

Agilent ICP-MS

Interactive Troubleshooting tool for Low sensitivity

Rev. B

2017, January, 20

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Preconditions

- 7900, 7800, 7700, or 8800 ICP-MS is used.
- Sample introduction type is “PeriPump”. If you are using a special configuration such as LC/GC integration or ISIS, setup the instrument with standard configuration.
- You have the “Hardware Maintenance Manual” for your instrument. Some details of the operations are not in this tool. You should refer to the manual.

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Legends

Note

Notes or tips that help troubleshoot.

Reference

You need to refer to another document for detail of the steps.

Good

Good example of situation.

Bad

Bad example of situation.

Did the ion lens test pass?

buttons such as or

← Questions are displayed in blue you need to click

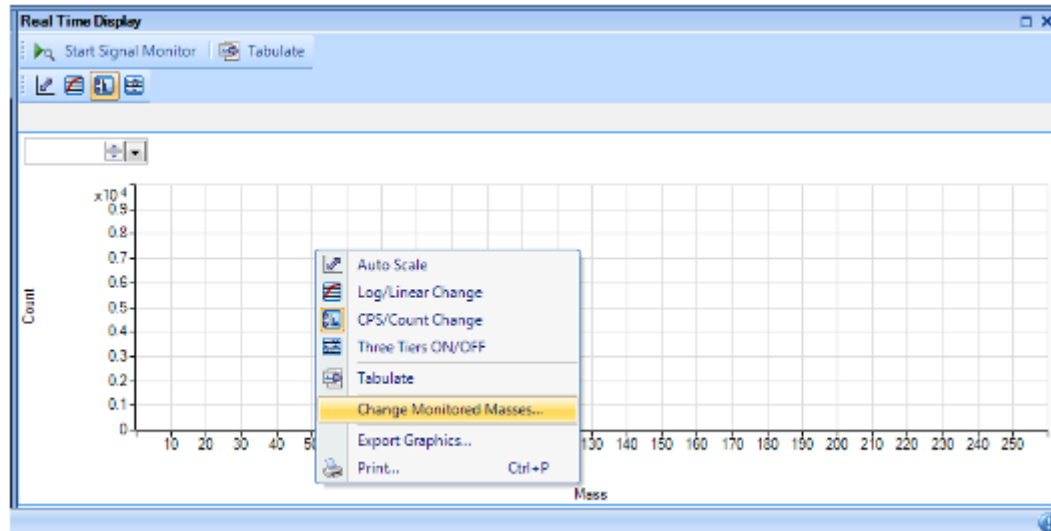
Based on your answer the tool will navigate you to next step.

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1.1.1 Signal monitor using mass 12, 56, and 80

- (1) Ignite plasma
- (2) Introduce pure water
- (3) Go to "Queue" Pane → "Real Time Display" → "Start Signal Monitor"
- (4) Right click on the pane and select "Change Monitored Masses..."



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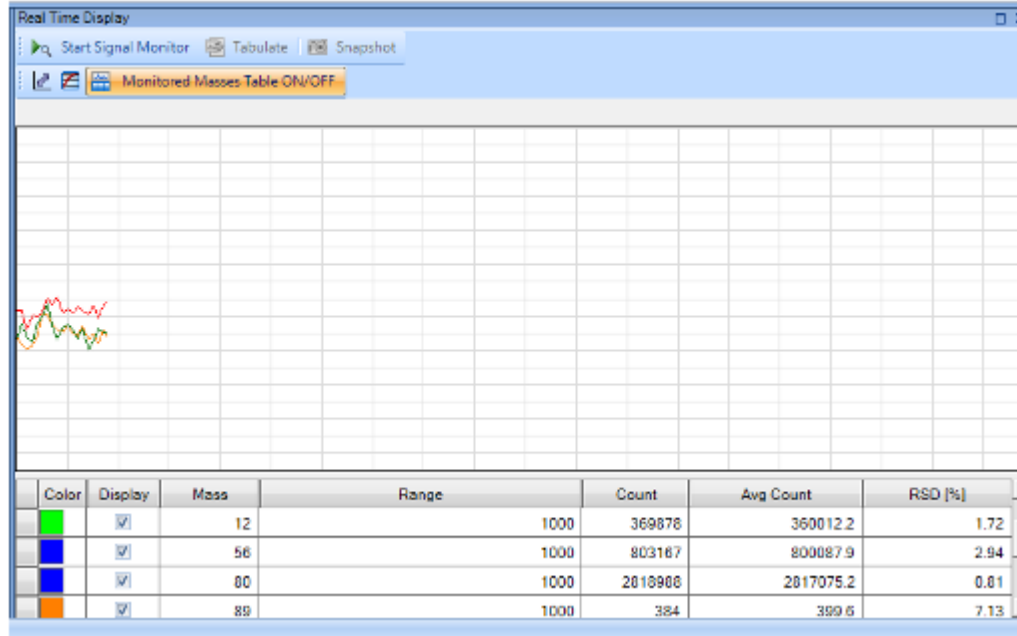
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1.1.2 Signal monitor using mass 12, 56, and 80

(5) Add measured mass 12, 56, and 80.

(6) Click "Signal Monitor" and check counts of 12, 56, and 80.

(7) Are all counts of 12, 56, and 80 zero ?



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Yes

No

1.2.1 Adjust res/axis using mass 12, 56, and 80

- (1) Go to "Startup" Pane and set the following. "Select Custom Setting" = OFF.
"Monitored Masses" = 12, 56, 80 (Just type "12 56 80" in the box).

Startup

... Add to Queue ... **Select Custom Settings** ... Auto Sampler ▾ ... Nebulizer Pump Speed ▾

Hardware Settings	On
Torch Axis	<input checked="" type="checkbox"/>
EM	<input checked="" type="checkbox"/>
▶ Plasma Correction	<input checked="" type="checkbox"/>
Standard Lenses Tune	<input type="checkbox"/>
Resolution/Axis	<input checked="" type="checkbox"/>
Performance Report	<input type="checkbox"/>
Full Spectrum	<input type="checkbox"/>
P/A Factor	<input type="checkbox"/>

Standard Setting

Vial# <Manual> ☐ Monitored Masses ☐

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1.2.2 Adjust res/axis using mass 12, 56, and 80

(2) Check “On” for “Resolution Axis”. Uncheck the others. Click “Add to Queue” to Execute startup.

Startup

☒ Add to Queue ☐ Select Custom Settings ☐ Auto Sampler ☐ Nebulizer Pump Speed

Hardware Settings	On
Torch Axis	<input type="checkbox"/>
EM	<input type="checkbox"/>
Plasma Correction	<input type="checkbox"/>
Standard Lenses Tune	<input type="checkbox"/>
Resolution/Axis	<input checked="" type="checkbox"/>
Performance Report	<input type="checkbox"/>
Full Spectrum	<input type="checkbox"/>
P/A Factor	<input type="checkbox"/>

Standard Setting

Viol# ☐ Monitored Masses: ☐

(3) Did the startup task end without error ?

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Yes

No

1.3.1 Adjust EM voltage

(1) In the same manner, check “On” for “EM”. Uncheck the others. Click “Add to Queue” to Execute startup.

