Mitutoyo

High Accuracy Non-contact In-line Measuring System Laser Scanning Micrometer

LSM-02-A/30-A/CU-A

Sensor Systems

PRE 1589

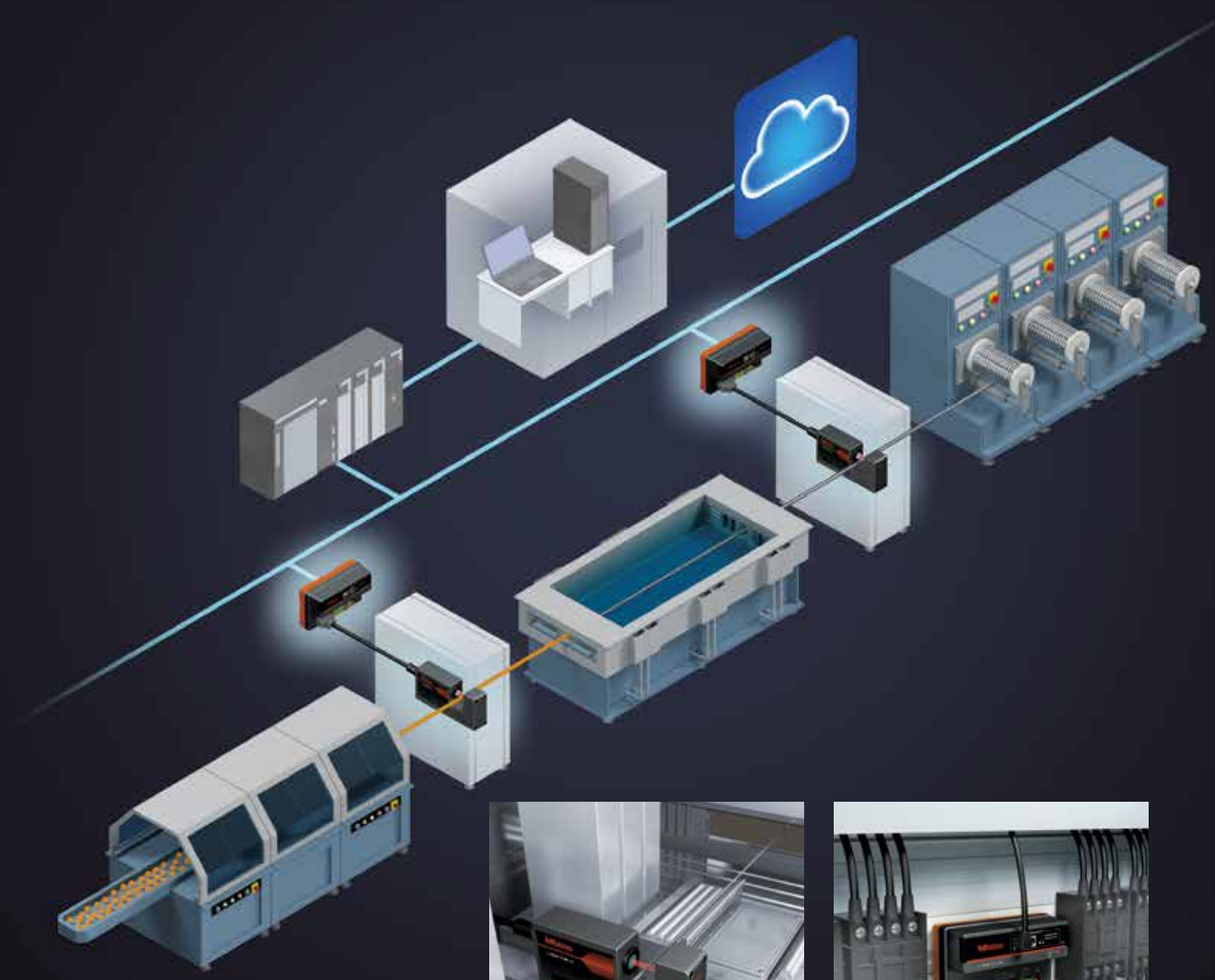
Mitutoyo

LSM-02-A / LSM-30-A / LSM-CU-A

NEW Products

Solutions for high-accuracy measurements of outer diameters in the era of in-line inspection

Our advanced sensor technologies provide new value by facilitating the development of a connected smart factory.

