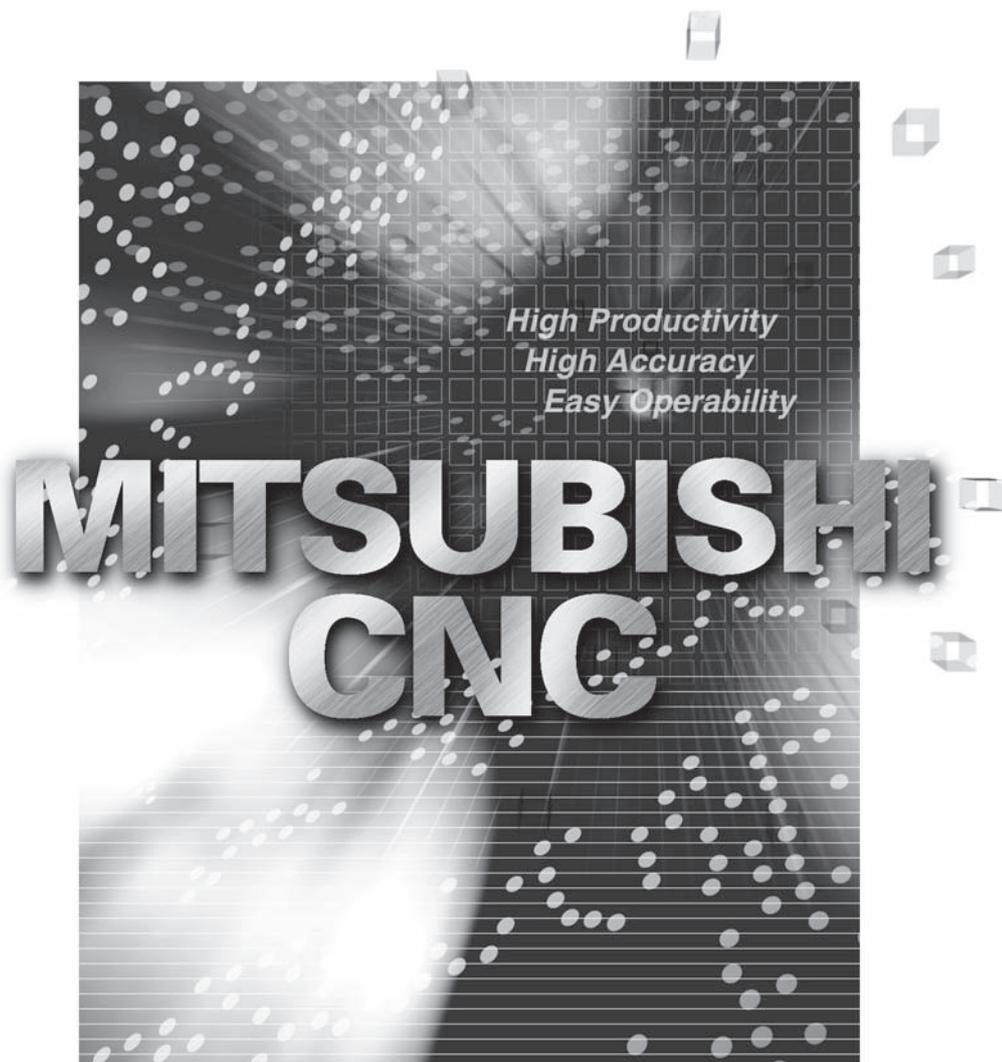




Changes for the Better

MITSUBISHI CNC

Instruction Manual
MS Configurator



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Introduction

Thank you for selecting the Mitsubishi numerical control unit. This instruction manual describes the handling and caution points for using MS Configurator. Incorrect handling may lead to unforeseen accidents, so always read this instruction manual thoroughly to ensure correct usage.

Notes on Reading This Manual

- (1) Since the description of this specification manual deals with NC in general, for the specifications of individual machine tools, refer to the manuals issued by the respective machine tool builders. The "restrictions" and "available functions" described in the manuals issued by the machine tool builders have precedence to those in this manual.
- (2) This manual describes as many special operations as possible, but it should be kept in mind that items not mentioned in this manual cannot be performed.

Precautions for safety

Please read this manual and auxiliary documents before starting installation, operation, maintenance or inspection to ensure correct usage. Thoroughly understand the device, safety information and precautions before starting operation.



DANGER

When there is a potential risk of fatal or serious injuries if handling is mistaken.



WARNING

When a dangerous situation, or fatal or serious injuries may occur if handling is mistaken.



CAUTION

When a dangerous situation may occur if handling is mistaken leading to medium or minor injuries, or physical damage.

Note that some items described as " CAUTION" may lead to major results depending on the situation. In any case, important information that must be observed is described.



DANGER

Not applicable in this manual.



WARNING

Not applicable in this manual.

 **CAUTION**

-  Do not fail to confirm the soft limit movement (over travel) to prevent collision. Be careful of the position of other axes and pay attention when the cutter has already mounted as the collision possibly occurs before the soft limit.
-  When a large vibration occurs because of increasing the speed loop gain and so on, immediately apply emergency stop to stop the vibration. The machine or servo amplifier could fail if vibration is generated for a long time.
-  Do not set the notch filters to the frequency where vibration does not occur. The automatic adjustment might not be executed correctly, or the vibration might be caused.
-  Set the same position loop gain (PGN1, PNG2, SHGC) to all the interpolation axes. (The parameters (PGN1, PNG2, SHGC) are tuned to the minimum setting of adjusted axis assistant.)
-  Set the same time constant to all the interpolation axes. (The time constant is tuned to the maximum setting of adjusted axis assistant.)
-  When enabling disturbance observer, lost motion compensation has to be adjusted again.
-  Restart the MS Configurator to validate IP address changing.
-  Neither the linear motor nor the direct drive motor corresponds.

Disposal



(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.

Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.

This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:

Hg: mercury (0,0005%), Cd: cadmium (0,002%), Pb: lead (0,004%)

In the European Union there are separate collection systems for used batteries and accumulators. Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

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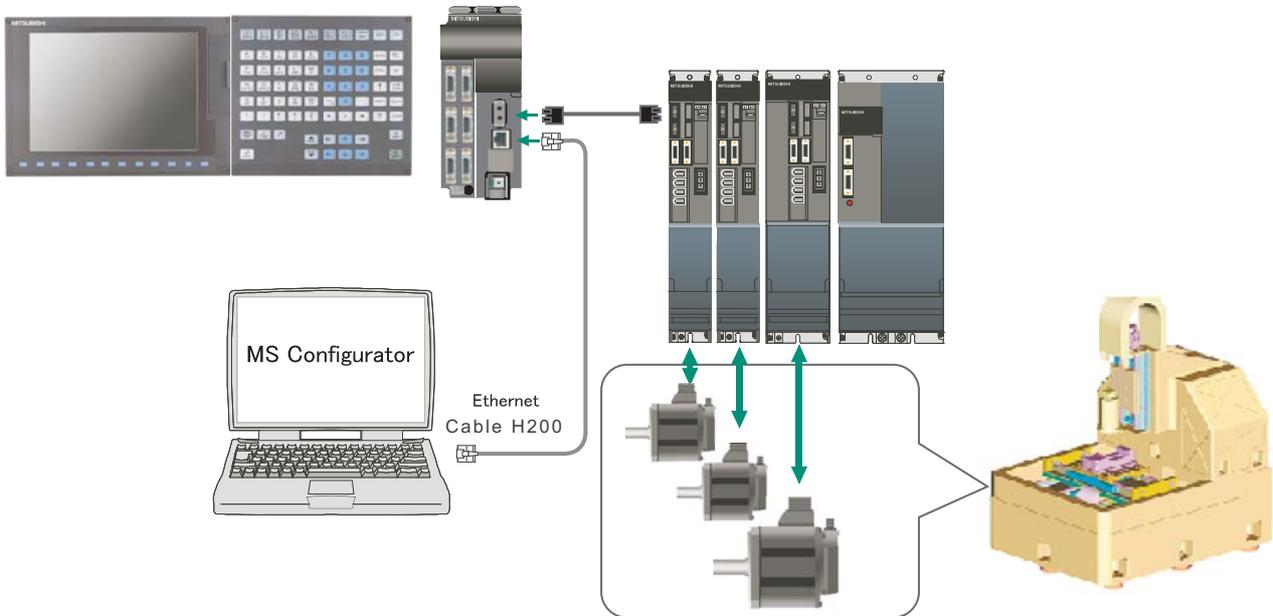
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Introduction

1.1 Outline of MS Configurator

With MS Configurator, the servo system's bode diagram can be measured by activating the motor with vibration signals and measuring/analyzing the machine characteristics. And the servo waveform measurement function is supported, too.



<Function>

Waveform measurement function

| | |
|---|--|
| Frequency response measurement | : Measures the frequency response (speed command - speed FB) of speed loop for the designated axis. The result will be presented as Bode diagram. |
| Frequency response measurement of machine | : Measures the frequency response (torque command - speed FB) of machine system for the designated axis. The result will be presented as Bode diagram. |
| Measurement function (with program creation function) | : Measures the Chronological data measurement, Arc shape error measurement, Synchronous tapping error measurement, Measuring arbitrary path. |

Automatic adjustment function

| | |
|-------------------------------|---|
| Initial notch filter setup | : Automatically adjusts the notch filter when the initial resonance is large. |
| Velocity loop gain adjustment | : Automatically adjusts the notch filter and the speed loop gain. |
| Time constant adjustment | : Automatically adjusts the acceleration/deceleration time constant. |
| Position loop gain adjustment | : Automatically adjusts the position loop gain. |
| Lostmotion adjustment | : Automatically adjusts the quadrant protrusion amount of the designated axis. |
| Lostmotion 3 adjustment | : Automatically adjusts the lost motion type 3 for the quadrant protrusion amount of the designated axis. |

Environment setup

- Communication path setup : Sets the path to communicate with NC. The model of connected NC is selected.
- Program creation : Creates machining programs for adjustment.

Assistance setup function

- Parameter setup : Saves/changes the servo parameters.

1.2 Applicable Model And Version

The model and the version of the CNC and drive unit which can use this software are as follows.

| | NC | | Servo/spindle drive unit | | |
|-----------------|------------------------|---------------------|--|--|---|
| | M700V/M70V Series | C70 Series | MDS-D/DH Series | MDS-D-SVJ3/SPV3 Series | MDS-DM Series |
| BND-1201W000-A3 | F2 version or later | A2 version or later | Vx:BND1501W001-A6 or later SP:BND1501W002-AA or later | SVJ3:BND1501W005-A1 or later SPJ3:BND1501W006-A1 or later | V3:BND-1501W012-A1 or later SV:BND-1501W016-A0 or later SP:BND-1501W018-A1 or later |
| BND-1201W000-A4 | F6 version or later | C0 version or later | Vx:BND1501W001-A6 or later SP:BND1501W002-AA or later | SVJ3:BND1501W005-A1 or later SPJ3:BND1501W006-A1 or later | V3:BND-1501W012-A or later SV:BND-1501W016-A0 or later SP:BND-1501W018-A1 or later |
| BND-1201W000-A5 | FB/G4 version or later | C4 version or later | Vx:BND1501W001-A6 or later SP:BND1501W002-AA or later | SVJ3:BND1501W005-A1 or later SPJ3:BND1501W006-A1 or later | V3:BND-1501W012-A1 or later SV:BND-1501W016-A0 or later SP:BND-1501W018-A1 or later |

This manual explains the functions that can be used with A5 version.

Correspondence function list for each CNC (servo)

| | | | Function | | M700V/M70V Series | C70 Series | |
|----------------------------|----------------------------------|---|--------------------------------|---------------------------------------|--------------------------------|------------|------------|
| Servo | NC axis | Singular axis | Environment setup | Program creation | ○ | ○ | |
| | | | Assistance setup | Parameter setup | ○ | ○ | |
| | | | Automatic adjustment | Initial notch filter setup | ○ | ○ | |
| | | | | Velocity loop gain adjustment | ○ | ○ | |
| | | | | Time constant adjustment | ○ | ○ | |
| | | | | Position loop gain adjustment | ○ | ○ | |
| | | | | Lostmotion adjustment | ○ | ○ | |
| | | | Waveform measurement | Lostmotion type 3 adjustment | ○ | ○ | |
| | | | | Frequency response measurement | ○ | ○ | |
| | | Frequency response measurement of machine | | ○ | ○ | | |
| | | Program creation for measurement | | ○ | ○ | | |
| | | Parallel synchronous control axis | Waveform measurement | Chronological data measurement | ○ | ○ | |
| | | | | Arc shape error measurement | ○ | ○ | |
| | | | | Synchronous tapping error measurement | ○ | ○ | |
| | | | | Arbitrary path measurement | ○ | ○ | |
| | | | | Automatic adjustment | Parameter setup | ○ | ○ |
| | | | | Waveform measurement | Initial notch filter setup | ○ | ○ |
| | | | | Waveform measurement | Frequency response measurement | ○ (Note 1) | ○ (Note 1) |
| | | Frequency response measurement of machine | ○ (Note 1) | | ○ (Note 1) | | |
| | Program creation for measurement | ○ (Note 2) | ○ (Note 2) | | | | |
| | Chronological data measurement | ○ | ○ | | | | |
| | Waveform measurement | Arc shape error measurement | ○ | ○ | | | |
| | | Synchronous tapping error measurement | ○ | ○ | | | |
| Arbitrary path measurement | | ○ | ○ | | | | |
| Waveform measurement | | Chronological data measurement | ○ (Note 3) | ○ (Note 3) | | | |
| PLC axis | - | Waveform measurement | Chronological data measurement | ○ (Note 3) | ○ (Note 3) | | |

(Note 1)The graphical display is only a selected axis though a primary axis and a secondary axis are vibrated at the same time when measuring.

(Note 2)Select a primary axis usually when the program for the measurement is created.

(Note 3)On program creation for measurement screen, only the chronological data measurement as a measurement item and the reciprocation acceleration/deceleration as the type can be selected. However, the program for the measurement is not created, so search the machining program on NC side.

(Note 4)Neither the linear motor nor the direct drive motor correspond.

(Note 5)The value to display waveform for the chronological data measurement and synchronous tapping error measurement corresponds to the inch system is applied ("#1041 I_inch" is set to "1"). The metric system is fixedly used for displaying the arc shape error measurement, the arbitrary path and others.

Correspondence function list for each CNC (spindle)

| | | Function | | M700V/M70V Series | C70 Series |
|---------|-------------------------------------|----------------------|---------------------------------------|-------------------|------------|
| Spindle | Acceleration/deceleration operation | Waveform measurement | Chronological data measurement | O | O |
| | Orientation | | Chronological data measurement | O | O |
| | Synchronous tapping | | Chronological data measurement | O | O |
| | | | Synchronous tapping error measurement | O(Note 1) | O (Note 1) |
| | Spindle C axis | | Chronological data measurement | - (Note 2) | - (Note 2) |
| | | | (Synchronous error measurement) | - | - |
| | Spindle synchronous | | Chronological data measurement | O | O |
| | | | (Synchronous error measurement) | - | - |

(Note 1)The synchronous tapping measurement for the spindle 1 is possible. (The usable servo axes during the measurement are X and Z.)

(Note 2)Spindle C cannot be selected as a target axis, however it is measurable as a spindle.

(Note 3)On program creation for measurement screen, only the chronological data measurement as a measurement item and the reciprocation acceleration/deceleration as the type can be selected. However, the program for the measurement cannot be created, so search the machining program on NC side.

(Note 4)The spindle does not correspond to the gear ratio.

1.3 Functions of MS Configurator and its corresponding CNC

Executable functions differ depending on the NC version and the combination of ATS parameter (#1164 ATS) and the sampling data output parameter (#1224 aux08 bit0).

Explanatory note for combination pattern of related parameters

| Abbreviation | Pattern |
|--------------|--|
| ○ | It does not depend on parameter setting. |
| ATS | Executable if ATS parameter is set to "1". |
| ATS & aux | Executable if both ATS parameter and the sampling output parameter are set to "1". |
| ATS=0 & aux | Executable if ATS parameter is set to "0" and the sampling output parameter is set to "1". |

List for the detail of each function

| NC | | M700V/M70V series | | C70 series | |
|----------------------|---|-----------------------------|----------------|--------------------|---------------|
| | | FA/G3 or before | FB/G4 or later | C3 or before | C4 or later |
| Environment setup | Communication path setup | ATS | ○ | ○ | ○ |
| | Program creation for adjustment | ATS | ○ | ○ | ○ |
| Assistance setup | Parameter setup | ATS | ○ | ○ | ○ |
| Automatic adjustment | Initial notch filter setup | ATS | ○ | ○ | ○ |
| | Velocity loop gain adjustment | ATS & aux | ATS | ATS | ATS |
| | Time constant adjustment | ATS & aux | ATS | ATS | ATS |
| | Position loop gain adjustment | ATS & aux | ATS | ATS | ATS |
| | Lost motion adjustment | ATS & aux | ATS | ATS | ATS |
| Waveform measurement | Lost motion type3 adjustment | ATS & aux | ATS | ATS | ATS |
| | Frequency response measurement | ATS & aux | ATS | ATS | ATS |
| | Frequency response measurement of machine | ATS & aux | ATS | ATS | ATS |
| | Time-series data measurement | ATS=0 & aux (Note 1,2,3) | ○ | ○ (Note 3, 4,5) | ○ (Note 5) |
| | Arc shape error measurement | ATS & aux | ○ | ○ | ○ |
| | Synchronous tapping error measurement | ATS & aux | ○ | ○ | ○ |
| | Arbitrary path measurement | ATS & aux | ○ | ○ | ○ |

(Note 1) If the version of MS Configurator you are using is older than A4, the combination pattern of related parameter is "ATS & aux" no matter which model of CNC you use.

(Note 2) PLC axis cannot be measured. The control input/output signal cannot be measured.

(Note 3) "Ring buffer" cannot be selected for the process configuration.

(Note 4) The elapsed time/remaining time/progress bar cannot be displayed in "Advance situation" screen.

(Note 5) Operation mode/operation status cannot be displayed in "Advance situation" screen.

1.4 About Display Unit

In this manual, (mm) is used for a position and (mm/min) is used for speed, but these units are for the metric system linear axis. Unit is varied depending on the various conditions.

| Unit | Metric system | | Inch system | |
|--|---------------|---------------------------------------|-------------|---------------------------------------|
| | Linear axis | Rotary axis (including spindle) | Linear axis | Rotary axis (including spindle) |
| Position command Position feed back | mm | deg | inch | deg |
| Position droop (Note 1) Speed command | um | mdeg | minch | mdeg |
| Speed feed back (Note 2) | mm/min | deg/min | inch/min | deg/min |

(Note 1) "μ" (micro) is displayed as "u" on the screen.

"mdeg" is 1/100 deg and "minch" is 1/1000 inch.

(Note 2) (r/min) (number of rotations per minute) is also used for speed unit.

The same unit is used regardless of the conditions.

2

Installation and Setup

2.1 Operation Environment

MS Configurator operates in the following personal computer environments.

- Operating system : Windows XP SP2 or later
- Language : English/Japanese (Note 1)
- RAM : 256MB or larger recommended
- Display : SVGA (800 x 600) or more video graphics adaptor and monitor
- Ethernet port

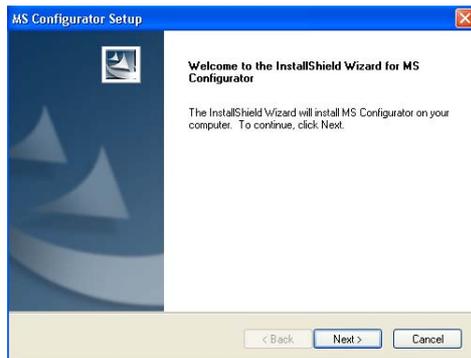
(Note 1) Japanese is selected for Japanese-language version of Windows. English is selected for other than Japanese-language version of Windows.

(Note 2) This tool can be used only by the administrator authority.

2.2 Procedure of the First Installation

(1) Double-click the BND1201W000xx.exe (xx is a version name).

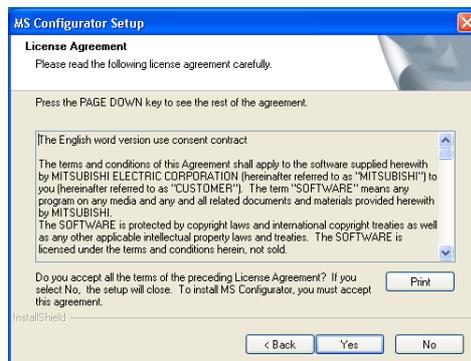
The setup screen is displayed. Press the "Next" button.



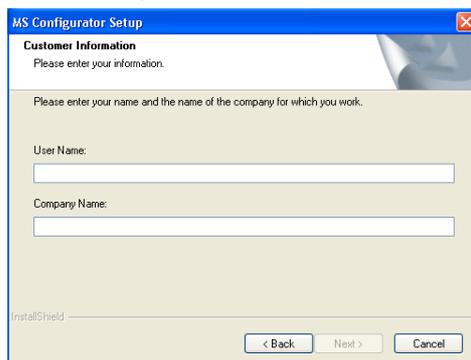
(2) The software license agreement is displayed.

Read the software license agreement carefully, and press the "Yes" button.

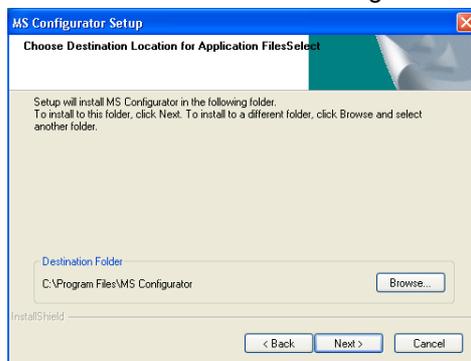
If "No" is selected (when you do not agree this agreement), the installation of MS Configurator is discontinued.



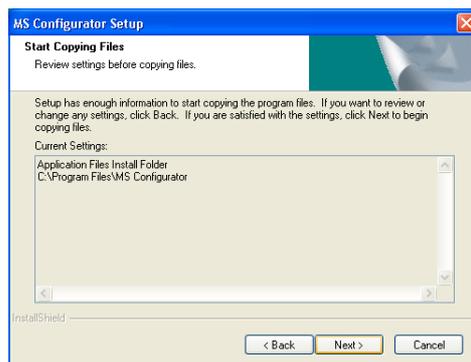
- (3) The Customer Information screen is displayed.
Input user name and company name and press the "Next" button.



- (4) The Choose Designation Location screen is displayed.
Press "Browse" and select the installation destination when changing the installation destination.
Press the "Next" button after the installation destination settings.

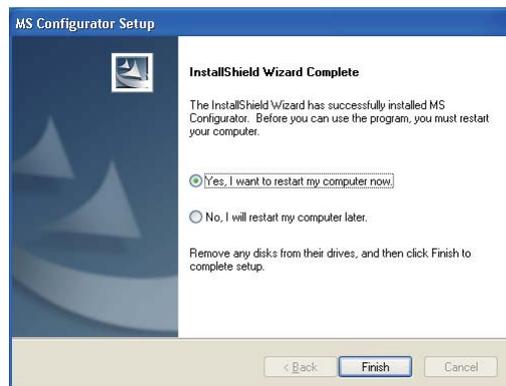


- (5) The installation destination information is displayed. Press the "Next" button after confirming the installation destination settings.
(When the setting is changed, press the "Back".)
The setup starts.



2 Installation and Setup

- (6) When the installation is correctly completed, the complete screen is displayed.
When "Finish" button is pressed, the installation completes.



2.3 Installation Procedure When Upgrading

When the old version has already been installed, install the new version after uninstalling the old version.

2.4 Procedure of Uninstalling

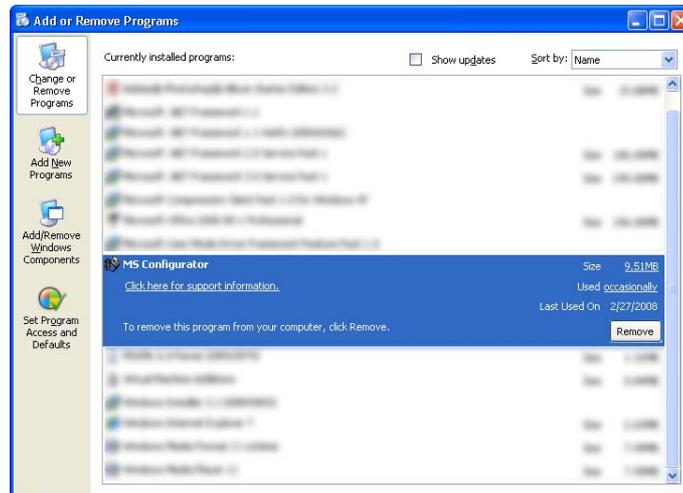
The MS Configurator has two procedures of uninstalling: executing from the control panel, double-clicking BND1201W000xx.exe (xx is a version name).

2.4.1 Procedure of Uninstalling by the Control Panel (Recommended)

(1) Select the [Start] - [Control Panel] - [Add or Remove Programs].

The "Add or Remove Programs" screen is displayed.

Select the MS Configurator from the list, and press the "Remove".



2 Installation and Setup

(2) The "Confirm Uninstall" screen is displayed.

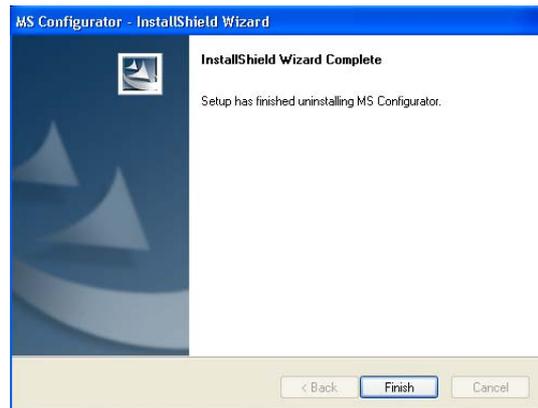
When the "Yes" is pressed, the uninstallation starts.

(When the "No" is pressed, return to the "Add or Remove Programs" screen.)



(3) When the uninstallation is finished, the complete screen is displayed.

When "Finish" button is pressed, the uninstallation completes.



2.4.2 Procedure of Uninstalling by BND1201W000xx.exe (xx is a version name)

- (1) Double-click BND1201W000xx.exe (xx is a version name).

The "Confirm Uninstall" screen is displayed.

When the "Yes" is pressed, the uninstallation starts.

(When the "No" is pressed, it will be terminated without uninstalling.)



- (2) When the uninstallation is finished, the complete screen is displayed.

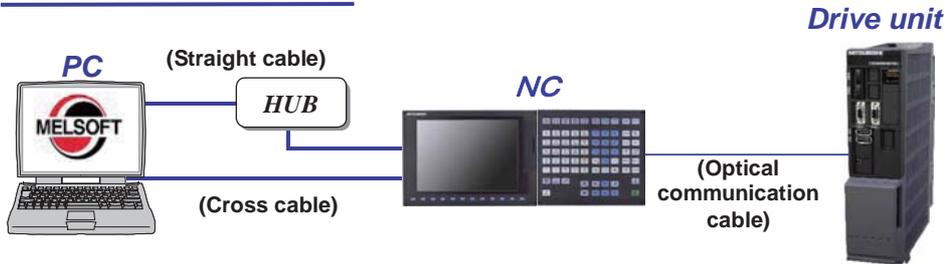
When "Finish" button is pressed, the uninstallation completes.



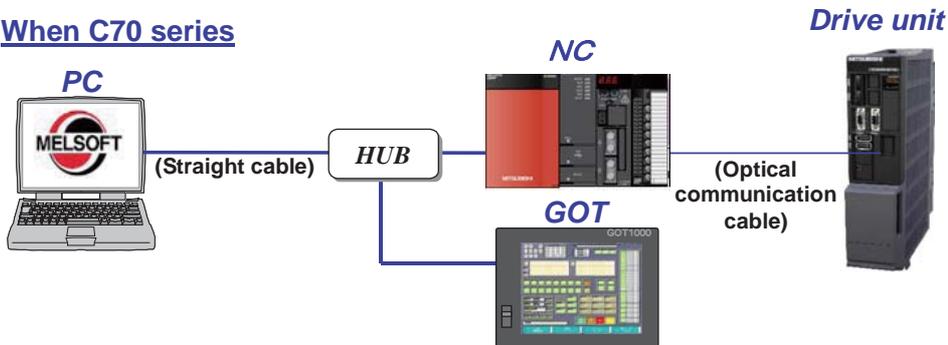
2.5 Connection Diagram

The connection diagrams with the M700V/M70V Series and C70 series are shown below.

When M700V/M70V series



When C70 series



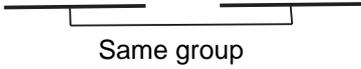


How to Use

3.1 Preparation (Connect with NC)

Prepare the followings before using MS Configurator.

3.1.1 Preparation for PC

| Item | Details | | | | |
|--------------------|--|---------------|------------------------------|---------------|---------------|
| Cross cable | Personal computer is connected to NC with LAN cable. | | | | |
| MS Configurator | Install the MS Configurator. | | | | |
| IP address setting | <p>Set IP address of personal computer to the same group as the IP address of NC which is set to "#1926 Global IP address". (Example)</p> <table> <tr> <td>NC IP address</td> <td>Personal computer IP address</td> </tr> <tr> <td>192.168.200.5</td> <td>192.168.200.7</td> </tr> </table> <p style="text-align: center;">  Same group </p> | NC IP address | Personal computer IP address | 192.168.200.5 | 192.168.200.7 |
| NC IP address | Personal computer IP address | | | | |
| 192.168.200.5 | 192.168.200.7 | | | | |

3.1.2 Parameter Setting

Correctly set the following NC parameters before starting the adjustment.

Turn OFF the CNC power after setting parameters with (PR) mark. These parameters will be enabled when the CNC power is turned ON again.

Base specifications parameter

【#1164(PR)】 ATS Automatic tuning function

Set this parameter to "1" (Enable).

0: Disable

1: Enable

(Note 1) For the relationship between parameter settings and each functions, refer to "1.3 Functions of MS Configurator and its corresponding CNC".

(Note 2) With M700V/M70V series, this parameter setting becomes valid after turning the power ON

【#1224】 aux08

bit0: Sampling data output

Set this parameter to "1" (Enable).

0: Disable

1: Enable

(Note) For the relationship between parameter settings and each functions, refer to "1.3 Functions of MS Configurator and its corresponding CNC".

【#1267(PR)】 ext03

bit0: High-speed high-accuracy control G code type

Set this parameter to "0" (Conventional format).

0: Conventional format (G61.1)

1: MITSUBISHI special format (G08P1)

【#1926(PR)】 Global IP address IP address

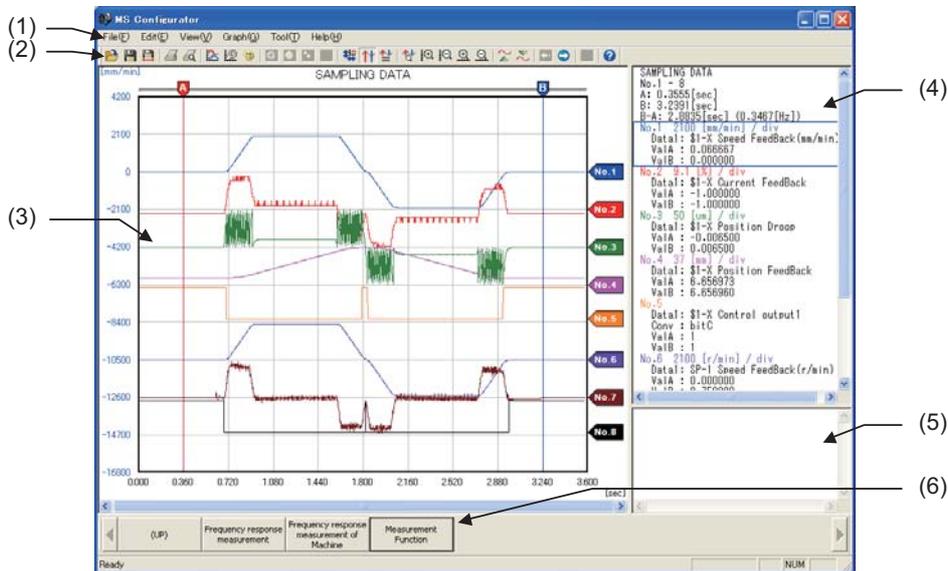
Set the IP address of the PC to be connected to the same group as this parameters' setting value.

3.1.3 Other Preparations/Precautions

- (1) Coordinate system offset
 MS Configurator creates programs created on the workpiece coordinate system. When the adjustment is executed, set the coordinate system offset in consideration of it.
 (Note) Always restore the coordinate system offset after MS Configurator completes.
- (2) Operation mode of NC
 Select the "memory mode" of NC when using MS Configurator.
 When MS Configurator is valid ("#1164" is "1"), normal memory operation cannot be used.
 Set "#1164" to "0" when using normal memory operation.
- (3) Parameter related to high-accuracy control
 The "before interpolation" and "after interpolation" must be selected in position loop gain adjustment. Thus, pay attention when setting NC parameters related to high-accuracy control below.
 (Example) When "#1205 G0bdcc" is set to "1", the adjustment is always "G0 before interpolation".
- (4) Motor vibration and soft limit
 When "Vibration signal setup", "Frequency response measurement", "Frequency response measurement of machine" or "Velocity loop gain adjustment" is executed, a minute vibration is added to the motor. Do not execute close to the soft limit as this may cause dangerous consequences. (Provide space of at least 10mm or more.)
- (5) Vibration signal setup
If a large resonance exists, the adjustment is not executed properly. In that case, reduce the speed loop gain until the resonance become small, and execute the vibration signal setup.
- (6) Velocity loop gain adjustment
 The upper limit of notch filter adjustment is around 2000Hz. Before executing this adjustment, set the parameter below and validate the speed feedback filter.
 Set "#2217 SV017/bit3 vfb Speed feedback filter" to "1" (Start (2250Hz)).
- (7) Time constant adjustment
 This function can be used only when the acceleration/deceleration mode is "soft acceleration/deceleration". Set the following parameters.
 Set "#2003 smgst/bit0-7 (Rapid traverse acceleration/deceleration type and Cutting feed acceleration/deceleration type)" to "FF (soft acceleration/deceleration)".
 Also set "#1219 aux03/bit7 (Time constant setting changeover for soft acceleration/deceleration)" to "1 (valid)".
When the target time constant has margin for the maximum output torque of the motor, the machine may vibrate. In that case, adjust the upper limit value of the motor current.
- (8) Position loop gain adjustment
 The default upper limit of the position loop gain adjustment with automatic adjustment is "47(SHG)".
- (9) Lost motion adjustment
 In this function, a compensation amount is simply determined by measuring the friction with a low speed feed.
- (10) Measurement functions
 When [Model] is [Lathe] and [G code system] is 2, 4 or 6, check the parameter below before sending a machining program.
 When "#1037(PR) cmdtyp (Command type)" is "3", "5", or "7", "#1076 AbsInc ABS/INC address (for L system only)" is set to "1".

3.1.4 Starting MS Configurator

Configuration of main screen



| Display item | Details |
|------------------|---|
| (1) Menu | This executes the Windows general operations, analysis of data displayed in the graph, MS Configurator settings, etc. |
| (2) Tool bar | The function of some menus can be executed by pressing the icon of the toolbar. |
| (3) Graph area | This displays a graph of the data measured by MS Configurator. |
| (4) Text area | This displays the analysis of the data measured by MS Configurator. |
| (5) Memo area | The user can arbitrarily input text. |
| (6) Floating bar | This reproduces the layered structure of the menu, and the function of the menu can be executed with a function key. |

Graph display mode

| Name | Measurement item | Details |
|-----------|---------------------------------|---|
| XY mode | Circular error measurement | Two channels of position command or position feedback data will be indicated by a roundness graph. |
| | Sync. tapping error measurement | Waveforms of spindle and servo axis (error pulse and servo and spindle speed) when measuring the synchronous tapping will be indicated with time on the horizontal axis and value on the vertical axis. |
| | Arbitrary path measurement | Two channels of position command or position feedback data will be indicated as a path on a plane. |
| Time mode | Time-series data measurement | Eight channels of waveforms (command and feedbacks of position, current, and speed) will be displayed on top of each others. |

The XY mode is established at the startup.

The time mode will be entered when the time-series data measurement graph is opened.

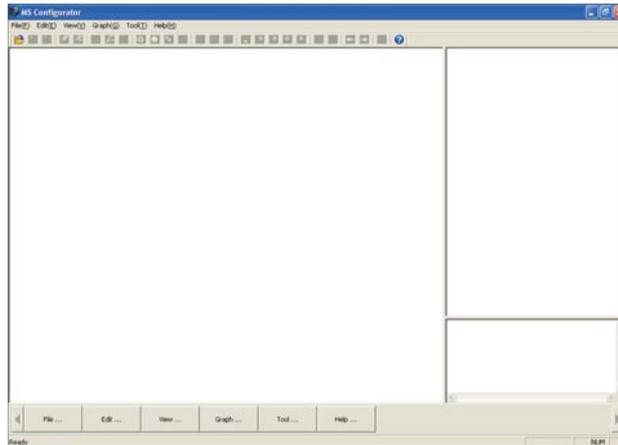
Likewise, the XY mode will be entered when Circular error measurement/Sync. tapping error measurement/Arbitrary path measurement graph is opened.

(Note1) All the ATS files stored in the MS Configurator Ver. A4 or older will open in the XY mode.

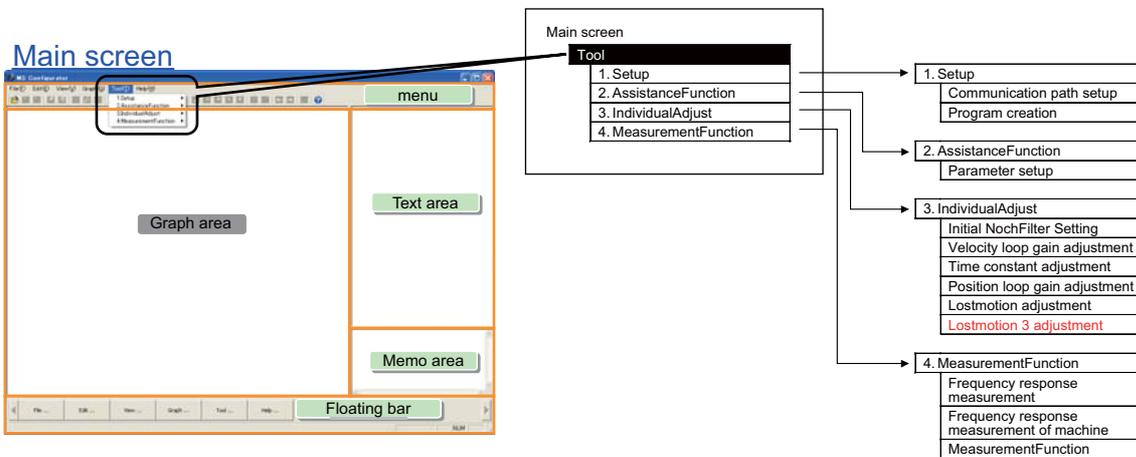
The ATS files saved in the Time mode cannot be opened by the MS Configurator Ver. A4 or older.

Operation method

- (1) Set the base specification parameter "#1164 ATS" to "1".
- (2) Set the NC operation mode to the memory mode.
- (3) Release the emergency stop.
- (4) Start the MS Configurator.
The main screen is displayed.



3.1.5 Screen Transition



3.1.6 Menu Items

Items available on the menu, the toolbar, and the floating bar and by right-clicking the mouse in the graph area are listed below.

File

| Item | Function | Validity | | | Other conditions |
|---------------------------|--|--------------|---------|-----------|--|
| | | No wave form | XY mode | Time mode | |
| Open | Open the waveform file. Open the window to select a file (ATS format) to be opened. | ○ | ○ | ○ | |
| Read data | Add a waveform to the graph. Open the window to select a file (CSV format) to be opened. | × | ○ | × | |
| Save as | Save the graph. Open the window to specify a directory file to save the graph. | × | ○ | ○ | |
| Save | Overwrite and save the currently displayed graph. | × | × | ○ | “Save as” is executed right after a measurement. |
| Save data between cursors | Save the data between cursors in the graph. Open the window to specify a directory file to save the data. | × | × | ○ | Enabled only when cursors are displayed. |
| Save bitmap | Save the bitmap. Save the contents of graph area, text area, and memory area in the bitmap file or PNG file (Ver. A3 or later). Open the window to specify a directory file to save the graph. | × | ○ | ○ | |
| Print | Execute printing. When connected to a printer, print the contents of graph area, text area, and memory area. Display the print window. | × | ○ | ○ | |
| Print preview | Display the print image. | × | ○ | ○ | |
| Printer setting | Provide printer settings. | ○ | ○ | ○ | |
| Close application | Close the MS Configurator. | ○ | ○ | ○ | |

Edit

| Item | Function | Validity | | | Other conditions |
|-------------------------|---|--------------|---------|-----------|------------------|
| | | No wave form | XY mode | Time mode | |
| Copy image on clipboard | Copy the graph area on the clip board. | × | ○ | ○ | |
| Copy text on clipboard | Copy all the contents of text area and memory area on the clip board. | × | ○ | ○ | |

View

| Item | Function | Validity | | | Other conditions |
|-------------------------|---|--------------|---------|--------------|------------------|
| | | No wave form | XY mode | Time mode | |
| Tool bar | Set to show/hide the tool bar. | ○ | ○ | ○ | |
| Status bar | Set to show/hide the status bar. | ○ | ○ | ○ | |
| Floating bar | Set to show/hide the floating bar. | ○ | ○ | ○ | |
| Setup PositionDroopView | Specify whether to enable the loop-back function and the loop-back amount for measuring a position droop graph. | ○ | ○ | ○ (Note1) | |

(Note1) "Setup PositionDroopView" is valid for the time constant adjustment and the position loop gain adjustment.

Chronological data graph will not be affected.

Graph

| Item | Function | Validity | | | Other conditions |
|----------------------|--|--------------|---------|-----------|---|
| | | No wave form | XY mode | Time mode | |
| Drawing setting | Set the graph drawing method. Position can be converted into speed or acceleration. And the difference between data can be viewed. | × | × | ○ | |
| Axis setting | Set the maximum/minimum XY axis value and etc. | × | ○ | ○ | |
| Setup graph | Set the plot color of displayed graph and etc. | × | ○ | ○ | |
| Graph layout setting | Set the number of graph to display. | × | ○ | × | |
| RemoveGraph | Delete the graph in a specified graph area. | × | ○ | × | |
| RemovePlot | Delete the graph plot. | × | ○ | × | |
| Zoom | Enlarge/reduce the graph. | × | ○ | × | |
| Search | Read the values of points on a specified graph and reflect it in the text area. | × | ○ | × | |
| Plural Search | Read the values in the 1st line of the graph displayed on the screen and reflect it in the text area. | × | ○ | × | Enabled only when more than one graph are displayed in the far left line of the graph area. |
| Drag | Drag the graph in a specified graph area. | × | ○ | × | |
| Execute AutoScaling | Perform auto scaling to the whole graph to make it easy-to-read. | × | × | ○ | |

| Item | Function | Validity | | | Other conditions |
|---|---|--------------|---------|-----------|--|
| | | No wave form | XY mode | Time mode | |
| ShowCursor | Change to show or hide the cursor. | × | × | ○ | |
| Move Cursors together | Change whether to move the two cursors together or separately. | × | × | ○ | Enabled only when cursors are displayed. |
| Show data between cursors | Enlarge (reduce) the data between cursors. | × | × | ○ | Enabled only when cursors are displayed. |
| Enlarge/Reduce in the vertical direction | Enlarge/Reduce the selected waveform in the vertical direction. | × | × | ○ | |
| Enlarge/Reduce in the horizontal direction | Enlarge/Reduce the selected waveform in the horizontal direction. | × | × | ○ | |
| Move the base line upward/downward | Move the selected waveform in vertical direction by 1Div. | × | × | ○ | |
| Change the display No. to the previous page/next page | Change the display No. of the waveform. | × | × | ○ | Disabled when No.1 to 8 are displayed. Disabled when No.25 to 32 are displayed. |

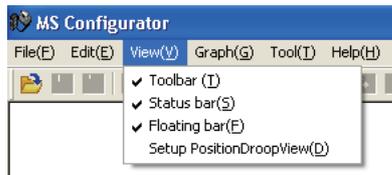
Tool

| Item | Function | Validity | | | Other conditions |
|------|--|--------------|---------|-----------|------------------|
| | | No wave form | XY mode | Time mode | |
| Tool | Displays adjustment/measurement functions. | ○ | ○ | ○ | |

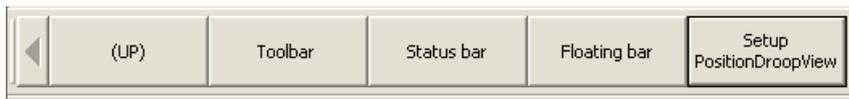
Help

| Item | Function | Validity | | | Other conditions |
|---------------------|--|-----------------------|-----------------------|-----------------------|------------------|
| | | No wave form | XY mode | Time mode | |
| Version information | Displays this MS Configurator's version information. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | |

(Note 1) Select [View]-[Setup PositionDroopView] on the menu bar.



The same items, [View]-[Setup PositionDroopView] are also on the floating bar.



Setting up the Position Droop View

Set how to display the positioning droop waveform when adjusting the position loop gain and time constant.

Loop-back display will be applied to the Y axis direction only. The waveform will be displayed as shown below.

(1) Waveform loop-back display

| Item | State | |
|-----------------------|---|-----------------------|
| Y axis display format | 1.000 to 9999.999 | Without index display |
| | 0.999 or less and 10000.000 or more | With index display |
| Y-axis maximum value | Same as the specified loop-back width. (The scale value must be rounded up to the closest whole number) Ex. 50.4 -> When the maximum loop-back width is 50.4, the Y-axis maximum value will be 51. | |
| Y-axis minimum value | Same as the specified loop-back width with a minus sign. (The scale value must be rounded up to the closest whole number) Ex. 50.4 -> When the maximum loop-back width is -50.4, the Y-axis minimum value will be -51. | |
| Waveform | Loop-back display. If the maximum or the minimum value of the Y axis is smaller than the specified loop-back width, the loop-back display will not be applied. | |

(2) Waveform no loop-back display

| Item | State |
|----------|---|
| Y axis | <ul style="list-style-type: none"> ■ When there is a 0 value or 0 cross <ul style="list-style-type: none"> - 0 line will be displayed at the center. - After multiplying the maximum value or the minimum value whichever the absolute value is larger, by 1.05, the upper two digits will be treated as the significant figures and the rest will be ■ Other than above <ul style="list-style-type: none"> (1) Positive value <ul style="list-style-type: none"> - Maximum value -> After multiplying the maximum value by 1.05, the third figure is rounded up and the upper two digits will be treated as the significant figures. - Minimum value -> After multiplying the minimum value by 0.95, the upper two digits will be treated as the significant figures and the rest will be rounded off. (2) Negative value <ul style="list-style-type: none"> - Maximum value -> After multiplying the maximum value by 0.95, the third figure is rounded up and the upper two digits will be treated as the significant figures. - Minimum value -> After multiplying the minimum value by 10.5, the upper two digits will be treated as the significant figures and the rest will be rounded off. |
| Waveform | No loop-back display |

3.1.7 Close the Application

MS Configurator is closed.

Operation method

- (1) Select the [File] - [Close application] from the menu.
This function can be selected from the floating bar [File] - [Close application] also.
- (2) MS Configurator is closed.

3.2 Environment Setup

With this function, the system environment is set. The environment setup must always be set first.

3.2.1 Communication Path Setup

With this function, the communication path is selected, and the communication setup is executed.

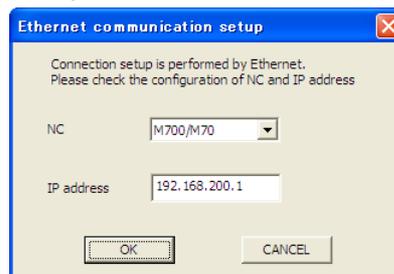
Note that a serial communication method is not supported now. Thus, do not select it.

Operation method

- (1) Select "Tool" - "1. Setup" - "Communication path setup".
(This function can be selected from the floating bar also.)
The "communication path setting" screen is displayed.

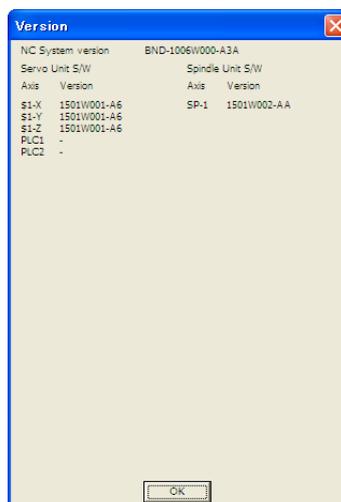


- (2) Select "Ethernet" for "communication path selection", then press the "Detail" button.
The "Ethernet communication setup" screen is displayed.
- (3) Select the NC model, and input the NC's IP address having been set to the parameter "#1926 Global IP address". The port No. is fixed.



- (4) Press the "OK" button.
The "Ethernet communication setup" screen is closed.
Return to the "communication path setting" screen.
- (5) Press the "OK" button.
The "communication path setting" screen is closed.

- (6) Display the "communication path setting" screen, then press the "Test" button.
The communication test between MS Configurator and NC is executed, and then the result is displayed.
When the result is normal, the message "It succeeded in communication." is displayed. When the result is abnormal, the message "E002 It was not able to communicate." is displayed.
Confirm the communication test results, and close the communication test dialog by pressing the "OK" button.
When the result is abnormal, display the Ethernet communication screen, confirm the NC model and IP address set with procedure (3), and start MS Configurator.exe again.
- (7) Press the [Version] button on the communication path setting screen, and confirm whether the versions such as NC, servo unit, etc. are versions for MS Configurator.
The servo axis to which "-" (hyphen) is displayed in the version is an unconnected axis.
Therefore, do not use the servo axis with "-" for the adjustment and the measurement.

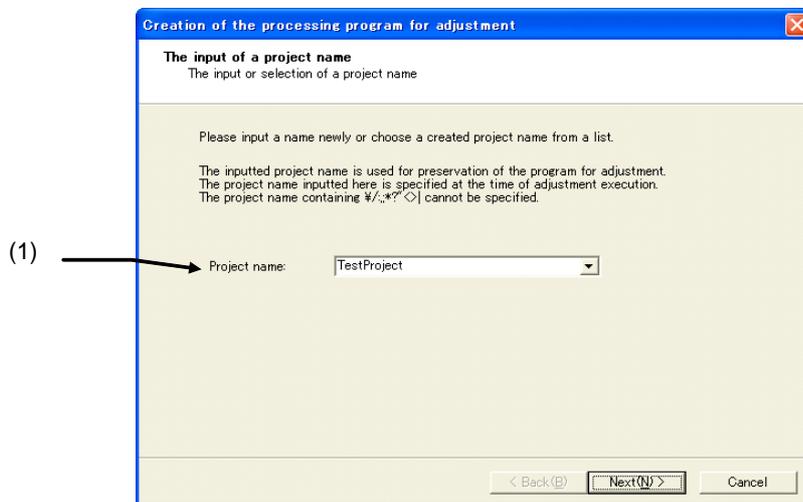


- (8) Close the communication path setting by pressing the "OK" button when setting value is saved or by pressing the "Cancel" button when setting value is not saved.

3.2.2 Program Creation

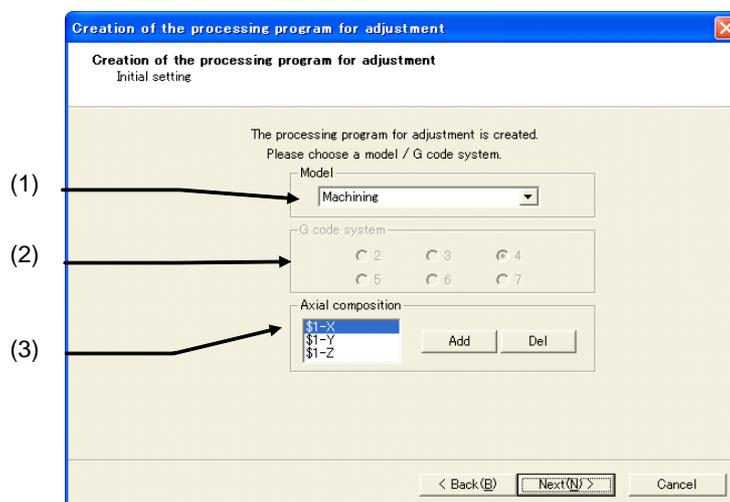
With this function, the machining program used for each adjustment is created.

