

# 11

## Sensors and Embedded Equipment

### IP67 G

#### IP Codes

The code indicates the degree of protection against the ingress of foreign materials and water as defined in the IEC standard (IEC 60529). The number indicates the protection level. (Refer to page 3)



Contact Sensors (Linear Gage)



Litematic



Laser Scan Micrometers



Non-contact Line-laser Sensor



NC Linear Scale (Linear Encoder)



Digital Readout System (DRO)

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Video

# Sensors and Embedded Equipment

Mitutoyo offers a variety of contact sensors that can accurately measure not only the movement amount of equipment but also the dimensions of workpieces to be measured, as well as non-contact sensors that can accurately measure the outlines and clearances of cylinders, surface texture of workpieces, etc.



Product catalog  
E13022

## Contact Sensors (Linear Gage)

A wide range of products are available to best suit your measurement needs, including space-saving, environment resistant, cost, and accuracy. They can help you build an optimized production environment.



IP67 G



Environment-resistant Linear Gage (Slim type)

### LG200

The vibration/shock resistance of the **LG100** Series is delivered in a slimmer body. Approximately 1/5 cross section compared with **LG100**.

- Measuring range: 10 mm
- Resolution: 1  $\mu$ m/0.5  $\mu$ m/0.1  $\mu$ m



Video



IP67 G



Environment-resistant, Linear Gage

### LG100

High-accuracy gage head suitable for in-line and in-laboratory use. Assures the repeatability ( $2\sigma$ ) of 0.3  $\mu$ m and the narrow range accuracy of 0.5  $\mu$ m (arbitrary 20  $\mu$ m range).

- Measuring range: 10 mm/25 mm/50 mm
- Resolution: 1  $\mu$ m/0.5  $\mu$ m/0.1  $\mu$ m



Video



IP66



ABSOLUTE Digimatic Linear Gage

### LGS-1012P

ABSOLUTE electrostatic capacitance type encoder makes it possible to maintain the reference point even when the power is switched off.

- Measuring range: 12.7 mm
- Resolution: 10  $\mu$ m



High-accuracy/resolution Linear Gage

### LGH

This series has achieved very high accuracy combined with a resolution of 0.01/0.005  $\mu$ m (according to model), practically equivalent to that of a laser interferometer, and a wide measuring range of 10 mm.

- Measuring range: 10 mm
- Resolution: 0.01  $\mu$ m/0.005  $\mu$ m

## Contact Sensors (Linear Gage Counter)

A wide range of products are available to best suit your measurement needs, including space-saving, environment resistant, cost, and accuracy. They can help you build an optimized production environment.



Linear Gage Counter (Display Unit)

### EJ-102N/NE Counter and Interface Unit

This is a compact counter for linear gages and industrial interface units.

Linear Gage Counter (Display Unit)

### EH Counter

Two types are available for this model: a 1-axis display and a 2-axis display, both of which enable addition or subtraction calculations between two gages.



Product catalog E13022



Product catalog E13022



Linear Gage Counter (Display Unit)

### EC Counter

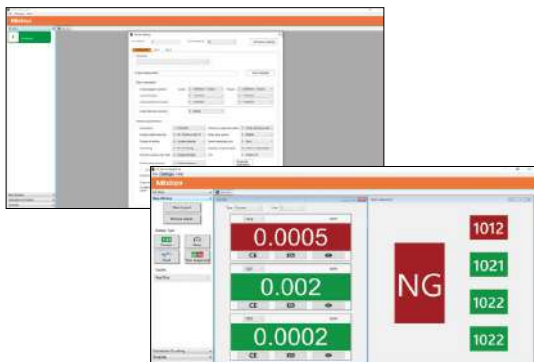
This Digimatic display can be connected to Linear gages with Digimatic output (LGS).



Product catalog E13022

## Contact Sensors (Linear Gage Software)

A wide range of products are available to best suit your measurement needs, including space-saving, environment resistant, cost, and accuracy. They can help you build an optimized production environment.



