

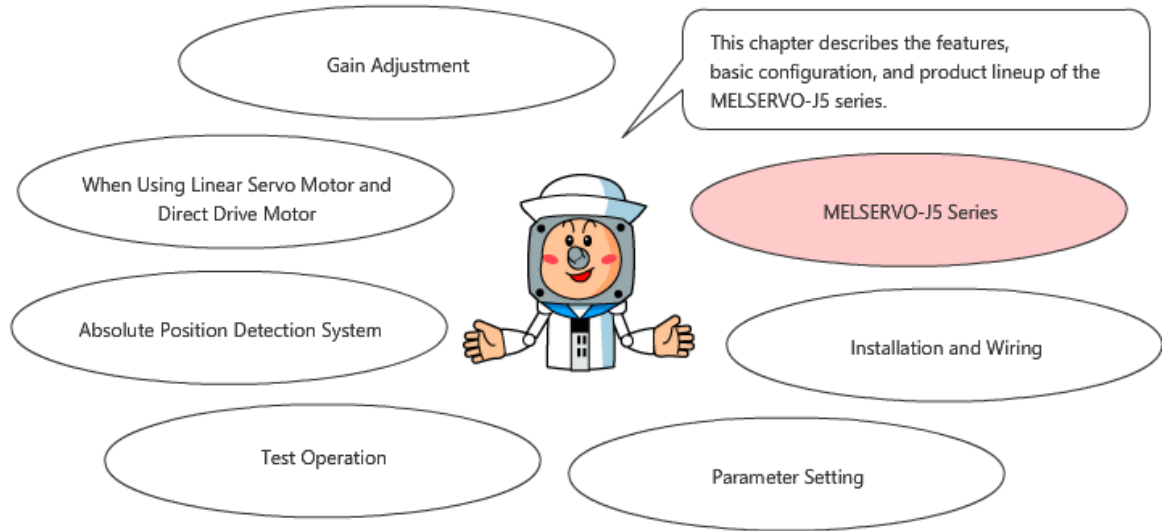
## Servo

# MELSERVO Basic (MR-J5)

This course is designed for anyone new to the MELSERVO-J5 series to learn about system design, installation, wiring, parameter setting, and tuning method.

Click the Forward button at the upper right corner to proceed to the next page.

This course is designed for anyone new to the MELSERVO-J5 series to learn about system design, installation, wiring, parameter setting, and tuning method.

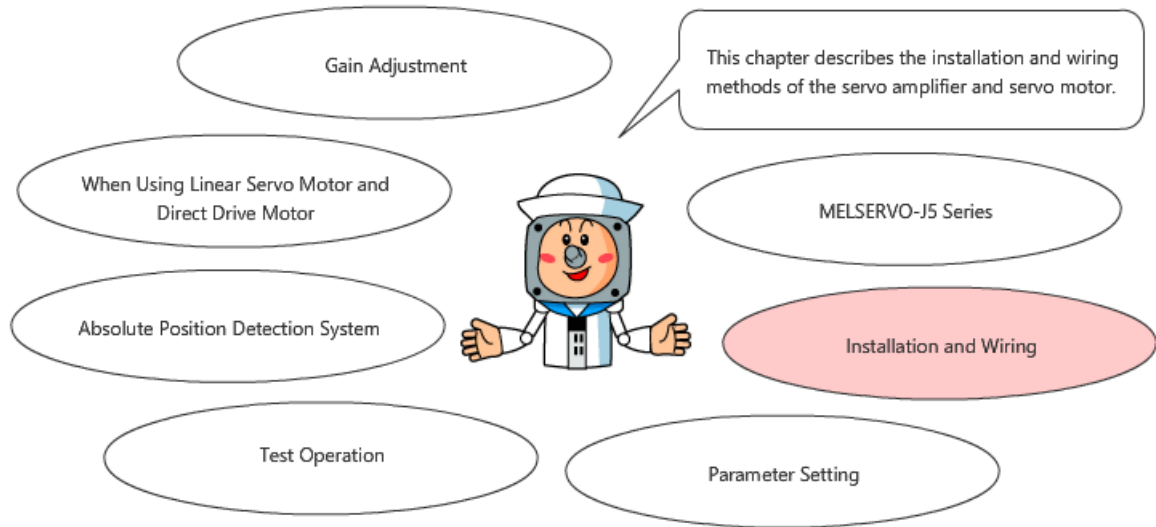


This course requires the basic knowledge of AC servos.

For beginners, taking the "FA Equipment for Beginners (Servos)" course is recommended.

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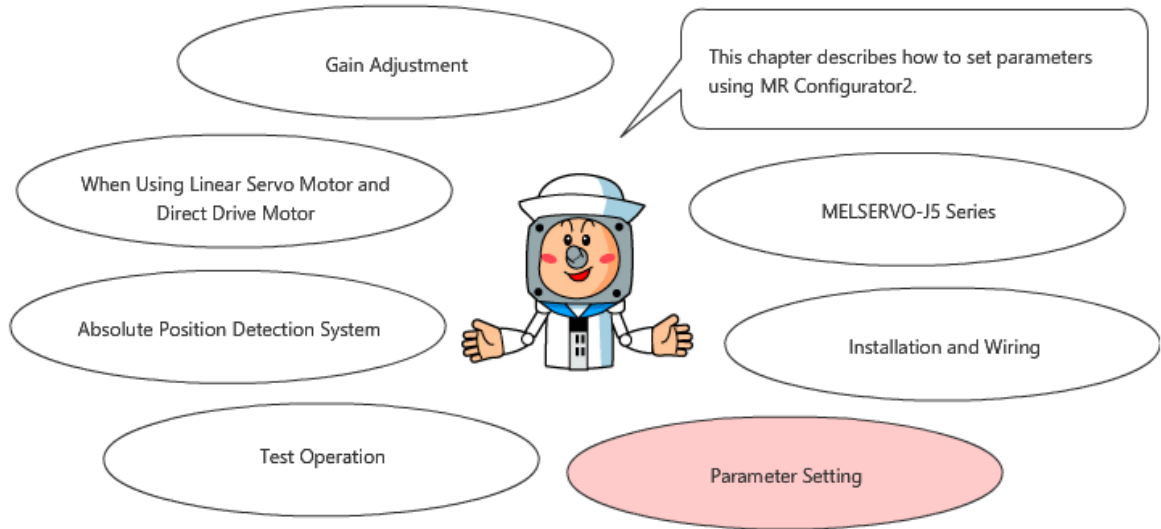


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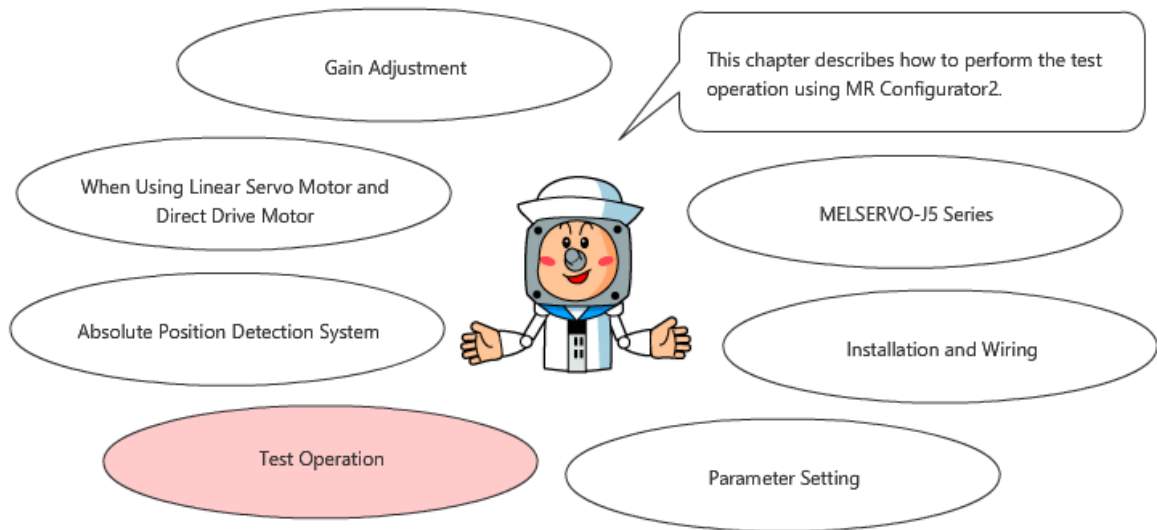
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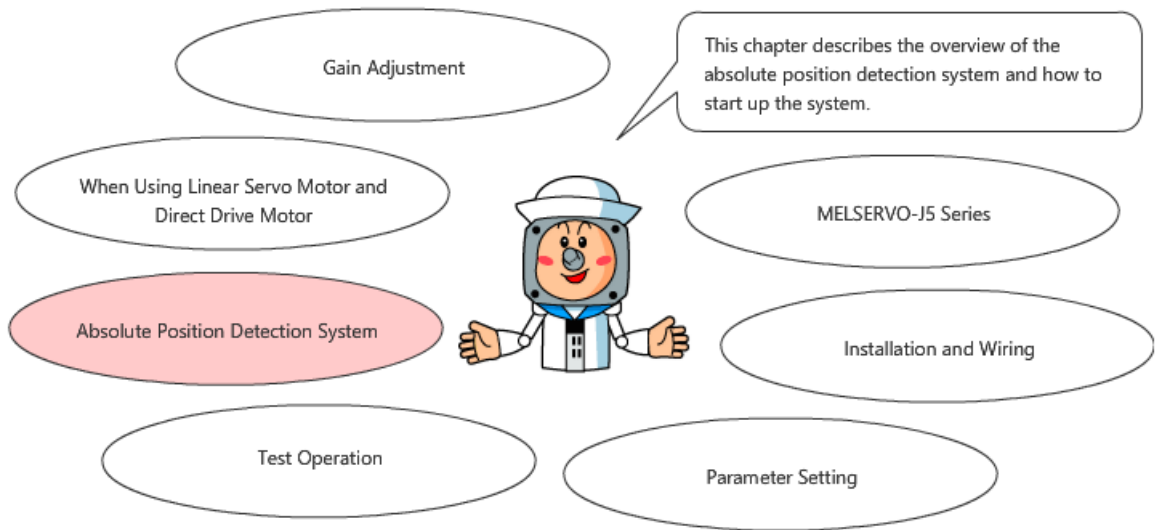


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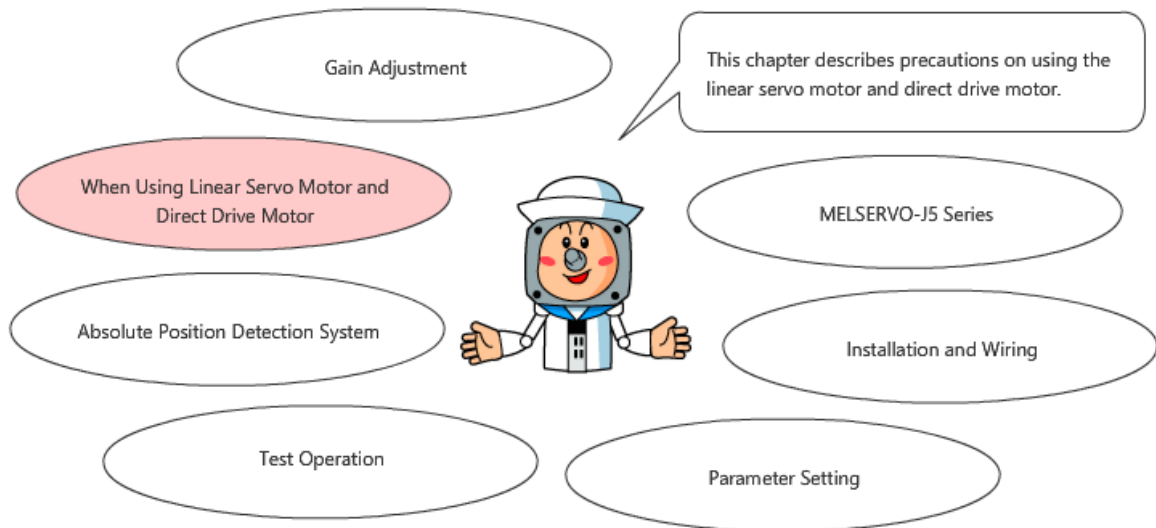


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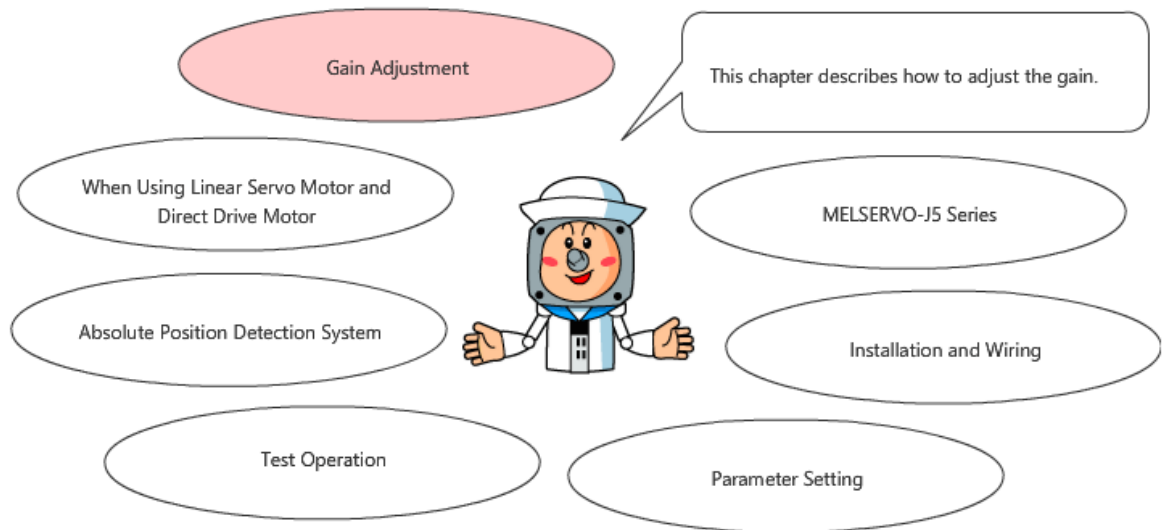


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The contents of this course are as follows.  
We recommend that you start from Chapter 1.

Chapter 1 MELSERVO-J5 Series

This chapter describes the features, basic configuration, and product lineup of the MELSERVO-J5 series.

Chapter 2 Installation and Wiring

This chapter describes the installation and wiring methods of the servo amplifier and servo motor.

Chapter 3 Parameter Setting

This chapter describes how to set parameters using MR Configurator2.

Chapter 4 Test Operation

This chapter describes how to perform the test operation using MR Configurator2.

Chapter 5 Absolute Position Detection System

This chapter describes the overview of the absolute position detection system and how to start up the system.

Chapter 6 When Using Linear Servo Motor and Direct Drive Motor

This chapter describes precautions on using the linear servo motor and direct drive motor.





Chapter 7 Gain Adjustment

This chapter describes how to adjust the gain.

Final Test

6 sections in total (12 questions) Passing grade: 60% or higher

## Introduction How to Use This e-Learning Tool

Go to the next page		Go to the next page.
Back to the previous page		Back to the previous page.
Move to the desired page		"Table of Contents" will be displayed, enabling you to navigate to the desired page.
Exit the learning		Exit the learning. Window such as "Contents" screen and the learning will be closed.

## ■Safety precautions

When you learn based on using actual products, please carefully read the safety precautions in the corresponding manuals and handle the product properly while taking all precautions for safety.


## ■Precautions in this course

The displayed screens of the software version that you use may differ from those in this course.

This course is for the following software versions.

For the latest version of each software, check the Mitsubishi Electric FA Website.

MELSOFT MR Configurator2      Ver.1.125F

The  icon indicates the reference manual.

Refer to the manuals corresponding to the types of the servo amplifier and servo motor used.

The contents of the manuals described in this course are those of the following versions.

If the versions differ, the location of description and contents may be slightly different.

For the latest version of manuals, check the Mitsubishi Electric FA Website.

Manual name	Manual No.	Version
MR-J5-A User's Manual (Introduction)	SH-030296	G
MR-J5-G/MR-J5W-G User's Manual (Introduction)	SH-030294	G
MR-J5 User's Manual (Hardware)	SH-030298	H
MR-J5 User's Manual (Function)	SH-030300	G
MR-J5 User's Manual (Adjustment)	SH-030306	F
MR-J5-A User's Manual (Parameters)	SH-030310	F
MR-J5-G/MR-J5W-G User's Manual (Parameters)	SH-030308	G
MR-J5D User's Manual (Hardware)	IB-0300548	B
MR-J5D-G User's Manual (Introduction)	IB-0300538	B
MR-J5 User's Manual (Troubleshooting)	SH-030312	G
Rotary Servo Motor User's Manual (For MR-J5)	SH-030314	G
Linear Servo Motor User's Manual (LM-H3/LM-U2/LM-F/LM-K2)	SH-030316	C
Direct Drive Motor User's Manual	SH-030318	C
MR-J5 Partner's Encoder User's Manual	SH-030320	F

The MELSERVO-J5 series is the industry's highest level AC servo, further evolved from our original dedicated engine. In this course, you will learn how to construct a servo system using MELSERVO-J5 and its parameter setting and tuning.

This course explains the contents common to MR-J5-A (hereinafter referred to as Type A) compatible with the general-purpose interface and MR-J5-G/MR-J5W-G/MR-J5D-G (hereinafter referred to as Type G) compatible with CC-Link IE TSN.

For Type G, the case where a CC-Link IE TSN-compatible controller is connected is explained. It is explained in MELSEC iQ-R Series Motion Module Basics Course as well. Take the course as well.



MR-J5-10A



MR-J5-10G



MR-J5W3-222G

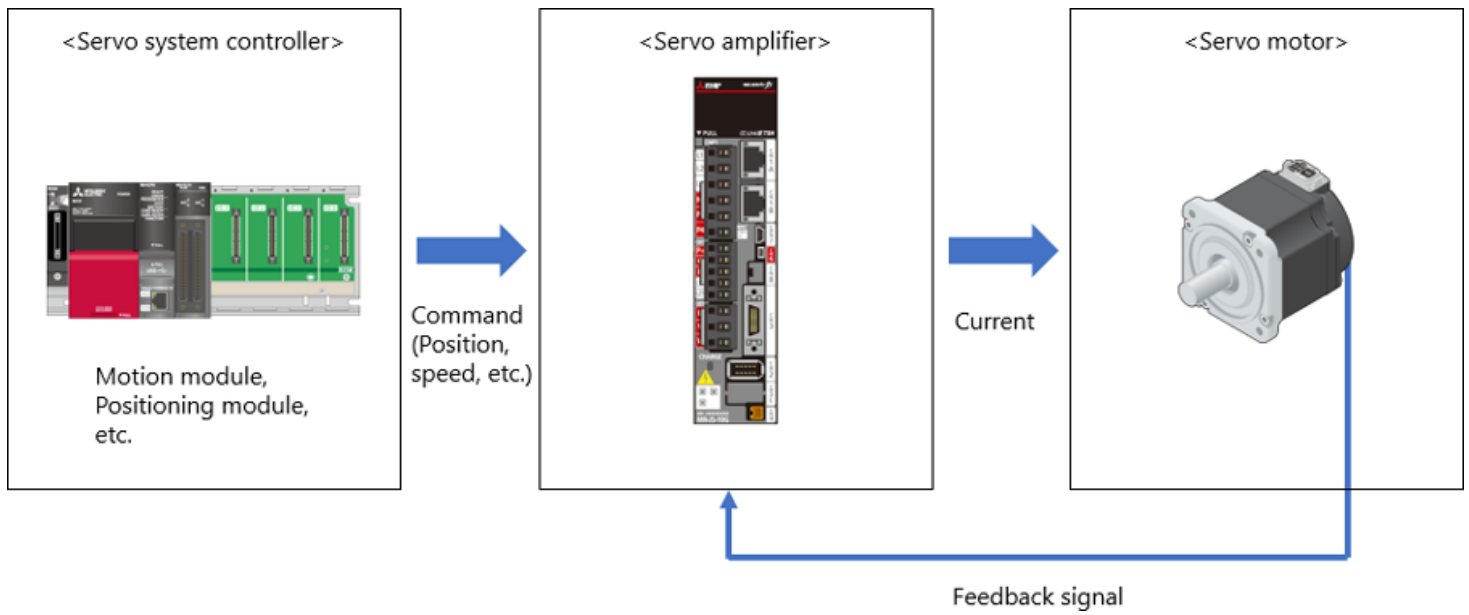
MR-CV11K4 +  
MR-J5D-100G4



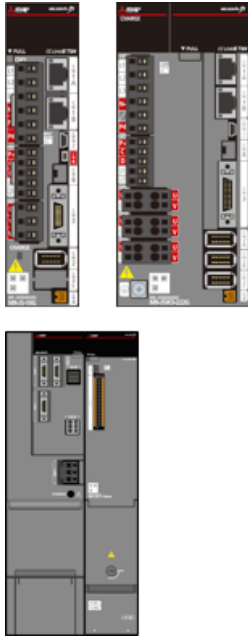

A servo system consists of a servo system controller, a servo amplifier, and servo motor.

The servo motor is equipped with an encoder, which feeds back the rotation position to the servo amplifier.

When a target value (such as position or speed) is input from the controller, the servo system detects the current value (such as position or speed), compares it with the target value, and always controls the servo motor rotation to reduce the difference.



The servo amplifier MR-J5 series has the following types depending on the command interface (connection method with the controller).

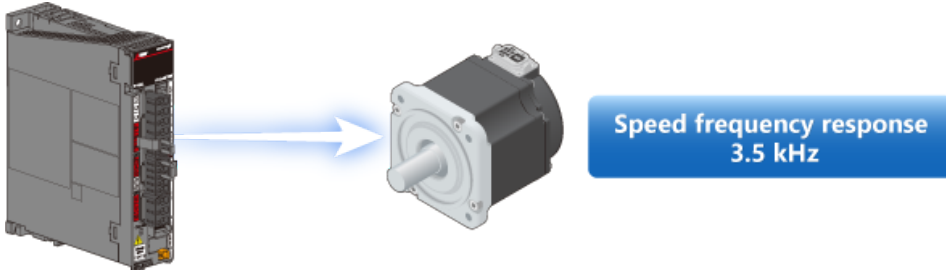
Model	Command interface	Feature
MR-J5-_G MR-J5W_-_G MR-J5D_-_G4 	CC-Link IE TSN	<ul style="list-style-type: none"> <li>• It supports CC-Link IE TSN, an Ethernet-based, high-speed, and high-capacity communication (1 Gbps).</li> <li>• Combined with a Motion module and motion control software, it realizes accurately synchronized motion among axes and devices with high-speed and high-precision time synchronization.</li> <li>• The 2-axis and 3-axis servo amplifiers MR-J5W_ are also available.</li> <li>• The 400 V class converter separate type drive unit MR-J5D_ is newly added.</li> </ul>
MR-J5-_A 	Pulse train, Analog voltage, etc.	<ul style="list-style-type: none"> <li>• It can be connected with a wide variety of controllers such as a pulse generator and positioning module.</li> <li>• It supports the maximum command pulse frequency of 4 Mpps.</li> <li>• Speed control and torque control are also possible by analog voltage command.</li> </ul>

The following describes the items that have been upgraded or newly added from the servo amplifier MR-J4 series.

### 1. Improved basic performance

High responsiveness ··· Speed frequency response 3.5 kHz

High speed communication ··· Minimum communication cycle 31.25  $\mu$ s (For CC-Link IE TSN)

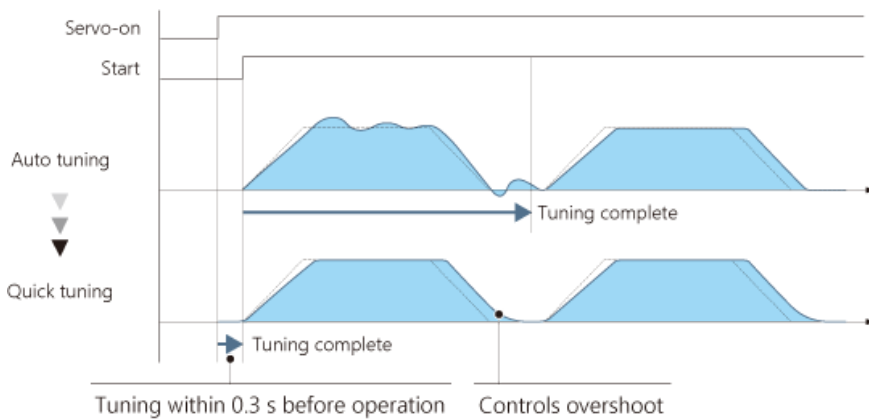


### 2. Plenty of tuning functions

#### ●Quick tuning

This function automatically performs easy-to-use auto tuning that controls vibration and overshoot just by turning on the servo-on command.

Before normal operation, the servo amplifier sets control gain and machine resonance suppression filters in 0.3 seconds by inputting torque to the servo motor automatically. After completing the setting, the servo amplifier starts operation normally.

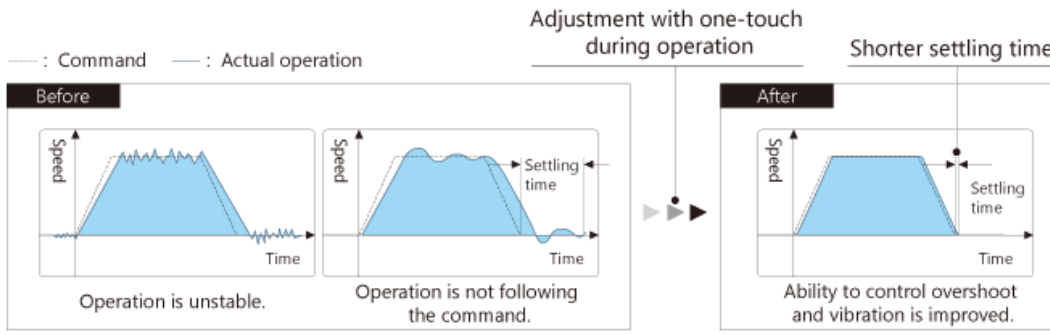


#### ●One-touch tuning

This function automatically performs adjustment according to the mechanical characteristics and reduces the settling time just by turning on the one-touch tuning.

It completes the servo gain adjustment including the machine resonance suppression filter, advanced vibration suppression control II, and robust filter.

Overshoot suppression and vibration control are enhanced to further improve your machine performance.



The difference between the quick tuning and one-touch tuning is explained in 7.1.

### 3. Predictive maintenance, preventive maintenance, corrective maintenance

To continue production at a factory, it is necessary to perform the following:

- 1) **Predictive maintenance** to diagnose signs of problems in all the equipment, devices, and lines,
- 2) Periodic preventive maintenance, and
- 3) **Corrective maintenance** for immediate recovery in the event of a failure or stop.

#### Predictive maintenance

Predicts signs of failure or stoppage for maintenance

Machine diagnosis function

#### Preventive maintenance

Performed when the operating hours and operating conditions reach the specified values

Servo amplifier life diagnosis function

Machine total travel distance failure prediction

#### Corrective maintenance

Performed on faulted or stopped equipment by promptly identifying the causes for restarting operation

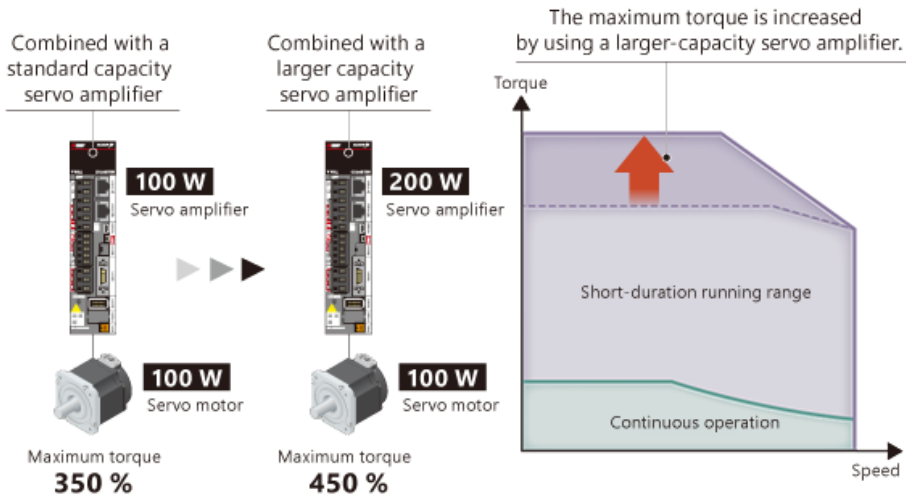
Drive recorder

Machine log/video/system recorder

The following describes the items that have been upgraded from the conventional model.

1. Extended combination with servo amplifiers

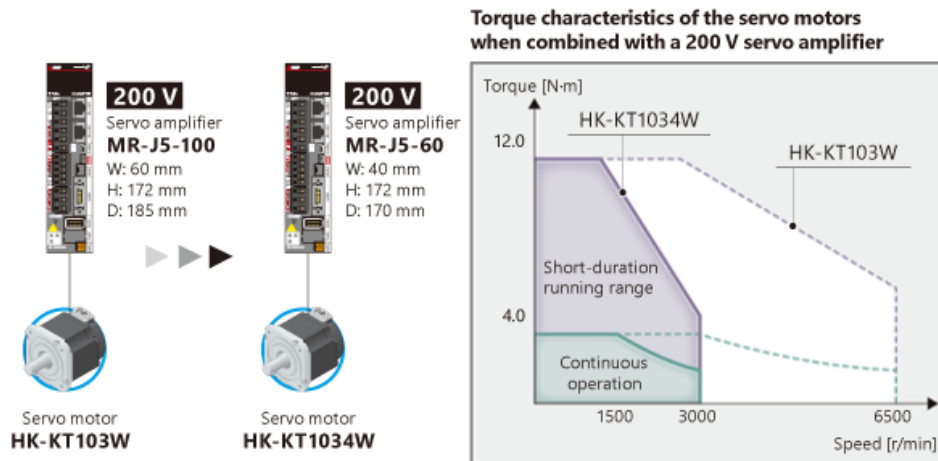
The maximum torque can be increased by combining the servo motor and a servo amplifier with a larger capacity as well as the one with the same capacity as that of the servo motor.



2. Compatible with both 200 V and 400 V

A servo motor which is compatible with 400 V as standard can be driven by a 200 V servo amplifier.

If satisfactory operation can be performed with the torque characteristics of the combination with a 200 V servo amplifier, the capacity of the servo amplifier can be reduced.



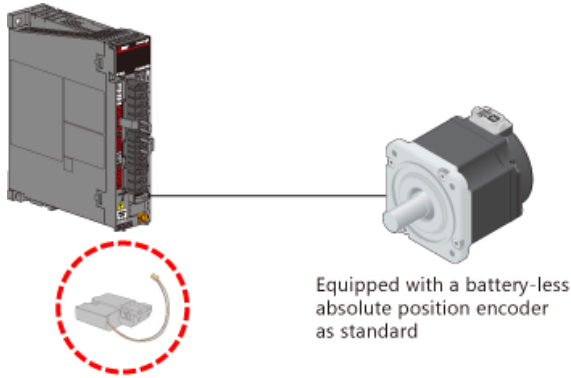
### 3. Equipped with a 26-bit resolution battery-less absolute position encoder

The resolution has been increased to 26 bits (67108864 pulses per revolution).

Adoption of a battery-less absolute position encoder has eliminated the need for a battery to retain the absolute position data.

The battery replacement and stock control are not required.

The absolute position system is explained in Chapter 5.



**Battery not required**

Equipped with a battery-less absolute position encoder as standard

### 4. Single connector

The HK-KT/MT series and some of the HK-RT series use the single connector which combines the servo motor power supply, encoder, and electromagnetic brake into a single cable.

The one-touch lock makes wiring easy.

Depending on the wiring condition, the single/dual cable type can be selected.

