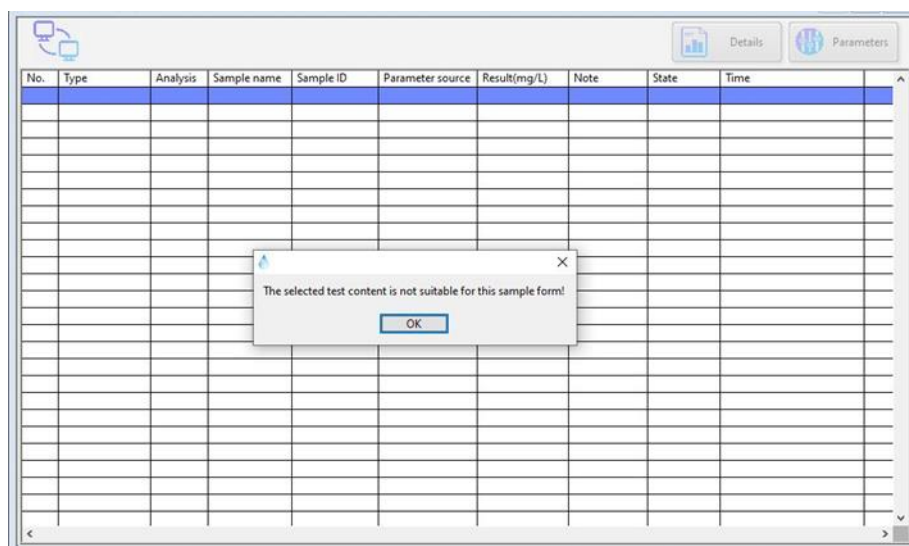


Figure-165

11.7.5.3 Viewing Saved Sample Table

View previous test data by opening the saved files in the "Sample Table" list in the File Browser tab.

Find the sample table record you want to view in the sample table list and double-click to open it (**Figure 166**).

[illegible]

Figure-166

Item	Description
Connection Status	Displays the connection status between the sample table and the instrument. Light green indicates a successful connection.
Basic Information of the Row	Displays the basic information of the selected row when not running. Unknown Sample Test: Sample Name/Sample ID, Test Results. Standard Curve Test: Sample Name/Sample ID, Maximum Range of Standard Curve.
Detailed Data	Button to enter the detailed data viewing interface of the selected row.
Test Parameters	Button to enter the test parameters viewing interface of the selected row. Some parameters can be modified when the unknown sample is in a custom state.

Sample Table Display Parameters (Not Editable):

Item	Description
Sequence	The sequence of test rows in the sample table.
Type	Displays the type of test. Two types: Standard Curve: The test in this row is for drawing the standard curve and calls the standard curve parameters. Unknown Sample: The test in this row is for sample testing and calls the method parameters, standard curve parameters, or custom parameters.
Analysis	Displays the type of analysis. Four types: TC, IC, NPOC, TOC.
Sample Name	Displays the sample name in the test parameters.
Sample ID	Displays the sample ID in the test parameters.
Parameter Source	Displays the name of the parameter configuration for the test row.
Result (mg/L)	Displays the concentration result value of the test row. Empty for the standard curve type.
Description	Description of the test.
Status	Displays the test status of the selected row. Four types: Custom, Testing, Stopped, Completed.
Time	Displays the completion time of the test row. Empty in the custom state.

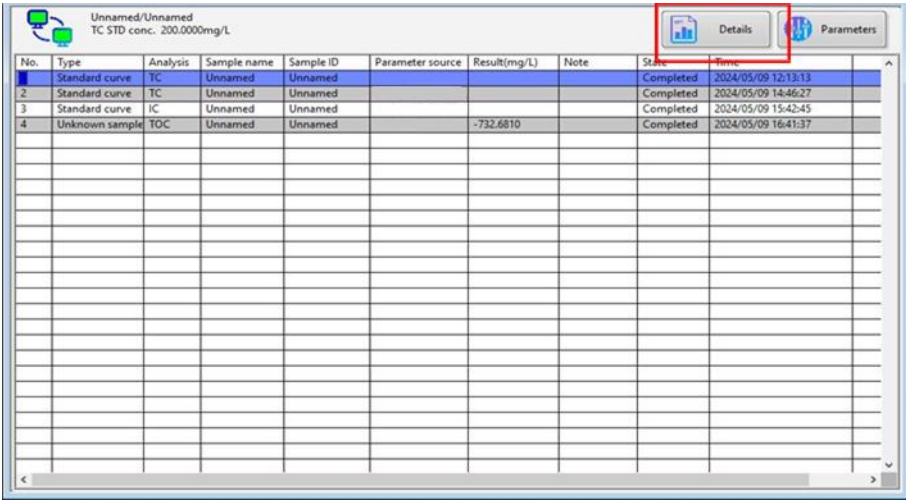
Note: The column width of the sample table can be changed by dragging the mouse.

11.7.6 Viewing Detailed Data and Test Parameters

11.7.6.1 Viewing Detailed Data

Detailed data displays the relevant data content of each analysis injection. This window also shows the injection peak shape and detailed information. Real-time peak shape can be observed in this window during analysis.

- 1) Click "**Detailed Data**" on the sample table window (**Figure 167**).



Unnamed/Unnamed
TC STD conc. 200.0000mg/L

No.	Type	Analysis	Sample name	Sample ID	Parameter source	Result(mg/L)	Note	Status	Time
1	Standard curve	TC	Unnamed	Unnamed				Completed	2024/05/09 12:13:13
2	Standard curve	TC	Unnamed	Unnamed				Completed	2024/05/09 14:46:27
3	Standard curve	IC	Unnamed	Unnamed				Completed	2024/05/09 15:42:45
4	Unknown sample	TOC	Unnamed	Unnamed		-732.6810		Completed	2024/05/09 16:41:37

Figure-167

- 2) The "**Sample Detailed Data Window**" pops up (**Figure 168**).

