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# ICP Technical Specifications

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# 1. Overview

## 1.1. About Us

NWspec self-developed ICP spectrometer research and development, production, sales, and technical services, Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES). This instrument builds upon traditional ICP-OES technology while incorporating the latest international advancements, achieving full automation, high precision, high sensitivity, and exceptional stability.

With a dedicated R&D team committed to innovation and collaboration, the company continuously pushes technological boundaries. Backed by extensive industry experience and solid expertise, it ensures high-quality and professional service.

ICP10 & ICPO3 is an advanced analytical instrument that integrates optical, mechanical, electrical, computing, and analytical technologies. It features high-speed testing, a wide measurement range, and highly accurate and reliable analytical results. Leveraging computer technology, the instrument offers intelligent operation, graphical and textual data display, and efficient data acquisition and processing. These capabilities place it at the forefront of domestic technology, making it an ideal analytical tool for various industries.

## 1.2. Main structure of ICP spectrometer

### 1.2.1. Sample Introduction System

The sample introduction system is responsible for delivering the sample into the plasma for analysis. It consists of a nebulizer, a spray chamber, and a carrier gas system. The liquid sample is nebulized into fine droplets and transported to the plasma torch by the carrier gas (argon) for excitation.

### 1.2.2. Excitation Source

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### 1.2.3. Optical Dispersion System

The main function of this system is to disperse and separate the multi-element spectral emissions from the plasma. A grating spectrometer is used to separate different wavelengths of light and focus them onto the detector. The optical system includes collimating mirrors, diffraction gratings, and dispersion prisms, ensuring high resolution and low stray light.

1.2.4. Detection and Control System

The main function of this system is to disperse and separate the multi-element spectral emissions from the plasma. A grating spectrometer is used to separate different wavelengths of light and focus them onto the detector. The optical system includes collimating mirrors, diffraction gratings, and dispersion prisms, ensuring high resolution and low stray light.

1.2.5. Output System

The output system includes computer software and data interfaces for displaying results, storing data, and generating reports. Users can configure operating parameters, perform spectral analysis, conduct quantitative calculations, and export experimental data through the software interface to meet various analytical requirements.

1.3. Brief description of the working principle of ICP spectrometer

The ICP spectrometer excites sample elements using high-temperature plasma, causing them to emit characteristic spectra for qualitative and quantitative analysis. The sample is atomized by the sample introduction system, mixed with carrier gas, and introduced into the plasma torch. A high-frequency electromagnetic field generates a high-temperature plasma, which evaporates, dissociates, and excites the sample to a high-energy state.

As the excited atoms and ions return to their ground state, they release light at characteristic wavelengths. This light is dispersed by the optical system, detected, and converted into electrical signals, which are then processed and analyzed. Finally, the analysis results are displayed, stored, and reported using computer software.

1.4. Range of applications

1.4.1. **Metallurgical Industry**: Steel and its alloys, including carbon steel, cast iron, alloy steel, high-purity steel, silicon and iron alloys, ferroalloys, and rare earth ferroalloys.

1.4.2. **Non-Ferrous Metals and Their Alloys**: Including non-ferrous metals (high-purity metals) and their alloys, rare metals and their alloys, precious metals, rare earth elements and their alloys, as well as their compounds.

1.4.3. **Water Quality Samples**: Drinking water, surface water, wastewater, mineralized water, and electroplating solutions and wastewater.

1.4.4. **Environmental Samples**: Soil, atmospheric dust, fly ash, and solid waste.

1.4.5. **Geological and Mining Samples**: Geological samples, ores, and minerals.

1.4.6. **Inorganic Non-Metallic Material Analysis**.

1.4.7. **Medical and Health**: Detection of Ca, Mg, Cu, Pb, Cd, Fe, Mn, Se, and Zn requires only 20 µL of blood or 0.1000 g of hair.

1.4.8. **Chemical and Industrial Products**: Chemical reagents (hydrochloric acid, nitric acid, sulfuric acid, phosphoric acid, hydrofluoric acid, and other synthetic reagents), industrial chemicals (e.g., saturated sodium chloride solution), inorganic materials, cosmetics, oils (gasoline, diesel, mineral oils, marine oils, petroleum coke, and raw materials), petroleum catalysts, urea solutions, and coatings.