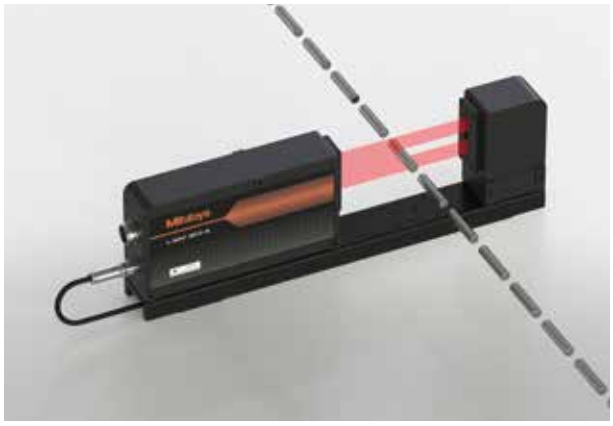


Its sleek profile ensures effortless mounting on a DIN rail, making it suitable for installation within a distribution board.

APPLICATION

Catheter and magnet wire measurements

Roller bearing measurements

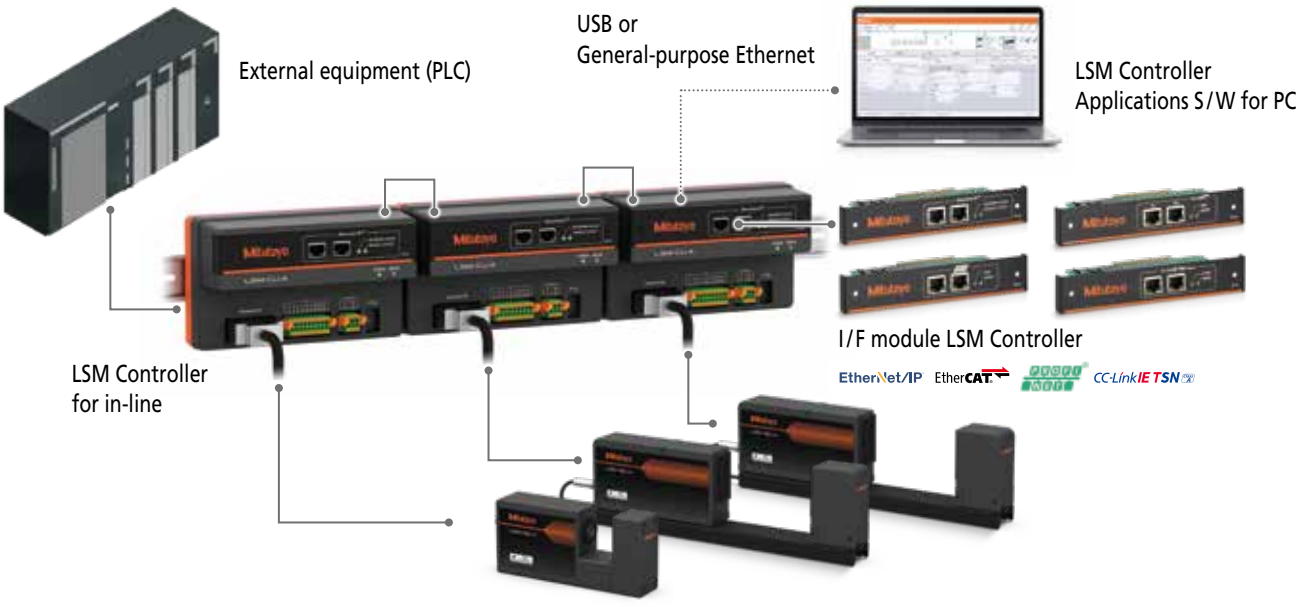


Simultaneous measurement of roller outer diameter and deflection

Film sheet thickness measurement

Note: The laser in the image is for illustrative purposes only.

SYSTEM CONFIGURATION



LINE UP

Sensor unit features

LSM-30-A

LSM-02-A

- **Proven accuracy developed by one of the most reputable precision measurement instrument manufacturers.**
  - Guaranteed repeatability of 2 σ
    LSM-02-A (ø1 mm): ±0.015 µm
    LSM-30-A (ø10 mm): ±0.06 µm
  - Guaranteed linearity:
    LSM-02-A: ±0.3 µm
    LSM-30-A: ±1.0 µm
- Compact body for **LSM-02-A,** ensuring versatile installation.
- **LSM-30-A** is a separable sensor with an emission/reception unit that can be used independently.
- Equipped with an ultra-fine wire measurement mode, capable of measuring outer diameters as small as 5 µm.
- **IP67** rated for durability.
- High-accuracy scanning facilitated by a precision motor.
- Scanning rate: **3,200** scans/s

Controller features

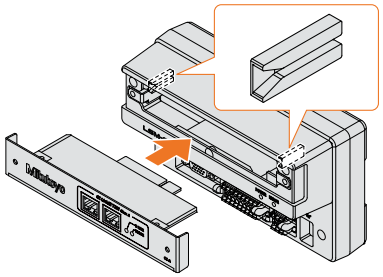
LSM-CU-A

- Compact and thin design, fitting seamlessly into distribution boards or equipment.
- Entire unit, including the cable, can be stored within a 100 mm deep distribution board.
- Tool-free mounting on a DIN rail.
- Equipped with USB Type-C, I/O ports, and optional industrial interfaces.
- Standard configuration software included for user-friendly setup.
- Unit can be rotated 90 degrees for flexible layout options.

