

## Installation Notes

# ETP ACTIVE FILM Multipliers Model 14533

Install the ETP ACTIVE FILM Multiplier™ as per the instructions in the mass spectrometer manual.

Active Film Multiplier models are direct replacement multipliers for Shimadzu mass spectrometers.

To ensure optimum performance from your mass spectrometer;

- all internal parts of the analyser must be handled following clean, high vacuum practice.
- all tools should be cleaned with AR grade methanol.
- all internal analyser parts handled with clean, lint free gloves.

### ATTENTION

If your ETP ACTIVE FILM Multiplier™ has been contaminated with vacuum pump oils or other carbons it may require cleaning. Please read the following instructions carefully before attempting to clean your ETP ACTIVE FILM Multiplier™.

	<b>WARNING</b>
	DO NOT clean your ETP ACTIVE FILM Multiplier™ as you would clean a channel electron multiplier.

### PRODUCT WARRANTY

SGE products are warranted to meet the stated quality and performance and to be free of defects in material or workmanship for a period of forty five (45) days from the date of shipment. ETP ACTIVE FILM Electron Multiplier™ shelf life is guaranteed for two years from invoice date. During that period the electron multiplier is guaranteed against any faulty workmanship or materials leading to operational failure at time of installation. Operational failure is defined as performance falling below specification. The warranty implies free replacement of a defective product only, upon proper written proof of the defect and upon return of the defective product. It does not apply to mishandling of product by the customer, either in use or in storage, nor to claims made after the warranty period has elapsed.

No other warranty or representation is expressed or implied by SGE for its products with respect to merchantability, fitness for any particular use or purpose, or any other matter. SGE shall not, under any circumstances, be liable for any incidental, consequential, or compensatory damages arising from use of or in conjunction with its products. The maximum liability for breach of warranty shall be the invoice price of the said product(s).

**In consideration of the health and well being of our employees, we respectfully insist that SGE products contaminated by hazardous materials NOT BE RETURNED.**

### MAINTENANCE STORAGE AND HANDLING

ACTIVE FILM Electron Multiplier™ are being used by a growing number of people in mass spectrometry primarily because the higher performance offered by ACTIVE FILM Electron Multipliers™ is required to meet the detector demands of mass spectrometry

in the 1990's. ACTIVE FILM Electron Multipliers™ have also attained a proven track record of reliability and performance across a wide range of mass spectrometry applications.

This application note is a guide to the maintenance storage and handling of ACTIVE FILM Electron Multiplier™. The following procedures cover all aspects of multiplier care and maintenance, and will assist you in obtaining the best life and performance from your ACTIVE FILM Electron Multiplier™.

#### 1. Storage of ACTIVE FILM Electron Multipliers™

The active dynode surfaces of an ACTIVE FILM Electron Multiplier™ are composed of a totally new stable-in-air material and can be repeatedly exposed to the air with no loss in performance.

The original packaging is designed for long term storage. The multiplier is delivered in two sealed plastic bags, the outer bag containing Silica Gel. If the multiplier is to be stored for long periods it is best left in the original packaging until required.

In its original packaging, the shelf life of the ACTIVE FILM Electron Multiplier™ is guaranteed for two years from ETP's shipping date.

If it is necessary to store the multiplier without its original packaging it should be kept in a dust free, dry environment. Ideally it should be stored in a glass dessicator containing Silica Gel.

#### 2. Care and Handling of ACTIVE FILM Electron Multipliers™

Handling of the multiplier should be carried out using normal high vacuum handling methods to keep the multiplier clean and free of contamination.

Powder free gloves should be used to prevent finger-oils from contaminating the multiplier via direct contact with skin. All tools, mountings and equipment should be cleaned before coming into contact with the multiplier.

Care should be taken to minimise the exposure of the multiplier to airborne particles of dust or lint. Dust particles within the multiplier can cause increased background noise.