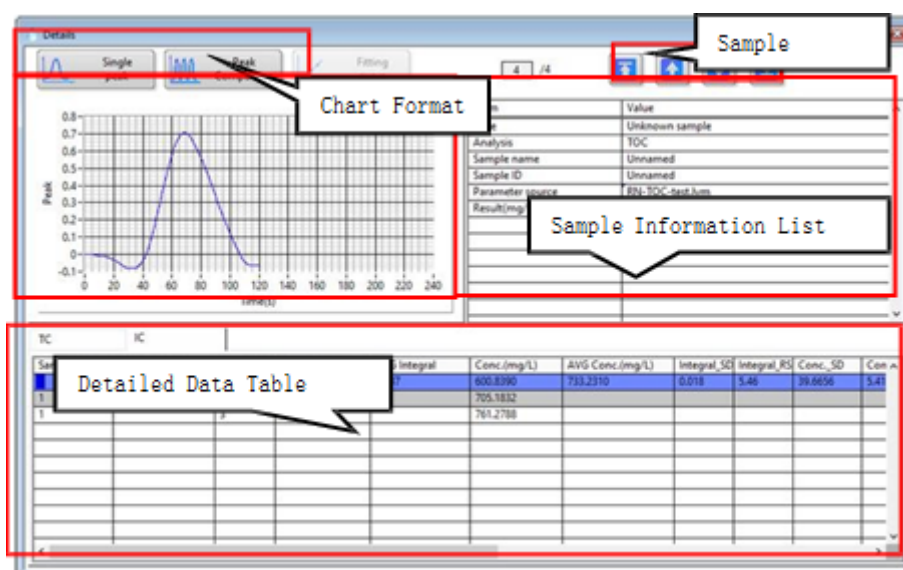


Figure-168

Item	Description
Chart Format	<p>Select the chart format: Single Peak, Peak Shape Comparison, Fitted Curve.</p> <p>Single Peak: Displays the real-time peak shape of the test or the peak shape of the selected row.</p> <p>Peak Shape Comparison: Displays all test peak shapes for the current sample sequence/standard sequence.</p> <p>Fitted Curve: Displays the fitted curve after completing the standard point test during standard curve drawing.</p>
Sample Selection	Click to switch the detailed data of the test row you want to view.

	 : Displays the detailed test data of the first sample in the sample table.  : Displays the detailed test data of the previous sample.  : Displays the detailed test data of the next sample.  : Displays the detailed test data of the last sample in the sample table.
Sample Information List	Displays the main parameters of the selected test row.
Detailed Data Table	<p>During Standard Curve Drawing:</p> <p>Standard Sequence: Displays the standard point sequence.</p> <p>Standard Concentration: Displays the standard point concentration value.</p> <p>Injection Times: Displays the sequence of test times.</p> <p>Integration Value: Displays the test integration value result.</p> <p>Average Integration Value: Displays the average integration value result.</p> <p>Integration SD: Displays the standard deviation of the integration value.</p> <p>Integration RSD (%): Displays the relative standard deviation of the integration value.</p> <p>Exclusion: Displays as "E" if the data in this row is excluded and not used in calculations.</p> <p>Injection Volume(mL): Displays the test injection volume.</p> <p>Automatic Dilution: Displays the dilution factor of the instrument.</p> <p>Time: Displays the test completion time.</p> <p>During Sample Testing:</p> <p>Sample Sequence: Displays the sample test sequence.</p> <p>Result: Displays the concentration result value of the sample analysis.</p> <p>Injection Times: Displays the sequence of test times.</p> <p>Integration Value: Displays the test integration value result.</p> <p>Average Integration Value: Displays the average integration value result.</p> <p>Concentration: Displays the test concentration result.</p> <p>Average Concentration: Displays the average concentration value used for calculation.</p> <p>Integration SD: Displays the standard deviation of the integration value.</p> <p>Integration RSD (%): Displays the relative standard deviation of the integration value.</p> <p>Concentration SD: Displays the standard deviation of the concentration value.</p> <p>Concentration RSD (%): Displays the relative standard</p>

	<p>deviation of the concentration value.</p> <p>Exclusion: Displays as "E" if the data in this row is excluded and not used in calculations.</p> <p>Injection Volume (mL): Displays the test injection volume. Automatic Dilution: Displays the dilution factor of the instrument.</p> <p>Standard Curve: Displays the standard curve file used for calculating the concentration.</p> <p>Time: Displays the test completion time.</p>
--	---

11.7.6.2 Viewing Test Parameters

Open the test parameter window to display the analysis parameters of the selected row in the sample table.

Click "**Test Parameters**" on the sample table window (**Figure 169**). If the analysis type is a standard curve, it will enter the "Standard Curve Parameter Viewing" interface, refer to "**Viewing and Modifying Standard Curve Files**". If the analysis type is an unknown sample, it will enter the "Method Parameter Viewing" interface, refer to "**Viewing and Modifying Method Files**"

[illegible]

Figure-169

11.7.7 Data Printing

- 1) Select the sample table to be printed. Refer to "**Viewing Saved Sample Tables.**"
- 2) Click "**Print**" on the software interface (**Figure 170**).

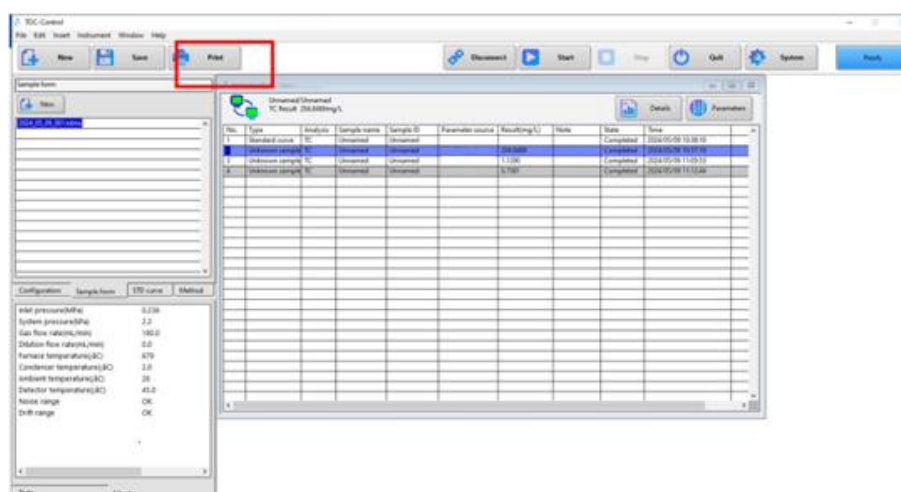


Figure-170

3) The “Print Content and Configuration” window pops up (**Figure 171**).

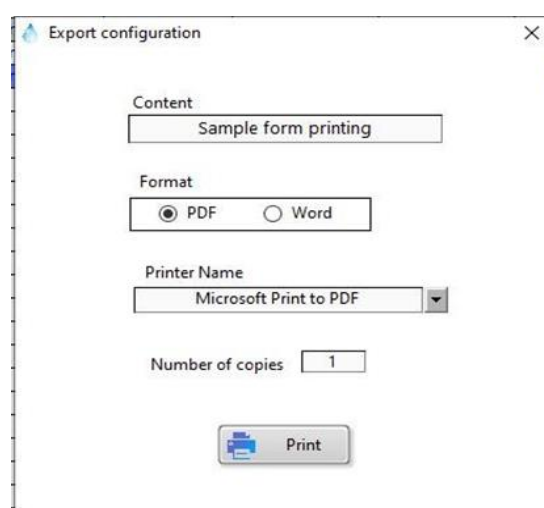


Figure-171

Item	Description
Print Content	Sample Table Printing: Output an overview of the selected sample table. Print All Detailed Data: Outputs the entire table according to row data content and detailed data content. Print Single Row Detailed Data: Outputs the detailed data content of the selected row.
Export Format	Two formats, PDF and Word.
Printer Name	Select the printer for printing. The dropdown list will list the names of printers with installed drivers on the computer.
Number of Copies	Set the number of copies to be printed.

11.7.8 Operation and Analysis

11.7.8.1 Connecting

Before analysis, the software and instrument must be connected. Create a new sample table or double-click to open an existing one, then click **"Connect"** on the software interface (**Figure 172**).

