



Thermal Type Aerosol Generator 3990-02

Operation Manual



01002

20. 06



Please carefully read and understand the warnings and precautions marked in this manual before using the product

For the convenience of long-term use, please keep this manual properly

Users Must Know

1. Before using this instrument, please read this manual carefully and be familiar with the relevant terms. .
2. Understand the basic electrical and mechanical principles before using the instrument
3. Operators shall be trained in the use of high-pressure gas instruments
4. Ensure the inert gas used by the instrument meets the pressure and flow requirements.
5. Ensure stable output pressure of the inert gas cylinder, and the minimum pressure is 345KPa (50PSI).
6. See 1.3 for applicable aerosol reagents.
7. For hoses, please use 3990-02 hose fittings and hoses.
8. If not strictly follow the requirements of this manual major safety accident such as instrument damage, fire, explosion, electric shock and casualties may be caused!!!

We define the types of warnings used in the manual as follows.

[Marking Instruction]



Warnings

Prevent personal accident

There may be a risk of personal accident for ignoring the contents of such warnings.



Precautions

Prevent damage to the instrument

The instrument may be damaged or its performance may be degraded for ignoring the contents of such warnings.

[Icon Instruction]



△ indicates precautions (including hazards). The specific content needing attention is drawn in the triangle box.



⊘ indicates prohibited items. Specific prohibited content is drawn in a circular frame.



● indicates mandatory behavior. The specific content is drawn near the icon.

⚠ Warnings



Warning: Electric Shock

○ Before the power supply is connected, the ground wire must be grounded, and the ground wire cannot be connected to the gas pipeline.

...Otherwise, it may lead to electric shock or fire.



Fire Warning

- Do not cover or block the aerosol outlet of the instrument.
- Only inert gas can be used as the air supply. Do not use compressed air or other flammable gases. Ensure that the air supply connection and input pressure are correct.
- Only the specified aerosol reagents can be used.
- Do not drain out the reagent in the liquid tank until the temperature drops. Please cut off the air supply and relieve the pressure of the inner gas circuit before opening the tank cover
- Do not move the instrument in the working state.

...Otherwise, it may lead to fire or even explosion.



Placement Prohibition

- Place the instrument horizontally and keep away from dangerous articles that may cause fire or explosion.
- It is forbidden to place the instrument in flammable, explosive, corrosive gas. ...Otherwise, it may lead to fire or even explosion.



Disassembly Prohibition

- Non-professionals should not disassemble or modify the instrument.
- ...Otherwise, it may lead to fire or even explosion.



High Temperature Warning

- Do not touch the aerosol outlet and its surrounding areas in the working state and before the cooling down of the instrument to prevent burns.
- Maintenance can only be performed after the instrument has cooled down

...Otherwise, it may lead to electric shock or fire.



Correct Use

- The high-pressure gas in the instrument without unloading may cause personal injury or damage the instrument. Close the air supply valve in time to cut off the air supply, and discharge the residual pressure in the inner gas circuit of the instrument by the button.
- ...Improper use may cause electric shock, fire or damage to sensors.



Transportation Warning

- Please empty all reagents inside the instrument liquid tank before transportation. ... Otherwise, this could lead to oil leakage, damage the instrument, contaminate the packaging or a fire

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Chapter I. Instrument Introduction

3990-02 is a thermal type, high-capacity aerosol generator. It has an inner heating element can quickly transform the liquid aerosol reagent into a vapor state, which is sent out by inert gas, nitrogen, carbon dioxide and other gases, and the vapor is rapidly cooled at the outlet to generate polydisperse aerosol.

The aerosol outlet is at the rear of the instrument, and all air holes in the outlet shall not be covered and blocked to limit the flow. The output is also used to connect the outlet adapter assembly of the glue feeder to introduce the output aerosol into the positive pressure test environment.

