Mitutoyo

Dial Caliper

Dial Caliper

User's Manual

No. 99MAC003A
Date of publication: July 1, 2021 (1)

Safety Precautions

To ensure operator safety, use this product in conformance with the directions, functionsand 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.

- The outside and inside measuring jaws of this caliper have sharp edges. Handle it with great care to avoid injury.
- Do not measure the workpiece if it is rotating. There is a risk of injury due to being caught in the machine, etc.

■ Conventions and wording indicating prohibited and mandatory actions

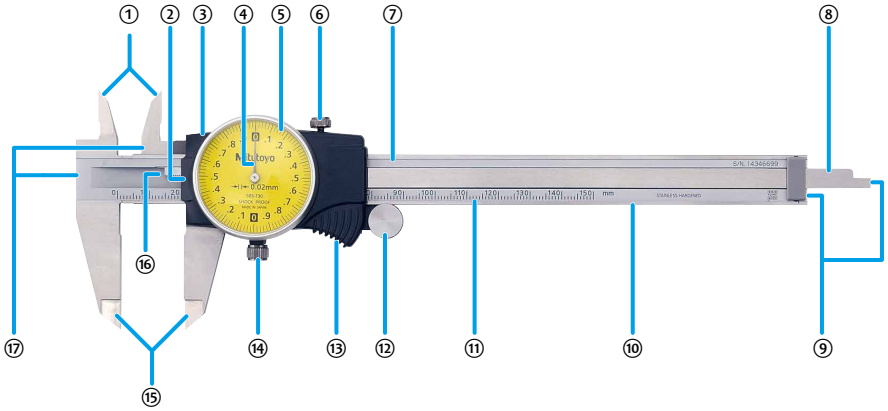
	Indicates concrete information about prohibited actions.
	Indicates concrete information about mandatory actions.

Contents

1 Code Number

505-730	505-731	505-732	505-733	505-734	505-735
505-736	505-737	505-738	505-739	505-740J	505-741J
505-742J	505-742-51J	505-742-52J	505-742-53J	505-742-54J	505-742-55J
505-742-56J	505-743J	505-744	505-745	505-746	505-747
505-748	505-749	505-750			

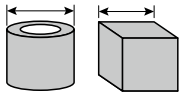
2 Names of Components



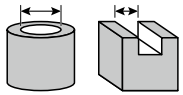
① Inside measuring jaws
② Main scale reading edge
③ Slider
④ Pointer
⑤ Dial graduation
⑥ Slider clamp screw
⑦ Beam
⑧ Depth bar
⑨ Depth measuring faces
⑩ Sliding surface (reference surface)
⑪ Main scale
⑫ Thumb roller
⑬ Finger rest
⑭ Bezel clamp screw
⑮ Outside measuring jaws
⑯ Rack
⑰ Step measuring faces

3 Product Applications

Outside measurement

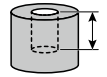


Inside measurement



Step measurement

Depth Measurement



4 Precautions before Use

- Before using this product for the first time, wipe the rust preventive oil from the product with a soft cloth soaked with cleaning oil. If the rust preventive oil is left on the product, it will dry on and the motion may become stiff. In this case, wipe the sliding surface (reference surface) with a cloth to improve the motion further.
- If cutting chips or debris adhere to the beam, measuring faces, or graduations, wipe them off with chamois or gauze, etc.
- Apply clean oil to the beam, especially the sliding surface. This protects the sliding surface and improves the slider motion.
- Do not perform the adjustment at sites where the temperature will change abruptly. Thermally stabilize the instrument sufficiently at room temperature.
- Be careful not to allow cutting chips or dust to enter the rack. Chips or particles can damage the rack, degrading accuracy or causing the pointer to skip and the zero point to deviate.

5 Basic Usage

■ Holding the caliper and moving the slider

Grasp the beam lightly with your right hand, put your right thumb on the slider finger rest, and slide the slider horizontally for measurement.

Tips

- For the measuring method details, refer to "7 Measurement Method".
- The thumb roller is a feed mechanism for handier open/close operation of the inside and outside jaws. Rotate the thumb roller with your thumb for fine adjustment of the slider.

■ Fixing the slider

Reading of the main scale and dial is usually taken with the workpiece clamped (or in close contact). However, depending on the measuring location, the orientation during measurement and so on, it may be difficult to get a reading in this position.
In this case, tighten the slider clamp screw, move the caliper carefully away from the workpiece, and take the reading.

