

# Interchangeable Rod Type Inside Micrometer

## Safety Precautions

To ensure operator safety, use this product according to the directions, functions and specifications given in this User's Manual.

Use under other conditions may compromise safety.

**CAUTION** Shows risks that could result in minor or moderate injury.

Always handle the sharp measuring faces of this product with care to avoid injury.

**NOTICE** Shows risks that could result in property damage.

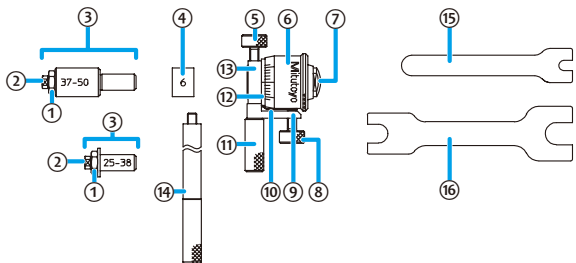
- Do not use this product for purposes other than measurement.
- Do not disassemble or modify. Doing so will void the warranty.
- Do not use or store the product in a place with sudden temperature changes. Adapt the product to ambient temperature before use.
- Do not store the product in a place with high humidity or a lot of dust.
- Do not use the product in a place where it may contact water, etc.
- Do not apply excessive force or subject to sudden impacts such as dropping.
- Remove dust, cutting chips, etc. and apply anti-rust oil after use.
- Remove any dirt on the product by wiping gently with a soft non-linty cloth. Do not use organic solvents such as cleaning agents or thinner.
- Do not write numbers, etc. with an electric pen.
- Do not move or dangle the product while it is still set on the workpiece.

## Contents

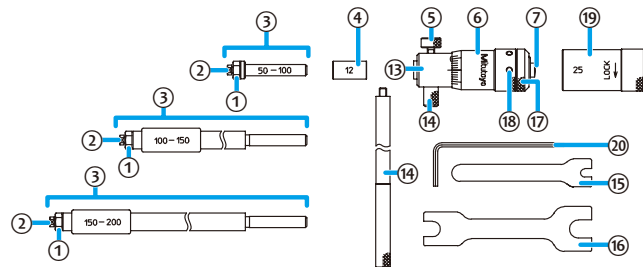
1.Names of Components .....	Page 1
2.Precautions for Use .....	Page 1
3.Selecting Interchangeable Rods and Extension Collars(Extension Rods) .....	Page 1
4.Mounting/Removing Interchangeable Rods and Extension Collars(Extension Rods)...	Page 2
5.Reference Point Setting .....	Page 2
6.Measurement Method .....	Page 2
7.How to Read Graduations .....	Page 2
8.Specifications .....	Page 2
9.Paid Maintenance .....	Page 2

## 1.Names of Components

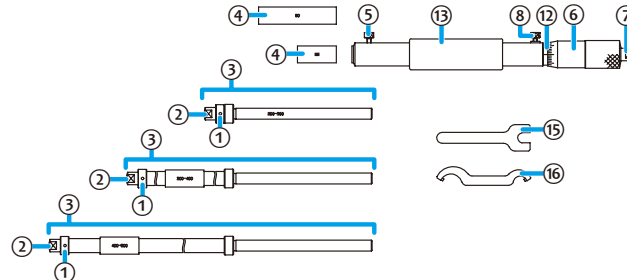
### IMS-T Type (141-101, -102, -103, -104)



### IMS-D Type (141-205, -206, -208, -233, -211, -212, -214, -215)



### IMS-L Type (141-117, -118, -121, -122)

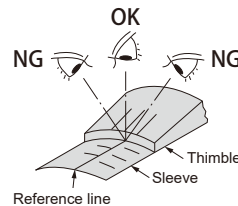


- |                                   |                               |                 |
|-----------------------------------|-------------------------------|-----------------|
| ① Adjustment nut                  | ⑦ Anvil                       | ⑭ Handle        |
| ② Adjustment anvil                | ⑧ Clamp (for thimble/plunger) | ⑮ Wrench        |
| ③ Interchangeable rod             | ⑨ Arm                         | ⑯ Wrench        |
| ④ Extension collars               | ⑩ Plate spring                | ⑰ Cap           |
| ⑤ Clamp (for interchangeable rod) | ⑪ Handle (small)              | ⑱ Extension rod |
| ⑥ Thimble                         | ⑫ Sleeve                      | ⑳ Wrench        |
|                                   | ⑬ Body                        |                 |