1.1 Product Features

2.4inch true color display screen, which can monitor the inner gas circuit pressure and heating zone temperature in real time;

Instant heating system, the heating time shall be less than 3 minutes;

The mechanical level gauge shows the oil level, so it is more intuitive to observe the liquid level;

High concentration aerosol output;

Applicable to a variety of types of aerosols;

It is easy to carry by equipping with shoulder straps and carrying straps;

Applicable to different flow rates of air conditioning systems;

Equipped with pressure relief valve to make the operation safer and more reliable;

1.2 Applications

Nuclear energy and fuel

Pharmaceutical industry and electronic industry

Medical operating room, clean room

Biosafety cabinet, clean bench

Food processing, scientific experiments

.....

1.3 Main Specifications

Generation Method	Thermal Type
Heating Settling Time	< 2 ~ 3mins reach the operating temperature 370°C
System Flow	833 ~ 119000m ³ /h(500 ~ 70000cfm)
Maximum Aerosol Concentration	100mg/m ³ @11900 m ³ /h(100µg/l@7000cfm) 10mg/m ³ @119000 m ³ /h(100µg/l@70000cfm)
Maximum Oil Consumption	19.8g/min
Full Oil Continuous Operation Time	70mins
Particle Size Distribution	Meet ANSI/ASME N509/510
Power	1050W
Power Source	110VAC 60Hz 15A 220VAC 50Hz 8A
Electric Fuse	A required 5×20mm , 8A,250V
Ambient Temperature	0°C ~ 40°C(32°F ~ 104°F Fahrenheit)
Ambient Humidity	5%RH ~ 95%RH (no condensation, ice-free)
Storage Temperature	-25°C~55°C (relative humidity is lower than 95%, no condensation)
Aerosol Reagent	PAO-4, DOS/DESH, Ondina EL, DOP/DEHP, mineral oil
The Capacity of Aerosol Liquid Tank	1.8L
Input Pressure of Compressed Inert Gas	345KPa(50PSI)
Inert Gas Consumption Rate (Continuous)	6L/min
Piping System Requirements	Negative pressure, if used in positive pressure system, a glue feeder needs to be connected (purchased separately)
Work Cycle	Intermittent operation, or after operating < 4 hours, shutdown > 1hour
Size (L×W×H)	430mm × 140mm × 360mm 16.3in x 5.5in x 13.8in
Weight	11Kgs

1.4 Packing List

When unpacking, please check the instrument and accessories according to the packing list. If there is any shortage or damage, please contact us immediately.

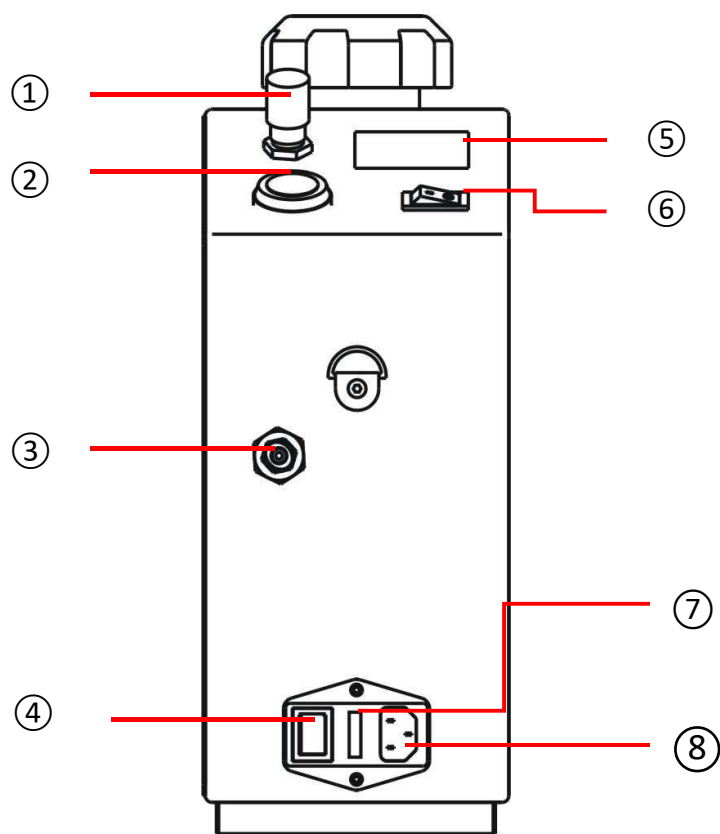
Name	Quantity
Main Engine	1
Carry belt	1
Shoulder Strap	1
Fuse	1
Power Supply Cord	1
Manual	1

