Bore Gage

Safety Precautions

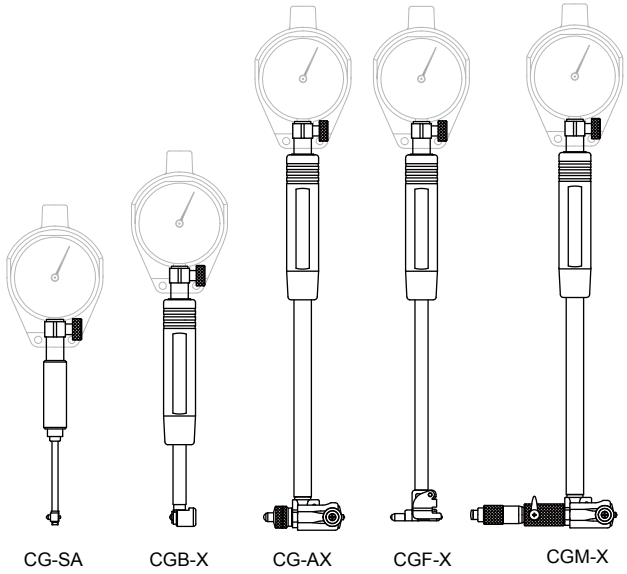
To ensure operator safety, use this product in conformance with the directions, functions and specifications given in this User's Manual.
Use under other conditions may compromise safety.

NOTICE

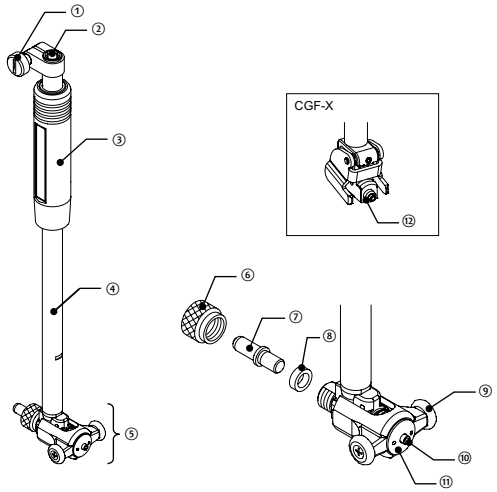
- Do not disassemble or modify. This may cause damage.
- Do not use or store the product in a place with sudden temperature changes. Adapt the product to room temperature before use.
- Do not store the product in a place with high humidity or a lot of dust.
- Do not apply impact or excessive force to this product.
- Be sure to perform reference point setting before measurement.
- Remove dust, cutting chips, etc. before and after use.
- After use, clean and perform anti-rust treatment for the body, anvils, adjustment washers, etc. Insufficient cleaning may cause accuracy or operation to suffer.
- For periodic calibration or precision measurement, wear thick gloves in order to reduce changes in the indicated value caused by the transmission of body temperature.
- Indicators with rubber bellows such as waterproof dial gages cannot be used.

Tips

The bore gage is a comparator. It will not function as a measuring instrument if used alone. An indicator such as a dial gage and a reference gage such as a set ring or micrometer are required to use the product.



1. Names of Components



① Clamp screw
② Indicator holder
③ Grip
④ Pipe (outer sleeve)
⑤ Measuring head
⑥ Supporting nut
⑦ Anvil
⑧ Adjustment washer
⑨ Guide
⑩ Contact point (contact rod)
⑪ Guide stopper screw
⑫ Contact rod holder

Tips

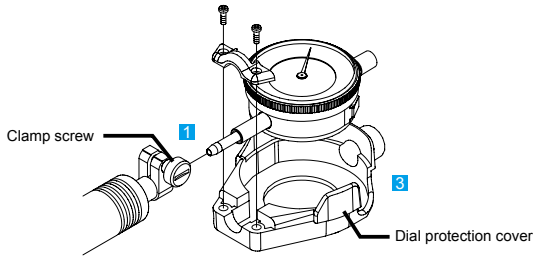
No guide (guide plate) is provided with CG-S10A.

2. Preparation for Measurement

1) Setup

NOTICE

- Confirm that the measuring head or screw is not loosened before use.
- Do not insert, remove, or turn the indicator with the clamp screw tightened, as it will lead to breakage.
- If the insertion hole of the indicator holder is accidentally deformed, correct it by inserting a ø8 mm rod for the metric type and a ø9.53 mm rod for the inch type.
- Secure fixation may be impossible when the indicator or the indicator holder insertion hole or the clamp screw is dirty. Clean them in advance.