## 2.Precautions for Use

### Parallax

- Because of the structure of the product, the reference line surface on the sleeve and the graduation line surface on the thimble are not on the same plane, so the point where the two lines meet will deviate depending on the position of your eyes. When reading measured values, do so with reference to the figure at right, perpendicular from the point where the reference line on the sleeve is aligned with the graduation line on the thimble.
- If looking from a different direction (as in the figure at right), there will be a parallax of roughly 2 μm.



### Precautions for Measurement

- This product, which is not equipped with a constant pressure device, is configured with heavier operation than normal outside micrometers. The interior hydraulic oil will increase in viscosity if used in low temperatures or left unused for a long time, and operation may feel heavier. In this case, operate the thimble at full stroke several times to recover normal operation.

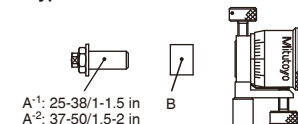
### Precautions and Cleaning after Use

- After use, clean the entire product with a soft, non-linty cloth and check that none of the parts are damaged.
- When oil, cutting fluid, or liquid itself is adhered, or when very dirty, clean with a soft, non-linty cloth impregnated with a volatile solvent (cleaning alcohol, etc.).
- After use, apply anti-rust treatment to the anvil, using Microil (Part No. 207000).
- If using in places exposed to water-based cutting fluid, always apply anti-rust treatment after cleaning.
- If Microil is unavailable and the only option is a commercial product, we recommend low-viscosity anti-rust oil of ISO VG10 or so.

## 3.Selecting Interchangeable Rods and Extension Collars(Extension Rods)

Assemble with interchangeable rod A, extension collars B, and/or extension rod C (IMS-D only) in accordance with workpiece length.

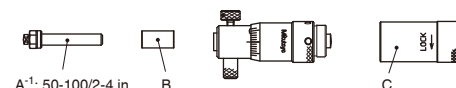
### IMS-T Type



A<sup>1</sup>: 25-38/1-1.5 in  
A<sup>2</sup>: 37-50/1.5-2 in

Workpiece length	Combination
25-32 mm/1-1.25 in	A <sup>1</sup>
31-38 mm/1.25-1.5 in	A <sup>1</sup> +B
37-44 mm/1.5-1.75 in	A <sup>2</sup>
43-50 mm/1.75-2 in	A <sup>2</sup> +B

### IMS-D Type

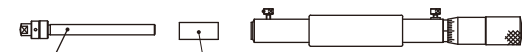


A<sup>1</sup>: 50-100/2-4 in  
A<sup>2</sup>: 100-150/4-6 in  
A<sup>3</sup>: 150-200/6-8 in  
A<sup>4</sup>: 200-250/8-10 in  
A<sup>5</sup>: 250-300/10-12 in

Workpiece length	Combination
50-63 mm/2-2.5 in	A <sup>1</sup>
62-75 mm/2.5-3 in	A <sup>1</sup> +B
75-88 mm/3-3.5 in	A <sup>1</sup> +C
87-100 mm/3.5-4 in	A <sup>1</sup> +B+C
100-113 mm/4-4.5 in	A <sup>2</sup>
112-125 mm/4.5-5 in	A <sup>2</sup> +B
125-138 mm/5-5.5 in	A <sup>2</sup> +C
137-150 mm/5.5-6 in	A <sup>2</sup> +B+C
150-163 mm/6-6.5 in	A <sup>3</sup>
162-175 mm/6.5-7 in	A <sup>3</sup> +B