Application Software

### LG QuickSetupTool

LG QuickSetupTool is a free software tool for use with the **EJ** counter when connected via the optional USB interface. All kinds of settings normally carried out with counter operating keys now can be easily applied from a computer.

Measurement Data Loading Software

### SENSORPAK

This software facilitates loading measurement data onto a personal computer from a linear gage counter with RS-232C/USB output (**EH Counter**), or from a Litematic display (**VL**).



Product catalog  
E13022

## High-accuracy/resolution Measuring Machine Litematic

These high-resolution Digimatic measuring units can accurately measure the thickness and height of workpieces that are susceptible to a measuring force.



High-accuracy/resolution Measuring Machine Litematic

### VL-50-B/50S-B

Features low and constant measuring force suitable for measuring high-precision parts and easily deformed workpieces such as functional thin films. Measuring force can be selected from 0.01 N, 0.15 N and 1.0 N.

- Measuring range: 50 mm
- Resolution: 1.0 μm/0.1 μm/0.01 μm (selectable)



Product catalog  
E13022

## Non-contact Line-laser Sensor



Non-contact Line-laser Sensor

### SurfaceMeasure1008S

This line-laser sensor combines the optical technology and sensor technology of Mitutoyo.

- Maximum measuring width: 100 mm
- Measuring range: 80 mm
- Z-axis repeatability: 0.5  $\mu\text{m}$



Product catalog  
E13023



Non-contact Line-laser Sensor

### SurfaceMeasure0303S

This line-laser sensor combines the optical technology and sensor technology of Mitutoyo.

- Maximum measuring width: 32.5 mm
- Measuring range: 25 mm
- Z-axis repeatability: 0.4  $\mu\text{m}$



Product catalog  
E13023



Master2410

Optional Accessory

### Sensor Networking Hub Master

In the multi-sensor system, this device is used for distributing power to sensors and synchronizing the sensors.



Optional Accessory

### GoMax NX

A calculation unit that accelerates measurement processing without using a PC.

## Non-contact Line-laser Sensor



Optional Accessory

### Master Cable

Cable for the connection between sensor and Master.



Optional Accessory

### Power and Ethernet Cable

Cable to supply and control power without using the Master for the sensor.



Optional Accessory

### I/O Cable

Cable to connect the external I/O device to the sensor.



Product catalog  
E13024

## High-accuracy Non-contact In-line Measuring System/Laser Scan Micrometers

These instruments feature extremely high-speed measurement capabilities thanks to an ultra-high-precision scan motor. They can also meet high-precision needs such as linearity precision.

IP67



Measuring Unit

### LSM-02-A

LSM sensor developed for in-line and automated equipment.

- Measuring range: 0.005 mm to 2 mm
- Guaranteed repeatability ( $2\sigma$ ):  $\pm 0.015\ \mu\text{m}$  ( $\phi 1\ \text{mm}$ )
- Guaranteed linearity:  $\pm 0.3\ \mu\text{m}$
- Scanning rate: 3,200 scans/s

IP67



Measuring Unit

### LSM-30-A

LSM sensor developed for in-line and automated equipment.

- Measuring range: 0.3 mm to 30 mm
- Guaranteed repeatability ( $2\sigma$ ):  $\pm 0.06\ \mu\text{m}$  ( $\phi 10\ \text{mm}$ )
- Guaranteed linearity:  $\pm 1.0\ \mu\text{m}$
- Scanning rate: 3,200 scans/s



Controller for LSM Developed for In-line and Automated Equipment

### LSM-CU-A

- Can be connected to **LSM-02-A/LSM-30-A**.
- Compact, thin design that fits in a distribution board or inside equipment.
- Easily mountable on a DIN rail without the need for tools.
- USB Type-C, I/O ports, and industrial interfaces (optional).
- Configuration software included as standard for easy configuration.

EtherNet/IP



EtherCAT



PROFINET



CC-Link I/TSN



Interface Unit

### I/F Module

Four types of interfaces are available so you can select the right one to meet your production line requirements.

The controller design enables insertion of a module without changing the layout.

