



Laser Scan Micrometer Selection Guide

MEASURING UNITS

Appearance	Model	Laser Classification	Measuring range	Resolution (Selectable)
	LSM-902*	Visible (650nm), IEC Class 2/ FDA Class II	0.1 - 25mm (.004" - 1.0")	0.01μm - 10μm (.000001" - .0005")
	LSM-500S	Visible (650nm), IEC Class 2/ FDA Class II	0.005 - 2mm (.0002" - .08")	0.01μm - 10μm (.000001" - .0005")
	LSM-501S	Visible (650nm), IEC Class 2/ FDA Class II	0.05 - 10mm (.002" - .4")	0.01μm - 10μm (.000001" - .0005")
	LSM-503S	Visible (650nm), IEC Class 2/ FDA Class II	0.3 - 30mm (.012" - 1.18")	0.02μm - 100μm (.000001" - .005")
	LSM-506S	Visible (650nm), IEC Class 2/ FDA Class II	1 - 60mm (.04" - 2.36")	0.05μm - 100μm (.000002" - .005")
	LSM-512S	Visible (650nm), IEC Class 2/ FDA Class II	1 - 120mm (.04" - 4.72")	0.1μm - 100μm (.000005" - .005")
	LSM-516S	Visible (650nm), IEC Class 2/ FDA Class II	1 - 160mm (.04" - 6.30")	0.1μm - 100μm (.000005" - .005")
 With display unit	LSM-9506 Measuring unit - display unit one-piece structure for bench- top use only	Visible (650nm), IEC Class 2/ FDA Class II	0.5 - 60mm (.02" - 2.36")	0.05μm - 100μm (.000002" - .005")

DISPLAY UNITS

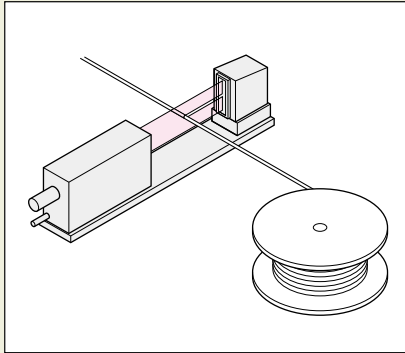
Appearance	Model	Type	Application	Interface units equipped
	LSM-6200 LSM-6900*	Multi-function type	Bench-top use	<ul style="list-style-type: none"> • RS-232C • I/O • Analog output
	LSM-5100**	Compact type (Low cost)	Assembly/ bench-top use (DIN size)	<ul style="list-style-type: none"> • RS-232C • I/O • Analog output

*LSM-902 and LSM-6900 are factory-set package.

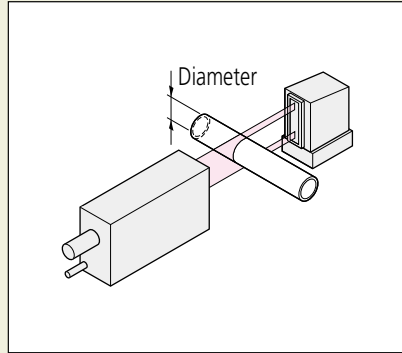
**When connecting with the LSM-500S series, the scanning speed becomes 1600 scans/sec.

■ Measurement Examples

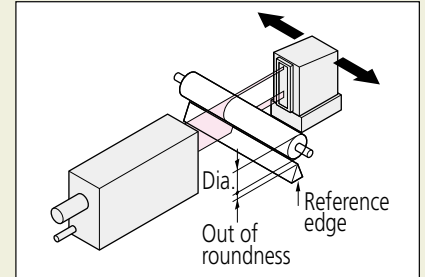
In-line measurement of glass fiber or fine wire diameter



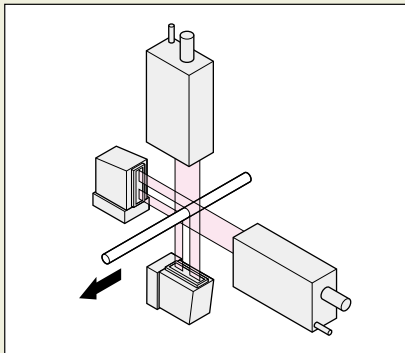
Measurement of outer diameter of cylinder



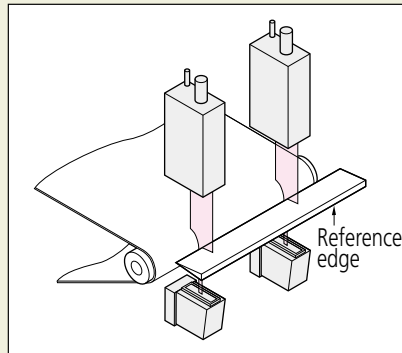
Measurement of outer diameter and roundness of cylinder



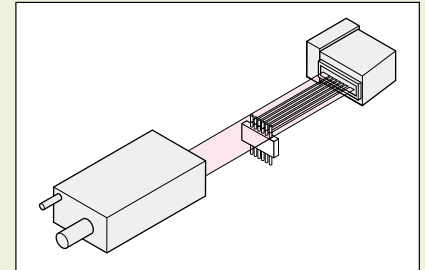
X- and Y-axis measurement of electric cables and fibers



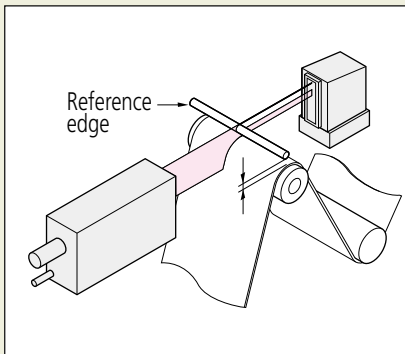
Measurement of thickness of film and sheet



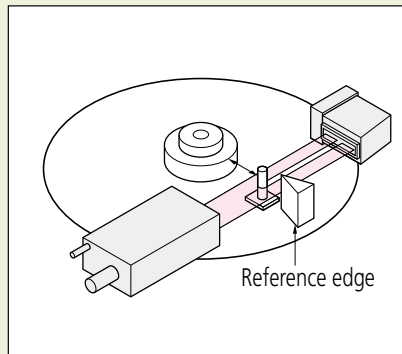
Measurement of spacing of IC chip leads



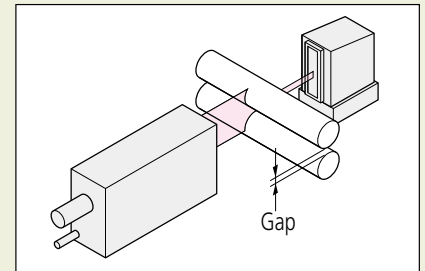
Measurement of film sheet thickness



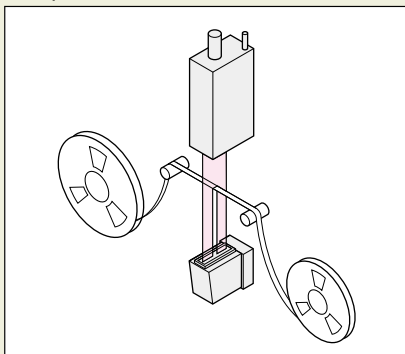
Measurement of laser disk and magnetic disk head movement



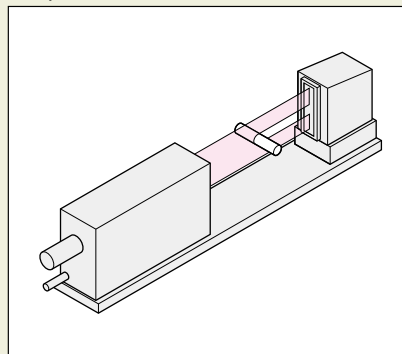
Measurement of gap between rollers



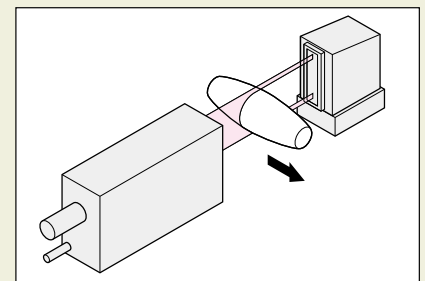
Measurement of tape width



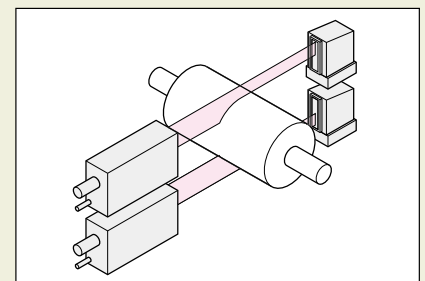
Measurement of outer diameter of optical connector and ferrule



Measurement of form



Dual system for measuring a large outside diameter



Laser Scan Micrometer LSM-902/6900

SERIES 544 — Ultra-high Accuracy Non-contact Measuring System

- Non-contact laser-based measuring system, mainly for outside diameter measurement. Suitable for delicate or moving workpieces.
- Accuracy of $\pm 0.5\mu\text{m}$ in the $\varnothing 0.1 - \varnothing 25\text{mm}$ range can be achieved. It is highly suitable for pin gage measurement.
- Narrow range accuracy of $\pm(0.3+0.1\Delta D)\mu\text{m}$ for high precision measurement.
- Ultra-high repeatability of $\pm 0.05\mu\text{m}$.
- The system consists of a measuring unit (LSM-902) and a display unit (LSM-6900).



