Magnescale®

Counter Unit
LY72

Read all the instructions in the manual carefully before use and strictly follow them.
Keep the manual for future references.

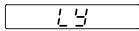# Instruction Manual (Operating manual)

Contents

1. Basic Operation

The operations below are possible after performing "4. Settings" in the Installation Manual.
Perform all the operations in the order below, and be sure that you understand the basic operation.
After understanding the basic operation ("4-2. Making and Changing the Basic Settings" in the Installation Manual), make any necessary basic settings before using the unit.

1-1.   Enabling Display

When the basic settings are made ("4. Settings" in the Installation Manual), the data for three axes of the measuring units is displayed.

1   Perform the procedure in "4-1. Enabling Operation" in the Installation Manual.

2   Press the ◯ (RESET) key on counter display A (or X).
   .... The counter display changes from the $L\,Y$ display
      to the count display.

$$\boxed{L\,Y} \rightarrow \boxed{l.000}$$
(Count display)

3   Move the measuring unit.
   .... The numerical value of the displayed position data changes. $\boxed{l535}$

∗ If no value is displayed, and an $Error$ display is shown, go to "2-15. Clearing the $Error$ Display".

1-2.   Setting the Display Value to Zero (Reset Function)

This sets the displayed value to zero.

1   Press the ◯ (RESET) key. $\boxed{l0.050} \rightarrow \boxed{0.000}$
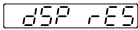
∗ The display value can also be reset by an external signal (Reference: "2-14-1. Resetting with an external signal")
∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

1-3.   Changing the Display Resolution

After making the basic settings, the display resolution is the same as the input resolution of the measuring unit. To use a lower display resolution, follow the procedure below to change the display resolution.

1   Press the ◯ (SETUP) key during count display. $\boxed{l0.050} \rightarrow \boxed{Pon\ dSP} \xrightarrow{\text{After 1 second}} \begin{smallmatrix}\text{(For example)}\\ \boxed{L\,Y}\end{smallmatrix}$

2   Press the ◯ ⇧ key.
   .... The display resolution is shown. $\boxed{dSP\ rES} \xrightarrow{\text{After 1 second}} \begin{smallmatrix}\text{(Example: 0.005)}\\ \boxed{0.005}\end{smallmatrix}$

3   Press the ◯◀ key. (The axis label flashes.)

4   The display changes each time the ◯◀ key is pressed. Press until the desired display resolution is shown.

5   Press the ◯ (ENT) key.
   .... The resolution displayed in step **4** is set.

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

1-4. Switching the Display Data (Example: Current value → Maximum Value) (When the axis label ABC is selected only)

Currently-displayed data can be switched.

1 Press the ⟨ key on counter display A. (The axis label flashes.)

2 Press the ○ ⇧ key. (The MAX lamp lights on.)

3 Press the ○ᴱᴺᵀ key. (The axis label lights on.)
.... The display for counter display A changes to the maximum value.
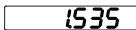
∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

1-5. Reading the Maximum/Minimum Values of Measured Data
(When the axis label ABC is selected only)

Use the procedure in "1-4. Switching the Display Data" to change the display data. The maximum value, minimum value, and peak-to-peak value ∗ can be measured.

∗ Peak-to-peak value = MAX (maximum value) – MIN (minimum value)

Example: When counter display A shows the maximum value
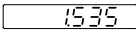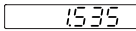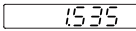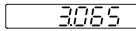
1 Press the ○ᴿᴱˢᴱᵀ key on counter display A. | 0.000 |

2 Move the measuring unit in the positive or negative direction to start | 0.000 | | 1.535 |
measurement.
.... The display for counter display A is updated in the increasing
direction, but the value is held when moved in the decreasing
direction.

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

1-6. Recalculating the Maximum and Minimum Values (Restart Function)
(When the axis label ABC is selected only)

Pressing the ○ˢᵀᴬᴿᵀ key recalculates the maximum and minimum values from
that point.

Example: When counter display A shows the maximum value

1 Press the ⟨ key on counter display A.

2 Press the ○ˢᵀᴬᴿᵀ key. | 1.535 | | 1.535 |
.... The display shows the same value as the current value.

3 Move the measuring unit. | 1.535 | | 3.065 |
.... The maximum value is updated.

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

1-7.   Setting Values to the Display (Preset Function)

This sets a value to the current value that is displayed.

1   Press the ⟲ key. (The ⟲ lamp lights on.)

2   Press the ◯ key on counter display A. (The axis label flashes.)

3   Use the ◯ key to move the digit, and then use the numeric keys to enter the value.

4   Press the ◯ENT key.

.... This sets the entered value. At the same time, the restart function is activated, and the maximum and minimum values are also set to the same value. (The peak-to-peak value becomes 0.)

∗   An entered value can be set from an external device using the preset operation. (See "2-14-9. Setting a values input by Preset from an external device".)
∗   Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

This completes the basic operations.

The next sections describe other operations and functions. Be sure to make the necessary settings in the basic and advanced settings before using. (See "4. Settings" in the Installation Manual.)

2. Applied Operation

Note

When the ◯ key is pressed to switch to axis selection mode, pressing a different function key cancels axis selection mode.

2-1. Inch/mm Selector

Basically, this operation can be done in any mode.

∗ The selector is only effective if the destination country is set to US or STD. You can confirm the current unit by looking at the lit display below the key.

1 Press the ◯ key.

2 **Returning to the previous unit display**
Press the ◯ key again.