Configuration of The input of a project name screen



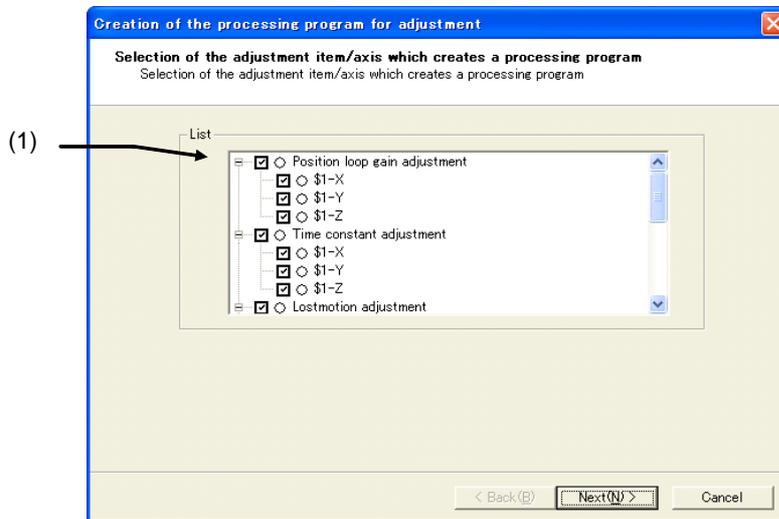
| Display item | Details |
|--------------|--|
| (1) Project | When uncreated name is input, the project is newly created. When selecting or inputting a created project name, the project is changed. The characters can be input except the following:\ / : ; * ? " < > |

Configuration of Creation of the processing program for adjustment screen



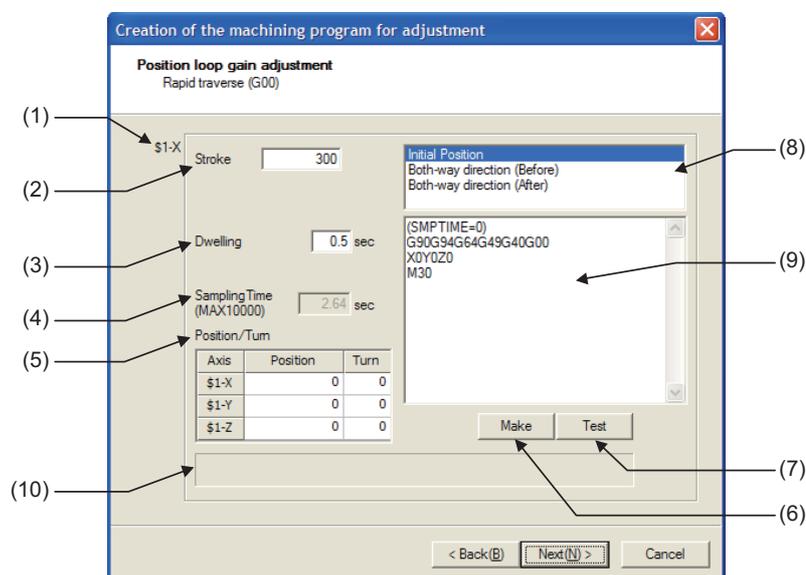
| Display item | Details |
|-----------------------|--|
| (1) Model | This selects "Lathe" or "Machining". |
| (2) G code system | This selects the G code system. The setting is valid when "Lathe" is selected. |
| (3) Axial composition | This displays axis configuration. When NC is connected, the axis configuration is obtained from NC. When NC is not connected, the "Add" and "Del" buttons are valid. |

Configuration of Creation of the processing program for adjustment screen



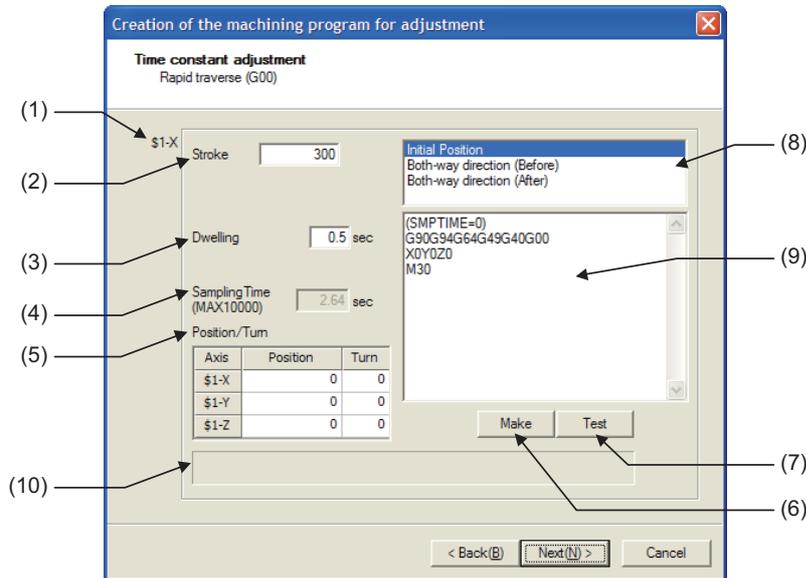
| Display item | Details |
|--|--|
| (1) List | This displays adjustment items and target axes. Position loop gain adjustment Time constant adjustment Lost motion adjustment Lost motion type 3 adjustment |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | When the checkbox is ON, a machining program is created. |
| <input type="radio"/> | This indicates a machining program for adjustment has not been created. |
| <input checked="" type="radio"/> | This indicates a machining program for adjustment has been created. When the checkbox (<input type="checkbox"/>) for this item is ON (<input checked="" type="checkbox"/>), the program is over written. |

Configuration of Position loop gain adjustment screen (Rapid traverse)



| Display item | Details | Default | |
|-------------------------------|---|----------|---|
| (1) Axis name | This displays the target part system and axis name. | - | |
| (2) Stroke | This sets a stroke (mm). | 300 | |
| (3) Dwelling | This sets a dwell time (s). | 0.5 | |
| (4) Sampling Time | This displays approx. time automatically calculated based on rapid traverse, time constant, stroke and dwell. | - | |
| (5) Position/Turn | This sets each axis' starting position (mm) on the workpiece coordinates and traveling order. When all axes simultaneously travel, set a same number to all axes. These settings can be input by double-clicking the cell. | Position | 0 |
| | | Turn | 0 |
| (6) Make | This creates the machining programs (two or more) based on the input data. | | |
| (7) Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. | | |
| (8) Machining program list | This displays the creating machining program list. | | |
| (9) Machining program display | This displays the machining program selected from the machining program list. The displayed program can be edited. | | |
| (10) Hint | This displays a hint for the input item where the cursor is put. | | |

Configuration of Time constant adjustment screen (Rapid traverse)

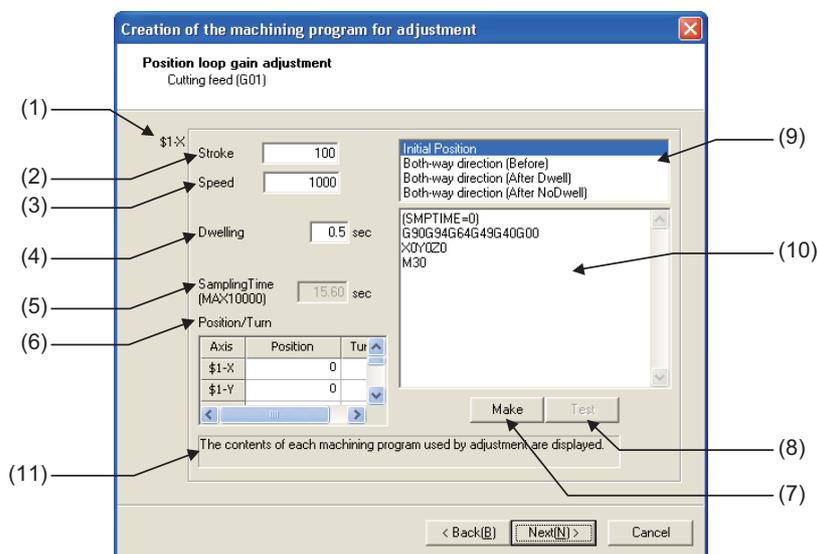


| Display item | Details | Default | |
|-------------------------------|---|----------|--------|
| (1) Axis name | This displays the target part system and axis name. | - | |
| (2) Stroke | This sets a stroke (mm). | 300 | |
| (3) Dwelling | This sets a dwell time (s). | 0.5 | |
| (4) Sampling Time | This displays approx. time automatically calculated based on rapid traverse, time constant, stroke and dwell. | - | |
| (5) Position/Turn | This sets each axis starting position (mm) on the workpiece coordinates and traveling order. When all axes simultaneously travel, set a same number to all axes. These settings can be input by double-clicking the cell. | Position | (Note) |
| | | Turn | (Note) |
| (6) Make | This creates the machining programs (two ore more) based on the input data. | | |
| (7) Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. | | |
| (8) Machining program list | This displays the creating machining program list. | | |
| (9) Machining program display | This displays the machining program selected from the machining program list. The displayed program can be edited. | | |
| (10) Hint | This displays a hint for the input item where the cursor is put. | | |

(Note) When the position loop gain adjustment (rapid traverse) has been executed, the set amount there is the initial amount here.

When the position loop gain adjustment (rapid traverse) has not been executed, the initial amount is "0".

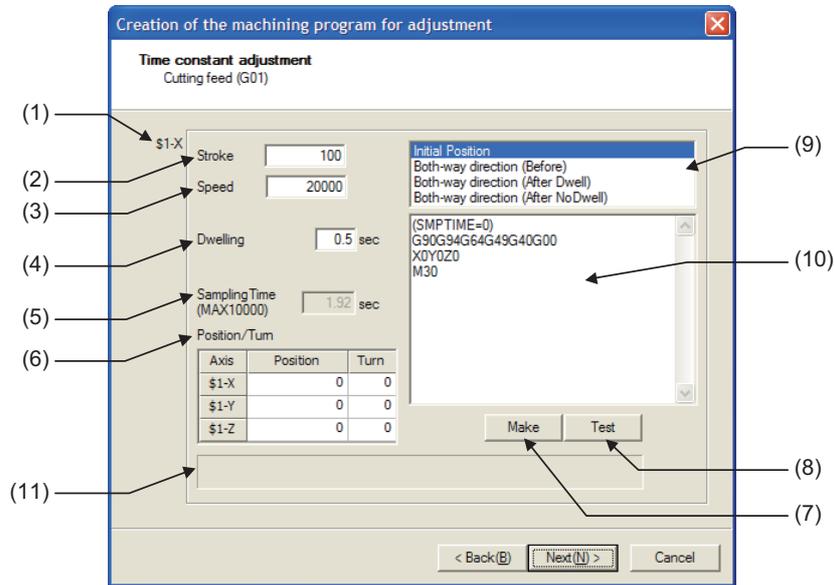
Configuration of Position loop gain adjustment screen (Cutting feed)



| Display item | | Details | Default | |
|--------------|---------------------------|---|--|--------|
| (1) | Axis name | This displays the target part system and axis name. | - | |
| (2) | Stroke | This sets a stroke (mm). | 100 | |
| (3) | Speed | This sets a cutting feedrate (mm/min). | Clamp value of NC | |
| (4) | Dwelling | Effect | This sets a dwell validity. It is valid when the checkbox is ON. | |
| | | Input | This sets a dwell time (s). | |
| (5) | Sampling Time | This displays approx. time automatically calculated based on rapid traverse, time constant, stroke and dwell. | - | |
| (6) | Position/Turn | This sets each axis starting position (mm) on the workpiece coordinates and traveling order. When all axes simultaneously travel, set a same number to all axes. These settings can be input by double-clicking the cell. | Position | (Note) |
| | | | Turn | (Note) |
| (7) | Make | This creates the machining programs (two or more) based on the input data. | | |
| (8) | Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. | | |
| (9) | Machining program list | This displays the creating machining program list. | | |
| (10) | Machining program display | This displays the machining program selected from the machining program list. The displayed program can be edited. | | |
| (11) | Hint | This displays a hint for the input item where the cursor is put. | | |

(Note) When the position loop gain adjustment (rapid traverse) or time constant adjustment (rapid traverse) has been executed, the set amount there is the initial amount here. When neither is executed, the initial amount is "0".

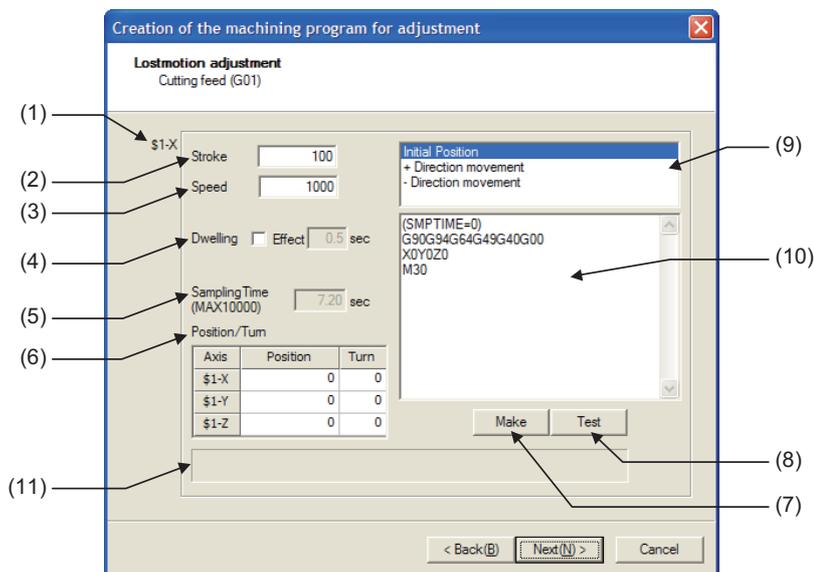
Configuration of Time constant adjustment screen (Cutting feed)



| Display item | | Details | Default | |
|--------------|---------------------------|---|--|--------|
| (1) | Axis name | This displays the target part system and axis name. | - | |
| (2) | Stroke | This sets a stroke (mm). | 100 | |
| (3) | Speed | This sets a cutting feedrate (mm/min). | Clamp value of NC | |
| (4) | Dwelling | Effect | This sets a dwell validity. It is valid when the checkbox is ON. | |
| | | Input | This sets a dwell time (s). | |
| (5) | Sampling Time | This displays approx. time automatically calculated based on rapid traverse, time constant, stroke and dwell. | - | |
| (6) | Position/Turn | This sets each axis starting position (mm) on the workpiece coordinates and traveling order. When all axes simultaneously travel, set a same number to all axes. These settings can be input by double-clicking the cell. | Position | (Note) |
| | | | Turn | (Note) |
| (7) | Make | This creates the machining programs (two or more) based on the input data. | | |
| (8) | Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. | | |
| (9) | Machining program list | This displays the creating machining program list. | | |
| (10) | Machining program display | This displays the machining program selected from the machining program list. The displayed program can be edited. | | |
| (11) | Hint | This displays a hint for the input item where the cursor is put. | | |

(Note) When the position loop gain adjustment (rapid traverse/cutting feedrate) or time constant adjustment (rapid traverse) has been executed, the set amount there is the initial amount here. When neither is executed, the initial amount is "0".

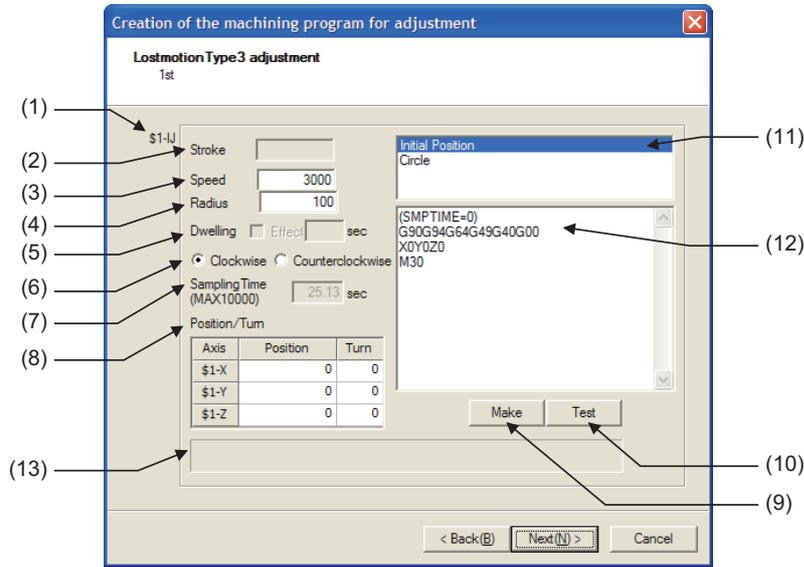
Configuration of Lostmotion adjustment screen



| Display item | | Details | Default | |
|--------------|---------------------------|--|--|--------|
| (1) | Axis name | This displays the target part system and axis name. | - | |
| (2) | Stroke | This sets a stroke (mm). | 100 | |
| (3) | Speed | This sets a cutting feedrate (mm/min). | 1000 | |
| (4) | Dwelling | Effect | This sets a dwell validity. It is valid when the checkbox is ON. | |
| | | Input | This sets a dwell time (s). | |
| (5) | Sampling Time | This displays approx. time automatically calculated based on rapid traverse, time constant, stroke and dwell. | - | |
| (6) | Position/Turn | This sets each axis starting position (mm) on the workpiece coordinates and traveling order. When all axes simultaneously travel, set a same number to all axes. These settings can be input by double-clicking the cell. | Position | (Note) |
| | | | Turn | (Note) |
| (7) | Make | This creates the machining programs (two or more) based on the input data. | | |
| (8) | Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. | | |
| (9) | Machining program list | This displays the creating machining program list. | | |
| (10) | Machining program display | This displays the machining program selected from the machining program list. The displayed program can be edited. | | |
| (11) | Hint | This displays a hint for the input item where the cursor is put. | | |

(Note) When the position loop gain adjustment (rapid traverse/cutting feedrate) or time constant adjustment (rapid traverse/cutting feedrate) has been executed, the set amount there is the initial amount here. When neither is executed, the initial amount is "0".

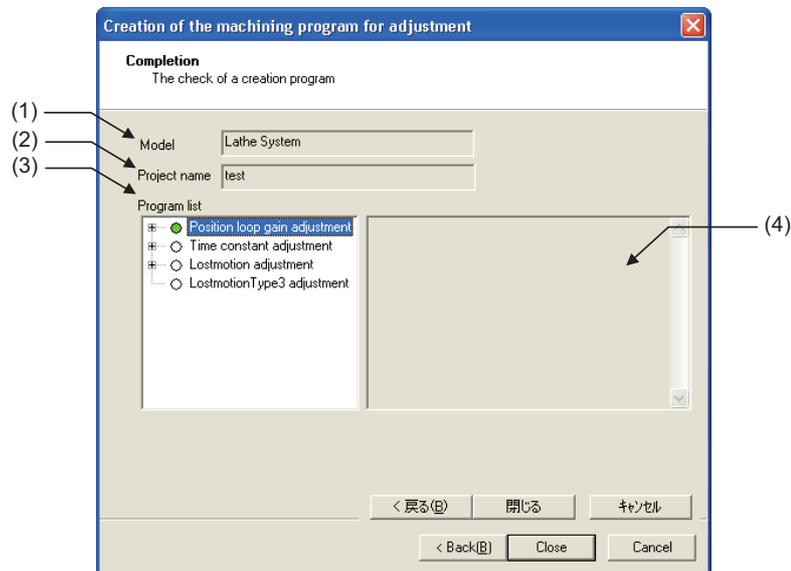
Configuration of Lostmotion type 3 adjustment screen



| Display item | | Details | Default | |
|--------------|---------------------------|---|--|--------|
| (1) | Axis name | This displays the target part system and axis name. | - | |
| (2) | Stroke | This sets a stroke (mm). | 100 | |
| (3) | Speed | This sets a cutting feedrate (mm/min). | 1000 | |
| (4) | Radius | This sets a radius. | 100 | |
| (5) | Dwelling | Effect | This sets a dwell validity. It is valid when the checkbox is ON. | |
| | | Input | This sets a dwell time (s). | |
| (6) | Rotation direction | This selects a rotation direction. | Clockwise | |
| (7) | Sampling Time | This displays approx. time automatically calculated based on rapid traverse, time constant, stroke and dwell. | - | |
| (8) | Position/Turn | This sets each axis starting position (mm) on the workpiece coordinates and traveling order. When all axes simultaneously travel, set a same number to all axes. These settings can be input by double-clicking the cell. | Position | (Note) |
| | | | Turn | (Note) |
| (9) | Make | This creates the machining programs (two or more) based on the input data. | | |
| (10) | Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. | | |
| (11) | Machining program list | This displays the creating machining program list. | | |
| (12) | Machining program display | This displays the machining program selected from the machining program list. The displayed program can be edited. | | |
| (13) | Hint | This displays a hint for the input item where the cursor is put. | | |

(Note) When the position loop gain adjustment (rapid traverse/cutting feedrate) or time constant adjustment (rapid traverse/cutting feedrate) has been executed, the set amount there is the initial amount here. When neither is executed, the initial amount is "0".

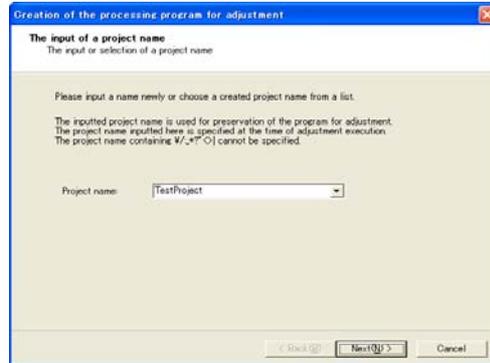
Configuration of Completion screen



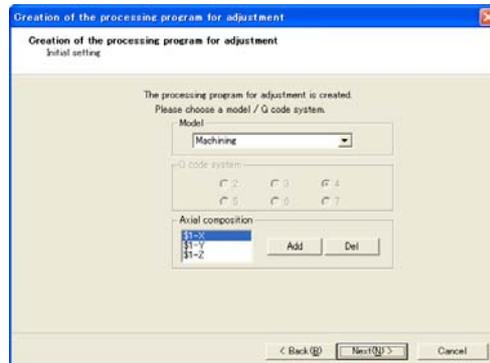
| Display item | Details |
|---------------------|---|
| (1) Model | This displays the selected model. |
| (2) Project name | This displays the input project name. |
| (3) Program list | This displays the machining programs created for each axis of each adjustment item. The ● is displayed next to the axis for which the machining program has been created. The ○ is displayed next to the axis for which the machining program has not been created. |
| (4) Program display | This displays the program contents selected from the program list. |

Operation method

- (1) Select "Tool" - "1. Setup" - "Program creation".
 (This function can be selected from the floating bar also.)
 When NC is not connected, the message "E001 Connect NC Failed." is displayed.
 The "The input of a project name" screen is displayed.



- (2) Select the project name. When a project is created newly, input the project name.
 After selected, press the "Next" button.
 The selected project name is used to save the programs for adjustment.
 When the adjustment is executed, specify the project name selected here.
 The "Creation of the processing program for adjustment" screen is displayed.



- (3) Set the model, G code system and axis configuration.

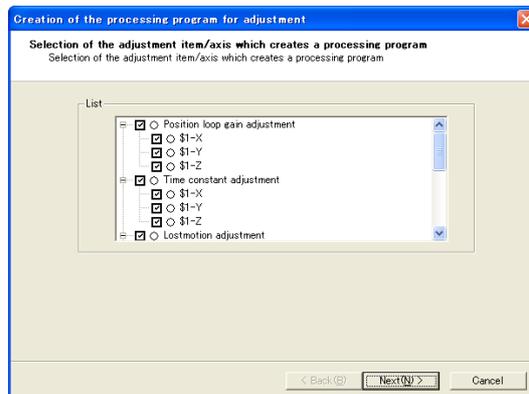
When the settings are completed, press the "Next" button.

When NC is connected, the axis configuration is automatically acquired from NC.

When NC is not connected or the axis configuration is changed, press the "OK" button after pressing the "Add" or "Del" button, and then inputting the added/changed axis name to the displayed dialog. When canceling, press the "Chancel" button.

(Note) When the NC model is lathe system, G code system can be selected.

The "Selection of the adjustment item/axis which creates a processing program" screen is displayed.

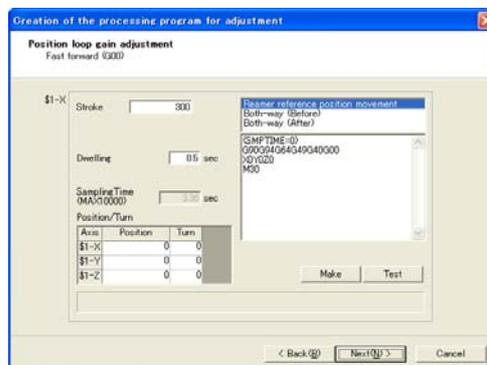


- (4) Set whether to create the adjustment machining program for each adjustment item of each axis.

Press the "Next" button after the axis creating machining program is selected (the checkbox is ON).

If  is displayed ahead of axis name, the machining program for the axis has already been created. But if the checkbox is turned ON, the program will be overwritten.

The "Creation of the processing program for adjustment" for position loop gain screen is displayed.



- (5) Create the machining program per axis for position loop gain (rapid traverse, cutting feedrate).

After the settings are input, **press the "Make" button.**

When the cursor is moved to the input area, a hint is displayed.

Create each machining program for adjustment.

After the "Make" button is pressed, the content of the machining program selected from the list of created machining programs is displayed.

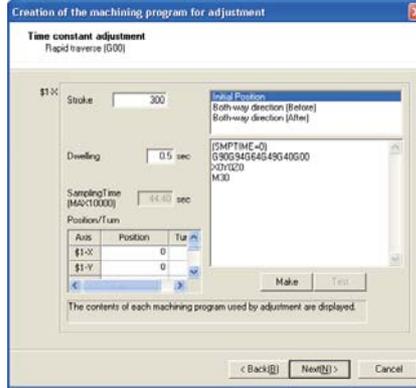
- (6) Carry out the machining program operation test.

Press the "Test" button.

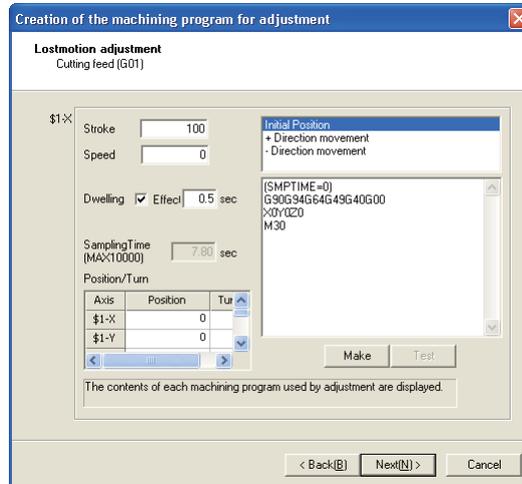
(Note) Set the NC operation mode to the MDI mode beforehand.

The displaying machining program is transmitted to NC (as MDI program), and MDI setting is completed. Then, the transmitted program is executed by inputting the cycle start.

- (7) After all axes' adjustment machining programs are created, press the "Next" button again. When there are two or more axes which should require the machining program to be created, the next axis "Creation of the processing program for adjustment" screen is displayed after pressing the "Next" button. The "Creation of the processing program for adjustment" for time constant adjustment screen is displayed.

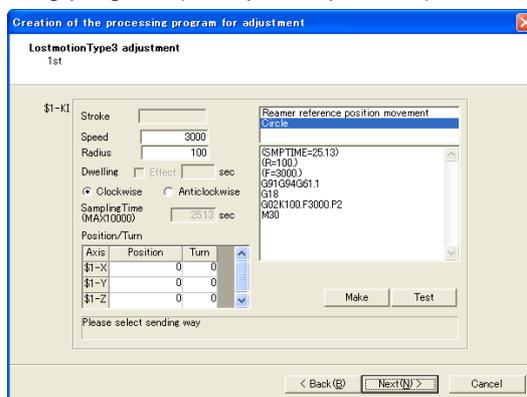


- (8) Create the machining program per axis for time constant adjustment (rapid traverse, cutting feedrate). The operation method is the same as (5).
- (9) After all axes' adjustment machining programs are created, press the "Next" button again. When there are two or more axes which should require the machining program to be created, the next axis "Creation of the processing program for adjustment" screen is displayed after pressing the "Next" button. The "Lostmotion adjustment" screen is displayed.

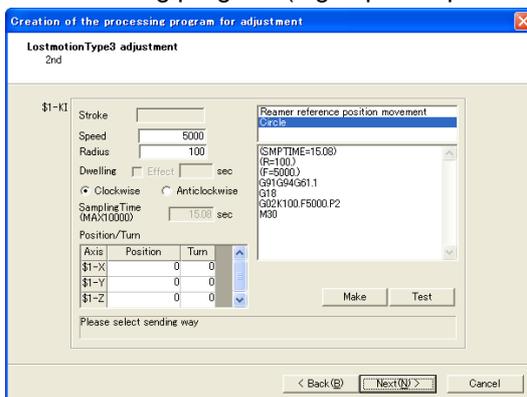


- (10) Create the machining program per axis for lostmotion adjustment. The operation method is the same as (5).

- (11) After all axes' adjustment machining programs are created, press the "Next" button again. When there are two or more axes which should require the machining program to be created, the next axis' "Creation of the processing program for adjustment" screen is displayed after pressing the "Next" button. The "Lostmotion type 3 adjustment" screen is displayed. The first machining program (low speed operation) is created.



- (12) Next, the second machining program (high speed operation) is created.

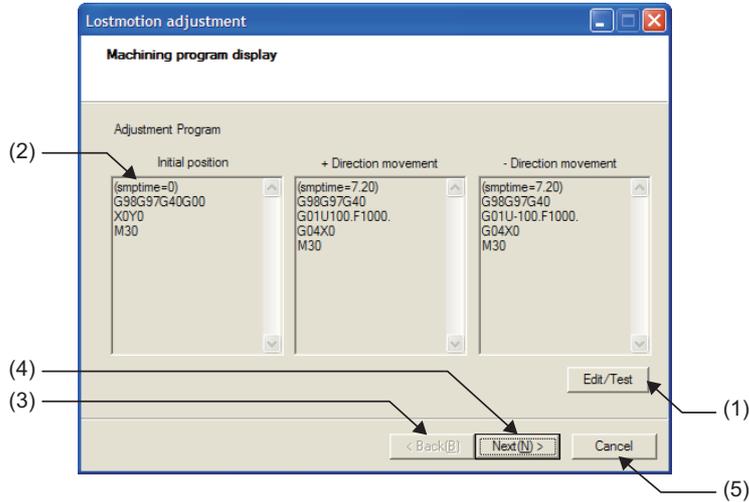


- (13) All created machining programs are displayed per axis for each adjustment item. If necessary, finish the program creation by pressing the "Complete" button after confirming the contents of each machining program.

Machining program display

Before the automatic adjustment is actually performed on "time constant", "position loop gain", "lost motion", and "lost motion type 3", the display and edit screen will be displayed so that the settings can be checked.

The programs used for adjustment will be displayed in black. And others will be grayed out.



| Item | Detail |
|------------------------|--|
| (1) Edit/Test | Program edit/test screen will be displayed. |
| (2) Adjustment Program | Machining programs used for adjusting the specified axis will be displayed. |
| (3) Back | Disabled. |
| (4) Next | The next screen will appear after setting the program in NC. When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed. |
| (5) Cancel | Stops the wizard. |

Machining program edit

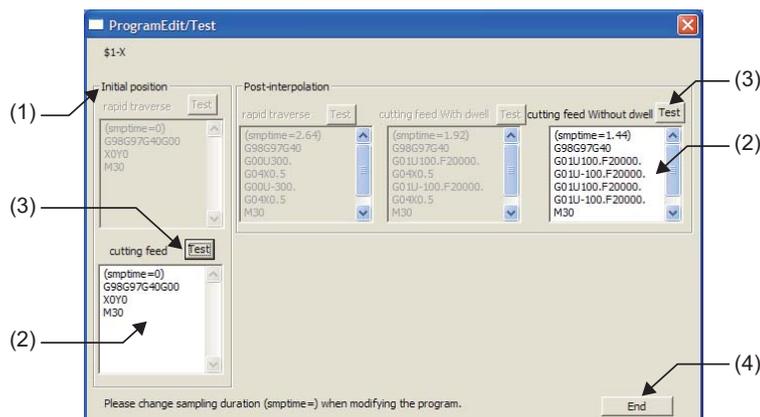
Edit the machining program to adjust the time constant.

Only the programs used for adjusting will be able to be edited from the dialogue.

Also, these programs can be tested (by transmitting them to NC and operate them in NC).

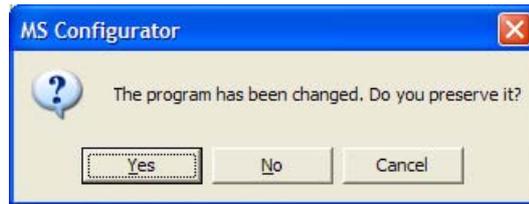
Editing will be prohibited for other programs (these will be grayed out) and test cannot be performed on these programs.

If a program is changed, the background color will change.



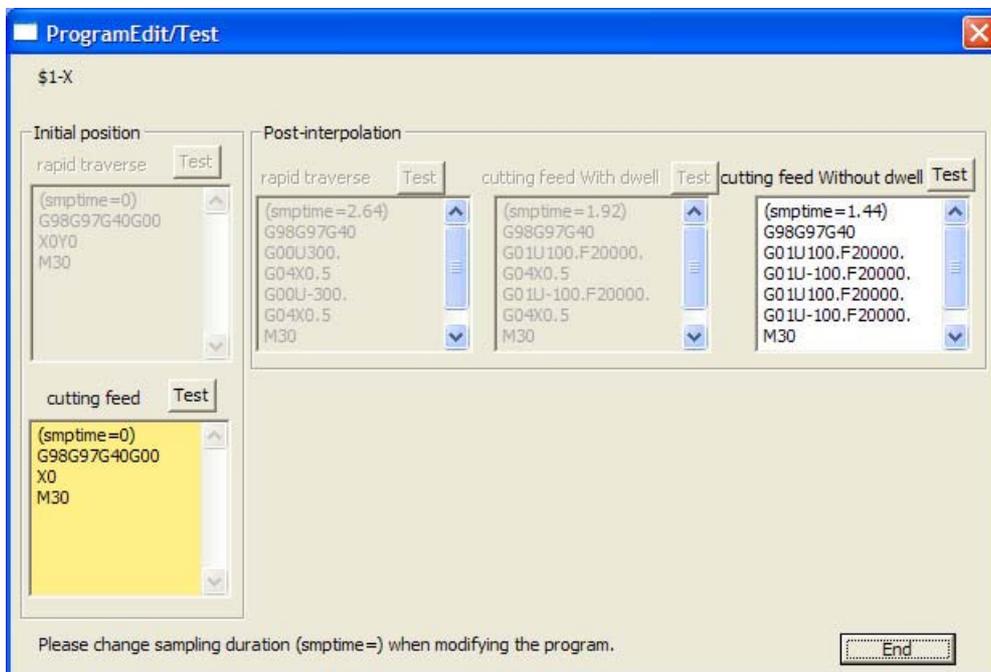
| Item | Detail | Default |
|------------------------------|---|--------------------------------------|
| (1) \$ ○ - △ axis | This displays the target axis name. | - |
| (2) Program display edit box | Program for adjustment will be displayed. | The adjustment program stored in PC. |

| Button name | Operation |
|-------------|--|
| (3) Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. An error dialogue will appear if the operation mode of the NC's test target part system is not set to MDI mode. An error dialogue will also appear when the program does not exist (when no program is displayed in the program display edit box). |
| (4) End | Clears the program edit/test screen and returns to the machining program display screen. If any of the program was changed, a dialogue to ask whether to confirm the change will appear. An error dialogue will appear when the program does not exist (when no program is displayed in the program display edit box). |



| Button name | Operation |
|-------------|--|
| Yes | Saves the programs on the program edit/test screen and returns to the machining program display screen. |
| No | Returns to the machining program display screen without saving the programs on the program edit/test screen. |
| Cancel | Returns to the programs on the program edit/test screen. |

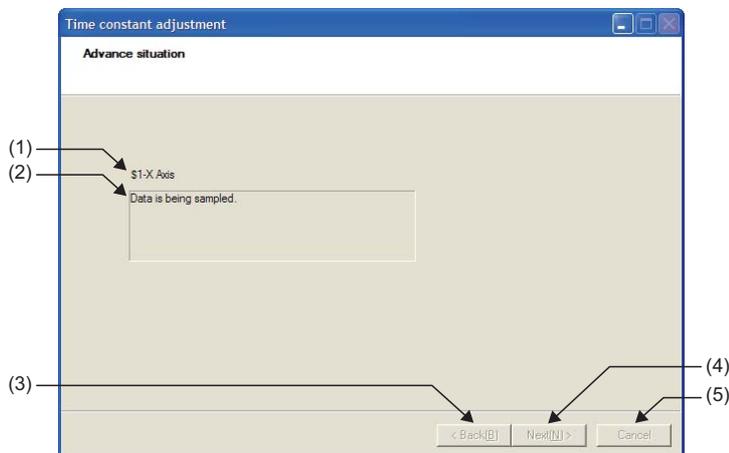
If a program is changed, the background color will change.



Horizontal scroll bars are not provided because it will narrow the text area. The hidden part can be viewed by moving the cursor. The vertical scroll bars will become operable when programs are too long to fit in the edit box.

Adjustment advance situation display

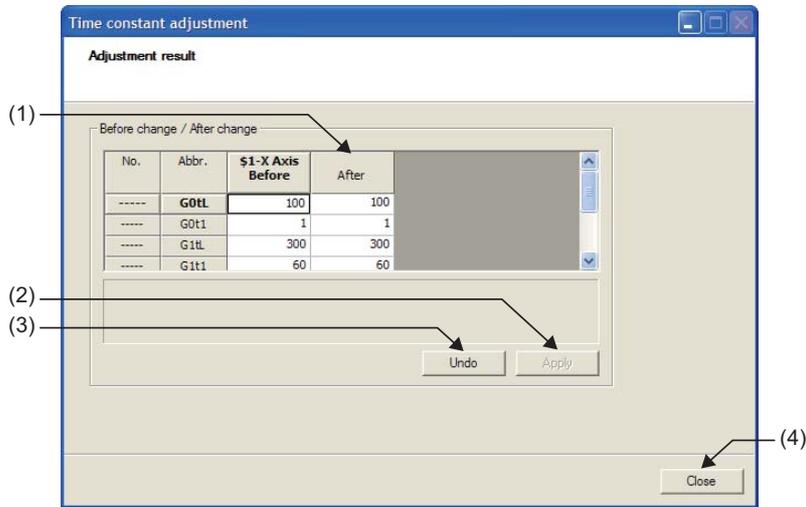
Adjustment advance situation display will be the same as that of the time constant adjustment.



| Item | Detail | |
|--|---|--|
| (1) Axis name | This displays the axis which is being adjusted. | |
| (2) Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | * When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter..." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out after ten seconds and stops by an error. | |
| (3) Back | Disabled. | |
| (4) Next | The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed. | |
| (5) Cancel | The dialogue "Adjustment ended?" will appear and, if "OK" is selected, the wizard will stop. The cancel button will be enabled when the advance situation turns to [Cycle start waiting] or [Adjustment was completed], or when the parameter restoration is completed after [Error stop]. | |

Parameter display

The parameters targeted for time constant adjustment and the parameters whose values are different before/after the adjustment will be displayed.



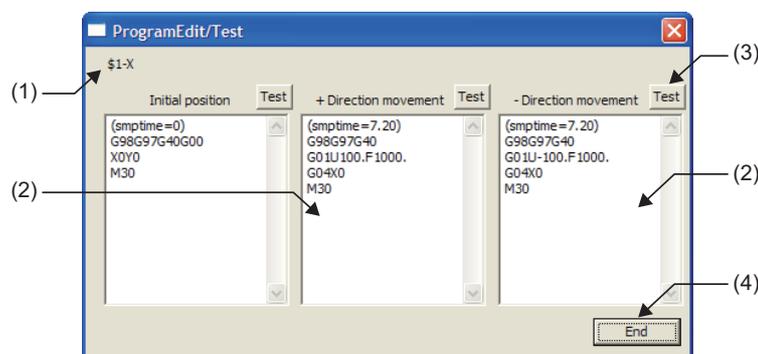
| Item | Detail |
|--------------------------------|---|
| (1) After change/before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| (2) Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| (3) Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are returned to the settings before the parameters are adjusted. |
| (4) Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

Machining program edit/test

Only the programs used for adjusting can be edited from the dialogue.

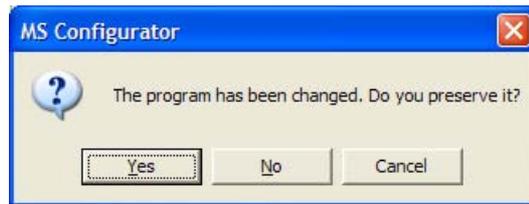
Also, these programs can be tested (by transmitting them to NC and operate them in NC).

Editing will be disabled for other programs (these will be grayed out) and test cannot be performed on these programs.



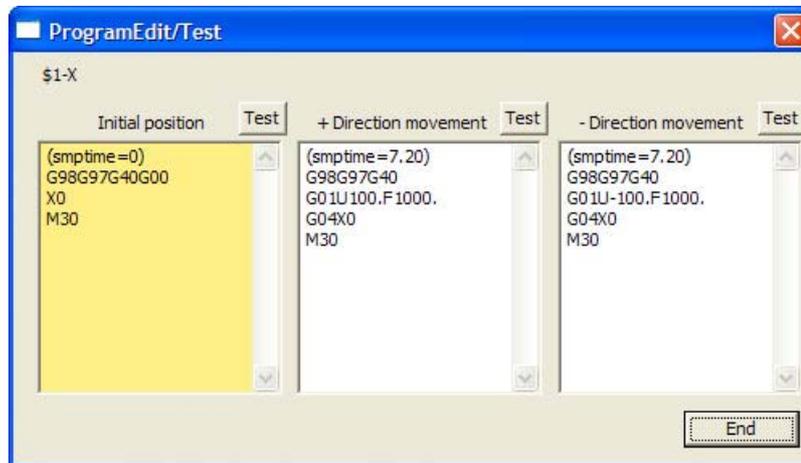
| Item | Detail | Default |
|------------------------------|---|--------------------------------------|
| (1) \$ ○ - △ axis | This displays the target axis name. | - |
| (2) Program display edit box | Program for adjustment will be displayed. | The adjustment program stored in PC. |

| Button name | Operation |
|-------------|--|
| (3) Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. An error dialogue will appear if the operation mode of the NC's test target part system is not set to MDI mode. An error dialogue will also appear when the program does not exist (when no program is displayed in the program display edit box). |
| (4) End | Clears the program edit/test screen and returns to the machining program display screen. If any of the program was changed, a dialogue to ask whether to confirm the change will appear. An error dialogue will appear when the program does not exist (when no program is displayed in the program display edit box). |



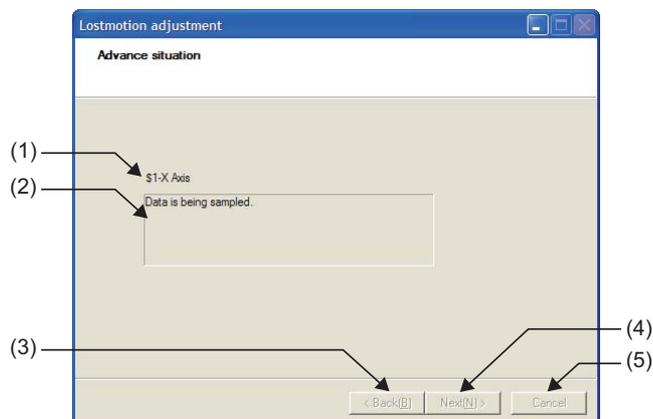
| Button name | Operation |
|-------------|--|
| Yes | Saves the programs on the program edit/test screen and returns to the machining program display screen. |
| No | Returns to the machining program display screen without saving the programs on the program edit/test screen. |
| Cancel | Returns to the programs on the program edit/test screen. |

If a program is changed, the background color will change.



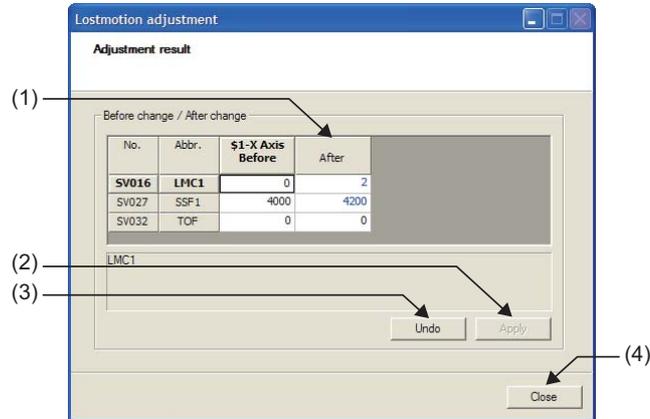
Horizontal scroll bars are not provided because it will narrow the text area. The hidden part can be viewed by moving the cursor. The vertical scroll bars will become operable when programs are too long to fit in the edit box.

Adjustment advance situation display



| Item | Detail | |
|--|---|--|
| (1) Axis name | This displays the axis which is being adjusted. | |
| (2) Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | * When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter..." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out after ten seconds and stops by an error. | |
| (3) Back | Disabled. | |
| (4) Next | The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed. | |
| (5) Cancel | The dialogue "Adjustment ended?" will appear and, if "OK" is selected, the wizard will stop. The cancel button will be enabled when the advance situation turns to [Cycle start waiting] or [Adjustment was completed], or when the parameter restoration is completed after [Error stop]. | |

Adjustment result display



| Item | Detail |
|--------------------------------|---|
| (1) After change/before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| (2) Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| (3) Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the parameters are returned to the settings before the parameters are adjusted. |
| (4) Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

Precautions

(1) Program for reference position traveling

Set the traveling order and traveling start position so that each axis should not collide. Especially, be careful about traveling order when the adjustment program for vertical axis is created.

(2) Stroke setting amount

When the set amount of the stroke is too short, the motor decelerates before it reaches at the maximum speed. So a correct adjustment cannot be executed. (Oppositely, when the set amount of the stroke is too long, sampling rate roughens. So a current peak cannot be acquired appropriately.)

Set about 500 as a standard of the stroke. If problem occurs, set the maximum stroke. Depending on the machine configuration, even if the maximum stroke is set to the short stroke axis, the above problem could occur, and the adjustment may not be executed correctly.

(3) Dwell setting amount of lostmotion adjustment

Usually validate the dwell, and set 0.5 seconds to it.

3.3 Assistance Setting Function

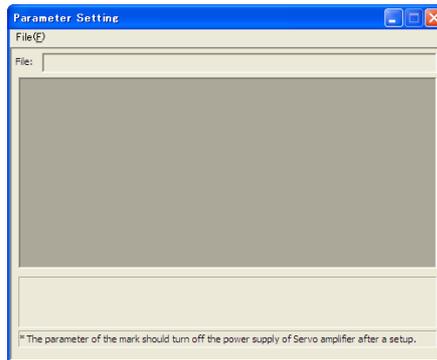
3.3.1 Parameter Setup

With this function, the servo parameter SV001 to SV128 can be saved/changed.

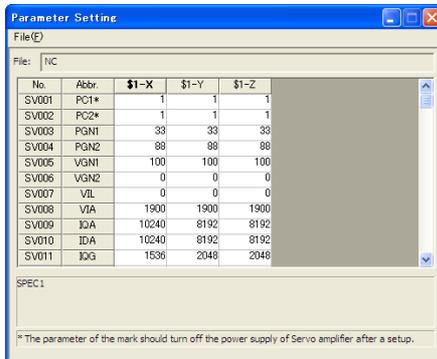
Note that the system setting parameters (SV066 to SV080) are not displayed.

Operation method

- (1) Select "Tool" - "2.AssistanceFunction" - "Parameter setup".
The "Parameter Setting" screen is displayed.



- (2) Select "File" - "Open" or "ReadNC" to read the parameters.
The parameters are read.



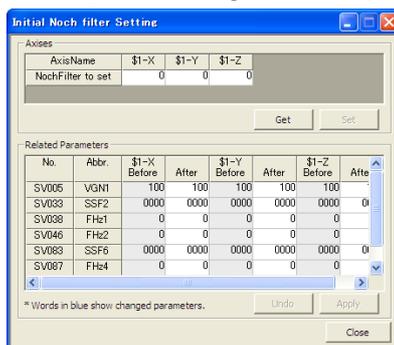
- (3) Edit the parameters.
- (4) Select "File" - "Save" or "Save As" to save the parameters.
Select "File" - "WriteNC" to write the parameters into the NC.

3.4 Servo Automatic Adjustment

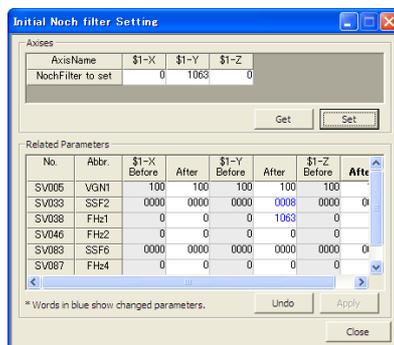
3.4.1 Initial Notch Filter Setup

Operation method

- (1) Select "Tool" - "3.IndividualAdjust" - "Initial Notch filter Setting".
When NC is not connected, the message "E001 Connect NC Failed." is displayed.



- (2) Press the "Get" button, and acquire the setting value of the notch filter.
When the value of the AFLT frequency is "0", the set value keeps "0".
- (3) Change the setting value of notch filter to an arbitrary value, press the "Set" button.



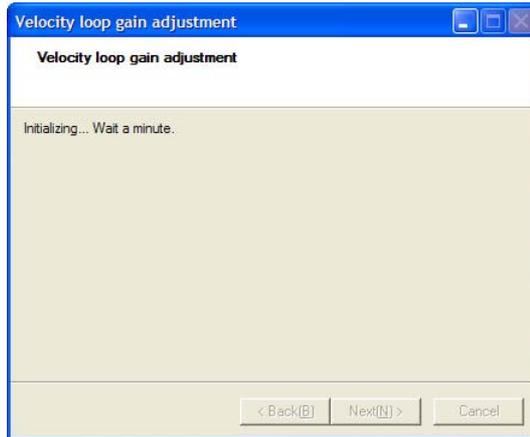
- (4) The changed parameter list is displayed. After the changed settings are confirmed, press the "OK" button and the process is finished.

3.4.2 Velocity Loop Gain Adjustment

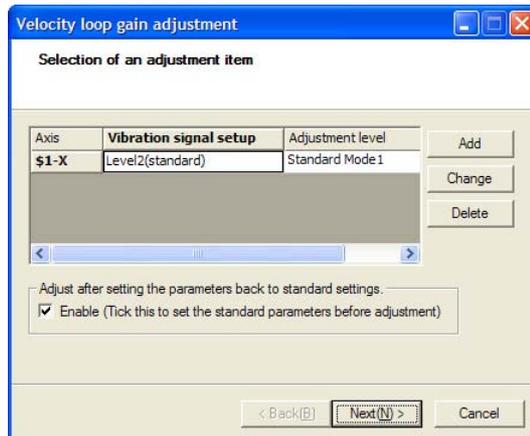
With this function, the speed loop gain is adjusted.

Operation method

- (1) Select "Tool" - "3.IndividualAdjust" - "Velocity loop gain adjustment".
 This function can be selected from the floating bar also.
 The screen to initialize the communication setting is displayed.
 The initialization time depends on the number of axes. When the initialization completes, it automatically proceeds to the screen to select axes.



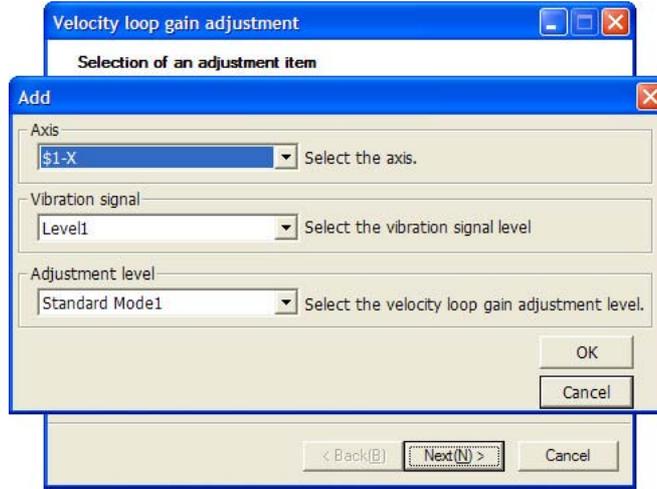
- (2) The "Velocity loop gain adjustment" screen is displayed.
 All the servo parameters are automatically saved in the PC before adjusting the velocity loop gain, which enables to restore the original parameters if any problem occurs afterwards.
 However, the parameters which can be restored from the screen to restore parameters are limited to those targeted for the velocity loop gain adjustment.



| Button name | Operation |
|-------------|---|
| Add | The Selection of adjustment item screen will appear. Invalid when an adjustment target axis is not selected. |
| Change | Adjustment method for the selected axis will be changed. |
| Back | Disabled |
| Next | Standard parameter setup screen will appear. |
| Cancel | Velocity loop gain adjustment will be cleared. |

| Setting item | Detail | Initial value | Setting range |
|--|---|--|----------------|
| Axis | The adjustment target axis will be displayed. | 1st time -> No display 2nd time and after -> The axis which was selected the previous time will be displayed in \$△-○ format. \$ △ indicates the part system, ○ indicates the axis name. Be aware that resetting will be necessary after changing the construction of the drive unit. | - |
| Vibration signal setup | Select the level of vibration signals. | Level 2 (standard) | - |
| Adjustment level | Select the velocity loop gain adjustment level. | Standard Mode 1 | - |
| Adjust after setting the parameters back to standard settings. | Select whether to return the parameter value to the standard value before adjustment. Enable = standard value. MS Configurator's standard value will be displayed on the parameter setup screen as the setting value. Not enabled = Current NC setting will be displayed. The setting value in NC will be displayed on the parameter setup screen as the setting value. | Enable | Enable/Disable |

(3) Press "Add" to display the screen below.



| Button name | Operation |
|-------------|--|
| OK | Saves the setting and closes the screen. |
| Cancel | Closes the axis adding screen. Returns to the velocity loop gain adjustment screen. |

| Setting item | Detail | Initial value | Setting range |
|-------------------------------------|---|---|---|
| Axis | Select the adjustment target axis. | 1st time -> The 1st axis of the 1st part system will be displayed in \$△-○ format. \$ △ indicates the part system, ○ indicates the axis name. | - |
| | | 2nd time and after -> The axis which was selected the previous time will be displayed in \$△-○ format. \$ △ indicates the part system, ○ indicates the axis name. Be aware that resetting will be necessary After changing the construction of the drive unit. | Level 1 to 6 |
| Vibration signal setup | Select the level of vibration signals. | Level 2 (standard) | - |
| Velocity loop gain adjustment level | Select the velocity loop gain adjustment level. | Standard Mode 1 | Standard Mode 1 (short) to 3 (short) Standard Mode 1 to 3 High Accuracy Mode 1 to 2 |

Vibration signal level

| Level | Magnitude of the vibration signal |
|--------------------|-----------------------------------|
| Level 1 | Small ↑ |
| Level 2 (Standard) | |
| Level 3 | |
| Level 4 | ↓ Big |
| Level 5 | |
| Level 6 | |

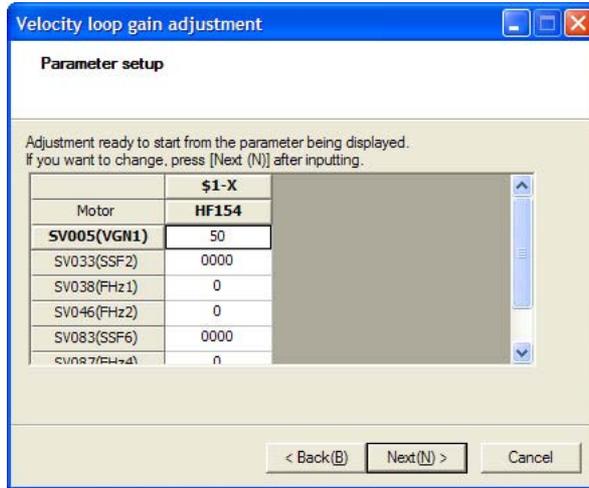
Velocity loop gain adjustment level

| Level | Accuracy | Time |
|---------------------------------|-----------|------------|
| Standard Mode 1 (short)(Note1) | Low ↑ | Short ↑ |
| Standard Mode 2 (short) | | |
| Standard Mode 3 (short) | | |
| Standard Mode 1 (Initial value) | ↓ High | ↓ Long |
| Standard Mode 2 | | |
| Standard Mode 3 | | |
| High Accuracy Mode 1 | | |
| High Accuracy Mode 2 | | |

(Note 1) Short mode

Adjustment level Standard Mode 1 to 3 (short) shortens the adjustment time but secures less adjustment accuracy compared to Standard Mode 1 to 3 and High Accuracy Mode 1 and 2. When there is no peripheral axis or when high accuracy is not required, use Standard Mode 1 to 3 (short).