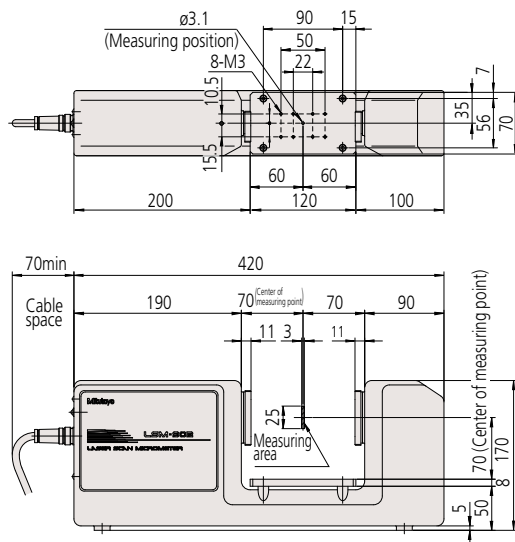
SPECIFICATIONS

Set Order No.	544-496A	
Measuring unit		
Type	inch/mm	
Measuring range	0.1 to 25mm (.004 - 1.0")	
Resolution	0.01 to 10 μm (selectable) (.00001 - .0005")	
Repeatability*1	$\pm 0.05\mu\text{m}$ (± 0.00002 ")	
Accuracy*2 (20°C)	Whole range	$\pm 0.5\mu\text{m}$ (± 0.000020 ")
	Small range	$\pm(0.3+0.1\Delta D)$ [D:mm]*5 $\pm(.000012+.001\Delta D)$ [D:inch]
Positional error*3	$\pm 0.5\mu\text{m}$ (± 0.000020 ")	
Measuring area*4	$\pm 1.5 \times 25\text{mm}$ ($\pm 0.6 \times 1.0$ ")	
Scanning rate	800 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	56m/s (2240"/sec)	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)

Display unit	
Display	16-digit plus 11-digit fluorescent display, and guide message LED
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges
Averaging times	Arithmetic average: per 1 to 2048/ Moving average: per 32 to 2048
Judgment	Selection from "target value + tolerance", "lower tolerance + upper tolerance", or "7 classes multi-limit tolerance zone".
Measurement mode	Standby, Single measurement, Continuous measurement
Statistical analysis	Maximum, Minimum, Average, Dispersion, σ (S.D)
External dimensions	335 (W) \times 134 (H) \times 250 (D)mm
Power supply	120 V AC $\pm 10\%$, 50W, 60Hz
Standard I/F	RS-232C, Analog I/O
Optional I/F	Digimatic code output unit (2-ch), 2nd I/O analog I/F, BCD I/F
Operating environment	0 to 40°C, RH 35 to 85% (no condensation)
Others	Nominal setting, sample setting, selection of unnecessary digits, transparent object measurement, automatic measurement in edge mode, output timer, abnormal data elimination, SHL change, group judgment, simultaneous measurement, statistical processing, mastering, buzzer function, automatic workpiece detection (dimension/position), zero-set/offset * Measuring unit dual connection, extra-fine line measurement, and some of the communication commands are not available.

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\varnothing 25\text{mm}$ at the interval of 1.28 sec. (average 1024 times).
- *2: At the center of the measuring range.
- *3: An error due to variation in workpiece position either in the optical axis direction or in the scanning direction.
- *4: The area given by [optical axis direction] \times [scanning direction]
- *5: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)

Measuring Unit External Dimensions



Unit: mm

Optional Accessories

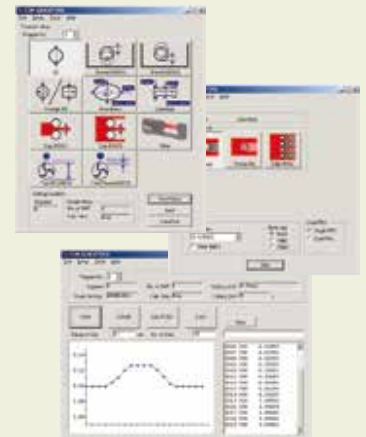
(Refer to page G-44 for details.)

- Calibration gage set ($\varnothing 1.0, \varnothing 25.0$)

- Workstage : No.02AGD180
- Adjustable workstage : No.02AGD270
- Digimatic code output unit (2-ch) : No.02AGD280
- 2nd I/O analog interface unit : No.02AGC840
- BCD interface unit : No.02AGC880
- Printer & cable set (120V AC C-type plug) : No.02AGC910
- Printing paper TP411-28CL / 1Pack = 10pcs : No.223663
- Digimatic code output cable : No.936937
- Foot switch : No.937179T

QUICKTOOL

QUICKTOOL is a free software program that makes programming the LSM-6200 quick and easy. Basic data acquisition is also possible. Included as standard accessory. (Connecting cables to PC are optional)



Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Laser Scan Micrometer LSM-500S

SERIES 544 — High Accuracy Non-contact Measuring System

Optional Accessories

- Multifunctional display unit, **LSM-6200***:

Order No.	Display type	Remarks
544-072A	English mm/inch	English user's manual

* Included in packages

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-047*	English user's manual

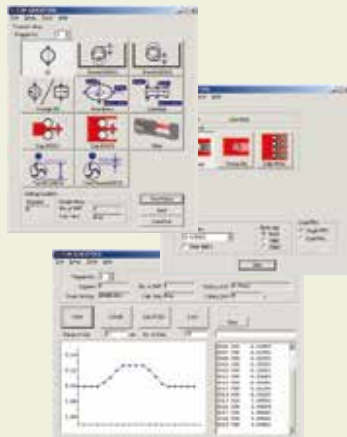
* AC adapter not included

- Calibration gage set (ø0.1, ø2.0)
- Guide pulley : **No.02AGD110**
- Air blower : **No.02AGD200**
- Extension signal cables: : **No.02AGD220**

Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m

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Laser safety

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- Capable of measuring down to 5µm outside diameter*1.
- Provides ultra-high accuracy of ±0.3µm over the entire measuring range (5µm to 2mm).
- Ultra-high speed measurement of 3200 scan/sec.
- Suitable for high speed lines or in applications subject to vibration.



SPECIFICATIONS

Order No. (Laser only)	544-532	
Package No. (with LSM 6200 Display)	64PKA117	
Applicable laser standards	IEC, FDA	
User's Manual	English version	
Measuring range	.0002" to .080" (0.005 to 2mm)*1	
Resolution	.000001" to .0005" (0.01 to 10µm) (selectable)	
Repeatability*2	±0.03µm	
Accuracy (20°C)*3	±0.3µm	
Positional error*4	±0.4µm	
Measuring area*5	1x2mm (0.005 to 2mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	76m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

*1: The measuring range for the transparent object will be 0.05mm to 2mm. Please consult your local Mitutoyo office for objects smaller than 0.05mm.

The measuring range will be 0.1mm to 2mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection.

If using the optional dual connection unit for LSM-6200, the measuring range will be 0.05mm to 2mm.

*2: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring ø2mm at the interval of 0.32 sec. (average 1024 times).

*3: Center of the measuring range for cylindrical workpieces outside diameter.

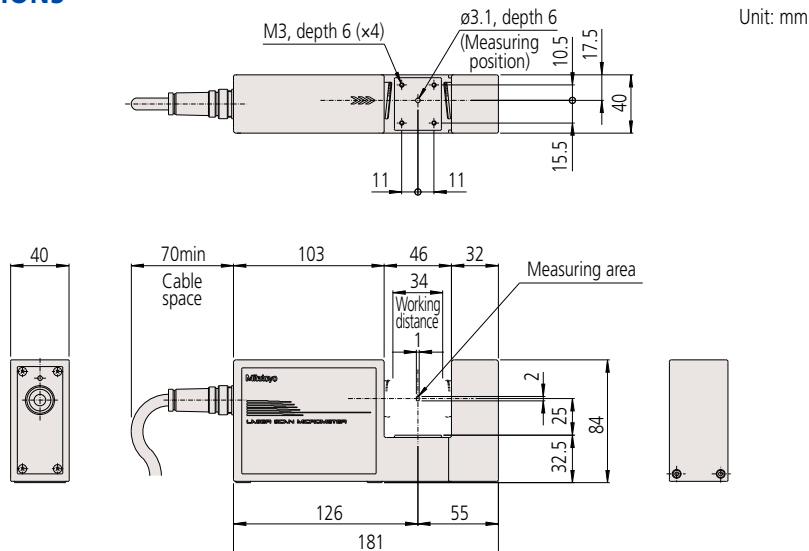
*4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

*5: The area given by [optical axis direction]x[scanning direction].