1.5 Options

Name	Product Code
Portable Protective Box	399002-0010
Inert Gas Cylinder Pressure Regulating Assembly	399002-0020
Outlet Adapter Assembly	399002-0030
Glue Feeder	399002-0040

Chapter II. Configuration and accessories introduction

2. 1 Front part of main engine



No.	Name	Function	Remarks
①	Metering valve	control aerosol output concentration	
②	Pressure relief button	after the instrument is used, discharge the residual high-pressure gas in the inner gas circuit of the instrument	
③	Inert gas source connector	connect the instrument with inert gas source with a ϕ 8 gas pipe	
④	Power switch	turn the instrument on or off	
⑤	Display screen	can simultaneous display the real-time temperature and pressure of the instrument	
⑥	Aerosol switch	Control the output of aerosol	
⑦	Fuse	Prevent the instrument from burning due to excessive current	
⑧	Power socket		



Precaution

1. The pressure and temperature of the product have been set before leaving the factory. The users cannot set the pressure and temperature by themselves.
2. The instrument can work normally only when the real-time pressure and temperature of the instrument reach the set value.



Precaution

After the instrument is used, please be sure to close the air supply valve first, and then press the pressure relief button to discharge the high-pressure gas remaining inside the instrument!



Precaution

1. The metering valve is used to adjust the output concentration of aerosol, rotate counterclockwise to increase the concentration, and rotate clockwise to reduce the concentration
2. The metering valve shall be rotated clockwise to the end before startup. After startup, in order to ensure the quality of aerosol output, when the metering valve is rotated counterclockwise to increase the concentration, the rotation speed shall not exceed 2 turns per minute. Rapidly increasing the number of turns will cause the liquid aerosol to be insufficiently heated and output in the form of fine oil droplets, which may result in a fire.



Precaution

Inert gas shall be used as the air supply, and the output pressure shall be stabilized at 345KPa±7KPa (50PSI±1PSI) to ensure the generation of aerosol with stable concentration.

Compressed air cannot be used as air supply! In case of explosion or fire!



Precaution

Installation of fuse of non-specified types will cause damage to the instrument.