(4) Press "Next" to display the parameter setup screen.
 The motor type will be identified from the readout parameter and fix the standard parameter value.
 If the motor is not among the target motors, [Motor] field will be blank.

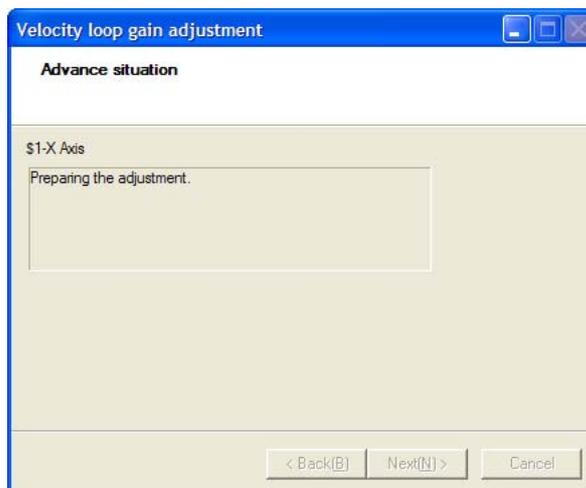


| Button name | Operation |
|-------------|---|
| < Back (B) | Displays the axis selection screen. |
| Next (N) > | Starts adjustment. |
| Cancel | Stops velocity loop gain adjustment. Returns to the MS Configurator main screen. |

The initial value varies depending on the setting for [Adjust after setting the parameters back to standard settings] on the axis selecting screen.

| Setting item | Enable | Disable |
|--------------|---------------------------------------|-----------------------|
| Motor | Motor name | Motor name |
| SV005(VGN1) | Standard parameter setting file value | Parameter SV005 in NC |
| SV033(SSF2) | XXXX (Bit1 to 3=0, Bit5 to 7=0) | Parameter SV033 in NC |
| SV038(FHz1) | 0 | Parameter SV038 in NC |
| SV046(FHz2) | 0 | Parameter SV046 in NC |
| SV083(SSF6) | XXXX (Bit1 to 3=0, Bit5 to 7=0) | Parameter SV083 in NC |
| SV087(FHz4) | 0 | Parameter SV087 in NC |
| SV088(FHz5) | 0 | Parameter SV088 in NC |

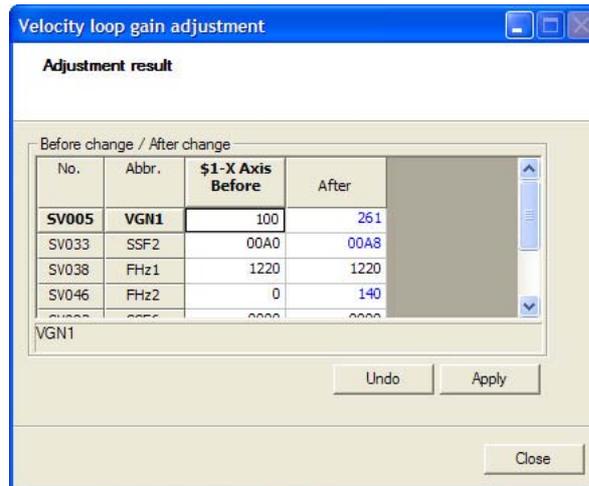
(5) Press "Next" to display the advance situation.



| Item | Detail | |
|------------------------------------|--|--|
| Axis name | This displays the axis which is being adjusted. | |
| Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | * When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out after ten seconds and stops by an error. | |
| Back | Disabled. | |
| Next | The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed. | |
| Cancel | Disabled. | |

(6) The message "The adjustment ended...." tells the completion of the adjustment. Press the "Next" button.

(7) The adjustment result will appear when the velocity loop gain adjustment is completed.



| Item | Detail |
|--------------------------------|--|
| After change/ before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are returned to the settings before the parameters are adjusted. |
| Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

(8) Check the changes and press "OK" to finish the velocity loop gain adjustment.

3.4.3 Time Constant Adjustment

With this function, the time constant is adjusted.

[View] - [Setup PositionDroopView] - [Return] is selected, the graph will loop-back at the specified width.

Operation method

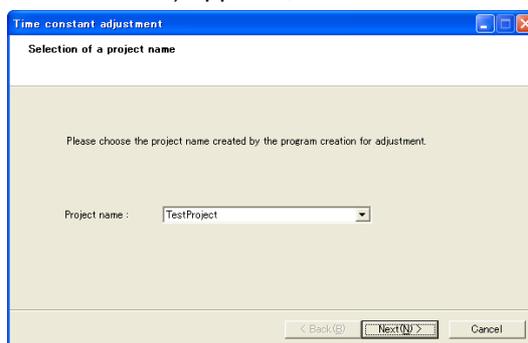
- (1) Select "Tool" - "3.IndividualAdjust" - "Time constant adjustment".

This function can be selected from the floating bar also.

The "Time constant adjustment" screen is displayed.

Select the project name created by "Program creation". Press the "Next" button.

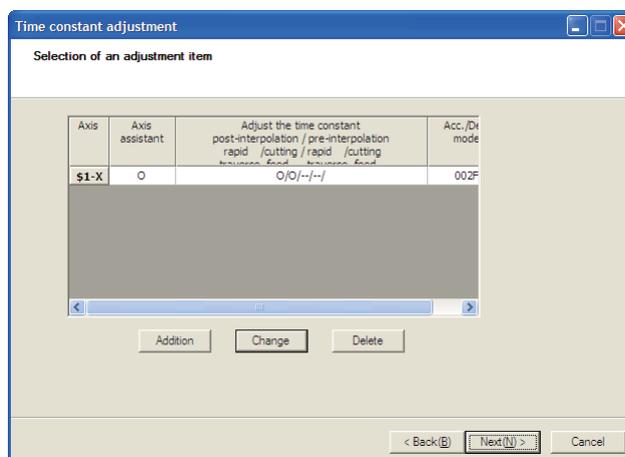
When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.



| Item | Detail |
|--------------|--|
| Project name | Select the project name created by "Program creation". Click ▼ to see the list of available project names. |
| Back | Displays the startup screen. |
| Next | Displays the next screen. The next button becomes valid after selecting a project name. |
| Cancel | Closes the wizard. |

- (2) The "Time constant adjustment" screen is displayed.

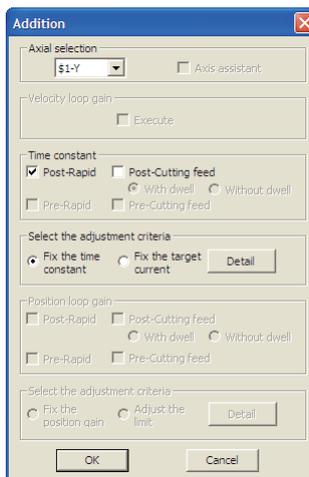
Select the axis to adjust.



| Item | Detail |
|---|--|
| Axis | Selects the target axis for measurement. In the combo box for the measurement target axis selection, the servo NC axes which are set in NC currently connected are displayed. Spindle, spindle/C axis and PLC axis are not displayed. Displays the axes which are set in NC. (Note1) |
| Axis assistant | Displays the validities of axis assistant operation. (Note2) |
| Adjust the time constant post-interpolation rapid traverse/post-interpolation cutting feed/pre-interpolation rapid traverse/pre-interpolation cutting feed | Displays the validities of executing time constant adjustment. |
| Acc./Dec. mode | Displays the value of acceleration/deceleration mode. |
| Addition | Adds adjustment axes. |
| Change | Changes the selected axis setting. If an axis has not been selected, the button cannot be used. |
| Delete | Deletes the selected axis. If an axis has not been selected, the button cannot be used. |
| Back | Returns to the previous screen. |
| Next | Goes to the next screen. An error dialogue will appear when pressing "OK" if machining program is not created for any of the adjustment items. In that case, clear the checkbox for the adjustment item without machining program. |
| Cancel | Stops the wizard. |

(Note 1) The servo axis is displayed in \$ ○ - △ format. The spindle and PLC axis are displayed in "SP- △ ", "PLC △ " format. "\$ ○ " indicates a part system, and " △ " indicates an axis name.
 (Ex) The 1st axis of 1st part system -> \$1-X
 (Note2)The time constant (G0tL, G1tL, G1btL) will be set at the maximum between adjusted assistant axes

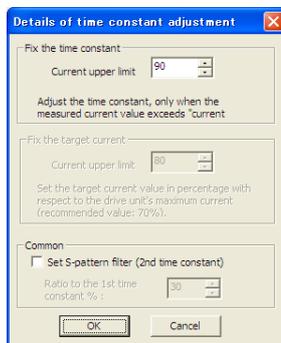
(3) Press "Addition" and "Change" to display the axis addition screen.



(Note) Only the axes which the time constant adjustment machining program has been created can be selected.

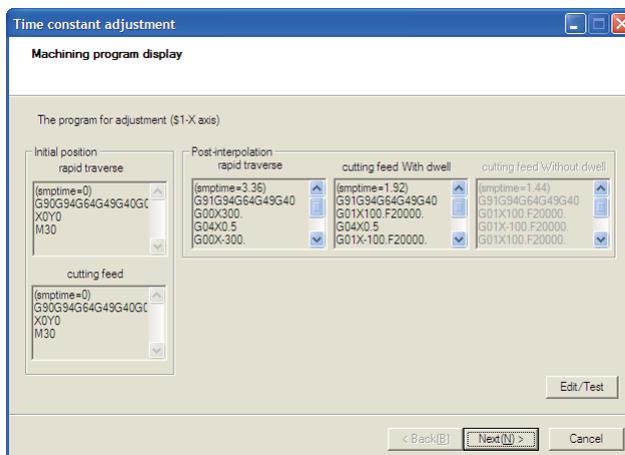
| Item | | Detail |
|--------------------------------|--|--|
| Axis selection | | Select the adjustment target axis. Enabled only when the "Addition" button is pressed. |
| Axis assistant | | When the checkbox is ON, the axis assistant operation is executed. It is validated when the position loop gain adjustment checkbox is ON. |
| Speed loop gain | Execute | Not used. |
| Time constant adjustment | After-Fast | When the checkbox is ON, rapid traverse adjustment is executed after interpolation. |
| | After-Cutting delivery | When the checkbox is ON, cutting feedrate adjustment is executed after interpolation. |
| | With/Without dwell | This selects with dwell/without dwell. It is validated when rapid traverse after interpolation of Time constant adjustment checkbox is ON. |
| Select the adjustment criteria | Fix the time constant/Fix the target current | This selects the criteria. It is validated when the adjustment method of Time constant adjustment checkbox is ON. |
| | Detail | This displays Select the adjustment criteria screen of the time constant adjustment when the button is pressed. It is validated when adjustment method of Time constant adjustment checkbox is ON. |
| Position loop gain | After-Fast | Not used. |
| | After-Cutting delivery | |
| | With/Without dwell | |
| | Before-Fast | |
| | Before-Cutting delivery | |
| Select the adjustment criteria | Fix the position gain/Adjust the limit | |
| | Detail | |
| OK | | The settings are saved, and the screen is closed. |
| Cancel | | The settings are cleared, and the screen is closed. |

- (4) Press "Detail" to display the "Details of time constant adjustment" screen.
 "Common" is not checked at default.
 The setting items change depending on the settings chosen in the axis selection screen.



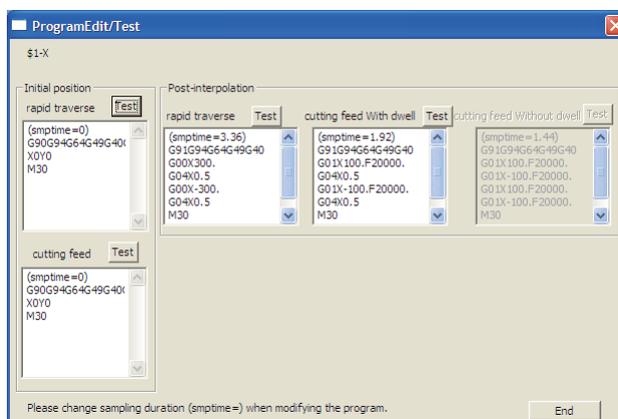
| Item | | Detail |
|------------------------|--|--|
| Fix the time constant | Current upper limit % | It is validated when the checkbox for "Fix the time constant" is checked when selecting the axis. |
| Fix the target current | Current upper limit % | It is validated when the checkbox for "Fix the target current" is checked when selecting the axis. |
| Common | Set S-pattern filter (2nd time constant) | When the checkbox is ON, the S-pattern filter (2nd time constant) will be set. |
| | Ratio to the 1st time constant % | It is validated when the checkbox for "Set S-pattern filter (2nd time constant)" is ON. |
| OK | | The settings are saved, and the screen is closed. |
| Cancel | | The settings are cleared, and the screen is closed. |

- (5) Press "Next" to display machining program display screen.
When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.
Adjustment program will be displayed. Programs used for adjustment will be in black. Others will be grayed out.



| Item | Detail |
|--------------------|---|
| Edit/Test | Program edit/test screen will be displayed. |
| Adjustment Program | Machining programs used for adjusting the specified axis will be displayed. |
| Back | Disabled. |
| Next | The next screen will appear after setting the program in NC. |
| Cancel | Stops the wizard. |

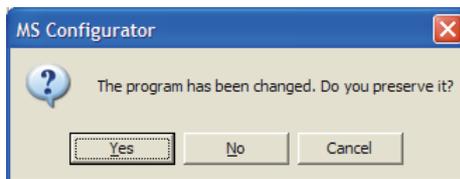
- (6) Press "Edit/Test" to display machining program edit screen.
Time constant machining program can be edited.
Only the programs used for adjusting will be able to be edited from the dialogue.
Also, these programs can be tested (by transmitting them to NC and operate them in NC).
Editing will be prohibited for other programs (these will be grayed out) and test cannot be performed on these programs.
If a program is changed, the background color will change.



3 How to Use

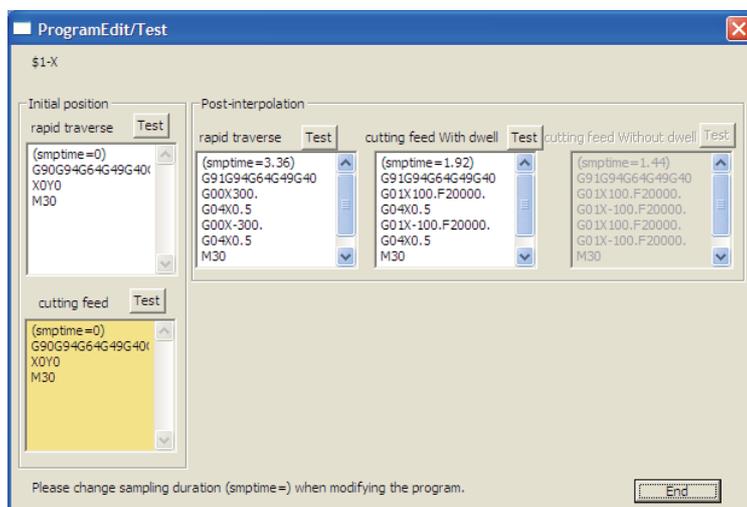
| Item | Detail | Default |
|--------------------------|---|--------------------------------------|
| \$ ○ - △ axis | This displays the target axis name. | - |
| Program display edit box | Program for adjustment will be displayed. | The adjustment program stored in PC. |

| Button name | Operation |
|-------------|---|
| Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. An error dialogue will appear if the operation mode of the NC's test target part system is not set to MDI mode. An error dialogue will also appear when the program does not exist (when no program is displayed in the program display edit box). |
| End | Clears the program edit/test screen and returns to the machining program display screen. If any of the program was changed, a dialogue to ask whether to confirm the change will appear. An error dialogue will appear when the program does not exist (when no program is displayed in the program display edit box). |



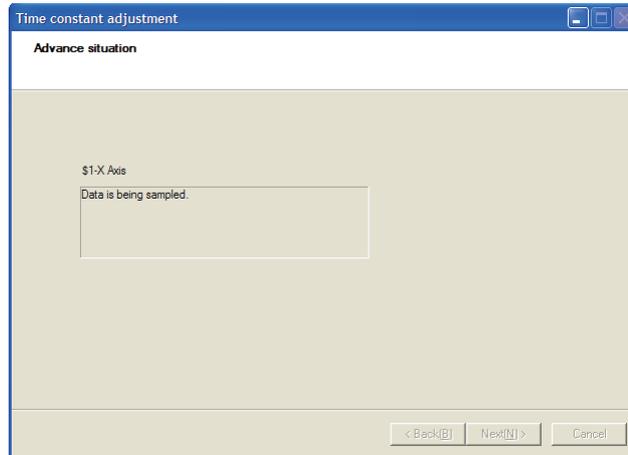
| Button name | Operation |
|-------------|--|
| Yes | Saves the programs on the program edit/test screen and returns to the machining program display screen. |
| No | Returns to the machining program display screen without saving the programs on the program edit/test screen. |
| Cancel | Returns to the programs on the program edit/test screen. |

If a program is changed, the background color will change.
Check the detail and press "End".



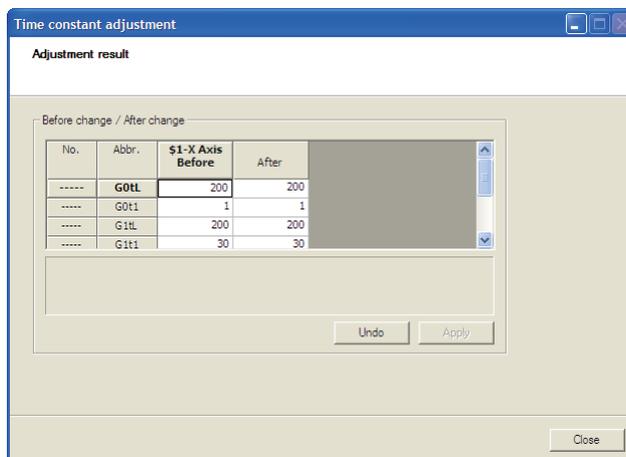
Horizontal scroll bars are not provided because it will narrow the text area. The hidden part can be viewed by moving the cursor. The vertical scroll bars will become operable when programs are too long to fit in the edit box.

(7) Press "Next" to display the advance situation screen.



| Item | Detail | |
|------------------------------------|--|--|
| Axis name | This displays the axis which is being adjusted. | |
| Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | * When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out after ten seconds and stops by an error. | |
| Back | Disabled. | |
| Next | The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed. | |
| Cancel | The dialogue "Adjustment ended?" will appear and, if "OK" is selected, the wizard will stop. The cancel button will be enabled when the advance situation turns to [Cycle start waiting] or [Adjustment was completed], or when the parameter restoration is completed after [Error stop]. | |

- (8) The adjustment result is displayed when the time constant adjustment is completed.
Target parameters of time constant adjustment and the other parameters whose value differs before and after the adjustment.



| Item | Detail |
|----------------------------|--|
| After change/before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are returned to the settings before the parameters are adjusted. |
| Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

3.4.4 Position Loop Gain Adjustment

With this function, the position loop gain is adjusted.

[View] - [Setup PositionDroopView] - [Return] is selected, the graph will loop-back at the specified width.

Operation method

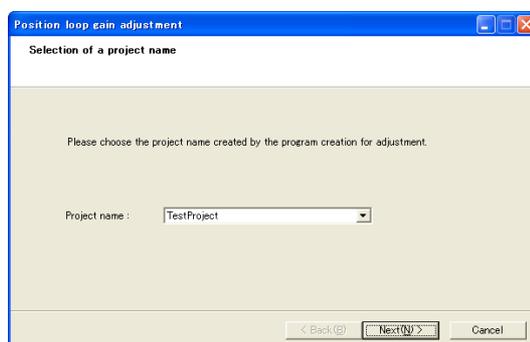
- (1) Select "Tool" - "3.IndividualAdjust" - "Position loop gain adjustment".

This function can be selected from the floating bar also.

The "Selection of a project name" screen is displayed.

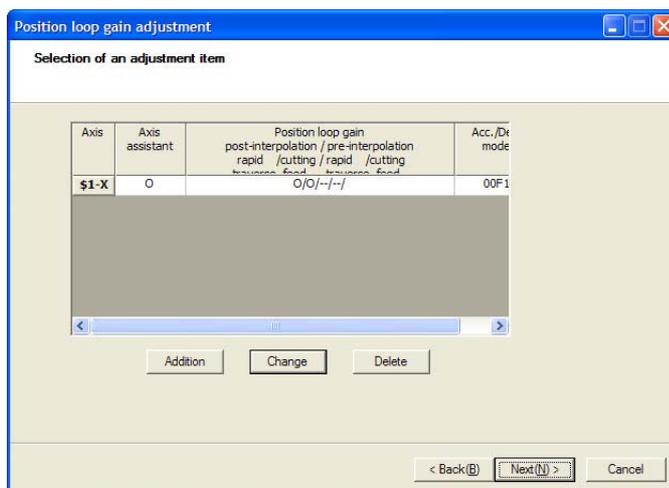
Select the project name created by "Program creation". Press the "Next" button.

When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.



| Item | Detail |
|--------------|--|
| Project name | Select the project name created by "Program creation". Click ▼ to see the list of available project names. |
| Back | Displays the startup screen. |
| Next | Displays the next screen. The next button becomes valid after selecting a project name. |
| Cancel | Closes the wizard. |

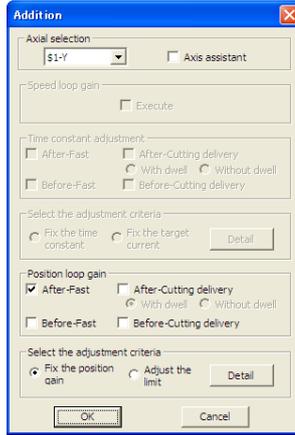
- (2) The "Position loop gain adjustment" screen is displayed.
Select the axis to adjust.



| Item | Detail |
|---|--|
| Axis | Selects the target axis for measurement. In the combo box for the measurement target axis selection, the servo NC axes which are set in NC currently connected are displayed. Spindle, spindle/C axis and PLC axis are not displayed. Displays the axes which are set in NC. (Note1) |
| Axis assistant | Displays the validities of axis assistant operation. |
| Position loop gain post-interpolation rapid traverse/post-interpolation cutting feed/pre-interpolation rapid traverse/pre-interpolation cutting feed | Displays the validities of executing position loop gain adjustment. |
| Acc./Dec. mode | Displays the value of acceleration/deceleration mode. |
| Addition | Adds adjustment axes. |
| Change | Changes the selected axis setting. If an axis has not been selected, the button cannot be used. |
| Delete | Deletes the selected axis. If an axis has not been selected, the button cannot be used. |
| Back | Returns to the previous screen. |
| Next | Goes to the next screen. An error dialogue will appear when pressing "OK" if machining program is not created for any of the adjustment items. In that case, clear the checkbox for the adjustment item without machining program. |
| Cancel | Stops the wizard. |

(Note 1) The servo axis is displayed in \$ ○ - △ format. The spindle and PLC axis are displayed in "SP- △", "PLC △" format. "\$ ○" indicates a part system, and "△" indicates an axis name.
(Ex) The 1st axis of 1st part system -> \$1-X

(3) Press "Addition" and "Change" to display the axis addition screen.



(Note) Only the axes which the position loop adjustment machining program has been created can be selected.

(Note) "Before-Fast" and "Before-Cutting delivery" are disabled when using a lathe system.

| Item | | Detail |
|--------------------------------|--|---|
| Axis selection | | Select the adjustment target axis. Enabled only when the "Addition" button is pressed. |
| Axis assistant | | When the checkbox is ON, the axis assistant operation is executed. It is validated when the position loop gain adjustment checkbox is ON. (Note) |
| Speed loop gain | Execute | Not used. |
| Time constant adjustment | After-Fast | |
| | After-Cutting delivery | |
| | With/Without dwell | |
| | Before-Fast | |
| | Before-Cutting delivery | |
| Select the adjustment criteria | Fix the time constant/Fix the target current | |
| | Detail | |

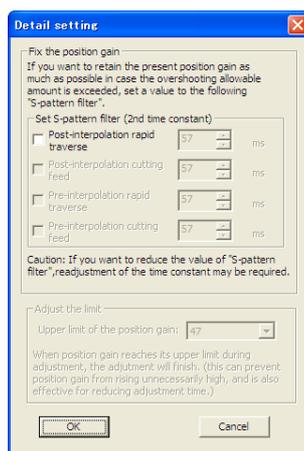
| Item | | Detail |
|--------------------------------|--|--|
| Position loop gain | After-Fast | When the checkbox is ON, rapid traverse adjustment is executed after interpolation. |
| | After-Cutting delivery | When the checkbox is ON, cutting feedrate adjustment is executed after interpolation. |
| | With/Without dwell | This selects with dwell/without dwell. It is validated when rapid traverse after interpolation of Time constant adjustment checkbox is ON. |
| | Before-Fast | When the checkbox is ON, rapid traverse adjustment is executed before interpolation. This is invalidated when using a lathe system. |
| | Before-Cutting delivery | When the checkbox is ON, cutting feedrate adjustment is executed before interpolation. This is invalidated when using a lathe system. |
| Select the adjustment criteria | Fix the position gain/ Adjust the limit | This selects the criteria. It is validated when the adjustment method of Position loop gain adjustment checkbox is ON. |
| | Detail | This displays Select the adjustment criteria screen of the position loop gain adjustment when the button is pressed. It is validated when adjustment method of Position loop gain adjustment checkbox is ON. |
| OK | | The settings are saved, and the screen is closed. |
| Cancel | | The settings are cleared, and the screen is closed. |

(Note)The time constant (PGN1, PGN2, SHGC) will be set at the minimum between adjusted assistant axes

(4) Press "Detail" to display the "Detail setting" screen.

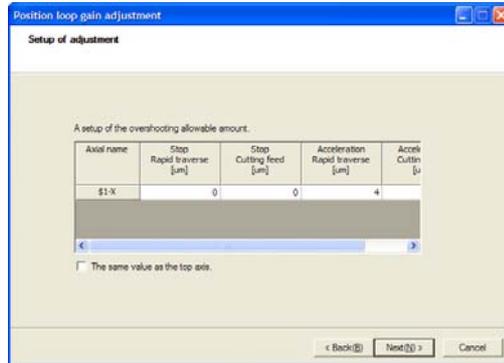
"After-Fast" is checked at the initial status.

The setting items changes depending on the settings chosen in the axis selection screen.



| Item | | Detail |
|-----------------------|---------------------------|---|
| Fix the position gain | S-pattern filter setting | It is validated when the checkbox for "Fix the position gain" is checked when selecting the axis. |
| Adjust the limit | Position gain upper limit | It is validated when the checkbox for "Adjust the limit" is checked when selecting the axis. |
| OK | | The settings are saved, and the screen is closed. |
| Cancel | | The settings are cleared, and the screen is closed. |

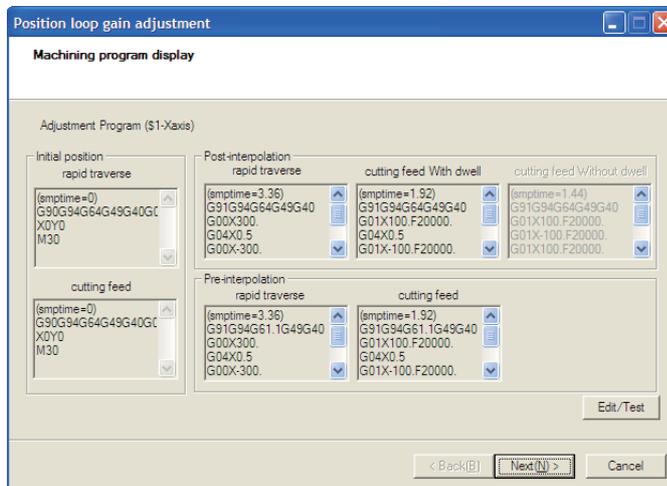
- (5) Press "Next" to display the Setup of adjustment screen.
Select the position loop gain adjustment level and then press "Next".



| Item | Detail |
|-----------------------------------|--|
| Axis name | Displays the adjustment target axis. |
| Stop Rapid traverse (G00) | When Position loop gain "Before/After-fast" is checked when selecting the axis, the overshooting allowable amount for "Stop Rapid traverse" can be set. The initial value is "0". (Note) |
| Stop Cutting feed (G01) | When Position loop gain "Before/After-Cutting delivery" is checked and also "With dwell" is checked when selecting the axis, the overshooting allowable amount for "Stop Cutting feed" can be set. The initial value is "0".(Note) |
| Acceleration Rapid traverse (G00) | When Position loop gain "Before/After-fast" is checked when selecting the axis, the overshooting allowable amount for "Acceleration Rapid traverse" can be set. The initial value is "4". (Note) |
| Acceleration Cutting feed (G01) | When Position loop gain "Before/After-Cutting delivery" is checked when selecting the axis, the overshooting allowable amount for "Acceleration Cutting feed" can be set. The initial value is "3". (Note) |
| The same value as the top axis. | When the checkbox is ON, the same value as the top axis will be applied to the following axes. |
| Back | Returns to the previous screen. |
| Next | Goes to the next screen. |
| Cancel | Stops the wizard. |

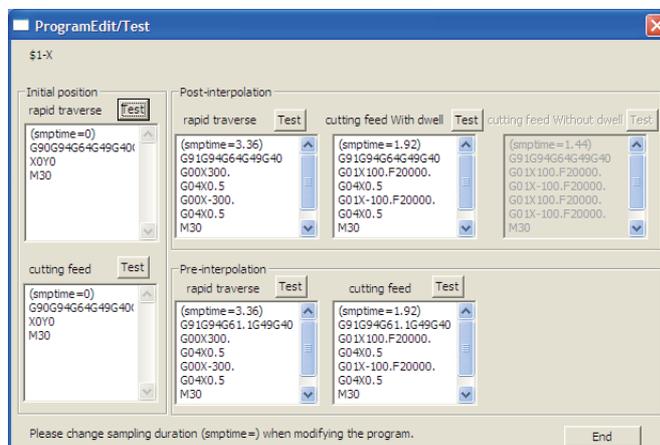
(Note) Even when "0" is set, an overshoot of up to 0.5µm may occur.

- (6) Adjustment program for position loop gain will be displayed.
 When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.
 Adjustment program will be displayed. Programs used for adjustment will be in black. Others will be grayed out.
 Check the details and press "Next".



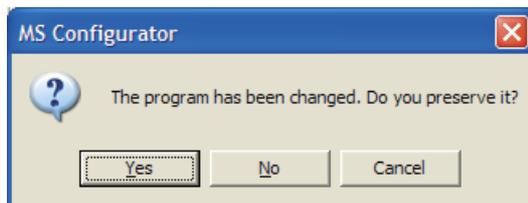
| Item | Detail |
|--------------------|---|
| Edit/Test | Program edit/test screen will be displayed. |
| Adjustment Program | Machining programs used for adjusting the specified axis will be displayed. |
| Back | Disabled. |
| Next | The next screen will appear after setting the program in NC. |
| Cancel | Stops the wizard. |

- (7) Press "Edit/Test" to display machining program.
 Adjustment program for position loop gain can be edited.
 Only the programs used for adjusting will be able to be edited from the dialogue.
 Also, these programs can be tested (by transmitting them to NC and operate them in NC).
 Editing will be prohibited for other programs (these will be grayed out) and test cannot be performed on these programs.
 If a program is changed, the background color will change.



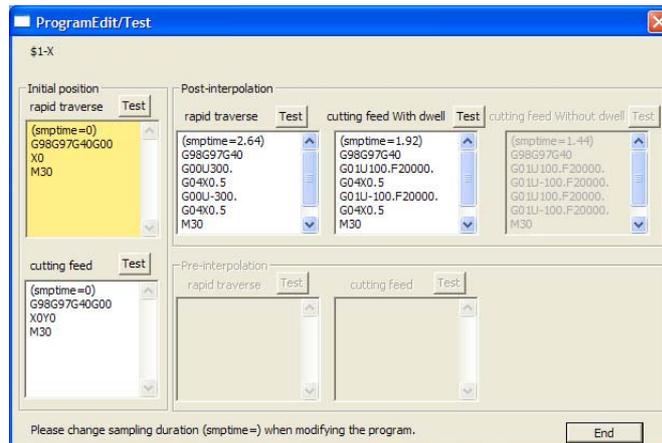
| Item | Detail | Default |
|--------------------------|---|--------------------------------------|
| \$ ○ - △ axis | This displays the target axis name. | - |
| Program display edit box | Program for adjustment will be displayed. | The adjustment program stored in PC. |

| Button name | Operation |
|-------------|---|
| Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. An error dialogue will appear if the operation mode of the NC's test target part system is not set to MDI mode. An error dialogue will also appear when the program does not exist (when no program is displayed in the program display edit box). |
| End | Clears the program edit/test screen and returns to the machining program display screen. If any of the program was changed, a dialogue to ask whether to confirm the change will appear. An error dialogue will appear when the program does not exist (when no program is displayed in the program display edit box). |



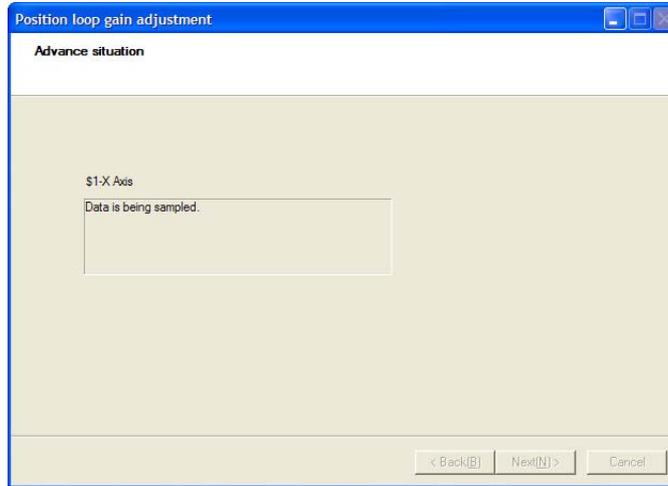
| Button name | Operation |
|-------------|--|
| Yes | Saves the programs on the program edit/test screen and returns to the machining program display screen. |
| No | Returns to the machining program display screen without saving the programs on the program edit/test screen. |
| Cancel | Returns to the programs on the program edit/test screen. |

If a program is changed, the background color will change.
Check the detail and press "End".



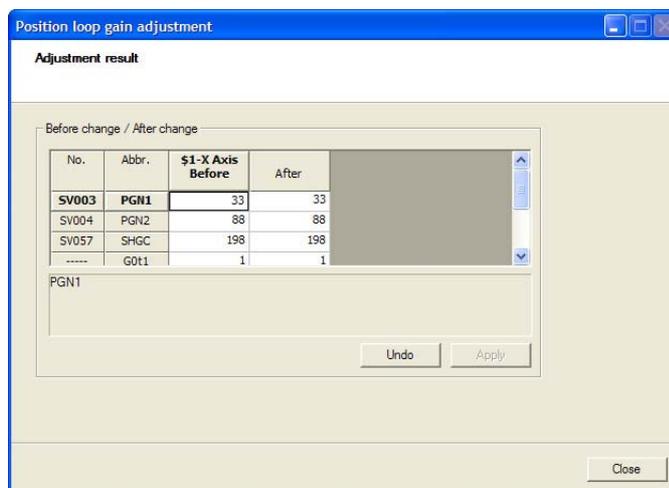
Horizontal scroll bars are not provided because it will narrow the text area. The hidden part can be viewed by moving the cursor. The vertical scroll bars will become operable when programs are too long to fit in the edit box.

- (8) Press "Next" to display the advance situation screen.
MS Configurator will enter "Cycle start waiting" status.
(Note) If the "automatic start" button is pressed before this screen appears, the axis may move.



| Item | Detail | |
|------------------------------------|---|--|
| Axis name | This displays the axis which is being adjusted. | |
| Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | * When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter..." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out ten seconds after it found no response from the NC and stops by an error. | |
| Back | Disabled. | |
| Next | The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed. | |
| Cancel | The dialogue "Adjustment ended?" will appear and, if "OK" is selected, the wizard will stop. The cancel button will be enabled when the advance situation turns to [Cycle start waiting] or [Adjustment was completed], or when the parameter restoration is completed after [Error stop]. | |

- (9) When the message "Adjustment was completed. Please..." is displayed, the adjustment is completed.
Press the "Next" button.
The adjustment result is displayed.



| Item | Detail |
|----------------------------|---|
| After change/before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are returned to the settings before the parameters are adjusted. |
| Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

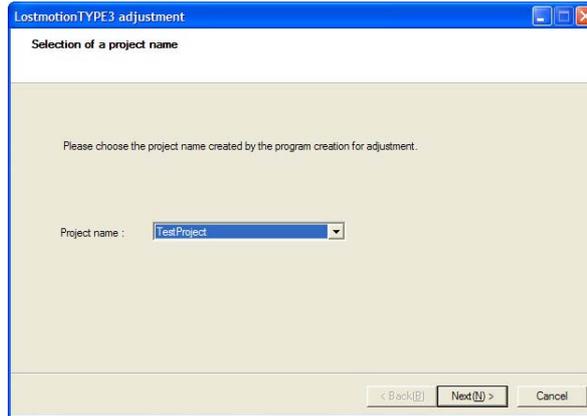
- (10) Confirm the changes, and press "OK" to finish the time constant adjustment.

3.4.5 Lost Motion Type 3 Adjustment

With this function, the lost motion type 3 is adjusted.

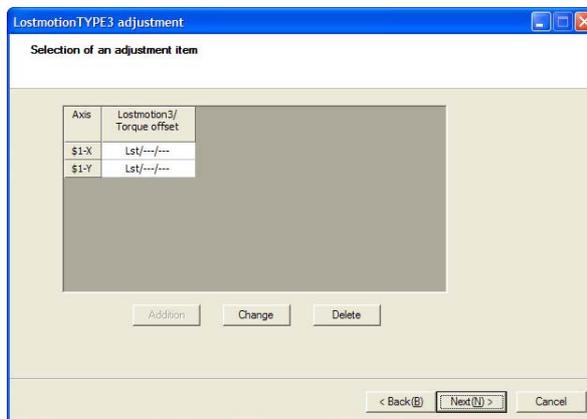
Operation method

- (1) Select "Tool" - "3.IndividualAdjust" - "LostmotionTYPE3 adjustment".
 Select the project name created by "Program creation".
 When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.



| Item | Detail |
|--------------|--|
| Project name | Select the project name created by "Program creation". Click ▼ to see the list of available project names. |
| Back | Displays the startup screen. |
| Next | Displays the next screen. The next button becomes valid after selecting a project name. |
| Cancel | Stops the wizard. |

- (2) Press the "Next" to go to the screen to select axes.
 Two axes must be selected for the lost motion type 3. You cannot go to the next process if two axes are not selected.
 Only two axes in a same part system can be selected.



| Item | Detail |
|---------------------------|--|
| Axis | Selects the target axis for measurement. In the combo box for the measurement target axis selection, the servo NC axes which are set in NC currently connected are displayed. Spindle, spindle/C axis and PLC axis are not displayed. Displays the axes which are set in NC. (Note1) |
| Lost motion/Torque offset | Displays whether to execute an adjustment. |
| Addition | Adds adjustment axes. When two axes are already selected, this button is disabled. An error dialogue will appear if this button is pressed without creating a machining program. |
| Change | Changes the selected axis setting. If an axis has not been selected, the button cannot be used. |
| Delete | Deletes the selected axis. If an axis has not been selected, the button cannot be used. |
| Back | Returns to the previous screen. |
| Next | Goes to the next screen. An error dialogue will appear if this button is pressed without creating a machining program. |
| Cancel | Stops the wizard. |

(Note 1) The servo axis is displayed in \$ ○ - △ format. The spindle and PLC axis are displayed in "SP- △", "PLC △" format. "\$ ○" indicates a part system, and "△" indicates an axis name.
(Ex) The 1st axis of 1st part system -> \$1-X

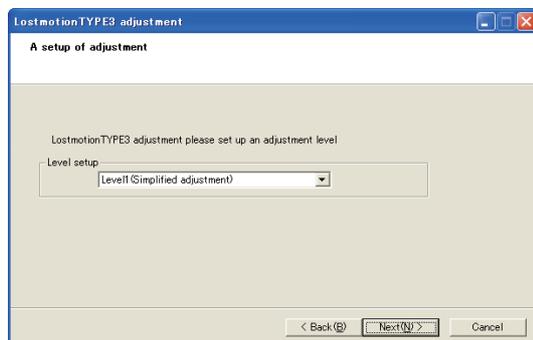
(3) Press "Addition" and "Change" to display the screen to select axes.

(Note) Only the axes which the lost motion type 3 adjustment machining program has been created can be selected.



| Item | Detail | |
|-------------------------------|---|--|
| Axis selection | Select the adjustment target axis. Enabled only when the "Addition" button is pressed. | |
| Lost motion/ Torque offset | Lost motion | Displays whether to execute an adjustment. |
| | Torque offset | Displays whether to execute an torque offset adjustment. Always check this checkbox when using a vertical axis. |
| OK | The settings are saved, and the screen is closed. | |
| Cancel | The settings are cleared, and the screen is closed. | |

- (4) After all adjustment axes are added and the settings are confirmed, press the "Next" button.
 - (Note 1) If the settings are changed, point the cursor to the axis to change, and press the "Change" button.
 - (Note 2) To delete an axis from the adjustment axes list, point the cursor to the axis to be deleted, and press the "Delete" button.

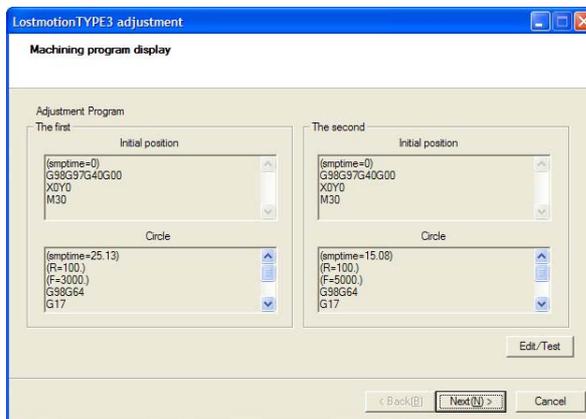


| Item | Detail |
|---------------|---|
| Level setting | Set the level (from 1 to 5). The initial value is 1. |
| Back | Returns to the previous screen. |
| Next | Goes the next screen. |
| Cancel | Stops the wizard. |

Set the adjustment level according to the accuracy required by your machine.

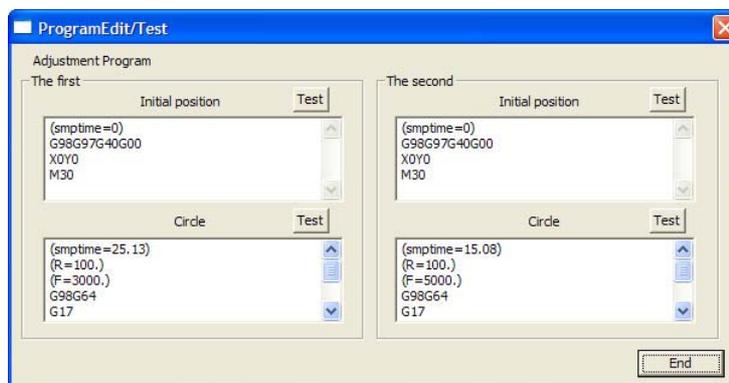
| | | Adjustment level | Times of fine adjustment |
|--|-------------------|------------------|--------------------------|
| | Accuracy-oriented | Level 5 | 4 |
| | | Level 4 | 3 |
| | | Level 3 | 2 |
| | | Level 2 | 1 |
| | Simple adjustment | Level 1 | 0 |

- (5) Set the adjustment level. Press the "Next" button after setting.
(Note 1) The message of operation mode error appears when the operation mode is not the memory mode.
- (6) The machining program for lost motion type 3 adjustment is displayed. Press the "Next" button after confirming the contents.
When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears.



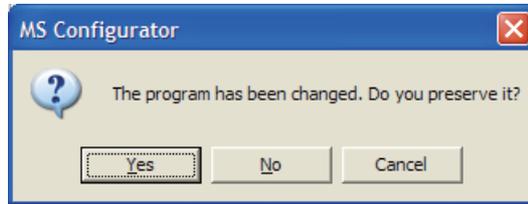
| Item | Detail |
|--------------------|---|
| Edit/Test | Program edit/test screen will be displayed. |
| Adjustment Program | Machining programs used for adjusting the specified axis will be displayed. |
| Back | Disabled. |
| Next | The next screen will appear after setting the program in NC. |
| Cancel | Stops the wizard. |

- (7) Press "Edit/Test" to display ProgramEdit/Test screen.
Only the programs used for adjusting will be able to be edited from the dialogue.
Also, these programs can be tested (by transmitting them to NC and operate them in NC).
Editing will be prohibited for other programs (these will be grayed out) and test cannot be performed on these programs.



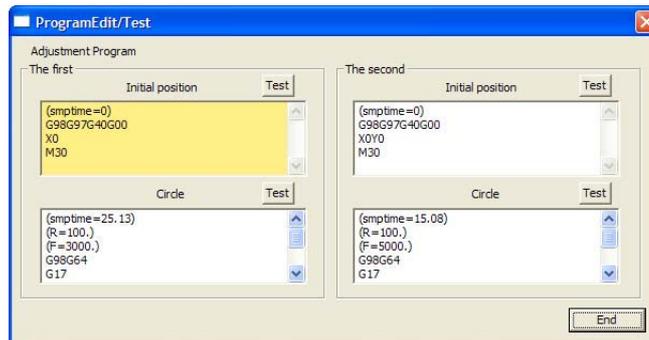
| Item | Detail | Default |
|--------------------------|---|--------------------------------------|
| \$ ○ - △ axis | This displays the target axis name. | - |
| Program display edit box | Program for adjustment will be displayed. | The adjustment program stored in PC. |

| Button name | Operation |
|-------------|--|
| Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. An error dialogue will appear if the operation mode of the NC's test target part system is not set to MDI mode. An error dialogue will also appear when the program does not exist (when no program is displayed in the program display edit box). |
| End | Clears the program edit/test screen and returns to the machining program display screen. If any of the program was changed, a dialogue to ask whether to confirm the change will appear. An error dialogue will appear when the program does not exist (when no program is displayed in the program display edit box). |



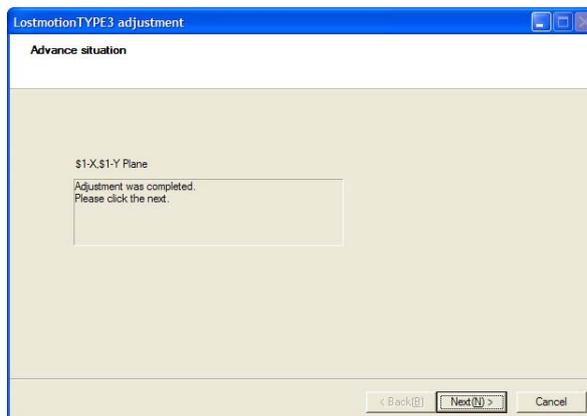
| Button name | Operation |
|-------------|--|
| Yes | Saves the programs on the program edit/test screen and returns to the machining program display screen. |
| No | Returns to the machining program display screen without saving the programs on the program edit/test screen. |
| Cancel | Returns to the programs on the program edit/test screen. |

If a program is changed, the background color will change. Check the detail and press "End".



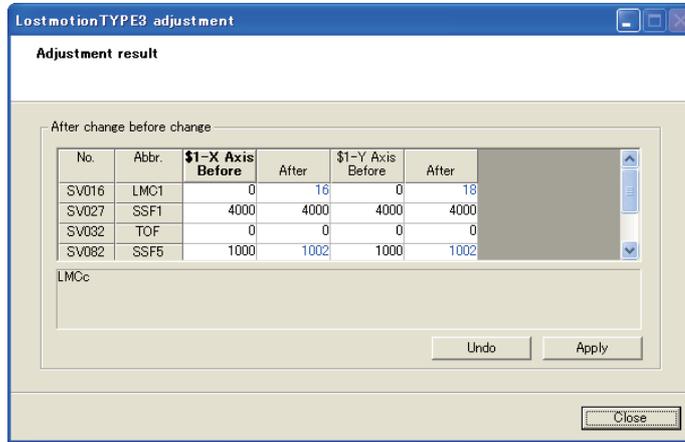
Horizontal scroll bars are not provided because it will narrow the text area. The hidden part can be viewed by moving the cursor. The vertical scroll bars will become operable when programs are too long to fit in the edit box.

- (8) Press "Next" to start the lost motion type 3 adjustment. Input the cycle start after the message "Preparation of adjustment was completed. Execution..." is displayed.



| Item | Detail | |
|------------------------------------|--|--|
| Axis name | This displays the axis which is being adjusted. | |
| Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | <p>* When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out ten seconds after it found no response from the NC and stops by an error.</p> | |
| Back | Disabled. | |
| Next | <p>The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed.</p> | |
| Cancel | <p>The dialogue "Adjustment ended?" will appear and, if "OK" is selected, the wizard will stop. The cancel button will be enabled when the advance situation turns to [Cycle start waiting] or [Adjustment was completed], or when the parameter restoration is completed after [Error stop].</p> | |

- (9) When the message "Adjustment was completed. Please..." is displayed, the adjustment is completed.
Press the "Next" button to proceed to the next screen.
- (10) The list of changed parameter by adjustment is displayed.
Confirm the changed contents, and press the "OK" button to finish the lost motion type 3 adjustment.



| Item | Detail |
|----------------------------|--|
| After change/before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are returned to the settings before the parameters are adjusted. |
| Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

3.4.6 Lost Motion Adjustment

With this function, the lost motion is adjusted.

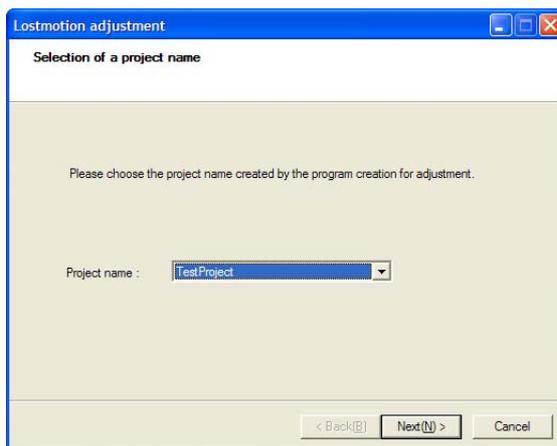
(Note) Normally, the lost motion adjustment is not used. Use lost motion type 3 adjustment.

Operation method

- (1) Select "Tool" - "3.IndividualAdjust" - "Lostmotion adjustment".