Module unit features

I/F module

- Choose from four interface types to match your production line requirements.
- Controller design allows for module insertion without altering the layout.



SOFTWARE [LSMPAK]

LSMPAK ensures intuitive operation of LSM's measurement conditions (such as functions for Go/no-go judgment), execution of calibration, and precise workpiece positioning for measurement. Additionally, LSMPAK enables the acquisition and real-time monitoring of measured values.

Point 1

Wizard instructions

The interactive wizard streamlines the process by guiding you through each step. Simply select the desired items, and the wizard will swiftly lead you through.

Measurement conditions selection screen

Advanced measurement conditions configuration screen

Point 2

Guidance function

A user-friendly guidance function provides clear explanations for complex features and terms, ensuring quick solutions to operator queries. This function also offers links to the user manual's PDF for prompt and accurate configuration.

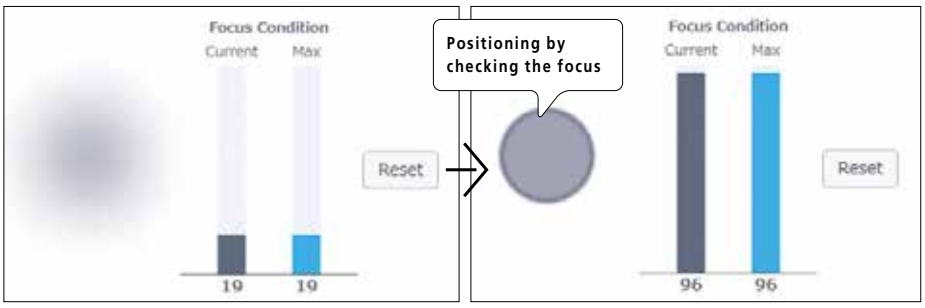
Clicking displays the simple guidance for each item

Displays the user manual PDF

Point 3

Workpiece Positioning

Achieve optimal workpiece positioning in relation to LSM, confirmed both visually and quantitatively. This feature guarantees rapid and accurate positioning, facilitating consistent and stable measurements.



Before positional adjustment

After positional adjustment

▪ Sensor unit

Specifications

Code No.		544-123	544-124
Model		LSM-02-A	LSM-30-A
Measuring range		0.005 to 2 mm 0.05 to 2 mm*1	0.3 to 30 mm
Resolution		0.01 µm	0.01 µm
Repeatability (2 σ)*2	Full range	ø 2 mm: ±0.03 µm*3	ø 30 mm:±0.09 µm*4
	Middle range	ø 1 mm: ±0.015 µm*3	ø 10 mm:±0.06 µm*4
Linearity*2		±0.3 µm*5	Whole range: ±1.0 µm*5 Narrow range:±(0.6+0.1 ⊿ D) µm*5*6
Positional error*2*7		±0.4 µm	Full range (10×30): ±1.8 µm Middle range (5×20): ±1.0 µm
Measuring region		1×2 [optical axis depth]×[scanning width] mm	10×30 [optical axis depth]×[scanning width] mm
Number of scans for averaging		16 to 2048 scans *8	1 to 2048 scans
Laser Class		Semiconductor laser: CLASS 1 (Max. output: 1.0 mW, Laser wavelength: 650 nm)	
Scanning rate		3200 scans/s	
Laser scanning speed		76 m/s	226 m/s
Protection level		IP67	
Distance between the emission unit and reception unit		–	Standard: 130 mm, Max.: 350 mm
Operating environment		Temperature: 0 °C to 40 °C, Humidity: 35%RH to 85%RH (non-condensing) Altitude: 2000 m or less	
Storage temperature		Temperature: -10 °C to 50 °C, Humidity: 35%RH to 85%RH (non-condensing)	
CE Marking/UKCA Marking		EMC Directive: EN IEC 61326-1, Immunity test requirements: Clause 6.2 Table 2 Emission limit: Class A RoHS Directive: EN IEC 63000	
Standard accessory		Signal cable: **02AGQ190** CD (User's Manual): **02AGQ039**	

*1: Applies when configured as "Do not perform ultra-fine wire measurement" or "Edge specification" in the basic setup.

