

SENSOR SYSTEMS

G



Linear Gauges



Laser Scan Micrometers



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Linear Gauges

SERIES 542 – LGF Economical Design Linear Gauge

- A compact, electronic, length measuring probe for measuring displacements up to 50 mm / 2".
- Wide range of application: due to its slim design this series can easily be integrated into measuring systems and automated machines.
- Long service life due to the linear ball bearing in the plunger assembly. Rubber protective boot for operation under severe conditions.



542-163

Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	5 µm or 1 µm
Scale type:	Photoelectric linear encoder
Max. response speed:	1500 mm/s
Contact point:	ø3 mm carbide
Stem:	ø15 mm
Bearing type:	Linear ball bearing
Measuring force:	Refer to the list of specifications
Output signal:	90° phase difference, differential square wave (RS-422A equivalent)
Signal pitch:	20 µm (542-613), 4 µm (542-163)
Dust/Water protection level:	IP66

Standard Accessory

210187: Wrench for contact point

Optional Accessories

962505:	Rubber boot £19.90
902434:	Extension cable (5 m) £108.00
902433:	Extension cable (10 m) £180.00
902432:	Extension cable (20 m) £255.00
02ADN370:	Thrust stem set £15.00
02ADB693:	Thrust stem wrench £7.00

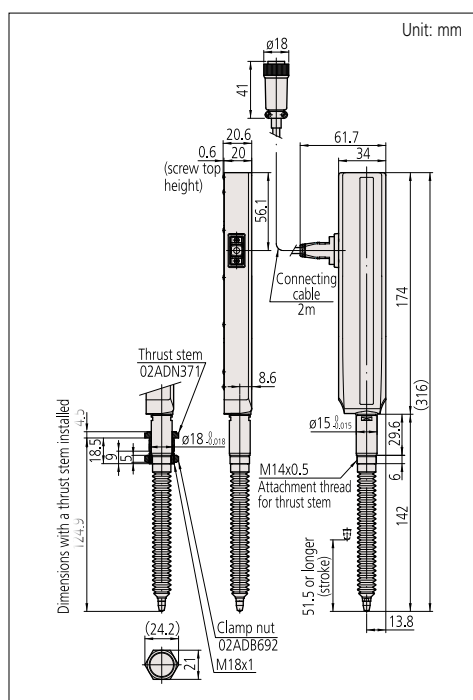
SPECIFICATIONS

Code No.	Range	Resolution	Accuracy*	Measuring force**	Stem ø	Price
542-163	50 mm (2")	0.001 mm	(1.5+L/50) µm	5.7N/5.3N/4.9N	15 mm	£724.00
542-613	50 mm (2")	0.005 mm	(7.5+L/50) µm	5.7N/5.3N/4.9N	15 mm	£540.00

* L = Effective range (mm)

** Orientation of gauge: Spindle down / horizontal / up

DIMENSIONS



Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	1 μ m
Scale type:	Photoelectric linear encoder
Max. response speed:	900 mm/s
Contact point:	\varnothing 3 mm carbide
Stem:	\varnothing 8 mm
Bearing type:	Linear ball bearing
Measuring force:	Refer to the list of specifications
Output signal:	90° phase difference, differential square wave (RS-422A equivalent)
Signal pitch:	4 μ m
Dust/Water protection level:	IP54

Standard Accessory

538610: Wrench for contact point

Optional Accessories

238773: Rubber boot for 5 mm LGB (spare)
£6.00

238772: Rubber boot for 10 mm LGB (spare)
£6.00

902434: Extension cable (5 m)
£108.00

902433: Extension cable (10 m)
£180.00

902432: Extension cable (20 m)
£255.00

SERIES 542 – LGB Extra-Slim Linear Gauge

- Extremely compact design. Available with an outside diameter as small as 8 mm.
- The small photoelectric linear encoder assures high precision over the entire stroke range.
- The ball bearings used in the spindle unit ensure superb durability.



542-204



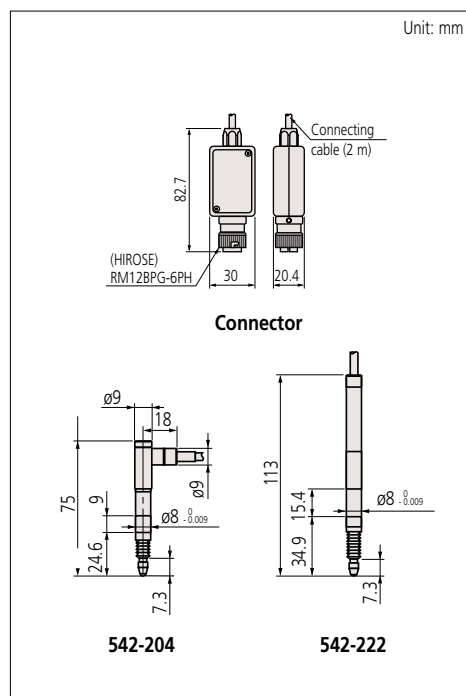
542-222

SPECIFICATIONS

Code No.	Range	Resolution	Accuracy	Measuring force*	Stem \varnothing	Price
542-204	5 mm (.2")	0.001 mm	2 μ m	0.65N/0.6N/0.55N	8 mm	£830.00
542-222	10 mm (.4")	0.001 mm	2 μ m	0.8N/0.75N/0.7N	8 mm	£712.00

* Orientation of gauge: Spindle down / horizontal / up

DIMENSIONS



Linear Gauges

SERIES 575 – LGS ABSOLUTE Waterproof Linear Gauge

- Compact length measuring instrument with built in capacitive measuring system.
- Dust and splash proof: suitable for installation in machines, measuring devices and multi-position measurement applications.
- Zero-setting via external display unit possible.
- Data output is in Digimatic format to enable documentation of measurement values as well as statistical evaluation via connected Digimatic data processing units or PCs.

ABSOLUTE

IP66



575-303

Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	0.01 mm
Scale type:	Capacitance-type ABSOLUTE linear encoder
Max. response speed:	Unlimited
Contact point:	ø3 mm carbide
Stem:	ø8 mm
Bearing type:	Slide bearing
Measuring force:	Refer to the list of specifications
Output signal:	Digimatic output
Dust/Water protection level:	IP66

Optional Accessories

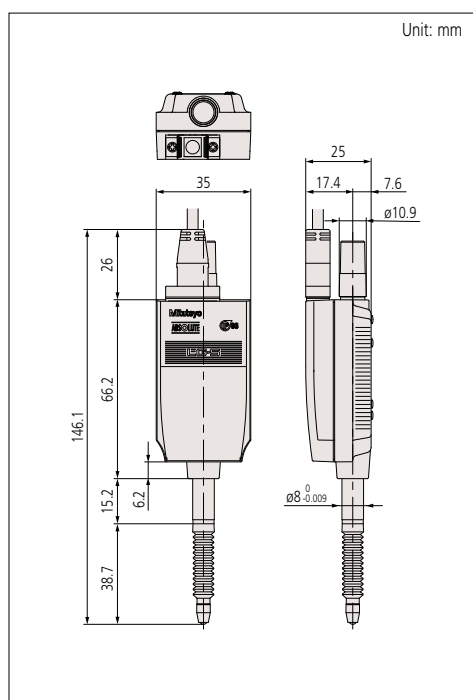
238774:	Rubber boot £11.90
903594:	Air drive unit (metric) £92.30
903598:	Air drive unit (inch) £92.30
02ADF640:	SPC cable extension adapter £30.00
02ADD950:	Extension cable (0.5 m) £50.00
936937:	Extension cable (1 m) £32.90
965014:	Extension cable (2 m) £39.10

SPECIFICATIONS

Code No.	Range	Resolution	Accuracy	Measuring force*	Stem ø	Reverse reading	Price
575-303	12.7 mm (.5")	0.01 mm	0.015 mm	2.0N/1.8N/1.6N	8 mm	—	£156.00
575-304	12.7 mm (.5")	0.01 mm	0.015 mm	2.0N/1.8N/1.6N	8 mm	●	£158.00

* Orientation of gauge: Spindle down / horizontal / up

DIMENSIONS



EC Counter

SERIES 542 – Low-Cost, Assembly Type Display Unit for LGS

Functions

Preset, GO/±NG judgement

Output (selectable)

Tolerance judgement: -NG, OK, +NG (open collector)
Data: Digimatic code

External control signal input

Preset, data hold

Power supply

Via AC adapter

Optional Accessories

- 936937:** SPC data output cable (1 m)
£32.90
- 965014:** SPC data output cable (2 m)
£39.10
- 214938:** DC plug PJ-2
£3.80
- C162-155:** I/O cable
£30.00

- Employs DIN size (96 x 48 mm) panel-mount configuration to facilitate system integration.
- Able to produce tolerance judgement and Digimatic measurement data output.



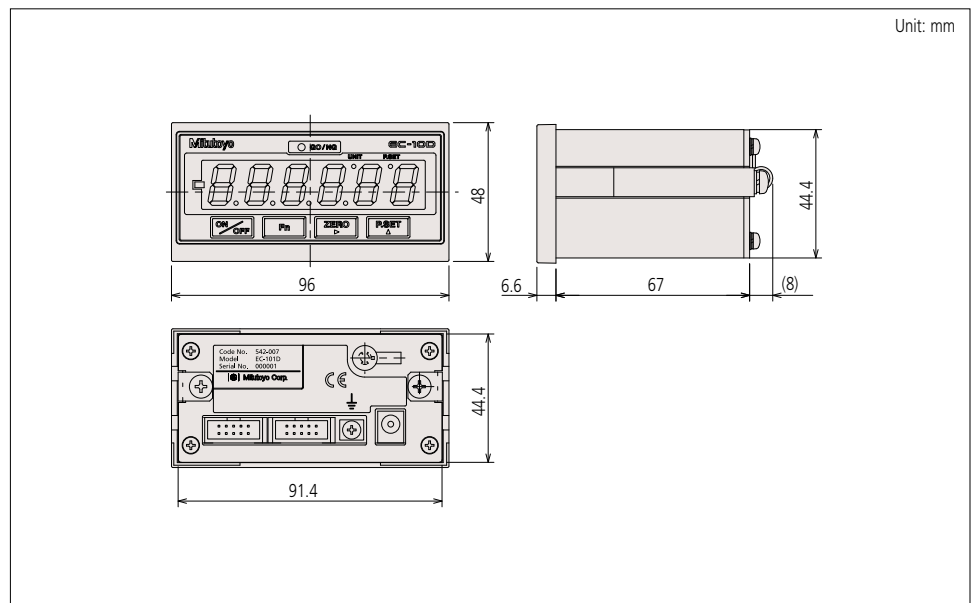
542-007E



SPECIFICATIONS

Code No.	542-007E
Applicable input	Digimatic code (SPC)
Applicable gauge	LGS
Number of gauge inputs	1
Resolution	0.01, 0.001 mm (automatically set depending on the gauge)
Display	6-digit and a negative [-] sign LED (amber, green, red)
Price	£216.00

DIMENSIONS



EB Counter

SERIES 542 – Panel Mount Display Unit with Multiple Limit Setting

- Able to produce 3-step/5-step X 7 kinds of tolerance output and limit value output independently for each of 7 channels.
- Comes with serial BCD output capability for connection to a programmable controller or personal computer, etc., when the minimum cabling requirement is met.
- Dynamic measurement possible with simplified analogue output.
- Employs DIN size (96 x 48 mm) and panel-mount configuration to facilitate system integration.