1.4.9. **Agricultural and Food Products**: Analysis of metal elements in grains, oils, seafood, food, and beverages.

1.4.10. **Animal, Plant, and Biochemical Samples**: Plants, traditional Chinese medicine (TCM), animal tissues, and biochemical samples.

1.4.11. **Nuclear Industry Products**: Nuclear fuel analysis and nuclear materials.

1.4.12. **Battery Materials**: Lithium carbonate, lithium cobalt oxide (LCO), lithium manganese oxide (LMO), nickel-cobalt-manganese (NMC) ternary materials, and lithium iron phosphate (LFP).

1.5. Main parameters

1.5.1. **High-quality optical components with an advanced control system**: Ensures precise scanning and positioning to achieve a high signal-to-noise ratio in test results.

1.5.2. **Key components sourced from France, Germany, and Japan**: Guarantees high accuracy and sensitivity of the instrument.

1.5.3. **Minimal matrix effect**: 99% of samples do not require matrix separation.

1.5.4. **Wide measurement range**: Capable of analyzing from ultra-trace to major concentrations.

1.5.5. **High measurement accuracy**: Relative standard deviation (RSD) ≤ 1.5%.

1.5.6. **Fast processing speed**: Sequential scanning of more than 15 elements per minute.

1.5.7. **Extensive element analysis**: Capable of detecting 70 metal elements and some non-metal elements.

1.5.8. **High stability**: Relative standard deviation (RSD) ≤ 2.0%.

1.5.9. **Low detection limits**: Meets national Class A standards.

1.5.10. **Supports both qualitative and quantitative analysis**.

1.5.11. **User-friendly analysis software**: Runs on **Windows 10 and Windows 11**, featuring a third-generation Chinese or English interface. The software is plug-and-play with no installation required, offering a powerful data processing system with multiple functions and flexible printing options.

1.6. Main technical indicators

1.6.1. **Scanning range**:

- **Grating 4320 lines/mm**: 180–442.5 nm
- **Grating 3600 lines/mm**: 180–530.0 nm
- **Grating 2400 lines/mm**: 180–800.0 nm

1.6.2. **Wavelength indication error**: ≤ ±0.03 nm, **repeatability**: ≤ 0.003 nm

1.6.3. **Minimum spectral bandwidth**: Mn 257.610 nm, better than national Class A standard, ≤ 0.015 nm

1.6.4. **Detection limits (mg/L)**:

- **Zn 213.856 nm ≤ 0.003**
- **Mn 257.610 nm ≤ 0.002**
- **Ba 455.403 nm ≤ 0.001**
- **Ni 231.604 nm ≤ 0.01**
- **Cr 267.716 nm ≤ 0.007**
- **Cu 324.754 nm ≤ 0.007**

1.6.5. **Stability**: Relative standard deviation (RSD) ≤ 2.0%

1.7. Product standards

ICP10 Inductively Coupled Plasma Emission Spectrometer, implementing the corporate standard Q/DXHKT0001-2017 of NWSPEC Co.,Ltd.

## 2. Working Environment & Facility Requirements

2.1. Room Size: The effective usable area of the room should be **at least** 15 square meters.

2.2. Placement: The rear side of ICP10 spectrometer should be **at least** 1000 mm away from the wall, and the right side should be **at least** 400 mm away from the wall.

2.3. Supporting Facilities: Reagent cabinet or reagent rack, gas cylinder cabinet, desks and chairs, **1–2 HP air conditioners**.

2.4. Operating Environment

- **Ambient Temperature**: (25℃ ± 3℃) with a temperature fluctuation rate within 2℃/h.
- **Relative Humidity**: ≤ 70%， ideally **45-60%**. (Dehumidifiers should be used in high-humidity areas).
- **Exhaust Requirements**: Doors and windows must be tightly sealed to prevent dust and acid mist intrusion.
- **Other Requirements**: The room should be clean, dry, dust-free, free of corrosive gases, and free from vibrations.
- **Grounding**: Proper grounding with a resistance of ≤ 4 Ω.