*2: Accuracy verified using a glass substrate workpiece with a vapor-deposited chromium pattern.
Environment: Temperature: 20°C ± 1°C, Humidity: 50% ± 10°C

*3: Value of ±2σ when measuring a ø2 mm/ø1 mm gage for two minutes with 0.32-second measuring intervals (σ : standard deviation).

*4: Value of ±2σ when measuring a ø30 mm/ø10 mm gage for two minutes with 0.32-second measuring intervals (σ : standard deviation).

*5: Value obtained through measurement at the midpoint of the measuring range.

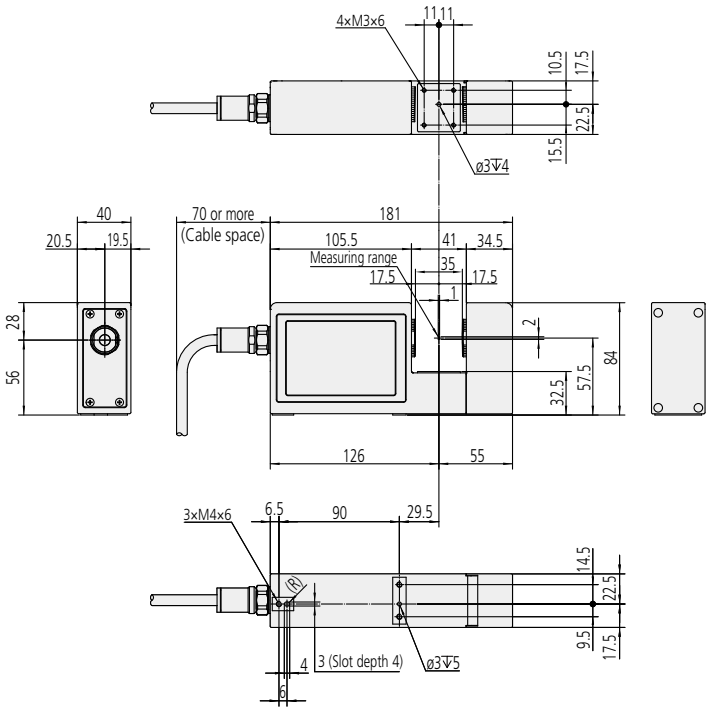
*6: ⊿ D = Diameter difference between master gage and workpiece. (Unit: mm)

*7: Error resulting from moving a workpiece in the optical axis direction or scanning direction.

*8: When configured as "Do not perform ultra-fine wire measurement" in the basic setup, averaging is available from one to eight times within the 0.05 mm to 2 mm measuring range.

