

# 29 mm (1.13") photomultiplier

## 9405B series data sheet

### 1 description

The 9405B is a 29 mm (1.13) diameter, end window photomultiplier with magnesium fluoride window, rubidium telluride photocathode and 11 BeCu dynodes of linear focused design for extended linearity.

It is supplied with spectral response data at specific wavelengths in the vacuum ultra-violet and with photon counting plateau curves showing the recommended voltage for photon counting applications.

### 2 applications

- fluorescence studies down to 110 nm
- measurement of synchrotron radiation down to 110 nm
- measurement of uv light in the presence of visible light

### 3 features

- sensitive to vacuum ultra-violet
- does not respond to visible light (solar blind)

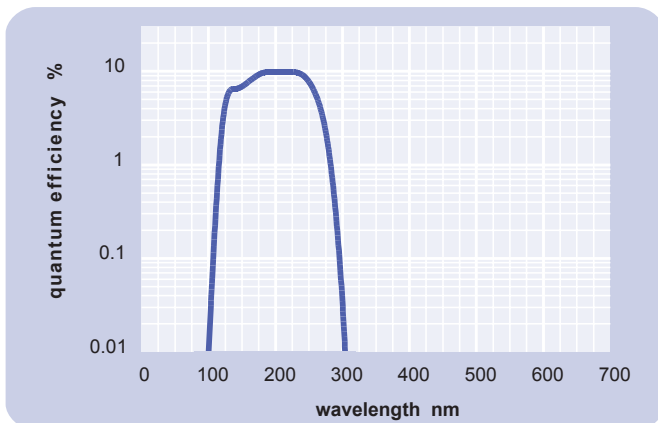
### 4 window characteristics

The plane of the window is cut perpendicular to its optical axis.

| 9405B<br>magnesium<br>fluoride |           |
|--------------------------------|-----------|
| spectral range (nm)*           | 110 - 310 |
| refractive index ( $n_d$ )     | 1.38      |

\* wavelength range over which quantum efficiency exceeds 1 % of peak

### 5 typical spectral response curves

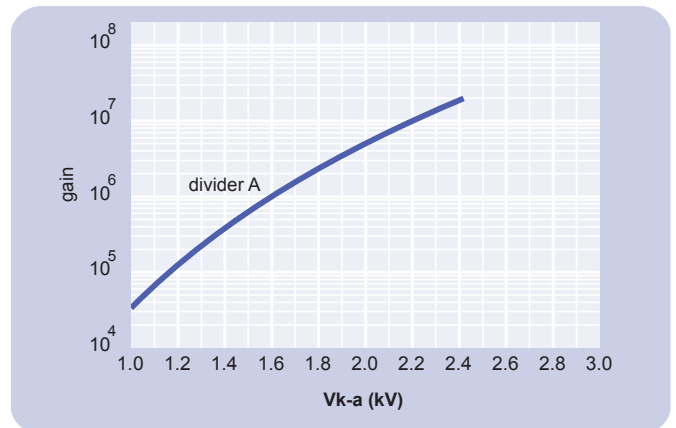


### 6 characteristics

|  | unit                        | min  | typ       | max  |
|--|-----------------------------|------|-----------|------|
| <b>photocathode: RbTe</b>  |                             |      |           |      |
| active diameter  | mm                          |      | 25        |      |
| quantum efficiency at peak   | %                           | 7    | 10        |      |
| <b>dynodes: 11LFBeCu</b>   |                             |      |           |      |
| <b>anode sensitivity in divider A:</b>                                 |                             |      |           |      |
| volts for $10^6$ gain  | V                           |      | 1600      |      |
| volts for $10^7$ gain  | V                           |      | 2200      | 3000 |
| <b>dark current at 20 °C:</b>  |                             |      |           |      |
| dc at $10^7$ gain  | nA                          |      | 0.3       | 5    |
| dark count rate  | $s^{-1}$                    |      | 50        | 500  |
| <b>pulsed linearity (-5% deviation):</b>                               | mA                          |      | 50        |      |
| <b>rate effect (<math>I_a</math> for <math>\Delta g/g=1\%</math>):</b> | $\mu A$                     |      | 1         |      |
| <b>magnetic field sensitivity:</b>                                     |                             |      |           |      |
| the field for which the output decreases by 50 %                       |                             |      |           |      |
| most sensitive direction   | $T \times 10^{-4}$          |      | 1.6       |      |
| <b>temperature coefficient:</b>  | $\% \text{ } ^\circ C^{-1}$ |      | $\pm 0.5$ |      |
| <b>timing:</b>   |                             |      |           |      |
| single electron rise time  | ns                          |      | 4.5       |      |
| single electron (fwhm)   | ns                          |      | 7.5       |      |
| transit time   | ns                          |      | 33        |      |
| <b>weight:</b>   | g                           |      | 50        |      |
| <b>maximum ratings:</b>  |                             |      |           |      |
| anode current  | $\mu A$                     |      |           | 100  |
| cathode current  | nA                          |      |           | 10   |
| gain   | $\times 10^6$               |      |           | 20   |
| temperature  | $^\circ C$                  | -180 |           | 60   |
| V (k-a) <sup>(1)</sup>   | V                           |      |           | 3000 |
| V (k-d1)   | V                           |      |           | 500  |
| V (d-d) <sup>(2)</sup>   | V                           |      |           | 300  |
| ambient pressure (absolute)  | kPa                         |      |           | 202  |