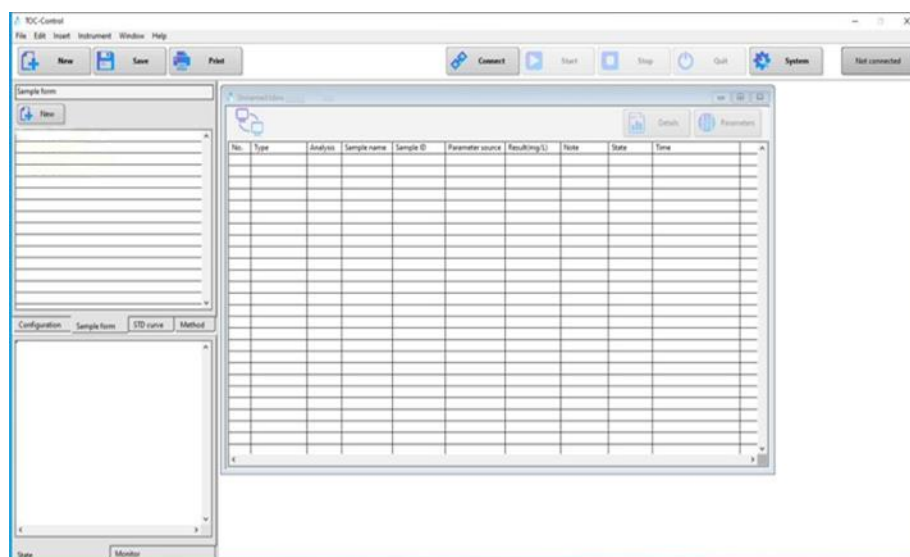


Figure-172

Note: After clicking **"Connect"** the software will enter the instrument initialization state (the instrument operates according to the initialization process). During this state, the software interface cannot be operated. Wait until **"Instrument Initialization Completed"** appears in the **"Status"** tab of the output window at the bottom left of the main software interface (**Figure 173**).

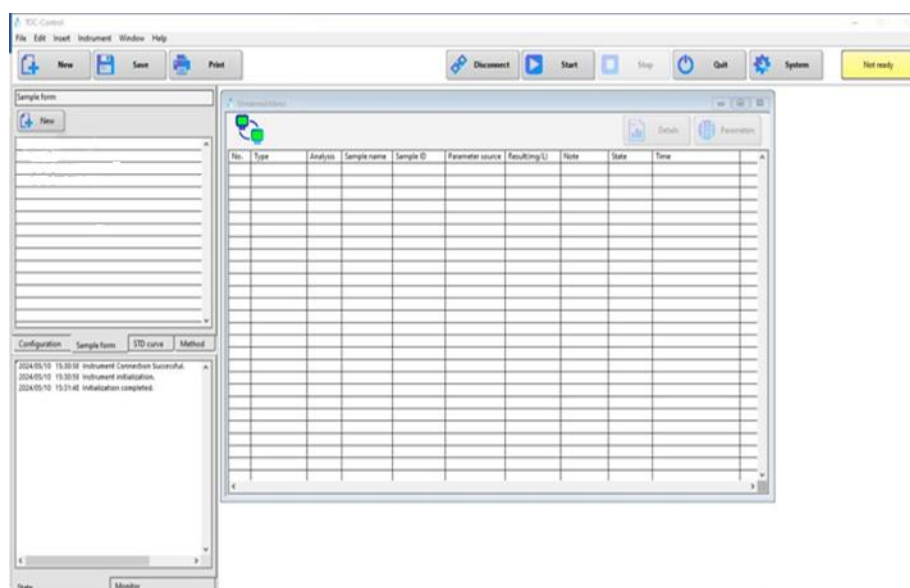


Figure-173

11.7.8.2 Disconnect

If the instrument is online, clicking "**Disconnect**" on the software interface will interrupt the communication between the software and the host (**Figure 174**).

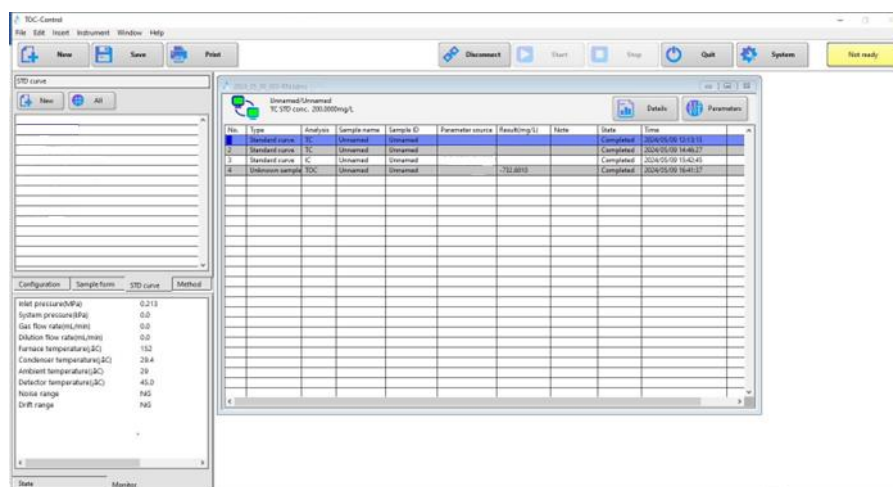


Figure-174

11.7.8.3 Start

- 1) Create/open a sample table. Refer to "**Viewing Saved Sample Tables**".
- 2) Instrument online. Refer to "**Connecting**".
- 3) Create/select the content to be tested. Refer to "**Inserting a Standard Curve Test**" and "**Inserting a Sample Test**".
- 4) Click "**Start**", and the "Select Test Mode" window will pop up (**Figure 175**).



Figure-175

- 5) Click "**Confirm**", and the software starts analyzing.
- 6) After the test is completed, the "Test Result Confirmation" window will pop up. Standard curve test (**Figure 176**), unknown sample test (**Figure 177**).

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Click [Retest] to add one test t or click [Next] to continue with the next sample test.

Figure-176

Item	Description
Total Rows	Displays the number of test rows connected to the sample table.
Current Row	Displays the row number of the test row in the sample table.
Test Times	Displays the preset number of test times for the test row.
Sample Name	Displays the sample name of the test row.
Sample ID	Displays the sample ID of the test row.
AVG Integration Value	Displays the average integration value of the test.
SD	Displays the standard deviation of the converted value.
RSD (%)	Displays the relative standard deviation of the converted value.
Test Result Table	Test No.: Test times sequence. Integral Value: Displays the integration value result of the test. Exclude: Displays as E indicating that the data in this row is excluded and not calculated. STD Concentration(mg/L): The concentration of the standard sample at the standard point set by the standard curve.
Exclude	Exclude/unexclude the selected row data in the test result table.
Repeat	Repeat the current sample test once.
Next	Proceed to the next sample test.
Stop	Stop the test.

