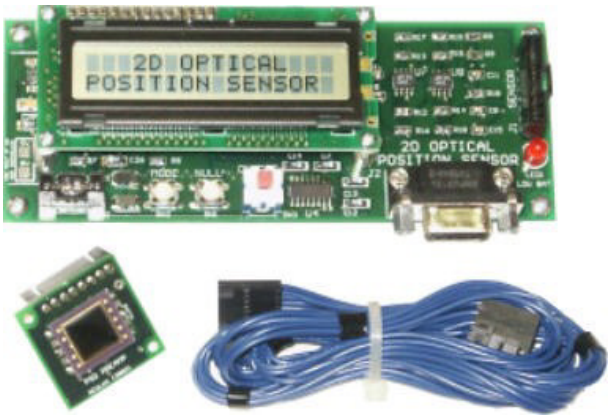
2-D Optical Position Sensor

This is the most versatile, compact and affordable 2-D optical sensing system on the market today. It very precisely measures the absolute position of a CW laser beam or any source of concentrated optical energy. It is designed for manufacturing and laboratory applications including: straightness and flatness measurements, alignment of laser cavities or optical systems, and machine tool travel accuracy.



FEATURES

- 0.4” x 0.4” sensing area
- +/- 0.001” accuracy; 0.0001” resolution
- 2 line LCD position display
- Absolute or relative position display modes
- Light power level displayed as x.xx mW
- Warning messages for high/low light levels
- Ambient light suppression
- RS-232 interface to a computer or PDA

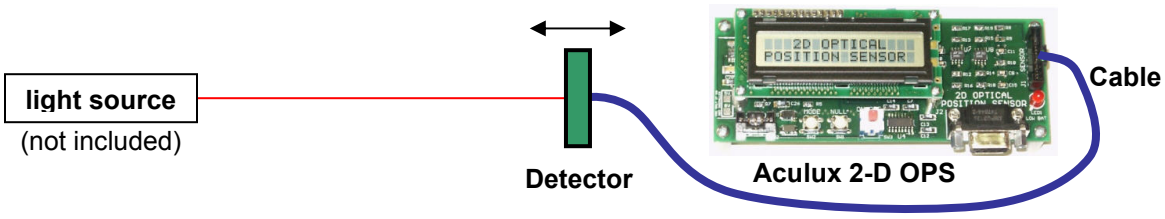
SPECIFICATIONS

Parameter	Specification	
Measurement range	+/- 0.2	inches in X and Y
Resolution	0.0001	inches
Accuracy	+/- 0.001	inches
Light source wavelength[1]	320-1100	nanometers
Power on detector, maximum	1.25	mW
Sample rate, internal	200	Hz
LCD/serial port update rate	4	Hz
LCD Display output	Position Mode: position and power Voltage Mode: voltage and power	
Serial output	Serial RS-232, 9600 Baud, 8 data bits, 1 Stop bit, No parity	
Power requirements	3 VDC at 10 ma	
Batteries	2 - AA alkaline (batteries not included)	
Battery life, estimated	20	hours
Indicators	1 LED indicates battery status	
Size	5.2 x 2.0 x 0.8 inches	
Weight	3 oz (80 grams)	
Sensor Cable configuration	8 conductor, DB9 female	
Mounting	Four #4 holes, 4.9” x 1.7” spacing	

[1] Kit does not include laser source.

OPERATION

The 2-D OPS uses a high accuracy lateral effect photodiode to produce four photocurrents proportional to light spot intensity and position. These photocurrents are digitized by a 12bit A/D converter then sent to a micro-processor where position calculations are performed. The position data and light power level are subsequently presented on a two line LCD display. The position or voltage data is sent continuously from the serial port at 4 Hz. The various sign-on messages and light power level are not sent out the serial port. Data communication is simplex or one-way from sensor to PC.



APPLICATIONS

The typical application uses the detector head together with a laser beam from most any source (an inexpensive pointer, precision collimated source, or the laser beam from a common tool like a laser level). The basic measurement will involve mounting the detector head and using the laser beam as a reference datum. The following are some typical measurement applications:

STRAIGHTNESS OF TRAVEL

Mount detector on the carriage or moving portion of a machine tool. Mount laser so that it strikes the active surface of the detector over the range of travel. Zero the position data at the starting point. Record X and Y data from the sensor at several points over the full range of travel. The deviation of any recorded point from a line defined between the first and last data point is straightness error.

MOVEMENT OF PLANE MIRROR OR ANY FLAT OPTICAL SURFACE

Point laser at mirror and direct reflected beam onto detector surface. Zero the position data. If mirror moves in angle, the amount is equal to the magnitude of the movement indicated by the display divided by twice the distance between the mirror and detector. The value is in radians.

OPTICAL CAVITY MONITORING

Split off a portion of the intra-cavity beam of a laser cavity using a beam splitter or partial reflector. Direct laser beam onto the detector head (power must be less than 1.25 mW). Zero the display and monitor subsequent movement on the position display.

SURFACE FLATNESS

Place detector on surface to be measured. Mount laser so that it strikes the active surface of the detector over the extent of the surface to be measured. Zero the position data at the starting point. Slide the detector along the surface under measurement and record data from the detector axis which is in contact with the surface. Repeat for as many points as needed. The deviation of any recorded point from a line defined between the first and last data point is flatness error.

More information on the 2-D OPS is available at http://www.aculux.com/optical2D.aspx.

Aculux also sells the LaserRanger™ line of precision optical range sensors.

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