Fuse Model: 5×20mm , 8A,250V

5×20mm , 15A,110V



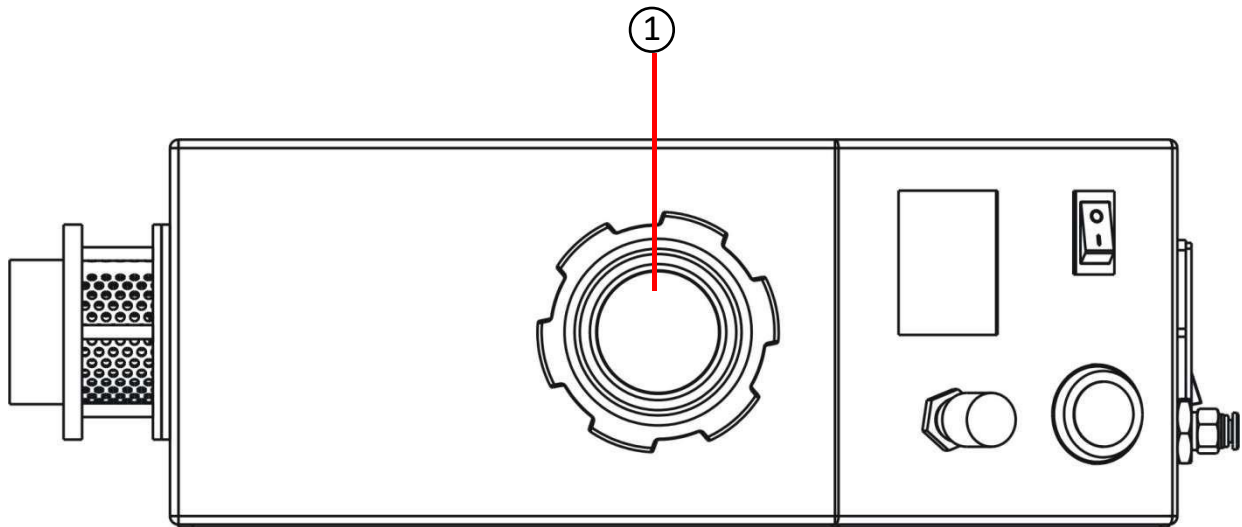
Precaution

Please supply power according to the voltage range marked on the label on the rear panel of the instrument to avoid damage to the instrument

1) 100 ~ 120V 60Hz 15A

2) 220 ~ 240V 50Hz 8A

2.2 Upper part of main engine



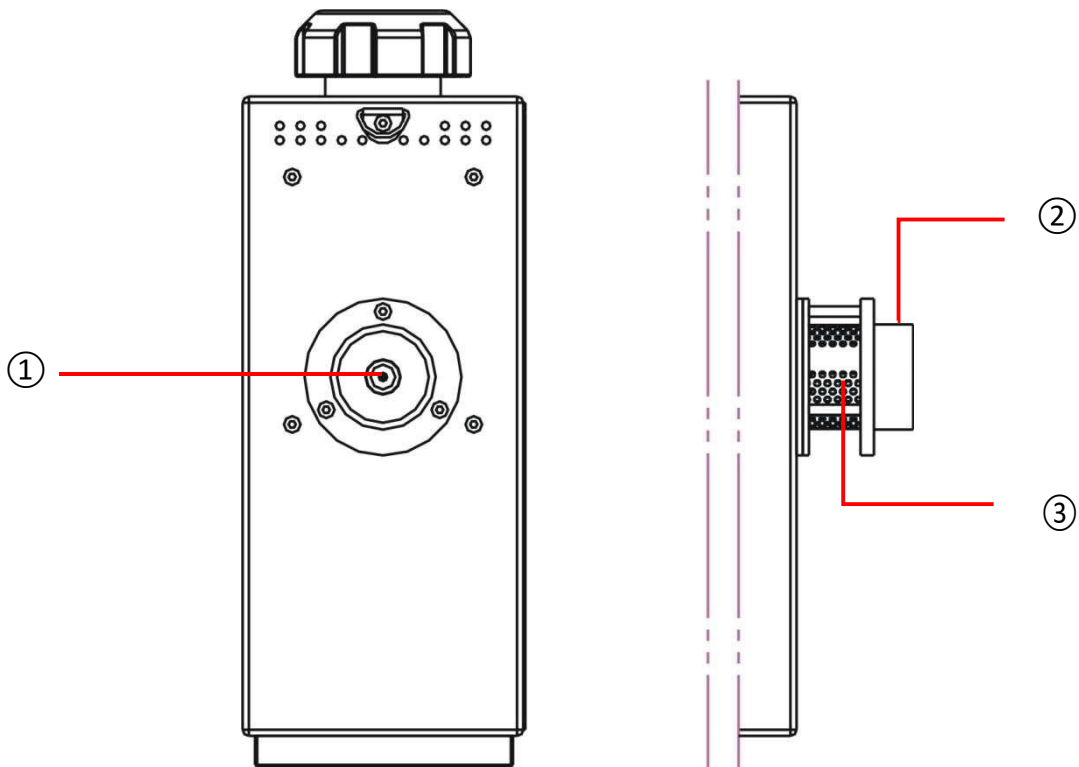
No.	Name	Function	Remarks
①	Cover Type Level Gauge	Indicates the approximate amount of liquid reagent in the tank. Unscrew the cover to separate from the liquid tank, then inject or pour out the reagent. After the reagent is injected or poured out, be sure to tighten the cover to prevent oil or gas leakage!	  