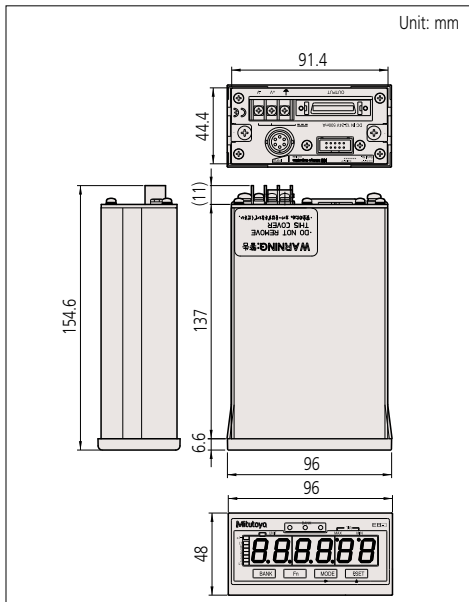


542-092-2E

SPECIFICATIONS

Code No.	542-092-2E
Applicable input	Differential square wave
Applicable gauges	LGF, LGB
Number of gauge inputs	1
Resolution	0.01, 0.005, 0.001, 0.0005, 0.0001 mm
Display	LED display (3 steps: amber, green, red / 5 steps: amber, amber flashing, green, red flashing, red)
Price	£521.00

DIMENSIONS



AC adapter and AC cable

Functions

Preset, tolerance judgement output (3/5-step X 7 kinds), limit value output (2 kinds independently for each of the 7 channels), peak (maximum, minimum, runout) measurement, diverse data output (serial BCD, simplified analogue)

Output

Tolerance judgement: L1 to L5, open collector
Control: Normal operation signal (NORMAL), open collector

External control signal input

Preset, display hold, peak value clear, tolerance judgement BANK switch, open collector or no-voltage contact signal (with/without contact point)

Interface

Serial BCD: Bit-serial format, open collector
Analogue output : 2.5V + Counting value X voltage resolution (25mV/2.5mV): Full-scale 0 to 5V

Digimatic input/output:

- Connecting to the external switch box (No. 02ADF180) makes it easy to enter tolerance limits and preset values. Note: This cannot be used when the gauge is connected to a Mitutoyo DP-1VR Digimatic Mini-Processor.
- Can connect to a Mitutoyo DP-1VR Digimatic Mini-Processor.
- Number of tolerance steps can be expanded by assembling a set of EB-D counters.

Maximum input frequency

1.25 MHz (the response speed depends on the gauge being used.)

Power supply

12 - 24V DC

Power consumption

6W (500 mA) or less (power supply to be capable of supplying at least 1A for each unit.)

Optional Accessories

- 02ADB440:** I/O output connector **£18.00**
- 02ADF180:** 10-key unit **£180.00**
- 936937:** SPC data output cable (1 m) **£32.90**
- 965014:** SPC data output cable (2 m) **£39.10**
- 02ADN460:** AC adapter **£46.70**
- 02ZAA030:** AC cable **£6.60**
- 02ADD930:** Terminal connecting cable **£17.40**

EH Counter

SERIES 542 – Multi-Function Display Unit

Functions

Zeraset, preset, limit setting (3 or 5-step), GO/±NG judgement, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, double reading, mm/inch switching, sum/difference calculation of 2 gauges, output mode selection

Output

I/O: Tolerance judgement output (3/5 stages), normal operation output RS-232C, USB or Digimatic code (selectable): Various measurement data (USB used only with SENSORPAK)

External control

I/O: Preset, Data hold and Error clear
RS-232C: Displayed value output, MAX/MIN/TIR switching, Zero set, peak value clear, preset value input, tolerance value input and error clear

RS link

Up to six EH counters may be connected via one RS-232C or USB port (daisy chained). (USB used only with SENSORPAK)

Error display/output

Power-supply voltage error, overspeed error, overflow error, gauge error, communication error, and tolerance setting error

Maximum input frequency

2.5MHz (differential square wave)

Power supply

Via AC adapter (12 - 24V DC, 700mA (max))

- Employs DIN size (144 x 72 mm) and panel-mount configuration to facilitate system integration.
- Counter can be used on a desktop mounted on a display stand (included).
- The standard RS-232C and USB interface allows easy communication with an external PC. (USB used only with SENSORPAK.)
- A multi-point measuring system can easily be created with the RS Link built-in networking function. (max. 12 points.)
- The 2-gauge input type can perform 2-axis display and make addition or subtraction calculations between 2 gauges.

542-075E



542-071E



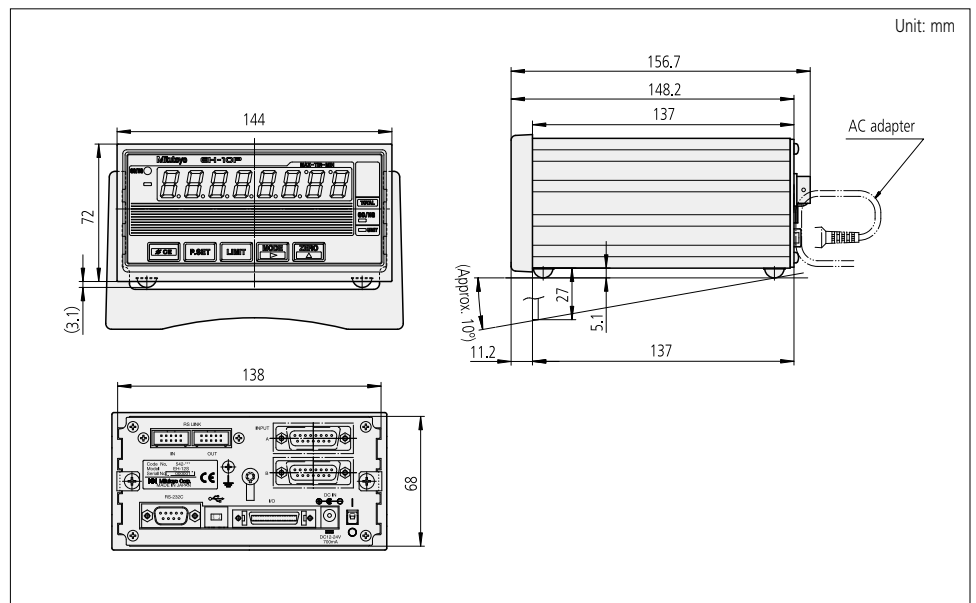
542-072E



SPECIFICATIONS

Code No.	542-075E	542-071E	542-072E
Applicable input	Differential square wave		Digimatic code output
Applicable gauges	LGB, LGF		LGS, ID-C
Number of gauge inputs	1	2	
Resolution	0.01, 0.005, 0.001, 0.0005, 0.0001 mm		Depends on the gauge head connected
Tolerance judgement display	LED display (3 steps: amber, green, red/5 steps: amber, amber flashing, green, red flashing, red)		
Price	£590.00	£741.00	£741.00

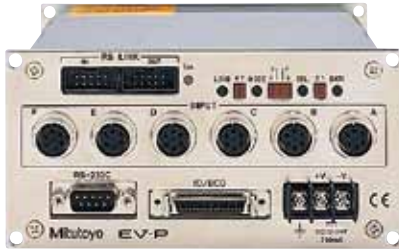
DIMENSIONS



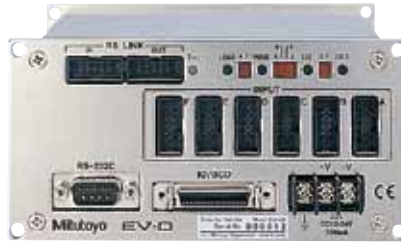
EV Counter

SERIES 542 – For Multi-Gauge System

- Up to six gauges can be connected to one unit.
- Up to 10 EV counters can be connected to one personal computer using the RS Link function to facilitate the configuration of a multi-point measurement system comprising a maximum of 60 gauges.
- A range of output modes are available: I/O output for tolerance judgement and segment output, BCD data output and RS-232C.
- Peak-hold measurements are possible for maximum value, minimum value, runout (TIR), etc.
- Able to display the sum, average, maximum, minimum, maximum difference, etc., between gauges connected to the same unit.



542-063



542-064E

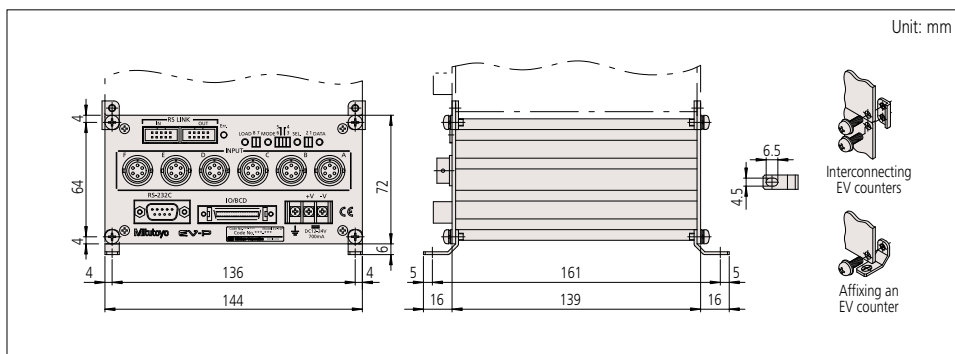
SPECIFICATIONS

Code No.	542-063	542-064E
Applicable input	Differential square wave	Digimatic code (SPC)
Applicable gauge	LGB (ex. 0.0001 mm resolution), LGF	LGS
Number of gauge inputs	6	
Resolution	0.0001**, 0.0005, 0.001, 0.005, 0.01 mm (.000005", .00005", .0005")	0.001*, 0.01 mm (.00005"*, .0005")
Price	£977.00	£927.00

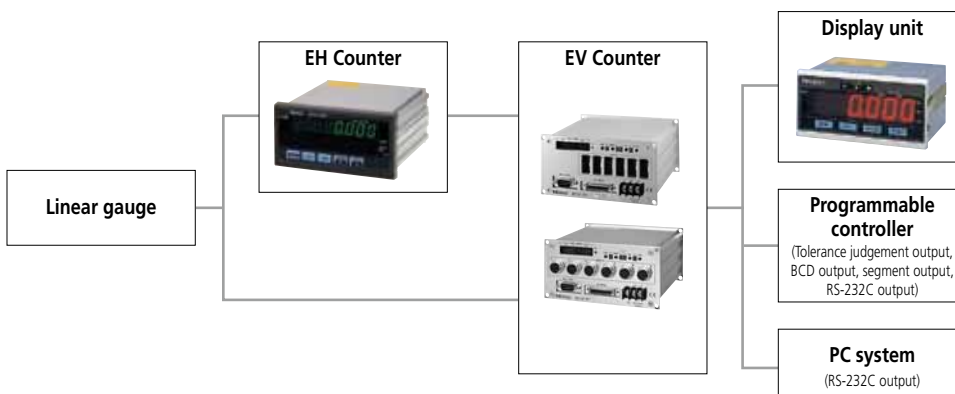
* Will not be indicated when combined with an LG gauge.

** D-EV is required when the resolution is 0.0001 mm.

DIMENSIONS



System Diagram



Functions

GO/±NG judgement, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, mm/inch switching, calculation of sum, average, maximum, minimum and maximum difference between specified axes, and output-mode selection

Output

I/O: Normal operation output and GO/±NG signal (three steps), measurement data (BCD code), or 21-stage segment output (selectable)
RS-232C: Various measurement data

External control

I/O: Axis designation, preset, data hold, and error clear
RS-232C: Displayed value output command, MAX/MIN/TIR switching and peak value clear, zero set, preset value input, tolerance value input, error clear, and command to output calculated value between specified axes

RS link

Up to 10 EV counters may be connected via a single RS-232C port (daisy chained). EV and EF counters can be mixed (in which case a total of six counters can be connected)

Error display/output

Power-supply voltage error, overspeed error, overflow error, gauge error, communication error, and tolerance setting error

Maximum input frequency

1.25MHz (differential square wave): max counting speed: 5MHz

Power supply

Terminal block (M3 screws), 12 - 24V DC, 700mA (max.)

D-EV Display Unit

Optional accessory for the EV Counter

- Allows set-up of EV counter without a personal computer or other equipment.
- Able to display each axis measurement value and GO/NG judgement result, total GO/NG judgement result for all axes, setting details, and errors.
- DIN compatible compact panel-mounting-cutout dimensions 45 x 92.