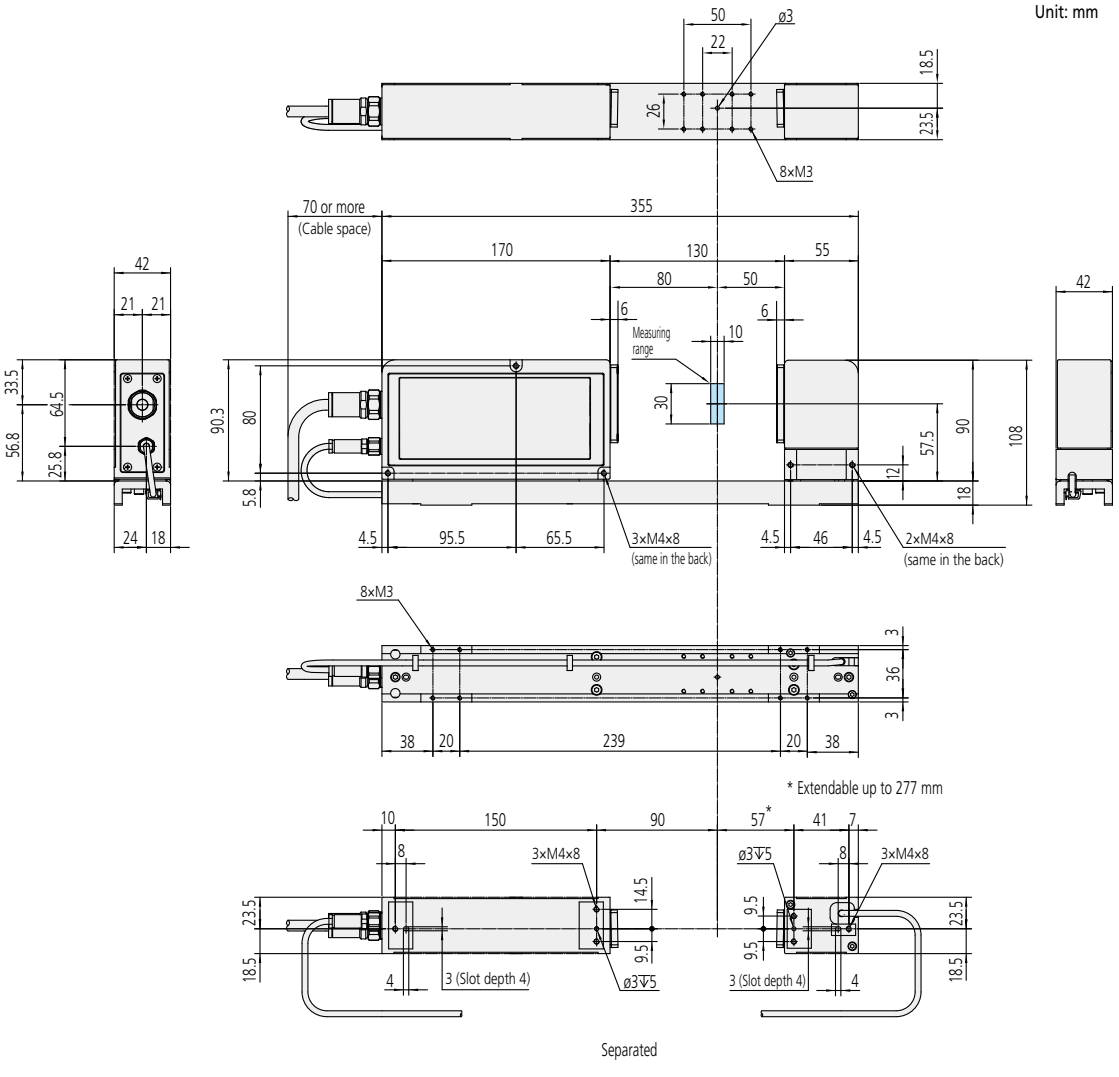
LSM-02-A

Unit: mm



LSM-30-A

Unit: mm



▪ Controller

Specifications

Code No.		544-120 (metric) 544-121 (mm/inch switchable type)
Model		**LSM-CU-A**
Measuring functions *1	Segment mode	1 to 7 (1 to 3, transparent)
	Edge mode	1 to 255
	Averaging method	Arithmetic average: from 1 to 2048, Moving average: from 32 to 2048
	Functions	Transparent object measurement, Ultra-fine wire mode (LSM-02-A only), Simultaneous measurement of two items, Automatic workpiece detection, Outlier elimination, Judgment (lower limit/upper limit, multi-limit tolerance zone, target value and tolerance value), Dirt detection for protective glass, Sample measurement, Analog output, Parameter setting (Measurement condition): 20, Workpiece position, Calibration, Presetting, Offset, Statistical analysis, Calculation of two or more sets, Sensor model identification
Standard I/F	Indicator	[POWER] LED (green), [ERROR] LED (red)
	Signal cable connector	Mini D-Sub (15 pins)
	USB connector	Type-C
	I/O connector	Separate terminal block (18 pins)
	Power supply connector	Separate terminal block (6 pins)
Power supply		DC+24 V±10%, 3.0 A or more *2
Operating temperature		Temperature: 0 °C to 50 °C, Humidity: 20%RH to 80%RH (non-condensing) Altitude: 2000 m or less
Storage temperature		Temperature: -10 °C to 60 °C, Humidity: 20%RH to 80%RH (non-condensing)
Mass		Approx. 550 g
CE Marking/UKCA Marking		EMC Directive: EN IEC 61326-1, Immunity test requirements: Clause 6.2 Table 2 Emission limit: Class A RoHS Directive: EN IEC 63000
Standard accessory		Socket for I/O terminal block: **D800-396**, Socket for power supply terminal block: **D827-827** Grounding wire (4 m): **02AGQ068** CD (LSMPAK installer, User's Manual): **02NGA070**

*1 Each function has its combination limit.

*2 Ensure the use of an AC adapter/switching power supply with an output of at least +24 V/3.0 A.

Reference AC adapter: Signcomplex/AC adapter 24V/3A DC Port diameter 5.5x2.1 mm, Power supply connector: KAUMO Co.,Ltd./Power supply connector O.D. 5.5 mm I.D. 2.1 mm

Switching power supply: OMRON Corporation/OMRON S8VS-12024

▪ Interface Unit

Specifications

Code No.		02AGQ300	02AGQ370
Model		**LSM-EI-A**	**LSM-EC-A**
Communication standards		EtherNet/IP	EtherCAT
Interface	LED	NETWORK STATUS Indicator: Dual Color LED1 (red/green)	RUN Indicator: Single Color LED1 (green)
		MODULE STATUS Indicator: Dual Color LED1 (red/green)	ERROR Indicator: Single Color LED1 (red)
	RJ45 connector	2 channels	
Ethernet communication	Communication port	RJ45 × 2	
	Communication speed	100 Mbps Full duplex	
	Cable used	Cat.5e or more STP cable	