6 Confirmation before Measurement

■ Confirming Slider Movement

- Confirm that there is no irregular slider movement and that the slider moves smoothly throughout the measurement range.
- Confirm that there is no play of the slider in the vertical direction against the sliding surface.

■ Confirming that Pointer is on Dial Graduation Zero Point

- Confirm that the pointer is pointing at the dial graduation zero point with each jaw measuring face closed.
- If the pointer deviates from the dial graduation zero point, the pointer zero point needs to be adjusted. For the adjustment method details, refer to "9 Zero Point Adjustment of Pointer".

■ Confirming Clearance (Wear) between Measuring Faces

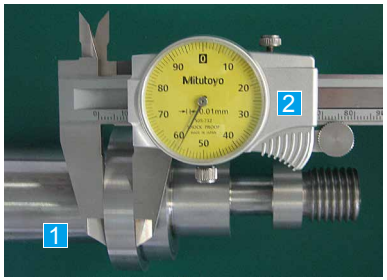
- When the outside measuring jaws are closed and held to the light, confirm that there is no slit observed between the jaws against the light, or that a faint light is uniformly visible. As well, confirm that the jaw tips are not deformed.
- When the inside measuring jaws are closed and held to the light, observing the jaws obliquely, confirm that a light is uniformly visible, and that the tips are not deformed.

7 Measurement Method

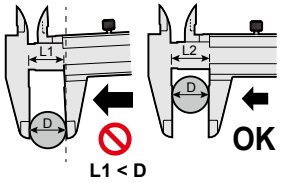
■ Precautions when measuring

Do not measure the workpiece if it is rotating, etc. Measuring faces will be worn out.

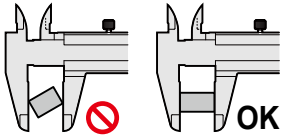
■ Outside measurement



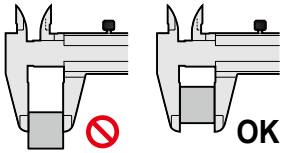
- Do not apply excessive force to the workpiece.
  Excessive measuring force will cause measurement error because of the positional deviations of the jaws.



- Do not clamp the workpiece diagonally.
  Measurement error will ensue if tilted.



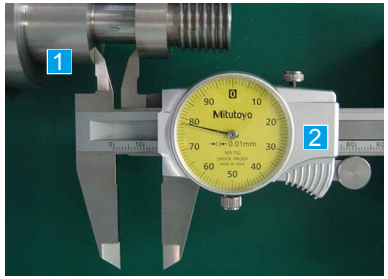
Clamp the workpiece as close to the sliding surface as possible. Measurement error is more likely to increase if clamped near the outside measuring jaw tips.



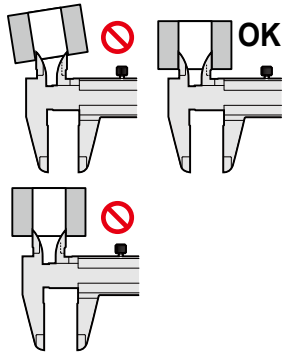
1 Insert the workpiece into the outside measuring jaws and bring jaws into close contact with the workpiece, using appropriate and uniform measuring force.

2 With the workpiece clamped, take the main scale and dial readings.

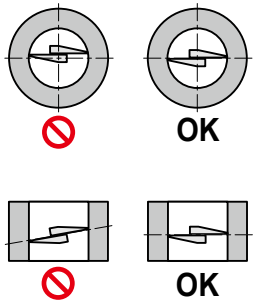
■ Inside measurement



- Insert the inside measuring jaws as deeply as possible into the workpiece.



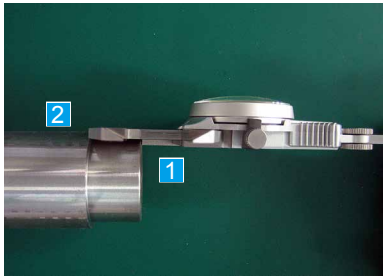
- For inner diameter measurement, bring the measuring faces into close contact, and read the value when the pointer indicated value is maximum: a direct line between the measuring faces passes through the center of the cross-section.
- For groove width measurement, bring the measuring faces into close contact, and read the value when the pointer indicated value is minimum: a direct line between the faces is perpendicular to the groove inner wall.