Precaution

1. Under working condition, the reagent in the liquid tank shall not exceed position F (the full-scale indication of the level gauge), and the reagent shall be added in time when it reaches or approaches position E (the minimum liquid level)!
2. Before adding reagent, be sure to press the pressure relief button to discharge the residual high-pressure gas inside the instrument, and then unscrew the cover to prevent damage to the instrument or personal injury!
3. After the liquid injection, be sure to tighten the cover to ensure the airtightness of the gas circuit system and prevent gas leakage from damaging the instrument, causing personal injury or other accidents.
4. Before transportation, all residual liquid inside the instrument shall be drained from this port to prevent instrument damage, fire or other safety accidents caused by oil leakage!

2.3 Rear part of main engine



No.	Name	Function	Remarks
①	Output Nozzle	outlet for aerosol vapor	
②	Output Neck	Can be connected to 2" connector or select outlet adapter assembly (see 1.5 Options for details)	
③	Quenching Hole	Mixes outside air into the aerosol vapor stream to condense the vapor and prevent combustion	



Precaution

The output nozzle shall not be blocked or have sediment to ensure stable aerosol output!



Precaution

The quenching hole shall not be covered or blocked to prevent explosion or fire!

Chapter III. Operation

3.1 Preparation before startup

Safety check shall be conducted before each startup. The unqualified items shall be handled until the requirements are met, and then can startup for use. Safety inspection items include:

1. Power supply cord: no aging, wear and tear, no bifurcated wires and other defects that affect electrical performance and cause leakage. Replace the power supply cord when necessary and only the power supply cord provided by GTI can be used.
2. Check that the inert gas is consistent with the identification, the gas cylinder pressure is sufficient, and the pressure regulating valve works normally.
3. Check the external gas connecting pipeline to ensure that there is no leakage, cracking, knotting, wear and other hidden dangers.
4. The Liquid aerosol reagent shall be clean, transparent and consistent with the container label.
5. Close the air supply valve, press the pressure relief button of the instrument, and discharge the residual oil-gas mixture in the internal pipeline of the instrument.
6. Place the instrument at the place where it needs to be used and make it easy to operate.
7. Do not move the instrument once it has started working.



Precaution

The reagent shall be clean and free of impurities to prevent clogging of the internal pipeline!

3.2 Operation



Precaution

The operators shall operate the instrument safely onsite. The instrument shall be guarded by relevant operators on site when it is powered on.

1. Observe the position of the level pointer, unscrew the hexagonal level cap, inject an appropriate amount of reagent into the liquid tank, the liquid full position is about 50mm high from the upper port (the height of one finger and two joints), tighten the level cap, and wipe off the oil stains on the surface of the instrument.
2. Check that all knobs, valves and gas circuits of the instrument are not damaged. Before use, wipe off the oil stains on the surface of the instrument, ensure that the aerosol switch is in the "off" state, and the metering valve is fully closed (turn clockwise to the end).
3. Press the pressure relief button to exhaust the residual gas in the internal pipeline of the instrument, and check whether the exhaust is smooth.



Precaution

1. Paraffin oil and corn oil cannot be used in this instrument.
2. See 1.3 for the aerosol reagent applicable to this instrument.

4. Inert gas source, adjust the output pressure to be stable at $345\text{KPa} \pm 7\text{KPa}$ ($50\text{PSI} \pm 1\text{PSI}$). Compressed air, non-inert or flammable gas shall not be used as the gas source!



Precaution

The annular hole of the output at the rear of the instrument shall not be covered or blocked, otherwise it will cause a fire!

5. Turn on the power switch. Wait for the internal temperature of the instrument to rise to the set value
6. Do not turn on the aerosol switch until the temperature and pressure reach the normal working range and the screen display value and the red background disappear.
7. Slowly adjust the metering valve counterclockwise, rotate it about 2 turns, and aerosol will be generated after about 10s. Once the aerosol is generated, slowly rotate the metering valve counterclockwise until the aerosol concentration meets the requirements.