Specifications

Code No.		02AGQ350
Model		**LSM-PN-A**
Communication standards		PROFINET
Interface	LED	RUN Indicator: Dual Color LED1 (red/green)
		ERROR Indicator: Dual Color LED1 (red/green)
	RJ45 connector	2 channels
Ethernet communication	Communication port	RJ45 × 2
	Communication speed	100 Mbps Full duplex
	Cable used	Cat.5e or more STP cable
PROFINET function	PROFINET RT	Conformance class B PROFINET device Media redundancy protocol (MRP) client Multicast provider and subscriber
	Min. cycle time	2 msec
	Maximum number of connections (ARs*1)	2
	Number of CRs*2 per connected controller	For cyclic data: 2, For parameter setting: 1

*1 AR: Application Relation, Type of AR: Device Access

*2 CR: Communication Relation

▪ Interface Unit

Specifications

Code No.		02AGQ390
Model		LSM-CC-A
Communication standards		CC-Link IE TSN
Interface	LED	D Link: Dual Color LED1 (red/green)
		ERROR: Single Color LED1 (red)
	RJ45 connector	2 channels
Ethernet communication	Communication port	RJ45×2
	Communication speed	100 Mbps Full duplex
	Cable used	Cat.5e or more STP cable
CC-Link IE TSN function	CC-Link IE TSN	Class A remote station
	Min. cycle time	1 msec

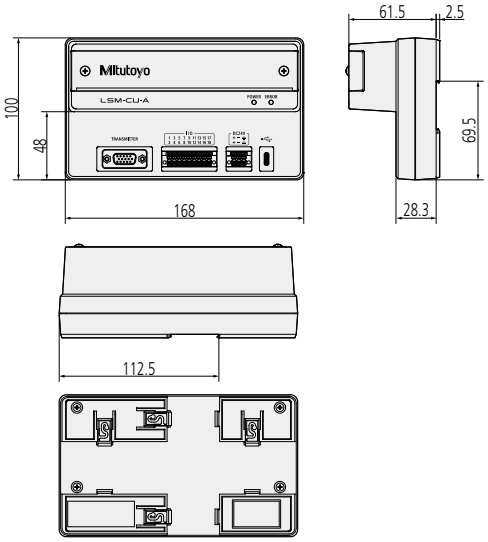
Common specifications

Operating environment	Temperature: 0 °C to 50 °C, Humidity: 20%RH to 85%RH (non-condensing)
Storage temperature	Temperature: -10 °C to 50 °C, Humidity: 35%RH to 85%RH (non-condensing)
CE Marking/UKCA Marking	EMC Directive: EN IEC 61326-1, Immunity test requirements: Clause 6.2 Table 2 Emission limit: Class A RoHS Directive: EN IEC 63000

▪ Controller

LSM-CU-A

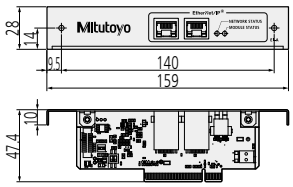
Unit: mm



▪ Interface Unit

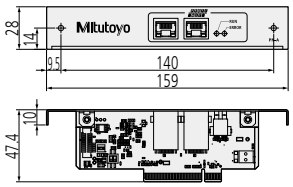
LSM-EI-A

Unit: mm

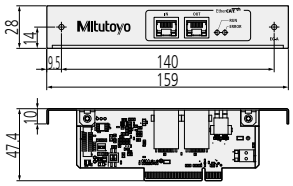


LSM-PN-A

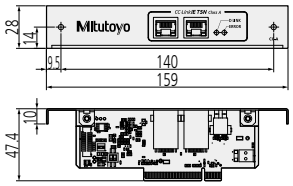
Unit: mm



LSM-EC-A



LSM-CC-A



▪ General Notes

Compatibility

LSM-02/30-A sensors and LSM-CU-A controller are not compatible with conventional models (LSM-3000/3100/4000/4100/400 Series, 5000/5100/5200/6000/6100/6200/500 Series, 500H Series, and 500S Series).

Workpiece and measuring conditions

Measurement errors may arise due to the workpiece's shape or surface roughness. To mitigate this, ensure calibration using a reference or master gage with a known shape or similar surface roughness.
If measurement values exhibit significant variation due to measuring conditions, increase scan averaging to enhance measurement accuracy.

Electromagnetic interference

Prevent operational errors by avoiding the routing of signal cables and relay cables alongside high-voltage lines or cables capable of inducing noise currents in nearby conductors.
Properly ground relevant units and cable shields

Safety precautions regarding laser beam

This product employs a low-power visible laser for measurement, classified as a CLASS 1 laser product per EN/IEC 60825-1. LSM-02/30-A sensors feature an attached CLASS 1 laser safety label as shown below.

