Caliper-Type Inside Micrometer

(en)

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.

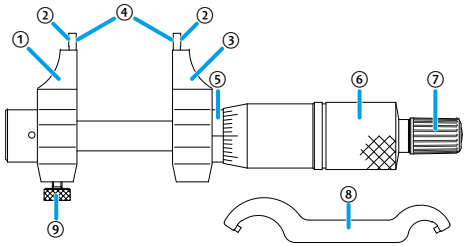
NOTICE Shows risks that could result in property damage.

- Do not disassemble or modify. Doing so will void the warranty.
- Do not use or store the product in a place with sudden temperature changes. Also, before using the product, allow it to acclimate to room temperature.
- 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.
- Use a soft, lint-free cloth to wipe dirt off of the product. Do not use detergents or organic solvents such as thinner.
- Do not write on the product, such as numbers, with an electric pen.

Contents

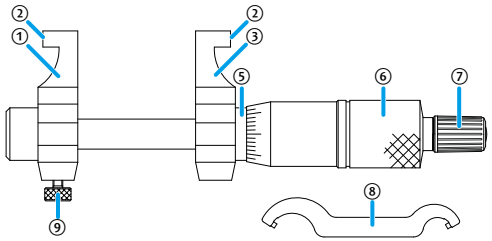
1. Names of Components

■145 Series
IMP-30

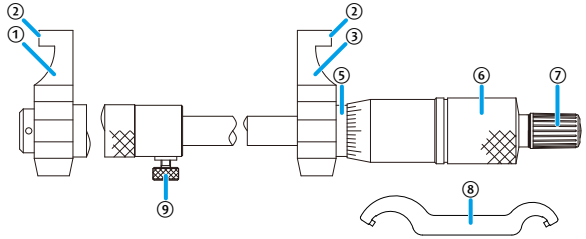


① Left jaw
② Measurement surfaces
③ Right jaw
④ Pins
⑤ Sleeve
⑥ Thimble
⑦ Ratchet stop
⑧ Key wrench
⑨ Clamping knob

■145 Series
IMP-50



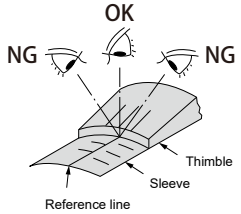
■145 Series
IMP-75 or higher



2. Precautions for Use

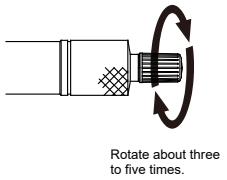
■ Parallax

- Due to the way this product is constructed, the plane of the reference line on the sleeve is not on the same plane as the graduation line on the thimble, so the point where the two lines meet will be viewed differently depending on the position of your eyes. When reading measured values, do so perpendicular from the point where the reference line on the sleeve meets the graduation line on the thimble (see the figure on the right).
- If you are looking from a different direction (as in the figure on the right), be aware that there will be a parallax of roughly 2 µm.



■ Measuring Force

- When measuring, always use the ratchet stop to ensure a consistent measuring force.
- To achieve an appropriate measuring force, make light contact between the measurement surfaces and the workpiece, and then rotate the ratchet stop about three to five times with your fingers. Note that excessive measuring force may cause errors.



■ Errors Due to Orientation

- Align the reference point and use the same orientation when making the actual measurement.

■ Precautions and Cleaning after Use

- After use, check that none of the parts are damaged, and clean the entire spindle with a soft, lint-free cloth.
- If oil, cutting fluid, or other fluids harden on the product or if dirt is difficult to remove, put some volatile cleaning liquid (such as cleaning alcohol) on a soft, lint-free cloth, and use that to clean the product.
- After use, apply some Micrometer Oil (Part No. 207000) to the entire spindle to prevent rust from forming.
- If using in places exposed to water-based cutting fluid, always apply anti-rust treatment after cleaning.
- If Micrometer Oil is not available and you must use a commercially available product, we recommend using an anti-rust agent with low viscosity of around ISO VG 10.
- For storage, release the clamp.

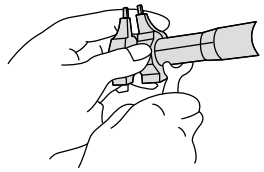
3. Reference Point Setting

IMPORTANT

- When measuring, be sure to follow the procedure in steps 1 to 5 below to confirm and set the reference point.
- 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 measurement surfaces of the gage and product prior to setting the reference point.
- Use the same orientation and conditions as when measuring to set the reference point. When setting the reference point, do not hold the left jaw while rotating the thimble. The play in the jaw may increase.

