Agilent

# Agilent 5000 Series ICP-OES and Agilent 4200/4210 MP-AES Instruments

# Instructions for using the inert torch and the inert spray chamber

Both the inert demountable torches for the 5000 Series ICP-OES and the inert Easy-fit torch for the 4200/4210 MP-AES are recommended for use with solutions containing free hydrofluoric acid. Each of these torches should be used in conjunction with the inert double pass spray chamber, PTFE ball joint coupler (Figure 1 and Figure 2) and the torch clamp for the inert torch (Figure 3a and 3b).

The inert spray chamber and the alumina injector in the inert torch are recommended, since the free hydrofluoric acid in the samples will attack a standard glass cyclonic spray chamber and the quartz injector in the standard torch (either the one-piece MP-AES/ICP-OES torch or the demountable ICP-OES torch).

WARNING

**Chemical and Eye Hazard**
**For your protection always wear safety gloves and safety glasses when handling glass and chemicals.**

**Hydrofluoric, nitric and hydrochloric acids are very corrosive and can cause severe burns when they come into contact with the skin.**

**Always wear appropriate protective clothing when handling these acids. Strong PVC or Neoprene rubber gloves and a face shield should ALWAYS be worn when using hydrofluoric acid.**

CAUTION

**Hydrofluoric acid is highly corrosive. Repeated or continual use of hydrofluoric acid may cause the torch walls to weaken or break.**

## Recommended practices for safe handling of hydrofluoric acid

- Do not use cable ties to secure pump tubing.
- Cover any tubing connections with a wide bore tube, to contain liquid in case of leaks.
- Wrap the joint with tissue to absorb any liquid in case of leaks.
- If a leak is detected during analysis, immediately stop the pump or release the pressure bar on the peristaltic pump.
- Place a plastic tray underneath the spray chamber to contain any leaks. Line the tray with tissues and calcium carbonate ($CaCO_3$) to absorb and neutralize any spilt liquid.

# Preparing the inert demountable torch for the 5000 Series ICP-OES

To assemble the inert demountable torch:

1. Ensure the outer/intermediate tube set and the injector (if applicable) has been correctly installed into the base of the semi or fully demountable inert torch. Refer to the instrument operation manual for torch assembly instructions if necessary.
2. The PTFE ball joint coupler is already fitted to the alumina injector of both the semi and fully demountable inert torch (Figure 1).



**Figure 1.** PTFE ball joint coupler and injector assembly used with the fully demountable inert torch. The semi-demountable inert torch incorporates a similar PTFE ball joint coupler and injector assembly that is fixed in place in the torch body.

# Assembling the inert torch for the 4200/4210 MP-AES

To assemble the inert torch:

1. Seat the PTFE ball joint coupler (Figure 2) over the free end of the alumina injector tube at the base of the torch.
2. Push the coupler all the way onto the injector.


**Figure 2.** PTFE ball joint attached to the injector tube

# Installing the inert torch and inert spray chamber

To install the inert torch and inert spray chamber:

1. Fully open the torch loader handle on the 5000 series ICP-OES or the 4200/4210 MP-AES.
2. Insert the torch into the torch loader.
3. Close the torch loader handle.

NOTE For additional information on how to install a torch, refer to the 'How to' section in the ICP Expert Help and Learning Center or the MP Expert Help.

4. Install the nebulizer into the inert spray chamber.

TIP It is easier to install the nebulizer before attaching the spray chamber to the torch.

5 Hold the spray chamber so that the ball joint socket at the top is positioned against the inert ball joint coupler on the base of the inert torch (Step 1 in Figure 4 or Figure 5).

