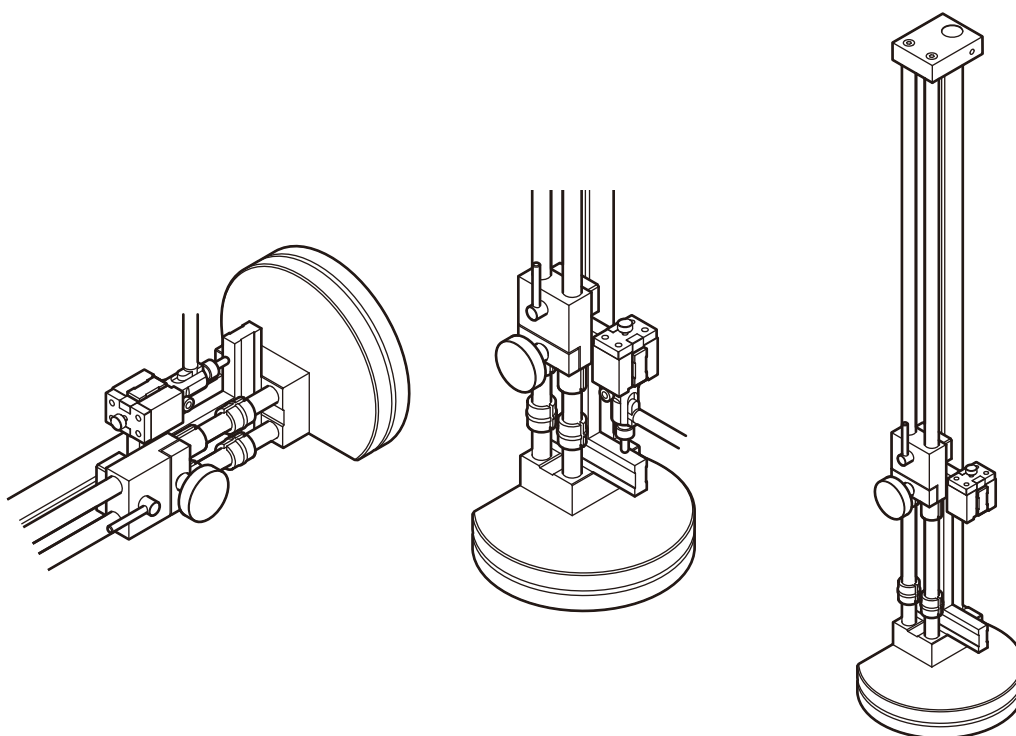




Bore Gage Accessory Bore Gage Zero Checker

CCG-400



User's Manual - Instructions for use -

Read this document thoroughly before operating the product.
After reading, retain it close at hand for future reference.
This English language version of the document contains
the original instructions.

No. 99MBF604B

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■ Product names and model numbers covered in this document

Product name	Model number
Bore gage accessory Bore Gage Zero Checker	CCG-400

■ Notice regarding this document

- Mitutoyo Corporation assumes no responsibilities for any damage to the product, caused by its use not conforming to the procedure described in this document.
- Upon loan or transfer of this product, be sure to attach this document to the product.
- In the event of loss or damage to this document, immediately contact the agent where you purchased the product or a Mitutoyo sales office.
- Read this document thoroughly before operating the product. In particular, be sure to fully understand "Safety Precautions" on page 6 and "Precautions for Use" on page 6.
- The contents of this document are based on information current as of April 2023.
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About This Document

■ Positioning of this document, document map

This describes the positioning of this document and its relationship with other installments.

Bore Gage Accessory
Bore Gage Zero Checker
User's Manual (This document)

Describes the overview, usage method, and maintenance of this product.

● Measuring tools

Bore Gage User's Manual

- Standard type
- Short leg type
- Shallow hole type
- Micrometer head type (excluding models with a measuring range of 400 mm to 800 mm)
- Integrated display digital type

Dial Indicator User's Manual
Digimatic Indicator User's Manual

Describes how to handle target measuring tools for base point adjustment (zero point adjustment) using this product.

● Gauge blocks / CERA blocks

Gauge Blocks/CERA Blocks
User's Manual

Describes the operation method, maintenance, and periodic calibration/inspection of gauge blocks and CERA blocks.

■ Intended readers and purpose of this document

● Intended readers

This document is intended for those who have experience of using a bore gage.
Readers are also assumed to be able to understand how to perform zero setting for measuring tools.

● Purpose

The purpose of this document is to help you understand the overview of this product, the functions of each part, usages, and details of maintenance.

Conventions Used in This Document

■ Safety reminder conventions warning against potential hazards

	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury .
	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury .
	Indicates a situation which, if not avoided, may result in property damage .
	Flammable material Alerts the user to a specific hazardous situation that means "Caution, risk of igniting gas".

■ Conventions indicating prohibited and mandatory actions

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

■ Conventions indicating referential information or reference location

IMPORTANT	Indicates information that must be known when using the product.
Tips	Indicates further information and details relevant for the operating methods and procedures that are explained in that section.
	Indicates reference location if there is information that should be referred to in this document or an extraneous User's Manual. Example: For details about XX, see  "1.2 Part Names and Functions" on page 12.

■ Other conventions

(): Round brackets	Represent a paraphrase of an immediately preceding phrase or a supplementary explanation.
" ": Double quotation marks	Represent a highlighted phrase. They also indicate an index where information to be referenced is described.
1 , 2 , 3 ... 1 , 2 , 3 , ...	Indicates the order and the contents of tasks. (1 : indicates main tasks, 1 : indicates detailed tasks)
»	Indicates the action resulted from some operation(s).

■ Example of conventions use

2 Method of Operation

2.1.2 Wringing Using Gauge Blocks and Plain Jaws

The process of firmly setting gauge blocks together or firmly setting a gauge block(block(s)) and the plain jaws together to establish a desired dimension is called "wringing". Steel and ceramic gauge blocks can also be wrung together.

IMPORTANT

- To ensure close contact, wring the gauge blocks together or wring the gauge block(s) and the plain jaws together. If the surfaces are not set together firmly, it may result in measurement errors.
 - Check for burrs before wringing the gauge blocks together or wringing the gauge block(s) and plain jaws together. Check for and remove any burrs from all gauge blocks and plain jaws used in wringing. For new gauge blocks and plain jaws, it is normally not necessary to check for or remove burrs.
- For details, see [Figure 12.1.1](#) Checking the Flatness of Wringing Surfaces and Removing Burrs on page 14.

- Indicates important information.

- 1 Wipe the wringing surfaces with lens cleaning paper moistened in a solvent (such as normal heptane), and then wipe the surfaces dry with a dry portion of the paper.

- Indicates an operating procedure to be performed or its outline.

NOTICE

If any small particles of dirt or grease are left on the wringing surfaces, dimensions after wringing may increase, or the gauge block(s) may become scratched.

- Indicates safety information.

Tips

For wiping, use lens cleaning paper or similar material which does not leave paper fibers.

