



## Agilent Mark 7 Burner

### Introduction

The Mark 7 burner is designed for use with either air-acetylene or nitrous oxide-acetylene. It is compatible with Mark V, Mark VI and Mark 7 spraychambers.

#### NOTE

If you wish to use the VGA 76/77 accessory with the Mark 7 burner, you will need to order the correct cell holder (part number 0110654900).

The Mark 7 burner is fitted with a burner interlock key, which is designed to inhibit ignition if a burner is not fitted to the spraychamber. Oxidant change-over will be prevented if an air-acetylene burner is fitted, and the flame gas mixture selected is nitrous oxide-acetylene.

The unique profile of the Mark 7 burner allows the burner to operate at suitable temperatures. An air entrainment pattern is established over the burner slot that reduces carbon build up. The contoured burner slot profile minimizes solids buildup in the burner jaws. Samples with a high solids content can be analyzed for a longer period of time before burner blockage occurs.

The Mark 7 burner may be rotated through 360 degrees, without having to extinguish the flame or remove any safety covers, by use of a clamping rotation handle.

### Burners for Organic Solvents

Before using a Mark 7 burner with organic solvents, ensure it is fitted with a white fluoroelastomer O-ring (part number 6910013100).

### Installation

#### NOTE

All burners are cleaned before shipment. However because the burner may pick up dirt during shipment, it is recommended that the burner be cleaned before initial use. Place the burner in an ultrasonic bath containing 1% laboratory detergent for five minutes. Rinse with tap water and then rinse with distilled water, and allow to air dry. A more detailed cleaning procedure is included in the Maintenance section.

#### To install the Mark 7 burner:

- 1 If necessary, remove the flame shield and take out the old burner assembly. If the flame has been on, the burner and its surrounds will be **hot**, so make sure that you **wear protective gloves**.



If you are fitting the Mark 7 burner to a **Mark V spray chamber**, the Mark V rotation handle and burner collar are not required. Remove the securing thumbscrew, its mating cylindrical nut, and the rotation handle and collar from the spray chamber.

If you are fitting the Mark 7 burner to a **Mark VI spray chamber**, then the two piece ratchet burner rotation handle is not required. Remove the securing thumbscrew, its mating cylindrical nut, and the burner rotation handle from the spray chamber.

- 2 Before installing the Mark 7 burner, check the O-ring on the underside of the burner. It must be supple and free from nicks or cracks to ensure the burner makes a gas tight seal with the spraychamber.
- 3 Position the burner in the sample compartment with the heat shield and rotation handle facing towards you. The burner slot should be parallel to the light path.
- 4 Align the interlock key with the interlock socket in the burner adjuster.
- 5 Slowly lower the burner so that the burner interlock key enters the interlock socket, and the burner neck enters the hole for the burner in the spraychamber.
- 6 Push the burner down as far as it will go using a slight twisting motion. Check that the O-ring on the neck of the burner has dropped below the top surface of the spray chamber and is providing a satisfactory seal.
- 7 Replace the flame shield on the spectrometer.

**WARNING**



**Fire and Explosion Hazard and Hot Surface**

Improper or careless use of burners can create explosion hazards and fire hazards which can cause death, serious injury to personnel, and damage to equipment and property.

**To minimize such hazards:**

- a Always fit the correct burner. Never attempt to use an air-acetylene burner for nitrous oxide-acetylene.
- b Never interfere with burner interlocks.
- c Never attempt to bypass the burner interlock.
- d Whenever you handle burners, remember that the burner may be very hot. Always use protective gloves.
- e Never use a nitrous-oxide/acetylene burner with a nitrous oxide/acetylene flame if the slot width is greater than 0.47 mm as this could result in a flashback occurring.

**Burner Position**

The burner position in the optical path can be altered in a variety of ways. The horizontal and vertical position can be adjusted using the controls on the burner adjuster. (See your spectrometer manual for more details.)

The Mark 7 burner can be rotated through 360 degrees by using the burner rotation handle.

**To rotate the burner:**

- 1 Press the ends of the burner rotation handle together to engage the handle with the burner.
- 2 Move the handle left or right to rotate the burner to achieve the desired signal. Release your grip on the rotation handle to disengage it from the burner.