#### Horizontally mounted single cable type with one-touch lock



In the direction of the load side

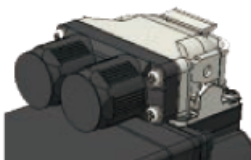


In the opposite direction of the load side

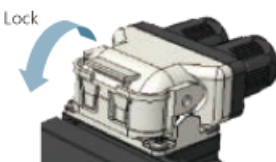
#### Vertically mounted single cable type with one-touch lock



#### Horizontally mounted dual cable type with one-touch lock



In the direction of the load side



In the opposite direction of the load side

#### Vertically mounted dual cable type with one-touch lock

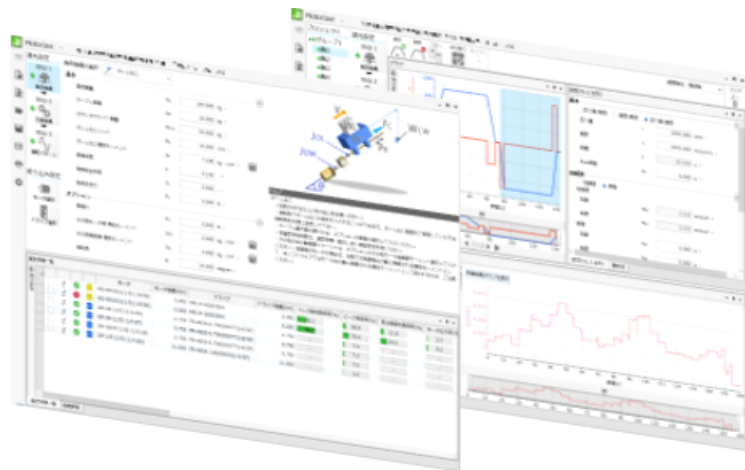
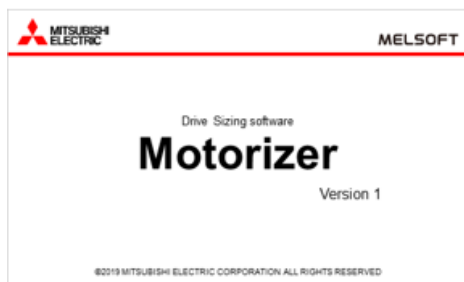


MELSOFT Motorizer is software that provides available motor options according to the entered information on the configuration, specifications, and operation patterns of the machine.

In addition to the AC servo, the inverter and sensorless servo can be selected.

This software also supports multi-axis selection, enabling you to select the capacities of the simple converter and power regeneration common converter.

The software and instructions can be downloaded at the Mitsubishi Electric [FA Website](#).



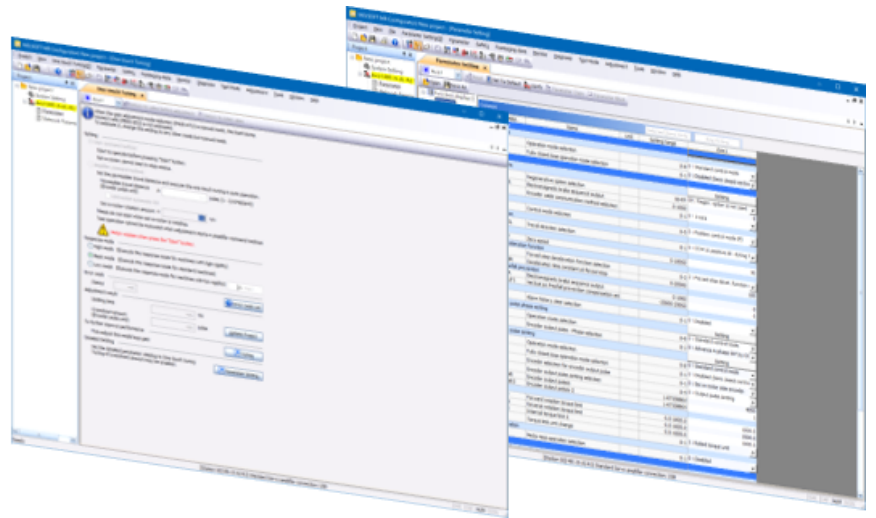


MELSOFT MR Configurator2 is software that supports all the phases of the servo amplifier from the startup to maintenance. It facilitates the parameter setting, monitor display, test operation, servo tuning, and other operations. The servo assistant function allows even beginners to use the most appropriate functions for their operation procedure.

In this course, this software is used for explaining the parameter setting and gain adjustment.

MR Configurator2 is bundled with MELSOFT GX Works3.

Anyone who purchased MELSOFT iQ Works, GX Works2, MT Works2, EM Software Development Kit, or CW Configurator can download MR Configurator2 for free.



In this chapter, you have learned:

- Servo System Configuration
- Types of Servo Amplifier MR-J5
- Features of Servo Amplifier MR-J5 Series
- Features of Servo Motor HK Series
- Engineering Software

Important points

Servo System Configuration	<ul style="list-style-type: none"> <li>• A servo system consists of a servo system controller, a servo amplifier, and servo motor.</li> <li>• The rotation position of the servo motor is fed back to the servo amplifier by the encoder.</li> <li>• It controls the servo motor to reduce the difference between the command value and current value.</li> </ul>
Types of Servo Amplifier MR-J5	<ul style="list-style-type: none"> <li>• Type G for CC-Link IE TSN</li> <li>• Multi-axis type MR-J5W_ and 400 V class converter separate type MR-J5D_ are also available.</li> <li>• Type A for the general-purpose interface such as a pulse train.</li> </ul>
Features of Servo Amplifier MR-J5 Series	<ul style="list-style-type: none"> <li>• Speed frequency response is 3.5 kHz.</li> <li>• Various tuning functions are provided.</li> <li>• Many useful functions are provided for preventive maintenance, predictive maintenance, and corrective maintenance.</li> </ul>
Features of Servo Motor HK Series	<ul style="list-style-type: none"> <li>• Extended combination with servo amplifiers</li> <li>• Compatible with both 200 V and 400 V</li> <li>• Equipped with a 26-bit resolution battery-less absolute position encoder</li> <li>• Single connector</li> </ul>
Engineering Software	<ul style="list-style-type: none"> <li>• Drive System Sizing Software Motorizer allows you to select the capacities including the motor driven by the inverter as well as the servo.</li> <li>• MELSOFT MR Configurator2 is software that supports all the phases of the servo amplifier from the startup to maintenance.</li> </ul>

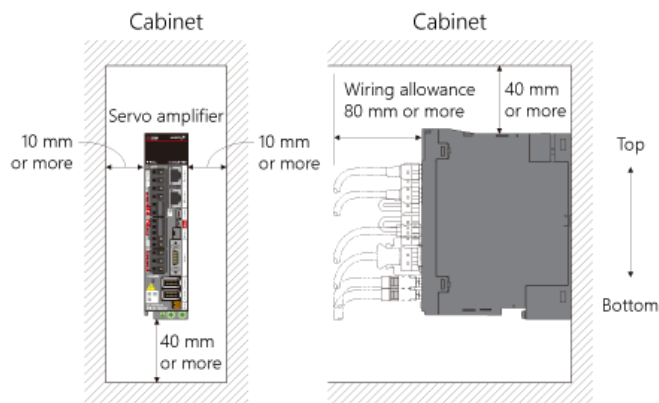
This chapter describes the wiring. For sake of simplicity, some wiring may be omitted in each wiring diagram. Be sure to read the user's manual of the model used to perform wiring correctly.

### 2.1 Installation of Servo Amplifier

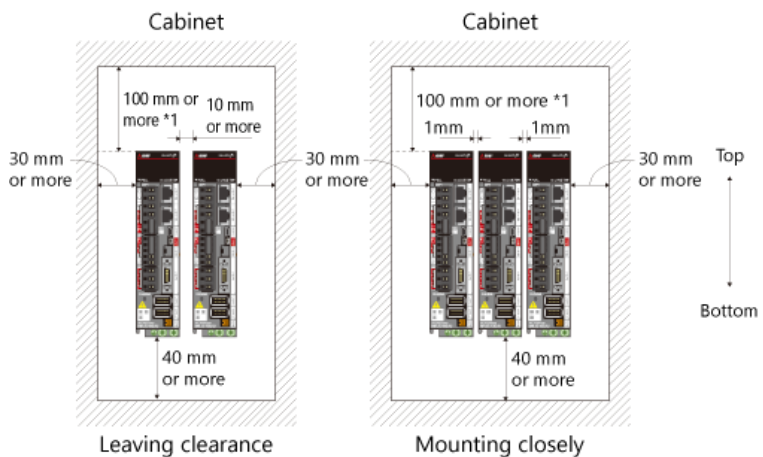
Install the servo amplifier in the cabinet.  
The following dimensions and precautions must be observed.

(1) MR-J5-A/MR-J5-G

#### ■ Installation of one servo amplifier



#### ■ Installation of two or more servo amplifiers



\*1 Leave a clearance of 100 mm or more above the fan units.

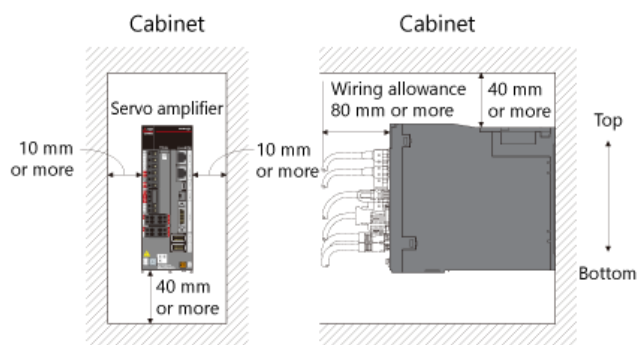
#### <Precautions>

- Install the servo amplifier right side up.
- Keep the ambient temperature within 0 °C to 60 °C. When the temperature exceeds 55 °C, circulate air so that the air at the top and bottom of the servo amplifier does not stagnate.
- Use the servo amplifiers in the specified environmental conditions, such as vibration and altitude.
- Provide an adequate protection to prevent the following matter from entering the servo amplifier: conductive matter such as screws and metal fragments, and combustible matter such as oil.
- When installing the cabinet in a place where toxic gas, dirt, and dust exist, conduct an air purge (force clean air into the cabinet from outside to make the internal pressure higher than the external pressure) to prevent such materials from entering the cabinet.
- For availability of close installation of the servo amplifier, check the specifications of the servo amplifier.
- When installing servo amplifiers in close to each other, leave a clearance of 1 mm between the adjacent servo amplifiers in consideration of installation tolerances.  
When installing servo amplifiers in this manner, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifiers with 75% or less of the effective load ratio.
- When servo amplifiers are installed in close to each other, the servo amplifier on the right must have a larger depth than that on the left. Otherwise, the CNP1, CNP2, and CNP3 connectors cannot be removed.

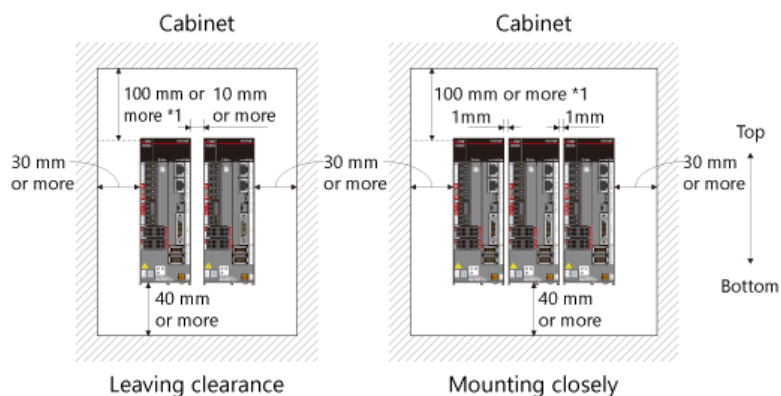
## 2.1 Installation of Servo Amplifier

(2) MR-J5W-G

### ■ Installation of one servo amplifier



### ■ Installation of two or more servo amplifiers



\*1 Leave a clearance of 100 mm or more above the fan units.

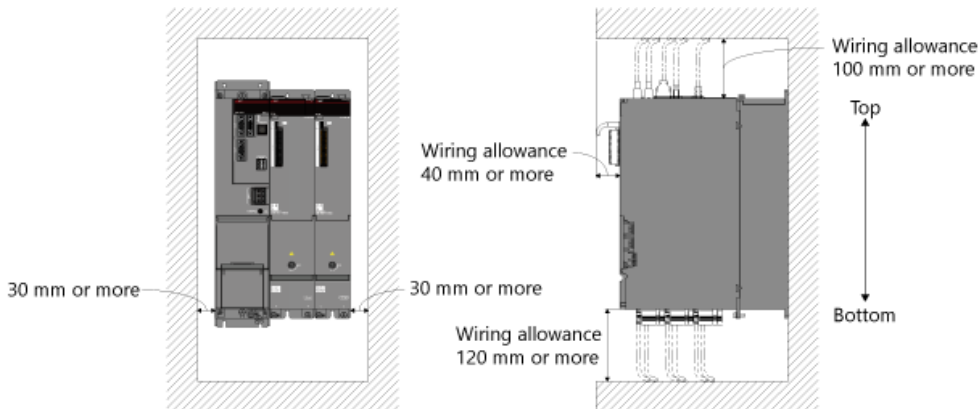
### <Precautions>

- Install the servo amplifier right side up.
- Keep the ambient temperature within 0 °C to 60 °C. When the temperature exceeds 55 °C, circulate air so that the air at the top and bottom of the servo amplifier does not stagnate.
- Use the servo amplifiers in the specified environmental conditions, such as vibration and altitude.
- Provide an adequate protection to prevent the following matter from entering the servo amplifier: conductive matter such as screws and metal fragments, and combustible matter such as oil.
- When installing the cabinet in a place where toxic gas, dirt, and dust exist, conduct an air purge (force clean air into the cabinet from outside to make the internal pressure higher than the external pressure) to prevent such materials from entering the cabinet.
- When installing servo amplifiers in close to each other, leave a clearance of 1 mm between the adjacent servo amplifiers in consideration of installation tolerances.

When installing servo amplifiers in this manner, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifiers with 75% or less of the effective load ratio.

## (3) MR-J5D-G

Connect the drive unit on the right of the power regeneration converter unit MR-CV\_K4.



## &lt;Precautions&gt;

- Install the converter unit and drive unit in the correct direction.
- To prevent malfunctions, maintain the specified clearances between the converter unit/drive unit and cabinet walls or other equipment.
- Circulate air so that the air at the top and bottom of the converter unit and drive unit does not stagnate.
- When using heat generating equipment, install it with full consideration of heat generation so that the converter unit and drive unit are not affected.
- Install the converter unit and drive unit right side up on a perpendicular wall.
- Use the servo amplifiers in the specified environmental conditions, such as vibration and altitude.
- Provide an adequate protection to prevent the following matter from entering the converter unit and drive unit: conductive matter such as screws and metal fragments, and combustible matter such as oil.
- When installing the cabinet in a place where toxic gas, dirt, and dust exist, conduct an air purge (force clean air into the cabinet from outside to make the internal pressure higher than the external pressure) to prevent such materials from entering the cabinet.

Connect the servo amplifier and servo motor.

Routing the servo motor power cable and encoder cable is required. (Note)

For a servo motor with an electromagnetic brake, wire the brake as well.

This course provides an example using optional servo motor power cable or connector set and encoder cable.

You can select the right options by using FA Integrated Selection Tool on the Mitsubishi Electric FA Website.

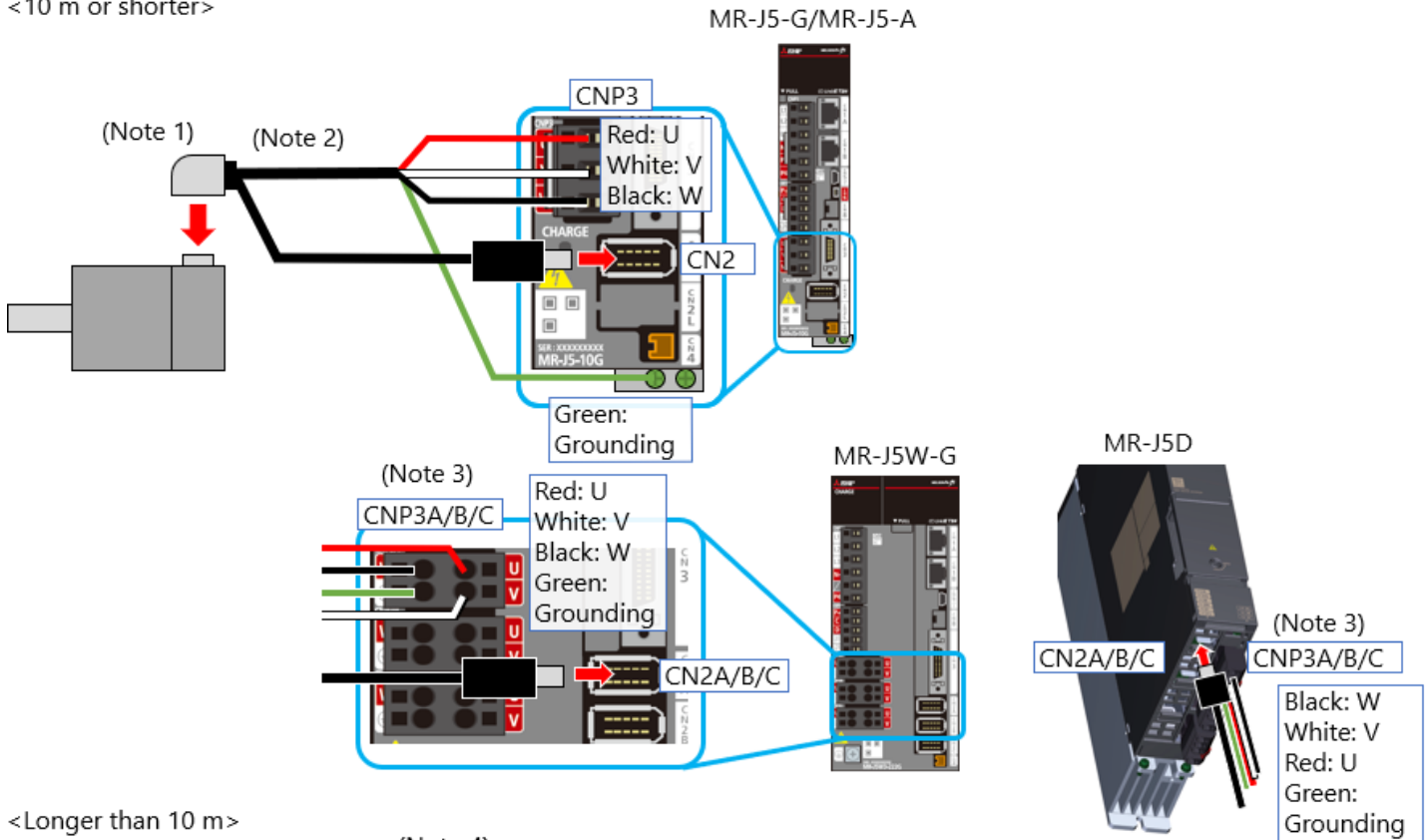
Click [here](#) for FA Integrated Selection Tool.

(Note) Depending on the type of the servo motor, the single cable type option is available that integrates the servo motor power cable, encoder cable, and electromagnetic brake cable.

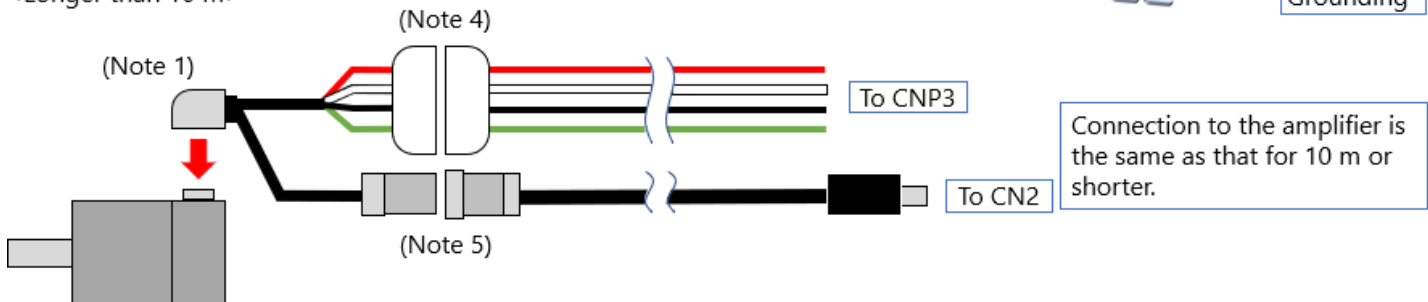
(1) Single connector type such as the HK-KT series

The option to be used and wiring method differ depending on whether the wiring length exceeds 10 m or not.

<10 m or shorter>



<Longer than 10 m>



(Note)

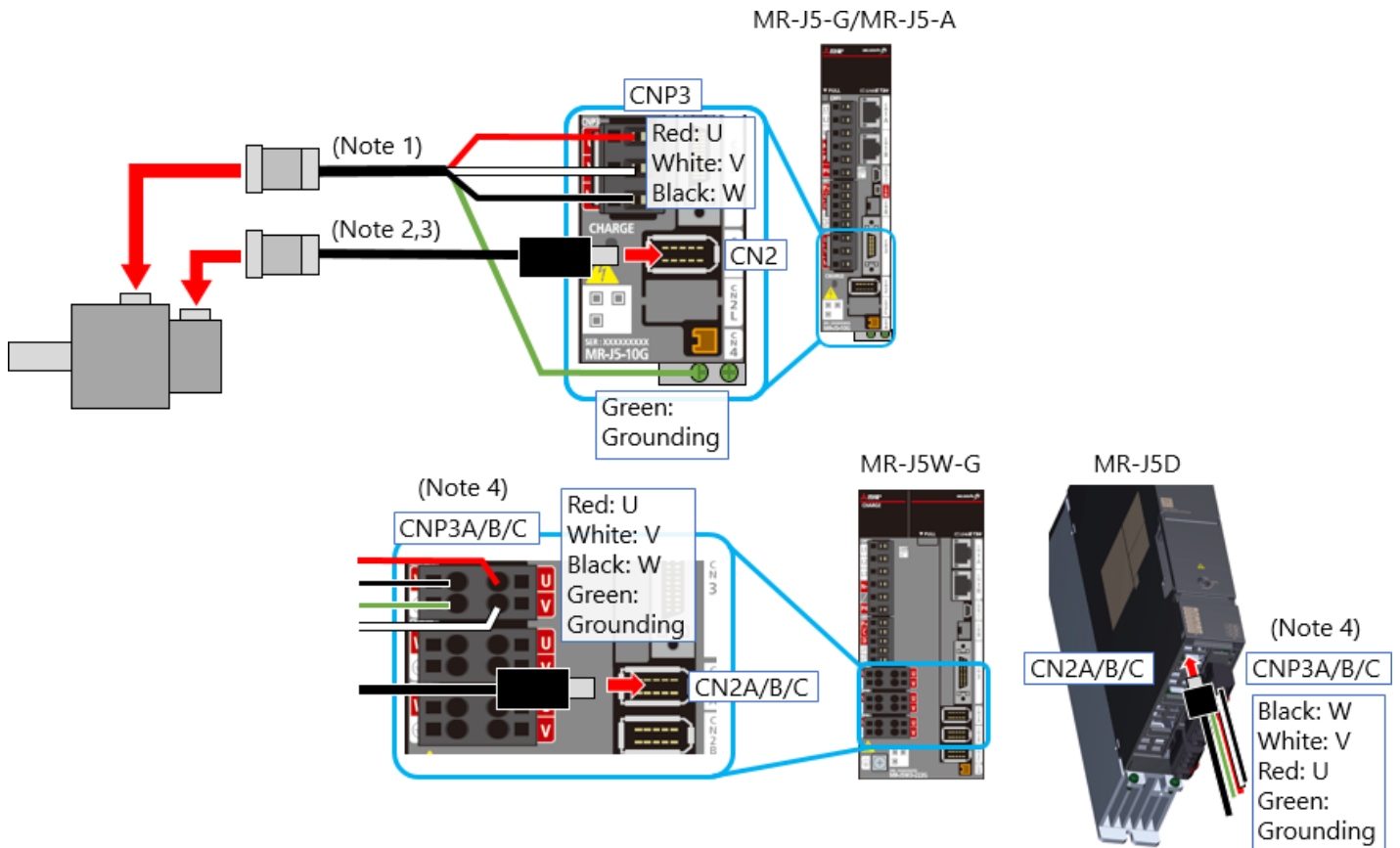
1. Select the cable direction from the load side, opposite to the load side, and vertical. The above figure is for the opposite to the load side.
2. For when the wiring length does not exceed 10 m, the single cable type option cable is available.
3. Perform wiring in such a way that the combination of the A-/B-/C-axis is correct. The above figure is for the A-axis.
4. Use connectors and terminal blocks that meet the required IP rating. Extension cables for the power supply should be fabricated by the customer.  
The wire size differs depending on the servo motor capacity. Always refer to Rotary Servo Motor User's Manual (For MR-J5) for correct wiring.
5. There are two options for the IP rating of the encoder relay connector: IP20 and IP65.  
Depending on which option is used, the option model name of the extension cable for the encoder differs.

#### [Important points]

For the single connector type servo motor, the single cable type option cable can be used when the wiring length does not exceed 10 m. Because the OD of this option cable is larger than the dual cable type option cable, use the dual cable type option cable when a smaller bend radius is required.

(2) Separate connector type such as the HK-ST series

The power cable should be fabricated by the customer using the optional connector set.



(Note)

1. The wire size to be used differs depending on the servo motor capacity. Always refer to Rotary Servo Motor User's Manual (For MR-J5) for correct wiring.
2. Use of an optional encoder cable is recommended. When fabricating the encoder cable, use the recommended product described in Rotary Servo Motor User's Manual (For MR-J5).
3. For fabricating the encoder cable, the angle type option connector is available.
4. Perform wiring in such a way that the combination of the A-/B-/C-axis is correct. The above figure is for the A-axis.



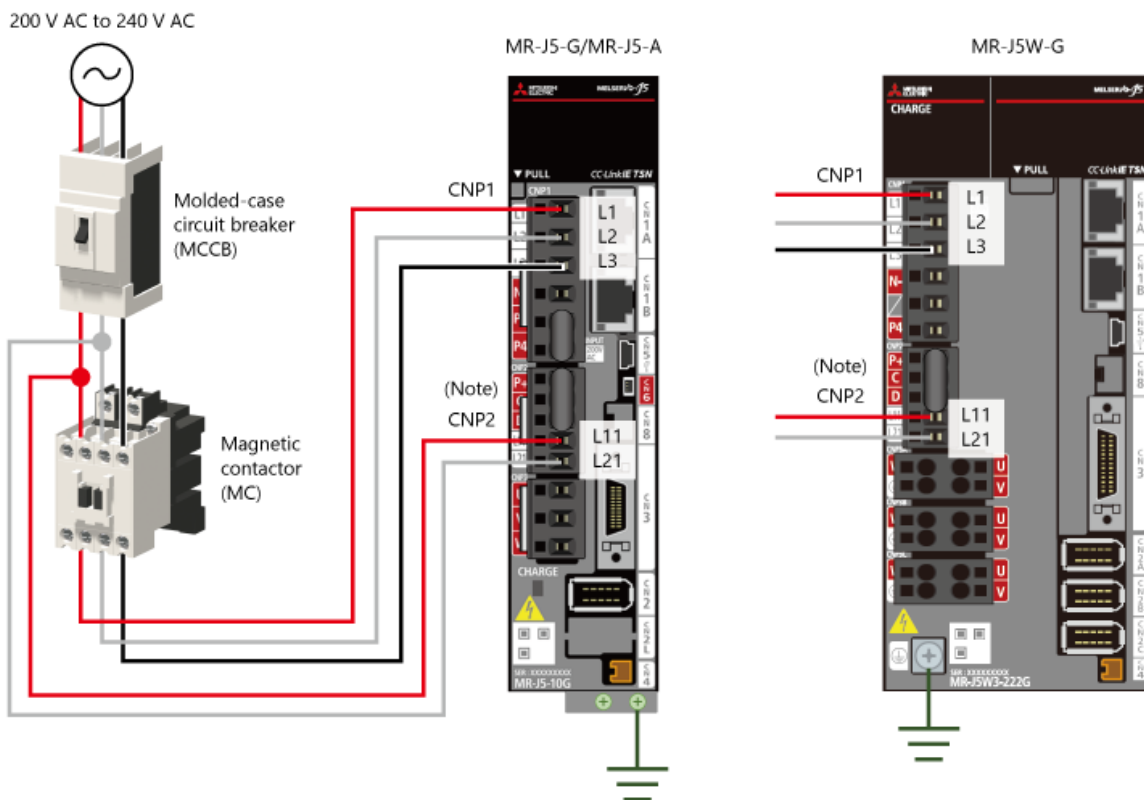
## (1) MR-J5-G/MR-J5-A/MR-J5W-G

Wire the power supply to the main circuit power supply (L1, L2, L3) and control circuit power supply (L11, L21) of the servo amplifier.

The following shows the schematic drawing for when the voltage of the power input is 200 V class. The actual wiring and applicable wire size differ depending on the capacity. For details, refer to the user's manual (hardware) of the servo amplifier.

Use a molded-case circuit breaker (MCCB) with the input cables of the main circuit power supply.

Always connect a magnetic contactor (MC) between the main circuit power supply and the L1/L2/L3 terminal of the servo amplifier, and perform wiring so that the main circuit power supply is turned off by turning off the magnetic contactor when the alarm output (ALM) or forced stop input (EM2) becomes open.



(Note)

Except for when the regenerative option is used, never disconnect the lead wired between P+ and D.

MR-J5 User's Manual (Hardware)

3 SIGNALS AND WIRING

3.3 Explanation of power supply system

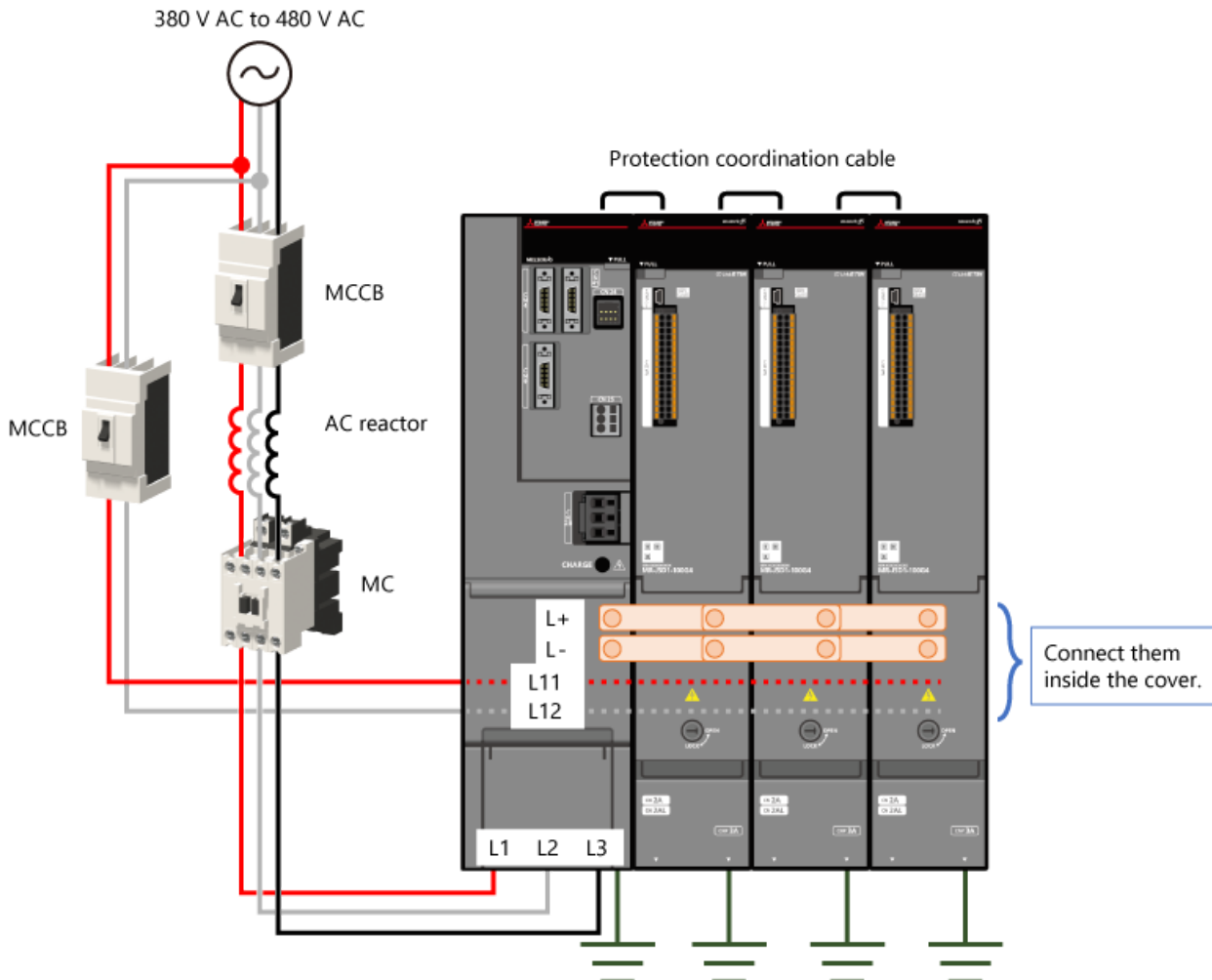
## (2) MR-J5D-G

Connect the power supply to the power regeneration converter unit MR-CV\_K4, and connect it with the drive unit MR-J5D\_-G4 using the option bus bar.