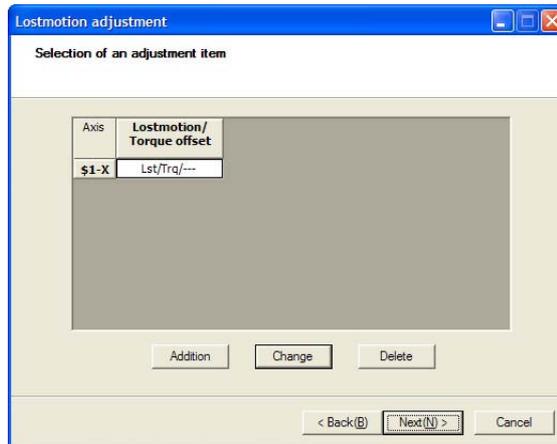
This function can be selected from the floating bar also.

When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.



| Item | Detail |
|--------------|--|
| Project name | Select the project name created by "Program creation". Click ▼ to see the list of available project names. |
| Back | Displays the startup screen. |
| Next | Displays the next screen. The next button becomes valid after selecting a project name. |
| Cancel | Stops the wizard. |

- (2) Select the project name created by "Program creation". Press the "Next" button.
The "Lost motion adjustment" screen is displayed.



| Item | Detail |
|---------------------------|--|
| Axis | Selects the target axis for measurement. In the combo box for the measurement target axis selection, the servo NC axes which are set in NC currently connected are displayed. Spindle, spindle/C axis and PLC axis are not displayed. Displays the axes which are set in NC. (Note1) |
| Lost motion/Torque offset | Displays whether to execute an adjustment. |
| Addition | Adds adjustment axes. |
| Change | Changes the selected axis setting. If an axis has not been selected, the button cannot be used. |
| Delete | Deletes the selected axis. If an axis has not been selected, the button cannot be used. |
| Back | Returns to the previous screen. |
| Next | Goes to the next screen. An error dialogue will appear when pressing "OK" if machining program is not created. |
| Cancel | Stops the wizard. |

(Note 1) The servo axis is displayed in \$ ○ - △ format. The spindle and PLC axis are displayed in "SP-△", "PLC△" format. "\$○" indicates a part system, and "△" indicates an axis name.
(Ex) The 1st axis of 1st part system -> \$1-X

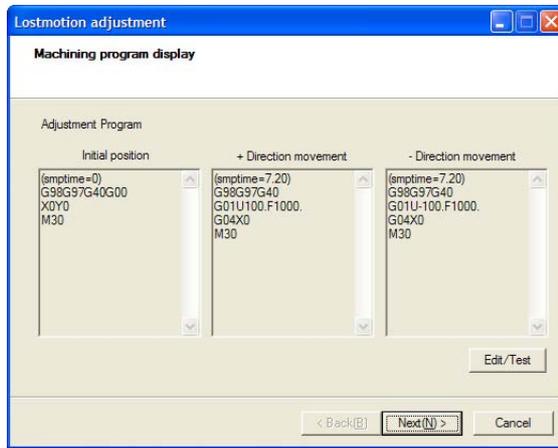
- (3) Press "Addition" and "Change" to display the screen to select axes.
"Lostmotion" checkbox is checked at default.



| Item | | Detail |
|-------------------------------|---------------|---|
| Axis selection | | Select the adjustment target axis. Enabled only when the "Addition" button is pressed. |
| Lost motion/ Torque offset | Lost motion | This checkbox is checked and cannot be changed. |
| | Torque offset | When this checkbox is checked, adjustment is executed with torque offset. |
| OK | | The settings are saved, and the screen is closed. An error dialogue will appear when pressing "OK" if machining program is not created while adjustment is set to be executed and the screen cannot be closed. In that case, clear the checkbox for OMR-FF adjustment. |
| Cancel | | The settings are cleared, and the screen is closed. |

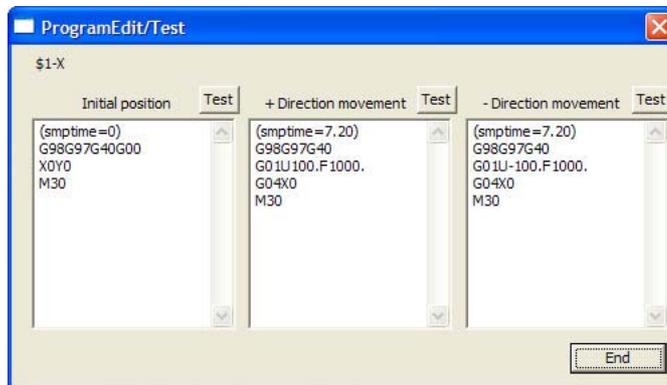
- (4) Select the adjustment axis.
Press the "OK" button after setting is completed.
(Note) When the horizontal axis is selected, do not select the torque offset.
The screen will return to the "Lost motion adjustment" screen.

- (5) Machining program display screen will appear.
 After adding all adjustment axes and confirming the settings, press the "Next" button.
 Adjustment program will be displayed. Programs used for adjustment will be in black. Others will be grayed out.
 When the operation mode of all part systems set to NC are not normal, the message (the operation mode is abnormal) appears, and the screen is not changed.



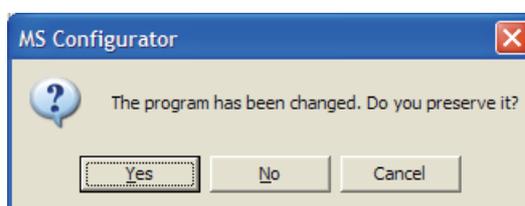
| Item | Detail |
|--------------------|---|
| Edit/Test | Program edit/test screen will be displayed. |
| Adjustment Program | Machining programs used for adjusting the specified axis will be displayed. |
| Back | Disabled. |
| Next | The next screen will appear after setting the program in NC. |
| Cancel | Stops the wizard. |

- (6) Press "Edit/Test" to display ProgramEdit/Test screen.
 Only the programs used for adjusting will be able to be edited from the dialogue.
 Also, these programs can be tested (by transmitting them to NC and operate them in NC).
 Editing will be prohibited for other programs (these will be grayed out) and test cannot be performed on these programs.



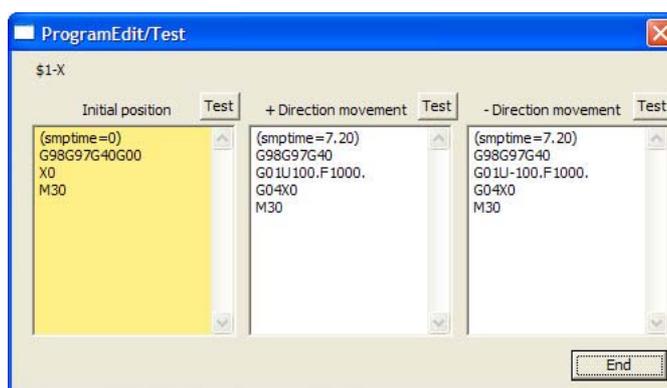
| Item | Detail | Default |
|--------------------------|---|--------------------------------------|
| \$ ○ - △ axis | This displays the target axis name. | - |
| Program display edit box | Program for adjustment will be displayed. | The adjustment program stored in PC. |

| Button name | Operation |
|-------------|--|
| Test | This transmits the displayed machining program to NC. The transmitted machining program can be operated (tested) with MDI mode. An error dialogue will appear if the operation mode of the NC's test target part system is not set to MDI mode. An error dialogue will also appear when the program does not exist (when no program is displayed in the program display edit box). |
| End | Clears the program edit/test screen and returns to the machining program display screen. If any of the program was changed, a dialogue to ask whether to confirm the change will appear. An error dialogue will appear when the program does not exist (when no program is displayed in the program display edit box). |



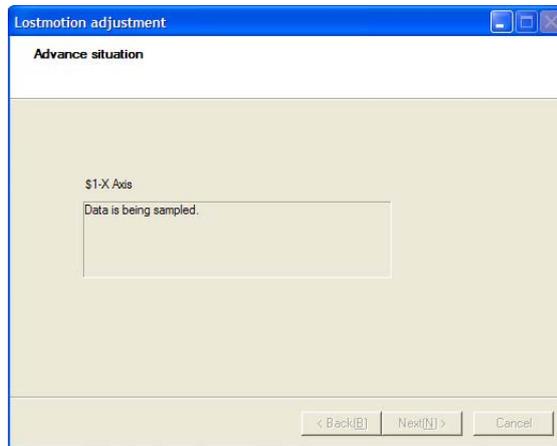
| Button name | Operation |
|-------------|--|
| Yes | Saves the programs on the program edit/test screen and returns to the machining program display screen. |
| No | Returns to the machining program display screen without saving the programs on the program edit/test screen. |
| Cancel | Returns to the programs on the program edit/test screen. |

If a program is changed, the background color will change. Check the detail and press "End".



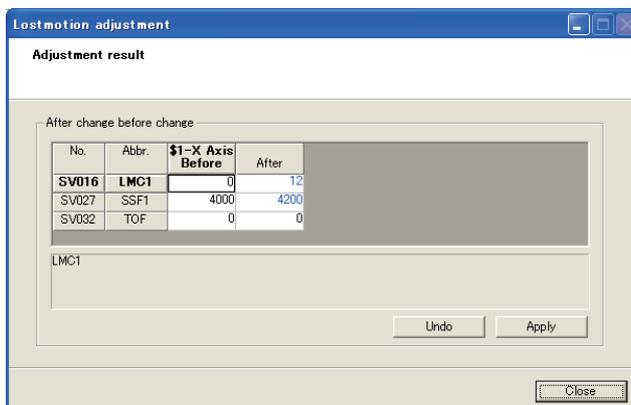
Horizontal scroll bars are not provided because it will narrow the text area. The hidden part can be viewed by moving the cursor. The vertical scroll bars will become operable when programs are too long to fit in the edit box.

- (8) Press "Next" after confirming the settings.
MS Configurator will enter "Cycle start waiting" status.
- (Note) If the "automatic start" button is pressed before this screen appears, the axis may move.



| Item | Detail | |
|------------------------------------|---|--|
| Axis name | This displays the axis which is being adjusted. | |
| Advance situation (status) display | Messages will appear according to the adjustment advance situation. The correspondence between the advance situation and messages are as follows. | |
| | Situation | Messages |
| | Initializing | Preparing the adjustment. |
| | Cycle start waiting | Preparation of adjustment was completed. Execution of a cycle start starts adjustment. |
| | Sampling | The data is being sampled. |
| | Analyzing data | The data is being analyzed. The parameter is changed. |
| | Adjustment completed | The adjustment ended. Please click the next. |
| | Error stop | The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped. |
| | * When an error occurs and stops, the message "The error occurred during adjustment. It returns, before adjusting a parameter, and adjustment is stopped." will appear in a dialogue. Press "OK" to restore the parameter (before the adjustment was made). Also, if no response returns from the NC due to an illegal mode, alarm or other, it will time out ten seconds after it found no response from the NC and stops by an error. | |
| Back | Disabled. | |
| Next | The next screen will appear. This button will be enabled when the status changes to [Adjustment completed]. If there are any axis which is not adjusted, the axis will be adjusted. When all the axes are adjusted, the next adjustment will be performed. | |
| Cancel | The dialogue "Adjustment ended?" will appear and, if "OK" is selected, the wizard will stop. The cancel button will be enabled when the advance situation turns to [Cycle start waiting] or [Adjustment was completed], or when the parameter restoration is completed after [Error stop]. | |

- (9) When the message "Adjustment was completed. Please..." is displayed, the adjustment is completed.
Press the "Next" button.
The adjustment result is displayed.



| Item | Detail |
|----------------------------|---|
| After change/before change | Settings for the target parameters before/after the adjustment is displayed per axis for each adjustment item. Settings for the non-target parameters are also displayed if there are any changes before/after the adjustment. The changed parameter is displayed in blue. The adjusted settings can be edited directly. |
| Apply | When the "Apply" button is pressed, the dialog "It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are changed to the edited adjustment settings. The "Apply" button is valid when the adjusted parameter is edited and it is invalid when "Apply" or "Undo" is executed. |
| Undo | If the "Undo" button is pressed, the dialog "It returns, before adjusting a parameter. Is it all right?" is displayed. When "OK" is selected, the NC parameters are returned to the settings before the parameters are adjusted. |
| Close | The wizard is closed. If the "Close" button is pressed when the "Apply" button is valid, the dialog "The parameter after adjustment is changed. Does it end without applying?" is displayed. When "OK" is selected, the wizard is closed without applying the parameter change. When "Cancel" is selected, it returns to the adjustment result screen. |

- (10) Confirm the changes and press the "OK" button to finish the lost motion adjustment.

3.5 Measurement Function

3.5.1 Frequency Response Measurement (Servo)

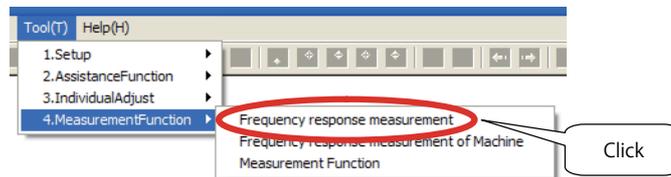
A random signal is applied to the speed command by specified axis and vibration amount, and the frequency characteristic is measured by that data (speed command/speed feedback). The result is displayed by the Bode diagram and the text data.

The traveling commands by G code etc. are not needed.

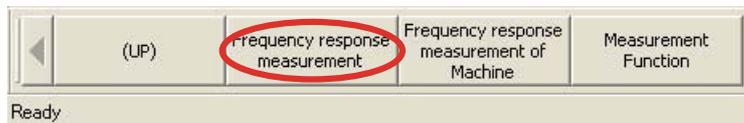
Frequency response measurement Configuration of Details setting screen

- (1) Select [Tool] - [MeasurementFunction] - [Frequency response measurement] to display the measurement function menu. The measurement function can also be displayed by selecting [Tool] - [MeasurementFunction] - [Frequency response measurement] from a floating bar.

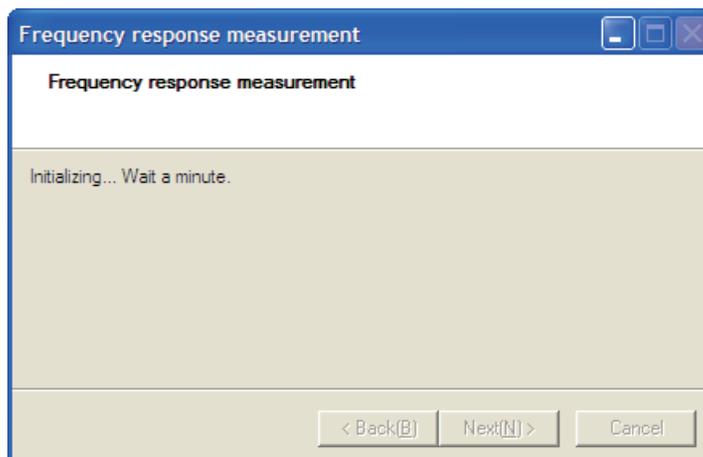
Selection from the menu



Selection from the floating bar



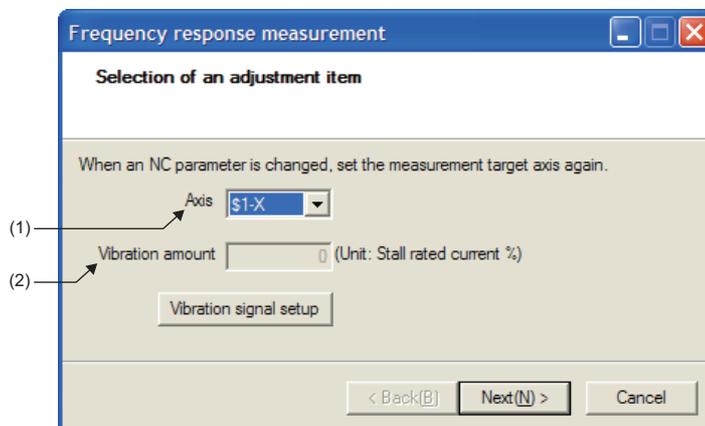
Execute the communication initialization process. The communication initialization time depends on the number of axes. When the initialization is completed, it goes to the next screen automatically.



(2)The "Frequency response measurement setup" screen is displayed.

When it is not connected to NC, an error message to indicate no connection with NC will be displayed and this screen will not appear.

When the operation mode is illegal, an error message for an operation mode illegal will be displayed and this screen will not appear.



| Display item | Detail | Default value | Unit |
|----------------------|--|--|-----------------------|
| (1) Axis | This selects the target axis for measurement. In the combo box for the measurement target axis selection, the servo NC axes which are set in NC currently connected are displayed. Spindle, spindle/C axis and PLC axis are not displayed. | The 1st part system's first axis set to NC (It is displayed with the format "\$1-○" (Note 1).) | - |
| (2) Vibration amount | The vibration amount during measurement (vibration) is displayed in vibration display area. To change the vibration amount, press the "Vibration signal setup" button. | 0 | Stall rated current % |

(Note 1)"\$1" indicates the 1st part system, and "○" indicates the first axis name.

| Button name | Operation |
|------------------------|---|
| Vibration signal setup | Display "Vibration signal setup" screen. |
| Back | Disabled |
| Next | Execute the frequency response measurement. Go to the state display screen. When the operation mode is illegal, an error message for an operation mode illegal will be displayed. |
| Cancel | Terminate the frequency response measurement. Go back to the MS Configurator main screen. |

(3)Select the measurement target axis.

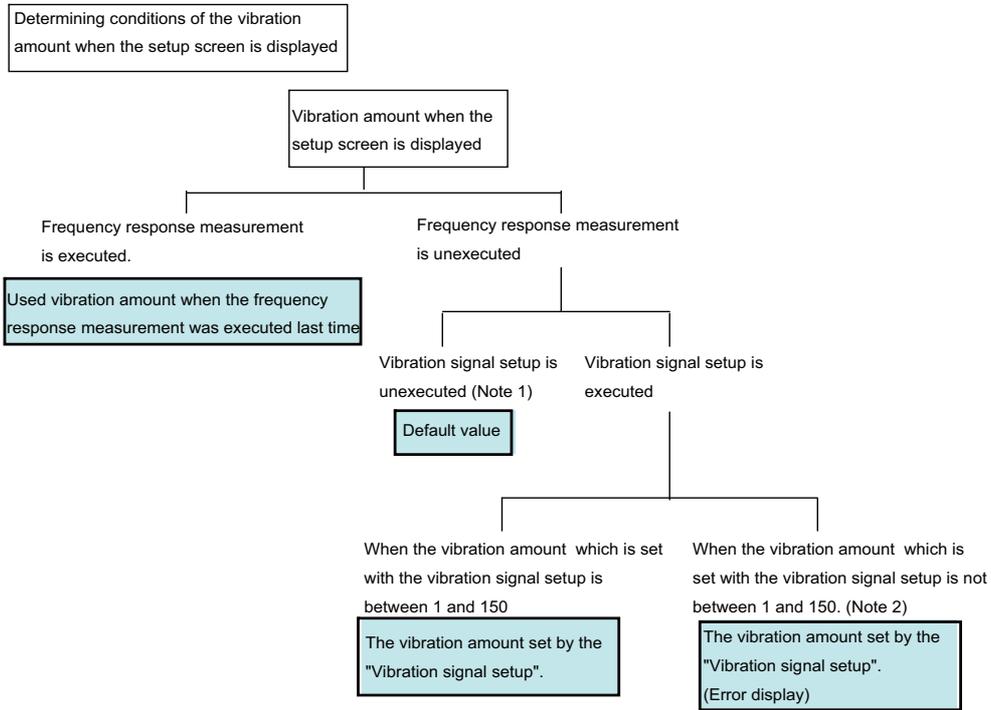
The measurement target axis can be selected from the servo NC axes which are set in the NC currently connected.

When the setting screen is displayed, the axis which was selected when executing the last frequency response measurement is displayed in the combo box for the measurement target selection.

If the frequency response measurement is unexecuted, the 1st part system's first axis set in NC currently connected is displayed.

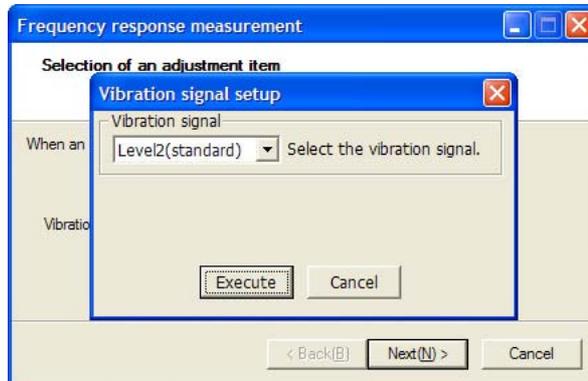
The vibration amount while displaying the details setting screen is set/displayed according to the following conditions.

(The value which indicated in the square box □ is the vibration amount when the setup screen is displayed.)



- (Note 1)When the frequency response measurement or the vibration signal setup is unexecuted or MS Configurator is started up for the first time, the default value "0" will be set/displayed.
- (Note 2)When the vibration amount set in the vibration amount setup is not between 1 and 150 (integer), the message shown below is displayed.
"An illegal value is set to the vibration amount. Set an appropriate value (1 to 150 (integer number))."

- (4) Select "\$1-X" as the measurement target axis.
Press the [Vibration signal setup] button.
- (5) The "Vibration signal setup" screen is displayed.



| Setting item | Details | Default value | Setting range |
|------------------|------------------------------|-------------------|--|
| Vibration signal | Select the vibration signal. | Level 2(standard) | Level1 Level2(standard) Level3 Level4 Level5 Level6 |

| Button name | Operation |
|-------------|---|
| Execute | Execute the vibration signal setup. It takes about 30 seconds to finish, depending on the connection speed and installation state of the machine. |
| Cancel | Close the vibration signal setup screen and return to the axis selection screen. Change of the setting will not be reflected. |

(6) Select the level and click the "Execute" button.

When "Measurement ready to start. Press the "automatic start" button." is displayed , press the automatic start button.

The message to be displayed in the Vibration Signal Setup screen will automatically change with the following order.

"Preparing the measurement."

-> "Measurement ready to start. Press the "automatic start" button."

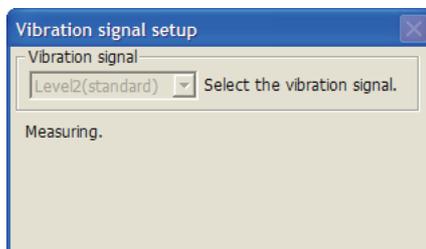
-> "Measuring."

-> "Measurement completed. Click the "Close" button."

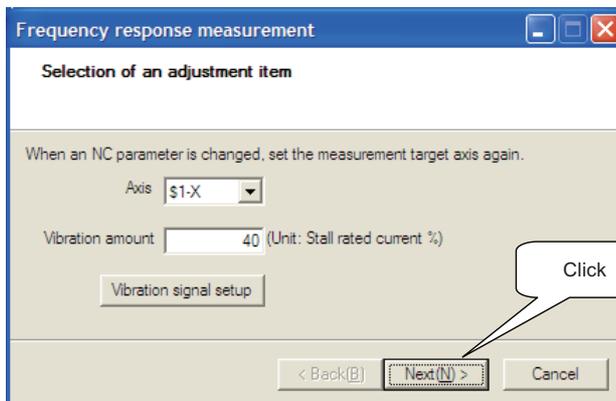
"Preparing the measurement." will automatically change to "Measurement ready to start. Press the "automatic start" button." in about 3 seconds.

Make sure to check that only the part system of the measurement target axis is selected before pressing the automatic start button. An error will occur if automatic operation is executed for the other part system, and the measurement will be canceled.

If the connection with NC fails, an error "Some error occurred while measuring. The measurement is discontinued." will be displayed in about 10 seconds.



(7) Press [Next] button.

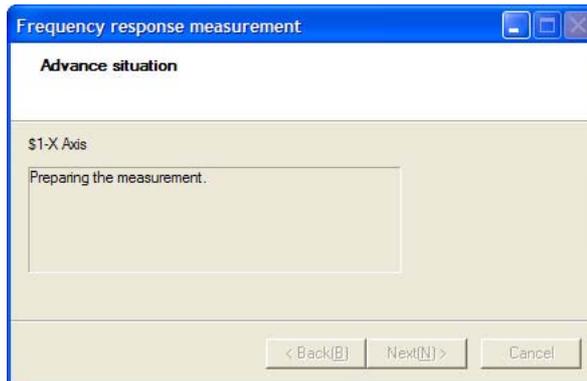


(8) Advance situation screen is displayed.

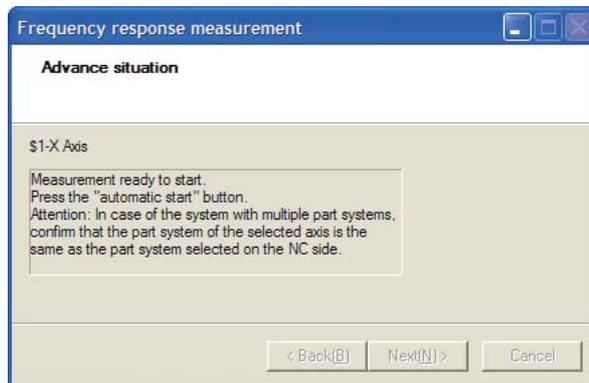
The message to be displayed in the Advance situation screen will partly automatically change with the following order.

- "In preparation screen"
- > "Queuing to start screen"
- > "Measuring screen"
- > "Completion state screen"

"In preparation screen" will automatically change to the "Queuing to start screen" in about 3 seconds. If the connection with NC fails as "In preparation screen" changes to "Queuing to start screen", an error "Some error occurred while measuring. The measurement is discontinued." will be displayed in about 10 seconds.

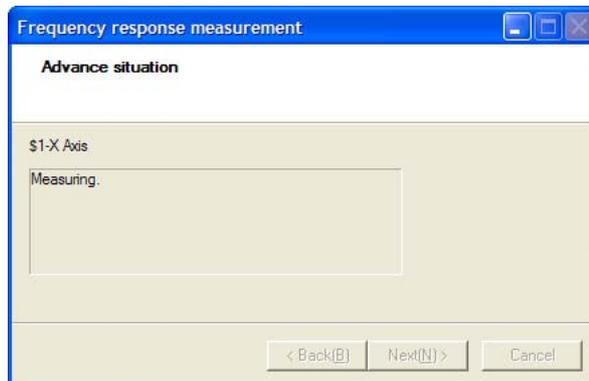


(9) The "Frequency response advance situation" screen is displayed.

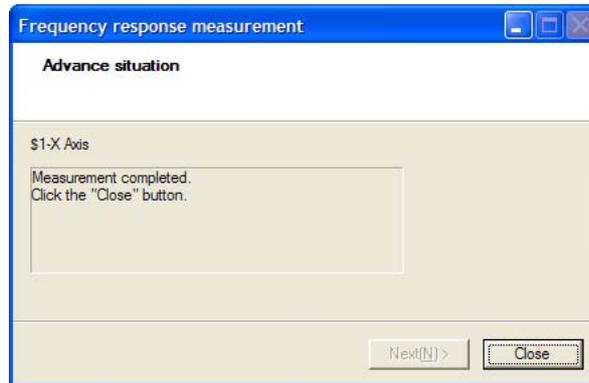


Press the NC automatic start button when this screen is displayed. Until the NC automatic start button is pressed, MS Configurator remains in the standby state with this screen displayed.

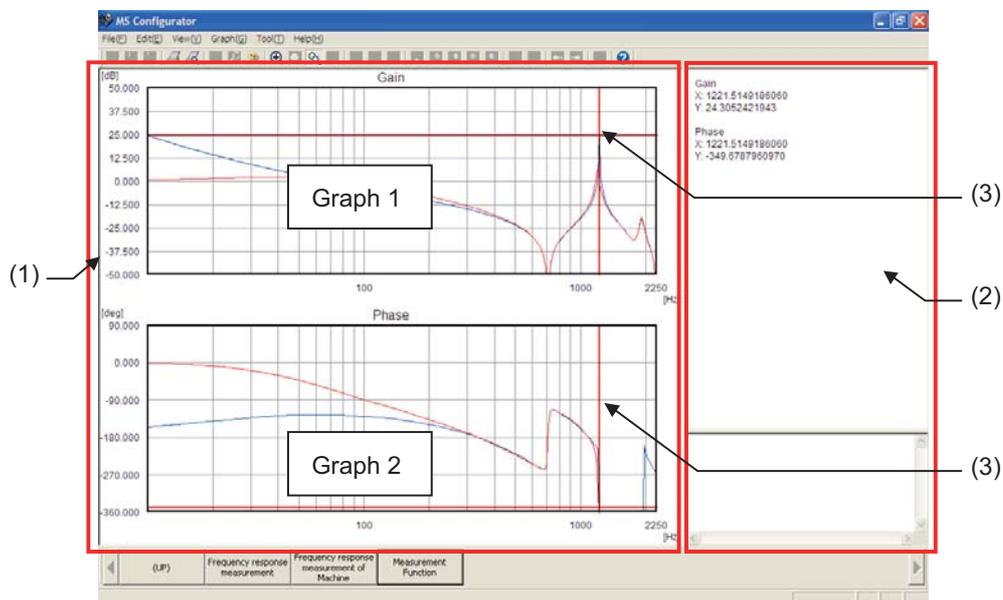
(10) The measurement "advance situation" screen is displayed.



- (11) The completion state "advance situation" screen is displayed.
Press the "Close" button.



Configuration of measurement result screen (Bode diagram)



| Display item | Details |
|----------------|---|
| (1) Graph area | This displays the frequency responses (Bode diagram). |
| Graph 1 | This displays the frequency responses (gain). Red line : Gain curve of speed closed loop frequency responses Blue line : Gain curve of speed open loop frequency responses |
| Graph 2 | This displays the frequency responses (phase). Red line : Phase curve of speed closed loop frequency responses Blue line : Phase curve of speed open loop frequency responses |

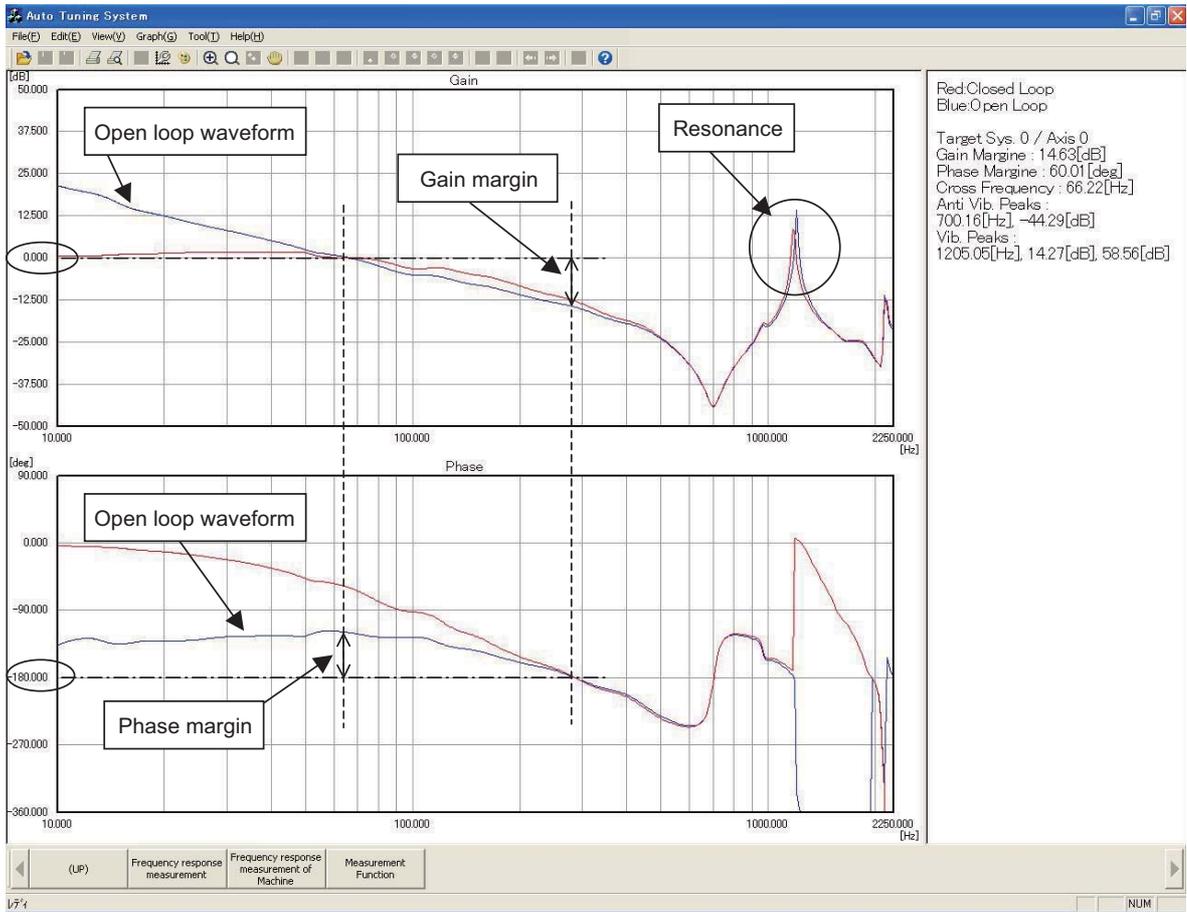
| Display item | Details | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---|--|---------|--------------|-----|-------------|------------------------|------|-----------|------------------------|-------------------|--|-------------------------------------|------|-------------------------------|---|------|-------------------------------|---|------|-------------------------------|------|------|-------------------------------|------|------|-------------------------------|---|------|-------------------------------|------|------|-------------------------------|------|-----|------------------------------|---|--------------|--------------|----|---------------|---------------|-----|-----------------|-----------------|----|-----------------|----------------------|---|------------|-----------------|--|--------------|---------|--------------|-------------------|--|-------------------------------------|-----------------|---------------------|----|-----------------|----------------------|--------|------------|-----------------|------------|---------------|---------------|-------------------|--------------|--------------|-------------------|---------------|---------------|---|--------|-----------------------------------|-------------------------------------|
| (2) Text area | <p>This displays the information (text data) at measuring.</p> <p>Frequency response measurement (servo)</p> <table border="1" data-bbox="715 365 1390 1263"> <thead> <tr> <th>Display item</th> <th>Details</th> <th>Remarks/Unit</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>Closed loop</td> <td>Fixed character string</td> </tr> <tr> <td>Blue</td> <td>Open loop</td> <td>Fixed character string</td> </tr> <tr> <td>Target Sys / Axis</td> <td>The part system/axis No. of measuring target</td> <td>Part system (1 to) /Axis No. (1 to)</td> </tr> <tr> <td>VGN1</td> <td>VGN1(SV005) value set with NC</td> <td>-</td> </tr> <tr> <td>SSF2</td> <td>SSF2(SV033) value set with NC</td> <td>-</td> </tr> <tr> <td>FHz1</td> <td>FHz1(SV038) value set with NC</td> <td>(Hz)</td> </tr> <tr> <td>FHz2</td> <td>FHz2(SV046) value set with NC</td> <td>(Hz)</td> </tr> <tr> <td>SSF6</td> <td>SSF6(SV083) value set with NC</td> <td>-</td> </tr> <tr> <td>FHz4</td> <td>FHz4(SV087) value set with NC</td> <td>(Hz)</td> </tr> <tr> <td>FHz5</td> <td>FHz5(SV088) value set with NC</td> <td>(Hz)</td> </tr> <tr> <td>VIA</td> <td>VIA(SV008) value set with NC</td> <td>-</td> </tr> <tr> <td>Gain Margine</td> <td>Gain Margine</td> <td>dB</td> </tr> <tr> <td>Phase Margine</td> <td>Phase Margine</td> <td>deg</td> </tr> <tr> <td>Cross Frequency</td> <td>Cross Frequency</td> <td>Hz</td> </tr> <tr> <td>Anti Vib. Peaks</td> <td>Anti vibration peaks</td> <td>Hz: Anti vibration frequency dB: Anti vibration peak value</td> </tr> <tr> <td>Vib. Peaks</td> <td>Vibration peaks</td> <td>Hz: Vibration frequency dB: Vibration peak value dB: Vibration wave high</td> </tr> </tbody> </table> <p>Frequency response measurement of machine (servo)</p> <table border="1" data-bbox="715 1305 1390 1704"> <thead> <tr> <th>Display item</th> <th>Details</th> <th>Remarks/Unit</th> </tr> </thead> <tbody> <tr> <td>Target Sys / Axis</td> <td>The part system/axis No. of measuring target</td> <td>Part system (1 to) /Axis No. (1 to)</td> </tr> <tr> <td>Cross Frequency</td> <td>Crossover Frequency</td> <td>Hz</td> </tr> <tr> <td>Anti Vib. Peaks</td> <td>Anti vibration peaks</td> <td>Hz, dB</td> </tr> <tr> <td>Vib. Peaks</td> <td>Vibration peaks</td> <td>Hz, dB, dB</td> </tr> <tr> <td>Motor Inertia</td> <td>Motor inertia</td> <td>kgcm²</td> </tr> <tr> <td>Load Inertia</td> <td>Load inertia</td> <td>kgcm²</td> </tr> <tr> <td>Inertia Ratio</td> <td>Inertia ratio</td> <td>%</td> </tr> <tr> <td>Cursor</td> <td>Coordinate position at the cursor</td> <td>Frequency[Hz], Gain[dB], Phase[deg]</td> </tr> </tbody> </table> <p>(Note) Only when the cursor is displayed, "Cursor" is displayed.</p> | Display item | Details | Remarks/Unit | Red | Closed loop | Fixed character string | Blue | Open loop | Fixed character string | Target Sys / Axis | The part system/axis No. of measuring target | Part system (1 to) /Axis No. (1 to) | VGN1 | VGN1(SV005) value set with NC | - | SSF2 | SSF2(SV033) value set with NC | - | FHz1 | FHz1(SV038) value set with NC | (Hz) | FHz2 | FHz2(SV046) value set with NC | (Hz) | SSF6 | SSF6(SV083) value set with NC | - | FHz4 | FHz4(SV087) value set with NC | (Hz) | FHz5 | FHz5(SV088) value set with NC | (Hz) | VIA | VIA(SV008) value set with NC | - | Gain Margine | Gain Margine | dB | Phase Margine | Phase Margine | deg | Cross Frequency | Cross Frequency | Hz | Anti Vib. Peaks | Anti vibration peaks | Hz: Anti vibration frequency dB: Anti vibration peak value | Vib. Peaks | Vibration peaks | Hz: Vibration frequency dB: Vibration peak value dB: Vibration wave high | Display item | Details | Remarks/Unit | Target Sys / Axis | The part system/axis No. of measuring target | Part system (1 to) /Axis No. (1 to) | Cross Frequency | Crossover Frequency | Hz | Anti Vib. Peaks | Anti vibration peaks | Hz, dB | Vib. Peaks | Vibration peaks | Hz, dB, dB | Motor Inertia | Motor inertia | kgcm ² | Load Inertia | Load inertia | kgcm ² | Inertia Ratio | Inertia ratio | % | Cursor | Coordinate position at the cursor | Frequency[Hz], Gain[dB], Phase[deg] |
| Display item | Details | Remarks/Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red | Closed loop | Fixed character string | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue | Open loop | Fixed character string | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Target Sys / Axis | The part system/axis No. of measuring target | Part system (1 to) /Axis No. (1 to) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VGN1 | VGN1(SV005) value set with NC | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SSF2 | SSF2(SV033) value set with NC | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FHz1 | FHz1(SV038) value set with NC | (Hz) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FHz2 | FHz2(SV046) value set with NC | (Hz) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SSF6 | SSF6(SV083) value set with NC | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FHz4 | FHz4(SV087) value set with NC | (Hz) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FHz5 | FHz5(SV088) value set with NC | (Hz) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VIA | VIA(SV008) value set with NC | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gain Margine | Gain Margine | dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase Margine | Phase Margine | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cross Frequency | Cross Frequency | Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anti Vib. Peaks | Anti vibration peaks | Hz: Anti vibration frequency dB: Anti vibration peak value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vib. Peaks | Vibration peaks | Hz: Vibration frequency dB: Vibration peak value dB: Vibration wave high | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Display item | Details | Remarks/Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Target Sys / Axis | The part system/axis No. of measuring target | Part system (1 to) /Axis No. (1 to) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cross Frequency | Crossover Frequency | Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anti Vib. Peaks | Anti vibration peaks | Hz, dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vib. Peaks | Vibration peaks | Hz, dB, dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Motor Inertia | Motor inertia | kgcm ² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Load Inertia | Load inertia | kgcm ² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inertia Ratio | Inertia ratio | % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cursor | Coordinate position at the cursor | Frequency[Hz], Gain[dB], Phase[deg] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (3) Cursor | <p>The cursor can be moved per one plot point by keyboard [Left/Right key]. The cursor can be moved per ten plot points by keyboard [Shift key + Left/Right key] or [Up/Down key].</p> <p>Synchronizing with the movement of the cursor, the cursor coordinates position in test display area is changed.</p> <p>The cursor display/non-display can be switched with the search button of the MS Configurator menu. After the cursor is changed to non-display, the cursor is set at the left end when the cursor is displayed again.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Interpretation of frequency response waveform (Bode diagram)

Bode diagram consists of a gain diagram and a phase diagram.

A diagram whose horizontal axis is a common logarithm of the frequency and vertical axis is a gain (dB) is called a gain diagram. A diagram whose horizontal axis is a common logarithm of the frequency and vertical axis is a phase is called a phase diagram.

Using the bode diagram, information about resonance frequency, control stability (gain margin, phase margin), crossover frequency (quick response) can be obtained in a batch.



(1) Resonance frequency

Machine resonance occurs when the speed loop gain is increased to improve the control accuracy. The machine resonance is a phenomenon that occurs when the servo's speed loop control acts on the machine's specific frequency (specific resonance frequency), resulting in an increase of vibration. When adjusting the speed loop gain, a notch filter must be set to suppress this machine resonance (vibration).

(2) Gain margin and phase margin

The gain margin is defined by the value in which a negative title was applied to the gain when the delay of the phase gives 180 degrees in the phase curve of the open loop waveform.

The phase margin is defined by the phase value in which 180 degrees is added to the delay of the phase on crossover frequency.

When seeking stability, it is general that the gain margin aims at 8-20dB and the phase margin aims at 40-60 degrees.

(3) Crossover frequency (quick-response)

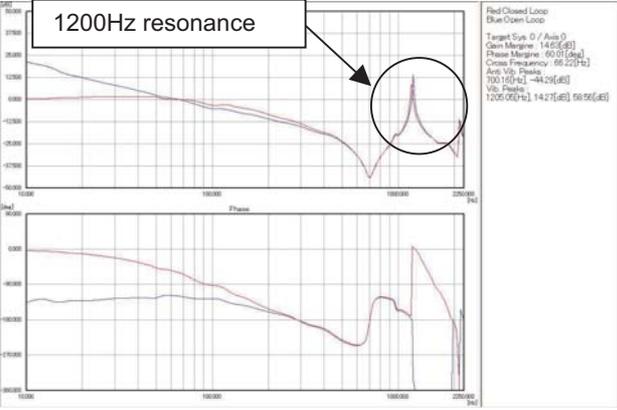
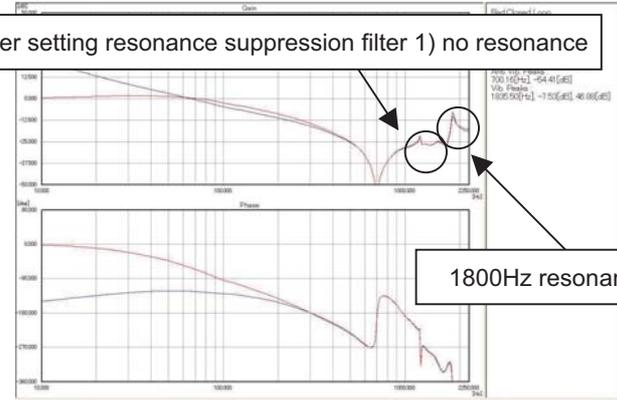
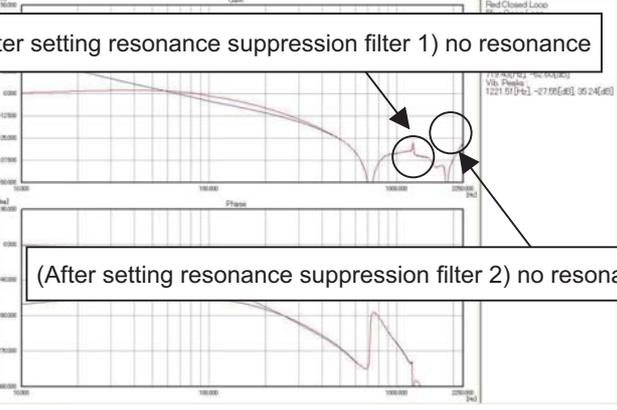
When the frequency response curves downward as shown in the graph above, there must be frequency in which a gain of open loop frequency becomes 0dB.

This frequency is called crossover frequency (or speed response band).

This value indicates the quick-response of the control system. When the larger the value is, the more excellent a quick-response is.

For the machine tools, 70Hz to 100Hz of crossover frequency is normally considered enough to secure a high-level of quick-response.

Example of the resonance suppression filter setting

| Measurement condition | Bode diagram (Example) |
|---|--|
| <p>Resonance Speed gain (VGN1)=100 Resonance suppression filter 1 (FHz1)=0 Resonance suppression filter 2 (FHz2)=0 Filter depth (SSF2)=0000</p> |  <p>1200Hz resonance</p> |
| <p>After setting one notch filter Speed gain (VGN1)=100 Resonance suppression filter 1 (FHz1)=1200 Resonance suppression filter 2 (FHz2)=0 Filter depth (SSF2)=0000</p> |  <p>(After setting resonance suppression filter 1) no resonance</p> <p>1800Hz resonance</p> |
| <p>After setting two notch filters Speed gain (VGN1)=100 Resonance suppression filter 1 (FHz1)=1200 Resonance suppression filter 2 (FHz2)=1800 Filter depth (SSF2)=0040</p> |  <p>(After setting resonance suppression filter 1) no resonance</p> <p>(After setting resonance suppression filter 2) no resonance</p> |

Example of speed gain setting (limit)

| Measurement condition | Bode diagram (Example) |
|--|------------------------|
| <p>Speed gain Default Speed gain (VGN1)=100 Gain margin: about 19 [dB] Phase margin: about 65 [deg]</p> | |
| <p>Speed gain Appropriate value Speed gain (VGN1)=200 Gain margin: about 10 [dB] Phase margin: about 73 [deg]</p> | |
| <p>Speed gain Excessive (Gain margin/ Phase margin:small) Speed gain (VGN1)=300 Gain margin: about 5 [dB] Phase margin: about 29 [deg]</p> | |

3.5.2 Frequency Response Measurement of Machine (Servo)

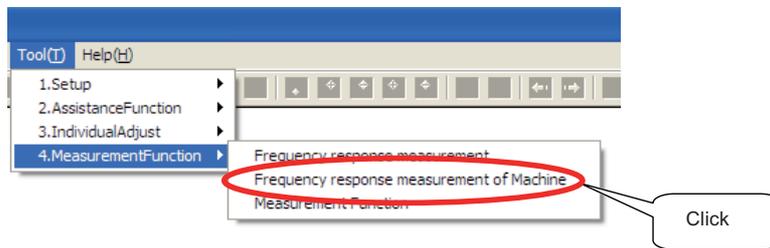
A random signal is applied to the current command by specified axis and vibration amount, and the frequency characteristic is measured by that data (torque command/speed feedback). The result is displayed by the Bode diagram and the text data.

The traveling commands by G code etc. are not needed.

Frequency response measurement of machine Operating procedure

- (1) Select [Tool] - [4.MeasurementFunction] - [Frequency response measurement of Machine] to display the waveform measurement menu. The waveform measurement menu can also be displayed from the floating bar by selecting [Tool] - [4.MeasurementFunction] - [Frequency response measurement of Machine].

• Selecting from menu

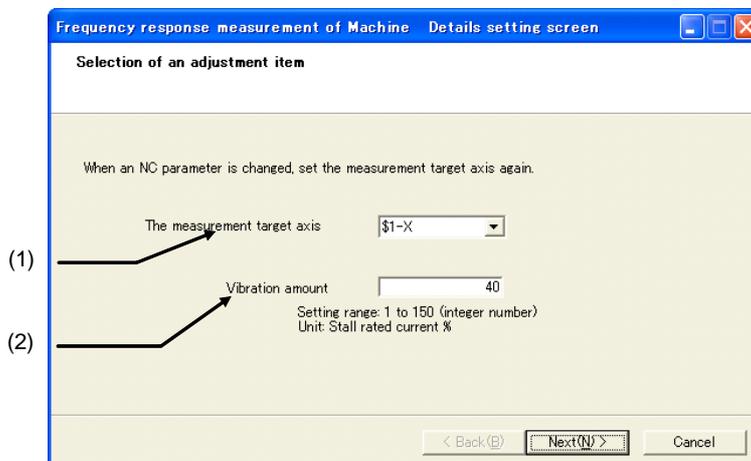


• Selecting from floating bar



Refer to “3.5.1 Frequency Response Measurement (Servo)” for more procedure.

Frequency response measurement of machine Configuration of Details setting screen



| Display item | Details | Default |
|---------------------------------|---|--|
| (1) The measurement target axis | This selects the target axis for measurement. In the combo box for the measurement target axis selection, the servo NC axes which are set in NC currently connected are displayed. Spindle, spindle/ C axis and PLC axis are not displayed. | The 1st part system's first axis set to NC (It is displayed with the format "\$1-*" (Note 1).) |
| (2) Vibration amount | The vibration amount during measurement (vibration) is displayed in vibration display area. | 0 |

(Note 1) "\$1" indicates the 1st part system, and "*" indicates the first axis name.

Configuration of measurement result display screen (Bode diagram)

Refer to "3.5.1 Frequency Response Measurement (Servo)" for details.

3.5.3 Waveform Measurement Function (Program Creation Function)

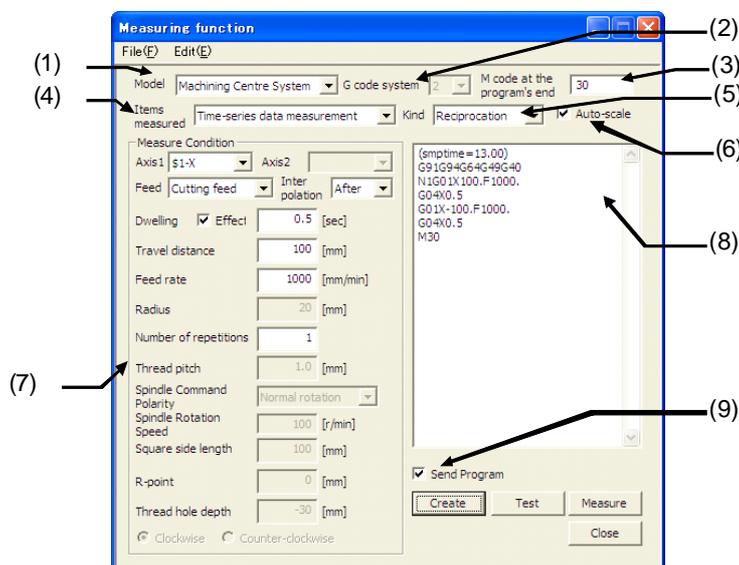
The created measurement program and the sampling conditions of the measurement target function are selected from the measurement function screen, and then an arbitrary program creation/ measurement process is executed.

The value of waveform to be drawn is displayed with radius value. It is not affected by the setting for parameter “#1019 dia”.

The measurement functions are as follows.

| Function | Details | Setting item | Axis | Measurement data |
|---------------------------------------|---|--------------------|--------|---|
| Chronological data measurement | This measures an arbitrary chronological data of current and speed etc. | Sampling condition | 1 to 8 | Either the following: Position command Speed command (mm/min) Speed command (r/min) Current command Position feed back Speed feed back(mm/min) Speed feed back (r/min) Current feed back Position droop Control input 1 to 6 Control output 1 to 6 |
| Arc shape error measurement | This measures the arc shape error. | Sampling condition | 2 | Position command or position feed back for both the 1st axis and the 2nd axis |
| Synchronous tapping error measurement | This measures the synchronous error of servo axis (mainly Z axis) and spindle during synchronous tapping measurement. | Sampling condition | 2 | Position command or position feed back for both the servo axis and the spindle |
| Measuring arbitrary path | This displays the path of an arbitrary plane by two axis plane in an arbitrary NC program operation. | Sampling condition | 2 | Position command and position feed back for both the 1st axis and the 2nd axis |

Waveform Measurement Function Configuration of Details setting screen



| Display item | Details | Default |
|---------------------------------|---|------------------------------|
| (1) Model | This selects "Lathe System" or "Machining Centre System". | Machining Centre System |
| (2) G code system | This selects the G code system. The setting is valid when "Lathe" is selected. | 2 |
| (3) M code at the program's end | This sets the M code of the program end. | 30 |
| (4) Items measured | This selects the measuring method. | Time-series data measurement |
| (5) Kind | This selects the kind of the created program. | Reciprocation |
| (6) Auto-scale enabled | This sets whether to enable the auto-scale. [Chronological data measurement] - The display will gray out - Set with the parameter screen whether to execute the auto-scale [Anti-chronological data measurement] - The scaled graph is displayed when it is ON. - The graph with the last value range(range set by the graph function) is displayed when it is OFF. - When the auto-scale is set in the graph function, it is set by synchronizing with the state of the auto-scale setting displayed on the upper left of the graph area. | Checked |

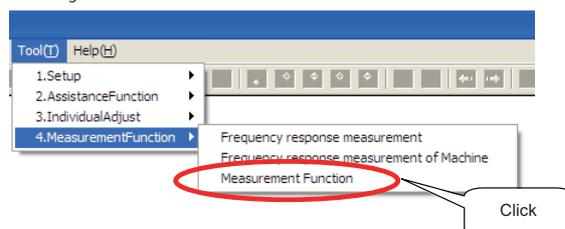
| Display item | Details | Default |
|----------------------------------|---|---|
| (7) Measurement Condition | | |
| Axis1 | This selects the axis set to "Axis1". | None |
| Axis2 | This selects the axis set to "Axis2". | None (Grayout when Reciproca- tion is selected) |
| Feed | This selects the feed status. | Cutting feed |
| Interpolation | This selects the before/after interpolation. | After |
| Dwelling Effect | This sets the validities of dwell. | Checked |
| Dwelling value | This sets the dwell. | 0.5 |
| Travel distance | This sets the traveling distance. | 100 |
| Feedrate | This sets the feedrate. When the rapid traverse is selected in [Feed], this cannot be input. | 1000 |
| Radius | This sets a drawn arc radius or a corner radius of arbitrary track. | 20 |
| Number of repetitions | This sets the repeat count. | 1 |
| Thread pitch | This sets the screw pitch used when the tap machining. | 1.0 |
| Spindle Command Polarity | This sets the spindle rotation direction. | Normal rotation |
| Spindle Rotation Speed | This selects the spindle rotation speed. | 100 |
| Square side length | This sets the length of one side at square drawing. | 100 |
| R-point | This sets R point. | 0 |
| Thread hole depth | This sets the screw hole depth. | -30 |
| Rotation direction | This sets the rotation direction. | Clockwise |
| (8) Machining program input area | This displays/inputs the machining program. The value which is displayed in the machining program display area is enabled as the machining program. | - |
| (9) Send Program | This selects whether to send the program displayed in machining program input area to NC. Operation search is executed after sending the program. The search No. will be "0" after the measurement. | Checked (Sending) |

Operation method

(1) Select [Tool] - [4. MeasurementFunction] - [Measurement Function] to display the measurement function menu.