Technical Data

No. of connectable units:	One display unit allows external display and setting for one EV counter
Displayed digits:	Uses a single sign plus six digits (EV counter operates on eight-digit data internally but displays only the last six digits).
LED display:	Channel display (also for display of judgement result): 3 (three-colour LED) Measurement mode display (current, maximum, minimum, runout): 2 Status display: 1 (two-colour)
Operating switches:	4
Switches and their functions:	Channel switching, measurement mode switching (current value, maximum value, minimum value and runout), parameter setting, preset, and tolerance setting
Input/output:	RS Link connectors: 1 in and 1 out.
Error display:	Overspeed, gauge error and others.
Power supply:	Terminal block (M3 screws), 12 - 24V DC, 200mA

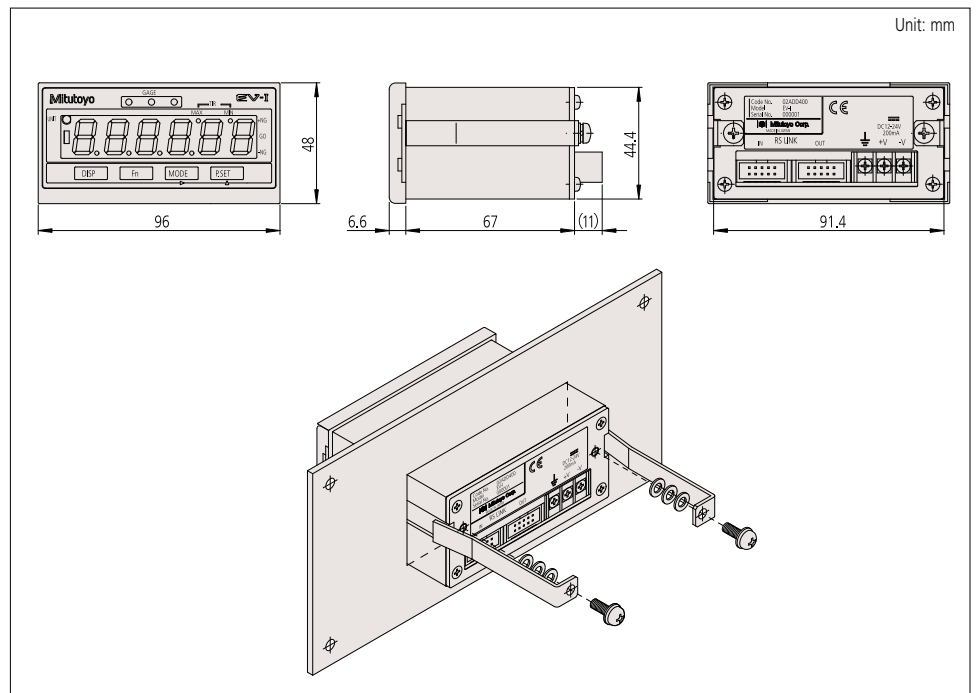


02ADD400

SPECIFICATIONS

Code No.	02ADD400
Price	£233.00

DIMENSIONS



Software

SENSORPAK – Software for on-screen control and analysis

- Up to six gauges can be connected to one unit.
- Able to connect up to 10 EV counters to one personal computer using the RS Link function to facilitate the configuration of a multi-point measurement system comprising a maximum of 60 gauges.
- A range of output modes to choose from; I/O output for tolerance judgement and segment output, BCD data output and RS-232C output are available.
- Peak-hold measurements are possible for maximum value, minimum value, runout (TIR), etc.
- Able to calculate the sum, average, maximum, minimum, maximum difference, etc., between gauges connected to the same unit.



Measurement screen

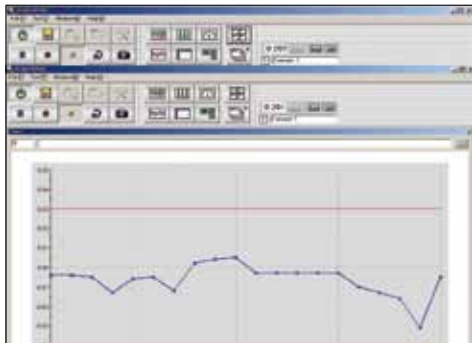
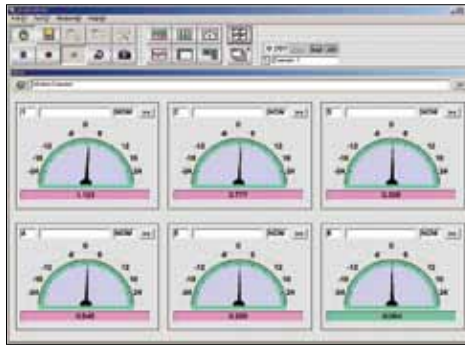


Chart screen

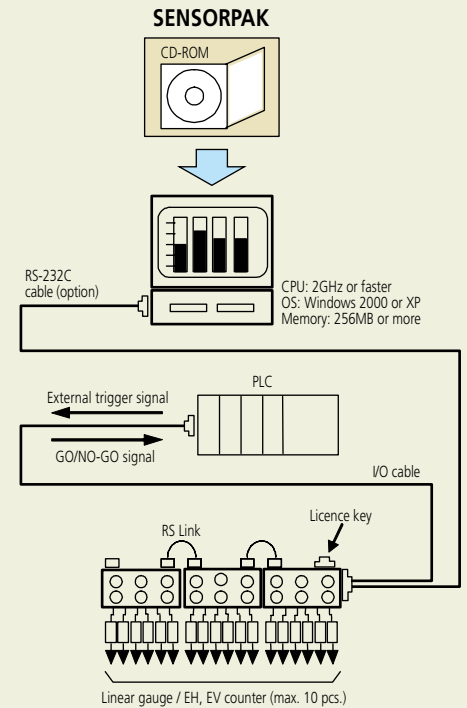


Meter screen

MiCAT
Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software
SENSOR

System Diagram



SPECIFICATIONS

Code No.	02ADM260-2	02ADM270-2
		Software only
Display function	Display type: Counter, bar graph, meter, chart (capable of simultaneous display) Tolerance judgement result: Colour display (green/red) Connectable gauges: Max. 60 gauges Digimatic code (SPC)	
Calculation function	Calculation items: Sum, difference, total, average, maximum, minimum, range (maximum–minimum), calculation with a constant Connectable gauges: Max. 30 calculation items (between gauges)	
Total tolerance judgement	GO/NG judgement (by specifying gauges to be used for total tolerance judgement) GO/NG signal output with optional I/O cable	
Input function	Trigger function: by means of key, timer or external TRG (with optional I/O cable) Data input frequency: Max. 9999 times (with 60 gauges connected) to 60000 times (with 6 gauges connected)	
Output function	Direct output to EXCEL spreadsheet, CSV file output (compatible with MeasurLink)	
Connectable items	Various Mitutoyo counters (those compatible with RS Link)	
Product requirement	Recommendation: PC/AT compatible machine; CPU: Pentium4 2GHz or higher; Memory: 256MB or more; Disk: 100MB or more; OS: Windows ME, 2000, XP	
Price	£450.00	£510.00

Currently supported languages: English, French, German, Spanish
User's manual: English

Litematic

SERIES 318 – High Resolution Measuring Unit

- The Litematic is designed for measuring easily-deformed workpieces and high-precision parts such as pin gauges, thin-wall bearings, plastic parts, and springs.
- Extra-low measuring force of 0.01N (1gf).
- Ceramic anvil is free from corrosion and easy to maintain.
- Includes SPC output.

Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	Refer to the list of specifications
Repeatability:	$\sigma = 0.05 \mu\text{m}$
Display unit:	8 digits and 14 mm character height
Stroke:	51.2 mm (using standard contact point)
Measuring force:	0.01N
Spindle feed speed:	2 mm/s, 4 mm/s, 8 mm/s
Length standard:	Photoelectric linear encoder
Contact point:	$\phi 3$ mm carbide ball
Power supply:	85 - 264V AC

Optional Accessories

936937:	SPC cable (1 m)	£32.90
965014:	SPC cable (2 m)	£39.10
101118:	Contact point, shell	£4.20
120066:	Contact point, $\phi 0.45$ mm needle (carbide)	£26.40
120059:	Contact point, $\phi 7.0$ mm spherical (carbide)	£47.00
120060:	Contact point, $\phi 10.5$ mm spherical (carbide)	£56.20
937179T:	Footswitch	£45.30
264-504-5E:	Digimatic mini-processor DP-1VR	£342.00
264-012-10:	Input tool (for USB port)	£191.00
02ADM270-2:	SENSORPAK (data capture software including I/O cable)	£510.00



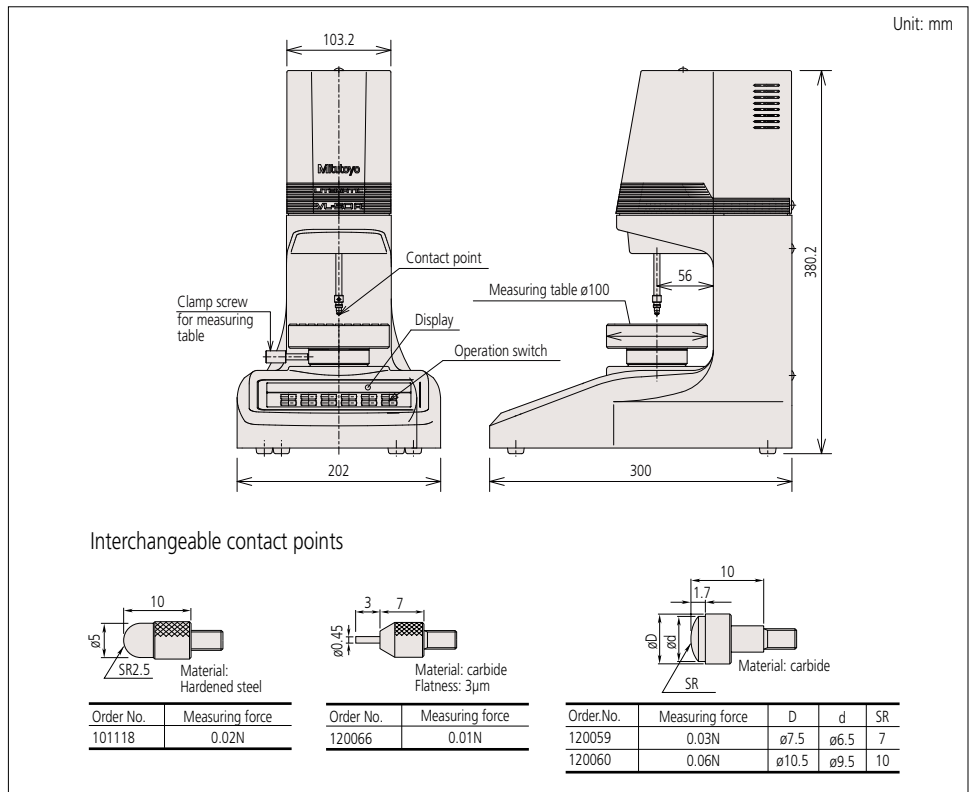
318-221E

SPECIFICATIONS

Code No.	Range	Resolution (switchable)	Accuracy (at 20°C±1°C)	Remarks	Price
318-221E	0-50 mm	0.01/0.1/1 μm , 0.5/5/50 μinch	(0.5+L/100) μm^*	Including $\phi 100$ mm grooved ceramic anvil	£4650.00

* L = measured length (mm)

DIMENSIONS

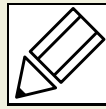


DP-1VR
(Digimatic output is to six significant figures)



Input tool

Quick Guide to Precision Measuring Instruments

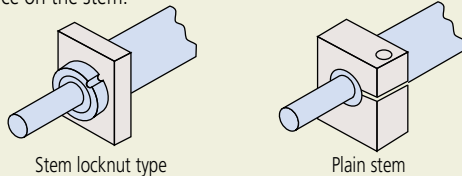


Linear Gauges

Head

Plain Stem and Stem with Clamp Nut

The stem used to mount a linear gauge head is classified as a "plain type" or "clamp nut type" as illustrated below. The clamp nut stem allows fast and secure clamping of the linear gauge head. The plain stem has the advantage of wider application and slight positional adjustment in the axial direction on final installation, although it does require a split-fixture clamping arrangement or adhesive fixing. However, take care so as not to exert excessive force on the stem.