*6: If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

Note: When using extra-fine line measurement function (FINE), guide messages for setting the following will not be displayed: dual-measurement, segment designation, automatic workpiece detection, and group judgment.

DIMENSIONS



Laser Scan Micrometer LSM-501S

SERIES 544 — High Accuracy Non-contact Measuring System

- Provides ultra-high accuracy of $\pm 0.5\mu\text{m}$ over the entire measuring range (0.05 to 10mm).
- Narrow range accuracy of $\pm(0.3+0.1\Delta D)\mu\text{m}$ for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.



SPECIFICATIONS

Order No. (Laser Only)	544-534	
Package No. (Laser w/LSM 6200 display)	64PKA118	
Applicable laser standards	IEC, FDA	
User's Manual	English version	
Measuring range	.002" to .4" (0.05 to 10mm)	
Resolution	.000001" to .0005" (0.01 to 10μm) (selectable)	
Repeatability*1	$\pm 0.04\mu\text{m}$	
Accuracy*2 (20°C)	Whole range	$\pm 0.5\mu\text{m}$
	Small range	$\pm(0.3+0.1\Delta D)\mu\text{m}$ *3
Positional error*4	$\pm 0.5\mu\text{m}$	
Measuring area*5	2x10mm ($\phi 0.05$ to $\phi 0.1\text{mm}$) 4x10mm ($\phi 0.1$ to $\phi 10\text{mm}$)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	113m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

*1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 10\text{mm}$ at the interval of 0.32 sec. (average 1024 times).

*2: Center of the measuring range for cylindrical workpieces outside diameter.

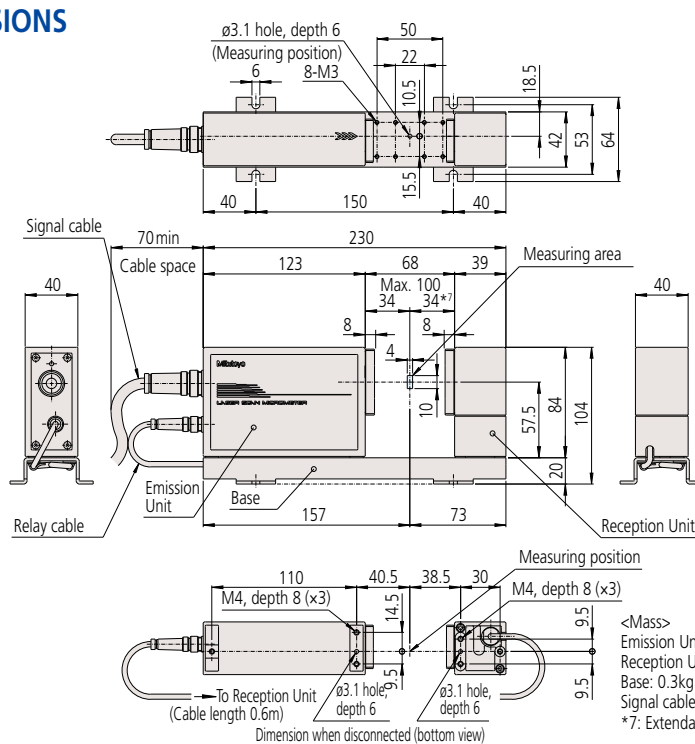
*3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)

*4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

*5: The area given by [optical axis direction]x[scanning direction].

*6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



<Mass>
 Emission Unit: 0.7kg
 Reception Unit: 0.4kg
 Base: 0.3kg
 Signal cable (5m): 0.5kg
 *7: Extendable up to 66mm.

Optional Accessories

- Multifunctional display unit, **LSM-6200***:

Order No.	Display type	Remarks
544-072A	English mm/inch	English user's manual

* Included in packages

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-047*	English user's manual

* AC adapter not included

- Standard calibration gage set ($\phi 0.1, \phi 10.0$)

- Wire guiding pulley : **No.02AGD120**
- Adjustable workstage : **No.02AGD210**
- Air blower : **No.02AGD400**
- Workstage : **No.02AGD230**
- Extension signal cables : **No.02AGD270**

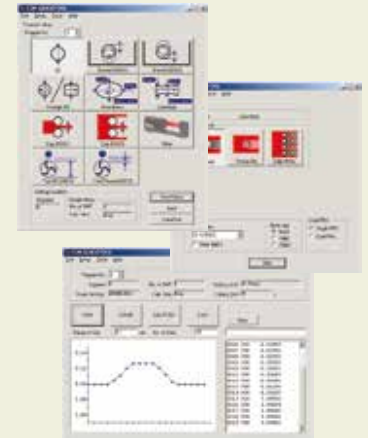
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m

- Extension relay cables

Order No.	Cable length
02AGC150A	1m

QUICKTOOL

QUICKTOOL is a free software program that makes programming the LSM-6200 quick and easy. Basic data acquisition is also possible. Included as standard accessory. (Connecting cables to PC are optional)



Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Laser Scan Micrometer LSM-503S

SERIES 544 — High Accuracy Non-contact Measuring System

Optional Accessories

- Multifunctional display unit, **LSM-6200***:

Order No.	Display type	Remarks
544-072A	English mm/inch	English user's manual

* Included in packages

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-047*	English user's manual

* AC adapter not included

- Standard calibration gage set (ø0.1, ø30.0)

	: No.02AGD130
Adjustable workstage	: No.02AGD490
Air blower	: No.02AGD240
Workstage	: No.02AGD270
Extension signal cables	

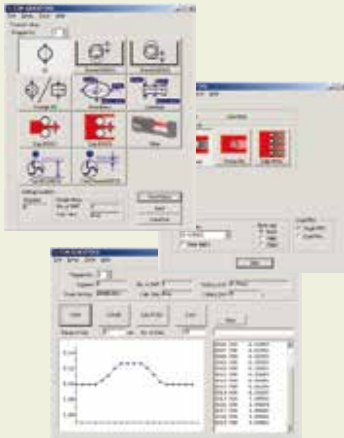
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cables

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

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Laser safety

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- Ensures $\pm 1.0\mu\text{m}$ accuracy over the entire measuring range (0.3 to 30mm).
- Narrow range accuracy of $\pm(0.6+0.1\Delta D)\mu\text{m}$ for high precision measurement.

- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.



SPECIFICATIONS

Order No. (Laser only)	544-536	
Package No. (Laser w/LSM 6200 display)	64PKA119	
Applicable laser standards	IEC, FDA	
User's Manual	English version	
Measuring range	.012" to 1.18" (0.3 to 30mm)	
Resolution	.000001" to .005" (0.02 to 100 μm) (selectable)	
Repeatability*1	$\pm 0.11\mu\text{m}$	
Accuracy*2 (20°C)	Whole range	$\pm 1.0\mu\text{m}$
	Small range	$\pm(0.6+0.1\Delta D)\mu\text{m}$ *3
Positional error*4	$\pm 1.5\mu\text{m}$	
Measuring area*5	10x30mm (0.3 to 30mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	226m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

*1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring ø30mm at the interval of 0.32 sec. (average 1024 times).

*2: Center of the measuring range for cylindrical workpieces outside diameter.

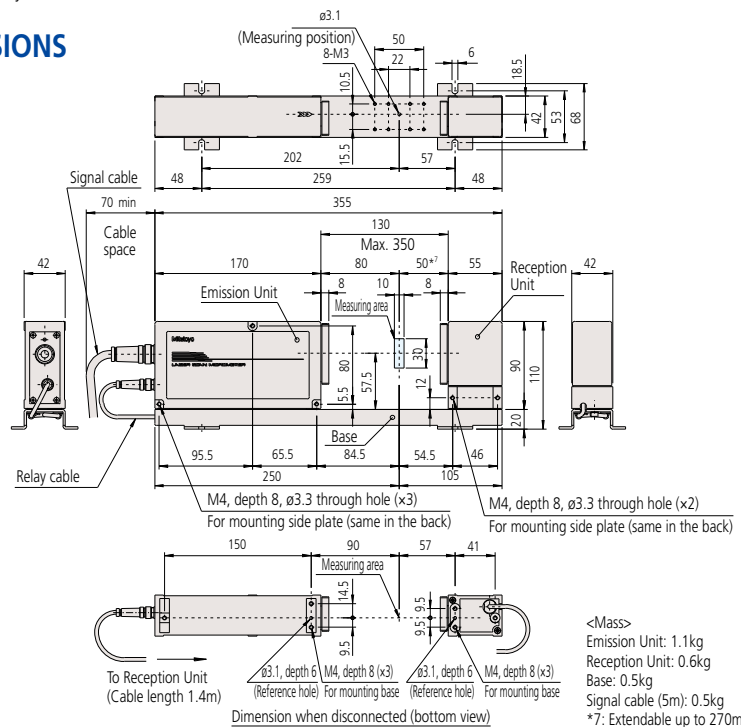
*3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)

*4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

*5: The area given by [optical axis direction]x[scanning direction].