The bus bar varies depending on the combination of the power regeneration converter unit and the drive unit.

In addition, perform wiring for MC and wire the protection coordination cable.

For details, refer to the user's manual.



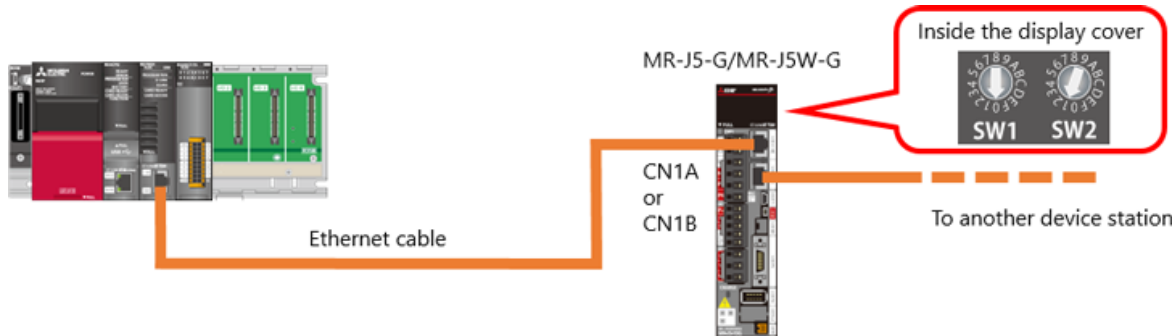
MR-J5D User's Manual (Hardware)  
 3 SIGNALS AND WIRING  
 3.3 Explanation of power supply system

The connection with the controller varies depending on the command interface of the servo amplifier.

(1) MR-J5-G/MR-J5W-G/MR-J5D-G (Note)

The controller is connected via CC-Link IE TSN.

Connect the controller and servo amplifier using an Ethernet cable that meets the standards listed below. In addition, set the station address using the rotary switches inside the cover of the display.



Communication speed	Ethernet cable	Connector	Standard
1Gbps	Category 5e or higher, (double shielded/STP) straight cable	RJ45 connector	Cable that meets the following standards. <ul style="list-style-type: none"> <li>• IEEE802.3(1000BASE-T)</li> <li>• ANSI/TIA/EIA-568-B (Category5e)</li> </ul>

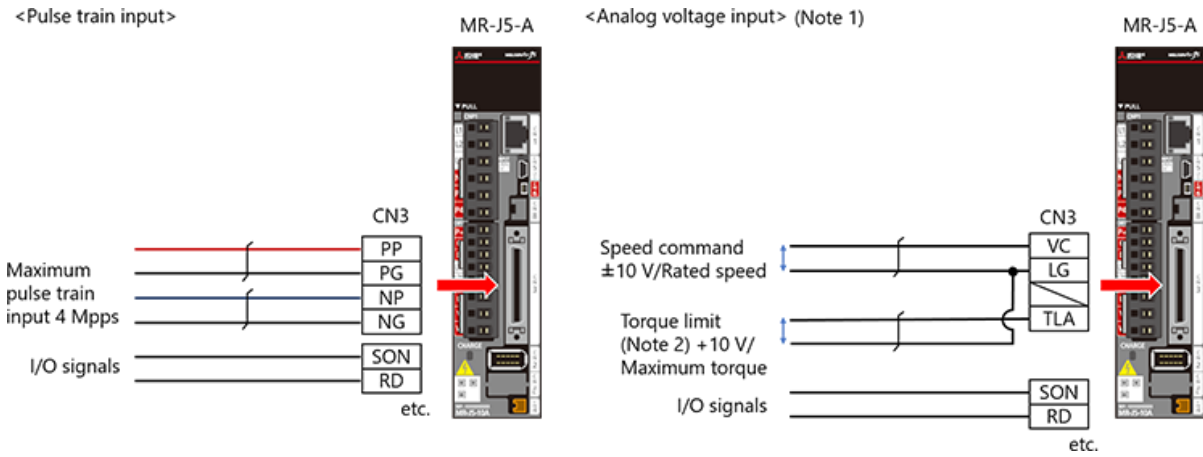
(Note) CN1A and CN1B of the MR-J5D-G drive unit are located on the top surface of the unit.

## (2) MR-J5-A

The command from the controller is input by pulse train input (position control) or analog voltage input (speed/torque control).

The required wiring varies depending on the controller specifications.

Check the manual and specifications of the controller for wiring.



(Note)

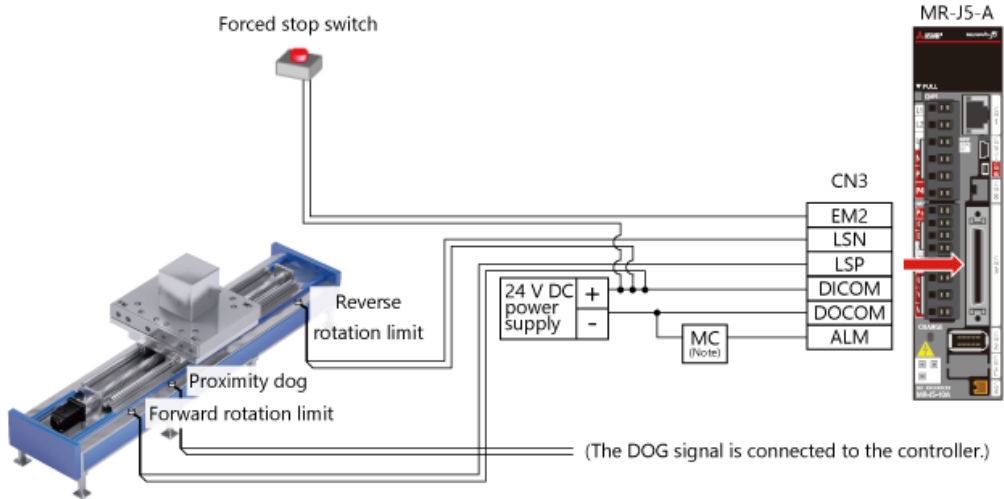
1. It is the wiring diagram for the speed control.
2. It can be used when the external torque limit is enabled in the parameter setting.

## (1) External I/O signals

Wire the hardware stroke limit signal, forced stop input, and others as necessary.

The following figure shows an example for Type A. For actual wiring, read the user's manual (hardware) thoroughly.

Please review equipment knowledge, safety information, and precautions before use.



(Note) Design the circuit so that MC is shut off when ALM turns off.

📖 MR-J5 User's Manual (Hardware)

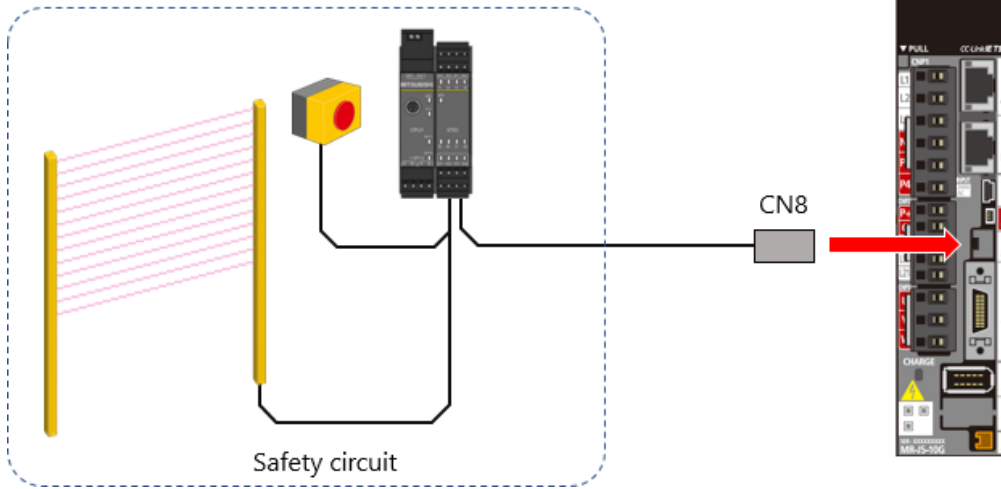
3 SIGNALS AND WIRING

3.2 Example I/O signal connections

(2) When using the STO function (Circuit for functional safety)

Connect an external safety circuit to CN8.

For details on the functional safety, refer to the user's manual (function).



[Important points]

When no external safety circuit is connected, do not remove the CN8 short-circuit connector supplied with the servo amplifier.

MR-J5 User's Manual (Function)  
6 FUNCTIONAL SAFETY

In this chapter, you have learned:

- Installation of Servo Amplifier
- Connecting Servo Motor and Servo Amplifier
- Wiring of Power Supply
- Connection with Controller
- Wiring of I/O Signals

Important points

Installation of Servo Amplifier	<ul style="list-style-type: none"> <li>• Always observe the vertical orientation and wiring allowance dimensions of the servo amplifier.</li> <li>• The specifications may be limited depending on the temperature condition and environmental conditions.</li> </ul>
Connecting Servo Motor and Servo Amplifier	<ul style="list-style-type: none"> <li>• The wiring method of the single connector type cable varies depending on whether the wiring length exceeds 10 m or not.</li> <li>• For a servo motor whose power connector and encoder connector are separated, fabricate the power cable by yourself. Use of an optional encoder cable is recommended.</li> </ul>
Wiring of Power Supply	<ul style="list-style-type: none"> <li>• Connect the power supply to the main circuit power supply and control circuit power supply of the servo amplifier.</li> <li>• Use a molded-case circuit breaker (MCCB) with the input cables of the main circuit power supply.</li> <li>• Always connect a magnetic contactor (MC) between the main circuit power supply and the L1/L2/L3 terminal of the servo amplifier, and perform wiring so that the main circuit power supply is turned off by turning off the magnetic contactor in the event of alarm occurrence or forced stop.</li> </ul>
Connection with Controller	<ul style="list-style-type: none"> <li>• Connect the G-type servo amplifier to the controller with an Ethernet cable that meets the CC-Link IE TSN standards.</li> <li>• For the A-type servo amplifier, the required wiring varies depending on the command method of the controller.</li> </ul>
Wiring of I/O Signals	<ul style="list-style-type: none"> <li>• Connect the hardware stroke limit and forced stop input to the servo amplifier as necessary.</li> <li>• Connect a safety circuit to CN8. When the functional safety is not used, do not remove the short-circuit connector attached with the servo amplifier.</li> </ul>

## Chapter 3 Parameter Setting

In this chapter and subsequent chapters, MR-J5-G/MR-J5-A will be explained unless otherwise noted.  
For MR-J5W-G and MR-J5D-G, some parameters may be different.  
For details, refer to the user's manual.

### 3.1 Servo Parameter Setting Method

The parameter of the servo amplifier is called servo parameter.  
The setting method of the servo parameter varies depending on the type of the servo amplifier.

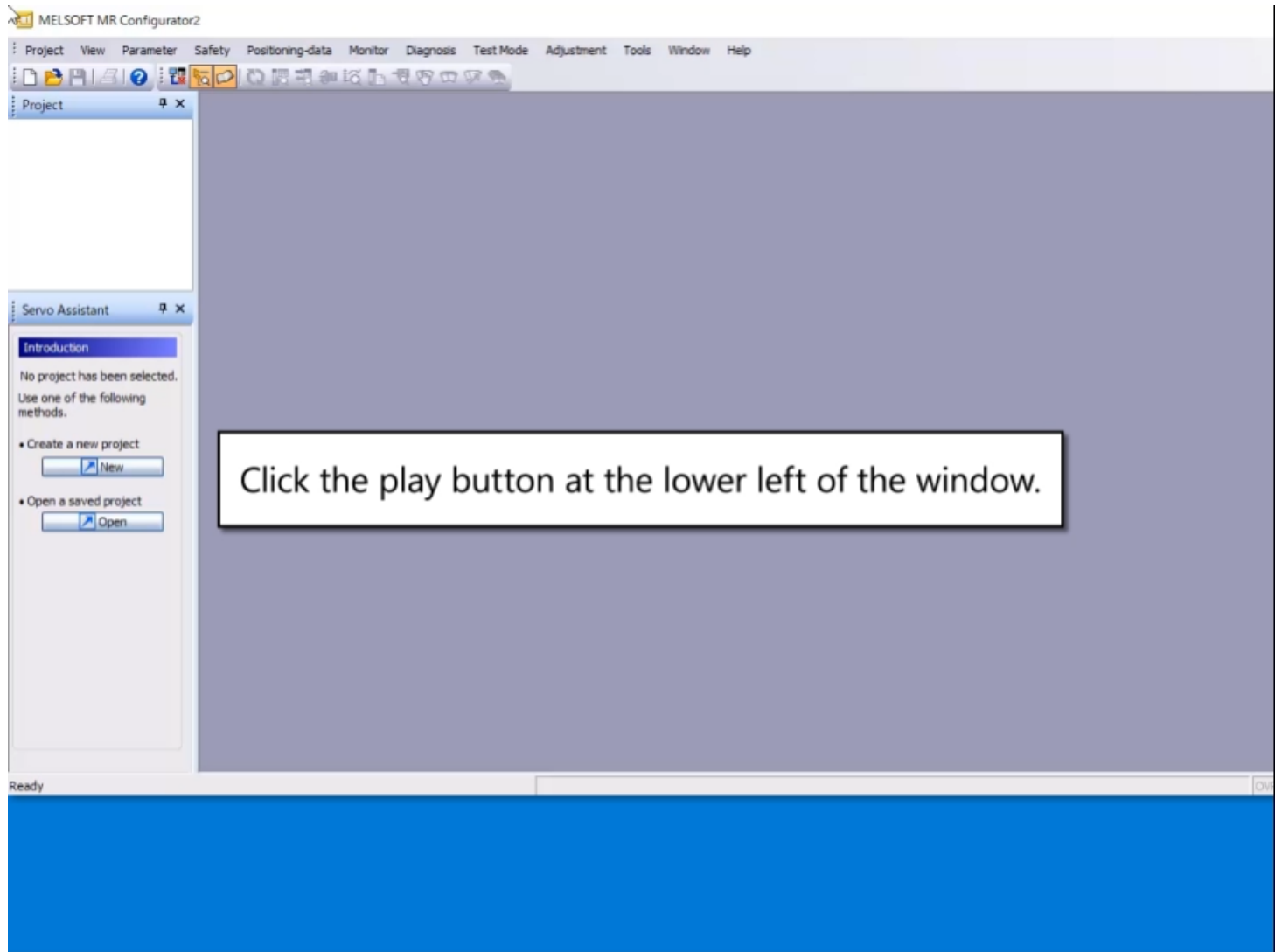
- Type A ... Set the servo parameter using the push buttons on the front of the servo amplifier or MR Configurator2.
- Type G ... Set the servo parameter from the controller side via a network or using MR Configurator2.

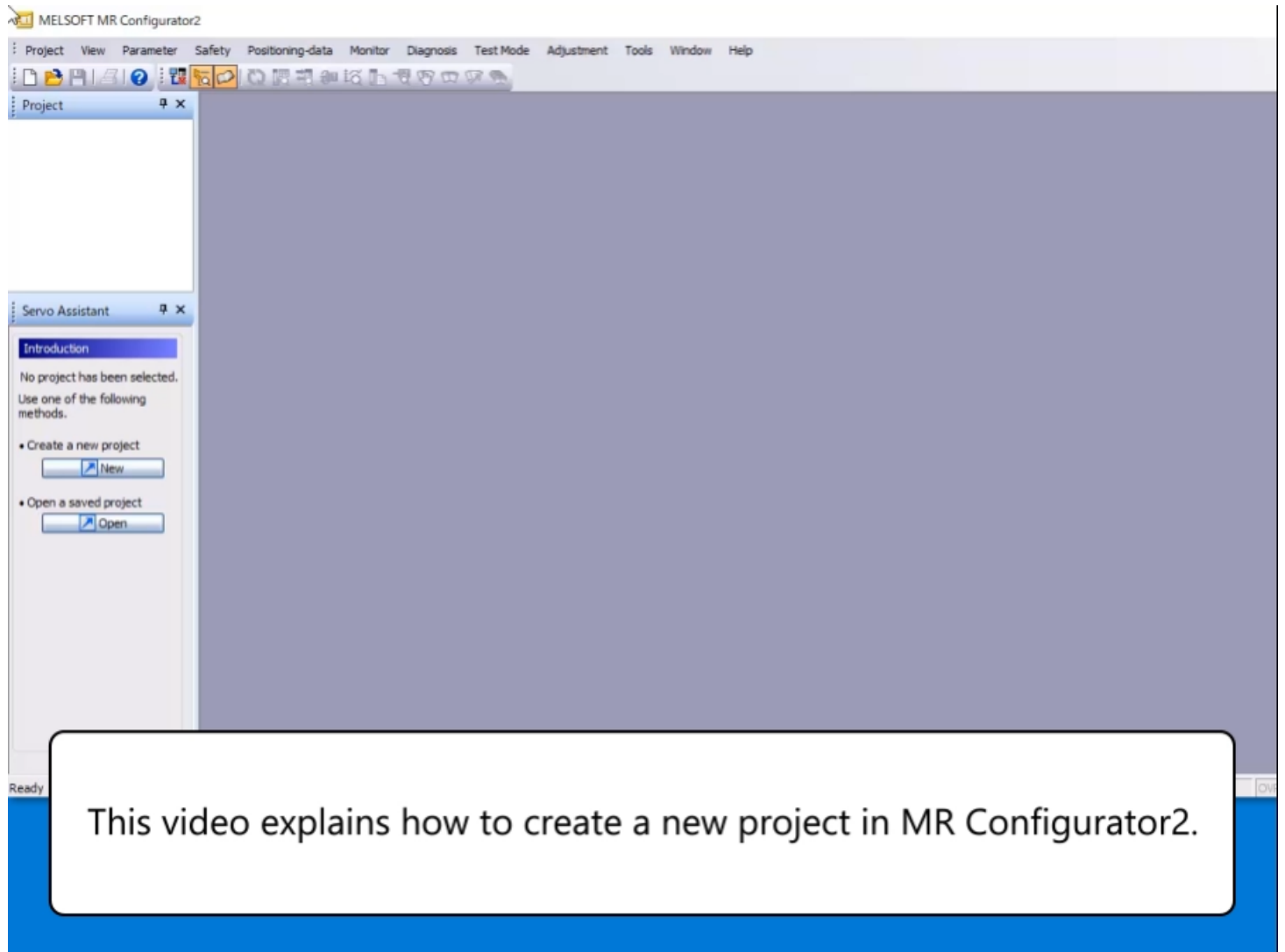
This course explains the setting method using MR Configurator2.

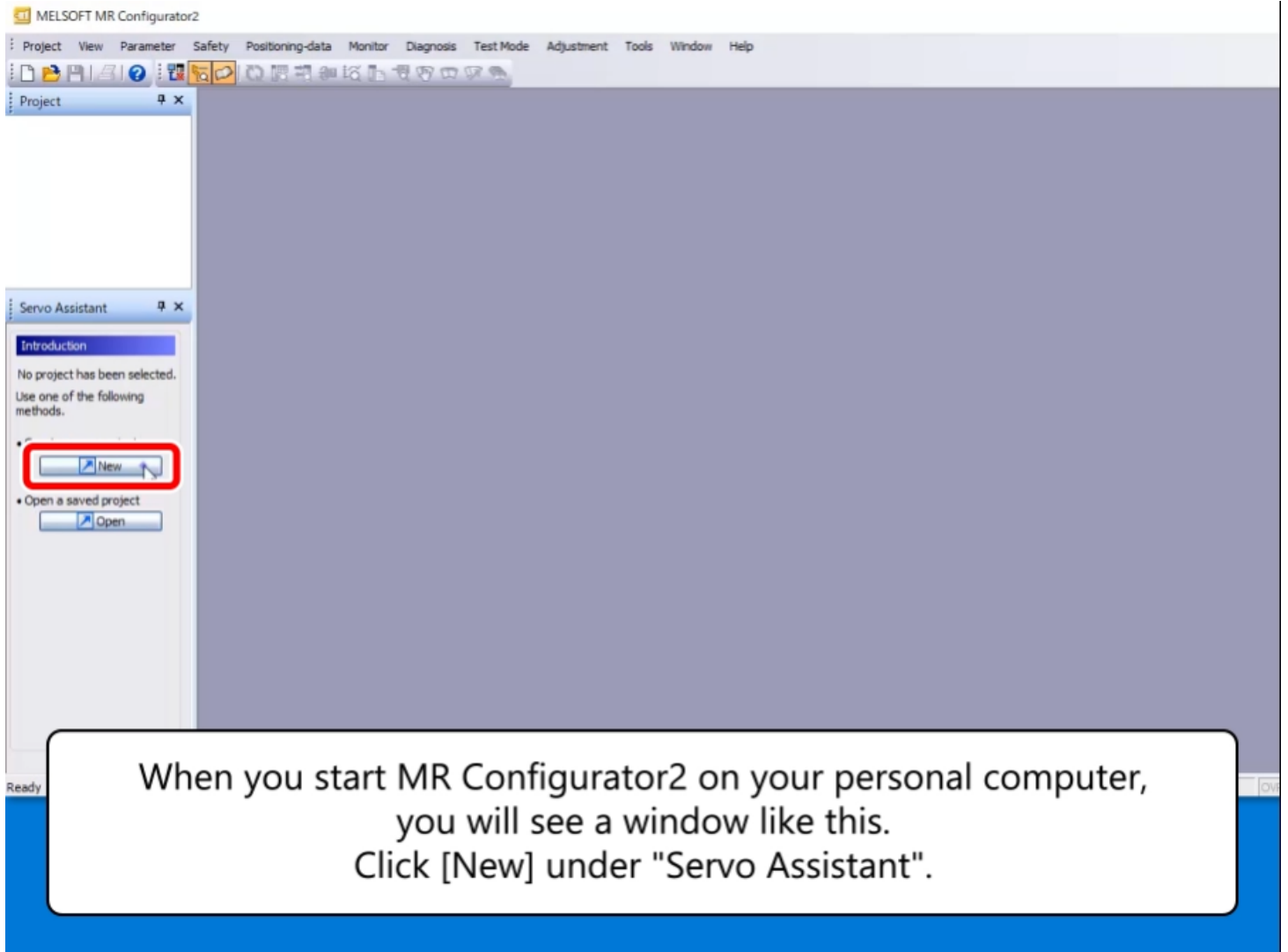
#### [Important points]

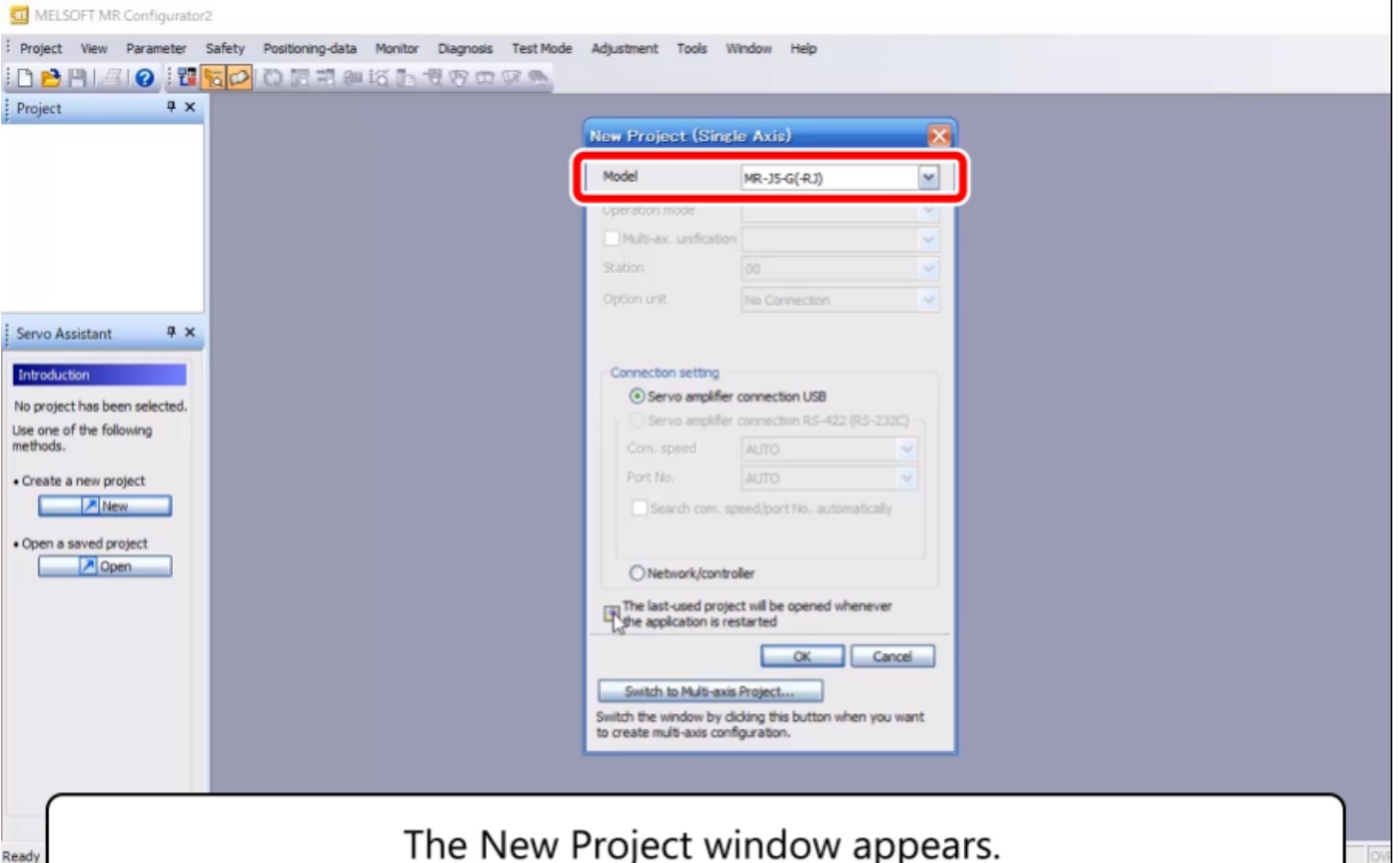
- For how to set the servo parameter of Type G from the controller side, refer to "MELSEC iQ-R Series Motion Module Basics (RD78G(H)/Startup)".
- The parameters related to the functional safety can be written only from MR Configurator2.



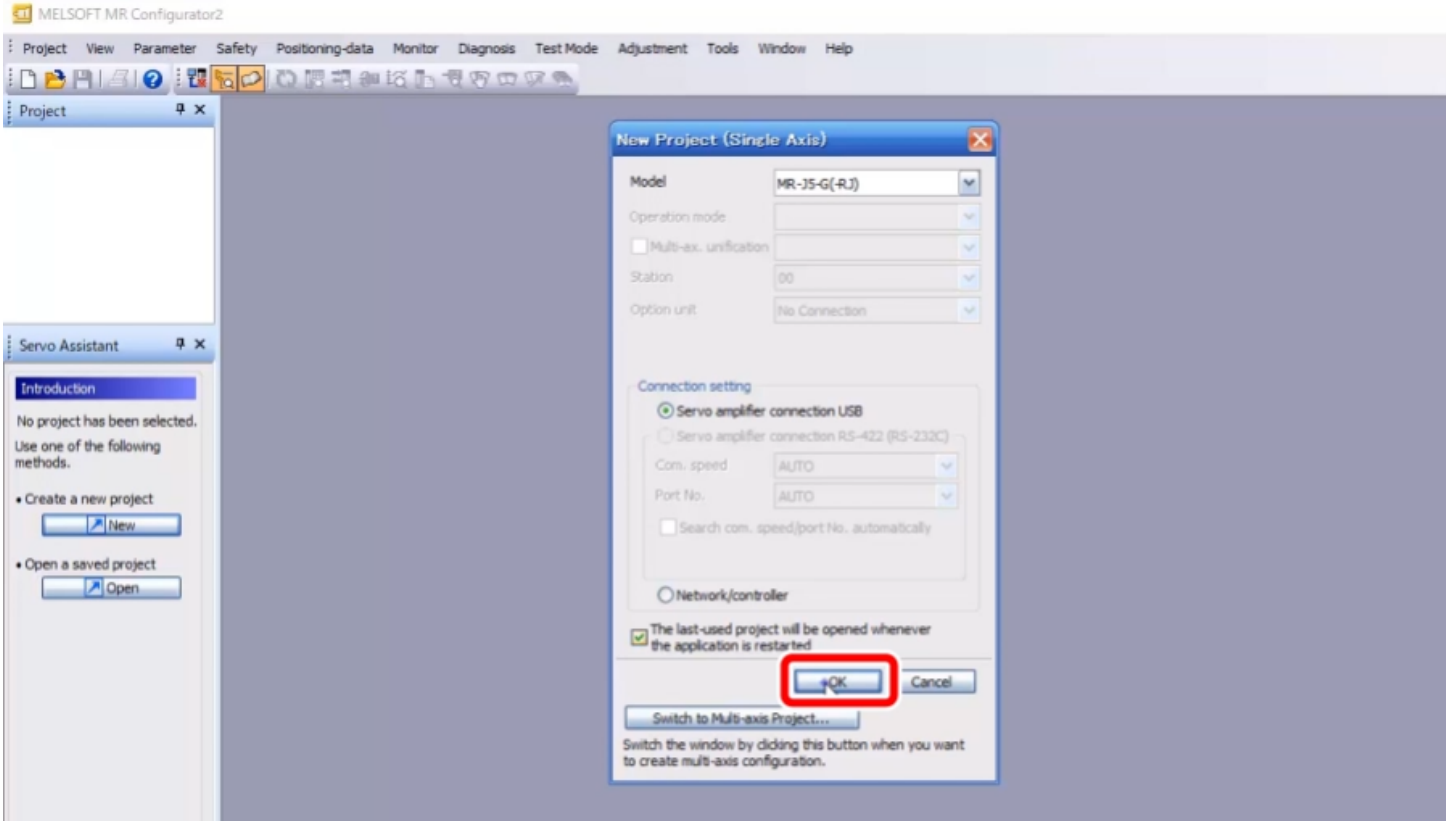








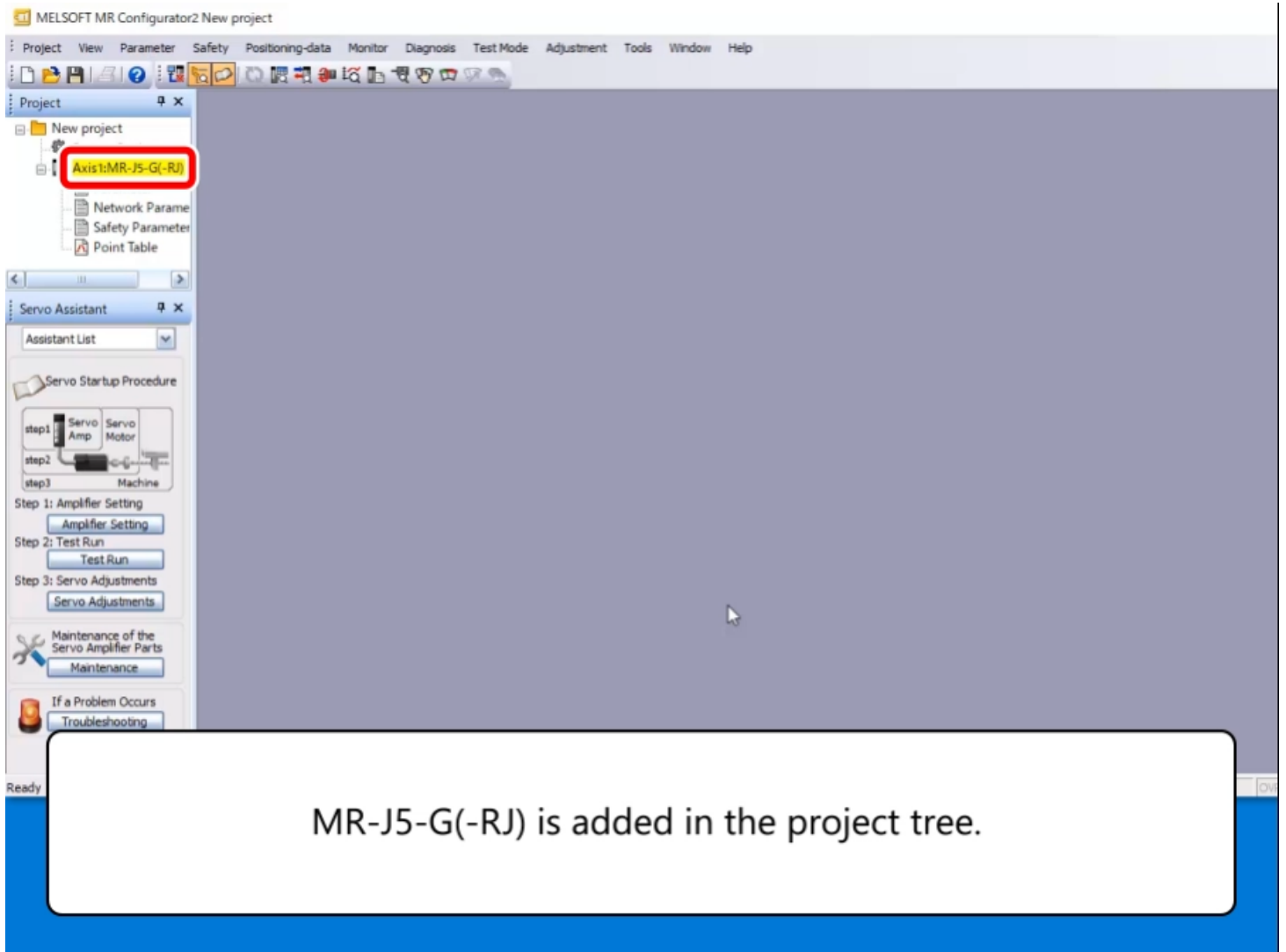
The New Project window appears.  
From the model drop-down list, select the model of the servo amplifier used. In this example, MR-J5-G(-RJ) is used.