**To rotate the burner through large angles:**

- 1 Grip the rotation handle and move it all the way to one side.
- 2 Release the handle and move it back to the other side.
- 3 Re-grip the handle and move it again to rotate the burner further.

## Maintenance

After each analysis it is advisable to aspirate deionized water through the atomizer assembly for 10–15 minutes.

Burners should be cleaned after each day of use, particularly if the solutions being analyzed have a high solids content, or a rich nitrous oxide-acetylene flame has been used. If they are not cleaned regularly, hard deposits that will be difficult to remove may build up and increase the probability of a flashback occurring.

### TIP

It is impossible to determine with the naked eye whether or not a burner is clean. Even a low power inspection lens will fail to show low levels of contamination. The best way is to backlight the burner gap with a small light globe and use a binocular microscope which allows you to look down inside the burner slot.

Operators can obtain advanced warning of the buildup of deposits down in the gap by observing the blue cone of an air/acetylene flame. The top of the cone should be even for the full length of the gap. Any slight dip or abnormality in the cone will almost certainly indicate that deposits are starting to form in the gap.

### WARNING



#### Fire and Explosion Hazard

The burner is correctly assembled, sealed and pressure tested during manufacture. To prevent gas leaks and flashbacks which may cause death, injury or property damage, the burner must NEVER be disassembled, modified or mistreated. ALWAYS use the correct procedure to clean the burner slot, since the use of a burner with an oversize slot can cause a flashback. If the burner is dropped, damage to the seals or the slot may result, so ensure that the burner's safety is unaffected before using it.

#### To clean the burner:

- 1 Make sure that the entire assembly is cool enough to handle.
- 2 Remove the chimney, flame shield and sample compartment front panel from the instrument.
- 3 Remove the burner from the spray chamber by lifting the burner assembly upwards. This may require a slight twisting motion.
- 4 Invert the top of the burner in dilute (5%) nitric acid so that the slot is submerged to a depth of 10 to 15 mm. Place the burner on an angle so that it is resting on the outer edge of one of the jaws. This will prevent damage to the slot. Leave to stand overnight to soften the deposits.
- 5 Rinse the burner with distilled water and place it upside down in an ultrasonic bath containing dilute laboratory detergent for approximately 10 minutes. The depth should be at least 15 mm.
- 6 Rinse the burner with distilled water and allow to dry.

### NOTE

To speed up drying, dry the burner with compressed oil-free air or inert gas.

- 7 Insert a non-metallic business card or the Agilent burner cleaning and alignment strip (part number 9910053900) into the burner slot and pour a small amount of metal polishing fluid on each side just above the burner slot.
- 8 Slide the card up and down in the slot (perpendicular to the top) to remove any deposits that may be present within the slot.

**NOTE**

If the deposits are baked on hard, their removal may require some effort, and several cards may be required. Another possibility is to use a strip of plastic which is just thinner than the dimension of the burner slot.

**CAUTION**

Under no circumstances should a metal strip or implement be used on or in the burner slot as it will scratch the surface and promote the rapid buildup of carbon or other solids.

- 9 Place some metal polishing fluid on a lint-free cloth and rub along the top of the slot. For particularly hard deposits, it may be necessary to use a fingernail or a wooden or plastic spatula. The thin top edges on either side of the burner slot must be shiny to indicate that all the deposits have been cleaned off.
- 10 Rinse the burner thoroughly in the ultrasonic bath again to remove all traces of the polish. Use a clean card to remove any excess metal polishing fluid from within the slot.
- 11 Dry the burner using gas as described previously, and inspect it under the microscope.
- 12 If necessary, repeat some or all of the previous steps until the burner slot is clean.

**NOTE**

Soaking the burner in dilute (5%) nitric acid and the use of the ultrasonic bath effectively removes soft chemical deposits inside the slot. The removal of hard carbon deposits usually requires more significant physical effort.

### Spare Parts

If the O-ring on the underside of the burner needs replacement (e.g., cracked, nicked or no longer supple), replace it immediately.

O-ring	Solution type	Part number
O-ring burner base, nitrile	Aqueous solutions	6910010500
O-ring burner base, fluorinated	Organic solvents	6910013100

This information is subject to change without notice.



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