Workpiece length	Combination
175-188 mm/7-7.5 in	A <sup>3</sup> +C
187-200 mm/7.5-8 in	A <sup>3</sup> +B+C
200-213 mm/8-8.5 in	A <sup>4</sup>
212-225 mm/8.5-9 in	A <sup>4</sup> +B
225-238 mm/9-9.5 in	A <sup>4</sup> +C
237-250 mm/9.5-10 in	A <sup>4</sup> +B+C
250-263 mm/10-10.5 in	A <sup>5</sup>
262-275 mm/10.5-11 in	A <sup>5</sup> +B
275-288 mm/11-11.5 in	A <sup>5</sup> +C
287-300 mm/11.5-12 in	A <sup>5</sup> +B+C

### IMS-L Type



A<sup>1</sup>: 200-300/8-12 in  
A<sup>2</sup>: 300-400/12-16 in  
A<sup>3</sup>: 400-500/16-20 in  
A<sup>4</sup>: 500-600/20-24 in  
A<sup>5</sup>: 600-700/24-28 in  
A<sup>6</sup>: 700-800/28-32 in  
A<sup>7</sup>: 800-900/32-36 in  
A<sup>8</sup>: 900-1000/36-40 in

B<sup>1</sup>: 25/1 in  
B<sup>2</sup>: 50/2 in

Workpiece length	Combination
200-225 mm/8-9 in	A <sup>1</sup>
225-250 mm/9-10 in	A <sup>1</sup> +B <sup>1</sup>
250-275 mm/10-11 in	A <sup>1</sup> +B <sup>2</sup>
275-300 mm/11-12 in	A <sup>1</sup> +B <sup>1</sup> +B <sup>2</sup>
300-325 mm/12-13 in	A <sup>2</sup>
325-350 mm/13-14 in	A <sup>2</sup> +B <sup>1</sup>
350-375 mm/14-15 in	A <sup>2</sup> +B <sup>2</sup>
375-400 mm/15-16 in	A <sup>2</sup> +B <sup>1</sup> +B <sup>2</sup>
400-425 mm/16-17 in	A <sup>3</sup>
425-450 mm/17-18 in	A <sup>3</sup> +B <sup>1</sup>
450-475 mm/18-19 in	A <sup>3</sup> +B <sup>2</sup>
475-500 mm/19-20 in	A <sup>3</sup> +B <sup>1</sup> +B <sup>2</sup>
500-525 mm/20-21 in	A <sup>4</sup>
525-550 mm/21-22 in	A <sup>4</sup> +B <sup>1</sup>
550-575 mm/22-23 in	A <sup>4</sup> +B <sup>2</sup>
575-600 mm/23-24 in	A <sup>4</sup> +B <sup>1</sup> +B <sup>2</sup>

Workpiece length	Combination
600-625 mm/24-25 in	A <sup>5</sup>
625-650 mm/25-26 in	A <sup>5</sup> +B <sup>1</sup>
650-675 mm/26-27 in	A <sup>5</sup> +B <sup>2</sup>
675-700 mm/27-28 in	A <sup>5</sup> +B <sup>1</sup> +B <sup>2</sup>
700-725 mm/28-29 in	A <sup>6</sup>
725-750 mm/29-30 in	A <sup>6</sup> +B <sup>1</sup>
750-775 mm/30-31 in	A <sup>6</sup> +B <sup>2</sup>
775-800 mm/31-32 in	A <sup>6</sup> +B <sup>1</sup> +B <sup>2</sup>
800-825 mm/32-33 in	A <sup>7</sup>
825-850 mm/33-34 in	A <sup>7</sup> +B <sup>1</sup>
850-875 mm/34-35 in	A <sup>7</sup> +B <sup>2</sup>
875-900 mm/35-36 in	A <sup>7</sup> +B <sup>1</sup> +B <sup>2</sup>
900-925 mm/36-37 in	A <sup>8</sup>
925-950 mm/37-38 in	A <sup>8</sup> +B <sup>1</sup>
950-975 mm/38-39 in	A <sup>8</sup> +B <sup>2</sup>
975-1000 mm/39-40 in	A <sup>8</sup> +B <sup>1</sup> +B <sup>2</sup>