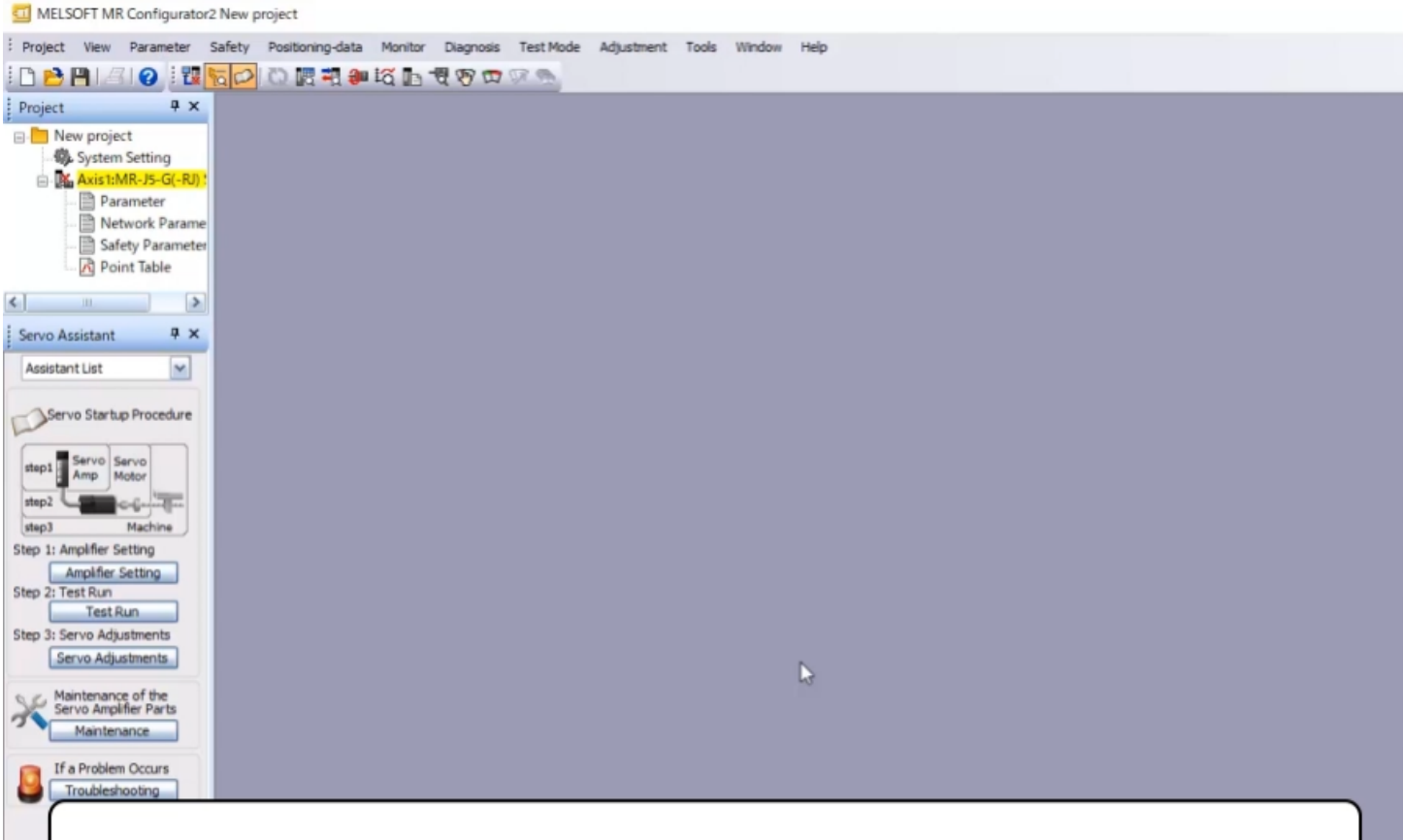


The screenshot displays the MELSOFT MR Configurator2 interface. The 'New Project (Single Axis)' dialog box is the central focus, with the following settings:

- Model: MR-J5-G(-RJ)
- Operation mode: (empty)
- Multi-ax. unification:
- Station: 00
- Option unit: No Connection
- Connection setting:  Servo amplifier connection USB
- Servo amplifier connection RS-422 (RS-232C):
- Com. speed: AUTO
- Port No.: AUTO
- Search com. speed/port No. automatically:
- Network/controller:
- The last-used project will be opened whenever the application is restarted:

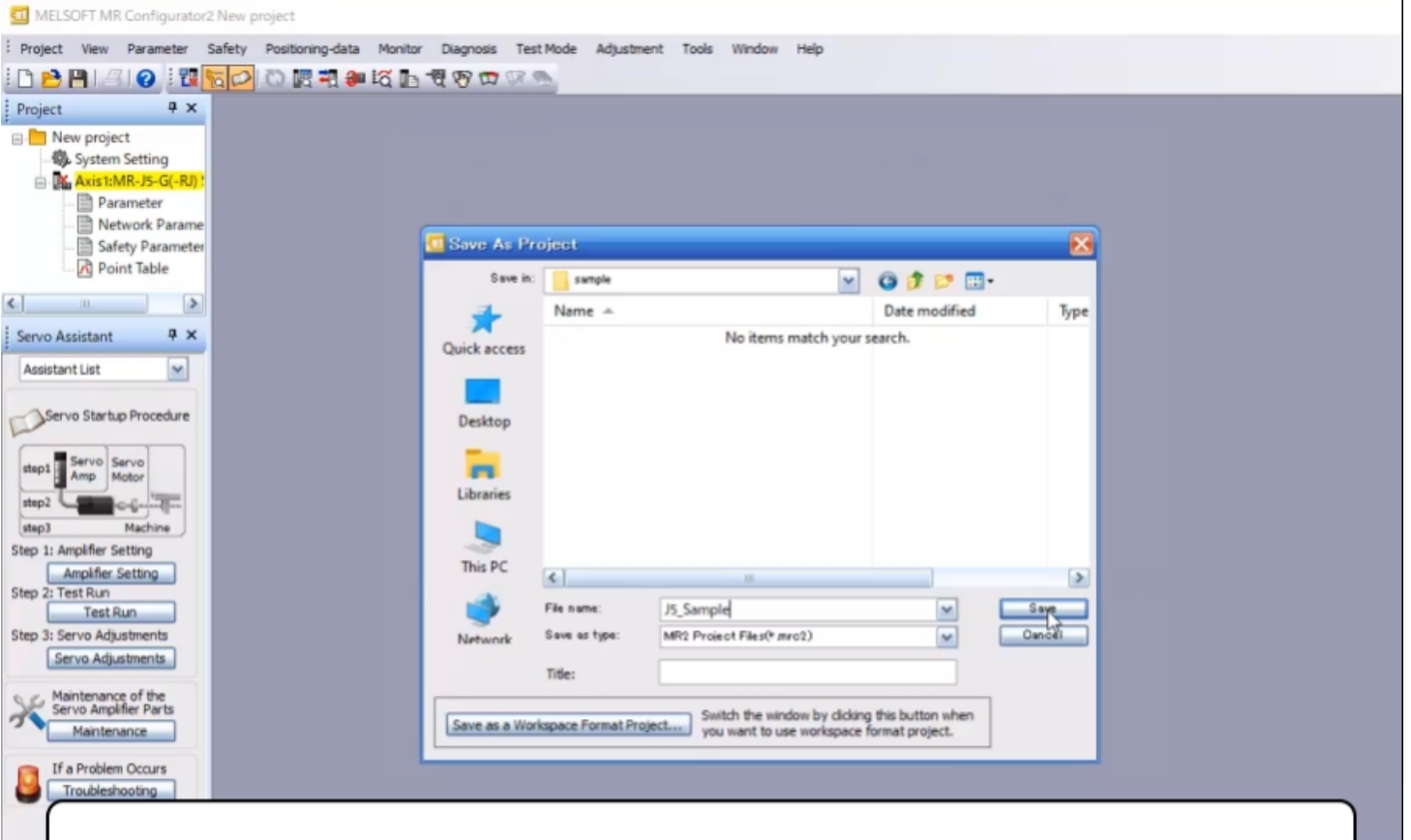
The 'OK' button is highlighted with a red circle. Below the dialog box, a white callout box contains the text: "Click the OK button to create a project."





The screenshot shows the MELSOFT MR Configurator2 software interface. The title bar reads "MELSOFT MR Configurator2 New project". The menu bar includes Project, View, Parameter, Safety, Positioning-data, Monitor, Diagnosis, Test Mode, Adjustment, Tools, Window, and Help. The Project tree on the left shows a "New project" folder containing "System Setting", "Axis:MR-J5-G(-R)", "Parameter", "Network Parame", "Safety Parameter", and "Point Table". The Servo Assistant panel on the left displays a "Servo Startup Procedure" diagram with three steps: "step1 Servo Amp", "step2 Servo Motor", and "step3 Machine". Below the diagram are buttons for "Amplifier Setting", "Test Run", "Servo Adjustments", "Maintenance", and "Troubleshooting". The status bar at the bottom left shows "Ready".

Now you have created a new project.

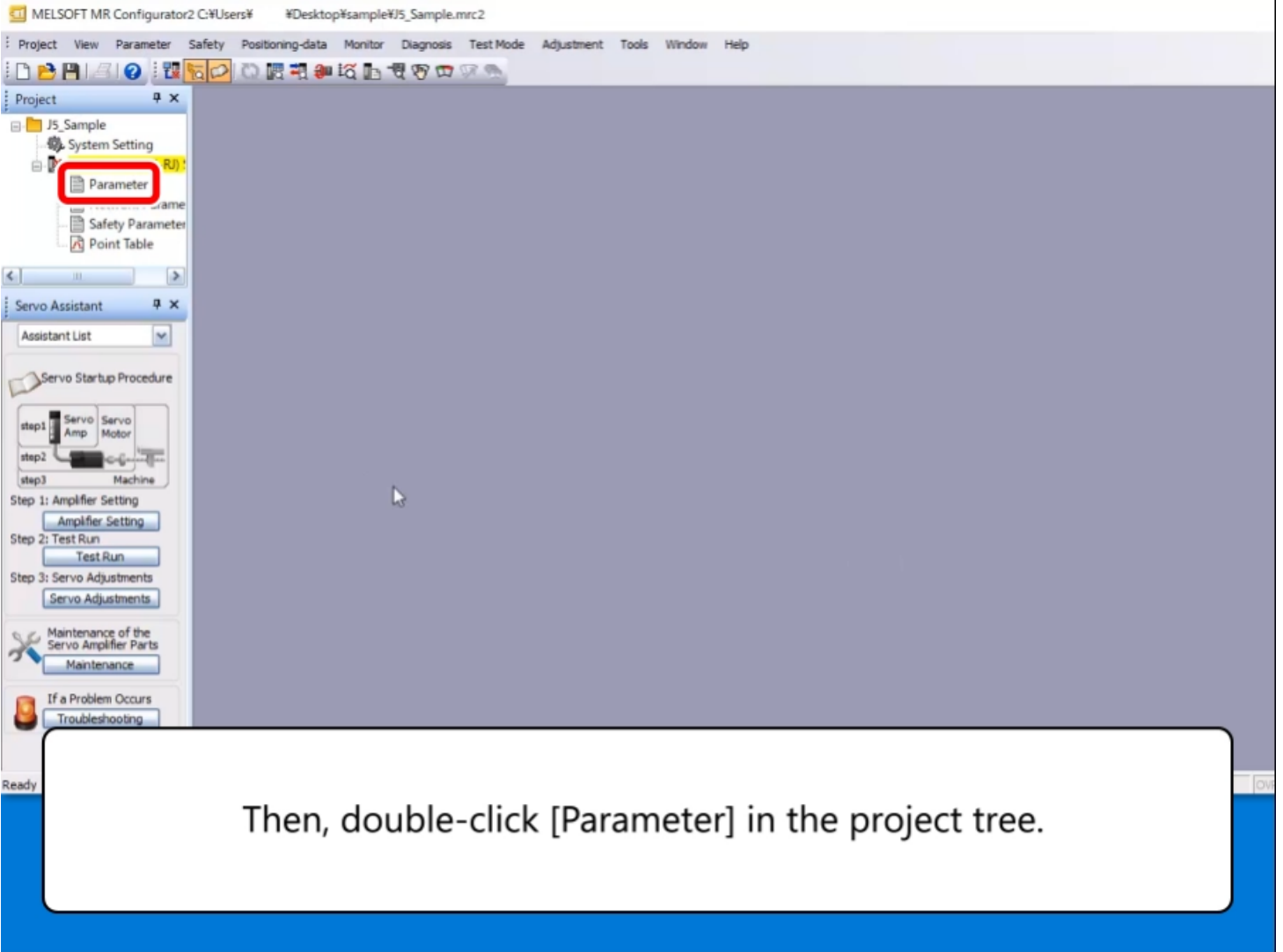


The screenshot shows the MELSOFT MR Configurator2 interface. The 'Project' pane on the left displays a tree view with 'New project' selected. The 'Servo Assistant' pane on the left shows the 'Servo Startup Procedure' with three steps: 'Step 1: Amplifier Setting', 'Step 2: Test Run', and 'Step 3: Servo Adjustments'. The 'Save As Project' dialog box is open, showing the 'sample' folder selected. The 'File name' is 'JS\_Sample' and the 'Save as type' is 'MR2 Project Files (\*.mro2)'. The 'Save' button is highlighted.

Ready

Select [Project] → [Save as...] to save the created project.





The screenshot shows the MELSOFT MR Configurator2 interface. The main window is titled "Parameter Setting" and is focused on "Axis 1". The left sidebar shows a project tree with "JS\_Sample" and "Axis1:MR-J5-G(-R)" selected. The "Servo Assistant" panel on the left shows a "Servo Startup Procedure" with steps: Step 1: Amplifier Setting, Step 2: Test Run, and Step 3: Servo Adjustments. The main parameter table is as follows:

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Operation mode</b>					
PA01.1	**	Operation mode selection		0-8	0 : Standard control
PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi dc
<b>Basic</b>					
<b>Component parts</b>					
PA02.0-1	**	Regenerative option selection		00-FF	00 : Regen. option is
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
PC04.3	**	Encoder cable communication method selection		0-1	0 : 2-wire
<b>Protection coordination setting</b>					
PC46.1	*	Converter stop mode selection		0-1	0 : Shut off converte
PC46.2	*	Protection coordination - Multiple connections selecti		0-1	0 : Connect convertr
PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl
<b>Network protocol setting</b>					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-link IE TSI
<b>Control mode</b>					
PA01.0	**	Control mode selection		0-6	0 : Network standarc

Below the table, the "Docking Help" section shows the parameter details for "[Pr. PA01\_Operation mode (\*\*STY)]":

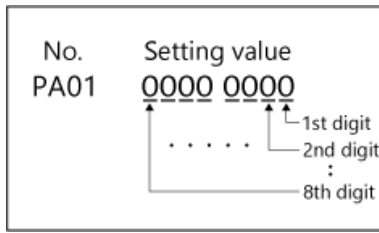
Initial value	Setting range	Setting method	Ver.
00003000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

The [Parameter Setting] window appears.  
In this window, input parameters for the servo amplifier.  
Go to the next page.

Parameter No.

[Pr.PA01.0] indicates the first digit of the parameter No. PA01.

[Pr.PA02.0-1] indicates the first and second digits of the parameter No. PA02.



Common to A and G

[Pr.PA02.0-1]	Regenerative option selection	Required when the regenerative option is used.
[Pr.PA14]	Travel direction selection	Used to set the direction of motor rotation when the forward rotation is commanded.

Type A only

[Pr.PA01.0]	Control mode selection [Position/Speed/Torque]	Used to set the control mode.
[Pr.PA13.0]	Command input pulse train form selection	Used to set the form of the command pulse train under the position control.
[Pr.PA13.1]	Pulse train logic selection	Used to set the logic of the pulse train according to the controller specifications.
[Pr.PA.05~07]	Number of command input pulses per revolution/Electronic gear	Used to set the electronic gear. For details, refer to 3.3.2.

Type G only (Note)

[Pr.PD41.2]	Limit switch enabled status selection	Set this parameter to "1: Enabled only for homing mode" when using a Motion module manufactured by Mitsubishi Electric.
[Pr.PD41.3]	Sensor input method selection	Used to set whether to connect the limit switch to the controller or servo amplifier.
[Pr.PT45]	Homing method	Used to set the homing method. Some other parameters (such as [Pr.PT05] Homing speed) are required to be set according to the homing method set in this parameter.

(Note) This table is for when the controller is a Motion module manufactured by Mitsubishi Electric and the PLCopen<sup>®</sup> Motion control FB mode is used.

When the controller type is different or the Simple Motion mode is used, the parameters to be set are different. For details, refer to the manual of the controller used.

### Parameters required to be set or checked depending on the servo motor type

Common to A and G

[Pr.PA01.1]	Operation mode selection	Used to set the type of the servo motor used (Rotary servo motor/Linear servo motor/Direct drive motor).
-------------	--------------------------	--

[Pr.PA17,18]	Servo motor series setting/ Servo motor type setting	
[Pr.PC04.3] (Type G) [Pr.PC22.3] (Type A)	Encoder cable communication method selection	When a linear servo motor is used, set these parameters according to the model of the linear servo motor and specifications of the encoder used. (Note)
[Pr.PL02,03]	Linear encoder resolution setting	
[Pr.PC02] (Type G) [Pr.PC16] (Type A)	Electromagnetic brake sequence output (For a motor with a brake)	When using a servo motor with an electromagnetic brake, set the delay time used between the MBR output signal (Electromagnetic brake interlock) shut-off and the base circuit shut-off.

(Note) In addition, parameters related to the magnetic pole detection must be set when a linear servo motor or direct drive motor is used.

The electronic gear is a function that multiplies a position command by a gear ratio to set the servo motor rotation or travel distance to the command unit rotation or travel distance as desired.

Set the electronic gear so that the position command value output from the controller matches the travel distance of the machine.

$$(\text{Position command value}) \times \frac{(\text{Electronic gear numerator})}{(\text{Electronic gear denominator})} = (\text{Travel distance of the machine})$$

[Type G]

The electronic gear is obtained by the following formula.

$$\frac{\text{(Electronic gear numerator)}}{\text{(Electronic gear denominator)}} = \frac{\text{Encoder resolution [pulse/rev]}}{\text{Travel distance per servo motor revolution [Position command unit/rev]}}$$

When the controller is RD78G(H) or FX5-□SSC-G, the controller has the electronic gear function as well.

In RD78G(H) and FX5-□SSC-G, it is called the driver unit conversion numerator/denominator in the axis parameters.

In such a case, set the driver unit conversion numerator/denominator for the controller.

(It can be set by following the wizard in the engineering tool.)

For controllers without electronic gear function such as the master/local module RD71GN11-T2, set it in the parameters [Pr.PA06/07] of the servo amplifier.

[Type A]

Set the electronic gear so that the maximum output frequency of the controller and the maximum input frequency of the servo amplifier (4 Mpps for the differential line driver) are not exceeded.

For the adjustment method and calculation example of the electronic gear for Type A, refer to the separate PDF.

It can be downloaded from the following link.

#### Electronic gear calculation example

[Important points]

The setting is different for the linear servo motor.

For details, refer to Chapter 6 and PDF.

Figurator2 C:\Users\... \Desktop\sampleJ5\_Sample.mrc2 - [Parameter Setting]

Parameter Setting(2) Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Parameter Setting x

Axis1 Read Set To Default Verify Parameter Copy Parameter Block

Open Save As

Function display

Common

No.	Abbr.	Name	Unit	Setting range	Axis Writing
Operation mode					
Operation mode selection					
PA01.1	**	Operation mode selection		0-8	0 : Standard control
PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi dc
Basic					
Component parts					
Setting					
PA02.0-1	**	Regenerative option selection		00-FF	00 : Regen. option is
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
PC04.3	**	Encoder cable communication method selection		0-1	0 : 2-wire
Protection coordination setting					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IE TSI
Control mode					
PA01.0	**	Control mode selection		0-6	0 : Network standarc

Click the play button at the lower left of the window.

Docking Help

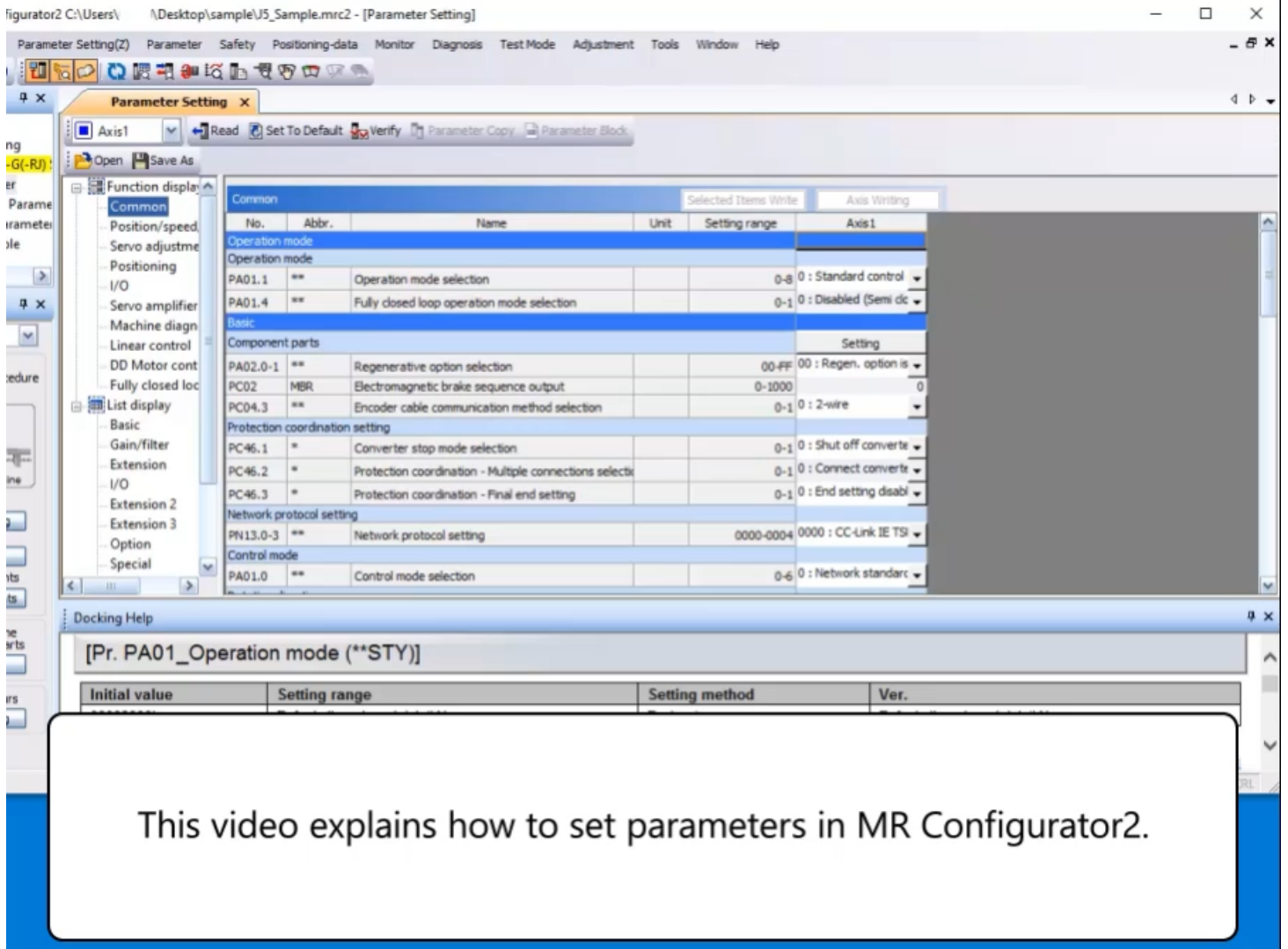
[Pr. PA01\_Operation mode (\*\*STY)]

Initial value	Setting range	Setting method	Ver.
00003000h	Refer to the relevant detail No.	Each axis	Refer to the relevant detail No.

[Pr. PA01.1\_Operation mode selection]

[Station 00] MR-J5-G(-R.J) Standard Servo amplifier connection: USB

OV R CAP NUM SCRL



The screenshot displays the MR Configurator2 software interface. The main window is titled "Parameter Setting" and shows a tree view on the left with categories like "Common", "Positioning", "Servo adjustment", etc. The right pane shows a table of parameters for "Axis 1".

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Operation mode</b>					
Operation mode selection					
PA01.1	**	Operation mode selection		0-8	0 : Standard control
Fully closed loop operation mode selection					
PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi dc
<b>Basic</b>					
Component parts					
Setting					
Regenerative option selection					
PA02.0-1	**	Regenerative option selection		00-FF	00 : Regen. option is
Electromagnetic brake sequence output					
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
Encoder cable communication method selection					
PC04.3	**	Encoder cable communication method selection		0-1	0 : 2-wire
<b>Protection coordination setting</b>					
Converter stop mode selection					
PC46.1	*	Converter stop mode selection		0-1	0 : Shut off converte
Protection coordination - Multiple connections selecti					
PC46.2	*	Protection coordination - Multiple connections selecti		0-1	0 : Connect convertr
Protection coordination - Final end setting					
PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl
<b>Network protocol setting</b>					
Network protocol setting					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IE TSI
<b>Control mode</b>					
Control mode selection					
PA01.0	**	Control mode selection		0-6	0 : Network standar

Below the table, there is a section for "Docking Help" showing the parameter name "[Pr. PA01\_Operation mode (\*\*STY)]" and a table with columns: Initial value, Setting range, Setting method, and Ver.

This video explains how to set parameters in MR Configurator2.



Figurator2 C:\Users\... \Desktop\sampleJ5\_Sample.mrc2 - [Parameter Setting]

Parameter Setting(2) Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Parameter No.	Name	Initial value	Setting value
[Pr.PA02.0-1]	Regenerative option selection	00 : Regen. option is not used	00 : Regen. option is not used
[Pr.PA14]	Travel direction selection	0 : CCW or positive dir. during fwd. pls. input, CW or negative dir. during rev. pls. input	0 : CCW or positive dir. during fwd. pls. input, CW or negative dir. during rev. pls. input
[Pr.PD41.2]	Limit switch enabled status selection	0 : Limit switch always enabled	1 : Enabled only for homing mode
[Pr.PD41.3]	Sensor input method selection	0 : Input from servo amplifier	1 : Input from controller
[Pr.PT45]	Homing method	37 : Method 37 (Data set type)	-1 : Dog type (Rear end detection - Z-phase reference)

Initial value    Setting range    Setting method    Ver.

In this example, the parameters shown above are set for the servo amplifier MR-J5-G.

The screenshot shows the 'Parameter Setting' window for 'Axis 1'. The left sidebar contains a tree view with categories like 'Position/speed', 'Servo adjustment', 'Positioning', 'I/O', 'Servo amplifier', 'Machine diagnosis', 'Linear control', and 'DD Motor control'. Two buttons, 'Function display' and 'List display', are highlighted with red boxes. The main area displays a table of parameters for 'Axis 1'.

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Operation mode</b>					
Operation mode					
PA01.1	**	Operation mode selection		0-8	0 : Standard control
PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi dc
<b>Basic</b>					
Component parts					
Setting					
PA02.0-1	**	Regenerative option selection		00-FF	00 : Regen. option is
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
PC04.3	**	Encoder cable communication method selection		0-1	0 : 2-wire
Protection coordination setting					
PC46.1	*	Converter stop mode selection		0-1	0 : Shut off converte
PC46.2	*	Protection coordination - Multiple connections selecti		0-1	0 : Connect converte
PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl
Network protocol setting					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IIE TSI
Control mode					
PA01.0	**	Control mode selection		0-6	0 : Network standar

Below the table, the 'Docking Help' area shows the parameter name: [Pr. PA01\_Operation mode (\*\*STY)]

Initial value      Setting range      Setting method      Ver.

In the Parameter Setting window of MR Configurator2, there are Function display and List display. Function display shows parameters related to each function collectively.

The screenshot shows the MR Configurator2 software interface. The main window is titled "Parameter Setting" and is set to "Axis 1". The interface includes a menu bar (Parameter Setting(2), Parameter, Safety, Positioning-data, Monitor, Diagnosis, Test Mode, Adjustment, Tools, Window, Help) and a toolbar with icons for Read, Set To Default, Verify, Parameter Copy, and Parameter Block. The left sidebar contains a tree view of parameter categories, with "Function display" and "List display" buttons highlighted in red. The main area displays a table of parameters:

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Operation mode</b>					
Operation mode					
PA01.1	**	Operation mode selection		0-8	0 : Standard control
PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi dc
<b>Basic</b>					
Component parts					
Setting					
PA02.0-1	**	Regenerative option selection		00-FF	00 : Regen. option is
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
PC04.3	**	Encoder cable communication method selection		0-1	0 : 2-wire
<b>Protection coordination setting</b>					
PC46.1	*	Converter stop mode selection		0-1	0 : Shut off converte
PC46.2	*	Protection coordination - Multiple connections selecti		0-1	0 : Connect converte
PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl
<b>Network protocol setting</b>					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IIE TSI
<b>Control mode</b>					
PA01.0	**	Control mode selection		0-6	0 : Network standar

Below the table, the "Docking Help" area shows the parameter name "[Pr. PA01\_Operation mode (\*\*STY)]". A table below this shows the initial value, setting range, setting method, and version for the selected parameter.

Initial value	Setting range	Setting method	Ver.

List display shows parameters in the order of Parameter Nos.  
Either display can be used to set the parameters.