Measuring Force

This is the force exerted on a workpiece during measurement by the contact point of a linear gauge head, at its stroke end, expressed in newtons.

Comparative Measurement

A measurement method where a workpiece dimension is found by measuring the difference in size between the workpiece and a master gauge representing the nominal workpiece dimension.

Ingress Protection Code

IP54 protection code

Type	Level	Description
Protects the human body and protects against foreign objects	5: Dust protected	Protection against harmful dust
Protects against exposure to water	4: Splash-proof type	Water splashing against the enclosure from any direction shall have no harmful effect.

IP66 protection code

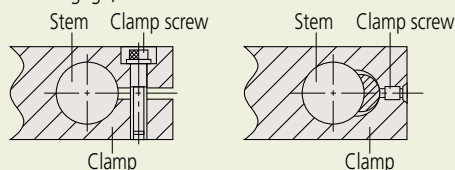
Type	Level	Description
Protection against contact with the human body and foreign objects	6: Dust tight	Protection from dust ingress Complete protection against contact
Protects against exposure to water	6: Water-resistant type	Water jets directed against the enclosure from any direction shall have no harmful effects.

Precautions in Mounting a Gauge Head

- Insert the stem of the gauge into the mounting clamp of a measuring unit or a stand and tighten the clamp screw.
- Notice that excessively tightening the stem can cause problems with spindle operation.
- Never use a mounting method in which the stem is clamped by direct contact with a screw.
- Never mount a linear gauge by any part other than the stem.
- Mount the gauge head so that it is in line with the intended direction of measurement. Mounting the head at an angle to this direction will cause an error in measurement.
- Exercise care so as not to exert a force on the gauge through the cable.

Precautions in Mounting a Laser Hologage

To fix the Laser Hologage, insert the stem into the dedicated stand or fixture.



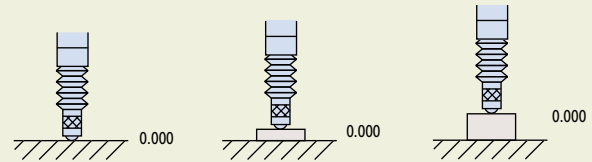
Recommended hole diameter on the fixing side: 15 mm +0.034/-0.014

- Machine the clamping hole so that its axis is parallel with the measuring direction. Mounting the gauge at an angle will cause a measuring error.
- When fixing the Laser Hologage, do not clamp the stem too tightly. Over-tightening the stem may impair the sliding ability of the spindle.
- If measurement is performed while moving the Laser Hologage, mount it so that the cable will not be strained and no undue force will be exerted on the gauge head.

Display Unit

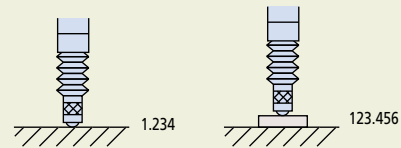
Zero-Setting

A display value can be set to 0 (zero) at any position of the spindle.



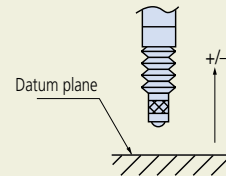
Presetting

Any numeric value can be set on the display unit for starting the count from this value.



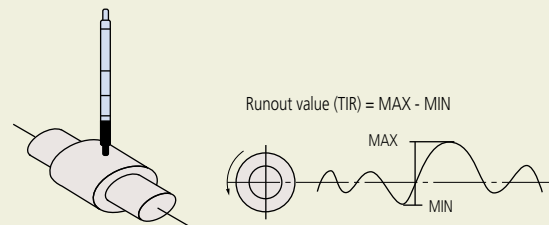
Direction Changeover

The measuring direction of the gauge spindle can be set to either plus (+) or minus (-) of count.



MAX, MIN, TIR Settings

The display unit can hold the maximum (MAX) and minimum (MIN) values, and MAX - MIN value during measurement.



Tolerance Setting

Tolerance limits can be set in various display units for automatically indicating if a measurement falls within those limits.

Open Collector Output

An external load, such as a relay or a logic circuit, can be driven from the collector output of an internal transistor which is itself controlled by a Tolerance Judgement result, etc.

Relay Output

Contact signal that outputs the open/closed status.

Digimatic Code

A communication protocol for connecting the output of measuring tools with various Mitutoyo data processing units. This allows output connection to a Digimatic Mini Processor DP-1VR for performing various statistical calculations and creating histograms, etc.

BCD Output

A system for outputting data in binary-coded decimal notation.

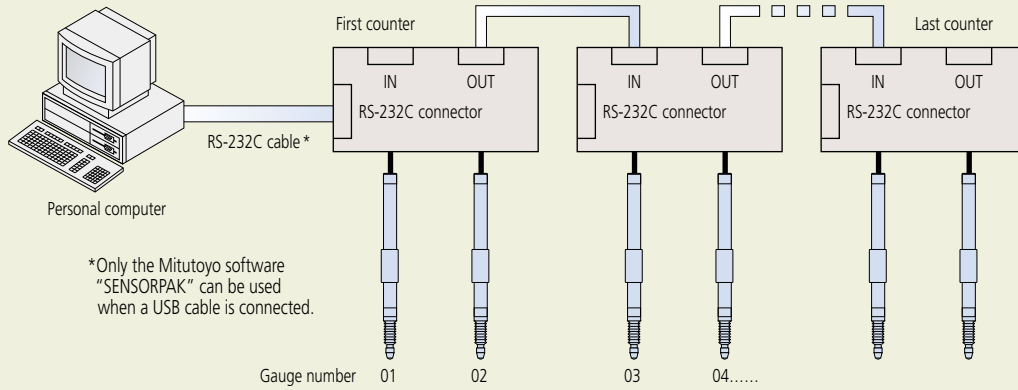
RS-232C Output

A serial communication interface in which data can be transmitted bi-directionally under the EIA Standards. For the transmission procedure, refer to the specifications of each measuring instrument.

RS Link Function Multi-point measurement can be performed by connecting multiple EH or EV counters with RS Link cables.

RS Link for EH Counter

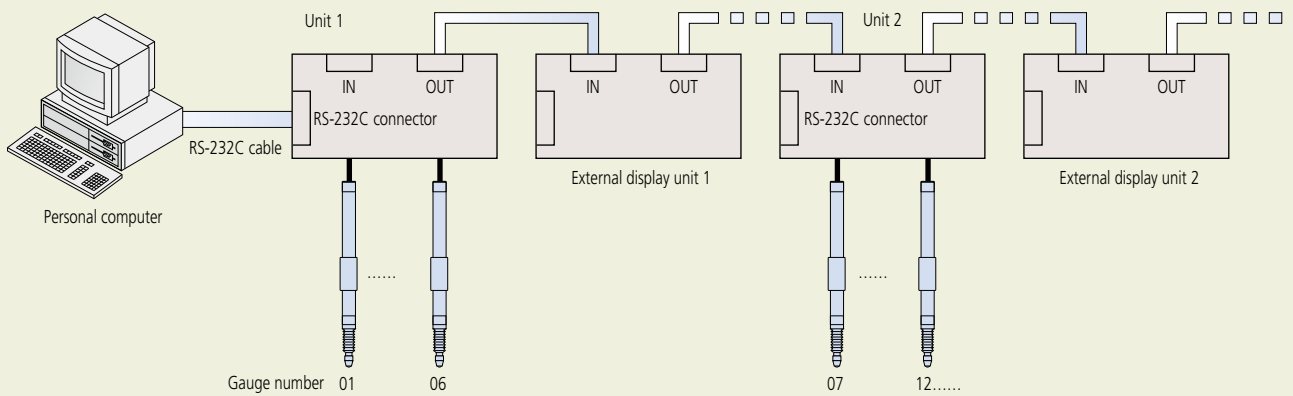
It is possible to connect a maximum of 10 counter units and handle up to 20 channels of multi-point measurement at a time. For this connection use a dedicated RS Link cable (**02ADD950**, 0.5 m; **936937**, 1 m; **965014**, 2 m). (The total length of RS Link cables permitted for the entire system is up to 10m.)



RS Link for EV Counter

It is possible to connect a maximum of 10* counter units and handle up to 60 channels of multi-point measurement at a time. For this connection use a dedicated RS Link cable (**02ADD950**, 0.5 m; **936937**, 1 m; **965014**, 2 m). (The total length of RS Link cables permitted for the entire system is up to 10 m.)

* The maximum number of counter units that can be connected is limited to 6 (six) if an EH counter is included in the chain.



Laser Scan Micrometers

SERIES 544 – LSM-902/6900 Ultra-High Accuracy Non-Contact Measuring System

- Suitable for pin and plug gauge measurements.
- Wide measuring range of $\varnothing 0.1$ to $\varnothing 25$ mm.
- Provides ultra-high accuracy of $\pm 0.5 \mu\text{m}$ over the entire measuring range and even better in the narrow range.
- Ultra-high repeatability of $\pm 0.05 \mu\text{m}$.



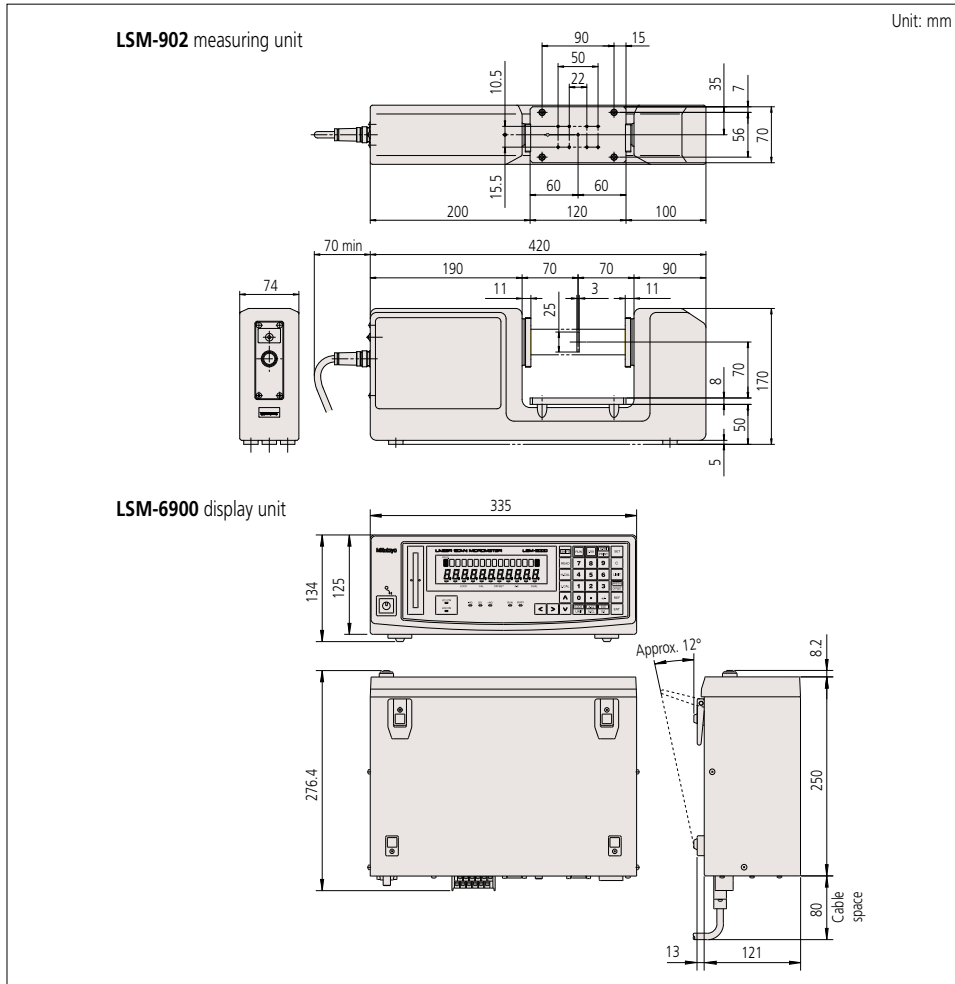
LSM-6900 display unit

LSM-902 measuring unit

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-496E	0.1 - 25 mm (.004 - 1")	0.00001 - 0.01 mm (.000001 - .0005")	£7060.00

DIMENSIONS



Technical Data

Accuracy at 20°C*	
Entire range:	$\pm 0.5 \mu\text{m}$
Narrow range:	$\pm (0.3 + 0.1 \Delta D) \mu\text{m}$
Repeatability ($\pm 2\sigma$):	$\pm 0.05 \mu\text{m}$
Positional error**:	$\pm 0.5 \mu\text{m}$
Measuring region:	3 x 25 mm
Laser wavelength:	650 nm, Visible
Scanning rate:	800 scans/s
Laser scanning speed:	56 m/s
Protection standard:	IEC
Main display:	16-digit fluorescent tube
Interface units equipped:	RS-232C, Analogue, I/O, Footswitch
Power supply:	100 - 240V AC $\pm 10\%$, 40VA, 50/60Hz

* At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece (mm).