- Indicates supplementary information.

- 2 Evenly spread a layer of petroleum jelly or grease over the wringing surfaces and then thoroughly wipe it off.

Tips

Wipe until the oil layer is almost completely gone.



- Indicates the current page number.

Safety Precautions

Read these "Safety Precautions" thoroughly before operating the product to use it properly. These safety precautions include such information as to prevent injury to the operator and other persons, damage to property and product defects. Be sure to observe these precautions carefully.



Organic solvents such as thinner and benzene have the risk of fire due to ignition or spontaneous combustion, and the risk of poisoning due to inhalation.



Do not use organic solvents such as thinner or benzene.



When transporting this product or optional accessories, there is a risk of injury if handled improperly.



If this product is dropped or falls down, it may cause an injury. Please handle it with care.

Precautions for Use

■ Use and handling of the product

- This product is a device for performing base point adjustment (zero point adjustment) for a bore gage.

Do not use this product for any purpose other than base point adjustment (zero point adjustment).

- The product is a precision instrument.

Exert extra caution while handling it. Be careful not to apply impact or excessive force to any of the parts during unpacking, installation, use, and storage. If this product is subjected to impact, its accuracy may be impaired.

■ Operating environment

Use the product in the following areas.

- Areas with minimal dirt or dust
- Areas with minimal vibrations
- Areas at the recommended temperature of around 20 °C with minimal temperature fluctuation
- Areas with low humidity (not exceeding 70 %)

Do not use or store the product in the following kinds of areas where the temperature or humidity changes rapidly.

Doing so may adversely affect the functions and measurement results of this product and cause malfunction.

- Areas directly affected by cutting oil, water, etc.
- Areas directly exposed to sunlight or drafts of hot air or cool air (e.g., from air conditioning)

■ Transportation

When transporting this product, apply anti-rust oil, wrap it in anti-rust paper, cover it with a plastic bag, and pack it in the box used for shipping. To that end, please keep these packing materials in a safe place for reuse, or if there is a need to transport the product, please contact the agent where you purchased the product or a Mitutoyo sales representative (📖 "SERVICE NETWORK" on page App-1).

■ Disassembly / modification

This product is precisely adjusted during assembly.

Do not perform any adjustments, disassembly, or modifications other than those described in this document, as doing so will affect the accuracy and functions of this product. If you do so, the product will no longer be covered by warranty.

■ Regarding maintenance

After using this product, use clean air to blow away any dust, etc., adhering to surfaces, wipe off any dirt with a soft, lint-free cloth moistened in a solvent, etc., and apply a thin layer of anti-rust oil (anti-rust treatment).

Do not use organic solvents such as thinner or benzene.

Recommended solvent: Normal heptane

Recommended anti-rust oil: MOLYKOTE SUPERGLISS

For details, see 📖 "4 Maintenance" on page 29.

Export Control Compliance

This product falls into the Catch-All-Controlled Goods and/or Catch-All-Controlled Technologies (including Programs) under Category 16 of Appended Table 1 of Export Trade Control Order or under Category 16 of Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan.

If you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-providing of the technology (including Programs), you shall observe the regulations of your country.

Also, if an option is added or modified to add a function to this product, this product may fall under the category of List-Control Goods, List-Control Technology (including Programs) under Category 1 - 15 of Appended Table 1 of Export Trade Control Order or under Category 1 - 15 of Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan. In that case, if you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-providing of the technology (including Programs), you shall observe the regulations of your country. Please contact Mitutoyo in advance.

Notes on Export to European Countries

When you intend exporting of this product to any of the European countries, it may be required to provide User's Manual(s) in English and Declaration of Conformity in English (in some cases, the official language of the country to be exported).

For detailed information, please contact Mitutoyo in advance.

Disposal of Products outside the European Countries

Please follow the official instruction in each community and country.

China RoHS Compliance Information

This product meets China RoHS requirements. See the table below.

产品中有害物质的名称及含量

部件名称	有害物质					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	(Pb)	(Hg)	(Cd)	(Cr(VI))	(PBB)	(PBDE)
本体	○	○	○	○	○	○
电气设备部分	×	○	○	○	○	○
配件	○	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

×: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。



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电器电子产品只要按照安全及使用说明内容在正常使用情况下,从生产日期算起,在此期限内产品中含有的有毒有害物质不致发生外泄或突变,不致对环境造成严重污染或对其人身、财产造成严重损害。

产品使用后,要废弃在环保使用年限内或者刚到年限的产品,请根据国家标准采取适当的方法进行处置。

另外,此期限不同于质量/功能的保证期限。

Warranty

This product has been manufactured under strict quality management, but should it develop problems within one year of the date of purchase in normal use, repair shall be performed free of charge. Please contact the agent where you purchased the product or a Mitutoyo sales representative (📖 "SERVICE NETWORK" on page App-1).

If this product fails or is damaged for any of the following reasons, it will be subject to a repair charge, even if it is still under warranty.

- Failure or damage owing to fair wear and tear
- Failure or damage owing to inappropriate handling, maintenance or repair, or to unauthorized modification
- Failure or damage owing to transport, dropping, or relocation of the product after purchase
- Failure or damage owing to fire, salt, gas, abnormal voltage, lightning surge, or natural disaster
- Failure or damage owing to use in ultra-hazardous activities

This warranty is effective only where the product is properly installed and operated in conformance with the instructions in this document within the original country of the installation.

EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES OF ANY NATURE WHATSOEVER INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE MAXIMUM EXTENT ALLOWED BY APPLICABLE LAW.

You assume responsibility for all results due to the selection of this product to achieve your intended results.

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IN NO EVENT WILL MITUTOYO, ITS AFFILIATED AND RELATED COMPANIES AND SUPPLIERS BE LIABLE FOR ANY LOST REVENUE, PROFIT, OR DATA, OR FOR SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PRODUCT EVEN IF MITUTOYO OR ITS AFFILIATED AND RELATED COMPANIES AND/OR SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

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The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose. BECAUSE SOME COUNTRIES, STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR THE LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, IN SUCH COUNTRIES, STATES OR JURISDICTIONS, MITUTOYO'S LIABILITY SHALL BE LIMITED TO THE EXTENT PERMITTED BY LAW.