Figurator2 C:\Users\... \Desktop\sampleU5\_Sample.mrc2 - [Parameter Setting]

Parameter Setting(2) Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Parameter Setting x

Axis1 Read Set To Default Verify Parameter Copy Parameter Block

Open Save As Copy Paste Undo Redo

Function display

Common Selected Items Write Axis Writing

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Operation mode</b>					
Operation mode					
PA01.1	**	Operation mode selection		0-8	0 : Standard control
PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi dc)
<b>Basic</b>					
Component parts					
PA02.0-1	**	Regenerative option selection		00-FF	00 : Regen. option is not used
PC02	MBR	Electromagnetic brake sequence output		0-1000	01 : FR-XC (H)
PC04.3	**	Encoder cable communication method selection		0-1	02 : MR-RB032
Protection coordination setting					
PC46.1	*	Converter stop mode selection		0-1	03 : MR-RB12
PC46.2	*	Protection coordination - Multiple connections selecti		0-1	05 : MR-RB30
PC46.3	*	Protection coordination - Final end setting		0-1	06 : MR-RB50 (Cooling fan is needed)
Network protocol setting					
PN13.0-3	**	Network protocol setting		0000-0004	08 : MR-RB31
Control mode					
PA01.0	**	Control mode selection		0-6	09 : MR-RB51 (Cooling fan is needed)
					0B : MR-RB3N
					0C : MR-RB3N (Cooling fan is needed)
					0D : MR-RB14
					0E : MR-RB34
					1C : MR-RB32
					1D : MR-RB52 (Cooling fan is needed)
					80 : MR-RB1H-4
					81 : MR-RB3M-4 (Cooling fan is needed)
					82 : MR-RB3G-4 (Cooling fan is needed)
					83 : MR-RB5G-4 (Cooling fan is needed)
					93 : MR-RB3Y-4 (Cooling fan is needed)
					94 : MR-RB5Y-4 (Cooling fan is needed)

00 : Regen. option is not used  
01 : FR-XC (H)  
02 : MR-RB032  
03 : MR-RB12  
05 : MR-RB30  
06 : MR-RB50 (Cooling fan is needed)  
08 : MR-RB31  
09 : MR-RB51 (Cooling fan is needed)  
0B : MR-RB3N  
0C : MR-RB3N (Cooling fan is needed)  
0D : MR-RB14  
0E : MR-RB34  
1C : MR-RB32  
1D : MR-RB52 (Cooling fan is needed)  
80 : MR-RB1H-4  
81 : MR-RB3M-4 (Cooling fan is needed)  
82 : MR-RB3G-4 (Cooling fan is needed)  
83 : MR-RB5G-4 (Cooling fan is needed)  
93 : MR-RB3Y-4 (Cooling fan is needed)  
94 : MR-RB5Y-4 (Cooling fan is needed)

Docking Help

[Pr. PA02\_Regenerative option (\*\*REG)]

In Function display, "[Pr.PA02.0-1] Regenerative option selection" is under Common → Basic → Component parts.

Always set this parameter when the regenerative option is used. To change the parameter, select an option from the drop-down list. In this example, leave the initial value as "00".

The screenshot shows the MR Configurator2 software interface. The main window displays a table of parameters for Axis 1. The parameter PA14 is highlighted with a red box. The table columns are: No., Abbr., Name, Unit, Setting range, and Axis1. The parameter PA14 is under the 'Common' category and is named 'Travel direction selection'.

No.	Abbr.	Name	Unit	Setting range	Axis1
PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl
Network protocol setting					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IE TSI
Control mode					
PA01.0	**	Control mode selection		0-6	0 : Network standarc
PA14	**POL	Travel direction selection		0-1	0 : CCW or positive c
Zero speed					
PC07	ZSP	Zero speed		0-10000	50
Forced stop					
PA04.2	*	Servo forced stop selection		0-1	0 : Enabled (Use forc
Forced stop deceleration function					
PA04.3	*	Forced stop deceleration function selection		0-2	2 : Forced stop dece
PC24	RSBR	Deceleration time constant at forced stop		0-20000	100
Vertical axis freefall prevention					
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
PC31	RSUP1	Vertical axis freefall prevention compensation amount		-25000-25000	0

The left-hand navigation tree shows the following structure:

- Function display
  - Common
    - Position/speed
    - Servo adjustme
    - Positioning
    - I/O
    - Servo amplifier
    - Machine diagn
    - Linear control
    - DD Motor cont
    - Fully closed loc
  - List display
    - Basic
    - Gain/filter
    - Extension
    - I/O
    - Extension 2
    - Extension 3
    - Option
    - Special

The bottom status bar shows: [Pr. PA02\_Regenerative option (\*\*REG)]

In Function display, "[Pr.PA14] Travel direction selection" is under Common → Basic → Rotation direction. Select the servo motor rotation direction for the forward rotation command. In this example, leave the initial value as "0".



The screenshot shows the MR Configurator2 software interface. The main window is titled "Parameter Setting" and displays a table of parameters for Axis 1. The "List display" menu is selected, and the "I/O" option is highlighted with a red box. The table below shows the parameters displayed in the List display view.

No.	Abbr.	Name	Unit	Setting range	Axis1
PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl
Network protocol setting					
PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IE TSI
Control mode					
PA01.0	**	Control mode selection		0-6	0 : Network standarc
Rotation direction					
PA14	*POL	Travel direction selection		0-1	0 : CCW or positive c
PC29.3	*	Torque PCL reflection selection		0-1	1 : Disabled
Zero speed					
PC07	ZSP	Zero speed		0-10000	50
Forced stop					
PA04.2	*	Servo forced stop selection		0-1	0 : Enabled (Use forc
Forced stop deceleration function					
PA04.3	*	Forced stop deceleration function selection		0-2	2 : Forced stop dece
PC24	RSBR	Deceleration time constant at forced stop		0-20000	100
Vertical axis freefall prevention					
PC02	MBR	Electromagnetic brake sequence output		0-1000	0
PC31	RSUP1	Vertical axis freefall prevention compensation amount		-25000-25000	0

Set "[Pr.PD41.2] Limit switch enabled status selection" and "[Pr.PD41.3] Sensor input method selection" in List display because they are not displayed in Function display.  
Click List display → I/O to display the PD groups.

Figurator2 C:\Users\... \Desktop\sampleU5\_Sample.mrc2 - [Parameter Setting]

Parameter Setting(2) Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Parameter Setting x

Axis1 Read Set To Default Verify Parameter Copy Parameter Block

Open Save As Copy Paste Undo Redo

I/O		Selected Items Write		Axis Writing	
No.	Abbr.	Name	Unit	Setting range	Axis 1
PD35	*MD7	For manufacturer setting		00000000-00000000	0000 0000
PD36	*MD8	For manufacturer setting		00000000-00000000	0000 0000
PD37	*TPOP	For manufacturer setting		00000000-00110031	0011 0001
PD38	*DI4	Input device selection 4		00000000-0000007F	0000 002C
PD39	*DI5	Input device selection 5		00000000-0000007F	0000 002D
PD40	TPRT2	For manufacturer setting		-32768-32767	0
PD41	*DOP4	Function selection D-4		00000000-00001100	0000 1100
PD42		For manufacturer setting		00000000-00000000	0000 0000
PD43		For manufacturer setting		00000000-00000000	0000 0000
PD44		For manufacturer setting		00000000-00000000	0000 0000
PD45		For manufacturer setting		00000000-00000000	0000 0000
PD46		For manufacturer setting		00000000-00000000	0000 0000
PD47		For manufacturer setting		00000000-00000000	0000 0000
PD48		For manufacturer setting		00000000-00000000	0000 0000
PD49	TPRT1	For manufacturer setting		-32768-32767	0
PD50	TPRT3	For manufacturer setting		-32768-32767	0
PD51	*DI3W2	Input device selection 3-2		00000000-0003007F	0000 0062
PD52		For manufacturer setting		00000000-00000000	0000 0000
PD53		For manufacturer setting		00000000-00000000	0000 0000
PD54		For manufacturer setting		00000000-00000000	0000 0000
DOEC		For manufacturer setting		00000000-00000000	0000 0000

Docking Help

Scroll to [Pr.PD41].  
To change each of [Pr.PD41.2] and [Pr.PD41.3] to 1,  
enter "0000 1100".

The screenshot shows the MR Configurator2 software interface. The main window is titled "Parameter Setting (Z)" and displays a table of parameters for "Axis 1". The "Positioning" section is expanded, and the "Homing method" parameter (PT45) is selected. The "Axis Writing" column shows "-1 : Dog type (Rear end detection - Z-phase reference)#Forward (CCW) or positive direction" selected from a drop-down list.

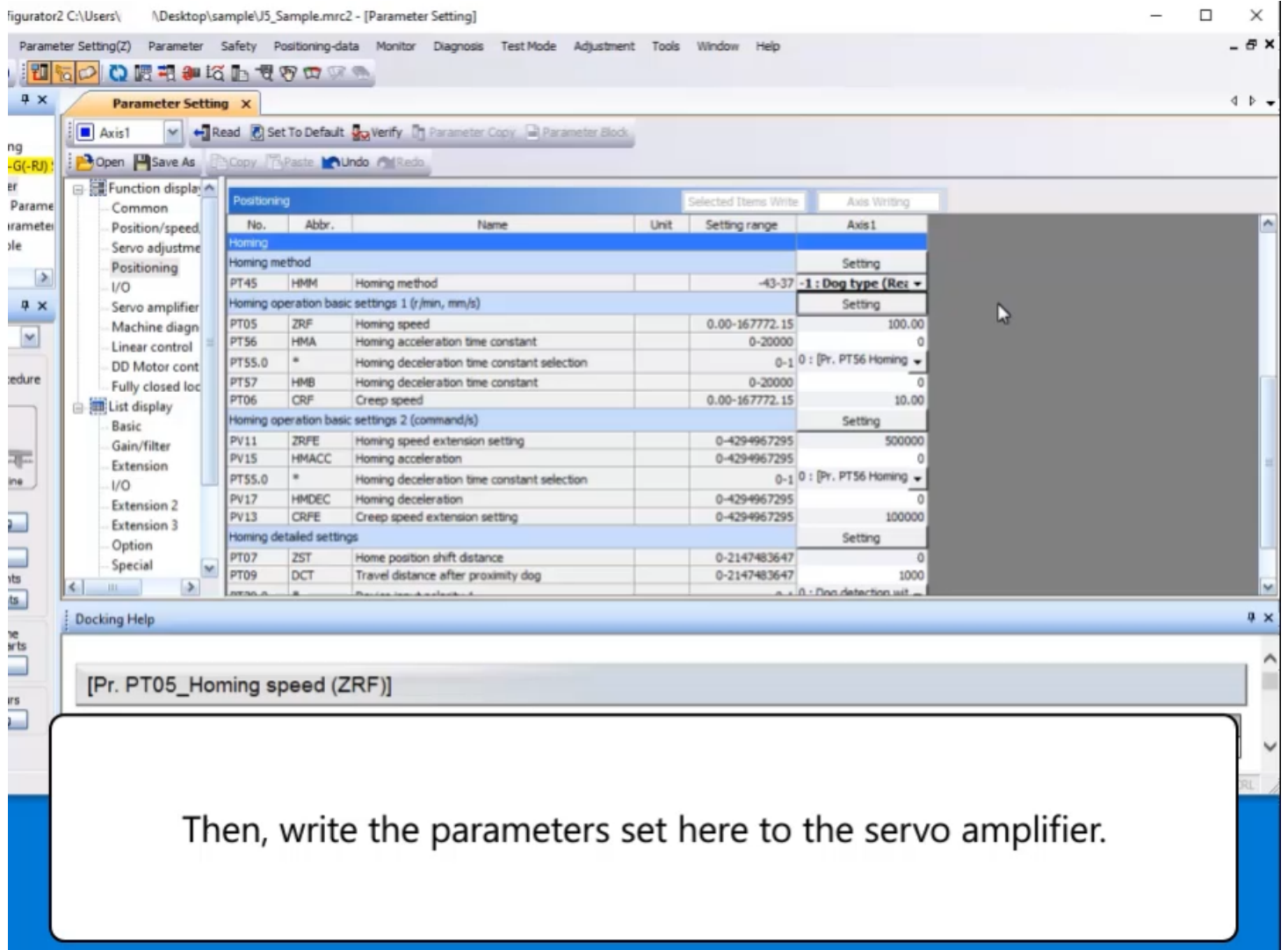
No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Homing</b>					
Homing method					
PT45	HMM	Homing method		-43-37	-1 : Dog type (Rear end detection - Z-phase reference)#Forward (CCW) or positive direction
Homing operation basic settings 1 (r/min, mm/s)					
PT05	ZRF	Homing speed		0.00-167772.15	100.00
PT56	HMA	Homing acceleration time constant		0-20000	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing]
PT57	HMB	Homing deceleration time constant		0-20000	0
PT06	CRF	Creep speed		0.00-167772.15	10.00
Homing operation basic settings 2 (command/s)					
PV11	ZRFE	Homing speed extension setting		0-4294967295	500000
PV15	HMAcc	Homing acceleration		0-4294967295	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing]
PV17	HMDEC	Homing deceleration		0-4294967295	0
PV13	CRFE	Creep speed extension setting		0-4294967295	100000
Homing detailed settings					
PT07	ZST	Home position shift distance		0-2147483647	0
PT09	DCT	Travel distance after proximity dog		0-2147483647	1000

The interface also shows a "Function display" tree on the left and a "Docking Help" window at the bottom with the text "[Pr. PT05\_Homing speed (ZRF)]".

In Function display, "[Pr.PT45] Homing method" is under Positioning → Homing → Homing method.

In this example, "-1 : Dog type (Rear end detection - Z-phase reference)#Forward (CCW) or positive direction" is selected from the drop-down list.





The screenshot shows the MR Configurator2 software interface. The main window displays the 'Parameter Setting' for 'Axis1'. The 'Positioning' section is expanded, and the 'Homing' sub-section is selected. The table below shows the parameters for homing settings.

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Homing</b>					
Homing method					
PT45	HMM	Homing method		-43-37	-1 : Dog type (Res
Homing operation basic settings 1 (r/min, mm/s)					
Setting					
PT05	ZRF	Homing speed		0.00-167772.15	100.00
PT56	HMA	Homing acceleration time constant		0-20000	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing
PT57	HMB	Homing deceleration time constant		0-20000	0
PT06	CRF	Creep speed		0.00-167772.15	10.00
Homing operation basic settings 2 (command/s)					
Setting					
PV11	ZRFE	Homing speed extension setting		0-4294967295	500000
PV15	HMAcc	Homing acceleration		0-4294967295	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing
PV17	HMDEC	Homing deceleration		0-4294967295	0
PV13	CRFE	Creep speed extension setting		0-4294967295	100000
Homing detailed settings					
Setting					
PT07	ZST	Home position shift distance		0-2147483647	0
PT09	DCT	Travel distance after proximity dog		0-2147483647	1000

The 'Axis Writing' column shows the current setting for each parameter. The 'Dog type (Res)' dropdown menu is visible in the 'Axis 1' column for PT45.

Below the table, the 'Docking Help' section shows the parameter name: [Pr. PT05\_Homing speed (ZRF)]

Then, write the parameters set here to the servo amplifier.



Connect the personal computer and CN5 of the servo amplifier with a USB cable.

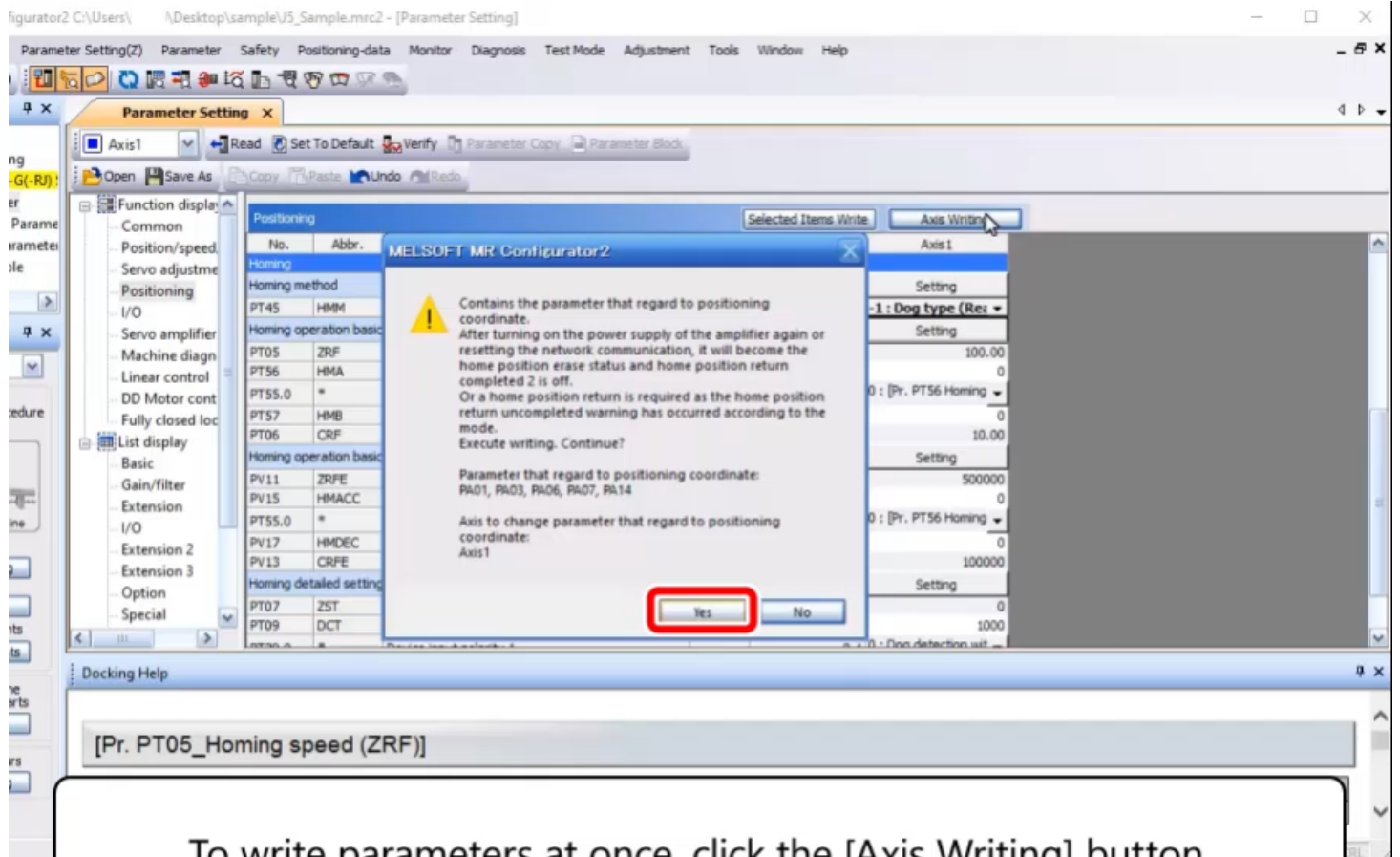


Turn on the power supply of the servo amplifier.  
When writing parameters, you may only turn on  
the control circuit power supply.

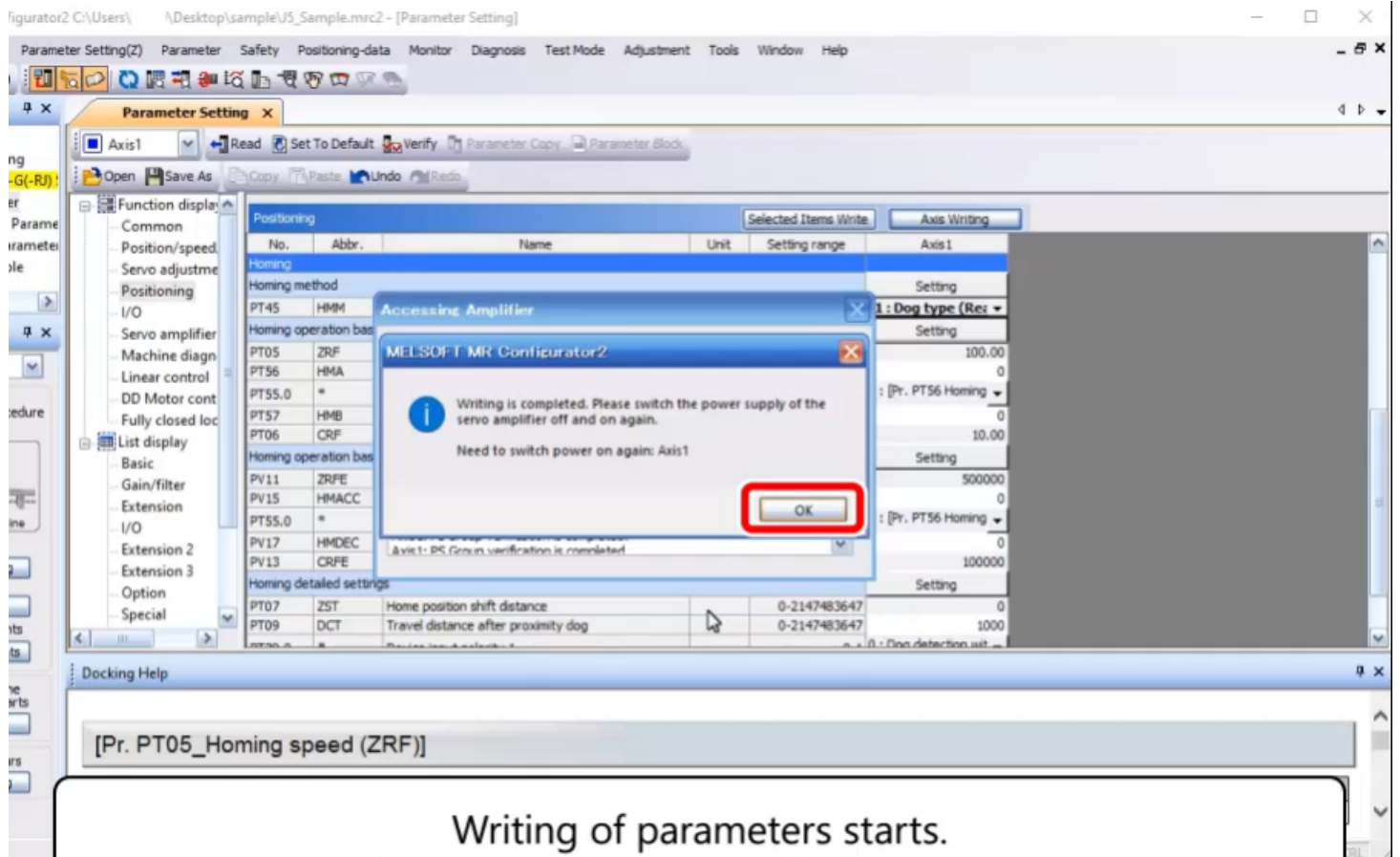
The screenshot shows the MR Configurator2 software interface. The main window displays the 'Parameter Setting' for 'Axis1'. The 'Positioning' section is expanded, showing a table of parameters. Two buttons, 'Selected Items Write' and 'Axis Writing', are highlighted with a red box. The interface includes a menu bar (Parameter Setting(2), Parameter, Safety, Positioning-data, Monitor, Diagnosis, Test Mode, Adjustment, Tools, Window, Help) and a toolbar with various icons. The parameter table is as follows:

No.	Abbr.	Name	Unit	Setting
<b>Homing</b>				
Homing method				
PT45	HMM	Homing method	-43-37	-1 : Dog type (Res
Homing operation basic settings 1 (r/min, mm/s)				
Setting				
PT05	ZRF	Homing speed	0.00-167772.15	100.00
PT56	HMA	Homing acceleration time constant	0-20000	0
PT55.0	*	Homing deceleration time constant selection	0-1	0 : [Pr. PT56 Homing
PT57	HMB	Homing deceleration time constant	0-20000	0
PT06	CRF	Creep speed	0.00-167772.15	10.00
Homing operation basic settings 2 (command/s)				
Setting				
PV11	ZRFE	Homing speed extension setting	0-4294967295	500000
PV15	HMACC	Homing acceleration	0-4294967295	0
PT55.0	*	Homing deceleration time constant selection	0-1	0 : [Pr. PT56 Homing
PV17	HMDEC	Homing deceleration	0-4294967295	0
PV13	CRFE	Creep speed extension setting	0-4294967295	100000
Homing detailed settings				
Setting				
PT07	ZST	Home position shift distance	0-2147483647	0
PT09	DCT	Travel distance after proximity dog	0-2147483647	1000

When the communication with the servo amplifier is enabled, the [Selected Items Write] and [Axis Writing] buttons are enabled.



To write parameters at once, click the [Axis Writing] button.  
 When the message "Execute writing. Continue?" appears,  
 click [Yes].



Writing of parameters starts.  
When it completes normally, the message  
"Writing is completed." appears.  
Click the [OK] button to delete the message.

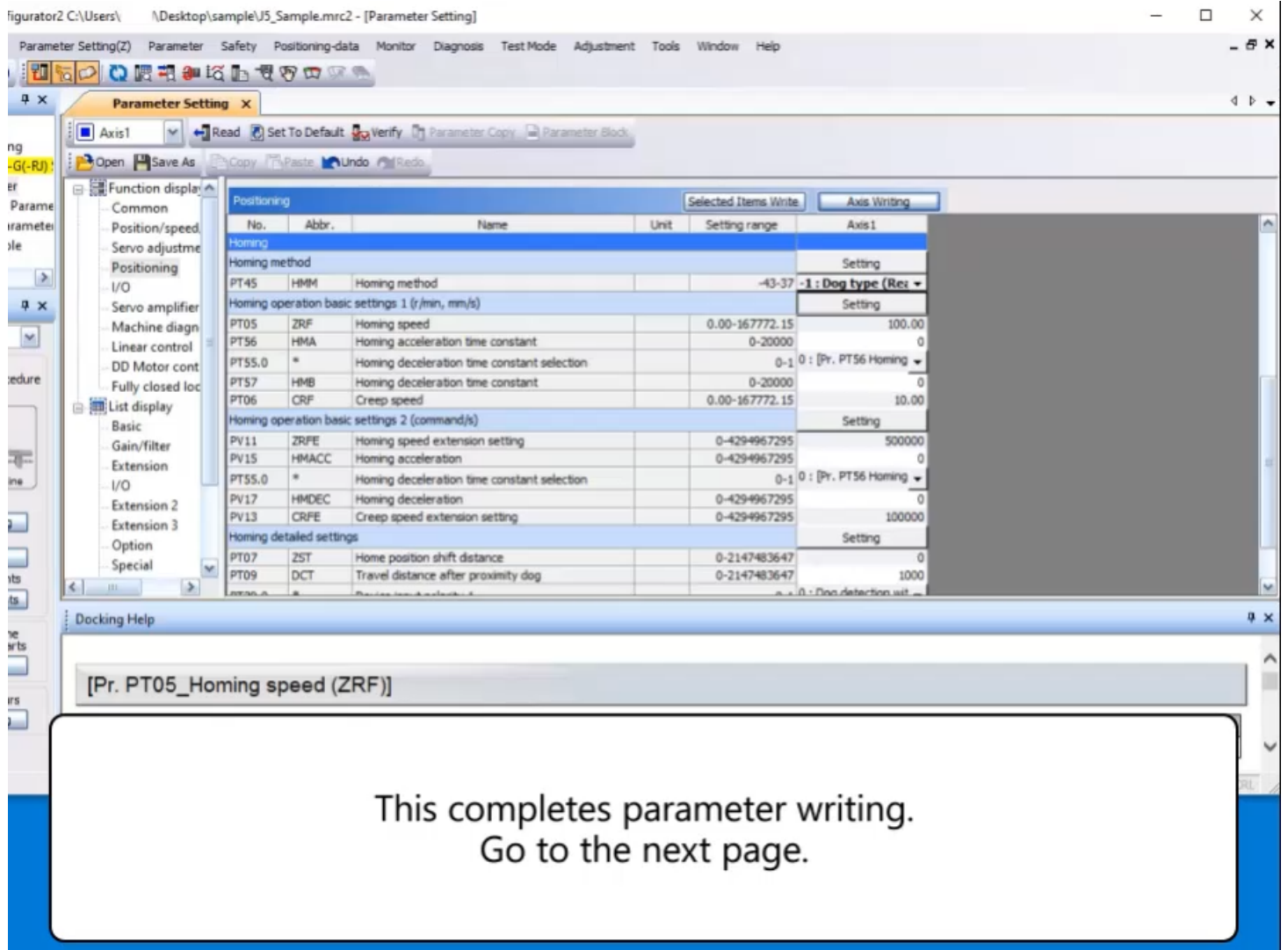
The screenshot shows the MR Configurator2 software interface. The main window displays the 'Parameter Setting' for 'Axis 1'. The 'Positioning' section is expanded, showing a list of parameters. The 'Homing' section is highlighted, and the 'Homing method' is set to 'ZRF'. The 'Homing operation basic settings 1 (r/min, mm/s)' section is also expanded, showing parameters like PT05 (ZRF) for Homing speed, PT56 (HMA) for Homing acceleration time constant, and PT57 (HMB) for Homing deceleration time constant. The 'Homing operation basic settings 2 (command/s)' section is also expanded, showing parameters like PV11 (ZRFE) for Homing speed extension setting, PV15 (HMACC) for Homing acceleration, and PV17 (HMDEC) for Homing deceleration. The 'Homing detailed settings' section is also expanded, showing parameters like PT07 (ZST) for Home position shift distance and PT09 (DCT) for Travel distance after proximity dog.

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Homing</b>					
Homing method					
PT45	HMM	Homing method		-43-37	-1 : Dog type (Res
Homing operation basic settings 1 (r/min, mm/s)					
Setting					
PT05	ZRF	Homing speed		0.00-167772.15	100.00
PT56	HMA	Homing acceleration time constant		0-20000	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing
PT57	HMB	Homing deceleration time constant		0-20000	0
PT06	CRF	Creep speed		0.00-167772.15	10.00
Homing operation basic settings 2 (command/s)					
Setting					
PV11	ZRFE	Homing speed extension setting		0-4294967295	500000
PV15	HMACC	Homing acceleration		0-4294967295	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing
PV17	HMDEC	Homing deceleration		0-4294967295	0
PV13	CRFE	Creep speed extension setting		0-4294967295	100000
Homing detailed settings					
Setting					
PT07	ZST	Home position shift distance		0-2147483647	0
PT09	DCT	Travel distance after proximity dog		0-2147483647	1000

At the bottom of the window, a message box displays the text: [Pr. PT05\_Homing speed (ZRF)]

When restarting the servo amplifier is required for enabling the parameters, the message "Please switch the power supply of the servo amplifier off and on again." appears. In this case, turn off and on the power supply of the servo amplifier.





The screenshot shows the MR Configurator2 software interface. The main window is titled "Parameter Setting (Z)" and is focused on "Axis 1". The interface includes a menu bar (Parameter, Safety, Positioning-data, Monitor, Diagnosis, Test Mode, Adjustment, Tools, Window, Help) and a toolbar with icons for Read, Set To Default, Verify, Parameter Copy, and Parameter Block. A left-hand navigation pane shows a tree view of parameter categories: Function display, Common, Position/speed, Servo adjustment, Positioning, I/O, Servo amplifier, Machine diagn, Linear control, DD Motor cont, Fully closed loc, List display, Basic, Gain/filter, Extension, I/O, Extension 2, Extension 3, Option, and Special. The main area displays a table of parameters for "Homing".

No.	Abbr.	Name	Unit	Setting range	Axis 1
<b>Homing</b>					
Homing method					
PT45	HMM	Homing method		-43-37	-1 : Dog type (Res
Homing operation basic settings 1 (r/min, mm/s)					
Setting					
PT05	ZRF	Homing speed		0.00-167772.15	100.00
PT56	HMA	Homing acceleration time constant		0-20000	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing
PT57	HMB	Homing deceleration time constant		0-20000	0
PT06	CRF	Creep speed		0.00-167772.15	10.00
Homing operation basic settings 2 (command/s)					
Setting					
PV11	ZRFE	Homing speed extension setting		0-4294967295	500000
PV15	HMACC	Homing acceleration		0-4294967295	0
PT55.0	*	Homing deceleration time constant selection		0-1	0 : [Pr. PT56 Homing
PV17	HMDEC	Homing deceleration		0-4294967295	0
PV13	CRFE	Creep speed extension setting		0-4294967295	100000
Homing detailed settings					
Setting					
PT07	ZST	Home position shift distance		0-2147483647	0
PT09	DCT	Travel distance after proximity dog		0-2147483647	1000

Below the table, a "Docking Help" window is visible, showing the text "[Pr. PT05\_Homing speed (ZRF)]".

This completes parameter writing.  
Go to the next page.



