

High-Accuracy Digimatic Micrometer MDH-MB

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.

WARNING Shows risks that could result in death or serious injury.

- Always keep batteries out of reach of children, and if swallowed, consult a physician immediately.
- Batteries should never be short-circuited, disassembled, deformed or come in contact with extreme heat or flames.
- If battery alkaline liquid comes in contact with the eyes, flush eyes immediately with clean water and consult a physician. If battery alkaline liquid comes in contact with the skin, flush the exposed area thoroughly with clean water.

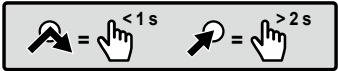
CAUTION Shows risks that could result in minor or moderate injury.

- Never attempt to charge the primary battery or reverse the positive-negative terminals when mounting. Improper battery handling or mounting may cause the battery to explode, cause battery leakage, serious bodily injury, or malfunction.
- 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.
- 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 an environment where it may contact water or oil.
- Do not apply excessive force or subject the product to sudden impacts such as dropping.
- Remove dust, cutting chips, etc. before and after use.
- When cleaning, wipe this product with a soft cloth moistened with diluted neutral detergent. Do not use an organic solvent such as thinner, which may cause the product to deform or malfunction.
- Do not press the display unit.
- The spindle is structured so that it cannot be pulled out. Do not forcibly retract it in excess of the measuring range.
- Dirt on the spindle may lead to malfunction. If the spindle becomes dirty, wipe it clean with a cloth containing a small amount of alcohol and apply a small amount of micrometer oil (Part No. 207000).
- Do not write numbers, etc. with an electric pen.
- If the product is to be out of use for three months or more, remove the battery before storage. Liquid leakage from the battery may damage the product.

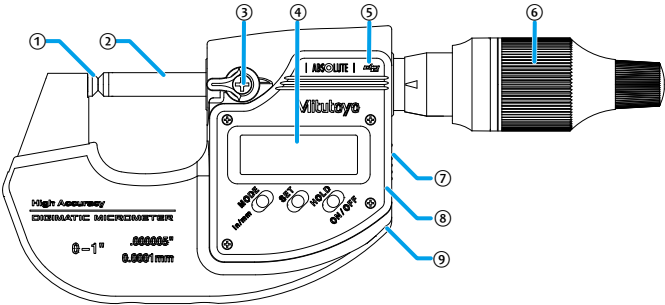
Key operation icon



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1. Names of Components



- ① Anvil

② Spindle

③ Swivel clamp (locks the spindle to prevent motion)

④ Display unit (LCD)

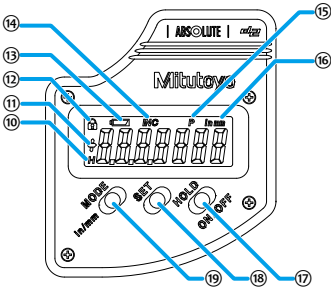
⑤ Marking for products compatible with 8-digit output
- ⑥ Ratchet thimble

⑦ Cover

⑧ Data output connector

⑨ Battery compartment cover (at rear)

■ Display Unit (LCD)



- Ⓢ Hold display

Ⓣ Sign display

Ⓤ Function lock display

Ⓦ Low voltage display

Ⓧ INC display
- Ⓨ Preset display

Ⓩ Unit display

ⓐ [HOLD] key, [ON/OFF] key

ⓑ [SET] key

ⓒ [MODE] key
[in/mm] key (in/mm products only)

2. Installing the Battery

NOTICE Shows risks that could result in property damage.

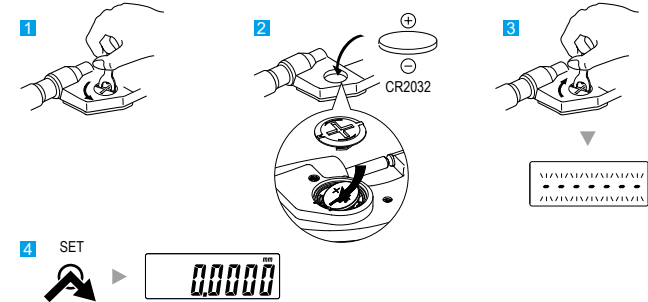
Always align the battery compartment cover with the threads and install so that the gasket does not protrude. The product may display an error or malfunction if the battery compartment cover or the gasket is not mounted correctly.

