

# ETP ELECTRON MULTIPLIERS



## Care and Handling

A division of

**ETP** electron  
multipliers

 **SGE Analytical Science**

# Maintenance, Storage, and Handling of ETP Electron Multipliers

ETP Electron Multipliers from SGE are incorporated as original equipment in all areas of mass spectrometry and surface science, as well as a diverse range of analytical and general physics applications. They offer the higher performance required by modern instrumentation and have a proven reputation for reliability, ruggedness, and performance.

This booklet provides information on the maintenance, storage, and handling of ETP Electron Multipliers. Following the basic procedures described herein will enable you to obtain the optimum life and performance from your ETP Electron Multiplier.

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# Storage of ETP Electron Multipliers

The critical dynode surfaces of an ETP Electron Multiplier consist of a specially formulated and applied aluminum oxide material, which is very rugged and completely stable, even when repeatedly exposed to room atmosphere. The original packing supplied by ETP is designed for long term storage. The multiplier is enclosed in two sealed plastic bags. The outer bag contains a silica gel package to minimize adsorption of moisture, which could otherwise lead to excessive outgassing upon installation.

Contained in its original packaging, the shelf-life of an ETP Electron Multiplier is guaranteed for up to two years from the date of shipment. If it is necessary to store the multiplier outside its original packaging, it should be kept in a clean, dust-free, low-humidity environment, such as a glass desiccator.

# Care and Handling of ETP Electron Multipliers

In order to minimize contamination, standard high-vacuum techniques are recommended when handling ETP Electron Multipliers. Clean, powder-free gloves or finger cots should be worn to prevent the transfer of skin oils to critical or mounting surfaces of the multiplier. All tools, mountings, and equipment should be thoroughly cleaned prior to coming in contact with the multiplier.

Care should also be taken to minimize exposure of the multiplier to dust or other airborne contamination. Dust particles within the detector may result in increased background noise during operation.

Exposure of the multiplier to high humidity should be avoided in order to minimize outgassing during initial operation. If the multiplier exhibits excessive noise due to adsorbed moisture, this condition may be rectified by either leaving the multiplier in high vacuum for about 24 hours, or by using a simple vacuum bake procedure.

**NOTE:** Most models may be baked in vacuum at up to 350°C. Some models may not be baked above 100°C. For information concerning temperature limitations, refer to the installation notes supplied with each ETP Electron Multiplier.

If baking must be done in atmosphere, the temperature must be limited to 120°C (or lower than 100°C for some models – see Note above). The multiplier should be heated and cooled slowly to avoid damage due to thermal shock.

The rugged design of ETP Electron Multipliers reduces the risk of damage during handling, however, an electron multiplier is a precision component, and all reasonable care should be used when installing or removing.

## Cleaning ETP Electron Multipliers

In normal operation it is not recommended to clean the multiplier in any way. However, if the multiplier becomes contaminated (eg. as a result of vacuum system failure) then it may be possible to clean the multiplier.

**Caution:** DO NOT operate an electron multiplier suspected of being contaminated until it has first been cleaned as described overleaf. Operation of a contaminated multiplier will permanently damage the critical surfaces.

Not all ETP Electron Multiplier models can be cleaned using an ultra-sonic cleaner. Check with SGE technical support to determine if your model multiplier can be cleaned.

If your multiplier can be cleaned, then non-polar solvents must be used. (Heptane is a non-polar solvent).

The following is the only procedure approved by SGE:

## **Cleaning Equipment**

1. Ultra-sonic cleaner
2. Clean glass beaker (100mL or larger)
3. AR- or HPLC-grade Heptane solvent

## **Cleaning Method\***

1. Place the multiplier in the beaker and fill with Heptane until multiplier is fully immersed.
2. Place the beaker in the ultra-sonic cleaner and clean for approximately ten minutes.
3. Dispose of solvent in an appropriate manner and refill the beaker.
4. Repeat steps 1-3 a further 2 times.
5. Remove the multiplier from the beaker and allow to dry at room temperature.
6. Bake the multiplier for three hours in air at 100°C.

\*Check with SGE technical support before proceeding.

# Installing and Operating ETP Electron Multipliers

ETP Electron Multipliers generally require no preconditioning, however, when first installed, it is recommended that applied voltage not exceed 2200V for the first 24 hours of operation. For fast Time-Of-Flight multipliers with model numbers between 14870 and 14899, the voltage limit is 3200V.

Multiplier leads should be positioned for a minimum clearance of 3mm between any lead and any other part of the multiplier mount or vacuum chamber.

The multiplier should be mounted so that there are no sharp objects in close proximity to the entrance aperture. This condition could result in noise during operation.

Operating pressure should be as low as possible for best lifetime and minimum noise. To avoid risk of damage due to discharge or arcing, the multiplier should not be operated at a pressure in excess of  $1 \times 10^{-4}$  mbar X.

# Obtaining Optimum Lifetime from ETP Electron Multipliers

The gain of a correctly installed electron multiplier will fall very gradually over time, requiring the applied voltage to be periodically increased. This is a normal part of the multiplier aging process. Total operational life varies depending on application and may be affected by a number of factors:

## **Operating Environment:**

Lower operating pressure and lower partial pressure of hydrocarbons in the vacuum chamber will result in increased operational life, all other conditions remaining the same.

## **Operating Gain:**

Operation should always be at the lowest applied voltage consistent with good signal acquisition. In general, the lower the gain, the longer the life of the multiplier.

## Output Current:

Multiplier lifetime is inversely proportional to average output current. Excessive input signals should be avoided, especially when operating at high gain.

Rapid degradation of multiplier performance may result from failure of the vacuum pumping system. This may result in severe contamination of the detector or damage due to arcing caused by the sudden increase in chamber pressure. If vacuum failure occurs, the multiplier should be cleaned before being operated again. Degradation caused by vacuum failure may be permanent and irreversible, especially if the multiplier high voltage was **ON** during the vacuum failure.

**NOTE:** Due to the wide variety of applications and environmental conditions within instruments, there is no warranty on the operational lifetime of any electron multiplier.

For technical or ordering information contact your nearest ETP or SGE office or visit [www.sge.com/etp](http://www.sge.com/etp)



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