Startup

☒ Add to Queue ☐ Select Custom Settings

Hardware Settings	On
Torch Axis	<input type="checkbox"/>
EM	<input checked="" type="checkbox"/>
Plasma Correction	<input type="checkbox"/>
Standard Lenses Tune	<input type="checkbox"/>
► Resolution/Axis	<input type="checkbox"/>
Performance Report	<input type="checkbox"/>
Full Spectrum	<input type="checkbox"/>
P/A Factor	<input type="checkbox"/>

Standard Setting

Vial# ☐ Monitored Masses:

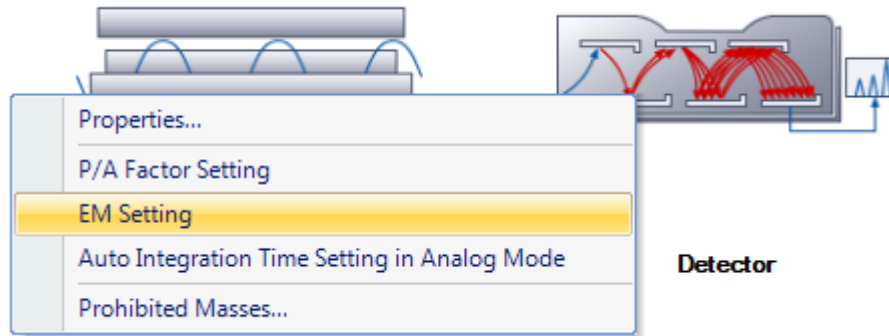
(2) Did the startup task end without error ?

Yes

No

1.4.1 Check EM voltage

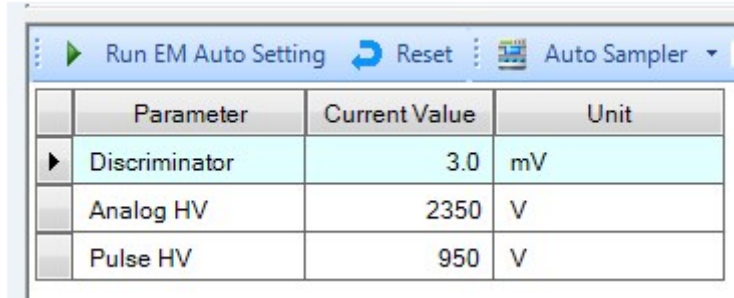
(1) Go to "Hardware" Pane. Right click on "Detector" and select "EM Setting" from the menu.



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1.4.2 Check EM voltage

(2) Confirm optimized value of Analog HV, Pulse HV



	Parameter	Current Value	Unit
▶	Discriminator	3.0	mV
	Analog HV	2350	V
	Pulse HV	950	V

(3) Do any exceed the values below?

Analog HV: 3300 V

Pulse HV: 1800 V

If exceeded, your EM has come to the end of it's life. You need to replace.

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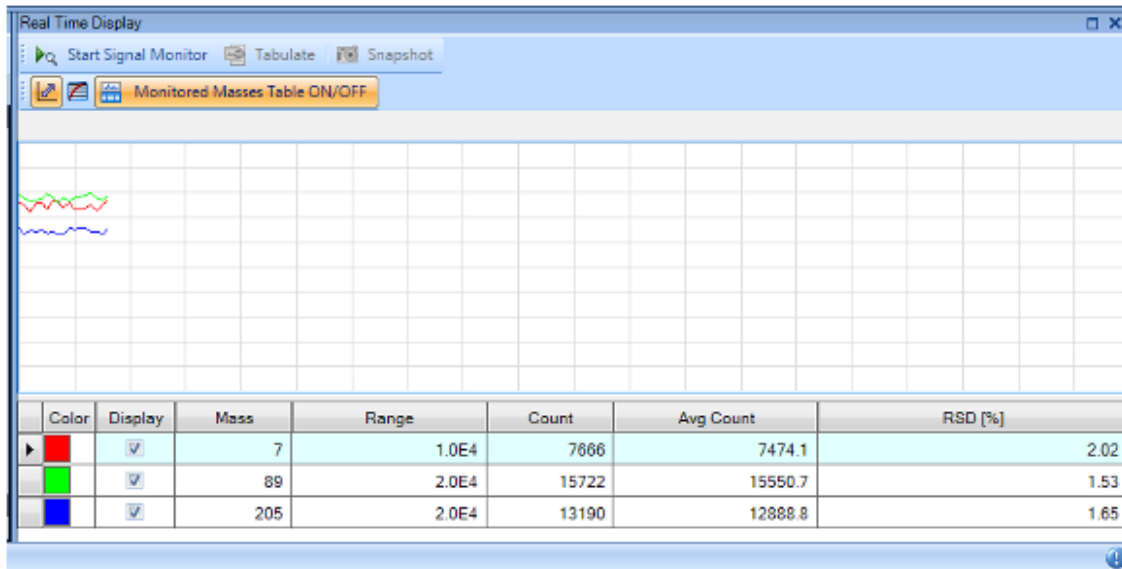
Yes

No

1.5.1 Signal monitor using tune solution

(1) Introduce tune solution.

(2) Go to "Queue" Pane → "Real Time Display" → "Start Signal Monitor" and acquire signal of mass 7, 89, 205.



(3) Are all counts of 7, 89, and 205 high enough ?

Yes

No

1.6.1

(1)Do you use gas modes ?

Yes

No

1.7.1 Check sensitivity for gas modes

- (1) Introduce tune solution.
- (2) Open the batch in which you intend to use the gas modes.
- (3) Go to "Batch" pane→"Tune" tab.
- (4) Run "Start Signal Monitor" for all gas modes.
- (5) Are all counts of 59, 89, and 205 high enough ?

Yes

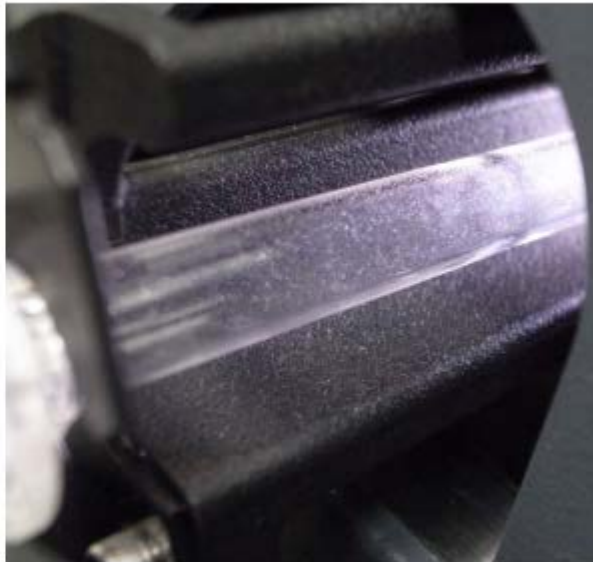
No

1.8.1 Check aerosol

(1) Can you see aerosol from spray chamber?



Good You can see aerosol flowing.



Bad You can see no aerosol.

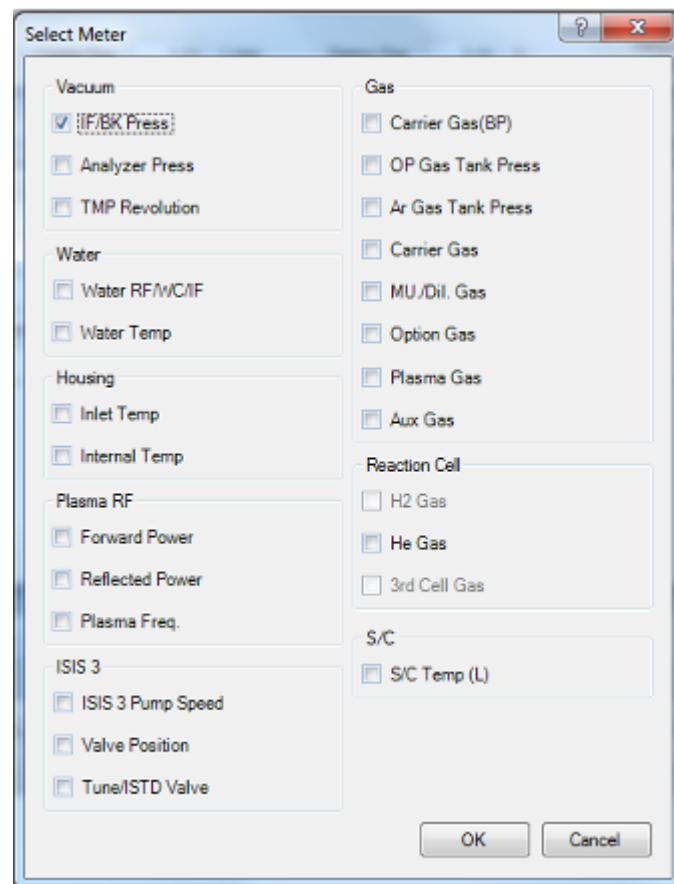
Note The aerosol is subtle, especially when micro flow nebulizer is in use. If it is not clear, regard it as “No”.