MEMO

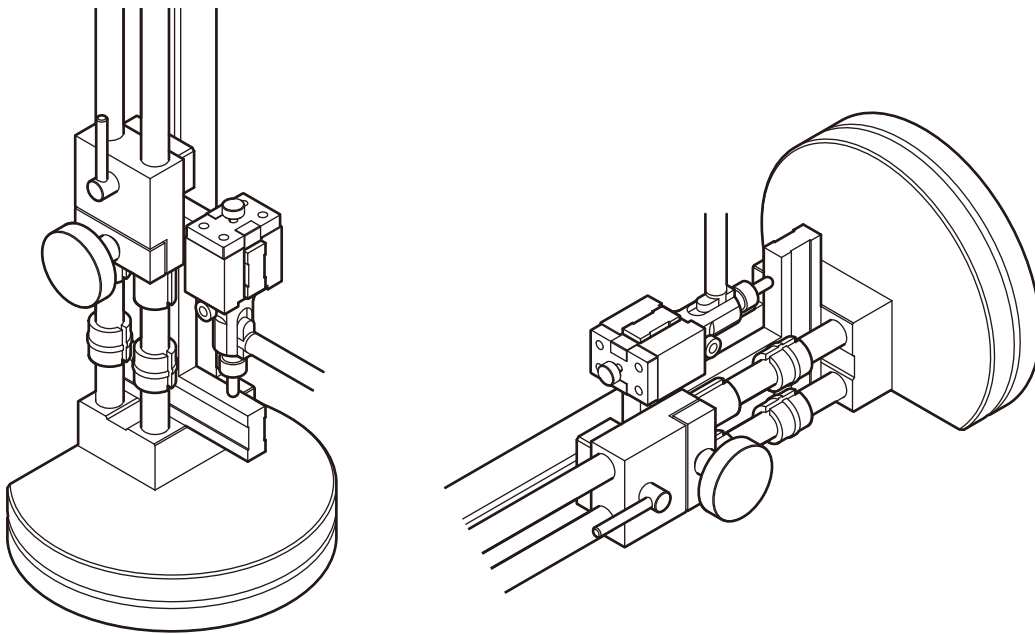
1 Overview

1.1 Features

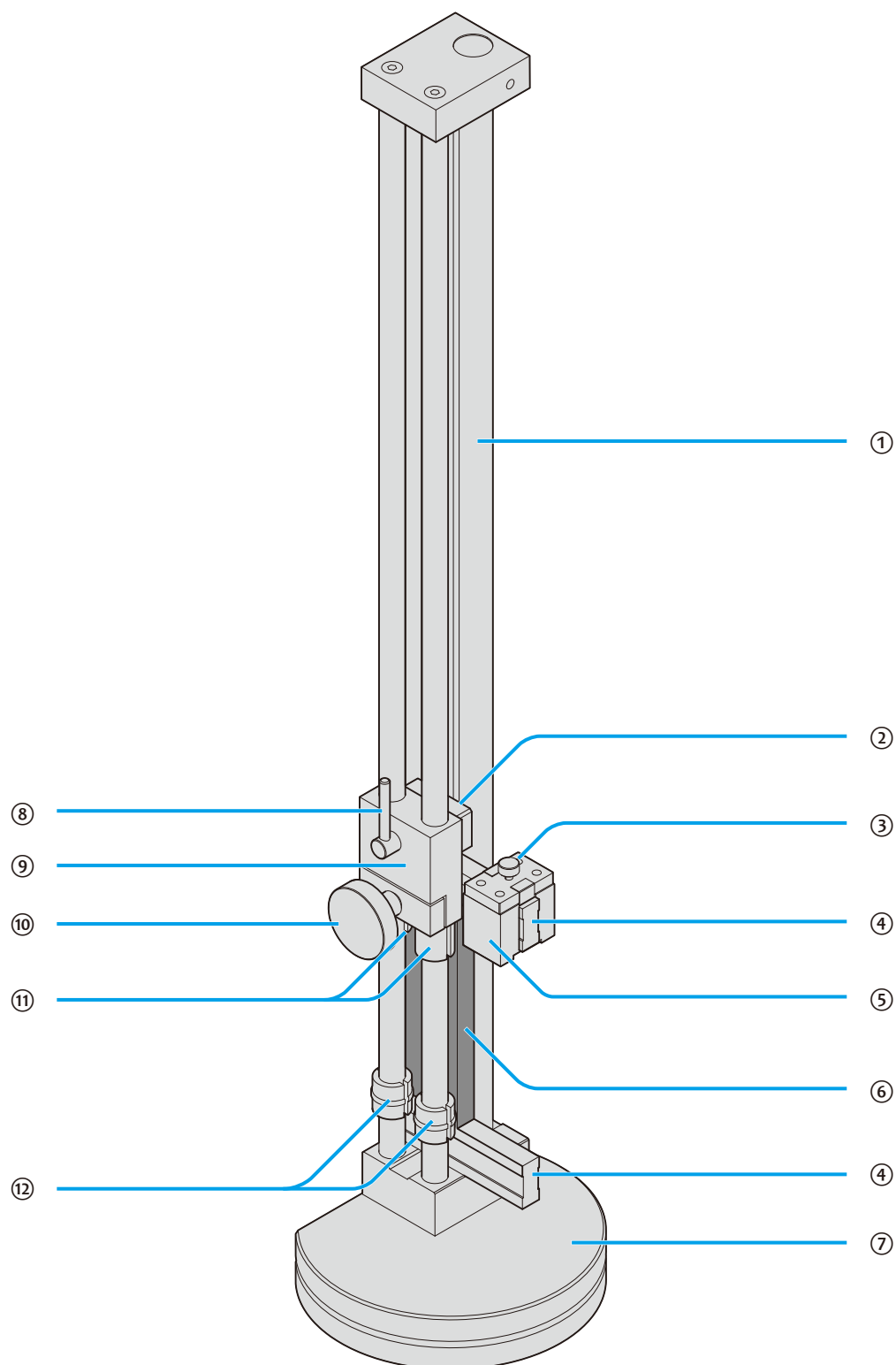
This product is a precision device that uses gauge blocks and plain jaws to perform base point adjustment (zero point adjustment) for a bore gage, previously performed using ring gages.

You can easily perform base point adjustment (zero point adjustment) for a bore gage with a measuring range of 18 mm to 400 mm (0.7 in to 16 in).

This product can be used in one of two orientations—vertical or horizontal—depending on the measuring orientation.

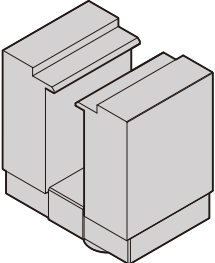
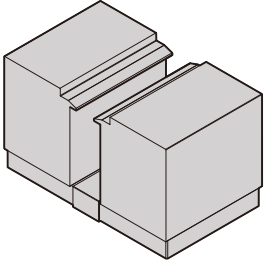
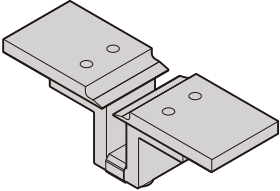