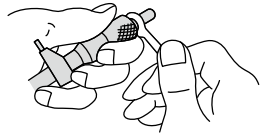
1. Remove any dirt or dust from the measurement surfaces of the calibration gage and the product.
2. Set a measuring length slightly less than the size of the gage by rotating the thimble of the product, and then slowly insert the product into the gage.
3. Bring the measurement surfaces gently into contact with the inside of the gage by rotating the thimble with the ratchet stop.
4. Apply the proper measuring force by rotating the ratchet stop three to five times. (See "■ Measuring Force" in "2. Precautions for Use".)
5. Read the measured value, and if the reading matches the size of the gage, you may start measuring.
   If they do not match, make adjustments as follows.

Figure 1



- If the reference point difference is ±0.01 mm or less (Figure 1)
  Insert the included key wrench into the hole on the rear of the reference line on the sleeve, and then rotate the sleeve until the reference line is aligned with the zero graduation line on the thimble.
- If the reference point difference is around ±0.01 mm or higher (Figure 2)
  1. Loosen the ratchet stop with the key wrench.
  2. Push the thimble to the outside (in the direction of the ratchet) so that it can be moved freely, and then align the zero graduation line on the thimble with the reference line on the sleeve.
  3. Tighten the ratchet stop with the key wrench and secure the thimble back into place.
     If the zero point is slightly off, adjust according to "• If the reference point difference is ±0.01 mm or less".

Figure 2



4. Measurement Method

IMPORTANT

- To obtain accurate measurements, be sure to perform reference point setting before measurement.
- When measuring, do not hold the left jaw while rotating the thimble. The play in the jaw may increase.
- The minimum measuring hole diameter is ø5 mm or higher when measuring the pitch between holes with the pin-type micrometer (IMP-30).

When measuring, insert the product into the workpiece with the same orientation and procedure used during the reference point setting, apply the proper measuring force, and then read the measured value. (See "■ Measuring Force" in "2. Precautions for Use".)

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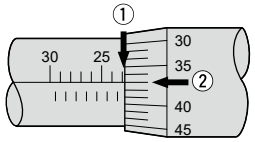
5.How to Read Graduations

■ Standard Scale (0.01 mm graduation type)

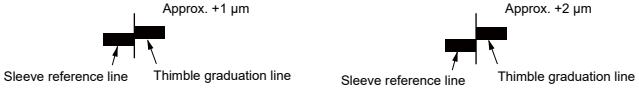
Read the graduations as follows.



① Sleeve reading		22.5 mm
② Thimble reading	+	0.37 mm
		22.87 mm

For "0.37 mm" in ②, read the location where the reference line on the sleeve meets the graduation line on the thimble.

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



6.Adjustment of Play in the Jaw

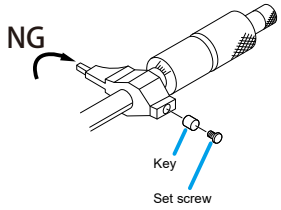
NOTICE Shows risks that could result in property damage.

Do not apply excessive force in the rotational direction of the jaw (force twisting the jaw in the direction of the arrow in the figure below). Doing so may cause play in the jaw. It may also cause a malfunction in the thimble or damage to the key.

If there is 0.2 mm or more of play in the tip of the right jaw has when the right jaw is moved in the direction of the circumference of the sleeve, make adjustments as follows. If the degree of play is less than 0.2 mm, it will not influence measurement errors, so do not make adjustments if the degree of play is small.

Remove the set screw with the clamping knob tightened, push the key to adjust the degree of play in the right jaw to less than 0.2 mm, and then tighten the set screw.

Note that reducing play in the right jaw too much will make the thimble movement stiff.



Tips

It may be impossible to obtain the specified accuracy depending on the adjustment method. If this occurs, it will require off-site repairs.

7.Specifications

■ Common Specifications

Graduation: 0.01 mm
0.001 in

Temperature range: 5 °C to 40 °C (operating temperature), -10 °C to 60 °C (storage temperature)

Standard accessories: Key wrench (No.301336)

■ Individual Specifications

Maximum measuring length	Maximum permissible error J_{MPE}*1
30 mm	±5 µm
50 mm	±6 µm
75 mm	±7 µm
100 mm	±8 µm
125, 150 mm	±9 µm
175, 200 mm	±10 µm
225, 250 mm	±11 µm
275, 300 mm	±12 µm
325–400 mm	±16 µm
425–500 mm	±21 µm
1.2 in	±0.00025 in
2 in	±0.0003 in
3 in	±0.00035 in
4 in	±0.0004 in

*1: Maximum permissible error for indicated value via contact with full measuring face J_{MPE} (20 °C)

8.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
  Burrs or nicks generated by an impact on the measurement surfaces may affect measurement repeatability.

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