Yes

No or not clear

1.9.1 Check IF/BK pressure

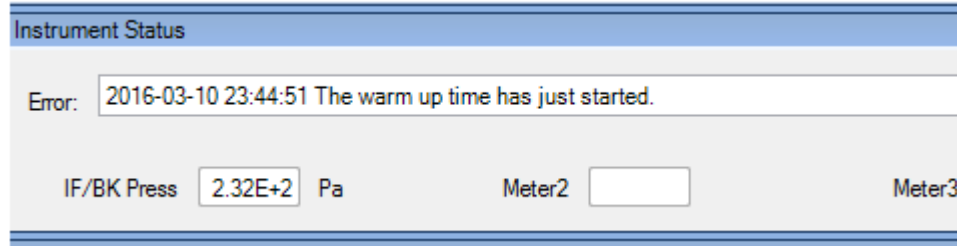
- (1) Select “View” → ”Meters” in main menu of ICP-MS Instrument Control.
- (2) Check “IF/BK Pressure”



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1.9.2 Check IF/BK pressure

(3) Display "Instrument Status" using "View" → "Instrument Status".



The screenshot shows a software window titled "Instrument Status". Inside, there is an "Error:" label followed by a text box containing the message "2016-03-10 23:44:51 The warm up time has just started." Below the error message, there are three data fields: "IF/BK Press" with a value of "2.32E+2" and unit "Pa", "Meter2" with an empty input box, and "Meter3" with an empty input box.

(4) Does the IF/BK pressure satisfy the criteria below?

7700, 7800, 8800: Below 270Pa

7900: Below 170Pa

Note If you are using s-lens, check the pressure in Hot mode.

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Yes

No

1.10.1 Check cones (without high IF/BK pressure)

(1) Turnoff plasma

(2) Remove sampling cone and skimmer cone. For details, refer to Hardware Maintenance manual.

Reference Hardware Maintenance Manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Removal"

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1.10.2 Check cones (without high IF/BK pressure)

(3) Check if there are any faults in the orifice, such as clogging or distortion.



Good Skimmer cone in good condition.



Bad Skimmer cone with distorted orifice.

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1.10.3 Check cones (without high IF/BK pressure)



Good Sampling cone in good condition.

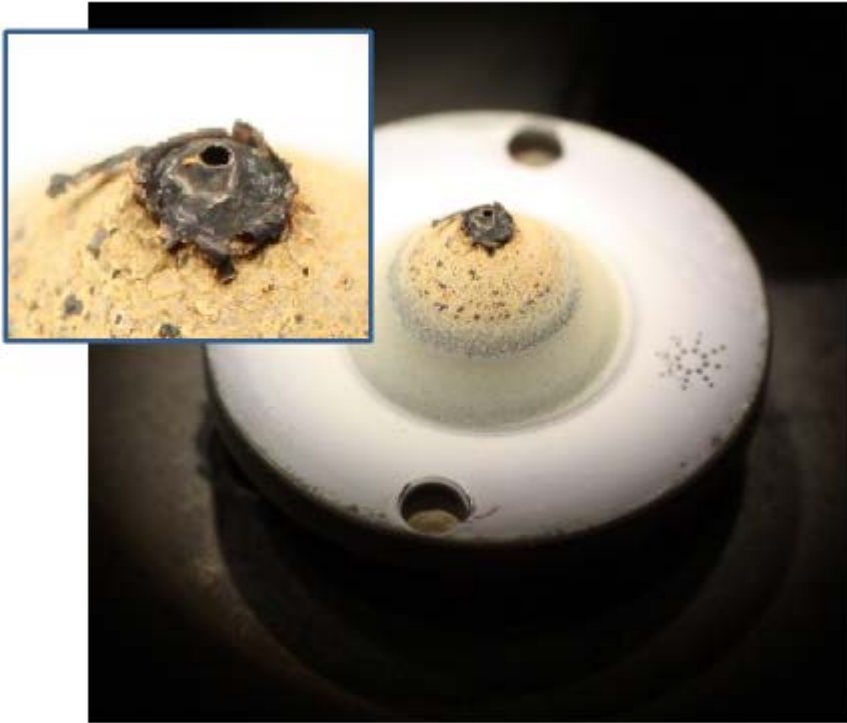


Bad Sampling cone with distorted orifice.

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1.10.4 Check cones (without high IF/BK pressure)



Bad Dirty skimmer cone whose orifice is nearly clogged.

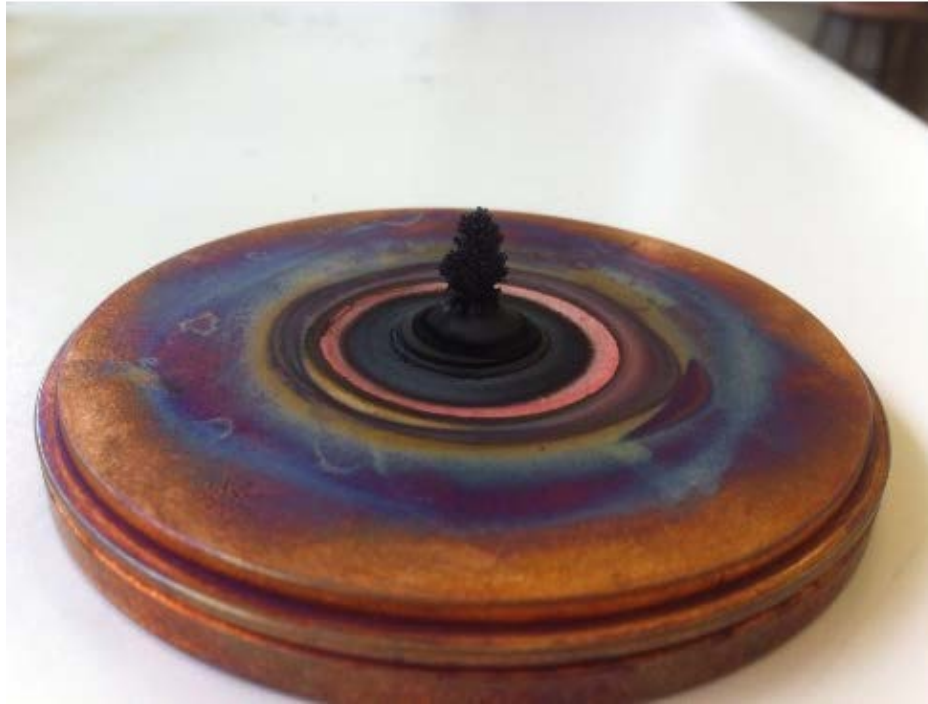


Bad Dirty sampling cone whose orifice is nearly clogged.

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1.10.5 Check cones (without high IF/BK pressure)



Bad Completely clogged sampling cone due to carbon formation caused by poor option gas supply in organic solvent analysis.

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1.10.6 Check cones (without high IF/BK pressure)

(4) Any fault regarding skimmer cone or sampling cone orifice found?

Reference Hardware Maintenance manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Check the orifice"

Note Distortions of cones are subtle, especially with skimmer cone. If it is not clear, regard it as "Yes".

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Yes or not clear

No

1.11.1 Maintain cones

(1) If distortion was found or not clear, replace it.

Reference Hardware Maintenance manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Installation"

(2) If clogging was found, clean it.

Reference Hardware Maintenance manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Cleaning the Cones"

(3) Ignite plasma.