<sup>(1)</sup> subject to not exceeding max. rated sensitivity <sup>(2)</sup> subject to not exceeding max rated V(k-a)

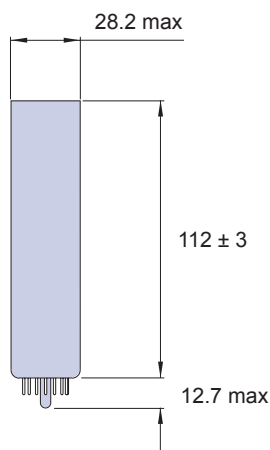
### 7 typical voltage gain characteristics



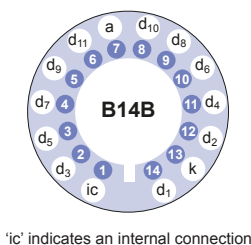
### 8 voltage divider distribution

| k | d <sub>1</sub> | d <sub>2</sub> | ..... | d <sub>8</sub> | d <sub>9</sub> | d <sub>10</sub> | d <sub>11</sub> | a |          |
|---|----------------|----------------|-------|----------------|----------------|-----------------|-----------------|---|----------|
| A | 2R             | R              | ..... | R              | R              | R               | R               | R | Standard |

### 9 external dimensions mm



### 10 base configuration (viewed from below)



Our range of B14B sockets, available for this series, includes versions with or without a mounting flange, and versions with contacts for mounting directly onto printed circuit boards.

### 11 high voltage caution

To avoid arc discharges between the photocathode and nearby grounded surfaces apply the HV only after hard vacuum has been attained, that is when the pressure is less than  $10^{-3}$  torr. Failure to observe this precaution will destroy the pmt and invalidate the warranty.

### 12 handling instructions

The window of this pmt has been specially cleaned to give maximum efficiency. It should not be touched with fingers or allowed to come into contact with oil or grease. The window can be cleaned with isopropyl alcohol to remove oil deposits.

### 13 ordering information

The 9405B meets the specification given in this data sheet. You may order **variants** by adding a suffix to the type number. You may also order **options** by adding a suffix to the type number. You may order product with **specification options** by discussing your requirements with us. If your selection option is for one-off order, then the product will be referred to as 9405A. For a repeat order, ET Enterprises will give the product a two digit suffix after the letter B, for example B21. This identifies your specific requirement.

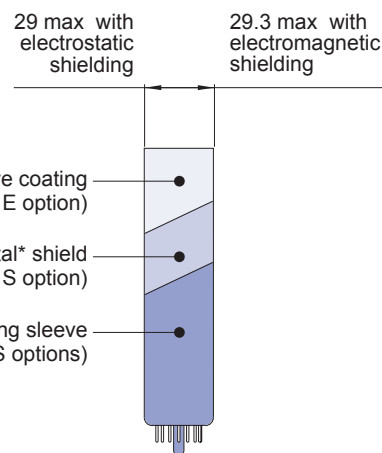
9405

#### options

- E** electrostatic shielding  
see drawing below
- S** electromagnetic shielding  
see drawing below

#### specification options

- B** as given in data sheet
- A** single order to selected specification
- Bnn** repeat order to selected specification



### 14 voltage dividers

The standard voltage dividers available for these pmts are tabulated below:

|       | k  | d <sub>1</sub> | d <sub>2</sub> | ..... | d <sub>7</sub> | d <sub>8</sub> | d <sub>9</sub> | d <sub>10</sub> | d <sub>11</sub> | a  |
|-------|----|----------------|----------------|-------|----------------|----------------|----------------|-----------------|-----------------|----|
| C670G | 2R | R              | .....          |       | R              | R              | R              | R               | R               |    |
| C670H | 2R | R              | .....          |       | R              | R              | R              |                 | 2R              | 4R |

R = 330kΩ

\*mumetal is a registered trademark of Magnetic Shield Corporation

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