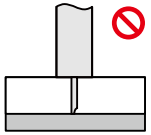
1 Insert the inside measuring jaws into the workpiece, and bring jaws into close contact with the workpiece interior using appropriate and uniform measuring force.

2 With the workpiece inserted, take the main scale and dial readings.

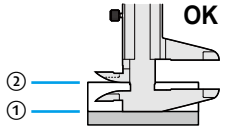
■ Step measurement



Do not use a depth bar for step measurement, as the small contact area with the workpiece makes it difficult to retain a stable orientation



For a stepped workpiece, bring the entire stepmeasuring surfaces (①, ②) into close contact with the workpiece

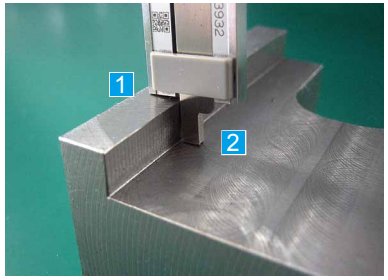


1 **Bring the step measuring face (①, beam side) into close contact with the workpiece.**

2 **Move the slider until the step measuring face (②, slider side) strikes the workpiece (stepped surface).**

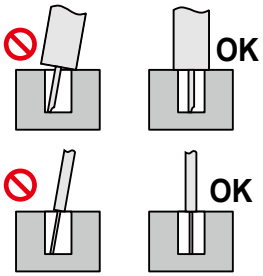
3 **With the measuring faces in close contact, take the reading.**

■ Depth measurement



1 **Bring the depth measuring surface (beam side) into close contact with the workpiece.**

The depth measuring face is narrow and unstable. Bring it into contact perpendicular with the workpiece.



2 **Move the slider until the depth measuring surface (depth bar side) makes contact.**

3 **With the measuring faces in close contact, take the main scale and dial readings.**

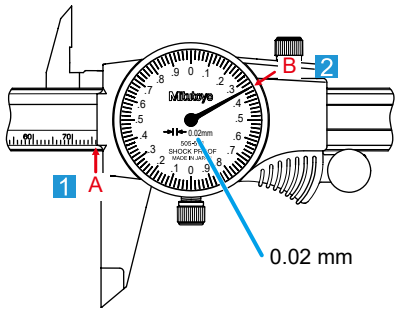
8 Reading Measurements

The measurement value (C) is obtained by adding the main scale reading (A) and the dial reading (B). The resolution (dial graduation interval value) is shown near the center of the dial face.

■ For Resolution: 0.02 mm (1 main scale graduation: half dial graduation rotation)

1 Take the main scale reading (A) shown by the main scale reading edge.

For example, if the main scale reading edge is between 76 mm and 77 mm, read the smaller "76 mm".
A = 76 mm



2 Take the dial reading.

Take the dial reading for within one main scale graduation position. For example, if the pointer points to "34", read "0.34 mm".
B = 0.34 mm

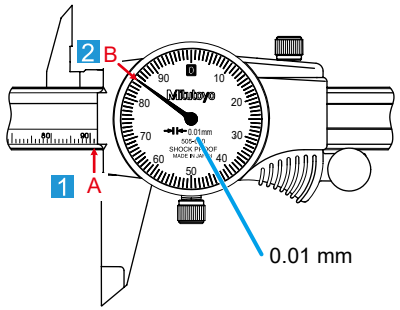
3 Add the main scale and dial readings for the measurement value (C).

C = A + B = 76 mm + 0.34 mm = 76.34 mm

■ For Resolution: 0.01 mm (1 main scale graduation: full dial graduation rotation)

1 Take the main scale reading (A) shown by the main scale reading edge.

For example, if the main scale reading edge is between 91 mm and 92 mm, read the smaller "91 mm"
A = 91 mm



2 Take the dial reading.

Take the dial reading for within one main scale graduation position. For example, if the pointer points to "85", read "0.85 mm".
B = 0.85 mm

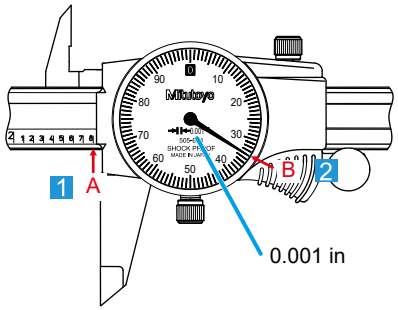
3 Add the main scale and dial readings for the measurement value (C).