The measurement function menu is also displayed by selecting [Tool] - [4. MeasurementFunction] - [Measurement Function] from a floating bar.

• Selecting from menu

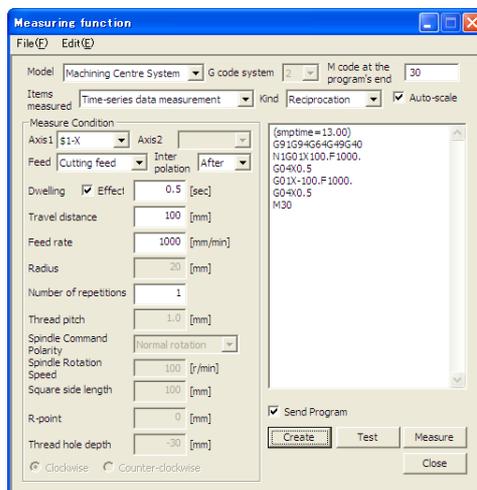


• Selecting from floating bar



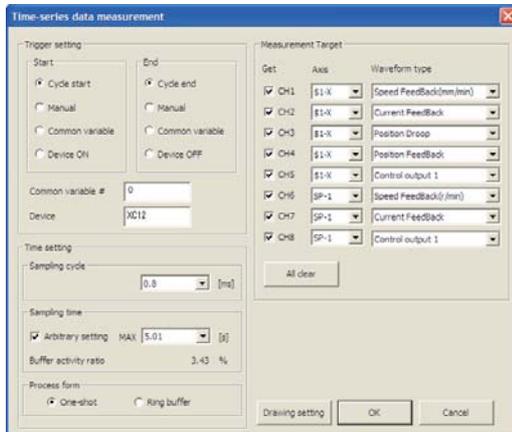
(2) Press the [Create] button.

The created machining program is displayed in the machining program display area.

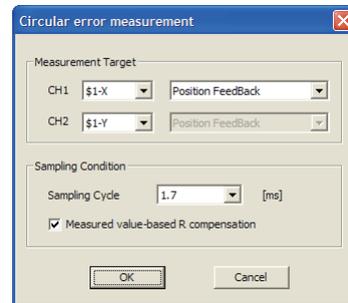


(3) Press the [Measure] button.

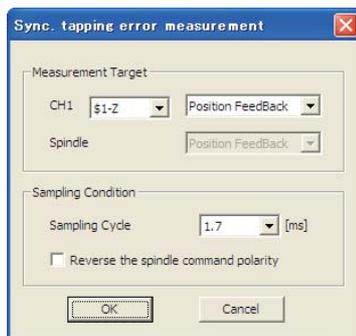
(4) The parameter setting screen of each selected measurement item is displayed.



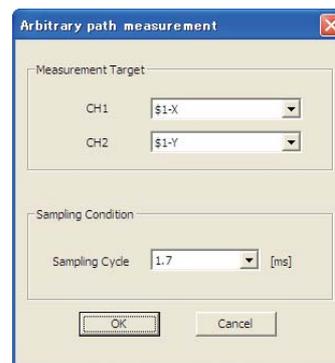
Time-series data measurement



Circular error measurement



Synchronous tapping error measurement



Arbitrary path measurement

3.5.3.1 Chronological Data Measurement

The waveform data (such as a position feed back) can be obtained with specified condition and the waveform display is available.

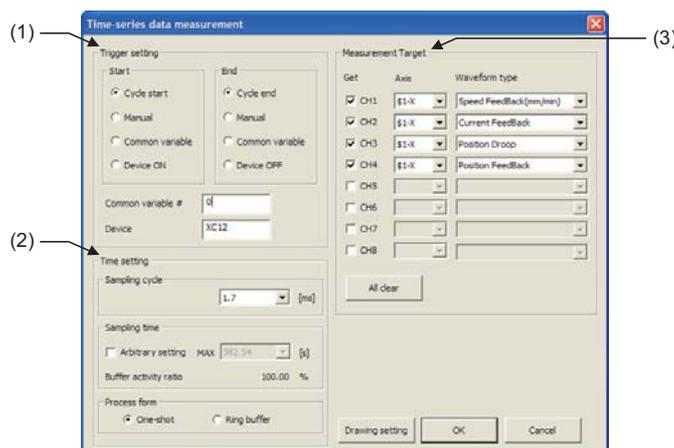
Up to 8 channel data can be measured (sampling).

Based on that data, difference can be obtained and it is possible to convert into speed and acceleration rate from a positional information.

List of measurement function

| Items | Specification |
|--|--|
| Axis available to obtain | Servo axis (Note 1), PLC axis (No.1), spindle (Note 2) |
| Type of waveform available to obtain | Position command, position feedback, position droop, current command, current feedback, speed command (mm/min or r/min) and speed feedback (mm/min or r/min) |
| Signal available to obtain | Control input 1 to 6, control output 1 to 6 |
| Number of channels available to obtain | 8 channels |
| Measurement cycle | (Control cycle) x n (n=1 to 255) When the control cycle is 1.7 ms, the measurement cycle can be selected among 1.7ms, 3.5ms, 5.3ms 453.3ms. |
| Number of measurements | Up to 1310720. The number of measurement per channel is "1310720/(the number of obtained channel) |
| Measurement start condition | Cycle start/Manual/Common variable/Device ON |
| Measurement end condition | Cycle end/Manual/Common variable/Device OFF |

Configuration of Time-series data measurement screen



(1) Trigger setting

| Setting item | Contents | Setting range | Default value |
|--------------|---|---|--|
| | | | (a) Startup at first time (b)Startup at second and subsequent |
| Start | Select a start trigger for the measurement. | Cycle start Manual Common variable Device ON | (a) Cycle start (b) A value previously set |
| End | Select a end trigger for the measurement. Measurement will finish when the conditions of end trigger are met or the buffer is full. | Cycle end Manual Common variable Device OFF | (a) Cycle end (b) A value previously set |

| Settings | Input required item |
|-----------------|--|
| Cycle start | Detect the start (or end) of automatic operation, and start (or end) the measurement. - If it is selected, the device value will become equivalent to the operation signal (OP1) of 1st part system. |
| Cycle end | - A device to designate the cycle start or cycle end is a signal which is allocated to CNC's PLC -> NC interface. For multi-part system, designate the cycle start or cycle end to the signal of part system to execute the sampling operation. - Keep in mind that if the cycle start or end is selected again after setting the device value, it will return to the original value. - If one of the triggers is changed to the cycle (start/end), other trigger will become the cycle (end/start). If it is changed to the condition other than the operation from that state, the other will be changed to the equivalent level. EX. If either of Start or End trigger is changed to Cycle start/end, the another one changes to Cycle start/end. From that state, if either one is changed to other condition, the another will change to the corresponding condition. if the end condition is changed to "Cycle end", the start condition becomes "Cycle start". Then if the start condition is changed to "Device ON", the end condition becomes "Device OFF". |
| Manual | At the start: If [Start sampling] button is pressed in the advance situation display screen, the measurement begins. At the end: If [End sampling] button is pressed in the advance situation display screen, the measurement ends. |
| Common variable | At the start: Operation will start when the value other than "0" (or empty) is set by the machining program to the variable set in the "Common variable #" box. At the end: Operation will end when "0" (or empty) is set by the machining program to the variable set in the "Common variable #" box. - The common variable trigger is enabled when it is rewritten by the machining program during the automatic operation startup. If it is rewritten either by the screen or the PLC program, it will not be recognized as a trigger. - Common variable is a floating point type. If the operation result is used, it may not be recognized as "0" because of error. - For multi-part system, the start trigger becomes ON if even one of the part systems meets the conditions. - If either trigger is changed to Common variable, another trigger also becomes common variable. And if it is changed to other than common variable from that state, another trigger will be changed to the corresponding condition. EX. When the start condition is "Cycle start" or the end condition is "Cycle end": If the end condition is changed to "Common variable", the start condition is also changed to "Common variable". Then the start condition is changed to "Device ON", the end condition is also changed to "Device OFF". |
| Device ON | The measurement starts when the signal which is set with device is ON. |
| Device OFF | The measurement ends when the signal which is set with device is OFF |

| Setting | Contents | Condition for setting | Setting range | Default value |
|-------------------|--|---|---|---|
| Common variable # | Set the common variable No. to become "start/end" trigger. 0: System variable (#1299) Other than 0: Specified common variable (from #100, from #500) An error will occur if the common variable does not exist in the system even within the setting range. | "Common variable" is selected either by trigger "Start" or "End". | 0 to 999 | (a) 0 (b) A value previously set |
| Device | Set the device to become "start/end" trigger. 0: Sampling start/stop signal (M700V/M70V series: Y72C, C70 series: Y321) Other than 0: Specified device. If "*" added at the head of the device name, ON/OFF for the device will be switched. | "PLC device" is selected either by trigger "Start" or "End". | [M700V/M70V series] (* X0 to X1FFF, (* Y0 to Y1FFF, [C70 series] (* X0 to XAFF, (* Y0 to YE7F, (* B0 to B1FFF | (a) Operation signal (OP1) for the machine (Because the start trigger is Cycle start) (b) A value previously set |

(2) Time setting

| Setting item | Details | Default value (a) Startup at first time (b)Startup at second and subsequent |
|-----------------------|---|---|
| Sampling cycle | Set the cycle to perform sampling. When the control cycle is 1.7ms, the sampling cycle can be selected from 255 patterns; 1.7ms, 3.5ms, 5.3ms, 453.3ms. The values in the pulldown menu are obtained by “(the control cycle) * n” (n=1 to 255). | (a) The value of n=1 When the control cycle is 1.7ms, it is 1.7ms. (b) A value previously set |
| Arbitrarily setting | - When it is ON, the sampling time can be set. - When it is OFF, the sampling time cannot be set. The value is set to become the maximum sampling time (buffer activity ration 100%) | (a) Deselected (b) A value previously set |
| MAX | Set the maximum duration of sampling time and display it. - Select the value from the pulldown menu. The values for selection depend on the “sampling cycle” and “the number of measurement target channels”. Sampling time [s] = ((Sampling cycle [ms]) / 1000) * (((n+1) * 1024) / (the number of obtained channels)) The n value for M700V and C70 is 0 to 1279, and 0 to 639 for M70V. The sampling time is displayed two places of decimal. (It is rounded off to two decimal places.) EX. When the sampling cycle 1.7 ms and the number of obtained channels is 8, the values in the pulldown menus are ; 0.27s, 0.45s, ... 145.63s ... 291.27s. When n=0: $(1.7777 / 1000) * \{(0 + 1) * 1024 / 8\} = 0.227[s]$ When n= 1: $(1.7777 / 1000) * \{(1 + 1) * 1024 / 8\} = 0.455[s]$: When n=639: $(1.7777 / 1000) * \{(639 + 1) * 1024 / 8\} = 145.635[s]$: When n=1279: $(1.7777 / 1000) * \{(1279 + 1) * 1024 / 8\} = 291.271[s]$ - The value will be updated when the sampling channel or the number of obtained channels is changed. - When the number of obtained channels is 0, the sampling time is 0.00[s]. | (a) The value for n = MAX When the sampling cycle is 1.7ms, it's 291.27s. (b) A value previously set. |
| Buffer activity ratio | It displays the buffer activity ratio. - The higher the value is, the longer time is needed to draw the waveform. - The ratio is obtained from the sampling time setting value: (n + 1) / 640 [the sampling time setting value n = 0 to 639] (M70V) (n + 1) / 1280 [the sampling time setting value n = 0 to 1279] (M700V/C70) - The ratio is displayed two places of decimal. (It is rounded off to two decimal places.) | |

(3) Process configuration

| Setting item | Details | Default value (a) Startup at first time (b)Startup at second and subsequent |
|--------------|---|---|
| One-shot | Sampling will finish when it reaches the set sampling time even without the end trigger. | (a) One-shot (b) A value previously set |
| Ring buffer | Sampling will continue until the sampling trigger is entered. When it reaches the set sampling time, the sampling will continue by deleting the oldest data. Therefore, the data to be obtained represents the data which was sampled until before the end trigger is entered. If it is selected, the progress bar and "Remaining time" on the Advance situation screen will not be displayed | (a) One-shot (b) A value previously set |

(4) Measurement target

| Setting | Contents | Setting range | Default value (a) Startup at first time (b)Startup at second and subsequent |
|---------------------|--|--|---|
| Check box for "GET" | Select whether to measure the set content. | Checked (to measure) Unchecked (not to measure) - "Axis" and "Waveform type" will be grayed out and cannot be changed if it is deselected. - When it is selected, gray out will be cleared and "Axis" and "Waveform type" can be changed. | (a) 1st to 4th channel : ON 5th to 8th channel : OFF (b) A value previously set |
| Axis | Set the target axis to get | Blank / Connected servo axis , PLC axis and spindle | (a) Servo 1st part system 1st axis (b) A value previously set |
| Waveform type | Set the waveform type to get | Blank Position command Position feed back Position droop Speed command (mm/min) or (r/min) (Note 1) Speed feed back (mm/min) or (r/min) Current command Current feed back Control input 1 to 6 Control output 1 to 6 - When the control input/output is selected, which bit to be displayed in a drawing setting window needs to be set. bitC is set as a default. | (a) 1st to 4th channel: Speed feed back Current feed back Position droop Position feed back 5th to 8th channel: Gray out (b) A value previously set |

| Setting | Contents | Setting range | Default value (a) Startup at first time (b)Startup at second and subsequent |
|-----------|---|---------------|---|
| All clear | Display the confirmation window. When [OK] button is pressed in confirmation window, the window will be closed and the setting contents for all channels are cleared. "GET" checkbox will be unchecked and "Axis" and "Saveform type" will be blank. At the same time, the storing process for the measurement target is executed. The window is closed by pressing [Cancel] button in the confirmation window. | - | - |

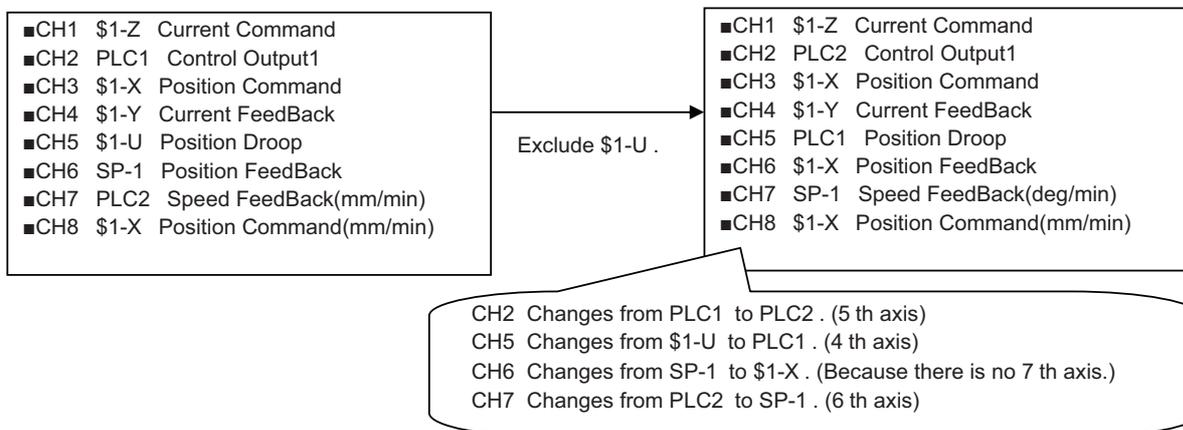
(Note 1) Display unit for speed (mm/min) differs according to the axis type. When the axis type is not selected, the unit for a linear axis is displayed. Unit type for the waveform type changes when switching between linear axis and rotary axis.

The display unit system of mm and inch will also be switched by L_inch parameter (#1041).

(Note 2) The set axis names may differ, when the axis configuration differs as the connection destination CNC is different. This is because the axis information is controlled with the axis No. of servo, PLC, and spindle, starting from No.1. If there is no corresponding axis, it will be changed to the 1st servo axis. Note that the waveform type does not change.

EX: The servo 4th axis(\$1-U) is detached and MS Configurator is restarted, when the axes are configured with 4

servo axes (\$1-X, \$1-Y, \$1-Z and \$1-U), 2 PLC axes (PLC1, PLC2) and 1 spindle (SP-1) and the measurement target setting is as follows.



(Note 3) The following combination of the waveform type cannot be set for the same axis. An error message will appear if one of the following combinations is selected and [OK] button is pressed.

Waveform type combination that cannot be used

| Axis type | Combination that cannot be used |
|----------------------|--|
| Servo axis, PLC axis | - "Position command" and "Speed command" - "Position command" and "Current command" |
| Spindle | - "Position command" and "Speed command" - "Position command" and "Current command" - "Position command" and "Current feed back" |

If the measurement target is changed, "drawing setting screen" will be affected.

When the measurement target is changed (check box for "GET", Axis, Waveform type), and [OK] or [Drawing setting] button is pressed, all the setting of "Drawing setting screen" and "Axis setting screen" will return to the default value.

Setting example

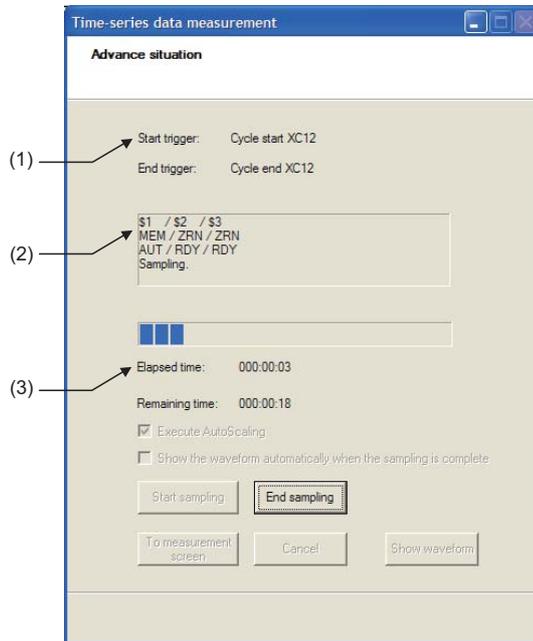
Setting example 1: Select Speed feed back (mm/min) for the servo 1st part system 1st axis (\$1-X) as an axis data in channel 1.

- 1) Select [\$1-X] from the axis combo box of channel 1.
- 2) Select "Speed FeedBack (mm/min)" from the waveform type combo box of channel 1.

Setting example 2: Select "During in-position" (INP) for the servo 1st part system 1st axis (\$1-X) as a control signal in channel 5.

- 1) Select [\$1-X] from the axis combo box in channel 5.
- 2) Select "Control output 1" from the waveform type combo box of channel 5. (Because "During in-position" is control output 1 bitC.)

Configuration of Advance situation screen



(1) The trigger display

Type of trigger to start and end and their contents (common variable value# and device) will be displayed in the trigger display area.

(2) Explanation for the advance situation display

The following will be displayed in the advance situation display area.

\$1 / \$2 / \$3
MEM / MEM / MEM
RDY / RDY / RDY
Start sampling.
Press the sampling start button.

“Part system” is displayed in the 1st line, “Operation mode” is displayed in the 2nd line and “Operation status” is displayed in the 3rd line. In the 4th line, a message will be displayed.

Operation mode

| Display | Mode |
|---------|--------------------------------|
| MEM | Memory mode |
| MDI | MDI mode |
| JOG | Jog feed mode |
| RPD | Rapid traverse mode |
| HDL | Handle feed mode |
| STP | Incremental mode |
| ZRN | Reference position return mode |

Operation status

| Display | Mode |
|---------|--|
| EMG | In emergency stop |
| RST | Resetting NC |
| LSK | Paper tape reader is in label skip state |
| BST | In block stop |
| HDL | Operation halted |
| SYN | Synchronizing |
| AUT | In automatic operation |
| RDY | Operation completed state |

Message display

| Display item | Status | Details |
|---|-------------------------|---|
| Preparing the measurement. | Preparing | Communicating with NC. Wait for a while. |
| Start sampling. Press the sampling start button. | Before sampling | Ready to start sampling. Press "Start sampling" button. When the condition to start sampling start is "manual", the sampling starts immediately after the button is pressed. If other condition is applied, it will be trigger waiting state. |
| Waiting for the trigger. | Waiting for the trigger | Waiting for the trigger. When the trigger is entered (such as automatic startup), sampling begins. |
| Sampling | Measuring | Sampling is being executed. The elapsed time is counted up and the remaining time is counted down. Sampling completes when the end trigger is established, "End sampling" button is pressed or the buffer is full. |
| Sampling finished. Press the waveform button. | Completed | Sampling completed. Waveform will be displayed when [Show waveform] is pressed. When "Show the waveform automatically when the sampling is complete" is selected, the waveform is displayed without showing this message. |
| Drawing. | Drawing | Waveform is being drawn. Wait for a while. During this state, button operation is invalid. After the process is finished, close the "Advance situation" screen, then the waveform will be displayed. " _ _ _ " will be updated to " -> " _ " -> " _ _ " -> " _ _ _ " -> (repetition of this pattern) every second. |
| An error occurred during communicating with the NC | Connection error | Cannot be measured as an error occurred. Close the window by pressing [To measurement screen] or [Cancel] button. |

(Note)When there is no response from NC to the status "Preparing", "Waiting for the trigger", "Sampling" or "Drawing", it will time out after 10 seconds of no response and then it will be "Connection error" status.

(3) Time display

| Display item | Details | When the radio button "Ring buffer" is selected in "Time-series data measurement" |
|---------------------------|--|---|
| Elapsed time progress bar | Display the usage situation of sampling buffer | Not to display |
| Elapsed time | Display the elapsed time since the sampling has started by "HHH:MM:SS". | Display |
| Remaining time | Remaining time for the sampling completion calculated with the remaining buffer is displayed by "HH:MM:SS". (It is not the time remained until the end buffer turns ON.) | Not to display |

Buttons and check boxes

| Button/Check box | Details | Status (○ : Available to operate X: Not available to operate) | | | | | | |
|---|--|--|--------------------|-------------------|-------------------------|------------|-------------|-----------|
| | | Prepar- ing | Connec- tion error | Before sam- pling | Waiting for the trigger | Sam- pling | Com- pleted | Draw- ing |
| Start sampling | Start sampling. If it is pressed after the completion, the previous sampling result is voided and the sampling starts again. | x | x | ○ | x | x | x | x |
| End sampling | End sampling. No matter how the end trigger is set, the sampling will end at the point of pressing this button. | x | x | x | ○ | ○ | x | x |
| To measurement screen | Return to the "Time-series data measurement" screen. The sampling result is voided. | ○ | ○ | ○ | x | x | ○ | x |
| Cancel (the X button on the top right of the screen works same way) | Change to the MS Configurator main screen. When it pressed after finishing the sampling, the result is voided and the waveform drawing is not performed. | ○ | ○ | ○ | x | x | ○ | x |
| Show waveform | Change to the waveform drawing screen. | x | x | x | x | x | ○ | x |
| Execute AutoScaling | Auto scale is executed while displaying the waveform, if it is selected. The settings in the "Axis setting" screen are ignored. Drawing is performed in the existing setting if it is unchecked. | x | x | (Note) | x | x | (Note) | x |
| Show the waveform automatically when the sampling is complete | The waveform is automatically drawn after the sampling ends if it is selected. The default is unchecked. | x | x | ○ | x | x | x | x |

(Note)About the operation status of the checkbox "Execute AutoScaling"

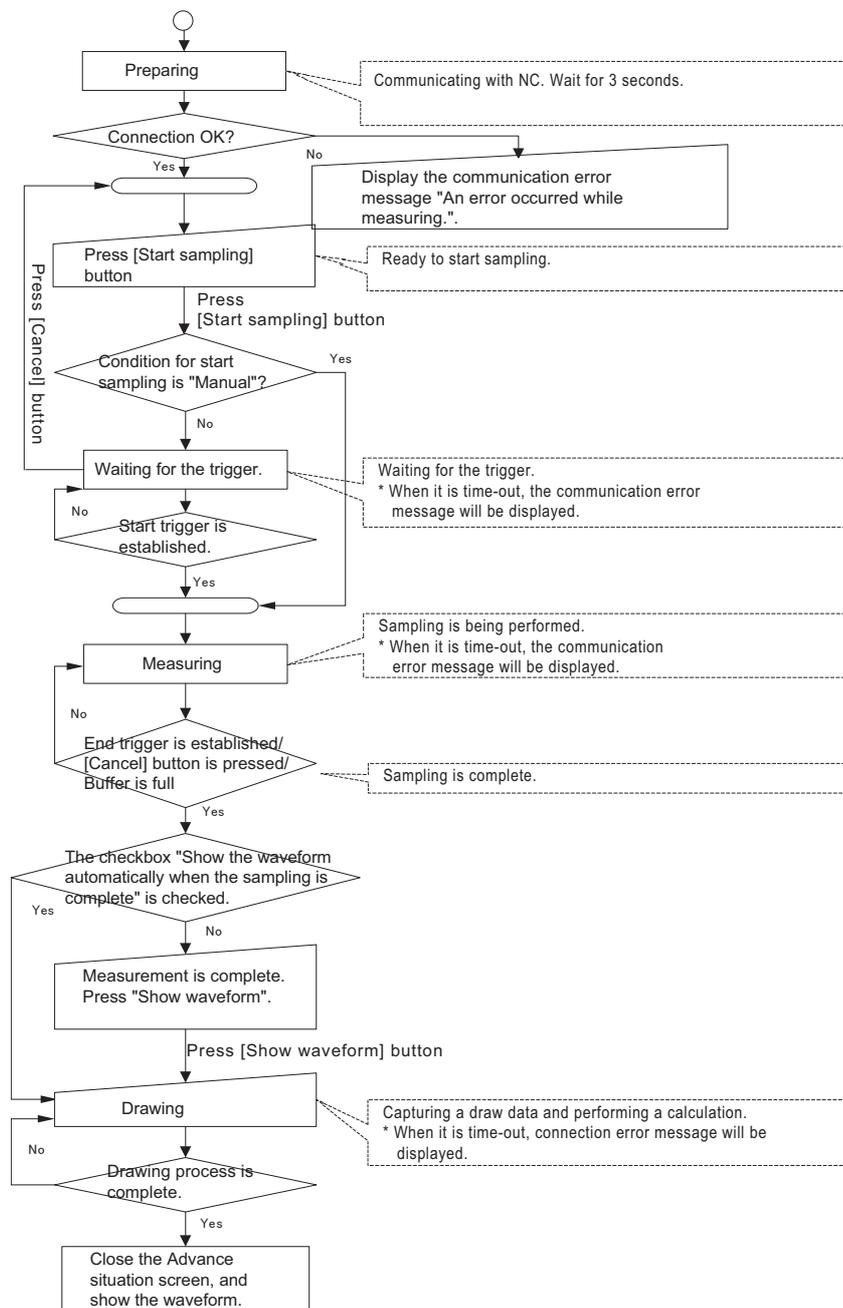
In the following cases, the checkbox is checked and cannot be changed:

- The first time
- After the measurement target, sampling time, cycle or process status is changed
- After opening the file to display the waveform

If the same settings (measurement target, sampling time and cycle) as last time are applied, the status of the checkbox can be changed and it will be unchecked at default.

When it is unchecked, the waveform drawing is performed with the same axis, drawing and graph setting as last time. However, if the drawing setting is changed, auto scaling for that changedNo. will be executed forcibly.

Process flow of Advance situation screen (Time-series data measurement)
Process flow is as follows.



[Remarks]

Measurement will stop if the emergency stop or reset is entered during the measurement (while the "Advance situation" screen is displayed). (Note 1)

When it stops, the error message "Emergency stop or reset was input. The measurement is discontinued." is displayed and returns to the MS Configurator main screen.

Also if some error (Note 2) occurs during the measurement, it returns to MS Configurator main screen after a message that correspond to each error is displayed.

(Note 1) Reset is valid only during the program operation.

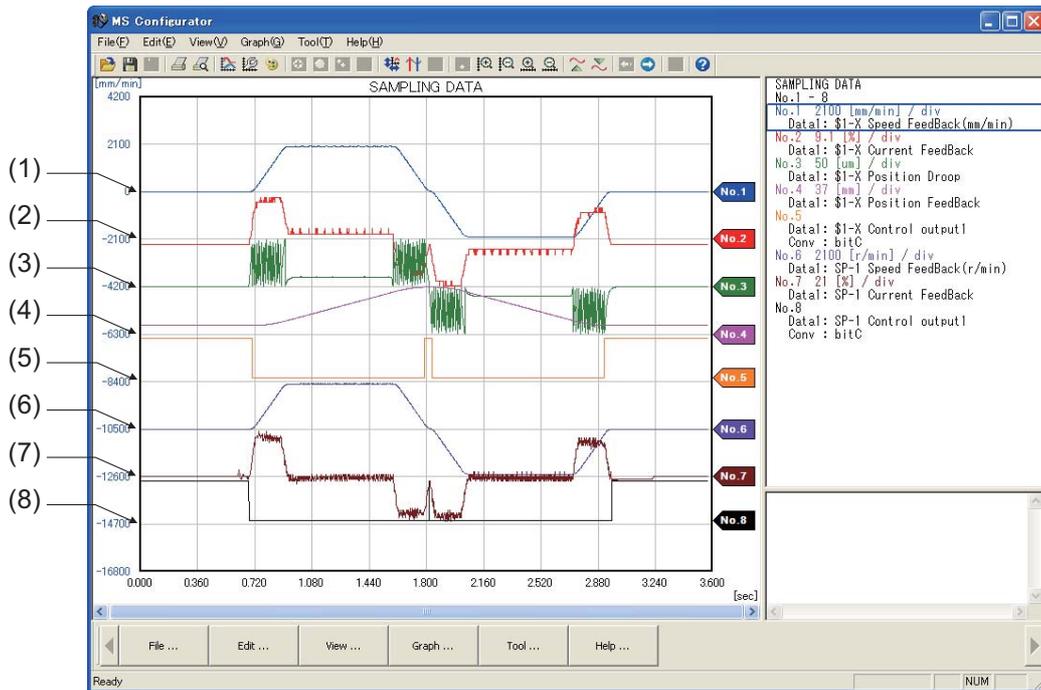
(Note 2) When there is no response from NC because of the illegal mode or alarm, it will time out after "the sampling time + 10 seconds" from the no response state.

Configuration of measurement result display screen

The chronological data of the measurement item selected on the chronological data measurement screen is displayed in the graph area.

The information (text data) at measurement is displayed in the text area.

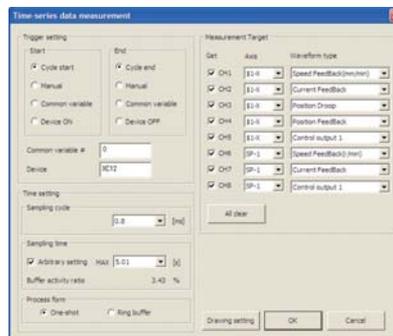
Only the designated CH will be the displayed.



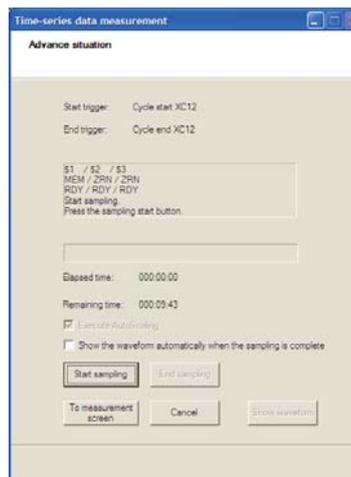
| Display item | Details |
|--------------|--|
| (1) No. 1 | This displays the chronological data of the measurement item selected with CH1 on the chronological data measurement screen. |
| (2) No. 2 | This displays the chronological data of the measurement item selected with CH2 on the chronological data measurement screen. |
| (3) No.3 | This displays the chronological data of the measurement item selected with CH3 on the chronological data measurement screen. |
| (4) No.4 | This displays the chronological data of the measurement item selected with CH4 on the chronological data measurement screen. |
| (5) No.5 | This displays the chronological data of the measurement item selected with CH5 on the chronological data measurement screen. |
| (6) No.6 | This displays the chronological data of the measurement item selected with CH6 on the chronological data measurement screen. |
| (7) No.7 | This displays the chronological data of the measurement item selected with CH7 on the chronological data measurement screen. |
| (8) No.8 | This displays the chronological data of the measurement item selected with CH8 on the chronological data measurement screen. |

Operation method

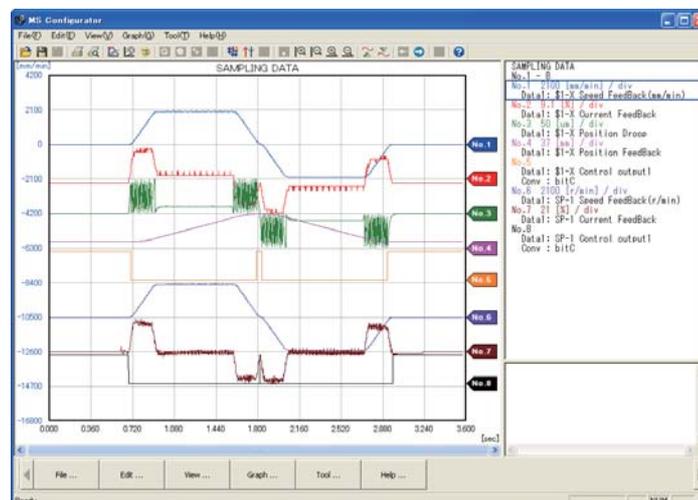
- (1) Designate the measurement target and sampling condition.
Press the [OK] button.



- (2) Advance situation screen is displayed.
Press [Start sampling] button. When the trigger is established, it will be measuring.



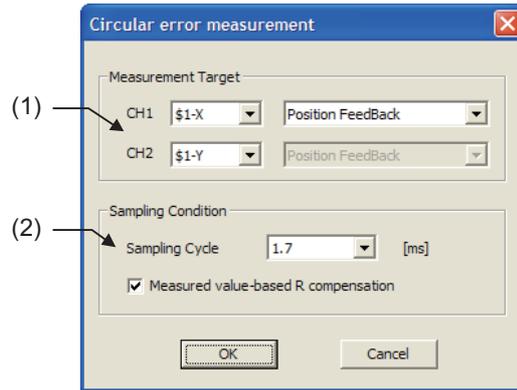
- (3) Sampling stops.
(The end conditions are met, the buffer is full, or press [End sampling] button.)
- (4) Press [Show waveform] button.



3.5.3.2 Arc Shape Error Measurement

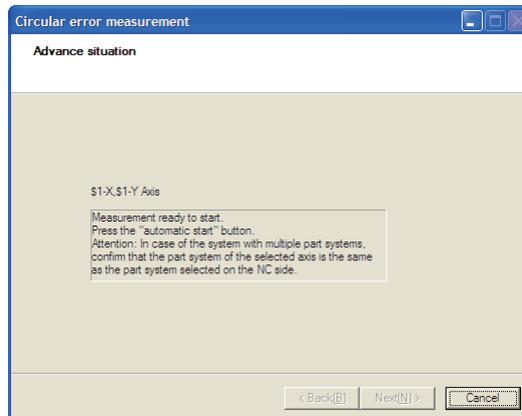
An arbitrary machining program is executed with specified axis, and the arc shape error is measured by that data (position command or position feed back for both 1st axis and 2nd axis). The result is displayed as the roundness graph and text data.

Configuration of Arc shape error measurement screen



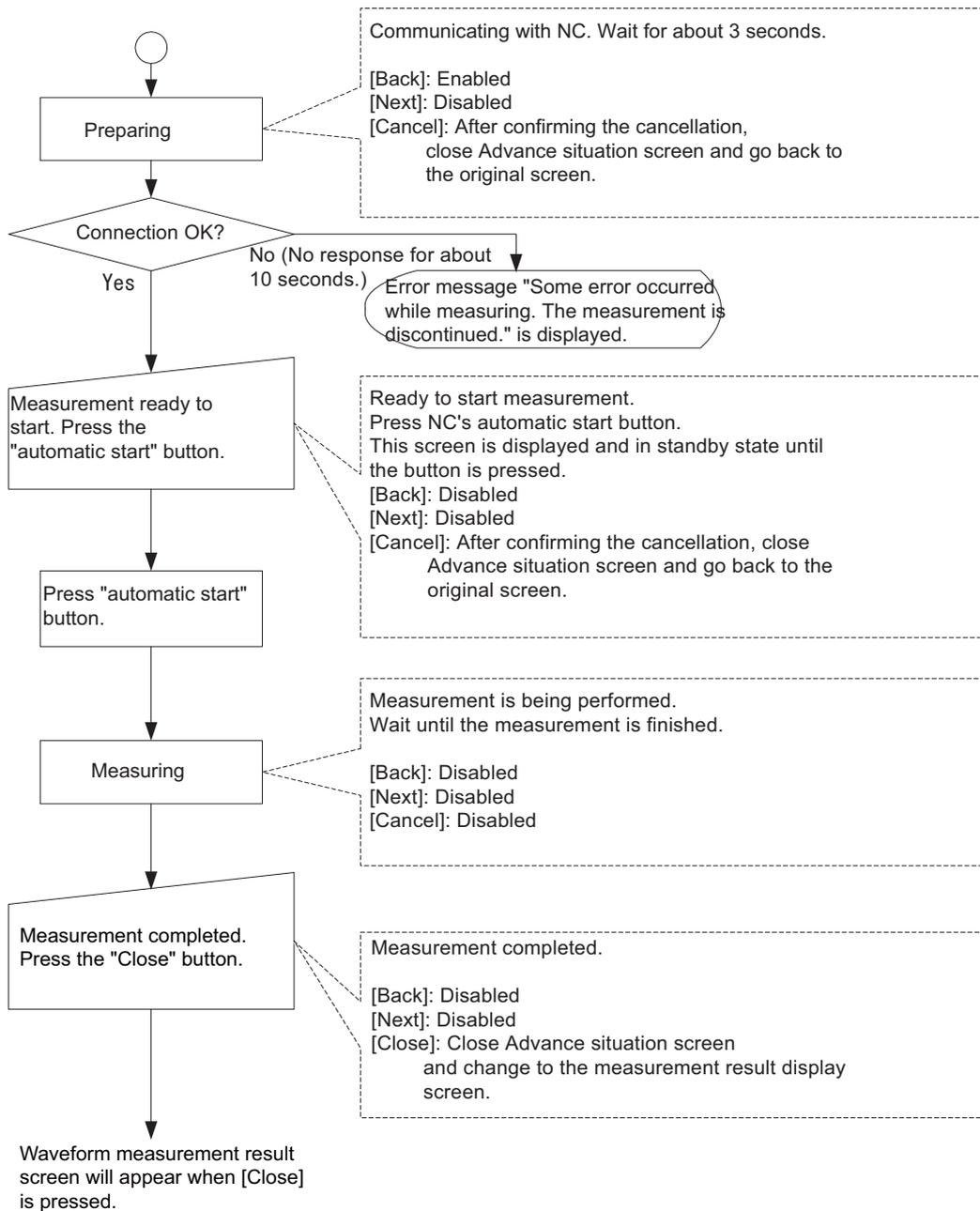
| Display item | Details | Default |
|------------------------|---|---|
| (1) Measurement Target | | |
| CH1 Target axis | This displays the channel (target axis) for sampling. The combo box only shows the NC axes which are set in the currently connected NC and have the same part system and type as those of the axis selected in "axis 1" on the measurement function screen. Spindle, spindle/C axis and PLC axis are not displayed. | Axis name selected with axis 1 on the measurement function screen |
| CH2 Target axis | This displays the channel (target axis) for sampling. The combo box only shows the NC axes which are set in the currently connected NC and have the same part system and type as those of the axis selected in "axis 2" on the measurement function screen. Spindle, spindle/C axis and PLC axis are not displayed. | Axis name selected with axis 2 on the measurement function screen |
| CH1 Measurement item | This selects the measurement item. | Position FeedBack |
| CH2 Measurement item | This selects the same measurement item as the CH1 measurement item. | This selects the same measurement item as the CH1 measurement item. |
| (2) Sampling Cycle | This sets the sampling period. | 1.7 |

Configuration of Advance situation screen



Process flow of Advance situation screen (anti-time series data)

Advance situation screen will change partly automatically in the following order.



[Remarks]

Measurement will stop if the emergency stop or reset is entered during the measurement (while the "Advance situation" screen is displayed). (Note 1)

When stops, the error message "Emergency stop or reset was input. The measurement is discontinued." is displayed and returns to the MS Configurator main screen.

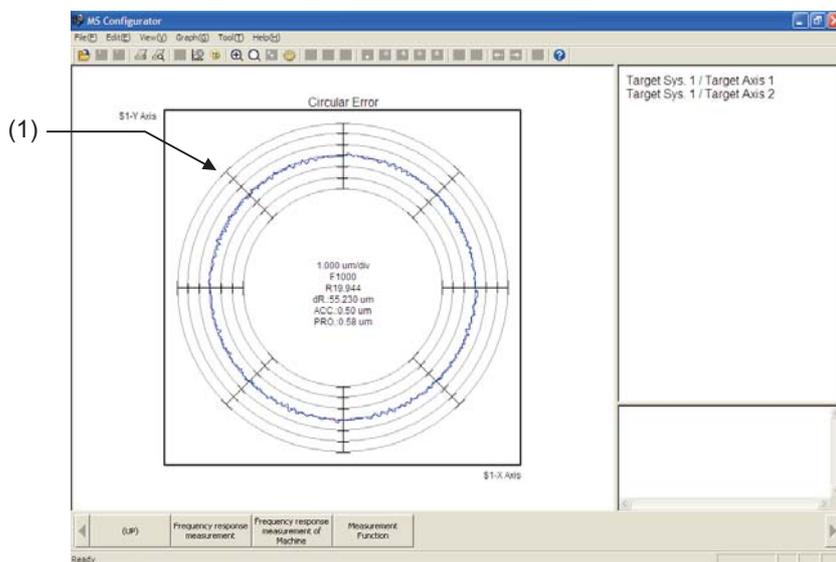
Also if some error (Note 2) occurs during the measurement, it returns to MS Configurator main screen after a message that correspond to each error is displayed.

(Note 1) Reset is valid only during the program operation.

(Note 2) When there is no response from NC because of the illegal mode or alarm, it will time out after "the sampling time + 10 seconds" from the no response state.

Configuration of measurement result display screen

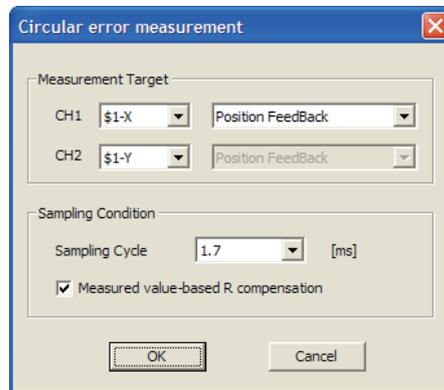
The roundness graph of the arc shape error measurement result is displayed in the graph area.
The information (text data) at measurement is displayed in the text area.



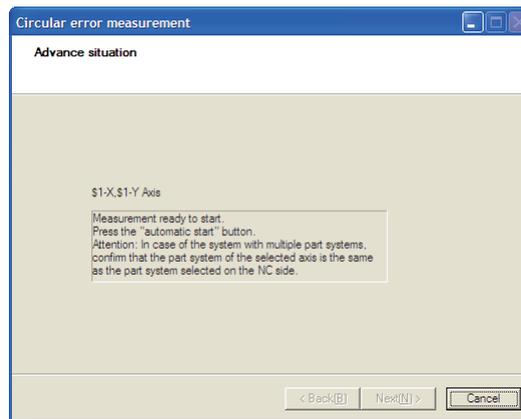
| Display item | Details |
|--------------|--|
| (1) Graph 1 | This displays roundness graph of the arc shape error measurement result. |

Operation method

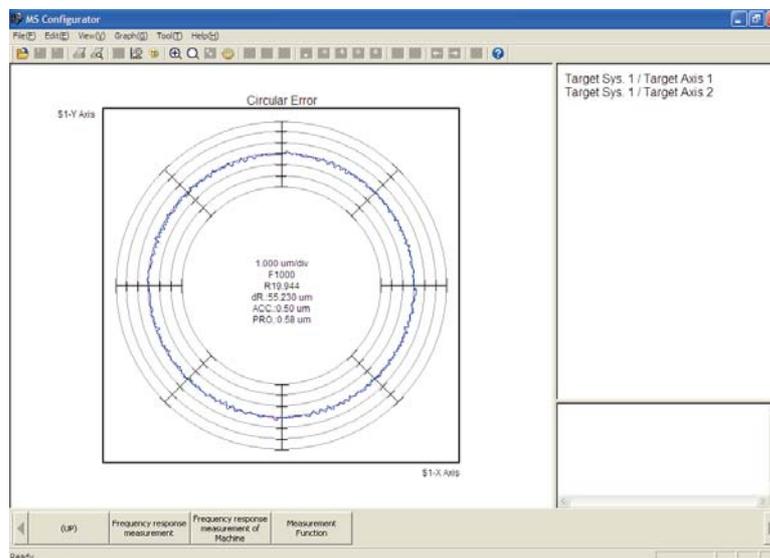
- (1) Designate the measurement target and sampling condition.
Press the [OK] button.



- (2) Advance situation screen is displayed. Press automatic start button.



- (3) The measurement result is displayed. Press [Cancel] to close the "Advance situation" screen.



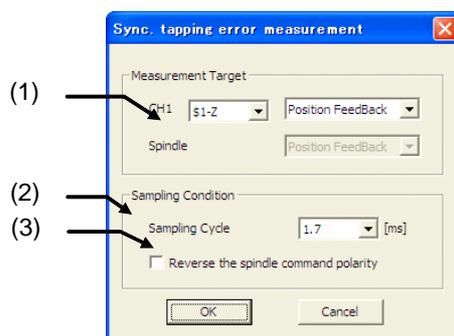
3.5.3.3 Synchronous Tapping Error Measurement

An arbitrary machining program is executed with specified axis, and the synchronous error of servo axis (mainly Z axis) and spindle at tapping measurement is measured by that data (position command or position feed back for both servo axis and spindle). The result is displayed as synchronous error waveform and text data.

(Note 1) As for the synchronous tapping error measurement, the spindle in the 1st part system can be measured. When spindle 1 is not connected/set to NC, this cannot be measured.

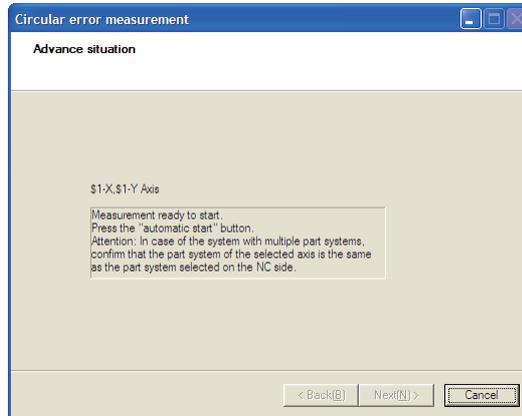
(Note 2) This function does not correspond to high-speed synchronous tapping.

Configuration of Sync. tapping error measurement screen

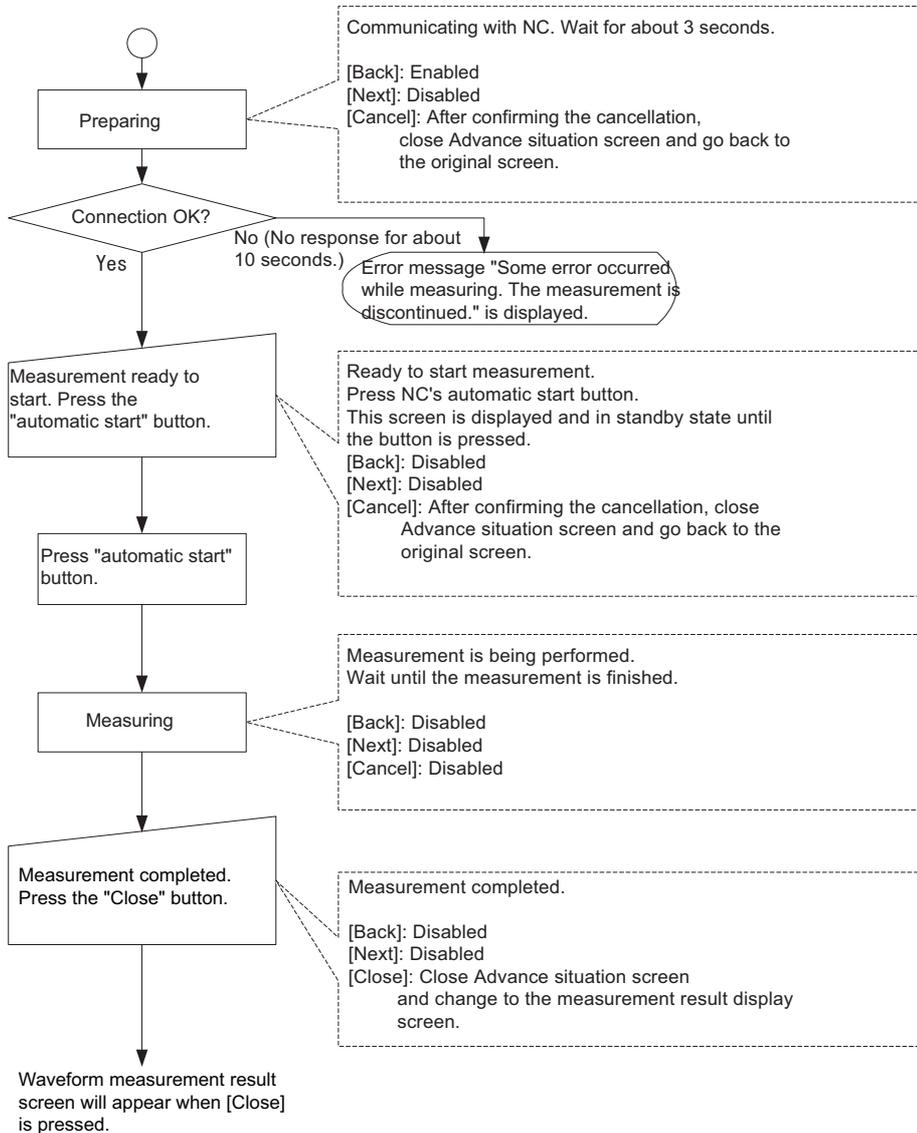


| Display item | Details | Default |
|--|---|---|
| (1) Measurement Target | | |
| CH1 Target axis | This displays the channel (target axis) for sampling. The combo box only shows the NC axes which are set in the currently connected NC and have the same part system and type as those of the axis selected in "axis 1" on the measurement function screen. Spindle, spindle/C axis and PLC axis are not displayed. | Axis name selected with axis 1 on the measurement function screen |
| CH1 Measurement item | This selects the measurement item. | Position FeedBack |
| Spindle Measurement item | This selects the same measurement item as the CH1 measurement item. | This selects the same measurement item as the CH1 measurement item. |
| (2) Sampling cycle | This sets the sampling period. | 1.7 |
| (3) Reverse the spindle command polarity | This displays the spindle waveform to reverse. When the servo and spindle command polarity is reversed, selected "Reverse the spindle command polarity". | Deselected (not reverse) |

Configuration of Advance situation screen



Process flow of Advance situation screen (anti-time series data)
 Advance situation screen will change partly automatically in the following order.



[Remarks]

Measurement will stop if the emergency stop or reset is entered during the measurement (while the "Advance situation" screen is displayed). (Note 1)

When it stops, the error message "Emergency stop or reset was input. The measurement is discontinued." is displayed and returns to the MS Configurator main screen.