Tips

- Be sure to use CR2032 (lithium battery) for the battery.
- Do not rotate the thimble until the count is displayed. Initial setting of the control unit may fail and the product may not count normally. If you mistakenly move the thimble, reinstall the battery.
- The battery supplied is for confirming the functions and performance of the product. Note that this battery may not fulfill the predetermined life.
- Malfunction or damage due to depleted batteries, etc. is not covered by the warranty.
- Follow local rules and regulations regarding battery disposal.

The battery is not installed into the product at purchase. Install the battery as follows.

- 1 Insert the wrench (standard accessory, part No.200877), a coin, or a similar object into the groove of the battery compartment cover, and turn it left (counterclockwise) to remove the cover.
- 2 Install the battery (CR2032) in the direction of the arrow with the positive side facing up.
- 3 Position the battery compartment cover and turn it right (clockwise) to attach. Moving on, set the PRESET value (reference point).
- 4 Press the [SET] key.
➤ Count display appears and counting starts.



Tips

- Reinstalling the battery will erase the PRESET value (reference point). Perform reference point setting again (see "5. PRESET Value (Reference Point) Setting").
- If an abnormal display that indicates an error or counting failure, etc., is shown, try removing the battery and reinstalling.

7. Key Functions

■ Switching the Measurement Mode: [SET] Key

The following two measurement systems are available.

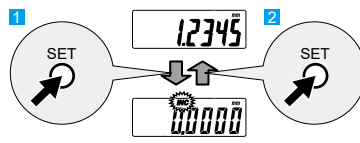
- Absolute measurement (ABS): Distance from the set (preset) reference is measured. This is compatible with many types of workpieces since the reference value can be set.
- Comparative measurement (INC): The difference between the zero-set position and the workpiece is measured.

1 Press and hold the [SET] key.

» [INC] is displayed, and the display is set to zero (comparative measurement).

2 Press and hold the [SET] key.

» [INC] is cleared, and the length from the reference point (anvil measurement surface) is displayed (absolute measurement).



Tips

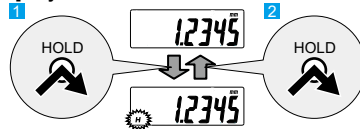
- Zero setting will be performed when the measurement system is changed from ABS to INC.
- Briefly press the [SET] key during INC measurement mode to zero-set the display.

■ Holding the Displayed Value: [HOLD] Key

1 Briefly press the [HOLD] key.

» [H] is displayed, and the display value is held.

2 Briefly press the key again to release the hold.

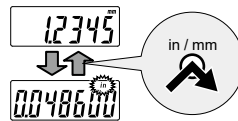


■ Switching between in and mm:

[MODE]/[in/mm] Key (in/mm Products Only)

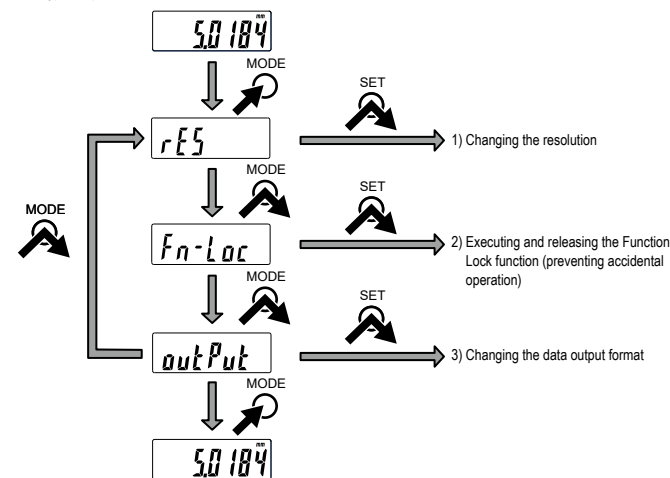
- Press the [MODE]/[in/mm] key.