Product catalog  
E13024

## High-accuracy Non-contact In-line Measuring System/Laser Scan Micrometers

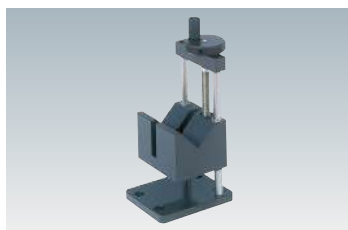
These instruments feature extremely high-speed measurement capabilities thanks to an ultra-high-precision scan motor. They can also meet high-precision needs such as linearity precision.



Optional Accessory

### Standard Calibration Gage Set

Standard calibration gage set suitable for calibration of Laser Scan Micrometers.

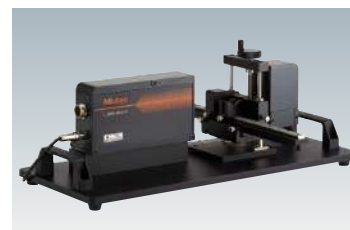


Optional Accessory

### Workstage

Easy set-up and height adjustment enables high-precision measurement.

Applicable model: **LSM-30-A**



Optional Accessory

### Adjustable Workstage

Vertical/horizontal slide mechanism enables easy measurement of various workpiece diameters.

Applicable model: **LSM-30-A**

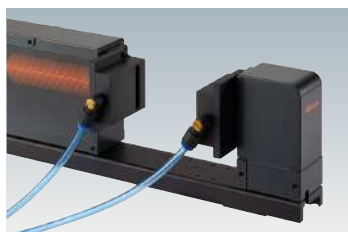


Optional Accessory

### Wire Guiding Pulley

Used for supporting measurement of outside diameter of fine wire-like materials such as magnetic wire or fiber.

Applicable model: **LSM-02-A**



Optional Accessory

### Air Shield

Air blows from the air outlet installed on the laser section to clear dust adhering to the laser window.

Applicable model: **LSM-30-A**



Optional Accessory

### Laser Beam Stabilization Shield

This suppresses variation of measured values caused by spatial fluctuation of the measurement environment.

Applicable model: **LSM-30-A**



Optional Accessory

### Extension Signal Cable/ Extension Relay Cable

Extension signal cables are necessary when the measuring unit and display unit are separated in operation. Extension relay cables are necessary when the optical section is separated in operation.

## NC Linear Scale (Linear Encoder)

The linear encoder detects the amount of linear movement and displacement and can output as digital data. They are useful for positioning and controlling CNC machines, semiconductor manufacturing equipment, inspection equipment, etc.



ABSOLUTE Linear Scale (separate type)

### ABS ST700

ABSOLUTE measurement with exposed scales. Non-contact detection is optimal for high speed and high acceleration devices such as linear motors.

- Detection method: Electromagnetic induction
- Maximum effective range: 6000 mm
- Resolution: 0.1  $\mu\text{m}$
- Maximum response speed: 5000 mm/s



Product catalog  
E13005



ABSOLUTE Linear Scale (separate type)

### ABS ST1300

The telecentric imaging optical system is used for detecting the position. Outstanding robustness against contamination and GAP allowance compared to earlier optical types. There are three types of attachment methods available according to the application.

- Detection method: Optical
- Maximum effective range: 12000 mm
- Resolution: 0.001  $\mu\text{m}$
- Maximum response speed: 8000 mm/s



Product catalog  
E13005



Incremental Linear Scale (separate type)

### ST36

A high-accuracy model that outputs a 2-phase sine wave of 4  $\mu\text{m}$  signal period. There are four types of output signal forms selectable for your specifications.

- Detection method: Optical
- Maximum effective range: 3000 mm
- Resolution: 0.01  $\mu\text{m}$
- Maximum response speed: 1200 mm/s



Product catalog  
E13005



Incremental Linear Scale (separate type)

### ST46-EZA

Includes an automatic adjustment function for the signal (EZA function) at the push of a button. A wide range of specifications are available to best suit your application(s). With the "setup indicator" installed on the connector shell, adjustment while attached is easy without the need of an oscilloscope or PC.