2.5. Dust Control Measures

To ensure the long-term stable operation of the ICP spectrometer, the following dust prevention measures should be implemented to prevent dust ingress from affecting the performance of optical components, circuit systems, and other precision parts:

- Wipe the instrument surface gently with a lint-free cloth moistened with a small amount of anhydrous ethanol or a neutral cleaner. Avoid using corrosive solvents.
- Although the optical system is sealed, maintaining a clean laboratory environment is still essential.
- The electronic components area should be protected from exposure to dusty environments. Periodic cleaning with low-pressure dry air is recommended to prevent dust accumulation.
- Regularly inspect and clean the air vents to prevent dust blockages that could impact cooling performance.

2.6. Stable power supply system

To ensure the safe operation of the ICP instrument, the power supply line must have sufficient capacity. Otherwise, excessive voltage drop during instrument operation may negatively impact its lifespan. As a precision measuring instrument, the ICP spectrometer requires a stable power supply, with voltage fluctuations generally not exceeding ±1%. If the voltage variation surpasses this range, a precision AC voltage stabilizer with purification capabilities should be used. Standard voltage regulators often produce waveform clipping under high voltage conditions, leading to electrical impulses that can interfere with electronic computers, microprocessors, and phase-sensitive amplifiers, potentially causing malfunctions. A continuous sine wave power supply is essential to ensure the stable operation of these electronic circuits.

The power supply line for the instrument should ideally be connected directly to the distribution panel of the power transformer, separate from high-power equipment such as large motors, ventilators, air conditioners, and muffle furnaces. Sharing a power line with such equipment can lead to significant voltage fluctuations when these devices start, resulting in instrument instability. The grounding resistance for the spectrometer should be less than 4 ohms, while the computer grounding resistance should meet ASTM standards of less than 0.25 ohms to prevent electromagnetic interference.

During instrument operation, it is crucial to monitor power supply voltage fluctuations and avoid prolonged operation under overvoltage or undervoltage conditions. Overvoltage operation significantly reduces the lifespan of electron tubes to less than 20% of their normal lifespan. Conversely, undervoltage operation causes the filament temperature of electron tubes to drop excessively, leading to premature degradation of the electron-emitting material, further shortening the tube's lifespan. Additionally, large voltage fluctuations during instrument operation can cause instability in the high-frequency generator output power, significantly affecting measurement accuracy. Therefore, maintaining a high-quality power supply is essential for reliable instrument performance.

## 2.7. Power Requirements

ICP10 requires a single-phase AC 220V/50Hz power supply. If the voltage fluctuation exceeds ±1V, a 10KVA precision purified AC voltage stabilizer must be used (output accuracy ≤±1%, response time <20-80ms). The specific power requirements for each component are as follows:

- ICP10 Main Unit: Single-phase AC (220±1)V/50Hz, 2kVA (incoming wire cross-section ≥4mm²).
- Computer: Single-phase AC (220±1)V/50Hz, 500VA.
- Cooling Water Tank: Single-phase AC (220±1)V/50Hz, 1.5kVA.
- Exhaust System: Single-phase AC (220±1)V/50Hz, 20W (fan provided by the manufacturer).
- Circuit Breakers: Main switch: 60A， ICP: 32A， Cooling water tank: 20A， Axial fan: 10A

2.8. Grounding Requirement

The ICP main unit must be reliably grounded. The grounding substrate should meet the following minimum requirements:

- Copper Plate: At least 400mm (L) × 300mm (W) × 3mm (T)
- Copper Rod: At least ∮12mm × 1500mm
- Copper Tape： At least 20mm (W) × 0.5mm (T)
- The copper plate must be buried 1.5m underground.
- Pour 1kg of salt into the burial site to improve conductivity.
- Connect the copper tape from the buried copper plate to the instrument's indoor grounding point.
- The ground resistance must be less than 4Ω.
- When burying the copper plate, **remove large stones from the soil** to ensure proper contact with the earth.