(4) Introduce tune solution

(5) Are all counts of 7, 89, and 205 high enough?

Yes

No

1.12.1 Check cones (with high IF/BK pressure)

(1) Turnoff plasma

(2) Remove sampling cone and skimmer cone. For details, refer to Hardware Maintenance manual.

Reference Hardware Maintenance Manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Removal"

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1.12.2 Check cones (with high IF/BK pressure)

(3) Check if there are any faults in the orifice, such as clogging or distortion.



Good Skimmer cone in good condition.



Bad Skimmer cone with distorted orifice.

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1.12.3 Check cones (with high IF/BK pressure)



Good Sampling cone in good condition.



Bad Sampling cone with distorted orifice.

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1.12.4 Check cones (with high IF/BK pressure)

(4) Any fault regarding skimmer cone or sampling cone orifice found?

Reference Hardware Maintenance manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Check the orifice"

Note Distortions of cones are subtle, especially with skimmer cone. If it is not clear, regard it as "Yes".

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Yes or not clear

No

1.13.1 Maintain cones

(1) If distortion was found or not clear, replace it.

Reference Hardware Maintenance manual → "Maintenance" "Interface" → "Sampling Cone and Skimmer Cone" → "Installation"

(2) Ignite plasma.

(3) Display "IF/BK Pressure" meter.

(4) Does the pressure satisfy the criteria below?

7700, 7800, 8800: Below 270Pa

7900: Below 170Pa

Note If you are using s-lens, check the pressure in Hot mode.

Yes

No

1.14.1

(1) Introduce tune solution.

(2) Are all counts of 7, 89, and 205 high enough ?

Yes

No

1.15.1

(1) Ignite plasma

(2) "Display "IF/BK Pressure" meter.

(3) Does the pressure satisfy the criteria below?

7700, 7800, 8800: Below 270Pa

7900: Below 170Pa

Note If you are using s-lens, check the pressure in Hot mode.

Yes

No

1.16.1 Check torch box

- (1) If plasma is ON, turn off.
- (2) Open torch box. Remove torch.

Reference Hardware Maintenance manual → "Maintenance" → "Torch Area"

- (3) Check if torch, shield plate, shield contact are OK (from the next page).

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1.16.2 Check torch box

Check if shield plate is installed.



Good With shield plate.



Bad Without shield plate.

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1.16.3 Check torch box

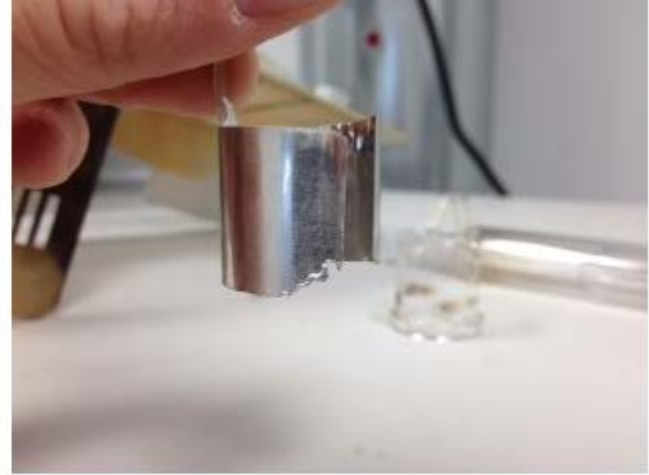
Check if shield plate is damaged.



Good Good shield plate.



Bad Damaged shield plate.



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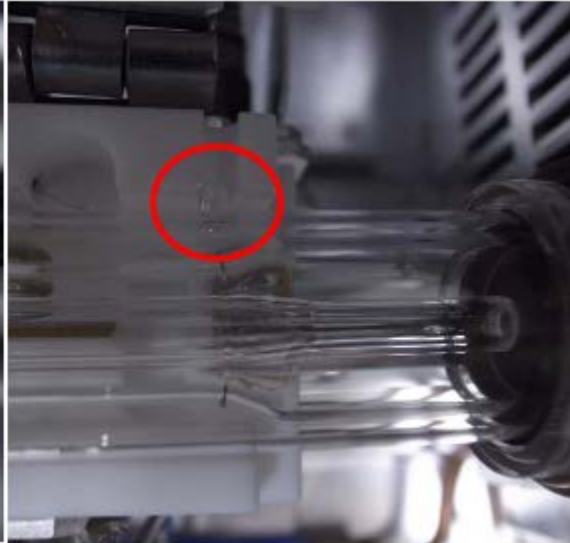
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1.16.4 Check torch box

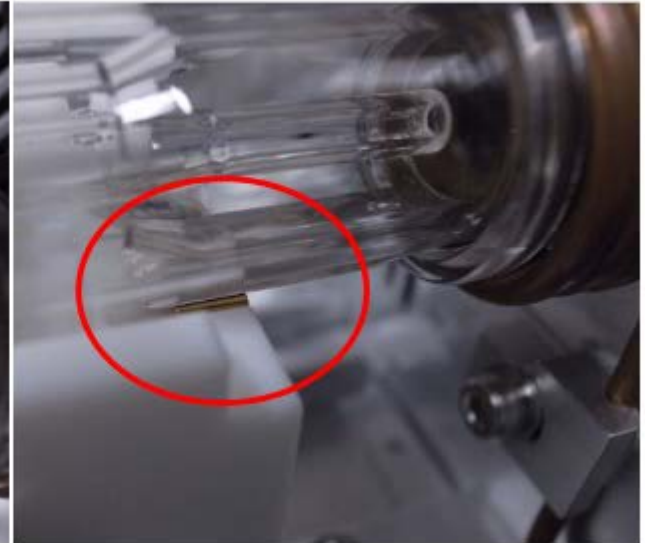
Check if shield/torch is correctly assembled.



Good Set the projection on torch in the hole of the shield plate .



Good Set the projection on torch in the notch of the holder.



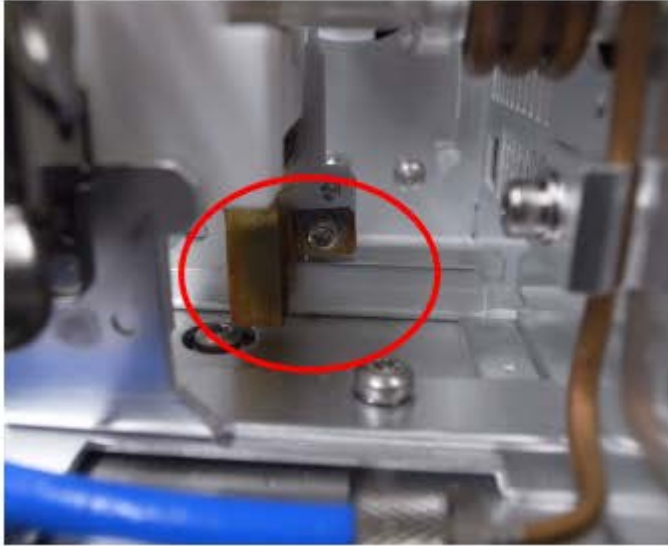
Good Good contact between shield plate and shield contact.

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1.16.5 Check torch box

Check shield contact.



Good Shield contact in good condition.



Bad Damaged shield contact.

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1.16.6 Check torch box

Check torch

Bad Clogging (No image)

Bad Significant distortion (No image)

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1.16.7 Check torch box

(4) Is there any failure of torch, shield plate, shield contact?

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Yes

No

1.17.1

(1) Is the shield contact damaged ?

Yes

No

1.18.1 Maintain torch box

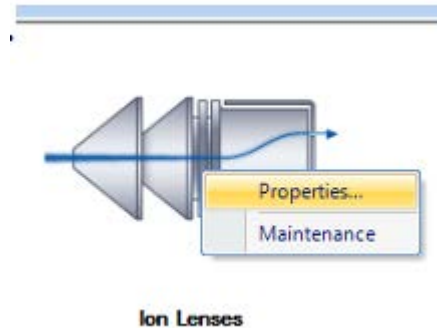
- (1) If shield plate is missing set a shield plate.
- (2) If shield plate is damaged, replace.
- (3) If the torch is clogged, clean or replace.
- (4) Ignite plasma.
- (5) Introduce tune solution.
- (6) Are all counts of 7, 89, and 205 high enough ?