2-2. Determining the Measurement Datum Point Position (Datum Point Setting)

Although pitch measurement (Incremental (INC)) can be made from positions that were reset or preset, the total dimensions are unknown. The total measurement (Absolute (ABS)) can also be made when the datum point is set.
(See "2-3. Switching between the ABS Display and INC Display".)
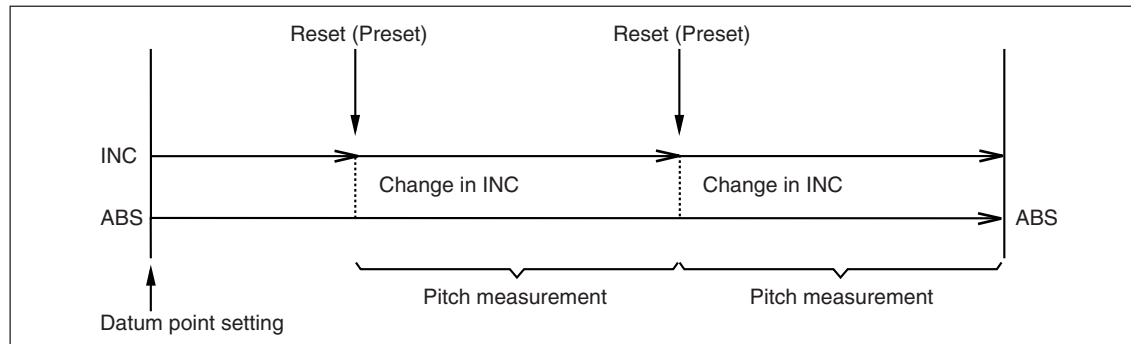
Note

When the axis label ABC is selected only

• The maximum value, minimum value, and peak-to-peak value are calculated based on the INC value.
• The counter display showing the peak value (maximum value, minimum value, peak-to-peak value) cannot set the datum point.

1 Press the ⬤S key. (The ⬤S lamp lights on.)

2 Press the ◯ key. (The axis label flashes.)

3 Use the ◯ key to move the counter display digit, and then use the numeric keys to enter the position (numerical value) for the datum point.

4 Use the ◯ENT key to set the value.

∗ When the datum point is set, the INC value is initialized and is identical to the ABS value until it is reset or preset.

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

2-3. Switching between the ABS Display and INC Display

Switching between the ABS display and INC display enables measurement while checking the total dimensions and pitch.

The display can be switched when the ⌀ᴾ lamp, ⬥ˢ lamp, or ⌀ᴿᴱᶠ lamp is not lit on. When the ABS display is shown, the ABS lamp on the counter display lights on.

| Note |

When the ⌀ᴾ lamp is lit on, the setting is fixed at INC display. When the ⬥ˢ lamp/⌀ᴿᴱᶠ lamp is lit on, the setting is fixed at ABS display.

(See "2-2. Determining the Measurement Datum Point Position (Datum Point Setting)".)

1   Press the ⌀ᴬᴮˢ/ᴵᴺˢ key.

2   **Returning to the previous display**
Press the ⌀ᴬᴮˢ/ᴵᴺˢ key again.

∗   Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)
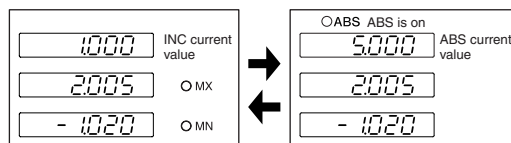
2-4. Relocating the Datum Point Position (Reference Point Operation)

When using a measuring unit with reference point, performing the reference point operation beforehand (see procedure below) enables relocation of the datum point position even if the datum point position that was set is unknown.

When the datum point position is unknown (examples)

- After the power is turned off, the measuring unit is moved
- Storing of the current value is not enabled (See "4-3. Advanced Settings" (Current value store) in the Installation Manual.)
- The power was cut off during operation

2-4-1.   Recording the datum point position

1   Press the ⌀ᴿᴱᶠ key. (The ⌀ᴿᴱᶠ lamp lights on.)

2   Press the ◯ key. (The axis label flashes.)

3   Press the ◯ᴱᴺᵀ key.

4   Move the measuring unit until it beeps. (The beeping sound is made when going past the reference point.)
.... The display is held.
∗   Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

5   Press the ◯ key.

6   Press the ◯ᴱᴺᵀ key.
.... The hold on the display is canceled.
∗   Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

This enables storing and relocation of the distance between the datum point position and reference point.

2-4-2. Relocation of the datum point position

7 **When the REF lamp is not lit on**
Press the $\circ^{REF}$ key. (The $\circ^{REF}$ lamp lights on.)

8 Press the $\circ$ key. (The axis label flashes.)

9 Press the $\bullet^{S}$ key.
.... The stored value is displayed.

10 Press the $\circ^{ENT}$ key.

11 Move the measuring unit until it beeps. (The beeping sound is made when going past the reference point.)
.... The count is started, and the datum point position is relocated.

∗ The datum point position can be relocated by input from an external signal. (See "2-14-5. Relocating the datum point position with an external signal".)

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

2-5. Pausing Maximum Value/Minimum Value Calculation (Pause)
(When the axis label ABC is selected only)

When making continuous measurements of multiple objects to calculate the total maximum value and minimum value, in some cases, the measurements will be updated to unneeded data unless they are stopped before finishing. In these types of cases, perform the procedure below to temporarily stop calculation of the maximum value and minimum value.

Measurement

Example 1 The measuring unit is moved outside the measurement range between ① and ②.

