

# POSITION SENSING TRANSDUCERS

Structurally modified photodiodes are used in the measurement of small angles, distances, and machine vibrations, which are related to linear position sensing.

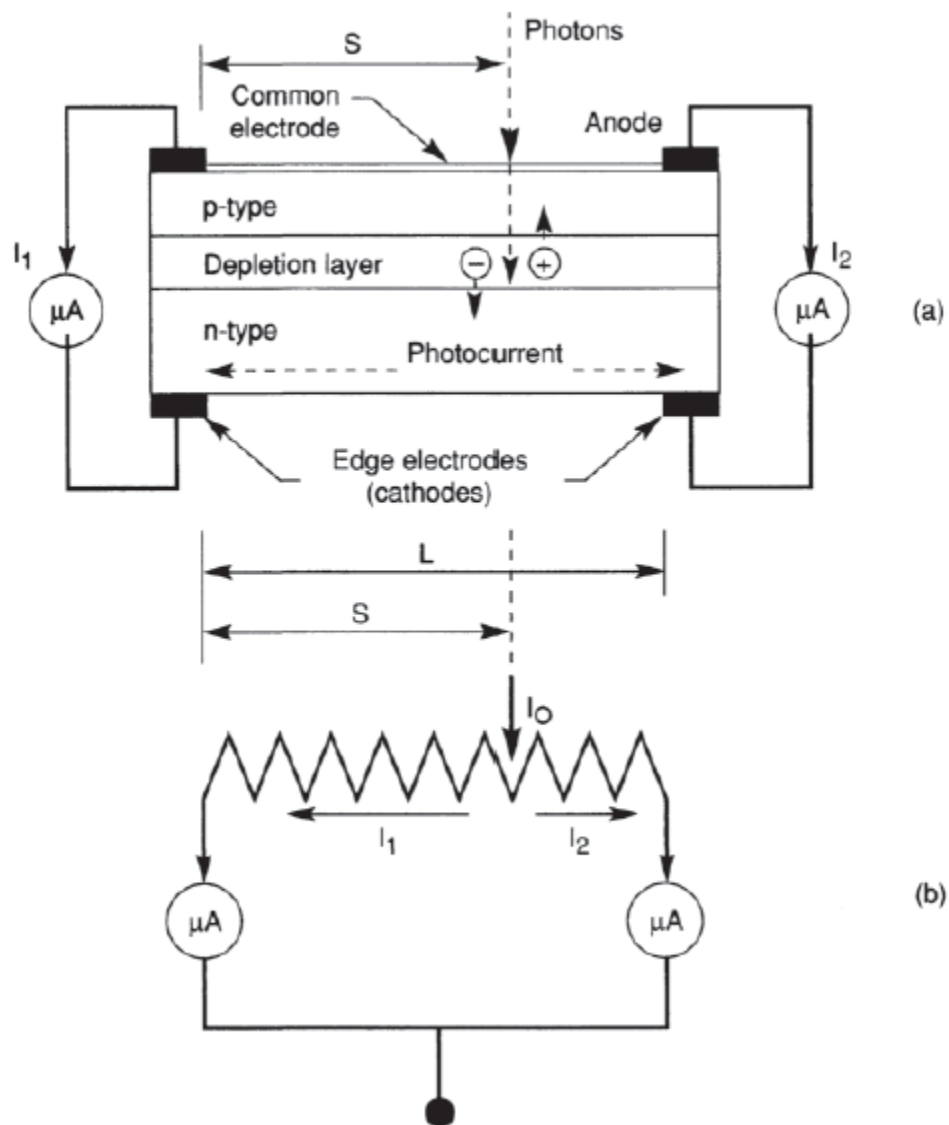


Fig 5.40 Position sensing transducer.

The lateral effect PIN photodiode is generally used for these measurements, and its cross section is shown in Fig. 5.40a. Photons from a laser source impinge on the p-type front surface of the PIN diode and are readily absorbed within the depletion region, where electron-hole pairs are generated.

The electrons move toward the n-type region and generate a photocurrent. The operation of the lateral-effect photodiode can be represented by a variable contact resistor, as shown in Fig. 5.40b. The location of the laser spot defines that variable contact. The photocurrent  $I_0$  divides between the paths to the two edge electrodes in a ratio given by

$$\frac{I_1 - I_2}{I_1 + I_2} = 1 - \frac{2S}{L}$$

Where  $L$  is the distance between the electrodes,  $S$  is the distance of the laser spot from one of the electrodes, and  $I_0 = I_1 + I_2$ . Using the above equation,  $S$  can be determined by measuring  $I_1$  and  $I_2$ . This is the transduction mechanism of the position sensing transducer. It measures displacements along a single axis.

Source: <http://mediatoget.blogspot.in/2012/08/position-sensing-transducers.html>