» [in] and [mm] switch back and forth each time the key is pressed.



8. Setting the Parameters

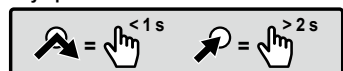
Three types of parameters can be set.



Tips

- To terminate the parameter setup before confirmation, press and hold the [MODE] key. However, unconfirmed settings will not be applied.
- Parameter settings are maintained even if the power is turned off. However, they will be erased when the battery is replaced and will need to be set again.

Key operation icon



1) Changing the resolution

The resolution can be set to 0.0001 mm or 0.0005 mm (for in/mm products, 0.00005 in or 0.00002 in).

1 Switch to parameter setting mode.

Press and hold the [MODE] key.

» The product enters parameter setting mode.

2 Select the parameter to set.

1 Confirm that [rES] is blinking.

2 Briefly press the [SET] key.

» The resolution can now be changed.

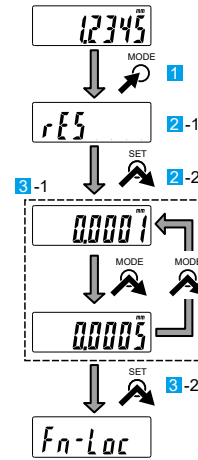
3 Set the resolution.

1 Briefly press the [MODE] key to select the resolution.

» Each time the key is pressed, the setting will change in the order of 0.0001 mm, 0.0005 mm, and 0.0001 mm (for in/mm products, each time the key is pressed, the setting will change in the order of 0.00005 in, 0.00002 in, and 0.00005 in).

2 Briefly press the [SET] key.

» When the setting is confirmed, the next parameter can be set (proceeds to step 2 in "2) Executing and releasing the Function Lock function (preventing accidental operation)").



2) Executing and releasing the Function Lock function (preventing accidental operation)

This product has a Function Lock function that disables the zero-setting function and the function to change the measurement system (ABS/INC) in order to avoid accidental changes to the reference point position. When the Function Lock function is set, [L] will light up on the display unit, the [SET] key will be disabled, and all operations except power on/off, display value hold/release, display value output, and Function Lock function release will be disabled.

● Executing the Function Lock function

1 Switch to parameter setting mode.

Press and hold the [MODE] key.

» The product enters parameter setting mode.

2 Select the parameter to set.

1 Briefly press the [MODE] key until [Fn-Loc] is displayed.

2 Briefly press the [SET] key.

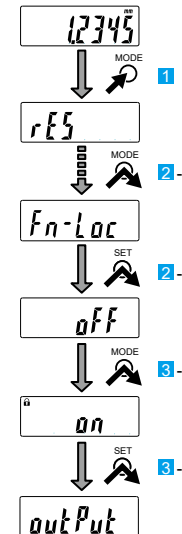
» The Function Lock function can now be changed.

3 Change the Function Lock function.

1 Briefly press the [MODE] key to select execution (on).

2 Briefly press the [SET] key.

» When the setting is confirmed, the next parameter can be set (proceeds to step 2 in "3) Changing the data output format").



Tips

- The Function Lock function is executed after parameter-setup mode completes and the product returns to measurement mode.
- Release the Function Lock function to set any items for functions that are locked.

● Releasing the Function Lock function

1 Switch to parameter setting mode.

Press and hold the [MODE] key.

» The product enters parameter setting mode (function lock).

2 Confirm the parameter to set.

Briefly press the [SET] key.

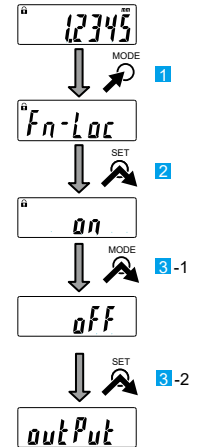
» The Function Lock function can now be changed.

3 Change the Function Lock function.

1 Briefly press the [MODE] key to select release (off).

2 Briefly press the [SET] key.

» When the setting is confirmed, the next parameter can be set (proceeds to step 2 in "3) Changing the data output format").



3) Changing the data output format

The data output format can be set to either 6 digits (out-d1) or 8 digits (out-d2). The parameter will be set to 6 digits (out-d1) after the battery is installed.