2.9. Gas Requirements

Two bottles of argon gas with purity ≥99.99% (one bottle as a spare). The pressure reducing valve has an inlet pressure of 25 MPa and an outlet pressure adjustment range of 0–2.5 MPa. During use, set the outlet pressure to 0.2–0.25 MPa.

2.10. Cooling Water Requirements

When installing the smart cooling water tank, add 25 liters of distilled or purified water to the PVC tank of the cooling system.

2.11. Exhaust Requirements

The gas discharged from the plasma chamber contains argon, some metal vapors, and solvents. It is recommended to use Φ110 PVC pipe and Φ110 PVC adapters, along with an axial fan, to vent the exhaust outside. The outdoor section should be equipped with an elbow to prevent dust and rainwater from entering the duct.

# 3. Installation

## 3.1. Unpacking and Inspection

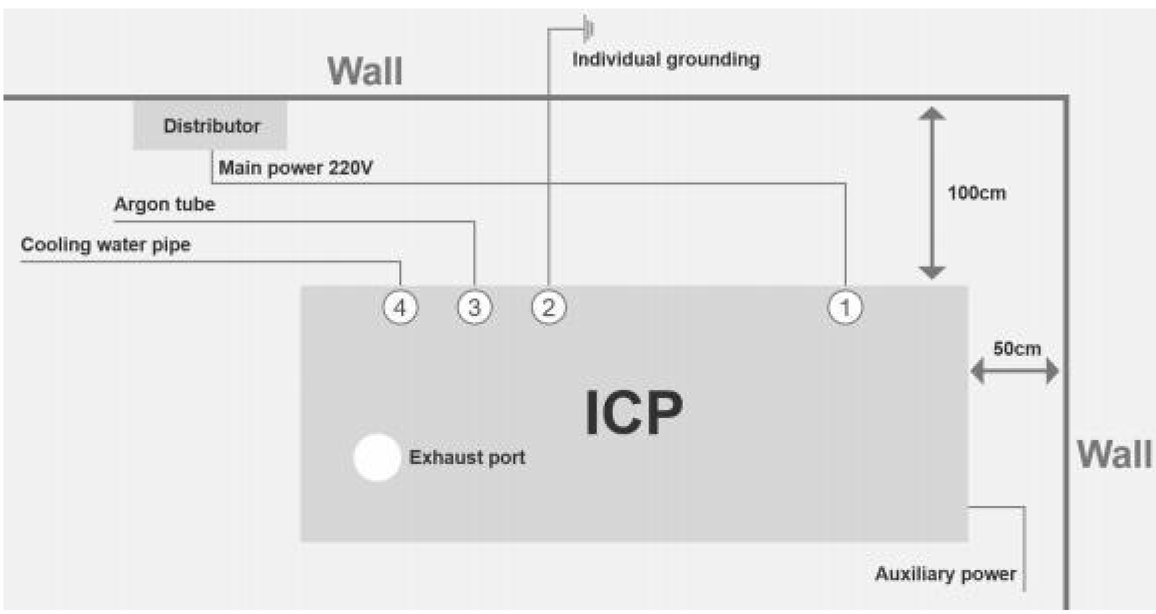
After opening the wooden packaging box, remove the technical documents and check the instrument's components against the packing list to ensure all parts are present and undamaged. If any parts are missing or damaged, contact the manufacturer and the freight company immediately.

## 3.2. Installation

3.2.1. Once all installation conditions are met, you can notify our technicians to come on-site for installation, commissioning, and training.

3.2.2. The ICP main unit is equipped with shock absorbers at the corners, which must be removed after unpacking. Once the instrument is positioned, engage the wheel brakes to stabilize it.

3.2.3. On the back of ICP10 spectrometer, from left to right, are the ICP main power cord, grounding terminal, argon gas inlet, and cooling water inlet and outlet.




3.2.4. ICP Mainframe Power Supply (① in the figure):

Connect the ICP mainframe to a stabilized power supply, and then connect the stabilized power supply to a 32A circuit breaker. (If the voltage is stable, the stabilized power supply may not be necessary.) It is recommended to separate the phase wires supplying the ICP mainframe from those of the cooling circulation water tank and other ancillary equipment.