OPTIONS

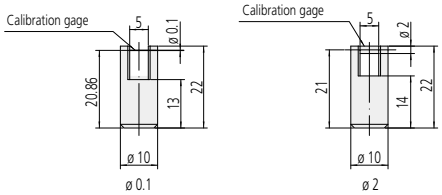
Standard calibration gage set

These gages are standard for calibrating laser scan micrometers. Each gage indicates the calibrated dimension at a specific point. The calibration focuses on one direction at that marked point.

For calibrating models		LSM-02-A	LSM-30-A
Set No.		**02AGD110**	**02AGD130**
Configuration (Code No.)	Stand	**02AGD111**	**02AGD131**
	Gages	ø0.1: **958200** ø2 : **958202**	ø1 : **02AGD920** ø30: **02AGD961**
	Carrying case	**958203**	**02AGD980**

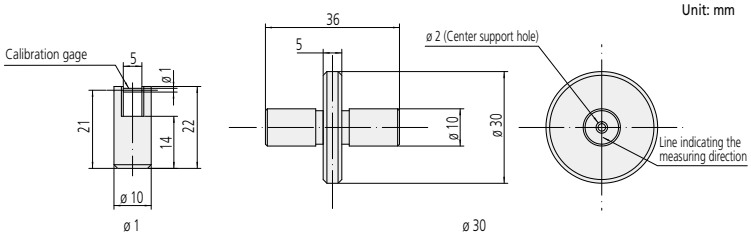
LSM-02-A

Unit：mm



LSM-30-A

Unit: mm



Wire guiding pulley

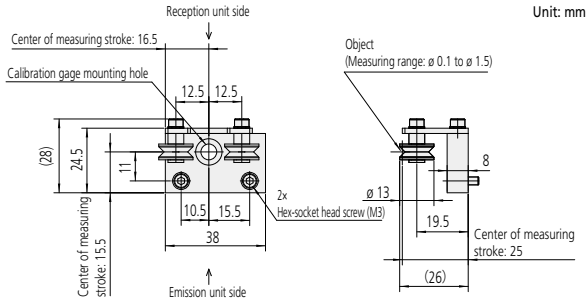
Designed to support measuring the outer diameter of fine wire-like materials like magnetic wire or fiber. Measuring range as follows:

Model	LSM-02-A
Code No.	**02AGD200**

LSM-02-A: ø 0.1 mm to ø 1.5 mm
For workpieces smaller than ø0.1 mm or larger than ø1.5 mm, please consult our sales or customer service representatives. For **LSM-02-A** calibration, use the calibration gage set **(02AGD110)** if necessary.

Use a calibration gage set **(02AGD110)** for **LSM-02-A** for any workpiece if calibration is necessary.

Unit: mm



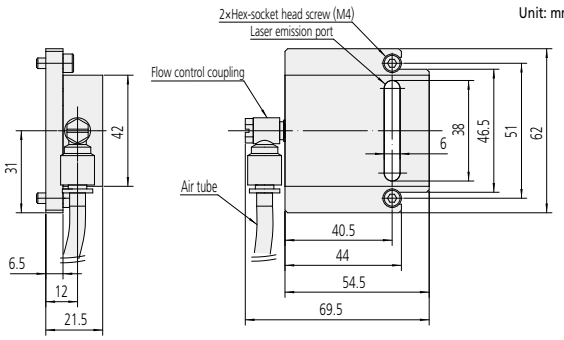
Air shield

Prevents emitter and receiver windows from becoming obscured by smoke or dust. Clean air is blown from air outlets at the emitter and receiver.
Note: A 5 m air tube (ø6 mm outer diameter) is included with the air shield.

Model	LSM-30-A
Code No.	**02AGQ450**

Note: A 5 m air tube (with ø6 mm outer diameter) is included with the air shield.

Unit: mm

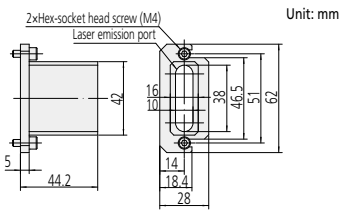


Laser beam stabilization shield

Suppresses variations in measured values due to spatial fluctuations in the measurement environment.