C = A + B = 91 mm + 0.85 mm = 91.85 mm

■ For Resolution: 0.001 in (1 main scale graduation: half dial graduation rotation)

1 Take the main scale reading (A) shown by the main scale reading edge.

For example, if the main scale reading edge is between 2.8 in and 2.9 in, read the smaller "2.8 in".
A = 2.8 in



2 Take the dial reading.

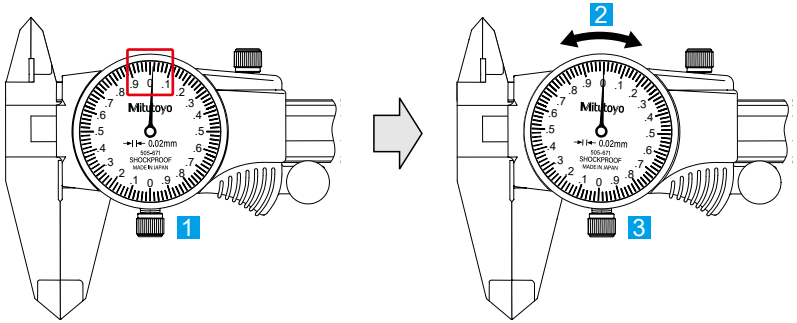
Take the dial reading for within one main scale graduation position. For example, if the pointer points to "34", read "0.034".
B = 0.034 in

3 Add the main scale and dial readings for the measurement value (C).

C = A + B = 2.8 in + 0.034 in = 2.834 in

9 Zero Point Adjustment of Pointer

Wipe any cutting chips, dust, or oil carefully off the measuring faces, and with the jaws closed,
if the pointer deviates from the dial graduation zero point, adjust the pointer zero point with the method below.



1 **Loosen the bezel clamp screw.**
2 **Rotate the bezel to align the dial graduation zero point and the pointer.**
3 **Tighten the bezel clamp screw.**

10 Precautions after Use

- If there is dirt on the measuring faces, sliding surface, etc., wipe it away with a dry cloth or a cloth slightly moistened with alcohol.
- For long-term disuse, wipe away any dirt carefully and apply a light coating of rust preventive oil before storage.
- Do not store in locations with high temperatures, low temperatures, high humidity, or exposure to direct sunlight.

11 Maximum Permissible Error of Indicated Values

📖 See "MPE (*E*MPE, *S*MPE)".

Mitutoyo Corporation

20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi, Kanagawa 213-8533, Japan
URL: https://www.mitutoyo.co.jp

Printed in Japan

MPE (*E*MPE, *S*MPE)

505 Sereis

0.02 mm: 505-730, 505-731, 505-734, 505-735, 505-745

*L (mm)	*E*MPE (mm)	*S*MPE (mm)
0 ≤ L ≤ 50	±0.02	±0.04
50 < L ≤ 200	±0.03	±0.05
200 < L ≤ 300	±0.04	±0.06

0.01 mm: 505-732, 505-735

*L (mm)	*E*MPE (mm)	*S*MPE (mm)
0 ≤ L ≤ 150	±0.02	±0.04
150 < L ≤ 200	±0.03	±0.05

0.001 in: 505-742J, 505-743J, 505-736, 505-737, 505-738, 505-739, 505-746, 505-747, 505-748, 505-742-51J, 505-742-52J, 505-742-53J, 505-742-54J, 505-742-55J

*L (inch)	*E*MPE (inch)	*S*MPE (inch)
0 ≤ L ≤ 6	±0.0010	±0.0020
6 < L ≤ 12	±0.0020	±0.0025

*L

jp	測定長さ	sv	Mätlängd	zh-CN	实测长度
en	Measured length	pt	Comprimento medido	zh-TW	實測長度
de	Messlänge	cs	Měřená délka	th	ความยาวที่วัดได้
es	Longitud medida	pl	Długość pomiaru	vi	Chiều dài đo được
fr	Longueur mesurée	ru	Длина измерения	ms	Panjang yang diukur
nl	Gemeten lengte	tr	Ölçme uzunluğu	id	Panjang terukur
it	Lunghezza misurata	ko	측정 된 길이		