1 Switch to parameter setting mode.

Press and hold the [MODE] key.

» The product enters parameter setting mode.

2 Select the parameter to set.

1 Briefly press the [MODE] key until [outPut] is displayed.

2 Briefly press the [SET] key.

» The data output format can be set.

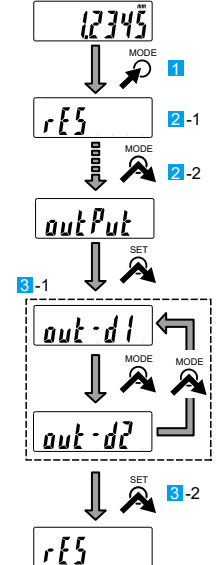
3 Set the data output format.

1 Briefly press the [MODE] key to select the data output format.

» Each time the key is pressed, the setting will change in the order of out-d1, out-d2, out-d1.

2 Briefly press the [SET] key.

» When the setting is confirmed, the next parameter can be set (proceeds to step 2 in "1) Changing the resolution").



Tips

- When out-d1 is selected, the Digimatic output is 6 digits.
- When out-d2 is selected, the Digimatic 2 output is 8 digits.

9. Installing the Heat-Resistant Cover

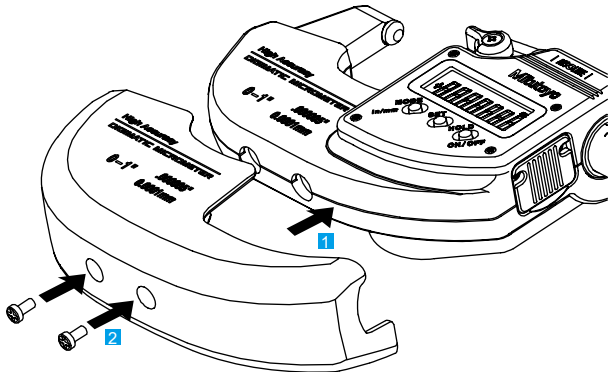
Installing the supplied heat-resistant cover reduces the transmission of heat from one's hands to the frame when measuring while holding the product, and it can reduce the error caused by the heat expansion of the frame.

Always install and use the supplied heat-resistant cover when measuring while holding the product with your hands.

- 1 Install the heat-resistant cover from the bottom side of the product.
- 2 Tighten the securing screws (two places) with a Phillips screwdriver.

Tips

- To remove the heat-resistant cover, perform the installation procedure in the opposite order.
- Store the securing screws so that they are not lost.
- For details about measurement error due to temperature, see "13. Measurement Error Due to Temperature Fluctuations".



10. Errors and Troubleshooting

Error display	Causes and countermeasures
Power Voltage Drop 	The battery voltage is low. Replace the battery promptly.
Display Overflow 	The measured value exceeds the number of digits that can be displayed. <ul style="list-style-type: none">For the ABS measurement system, press the [SET] key to enter setup for the measurement origin, and reset the preset value.For the INC measurement system, press the [SET] key at the appropriate position to perform a zero set.
Abnormality Detected in the Sensor Signal 	The signal from the sensor has an abnormality. Try removing the battery and reinstalling. If it does not recover after being reset, repair is required: please contact the agent where you purchased the product or a Mitutoyo sales representative.
Abnormality Detected in the Sensor Signal 	The signal from the sensor has an abnormality. Try removing the battery and reinstalling. If it does not recover after being reset, repair is required: please contact the agent where you purchased the product or a Mitutoyo sales representative.
Counting Error 	The positional calculation is erroneous due to an abnormality in the signal from the sensor. Try removing the battery and reinstalling. If it does not recover after being reset, repair is required: please contact the agent where you purchased the product or a Mitutoyo sales representative.
Abnormality Detected of Setting Rewrites 	Internal settings are being rewritten due to the intrusion of oil, etc. Try removing the battery and reinstalling. If it does not recover after being reset, repair is required: please contact the agent where you purchased the product or a Mitutoyo sales representative.