3.2.5. Ground Wire (② in the figure):

Use copper tape to connect the ICP mainframe to the outdoor grounding point.

3.2.6. Argon Gas Inlet (③ in the figure):

Use a Φ6 PU pipe to connect the ICP mainframe to the argon gas cylinder.

3.2.7. Cooling Water Inlet and Outlet (④ in the figure):

Use a Φ10 water pipe to connect the ICP mainframe to the water tank.

3.2.8. Auxiliary Power

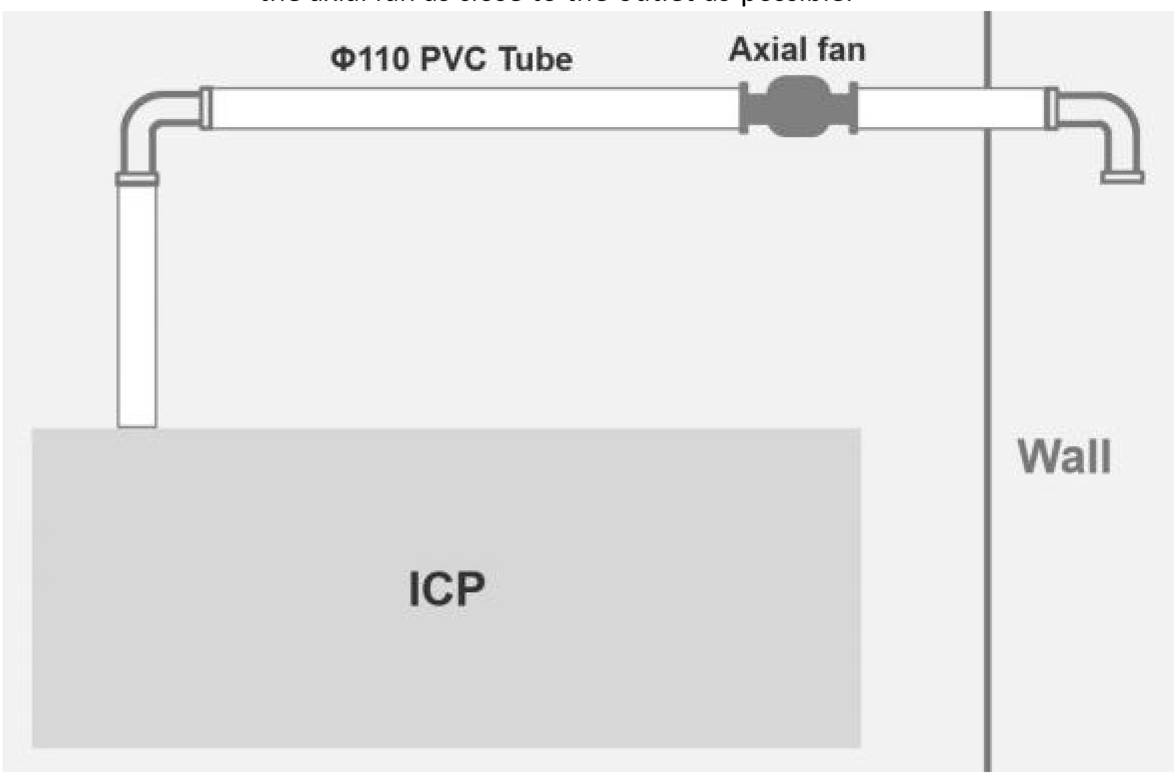
Plug the auxiliary power supply into the plug board.

3.2.9. Communications Interface

Connect the ICP mainframe to the computer using a serial cable.

3.2.10. Installation of exhaust duct

Install the exhaust ducting according to the diagram below, connecting the axial fan as close to the outlet as possible.




3.3. Acceptance

After completing the installation of the instrument, the acceptance process can begin. Before proceeding, carefully read the instruction manual to understand the functions of all switches and buttons, and familiarize yourself with the instrument's operation methods and procedures before starting its operation.