1.2 Part Names and Functions

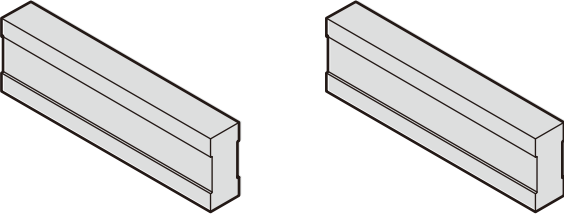


No.	Name	Function
①	Column	Supports the slider.
②	Holding block	Used to hold down the gauge block(s) and plain jaws.
③	Securing knob	A knob for securing the attachment to one of the plain jaws.
④	Plain jaws	Wring both end faces of the gauge block(s) together with the jaws to create a measurement surface for performing base point adjustment (zero point adjustment) for the bore gage. Both sides have been processed with high precision and given a lapped finish, so either side can be used as a measurement surface.
⑤	Attachment	Mounting an attachment to one of the plain jaws stabilizes the position of the bore gage during base point adjustment (zero point adjustment), improving workability and accuracy for base point adjustment (zero point adjustment). There are three types of attachments to select from depending on the measuring range. For details, see  "■ Types of attachments" on page 14.
⑥	Gauge block(s) (optional accessory)	Gauge blocks serve as a reference for base point adjustment (zero point adjustment) of the bore gage. Wring the gauge block(s) used as the reference dimension together with the plain jaws and secure them to the stand.
⑦	Stand	A stand for mounting the gauge block(s) and plain jaws. It can be used in one of two orientations—vertical or horizontal—depending on the measuring orientation when measuring the bore gage.
⑧	Clamping lever	A lever for securing the gauge block(s) and plain jaws. The eccentric cam mechanism presses the holding block on the slider against the plain jaw to secure the gauge block(s) and plain jaws. Rotate the lever clockwise to secure them and counterclockwise to release them.
⑨	Slider	Lower the slider and press the holding block against the plain jaw to secure the plain jaws and gauge block(s) to the stand. It can move up and down along the column of the stand.
⑩	Clamping knob	A knob for securing the slider to the column of the stand. Tighten the knob to secure the slider to the column of the stand.
⑪	Collars B	The stoppers for the slider. They can move up and down along the column of the stand.
⑫	Collars A	The stoppers for positioning the gauge block(s). Press the gauge block(s) against the protrusions of Collars A to keep the orientation of the gauge block(s) vertical. They can move up and down along the column of the stand.

■ Types of attachments

Part name	Type A	Type B	Type C
Part No.	940088	940089	940090
Illustration			
Measuring range of target bore gage	18 mm to 35 mm, 35 mm to 60 mm	50 mm to 100 mm, 100 mm to 160 mm	160 mm to 250 mm, 250 mm to 400 mm
	0.7 in to 1.4 in, 1.4 in to 2.5 in	2 in to 6 in, 4 in to 6.5 in	6.5 in to 10 in, 10 in to 16 in

■ Plain jaws

Part name	Plain jaws	
Part No.	630030	
Illustration		
Flatness	0.5 μm	
Parallelism	1 μm	

2 Method of Operation

2.1 Setup

In preparation, mount the gauge block(s), plain jaws, and attachment to the Bore Gage Zero Checker stand.

NOTICE



When handling gauge blocks or attachments, wear gloves for precision work (such as smooth cotton gloves). If they are handled with bare hands, the resulting heat conduction can alter their dimensions. Moreover, if the gauge blocks are made of steel, oil and sweat from bare hands can cause rusting.

● Items needed for performing work

Please prepare the following.

- Plain jaws (x2)*
- A gauge block (or blocks) matching the dimension for base point adjustment (zero point adjustment)
Combinations of multiple gauge blocks and combinations of steel and ceramic gauge blocks are also possible.
- An attachment that matches the dimensions of the bore gage to be used for base point adjustment (zero point adjustment)*
- Ceraston
- Optical flat
- Cleaning solvent (normal heptane, etc.)
- Petroleum jelly, grease
- Lens cleaning paper or similar material which does not leave paper fibers

* Standard accessories of this product

1 Check the flatness of the gauge block(s) and plain jaws and remove any burrs.

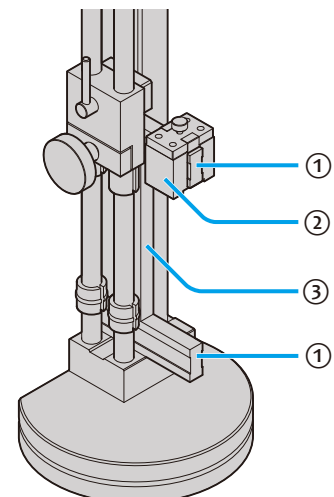
For details, see "2.1.1 Checking the Flatness of Wringing Surfaces and Removing Burrs" on page 16.

2 Wring the gauge block(s) together with the plain jaws.

For details, see "2.1.2 Wringing Using Gauge Blocks and Plain Jaws" on page 18.

3 Mount the gauge block(s) (3), plain jaws (1), and attachment (2) to the Bore Gage Zero Checker stand.

For details, see "2.1.3 Mounting the Gauge Block(s), Plain Jaws, and Attachment" on page 21.



2.1.1 Checking the Flatness of Wringing Surfaces and Removing Burrs

Check the flatness of the wringing surfaces of the gauge block(s) and plain jaws with an optical flat, and remove any burrs with a Ceraston.

1 Check for burrs on the wringing surfaces of the gauge block(s) and plain jaws with an optical flat (optional accessory).*

* Optical flat: Part No. 158-117

Tips

The optical flat is a product that enables easy checking of flatness with its high precision-processed plane.

- 1 Wipe the wringing surfaces of the gauge block(s) and plain jaws and both surfaces of the optical flat with lens cleaning paper moistened in a solvent (such as normal heptane), and then wipe the surfaces dry with a dry portion of the paper.

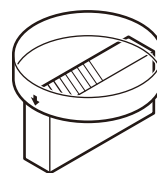
Tips

For wiping, use lens cleaning paper or similar material which does not leave paper fibers.

- 2 Gently place the optical flat on the wringing surface of the gauge block or plain jaw.

IMPORTANT

Place the optical flat on the wringing surface of the gauge block or plain jaw so that the arrow printed on the side of the optical flat points downward.



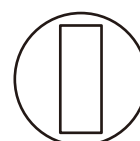
- 3 Lightly slide the optical flat.
 - » When interference fringes appear (There are no burrs. Proceed to step 4.)
 - » When no interference fringes appear (There is a burr. Proceed to step 2.)

Tips

Interference fringes may not appear if the surfaces were not wiped sufficiently or if paper fibers are present on the surface. In this case, wipe the surfaces again and repeat from step 2.



- 4 Lightly hold down the optical flat.
 - » When no interference fringes appear (There are no burrs. Proceed to "2.1.2 Wringing Using Gauge Blocks and Plain Jaws" on page 18.)



- » When interference fringes partially appear (There is a burr. Proceed to step 2.)



Tips

When interference fringes partially appear, slide the optical flat slightly. If the interference fringes move along with the optical flat, the burrs are on the optical flat. Use a new optical flat. After replacing the optical flat, wipe the surfaces again and repeat from step 2.