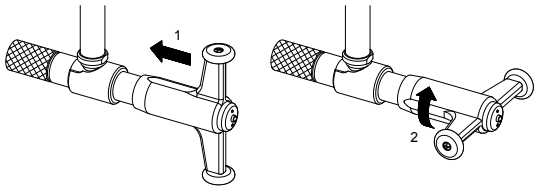


1 Loosen the clamp screw and insert the indicator into the indicator holder.
2 Tighten the clamp screw to fix the indicator.

Tips

Firm tightening is possible by turning with an object such as a coin inserted in the groove on the clamp screw head.

3 When required, attach a dial protection cover (optional depending on models).
4 For models with a measurement range of 160 mm or more, the direction of the guide unit must be switched.
1. Push the guide until it hits the end lightly.
2. Turn 90 degrees clockwise.
3. Let go.
⇨ The guide returns to the reference point position, and the product is ready for measurement.



Model/Code No. List

Model	Code No.
CG-S10A	511-209
CG-S18A	511-201
CG-S.4"A	511-214
CG-S.7"A	511-205
CGB-35X	511-761
CGB-60X	511-762
CGB-150X	511-763
CGB-160X	511-764
CGB-1.4"X	511-781
CGB-2.5"X	511-782

Model	Code No.
CGB-6"X	511-783
CGB-6.5"X	511-784
CG-35AX	511-701
CG-60AX	511-702
CG-150AX	511-703
CG-160AX	511-704
CG-250AX	511-705
CG-400AX	511-706
CG-1.4"AX	511-731
CG-2.5"AX	511-732

Model	Code No.
CG-6"AX	511-733
CG-6.5"AX	511-734
CG-10"AX	511-735
CG-16"AX	511-736
CGF-35X	511-415
CGF-60X	511-416
CGF-150X	511-417
CGF-1.4"X	511-418
CGF-2.4"X	511-419
CGF-6"X	511-420

Model	Code No.
CGM-100X	511-803
CGM-160X	511-804
CGM-250X	511-805
CGM-400X	511-806
CGM-600X	511-807
CGM-800X	511-808
CGM-4"X	511-833
CGM-6.4"X	511-834
CGM-10"X	511-835
CGM-16"X	511-836

Model	Code No.
CGM-24"X	511-837
CGM-32"X	511-838

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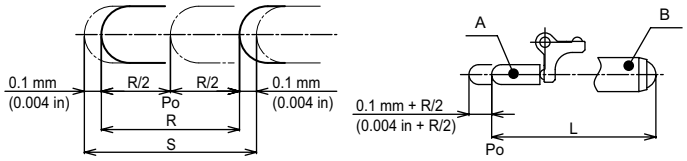
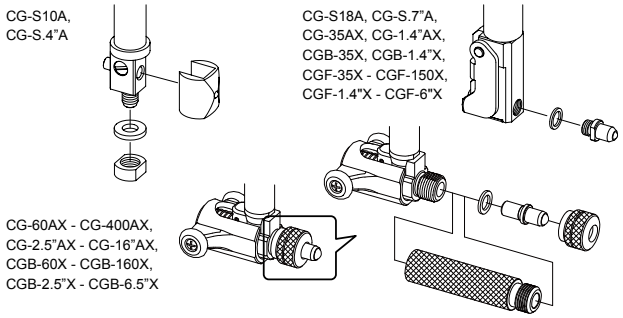
2) Adjusting the nominal size

Adjust the nominal size according to the dimensions to be measured by attaching an anvil, adjustment washer, or sub-anvil, or adjusting the micrometer head.
We recommend using a central value of the measured dimensions as nominal size L.
For instance, if the measured dimensions are 100 ±0.05 mm, the nominal size is set to 100 mm. Similarly, if the measured dimensions are 100.5 +0.02/-0.08 mm, nominal size L should ideally be set to 100.47 mm. However, except for CGM-X, settings in 0.01 mm increments are not possible. Therefore, set to 100.5 mm, the nearest possible value to the central value.



A: Contact point
B: Anvil
L: Nominal size (length from the anvil tip to P0 which is the center of effective measurement range)
R: Effective measurement range
S: Movable range

■ Adjusting the nominal size with anvils, adjustment washers, or sub-anvils.

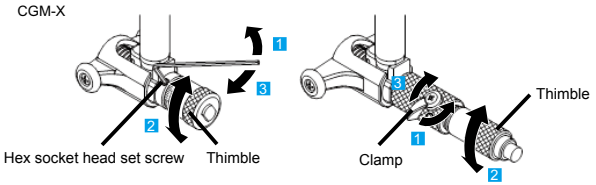


1 Select an anvil, adjustment washers, etc. according to the measured dimensions.
2 Mount securely, making sure there is no looseness or play.

Tips

- If attaching multiple adjustment washers, attach as few as possible.
- Except for models where an anvil is fixed with a supporting nut, use the provided wrench when attaching or removing the anvil.