Yes

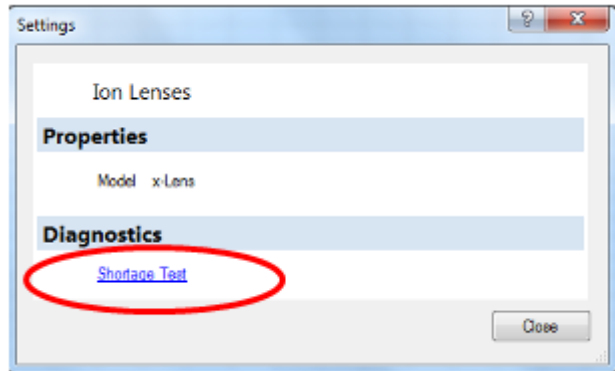
No

1.19.1 Do lens shortage test

(1) Go to "Hardware" pane. Right click on "Ion Lens" and select "Properties..." from the menu.



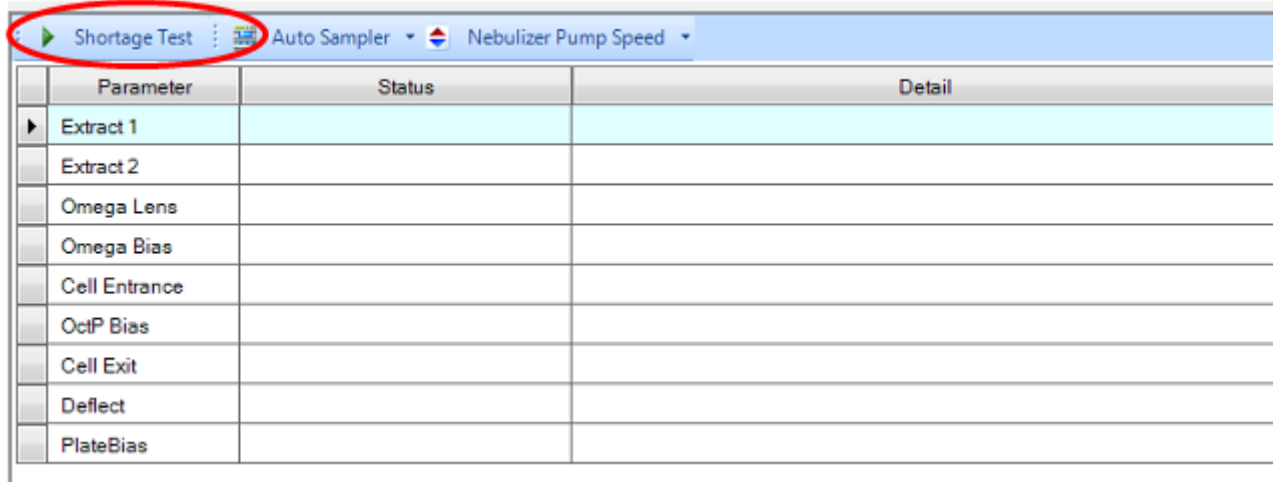
(2) Click "Shortage test" test.



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1.19.2 Do lens shortage test

(3) Click Shortage test.



The screenshot shows a software interface with a menu bar at the top. The 'Shortage Test' menu item is circled in red. Below the menu bar is a table with three columns: 'Parameter', 'Status', and 'Detail'. The table contains several rows, with 'Extract 1' highlighted in light blue.

	Parameter	Status	Detail
▶	Extract 1		
	Extract 2		
	Omega Lens		
	Omega Bias		
	Cell Entrance		
	OctP Bias		
	Cell Exit		
	Deflect		
	PlateBias		

(4) Did the test pass?

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Yes

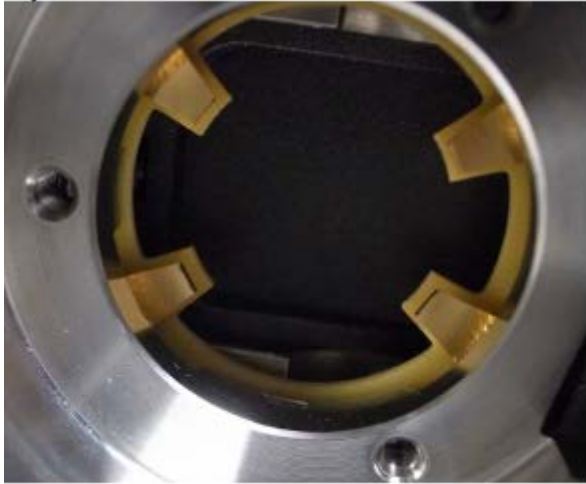
No

1.20.1 Check ion lens contact

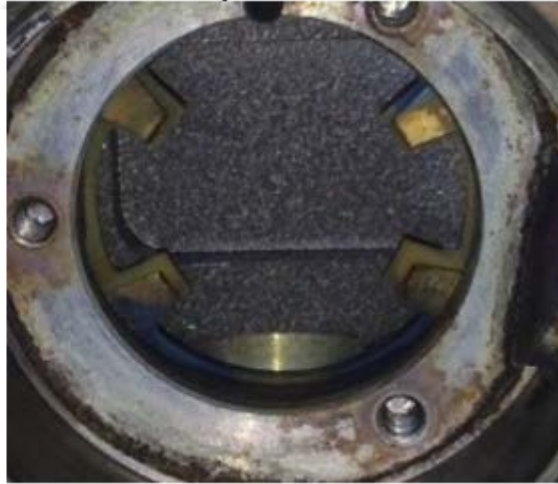
(1) Remove ion lens.

Reference Hardware Maintenance manual → “Maintenance” → “Extraction Lens-Omega Lens Assembly” → “Removal”

(2) Check lens contacts on the Interface assy.



Good Clean lens contacts.



Bad Dirty lens contacts.

(3) Are they clean?

Yes

No

1.21.1 Check ion lens

(1) Check ion lenses.



(2) Are they clean?

Bad

Dirty ion lenses (7500 ICP-MS).

Yes

No

1.22.1 Maintain ion lens

(1) Polish ion lenses

Reference Hardware Maintenance manual → "Maintenance" → "Extraction Lens-Omega Lens Assembly" → "Disassembly" and "Cleaning"

(2) Assemble ion lenses and set in the instrument.

Reference Hardware Maintenance manual → "Maintenance" → "Extraction Lens-Omega Lens Assembly" → "Assembly"

(3) Set skimmer cone and sampling cone to instrument.

(4) Ignite plasma.

(5) Introduce tune solution.

(6) Are all counts of 7, 89, and 205 high enough ?

Yes

No

1.23.1 Do lens shortage test without ion lens

(1) Remove ion lens.

Reference Hardware Maintenance manual → “Maintenance” → “Extraction Lens-Omega Lens Assembly” → “Removal”

(2) Do the ion lens test again.

(3) Did the test pass?

Yes

No

1.24.1 Check ion lens assembly

(1) Disassemble ion lens to check if they are assembled correctly.

Reference Hardware Maintenance manual → “Maintenance” → “Extraction Lens-Omega Lens Assembly” → “Disassembly”

(2) Correct ?

Yes

No

1.25.1

(1) Assemble ion lenses and set in the instrument.