11. Specifications

Measuring range:	0–25 mm 0–1 in (in/mm products only)
Resolution:	0.0001 mm (can be changed to 0.0005 mm) 0.000005 in (can be changed to 0.00002 in) (in/mm products only)
Maximum permissible error J_{MPE}^*1 :	$\pm 0.5 \mu\text{m}$ $\pm 0.00002 \text{ in}$ (in/mm products only)
Measuring force:	7 N–9 N
Display unit:	LCD (7-digit and minus sign)
Power:	Lithium battery (CR2032) x1
Battery life *2:	About two years
Temperature range:	20 °C (temperature of assured accuracy), 5 °C to 40 °C (operating temperature), –10 °C to 60 °C (storage temperature)
Standard accessories:	Heat-resistant cover (No.04AAB969A), wrench (No.200877), screwdriver (No.04AAB985), wiping sheet, inspection results
CE-marking:	EMC Directive: EN 61326-1 Immunity test requirement: Clause 6.2 Table 2 Emission limit: Class B RoHS Directive: EN IEC 63000

*1: Maximum permissible error for indicated value via contact with the full measuring face J_{MPE} (20 °C).
*2: Under normal usage conditions. The battery life will fluctuate according to the usage conditions.

12. Output Function

Display Value External Output

The display value can be output to a device by connecting the product and the external device with a connecting cable (optional accessory).

Connecting Cable Installation Method

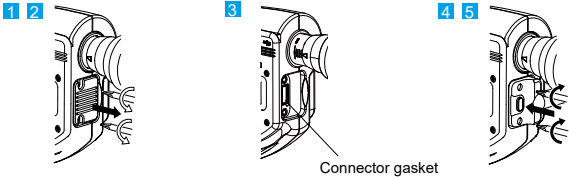
NOTICE Shows risks that could result in property damage.

- Always use the 0-size Phillips screwdriver (No.04AAB985) supplied with the product when installing/removing screws, and tighten with a torque of about 5 to 8 cN·m. Otherwise, it may cause damage.
- When connecting the connecting cable, ensure that the connector gasket does not protrude. If the connector gasket is not installed properly, it may lead to malfunction.

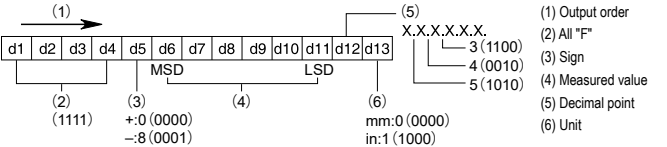
Tips

- The maximum number of digits this product can display is 7. Note that when using 6-digit output (out-d1) for the data output format, the data must be re-read. Also note that if 100 mm or more is displayed for the preset function, the digit in the position of the highest value will not be output.
- For in/mm products (resolution: 0.000005 in), the value after the decimal point is output as an integer value. (Example: A value displayed as "0.012345 in" will be output as "12345 in".)
- For in/mm products (resolution: 0.00002 in), if a measured value exceeding "10 in" is displayed for the preset function, the digit in the position of the highest value will not be output.
- The data output format will be set to 6 digits (out-d1) after the battery is installed.
- If connecting a peripheral device not compatible with 8-digit output, set the data output format to 6 digits (out-d1).
- If outputting to a peripheral device that is compatible with 8-digit output, set the data output format to 8 digits (out-d2).
- For details about changing the data output format, see "8. Setting the Parameters 3) Changing the data output format".

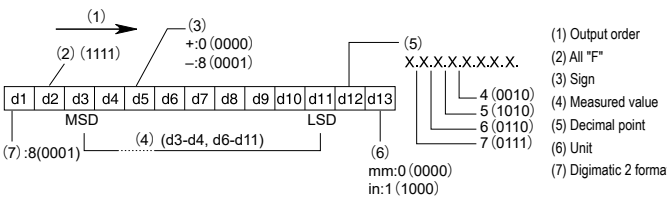
- 1 Use the Phillips screwdriver supplied with the connecting cable to remove the cover fixing screws (M1.7 x 0.35 x 4, No.04AAB541).
- 2 Remove the cover.
- 3 Check that the connector gasket (No.09GAA374) is correctly installed at the proper position (do not remove the connector gasket).
- 4 Mount the connecting cable plug.
- 5 Hold the plug manually so that there is no gap between the plug and the connector on the micrometer body, and fasten using the connecting cable fixing screws.