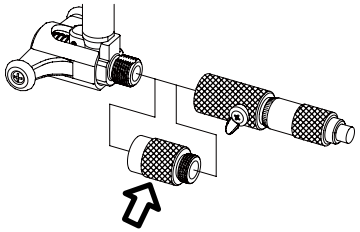
■ Adjusting the nominal size with micrometer head



1 Turn the hex socket head set screw or clamp to release the micrometer head.
2 Turn the thimble to adjust the length of the micrometer head.
3 Turn the hex socket head set screw or clamp to fix the micrometer head.

Tips

Use a sub-anvil as well when the micrometer head only is insufficient for the required adjustment range.



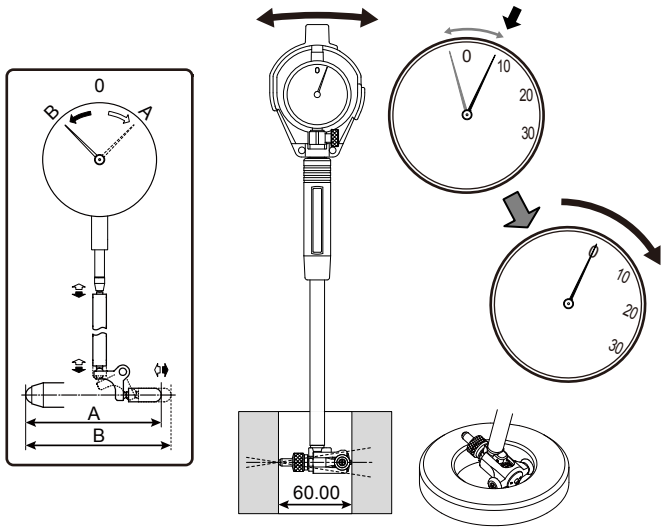
3. Reference Point Setting

NOTICE

- A reference gage is required for reference point setting.
- Dirt on the reference gage may lead to an error. Clean before reference point setting.
- Be sure to set the reference point before measurement and after measured dimension setting. Even during continuous measurement, set the reference point as often as possible.

1) Reference point setting with a set ring or cylindrical master gage

1 Insert the bore gage into the reference gage (set ring or cylindrical master gage).
2 Oscillate the bore gage. The reference point is where the contact point is pushed deepest.



Tips

- Setting the indicator to the reference point.
- Turn the bezel when the indicator is a dial gage.
- Perform presetting when the indicator is a Digimatic indicator.
- When inserting the bore gage into a reference gage, insert the contact point/guide side first. After that, insert the anvil side while pressing the guide to the reference gage.

2) Reference point setting with outside micrometer and gauge block

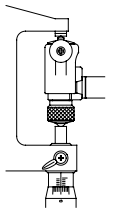
1 Measure the gauge block corresponding to the reference dimension by inserting it into the micrometer.
2 Clamp the micrometer and then remove the gauge block.
3 Insert the bore gage instead into the micrometer, and then oscillate the bore gage. The reference point is where the contact point is pushed deepest.

3) Reference point setting with outside micrometer only

Notices

Do not clamp the micrometer.

1 Fix the micrometer vertically with the head (spindle) portion downward and align the opening of the measuring surfaces to the reference dimension.
2 Insert the bore gage to the measuring surfaces of the micrometer and then oscillate the bore gage. The reference point is where the contact point is pushed deepest.



Tips

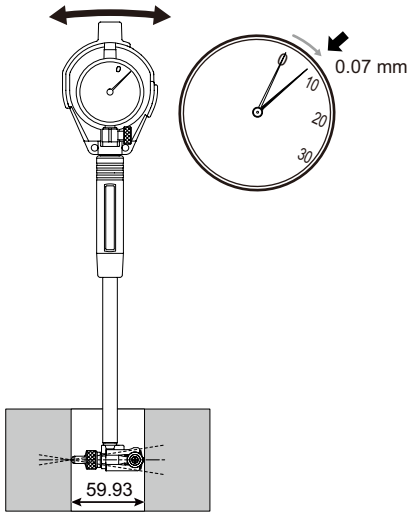
- Reference point setting with the outside micrometer requires expertise, since centripetal effects by the guides cannot be utilized.
- Reference point setting can be performed in the same way as with an outside micrometer even with another reference gage (gauge block, height master, bore gage checker).

4. Measurement Method

NOTICE

Dirt on the workpiece may lead to an error. Clean before measurement.

1 Insert the bore gage into the workpiece to be measured.
2 Oscillate the bore gage and read the indicated value. If the indicator is a dial gage, read the value when the needle swings widest clockwise.



3 Calculate the measured value by adding the read value (difference) to the dimension of the reference gage.

Tips

When inserting the bore gage into the workpiece to be measured, insert the contact point/guide side first. After that, insert the anvil side while pressing the guide to the workpiece.