Reference Hardware Maintenance manual → “Maintenance” → “Extraction Lens-Omega Lens Assembly” → “Assembly”

(2) Run ion lens test again

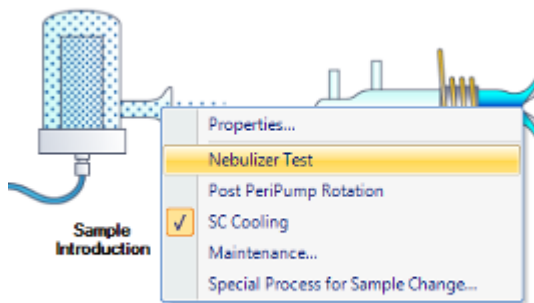
(3) Did the test pass?

Yes

No

2.1.1 Check aerosol

- (1) Turn off plasma.
- (2) Go to "Hardware" pane. Right click on "Sample Introduction" and select "Nebulizer Test" from the menu.



- (3) Click "Nebulizer Test" in the toolbar.
- (4) If the test passed, go to (5), otherwise go to (11).

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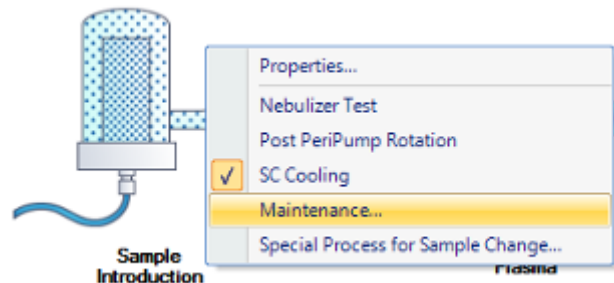
2.1.2 Check aerosol

(5) Introduce pure water.

(6) Pull out the nebulizer from the spray chamber, but keep the carrier gas line and sample line connected.

Reference Hardware Maintenance manual → “Maintenance” → ”Nebulizer and Spray Chamber” → “Nebulizer” → ”Removal”

(7) Go to "Hardware" pane. Right click on “Sample Introduction” and select “Maintenance...” from the menu.



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2.1.3 Check aerosol

(8) Set the following . Ar valve = On, Carrier gas flow = 1.0 L/min, PeriPump = 0.1 rps.

Sample Introduction Maintenance

Output (Manual Control)

Parameter	Value	Unit
Open Ar Gas Valve	<input checked="" type="checkbox"/>	
Open Option Gas Valve	<input type="checkbox"/>	
Select Gas	Dilution Gas	
Enable Temperature Control	<input type="checkbox"/>	
Plasma Gas	0.00	L/min
Auxiliary Gas	0.000	L/min
Carrier Gas	1.000	L/min
Makeup/Dilution Gas	0.000	L/min
Option Gas	0.0	%
Spray Chamber Temperature (L)	2	°C

PeriPump

Parameter	Value	Unit
Nebulizer Pump	0.10	rps

Input (Meter Reading and Status)

Parameter	Value	Unit
Ar Gas Tank Pressure	700.0	kPa
Option Gas Tank Pressure	-44.4	kPa
Carrier Gas Pressure (BP)	150	kPa
Plasma Gas	0.0	L/min
Auxiliary Gas	0.00	L/min
Carrier Gas	1.00	L/min
Makeup/Dilution Gas	0.00	L/min
Option Gas	0.00	%
Spray Chamber Temperature (L)	25.00	°C

Torch Position

Initialize

Maintenance

Enter Close

(9) Observe aerosol (the next page).

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2.1.4 Check aerosol



Good Good fine aerosol.



Bad Liquid droplets come out.



Bad Only water come out.

Bad Only carrier gas come out (No image).

Bad Nothing come out (No image).

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2.1.5 Check aerosol

(10) Set the following . Carrier gas flow = 0.0 L/min, PeriPump = 0.0 rps.

(11) Was the nebulizer test and aerosol OK?

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Yes

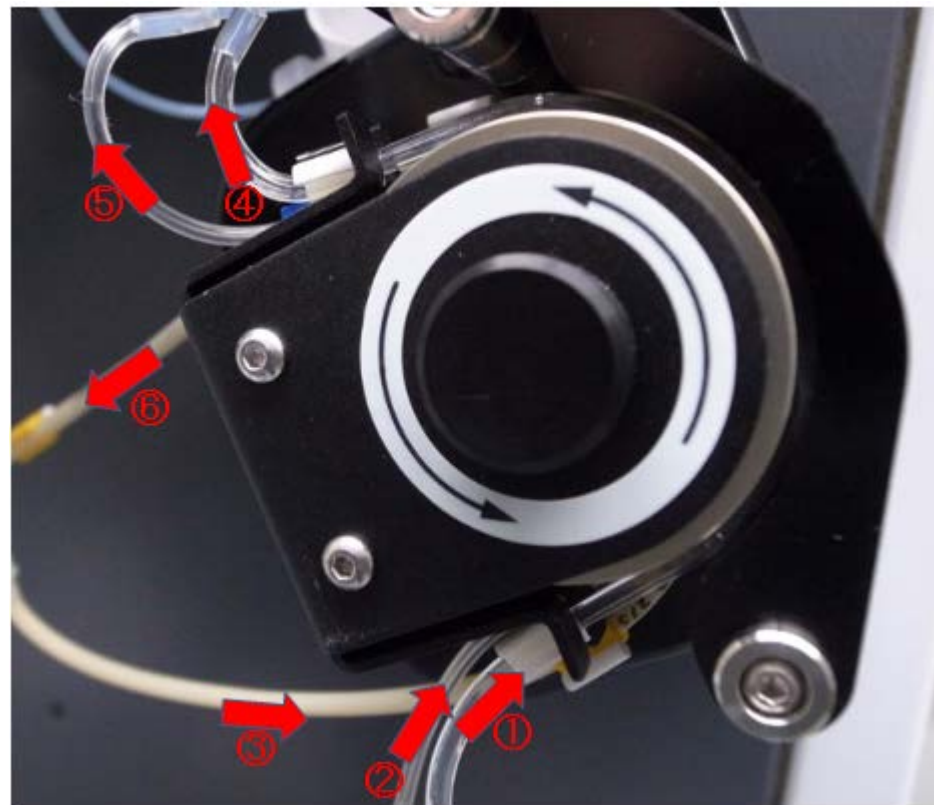
No

2.2.1 Check peripump tubing

(1) Is there any fault on PeriPump tubing?

- | | |
|-----------|----------------------------------|
| ①[Front] | From Sample |
| ②[Middle] | From ISTD |
| ③[Back] | From spray chamber |
| ④[Front] | To 3 way connector* ¹ |
| ⑤[Middle] | To 3 way connector* ¹ |
| ⑥[Back] | To drain |

*1



Good Correct tubing.

Yes

No

2.3.1

(1) Fix the PeriPump tubing.



2.4.1 Check carrier gas connection

(1) Check carrier gas connection.



Push carrier gas line into connector.



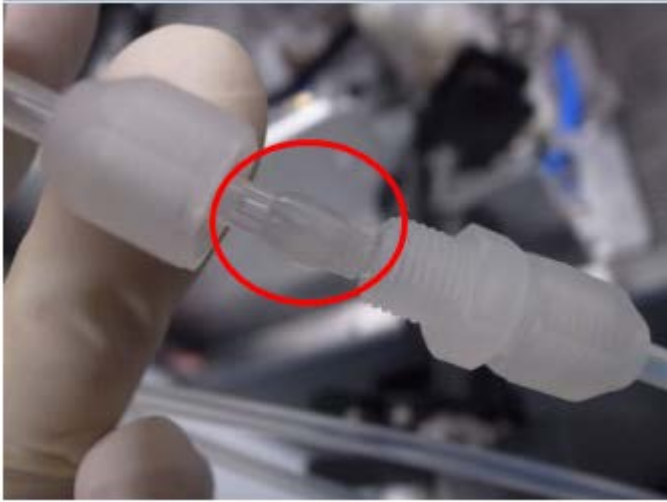
Push carrier gas line into connector (In case glass nebulizer).



Push connector toward nebulizer (In case glass nebulizer).