*6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Laser Scan Micrometer LSM-506S

SERIES 544 — High Accuracy Non-contact Measuring System

- Ensures $\pm 3\mu\text{m}$ accuracy over the entire measuring range (1 to 60mm).
- Narrow range accuracy of $\pm(1.5+0.5\Delta D)\mu\text{m}$ in for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.

IP64

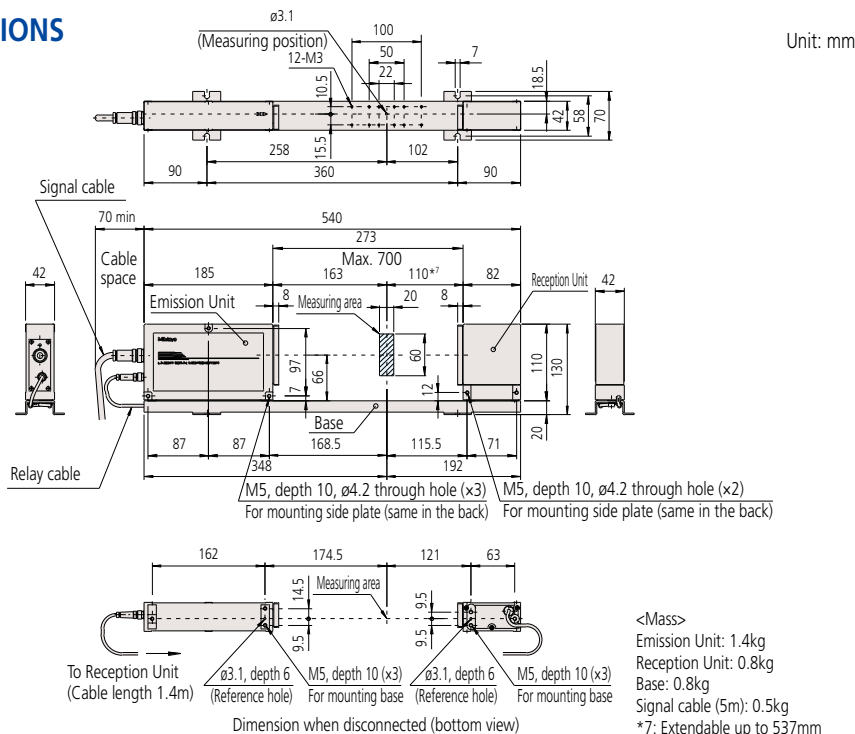


SPECIFICATIONS

Order No. (Laser only)	544-538	
Package No. (Laser w/ LSM 6200 display)	64PKA120	
Applicable laser standards	IEC, FDA	
User's Manual	English version	
Measuring range	.040" to 2.36" (1 to 60mm)	
Resolution	.000002" to .005" (0.05 to 100 μm) (selectable)	
Repeatability*1	$\pm 0.36\mu\text{m}$	
Accuracy*2 (20°C)	Whole range	$\pm 3\mu\text{m}$
	Small range	$\pm(1.5+0.5\Delta D)\mu\text{m}^*3$
Positional error*4	$\pm 4\mu\text{m}$	
Measuring area*5	20x60mm (1 to 60mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	452m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 60\text{mm}$ at the interval of 0.32 sec. (average 1024 times).
 *2: Center of the measuring range for cylindrical workpieces outside diameter.
 *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
 *4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.
 *5: The area given by [optical axis direction]x[scanning direction].
 *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Optional Accessories

- Multifunctional display unit, **LSM-6200***:

Order No.	Display type	Remarks
544-072A	English mm/inch	English user's manual

* Included in packages

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-047*	English user's manual

* AC adapter not included

- Standard calibration gage set ($\phi 1.0, \phi 60.0$) : **No.02AGD140**
- Adjustable workstage : **No.02AGD520**
- Air blower : **No.02AGD250**
- Extension signal cables

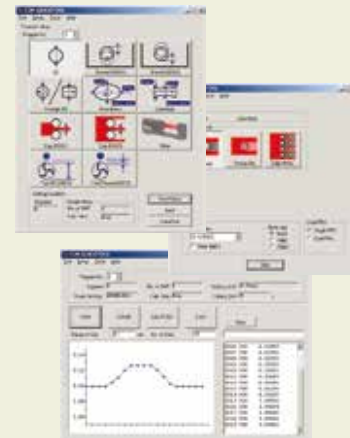
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cables

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

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Laser Scan Micrometer LSM-512S

SERIES 544 — High Accuracy Non-contact Measuring System

Optional Accessories

- Multifunctional display unit, **LSM-6200***:

Order No.	Display type	Remarks
544-072A	English mm/inch	English user's manual

* Included in packages

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-047*	English user's manual

* AC adapter not included

- Standard calibration gage set (ø20.0, ø120.0)

: **No.02AGD150**

- Air blower

: **No.02AGD260**

- Extension signal cables

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

- Extension relay cables

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

- Roll diameter/form measuring instrument (Refer to page G-60 for details.)

- Ensures $\pm 6\mu\text{m}$ accuracy over the entire measuring range (1 to 120mm).

- Narrow range accuracy of $\pm(4.0+0.5\Delta D)\mu\text{m}$ in for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.



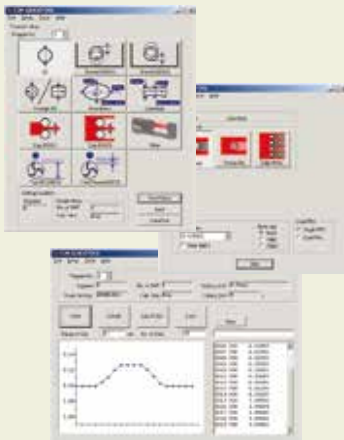
SPECIFICATIONS

Order No. (Laser Only)	544-540
Package No. (Laser w/ LSM 6200 display)	64PKA121
Applicable laser standards	IEC, FDA
User's Manual	English version
Measuring range	.040" to 4.72" (1 to 120mm)
Resolution	.000005" to .005" (0.1 to 100 μm) (selectable)
Repeatability*1	$\pm 0.85\mu\text{m}$
Accuracy*2	$\pm 6\mu\text{m}$
(20°C) Whole range	$\pm(4.0+0.5\Delta D)\mu\text{m}^{*3}$
Small range	$\pm 8\mu\text{m}$
Positional error*4	$\pm 8\mu\text{m}$
Measuring area*5	30x120mm (1 to 120mm)
Scanning rate	3200 scans/s
Laser wavelength	650nm (Visible)
Laser scanning speed	904m/s
Operating Temperature	0 to 40°C
environment Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6

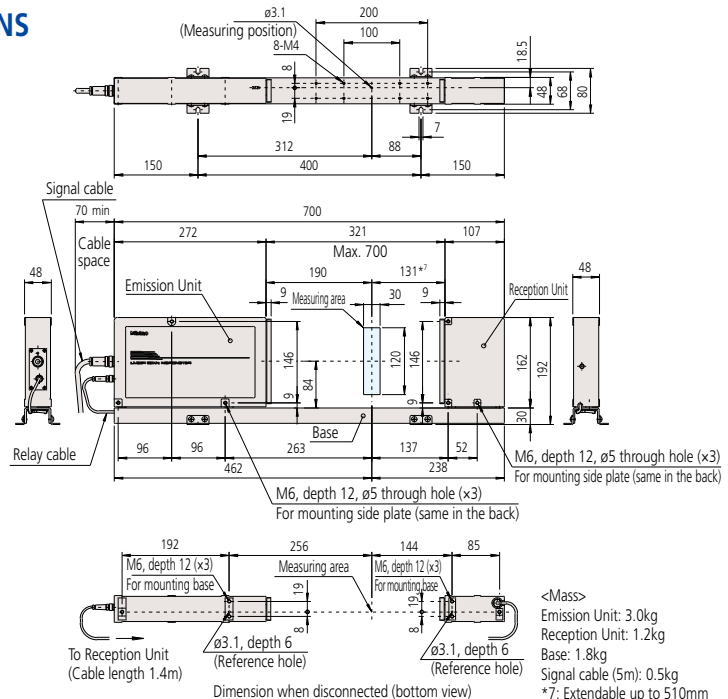
- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring ø120mm at the interval of 0.32 sec. (average 1024 times).
 *2: Center of the measuring range for cylindrical workpieces outside diameter.
 *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
 *4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.
 *5: The area given by [optical axis direction]x[scanning direction].
 *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

QUICKTOOL

QUICKTOOL is a free software program that makes programming the LSM-6200 quick and easy. Basic data acquisition is also possible. Included as standard accessory. (Connecting cables to PC are optional)



DIMENSIONS



Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Laser Scan Micrometer LSM-516S

SERIES 544 — High Accuracy Non-contact Measuring System

- Ensures $\pm 7\mu\text{m}$ accuracy over the entire measuring range (1 to 160mm).
- Ultra-high speed measurement of 3200 scan/sec.
- Narrow range accuracy of $\pm(4.0+2.0\Delta D)\mu\text{m}$ suitable for high speed lines or in applications subject to vibration.