- Detection method: Optical
- Maximum effective range: 3000 mm
- Resolution: 0.05  $\mu\text{m}$
- Maximum response speed: 2600 mm/s



Product catalog  
E13005

## NC Linear Scale (Linear Encoder)

The linear encoder detects the amount of linear movement and displacement and can output as digital data. They are useful for positioning and controlling CNC machines, semiconductor manufacturing equipment, inspection equipment, etc.



ABSOLUTE Linear Scale (assembly type)

### ABS AT1300

The telecentric imaging optical system is used for detecting the position. Features outstanding robustness against contamination and scuffing compared to earlier optical types. The best-in-class, smallest resolution of 0.001  $\mu\text{m}$  as an ABSOLUTE scale. Space-saving, slim body.

- Detection method: Optical
- Maximum effective range: 2200 mm
- Resolution: 0.001  $\mu\text{m}$
- Maximum response speed: 3000 mm/s



Product catalog  
E13005



ABSOLUTE Linear Scale (assembly type)

### ABS AT1100

Electromagnetic induction type with excellent water and oil resistance. Features a structure that can prevent coolant entry and is dust proof as well. This manufacturing site-ready linear scale provides more reliable operation compared with conventional models.

- Detection method: Electromagnetic induction
- Maximum effective range: 3040 mm
- Resolution: 0.05  $\mu\text{m}$
- Maximum response speed: 3000 mm/s



Product catalog  
E13005



Video



INCREMENTAL Linear Scale (assembly type)

### AT211-A, AT211-B

This is a slim, sealed, 2-phase, square-wave scale that can be directly connected to a control unit.

- Detection method: Optical
- Maximum effective range: 1500 mm
- Resolution: 0.1  $\mu\text{m}$
- Maximum response speed: 2000 mm/s



Product catalog  
E13005

## Digital Readout System (DRO)



Incremental Linear Scale (assembly type)

### AT103

A wide choice of measuring range is available in this standard type scale unit. Connectable to the **KA-200** counter or **PSU-200**.

- Detection method: Optical
- Maximum effective range: 6000 mm
- Maximum response speed: 2000 mm/s



Product catalog  
E13000



Incremental Linear Scale (assembly type)

### AT113

Slim spar type with unit sectional dimensions of 22x35 mm. Connectable to the **KA-200** counter or **PSU-200**.

- Detection method: Optical
- Maximum effective range: 1500 mm
- Maximum response speed: 2000 mm/s



Product catalog  
E13000

IP67



ABSOLUTE Linear Scale (assembly type)

### ABS AT715

Electromagnetic induction principle means scales are unaffected by contamination.

- Detection method: Electromagnetic induction
- Maximum effective range: 3000 mm
- Resolution: 1  $\mu$ m
- Maximum response speed: 833 mm/s



Product catalog  
E13000



Counter (Display Unit)

### KA-200

A high-performance display unit that has special functions for lathes and milling machines as standard.



Product catalog  
E13000

## ABSOLUTE Digimatic Scale Units

The scale units developed from digital callipers can be installed to position a small machine tool, jig, tool, etc.



Applicable models: SD-G



Digimatic Scale Units

### SD

SD Series can be easily mounted on jigs, tools, and small machine tools to enable accurate positioning.

- Detection method: Electromagnetic induction, Electrostatic capacitance
- Maximum effective range: 1000 mm
- Resolution: 0.01 mm
- Response speed: Unlimited

## Accessories, Options

Various signal controller units and programs for linear gages are available.



Pulse Signal Interface Unit

### PSU-200

The **PSU-200**, which can convert a sine wave into a square wave signal and output it, allows the use of a linear gage with a CNC feedback system or measurement control equipment to improve positioning accuracy and resolution.



Serial Signal Interface Unit

### PSU-251/252

**PSU-251** Series is a serial signal interface unit for incremental linear scales.



Product catalog  
E13005



Product catalog  
E13005