Example 2 Pause
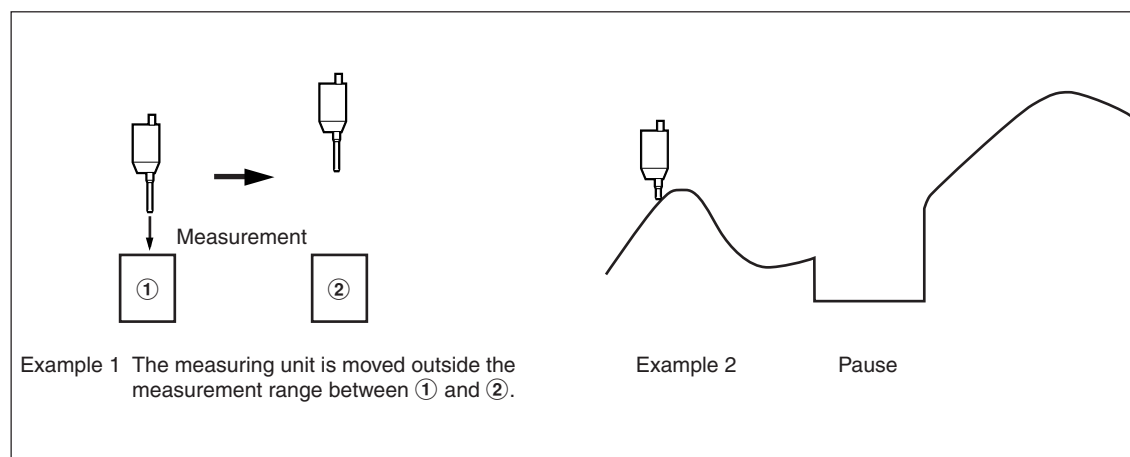
1 Select $PAUSE$ in the Hold setting.
➡ Installation manual "4-3. Advanced Settings" (Hold function)

2 Press the $\circ^{HOLD}$ key. (The $\circ^{HOLD}$ lamp lights on.)
.... The calculation of the maximum and minimum values is paused.

Restarting
Press the $\circ^{HOLD}$ key. (The $\circ^{HOLD}$ lamp lights off.)

∗ Pause can be performed by input from an external signal.

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

2-6. Pausing Updates of Display Data (Latch)

If you prefer to read selected position data without pausing the calculation itself, updating of the display only can be paused.

1 Select $LATCH$ in the Hold setting.
 ➡ Installation manual "4-3. Advanced Settings" (Hold function)

2 Press the ⟳ HOLD key.
 .... Updating of the display data is paused. (The ⟳ HOLD lamp lights on.)

Restarting
Press the ⟳ HOLD key. (The ⟳ HOLD lamp lights off.)

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

2-7. Changing the Display Scale

This sets the count display magnification. This is effective for situations such as when measuring an object where the scale was changed.
 ➡ Installation manual "4-3. Advanced Settings" (Scaling)

2-8. Reducing Flickering of the Minimum Digit

If the number for the minimum digit of the display value is unstable and difficult to check, flickering of the display can be reduced.
 ➡ Installation manual "4-3. Advanced Settings" (Flicker control)

2-9. Disabling Key Operation (Preventing Accidental Operation)

This locks key operation to prevent unintended operations.
 ➡ Installation manual "4-3. Advanced Settings" (Key lock)

After making the setting, the only valid key operations are the ⏻ (Standby) key and ⟳ SETUP key.

A password must be entered to remove the key lock. Pressing the ⟳ SETUP key displays the password input display.
 ➡ Installation manual "4-3-10. Key Lock"

2-10. Power Outage Detection On/Off

In the shipping settings, $L\,4$ is displayed to indicate that a power outage has occurred. When the detection setting is activated, $L\,4$ is displayed whenever the power is turned on.
The setting can also be made to display the count directly when the power is turned on without detection.

| Note |

The basic settings cannot be made during count display. To change the basic settings, first return the display to the setting (power outage detection on).

➡ Installation manual "4-3. Advanced Settings" (Display at power ON)

2-11. Power Save

The display can be turned off automatically when no operations will be performed for a certain period of time such as when pausing work during operation. The display is restored whenever the measuring unit is moved or a key operation is made.

➡ Installation manual "4-3. Advanced Settings" (Sleep)

2-12. Changing the Display Axis

This can display the 1st axis input on counter display B (or Y) and the 2nd axis input on counter display A (or X).

➡ Installation manual "4-3. Advanced Settings" (Display axis, and display data at power ON/Display axis)

2-13. Master Calibration (When the axis label ABC is selected only)

When using a gauge-type measuring unit, an operation known as master calibration is sometimes performed when starting operation. The master calibration operation can be simplified if a gauge-type measuring unit with reference point is used together with the master calibration function in this counter unit.

Master calibration value setting

1 Set the master calibration to ON.
➡ Installation manual "4-2. Making and Changing Basic Settings"

2 Press the ○ (RESET) key in the $\llcorner \mathrm{H}$ display mode.
.... This sets to the reference point signal standby mode.

3 Go past through the reference point.
.... The count display is shown.

4 Press the ⬥S key.

5 After installing the master for performing master calibration, bring the gauge-type measuring unit into contact with the master.

6 Press the ○ key.

7 Use the numeric keys to enter the master calibration value.

8 Press the ○ENT key.
.... The master calibration value is saved.

After this is completed, the master calibration operation is no longer necessary.

∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

Relocating the master calibration value

1 Turn on the power, and press the ○ (RESET) key in the $\llcorner \mathrm{H}$ display mode.
.... This sets to the reference point signal standby mode.

2 Go past the reference point.
.... The master calibration value is relocated.

After this is completed, the master calibration operation is no longer necessary.

∗ Relocation of the master calibration value can also be performed by input from an external signal. (An external reference point load input signal is input.)
∗ Operation can also be performed using RS-232C commands. (See "3. RS-232C Commands".)

2-14. External Input/Output

2-14-1. Resetting with an external signal

Connections are required.

Ex. RESET A or Ex. RESET X : Counter display A or X reset
Ex. RESET B or Ex. RESET Y : Counter display B or Y reset
Ex. RESET C or Ex. RESET Z : Counter display C or Z reset

➡ Installation manual "4-3. Advanced Settings" (General-purpose input)

2-14-2. Switching the display data from an external device
   (When the axis label ABC is selected only)

Connections are required.

Ex. IN A or Ex. IN X : Counter display A input signal
Ex. IN B or Ex. IN Y : Counter display B input signal
Ex. IN C or Ex. IN Z : Counter display C input signal

➡ Installation manual "4-3. Advanced Settings" (General-purpose input)

2-14-3. Sending alarm signals to an external device

Connections are required.

OUT AX : Counter display A or X output
OUT BY : Counter display B or Y output
OUT CZ : Counter display C or Z output

➡ Installation manual "4-3. Advanced Settings" (General-purpose output)

2-14-4. Sending the display data to an external device
   (When the axis label ABC is selected only)

Connections are required.

➡ Installation manual "4-3. Advanced Settings" (General-purpose input)

2-14-5. Relocating the datum point position with an external signal

The operation in "2-4-2. Relocation of the datum point position" can be used to relocate with an external signal.
Connections are required.

Ex. IN A or Ex. IN X : Counter display A or X input signal
Ex. IN B or Ex. IN Y : Counter display B or Y input signal
Ex. IN C or Ex. IN Z : Counter display C or Z input signal

➡ Installation manual "4-3. Advanced Settings" (General-purpose input)

2-14-6. Sending the reference point detected signal to an external device

When performing the reference point operation, the reference point detected signal can be sent. The signal is not output even when going past the reference point unless the reference point operation is performed. Connections are required.

Output 1 : Counter display A or X output signal
Output 2 : Counter display B or Y output signal
Output 3 : Counter display C or Z output signal

➡ Installation manual "4-3. Advanced Settings" (General-purpose output)

2-14-7. Operating the hold function from an external device

The hold function (Latch, Pause) can be performed by an external signal. This function is activated when turned ON/OFF once, and it is disabled when turned ON/OFF again.
Connections are required.

Ex. IN A or Ex. IN X : Counter display A or X input signal
Ex. IN B or Ex. IN Y : Counter display B or Y input signal
Ex. IN C or Ex. IN Z : Counter display C or Z input signal

➡ Installation manual "4-3. Advanced Settings" (General-purpose input)

2-14-8. Operating restart from an external device
(When the axis label ABC is selected only)

Restart can be performed by an external signal.
Connections are required.

Ex. IN A : Counter display A input signal
Ex. IN B : Counter display B input signal
Ex. IN C : Counter display C input signal

➡ Installation manual "4-3. Advanced Settings" (General-purpose input)

2-14-9. Setting a value input by Preset from an external device

This sets a value input by Preset from an external device beforehand. However, the value that is called is the first (No. 1) of the three values.
Connections are required.

2-15. Clearing the $Error$ Display

When an $Error$ display is shown, pressing the $\overset{\text{RESET}}{\bigcirc}$ key clears the display. However, the error cannot be cleared if the cause of the error is not removed.

Differences from regular reset

In addition to the incremental value, the absolute value is also reset to zero. Therefore, to relocate the datum point position, perform the procedure in "2-4-2. Relocation of the datum point position". If the master calibration function is set to ON, master relocation is performed, and the measuring unit must go past the reference point.

2-16. Presetting Multiple Points

Up to three preset values can be saved.

1 Press the ⌀ᴾ key. (The ⌀ᴾ lamp lights on.)

2 Press the ◯ key.

3 Press the ◯ ⇧ key to switch to the preset number to be set.

4 Enter a numerical value.

5 Press the $\overset{\text{ENT}}{\bigcirc}$ key.
   .... This sets the entered value.

Repeat steps **2** to **5**.

2-17. Compensating the Position

If the machine or other object where the measuring unit is mounted has some sagging and the position is shifted, a compensation can be entered. Use the procedure below to measure the compensation value. Use the linear compensation in the Installation Manual to set the compensation amount that is obtained.

2-17-1. Compensation

Generally a machine tool has its inherent geometric error. For example, with a knee type milling machine, the knee is slightly tilted as the table moves and the horizontal component of this inclination is added to the measuring unit displacement as an error. When the displayed value is obtained by adding an error compensation corresponding to the actual displacement, the mechanical error is compensated for and a more accurate display value is obtained for the actual displacement of the machine table, thus yielding more accurate machining.

The unit is factory-set so that the compensation function is not activated.

If the compensation value is not known, set the compensation value to OFF in the "advanced settings", and redo the settings after measuring the compensation value.