** Potential measurement error due to variation in workpiece position within the measuring region.

Display Unit Functions

Zero-setting, preset, GO/NG judgement, multi-limit judgement, offset value setting, sample measurement, statistical calculation, group judgement, data output, workpiece position display, mm/inch switching, dual-gauge calibration, transparent object measurement, dual-unit measurement (optional), automatic measurement, abnormal data elimination.

Optional Accessories

- 02AGD180:** Calibration gauge set for LSM-902/6900
£405.00
- 02AGD270:** Workstage
£500.00
- 02AGD280:** Adjustable workstage
£1180.00
- 02AGD600A:** Thermal printer including 100V AC adapter
£611.00
- 02AGD600B:** Thermal printer including 120V AC adapter
£611.00
- 02AGD600C:** Thermal printer including 130V AC adapter
£611.00

SERIES 544 – LSM-500S Ultra-High Accuracy Non-Contact Measuring System

Technical Data

Accuracy at 20°C*: $\pm 0.3 \mu\text{m}$
 Repeatability ($\pm 2\sigma$): $\pm 0.03 \mu\text{m}$
 Positional error**: $\pm 0.4 \mu\text{m}$
 Measuring region: 1 x 2 mm
 Laser wavelength: 650 nm, Visible
 Scanning rate: 3200 scans/s
 Laser scanning speed: 76 m/s
 Protection standard: IEC, FDA

* At the centre of the measuring region.

** Potential measurement error due to variation in workpiece position within the measuring region.

Optional Accessories

02AGD110: Calibration gauge set ($\varnothing 0.1 \text{ mm}$, $\varnothing 2.0 \text{ mm}$)
£330.00

02AGD200: Wire guiding pulley
£263.00

02AGD220: Air shield
£545.00

957608: Air cleaner for air shield
£650.00

02AGN780A: Extension signal cable 5 m
£118.00

02AGN780B: Extension signal cable 10 m
£156.00

02AGN780C: Extension signal cable 15 m
£189.00

- Permits measurements starting from $\varnothing 5 \mu\text{m}$.
- Provides ultra-high accuracy of $\pm 0.3 \mu\text{m}$ over the entire measuring range (5 μm to 2 mm).
- Ultra-high repeatability of $\pm 0.03 \mu\text{m}$.

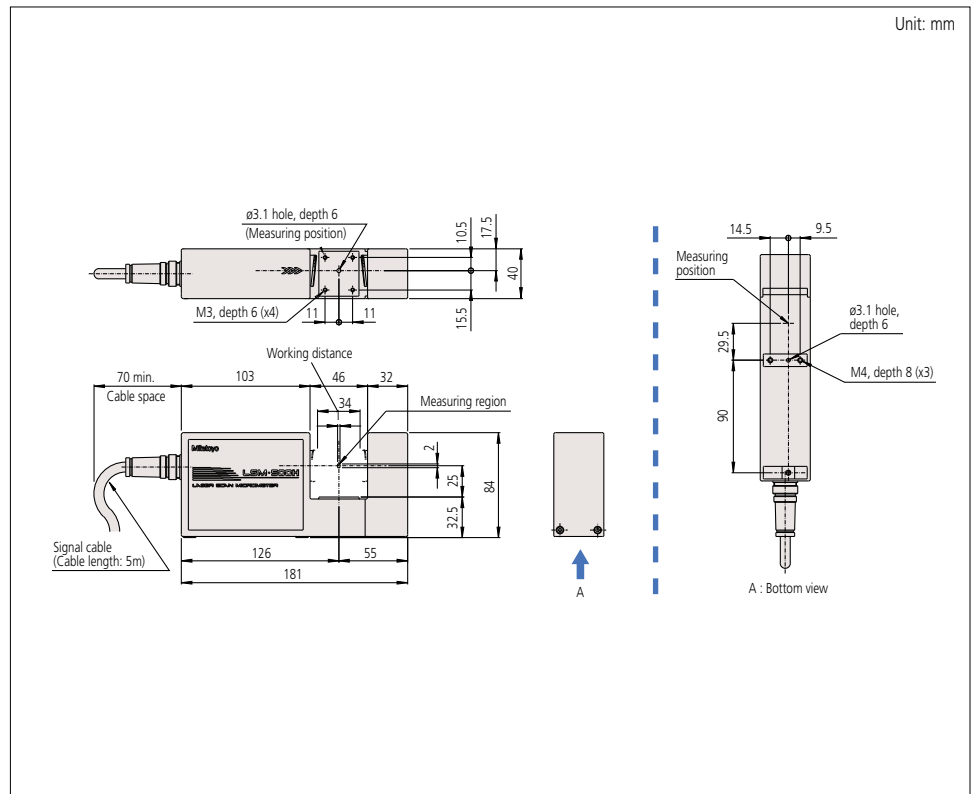


544-532

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-532	0.005 - 2 mm (.0002 - .08")	0.00001 - 0.01 mm (.000001 - .0005")	£5210.00

DIMENSIONS



Laser Scan Micrometers

SERIES 544 – LSM-501S Ultra-High Accuracy Non-Contact Measuring System

- Provides ultra-high accuracy of $\pm 0.5 \mu\text{m}$ over the entire measuring range (0.05 mm to 10 mm) and even better in the narrow range.
- Ultra-high repeatability of $\pm 0.04 \mu\text{m}$.

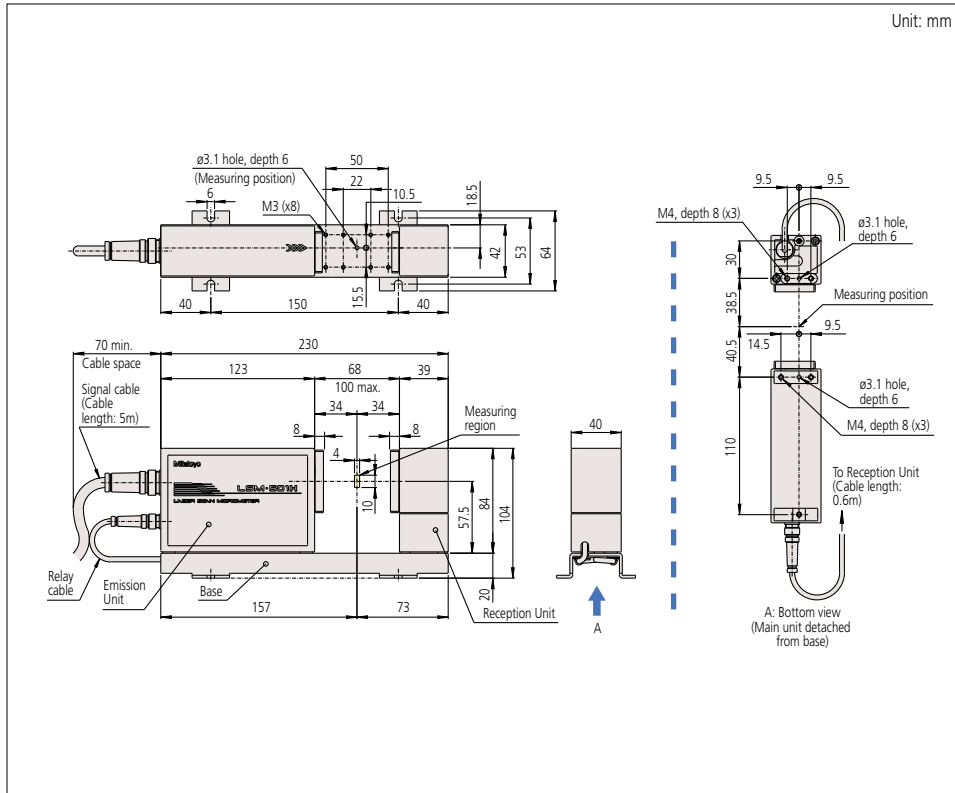


544-534

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-534	0.05 - 10 mm (.002 - .04")	0.00001 - 0.01 mm (.000001 - .0005")	£4520.00

DIMENSIONS



Technical Data

Accuracy at 20°C*

Entire range:	$\pm 0.5 \mu\text{m}$
Narrow range:	$\pm(0.3+0.1\Delta D) \mu\text{m}$
Repeatability ($\pm 2\sigma$):	$\pm 0.04 \mu\text{m}$
Positional error**:	$\pm 0.5 \mu\text{m}$
Measuring region:	2 x 10 mm ($\phi 0.05 - \phi 0.1$ mm) 4 x 10 mm ($\phi 0.1 - \phi 10$ mm)
Laser wavelength:	650 nm, Visible
Scanning rate:	3200 scans/s
Laser scanning speed:	113 m/s
Protection standard:	IEC, FDA

* At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece.

** Potential measurement error due to variation in workpiece position within the measuring region.

Optional Accessories

- 02AGD120:** Calibration gauge set ($\phi 0.1$ mm, $\phi 10$ mm) **£330.00**
 - 02AGD210:** Wire guiding pulley **£278.00**
 - 02AGD400:** Adjustable workstage **£1100.00**
 - 02AGD440:** Centre support* **£394.00**
 - 02AGD450:** Adjustable V-block* **£471.00**
 - 02AGD230:** Air shield **£323.00**
 - 957608:** Air cleaner for air shield **£650.00**
 - 02AGC150A:** Extension relay cable 1 m **£73.00**
 - 02AGN780A:** Extension signal cable 5 m **£118.00**
 - 02AGN780B:** Extension signal cable 10 m **£156.00**
 - 02AGN780C:** Extension signal cable 15 m **£189.00**
- * Use with an adjustable workstage.

SERIES 544 – LSM-503S Ultra-High Accuracy Non-Contact Measuring System

Technical Data

Accuracy at 20°C*

Entire range:	±1.0 µm
Narrow range:	±(0.6+0.1ΔD) µm
Repeatability (±2σ):	±0.11 µm
Positional error**:	±1.5 µm
Measuring region:	10 x 30 mm
Laser wavelength:	650 nm, Visible
Scanning rate:	3200 scans/s
Laser scanning speed:	226 m/s
Protection standard:	IEC, FDA

* At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece.