Confirmation of test results

Total rows: 4
Current row: 4
Test times: 2/3
Sample name: Unnamed
Sample ID: Unnamed
AVG Integral: NaN
AVG Conc.: 0.0000
Integral SD: 0.770
Integral RSD(%): 71.80
Conc. SD: 0.0000
Conc. RSD(%): 0.00

Test No.	Integral value	Conc.(mg/L)	Exclude
1	0.528	Inf	E
2	1.617	Inf	E

Click [Retest] to add one test t or click [Next] to continue with the next sample test.

Retest Next Stop Exclude

Figure-177

Item	Description
Total Rows	Displays the number of test rows connected to the sample table.
Current Row	Displays the row number of the test row in the sample table.
Test Times	Displays the preset number of test times for the test row.
Sample Name	Displays the sample name of the test row.
Sample ID	Displays the sample ID of the test row.
AVG Integration	Displays the average integration value after selecting the data.
Average Concentration	Displays the average concentration after selecting the data.
Integration SD	Displays the standard deviation of the integration calculation.
Integration RSD (%)	Displays the relative standard deviation of the integration calculation.
Concentration SD	Displays the standard deviation of the concentration calculation.
Concentration RSD (%)	Displays the relative standard deviation of the concentration calculation.
Test Result Table	Test No.: Test times sequence. Integration Value: Displays the integration value result of the test. Concentration(mg/L): The sample concentration obtained after calculation with the standard curve. Exclude: Displays as E indicating that the data in this row is excluded and not calculated.
Exclude	Exclude/unexclude the selected row data in the test result table.
Repeat	Repeat the current sample test once.
Next	Proceed to the next sample test.
Stop	Stop the test.

Note: If the autosampler is not configured, the software will prompt to change the sample during a full table test. The tester can replace the sample according to the actual situation and click “**Confirm**” to continue the test.

11.7.8.4 Stop

When testing samples, click "**Stop**", and the "Select Stop Mode" window will pop up (**Figure 178**). After selection, click "**Confirm**" to execute.

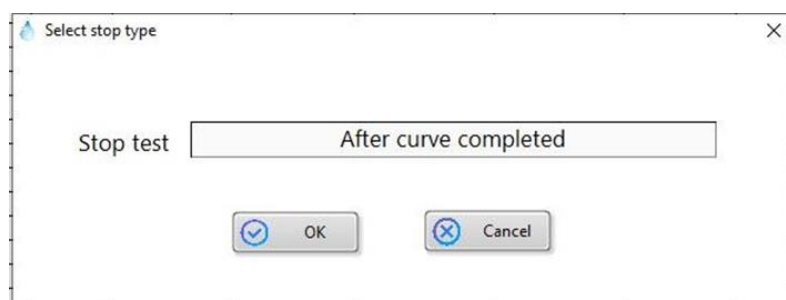


Figure-178

Item	Description
Stop Test Mode	Stop after Current Injection: Wait for the current injection analysis to complete before stopping the test. Stop after Current Row: Wait for the current row analysis to complete before stopping the test. Stop Immediately: Immediately interrupt the current analysis.

11.7.8.5 Shutdown

After the instrument completes the test, it needs to go through the shutdown process before shutting down. Click "**Shutdown**", and the "Pre-Shutdown Cleaning" window will pop up (**Figure 179**).

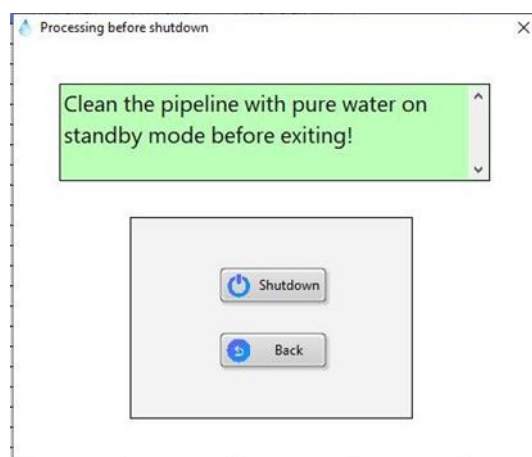


Figure-179

Item	Description
Status Window	Displays instrument status prompts before shutdown. There are four prompts: 1) Perform pre-shutdown processing! 2) During pipeline cleaning, please wait. 3) Pipeline cleaning is completed; the instrument is cooling down before shutdown!

	4) You can turn off the instrument power!
Shutdown	The instrument performs a cooling and cleaning process before exiting. When cleaning with pure water, the software interface is locked and cannot be operated.
Return	Exit the pre-shutdown processing interface, and you can return to view the test data.

11.7.8.6 System

Click **"System"** on the software interface, and the "System" window will pop up.

1) Detector Status (Figure 180)

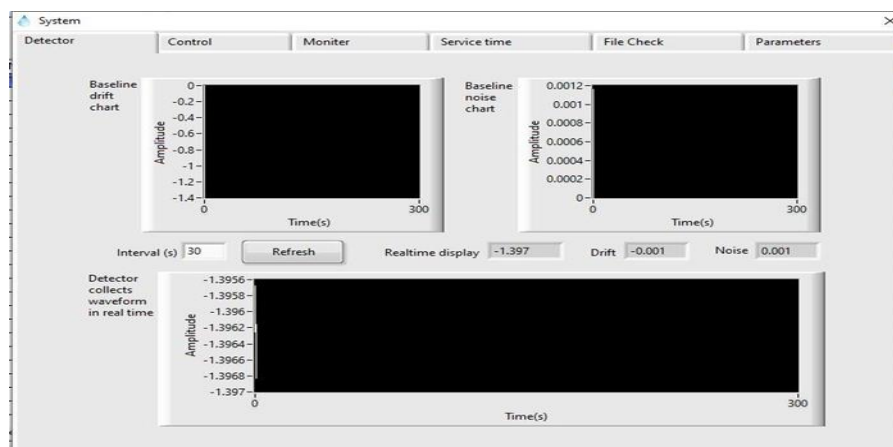


Figure-180

The interface mainly displays some real-time data and peak shape charts of the detector, which are used to determine whether the detector is abnormal in case of an abnormal situation.

2) Instrument Control (Figure 181)

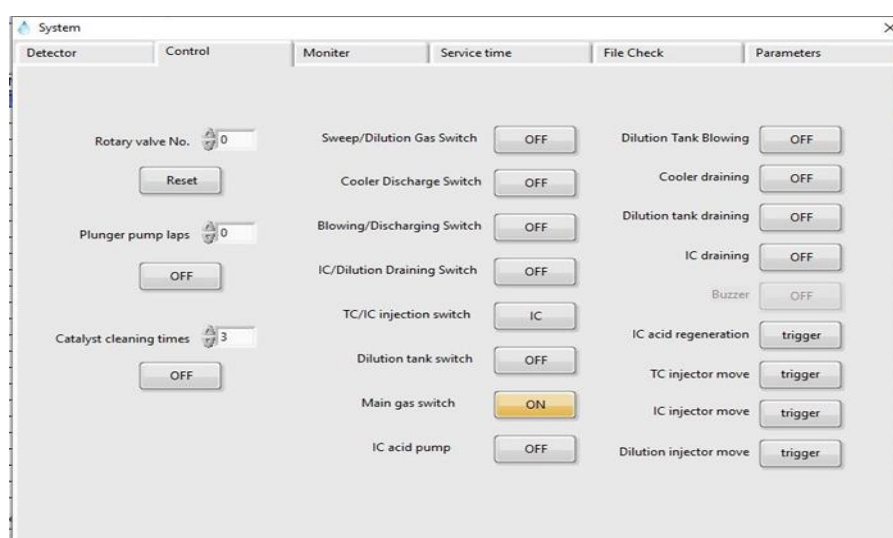


Figure-181

The interface shows the main basic control operations of the instrument, which are used to assist in debugging the instrument.