2-17-2. Linear Compensation

The linear compensation is set using the following process.

| Measure the compensation (error) value | → | Set the linear compensation value ("Advanced Settings") |
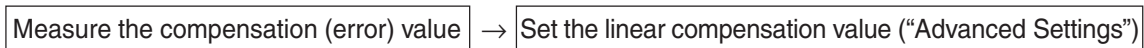
Compensation amount : up to ±600 μm/m (can be entered in measuring unit input resolution units)
　　　　　　　　　　　* Max. ±1000 μm/m with the expansion function

The compensation amount is a displacement of 1 m for the millimeter operation. Input the value as millimeter unit.

Error (compensation) measurement (Linear compensation)

Following is an example of machine error measuring procedures for determining the amount of compensation.

1 Place a block gauge Ⓐ on the machine table until the block gauge Ⓐ assumes the same temperature as the machine table.
Then touch the surface B of the block gauge Ⓐ with a block gauge Ⓑ.

Example: L = 250 mm (L = 9.84250 in)
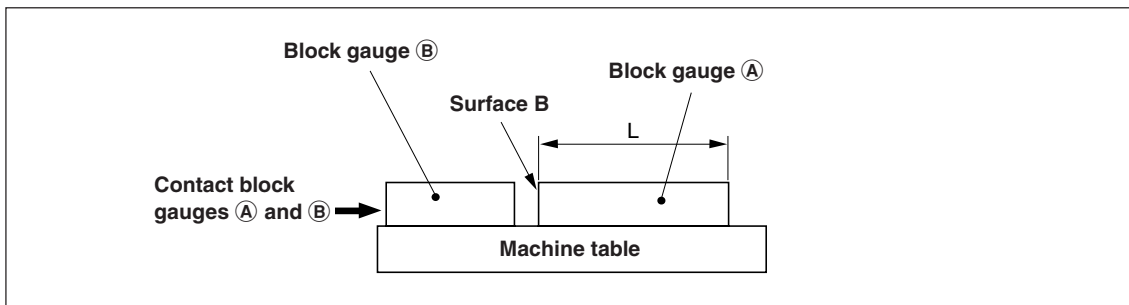
2 Touch the surface A of the block gauge Ⓐ with the probe of an electric micrometer or dial gauge and align the micrometer hand to read "0." Simultaneously reset the counter unit.

| 0.000 |

When the display resolution is 0.001 mm

② Press ◯ RESET key when the meter reads "0."

RESET
◯ key

Electric micrometer

Spindle head

Block gauge Ⓑ

Block gauge Ⓐ

① **Touch probe to surface**

h

Machine table
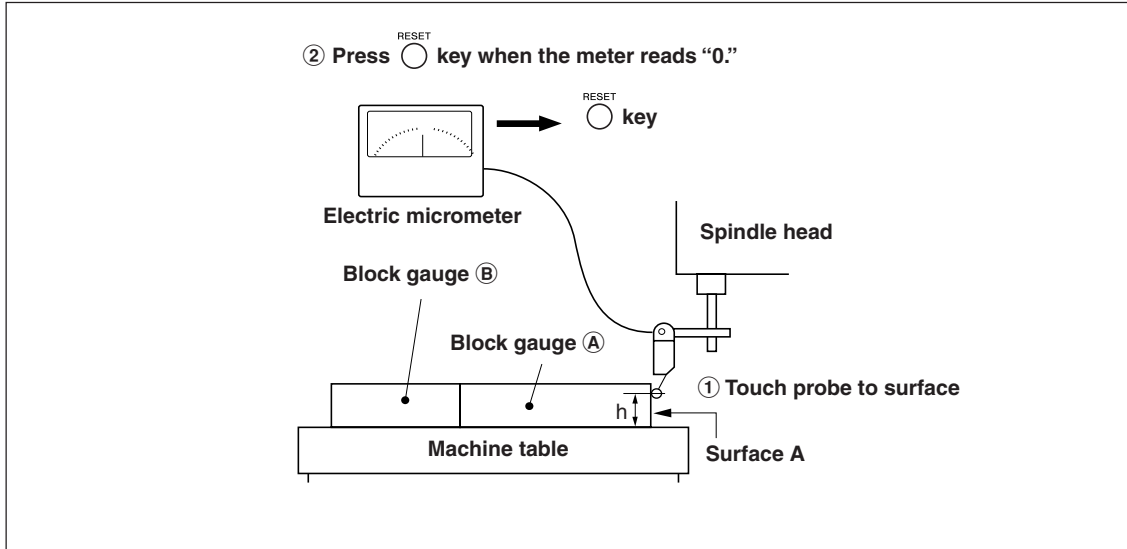
Surface A

3 Next, move the table away from the probe and remove the block gauge Ⓐ, move the machine table again, touch the surface C of the block gauge Ⓑ with the probe of the electric micrometer or dial gauge, and move the machine table until the meter reads "0." Be sure to make a note of the difference between the displayed value on the counter unit and the length of the block gauge Ⓐ, because this is the linear error to be compensated.

An example of setting the amount of linear compensation is shown below.

| 249.996 |

or

| 250.004 |

MEMO
−0.004
or
0.004 mm

Make a note of linear error to be compensated for.