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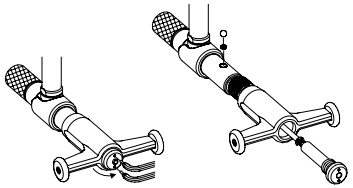
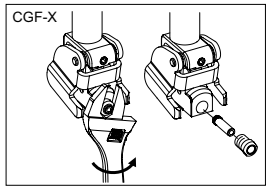
5. Maintenance

- Clean the exterior with a soft, dry cloth or a cloth slightly moistened with neutral detergent or alcohol. Do not use other organic solvents (thinner, benzine, etc.) for resin components.
- If the inside of the measuring head is dirty, disassemble and wash it. However, the measuring head of CG-SA cannot be disassembled. Wash it by immersing it in alcohol.
- To disassemble the measuring head, turn the guide stopper screw or contact rod holder anticlockwise with commercially available snap ring pliers or small monkey wrench.





Hole diameter on the guide stopper screw	Models with measurement range of 35 mm or less: ø1 mm Others: ø1.5 mm
Width across flats of contact rod holder	4.2 mm

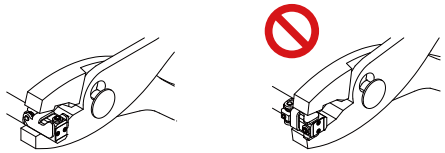
- Models with measurement range of more than 160 mm contain a ball and spring to stop guide rotation. Note that the ball may pop out when you remove the guide.
- When you attach the removed measuring head again, tighten the measuring head securely while the pipe is held with priers which do not cause damage to the pipe.
- When the product will be out of use for a long period of time, clean and perform anti-rust treatment, and then store it in a place without condensation. When using the product again, verify the accuracy and operation of the bore gage and indicator.
- The performance of the bore gage is strongly influenced by usage and storage conditions. We recommend stipulating a maintenance cycle in-house according to usage frequency, environment, storage method, etc., and inspecting the product periodically.

6. Extension Rod (Optional)

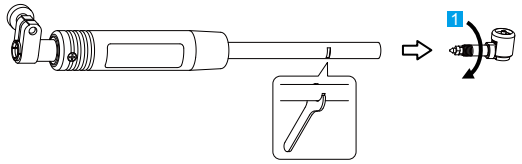
When measuring deep holes which cannot be measured with a standard bore gage, the measurement depth can be extended by connecting an extension rod (CG-AX, CGB-X, CGM-X, and CGF-X only).

NOTICE

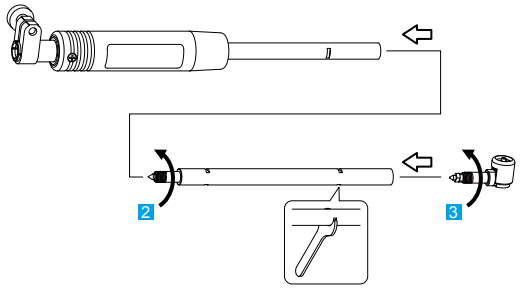
- Do not connect 2 or more extension rods.
- When an 500 mm or more extension rod is connected, use the product vertically.
- When an extension rod is connected, accuracy may change due to deflection, etc. We recommend performing reference point setting in the same orientation as measurement, in order to reduce effects on accuracy.
- Securely tighten screws without looseness. Insufficient tightening may lead to breakage, poor accuracy, malfunction or injury due to falling components.
- Hold the front and back of the measuring head of CGF-X since it may deform if held by the guide. Be sure not to grasp the contact point (contact rod).



1 Remove the measuring head by turning it while the pipe is fixed with the wrench provided with the extension rod.

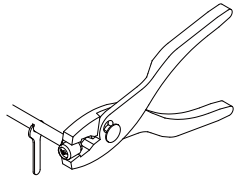


2 Screw in the extension rod to the pipe.
3 Screw in the measuring head while the extension rod is fixed with the wrench.



Tips

If the measuring head is hard to rotate manually, turn while holding with a tool such as combination pliers. While doing so, wrap the measuring head with a soft cloth or use combination pliers with a resin measuring head in order to prevent damage.



7. Specifications

- Operation environment: Temperature 0°C to 40°C, humidity 30% to 70%
- Storage environment: Temperature -10°C to 50°C, humidity 30% to 70%

8. Off-Site Repairs (Subject to Charge)

Off-site repair (subject to charge) is required in the case of the following malfunctions. Contact your nearest dealer or our sales office.

- Poor accuracy
- Wear on contact point or guide
- Contact point malfunction
- If the product is repaired by a party other than Mitutoyo, its performance cannot be guaranteed.

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