# 4. Hardware Operation

## 4.1. Startup Procedure

4.1.1. Power on the cooling water tank

4.1.2. Turn on the axial fan

4.1.3. Turn on the argon

4.1.4. Turn on the ICP main power supply

4.1.5. Turn on the auxiliary control power cord

4.1.6. Turn on the main power on the right side of the instrument

4.1.7. Turn on the carrier gas switch, immerse the capillary tube in pure water or any solution, and check if the sample is fed smoothly

4.1.8. After completing the above steps, wait for the instrument to warm up for 3-5 minutes and then start the ignition

## 4.2. Ignition Procedure

4.2.1. Turn on the carrier gas for 10 seconds and then turn off the carrier gas

4.2.2. Turn on the plasma gas

4.2.3. Turn on the high voltage

4.2.4. Click the ignition button

4.2.5. Turn on the carrier gas

## 4.3. Flame shut-off Procedure

4.3.1. Shut down high pressure

4.3.2. Turn off the plasma gas

4.3.3. Shut off the carrier gas

## 4.4. Shutdown Procedure

4.4.1. Turn off the main power on the right side of the instrument

4.4.2. Turn off the auxiliary control power cord

4.4.3. Turn off the ICP main power supply

4.4.4. Turn off the argon

4.4.5. Turn off the axial fan

4.4.6. Wait 10-15 minutes and switch off the power to the water tank

## 5. Software operation Procedure

### 5.1. Zero Scan

5.1.1. Click on "ZeroScan" in the top navigation bar, then select "Auto Scan" from the drop-down menu.

### 5.2. New Method

5.2.1. Click on "Method" in the top navigation bar, then select "New Method" from the drop-down menu

5.2.2. Enter the method name and click "OK"

5.2.3. Set up "PARAM" as shown below, then click "OK"

5.2.4. Click the + icon to add an element

5.2.5. Enter the element name in the search box on the right side of the pop-up window, double-click the element to add its spectral line, and click 'Cancel' to close the window

5.2.6. Select a spectral line and set 'Repeat Standard'. Assuming there are three standard solutions, modify STDLOW to STD1 (the lowest standard) and STDHIGH to STD3 (the highest standard).

5.2.7. Select a spectral line and set 'Std'. Assuming there are three standard solutions, arrange the standard names in ascending order as STD1, STD2, and STD3, and input the theoretical concentration corresponding to each standard.

5.2.8. Select a spectral line to set 'Ms.Unit'. Click the drop-down box next to 'Ms.Unit' on the right, and choose the unit of measurement (if the required unit is not available in the drop-down box, you can manually input it).

5.2.9. Click 'OK' to complete the setup.

### 5.3. Select Method

5.3.1. Click on "**Method**" in the top navigation bar, then select "**Select Method**" from the drop-down menu.

5.3.2. Double-click on the method name to select.

### 5.4. Auto Search

5.4.1. Click on the **"Auto Search"** button at the top, or click on **"Analysis"** in the top navigation bar, then select **"Auto Search"** from the drop-down list.

5.4.2. Click "OK" to start.

### 5.5. Auto Attenuate

5.5.1. Click on the **"Auto Attenuate"** button at the top, or click on **"Analysis"** in the top navigation bar, then select **"Auto Attenuate"** from the drop-down list.

5.5.2. Click “OK” to start.

5.6. Standard

5.6.1. Click on the **"Standard"** button at the top, or click on **"Analysis"** in the top navigation bar, then select **"Calibration"** from the drop-down list.

5.6.2. Ensure that the standard to be tested matches the actual standard, then click the **"Measurement"** button (repeat this operation until tests for STD1, STD2, STD3... STDn are completed).

5.6.3. After completing the standard test, click the **"Curve Smoothing"** button to verify whether the working curve meets the requirements (correlation coefficient ≥ 0.9995).

5.7. Sample

5.7.1. Click on the **"Sample"** button at the top, or click on **"Analysis"** in the top navigation bar, then select **"Analysis Sample"** from the drop-down list.