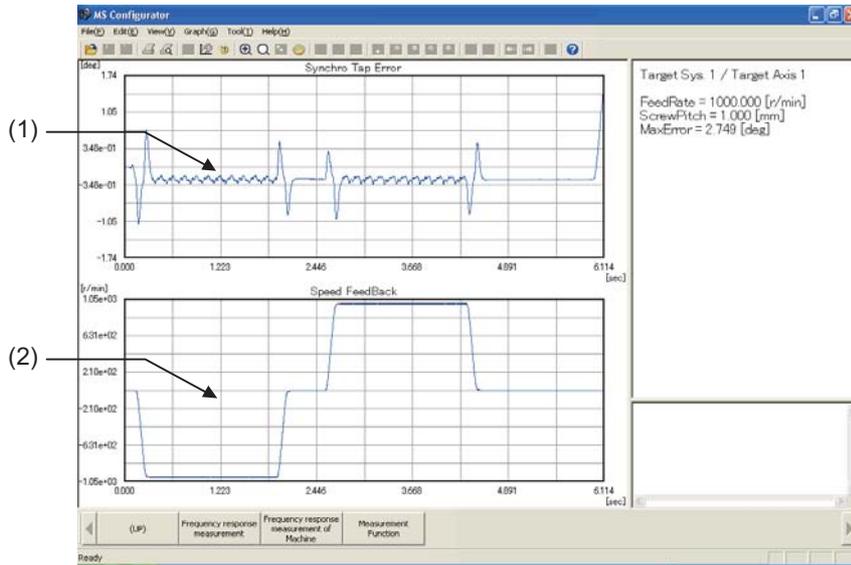
Also some error (Note 2) occurs during the measurement, it returns to MS Configurator main screen after a message that correspond to each error is displayed.

(Note 1) Reset is valid only during the program operation.

(Note 2) When there is no response from NC because of the illegal mode or alarm, it will time out after "the sampling time + 10 seconds" from the no response state.

Configuration of measurement result display screen

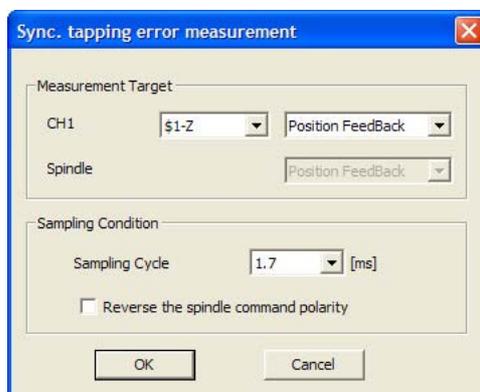
The synchronous error when the tapping is measured with data (servo axis: position feed back, spindle: position feed back/speed feed back) of servo (mainly Z axis) and spindle is displayed in the graph area as the chronological data. The spindle used for the measurement is spindle 1. The information (text data) at measurement is displayed in the text area.



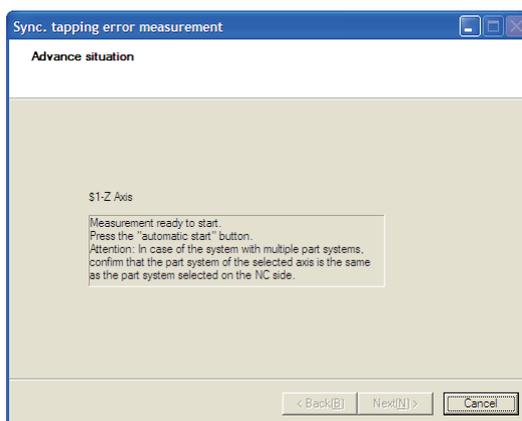
| Display item | Details |
|--------------|---|
| (1) Graph 1 | This displays the chronological data of synchronous error. Blue line: Chronological graph of error pulse (Position error of spindle and servo axis) |
| (2) Graph 2 | Blue line: Chronological graph of spindle speed command or speed feed back Red line: Chronological graph of selected servo axis speed command or speed feed back |

Operation method

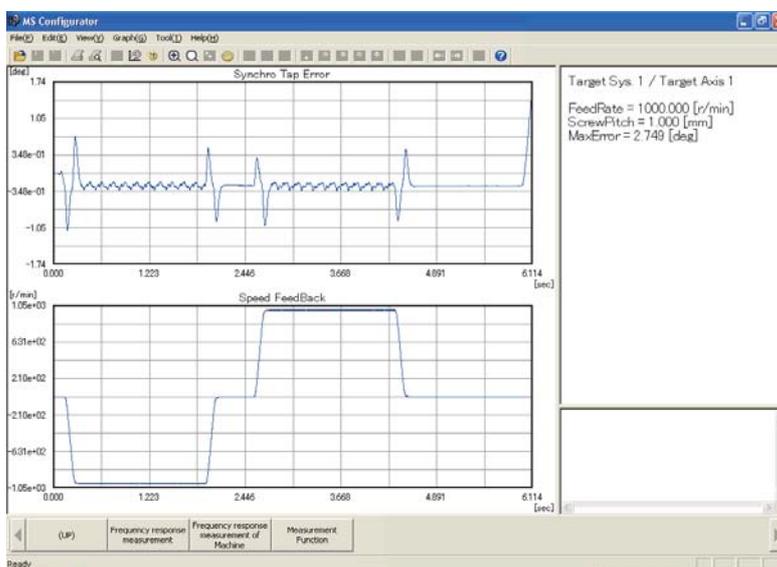
- (1) Designate the measurement target and sampling condition.
Press the [OK] button.



- (2) Advance situation screen is displayed. Press automatic start button.



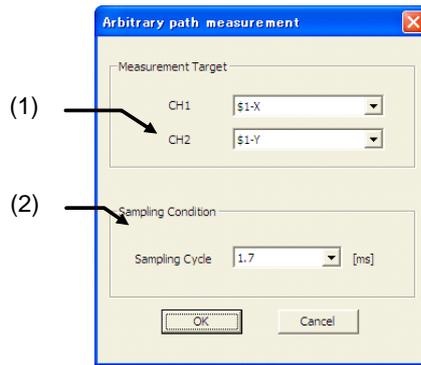
- (3) The measurement result is displayed. Press [Cancel] to close the “Advance situation” screen.



3.5.3.4 Arbitrary Path Measurement

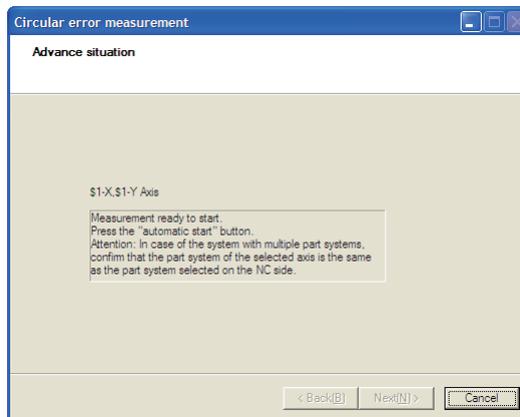
An arbitrary machining program is executed with specified axis, and an arbitrary path of plane by two axes to an arbitrary NC program operation is measured by that data (position command or position feed back for both 1st axis and 2nd axis). The result is displayed as two dimension plot and text data.

Configuration of Arbitrary path measurement screen

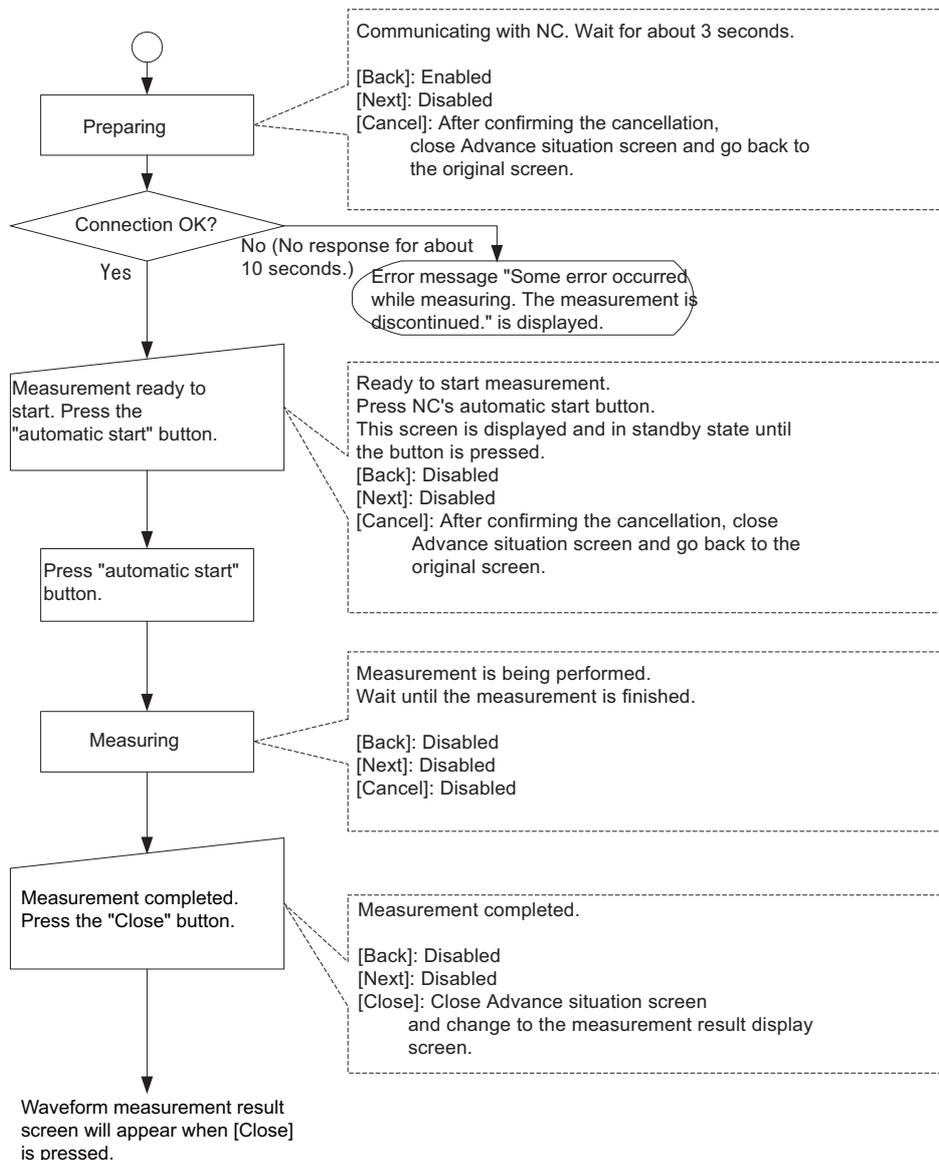


| Display item | Details | Default |
|------------------------|---|---|
| (1) Measurement Target | | |
| CH1 Target axis | This displays the channel (target axis) for sampling. The combo box only shows the NC axes which are set in the currently connected NC and have the same part system and type as those of the axis selected in "axis 1" on the measurement function screen. Spindle, spindle/C axis and PLC axis are not displayed. | Axis name selected with axis 1 on the measurement function screen |
| CH2 target axis | This displays the channel (target axis) for sampling. The combo box only shows the NC axes which are set in the currently connected NC and have the same part system and type as those of the axis selected in "axis 2" on the measurement function screen. Spindle, spindle/C axis and PLC axis are not displayed. | Axis name selected with axis 2 on the measurement function screen |
| (2) Sampling Cycle | This sets the sampling period. | 1.7 |

Configuration of Advance situation screen



Process flow of Advance situation screen (anti-time series data)
Advance situation screen will change partly automatically in the following order.



[Remarks]

Measurement will stop if the emergency stop or reset is entered during the measurement (while the "Advance situation" screen is displayed). (Note 1)

When it stops, the error message "Emergency stop or reset was input. The measurement is discontinued." is displayed and returns to the MS Configurator main screen.

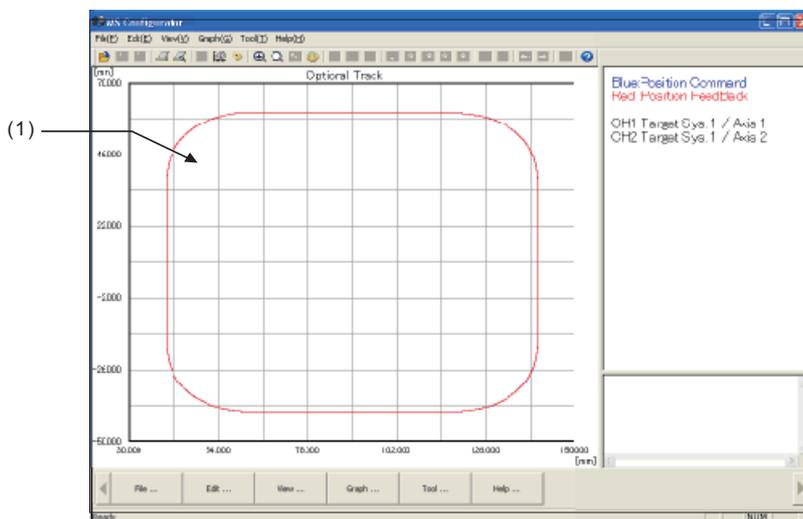
Also some error (Note 2) occurs during the measurement, it returns to MS Configurator main screen after a message that correspond to each error is displayed.

(Note 1) Reset is valid only during the program operation.

(Note 2) When there is no response from NC because of the illegal mode or alarm, it will time out after "the sampling time + 10 seconds" from the no response state.

Configuration of measurement result display screen

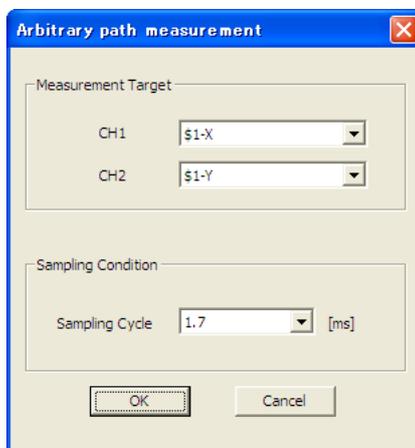
The two dimension plot data of the arbitrary path measurement result is displayed in the graph area.
The information (text data) at measurement is displayed in the text area.



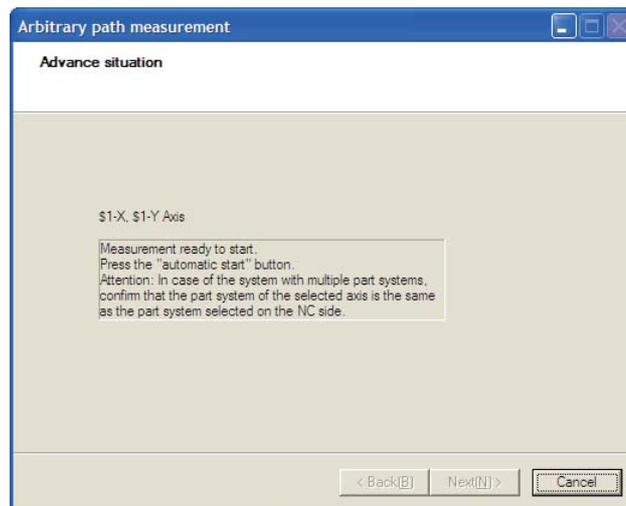
| Display item | Details |
|--------------|--|
| (1) Graph 1 | The two dimension plot data of the arbitrary path is displayed. Blue line: Two dimension plot of position command for 1CH and 2CH Red line: Two dimension plot of position feed back for 1CH and 2CH |

Operation method

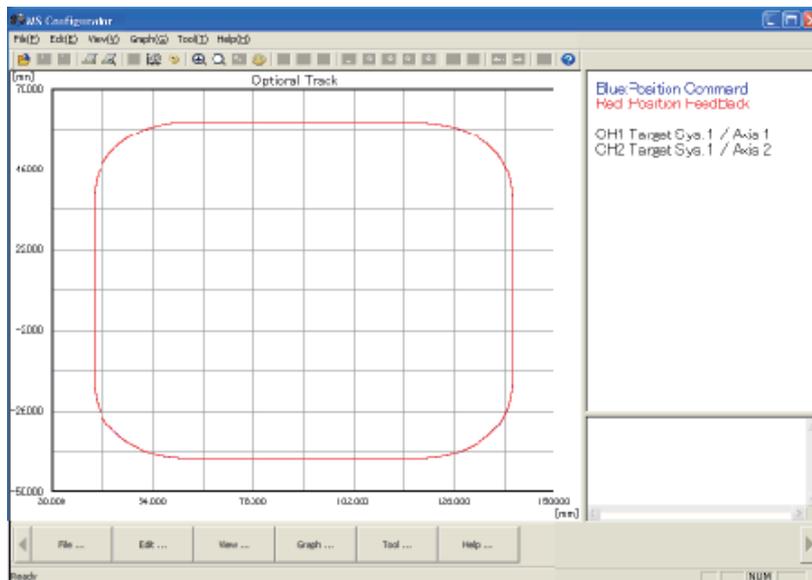
- Designate the measurement target and sampling condition.
Press the [OK] button.



(2) Advance situation screen is displayed. Press automatic start button.



(3) The measurement result is displayed. Press [Cancel] to close the “Advance situation” screen.



3.6 Graph Function of Tools

In MS Configurator, various processes can be executed for the displayed graph.

Each process menu can be selected by the menu, the toolbar, the floating bar and the mouse right-clicking in the graph area.

3.6.1 Graph Function in XY Mode

This section explains the graph function for automatic adjustment/waveform measurement.

Automatic adjustment:

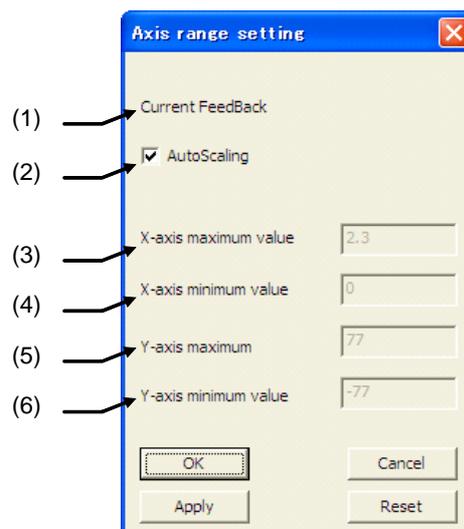
Velocity loop gain, time constant adjustment, position loop gain, lost motion adjustment, lost motion type 3 adjustment

Waveform measurement:

Frequency response measurement, frequency response measurement of machine, arc shape error measurement, synchronous tapping error measurement, arbitrary path measurement

3.6.1.1 Configuration of Screens

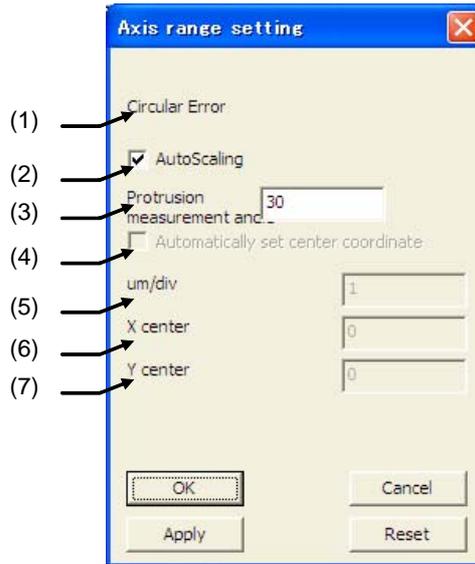
Standard/Logarithm graph Configuration of Axis range setting dialog



| Display item | Details | Default |
|-----------------------------------|---|--|
| (1) Graph title | This displays the graph title. | - |
| (2) AutoScaling Check box | This sets the auto scale ON/OFF. ON: The graph is displayed with auto scale ON. Among displayed plots, the scale is set to the maximum value. OFF: The graph is displayed with auto scale OFF. When the drag mode and expansion/reduction mode are selected, auto scale OFF is set automatically. | ON |
| (3) X-axis maximum value Text box | This sets the maximum value of x axis in the graph. When the auto scale check box is ON, this cannot be set. | Current x axis maximum value Cannot be set. |
| (4) X-axis minimum value Text box | This sets the minimum value of x axis in the graph. When the auto scale check box is ON, this cannot be set. | Current x axis minimum value Cannot be set. |

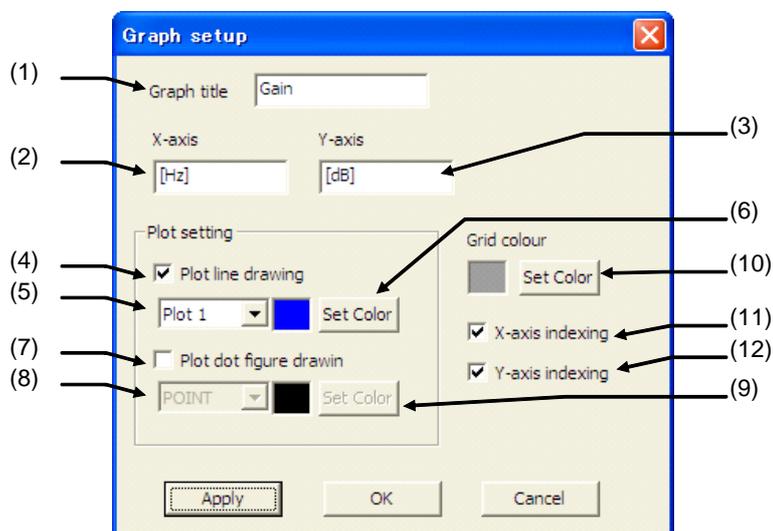
| Display item | Details | Default |
|-----------------------------------|--|--|
| (5) Y-axis maximum value Text box | This sets the maximum value of y axis in the graph. When the auto scale check box is ON, this cannot be set. | Current y axis maximum value Cannot be set. |
| (6) Y-axis minimum value Text box | This sets the minimum value of y axis in the graph. When the auto scale check box is ON, this cannot be set. | Current y axis minimum value Cannot be set. |

Roundness graph Configuration of Axis range setting dialog



| Display item | Details | Default |
|---|---|---|
| (1) Graph title | This displays the graph title. | - |
| (2) AutoScaling Check box | This sets the auto scale ON/OFF. ON: The graph is displayed with auto scale ON. OFF: The graph is displayed with auto scale OFF. | ON |
| (3) Protrusion measurement and ... Text box | This designates the protrusion angle. The protrusion amount calculated with a designated angle is displayed in the text area. | 30 |
| (4) Automatically set center coordinate Check box | This sets the center coordinates automatically. When the auto scale check box is OFF, this cannot be set. Check ON: Automatic adjustment ON Check OFF: Automatic adjustment OFF | Check OFF Cannot be set. |
| (5) $\mu\text{m}/\text{div}$ | This sets the division. When the auto scale check box is OFF, this cannot be set. The range 0.001 to 10000 can be designated. | - |
| (6) X center Text box | This sets the center coordinate of x axis. When the auto scale check box is OFF, this cannot be set. | Current center x coordinate Cannot be set. |
| (7) Y center Text box | This sets the center coordinate of y axis. When the auto scale check box is OFF, this cannot be set. | Current center y coordinate Cannot be set. |

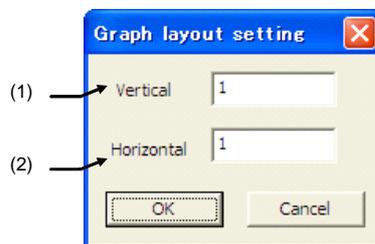
Configuration of Graph setup dialog



| Display item | Details | Default |
|---|--|------------------------------|
| (1) Graph title | This displays the graph title. Up to 32 characters can be input. | - |
| (2) X-axis | This sets the character string displayed in x axis label. Up to 32 characters can be input. | Displaying character strings |
| (3) Y-axis | This sets the character string displayed in y axis label. Up to 32 characters can be input. | Displaying character strings |
| (4) Plot line drawing Check box | This sets the Plot line drawing. Check ON: Draw Check OFF: Do not draw | ON |
| (5) Plot line drawing selection Combo box | This selects the setting target plot. When the Plot line drawing check box is OFF, this cannot be input. | Plot 1 |
| (6) Plot line color setting button | A setting dialog of the color is displayed when pressing, and the plot line color can be set. When the Plot line drawing check box is OFF, this cannot be input. | - |
| (7) Plot dot figure drawing Check box | This sets the Plot dot figure drawing Check ON: Draw Check ON: Do not draw | OFF |
| (8) Plot dot figure drawing Combo box | This selects Plot dot figure drawing When the Plot line drawing check box is OFF, this cannot be input. | - |
| (9) Plot point color setting button | A setting dialog of the color is displayed when pressing, and the plot point color can be set. When the Plot line drawing check box is OFF, this cannot be input. | - |
| (10) Grid colour setting button | A setting dialog of the color is displayed when pressing, and the grid display color can be set. | - |

| Display item | Details | Default |
|-----------------------------------|---|---------|
| (11) X-axis indexing Check box | This sets the index display of x axis when the unit is set to x axis. When the unit is not set, this cannot be pressed. Check ON: Exponential display ON Check OFF: Exponential display OFF | ON |
| (12) Y-axis indexing Check box | This sets the index display of y axis when the unit is set to y axis. When the unit is not set, this cannot be pressed. Check ON: Exponential display ON Check OFF: Exponential display OFF | ON |

Configuration of Graph layout setting dialog



| Display item | Details | Default |
|----------------|--|---------------------------------------|
| (1) Vertical | This sets the number of graph arrangement for vertical direction. 1 to 10 can be set. | Number of displayed graph arrangement |
| (2) Horizontal | This sets the number of graph arrangement for horizontal direction. 1 to 10 can be set. | Number of displayed graph arrangement |

3.6.1.2 How to Use the Graph

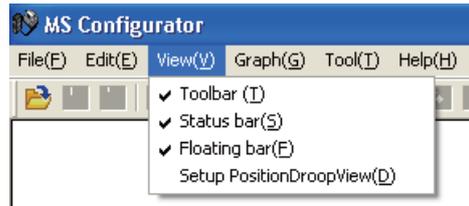
Menu bar display setting

Set whether to display the tool bar, the status bar, and the floating bar.

(1) Select the menu [View].

The menu bar list to which display/non-display can be set is displayed.

This function can be selected from [View] of the floating bar also.



(2) Select the menu bar which sets display/non-display.

The check changes whenever pressing once.

Zoom mode of the graph

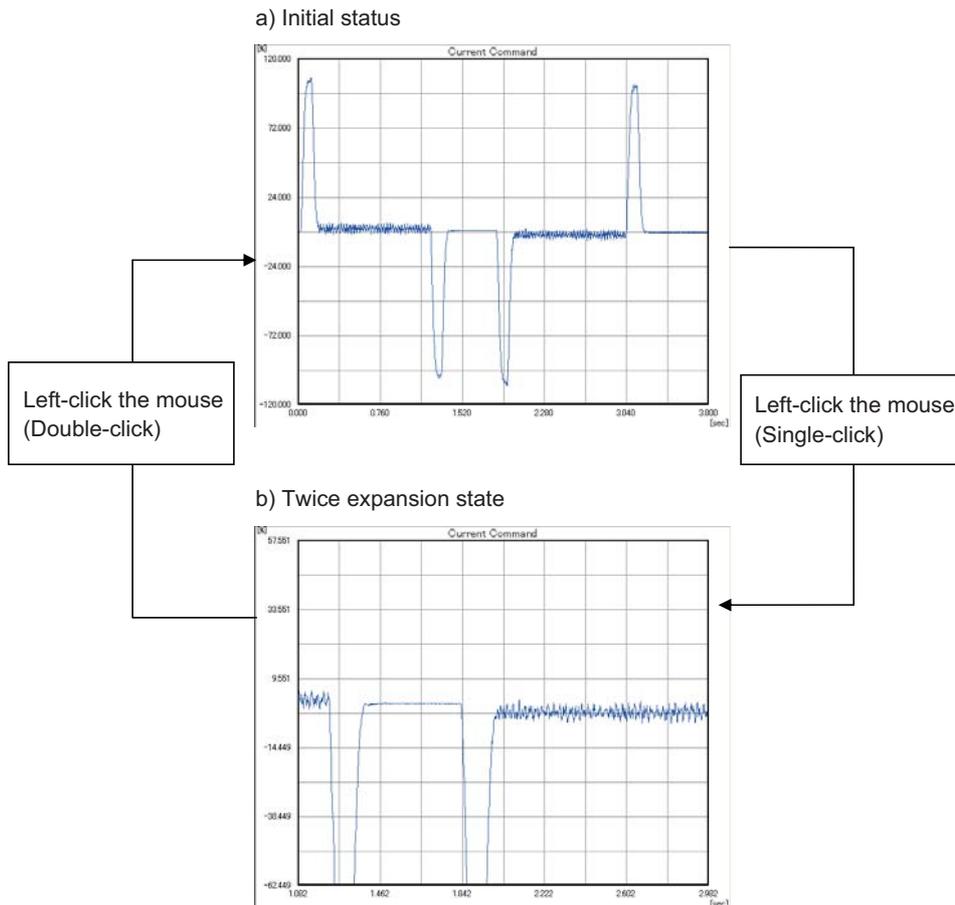
Execute expansion/reduction display of the graph.
 When the graph is not displayed, this cannot be selected.

(1) Select the menu [Graph] - [Zoom].

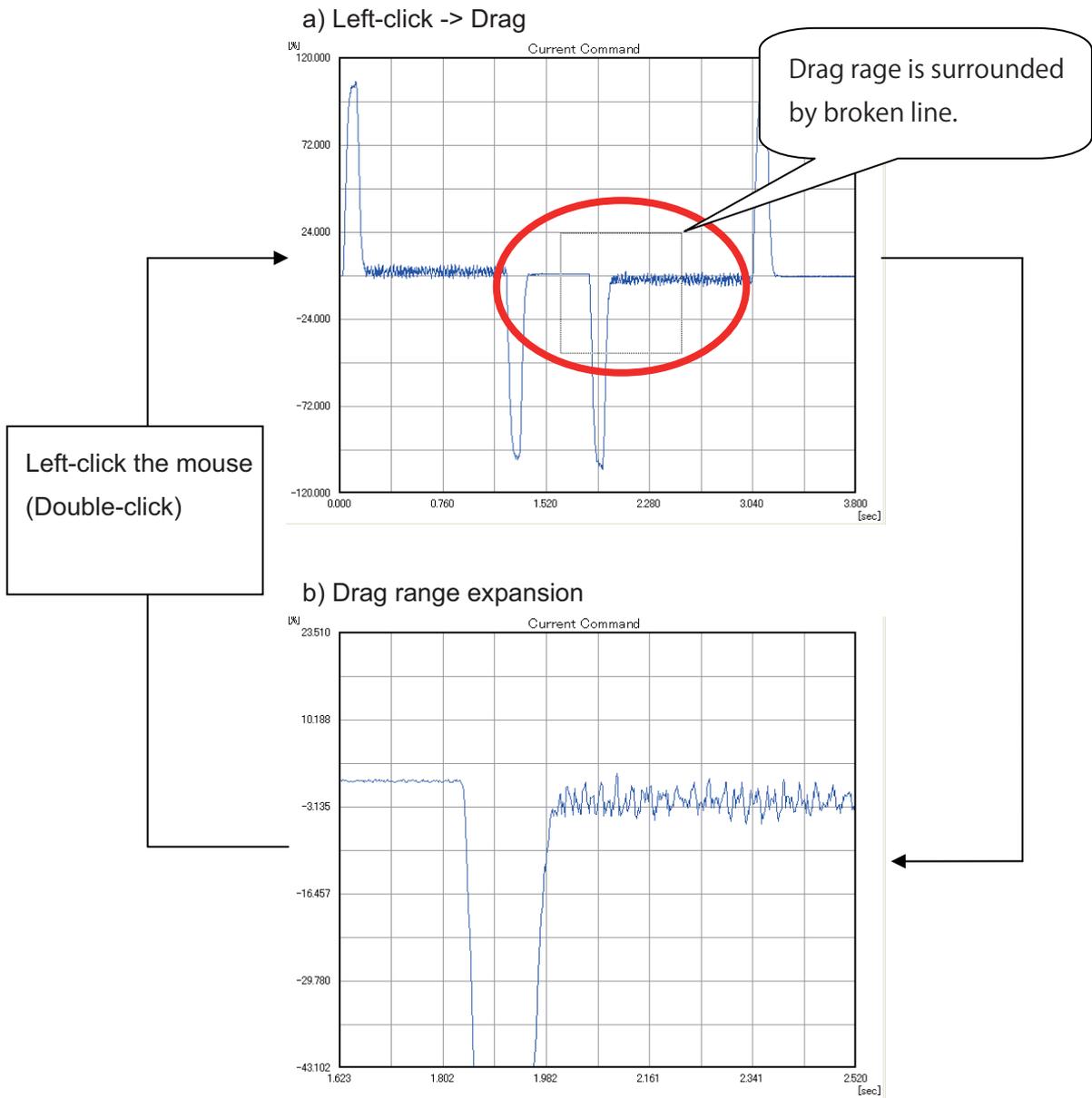
This function can be selected from the floating bar, right-click or tool box also.

(2) The zoom mode is applied.

- The mouse cursor is changed to the magnifying glass icon during zoom mode.
- When left-clicking the mouse, the display size can be doubled centering on the place where the mouse points.
- The zoom mode is canceled by double-clicking the mouse, and returns initial display.
- When the zoom mode is selected, an auto scale OFF is automatically set.
- Auto scale OFF mode is kept even after the zoom mode is canceled. Set the auto scale ON from axis range selection menu by manual.



The area designated by dragging with the mouse left-clicked can be expanded.



Drag mode of the graph

The designated graph is dragged.

When the graph is not displayed, this cannot be selected.

- (1) Select the menu [Graph] - [Drag].

This function can be selected from the floating bar, right-click or tool box also.

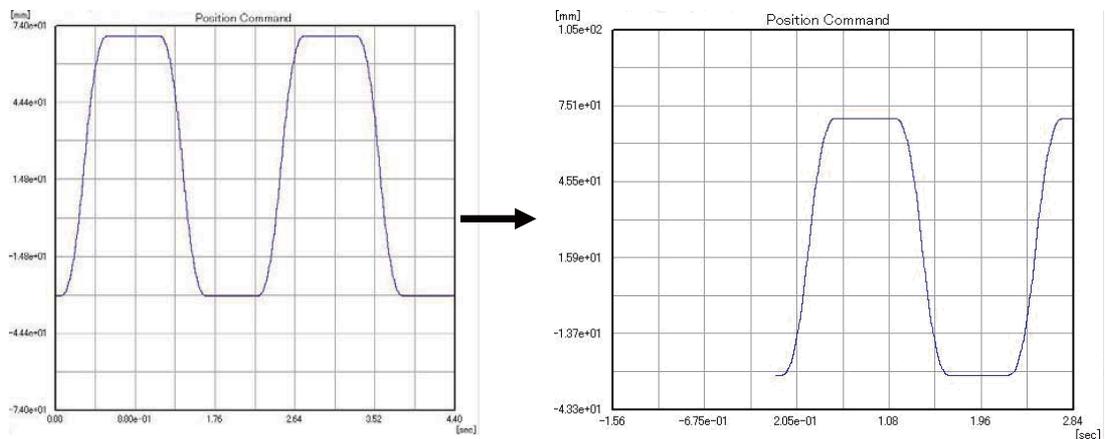
- (2) Left-click on the drag target graph area.

- (3) The graph area selected by (2) is a drag mode.

The graph is dragged by moving the pointer.

All plots move at the same time when two or more plots exist.

When the mode is selected, an auto scale OFF is automatically set.



- (4) When the [Drag] menu is selected again, the drag mode is canceled.

The auto scale OFF status is kept even after the mode is canceled.

Set the auto scale ON from axis range selection menu by manual.

Search mode of the graph

The value of the data point on the designated graph is read, and displayed it in the text area.
When the graph is not displayed, this cannot be selected.

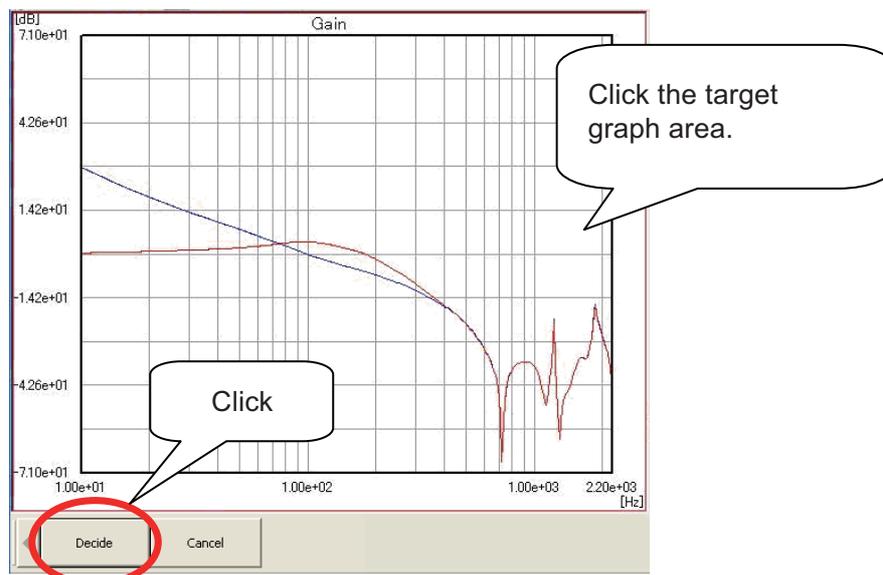
- (1) Select the menu [Graph] - [Search].

This function can be selected from the floating bar, right-click or tool box also.

- (2) Shift in the state of the graph selection. Select the target graph with the mouse.

If the graph is selected from the menu displayed by right-clicking, this operation is not needed.

The selected graph is enclosed in a red line. Press the [Decision] button when selecting.



- (3) The Select plot dialog is displayed.

Designate the read target plot from plot selection combo box, and press the [OK] button.



(4) The plot data selected by (3) is a search mode.

When the right cursor key is pressed, the red cross is displayed.

Move the red cross with the cursor key, and read the data point value on the designated graph.

The read value is displayed in the text area.

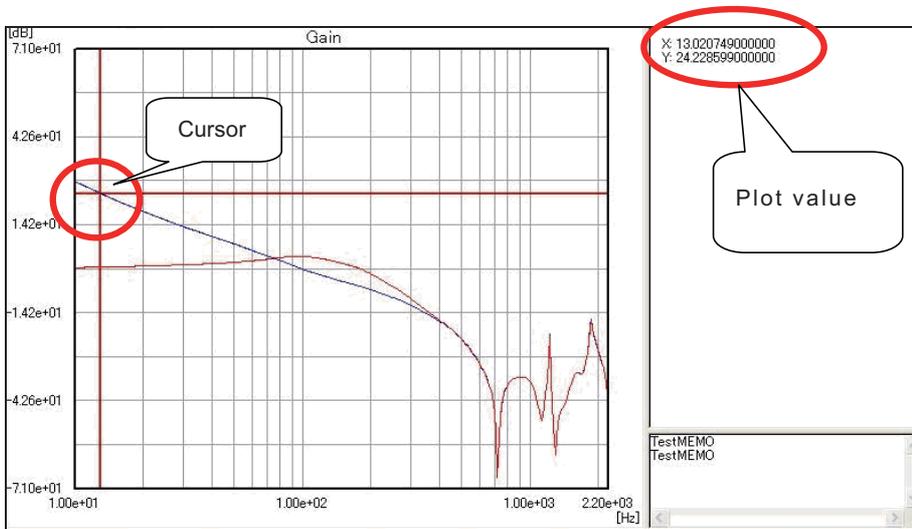
The cursor can be moved per one plot point by keyboard [Left/Right key].

The cursor can be moved per ten plot points by keyboard [Shift key + Left/Right key] or [Up/Down key].

Synchronizing the cursor movement, the cursor coordinates value of the text display area changes.

The thing to search only for the range displayed on the screen for X axis is possible.

For X axis, it is possible to search only for the range displayed on the screen.

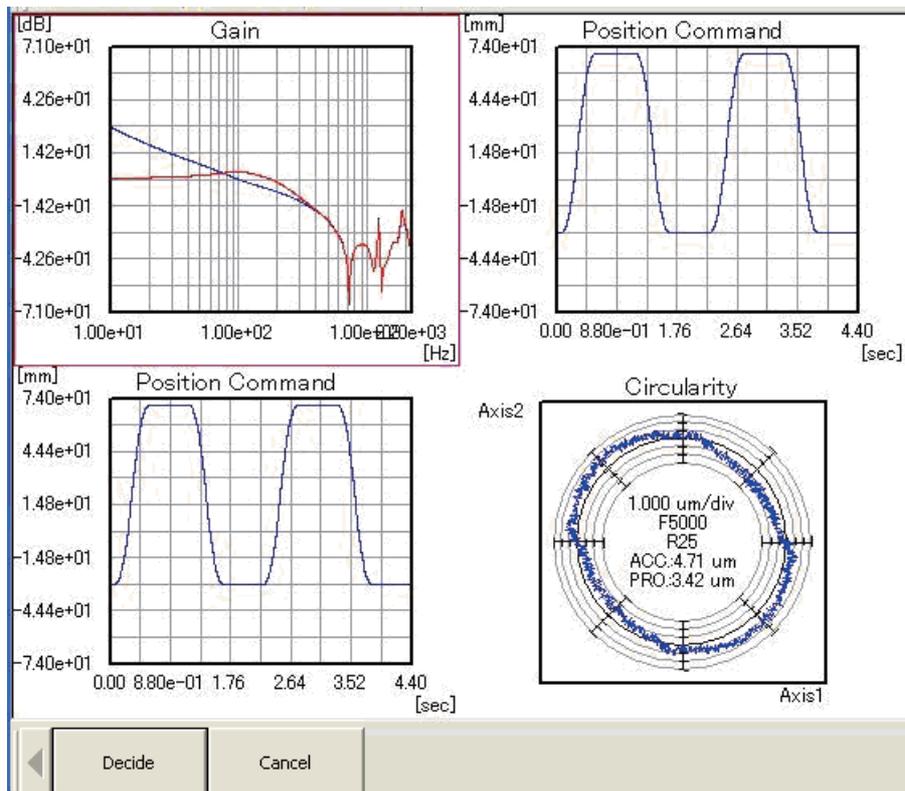


Multiple search mode of the graph

The value of the data point is read in the most left side graph among the displayed graphs on the screen, and displayed it in the text area.

When two or more graphs are not displayed in the most left side, this cannot be selected.

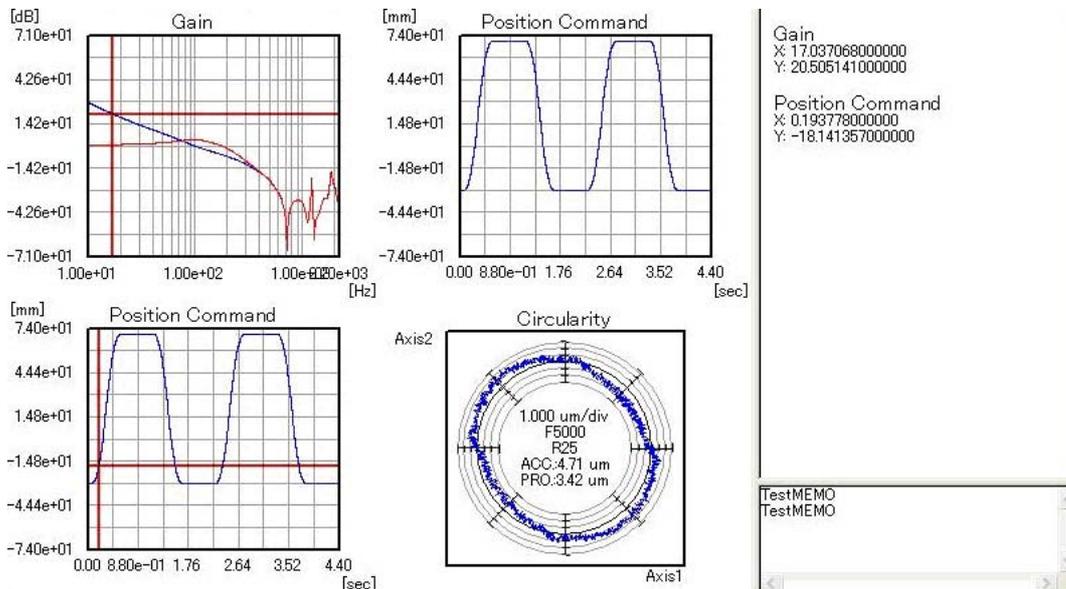
- (1) Select the [Graph layout setting] from the menu, and set 2 to 10 of Vertical.
Refer to the contents of "Graph layout setting".
- (2) Two or more graphs are displayed in vertical in the most left side. Plural search can be selected after displayed.
- (3) Select the menu [Graph] - [PluralSearch].
This function can be selected from the floating bar, right-click or tool box also.
- (4) Shift in the state of the graph selection. Select the target graph with the mouse.
If the graph is selected from the menu displayed by right-clicking, this operation is not needed.
The selected graph is enclosed in a red line. Press the [Decision] button when selecting.



- (5) The plot selection dialog of the number of displayed graphs in the most left side is displayed.
 Designate the read target plot each graph from plot selection combo box, and press the [OK] button.



- (6) The plot data selected by (5) is a search mode.
 When the right cursor key is pressed, the red cross is displayed.
 Move the red cross with the cursor key, and read the data point value on the designated graph.
 The read value is displayed in the text area.
 The cursor can be moved per one plot point by keyboard [Left/Right key].
 The cursor can be moved per ten plot points by keyboard [Shift key + Left/Right key] or [Up/Down key].
 Synchronizing the cursor movement, the cursor coordinates value of the text display area changes.
 The thing to search only for the range displayed on the screen for X axis is possible.
 For X axis, it is possible to search only for the range displayed on the screen.
 The difference of the X axis scale value in 2 graphs is not considered.



Delete the plot

The designated plot is deleted.

When the graph is not displayed, this cannot be selected.

- (1) Select the menu [Graph] - [RemovePlot].

This function can be selected from the floating bar, right-click or tool box also.

- (2) Shift in the state of the graph selection. Select the target graph with the mouse.

If the graph is selected from the menu displayed by right-clicking, this operation is not needed.

The selected graph is enclosed in a red line. Press the [Decision] button when selecting.

- (3) When the plot is displayed in the selected graph area, the plot selection dialog is displayed.

Designate the read target plot from plot selection combo box, and press the [OK] button.

The selected plot is deleted.

When the graph is not displayed in the designated area, nothing happens.



Setup axis range of the graph

This sets the maximum value, minimum value, and an auto scale ON/OFF etc. of the X and Y axis. When the graph is not displayed, this cannot be selected.

- (1) Select the menu [Graph] - [Setup axis range].

This function can be selected from the floating bar, right-click or tool box also.

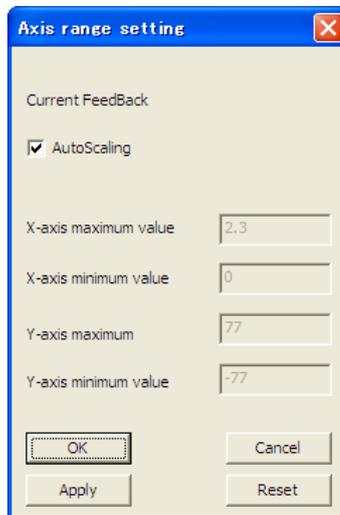
- (2) Shift in the state of the graph selection. Select the target graph with the mouse.

If the graph is selected from the menu displayed by right-clicking, this operation is not needed.

The selected graph is enclosed in a red line. Press the [Decision] button when selecting.

- (3) The Axis setting range dialog is displayed.

The displayed dialog is different depending on the selected graph.



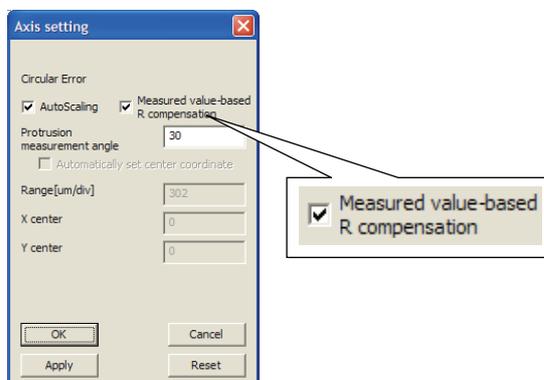
Measured value based R-compensation

| | |
|---------|---|
| Enable | The radius of the drawn graph will be compensated as much as the reduction in radius which occurs due to servo's delay in tracking while cutting a circle. Enable this function to enlarge the display of accuracy error and to check the protrusion. |
| Disable | Disable this function to check the reduction in radius which occurs due to servo's delay in tracking while cutting a circle. Servo's delay in tracking can be improved by the high-accuracy control (Pre-interpolation acceleration/deceleration control + Feed forward control). |

Measured value based R-compensation: Enable

Circle waveform will be drawn using the reference circle (red line) of the roundness graph as the circle with measured radius.

The measured circle waveform will be shown on top of the reference circle.



Roundness graph

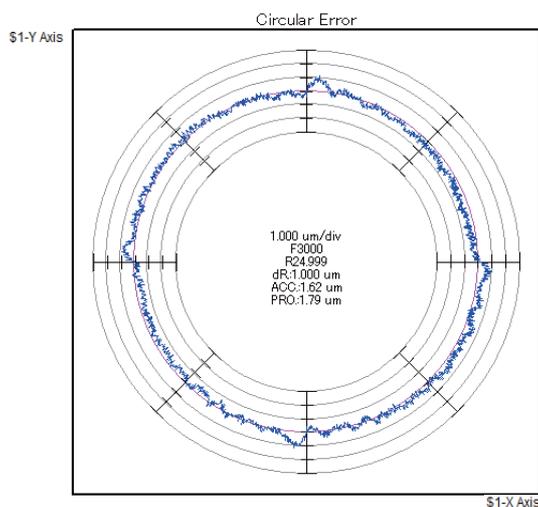
The display example when "measured value based R-compensation" is enabled.

Commanded radius: 25.000mm

Measured value based radius: 24.999mm

Reference circle of the roundness graph: Measured value based radius (R24.999)

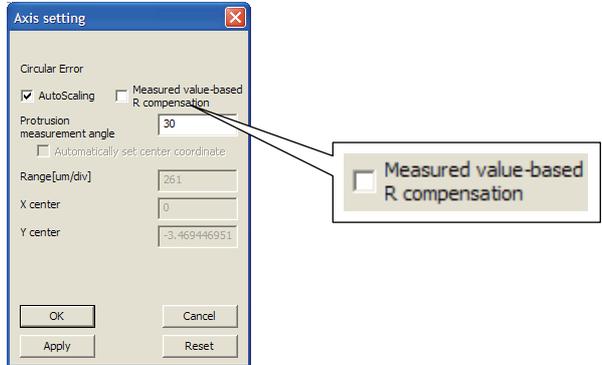
Radius error (dR: 1.000um)



Measured value based R-compensation: Disable

Circle waveform will be drawn using the reference circle (red line) of the roundness graph as the circle with commanded radius.

The measured circle waveform will be smaller than the reference circle by the error amount between the commanded radius and the measured value based radius.



Roundness graph

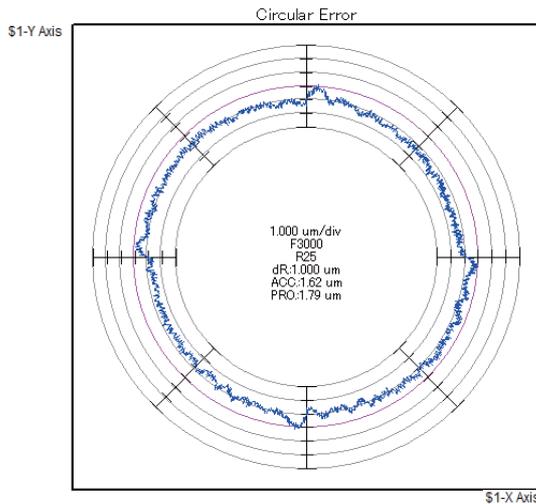
The display example when "measured value based R-compensation" is disabled.

Commanded radius: 25.000mm

Measured value based radius: 24.999mm

Reference circle of the roundness graph: Commanded radius (R25)

Radius error (dR: 1.000um)



Delete the graph

This deletes the displayed graph.

When the graph is not displayed, this cannot be selected.

- (1) Select the menu [Graph] - [Remove].

This function can be selected from the floating bar, right-click or tool box also.

- (2) Shift in the state of the graph selection. Select the target graph with the mouse.

If the graph is selected from the menu displayed by right-clicking, this operation is not needed.

The selected graph is enclosed in a red line. Press the [Decision] button when selecting.

- (3) The designated graph is deleted.

Graph setting

This sets the displayed graph title, plot, etc.

When the graph is not displayed, this cannot be selected.

- (1) Select the menu [Graph] - [Setup graph].

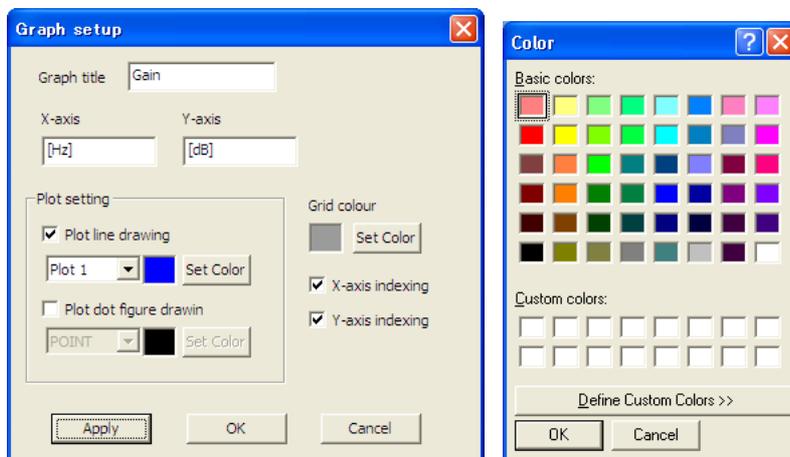
This function can be selected from the floating bar, right-click or tool box also.