Model	LSM-30-A
Code No.	**02AGQ452**

Unit: mm

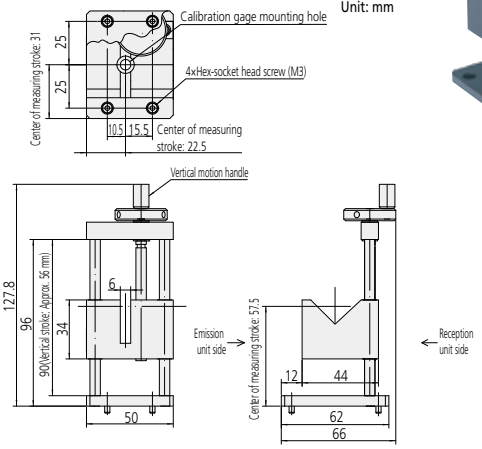


Workstage

Allows for highly accurate measurement with easy setup and height adjustment for shafts and similar items.

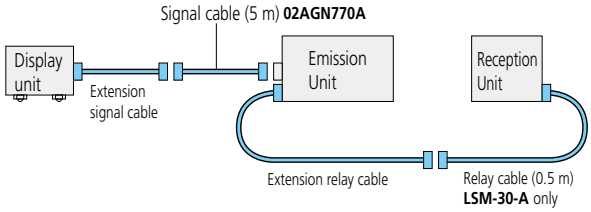
Model	LSM-30-A
Code No.	02AGD270

Unit: mm



Extension signal cable/Extension relay cable

Used when the measuring unit and display unit are separated during use (extension signal cable) or when the emission unit and reception unit are separated (extension relay cable).



Extension signal cable

Code No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m
02AGN780D	20 m

Extension relay cable

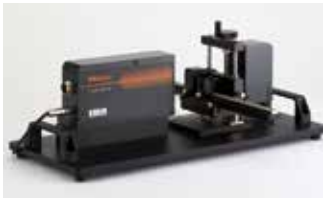
Code No.	Cable length
02AGQ464A	1 m
02AGQ464B	3 m
02AGQ464C	5 m

Note1: For **LSM-02-A**, signal cable should be a maximum of 20 m and relay cable 2 m.
Note2: For **LSM-30-A**, signal cable should be a maximum of 29 m and relay cable 5 m.
Note3: Total length of signal cable and relay cable should not exceed 29 m.

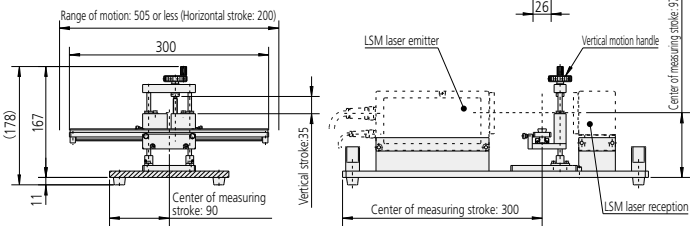
Adjustable workstage (for LSM-30-A)

This mechanism, featuring vertical and horizontal sliding, facilitates outside diameter measurement for a range of workpieces.
It proves valuable for quality control of precision shafts, rollers, and pin gages.

Code No.	02AGD490
Measuring range	0.3 to 30 mm
Horizontal stroke	200 mm
Vertical stroke	35 mm
Maximum loading mass	2.0 kg
Mass	4.9 kg
Standard Accessories	V-block (**02AGD420**)×2 Stop (**02AGD430**)×1
Optional accessories	Center support (**02AGD440**) Adjustable V-block (up/down) (**02AGD450**)

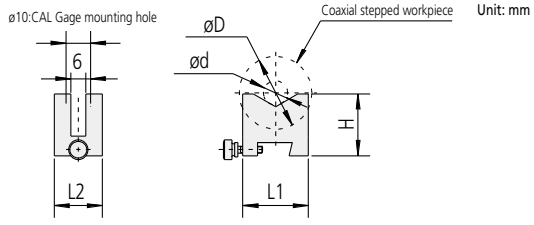


Unit: mm



Adjustable workstage Standard Accessories (for LSM-30-A)

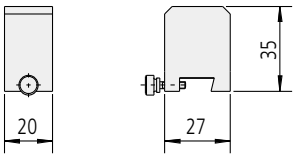
V-block



Unit: mm

Code No.	02AGD420
Workpiece diameter ø Dmax	30 mm
Spigot diameter ø dmax	30 mm
(øD-ød)max	25 mm
Mass	0.03 kg (Weight per unit)
Remarks	Supported CAL gages ø 1 (**02AGD920**) ø 10 (**229317**) ø 25 (**02AGD963**) ø 30 (**02AGD961**)

Stop



Unit: mm

Code No.	02AGD430
Mass	0.05 kg
Application	Positioning of workpiece

KUBOUŠEK®
TECHNOLOGIES AND INSTRUMENTS

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Test Equipment

Digital Scale and DRO Systems

Small Tool Instruments and Data Management

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Find additional product literature and our complete catalog here.

www.mitutoyo.eu

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