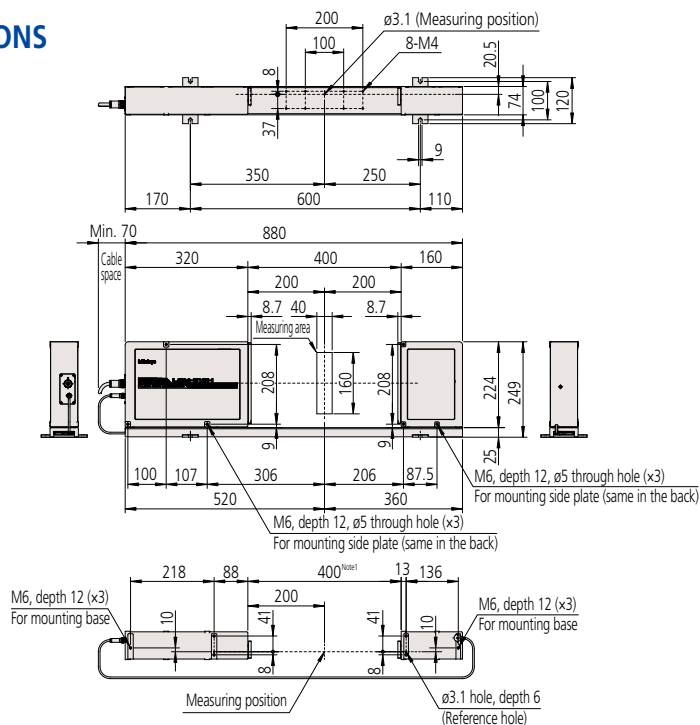


SPECIFICATIONS

Order No. (Laser only)		544-542
Package No. (Laser w/ LSM 6200 display)		64PKA122
Applicable laser standards		IEC, FDA
User's Manual		English version
Measuring range		.040" to 6.3" (1 to 160mm)
Resolution		.000005" to .005" (0.1 to 100 μm) (selectable)
Repeatability*1		$\pm 1.4\mu\text{m}$
Accuracy*2 (20°C)	Whole range	$\pm 7\mu\text{m}$
	Small range	$\pm(4.0+2.0\Delta D)\mu\text{m}$ *3
Positional error*4		$\pm 8\mu\text{m}$
Measuring area*5		40x160mm (1 to 160mm)
Scanning rate		3200 scans/s
Laser wavelength		650nm (Visible)
Laser scanning speed		1206m/s
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level		IP64*6

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 160\text{mm}$ at the interval of 0.32 sec. (average 1024 times).
 *2: Center of the measuring range for cylindrical workpieces outside diameter.
 *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
 *4: An error of the outside diameter due to variation in cylinder position either in the optical axis direction or in the scanning direction.
 *5: The area given by [optical axis direction]x[scanning direction].
 *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Unit: mm

Note1: Distance between emission unit and reception unit: 400mm to 800mm

Optional Accessories

- Multifunctional display unit, **LSM-6200***:

Order No.	Display type	Remarks
544-072A	English mm/inch	English user's manual

* Included in packages

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-047*	English user's manual

* AC adapter not included

- Standard calibration gage set ($\phi 20$, $\phi 160$)

: **No.02AGM300**

- Extension signal cables

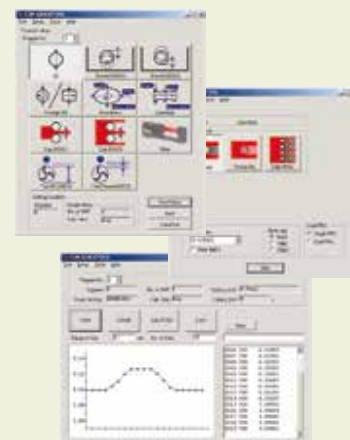
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cables

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

QUICKTOOL

QUICKTOOL is a free software program that makes programming the LSM-6200 quick and easy. Basic data acquisition is also possible. Included as standard accessory. (Connecting cables to PC are optional)



Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Laser Scan Micrometer LSM-9506

SERIES 544 — Bench Top Type Non-contact Measuring System

Optional Accessories

02AGD170

Calibration gage set (ø1.0mm, ø60mm)



02AGD680 Adjustable Workstage

02AGD580 Center support*

02AGD590 Adjustable V-block*

936937 SPC output cable (1m)

937179T Footswitch

264-012-10 USB Input Tool for spreadsheets (SPC cable also required)

*Use with an adjustable workstage.

*1: Determined by the value for $\pm 2\sigma$ at the measurement interval of 0.32 sec.

*2: At the center of the measuring region.

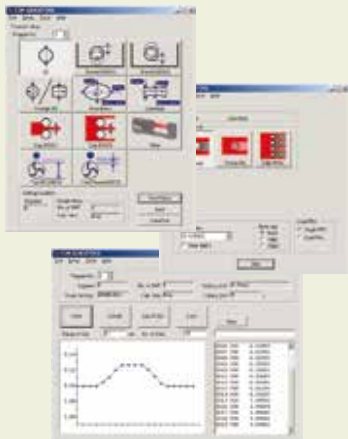
*3: An error due to workpiece shift either in the optical axis direction or in the scanning direction. L= Distance between the center of workpiece and the center of optical axis (in mm or inches).

*4: The area given by "measuring range on the optical axis" x "measuring range in the scanning direction".

*5: FDA Class II (544-116-1A) semiconductor laser for scanning (Maximum power: 1.0mW)

QUICKTOOL

QUICKTOOL is a free software program that makes programming the LSM-6200 quick and easy. Basic data acquisition is also possible. Included as standard accessory. (Connecting cables to PC are optional)



Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



- Bench-top type with integrated display unit which includes many functions equivalent to the multi-function display unit.



SPECIFICATIONS

Order No.	544-116-1A
Type	inch/mm
Measuring range	.02" - 2.36" / 0.5 - 60mm
Resolution	.000002" - .005" / 0.00005 - 0.1mm
Repeatability*1	$\pm 0.6\mu\text{m}$ ($\pm 0.00003"$)
Accuracy*2 (20°C)	$\pm 2.5\mu\text{m}$ ($\pm 0.0001"$)
Positional error*3 (optical axis/scanning direction)	$\pm 2.5\mu\text{m}$ ($\pm 0.0001"$) L: Displacement between workpiece center and optical axis center
Measuring area*4	$\pm 5 \times 60\text{mm}$ ($\pm 2 \times 2.36"$)
Scanning rate	1600 scans/s
Laser wavelength	650nm (Visible)*5
Laser scanning speed	226m/s (8900" / s)
Display unit	16-digit dot matrix (upper column) + 7 segment 11-digit (lower column), guidance LEDs
Standard interface	RS-232C, Digimatic code output unit (1ch)
Optional interface	No
Power supply	120 V AC $\pm 10\%$, 40VA, 60Hz
Operating environment	0 to 40°C, RH 35 to 85% (no condensation)

*1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring ø10mm at the interval of 0.32 sec. (average 1024 times).

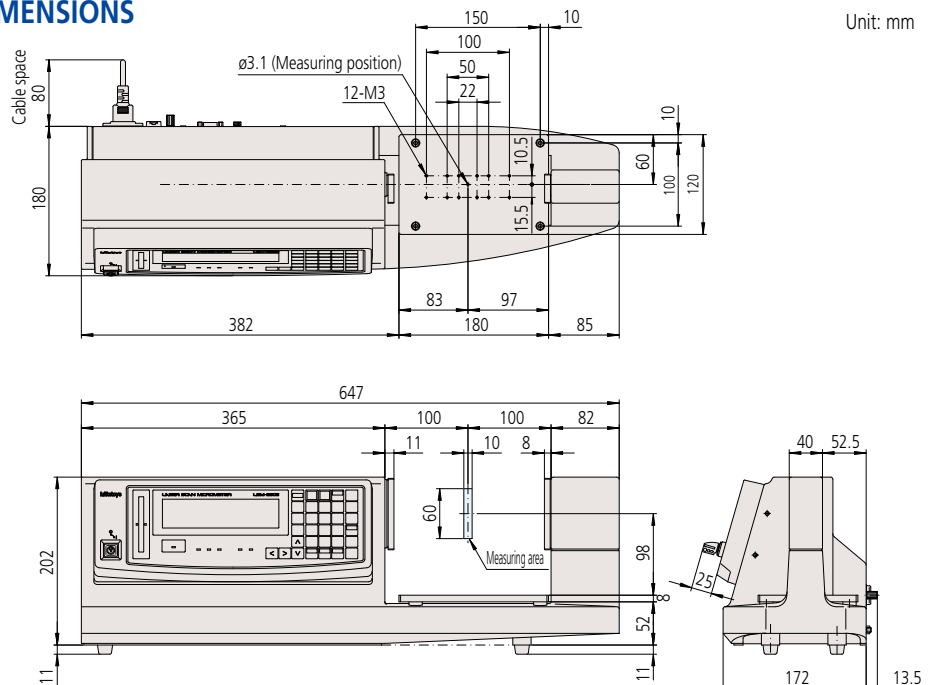
*2: Center of the measuring range for cylindrical workpieces outside diameter.