Note: If the IC test has not been performed for a long time, IC acid regeneration must be performed in the "System" - "Instrument Control" interface before the test, otherwise, the accuracy and precision of the test data will be affected.

3) Debug Monitoring (Figure 182)

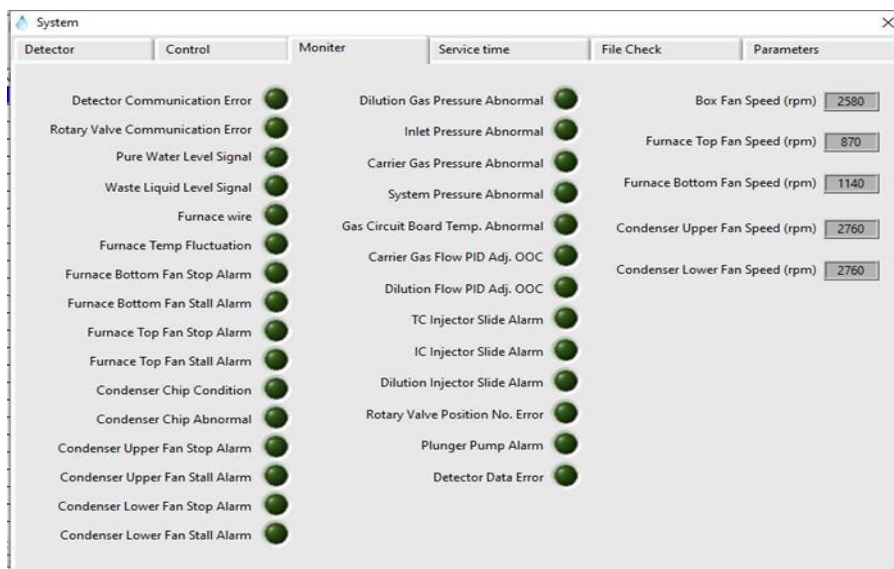


Figure-182

The interface displays the hardware status mainly viewed during instrument debugging.

4) Usage Time (Figure 183)

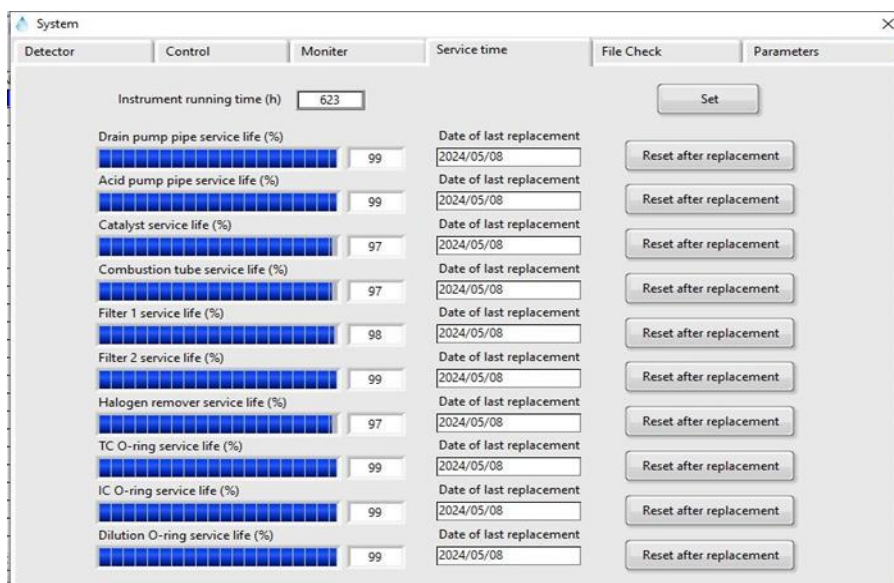


Figure-183

The interface shows the instrument's usage time and the usage of major consumables. It is used to timely reflect the usage time of major consumables. When the service life expires, the software will prompt after connection initialization **(Figure 184)**. Clicking **"Settings"** on this interface will enter the usage time setting interface of major consumables **(Figure 185)**.



Figure-184

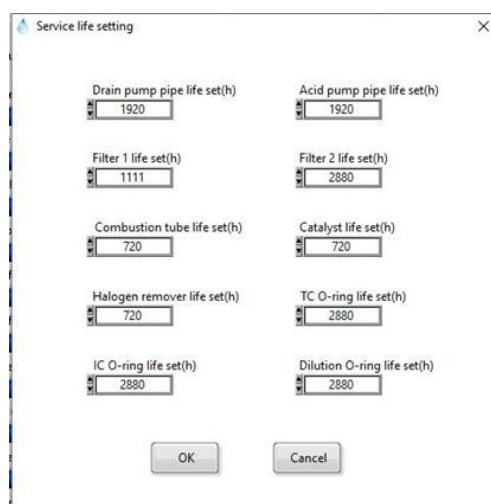


Figure-185

5) Software Verification (Figure 186)

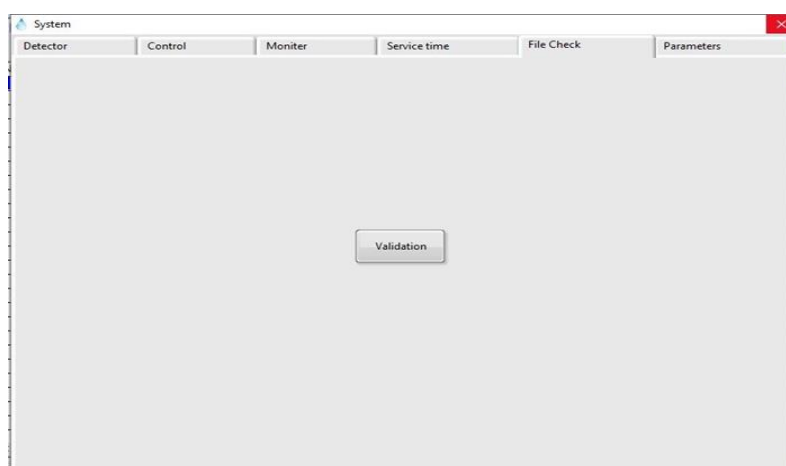


Figure-186

Click "**Software Verification**", and the "**File Check**" interface appears (**Figure 187**).