2 Remove burrs on the wringing surface with a Ceraston (optional accessory).*

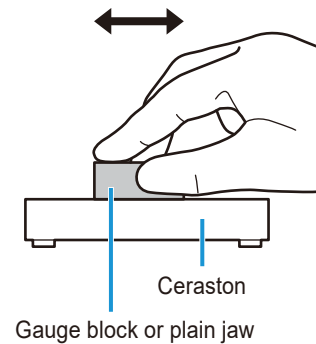
* Ceraston: Part No. 601644 or No. 601645

- 1 Wipe the wringing surfaces of the gauge block(s) and plain jaws and the surface of the Ceraston with lens cleaning paper moistened in a solvent (such as normal heptane), and then wipe the surfaces dry with a dry portion of the paper.

Tips

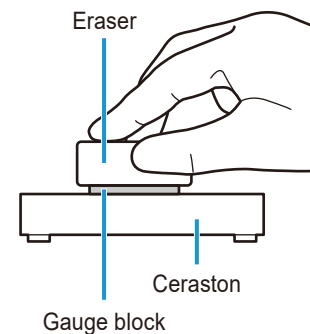
For wiping, use lens cleaning paper or similar material which does not leave paper fibers.

- 2 Place the surface of the gauge block or plain jaw that has burrs facing towards the Ceraston.
- 3 While holding the gauge block or plain jaw with your thumb and middle finger, lightly push down on it with your index finger and give it a back-and-forth motion over the Ceraston about 10 times.



Tips

- When the gauge block is too thin to hold (a nominal size of less than 3 mm, for example), using an eraser or other rubbery object to hold down the gauge block may help apply the force uniformly, as shown in the figure on the right.
- As long as there are burrs on the surface, the gauge block or plain jaw will slide smoothly on the Ceraston. When the burrs are removed, the gauge block or plain jaw will begin to stick to the Ceraston.



- 3 Repeat steps 1 and 2 to check for and remove burrs from all gauge blocks and plain jaws to be wrung together.

Tips

If burrs cannot be removed from the wringing surface of the gauge block or plain jaw even by repeating steps 1 through 3, replace the gauge block or plain jaw with a new one because the gauge block cannot be used as a reference.

IMPORTANT

Place the optical flat on the wringing surface of the gauge block or plain jaw so that the arrow printed on the side of the optical flat points downward.

2.1.2 Wringing Using Gauge Blocks and Plain Jaws

The process of firmly setting gauge blocks together or firmly setting a gauge block(block(s)) and the plain jaws together to establish a desired dimension is called "wringing". Steel and ceramic gauge blocks can also be wrung together.

IMPORTANT

- To ensure close contact, wring the gauge blocks together or wring the gauge block(s) and the plain jaws together. If the surfaces are not set together firmly, it may result in measurement errors.
- Check for burrs before wringing the gauge blocks together or wringing the gauge block(s) and plain jaws together. Check for and remove any burrs from all gauge blocks and plain jaws used in wringing. For new gauge blocks and plain jaws, it is normally not necessary to check for or remove burrs. For details, see  "2.1.1 Checking the Flatness of Wringing Surfaces and Removing Burrs" on page 16.

- 1 Wipe the wringing surfaces with lens cleaning paper moistened in a solvent (such as normal heptane), and then wipe the surfaces dry with a dry portion of the paper.**

NOTICE

If any small particles of dirt or grease are left on the wringing surfaces, dimensions after wringing may increase, or the gauge block(s) may become scratched.

Tips

For wiping, use lens cleaning paper or similar material which does not leave paper fibers.

- 2 Evenly spread a layer of petroleum jelly or grease over the wringing surfaces and then thoroughly wipe it off.**

Tips

Wipe until the oil layer is almost completely gone.



3 Wring the gauge blocks together.

The following three usages are possible:

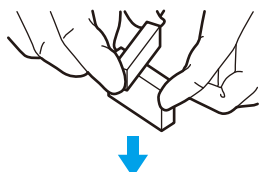
- For two thick gauge blocks
- For a thick gauge block and a thin gauge block
- For two thin gauge blocks

Tips

A gauge block with a nominal size of less than 3 mm is considered a thin gauge block.

For two thick gauge blocks

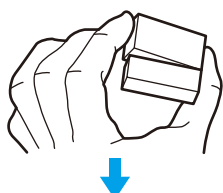
- 1 Cross the gauge blocks at 90° at the center of each measurement surface.



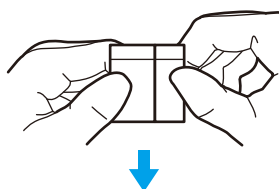
- 2 While applying a slight pressure, rotate one of the gauge blocks 90° until both measurement surfaces are aligned with each other.

Tips

It will feel like the blocks are sticking together while you are sliding the block.



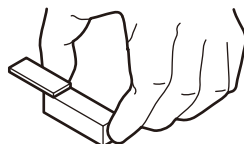
- 3 Align the measurement surfaces with each other.



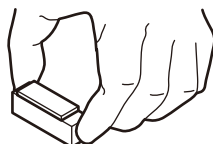
Proceed to step **5**.

For a thick gauge block and a thin gauge block

- 1 Place one end of the thin gauge block on top of one end of the thick gauge block (to prevent thin gauge blocks from bending).



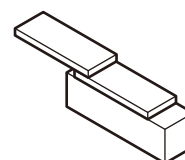
- 2 Slide the thin gauge block while pressing the entire overlapped area until both measurement surfaces are aligned with each other.



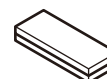
For two thin gauge blocks



- 3 Wring another thin gauge block together with the top of the thin gauge block wrung in steps **1** and **2**.



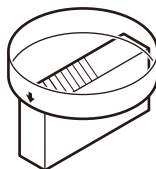
- 4 Remove the thick gauge block wrung in steps **1** and **2**. For details, see "Undoing wringing (removal)" on page 20.



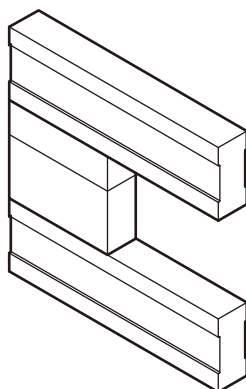
Proceed to step **4**.

4 When a thin gauge block is wrung, the surfaces of the gauge block must be checked with the optical flat (flatness check).

- » When no interference fringes appear (The wrung gauge block is not bent. → Proceed to step **5**.)
- » When irregular interference fringes appear (The wrung gauge block is bent. → Redo wringing from the beginning.)



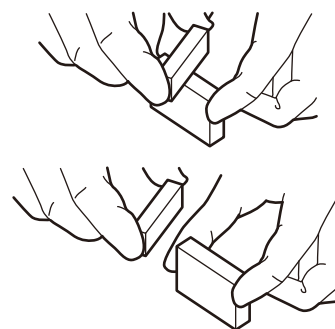
5 Wring the stack of gauge blocks together with the plain jaws in the same way as in step **3** (for two thick gauge blocks).



■ Undoing wringing (removal)

1 Disengage the wringing.

- 1** Rotate the gauge block and plain jaw wrung together and rotate the gauge blocks wrung together until they form a cross shape.
- 2** Disengage the wringing by sliding the gauge blocks and plain jaws to detach them.



