2D Image Correlation Encoder
MICSYS

Bulletin No. 2029

Making small, non-contact, 2D-displacement measurements at the nanometer level

Mitutoyo

MICSYS

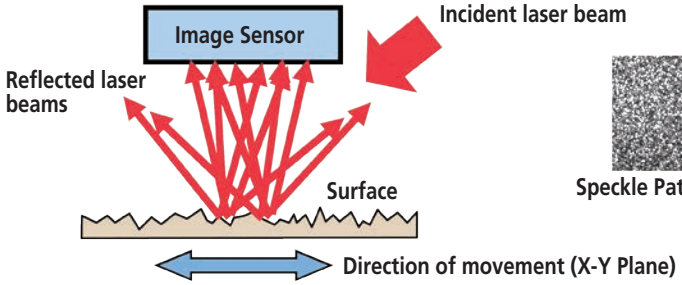
Two-dimensional micro-displacement measurement achieved with high resolution and high accuracy.

FEATURES

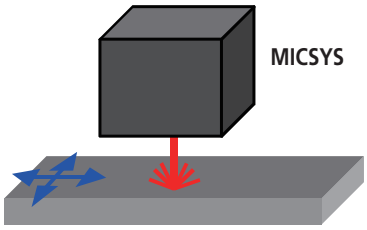
- High accuracy non-contact 2D encoder using image correlation.
- Simultaneous X-Y position measurements.
- Nanometer resolution.
- Easy alignment.
- Allows minute strain and deflection measurements.

Measuring principle

When the rough surface of an object is irradiated by a laser beam, the beam is scattered into multiple reflected beams that, due to the coherent nature of laser radiation, interfere with each other to form a particular kind of reflection called a speckle pattern.
Now, if the object is moved, the speckle pattern image is also moved in proportion, and this effect can be used to track the 2D displacement of the object at the nanometer resolution level by comparing the speckle images obtained before and after the movement (image correlation).



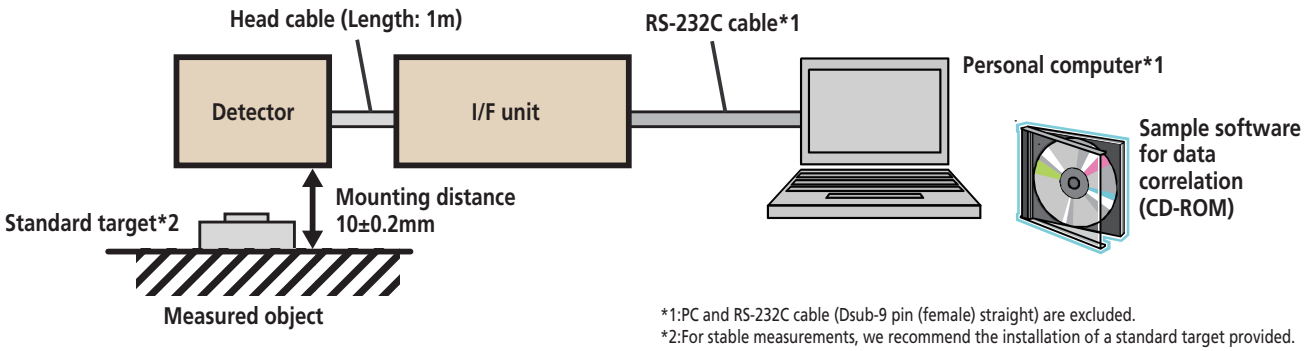
Speckle Pattern



2D displacement measurements in the X-Y plane

System Configuration

Standard configuration: Detector, I/F unit, Head cable, Sample software for data correlation, Standard target



*1:PC and RS-232C cable (Dsub-9 pin (female) straight) are excluded.
*2:For stable measurements, we recommend the installation of a standard target provided.

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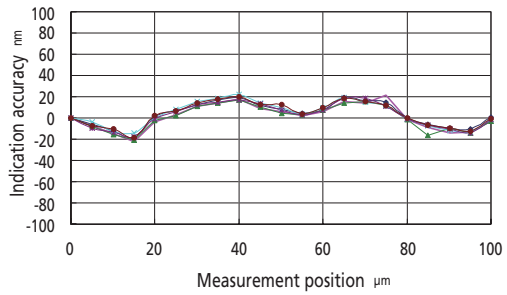
Specification

Model No.	MICSYS-SA1
Order No.	549-701A
Detection method	Laser speckle image correlation
Resolution	1nm
Repeatability (20C°)	5nm (σ)
Accuracy (20C°)	+/-100nm; Linearity: 80nm
Effective range	± 100μm (2D)
Interface	RS-232C
Data update period	20Hz
Laser wavelength	650nm (Visible) Class 2
Operating temperature and humidity range	Detector: 15-25°C, I/F unit: 0-40°C, 20-80%RH (Non-condensing)
Storage temperature and humidity range	-10-50°C / ~85%RH (Non-condensing)
Power supply	AC100-240V 45W 50/60Hz
Standard accessories	Standard target, Sample software for data correlation (on CD-ROM)

* : Measurement is performed within the X-Y plane from the origin point with the standard target.