Precaution

In order to ensure the quality of aerosol output, when the metering valve is rotated counterclockwise, the rotation speed shall not exceed 2 turns per minute. Rapidly increasing the number of turns will cause the liquid aerosol to be insufficiently heated and output in the form of fine oil droplets, which may result in a fire.

3.3 Shutdown

1. Turn off the aerosol switch.
2. Tighten the metering valve clockwise to end.
3. The aerosol at the outlet is naturally discharged.
4. Turn off the power switch.
5. Close the inert gas source valve, but do not disconnect the gas circuit.
6. Press the pressure relief button continuously until no residual gas or liquid is discharged.
7. Disconnect the external gas circuit, and unplug the power supply cord, the devices and pipelines connected to the output of the instrument.
8. Cool down the instrument for 10 minutes.
9. If the generator will not be used within 24 hours, the residual liquid aerosol reagent in the liquid tank shall be poured out to other designated containers, and the containers shall be marked properly.



Precaution

Be sure to shut down the instrument according to the above shutdown steps, otherwise it will cause damage to the instrument, fire or personal injury!

3.4 Replace aerosol reagent



Precaution

1. Paraffin oil and corn oil cannot be used in this instrument.
2. See 1.3 for the aerosol reagent applicable to this instrument.
3. The reagent shall be clear, transparent and free of contamination.

1. Unscrew the level cap until it is separated from the liquid tank
2. Pour out the residual reagent in the tank
3. Inject appropriate amount of new reagent.
4. Re-tighten the level cap.
5. The reagent spilled on the surface of the housing shall be wiped off.



Precaution

- 1 . Do not overfill the liquid. The instrument can work normally only when the liquid level is below the full scale!
- 2 . The reagent spilled on the surface of the housing shall be wiped off
- 3 .Before transportation, all residual liquid inside the instrument shall be drained to prevent instrument damage, fire or other safety accidents caused by oil leakage!

Chapter IV. Maintenance

4.1 Replace fuse

	1. Cut off the power supply. 2. Confirm that the current is correct. 3. Remove the fuse cover with a flat-blade screwdriver. 4. Take out the fuse and check whether the fuse is blown.
	5. Replace the fuse with the specifications listed below and close the fuse box cover. 6. Reconnect the power supply.



Precaution

Please supply power according to the voltage range marked on the label on the rear panel of the instrument to avoid damage to the instrument

- 1) 100 ~ 120V 60Hz Fuse Model: 5×20mm , 15A
- 2) 220 ~ 240V 50Hz Fuse Model: 5×20mm , 8A



Precaution

If the instrument fuse has been blown multiple times, please contact GTI.

4.2 Maintenance before use

To ensure the safe operation of the instrument, please follow the steps below for maintenance before each use.

1. Clean the surface of the instrument, wipe off the residual oil stains on the surface, and do not use flammable solvents.
2. Check that the instrument has no liquid reagent leakage and the output nozzle has no blockage or sediment.
3. Check whether the output neck is loose, and tighten it if necessary.
4. Check whether the instrument components are loose, and tighten them if necessary.
5. Clean any sediment at the nozzle opening.

4.3 Periodic maintenance

The instrument can be returned to the GTI authorized agency for annual inspection, maintenance and other services. For details, please consult the dealer.



Precaution

The work cycle of the instrument should be intermittent, or after operating <4 hours, shutdown > 1hour.



Precaution

Users are not allowed to dismantle or repair the internal components without authorization. Problems with any components inside the product must be handled and repaired by a GTI authorized service organization.