*3: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

*4: The area given by [optical axis direction] x [scanning direction].

*5: FDA Class II (544-116-1A)/IEC Class 2 semiconductor laser for scanning. (Maximum power: 1.0mW)

DIMENSIONS



LSM-6200 Display Unit

SERIES 544 — Standard Display Unit for Laser Scan Micrometer

- 2-axis display unit enables 2 items to be displayed simultaneously.
- Capable of statistical analysis such as: average, maximum value, minimum value, range (max. - min.) and more.
- Segment measurement (7 points) or edge measurement (1 to 255 edge) can be selected.
- A function to eliminate abnormal values is standard.
- 100 tolerance values, preset values, or settings can be stored.



SPECIFICATIONS

Order No.	544-072A
Type	inch/mm
Display	16-digit plus 11-digit fluorescent display, and guide message LED
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges*1
Averaging times	Arithmetic average: per 8 to 2048/ Moving average: per 32 to 2048 (Arithmetic average is per 16 to 2048 when using 544-531, 544-532)
Judgment	Selection from "target value + tolerance", "lower tolerance + upper tolerance", or "7 classes multi-limit tolerance zone".
Measurement mode	Standby, Single measurement, Continuous measurement
Statistical analysis	Maximum, Minimum, Average, Dispersion, σ (S.D)
Size	335 (W) \times 134 (H) \times 250 (D)mm
Power supply	120 V AC \pm 10%, 40VA, 60Hz
Standard I/F	RS-232C, Analog I/O
Optional I/F	Digimatic code output unit (2-ch), 2nd I/O analog I/F, BCD I/F
Operating environment	0 to +45°C, RH 35 to 85% (no condensation)
Others	Nominal setting, sample setting, selection of unnecessary digits, transparent object measurement*2, measurement of odd fluted parts, automatic measurement in edge mode, output timer, abnormal data elimination, SHL change, group judgment, simultaneous measurement, statistical processing, mastering, buzzer function, automatic workpiece detection (dimension/position)*1, zero-set/offset, dual measurement (optional)

*1: The measuring range will be 0.1mm to 2mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection with **544-531, 544-532**.

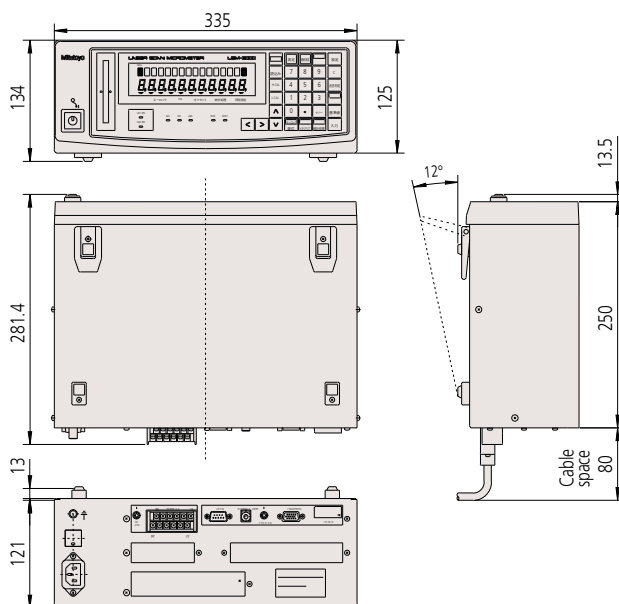
Each function has its combination limit.

*2: The measuring range is 50 μ m to 2mm when using **544-531, 544-532**. For smaller range, contact your local Mitutoyo sales office.

** Cannot be connected to **544-496A**.

** Previous models such as **544-451** cannot be connected.

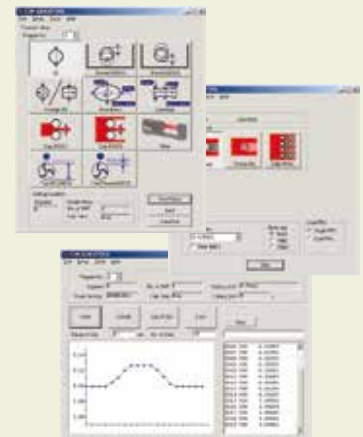
DIMENSIONS



Unit: mm

QUICKTOOL

QUICKTOOL is a free software program that makes programming the LSM-6200 quick and easy. Basic data acquisition is also possible. Included as standard accessory. (Connecting cables to PC are optional)



LSM-5200 Display Unit

SERIES 544 — Compact Display Unit for Real-time Multi-channel Measurement

- A compact controller which could be used for multi-unit system configurations.
- Capable of simple connection to a PC via USB.
- A Panel-mount type display unit designed for the LSM-S series.
- Analog I/O and RS-232C is standard.
- Measurement of odd fluted parts, and simultaneous measurement / 2-program function are equipped.



SPECIFICATIONS

Order No.	544-047
Display	9 digits plus 8 digits LED, guide message LED
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges*1
Averaging method	Arithmetic average: from 4 to 2048; Moving average: from 32 to 2048 (Arithmetic average is from 16 to 2048 when using LSM-500S.)
Judgment	Selecting from "target value ± tolerance value" or "lower limit/upper limit".
Measurement mode	Standby, Single measurement, Continuous measurement
Statistical analysis	Calculation result is output via USB or RS-232C.
External dimensions	144 (W)×72 (H)×197.1 (D)mm
Power supply*3	24V DC±10%, 1.3A or more (AC adapters are optional)
Standard I/F	USB2.0, RS-232C, I/O analog
Operating environment	0 to 40°C, RH 35 to 85% (no condensation)
Preservation environments	-20 to 70°C, RH 35 to 85% (no condensation)
Others	Measurement of odd fluted parts, simultaneous measurement, nominal setting, sample setting, selection of unnecessary digits, transparent object measurement*2 Automatic workpiece detection (dimension/position detected)*1, abnormal data elimination, mastering, statistical processing (when using USB, RS-232C), output timer, automatic measurement in edge mode, presetting Note that every function is limited in its combination possibilities. See the user manual for details.
Mass	1.4 kg

*1: The measuring range will be 0.1mm to 2mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection with **544-531, 544-532**.
Each function has its combination limit.

*2: The measuring range is 50μm to 2mm when using **544-531, 544-532**. For smaller ranges, contact your local Mitutoyo sales office.

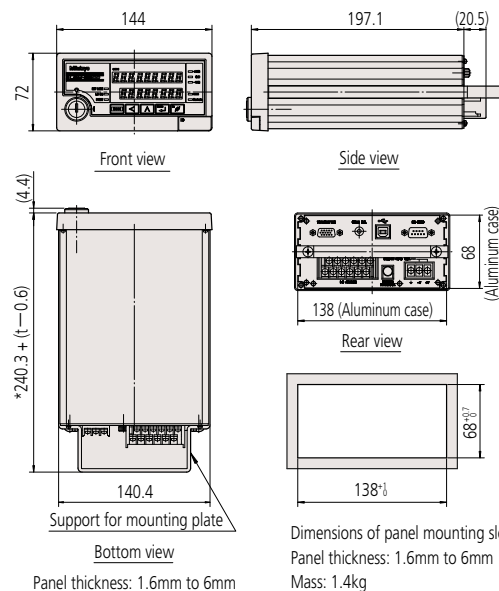
*3: DC24V external power supply (commercial item) is required separately.

Note 1: Cannot be connected to **544-496A**.

Note 2: Previous models such as **544-451** cannot be connected.

Note 3: For USB communication with a PC, a dedicated device driver is required. For details, contact your local Mitutoyo sales office.

DIMENSIONS



Laser Scan Micrometer

SERIES 544 Optional Accessories

LSMPAK

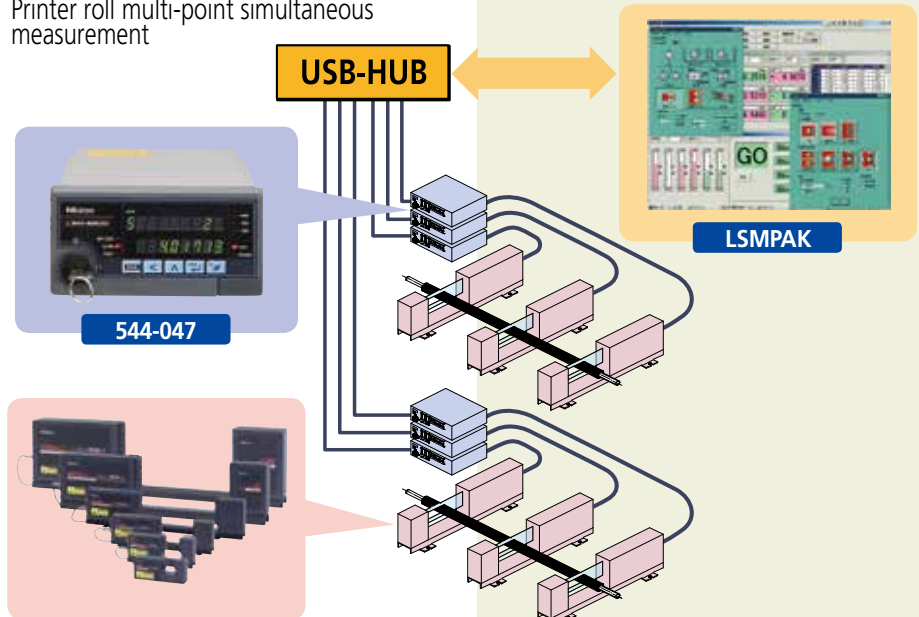
- Software can import measurement data from multiple LSM-5200 display units to a PC allowing a variety of measuring systems to be constructed.
 - Capable of processing a maximum of 10 channels of measurement data (USB-HUB connection).
 - Capable of Calculation between channels, statistical analysis, file output of calculation results.
 - Various display functions such as counter display, graph display, and calculation result are equipped.
- * Refer to page G-42 for specifications of **LSM-5200**.