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2.4.2 Check carrier gas connection



Check if ferrule is correctly installed
(In case of PFA nebulizer).

(2) Check the aerosol again.

(3) Is the aerosol OK?



Bad loose nut.

Tighten the nut, if it is loose.
(In case of PFA nebulizer).

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Yes

No

2.5.1 Wash the nebulizer

(1) Wash the nebulizer.

Reference Hardware Maintenance manual → "Maintenance" → "Nebulizer and Spray Chamber" → "Nebulizer" → "Cleaning"

(2) Check the aerosol again.

(3) Is the aerosol OK?

Yes

No

2.6.1 Replace the nebulizer

(1) Replace the nebulizer.

Reference Hardware Maintenance manual → “Maintenance” → “Nebulizer and Spray Chamber” → “Nebulizer” → “Removal”

(2) Check the aerosol again.

(3) Is the aerosol OK?

Yes

No

2.7.1

(1) Is your nebulizer type MicroMist?



Yes

No

2.8.1 Check air bubble intake

- (1) Go to Sample Introduction maintenance.
- (2) Set PeriPump: 0.1 rps.

Sample Introduction Maintenance

Output (Manual Control)

Parameter	Value	Unit
Open Ar Gas Valve	<input type="checkbox"/>	
Open Option Gas Valve	<input type="checkbox"/>	
Select Gas	Dilution Gas	
Enable Temperature Control	<input type="checkbox"/>	
Plasma Gas	0.00	L/min
Auxiliary Gas	0.000	L/min
Carrier Gas	0.000	L/min
Makeup/Dilution Gas	0.000	L/min
Option Gas	0.0	%
Spray Chamber Temperature (L)	2	°C

PeriPump

Parameter	Value	Unit
Nebulizer Pump	0.10	rps

Input (Meter Reading and Status)

Parameter	Value	Unit
Ar Gas Tank Pressure	500.0	kPa
Option Gas Tank Pressure	-44.4	kPa
Carrier Gas Pressure (BP)	0	kPa
Plasma Gas	0.0	L/min
Auxiliary Gas	0.00	L/min
Carrier Gas	0.00	L/min
Makeup/Dilution Gas	0.00	L/min
Option Gas	0.00	%
Spray Chamber Temperature (L)	25.00	°C

Torch Position

Initialize

Maintenance

Enter Close

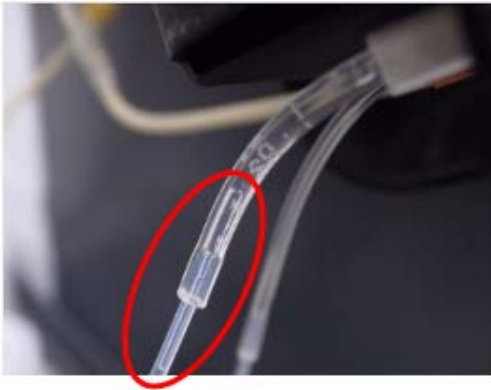
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2.8.2 Check air bubble intake

(3) Pull out sample tube from the pure water to introduce air bubbles to the sample tube.



(4) Can you observe an air bubble is intaken and it moves toward the nebulizer?



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Yes

No

2.9.1

(1) Is there any leak of pure water between sample and nebulizer?

Yes

No

2.10.1

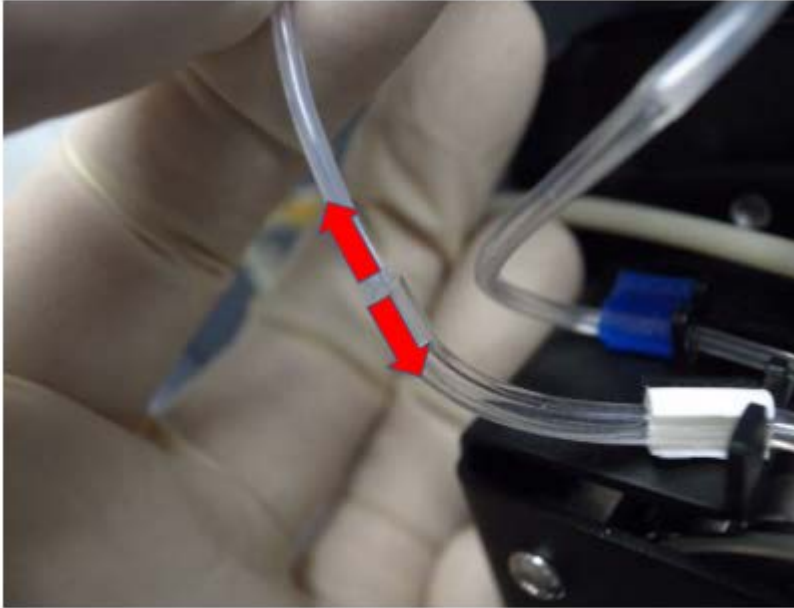
(1) Fix the leak.



2.11.1 Check clogging in sample tube

(1) Pull out tube between PeriPump tube and 3 way connector.

(2) Does water come out from PeriPump tube?



Yes

No

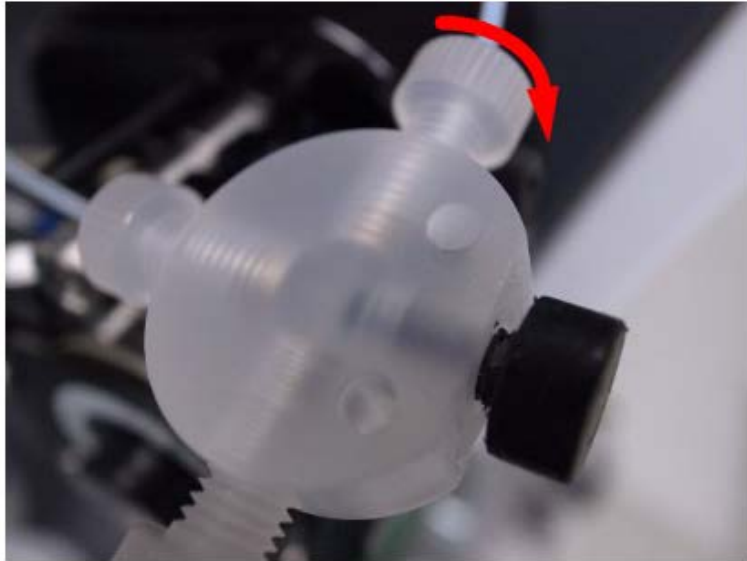
2.12.1

(1) Change sample line between PeriPump tube and sample.



2.13.1 Check clogging in 3 way connector

- (1) Connect again tubing between PeriPump tube and 3 way connector.
- (2) Loosen screw on 3 way connector and take off the line to nebulizer.
- (3) Does water come out from 3 way connector?



Yes

No

2.14.1

(1) Change the 3 way connector.



3.1.1 Check tune parameters

(1) Refer to User Guide to confirm current tune parameters are typical ones. If not, set to typical one.

Reference MassHunter Workstation User Guide → "Appendix" → "Recommended Values for Tuning Parameters"

(2) Is the problem solved?

Yes

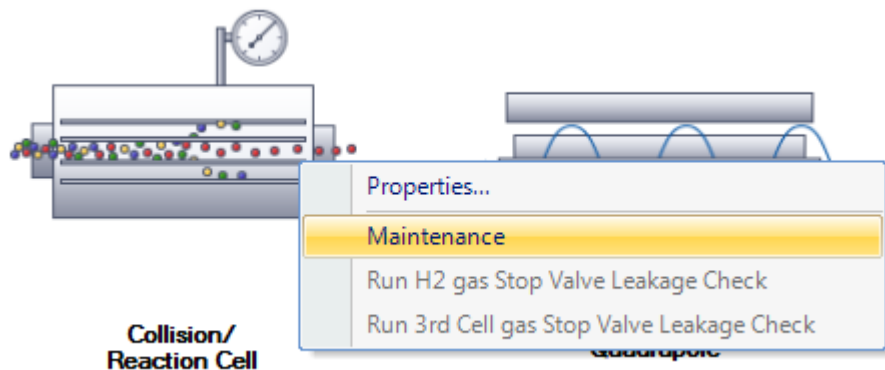
No

3.2.1 Purge cell gas line

Purge cell gas line with the problem, following these steps.