** Potential measurement error due to variation in workpiece position within the measuring region.

Optional Accessories

02AGD130:	Calibration gauge set (ø1 mm, ø30 mm) £366.00
02AGD490:	Adjustable workstage £1670.00
02AGD440:	Centre support* £394.00
02AGD450:	Adjustable V-block* £471.00
02AGD240:	Air shield £545.00
957608:	Air cleaner for air shield £650.00
02AGC150A:	Extension relay cable 1 m £73.00
02AGC150B:	Extension relay cable 3 m £77.80
02AGC150C:	Extension relay cable 5 m £82.70
02AGN780A:	Extension signal cable 5 m £118.00
02AGN780B:	Extension signal cable 10 m £156.00
02AGN780C:	Extension signal cable 15 m £189.00
02AGN780D:	Extension signal cable 20 m £267.00

* Use with an adjustable workstage.

- General-purpose type with a measuring range of 0.3 mm to 30 mm.
- Provides ultra-high accuracy of ±1.0 µm over the entire measuring range and even better in the narrow range.
- Excellent repeatability of ±0.1 µm.

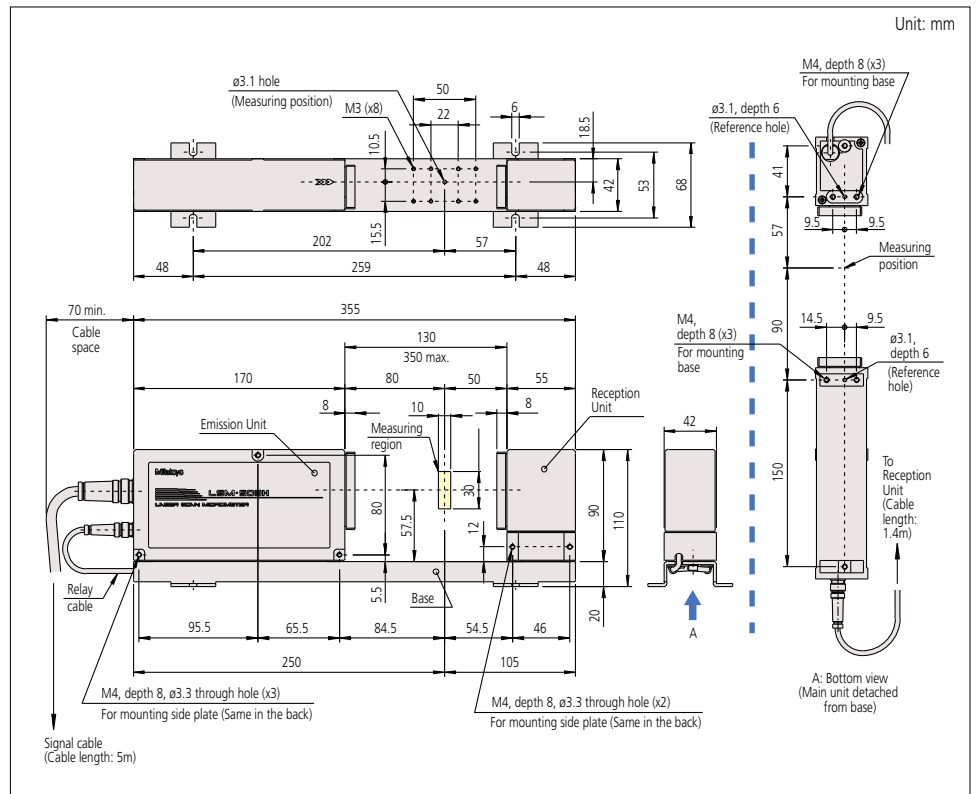


544-536

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-536	0.3 - 30 mm (.012 - 1.18")	0.00002 - 0.1 mm (.000001 - .005")	£4750.00

DIMENSIONS



Laser Scan Micrometers

SERIES 544 – LSM-506S High Accuracy Non-Contact Measuring System

- General-purpose type with a measuring range of 1 mm to 60 mm.
- Provides high accuracy of $\pm 3.0 \mu\text{m}$ over the entire measuring range and even better in the narrow range.
- Excellent repeatability of $\pm 0.36 \mu\text{m}$.

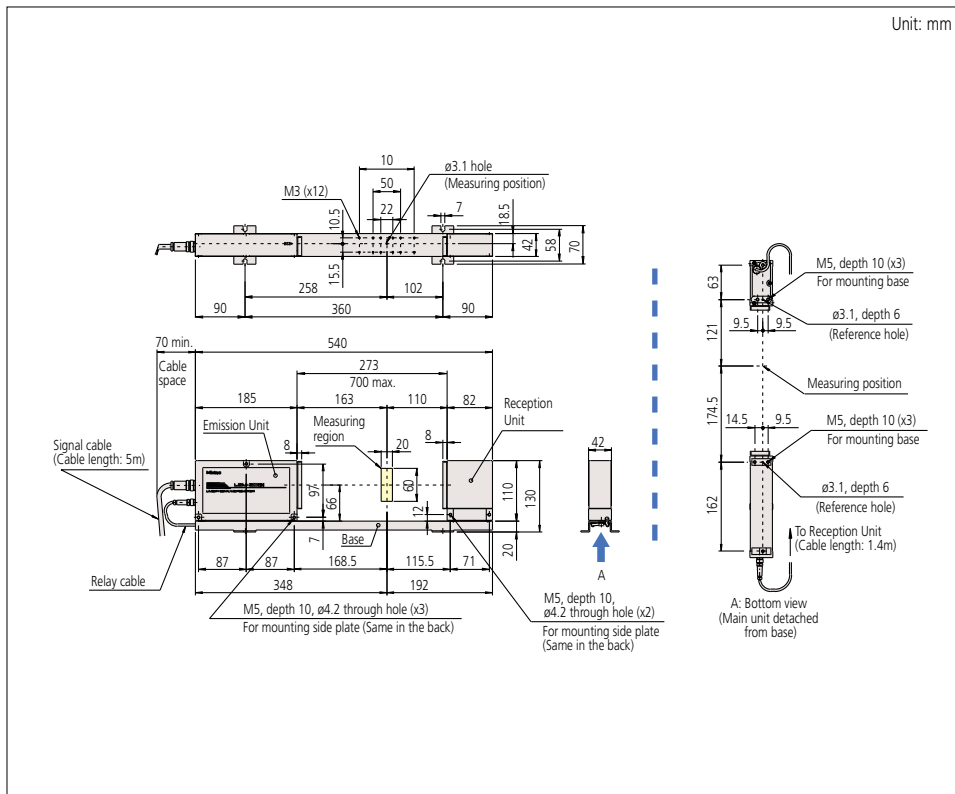


544-538

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-538	1 - 60 mm (.04 - 2.36")	0.00005 - 0.1 mm (.000002 - .005")	£6460.00

DIMENSIONS



Technical Data

Accuracy at 20°C*

- Entire range: $\pm 3 \mu\text{m}$
- Narrow range: $\pm (1.5 + 0.5\Delta D) \mu\text{m}$
- Repeatability ($\pm 2\sigma$): $\pm 0.36 \mu\text{m}$
- Positional error**: $\pm 4 \mu\text{m}$
- Measuring region: 20 x 60 mm
- Laser wavelength: 650 nm, Visible
- Scanning rate: 3200 scans/s
- Laser scanning speed: 452 m/s
- Protection standard: IEC, FDA

* At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece.

** Potential measurement error due to variation in workpiece position within the measuring region.

Optional Accessories

- 02AGD140:** Calibration gauge set ($\phi 1 \text{ mm}$, $\phi 60 \text{ mm}$) **£403.00**
- 02AGD520:** Adjustable workstage **£2940.00**
- 02AGD580:** Centre support* **£513.00**
- 02AGD590:** Adjustable V-block* **£537.00**
- 02AGD250:** Air shield **£751.00**
- 957608:** Air cleaner for air shield **£650.00**
- 02AGC150A:** Extension relay cable 1 m **£73.00**
- 02AGC150B:** Extension relay cable 3 m **£77.80**
- 02AGC150C:** Extension relay cable 5 m **£82.70**
- 02AGN780A:** Extension signal cable 5 m **£118.00**
- 02AGN780B:** Extension signal cable 10 m **£156.00**
- 02AGN780C:** Extension signal cable 15 m **£189.00**
- 02AGN780D:** Extension signal cable 20 m **£267.00**

* Use with an adjustable workstage.

SERIES 544 – LSM-512S High Accuracy Non-Contact Measuring System

Technical Data

Accuracy at 20°C*

Entire range:	±6 μm
Narrow range:	±(4.0+0.5Δ) μm
Repeatability (±2σ):	±0.8 μm
Positional error**:	±8 μm
Measuring region:	30 x 120 mm
Laser wavelength:	650 nm, Visible
Scanning rate:	3200 scans/s
Laser scanning speed:	904 m/s
Protection standard:	IEC, FDA

* At the centre of the measuring region. ΔΔ = Difference in diameter between the master gauge and workpiece.

** Potential measurement error due to variation in workpiece position within the measuring region.

Optional Accessories

02AGD150:	Calibration gauge set (ø20 mm, ø120 mm) £900.00
02AGD260:	Air shield £855.00
957608:	Air cleaner for air shield £650.00
02AGC150A:	Extension relay cable 1 m £73.00
02AGC150B:	Extension relay cable 3 m £77.80
02AGC150C:	Extension relay cable 5 m £82.70
02AGN780A:	Extension signal cable 5 m £118.00
02AGN780B:	Extension signal cable 10 m £156.00
02AGN780C:	Extension signal cable 15 m £189.00
02AGN780D:	Extension signal cable 20 m £267.00

- General-purpose type with a measuring range of 1 mm to 120 mm.
- Provides high accuracy of ±6.0 μm over the entire measuring range and even better in the narrow range.
- Excellent repeatability of ±0.8 μm.

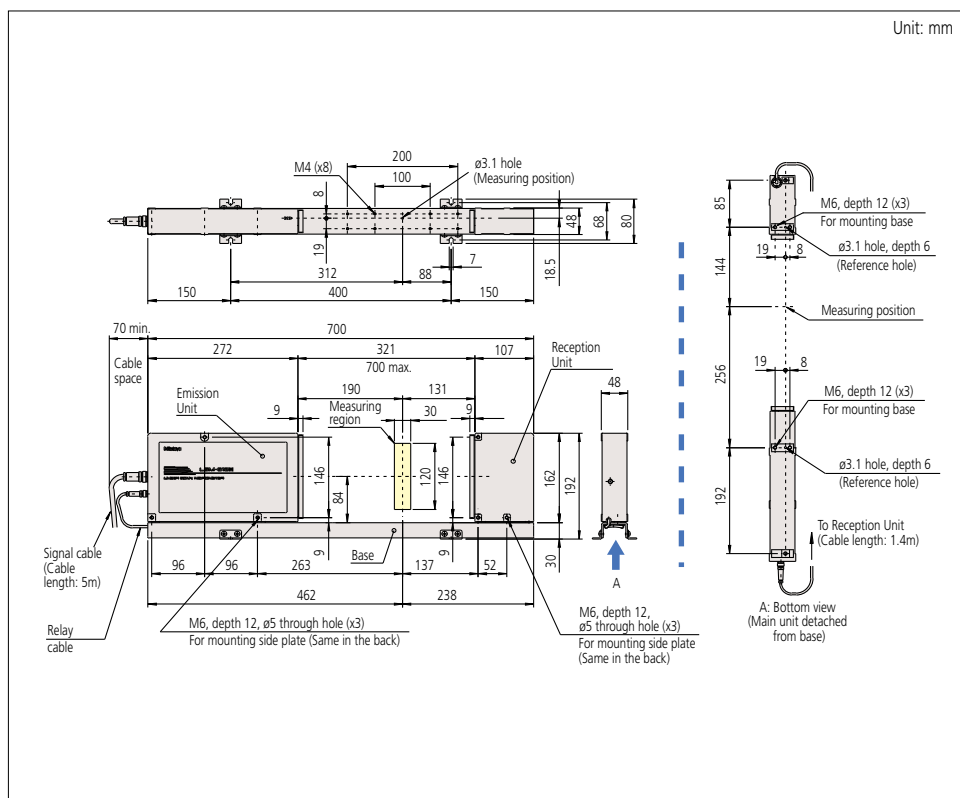


544-540

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-540	1 - 120 mm (.04 - 4.72")	0.0001 - 0.1 mm (.000005 - .005")	£8850.00

DIMENSIONS



Laser Scan Micrometers

SERIES 544 – LSM-516S High Accuracy Non-Contact Measuring System

- General-purpose type with a measuring range of 1 mm to 160 mm.
- Provides high accuracy of $\pm 7.0 \mu\text{m}$ over the entire measuring range and even better in the narrow range.
- Excellent repeatability of $\pm 1.4 \mu\text{m}$.

