

## **Features**

**For instruments:** Agilent 5973/A/N MSD, 5975 (without TAD), 1100 LC-MSD

- "Plug-in" Compatible
- High Sensitivity
- Low Noise
- High Gain
- Long Life
- Stable in air

ETP Active Film Multipliers™ are the latest development in electron multiplier technology. They incorporate a discrete dynode structure and are designed specifically for use where high sensitivity, low noise and longer operation life is demanded.

## **Description**

**For instruments:** Agilent 5973/A/N MSD, 5975 (without TAD), 1100 LC-MSD

**Notes:** 14616 - Multiplier only.

14617 - Multiplier and Mount.

The Model 14617 detector has been specifically developed to retrofit the Agilent Technologies 5973 MSD. The detector incorporates a modular design to facilitate ease of replacement and additional innovations intended to enhance performance. First time installation requires the 14617 assembly which includes the mechanical housing and multiplier module. Subsequent replacements require only the 14616 multiplier module. Note: Initial installation of the ACTIVE FILM Multipliers for the HP 5973 MSD requires part number 14617, which includes the electron multiplier and the mount. The mount houses the HED (high energy dynode) which increases the energy of the ions and reduces multiplier contamination. After initial installation, only the replacement electron multiplier, Part No. 14616, is required.

The ACTIVE FILM Multipliers™ for the Agilent Technologies 5973 MSD (Mass Selective Detector) is specifically designed for the instrument. It is a direct "plug-in" replacement electron multiplier assembly for the HP5973 MSD series mass spectrometer and is fully compatible with Agilent Technologies hardware and "Auto-tune" software.

## **5975 Users**

**Important selection notes for 5975 users: Please check whether your Agilent 5975 MS has a "triple axis detector" (TAD) configuration.**

TAD instruments use the #G3170-80103 or equivalent replacement multiplier, such as the [Detech 2800](#). The 5975C inert XL and 5975E generally use a TAD, but some older models may be upgraded to the TAD with the TAD upgrade kit (#G3392A).

Older (non-TAD) instruments can use the Agilent/ITT [#05971-80103](#) or equivalent replacement multiplier, such as the [Detech 2300](#) or [Photonis 5900](#) (which are drop-in replacements) or [ETP AF617](#) (which includes a new frame mount and "discrete dynode" style AF616 multiplier, also known as Agilent #G3170-80200/#G3170-80203).

[Click here to go to main 5975 Multiplier page.](#)

NOTE: Initial installation of the ACTIVE FILM Multipliers for the HP5973 MSD requires part number 14617, which requires part number 14617, which includes the electron multiplier and the mount.

The mount houses the HED (high energy diode) which increases the energy of the ions and reduces multiplier contamination.

After initial installation, only the replacement electron multiplier, Part No. 14616, is required.

### **Specs**

<b>Replacement multiplier for instrument</b>	HP 5973 GC-MS
<b>Maximum Dark Current (pA) / Counts (cts/min) at 2.5kV</b>	1/3
<b>Number of dynodes (excluding HED)</b>	15
<b>Internal resistance (MΩ)</b>	23.58
<b>Typical Gain at 2.0kV (when new)</b>	4 x 10 <sup>6</sup>
<b>Typical Voltage for 1 x 10<sup>5</sup> Gain (when new)</b>	1.4 kV
<b>Maximum Temperature Under Vacuum</b>	350 °C

### **Technical**

Installation instructions on an 5973 (video)

<https://youtu.be/uyjYnF1sMUY>

### **Care and Handling**

ETP Electron Multipliers 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 performance required by modern instrumentation and have a proven reputation for reliability and ruggedness.

The original packing supplied by ETP is suitable 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.

In order to minimize contamination, standard high-vacuum techniques are recommended when handling ETP Electron Multipliers. Clean, powder-free nitrile or latex 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 (see instrument manual) prior to coming in contact with the multiplier.

(WARNING) Care should 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.

(WARNING) Exposure of the multiplier to high humidity should be avoided in order to minimize outgassing during initial operation. Excessive noise due to adsorbed moisture may be rectified by leaving the multiplier under high vacuum for 24 hours

### **Active Film**

ACTIVE FILM Multipliers™ are a new development in multiplier technology that incorporate totally air-stable "ACTIVE FILM" materials into a discrete-dynode multiplier design to produce an exceptionally sensitive ion detector with long operating life and excellent air stability. ACTIVE FILM Multipliers™ give a combination of performance and durability unsurpassed by any other type of electron multiplier detector.

ACTIVE FILM Multipliers™ have higher gain than alternative multipliers resulting in consistently lower multiplier voltages. Their long operating lifetime means less frequent multiplier replacement and reduced instrument down-time.

### **ACTIVE FILM TECHNOLOGY**

ACTIVE FILM Multipliers™ are a new type of electron multiplier detector for mass spectrometry and represent the latest development in electron multiplier technology.

ACTIVE FILM Multipliers™ combine the wide dynamic range and longevity of discrete-dynode multipliers, with the compact size and air stability of continuous-dynode multipliers.

ACTIVE FILM Multipliers™ are completely air-stable while exhibiting extremely wide dynamic range, long operational life, and very high sensitivity.

## **Installation**

### **Installing and Operating**

ETP Electron Multipliers generally require no preconditioning if stored correctly. The multiplier should be installed according to the instrument manufacturer's instructions. There should be no sharp objects in close proximity to the entrance aperture as this 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  $1 \times 10^{-4}$  Torr.

(WARNING) Applying the maximum rated supply voltage to a new multiplier can cause damage and permanent loss of gain.

(WARNING) Do not increase the applied voltage to a multiplier to overcome background noise as this can cause permanent loss of gain.

### **Obtaining Optimum Lifetime from an ETP Electron Multiplier**

Operational life varies depending on application and can be affected by the following 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. The gain of a electron multiplier will fall gradually over time, requiring the applied voltage to be periodically increased. This is a normal part of the multiplier aging process.
- **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 cause severe contamination of the detector or damage due to arcing caused by the sudden increase in chamber pressure. Degradation caused by vacuum failure may be permanent and irreversible, especially if the multiplier supply 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.

ETP does not recommend washing or cleaning of multipliers.