0

Electric micrometer

Spindle head

Block gauge Ⓑ

② **Touch probe to surface**

h

Surface C

Machine table

① **Move the machine table.**
③ **Move it until the meter reads "0."**

Movement direction
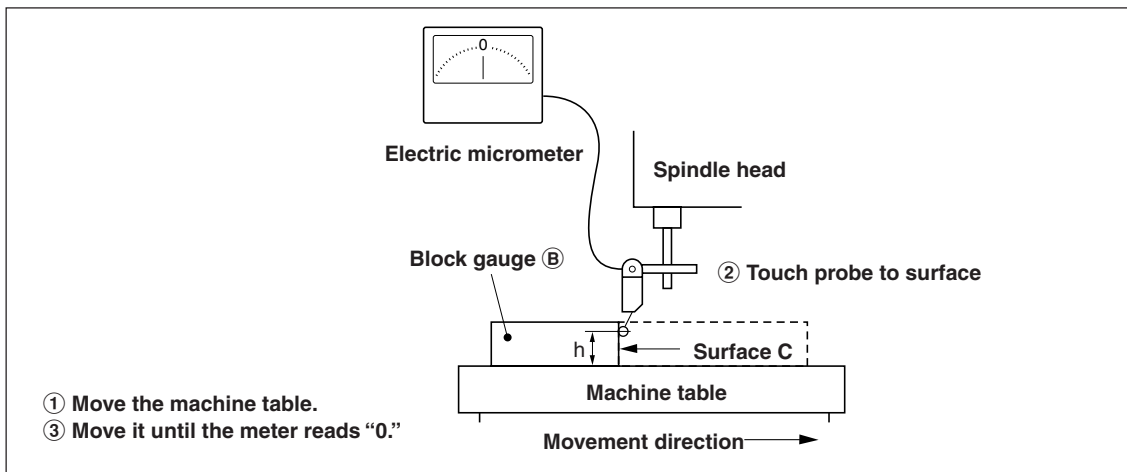
Note: Do not change the probe height h until finished measuring.

Examples of setting amount of linear compensation (Linear compensation)

After the mechanical error is measured, calculate and set the compensation amount as shown in the following examples.

Addition to or subtraction from displayed value for displacement

L : Length of block gauge Ⓐ
ℓ : Displayed value for the distance between surfaces A and C

When $\boxed{L > \ell}$, add a compensation amount to the displayed value.

Set an appropriate positive compensation amount.
Example : If L = 250 mm and ℓ = 249.996 mm
   If L is converted to 1m (L × 4), ℓ × 4 = 999.984, so the compensation amount is 0.016 mm.

When $\boxed{L < \ell}$, subtract a compensation amount from the displayed value.

Set an appropriate negative compensation amount.
Example : If L = 250 mm and ℓ = 250.004 mm
   If L is converted to 1m (L × 4), ℓ × 4 = 1000.016, so the compensation amount is −0.016 mm.

2-18. Outputting Data

2-18-1. When axis label ABC is selected

Data can be output using the "R" or "r" command or using the "M" command.

The "R" or "r" command outputs the data specified by the advanced setting (Output data selection). The data output at this time is the newest values which are recalculated whenever an "R" or "r" command request is received. (See "4-3-16. Output data selection" in the Installation Manual.)

The "M" command (memory data output) is used to output other data.

With the "M" command, recalculation is not performed even if a request is received. Therefore, the data is output immediately, but this data includes already-calculated data, not the newest values.

∗ Data can also be output in the same way as the "R" or "r" command using external printing with the Print key or external contact output.

Timer output

If timer output is used, data can be output at fixed intervals even if the "R" or "r" command is not sent. (See "4-3-17. Timer" in the Installation Manual.)

Data output formats

\<COMP mode\>

Single axis   Header   Numerical value   CR   LF

All axes   Header   Numerical value   ①   Header   Numerical value   ①   Header   Numerical value   CR   LF

Header : **Header type 1**

◇ =

   ├ A : A axis

   ├ B : B axis

   └ C : C axis

Numerical value : Signed zero suppression 7-digit data with decimal

① : When the output data format has no line breaks   Space

When the output data format has line breaks   CR   LF

(See "4-3-15. RS-232C data output format" in the Installation Manual.)

∗ The header is not output when Header is set to OFF.

\<Printer mode\>

A axis data only output

R   ②   ③   Numerical value   CR   LF

② : N : Current value   A : Maximum value   I : Minimum value   P : Peak-to-Peak value   B : ABS value

③ : Unit   M : Millimeters   I : Inch

Numerical value : Signed zero suppression 6-digit data with decimal

Note

If the display resolution of the A axis is set to angle display, CR and LF only are output.

2-18-2. When axis label XYZ is selected

When the "R" command output data is selected, data output is not performed by the "M" command.

Data output formats

<COMP mode>

Single axis | Header | Numerical value | CR | LF |
All axes | Header | Numerical value | ① | Header | Numerical value | ① | Header | Numerical value | CR | LF |

| Header | : **Header type 1**

$\triangle$ ●
- I : INC value
- A : ABC value
- X : X axis
- Y : Y axis
- Z : Z axis

Header type 2

$\triangle$ □   ●
- I : INC value
- A : ABC value
- N : Normal display
- D : Diameter display
- X : X axis
- Y : Y axis
- Z : Z axis
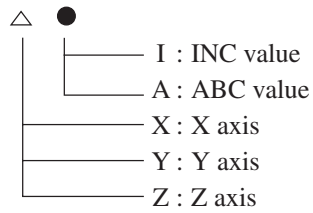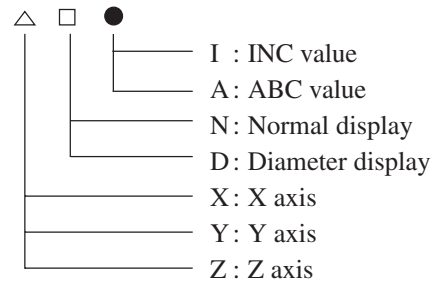
① : When the output data format has no line breaks | Space |
     When the output data format has line breaks | CR | LF |

| Numerical value | : Signed zero suppression 7-digit data with decimal

∗ Header type 2 is available in software version 01.11 and later only.
   (See P8-1 "Checking the software version number" in the Installation Manual.)