2 Wipe any dirt off the gauge blocks and plain jaws.

Tips

For details about cleaning, see  "■ Cleaning" on page 29.

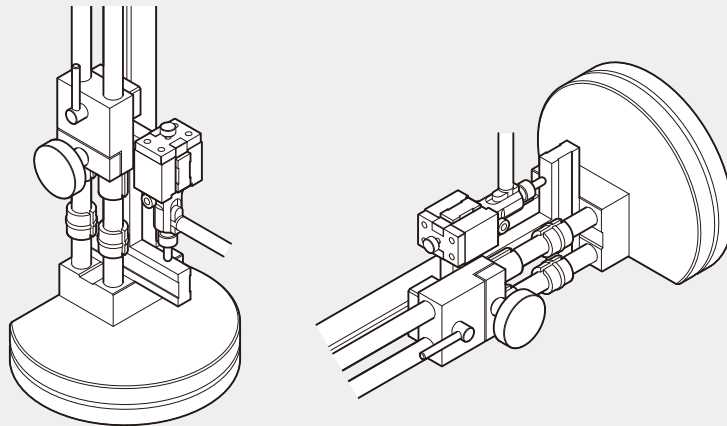
2.1.3 Mounting the Gauge Block(s), Plain Jaws, and Attachment

Mount the wrung gauge block(s) and plain jaws on the stand and then mount the attachment on one of the plain jaws.

1 Check the orientation of Bore Gage Zero Checker.

IMPORTANT

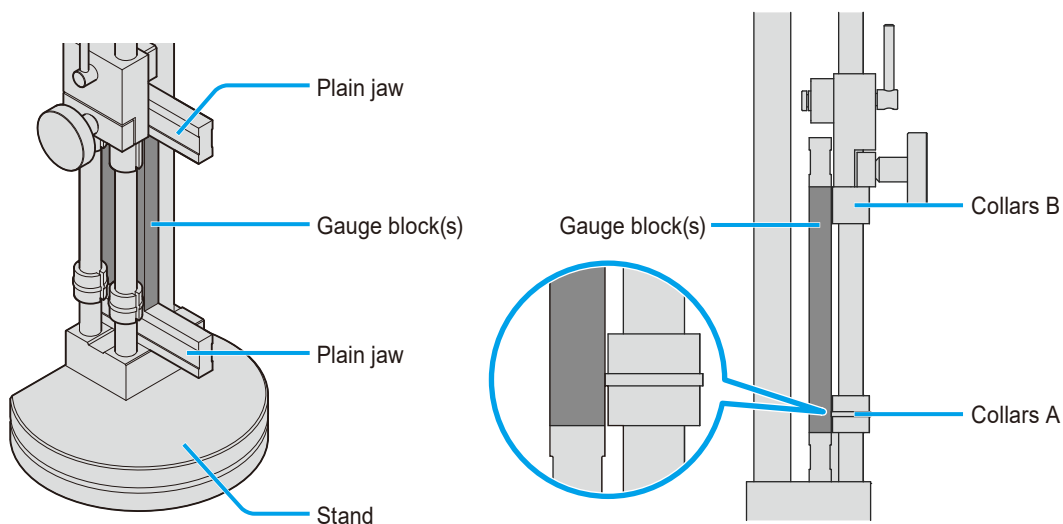
If the orientation of the bore gage during measurement and the orientation of the bore gage during base point adjustment (zero point adjustment) are different, it may result in measurement errors. Depending on the orientation at the time of measurement, use either a vertical or horizontal orientation when performing base point adjustment (zero point adjustment).



2 Set the wrung gauge block(s) and plain jaws on the stand (see the figure below).

3 Move Collars A and Collars B up and down and align them with the upper and lower ends of the gauge block(s).

4 Lightly press the lower end of the gauge block(s) against Collars A.



Tips

When the wrung gauge block(s) and plain jaws are vertical, they are set correctly.
At this time, there will be a gap between Collars B and the upper end of the gauge block(s).

2 Method of Operation

5 Rotate the clamping lever on the slider counterclockwise.

» This unlocks the slider.

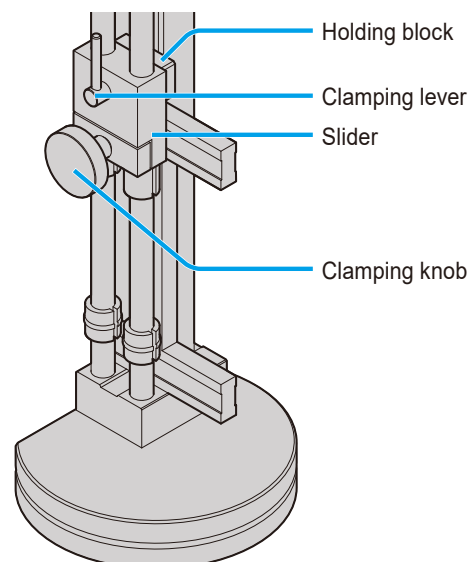
6 Slowly lower the slider until the holding block meets the plain jaw.

7 Tighten the clamping knob.

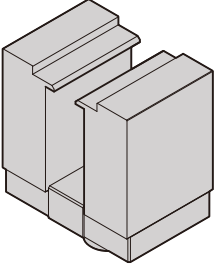
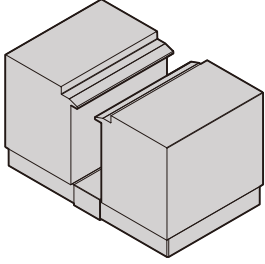
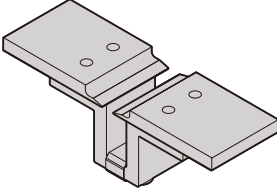
» This secures the slider to the column.

8 Rotate the clamping lever clockwise.

» This secures the gauge block(s) and plain jaws to the stand.



9 Mount an attachment matching the reference dimension to one of the plain jaws.

Part name	Type A	Type B	Type C
Illustration			
Measuring range of target bore gage	18 mm to 35 mm, 35 mm to 60 mm	50 mm to 100 mm, 100 mm to 160 mm	160 mm to 250 mm, 250 mm to 400 mm
	0.7 in to 1.4 in, 1.4 in to 2.5 in	2 in to 6 in, 4 in to 6.5 in	6.5 in to 10 in, 10 in to 16 in

IMPORTANT

When using a shallow hole bore gage, there is no need to mount an attachment.