Sample Screen



Measurement Examples

Printer roll multi-point simultaneous measurement



Commercially available products, such as USB hubs and cables, are available for connecting to the display unit.

SPECIFICATIONS

Order No.	02NGA002 (English)	
Applicable models	Display unit: 544-047 (Ver.1.004A or later) Measuring unit: LSM 500S Series	
Display function	Max. 12 windows (counter, meter, chart, overall judgment)	
Setup function	Presetting, data output, sample measurement, resolution select, judgment setting, measurement of odd number fluted parts, simultaneous measurement *Each function has its combination limit.	
Measurement function	Single, continuous measurement, single automatic repetition	
Calculation function	Arithmetic operation, maximum, minimum, range, average, total (any combination available)	
GO/NG judgment	3-step (-NG, GO, +NG)	
Interface	USB2.0 (Hi-Speed communication recommended)	
Maximum connection	10 units	
Operating environment (PC)	OS	Windows XP, 7 (32-bit)
	CPU	Pentium 4, 2GHz or better recommended
	Memory	1GB or more
	HDD free space	500MB or more
Display	124x768 dot, True Color (32-bit) or more recommended	



Laser Scan Micrometer

SERIES 544 Optional Accessories

Calibration gage set



- Standard cylinder gage set suitable for calibration of Laser Scan Micrometers.
- Nominal gage diameters (1 to 160mm) are as given in Specifications.

SPECIFICATIONS

For calibrating models		544-496A	544-532	544-534	545-536	544-538	544-540	544-542	544-116-1A
		LSM-902	LSM-500S	LSM-501S	LSM-503S	LSM-512S	LSM-512S	LSM-516S	LSM-9506
Set No.		02AGD180	02AGD110	02AGD120	02AGD130	02AGD140	02AGD150	02AGM300	02AGD170
Configuration (Order No.)	Stand	02AGD181	02AGD111	02AGD121	02AGD131	02AGD141	02AGD151	02AGM320	02AGD171
	Gages	ø1: 02AGD920 ø25: 02AGD963	ø0.1: 958200 ø2 : 958202	ø0.1: 958200 ø10: 229317	ø1: 02AGD920 ø30: 02AGD961	ø1: 02AGD920 ø60: 02AGD962	ø20: 229730 ø120: 234072	ø20: 229730 ø160: 02AGM303	ø1: 02AGD920 ø60: 02AGD962
	Carrying case	02AGD190	958203	958203	02AGD980	02AGD980	02AGD990	02AGM310	02AGD970

Workstage



Installation example (LSM-902)

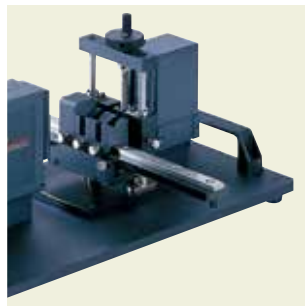
- Easy set-up and height adjustment enables high-precision measurement.

SPECIFICATIONS

Model	544-533, 544-534 544-535, 544-536 544-495, 544-496
Order No.	02AGD270

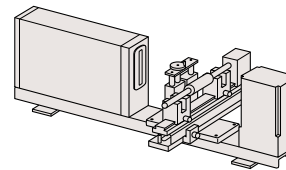
Adjustable workstage

- Vertical/horizontal slide mechanism enables easy measurement of various workpiece diameters.
- Best suited for quality assurance of high precision pin gages.

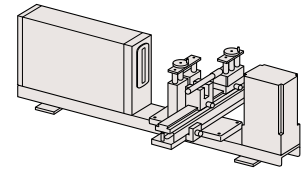


Measurement Examples

- Roller of copying machine



- Pin gage or plug gage



Basic configuration

Basic set	Order No.	Applicable Model	Standard Accessories	Measuring range (mm)	Horizontal stroke (mm)	Vertical stroke (mm)
(1) Main unit (2) V-block (3) Stop	02AGD280	544-496A	V-block (02AGD420), 2 pcs Stopper (02AGD430), 1 pc	0.1 - 25	130	47
	02AGD400	544-534		0.05 - 10	130	32
	02AGD490	544-536		0.3 - 30	200	35
	02AGD520	544-538	V-block A (02AGD550), 2 pcs V-block B (02AGD550), 1 pc V-block C (02AGD570), 1 pc	1 - 60	300	45
	02AGD370	544-116-1A		0.5 - 60	200	45
	02AGD680			0.5 - 60	300	45

* The stop is not included in the basic set for 544-537, 544-538, 544-115, 544-116.

- Optional parts for the adjustable workstage, such as center support, adjustable V-block (up/down) etc., are available.

Laser Scan Micrometer

SERIES 544 Optional Accessories

Guide pulley

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



SPECIFICATIONS

Model	544-532	544-534
Order No.	02AGD200	02AGD210

Each measurement range is as follows:

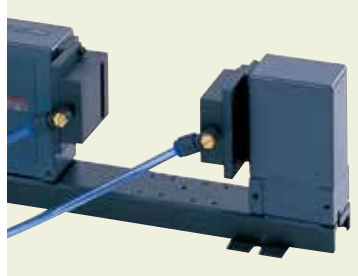
544-532: $\varnothing 5\mu\text{m}$ to $\varnothing 1.6\text{mm}$

544-534: $\varnothing 50\mu\text{m}$ to $\varnothing 2\text{mm}$

For calibration, the calibration gage set for **544-532 (No.02AGD110)** is required.

Air shield driven by air supply unit

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



SPECIFICATIONS

Air supply unit	Air shield	Applicable models
No.957608	No.02AGD220	544-532
	No.02AGD230	544-534
	No.02AGD240	544-536
	No.02AGD250	544-538
	No.02AGD260	544-540

The number of air shields that can be driven per air supply unit (**No.957608**) is as follows:

Air shield	Quantity
No.02AGD220/No.02AGD230	6
No.02AGD240	3
No.02AGD250/No.02AGD260	1

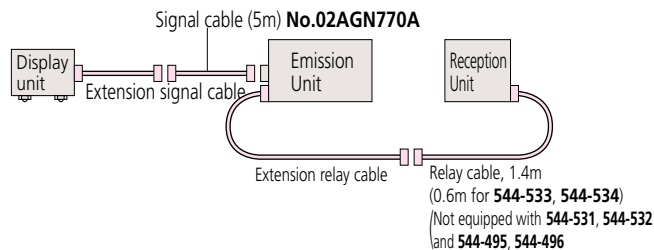
*1: Air shield and air supply unit are sold separately. An air supply unit includes a flow regulating valve and filter. Note, however, that clean air should be supplied.

*2: Air shield is supplied with 5m air tube (Outside Diameter: 6mm).

*3: Air supply unit is compatible with air tube of 9mm internal diameter.

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.



SPECIFICATIONS

Extension signal cable

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

Extension relay cable

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

* For **544-532** and **544-534** the allowable maximum length for signal cable is 20m; relay cable is 2m.

* For **544-536, 544-538, 544-540** and **544-542** the allowable maximum length for signal cable is 30m; relay cable is 5m.

* The maximum extension length of the signal cable and relay cable is 32m in total.

* Cannot be used with **544-496A**.

Laser Scan Micrometer

SERIES 544 Optional Accessories

Thermal printer DPU-414



- Measurement data can be printed.