In this chapter, you have learned:

- Servo Parameter Setting Method
- Starting MR Configurator2
- Example of Parameter Setting
- Operating MR Configurator2

Important points

Servo Parameter Setting Method	<ul style="list-style-type: none"> <li>• For the G-type servo amplifier, set the parameter from the controller side via a network or using MR Configurator2.</li> <li>• For the A-type servo amplifier, set the parameter using MR Configurator2 or push buttons on the front.</li> <li>• Change the parameters related to the functional safety using MR Configurator2.</li> </ul>
Starting MR Configurator2	<ul style="list-style-type: none"> <li>• Start MR Configurator2 and create a new project. Then, select the model to be used.</li> </ul>
Example of Parameter Setting	<ul style="list-style-type: none"> <li>• First, check the parameters that must be set and parameters that need to be set depending on the servo motor type.</li> <li>• Adjust the relationship between the command value from the controller and actual travel distance of the machine using the electronic gear parameters.</li> </ul>
Operating MR Configurator2	<ul style="list-style-type: none"> <li>• In the Parameter Setting window of MR Configurator2, there are Function display and List display. Either display can be used to set the parameters.</li> <li>• When writing the parameters to the servo amplifier, turn on the control circuit of the servo amplifier.</li> <li>• Some parameters are applied when the control circuit of the servo amplifier is turned off and on.</li> </ul>

## Chapter 4 Test Operation

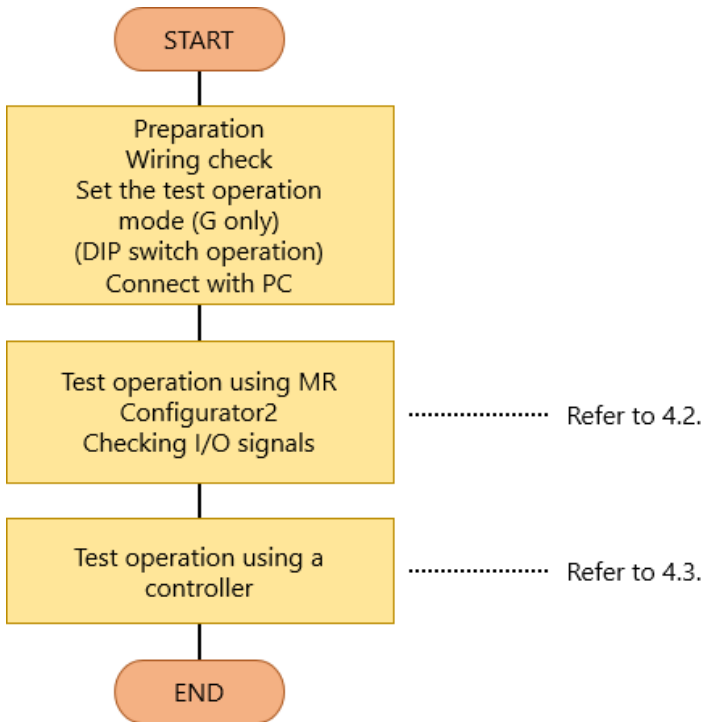
This chapter describes how to perform the test operation for checking the rotation direction, travel distance, and others.

<Restrictions>

When an absolute position detection system by DIO is configured with Type A, the test operation cannot be executed. To execute the test operation, change the system to the incremental system.

The absolute position detection system is explained in Chapter 5.

### 4.1 Test Operation Procedure



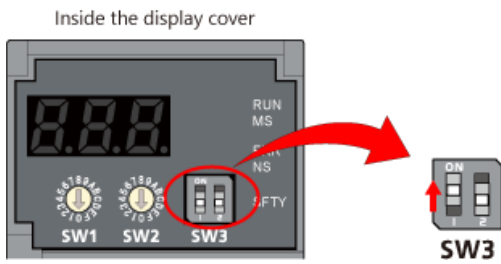
#### [Important points]

When a linear servo motor or direct drive motor is used, the test operation is performed after the execution of magnetic pole detection.

For details, refer to Chapter 6.

[Type G only]

Before using the test operation function of MR Configurator2, change the DIP switch. Set SW3-1 to "ON" (upper side), and then turn on the power supply of the servo amplifier.

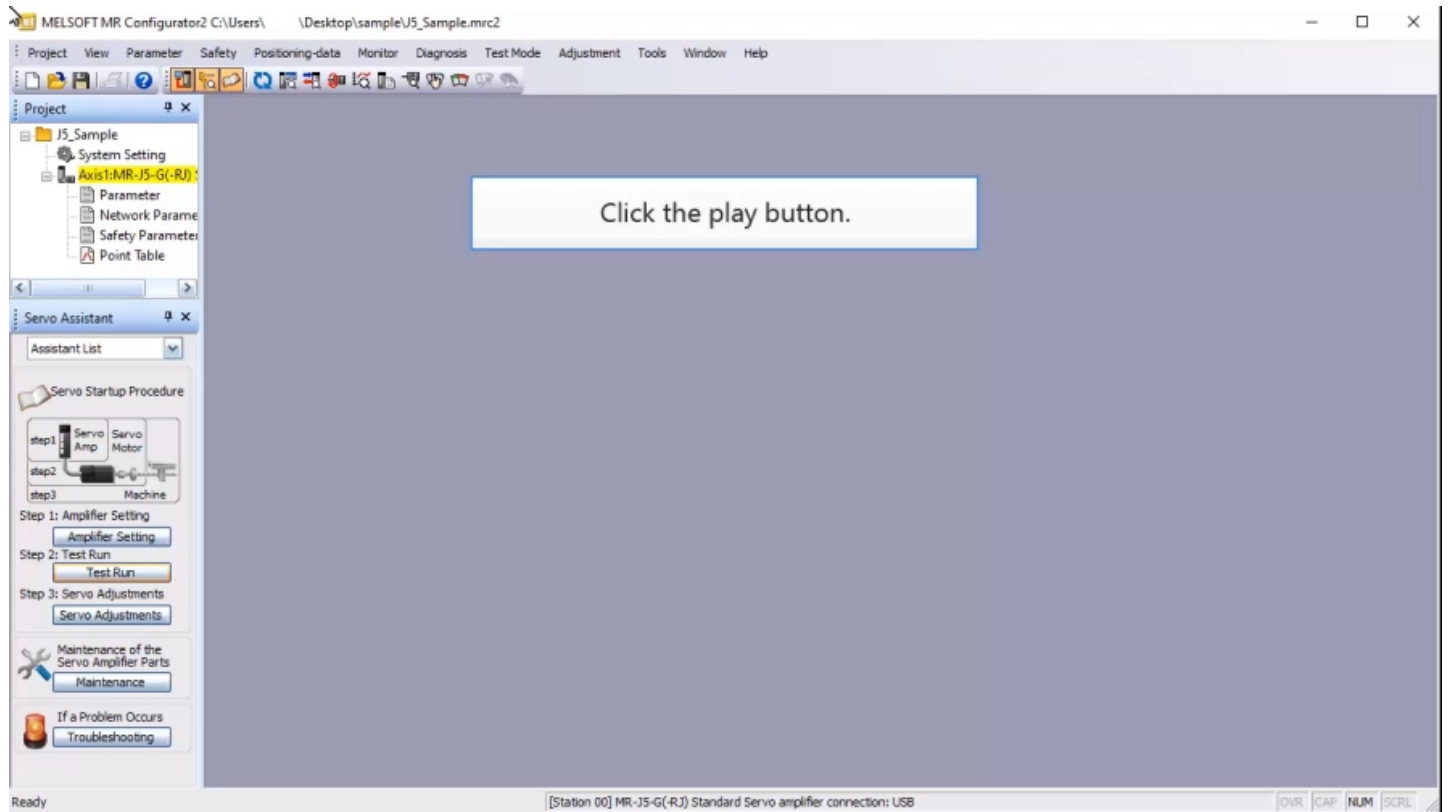


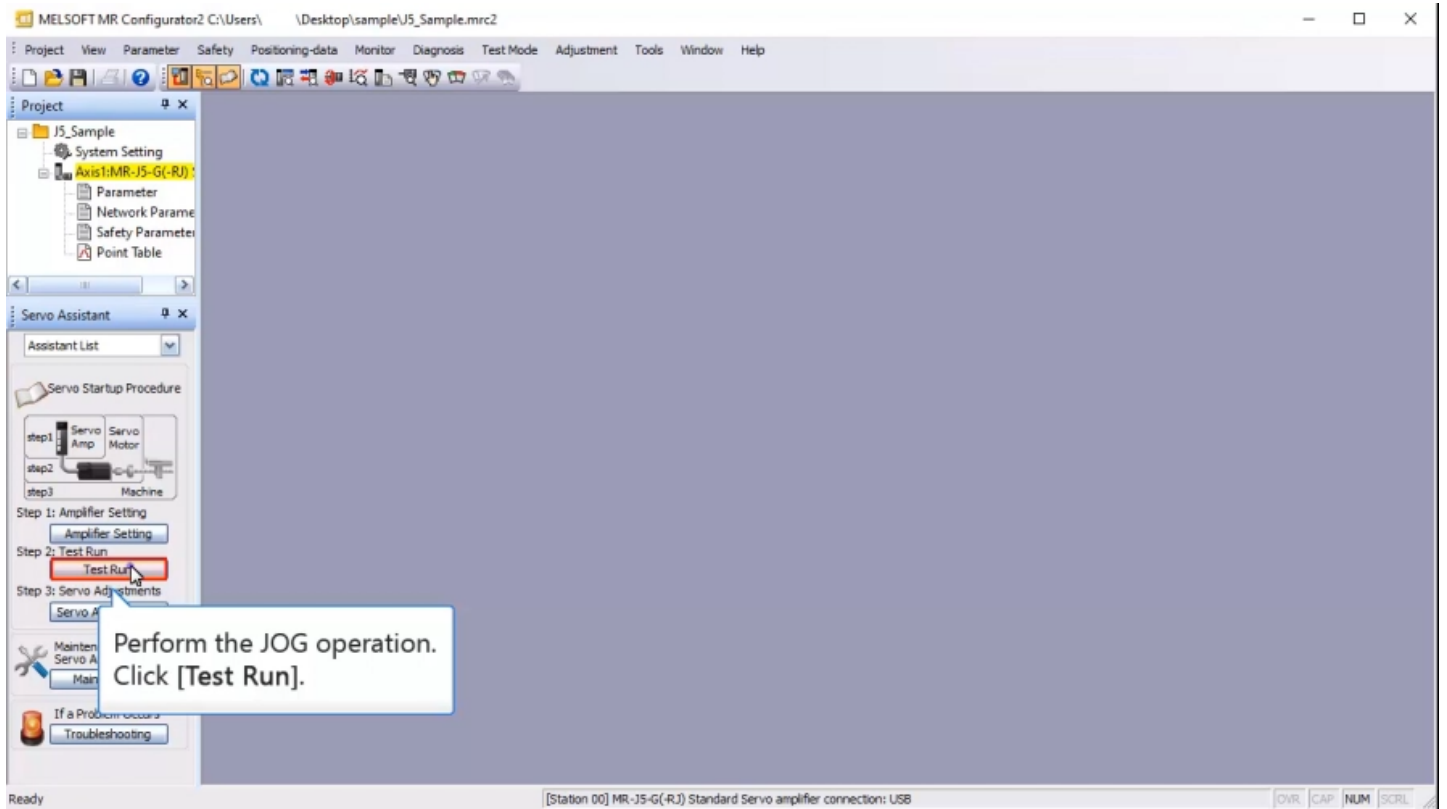
When the initialization is completed after the power is supplied, the display changes as shown in the figure below.

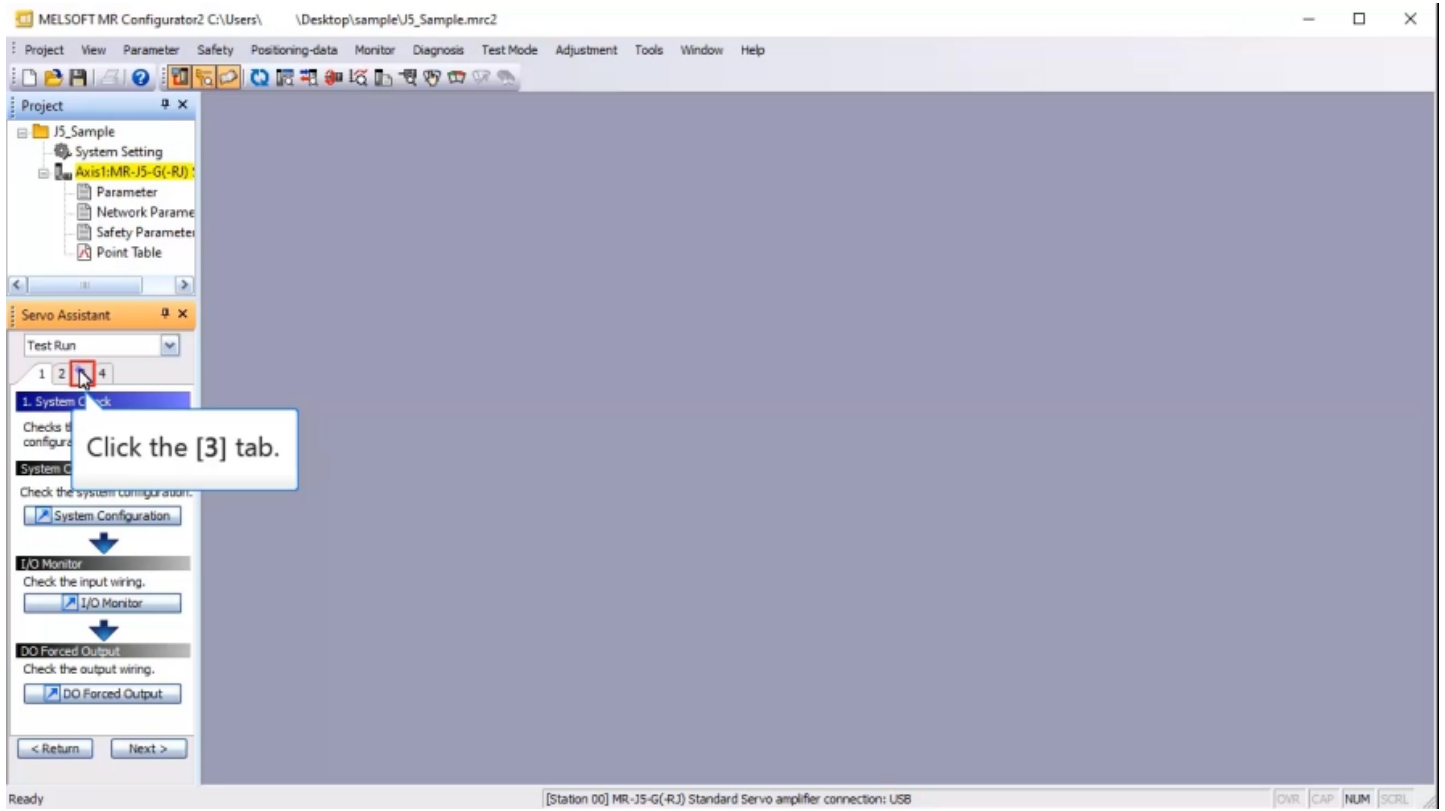


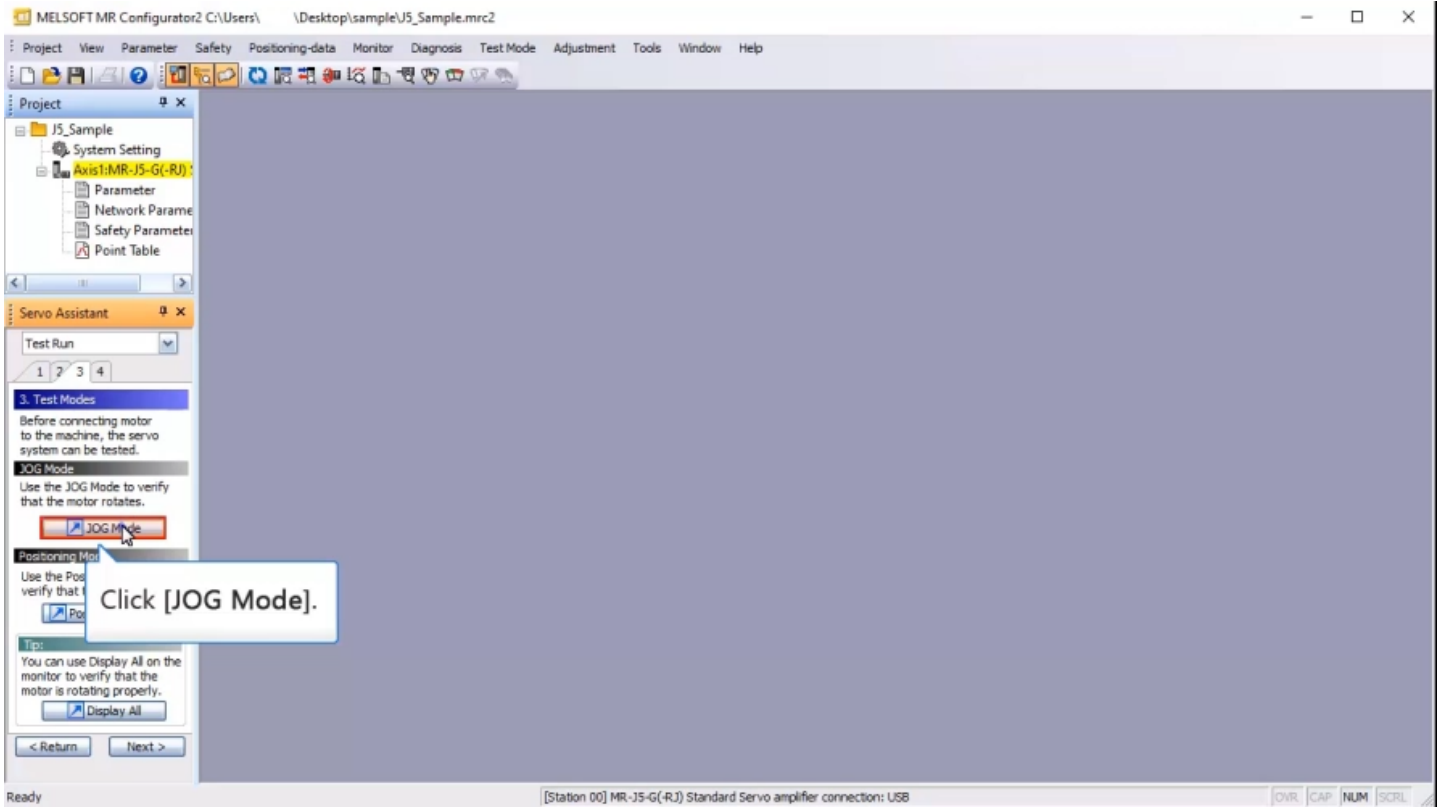
[Common to Type A and G]

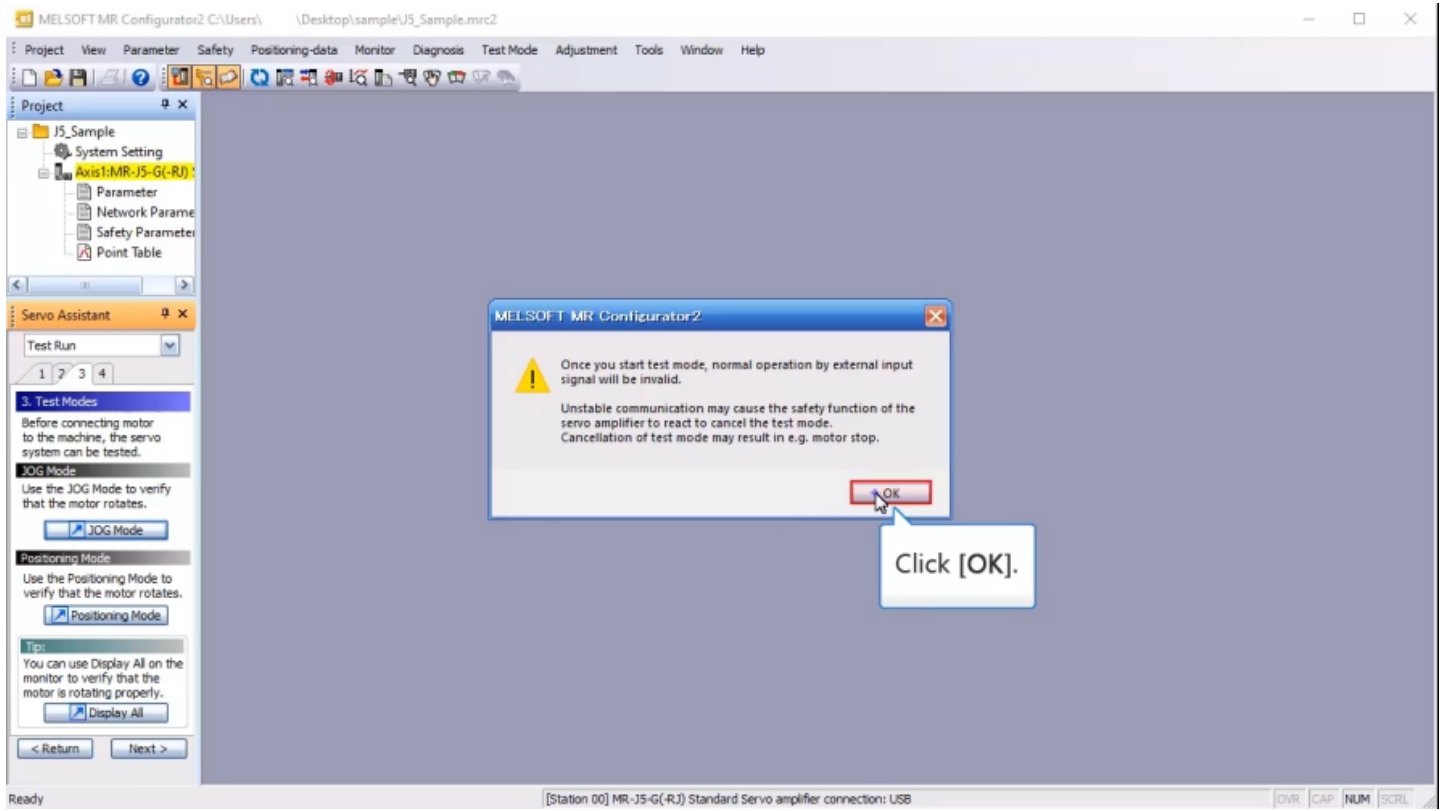
Perform the JOG operation using the test operation function of MR Configurator2. Details are explained in the video on the next page.



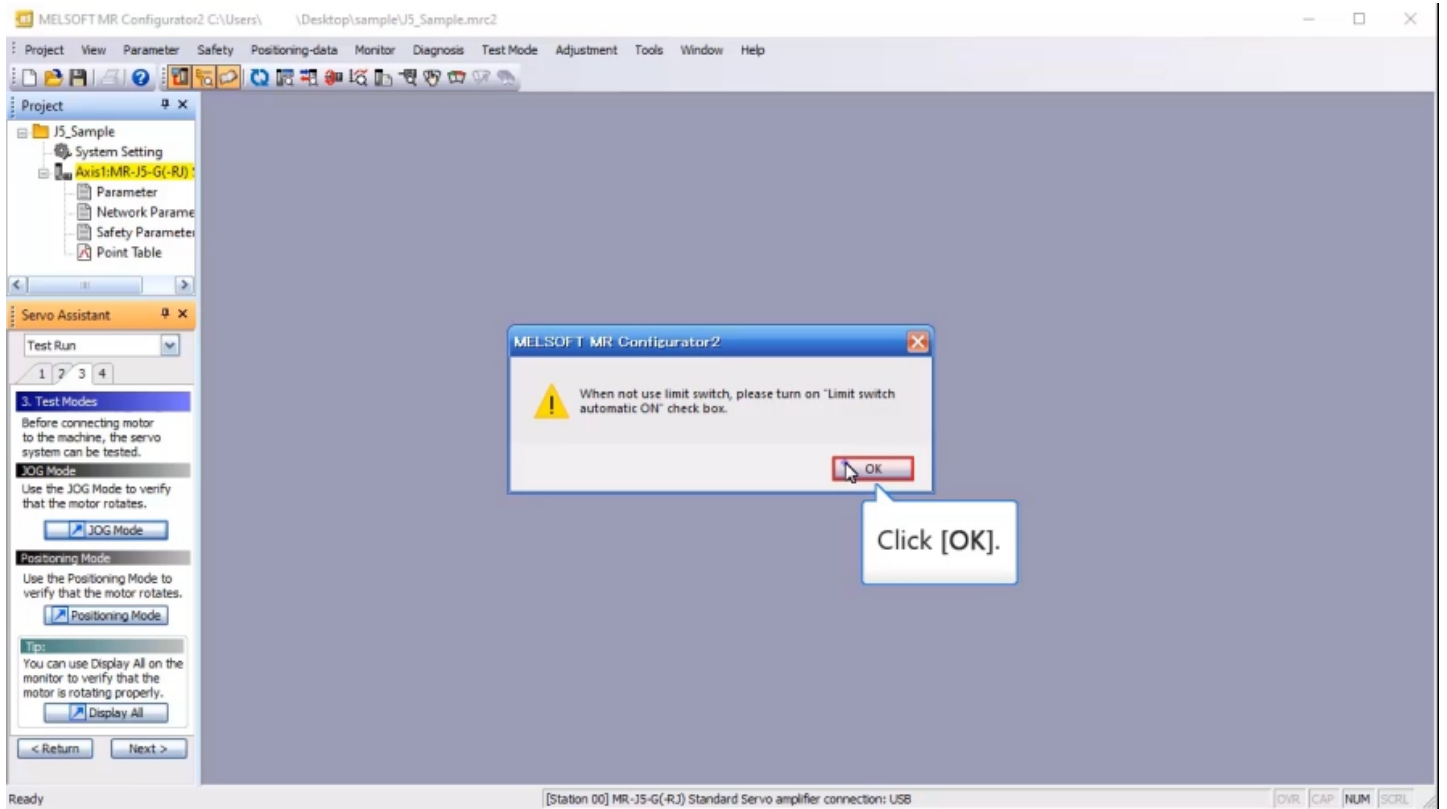












The screenshot displays the MELSOFT MR Configurator2 interface. The main window is titled "JOG Mode" and is set for "Axis1". The "Setting" section includes:

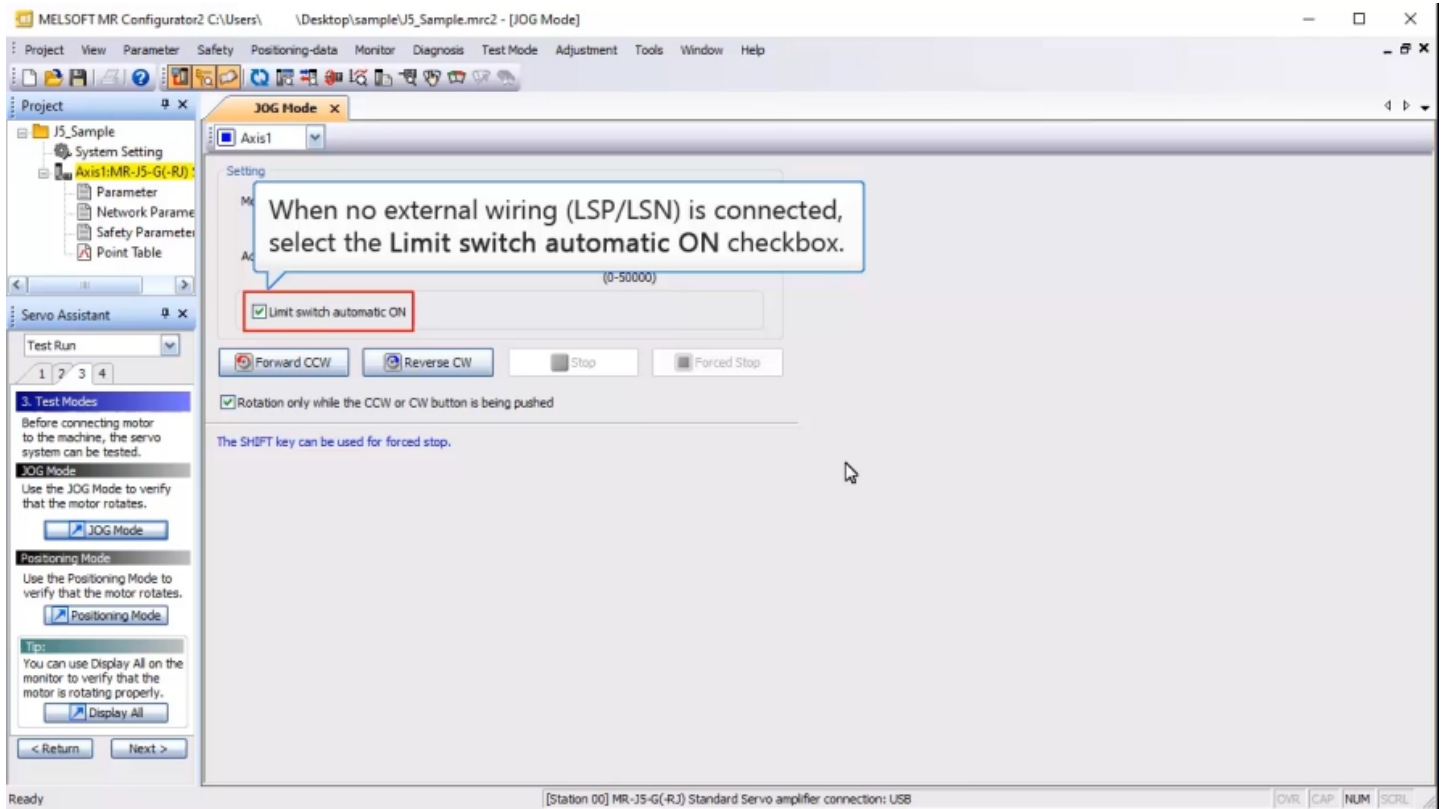
- Motor speed: 200 r/min (range 1-6700)
- Accel./decel. time constant: 1000 ms (range 0-50000)
- Limit switch automatic ON

Control buttons include "Forward CCW", "Reverse CW", "Stop", and "Forced Stop". A checkbox is checked for "Rotation only while the CCW or CW button is b...". A note states: "The SHFT key can be used for forced stop."

A callout box with a blue border contains the text: "The JOG Mode window opens."

The left sidebar shows the "Servo Assistant" with "Test Run" selected. The "Test Modes" section includes instructions for JOG Mode and Positioning Mode, with buttons for "JOG Mode", "Positioning Mode", and "Display All".

At the bottom, the status bar shows "Ready" on the left and "[Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB" on the right, along with "OVR", "CAP", "NUM", and "SCRL" indicators.



MELSOFT MR Configurator2 C:\Users\ \Desktop\sampleU5\_Sample.mrc2 - [JOG Mode]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project JS\_Sample System Setting Axis1:MR-J5-G(-RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

3. Test Modes  
Before connecting motor to the machine, the servo system can be tested.  
JOG Mode  
Use the JOG Mode to verify that the motor rotates.  
JOG Mode  
Positioning Mode  
Use the Positioning Mode to verify that the motor rotates.  
Positioning Mode  
Tip:  
You can use Display All on the monitor to verify that the motor is rotating properly.  
Display All  
< Return Next >

JOG Mode Axis1

Setting  
Motor speed 200 r/min (1-6700)  
Accel./decel. time constant 1000 ms (0-50000)  
 Limit switch automatic ON

Forward CCW Reverse CW Stop Forced Stop

Rotat  
The SHPF

Click [Forward CCW].

<Operation image>  
Lower stroke limit Upper stroke limit  
Dog signal

Ready [Station 00] MR-J5-G(-RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

MELSOFT MR Configurator2 C:\Users\ \Desktop\sampleU5\_Sample.mrc2 - [JOG Mode]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project JS\_Sample System Setting Axis1:MR-J5-G(-RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

3. Test Modes  
Before connecting motor to the machine, the servo system can be tested.  
**JOG Mode**  
Use the JOG Mode to verify that the motor rotates.  
JOG Mode  
**Positioning Mode**  
Use the Positioning Mode to verify that the motor rotates.  
Positioning Mode  
**Tip:**  
You can use Display All on the monitor to verify that the motor is rotating properly.  
Display All  
< Return Next >

Axis1

Setting

Motor speed 200 r/min (1-6700)

Accel./decel. time constant 1000 ms (0-50000)

Limit switch automatic ON

Forward CW Reverse CW Stop Forced Stop

Rotation only while the CCW or CW button is being pushed

The SHFT key can be used for forced stop.