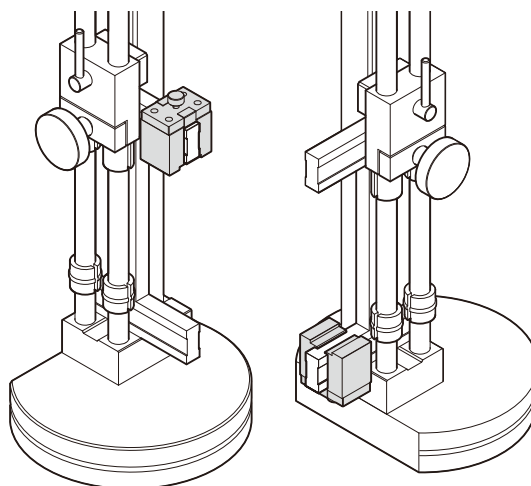
1 Set the attachment on either the upper or lower plain jaw.

Tips

The attachment can be mounted on either the upper or lower plain jaw, depending on the orientation when using the bore gage.

2 Tighten the securing knob for the attachment.

» This secures the attachment to the plain jaw.



2.2 Base Point Adjustment (Zero Point Adjustment)

Set the base point (zero point) of the bore gage.

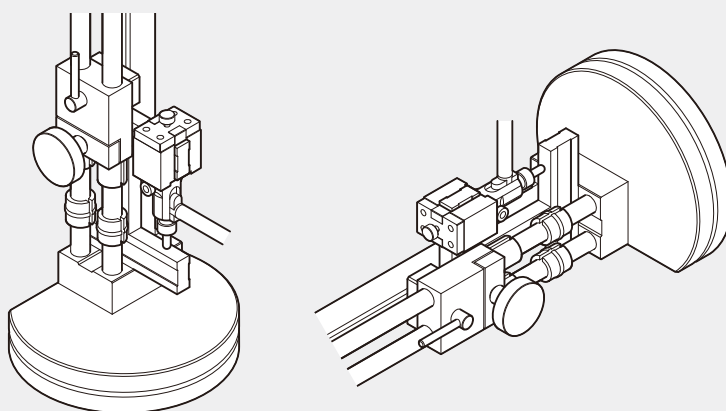
● Items needed for performing work

Please prepare the following.

- A bore gage used for measurement
- An indicator used with the bore gage (Dial Indicator/Digimatic Indicator)

IMPORTANT

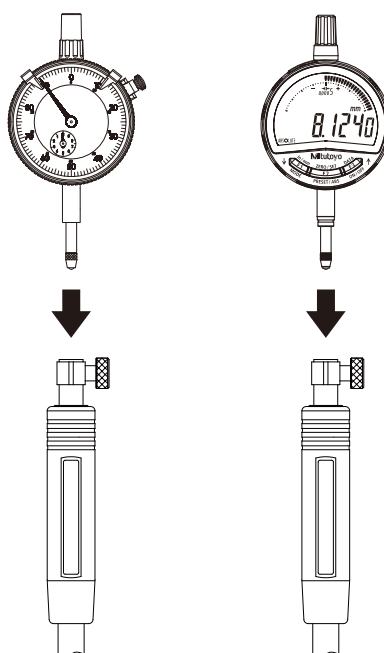
If the orientation of the bore gage during measurement and the orientation of the bore gage during base point adjustment (zero point adjustment) are different, it may result in measurement errors. Depending on the orientation at the time of measurement, use either a vertical or horizontal orientation when performing base point adjustment (zero point adjustment).



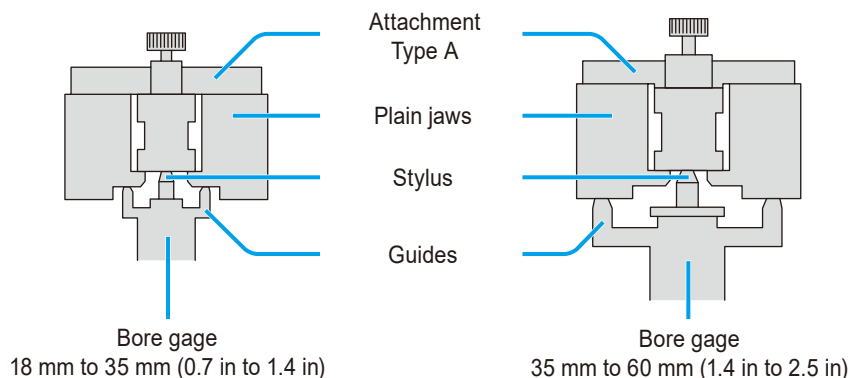
As an example, the following explanation describes the procedure for using this product in a vertical orientation with a Dial Indicator.

1 Attach the indicator to be used to the bore gage.

For details, see the  Bore Gage User's Manual.



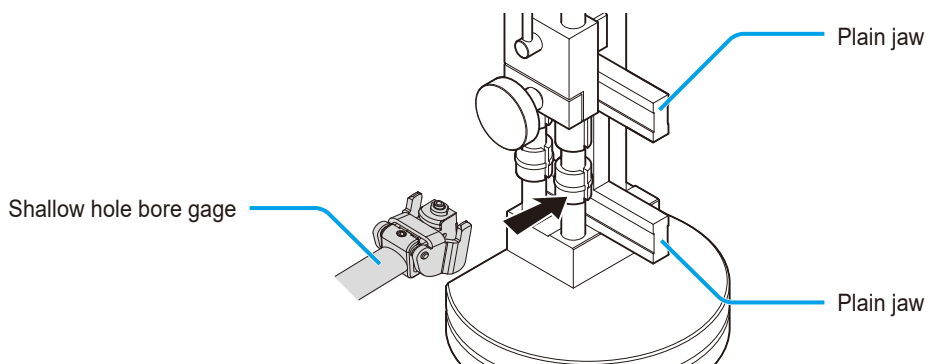
- 2** Except when using a shallow hole bore gage, insert the bore gage so that the guides touch the steps of the attachment.



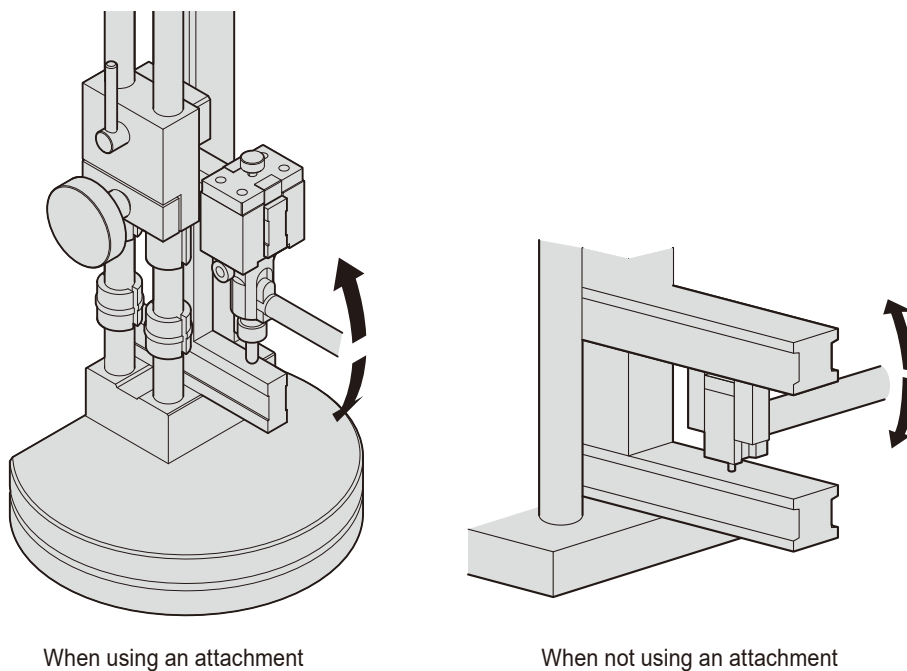
Tips

Except when using a shallow hole bore gage, inserting the bore gage while lifting the guides of the bore gage by hand will make it easier to insert.