(1) Turn off plasma.

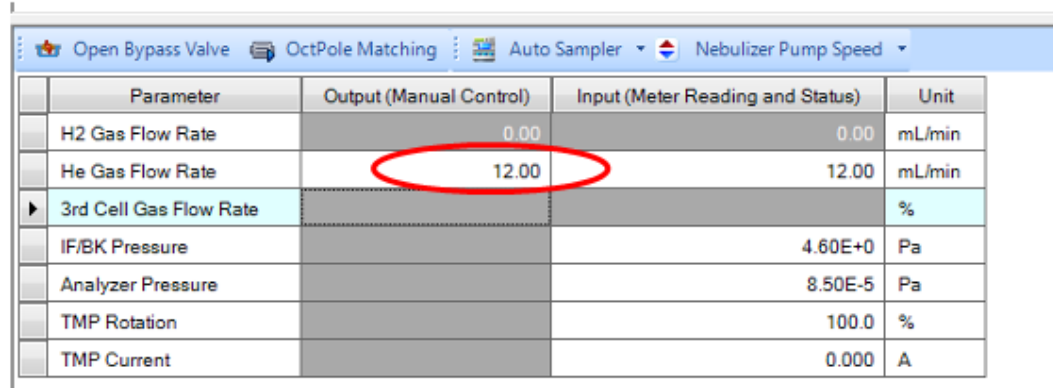
(2) Go to "Hardware" pane. Right click on "Collision/Reaction Cell" and select "Maintenance" from the menu.



Next >

3.2.2 Purge cell gas line

(3) Set the flow rate maximum for the cell gas with the sensitivity problem.



Open Bypass Valve OctPole Matching Auto Sampler Nebulizer Pump Speed				
	Parameter	Output (Manual Control)	Input (Meter Reading and Status)	Unit
	H2 Gas Flow Rate	0.00	0.00	mL/min
	He Gas Flow Rate	12.00	12.00	mL/min
▶	3rd Cell Gas Flow Rate			%
	IF/BK Pressure		4.60E+0	Pa
	Analyzer Pressure		8.50E-5	Pa
	TMP Rotation		100.0	%
	TMP Current		0.000	A

(5) Wait 30 minutes.

(4) Ignite plasma.

(5) Go to "Batch" pane → "Tune" tab

(6) Are all counts of 59, 89, and 205 high enough with the gas mode ?

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Yes

No

3.3.1

(1) Is the sensitivity better than before purging?

Yes

No

3.4.1 Check cell gas purity

(1) Check specification of cell gas to confirm if it meets the criteria below.

(2) Is it OK?

He: $\geq 99.999\%$

H₂: $\geq 99.999\%$

Xe : $\geq 99.999\%$

NH₃/He 10%/90% :99.999%

O₂/Ar 20%/80% :99.999%

Yes

No

3.5.1

(1) Replace with correct gas.



3.6.1 Check Gas Clean Filter

(1) Does the indicator of the Gas Clean Filter System indicate end of life?



Yes

No or No Gas Clean Filter in use

3.7.1 Maintain Gas Clean Filter

(1) Replace the Gas Clean Filter System



3.8.1 Do leak test for cell gas line

Perform a leak test, following the steps below.

(1) Turn off plasma (if it is ON)

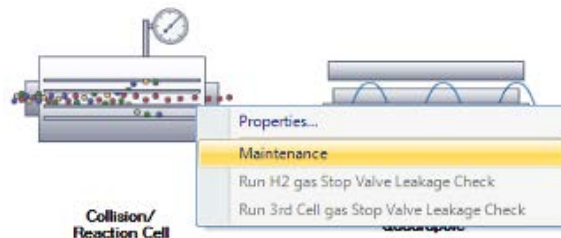
(2) Set the pressure of the reaction gas with the sensitivity problem as below. You can do it by adjusting regulator on gas lines.

to 110kPa (16psi) for He

to 40kPa (5.8psi) for H₂, 3rd, and 4th cell gas.

(3) Close gas cylinder main valve.

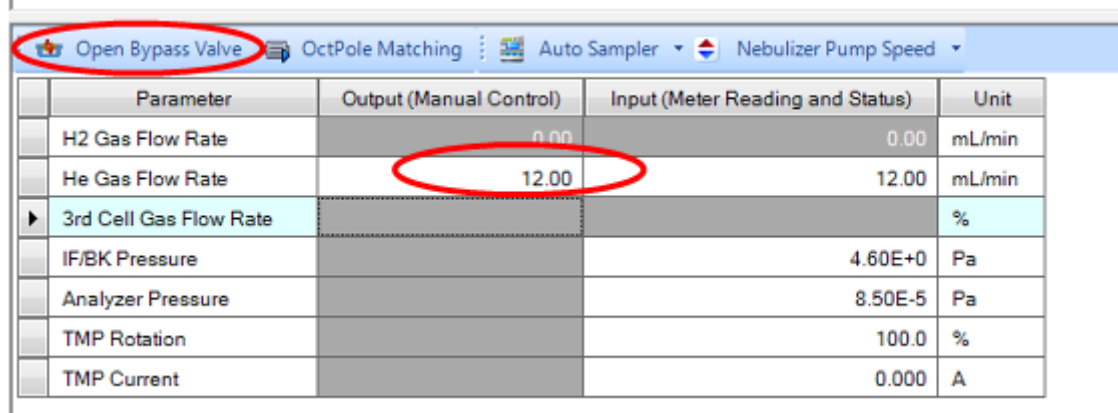
(4) Go to "Hardware" pane. Right click on "Collision/Reaction Cell" and select "Maintenance" from the menu.



Next >

3.8.2 Do leak test for cell gas line

- (5) Click the open “Bypass Valve” icon on the Task Setting bar.
- (6) Confirm that the flow setting of the cell gas with the sensitivity problem is 0.
- (7) Set the flow rate maximum for the cell gas with the sensitivity problem.



Open Bypass Valve OctPole Matching Auto Sampler Nebulizer Pump Speed				
	Parameter	Output (Manual Control)	Input (Meter Reading and Status)	Unit
	H2 Gas Flow Rate	0.00	0.00	mL/min
	He Gas Flow Rate	12.00	12.00	mL/min
▶	3rd Cell Gas Flow Rate			%
	IF/BK Pressure		4.60E+0	Pa
	Analyzer Pressure		8.50E-5	Pa
	TMP Rotation		100.0	%
	TMP Current		0.000	A

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3.8.3 Do leak test for cell gas line

(8) Monitor the actual gas flow. Wait for the actual flow to reach less than 0.1ml/min (or less than 1%), this will take several hours depending on the length of tubing, the size of two stage regulator, and the in- line filter. If the flow becomes constant above 0.1ml/min (or above 1%) the test failed.

(9) Set the flow to 0ml/min, and then open the gas cylinder main valve.

(10) Set the cell gas flow to 0 and close the reaction gas screen.

(11) Did it pass? In other words, did the actual flow reach less than 0.1ml/min in step 8?

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Yes

No

3.9.1

(1) Confirm the gas tubing. Tighten nuts if required.

(2) Perform leak test again (same as previous).

(3) Does it pass ?

Yes

No

4.1.1 Check rotary pump

(1) Check and Maintain rotary pump.

Reference Hardware Maintenance manual → "Maintenance" → "Maintaining Other Parts"

OK

5.1 End of procedure

Close this window.

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5.2 End of procedure

To solve the problem an engineer from Agilent is needed. Please contact Agilent using the link below.

<http://www.agilent.com/en-us/contact-us/page>

Close this window.

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