Exposure of the multiplier to a high humidity environment should be avoided as it can cause noisy operation. In the event of this situation occurring, the multiplier can be restored by baking for three (3) hours. In vacuum the multiplier can be baked up to 350°C. At room ambient pressure baking temperature should be limited to 150°C. In either case the multiplier should be heated and cooled slowly in the oven or vacuum chamber (to avoid damage due to thermal shock).

The rugged design of the ACTIVE FILM Electron Multiplier™ greatly reduces the chance of damage through rough or careless handling. Nonetheless, an electron multiplier is a precision instrument and all reasonable care should be taken when handling.

### 3. Cleaning ACTIVE FILM Electron Multipliers™

If the multiplier becomes contaminated with pump oil, it will be necessary to clean the multiplier to remove oil from the active surfaces. Do not operate an oil contaminated multiplier until it has been cleaned using the procedures described below.

Operating a multiplier that is contaminated with oil can result in irreversible damage to the performance of the multipliers active surfaces.

The recommended technique for cleaning ACTIVE FILM Multiplier™ requires the following equipment;

- a. ultra-sonic cleaner
- b. glass beaker (properly cleaned)
- c. Heptane (AR or HPLC grade) Warning - Heptane is a volatile, flammable solvent and appropriate care should be taken. Under no circumstance should the active surfaces of the ACTIVE FILM Electron Multiplier™ be allowed to come into contact with halogenated solvents.

Method;

- a. place multiplier in beaker and fill with Heptane until multiplier is fully immersed.
- b. place multiplier in ultra-sonic cleaner and clean for approximately ten (10) minutes.
- c. Dispose of used solvent in an appropriate manner and refill beaker with fresh Heptane. Place beaker in ultra-sonic cleaner and clean for approximately ten (10) minutes.
- d. repeat step c).
- e. allow to dry at room temperature. Dry with clean nitrogen. Precautions should be taken to keep the multiplier as free from dust as possible.
- f. bake multiplier for three (3) hours at 120°C in a suitable dust free oven.

### 4. Installing and Operating ACTIVE FILM Electron Multipliers™

ACTIVE FILM Electron Multipliers™ require no pre conditioning. However, when an ACTIVE FILM Electron Multiplier™ is first installed it is recommended that the applied high voltage be limited to 2200 volts for the first day of operation. When installing an ACTIVE FILM Electron Multiplier™ for the first time there may be absorbed water vapour in the ceramic.

The multiplier leads should be positioned to have minimum clearance of 3mm between the lead and any metal parts of the multiplier mounting or vacuum chamber.

The multiplier should be mounted so that there are no sharp objects in close proximity to the multiplier aperture. Sharp objects near the aperture can become a source of noise.

Both the life and background noise characteristics of ACTIVE FILM Electron Multipliers™ are improved as the operating pressure is decreased.

	<b>CAUTION</b>
	An ACTIVE FILM Electron Multiplier™ should never be operated at pressures above 1x10 <sup>4</sup> mbar. Operation of the multiplier above this pressure risks permanent damage to the multiplier performance as a result of gas discharge arcing.

### 5. OBTAINING THE BEST LIFETIME FROM ACTIVE FILM Electron Multipliers™

The gain of a correctly installed multiplier will fall very gradually with time, requiring the applied high voltage to be increased periodically to restore multiplier performance. This is the normal ageing process of the multiplier. The operating life obtain for the multiplier will vary between applications and is affected by a number of factors.

Factors influencing multiplier life are;

- a. the operating environment - lower operating pressure and lower partial pressure of hydrocarbons in the vacuum chamber will increase multiplier life
- b. operating gain of the multiplier - operation with lower applied voltages will improve multiplier life
- c. output current - lower average current drawn from the multiplier will improve multiplier life

**Rapid loss of multiplier performance can result from a failure in the vacuum pumping system resulting in either severe contamination of the multiplier by pump oils or arcing by the multiplier high voltage due to loss of high vacuum. Refer to section three for details of cleaning ACTIVE FILM Electron Multiplier™ after contamination by pump oils.**

**ETP** electron  
multipliers

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