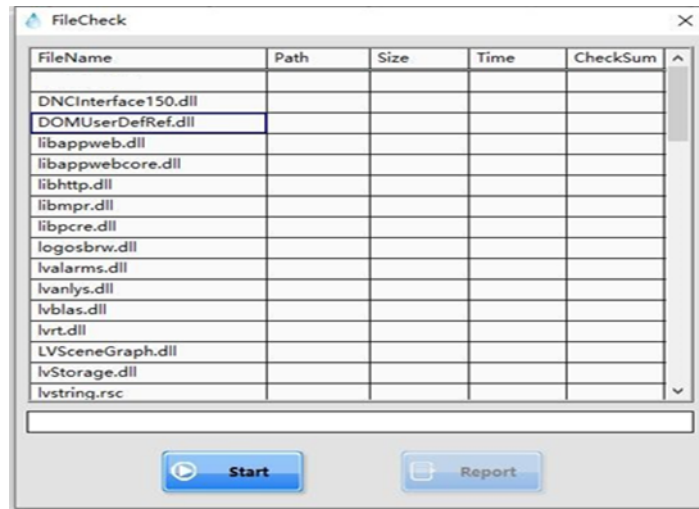


Figure-187

Click "**Start**", and the software will perform a self-check operation on the file. If an abnormality occurs, "NG" will be displayed (**Figure 188**).

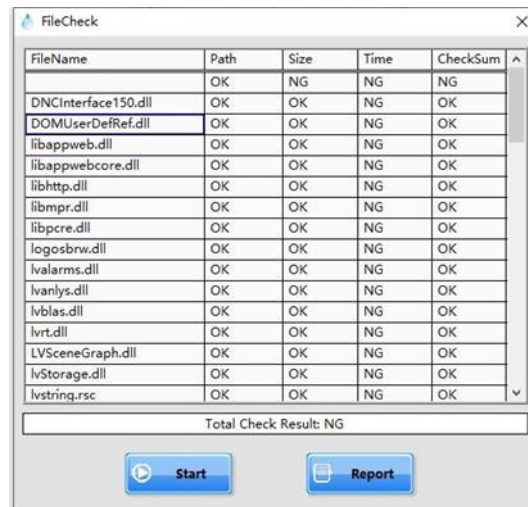


Figure-188

Click "**Export Report**" to export the self-check results of the software in TXT document format.

Note: In the directory of the software executable file path, there is "**FileCheck.exe**". This file can also be executed directly to perform the software self-check function.

6) Instrument Parameters (Figure 189)

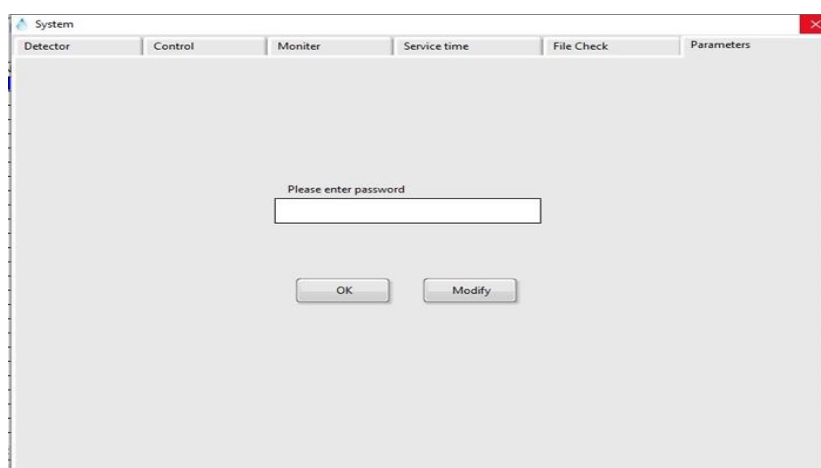


Figure-189

After entering the password in the software, the configuration parameter information can be displayed (**Figure 190**). The default password is "123456".

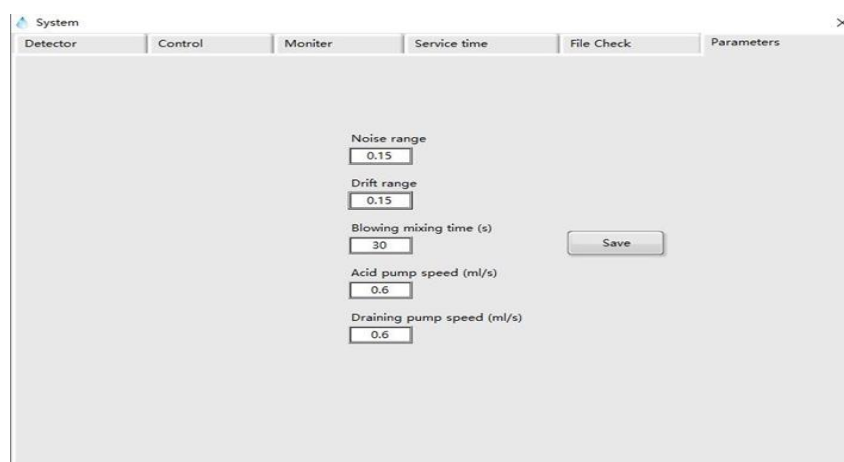


Figure-190

Item	Description
Noise Range	The noise range for stable detector measurement values, default is 0.15. The setting range is 0-0.5.
Drift Range	The drift range for stable detector measurement values, default is 0.15. The setting range is 0-0.5.
Blowing Mixing Time	The time for the software to control the purge mixing of the dilution tank, default is 30 seconds. The setting range is 0-100.
Acid Pump Speed	Used for acid pumping timing control in the software, the default is 0.6ml/s. The setting range is 0.5-1.
Draining Pump Speed	Used for discharge pumping timing control in the software, the default is 0.6ml/s. The setting range is 0.5-1.

12. Maintenance

12.1 Daily Inspection

Inspection Part	Inspection Content	Inspection Frequency	Solution
Gas Cylinder	Check total pressure	Daily	Replace the gas cylinder when the total pressure is less than 3MPa.
Scrubber	Check solution level	Daily	Refill/replace the solution when the solution level in the scrubber is below the branch pipe level or the solution is turbid.
Acid Bottle	Check the acid solution level	Daily	Refill acid when the solution in the acid bottle is less than 10mL.
Halogen Trap Tube	Check the discoloration of halogen-trapping material	Daily	Replace the halogen trapping material according to the steps in "14.1" when more than half of it is discolored.
Enhanced Halogen Trap Device (optional)	Check the acid solution level and the remaining amount of stainless steel mesh.	Daily	Add solution or stainless steel mesh according to the steps in "14.2" when the solution level is below the branch pipe level or the stainless steel mesh is dissolved.