- (2) Shift in the state of the graph selection. Select the target graph with the mouse.

If the graph is selected from the menu displayed by right-clicking, this operation is not needed.

The selected graph is enclosed in a red line. Press the [Decision] button when selecting.

- (3) The Graph setup dialog is displayed.



Graph layout setting

This sets the number of the displayed graphs.

When the graph is not displayed, this cannot be selected.

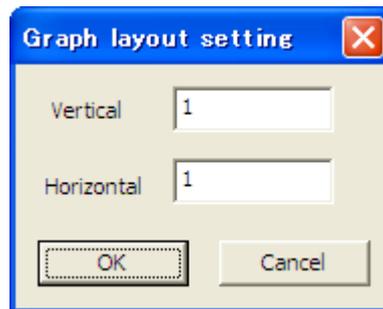
- (1) Select the menu [Graph] - [Graph layout setting].

This function can be selected from the floating bar also.

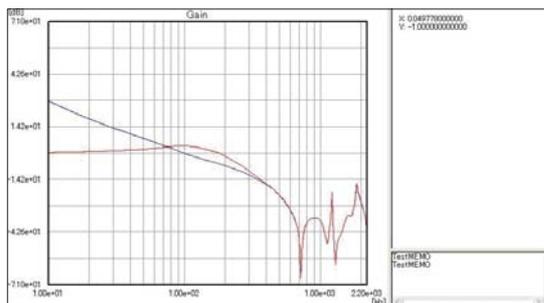
- (2) The Graph layout setting dialog is displayed.

Press the [OK] button after inputting an arbitrary number.

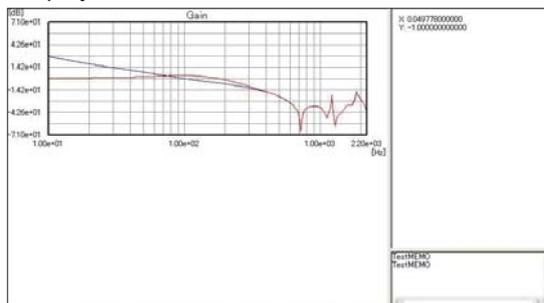
100 graphs (10 (Vertical) x 10 (Horizontal)) in total can be displayed in maximums.



Initial status



Display 2 Vertical x 1 Horizontal



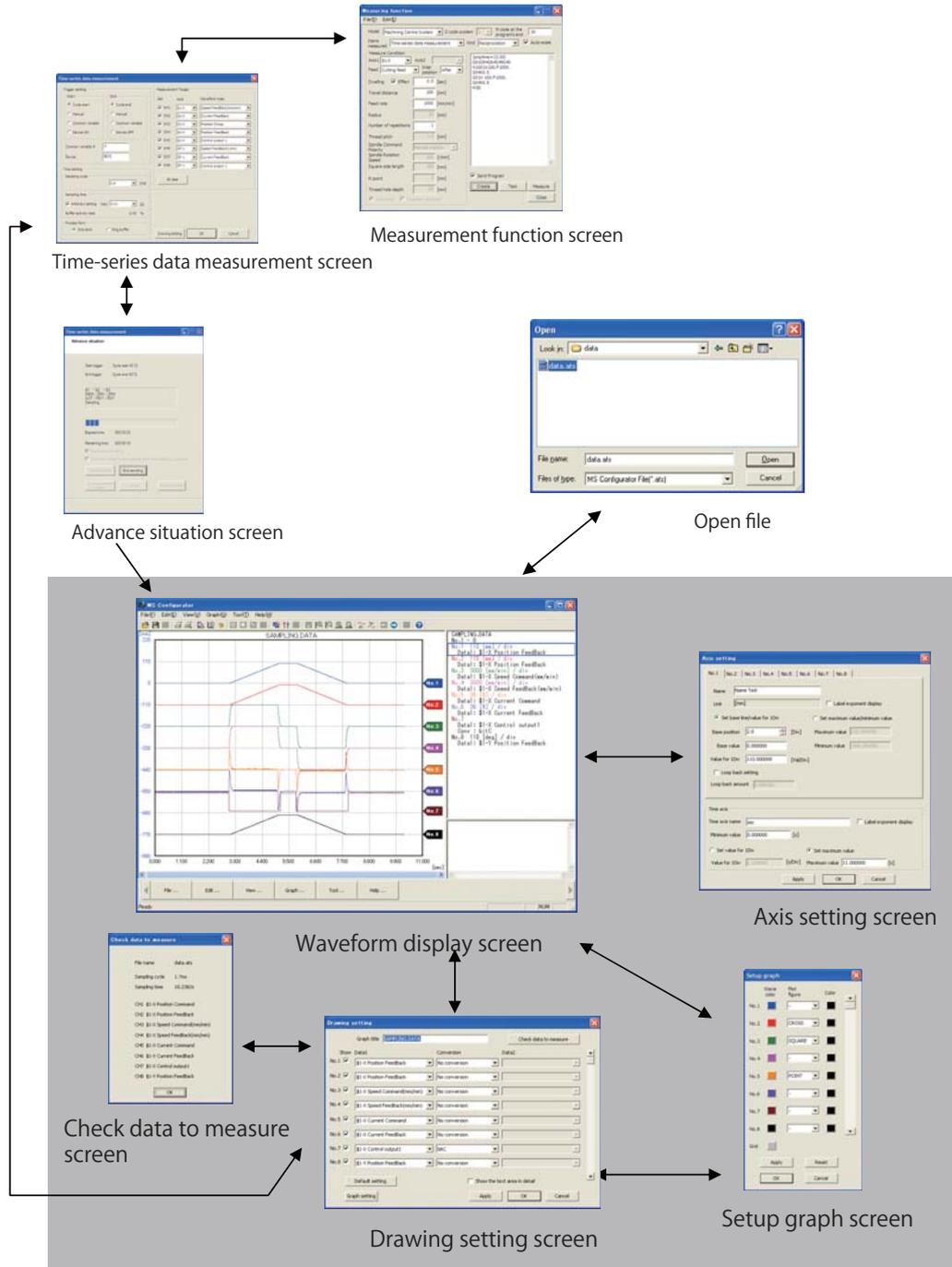
Set to
2 Vertical x 1 Horizontal

3.6.2 Graph Function in Time Mode

This section explains the graph function for chronological data measurement.

3.6.2.1 Screen Configuration

Operation procedure (Time mode)



The explanation of this section is related to the shaded area in the above figure.

(Note1) If you go to the Drawing setting screen from the Time-series data measurement screen, you cannot go to the Axis setting screen and the Setup graph screen.

(Note2) You are allowed to go to the Advance situation screen from Waveform display screen only right after the measurement.

The operation to display waveform in time mode is divided into "Waveform Display" and "Setting and Operation".

"Waveform Display" is the operation to display waveforms. Perform either of the following operation to display waveforms.

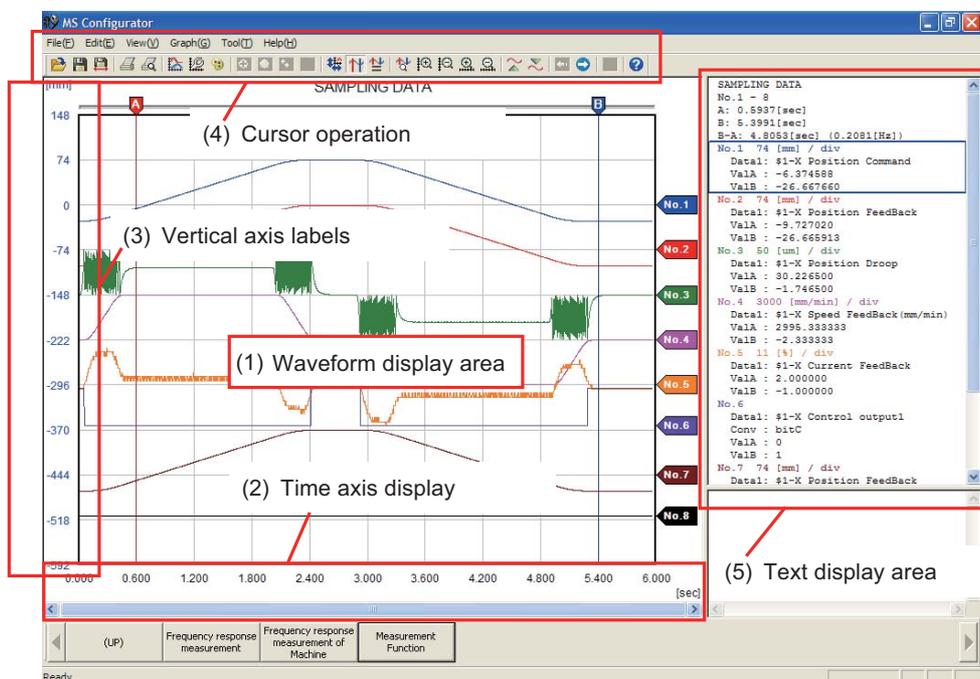
- Execute the measurement function (Time-series data measurement).
- Open a waveform file saved in time mode format.

In "Setting and Operation", set whether to show/hide cursors and perform waveform data processing (calculation of difference, speed conversion, etc.)

It is allowed to go to the Drawing setting screen from the Time-series data measurement screen. Also, it is allowed to go to the Check data to measure screen from the Drawing setting screen. Access to the Setup graph screen and the Axis setting screen are not available. If the "OK" or "Cancel" button is pressed on the Drawing setting screen, it returns to the original screen (Time-series data measurement screen). You cannot go to the Waveform display screen.

Contents of Waveform Display

The figure below shows the waveform display screen's graph display area.



(1) Waveform display area

- Maximum of 32 waveforms (8 per screen) can be viewed. Press the display No. changing buttons to change the displayed waveforms.
- Waveforms No.1 to 8 are displayed at default. An auto scaling is executed when opening a file. When you reach the waveform display screen from the Advance situation screen, you can select whether to execute auto scaling or to use the previously used value, depending on the settings for the Advance situation screen.
- The labels on the vertical axis will be displayed in the same color as the selected waveform.
- The graph title will be displayed in the middle of the graph.
- The zero position of each graph will be marked on the right side of the graph. It will not be marked if there is no zero in a waveform.
- There are following types of plotting.

Thin-out plot Used when the display area is relatively small compared to the number of display plots and it is impossible to plot all the data. For example, when displaying 10000 data in an area of 800 pixels wide, one in 12 or 13 data will be plotted.

All-data plot Used when the display area is relatively large compared to the number of display plots and the space between plots is not one pixel. For example, when displaying 120 data in an area of 800 pixels wide, the interval between plots is six or seven pixels.

(2) Time axis display

Scroll to move along the time axis.

The label display follows the following rules.

When the index is not displayed, down to three places of decimals are shown. When the unit of display time is small, same labels may appear due to rounding.

When the index is displayed, the value will be displayed in " $\#.##e\pm##$ " format. But when the value is one or more and 10 or less, " $e\pm##$ " will be omitted.

Also, for both cases, the next digit after the display digits will be rounded.

(3) Vertical axis labels

The vertical axis labels show the labels for currently selected waveform. The color of labels is same as that of waveform.

The label's display digits follow the following rules.

When the index is not displayed, the display digits differ according to the gap between the maximum and minimum display value.

Vertical axis labels without index

| Gap between the maximum and minimum display value | Label display | Example |
|---|---------------------------------|-----------|
| 100 or more | Integer only | 123 |
| 10 or more and less than 100 | Down to one place of decimal | 1.2 |
| 1 or more and less than 10 | Down to two place of decimal | 1.23 |
| 0.1 or more and less than 1 | Down to three places of decimal | 1.234 |
| : | | |
| 0.00001 or more and less than 0.0001 | Down to seven places of decimal | 1.2345679 |

When the index is displayed, the value will be displayed in "(-)#.##e±##" format.

(Ex.) -9876.5 -> -9.88e+03

Also, for both cases, the next digit after the display digits will be rounded.

(4) Cursor operation

There are cursors A and B.

- The values of the time where the cursor is placed will be displayed in the text area.
- Also, values (P-P, average, etc.) between cursors will be displayed in the text area.

(5) Text display area

Various informations will be displayed in the text area.

Active waveform can be selected. The selected waveform will be marked with a frame of the same color as the waveform.

If the informations are too long to fit in the text area, it can be viewed by scrolling right and left or up and down.

The informations differ depending on the situation.

Content of the text display area

| Display item | Display contents | Display example | Display | |
|--|--|--|--------------|--------------|
| | | | Cursor | No cursor |
| Graph title | Graph title. Set by the Drawing setting screen. | (arbitrary) | ○ | ○ |
| Displayed waveform No. | The No. of currently displayed waveform is shown. Display is either "No.1 - 8", "No.9 - 16", "No.17 - 24", or "No.25 - 32". | No.1 - 8 | ○ | ○ |
| A | The time where the cursor A is placed is indicated on the second time scale. | A: 0.8888[sec] | ○ | × |
| B | The time where the cursor B is placed is indicated on the second time scale. | B: 4.6222[sec] | ○ | × |
| B-A | The time gap between cursor A and B is displayed on the second time scale and its reciprocal. When the cursor A and B overlap, the reciprocal on the second time scale will be displayed as "N/A". | B-A: 3.7333[sec] 0.268[Hz] | ○ | × |
| Waveform No. and Value for 1Div | The waveform No. and the value per division (Value for 1Div) are displayed. Display of 1Div will be omitted when the digits below the decimal point are all zero. (Ex. 1.100000 will be displayed as 1.1.) This is displayed in the color specified by the Setup graph screen. But when a control input/out is selected for Data1 and a bit for Conversion. | No.1 1.1[%] / div | ○ | ○ |
| Title | Titles of each waveform set by the Axis setting screen are displayed. Nothing will be displayed when titles are not set. | (arbitrary) | ○ | ○ |
| Data1 | Titles of the waveform set in Data1 of the Drawing setting screen are displayed. | Data1: \$1-X Current feedback | ○ | ○ |
| Conversion | This displays the data processing method. Nothing will be displayed when "Conversion" is set to "No conversion". | Conv : gap(-) | ○ | ○ |
| Data2 | Titles of the waveform set in the data 2 of the Drawing setting screen are displayed. | Data2: \$1-Y Current feedback | ○ Note1 | ○ Note1 |
| ValA | This displays the time value of cursor A. | ValA: 1.000000 | ○ | × |
| ValB | This displays the time value of cursor B. | ValB: 0.000000 | ○ | × |
| Maximum value Minimum value | Displays the maximum value and the minimum value. Also displays the number of seconds. If the maximum or minimum value is recorded more than once, the earlier one will be displayed. When the cursor is displayed, the value between the cursors is displayed. | Max: 1.012000 (0.8888[sec]) Min: -1.008000 (3733.3333[sec]) | ○ Note2,3 | ○ Note2,3 |
| P-P | This displays the maximum vibration amplitude. When the cursor is displayed, the value between the cursors is displayed. | P-P: 2.020000 | ○ Note2,3 | ○ Note2,3 |
| Ave | This displays average value between the cursors. | Ave: 0.004000 | ○ Note2,3 | × |
| RMS | This displays the root-mean-square between the cursors. | RMS: 0.002000 | ○ Note2,3 | × |

- The time is indicated on the second time scale. Down to four places of decimals are displayed and others are rounded off.

- Others than time are displayed down to six places of decimals. The value is rounded off to six decimal places.

(Note1) Displayed only when "Conversion" is set to "Minus (-)".

(Note2) Not displayed when a control input/out is selected for Data1 and a bit for Conversion.

(Note3) Not displayed when the "Show the text area in detail" check box in the Drawing setting screen is not checked.

3.6.2.2 How to Use the Graph

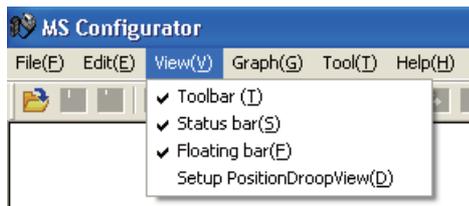
Menu bar display setting

Set whether to display the tool bar, the status bar, and the floating bar.

- (1) Select the menu [View].

The menu bar list to which display/non-display can be set is displayed.

This function can be selected from [View] of the function bar also.



- (2) Select the menu bar which sets display/non-display.

The check changes whenever pressing once.

Auto Scaling

Auto scaling shows all the area from the start to the end of measurement.

When there are several waveforms, they are arranged by their No. in ascending order from the top.

- Auto scaling is applied to the default waveform display.
- Auto scaling while the cursors are displayed changes the apparent cursor position. But it will not change the times they point at.

(1) Details of time label

All the area from the start to the end of measurement is displayed.

The far right label indicates the measurement time rounded up to the second significant figure.

Ex. When the sampling time is 12.34 sec.

The far right label will be 13.0 sec. which means 1Div is about 1.30 sec.

(2) Arranging several waveforms

Base lines are allocated to waveforms by their No. in ascending order from the top. When No.1 to 8 are displayed, the second Div from the top is the base line for No.1. The base line value is 0. Likewise, the third Div from the top is the base line for No.2.

"Set base line/value for 1Div" on the Axis setting screen is checked.

For the vertical axis, the arrangement applies to the currently displayed eight waveforms. For the horizontal axis, the whole area gets changed.

[Axis data waveform]

It is arranged that the waveform falls inside the range of ± 1 Div of the vertical axis with the reference line indicating 0.

The unit per Div is the upper two significant figures (round up the third figure) of the absolute value of either the maximum or minimum value, whichever larger.

When all the axis data is 0, the unit per Div is 10.

When loop back function is valid, the unit per Div corresponds to the loop back amount. As for the position droop, only when "Conversion" is set to "No conversion", the loop back function becomes valid and the line-wrap width will be 50[μ m].

Ex.: Waveform No.1 Maximum value 17221, Minimum value -16880

Waveform No.2 Maximum value 1.000, Minimum value -2.000

No.1

The base line is the second Div.

The absolute value of the positive (maximum) value 17221 is larger than the negative (minimum) value.

The unit per Div, which is to say the upper two significant figures, is 18000.

(On the Axis setting screen, "Base position" is 2.0 Div, "Base value" is 0, "Value for 1Div" is 18000 Val/Div, and "Loop back amount" is 0.0Div.)

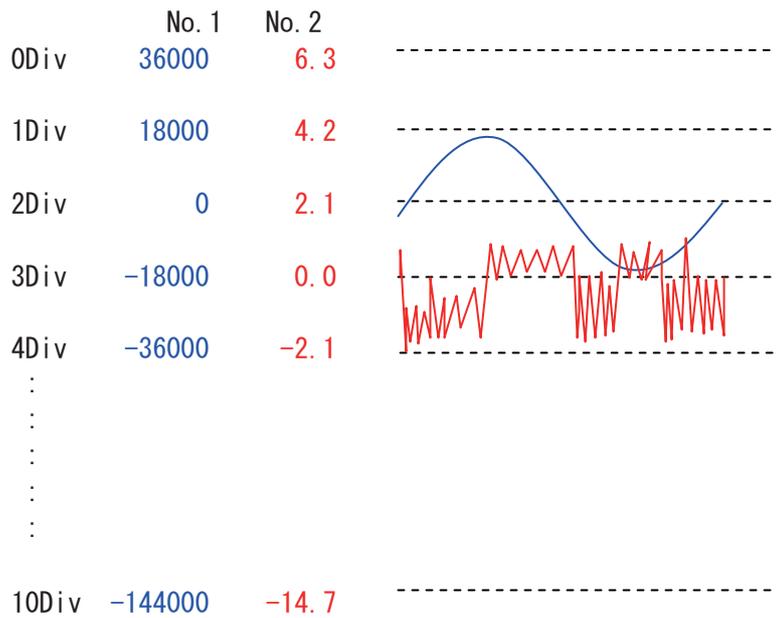
No.2

The reference line is the third Div.

The absolute value of the negative value -2.000 is larger than the positive value.

The unit per Div, which is to say the upper two significant figures, is 2.100.

(On the Axis setting screen, "Base position" is 3.0 Div, "Base value" is 0, "Value for 1Div" is 2.1 Val/Div, and "Loop back amount" is 0.0Div.)



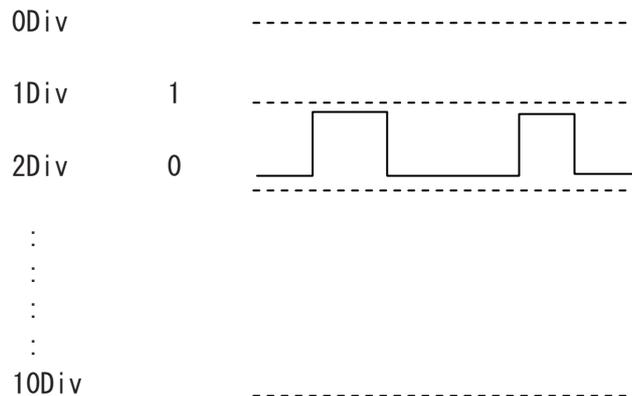
Explanation drawing of vertical axis auto scale (axis data)

[Control signal]

Displays "0" on the base line (2.0Div) and "1" on the line 1Div above the base line. There is no exception.

It will not change even by enlarging or reducing the waveform in vertical direction.

Ex: No.1 control signal waveform



Explanation drawing of vertical axis auto scaling (control signal)

Auto scaling operation method

(1) Select the menu [Graph] - [Execute AutoScaling].

This function can be selected from the floating bar, right-click or tool box also.

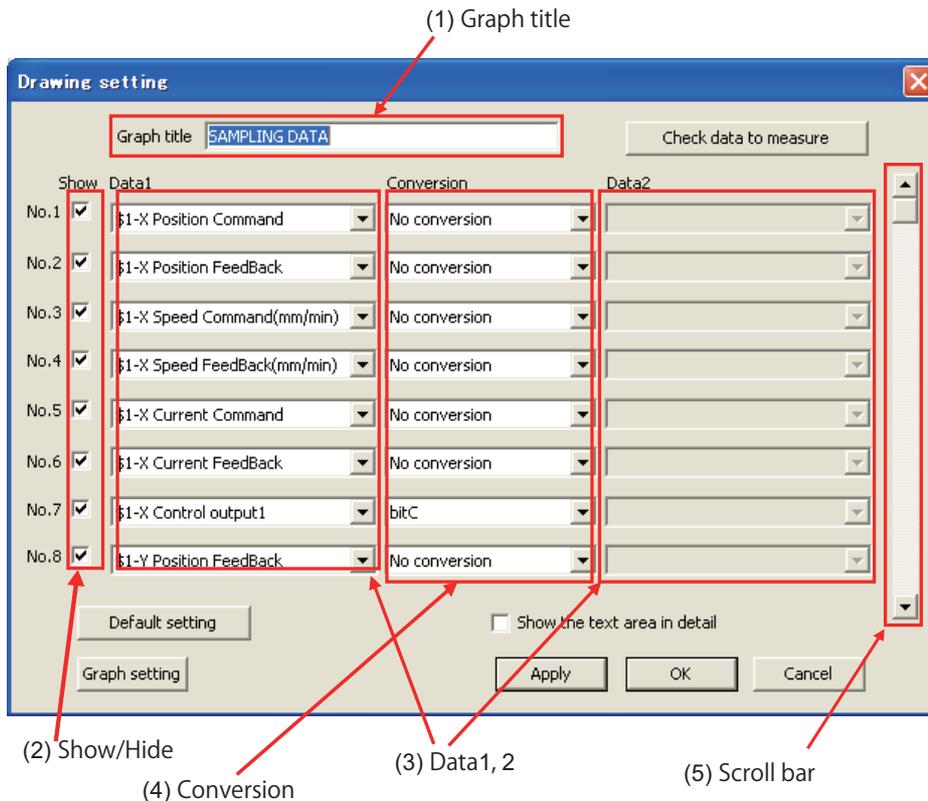
Drawing setting screen

On the drawing setting screen, perform data processing according to the measured data displayed on the screen.

It is possible on this screen to view the difference between waveforms of same type, to convert control signals into bit, and to convert positional information into speed and acceleration.

The currently displayed waveform No. will appear when opening the drawing setting screen. Also, the currently displayed waveform No. will reappear on the waveform display screen when the drawing setting screen is closed.

The display contents of the Drawing setting screen



(1) Graph title

Give a name of up to 32 characters to the whole waveforms.

The name will be displayed on top of the graph and in the text display area.

Right after the measurement, the name is fixed to "SAMPLING DATA".

(2) Show/Hide

Select whether to show or hide waveforms. When turned ON, waveforms appear.

More than 1310720 data as a total cannot be displayed in a page. "Show" check boxes are grayed out if the total data exceeds this limit when they are checked. "Data1" check boxes remain selectable.

Ex.: When sampled 327680 points for four channels

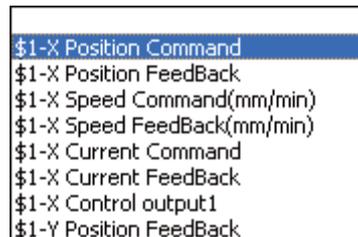
When check boxes of four waveforms are checked (1310720 = 327680 points x 4 waveforms), the check boxes for the rest of four waveforms are grayed out. Take OFF any of the checks to remove the grayout.

(3) Data1

"Data1" combo box includes the data of CH1 to 8 on the Check data to measure screen and "Blank".

Ex.: When the data of CH1 to 8 is as shown in the "Example of Check data to measure screen".

-> The choice is as shown below.



Example of Data1 choices

- When "Data1" of a No. is selected, "Conversion" of the same No. shows the default value. The default value for axis data is "No conversion" and for control output signal is "bitC". Also, "Data2" is cleared and becomes invalid.
- If "blank" is set to "Data1" of a No., its "Conversion" and "Data2" are cleared and becomes invalid.

(4) Conversion and Data2

Select the conversion. Available conversions are as follows.

| Conversion | Details | Selectable choices for Data1 |
|-------------------------|---|---|
| No conversion | The data of Data1 will not be converted. This is not available when a control output data is selected for Data1. | Position command, position feedback, position droop, speed command, speed feedback, current command, current feedback |
| Minus (-) | The result of calculation (Data1) - (Data2) will be displayed. When this is selected, "Data2" will be cleared and invalidated. The unit of "Data2" must be same as that of "Data1". The combo box displays only "blank" and "the waveform data whose unit is same as Data1". - The difference between position droop [μ m] and position command [mm] cannot be calculated. - Even when the type of waveforms matches, the difference cannot be calculated if one is a linear axis [mm] and another is a rotary axis [deg]. - As for speed, the difference between rotation [r/min] and length [mm/min] cannot be calculated. | Position command, position feedback, position droop, speed command, speed feedback, current command, current feedback |
| Acceleration conversion | Converts positional information (position command, position feedback) into speed. The first value is treated as 0. The display unit is [mm/min] or [deg/min]. | Position command, Position feedback |
| Acceleration conversion | Converts positional information (position command, position feedback) into speed. The first and second values are treated as 0. The display unit is [mm/s ²] or [deg/s ²]. | Position command, Position feedback |
| bit0 : bitF | Specify the control signal's bit to perform drawing. | Control input 1 to 6, control output 1 to 6 |

3 How to Use

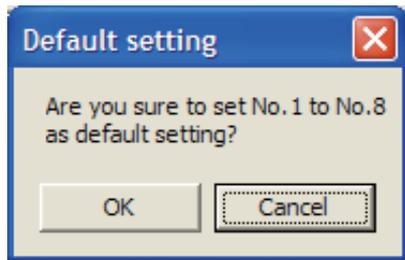
- When other than "Minus (-)" is set to "Conversion", "Data2" is cleared and becomes invalid.
- When "Conversion" is "Minus (-)" and "Data2" is not set, the displayed waveform will be as same as when "Conversion" is "No conversion".

(5) Scroll bar

By moving the scroll bar, the drawing setting screen changes between No.1 to 8, 9 to 16, 16 to 24, and 25 to 32.

(6) Buttons and check boxes

| Conversion | Details |
|-----------------------|---|
| Check data to measure | Displays the "Check data to measure" screen. |
| Default setting | When pressed, the confirmation window will appear. Press [OK] to turn all the processing settings back to default status. [Default setting] - The data of channel 1 to 8 of measurement data (ATS file) will be applied to No.1 to 8. - The default setting of "Conversion" is "bit0" for the control input and output and "No conversion" for the others. - Graph title and settings for No.9 to 32 will not change. |
| Graph setting | Settings will be saved and "Setup graph" screen will appear. |

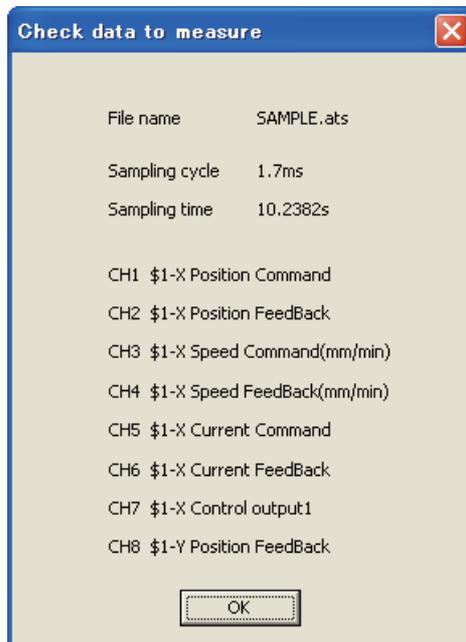


The image of confirmation window before applying default settings

Check box on drawing setting screen

| Name | Details |
|------------------------------|--|
| Show the text area in detail | Check this check box to view details, including the maximum and minimum value, in the text display area of the waveform display screen. This is unchecked at default. |

- (7) Check data to measure screen
Check the measured data.



Display contents include file name, sampling cycle and time, and measured waveforms. The file name is "NC" before measurement or right after measurement.

Operation Method of the Drawing Setting Screen

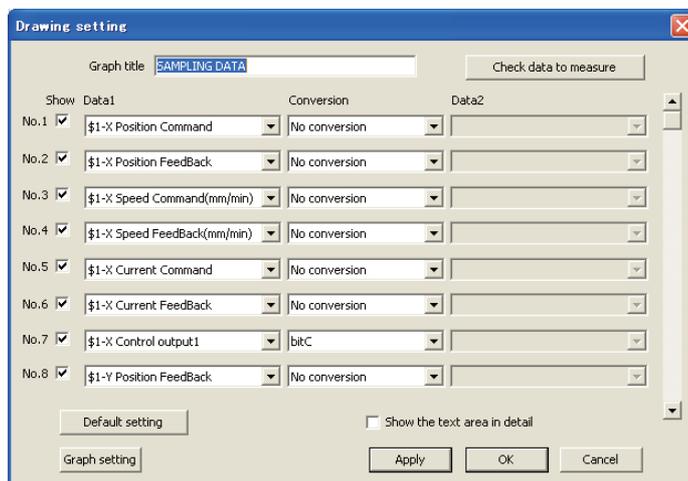
The following procedure shows how to conduct measurement and display the difference between position command and position feedback, the acceleration calculated from position feedback, and the waveform of imposition (Control output 1 bitC) without drawing setting.

- (1) Conduct measurement and display the waveform.
- (2) Display the Drawing setting screen.

Select the menu [Graph] - [Drawing setting].

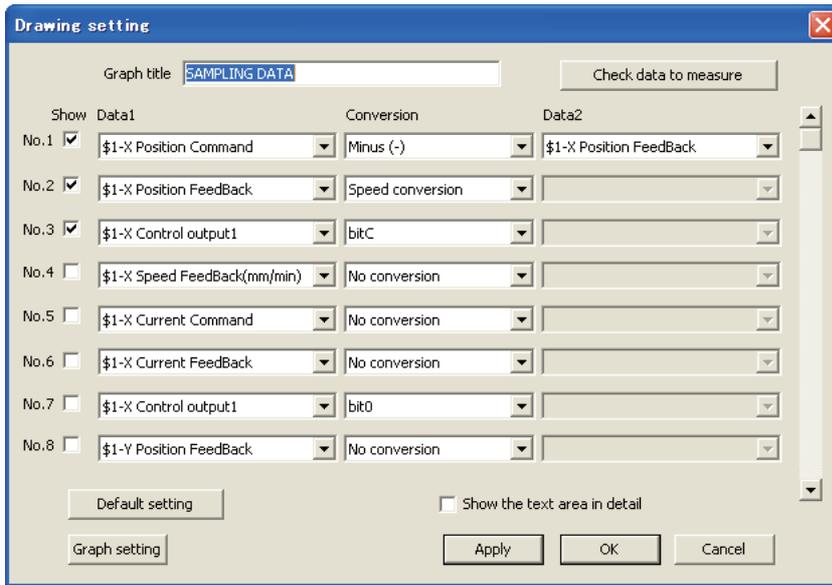
This function can be selected from the floating bar, right-click or tool box also.

-> Drawing setting screen appears. The default settings are applied as below.

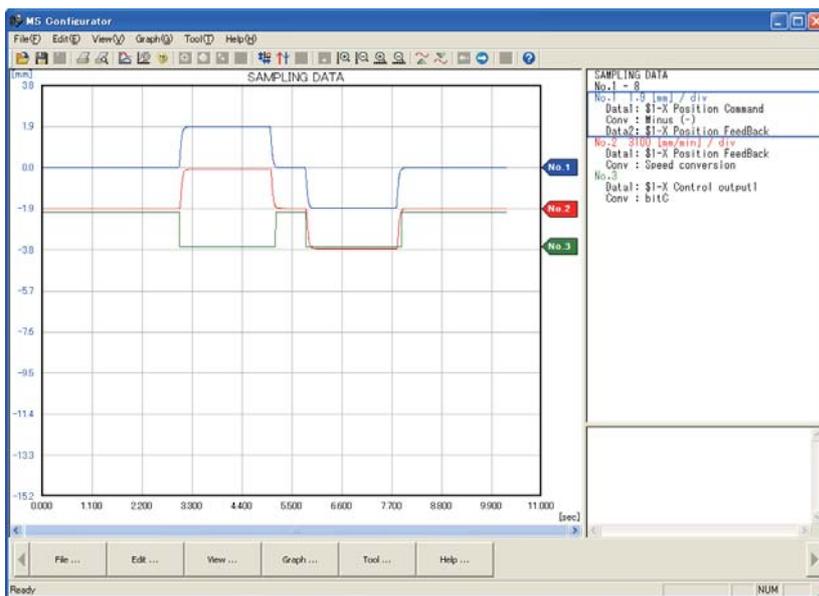


- (3) Set "\$1-X Position Command(mm/min)" to Data1 of No.1.
- (4) Set "Minus (-)" to "Conversion" of No.1.
-> The Data2 of No.1 becomes valid. Data2 is blank.
- (5) Set "\$1-X Position FeedBack(mm/min)" to Data2 of No.1.
- (6) Set "Speed conversion" to "Conversion" of No.2 "\$1-X Position FeedBack".
- (7) Set "\$1-X Control output1" to No.3 Data1 and "bitC" to "Conversion".
- (8) Uncheck the check box No.4 to 8.

Drawing setting completed



- (9) Press the "OK" button.
->The Drawing setting screen closes and waveform is displayed as below.

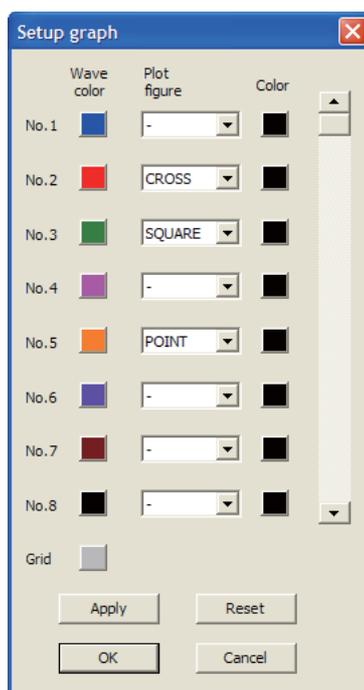


Setup graph screen

Specify show/hide and color of waveforms by the Setup graph screen.

Waveforms No.1 to 8 appears when opening the Setup graph screen. Also, the currently displayed waveform No. will reappear on the waveform display screen when the drawing setting screen is closed.

Display Contents of the Setup Graph Screen



| Item | Details | Default value |
|-------------|---|---|
| Wave color | The colors of waveforms. Press to show the Color dialogue. | No.1: Blue No.2: Red No.3: Green No.4: Pink No.5: Orange No.6: Purple No.7: Brown No.8: Black The above color cycle repeats for No.9 and later. |
| Plot figure | Select a plot from the dialogue box. - : No plotting POINT : Plot ■ . CIRCLE: Plot ○ . CROSS : Plot × . TRIANGLE: Plot △ . SQUARE: Plot □ . | - |
| Color | The colors of waveforms. Press to show the Color dialogue. | Black |
| Grid | The color of grid. Press to show the Color dialogue. | Gray |

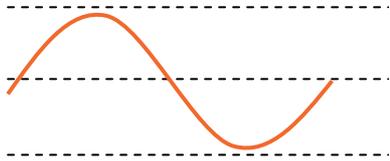
If "white" is set for any of the above items, it disappears.

3 How to Use

The operation of Setup graph screen

Ex.: When the No.5 waveform color is set to red. And the plot figure is "SQUARE" and blue.

(1) Choose one of waveforms as No.5 and draw the waveform.



The waveform No.5 is drawn in orange at default.

(2) Call up the Setup graph screen.

Select the menu [Graph] - [Setup graph].

This function can be selected from the floating bar, right-click or tool box also.

-> "Setup graph" screen appears. The default settings are applied as below.

| Wave color | Plot figure | Color |
|------------|-------------|-------|
| No.1 | - | |
| No.2 | - | |
| No.3 | - | |
| No.4 | - | |
| No.5 | - | |
| No.6 | - | |
| No.7 | - | |
| No.8 | - | |
| Grid | | |

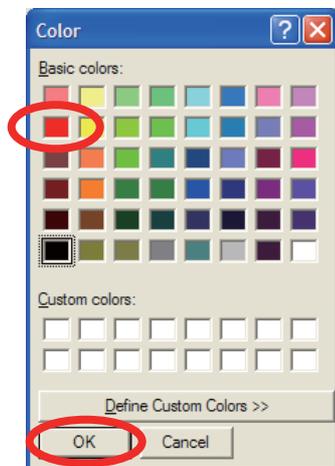
(3) Press the No.5 color button.

-> Color dialogue appears.



(4) Select red from the Color dialogue and press [OK].

-> Dialogue closes and the No.5 color button turns into red.

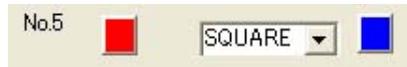


(5) Select "SQUARE" from the No.5 Plot figure combo box.

(6) Press No.5 Plot color button to show Color dialogue.

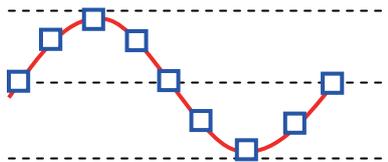
(7) Select "blue" and press the "OK" button.

-> The No.5 looks like below.



(8) Press the "OK" button on the Setup graph screen.

-> The Graph setup dialog closes. No.5 waveform is drawn in red and [SQUARE] plot figures are in blue.



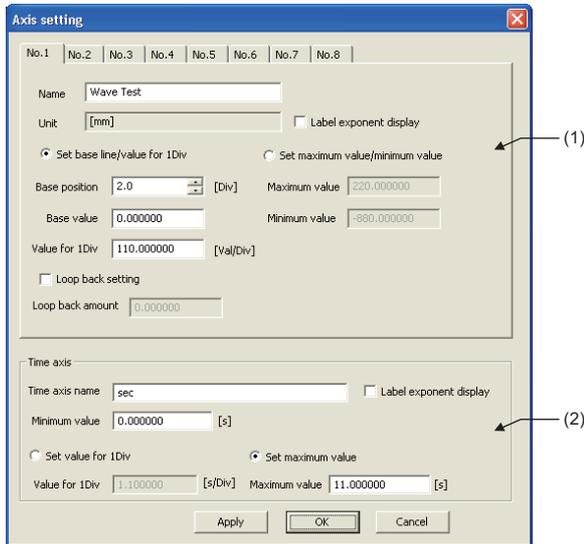
When the intervals between plots are too narrow, the waveform will look crushed.

Axis setting screen

Set axis-related information, such as the maximum and minimum display value, by the Axis setting screen.

Display Contents of the Axis Setting Screen

The Axis setting screen consists of (1) Vertical axis setting area and (2) Time axis setting area.



(1) Vertical axis setting area

In this area, a tab is provided for each waveform No. When the screen opens, the tab of the currently active waveform is selected.

- Only the currently displayed eight waveforms are available for setting. The setting will be applied only to these eight waveforms.
- Nos. which are not used or not displayed are all grayed out and unavailable for setting.
- When the type of waveform is "Control I/O", only Name and Base value are valid. Others are grayed out. "Set base line/value for 1Div" is selected.
- Either "Set base line/value for 1Div" or "Set maximum value/minimum value" can be selected for the Vertical axis. "Set base line/value for 1Div" is checked at default.
- When "Set base line/value for 1Div" is checked, "Base position", "Base value", and "Value for 1Div" become valid. Refer to "Auto Scaling (2) Arranging several waveforms" for specific setting example.
- When "Set maximum value/minimum value" is checked, apparent "maximum value" and "minimum value" become valid.
- Check "Loop back setting" check box to set loop back amount. This is useful for viewing a waveform with relatively stable big value, such as position droop.

When the loop back function is applied, each plot value of a waveform will be divided by a set loop back value and the remainder will be drawn. For example, when the loop back amount is set to 1500, 1504 will be divided by 1500, and the remainder 4 will be plotted.

After changing the loop back amount or enabling the "loop back setting", press [Apply] to reflect the "loop back amount" to "Value for 1Div".

"Loop back setting" check box is not checked at default. It, however, will be checked when the waveform is "Position Droop".

- Values of "Set base line/value for 1Div" and "Set maximum value/minimum value" are linked. When values for "Set base line/value for 1Div" are changed, values for "Set maximum value/minimum value" are updated.

When "Set maximum value/minimum value" is selected, "Base value" of "Set base line/value for 1Div" changes to 5.0Div.

When the settings in "Set base line/value for 1Div" are changed, "Base value" (5.0Div from top) and "Value for 1Div" for "Set maximum value/minimum value" are updated.

- Auto scaling will update all the values for "Set base line/value for 1Div" and "Set maximum value/minimum value" on the displayed page.
- Changing the value of "Data1" on the Drawing setting screen resets all the values for "Set base line/value for 1Div" and "Set maximum value/minimum value".

Axis Setting Screen Setting Items in Vertical Axis Setting Area (Set base line/value for 1Div)

| Category | Item | Details | Setting range | Default value (Note2) |
|----------------------------------|------------------------|---|--|--|
| Common | Name | Waveform title for each waveform No. | Character string of up to 32 characters. | (blank) |
| | Unit | Waveform display unit | Cannot be set. | The unit used for measuring Ex.: [mm/min] |
| | Label exponent display | Check this check box to set exponent value for the label. Setting is required for each display No. | ON/OFF | Not checked. |
| Set base line/ value for 1Div | Base position | Set the base position. This will be the center line for enlarging and reducing the waveform in vertical direction. | -1000.0 to 1000.0 Div. By 1.0Div unit for control input and output. For others, by 0.5Div unit. (Note5) | Divide the displayed No. by 8 and plus 1 to the remainder. When the displayed No. is divisible by 8, it will be "9.0Div". Ex.: No.1 -> "2.0Div". |
| | Base value | The value for the base position. When this base value is "0", the base position locates on the zero line, which makes it easier to read the graph. | (Note1,4) | 0 |
| | Value for 1Div | The value per division. | (Note1,3,4) The maximum value and the minimum value must be within -2147183648 to 214783647. | Divide the value between currently displayed maximum value and minimum value by 10. For position droop, it is fixed to 50[μ m] at default. |
| Set maximum value/minimum value | Maximum value | The maximum value to be displayed on the graph | (Note1,3,4) | The currently displayed maximum value |
| | Minimum value | The minimum value to be displayed on the graph. | (Note1,3,4) | The currently displayed minimum value |
| Loop back setting | Loop back amount | Loop back amount | 0 to 2147483647 Down to six decimal places can be set. When set to "0", loop back will not be conducted. | 0 For position droop, it is fixed to 50[μ m] at default. |

(Note1) The integer must be within -2147483648 and 2147483647.

Down to six decimal places can be set.

(Note2) "Default value" is the value that is set to the Axis setting screen when it is opened right after performing a Chronological Data Measurement and displaying waveforms with auto scaling valid.

(Note3) Auto scaling in vertical direction will be applied to waveforms when 0 is input (when both maximum value and minimum value are set to "0"). By recalling the Axis setting screen, the values will be updated to the currently displayed values.

(Note4) If this screen appears after setting a new channel to be measured and before executing measurement in the time mode, the base value/Value for 1Div/Maximum value/Minimum value cannot be fixed because the waveform has not been displayed yet. Set "0" to these values in this case.

(Note5) Change the value by unit with the spin button. Or directly input a value. The input value will be rounded up to the nearest unit value. (Ex.: If "-0.7Div" is entered for position command, "-0.5Div" will be set.)

3 How to Use

(2) Time axis setting area

As well as the Vertical axis setting, either "Set base line/value for 1Div" or "Set maximum value/minimum value" can be selected for Time axis setting. "Set maximum value" is checked at default.

Setting the time axis updates the whole graph. (It updates even the waveforms on undisplayed pages.)

Axis setting screen setting items in time axis setting area

| Category | Item | Details | Setting range | Default value |
|------------------------|------------------------|---|--|--|
| Common | Time axis name | Give a title to the time axis. | Character string of up to 32 characters. | The unit which was automatically added when measured. Ex.: [sec] |
| | Label exponent display | Check this check box to set exponent value for the label. | ON/OFF | Not checked. |
| | Minimum value | The minimum value to be displayed on the graph | "0 or more" and "less than the Sampling Time" | 0.0000[sec] |
| Set the value for 1Div | Value for 1Div | The value per division. | Between "one-tenth of sampling cycle or more" and "ten times the sampling time or less" (Note1) | Divide the value between currently displayed maximum value and minimum value by 10. (Note2) |
| Set the maximum value. | Maximum value | The maximum value to be displayed on the graph | "The difference between displayed maximum value and minimum value is same as sampling cycle or more" and "100 times the sampling time or less" (Note1) | The currently displayed maximum value (Note2) |

(Note1) "0" can be set. When set to "0", the minimum value will be ignored and auto scaling will be applied in horizontal direction. After executing auto scaling, the value will be updated to other than "0".

(Note2) The default value is "0" when this screen opens right after installation and before executing a measurement in the time mode.

Error display

Error check is performed when pressing the [Apply] or [OK] button and when changing the tab.

An error window will appear in the following cases and settings cannot be applied.

| Error messages | Error condition | Remedy |
|-------------------------|--|---|
| Input value is invalid. | - The minimum value is larger than the maximum value. - A value outside the setting range is entered. - A negative value was entered into the time axis. | Input a value within the setting range. |

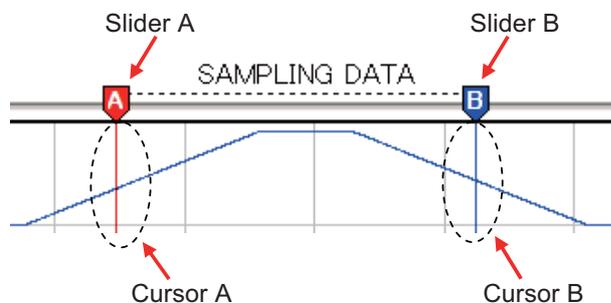
Cursor

Cursor specification

(1) Show/Hide

By setting to show cursors, two cursors, A (red) and B (blue) will appear.

When these two cursors are interlocked, a wave line appears between the cursors.



Cursor button specification

| Image | Name | Details |
|-------|--------------------------|---|
| | Show/Hide | Change whether to show or hide the cursors. It switches between ON and OFF by every click. The cursors are shown when this button is ON. The cursor's initial position differs according to the plotting method. (Note1) |
| | Interlocking the Cursors | When this button is ON, cursors A and B are interlocked. When interlocked, a broken line appears between sliders A and B. When interlocked, cursors A and B move simultaneously. Hiding the cursors will force this setting to turn OFF. |

(Note1) The cursors move as follows according to the plotting method.

For thin-out plot, the cursor A is placed at the first Div from the left and the cursor B at the first Div from the right.

For all-data plot, the cursor A is placed at the first plot after the first Div from the left and the cursor B at the first plot after the first Div from the right.

- The cursors are not displayed when there is no graph in the display area.

However, it is possible to show and move the cursors even when displaying the No. without drawing setting if any waveform exists for Nos. which is out of the display area.

(2) Specifications of Cursor Movement

- Slider A and B also appears by showing the cursors.
- When the cursors are not interlocked, dragging a slider moves the corresponding cursor. The movement is limited within the display area. If you want to move the cursors outside the display area, change the time axis setting or scroll the area.
- When the cursors are interlocked, dragging a slider moves both cursors while keeping the distance between A-B time differences. While the dragging slider should move only within the display area, the other slider can go out of the display area.
- Nonetheless, the sliders cannot move to the left of zero and beyond the sampling time, so the dragging slider may not be able to move. In that case, the sliders move as much as they can.
- After dragging and dropping the cursor, the waveform values in the text area will be updated. The time and time difference indicated by the cursors update even they are being dragged.
- The cursors' position does not change when the displayed waveforms change.
- For thin-out plot, the cursors move by 1 pixel.
- For all-data plot, the cursors move by 1 block.
- The cursors A and B do not change the time to point even when the time axis settings are changed. Therefore, the cursors may disappear from the display area depending on the setting changes by the time axis setting screen and other time axis changes, such as enlarging/reducing the waveform in vertical direction, auto scaling, and scrolling in horizontal direction.
- The cursors cannot move to a time exceeding the sampling time. The cursor will just move to the time when the sampling completed.

Enlarging/reducing the waveform

While displaying the waveforms, they can be enlarged or reduced.

Enlarging/Reducing the Waveform in Vertical Direction

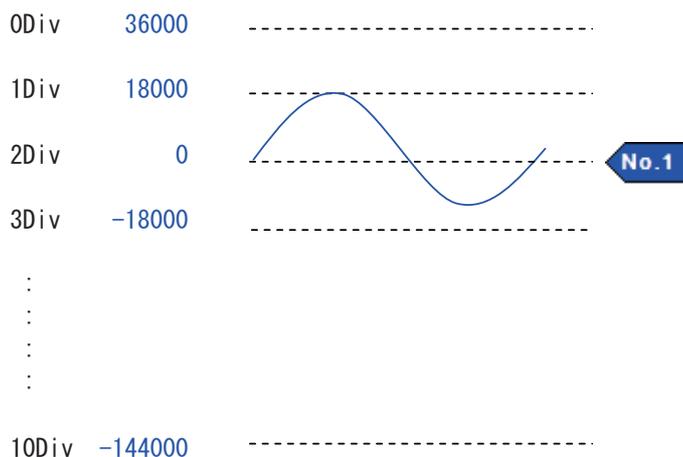
Press  (Enlarge the waveform in time axis direction button) to reduce the value per vertical axis division by half.

Press  (Reduce the waveform in time axis direction button) to double the value per vertical axis division.

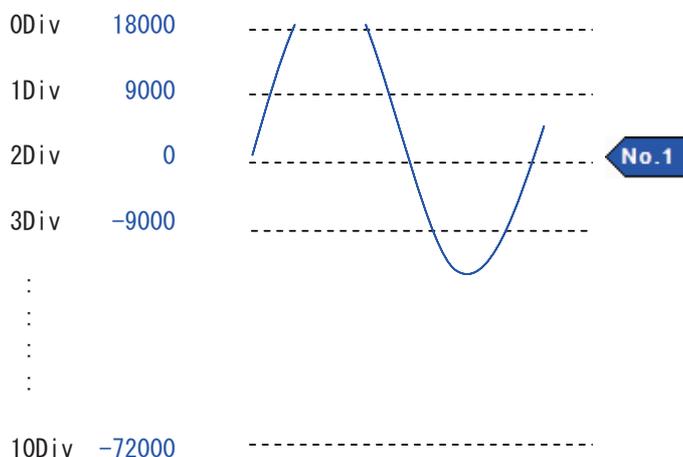
- Enlargement and reduction apply to the currently active waveforms.
- The center of enlargement and reduction depends on the vertical axis setting in the axis setting screen. When set to "Set base line/value for 1Div", the center will be the base line. When set to "Set maximum value/minimum value", the fifth Div from the top will be the base line.

Ex.: When the second Div from the top is the base line, the base value is "0", and value per Div is "18000".

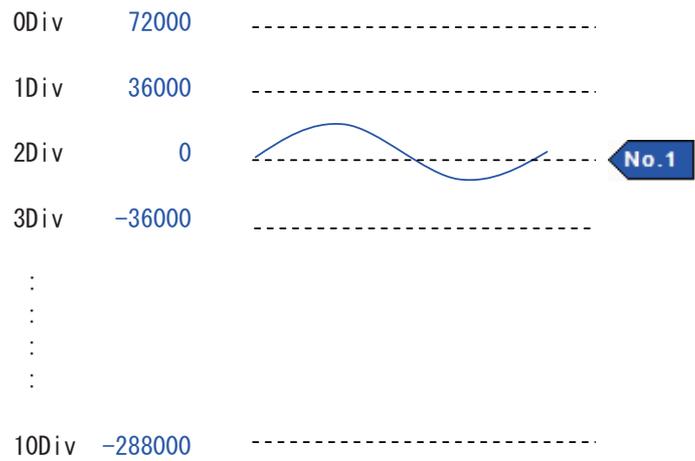
(Normal)



(Enlarged)



(Reduced)



- Enlargement is not available when the value for 1Div is 1.00e-06 (0.000001) or smaller. You can click the button but it will not work.
- Reduction is not available when the maximum display value is over 2147483647 or the minimum display value is below -2147483648. You can click the button but it will not work.