6 Use the appropriate torch clamp for the inert torch (Figure 3).

WARNING

**Chemical Hazard**

**The standard torch clamp is not compatible with the MP-AES inert torch and will not ensure a leak free connection at the ball joint. Using the wrong clamp may cause the inert ball joint coupler to slide off the free end of the alumina injector tube, damaging components and creating leaks.**

**Solutions used in ICP-OES and MP-AES analyses may involve acids or other harmful chemicals. It is essential that appropriate protective clothing be worn at all times when handling these liquids and that the correct torch clamp is used to secure the spray chamber to the torch. Exposure to nitric, hydrofluoric, or other acids can cause severe burns when it comes into contact with the skin. If acid or other harmful liquid contacts the skin, wash off with copious amounts of water and seek medical attention immediately.**

7 Squeeze the end of the clamp with the locking nut to open it.

TIP Turn the locking nut on the clamp clockwise (if necessary) to ensure there is enough room to open the clamp.

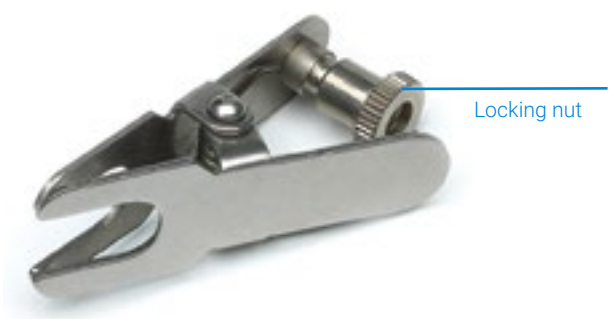


**Figure 3a.** Use the standard torch clamp with both the semi and fully demountable ICP-OES inert torches.

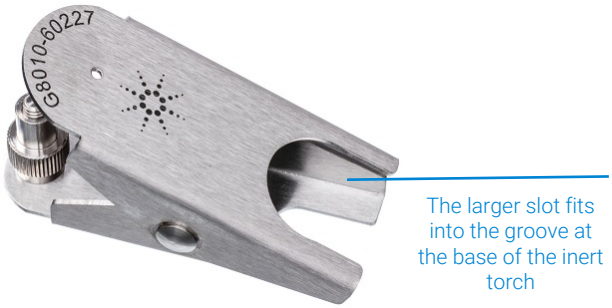


**Figure 3b.** Clamp recommended for use with the MP-AES inert torch.

8 While holding the clamp open, slide the larger slot of the clamp into the groove at the base of the inert torch and below the spray chamber ball joint socket (Steps 1 and 2 in Figure 4). If using the semi or fully demountable ICP-OES inert torch, use the standard torch clamp. While holding the clamp open, position it so that it is on either side of the ball joint socket connection (Figure 5).

9 Gently release the clamp so that the spray chamber is secured to the base of the torch (Step 3 in Figure 4 or Step 2 in Figure 5).


**Figure 4.** Installing the inert spray chamber onto the MP-AES inert torch.

**Figure 5.** Installing the inert spray chamber onto the fully demountable ICP-OES inert torch. The procedure is the same on the semi-demountable ICP-OES inert torch.

**10** Turn the locking nut on the clamp counter-clockwise until tight to lock the clamp in position.

NOTE For information on how to connect the gas and sample lines to the nebulizer, the drain tube to the spray chamber, connect the peristaltic pump tubing, and ignite the plasma, refer to the 'How to' section in the ICP Expert Help and Learning Center or MP Expert Help.

## Recommended shut-down practices to use at the end of analysis

Always thoroughly rinse the sample introduction system at the end of the analysis before shutting down the plasma.

Always handle a used torch with acid resistant gloves.

Remove the torch and disassemble the demountable torch (where applicable) and immediately rinse all components to remove any residual liquid either in the ball joint connector or the join between the ball joint connector and the injector base.

## Recommended maintenance practices

Check the condition of the ball joint coupler and the four securing O-rings (where applicable) whenever the torch is removed. Replace the coupler if it does not fit firmly due to:

- excessive wear
- damaged O-rings
- one or more of the four O-rings is missing
- the O-rings do not provide a tight seal.



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