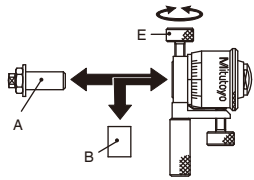
## 4. Mounting/Removing Interchangeable Rods and Extension Collars(Extension Rods)

### Important

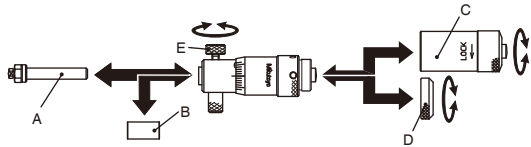
- Extension rod C and cap D are left threaded. Take care when mounting and removing.
- Before mounting, wipe clean interchangeable rod A, extension collars B, Extension rod C, and cap D to be mounted, as well as the connection area on the body.
- Be sure to perform reference point setting after mounting or removing.

- 1 Manually loosen Clamp E and remove interchangeable rod A and extension collars B.
- 2 Wipe the connection area on the body clean, mount interchangeable rod A and extension collars B as suited to the measurement length, and then tighten Clamp E manually to fix.
- 3 For IMS-D Type only, remove cap D or extension rod C on the anvil side.
- 4 For IMS-D Type only, wipe the connection area on the body anvil side clean, and then mount cap D or extension rod C.

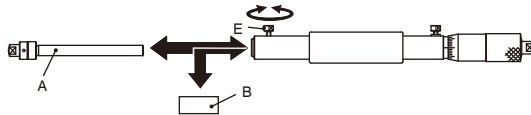
### ■ IMS-T Type



### ■ IMS-D Type



### ■ IMS-L Type



## 5. Reference Point Setting

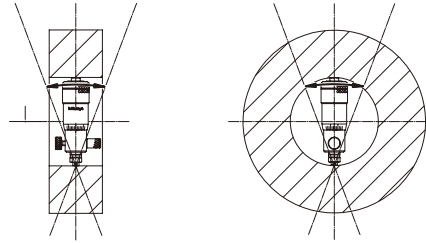
### Important

- Be sure to follow the procedure shown in 1 to 7 below to confirm and set the reference point prior to measuring.
- When setting the reference point for this product, make sure to use a calibrated gage (setting ring, etc.).
- Remove any dirt or oil from the measuring surfaces of the gage and product prior to setting the reference point.
- Use the same orientation and conditions when measuring and setting the reference point.

- 1 Remove any dirt or dust from the measuring surfaces of the gage and the product.
- 2 Rotate the product thimble to set the measurement length slightly shorter than that of the gage, and then slowly insert it into the gage.
- 3 Rotate the product thimble and bring the measurement surface gently into contact with the inside of the gage.

- 4 In order to measure the diameter accurately, move the product in the direction of the arrow with regard to the axis to determine the lowest point.

Next, move it in the direction of the arrow within a cross-section perpendicular to the axis to determine the highest point.



- 5 Read the measured value. If it matches the gage dimension value, reference point setting is complete.

If the values do not match, adjust for greater accuracy with the following method (repeat until reference point setting is complete).

### ■ For IMS-T Type

With the thimble manually fixed so as not to rotate, use the wrench (⊗) to rotate and loosen the anvil, remove the thimble, and mount it again with its scale aligned with the gage dimension value. After adjustment, tighten the anvil with the wrench (⊗).

### ■ For IMS-D Type

Loosen the set screws (two locations) with the wrench (⊗), adjust the thimble position, and align the scale with the gage dimension value. After adjustment, tighten the set screws (two locations) with the wrench (⊗).