12.2 Consumables

Consumable Name	Specification/Part Number	Replacement Cycle	Replacement Method
Combustion Tube	/	Every three months or when damaged	Refer to sections "7.3.2.1" and "7.3.2.2" for replacement.
Catalyst	15g/bottle	Every three months, when the standard solution response value drops significantly, or when replacing the combustion tube	

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Quartz balls	6g/bottle	Every three months or when replacing the combustion tube	
Quartz Wool	0.5g/package	Every three months or when replacing the combustion tube and halogen trapping material	
Halogen Trapping Material	0.4m	Every three months or when discolored and ineffective	Refer to section "14.1" for replacement.
Enhanced Halogen Trap Device Metal Wire (optional)	4g	Completely dissolved	Refer to section "14.2" for replacement.
Soft Joints	21 to 6.5 6 to 2.2 9 to 2.5 4 to 2.2	Every year or when cracked	/
Peristaltic Pump Tubing		Every eight months	Refer to section "14.3" for replacement.
CO ₂ Absorbent	500g/bottle	When discolored and ineffective	/
Filter	φ50mm×0.45μm	Every year or when clogged	/
O-ring - PTFE	φ13.6×1.8mm	Every year or when sliding sample injection leaks	Refer to section "14.4" for replacement.

13. Troubleshooting

13.1 Error Information

The following error messages will be displayed on the computer screen. Take the appropriate measures as indicated in the table below.

Error Information	Description	Corrective Measures
Rotary Valve Communication Error	Rotary valve communication interrupted	Check the rotary valve communication.
Detector Communication Error	Detector communication interrupted	Check the detector communication.
Waste Liquid Level Abnormal	A waste container is full	Empty the waste container.
Pure Water Level Abnormal	The dilution water level is below the sensor	Refill the dilution water.
Carrier Gas Pressure Abnormal	The carrier gas flow rate is out of range	
Dilution Gas Pressure Abnormal	The dilution gas flow rate is out of range	
Inlet Pressure Abnormal	Inlet pressure is out of range	Check if the gas cylinder pressure is within the specified range.
System Pressure Abnormal	System pressure is out of range	Check the gas path.
Furnace Wire Status Abnormal	Pyrolysis furnace cannot heat up	Turn off the instrument and check the pyrolysis furnace.
Furnace Temperature Fluctuation Abnormal	Large fluctuation in furnace temperature or inability to adjust furnace temperature within 5 minutes	
Thermoelectric Cooler Status Abnormal	Cooling temperature cannot drop	
Thermoelectric Cooler Communication Error	Thermoelectric cooler communication error	
Cooling Fan 1 Stopped	Cooling fan 1 stopped	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
Cooling Fan 1 Speed Error	Cooling fan 1 speed error	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
Cooling Fan 2 Stopped	Cooling fan 2 stopped	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.

Cooling Fan 2 Speed Error	Cooling fan 2-speed error	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
Bottom Furnace Fan Stopped	The bottom furnace fan stopped	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
Bottom Furnace Fan Speed Error	Bottom furnace fan speed error	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
Top Furnace Fan Stopped	The top furnace fan stopped	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
Top Furnace Fan Speed Error	Top furnace fan speed error	Turn off the instrument, turn the power back on, and check if the error reoccurs after restarting the instrument.
TC Sliding Sample Injection Alarm	TC sliding sample injection misalignment	Turn off the instrument, check the slider, and remove any external particles from the sliding sample injection device.
IC Sliding Sample Injection Alarm	IC sliding sample injection misalignment	Turn off the instrument, check the slider, and remove any external particles from the sliding sample injection device.
Dilution Tank Sliding Sample Injection Alarm	Dilution tank sliding sample injection misalignment	Turn off the instrument, check the slider, and remove any external particles from the sliding sample injection device.
Rotary Valve Position Error	Rotary valve position error	Turn off the instrument, remove the six-way valve rotor, remove debris, and then clean the six-way valve.
Detector Data Error	Large fluctuation in baseline value, unable to stabilize for a long time	
Gas Path Board Temperature Abnormal	Gas path board temperature out of range	
Carrier Gas Flow PID Adjustment Error	Carrier gas flow unable to adjust to set value	
Dilution Flow PID Adjustment Error	Dilution gas flow unable to adjust to set value	
Plunger Pump Alarm	Plunger pump communication interrupted or wrong rotation count	

13.2 Instrument Troubleshooting

Fault Information	Fault Phenomenon	Cause of Fault	Countermeasure
Inlet Pressure Abnormal	Inlet pressure abnormal alarm	① Pressure regulator not adjusted ② Inlet pipeline not connected properly	① Adjust the pressure regulator to 0.2-0.3Mpa. ② Check the inlet quick-connect pipeline for damage; if undamaged, reconnect and ensure the pipeline is fully inserted into the quick-connect fitting.
System Pressure Abnormal	System pressure abnormal alarm	① Combustion tube blockage ② Sliding sample injection leak ③ Glass parts cracked or blocked ④ Soft joint aging or damage ⑤ Filter blockage	① Repack the combustion tube ② Replace the O-ring ③ Replace the glass parts or internal filling ④ Replace the soft joint ⑤ Replace the filter
Condenser Temperature Display Abnormal	Condenser temperature display inconsistent with a set value	Refrigeration module fault	Turn off the instrument.
Pyrolysis Furnace Temperature Display Abnormal	The pyrolysis furnace temperature display is inconsistent with set value	Pyrolysis furnace fault	Turn off the instrument.
Detector Baseline Value Abnormal	Large fluctuation in baseline value, unable to stabilize for a long time	① Gas path leakage ② Large environmental temperature and humidity differences ③ Detector internal components damaged or aging	① Check the gas path for leaks ② Stabilize the environmental temperature and humidity before restarting ③ Turn off the instrument.
		① Sample inconsistency ② Residual bubbles in	① Mix the sample thoroughly ② Clean the sample

Poor Test Repeatability	RSD>3% for multiple test results	<p>sample injection tube</p> <ul style="list-style-type: none"> ③ Sample path not cleaned before injection ④ Gas path leakage ⑤ Detector internal components damaged or aging ⑥ Low sample carbon content ⑦ Large deviation in sample injection angle on the sliding sample plate 	<p>injection tube multiple times</p> <ul style="list-style-type: none"> ③ Clean the sample path before injection ④ Check the gas path for leaks ⑤ Turn off the instrument ⑥ Increase the sample injection volume ⑦ Adjust the sample path position
No Peak After Injection	Very low response value	<ul style="list-style-type: none"> ① Sample not injected ② Carrier gas abnormality ③ Detector abnormality ④ Low concentration of sample solution 	<ul style="list-style-type: none"> ① Visually check if the sample is injected into the combustion tube or IC reaction pool ② Check the gas path ③ Turn off the instrument. ④ Prepare a standard solution for testing and observe the test peak; if normal, increase the sample injection volume for testing.

14. Replacement

14.1 Replacement of Halogen Trapping Material

- 1) Apply a slight outward force to pull out the halogen trap tube (**Figure 191**).



Figure-191

- 2) Remove the 9 to 2.5 soft joint from the top of the halogen trap tube and replace the quartz wool and halogen trapping material inside the tube (**Figure 192**).



Figure-192

Install the halogen trap tube by reversing the above steps.

Note: The halogen trap tube is made of quartz glass; take precautions to avoid breakage during replacement.