Enlarging/reducing the waveform in time axis direction

Press  (Enlarge the waveform in time axis direction button) to reduce the value per time axis division by half.

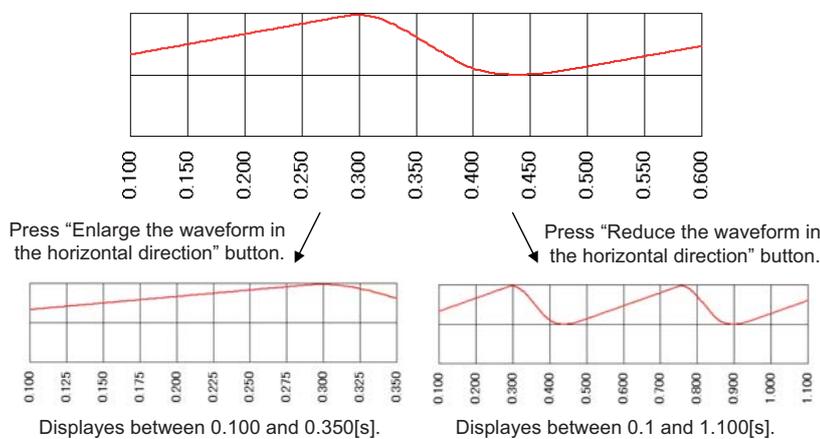
Press  (Reduce the waveform in time axis direction button) to double the value per time axis division.

Press  (Show data between cursors button) to view the waveform between the cursors.

- All the waveforms are subject to this enlargement and reduction, including those not displayed.

- The far left of the display area is the base point of enlarging/reducing buttons.

Ex.: When displaying between 0.100 and 0.600[s].

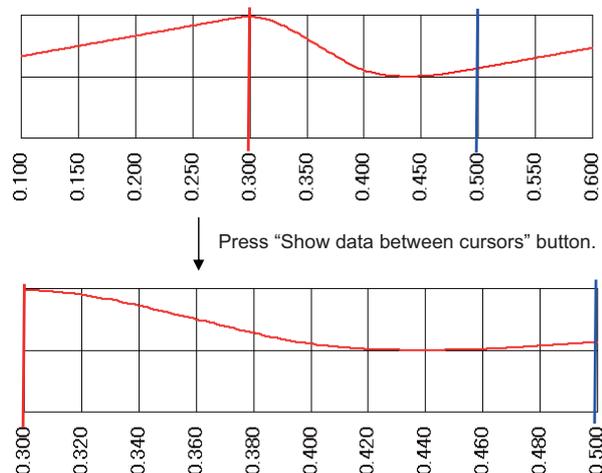


- Press the "Show data between cursors" button to enlarge (reduce) the waveform from the left cursor to the right cursors to fill the display area.

This is same as for, in the Time axis setting by the Axis setting screen, setting the time of the left cursor to "Minimum value" and, after checking the "Set maximum value/minimum value" check box, the time of the right cursor to "Maximum value".

Therefore, the settings in the Axis setting screen will change. If the enlarged or reduced waveform will exceed the setting range, enlargement or reduction are not executed.

Ex.: When displaying between 0.100 and 0.600[s] and the cursors are at 0.300 and 0.500.

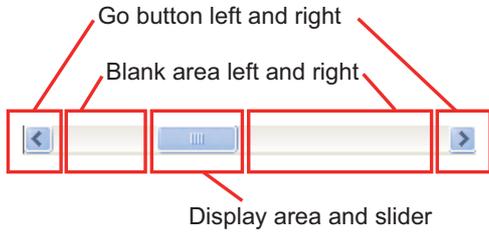


The waveform movement

The waveforms move in vertical and horizontal direction.

Horizontal Scroll

Waveforms move in the horizontal direction.



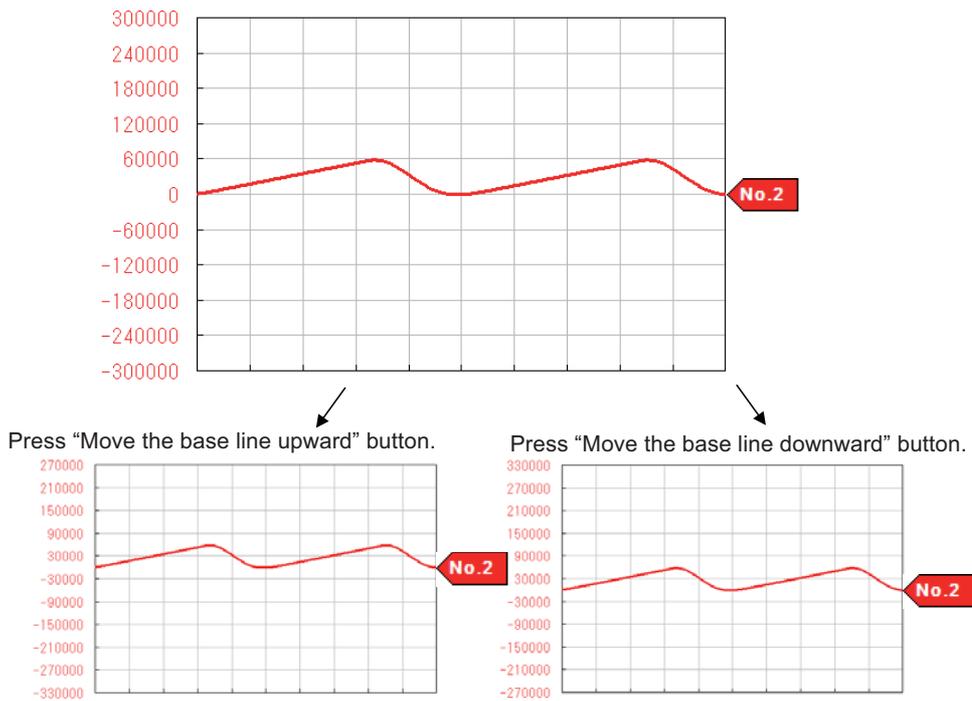
| Name | Details |
|---------------------------|---|
| Display area and slider | Indicates the currently displayed area. Moves by 1 pixel by dragging. |
| Go button left and right | Moves the horizontal axis by 1Div. |
| Blank area left and right | Moves by 1 page (10Div). |

Vertical Scroll

Press   (Move the base line upward/downward) button to move the base line of the active waveform in vertical direction.

- Normal waveforms move by 0.5Div.
- Control input/output waveforms move by 1.0Div.

Ex. When the 5.0Div is the base line, the base value is 0, and the value per 1Div is 60000.



This function will not work in the following cases. You can click the button but it will not work.

- The new base line will exceed $\pm 1000.0\text{Div}$ from the current base line (Check the current base line in the Axis setting screen).
- The maximum display value will be over 2147483647 or the minimum display value below - 2147483648 when executed.

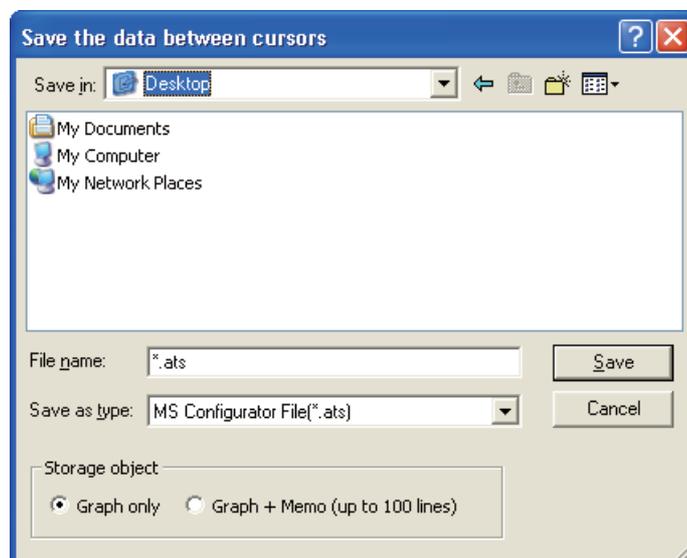
Change the display No.

There are two buttons to change the display No. to the previous page  and next page . Eight waveforms constitute a unit for changing pages.

- When displaying waveforms No.1 to 8, the "Change the display No. to the previous page" button  cannot be pressed. Likewise, when displaying waveforms No.25 to 32, the "Change the display No. to the next page" button  cannot be pressed.
- If switched to a page without drawing setting while the cursors are being displayed, the cursors cannot move on the page. They will be able to move again when switched to a page with drawing setting.
- The waveform with the smallest No. in the page will be active at default and when the display waveform Nos. are changed.

Ex.: When the display Nos. change from No.1 to 8 to No.9 to 16, the No. 9 will become active.

If No.9 is not set or not displayed, No.10 will become active.



3.6.3 Method of Saving/Displaying the Data

Save the graph data

This saves the designated graph data in the file.

When the graph is not displayed, this cannot be selected.

There are three saving methods for the graph data. There are three saving methods for the graph data. Which saving method to use differs depending on the mode.

| How to save | XY mode | Time mode |
|-----------------------------|---------|-----------|
| [Save as] | ○ | ○ |
| [Save] | - | ○ |
| [Save data between cursors] | - | ○ |

[Save as]

- (1) Select the menu [File] - [Save as].

This function can be selected from the floating bar, right-click or tool box also.

- (2) Shift in the state of the graph selection. Select the target graph with the mouse.

When the graph is selected from the menu displayed by right-clicking or when the graph is drawn in time mode, this operation is not necessary. The screen automatically proceeds to (3).

- (3) The file dialog is displayed. After designating the destination, file name, file type, and target, press [Save].
- (4) The graph is saved with the designated file name.

[Save data between cursors]

- (1) Select the menu [Graph] - [ShowCursor]

This function can be selected from the floating bar, right-click or tool box also.

- (2) Move the cursors and choose the area to save.

- (3) Select the menu [File] - [Save data between cursors]

This function can be selected from the floating bar, right-click or tool box also.

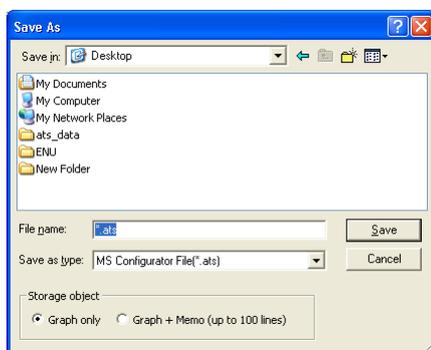
- (4) The file dialog is displayed. After designating the destination, file name, file type, and target, press [Save].
- (5) The graph is saved with the designated file name.

[Save]

(1) Select the menu [File] - [Save]

This function can be selected from the floating bar, right-click or tool box also.

(2) The graph is saved with the present file name.



The data saving format is as follows.

| File format | Format | Details | XY mode | Time mode |
|-----------------------------|----------------|--|-----------------------|-----------------------|
| MS ConfiguratorFile (*.ats) | *.ats | The necessary data to reproduce the graph such as the plot data and the axis range of the graph is saved in a batch. The data that the user input to the memo area is saved, however, the data displayed in text area is not saved. | <input type="radio"/> | <input type="radio"/> |
| PlotData(*.csv) | *.csv | Only the plot data with CSV format is saved. The data displayed in text area and memo area are not saved. | <input type="radio"/> | - |
| All(*.ats/*.csv) | *.ats *.csv | Both ats format file and CVS format file are created with the designated name. The file name (previous part from the extension) and the saved place are common. | <input type="radio"/> | - |

| Storage object | Details |
|-------------------------------|---|
| Graph only | Only the graph data is saved. |
| Graph + Memo (up to 100 line) | The graph data and the memo area data are saved. The memo area data is saved up to 100 lines or less. 100 lines or more are not saved. |

Display of .ats file

This displays the graph from .ats file.

- (1) Select the menu [File] - [Open].

This function can be selected from the floating bar, right-click or tool box also.

- (2) Shift in the state of the graph selection when the graph is displayed in the graph area.

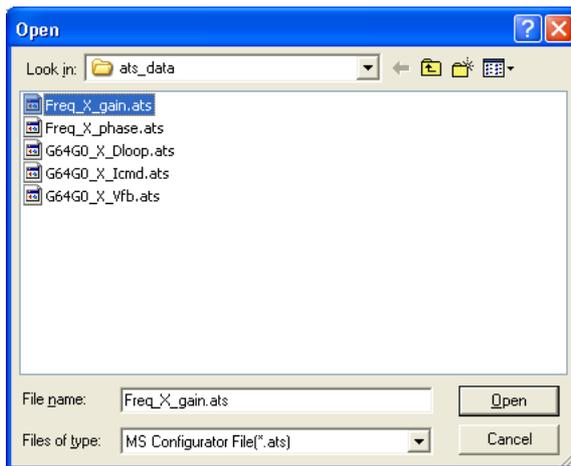
When the graph is selected from the menu displayed by right-clicking or when the graph is drawn in time mode, this operation is not necessary. The screen automatically proceeds to (3). When a graph is not displayed in the designated graph area, the display does not shift in the state of the graph selection.

The place where data is read is designated. Select the target area with the mouse.

The selected graph is enclosed in a red line. Press the [Decision] button when selecting.

- (3) The file dialog is displayed.

After the displayed file is selected, the designated file is displayed in the graph area when the [Open] button is pressed. At this time, when the graph area where the graph has already been displayed is selected, the graph is overwritten and displayed.



Auto scaling is executed when opening a .ats file written in time mode.

When opening a .ats file written in XY mode, the state of an auto scale is changed by the state of the graph area where the graph is displayed.

| Graph area | Auto scale ON/OFF state | | Supplement |
|----------------------|---|-----------------------------------|--|
| Newly display (Note) | Always display the auto scale ON state. | | Auto scale ON/OFF setting by the user is impossible. |
| Overwrite display | Auto scale ON setting | Display the auto scale ON state. | The display target graph is displayed with auto scale. |
| | Auto scale OFF setting | Display the auto scale OFF state. | The graph is displayed with the scale range set by the graph before being overwritten. |

(Note) When the graph is not displayed in the graph area such as initial display, the graph is deleted, etc.

Display of .csv file

This displays the graph from .csv file.

When the graph is not displayed, this cannot be selected.

- (1) Select the menu [File] - [Read data].

This function can be selected from the floating bar, right-click or tool box also.

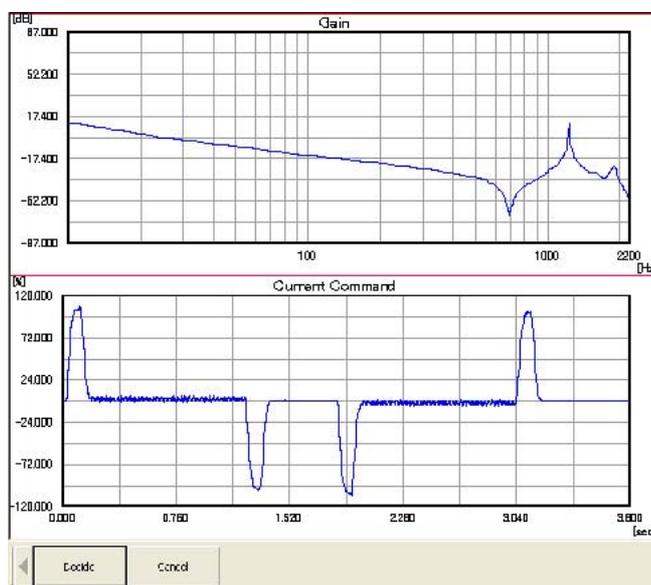
- (2) Shift in the state of the graph selection when the graph is displayed in the graph area.

If the graph is selected from the menu displayed by right-clicking, this operation is not needed.

When a graph is not displayed in the designated graph area, this operation is not executed.

The place where data is read is designated. Select the target area with the mouse.

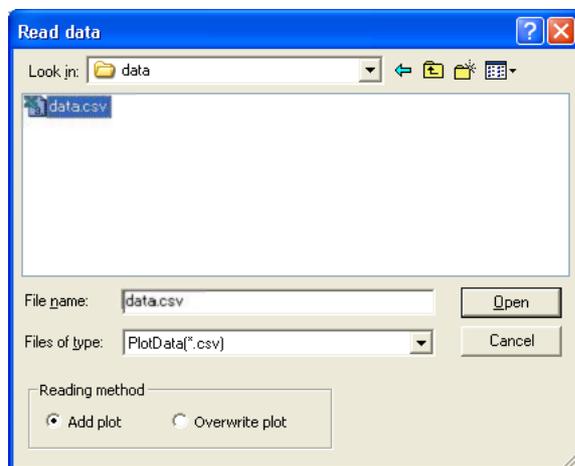
The selected graph is enclosed in a red line. Press the [Decision] button when selecting.



- (3) The file dialog is displayed.

Select the displayed file and read method.

The plot addition/overwriting depends on the AutoScaling checkbox selection state of "Axis range settings" dialog.



- (4) When the [Open] button is pressed. The file is displayed with the designated method in the graph area.

Save the bitmap

The data of the graph area, the text area, and the memo area is saved as a bit map file.
When the graph is not displayed, this cannot be selected.

(1) Select the menu [File] - [Save bitmap].

This function can be selected from the floating bar, right-click or tool box also.

(2) The file dialog is displayed.

After the saved place, file name are designated, the graph is saved with the designated file name when the [Save] button is pressed.

The bit map is preserved in the state of the text area and the memo area the ratio of 3 to 1.

3.6.4 Method of Printing

Printing

This prints the contents of the graph area, the text area, and the memo area when connected with the printer.

When the graph is not displayed, this cannot be selected.

When the printer driver is not installed, the error message appears, and the process is finished.

- (1) Select the menu [File] - [Print].

This function can be selected from the floating bar or tool box also.

- (2) When the printer driver is installed, the printing dialog is displayed.

Print according to the print procedure of each printer.

The data is printed in the state of the text area and the memo area the ratio of 3 to 1.

Print preview

This displays the print preview when connected with the printer.

When the graph is not displayed, this cannot be selected. Also, cursors for waveform graph will not be displayed.

When the printer driver is not installed, the error message appears, and the process is finished.

- (1) Select the menu [File] - [Print preview].

This function can be selected from the floating bar or tool box also.

- (2) When the printer driver is installed, the print preview screen is displayed.

Printer setting

This displays the printer setting screen when connected with the printer.

When the printer driver is not installed, the error message appears, and the process is finished.

- (1) Select the menu [File] - [Printer setting].

This function can be selected from the floating bar also.

- (2) When the printer driver is installed, the printer setting dialog is displayed.

4

Precautions

When using MS Configurator, pay attention to the followings.

4.1 Precautions for Using Automatic Adjustment Function

Precautions

- (1) When using a program created with the program creation function, confirm an appropriate soft limit.
- (2) When using the Speed loop gain adjustment, Frequency response measurement, a minute vibration is added to the motor. In that case, the servomotor might vibrate violently. Input the reset or emergency stop if a danger status is caused because the servomotor vibrates violently. The machine vibration can be controlled by reducing adjustment level. After reducing adjustment level, execute the speed loop gain adjustment.
- (3) Confirm the effect stroke of the machine, and execute the Position loop gain adjustment, Time constant adjustment, Lostmotion adjustment, and Lost motion type 3, paying attention to avoid interference.
- (4) Cannot execute the automatic adjustment for the axis which uses parallel drive system (tandem). Only parameter setting and initial notch filter setting are available.
- (5) Always confirm that the emergency stop and reset are valid when using.
- (6) While the automatic tuning function is executed, the display of the servo monitor screen is not updated.
- (7) If emergency stop, NC power OFF, alarm occurrence, or input power OFF (instantaneous stop) occurs while performing adjustment with MS Configurator, make sure to enter the servo in a ready ON after the parameter settings are returned.
- (8) Measurement or adjustment is possible even if the vibration value is less than the current limit value. In that case, the measurement or adjustment might not be completed normally. Do not set the current limit value less than 100%.
- (9) Do not adjust the axis with a motor unconnected (servo drive unit connected) axis or detached axis. If such an axis is adjusted, the adjustment might not be completed while keeping the status display screen (adjusting screen) displayed. In that case, input the emergency stop or reset to stop the measurement.
- (10) Confirm that each parameter described in the section "3.1.2 Parameter Setting" is correctly set to NC. If it is not set correctly, the operation might be incorrect. In that case, input the emergency stop or reset to stop the adjustment.
- (11) Each adjustment function confirms the operation mode of all part systems when it is selected from MS Configurator main screen. If there is even one part system to which the operation mode is not set correctly, an operation mode error message and illegal part system name are displayed. So set the operation mode for subjected part system correctly. In the program creation function, only the operation mode of the part system subjected to the program creation function.
- (12) Always execute the speed loop gain adjustment before each adjustment.
- (13) If the axis is not moved, the resonance might not be generated.
Confirm the resonance is not generated even if the axis is moved by the pulse sending.
- (14) This function does not correspond to inch system. Operate with a metric system.

- (15) When the type name of the drive unit cannot be acquired from NC, all drive units are assumed to have not been connected.
- (16) When this function is used with other external device connected to PC, the measurement/adjustment might not be correctly completed because of the noise influence.
- (17) Input the emergency stop after inputting reset when the emergency stop is input with NC. When only the emergency stop is input, the program forwarded from this function to NC is not deleted.
- (18) When the parameters of NC, the servo and spindle parameters are changed and the NC restarts, restart the MS Configurator also.
When the MS Configurator is not restarted, the measurement/adjustment is executed by the parameter setting before restarting, therefore, correct results cannot be obtained.

Relation with other functions

(1) NC data sampling

The NC data sampling function cannot be set when the automatic tuning function "#1164 ATS" is set to "1" and "Data protect" is being displayed.

When the adjustment is executed, the NC data sampling parameters are changed.

(2) The servo monitor screen

"ATS Sampling" is displayed and the data is not updated while the automatic tuning function is being executed.

(3) Program display

In the Position loop gain adjustment, Time constant adjustment, Lost motion adjustment, Lost motion type 3 adjustment and Data measurement in program operation, when the program is created and adjusted on MS Configurator, the machining program No. is allocated automatically. When the machining program in NC memory is used, the machining program No. in which operation search has been executed is displayed.

4.2 Precautions for Using Measurement Function

Precautions

- (1) Execute the Vibration signal setup before the Frequency response measurement is executed.
- (2) When Frequency response measurement is executed, start measuring from small enough (10 to 20) vibration amount.
However, when the vibration amount is reduced, an error might occur. In that case, set a larger vibration amount on Frequency response measurement Details setting screen, and measure again.
- (3) When using the Frequency response measurement, a minute vibration is added to the motor. In that case, the servomotor might vibrate violently. Input the reset (only during vibration) or emergency stop if a danger status is caused because the servomotor vibrates violently. Measure the frequency response by separating about 10mm from the edge of stroke.
The machine vibration can be controlled by reducing vibration amount. Set a smaller amount to vibration amount at measurement on the "Frequency response measurement Details setting" screen, and measure again.
- (4) Always confirm that the emergency stop and reset are valid when using.
- (5) When the measurement could not be stopped even if the reset is input, input the emergency stop.
- (6) Do not measure the axis with a motor unconnected (servo drive unit connected) axis, detached axis or synthetic axis composed of two or more axes (inclination Y axis in lathe system, etc.). If such an axis is measured, the measurement might not be completed while keeping the status display screen (measuring screen) displayed. In that case, input the emergency stop or reset to stop the measurement.
- (7) Even if the parameter "#2018 no_srv" is set to "1", the measurement is executed when the servo drive unit and motor are connected.
- (8) Measurement or adjustment is possible even if the vibration value is less than the current limit value. In that case, the measurement or adjustment might not be completed normally. Do not set the current limit value less than 100%.
- (9) Confirm that each parameter of the axis or axis specification is correctly set to NC. If it is not set correctly, the operation might be incorrect. In that case, input the emergency stop or reset to stop the measurement.
- (10) The Frequency response measurement function of machine confirms the operation mode of all part systems when it is selected from the MS Configurator main screen. If there is even one part system to which the operation mode is not set correctly, an operation mode error message and illegal part system name are displayed. So, correctly set the operation mode for subject part system.

- (11) The measurement function confirms the operation mode for all part systems when the [Test] button on the measurement function screen or the [OK] button on each measurement function is pressed.
When the part system to which the operation mode is not correctly set exists, an operation mode error message and an illegal part system name are displayed, and so set the operation mode in the object system correctly.
- (12) The spindle used by the synchronous tapping error measurement is the spindle of the 1st part system.
Cannot execute the measurement for the axis which uses parallel drive system (tandem).
- (13) The value to display waveform for the chronological data measurement and synchronous tapping error measurement applies the inch system ("#1041 I_inch" is set to "1"). The metric system is fixedly used for displaying the arc shape error measurement, the arbitrary path and others.
- (14) Automatic operation startup is valid only for the 1st part system. The gear ratio is not taken into account in the spindle measurement data.
- (15) When the type name of the drive unit cannot be acquired from NC, all drive units are assumed to have not been connected.
- (16) When this function is used with other external device connected to PC, it might not be able to measure and adjust correctly because of the noise influence.
- (17) When the tandem axis is used, use the system in which the gear ratio, motor and detector of the primary axis and secondary axis are the same.
- (18) Input the emergency stop after inputting reset when the emergency stop is input with NC. When only the emergency stop is input, the program forwarded from this function to NC is not deleted.
- (19) This function does not correspond to the high-speed synchronous tapping mode. Do not measure during the high-speed synchronous tapping mode.
- (20) When the parameters of NC, the servo and the spindle parameters are changed and the NC restarts, restart the MS Configurator also.
When the MS Configurator is not restarted, the measurement/adjustment is executed by the parameter setting before restarting, therefore, correct results cannot be obtained.
- (21) If the internal sampling complete processing fails for chronological data measurement, the warning window "The sampling termination failed. Please stop driving, and push the OK button." will be displayed. Stop the operation and press [OK] button.

5

Appendix

5.1 Message of Automatic Adjustment

Error messages

E001 Connect NC Failed.

An error occurred in communicating with NC.
Check the connection with NC.

E002 It was not able to communicate.

An error occurred in communication test with NC.
Check the connection with NC.
Check the port No. and baudrate.

E003 Reading of a file went wrong.

The reading from the file was failed.
Check the file.

E004 Preservation of a file went wrong.

The writing to the file was failed.
Check the destination file.

E005 An input value is inaccurate.

The value of set parameter exceeded the input range.
Check the parameter setting.

E006 Reading went wrong from NC.

The parameter value could not be read from NC.
Check the connection with NC.

E007 The writing to NC went wrong.

The parameter value could not be written to NC.
Check the connection with NC.

E008 The machining program for position loop gain adjustment is not created.

The machining program for adjustment had not been created when the "Execute" of position loop gain adjustment was selected.
Create the machining program for position loop gain adjustment by [Tool] - [1.Setup] - [Program creation].

E009 The machining program for time constant adjustment is not created.

The machining program for adjustment had not been created when the "Execute" of time constant adjustment was selected.
Create the machining program for time constant adjustment by [Tool] - [1.Setup] - [Program creation].

E010 The machining program for lostmotion adjustment is not created.

The machining program for adjustment had not been created when the "Execute" of lost motion adjustment was selected.
Create the machining program for lost motion adjustment by [Tool] - [1.Setup] - [Program creation].

E015 The machining program for lostmotion type3 adjustment is not created.

The machining program for adjustment had not been created when the "Execute" of lost motion type 3 adjustment was selected.
Create the machining program for lost motion type 3 adjustment by [Tool] - [1.Setup] - [Program creation].

It returned, before adjusting a parameter. Adjustment is stopped.

The adjustment is discontinued because an error occurred while adjusting. Restore the parameter settings before the parameter was adjusted.

Restore the parameter settings before the parameter was adjusted, but the parameter setting might not be restored when communication failure.

Check the connection with NC.

Check the state of NC (alarm, mode) and related parameters.

When other part system is selected or in operation, clear the selection or press the emergency stop button and execute again.

It returned, before measurement a parameter. Measurement is stopped.

Measurement is interrupted as the error occurred during the measurement. The value of the parameter is returned to the one during the measurement.

The value of the parameter needs to be returned to the one before the measurement, however, it might not be possible if the data communication is interfered.

Check the connection with NC.

Check the state of NC (alarm, mode) and the various parameter setting.

When other part system is selected or in operation, clear the selection or press the emergency stop button and execute again.

E012 The machining program of xxx axis is not created.

The machining program for adjustment of the adjustment target axis had not been created.

(The axis whose machining program has not been created appears in xxx.)

Create the machining program for adjustment of the adjustment target axis.

E013 The program for adjustment is not created.

The project not created a machining program for adjustment was selected, and attempted to move to next screen.

Select another project or create the machining program for each adjustment for the selected project.

E014 It was not able to write in a file.

The save of machining program for adjustment failed.

Check the destination file.

E021 There is no parameter information to save.

When the data saved in the file or written to NC did not exist, saving or writing in NC was executed.

Set the parameter information for saving.

The amplitude of output signal obtained by the frequency response measurement is too small.

It returns, before adjusting a parameter, and adjustment is stopped.

The amplitude of output signal that is obtained at the Frequency response measurement is too small.

Check the NC parameters. Check the vibration amount. Check the state (alarm and mode) of NC.

E016 The value of a position is inaccurate. A program was not able to be created.

This is displayed when the value set to the position in the program creation function is illegal.

Set a correct value.

E017 The value of speed is inaccurate. Program was not able to be created.

This is displayed when the value set to the speed in the program creation function is illegal.

Set a correct value.

E018 The value of a dwelling is inaccurate. Program was not able to be created.

This is displayed when the value set to the dwell in the program creation function is illegal.

Set a correct value.

E019 The value of a stroke is inaccurate. Program was not able to be created.

This is displayed when the value set to the stroke in the program creation function is illegal.
Set a correct value.

E020 The value of radius is inaccurate. Program was not able to be created.

This is displayed when the value set to the radius in the program creation function is illegal.
Set a correct value.

You can't select PLC axis or spindle. (Y axis)

This is displayed when the PLC axis and the spindle have been selected in the function which does not correspond to the PLC axis and the spindle.
Change a selected axis.

You can't select synchronous axis. (Y axis)

This is displayed when the synchronous axis have been selected in the function which does not correspond to the parallel synchronous control axis.
Change a selected axis.

You can't select slave axis. (Y axis)

This is displayed when the secondary axis have been selected in the function which does not correspond to the secondary axis.
Change a selected axis.

You can't select an axis to which drive unit is not connected. (Y axis)

This is displayed when the drive unit unconnected axis have been selected.
Change a selected axis.

NC has no free space for storing programs.

This is displayed when there is no empty area for the program preservation in NC.
Delete an unnecessary program with NC.

Initialization of ATSIF.DLL went wrong.

Failed to initialize ATSIF.DLL.
After reinstalling MS Configurator, restart the PC again.

DLL required for the measurement class is not found

When the measurement class is initialized/completed, the necessary DLL is not found.
After reinstalling MS Configurator, restart the PC again.

Change to Memory Mode. (System X)

This is displayed when the adjustment is executed with operation mode of NC other than the memory mode set.
Set the NC operation mode of the part system displayed in the part system X to the memory mode.

Change to MDI Mode.

This is displayed when the program test is executed with operation mode of NC other than the MDI mode set.
Set NC operation mode to the MDI mode.

The test was interrupted.

This is displayed when some errors occur during the machining program test.
Check the state of NC.

There is no consistency between the contents of selected project and the NC parameter.

Please confirm the NC parameter (G code system and the setting of AbsInc).

This is displayed when all the following conditions are met: [Send Program] of the measurement function screen is checked ON. [Lathe] is selected on [Model], and 2, 4 or 6 is selected on [G code system] of the measurement function screen. AbsInc parameter of NC is illegally set.
Check the NC parameters (G codes and AbsInc setting).

Emergency stop or reset was input. The measurement is discontinued.

The emergency stop or reset was input with NC.
Clear the emergency stop or reset with NC.

The setting for the measurement target axis is not appropriate.

The default value is set to the measurement target axis.

The setting for the measurement target axis is not appropriate.
Check the NC parameters.

The vibraton maybe occurred. Decrease the parameter VGN1 and retry adjust.

The vibration maybe occurred.
Check the NC parameters.

Adjustment is stopped because CFB_TOO_LOW. Check the motor-lines, or the parameters.

The vibration signal setup is interrupted as the current feedback is extremely small.
Check the motor power cable and the standard parameters.

Adjustment is stopped because OVERTIME. Check the motor-lines, or the parameters.

The vibration signal setup is interrupted as the number of adjustments has reached its limit.
Check the motor power cable and the standard parameters.

Vibration signal level is not set.

The vibration signal level is not set.
Check ATS.INI.

An illegal value is set to the vibration amount. Set an appropriate value (1 to 150 (integer number)).

The vibration amount setting exceeds the setting range, or value other than the integer value is set.
Set the vibration amount again.

Execute the ""Vibration signal setup"". The default value is set to the vibration amount.

The Vibration signal setup has never been executed.
Execute the Vibration signal setup.

The program end M code is set to an illegal value or is not set.

Set an appropriate value (0 to 99999).

The value set to program end M code is illegal.
Set the value within the specified range.

The dwell time is set to an illegal value or is not set.

Set an appropriate value (0.001 to 999999.999).

The value set to the dwell is illegal.
Set the value within the specified range.

The travel distance is set to an illegal value or is not set.

Set an appropriate value (-1000000 to 1000000).

The value set to the travel distance is illegal.
Set the value within the specified range.

The feed rate is set to an illegal value or is not set.

Set an appropriate value (0 to 1000000).

The value set to the feedrate is illegal.
Set the value within the specified range.

The radius is set to an illegal value or is not set.

Set an appropriate value (1 to 1000000).

The value set to the radius is illegal.
Set the value within the specified range.

The number of repetitions is set to an illegal value or is not set.

Set an appropriate value (1 to 100).

The value set to the number of repetitions is illegal.
Set the value within the specified range.

The thread pitch is set to an illegal value or is not set.

Set an appropriate value (0 to 100).

The value set to the thread pitch is illegal.
Set the value within the specified range.

The spindle rotation speed is set to an illegal value or is not set.

Set an appropriate value (0 to 999999).

The value set to the number of spindle rotation is illegal.
Set the value within the specified range.

The square side length is set to an illegal value or is not set.

Set an appropriate value (0 to 999999).

The value set to the square side length is illegal.
Set the value within the specified range.

R-point is set to an illegal value or is not set.

Set an appropriate value (-999999.999999 to 999999.999999).

The value set to the R-point is illegal.
Set the value within the specified range.

The thread hole depth is set to an illegal value or is not set.

Set an appropriate value (-999999.999999 to 999999.999999).

The value set to the thread hole depth is illegal.
Set the value within the specified range.

The corner radius value is larger than the half of the square side length.

The [Radius] value has been set to 1/2 or more of the [Square side length] value when [Square] program is created.
Set the value of [Radius] and [Square side length] again.

The previous value of the auto-scale is not held. Set the auto-scale ON.

This is displayed when an auto scale is turned OFF for the first measurement because a previous value of graph area does not exist.

Check the auto scale check box and press [Measurement] button.

It's impossible to select axes other than X, Y and Z axes.

This is displayed when [Arc] or [Square] is selected on [Kind] of the measurement screen and excluding [X] axis, [Y] axis, or [Z] axis is selected with [Axis1] of the measurement condition.

Select either X axis, Y axis or Z axis.

It's impossible to select axes other than X and Z axes.

This is displayed when [Synchronous tapping] is selected on [Kind] of the measurement screen and excluding [X] axis or [Z] axis is selected with [Axis1] of the measurement condition.

Select either X axis or Z axis when a synchronous tapping program is created.

You haven't set the NC parameters for basic axes that constitute a plane. Set appropriate values.

This is displayed when the plane axis parameter (bas*I,J,K) is not set with NC to create a circular program.

Check the plane axis parameter setting of NC.

It's impossible to select axes to be measured from same axes.

Select the axes from different.

This is displayed when the same axis is set with axis 1 and axis 2 when a circular arc and a square program are created.

Select a different axis of the same part system.

It's impossible to select axes to be measured from different part-systems.

Select the axes from one and the same part-system.

This is displayed when the axis in a different part system is set at the measurement which uses two or more axes.

Select an axis of the same part system.

It's impossible to measure the speed command, current command of an axis that is set for the measurement of position command.

Change the measurement items or the axes to be measured. (Axis name)

This is displayed when the measurement target axis and measurement items have been selected by the combination which cannot be measured if the target axis is a servo axis.

Change the measurement target axis or the measurement item to the combination which can be measured.

It's impossible to measure the speed command, current command, current feedback of an axis that is set for the measurement of position command.

Change the measurement items or the axes to be measured. (Axis name)

This is displayed when the measurement target axis and measurement items have been selected by the combination which cannot be measured if the target axis is spindle.

Change the measurement target axis or the measurement item to the combination which can be measured.

A spindle is not connected to the NC.

This is displayed when the spindle is not connected with NC when the synchronous tapping error accuracy is measured.

Connect the spindle with NC, and restart MS Configurator.

The data obtained by the frequency response measurement is abnormal.

The (sampling) data obtained at the Frequency response measurement is abnormal.

Measure again after checking the connection with NC and the state of NC (alarm and mode).

The amplitude of output signal obtained by the frequency response measurement is too small.

The amplitude of output signal obtained by the frequency response measurement is too small.
 Check the NC parameters.
 Check the vibration amount.
 Check the state of NC (alarm and mode).

The time-series measurement data is incorrect.

Some abnormalities occurred while the chronological data measuring. The measurement is discontinued.
 Check the NC parameters.
 Check the state of NC (alarm and mode).

The measurement data of arc shape error is incorrect.

Some abnormalities occurred while the arc shape error measuring. The measurement is discontinued.
 Check the NC parameters.
 Check the state of NC (alarm and mode).

The synchronous tapping error data is incorrect.

Some abnormalities occurred while the synchronous tapping accuracy measuring. The measurement is discontinued.
 Check the NC parameters.
 Check the state of NC (alarm and mode).

The measurement data of arbitrary path is incorrect.

Some abnormalities occurred while measuring arbitrary path. The measurement is discontinued.
 Check the NC parameters.
 Check the state of NC(alarm and mode) .

Pop-up messages**It succeeded in communication.**

MS Configurator succeeded in the communication with NC when the communication was tested.

The parameter after adjustment is changed. Does it end without applying?

When creating the parameter or machining program, the operation was attempted to be ended without saving.

Adjustment ended?

The adjustment was attempted to be ended by pressing the "Cancel" button during the adjustment.

It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?

The "Apply" button is pressed on the "Adjustment result" screen.

It returns, before adjusting a parameter. Is it all right?

The "Undo" button is pressed on the "Adjustment result" screen.

The parameter after adjustment is changed. Does it end without applying?

The adjusted parameters were edited on "Adjustment result" screen, and the adjustment was attempted to be ended without pressing "Apply".

Creation is interrupted.**May I cancel information in preparation?**

The "Cancel" button was pressed while creating the machining program for adjustment.

May I change a program?

The "Make" button was pressed while the machining program for adjustment is created.

Is a program tested?

The "Test" button was pressed.

Are No., an axis name, and the number of axes acquired from NC?

The parameters were read from file while communication with NC is possible.

Reading is performed from NC. Is it all right?

Reading from NC was selected.

It writes in to NC. Is it all right?

Writing to NC was selected.

The machining program being displayed is transferred to the NC.

It's possible to operate (test) the transferred machining program in Memory mode.

The machine program is being transferred.

Adjustment ended?

The cancel button was pressed while adjusting.

Cancel the measurement?

The cancel button was pressed while measuring.

The parameter after adjustment is changed. Does it end without applying?

The parameter is changed after the adjustment but not reflected to NC.

Non-saved data exists. Data is canceled after ending as it is. Is it all right?

The parameter is changed but not reflected to NC.

The program has been changed. Do you preserve it?

Program save confirmation is displayed as the program is changed.

Preparing the adjustment.

The preparation for adjustment is executed.

Preparing the measurement.

The preparation for measurement is executed.

Preparation of adjustment was completed. Execution of a cycle start starts adjustment.

Attention: In case of the system with multiple part systems, confirm that

the part system of the selected axis is the same as the part system selected on the NC side.

MS Configurator is waiting for the automatic start button to be pressed.

Measurement ready to start. Press the "automatic start" button.

MS Configurator is waiting for the automatic start button to be pressed.

Data is being sampled.

Data is being sampled.

Measuring.

The data is being measured.

Data is being analyzed. The parameter is changed.

The data is being analyzed and the parameter is being changed.

Data is being analyzed.

The data is being analyzed.

Adjustment was completed. Please click the next.

Adjustment completed.

Measurement completed. Click the "Close" button.

Adjustment completed.

Measurement completed. Please click the next.

Measurement completed.

The error occurred during adjustment.

It returns, before adjusting a parameter, and adjustment is stopped.

The error occurred during adjustment.

The error occurred during adjustment.

adjustment is stopped.

The error occurred during adjustment.

It returns, before adjusting a parameter. Is it all right?

Return the parameter which is changed for adjustment to the original value.

It rewrites in the parameter after adjustment while displaying a parameter. Is it all right?

Set the parameter input from UI to NC.

VGN1 reached the upper limit.

Continue adjustment by setting VGN1 to the upper limit?

VGN1 has reached the upper limit during the adjustment.

VGN1 reached the lower limit.

Continue adjustment by setting VGN1 to the lower limit?

VGN1 has reached the lower limit during the adjustment.

Execute the "Vibration signal setup".

The default value is set to the vibration amount.

Adjustment was performed without setting the vibration signal setup.

Status display

Adjustment is prepared.

The adjustment is being prepared now.

Preparation of adjustment was completed.

The adjustment has been prepared. When the cycle start is input, the adjustment is started.

Data is sampling.

The data is being sampled.

Data is analyzing.

The data is being analyzed. The parameters are changed.

Adjustment was completed.

The adjustment ended. Press the "Next" button.

The error occurred during adjustment.

The adjustment is discontinued because an error occurred while adjusting. Restore the parameter settings before the parameter was adjusted.

5.2 Message of Measurement Function

Connection with NC was not completed.

An error occurred in communicating with NC.
Check the connection with NC.

You can't select synchronous axis. (Y axis)

This is displayed when the synchronous axis have been selected in the function which does not correspond to the parallel synchronous control axis.
Change a selected axis.

Execute the "Vibration signal setup". The default value is set to the vibration amount.

The Frequency response measurement/vibration signal setup has never been executed.
Execute the Vibration signal setup.

The vibration amount set by the "Vibration signal setup" is outside the setting range.

The default value is set to the vibration amount.

The vibration amount set by vibration signal setup exceeds the setting range.
Execute the Vibration signal setup again.

An illegal value is set to the vibration amount. Set an appropriate value (1 to 150 (integer number)).

The vibration amount setting exceeds the setting range, or value other than the integer value is set.
Set the vibration amount again.

Execute the "Vibration signal setup".

The Vibration signal setup has never been executed.
Execute the Vibration signal setup.

The program end M code is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to program end M code is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The dwell time is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the dwell is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The travel distance is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the travel distance is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The feed rate is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the feed rate is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The radius is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the radius is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The number of repetitions is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the number of repetitions is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The thread pitch is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the thread pitch is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The spindle rotation speed is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the spindle rotation speed is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The square side length is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the square side length is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

R-point is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the R-point is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The thread hole depth is set to an illegal value or is not set.

Set an appropriate value (XXXXX to XXXXX).

The value set to the thread hole depth is illegal.
Set the value within the range specified by (XXXXX to XXXXX).

The corner radius value is larger than the half of the square side length.

The [Radius] value has been set to 1/2 or more of the [Square side length] value when [Square] program is created.
Set the value of [Radius] and [Square side length] again.

The previous value of the auto-scale is not held. Set the auto-scale ON.

This is displayed when an auto scale is turned OFF for the first measurement because a previous value of graph area does not exist.
Check the auto scale check box and press [Measurement] button.

The test was interrupted.

This is displayed when NC cannot read the machining program when the machining program is tested.
Check the state of NC.

It's impossible to select axes other than X and Y and Z axes.

This is displayed when [Arc] or [Square] is selected on [Kind] of the measurement function screen and excluding [X] axis, [Y] axis, or [Z] axis is selected with [Axis1] of the measurement condition.
Select either X axis, Y axis or Z axis.

It's impossible to select axes other than X and Z axes.

This is displayed when [Synchronous tapping] is selected on [Kind] of the measurement function screen and excluding [X] axis or [Z] axis is selected with [Axis1] of the measurement condition.
Select either X axis or Z axis when a synchronous tapping program is created.

Change to MDI Mode.

This is displayed when the program test is executed with operation mode of NC other than the MDI mode set.
Set NC operation mode to the MDI mode.

You haven't set the NC parameters for basic axes that constitute a plane. Set appropriate values.

This is displayed when the NC parameter "#1026 base_I (Base axis I)", "#1027 base_J (Base axis J)", "#1028 base_K (Base axis K)" are not set when a circular program is created.
Check the plane axis parameter setting of NC.

It's impossible to select axes to be measured from same axes. Select the axes from different.

This is displayed when the same axis is set with axis 1 and axis 2 when a circular arc and a square program are created.
Select a different axis of the same part system.

It's impossible to select axes to be measured from different part systems.**Select the axes from one and the same part system.**

This is displayed when the axis in a different part system is set at the measurement which uses two or more axes.
Select an axis of the same part system.

It was not able to write in a file.

This is displayed when failing to write the test program in the file when pressing the test button.
Check whether to write in the Program_Measure\Measurement.eia file and whether the file exists.

The test was interrupted.

This is displayed when some errors occur during the machining program test.
Check the state of NC.

There is no consistency between measurement program and NC parameters.**Check the NC parameters (G codes and AbsInc setting).**

This is displayed when all the following requirements are met:
[Send Program] of the measurement function screen is checked ON.
[Lathe] is selected on [Model], and 2, 4 or 6 is selected on [G code system] of the measurement function screen.
AbsInc parameter of NC is illegally set.
Confirm the NC parameter (setting of G code system and AbsInc).

DLL required for the adjustment class is not found.

When the adjustment class is initialized/completed, DLL that is necessary class is not found.
After reinstalling MS Configurator, restart the PC again.

DLL required for the measurement class is not found.

When the measurement class is initialized/completed, DLL that is necessary class is not found.
After reinstalling MS Configurator, restart the PC again.

Change to Memory Mode. (System X)

This is displayed when the adjustment is executed with operation mode of NC other than the memory mode set.
Set the NC operation mode of the part system displayed in the part system X to the memory mode.

You can't select PLC axis or spindle. (Y axis)

This is displayed when the PLC axis and the spindle have been selected in the function which does not correspond to the PLC axis and the spindle.
Change a selected axis.

You can't select synchronous axis. (Y axis)

This is displayed when the synchronous axis has been selected in the function which does not support the synchronous axis.
Change a selected axis.

You can't select slave axis. (Y axis)

This is displayed when the secondary axis have been selected in the function which does not correspond to the secondary axis.
Change a selected axis.

You can't select an axis to which drive unit is not connected. (Y axis)

This is displayed when the servo drive unit unconnected axis or spindle drive unit unconnected axis have been selected.
Change a selected axis.

NC has no free space for storing programs.

This is displayed when there is no empty area for the program preservation in NC.
Delete an unnecessary program with NC.

It's impossible to measure the speed command, current command of an axis that is set for the measurement of position command.

Change the measurement items or the axes to be measured. (Axis name)

This is displayed when the measurement target axis and measurement items have been selected by the combination which cannot be measured when the target axis is a servo axis.
Change the measurement target axis or the measurement item to the combination which can be measured.

It's impossible to measure the speed command, current command, current feedback of an axis that is set for the measurement of position command.

Change the measurement items or the axes to be measured. (Axis name)

This is displayed when the measurement target axis and measurement items have been selected by the combination which cannot be measured when the target axis is a spindle.
Change the measurement target axis or the measurement item to the combination which can be measured.

A spindle is not connected to the NC.

This is displayed when the spindle is not connected with NC when the synchronous tapping error accuracy is measured.
Connect the spindle with NC, and start MS Configurator again.

Emergency stop or reset was input. The measurement is discontinued.

The emergency stop or reset was input.

The setting for the measurement target axis is not appropriate.

The default value is set to the measurement target axis.

The setting for the measurement is not appropriate.
Check the parameter of NC.

An error occurred while measuring. The measurement is discontinued.

Some abnormalities occurred while measuring. The measurement is discontinued.
Check the connection with NC. Check the state of NC (alarm and mode).

The data obtained by the frequency response measurement is abnormal.

The (sampling) data obtained at the Frequency response measurement is abnormal.
Measure again after check the connection with NC.

The amplitude of output signal obtained by the frequency response measurement is too small.

The amplitude of output signal that is obtained at the Frequency response measurement is too small.
Check the NC parameters. Check the vibration amount. Check the state (alarm and mode) of NC.

The time-series measurement data is incorrect.

Some abnormalities occurred while the chronological data measuring. The measurement is discontinued.
Check the NC parameters. Check the state (alarm and mode) of NC.

The measurement data of arc shape error is incorrect.

Some abnormalities occurred while the arc shape error measuring. The measurement is discontinued.
Check the NC parameters. Check the state (alarm and mode) of NC.

The synchronous tapping error data is incorrect.

Some abnormalities occurred while the synchronous tapping accuracy measuring. The measurement is discontinued.
Check the NC parameters. Check the state (alarm and mode) of NC.

The measurement data of arbitrary path is incorrect.

Some abnormalities occurred while measuring arbitrary path. The measurement is discontinued.
Check the NC parameters. Check the state (alarm and mode) of NC.

Enable the automatic tuning function. (NC parameter #1164 ATS)

The adjustment function or the measurement function was executed without setting the base specification parameter 1164 to "1".

Set the base specification parameter 1164 to "1" and then execute.

Enable the sampling data output. (NC parameter #1224 aux08 bit0)

The adjustment function or the measurement function was executed without setting the base specification parameter 1224 bit0 to "1".

Set the base specification parameter 1224 bit0 to "1" and then execute.

The sampling termination failed. Please stop driving, and push the OK button.

The sampling completion process failed as it was executed during the operation.
Cancel the operation and then press [OK] button.

The measurement target illegal. Control input/output signal is not selectable.

The control input/output signal was selected as a measurement target with NC which does not support the control input/output signal.

Execute with NC which supports to the control input/output signal.

The measurement target illegal. You can't select SP axis.

The spindle was selected as a measurement target with NC which does not support the spindle.

Execute with NC which supports to the spindle.

The measurement target illegal. You can't select PLC axis.

The PLC axis was selected as a measurement target with NC which does not support the PLC axis.

Or NC is in a state where PLC axis cannot be selected as a measurement target.

Execute with NC which supports the PLC axis.

When NC corresponds to the PLC axis, cancel the operation if it is in automatic operation. Close the dialog and then try again.

Message of Advance situation screen

Preparing the measurement.

The preparation for measurement is executed.
 Wait for a while until the preparation is completed.

Measurement ready to start. Press the "automatic start" button.

MS Configurator is waited that the automatic start button is pressed.
 Press the automatic start button.

Measuring.

The measurement is executing now.
 Wait for a while until the measurement is completed.

Measurement completed. Click the "Close" button.

The measurement ended.
 Press the "Close" button.

Cancel the measurement?

The cancel button was pressed while measuring.
 If the measurement is ended, press "Yes" button. If the measurement is not ended, press "Cancel" button.

5.3 Message of Graph Function

Input the integer

This is displayed when an invalid value is input when the graph arrangement is set.
Input the integer from 1 to 10.

Input value is invalid

This is displayed when an invalid value is input.
Input a normal value.

The number of plots is exceeding the maximum displayable number (20 plots)

This is displayed when the displayed plot exceeds the MAX value when the data is read.
Display in another graph.

Reading/Writing of the file failed.

This is displayed when opening a file or attempting to save but failed.
Check whether the device is inserted or read/write is prohibited.

Revision History

| Date of revision | Manual No. | Revision details |
|------------------|-----------------|--|
| Dec. 2005 | IB(NA)1500154-A | First edition created. |
| Jul. 2006 | IB(NA)1500154-B | <ul style="list-style-type: none"> - Corresponding to MS Configurator version "A0". - The section "2. Installation Method" was revised overall. - Mistakes were corrected. |
| Mar. 2008 | IB(NA)1500154-C | <ul style="list-style-type: none"> - Corresponding to MS Configurator version "A2". - The old section "1. Outline" was revised overall as "1. Introduction". - The old section "3.3 Automatic Adjustment" was revised overall as "3.4 Servo Automatic Adjustment". - The old section "3.3 Automatic Adjustment" was revised overall as "3.4 Servo Automatic Adjustment". - The section "3.6 Graph Function of Tools" was added. - Mistakes were corrected. |
| Dec. 2010 | IB(NA)1500154-E | <ul style="list-style-type: none"> - Corresponding to MS Configurator version "A5". - The old section "3.2.2 Vibration Signal Setup" was deleted. - The old section "3.4.1 Package Adjustment" was deleted. - "3.4 Servo Automatic Adjustment" was wholly revised. - "3.5 Measurement Function" was wholly revised. - The old section "3.6.1 Configuration of Screens" and "3.6.2 How to Use the Graph" were moved to "Graph Function in XY Mode". - "3.6.2 Graph Function in Time Mode" was added. |
| | | |

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Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

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MITSUBISHI CNC



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|------------|-----------------|
| MODEL | MS-Configurator |
| MODEL CODE | 008—378 |
| Manual No. | IB-1500154 |