<Operation image>

Lower stroke limit Upper stroke limit

Dog signal

The forward operation is performed while the mouse button is being pressed.

Ready [Station 00] MR-J5-G(-RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

MELSOFT MR Configurator2 C:\Users\ \Desktop\sampleU5\_Sample.mrc2 - [JOG Mode]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project JS\_Sample System Setting Axis1:MR-J5-G(-RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

3. Test Modes  
Before connecting motor to the machine, the servo system can be tested.  
JOG Mode  
Use the JOG Mode to verify that the motor rotates.  
[JOG Mode]  
Positioning Mode  
Use the Positioning Mode to verify that the motor rotates.  
[Positioning Mode]  
Tip:  
You can use Display All on the monitor to verify that the motor is rotating properly.  
[Display All]  
< Return Next >

JOG Mode Axis1

Setting  
Motor speed 200 r/min (1-6700)  
Accel./decel. time constant 1000 ms (0-50000)  
 Limit switch automatic ON

[Forward CCW] [Reverse CW] [Stop] [Forced Stop]

Rotation only while the CCW or CW is selected.  
The SHFT key can be used for forced stop.

Click [Reverse CW].

<Operation image>  
Lower stroke limit Upper stroke limit  
Dog signal

Ready [Station 00] MR-J5-G(-RJ) Standard Servo amplifier connection: USB [OVR] [CAP] [NUM] [SCRL]

MELSOFT MR Configurator2 C:\Users\ \Desktop\sampleU5\_Sample.mrc2 - [JOG Mode]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project JS\_Sample System Setting Axis1:MR-J5-G(-RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

3. Test Modes  
Before connecting motor to the machine, the servo system can be tested.  
**JOG Mode**  
Use the JOG Mode to verify that the motor rotates.  
[JOG Mode]  
**Positioning Mode**  
Use the Positioning Mode to verify that the motor rotates.  
[Positioning Mode]  
**Tip:**  
You can use Display All on the monitor to verify that the motor is rotating properly.  
[Display All]  
< Return Next >

JOG Mode Axis1

Setting  
Motor speed 200 r/min (1-6700)  
Accel./decel. time constant 1000 ms (0-50000)  
 Limit switch automatic ON

Forward CCW Reverse CW Stop Forced Stop

Rotation only while the CCW or CW button is being pushed

The SHFT key can be used for forced stop.

<Operation image>  
Lower stroke limit Upper stroke limit  
Dog signal

The reverse operation is performed while the mouse button is being pressed.

Ready [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

The screenshot displays the MELSOFT MR Configurator2 interface in JOG Mode. The main window shows settings for Axis1, including Motor speed (200 r/min) and Accel./decel. time constant (1000 ms). The Limit switch automatic ON checkbox is checked. Control buttons for Forward CCW, Reverse CW, Stop, and Forced Stop are visible. A Servo Assistant panel on the left provides instructions for JOG Mode, Positioning Mode, and a Tip about the Display All function. An inset diagram titled '<Operation image>' shows a motor with a dog signal and stroke limits. A text box at the bottom right states: 'This completes the JOG operation. Go to the next page.'

MELSOFT MR Configurator2 C:\Users\ \Desktop\sampleU5\_Sample.mrc2 - [JOG Mode]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project JS\_Sample System Setting Axis1:MR-J5-G(-RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

3. Test Modes

Before connecting motor to the machine, the servo system can be tested.

**JOG Mode**

Use the JOG Mode to verify that the motor rotates.

[JOG Mode]

**Positioning Mode**

Use the Positioning Mode to verify that the motor rotates.

[Positioning Mode]

**Tip:**

You can use Display All on the monitor to verify that the motor is rotating properly.

[Display All]

< Return Next >

Setting

Axis1

Motor speed 200 r/min (1-6700)

Accel./decel. time constant 1000 ms (0-50000)

Limit switch automatic ON

[Forward CCW] [Reverse CW] [Stop] [Forced Stop]

Rotation only while the CCW or CW button is being pushed

The SHFT key can be used for forced stop.

<Operation image>

Lower stroke limit Upper stroke limit

Dog signal

This completes the JOG operation.  
Go to the next page.

Ready [Station 00] MR-J5-G(-RJ) Standard Servo amplifier connection: USB [OVR] [CAP] [NUM] [SCRL]



[Common to Type A and G]

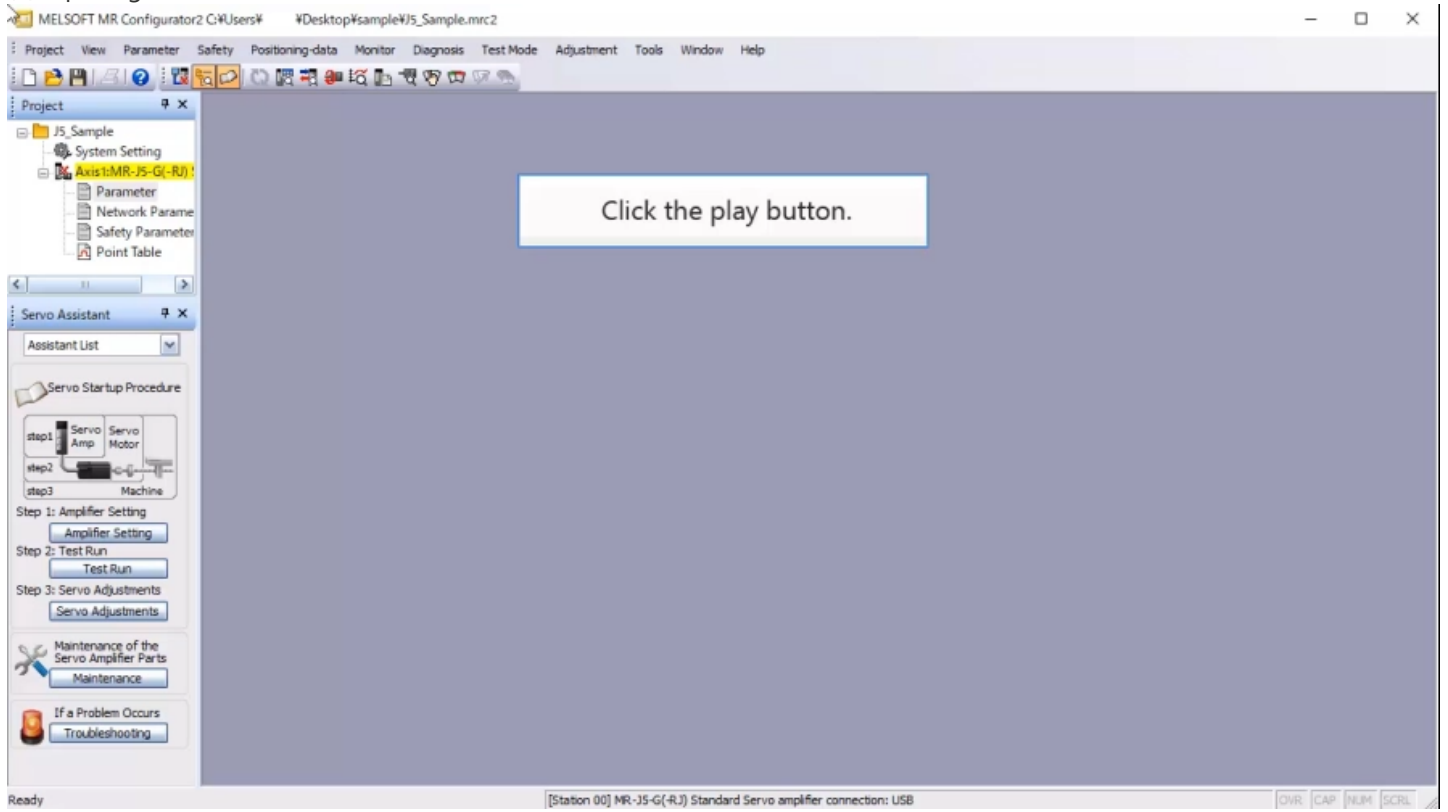
You can check whether the external I/O signals connected to the servo amplifier are operating properly.

Input signal check allows you to check if the stroke limit and other signals are properly turned on and off.

Output signal check allows you to check if the external circuit operates properly using a tester or other means by forcibly turning on the external signal.

On the next two pages, you can learn the checking method with videos.

## (1) Input signal

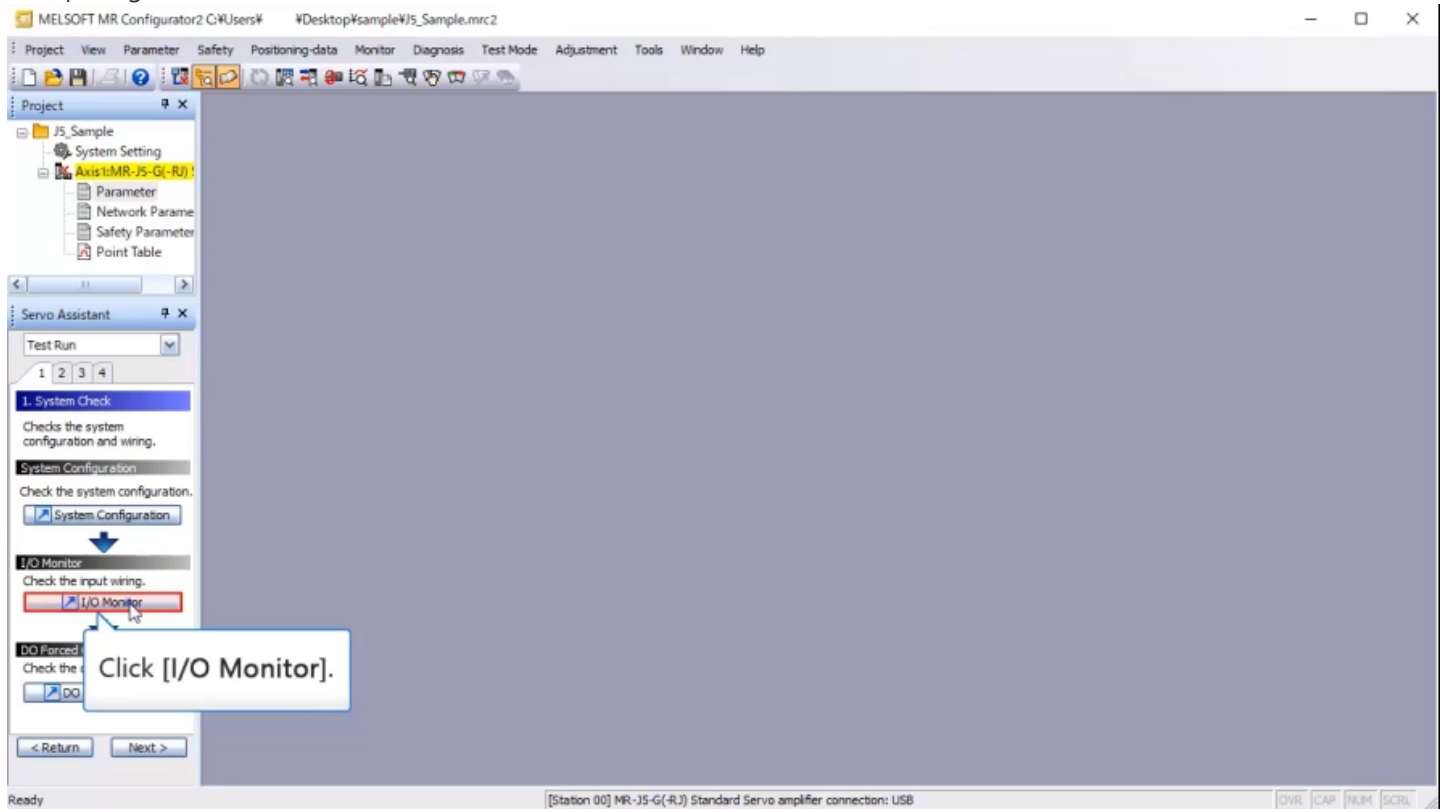


## (1) Input signal

The screenshot displays the MELSOFT MR Configurator2 software interface. The main window shows the 'Servo Assistant' panel on the left, which includes a diagram of the servo system and a list of steps: Step 1: Amplifier Setting, Step 2: Test Run, and Step 3: Servo Adjustments. The 'Test Run' button is highlighted with a red box. A callout box with a blue border and white background points to the 'Test Run' button, containing the text: "Check the I/O monitor display. Click [Test Run]."

The status bar at the bottom of the window displays: Ready [Station 00] MR-J5-G(-R.J) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

## (1) Input signal



(1) Input signal

The screenshot shows the I/O Monitor window for Axis 1 of an MR-J5-G(RJ) servo amplifier. The window is titled 'I/O Monitor' and includes a 'Clear' button. It displays two tables: 'Input sig.' and 'Output sig.'. A callout box with the text 'The I/O Monitor window opens.' points to the main content area.

**Input sig. table:**

Input sig.	CN8
STO1	4
STO2	5
TPR2	1
LSP	2
TPR1	10
LSN	12
DOG	19
EM2	20

**Output sig. table:**

Output sig.	CN8	Output sig.
	6	----
	7	----
	CN3	
	9	INP
	13	MBR
	CN6	
	3	MO1
	2	MO2

Additional data shown in the window includes 'Cumulative enc. output' (0.00 v) and '4 times output' (8/18 LZ/LZR).

Buttons at the bottom include 'Parameter Setting' and 'Safety Parameter Setting'.

At the bottom of the window, the status bar shows: 'Ready', '[Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB', and 'OVR CAP NUM SCRL'.

(1) Input signal

The screenshot shows the MELSOFT MR Configurator2 I/O Monitor window for Axis1. The main display area shows a table of input and output signals for the MR-J5-G(RJ) servo amplifier. A red box highlights the input signal table, and a blue callout box provides instructions on how to check these signals.

Input sig.	CN8	CN8	Output sig.
STO1	4	6	---
STO2	5	7	---
		CN3	
TPR2	1	9	INP
LSP	2	13	MBR
TPR1	10	15	ALM
LSN	12		
DOG	19		
EM2	20		

Cumulative enc. output pulses	CN3	Output
0	6/16	LA/LAR
pulse	7/17	LB/LBR
4 times output	8/18	LZ/LZR
	CN6	

**<Operation image>**

Lower stroke limit      Upper stroke limit

Dog signal

This is an example for checking input signals of LSP, LSN, and DOG. When the workpiece shown in the operation image reaches the upper stroke limit, lower stroke limit, or dog sensor, the I/O signal turns on/off.  
 \* The actual system stops immediately when LSP or LSN turns off.

(1) Input signal

The screenshot shows the I/O Monitor window for Axis1 in the MELSOFT MR Configurator2. The window title is "I/O Monitor" and it displays the status of various signals for the MR-J5-G(RJ) servo amplifier. The status is indicated by yellow boxes for ON and white boxes for OFF.

**Input sig.:**

Signal	Status
STO1	4
STO2	5
TPR2	1
LSP	2
TPR1	10
LSN	12
DOG	19
EM2	20

**Output sig.:**

Signal	Status
6	---
7	---
CN3	
9	INP
13	MBR
15	ALM
CN3	
6/16	LA/LAR
7/17	LB/LBR
8/18	LZ/LZR
CN6	
3	MO1
2	MO2

**Cumulative enc. output pulses:**

Signal	Status
0	6/16 LA/LAR
pulse	7/17 LB/LBR
4 times output	8/18 LZ/LZR
0.00 v	
0.00 v	

Buttons: Parameter Setting, Safety Parameter Setting

Bottom status bar: [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB

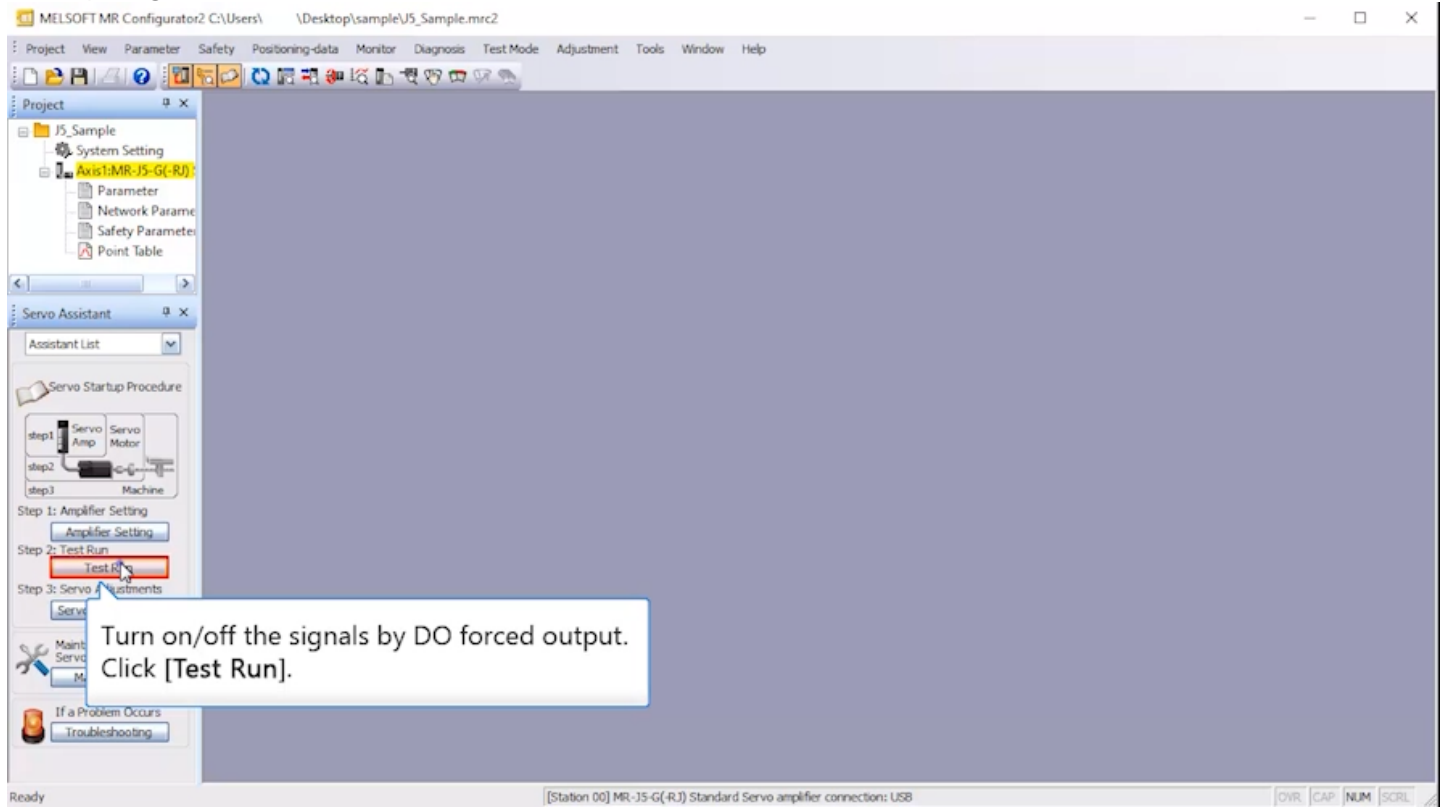
This completes the I/O monitor display check.  
Go to the next page.

## (2) Output signal

The screenshot displays the MELSOFT MR Configurator2 software interface. The main window shows a project tree on the left with 'J5\_Sample' selected, containing 'System Setting', 'Parameter', 'Network Parameter', 'Safety Parameter', and 'Point Table'. The 'Servo Assistant' window is open, showing a 'Servo Startup Procedure' diagram with three steps: 'Step 1: Amplifier Setting', 'Step 2: Test Run', and 'Step 3: Servo Adjustments'. A callout box with the text 'Click the play button.' is overlaid on the main workspace. The status bar at the bottom indicates 'Ready' and '[Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB'. The bottom right corner shows keyboard shortcuts: OVR, CAP, NUM, and SCRL.



## (2) Output signal



The screenshot displays the MELSOFT MR Configurator2 software interface. The main window shows the 'Servo Assistant' panel on the left, which includes a 'Servo Startup Procedure' diagram and a list of steps: 'Step 1: Amplifier Setting', 'Step 2: Test Run', and 'Step 3: Servo Adjustments'. The 'Test Run' button is highlighted with a red box. A callout box points to this button with the text: 'Turn on/off the signals by DO forced output. Click [Test Run].'

Ready [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

## (2) Output signal

The screenshot displays the MELSOFT MR Configurator2 interface. The main window shows a project tree on the left with 'J5\_Sample' selected. The 'Servo Assistant' window is open, showing the 'I/O Monitor' step. A callout box points to the 'DO Forced Output' button with the text 'Click [DO Forced Output].'. The status bar at the bottom indicates 'Ready' and '[Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB'.

Project: MELSOFT MR Configurator2 C:\Users\... \Desktop\sampleU5\_Sample.mrc2

Project

- J5\_Sample
  - System Setting
  - Axis1:MR-J5-G(RJ)
    - Parameter
    - Network Parameter
    - Safety Parameters
    - Point Table

Servo Assistant

Test Run

1 2 3 4

1. System Check

Checks the system configuration and wiring.

System Configuration

Check the system configuration.

[System Configuration]

I/O Monitor

Check the input wiring.

[I/O Monitor]

DO Forced Output

Check the output wiring.

[DO Forced Output]

< Return Next >

Ready [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

## (2) Output signal

The screenshot displays the MELSOFT MR Configurator2 software interface. On the left, the 'Servo Assistant' panel is visible, showing a sequence of steps: 1. System Check, System Configuration, I/O Monitor, and DO Forced Output. The 'I/O Monitor' step is currently selected, with a button labeled 'I/O Monitor'. A blue arrow points from 'System Configuration' to 'I/O Monitor', and another blue arrow points from 'I/O Monitor' to 'DO Forced Output'. Below these steps are buttons for '< Return' and 'Next >'. The main workspace is a grey area where a warning dialog box is displayed. The dialog box has a yellow warning icon and the following text: 'Once you start test mode, normal operation by external input signal will be invalid. Unstable communication may cause the safety function of the servo amplifier to react to cancel the test mode. Cancellation of test mode may result in e.g. motor stop.' An 'OK' button is highlighted with a red box, and a callout bubble points to it with the text 'Click [OK]'. The status bar at the bottom shows 'Ready' on the left and '[Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB' in the center, with 'OVR', 'CAP', 'NUM', and 'SCRL' indicators on the right.

(2) Output signal

The DO Forced Output window opens.

<I/O symbol connector pin array>

	1		11
2	TPR2	12	LG
LSP	3	LSN	13
4	DOCOM	14	MBR
ADIN0	5	ADIN1	15
6	DIKOM	16	ALM
LA	7	LAR	17
8	LB	18	LBR
LZ	9	LZR	19
10	INP	20	DOG
TPR1		EM2	

(2) Output signal

Forced output status

Axis1

Test Operation Mode Cancel

Forced output status

:ON :OFF

CN3-8 ON OFF

CN3-9 ON OFF

CN3-13 ON OFF

CN3-15 ON OFF

This is an example for checking CN3-9. Click [ON].

Output for safety sub-function

\*Set PSA01.0 as 1 and PSA01.1 as 2

Switch the dual output at the same time

CN3-6 ON OFF CN3-7 ON OFF

<I/O symbol connector pin array>

CN3

	1		11
2	TPR2	12	LG
LSP	3	LSN	13
4	DOCOM	14	MBR
ADIN0	5	ADIN1	15
6	DICOM	16	ALM
LA	7	LAR	17
8	LB	18	LBR
LZ	9	LZR	19
10	INP	20	DOG
TPR1		EM2	

Ready [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB [OVR] [CAP] [NUM] [SCRL]

(2) Output signal

The screenshot shows the MELSOFT MR Configurator2 interface for configuring the DO Forced Output for Axis1. The main window is titled "DO Forced Output" and includes a "Test Operation Mode Cancel" button. The "Forced output status" section contains several toggle switches for CN3-8, CN3-9, CN3-13, and CN3-15. The CN3-9 switch is currently set to "ON" and is highlighted in yellow. Below this, the "Output for safety sub-function" section includes a checkbox for "Switch the dual output at the same time" and two more toggle switches for CN3-6 and CN3-7.

To the right, a callout diagram titled "<I/O symbol connector pin array>" shows the CN3 connector pin array. The pins are arranged in a grid with the following labels:

	1		11
2	TPR2	12	LG
LSP	3	LSN	13
4	DOCOM	14	MBR
ADINO	5	ADIN1	15
6	DICOM	16	ALM
LA	7	LAR	17
8	LB	18	LBR
LZ	9	LZR	19
10	JNP	20	DOG
TPR1		EM2	

A callout box points to pin 9 (JNP) in the diagram, stating "CN3-9 has turned ON."

At the bottom of the window, the status bar shows "Ready" on the left and "[Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB" in the center. On the right, there are buttons for "OVR", "CAP", "NUM", and "SCRL".

## 4.2.2 Checking I/O Signals

### (2) Output signal

When the external signal turns on, check if the signal is actually output using a tester or other means and if the external circuit is working properly.

CN3			
	1		11
2	TPR2	12	LG
LSP	3	LSN	13
4	DOCOM	14	MBR
ADINO	5	ADIN1	15
6	DICOM	16	ALM
LA	7	LAR	17
8	LB	18	LBR
LZ	9	LZR	19
	NP	20	DOG
			EM2

(2) Output signal

MELSOFT MR Configurator2 C:\Users\... \Desktop\sample\J5\_Sample.mrc2 - [DO Forced Output]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project J5\_Sample System Setting Axis1:MR-J5-G(RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

1. System Check Checks the system configuration and wiring.

System Configuration Check the system configuration. System Configuration

I/O Monitor Check the input wiring. I/O Monitor

DO Forced Output Check the output wiring. DO Forced Output

< Return Next >

Axis1 Test Operation Mode Cancel

Forced output status

:ON :OFF

CN3-8 ON OFF

CN3-9 ON OFF

CN3-13 ON OFF

CN3-15 ON OFF

Click [OFF].

Output for safety sub-function  
\*Set PSA01.0 as 1 and PSA01.1 as 2  
Switch the dual output at the same time

CN3-6 ON OFF CN3-7 ON OFF

<I/O symbol connector pin array>

CN3

	1		11
2	TPR2	12	LG
LSP	3	LSN	13
4	DOCOM	14	MBR
ADIN0	5	ADIN1	15
6	DICOM	16	ALM
LA	7	LAR	17
8	LB	18	LBR
LZ	9	LZR	19
10	INP	20	DOG
TPR1		EM2	

Ready [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL



(2) Output signal

The screenshot shows the 'DO Forced Output' configuration window for Axis1. The 'Forced output status' section includes:

- Axis1: ON (highlighted in yellow), OFF
- CN3-8: ON, OFF
- CN3-9: ON, OFF
- CN3-13: ON, OFF
- CN3-15: ON, OFF

Below this, the 'Output for safety sub-function' section is checked, with a note: '\*Set PSA01.0 as 1 and PSA01.1 as 2'. It includes a checkbox for 'Switch the dual output at the same time' and status indicators for CN3-6 and CN3-7.

To the right, a callout diagram titled '<I/O symbol connector pin array>' shows the CN3 connector pin layout. Pin 9 is labeled 'INP' and is highlighted with a red box. A callout box points to this pin with the text 'CN3-9 has turned OFF.'

1	11
2 TPR2	12 LG
LSP 3	13 LSN
4 DOCOM	14 MBR
ADIN0 5	15 ADIN1
6 DI/COM	16 ALM
LA 7	17 LAR
8 LB	18 LBR
LZ 9	19 LZR
10 INP	20 DOG
TPR1	EM2

(2) Output signal

MELSOFT MR Configurator2 C:\Users\... \Desktop\sample\J5\_Sample.mrc2 - [DO Forced Output]

Project View Parameter Safety Positioning-data Monitor Diagnosis Test Mode Adjustment Tools Window Help

Project J5\_Sample System Setting Axis1:MR-J5-G(RJ) Parameter Network Parameter Safety Parameter Point Table

Servo Assistant Test Run 1 2 3 4

1. System Check Checks the system configuration and wiring.

System Configuration Check the system configuration. System Configuration

I/O Monitor Check the input wiring. I/O Monitor

DO Forced Output Check the output wiring. DO Forced Output

< Return Next >

Axis1 Test Operation Mode Cancel

Forced output status

:ON :OFF

CN3-8 ON OFF

CN3-9 ON OFF

CN3-13 ON OFF

CN3-15 ON OFF

Output for safety sub-function

\*Set PSA01.0 as 1 and PSA01.1 as 2

Switch the dual output at the same time

CN3-6 ON OFF CN3-7 ON OFF

<I/O symbol connector pin array>

CN3

	1		11
2	TPR2	12	LG
LSP	3	LSN	13
4	DOCOM	14	MBR
ADINO	5	ADIN1	15
6	DICOM	16	ALM
LA	7	LAR	17
8	LB	18	LBR
LZ	9	LZR	19
10	INP	20	DOG

This completes signal on/off by DO forced output.  
Go to the next page.

Ready [Station 00] MR-J5-G(RJ) Standard Servo amplifier connection: USB OVR CAP NUM SCRL

The following are troubleshooting examples for the test operation.

<Wiring problems>

- Check if all the cables are properly connected.
- If there is any disconnected or loose connector, connect it again.
- If there is any corroded or damaged cable, replace it with a new cable.
- If there is a short in wiring, insulate the wiring or perform rewiring.

<Operation problems>

- Check that the main circuit power supply and control circuit power supply are on.
- If the forced stop input switch has been pressed (EM2 is open), release the switch (close EM2).
- When the motor does not operate in the JOG operation, check the cause with the "No Motor Rotation" function in "Diagnosis", and take an appropriate action.

[Important points]

Although the servo motor does not rotate when the JOG operation is started without the main circuit power supply turned on, this may not be displayed in "No Motor Rotation".

In this case, a warning occurs and the JOG operation mode is disabled. However, this event is not recorded in the alarm history because it is not an alarm.

Execute the JOG operation function of the controller at low speed, and check the operation of the machine.

For the JOG operation function of the controller, refer to the manual of the controller used.

[Important points]

When any of the following controllers manufactured by Mitsubishi Electric is used, using the function block for the JOG operation facilitates the test operation.

	Controller	FB name
MELSEC iQ-R series	RD78G(H) Motion module (PLCopen <sup>®</sup> Motion control FB mode)	Motion control FB "MCv_Jog"
	RD78G(H) Motion modul (Simple Motion mode)	Module FB "M+RD78GS_JOG"
	RD75□Positioning module	Module FB "M+RD75_JOG"
MELSEC iQ-F series	FX5-□SSC-G Motion module (Simple Motion mode)	Module FB "M+FX5SSC_JOG"
MELSEC-Q series	QD75□Positioning module	FB library (Note) "M+D75_JOG"
MELSEC-L series	LD75□Positioning module	

(Note) The FB library is required to be installed separately from GX Works2.

Download the FB library from [here](#).

In this chapter, you have learned:

- Test Operation Procedure
- Test Operation Using MR Configurator2
- Checking I/O Signals
- Test Operation Using a Controller

Important points

Test Operation Using MR Configurator2	<ul style="list-style-type: none"><li>• Only for Type G, change the DIP switch before supplying the power.</li><li>• Check the rotation direction of the servo motor with the JOG operation of the test operation function of MR Configurator2.</li></ul>
Checking I/O Signals	<ul style="list-style-type: none"><li>• Check whether the external circuit of the servo amplifier is working properly.</li></ul>
Test Operation Using a Controller	<ul style="list-style-type: none"><li>• Execute the JOG operation function of the controller at low speed, and check that the operation is performed by the command from the controller.</li></ul>

This chapter describes the overview of the absolute position detection system and how to start up the system.

### 5.1 What Is Absolute Position Detection System?

The absolute position detection system is a function that stores the absolute position of the machine regardless of the ON/OFF status of the power supply to the controller or servo amplifier.

Therefore, once homing is performed at the time of machine installation, homing is not needed when power is switched on thereafter.

Even if a power failure or a malfunction occurs, the system can be easily restored.

#### <Restrictions>

The absolute position detection system cannot be used in the following cases.