<Printer mode>

X axis data only output
| R | ② | ③ | Numerical value | CR | LF |

② : N : INC value   B : ABS value
③ : Unit   M : Millimeters   I : Inch
| Numerical value | : Signed zero suppression 6-digit data with decimal

| Note |

If the display resolution of the X axis is set to angle display, | CR | and | LF | only are output.

3. RS-232C Commands

Use the RS-232C commands to check the available settings and operations below.

All commands use ASCII code. A command ends with LF (Line Feed), CR (Carriage Returns), or CR + LF.

| Note |

The basic setting items and items pertaining to RS-232C cannot be set using the commands. Use key operation to make the settings.

3-1. Detailed Settings

(See "4-3. Advanced Settings" in the Installation Manual.)

3-1-1. When axis label ABC is selected

Command table

- △ indicates the target axis (A/B/C) that is set.
- ▲ indicates the measuring unit (1/2/3) that is set.
- ① to ③ indicate the setting details.
- □ indicates a space.

Setting example : When the display resolution of the 1st axis is set in −20 μm units → 1SDR = −7S

Command table

Setting item	Command
Display at power ON	□ Pon = ① 　① 1 : ᴸ ५ display after power ON 　　 0 : Count display after power ON
Display resolution and polarity	▲ SDR = ①②③ 　▲ 1 : 1st axis　2 : 2nd axis　3 : 3rd axis 　① − : Negative　+ : Positive 　② 0 : 0.05 μm　1 : 0.1 μm　2 : 0.5 μm　3 : 1 μm　4 : 2 μm 　　 5 : 5 μm　6 : 10 μm　7 : 20 μm　8 : 25 μm　9 : 50 μm 　　 A : 100 μm　B : 1 s　C : 10 s　D : 1 min　E : 10 min 　　 F : 1° angle 　③ S : Normal display　　　　D : Diameter display
Display axis, and display data power ON	△ dsp = ①② 　△ A : A axis　B : B axis　C : C axis 　① 1 : 1st axis　2 : 2nd axis　3 : 3rd axis　N : Display off 　② C : Current value　　　　A : Maximum value 　　 I : Minimum value　　　　P : Peak-to-peak value
Scaling	□ SCL = ① 　① 0.100000 to 9.999999 (6 decimal places) (Input)
Linear compensation	▲ LC = ① 　▲ 1 : 1st axis　2 : 2nd axis　3 : 3rd axis 　① 0 to ±1 (Numerical value for input resolution units) (Input) mm 　Example: 　When the input resolution is 0.001 mm, the value has 3 decimal places 　and ranges from −1.000 to 1.000.
Hold function	□ HF = ① 　① L : Latch　　P : Pause
General-purpose input	△ IN = ① 　△ A : A axis　B : B axis　C : C axis 　① 1 : Hold input 　　 2 : Restart input 　　 3 : Display data switching 　　 4 : Reference point load input 　　 5 : Preset value recall

Setting item	Command
General-purpose output	△ OUT = ① 　△　A : A axis　　B : B axis　　C : C axis 　①　1 : Alarm 　　　2 : Display data 　　　3 : Reference point detected signal 　　　4 : Reference point alarm
Key lock	☐ KL = ① 　①　1 : Key locked 　　　0 : Key unlocked KEYON　: Key unlocked KEYOF　: Key locked
Current value store	☐ ST = ① 　①　1 : Current value held 　　　0 : Current value not held MON　: Current value held MOF　: Current value not held
Flicker control	☐ FL = ① 　①　0 : Flicker control OFF 　　　1 : Weak 　　　2 : Strong
Sleep	☐ SL = ① 　①　0 : Sleep mode OFF 　　　1 : After 1 minute 　　　2 : After 5 minutes 　　　3 : After 10 minute 　　　4 : After 30 minute 　　　5 : After 60 minutes
Header output	This sets if a header is used during data output. HOF　: No header is output. HON　: Header type 1 is output.

3-1-2. When axis label XYZ is selected

Command table

- △ indicates the target axis (X/Y/Z) that is set.
- ▲ indicates the measuring unit (1/2/3) that is set.
- ① to ① indicate the setting details.
- ☐ indicates a space.

Setting example : When the display resolution of the 1st axis is set in -20 μm units $\rightarrow$ 1SDR = $-$7S

Command table

Setting item	Command
Display at power ON	☐ Pon = ① 　①　1　: $L\,Y$ display after power ON 　　　0　: Count display after power ON
Display resolution and polarity	▲ SDR = ①②③ 　▲　1 : 1st axis　　2 : 2nd axis　　3 : 3rd axis 　①　− : Negative　+ : Positive 　②　0 : 0.05 μm　1 : 0.1 μm　　2 : 0.5 μm　　3 : 1 μm　　　4 : 2 μm 　　　5 : 5 μm　　6 : 10 μm　　7 : 20 μm　　8 : 25 μm　　9 : 50 μm 　　　A : 100 μm　B : 1 s　　　C : 10 s　　　D : 1 min　　E : 10 min 　　　F : 1° angle 　③　S : Normal display　　　D : Diameter display
Display axis	△ dsp = ① 　△　X: X axis　　Y : Y axis　　Z : Z axis 　①　1 : 1st axis　2 : 2nd axis　3 : 3rd axis　N : Display off
Scaling	☐ SCL = ① 　①　0.100000 to 9.999999 (6 decimal places) (Input)