Chapter V. Common Faults and Treatments

It takes too long for the instrument to reach the set temperature

Possible Causes	Solutions
Insufficient warm-up time for the instrument	Wait for the instrument to warm up for 3 minutes
Heating components are damaged	Contact GTI authorized maintenance department
Temperature control components are damaged	Contact GTI authorized maintenance department

Abnormal airflow noise inside the instrument

Possible Causes	Solutions
Incorrect inert gas source pressure	Adjust the inert gas output pressure to 345KPa±7KPa(50PSI±1PS)
Leakage in the internal pipeline of the instrument	Contact GTI authorized maintenance department

Aerosol output is unstable

Possible Causes	Solutions
Aerosol pipeline blocked or partially blocked	Return to GTI authorized agency for repair
Leakage of level cap	Tighten the level cap and replace it if necessary
The operating temperature has not reached the set temperature	Turn off the aerosol switch and wait at least 3 minutes to make the heating zone reach the set temperature and remain stable
Incorrect inert gas source pressure	Adjust the inert gas output pressure to 345KPa $\pm$ 7KPa(50PSI $\pm$ 1PS
The inert gas pipeline is blocked, knotted or leaked	Check the air supply line and replace it if necessary
The pressure regulating valve is damaged, and the internal pressure of the instrument is lower than the set pressure	Contact GTI authorized maintenance department
Internal solenoid valve is damaged	Contact GTI authorized maintenance department

Aerosol state is abnormal

Possible Causes	Solutions
The generator is not purified and exhausted	Turn off the aerosol switch and press the pressure relief button for 1 minute
Incorrect inert gas source pressure	Adjust the inert gas output pressure to 345KPa $\pm$ 7KPa(50PSI $\pm$ 1PS
The temperature has not reached the set temperature	Turn off the aerosol switch and wait at least 3 minutes to make the temperature reach the set temperature and remain stable, tighten the level cap, and replace it if necessary.
Internal pressure regulating valve is damaged	Contact GTI authorized maintenance department
Excessive adjustment of metering valve opening	Turn off the aerosol switch, press the pressure relief button to purify the internal gas circuit, wait for 3 minutes to make the instrument's temperature reach the set temperature and remain stable, adjust the metering valve clockwise for several turns to reduce the opening, turn on the aerosol switch, and when the metering valve is rotated counterclockwise again, the rotation speed shall not exceed 2 turns per minute, and adjust the aerosol output concentration to the required one.

No aerosol output

Possible Causes	Solutions
No reagent in the liquid tank	Refill reagent into the liquid tank
Aerosol switch is in the "off" state	Turn on the aerosol switch
Metering valve unopened	Turn the metering valve counterclockwise to open it
Heating temperature has not reached the set temperature	Ensure that the inert gas is connected to the instrument and wait for the instrument to warm up for 3 minutes
Leakage of level cap	Tighten the level cap and replace it if necessary
Incorrect inert gas source pressure	Adjust the inert gas output pressure to 345KPa $\pm$ 7KPa(50PSI $\pm$ 1PS
Heating components are damaged	Contact GTI authorized maintenance department
Gas source not supplied	Open the inert gas source valve and connect it to the gas circuit of the instrument.

Chapter VI. Warranty and After- Sale Service

6.1 Warranty

Under the premise of carefully reading the product manual and operating properly according to its instructions, if there is any product quality problem, the warranty shall be 1 year from the date of purchase.

6.2 After- Sale Service

In case of instrument failure, please check and eliminate the failure by yourself first.

If the failure cannot be eliminated, please contact us (please refer to the last page of the manual for contact information).

Repairs under warranty. We will provide free repairs for the failures caused by our manufacturing.

Repairs outside the warranty period. After the warranty period expires, if the user wants to maintain the function and accuracy of the instrument through repairs, we will provide paid repairs according to the user's requirements.

Retention period for repaired parts. Repaired parts shall be retained for at least 5 years after the product is discontinued. The retention period is a repairable period, please contact us for details. Annual maintenance services are provided by GTI or partners trained and certified by GTI service system, or by authoritative verification agencies.

Please provide the below information for after-sale service	
* Product Name	-----
* Product Model	-----
* Product ID	-----
* Symptom	As detailed as possible
* Purchase Date	Year/Month/Day



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