### ■ For IMS-L Type

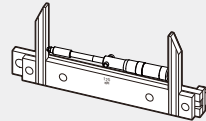
- If the reference point difference is  $\pm 0.01$  mm or less  
Using the wrench (⊗), rotate the sleeve until the thimble scale is aligned with the gage dimension value.

- If the reference point difference is  $\pm 0.01$  mm or higher  
Fix the thimble with the Clamp (⊗), use the wrench (⊗) to rotate and loosen the anvil, remove the thimble, and mount it again with its scale aligned with the gage dimension value. After adjustment, tighten the anvil with the wrench (⊗).  
If the thimble scale is slightly off from the gage dimension value, adjust according to "• If the reference point difference is  $\pm 0.01$  mm or less".

- 6 Repeat steps 1 to 5, and confirm that the measured value matches the gage dimension value.

### Tips

When setting the reference point with a rectangular gauge block and its accessories, set the product as in the figure. For details of the gage assembly method, etc., see the separate "Rectangular Gauge Block Accessories for Gauge Blocks over 100 mm".



## 6. Measurement Method

### Important

- For the IMS-T and IMS-D Types, mount the handle on the body for use as needed.
- For the IMS-T Type, mount the handle (small) by the tip. Handle with care when mounting or removing the handle (small), as the plate spring and arm will also be removed upon removal.

- 1 Insert the product into the workpiece, and then revolve the thimble until the anvil makes contact with the measurement location.

- 2 In the same position and conditions as for reference point setting, move the product back and forth within the cross-section orthogonal to the axis to make contact with the minimum measurement length position; at the same time, move it horizontally to make contact with the maximum measurement length position, and read the measured value.

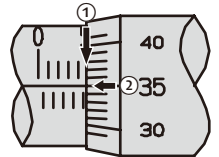
## 7. How to Read Graduations

Total the readings for the body with interchangeable rod mounted, extension collars, extension rod (IMS-D Type only), sleeve, and thimble.

Read the graduations as below.

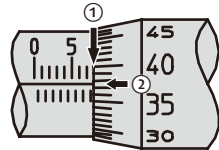
### ■ For IMS-T Type (measurement range setting example: 43-50)

① Sleeve reading	4.5 mm
② Thimble reading	0.35 mm
③ Body (with interchangeable rod) dimension	37.0 mm
④ Extension collars dimension	6.0 mm
	<hr/>
	47.85 mm



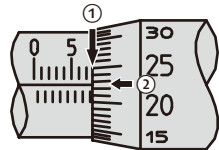
### ■ For IMS-D Type (measurement range setting example: 137-150)

① Sleeve reading	7.5 mm
② Thimble reading	0.37 mm
③ Body (with interchangeable rod) dimension	100.0 mm
④ Extension collars dimension	12.0 mm
⑤ Extension rod dimension	25.0 mm
	<hr/>
	144.87 mm



### ■ For IMS-L Type (measurement range setting example: 475-500)

① Sleeve reading	7.5 mm
② Thimble reading	0.22 mm
③ Body (with interchangeable rod) dimension	400.0 mm
④ Extension collars dimension	25.0 mm
④ Extension collars dimension	50.0 mm
	<hr/>
	482.72 mm



Read the thimble at the location where the sleeve reference line matches the graduation line on the thimble.

This is normally read up to a graduation of 0.01 mm (as shown above). However, it is also visually possible to read up to a graduation of 0.001 mm (as shown in the figure below).



## 8. Specifications

- Plunger feed error (20 °C) : 3 μm  
0.00015 in
- Graduation : 0.01 mm  
0.001 in
- Operating temperature : 5 °C to 40 °C
- Storage temperature : -10 °C to 60 °C

## 9. Paid Maintenance

We recommend periodic inspections to check and maintain the product's accuracy. Also, if any of the following defects occur, please contact the agent where you purchased the product or a Mitutoyo sales office.

- Inconsistent measured values  
Burr or nicks generated by an impact on the measurement surfaces may affect measurement repeatability.