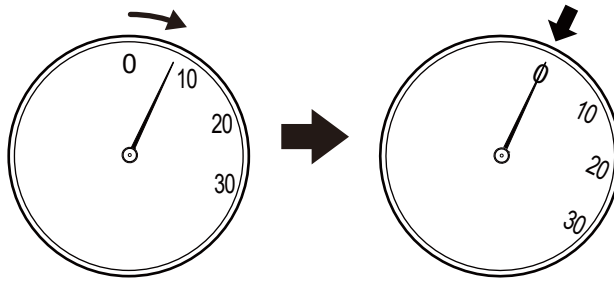
When using a shallow hole bore gage, insert the bore gage from the side of the plain jaws.



- 3** Swing the bore gage in the directions indicated by the arrows (up and down) and find the point where the indicator value is maximum (minimum dimension).

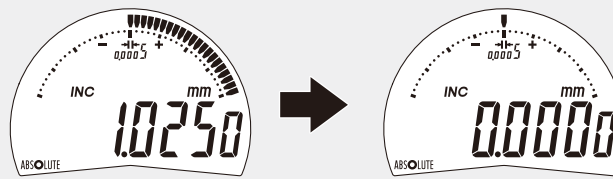


- 4 Rotate the dial of the Dial Indicator to set the pointer to "0".



Tips

When using a Digimatic Indicator, preset the display value (set it to an arbitrary number). For details about presetting, see the  Digimatic Indicator User's Manual.



MEMO

3 Troubleshooting

If base point adjustment (zero point adjustment) cannot be performed normally, refer to the following causes and countermeasures.

Problem	Cause	Countermeasures
Measured values vary when setting the base point.	The plain jaws and gauge block(s) are not properly wrung together.	Clean the measurement surfaces again, check for dust, etc., and then make sure to wring the gauge block(s) and plain jaws together properly.
	Dust is caught between the plain jaws and the gauge block(s).	For details, see  "2.1.1 Checking the Flatness of Wringing Surfaces and Removing Burrs" on page 16,  "2.1.2 Wringing Using Gauge Blocks and Plain Jaws" on page 18.
	The plain jaw(s) or gauge block(s) is worn or damaged (with scratches or dents).	If the measured values vary at multiple measurement locations, replace the plain jaws.
	The attachment is not mounted correctly.	Remove the attachment and re-mount it. For details, see  "2.1.3 Mounting the Gauge Block(s), Plain Jaws, and Attachment" on page 21.
The object cannot be measured with the bore gage.	The dimension of the gauge block(s) prepared does not match the inner diameter to be measured.	Prepare a gauge block or stack of gauge blocks with the appropriate dimension.

MEMO

4 Maintenance

This chapter explains the regular inspection and storage of this product.

In order to achieve the best performance with this product and use it safely over a long period, follow the maintenance instructions below.

CAUTION

When transporting this product or optional accessories, there is a risk of injury if handled improperly.



If this product is dropped or falls down, it may cause an injury. Please handle it with care.

■ Regular inspection

Check the underside of the stand, the plain jaws, the gauge blocks, and the optical flat for dirt and defects.

If any of these parts are dirty, clean them. Any defective parts will require repair. Please contact the agent where you purchased the product or a Mitutoyo sales representative ( "SERVICE NETWORK" on page App-1).

■ Cleaning

After using this product, use clean air to blow away any dust, etc., adhering to surfaces, and wipe off any oil stains, etc., with a lint-free cloth moistened in a solvent such as absolute alcohol.

Do not use air guns installed in factories, as they may be contaminated with oil or other substances.

DANGER

Organic solvents such as thinner and benzene have the risk of fire due to ignition or spontaneous combustion, and the risk of poisoning due to inhalation.



Do not use organic solvents such as thinner or benzene.

NOTICE

Do not use organic solvents such as detergents, thinner, or benzene, as they can degrade the product's quality or damage the product.

■ Storage

After cleaning, apply anti-rust oil to each part of this product (especially the underside of the stand), wrap it in anti-rust paper, cover it with a plastic bag, and store it in the box used for shipping. (The same applies for long-term storage.)

MEMO

5 Specifications

5.1 Specifications

Model number		CCG-400
Code No.		515-590
Base point adjustment (zero point adjustment) range		18 mm to 400 mm (0.7 in to 16 in)
Precision of plain jaw (single piece)	Flatness	0.5 μ m
	Parallelism	1 μ m
Operating environment		Temperature: 0 °C to 40 °C, Humidity: 30 % to 70 %
Storage environment		Temperature: -10 °C to 50 °C, Humidity: 30 % to 70 %
External dimensions (W × D × H)		120 mm x 100 mm x 550 mm
Mass		4.5 kg

■ Bore gage for base point adjustment (zero point adjustment)

- 511 Series Standard Bore Gage
- 511 Series Short Leg Bore Gage
- 511 Series Micrometer Head Bore Gage
- 511 Series Shallow Hole Bore Gage
- 511 Series Integrated Display Digital Bore Gage

5.2 Standard Accessories

Part No.	Item name
–	Main unit
940088	Attachment Type A
940089	Attachment Type B
940090	Attachment Type C
630030	Plain jaw (×2)
99MBF604B	User's Manual (this document)
–	Warranty card
–	Inspection certificate

5.3 Optional Accessories

Part No.	Item name
158-117	Optical flat (outer diameter: 45 mm, thickness: 12 mm, flatness: 0.2 μm)
158-118	Optical flat (outer diameter: 45 mm, thickness: 12 mm, flatness: 0.1 μm)
158-119	Optical flat (outer diameter: 60 mm, thickness: 15 mm, flatness: 0.2 μm)
158-120	Optical flat (outer diameter: 60 mm, thickness: 15 mm, flatness: 0.1 μm)
158-122	Optical flat (outer diameter: 1.8 in, thickness: 0.5 in, flatness: 0.000004 in)
158-124	Optical flat (outer diameter: 2.4 in, thickness: 0.6 in, flatness: 0.000004 in)
601644	Ceraston [external dimensions (W × D × H): 150 mm × 50 mm × 20 mm]
601645	Ceraston [external dimensions (W × D × H): 100 mm × 25 mm × 12 mm]

SERVICE NETWORK

*As of December 2022

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