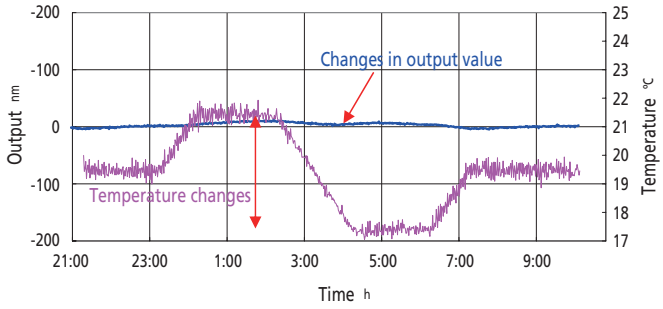
Measurement accuracy relative to position

* : The following results are typical but are not guaranteed for any particular unit.
* : Measurement is performed within the X-Y plane from the origin point with the standard target.



Effect of temperature change on dimensional output

* : The following results are typical but are not guaranteed for any particular unit.
* : Measurement is performed within the X-Y plane from the origin point with the standard target.

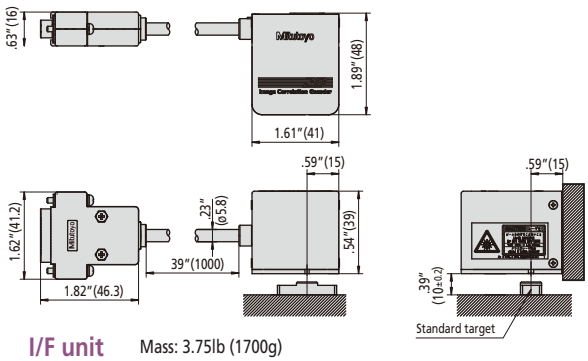


Dimensions

Unit: Inch (mm)

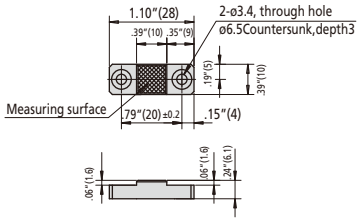
Detector

Mass: .66lb (300g)



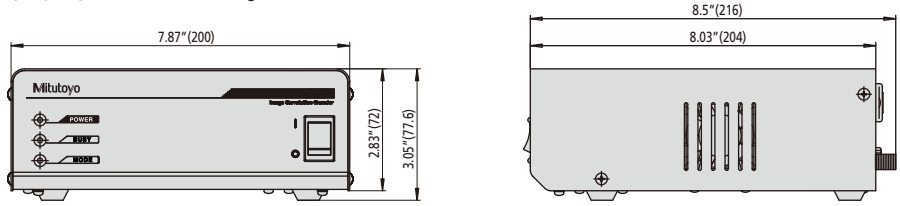
Standard target

Mass: .02lb (10g)



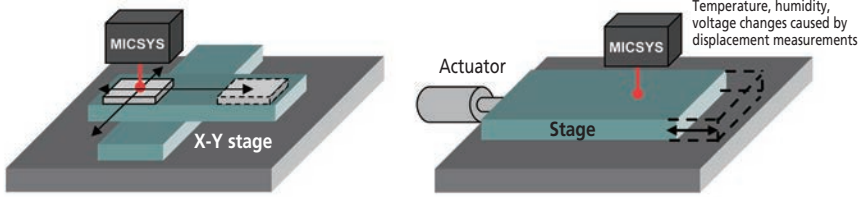
I/F unit

Mass: 3.75lb (1700g)



Applications

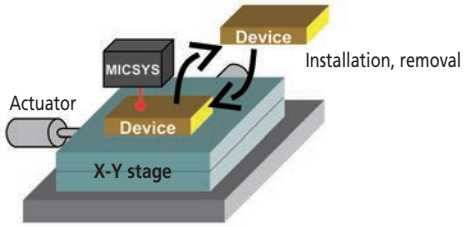
1. Evaluation stage system for various types of manufacturing and inspection equipment



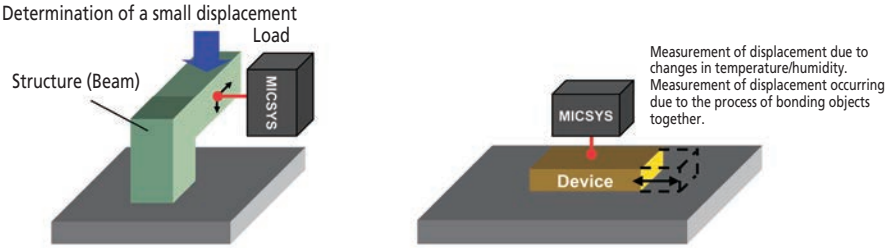
a) Evaluation of positional repeatability

b) Evaluation of static stability and drift

2. High-precision positioning for various types of workpiece (device)



3. Determination of a small displacement



a) Determination of small structural displacements

b) Determination of small workpiece displacements

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