Setting item	Command
Linear compensation	▲ LC = ① ▲ 1 : 1st axis 2 : 2nd axis 3 : 3rd axis ① 0 to ±1 (Numerical value for input resolution units) (Input) mm Example: When the input resolution is 0.001 mm, the value has 3 decimal places and ranges from −1.000 to 1.000.
General-purpose input	△ IN = ① △ X : X axis Y : Y axis Z : Z axis ① 1 : Hold input 2 : Reference point load input 3 : Preset value recall
General-purpose output	△ OUT = ① △ X : X axis Y : Y axis Z : Z axis 1 : Alarm 2 : Reference point detected signal 3 : Reference point alarm
Key lock	□ KL = ① ① 1 : Key locked 0 : Key unlocked KEYON : Key unlocked KEYOF : Key locked
Current value store	□ ST = ① ① 1 : Current value held 0 : Current value not held MON : Current value held MOF : Current value not held
Flicker control	□ FL = ① ① 0 : Flicker control OFF 1 : Weak 2 : Strong
Sleep	□ SL = ① ① 0 : Sleep mode OFF 1 : After 1 minutes 2 : After 5 minutes 3 : After 10 minutes 4 : After 30 minutes 5 : After 60 minutes
Header output	This sets if a header is used during data output. HOF : No header is output. HON : Header type 1 is output. HON1 : Header type 1 is output. HON2 : Header type 2 is output. ∗ HON1/HON2 is available in software version 01.11 and later only. (See P8-1 "Checking the software version number" in the Installation Manual.)

3-2. Key Operation

Command input is used to perform the same role as key input.

Command table

Key	Command
P key	P
↓S⊕ key	M
REF key	REF
HOLD key	HOLD
CE (Cancel) key	CE
ENT (Enter) key	ENT

3-3. Operations during Measurement

3-3-1. When axis label ABC is selected

Command table

- ◆, ◇ indicates the specified axis.

  If all axes are specified (for ◆ only), insert a space.

  ◆ : Enter one of the following : Space, A, B, C, 1, 2, or 3

  ◇ : Enter one of the following : A, B, C, 1, 2, or 3

- ① indicates a numerical value. This is the numerical value of the display resolution unit. For example,

  when the display resolution is 0.005 mm, P = 20.055 to three decimal places.

Command table

Operation	Command	Description
Reset	◆C ◆CN ◆RES	Reset
Preset	◇P = ① ◇P1 = ①	Preset #1 (Each command is the same.)
	◇P2 = ①	Preset #2
	◇P3 = ①	Preset #3
	◇Q ◇Q1 ◇RC ◇RC1 ◇RCL ◇RCL1	Preset value recall #1 (Each command is the same.)
	◇Q2 ◇RC2 ◇RCL2	Preset value recall #2 (Each command is the same.)
	◇Q3 ◇RC3 ◇RCL3	Preset value recall #3 (Each command is the same.)
Datum point setting	◇M = ①	This sets the datum point.
Reference point operation cancel	◇H	Reference point hold wait status (Datum point position hold)
	◇HC	Reference point hold/Wait
	◇HS	Reference point hold store (Storing of datum point position)
	◇L	Reference point load wait status (Relocation of datum point position)
	◇L = ①	Reference point load wait status
Master	◇MS = ①	This sets the master calibration value.
	◇MR	This relocates the master calibration value.
Display switching	◆REAL	This switches the specified axis display to the current value.
	◆MAX	This switches the specified axis display to the maximum value.
	◆MIN	This switches the specified axis display to the minimum value.
	◆P-P	This switches the specified axis display to the peak-to-peak value.

Operation	Command	Description
Restart	◆CP ◆START	This restarts the peak value calculation. (Each command is the same.)
Pause	◆PAUON	Pause
	◆PAUOFF	Pause cancel
Latch	◆LCHON	Latch
	◆LCHOFF	Latch cancel
ABS/INC	◆A	This sets to ABS (absolute) display.
	◆I	This sets to INC (incremental) display.
Memory data Output	◇MN	Current value memory data
	◇MP	Peak-to-peak value memory data
	◇MI	Minimum value memory data
	◇MA	Maximum value memory data
	◇MM One of the following is output. MMN MMI	Acquiring the display mode : Count display : ᒷᎩ display
	◇ME One of the following is output. EO ER EF OK	Acquiring the error information : Over-speed and measuring unit unconnected : Reference point error : Overflow display for current value : No error (Normal operation)
Data request	R #	All axis data request (Each command is the same.)
	◇r	Specified axis data request

3-3-2. When axis label XYZ is selected

Command table

- ◇ indicates the specified axis.
    - ◇ : Enter one of the following: X, Y, or Z
- ① indicates a numerical value.

Example : When the X axis datum point is set to 20 → X20M

Command table

Operation	Command	Description
Reset	x	This resets the X axis.
	y	This resets the Y axis.
	z	This resets the Z axis.
Preset	◇①P	Preset (This is set to #1.)
	◇Q	Preset value recall
Datum point setting	◇①M	This sets the datum point.
Reference point operation	◇①L	Reference point load wait status
	◇L	Reference point load wait status (relocation of datum point position)
	◇H	Reference point hold wait status (hold of datum point position)
	◇S	Reference point hold store (storing of datum point position)
ABS/INC	◇A	This sets to ABS (absolute) display.
	◇I	This sets to INC (incremental) display.
Data request	R ＃	All axis data request (Each command is the same.)
	◇r	Specified axis data request