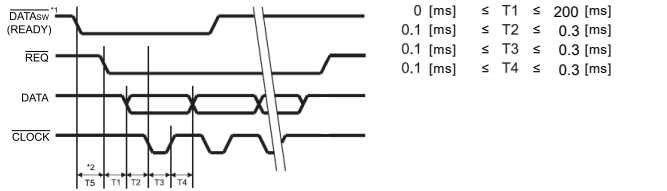
Output Data Format (When Set to 6 Digits)



Output Data Format (When Set to 8 Digits)



Timing Chart



13. Measurement Error Due to Temperature Fluctuations

Because the display resolution of this product is 0.1 μm , the measurement results will be affected by heat expansion of this product caused by temperature fluctuations.

Performing high-accuracy measurements with the stand installed is recommended. Always use the supplied heat-resistant cover when measuring while holding the product with your hands. Measured data under the following two conditions is provided below as a reference.

■ Measurement Error Due to Temperature Fluctuations When the Heat-Resistant Cover Is Used

Shows the effect on the frame using the supplied heat-resistant cover when measuring while holding the product with one's hands.

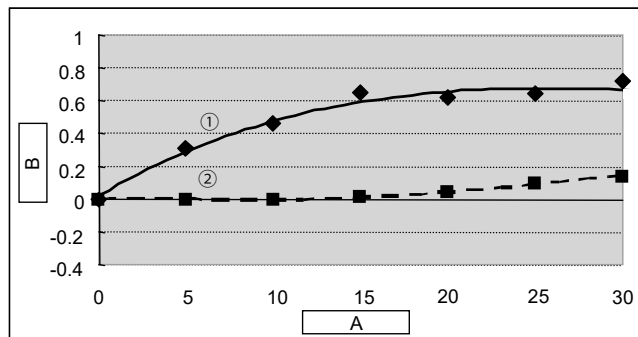
Measurement environment: Ambient temperature 20 °C, humidity 50 %, measured at anvil position

① Without heat-resistant cover

② With heat-resistant cover

A. Holding time (minutes)

B. Extension (μm)



■ Amount of Displacement Due to Fluctuations in Ambient Temperature

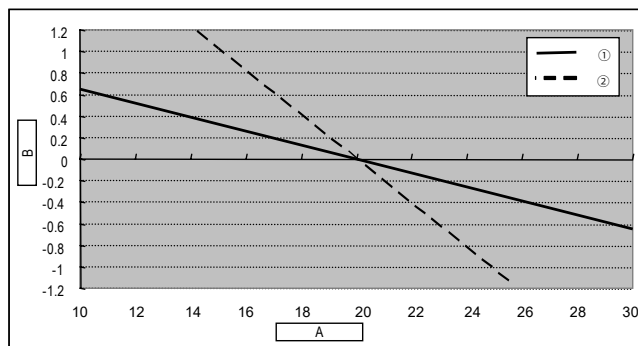
If the ambient temperature of the measurement environment changes, the entire measuring tool will expand due to heat.

① Steel gauge block

② Zero-expansion glass

A. Environment temperature (°C)

B. Displacement from 20 °C (μm)



14. Optional Accessories

- Connecting cable: No.05CZA662 (1 m)
- Connecting cable: No.05CZA663 (2 m)
- Wiping sheet (1000 sheets): No.04AZB581

For optional accessories other than the above, see the General Catalog.

15. Off-Site Repairs (Subject to Charge)

Off-site repair (subject to charge) is required in the case of the following malfunctions. Please contact the agent where you purchased the product or a Mitutoyo sales representative.

- Faulty spindle operations

Scratches on the spindle may cause interference while the spindle is retracting, causing faulty operations.

Rust on the spindle may also cause faulty operations.

- Inconsistent measured values

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

- Count value errors/faulty operations

If the thimble of this product is retracted too far, the internal sensor will be damaged. This may cause count errors or faulty operations.