SPECIFICATIONS

Order No.	02AGD600B
Printing method	Thermal dot matrix
Printing capacity	40 Columns (Normal)
Character configuration	9x8 dot matrix
Printing direction	Bidirectional
Interface	RS-232C
Power supply	AC 100-240V 50/60Hz (AC adapter)
Standard Accessories	Printer cable 2m (02AGD620A), Printer paper 1 roll, AC adapter
Printer paper (optional)	Order No.223663 (10-roll set)

Foot switch

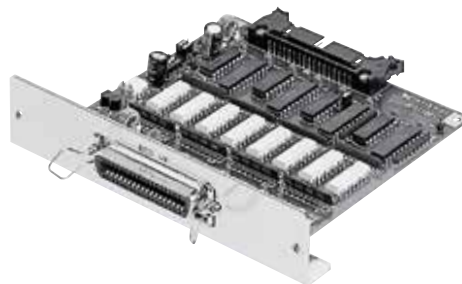


- **937179T**
- For LSM Order **544-072A, 544-496A, 544-116-1A**

Interface for LSM6200, 6900

Optional Accessories

BCD Interface



- Outputs measurement data in BCD output (7-digit) or HEX output.
- Data logic can be switched.
- Isolated I/O circuitry
- Available for, **544-072A, 544-496A.**

SPECIFICATIONS

Order No.	02AGC910
Standard Accessories	Connector (DDK) 57-30360 (No.214188)

Laser Scan Micrometer

SERIES 544 Optional Accessories

Digimatic code output unit

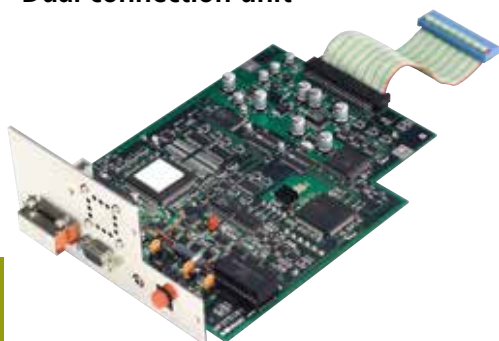


- 2-channel Digimatic code output
 - In simultaneous measurement, measurement data are output as follows:
Program No.0 to No.4 in OUTPUT-1
Program No.5 - No.9 in OUTPUT-2 (10 programs operated)
 - 10 pin MIL type connector.
 - Output cable is not supplied.
Connecting cable (optional) 1m (No.936937)
 - Available for **544-072, 544-496A**.
- * Output is 6 digits of measurement data.
* Displaying 6th and 7th digit after the decimal point is not supported.

SPECIFICATIONS

Order No.	02AGC840
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Dual connection unit

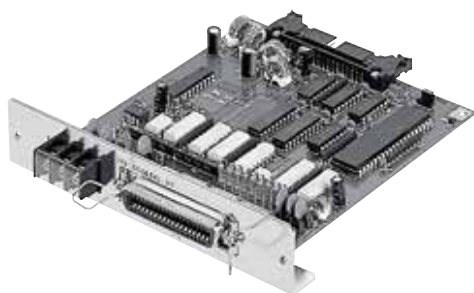


- Enables second unit connection to the **544-072A**. (both units must be the same model)
- * Cannot be used for **544-496A**.
- Depending on the layout of the two measuring units, large-diameter measurement, XY measurement, and parallel measurement are possible.
- Both of the measuring units and display units can be simultaneously operated.

SPECIFICATIONS

Order No.	02AGP150
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2nd I/O analog I/F



- I/O, analog output.
- Simultaneous measurement is supported by two pairs of GO/NG judgment outputs.
- Available for **544-072A, 544-496A**.

SPECIFICATIONS

Order No.	02AGP150
Standard Accessories	Connector (DDK) 57-30360 (No.214188)

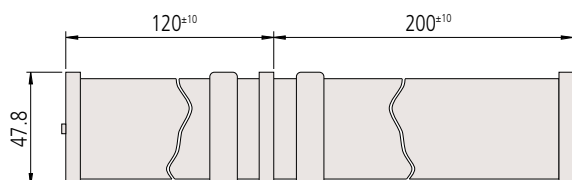
Cable for BCD and 2nd I/O simultaneous mount

- Both BCD (No.02AGC910) and 2nd I/O analog I/F (No.02AGC880) can be mounted on **544-072A, 544-496A** using this cable.
- * If using this cable, the dual connection unit (No.02AGP150) cannot be used.

SPECIFICATIONS

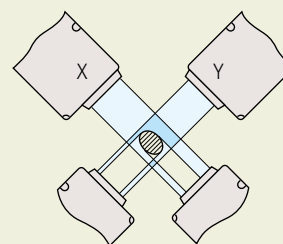
Order No.	02AGE060
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DIMENSIONS



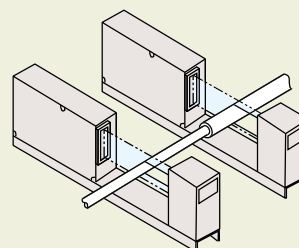
Unit: mm

XY Measurement

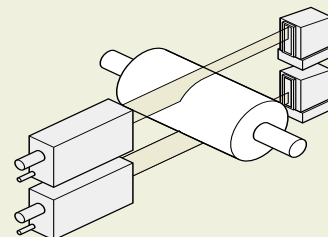


(X-Y): flatness
(X+Y)/2: average
* XY requires 10mm-interval.

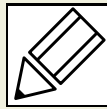
Parallel Measurement



Large-diameter measurement



Quick Guide to Precision Measuring Instruments



Laser Scan Micrometers

Compatibility

Your Laser Scan Micrometer has been adjusted together with the ID Unit, which is supplied with the measuring unit. The ID Unit, which has the same code number and the same serial number as the measuring unit, must be installed in the display unit. This means that if the ID Unit is replaced the measuring unit can be connected to another corresponding display unit.

The workpiece and measuring conditions

Depending on whether the laser is visible or invisible, the workpiece shape, and the surface roughness, measurement errors may result. If this is the case, perform calibration with a master workpiece which has dimensions, shape, and surface roughness similar to the actual workpiece to be measured. If measurement values show a large degree of dispersion due to the measuring conditions, increase the number of scans for averaging to improve the measurement accuracy.

Electrical interference

To avoid operational errors, do not route the signal cable and relay cable of the Laser Scan Micrometer alongside a high voltage line or other cables capable of inducing noise current in nearby conductors. Ground all appropriate units and cable shields.

Connection to a computer

If the Laser Scan Micrometer is to be connected to an external personal computer via the RS-232C interface, ensure that the cable connections conform to the specification.

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.

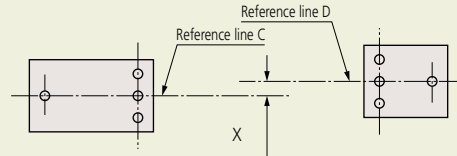


Re assembly after removal from the base

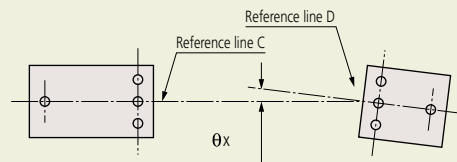
Observe the following limits when re assembling the emission unit and reception unit to minimize measurement errors due to misalignment of the laser's optical axis with the reception unit.

Alignment within the horizontal plane

- a. Parallel deviation between reference lines C and D: X (in the transverse direction)

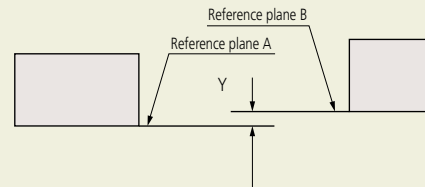


- b. Angle between reference lines C and D: θ_x (angle)

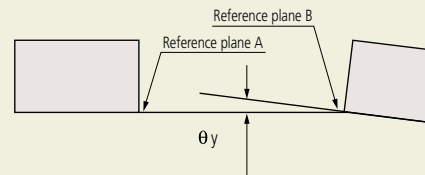


Alignment within the vertical plane

- c. Parallel deviation between reference planes A and B: Y (in height)



- d. Angle between reference planes A and B: θ_y (angle)



Allowable limits of optical axis misalignment

Model	Distance between Emission Unit and Reception Unit	X and Y	θ_x and θ_y
544-533, 544-534	68mm (2.68°) or less	within 0.5mm (.02°)	within 0.4° (7mrad)
	100mm (3.94°) or less	within 0.5mm (.02°)	within 0.3° (5.2mrad)
544-535, 544-536	130mm (5.12°) or less	within 1mm (.04°)	within 0.4° (7mrad)
	350mm (13.78°) or less	within 1mm (.04°)	within 0.16° (2.8mrad)
544-537, 544-538	273mm (10.75°) or less	within 1mm (.04°)	within 0.2° (3.5mrad)
	700mm (27.56°) or less	within 1mm (.04°)	within 0.08° (1.4mrad)
544-539, 544-540	321mm (12.64°) or less	within 1mm (.04°)	within 0.18° (3.6mrad)
	700mm (27.56°) or less	within 1mm (.04°)	within 0.08° (1.4mrad)
544-541, 544-542	800mm (31.50°) or less	within 1mm (.04°)	within 0.09° (1.6mrad)

Mitutoyo Quality



People – Quality starts with our people. Our team is comprised of the best and the brightest in the industry.



Confidence – Confidence you have each time you rely on a Mitutoyo product.

Reliability – Reliability of the product that you use many times every day.

Accuracy – Accuracy you need to preserve tight machining tolerances.



Relationship – Relationship you have formed with Mitutoyo staff and distributors

Longevity – Longevity of a tool or instrument that maintains factory specifications.



Savings – Savings that are realized by implementing metrology solutions that reduce production costs.



Feel – Feel of a caliper or micrometer that you have come to expect.

Pride – Pride you feel when you produce the best manufactured product possible.