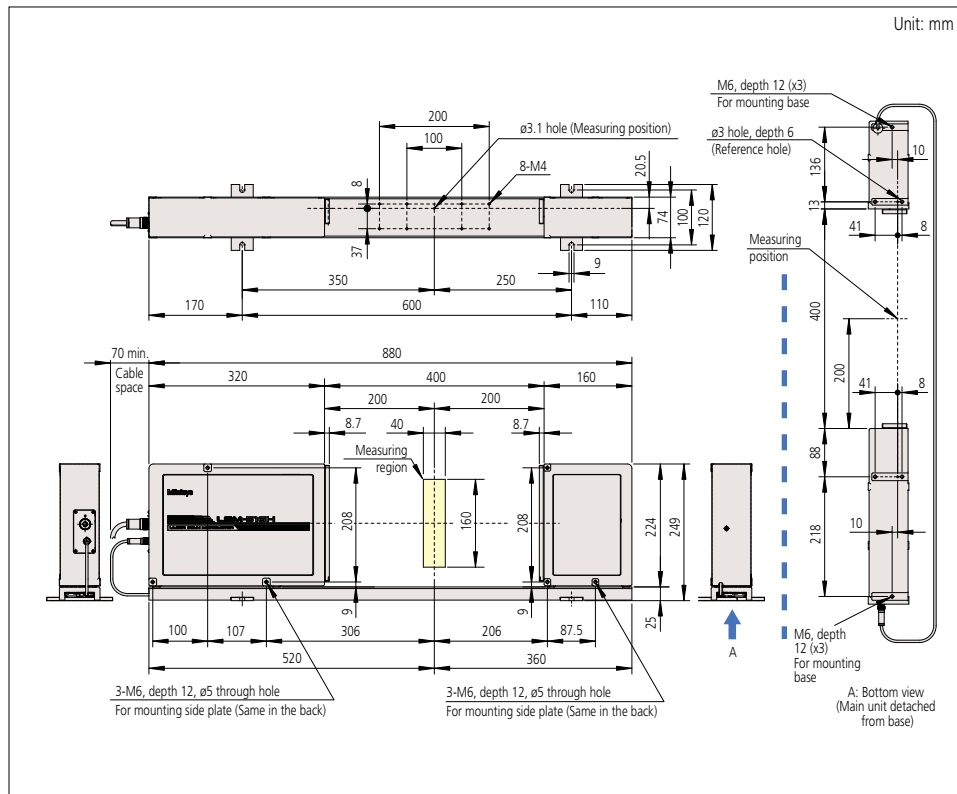


544-542

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-542	1 - 160 mm (.04 - 6.3")	0.0001 - 0.1 mm (.000005 - .005")	£12650.00

DIMENSIONS



Technical Data

Accuracy at 20°C*

Entire range: $\pm 7 \mu\text{m}$
 Narrow range: $\pm(4.0+2.0\Delta D) \mu\text{m}$

Repeatability ($\pm 2\sigma$): $\pm 1.4 \mu\text{m}$

Positional error**: $\pm 8 \mu\text{m}$

Measuring region: 40 x 160 mm

Laser wavelength: 650 nm, visible

Scanning rate: 3200 scans/s

Laser scanning speed: 1206 m/s

Protection standard: IEC, FDA

* At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece.

** Potential measurement error due to variation in workpiece position within the measuring region.

Optional Accessories

- 02AGM300:** Calibration gauge set ($\phi 20$ mm, $\phi 160$ mm) **£1160.00**
- 02AGC150A:** Extension relay cable 1 m **£73.00**
- 02AGC150B:** Extension relay cable 3 m **£77.80**
- 02AGC150C:** Extension relay cable 5 m **£82.70**
- 02AGN780A:** Extension signal cable 5 m **£118.00**
- 02AGN780B:** Extension signal cable 10 m **£156.00**
- 02AGN780C:** Extension signal cable 15 m **£189.00**
- 02AGN780D:** Extension signal cable 20 m **£267.00**

SERIES 544 – LSM-9506 Bench Top Type Non-Contact Measuring System

Technical Data

Accuracy at 20°C*:	±2.5 µm
Repeatability (±2σ):	±0.6 µm
Positional error**:	±2.5 µm
Measuring region:	10 x 60 mm
Laser wavelength:	650 nm, Visible
Scanning rate:	1600 scans/s
Laser scanning speed:	226 m/s
Protection standard:	IEC
Main display:	16-digit fluorescent tube
Interface units equipped:	RS-232C, SPC, Footswitch
Power supply:	100 - 240V AC±10%, 40VA, 50/60Hz

* At the centre of the measuring region.

** Potential measurement error due to variation in workpiece position within the measuring region.

Functions

Zero-setting, preset, GO/±NG judgement, multi-limit judgement, offset value setting, sample measurement, statistical calculation, group judgement, data output, workpiece position display, mm/inch switching, dual-gauge calibration, transparent object measurement, automatic measurement, abnormal data elimination.

- Measurement system and display integrated into a single unit for easy bench-top inspection.
- A statistical calculation function is provided.
- RS-232C interface and SPC output interface included as standard.

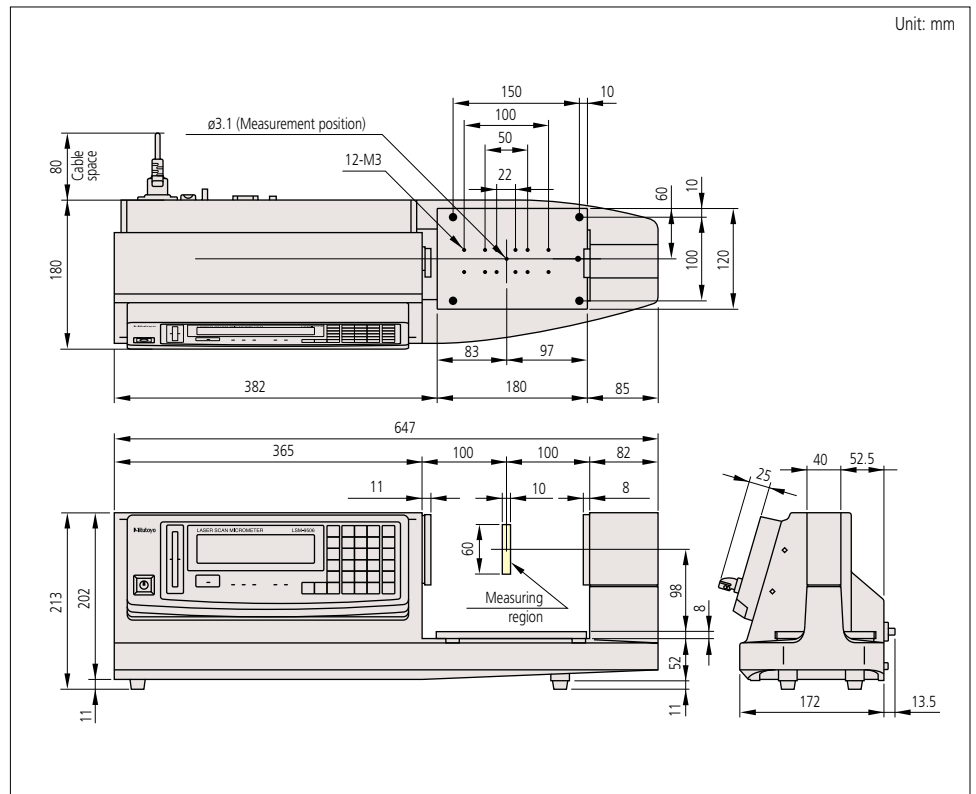


544-116E

SPECIFICATIONS

Code No.	Range	Resolution (selectable)	Price
544-116E	0.5 - 60 mm (.02 - 2.36")	0.00005 - 0.1 mm (.000002 - .005")	£7750.00

DIMENSIONS



Laser Scan Micrometers

SERIES 544 – LSM-6200 Standard Display Unit for Laser Scan Micrometer

- Setup values can be continuously monitored with this dual-display design. Simultaneous display of two measurement values is also possible.
- Either the segment measurement (7 segments maximum) or edge measurement (1 to 255 edges) can be selected.
- Includes RS-232C and I/O and analogue interface capabilities.
- Includes statistical calculation and abnormal data elimination functions.

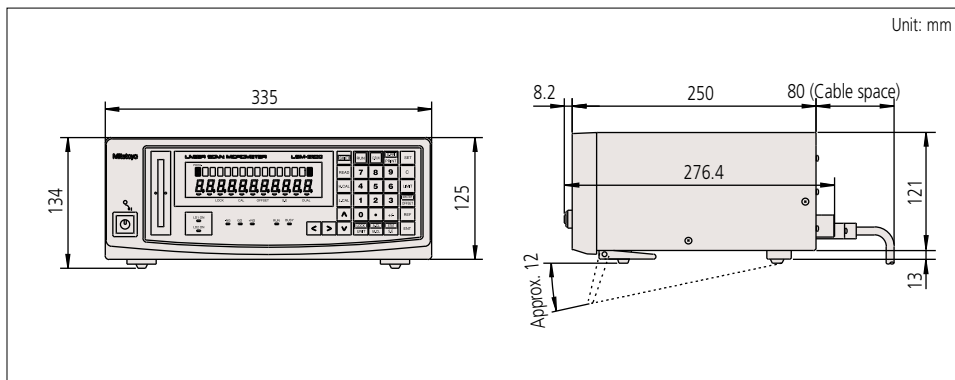


544-072E

SPECIFICATIONS

Code No.	544-072E
Price	£2040.00

DIMENSIONS



Technical Data

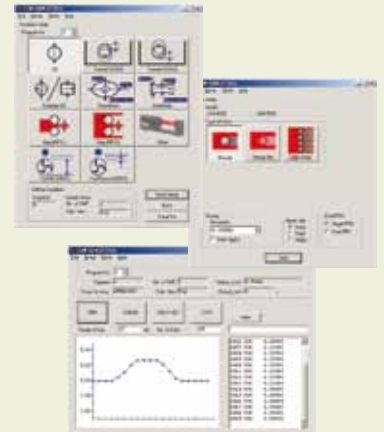
Main display:	16-digit fluorescent tube
Interface units equipped:	RS-232C, Analogue, I/O, Footswitch
Power supply:	100 - 240V AC±10%, 40VA, 50/60Hz

Functions

Zero-setting, preset, GO/±NG judgement, multi-limit judgement, offset value setting, sample measurement, statistical calculation, group judgement, data output, workpiece position display, mm/inch switching, dual-gauge calibration, transparent object measurement, dual-unit measurement (optional), automatic measurement, abnormal data elimination.

QUICKTOOL

QUICKTOOL is a free software tool that makes LSM-5200 key-operated settings simple and easy. Please contact your local Mitutoyo office for details. Note that QUICKTOOL for LSM-6200 and QUICKTOOL for LSM-5200 are incompatible.