5.7.2. Enter the sample number and click the **"Measure"** button (repeat this operation until all samples have been tested).

5.8. View Test Results

5.8.1. Click on **"Preparation"** in the top navigation bar, then select **"Result"** from the drop-down list

## 6. Common Fault Resolution

| Process | Phenomenon | Inspection | Cause | Solution |
|---|---|---|---|---|
| Startup Stage | Water tank makes a beeping sound, water tank water - lack indicator light is on | Check if the water tank is short of water | Water tank is short of water | Add pure water to the water tank |
| | Open the right - side power supply of the instrument, the instrument does not start | Instrument main power not turned on | Voltage protection | Turn on the main power |
| | | Gas cylinder not turned on | Pressure protection | Turn on the gas cylinder |
| | | Gas pressure not in 0.25 - 0.4 Mpa | Pressure protection | Adjust the gas cylinder flow to 0.25 - 0.4 Mpa |
| | | Water tank not turned on | Water pressure protection | Turn on the water tank |
| | | Use a multimeter to check whether the water pressure switch is disconnected when the water tank is open and connected when the water tank is closed. Check if it is connected when the water tank is open and disconnected when the water tank is closed | Abnormal water pressure | Adjust the water pressure switch |

| | | | | |
|---|---|---|---|---|
| Ignition Stage | no Ignition | Check the purity of argon gas | Impure argon gas | Replace with new argon gas (≥99.99) |
| | | Ignition wire hook not hung well | Ignition wire not placed well | Stick and fasten the ignition wire hook tightly to the torch wall |
| | | Carrier gas opened during ignition | Carrier gas will blow out the flame during ignition | Close the carrier gas before ignition |
| | | After the high voltage is turned on, the voltage is too low | Preheating time is too short | Turn on the right - side power supply of the instrument, wait for 3 minutes of preheating, and then perform the ignition operation |
| | | Ignition - time, there is a mesh - like upward current at the torch tube, but no flame forms | Insufficient power | After a mesh - like current appears at the torch tube, increase the voltage until the flame forms |
| | | | Mismatch | 1. Open the upper right panel at the back of the instrument, find the white vacuum capacitor and make a mark |
| | | | | 2. Rotate the mark 1/4 turn to the left or right, and try to ignite |
| | | | | 3. Observe the strength of the current at the torch tube during ignition. If it becomes stronger, continue to rotate in the same direction until the flame forms; if the current becomes weaker during rotation, adjust in the opposite direction until the flame forms |
| | | | | 4. If the current is abnormal, adjust until the flame forms |
| | Ignition - after, flame goes out | Capillary tube not inserted into the solution | Air is sucked in | Ensure that the capillary tube is inserted into the solution in time |
| | | Torch tube installed too high or too low | Improper installation position of the torch tube | Re - adjust the torch tube. Ensure that the ignition coil is between the middle layer and the outer wall of the torch tube |
| | Ignition - time, there is arcing between the ignition coil and the torch tube | Small water droplets on the outer wall of the ignition coil | Water droplets conduct electricity and cause arcing | Wipe off the water droplets on the coil |
| | | The black insulating part of the ignition coil is damaged | Insulation sleeve is damaged | Replace the ignition coil |
| | | | | Clean or replace the torch tube |
| | | Torch tube touches the ignition coil | Improper matching between the torch tube and the ignition coil | Adjust the torch tube or the ignition coil to ensure that after installation, the torch tube is in the ignition coil |
| | Unstable Flame | Voltage and current values are too low | Insufficient power | Increase the instrument power |
| | | Torch tube/chamber is very dirty | Solution is adsorbed on the torch tube/chamber, causing sample contamination | Soak the torch tube/chamber in a 1:1 nitric acid or hydrochloric acid solution for 24 hours, then rinse with pure water, heat to boiling for about 20 minutes, then clean with pure water and dry |
| | | | | Replace the torch tube/chamber |

