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MODEL 40 SERIES ELECTRO-OPTIC DEFLECTORS

DATA SHEET 726A

ELECTRO-OPTIC DEFLECTORS

- **Model 41**
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The linear electro-optic effect of $LiNb0_3$ (LNB) crystal can be used to obtain beam deflection. There are two models, Model 40 (size 5x5x32mm) and Model 41 (size 5x5x50mm), with crystal orientation such that the beam is propagating in the Y direction and the X and Z axis are along the diagonal of the rod, Quadrupole electrodes being along X and Z axis as shown in the figure 1. This utilizes the r_{33} electro-optic coefficient. When the voltage is applied as shown, it establishes a gradient of Ez along the X-axis, which then creates a gradient in the refractive index along X axis. Thus it deflects a propagating beam along Y in the X-Y plane. The angle of deflection q is proportional to the voltage and is expressed by the equation:

$$\theta_x = l n_e^3 r_{33} Ez/w$$

where l = length of crystal, w = limiting aperture, n_e = extra-ordinary index, r_{33} = E-O constant (polarization parallel to Z axis)

The "figure of merit" for the deflector is given by the number of resolvable spots per sweep in the far field. The diffraction limited spot diameter 'b', given by the Rayleigh criterion, is:

$$b = \frac{2.44 \lambda f}{w}$$

where λ = wavelength, f = focal length of the lens, and w = beam diameter

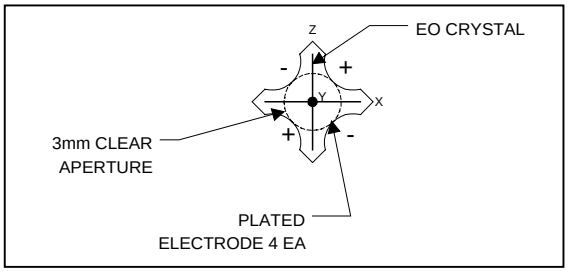

Fig.1

Specifications:

Parameter	Model 40	Model 41
Crystal LNB size	5x5x32mm	5x5x50mm
Crystal orientation	45^o to x & z axis	45^o to x & z axis
Aperture	3mm	3mm
Max voltage	6 KV	6 KV
Spectral response	650-3500nm	650-3500nm
Deflection Sensitivity (3mm beam) @633 nm	2.25 mr/KV	3.5 mr/KV

Special AR coatings are available. Crystal Lithium Tantalant (LTA) may also be used. A cut similar to LNB, of size 5x5x32mm will produce a deflection sensitivity of 2.5 mr/KV (3mm beam). The advantage of the LTA crystal is that it has a damage threshold, about 40% higher than LNB.