Optional Accessories

For Laser Scan Micrometers

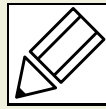
Optional Accessories

02AGD110:	£330.00
02AGD120:	£330.00
02AGD180:	£405.00
02AGD130:	£366.00
02AGD140:	£403.00
02AGD150:	£900.00
02AGM300:	£1160.00
02AGD170:	£415.00
02AGP150:	£905.00
02AGC840:	£60.80
02AGC880:	£487.00
02AGC910:	£342.00
02AGC940:	£500.00
02AGN780A:	£118.00
02AGN780B:	£156.00
02AGN780C:	£189.00
02AGN780D:	£267.00
02AGC150A:	£73.00
02AGC150B:	£77.80
02AGC150C:	£82.70
936937:	£32.90
937179T:	£45.30
02AGD270:	£500.00
02AGD400:	£1100.00
02AGD280:	£1180.00
02AGD490:	£1670.00
02AGD520:	£2940.00
02AGD370:	£1360.00
02AGD680:	£2690.00
02AGD440:	£394.00
02AGD580:	£513.00
02AGD450:	£471.00
02AGD590:	£537.00
02AGD200:	£263.00
02AGD210:	£278.00
02AGD220:	£545.00
02AGD230:	£323.00
02AGD240:	£545.00
02AGD250:	£751.00
02AGD260:	£855.00
957608:	£650.00
02AGD600C:	£611.00

Appearance	Code No.	Description	Application
	02AGD110 02AGD120 02AGD180 02AGD130 02AGD140 02AGD150 02AGM300 02AGD170	Calibration gauge set Calibration gauge set Calibration gauge set Calibration gauge set Calibration gauge set Calibration gauge set Calibration gauge set Calibration gauge set	LSM-500S LSM-501S LSM-902 LSM-503S LSM-506S LSM-512S LSM-516S LSM-9506
	02AGP150	Dual-type add-on unit	LSM-6200
	02AGC840 02AGC880 02AGC910 02AGC940	Digimatic (SPC) code out unit 2nd I/O & analogue interface unit BCD interface unit GP-IB interface unit	LSM-6200/6900 LSM-6200/6900 LSM-6200/6900 LSM-6200/6900
	02AGN780A 02AGN780B 02AGN780C 02AGN780D 02AGC150A 02AGC150B 02AGC150C	Extension signal cable (5 m) Extension signal cable (10 m) Extension signal cable (15 m) Extension signal cable (20 m) Extension relay cable (1 m) Extension relay cable (3 m) Extension relay cable (5 m)	Any model of LSM* Any model of LSM* Any model of LSM* Any model of LSM* Any model of LSM** Any model of LSM** Any model of LSM**
	936937	SPC cable (1 m)	LSM-6200/6900/9506
	937179T	Footswitch	LSM-6200/6900/9506
	02AGD270 02AGD400 02AGD280 02AGD490 02AGD520 02AGD370 02AGD680 02AGD440 02AGD580 02AGD450 02AGD590	Workstage Adjustable workstage Adjustable workstage Adjustable workstage Adjustable workstage Adjustable workstage Adjustable workstage Centre support Centre support Adjustable V-block Adjustable V-block	LSM-501S/503S/902 LSM-501S LSM-902 LSM-503S LSM-506S LSM-9506 LSM-9506 LSM-501S/503S/902 LSM-506S/9506 LSM-501S/503S/902 LSM-506S/9506
	02AGD200 02AGD210	Wire guiding pulley Wire guiding pulley	LSM-500S LSM-501S
	02AGD220 02AGD230 02AGD240 02AGD250 02AGD260 957608	Air shield Air shield Air shield Air shield Air shield Air cleaner	LSM-500S LSM-501S LSM-503S LSM-506S LSM-512S Any model of LSM
	02AGD600C	Thermal printer (240V AC)	Any model of LSM

* Except for LSM-902
** Except LSM-500S/902

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 cable 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 ENIEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.

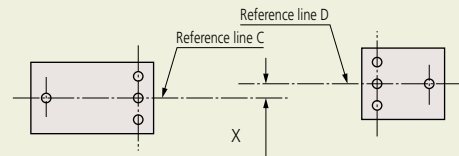


Re-Assembly after Removal from the Base

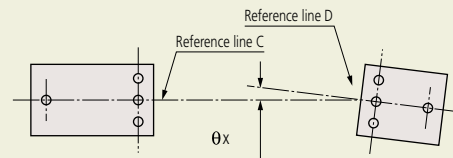
Observe the following limits when re-assembling the emission unit and reception unit to minimize measurement errors due to misalignment of the laser's optical axis with the reception unit.

Alignment within the horizontal plane

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

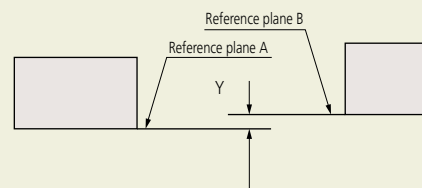


- b. Angle between reference lines C and D: θ_x (angle)

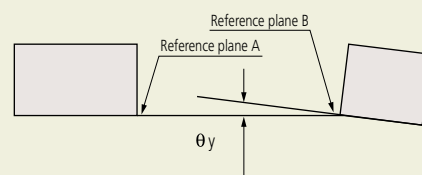


Alignment within the vertical plane

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



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

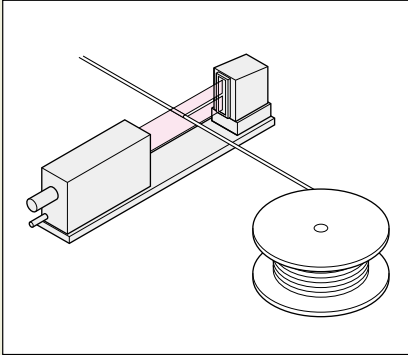


Allowable limits of optical axis misalignment

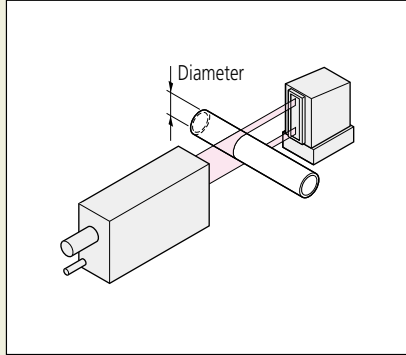
Model	Distance between Emission Unit and Reception Unit	X and Y	θ_x and θ_y
LSM-501S	68 mm (2.68") or less	within 0.5 mm (.02")	within 0.4' (7mrad)
	100 mm (3.94") or less	within 0.5 mm (.02")	within 0.3' (5.2mrad)
LSM-503S	130 mm (5.12") or less	within 1 mm (.04")	within 0.4' (7mrad)
	350 mm (13.78") or less	within 1 mm (.04")	within 0.16' (2.8mrad)
LSM-506S	273 mm (10.75") or less	within 1 mm (.04")	within 0.2' (3.5mrad)
	700 mm (27.56") or less	within 1 mm (.04")	within 0.08' (1.4mrad)
LSM-512S	321 mm (12.64") or less	within 1 mm (.04")	within 0.18' (3.6mrad)
	700 mm (27.56") or less	within 1 mm (.04")	within 0.08' (1.4mrad)
LSM-516S	800 mm (31.50") or less	within 1 mm (.04")	within 0.09' (1.6mrad)

Measurement Examples

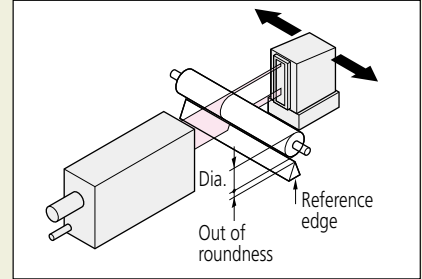
On-line measurement of glass fibre or thin wire diameter



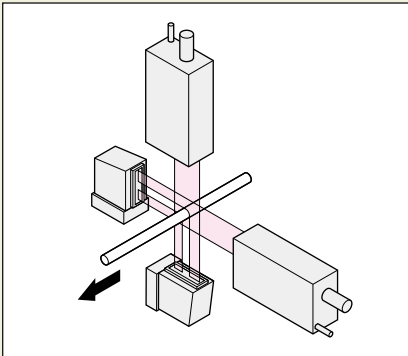
Measurement of outer diameter of cylinder



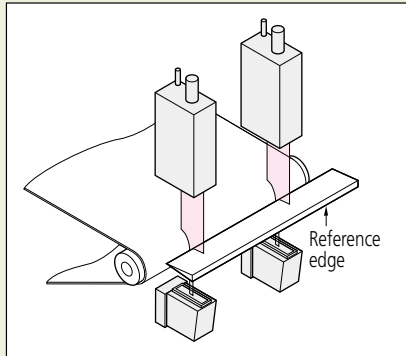
Measurement of outer diameter and roundness of cylinder



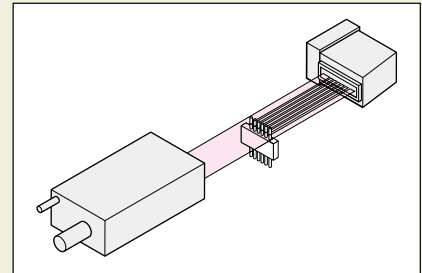
X- and Y-axis measurement of electric cables and fibres



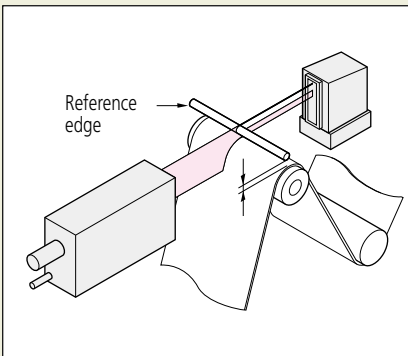
Measurement of thickness of film and sheet



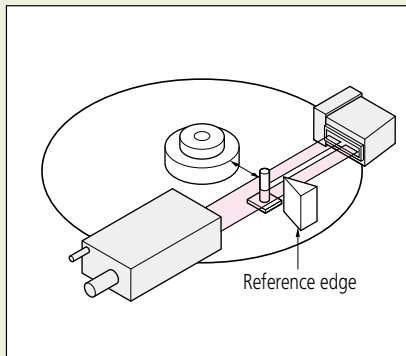
Measurement of spacing of IC chip leads



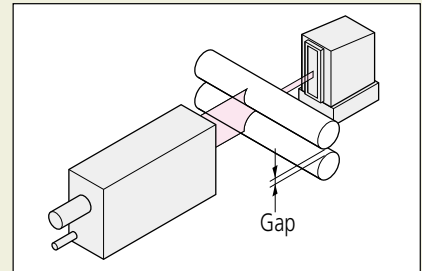
Measurement of film sheet thickness



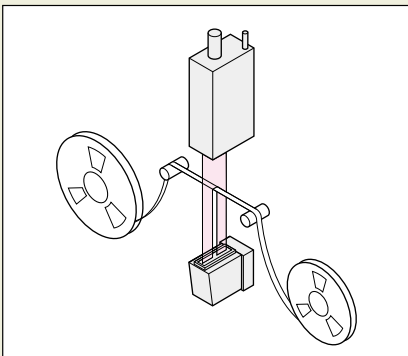
Measurement of laser disc and magnetic disc head movement



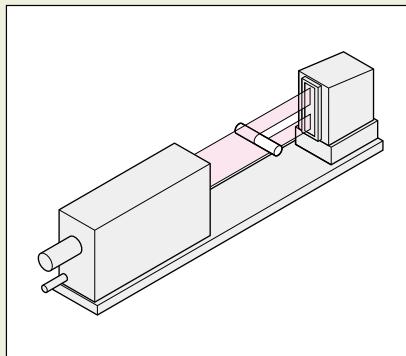
Measurement of gap between rollers



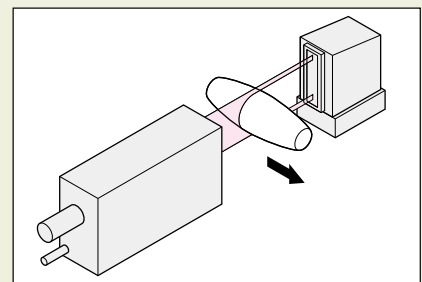
Measurement of tape width



Measurement of outer diameter of optical connector ferrule



Measurement of form



Dual system for measuring a large outside diameter