| | | | | |
|---|---|---|---|---|
| | | Water accumulates at the bottom of the torch tube | The interval between ignition times is too long | Dry the torch tube |
| | | Waste liquid bottle has air bubbles | Torch tube center channel is blocked | Soak the torch tube in a 1:1 nitric acid or hydrochloric acid solution for 24 hours, then rinse with pure water, heat to boiling for about 20 minutes, then clean with pure water and dry |
| | | | Torch tube center channel is burned out | Replace the torch tube |
| Detection Stage | No such communication port or the communication port has been opened by itself | Check if the serial port is connected | Serial port line is loose | Pull out the serial port line on the computer host and reinsert it |
| | | | | Pull out the serial port line on the right side of the ICP main unit and reinsert it |
| | Automatic alignment fails to find the peak | Capillary tube not inserted into the high - standard | Sampling error | Insert the capillary tube into the high - standard and re - align |
| | | Capillary tube is not smooth | Nebulizer is blocked | Remove the nebulizer, open the gas path, and use fingers to blow back and forth. If the blockage still exists after multiple blows, soak the nebulizer in a 1:1 nitric acid or hydrochloric acid solution for 24 hours, then rinse with pure water and dry |
| | | Waste liquid bottle has air bubbles | Torch tube center channel is blocked | Soak the torch tube in a 1:1 nitric acid or hydrochloric acid solution for 24 hours, then rinse with pure water, heat to boiling for about 20 minutes, then clean with pure water and dry |
| | | | Torch tube center channel is burned out | Replace the torch tube |
| | | Room temperature changes greatly | Large temperature difference | 1. Select the detection method to be used 2. Click "Modify Method" - "Analysis Line" - all lines "Restore Actual Length" 3. Re - align |
| | Curve fitting <0.9995 | Check if the standard solution is contaminated | Standard solution is contaminated | Re - configure the standard solution |
| | | | | The pure water for cleaning the capillary tube needs to be replaced daily. Note: Do not directly insert the capillary tube from the high - standard to the low - standard Note: Do not use standard solutions that have been placed for too long |
| | | Software element concentration input error | Actual solution concentration does not match the software setting | Adjust the standard solution concentration or the concentration content in the software |

| | | | | |
|---|---|---|---|---|
| | | Capillary tube inlet is not smooth | Nebulizer is blocked | Remove the nebulizer, turn on the carrier gas, and block the nebulizer nozzle with your hand to blow the impurities back into the solution. If it is still blocked after back - blowing, place the nebulizer in a 1:1 nitric acid or hydrochloric acid solution and soak for 24 hours |
| | | Small window runs peak | Instrument temperature changes too much | Control the instrument temperature to be stable at 25℃. Turn on the instrument auxiliary heating switch if necessary |
| | | Transmission system lacks oil or is contaminated | Transmission system needs maintenance | 1. Power off the instrument 2. While rotating the black knob, use a brush dipped in absolute ethanol to clean the oil stains between the copper gears twice 3. Evenly drop the watch oil between the copper gears |
| | Sample Result Deviation | Is the sample contaminated? | Sample is contaminated | Re - sample |
| | | Is the sample dissolved? | Sample has precipitation | Re - sample to ensure complete dissolution |
| | | Instrument temperature | Instrument temperature changes too much | Control the instrument temperature to be stable at 25℃. Turn on the instrument auxiliary heating switch if necessary |
| | | Capillary tube inlet is not smooth | Nebulizer is blocked | Remove the nebulizer, turn on the carrier gas, and block the nebulizer nozzle with your hand to blow the impurities back into the solution. If it is still blocked after back - blowing, place the nebulizer in a 1:1 nitric acid or hydrochloric acid solution and soak for 24 hours |
| | | Small window runs peak | Instrument temperature changes too much | Control the instrument temperature to be stable at 25℃. |
| | | Transmission system lacks oil or is contaminated | Transmission system needs maintenance | 1. Power off the instrument 2. While rotating the black knob, use a brush dipped in absolute ethanol to clean the oil stains between the copper gears twice 3. Evenly drop the watch oil between the copper gears |
| | | Sample content has a large deviation from the standard curve | Sample does not match the standard | Adjust the sample concentration or re - configure the standard solution that matches the sample |