14.2 Replacement of Stainless Steel Mesh

- 1) Unscrew the 4 screws on the 2 fixing plates and remove the plates, then take out the enhanced halogen trap assembly (**Figure 193**).



Figure-193

- 2) Remove the 21 to 6.5 soft joint from the enhanced halogen trap tube and add 0.05mol/L hydrochloric acid and the stainless steel mesh (**Figure 194**).



Figure-194

Install the enhanced halogen trap tube by reversing the above steps.

Note:

- Both the trap and enhanced halogen trap tube are made of quartz glass; take precautions to avoid breakage during replacement.
- Hydrochloric acid is a hazardous chemical; avoid contact with the body and prevent spills.
- To avoid injury from the stainless steel mesh, take protective measures during operation.

14.3 Replacement of peristaltic pump tubing

- 1) Unscrew the two hand screws above the waste pump/acid pump (**Figure 195**).



Figure-195

- 2) Use a Phillips screwdriver to unscrew the screws on the peristaltic pump tubing fixing plate and remove the cover plate (**Figure 196**).



Figure-196

- 3) Loosen the hand screw cap on the peristaltic pump tubing press cap (**Figure 197**) and slide out the tubing.



Figure-197

- 4) Take out the spare tubing and complete the installation by reversing the above steps.

14.4 Replacement of O-ring

14.4.1 Replacement of sliding sample injection O-ring for Dilution Tank/IC Pool ($\phi 13.6 \times 1.8\text{mm}$)

- 1) Unscrew the hand screws on the sliding sample injection rack of the dilution tank/IC pool (**Figure 198**).



Figure-198

- 2) Move the sliding sample plate to the left and remove it.
- 3) Replace the O-ring ($\phi 13.6 \times 1.8\text{mm}$) and complete the installation by reversing the above steps.

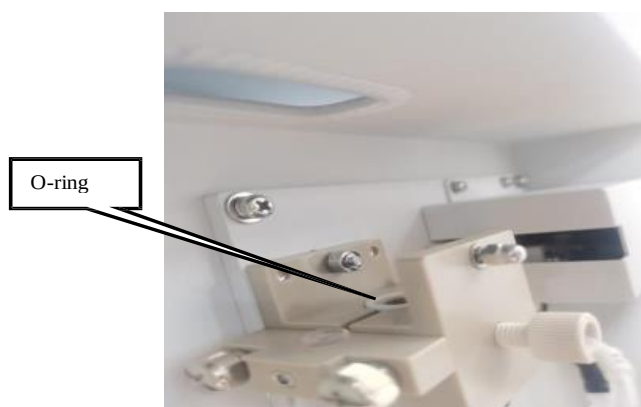


Figure-199

14.4.2 Replacement of TC Sliding Sample Injection O-ring ($\phi 13.6 \times 1.8\text{mm}$)

- 1) Unscrew the hand screws on the TC sliding sample injection rack (**Figure 200**).



Figure-200

- 2) Move the sliding sample plate backward and remove it (**Figure 201**).

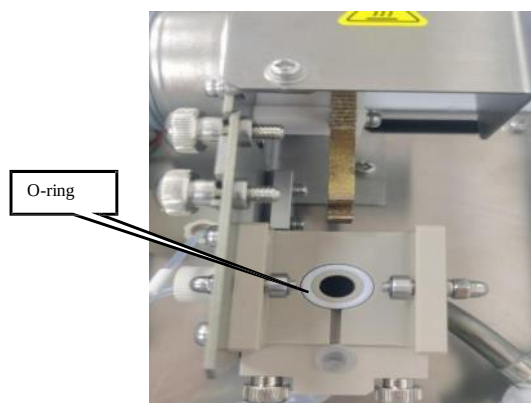
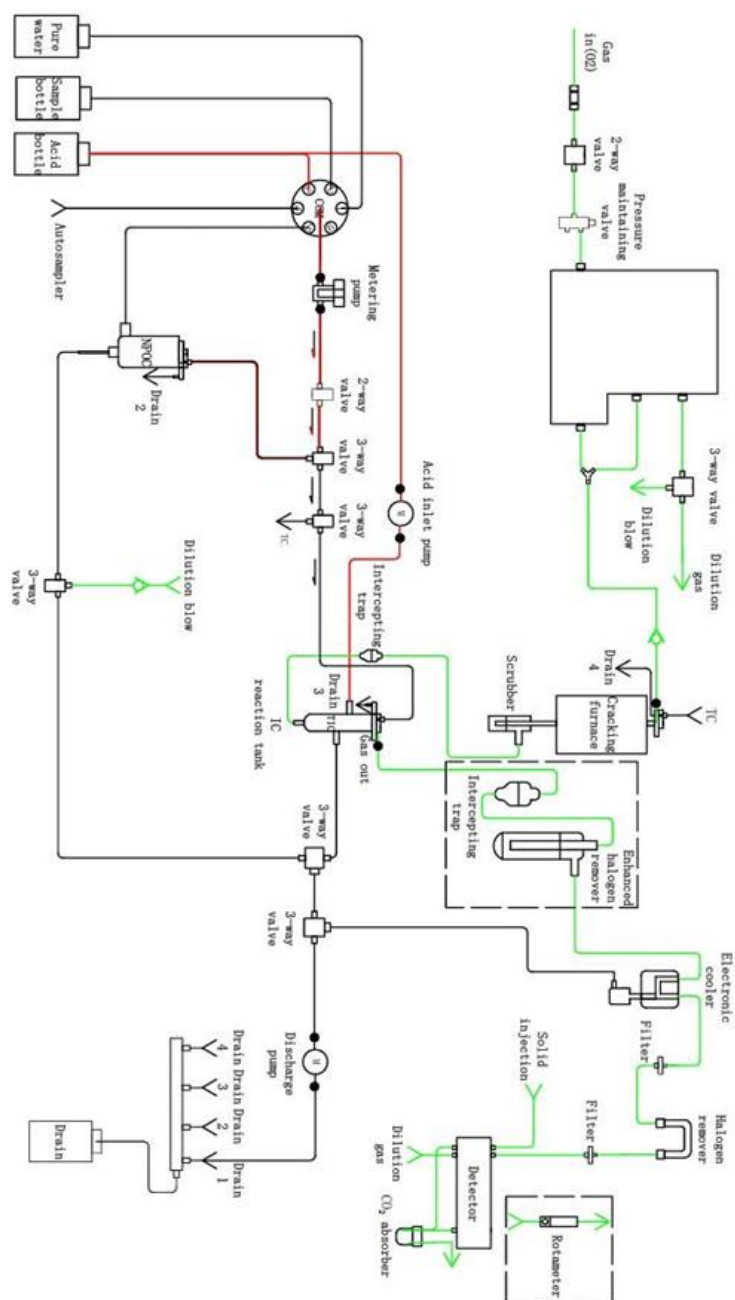


Figure-201

- 3) Replace the O-ring ($\phi 13.6 \times 1.8\text{mm}$) and complete the installation by reversing the above steps.

Note: Ensure the O-ring is placed in the groove during replacement, otherwise it will affect the installation of the sliding sample plate.

15. Circuit Diagram



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