[Type G]

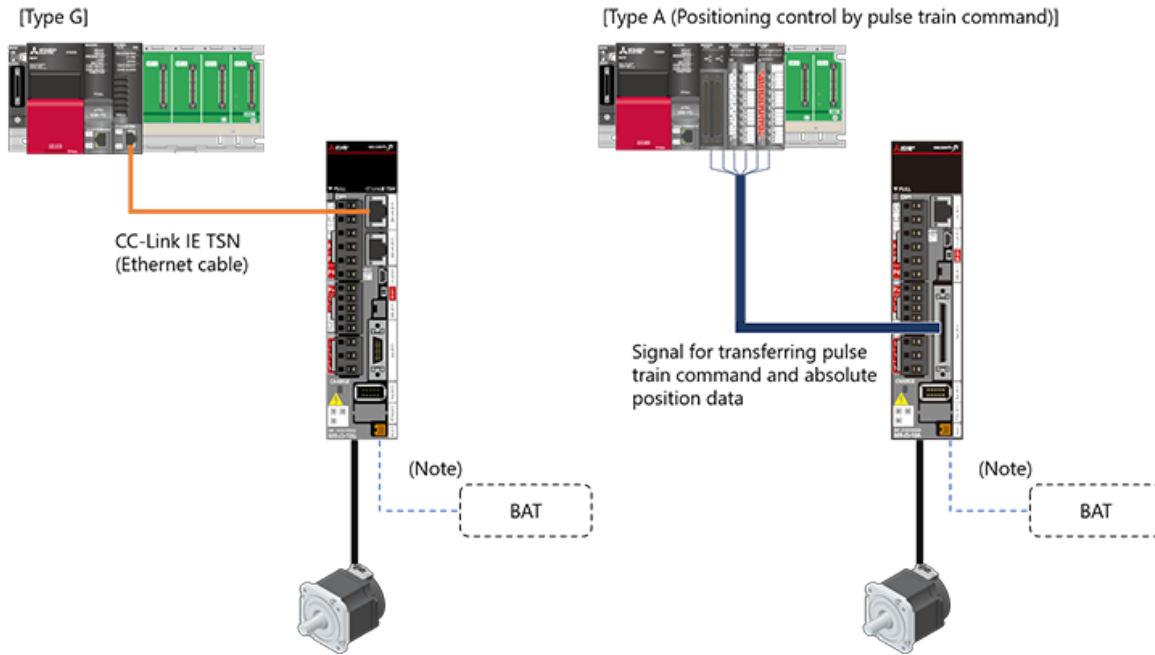
- When an incremental type encoder is being used
- Stroke-less coordinate system for infinite positioning and others in combination with a controller other than a Mitsubishi Electric Motion module

[Type A]

- When an incremental type encoder is being used
- Speed control mode and torque control mode
- Stroke-less coordinate system such as for infinite positioning
- When electronic gear is changed after homing
- When the absolute position detection system by DIO is used, the control switching mode (position/speed, speed/torque, and torque/position) cannot be used.
- In the absolute position detection system by DIO, the test operation cannot be executed.  
To execute the test operation, select the incremental system in [Pr. PA03].

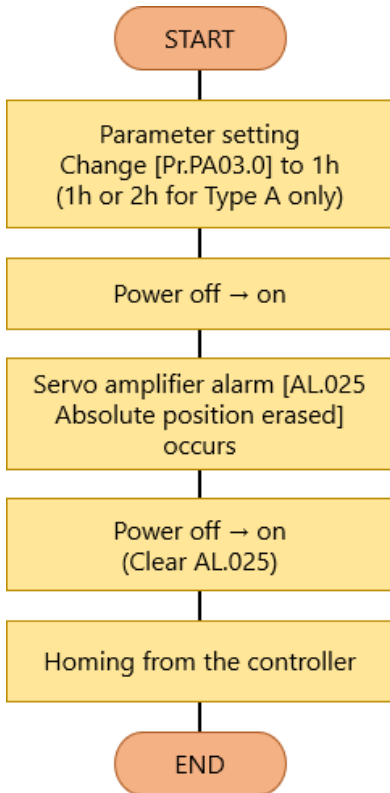
Type G sends the absolute position data to controller via a network.

Type A sends the absolute position data to controller using the DI signal or communication function of the servo amplifier.



(Note) For a motor without a battery-less encoder such as the direct drive motor, a battery is required.

The following shows the procedure for starting up the absolute position detection system.



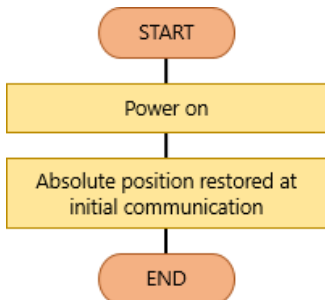


The following figures show the procedure (outline) for restoring the absolute position data by transferring it to the controller when the power supply is turned off and on after the startup of the absolute position detection system.

Type G does not require any specific user operation.

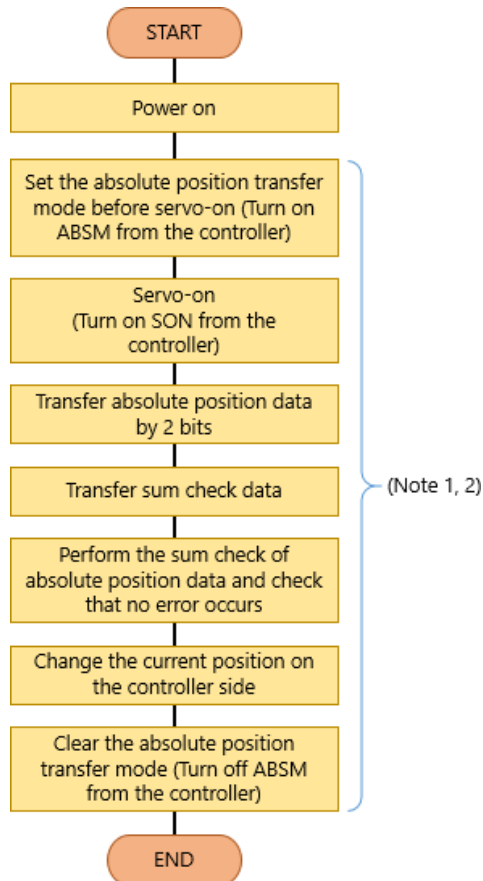
Type A requires a program for transferring the absolute position data before performing the position control.

[Type G]

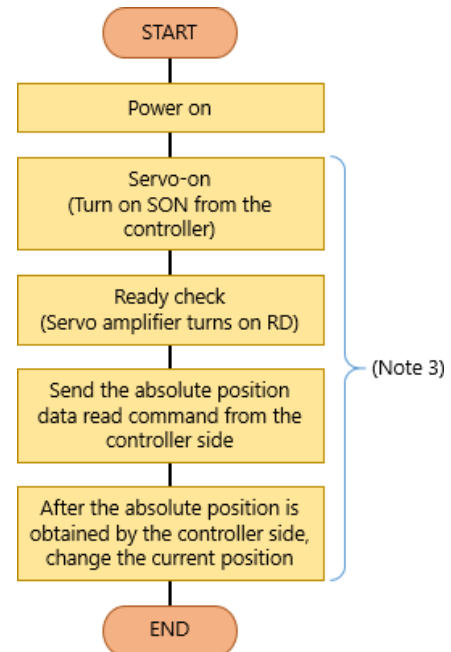


[Type A]

1) Transfer by DIO ([Pr.PA03.0] = 1h)



2) Transfer with the communication function ([Pr.PA03.0] = 2h)



(Note)

1. For details on the procedure, refer to the following manual.



MR-J5 User's Manual (Hardware)

7 ABSOLUTE POSITION DETECTION SYSTEM

7.3 Absolute position detection system by DIO [A]

2. When the controller is RD75□ or FX5-20PG-□, an FB is prepared for restoring the absolute position.

3. For details on the procedure, refer to the following manual.



MR-J5 User's Manual (Hardware)

7 ABSOLUTE POSITION DETECTION SYSTEM

7.4 Absolute position detection system via communication [A]

Even when a servo motor with a battery-less absolute position encoder is used, the absolute position data is erased under the following conditions.

If the absolute position data is erased, perform homing again.

- The servo motor or servo amplifier has been replaced.
- The incremental system has been enabled.
- [Pr. PA01 Operation mode] has been changed.

If any servo motor other than the one connected when the absolute position detection system was started up is connected, [AL. 01A Servo motor combination error] occurs.

In this case, operation can be performed without erasing the absolute position data by connecting the servo motor connected when the absolute position detection system was started up again.

The absolute position data can be monitored by selecting [Monitor] → [ABS Data Display...] in MR Configurator2.

**ABS Data Display** ×

Axis1

Absolute position data (ABS position)

Display the current position of home position used as 0.

Motor edge pulse unit value:  pulse  
=ABS x Enc. counts No. per rot. + (CYC-CYC0)

Command pulse unit value:  pulse  
=(CDV/CMX) x Motor edge pulse unit value

Encoder data

Amp. val

Absolute encoder data

CYC (Motor edge pulse unit):  pulse

Home position

Absolute encoder data at home position

CYC0 (Motor edge pulse unit):  pulse

Motor rotations No.

ABS:  rev

Motor rotations No. at home position

ABS0:  rev

In this chapter, you have learned:

- What Is Absolute Position Detection System?
- Wiring of Absolute Position Detection System
- Startup of Absolute Position Detection System
- Restoration of Absolute Position Data
- Monitor of Absolute Position Data

Important points

What Is Absolute Position Detection System?	<ul style="list-style-type: none"> <li>• The absolute position detection system is a function for always detecting and storing the absolute position of the machine regardless of the ON/OFF status of the power supply to the controller or servo amplifier.</li> </ul>
Wiring of Absolute Position Detection System	<ul style="list-style-type: none"> <li>• When a servo motor with a battery-less encoder is used, no battery is required to retain the absolute position data.</li> <li>• Type A requires wiring and programming for transferring the absolute position data.</li> </ul>
Startup of Absolute Position Detection System	<ul style="list-style-type: none"> <li>• Change the parameter [Pr.PA03.0].</li> <li>• After the parameter is changed, the alarm [AL.25 Absolute position erased] occurs when the power is cycled. Then, cycle the power again.</li> </ul>
Restoration of Absolute Position Data	<ul style="list-style-type: none"> <li>• For Type G, the absolute position data is restored at the initial communication of the CC-Link IE TSN network.</li> <li>• For Type A, the absolute position data is restored by using the communication function or DO signal.</li> </ul>
Monitor of Absolute Position Data	<ul style="list-style-type: none"> <li>• The absolute position data can be monitored in MR Configurator2.</li> </ul>

When using a linear servo motor and direct drive motor, additional parameter setting and magnetic pole detection operation are required.

This chapter mainly describes the differences from the rotary motor regarding the overview, installation, and parameter setting of the linear servo motor and direct drive motor.

(1) Linear servo motor

A linear servo motor is a servo motor that performs linear motion, where the primary side consists of a coil and an iron core (Note) and secondary side consists of permanent magnets.

(Note) Except for coreless type linear servo motors

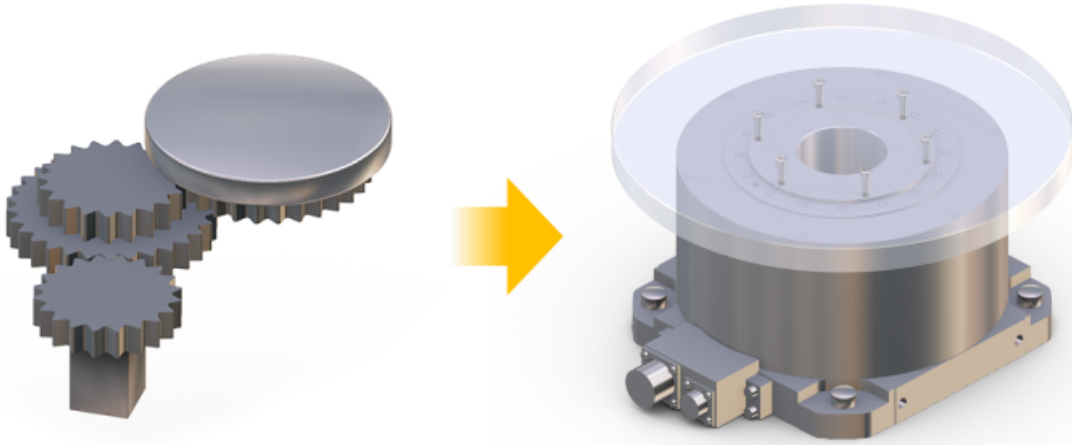


The linear servo motor has the following features.

- Because linear motion mechanisms such as ball screws are no longer needed, machines can be made smaller and more rigid.
- Because it does not have transmission mechanisms, smooth and quiet operation is available. A clean system where no grease spatters can be configured.
- By placing the magnets of the secondary sides side by side, long strokes of the moving part can be easily achieved.

## (2) Direct drive motor

A direct drive motor is a servo motor for directly rotating the drive unit of a machine without using a gear reducer.



The direct drive motor has the following features.

- Because no gear reducer is used, machines can be made smaller and more rigid.
- Because no loss is generated by the rattle, warp, twist, and backlash, higher precision is available.
- The motor has an inner rotor with hollow shaft that allows cables and pipes to pass through.

## 6.2 Precautions on Linear Servo Motor and Direct Drive Motor

### (1) Linear servo motor



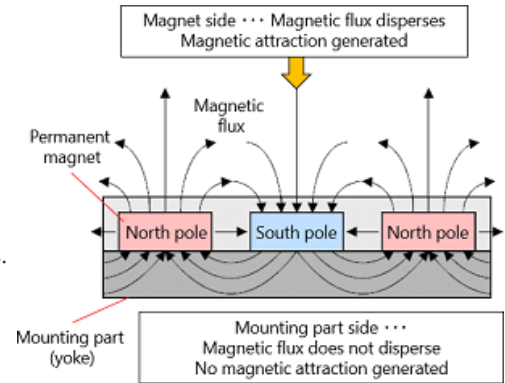
Strong permanent magnets are used on the secondary side of a linear servo motor. Incorrect handling can be very dangerous as it may cause serious accidents. When handling the product, read the user's manual of the linear servo motor thoroughly to understand the contents well and handle the product with care.

Strong permanent magnets are used on the secondary side of a linear servo motor, generating magnetic attraction force constantly regardless of whether the power is on or off.

This magnetic attractive force is so strong that if an A4 size steel plate were completely adsorbed, the magnetic attractive force would be as much as 2.5 tons.

The magnetic attraction force is inversely proportional to the square of the distance from the magnetic object and increases rapidly as the distance decreases. When using the secondary side of a linear servo motor, therefore, keep iron and other magnetic materials away.

The mounting part (yoke) side is designed to prevent leakage of magnetic flux.



## (2) Direct drive motor

### 1) Mounting

- Fix the direct drive motor securely on a high-rigid mounting surface.
- Fix the mounting screws of the direct drive motor securely to obtain sufficient rigidity. Poorly secured screws may come off or cause vibration.
- To ensure heat dissipation and accuracy, mount the direct drive motor on a high-rigid mounting surface which has enough heat dissipation area without gaps between the bottom of the direct drive motor and the mounting surface.
- When coupling a load, do not give any impact, such as hitting the rotating part with a hammer.

### 2) Operation

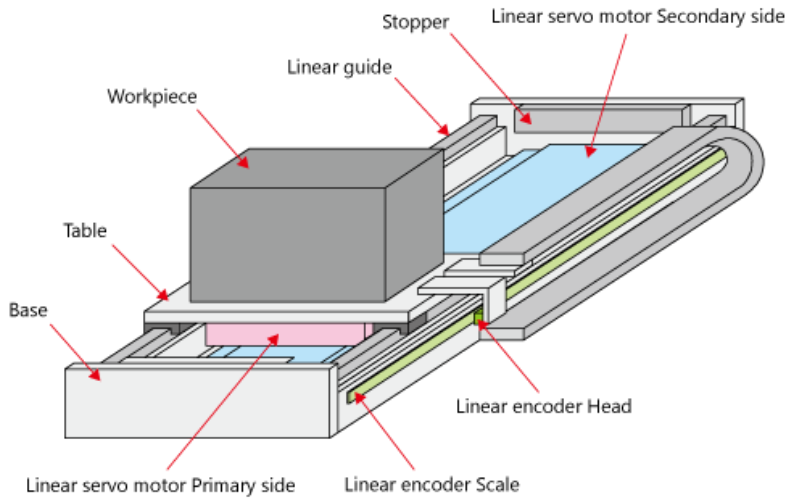
- If the direct drive motor swings at a small angle ( $70^\circ$  or less), rotate it at least  $90^\circ$  once a day to prevent poor lubrication of the internal bearings.
- After power-on, the Z-phase mark of the direct drive motor must pass the connector area once. (Note)  
In a system which prevents the direct drive motor from making a full rotation or more, install the direct drive motor in a position where the Z-phase mark can pass over the connector area.
- To make sure that the Z-phase mark pass the connector area, rotate the Z-phase mark  $\pm 15^\circ$  or more relative to the center of the connector mounting part.

(Note) When the absolute position detection system is used and the magnetic pole detection is executed before the power is supplied, passing the Z-phase is not required.



## (1) Linear servo motor

A linear servo motor is used with a linear encoder and linear guide as shown below. For the linear encoder, select a product from our partner manufacturers.

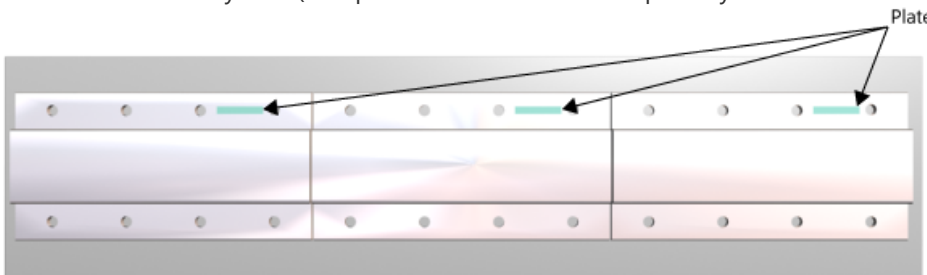


## (1) Linear servo motor (continued)

Install the primary and secondary sides in the following order.

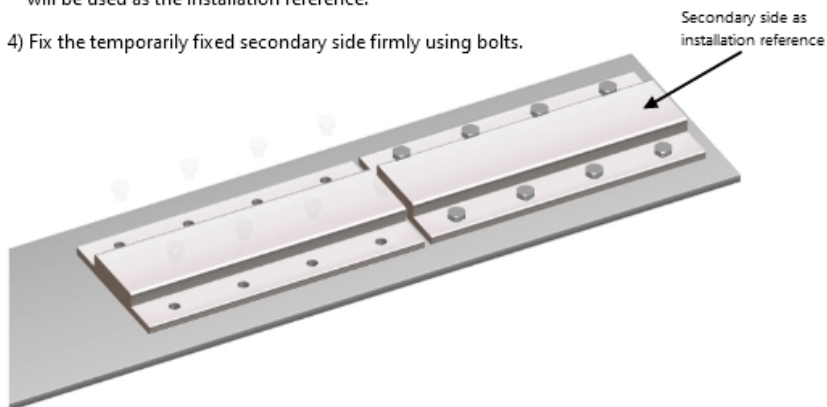
Be especially careful when installing the secondary side because they have strong magnetic attraction force.

## 1) Install the secondary side (except for the area where the primary side will be installed)



To reduce the gaps in the secondary side, follow the steps below for installation.

- 1) Fix the secondary side that will be used as the installation reference firmly using bolts.
- 2) Place another secondary side on the installation surface and temporarily fix it using bolts.
- 3) Push the temporarily fixed secondary side to the secondary side that will be used as the installation reference.
- 4) Fix the temporarily fixed secondary side firmly using bolts.



## 2) After installing the primary side, install the last secondary side.

- 1) Install some parts of the secondary side.
- 2) Install the primary side above the area where there is no magnet of the secondary side.
- 3) Move the primary side to above the area where the magnet of the secondary side is installed.  
Check that the primary and secondary side do not interfere.
- 4) Install the rest parts of the secondary side.  
Check that the primary and secondary side do not interfere.



When installing the primary side, pay attention to the following.

- To avoid danger caused by the attractive force between the primary and secondary sides generated by permanent magnets, it is recommended that the primary side be installed above the area where there is no magnet of the secondary side.
- If it is unavoidable to install the primary side above the secondary side, use a crane or other equipment that can adequately withstand the attractive force or other loads.
- Even when sliding the primary side to above the secondary side after installation, be careful with attractive force as well.

## (2) Direct drive motor

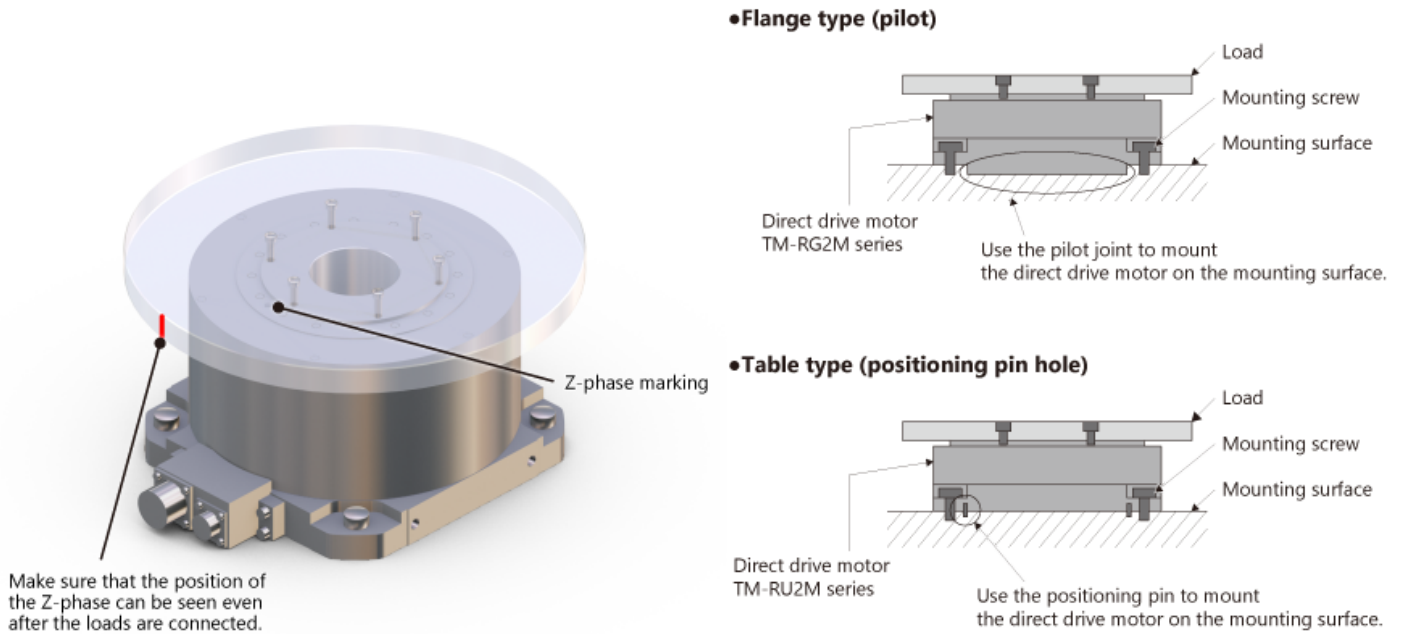
For the direct drive motor, connect a table and other loads to the rotating part (output axis) as shown in the following figure. Because it is necessary to check the position of the Z-phase for the magnetic pole detection, make sure that the position of the Z-phase can be seen even after the loads are connected.

The Z-phase pulse turns on when the Z-phase marking comes near the connector.

Fix the direct drive motor securely on a high-rigid mounting surface.

For the flange type, use the mounting pilot (protrusion at the bottom) to perform centering.

For the table type, use the positioning pins to perform centering.

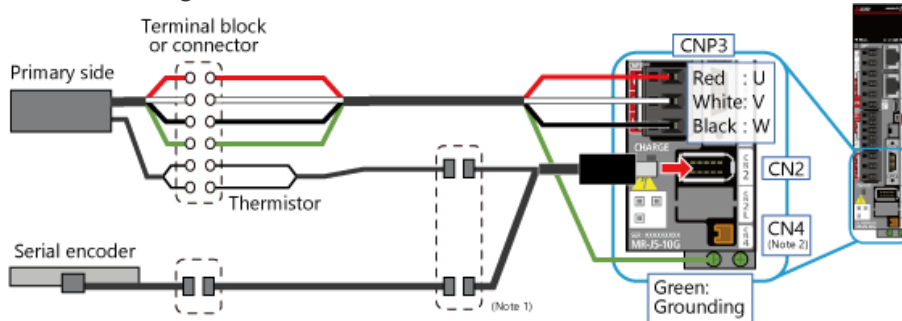


## (1) Linear servo motor

The wiring varies depending on the linear encoder used.

The options to be used and cables to be fabricated vary. For details, refer to the user's manual.

## 1) When connecting with a serial encoder

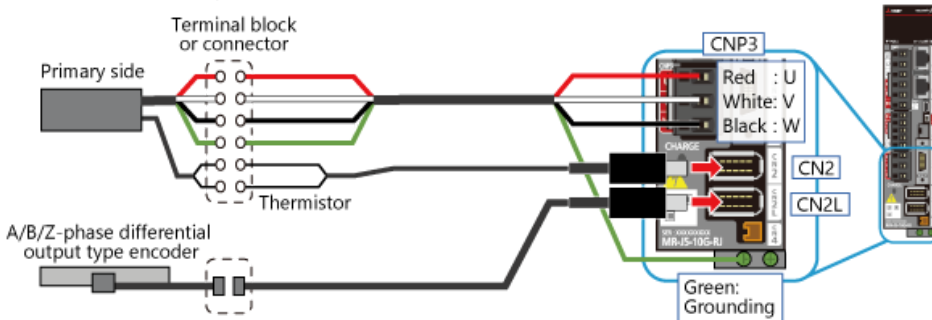


(Note)

1. The above shows the case in which an option branch cable is used.
2. In the absolute position detection system, the absolute position data is backed up with the linear encoder. Therefore, there is no need to attach a battery for the encoder to the servo amplifier.

## 2) When connecting with an A/B/Z-phase differential output type encoder

\* For the servo amplifier, MR-J5-□-RJ is used.

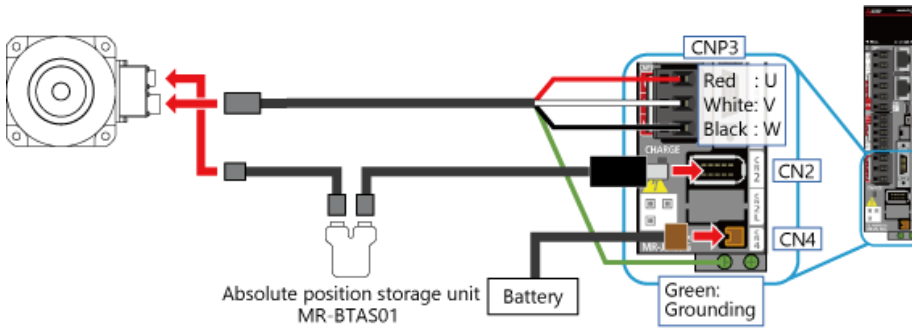


MR-J5 Partner's Encoder User's Manual  
2 OPTION CABLES/CONNECTOR SETS

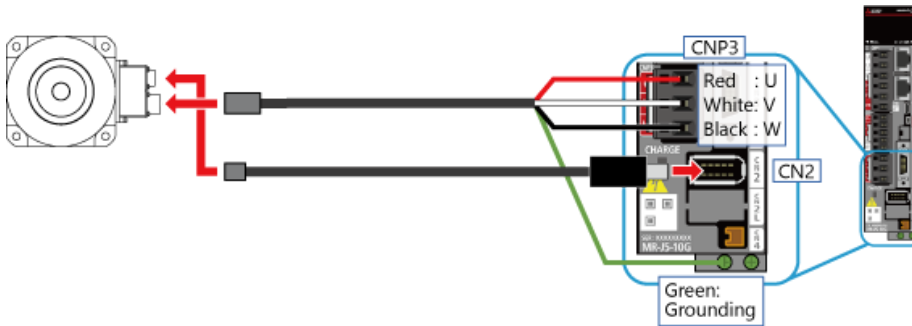
## (2) Direct drive motor

The wiring varies depending on whether the absolute position detection system is used or not.  
The power cable and encoder cable should be fabricated by the customer using the optional connector set.

## 1) When using the absolute position detection system



## 2) When not using the absolute position detection system



## 6.5 Parameter Setting

### 6.5.1 Required parameters

When using a linear servo motor or direct drive motor, setting the following parameters is required in addition to the ones described in 3.3.

Common to linear servo motor and direct drive motor

[Pr.PA01.1]	Operation mode selection	Set it to "4" (Linear servo motor control mode) or "6" (Direct drive motor control mode).
[Pr.PL01.0]	Servo motor magnetic pole detection selection	Set the parameters related to the magnetic pole detection. For details, refer to 6.6.
[Pr.PL08.0]	Magnetic pole detection method selection	
[Pr.PL08.2]	Magnetic pole detection - Stroke limit enabled/disabled selection	

\* In addition, some other parameters need to be set depending on the magnetic pole detection method.

Linear servo motor

[Pr.PA17]	Servo motor series setting	Set the model of the linear servo motor.
[Pr.PA18]	Servo motor type setting	
[Pr.PC04.3] (Type G) [Pr.PC22.3] (Type A)	Encoder cable communication method selection	Set it according to the specifications of the linear encoder.
[Pr.PC17.1]	Linear encoder multipoint Z-phase input - Function selection	
[Pr.PC27.0]	Encoder pulse count polarity selection (Travel direction selection at a positive direction command)	
[Pr.PC27.2]	ABZ phase input interface encoder ABZ phase connection assessment function selection	
[Pr.PL02]	Linear encoder resolution setting - Numerator	
[Pr.PL03]	Linear encoder resolution setting - Denominator	

## (1) Linear servo motor

For a linear servo motor, set both the resolution and electronic gear of the linear encoder used.

[Type G]

The electronic gear is obtained by the following formula.

$$\frac{\text{(Electronic gear numerator)}}{\text{(Electronic gear denominator)}} = \frac{1}{\text{Linear encoder resolution}}$$

When the controller is RD78G(H) or FX5-□SSC-G, set the driver unit conversion numerator/denominator in the axis parameters. (It can be set by following the wizard in the engineering tool.)

The servo amplifier parameters [Pr. PA06/07] are not required to be set. Leave the initial values as 1/1.

For controllers without electronic gear function such as the master/local module RD71GN11-T2, set it in the parameters [Pr.PA06/07] (Electronic gear numerator/denominator) of the servo amplifier.

[Type A]

Calculation examples are provided in the separate PDF that can be downloaded in 3.3.2.

Refer to the PDF.



## (2) Direct drive motor

Usually, [deg] is used as the unit.

$$\frac{\text{(Electronic gear numerator)}}{\text{(Electronic gear denominator)}} = \frac{\text{Encoder resolution [pulse/rev]}}{360 \text{ [deg/rev]} \times \text{Magnification}}$$

Set the magnification according to the command unit as shown in the following table.

Command unit	1[deg]	0.1[deg]	0.01[deg]	0.001[deg]	0.0001[deg]	0.00001[deg]
Magnification	1	10	100	1000	10000	100000

[Type G]

When the controller is RD78G(H) in the PLCopen<sup>®</sup> Motion control FB mode, set [Driver unit conversion numerator/denominator] in the axis parameters.

In this case, set the magnification to 1. (Set the command value as a double-precision real number.)

The servo amplifier parameters [Pr. PA06/07] are not required to be set. Leave the initial values as they are.

For controllers without electronic gear function such as the master/local module RD71GN11-T2, set it in the parameters [Pr.PA06/07] (Electronic gear numerator/denominator) of the servo amplifier.

[Type A]

Calculation examples are provided in the separate PDF that can be downloaded in 3.3.2.

Refer to the PDF.

(Setting example)

When TM-RG2M-004E30 is used and control is performed in units of 0.001 [deg], the encoder resolution is 4194304 [pulses/rev] and magnification is 1000. Therefore, the calculation is as follows.

$$\text{Electronic gear} = \frac{4194304[\text{pulse/rev}]}{360[\text{deg/rev}] \times 1000} = \frac{65536}{5625}$$

The following table provides an example of parameter setting when the following models are used.

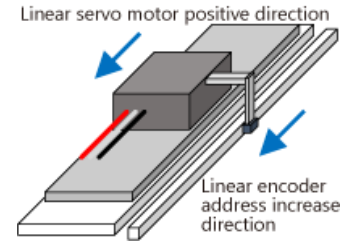
Controller: RD78G□(Note)

Servo amplifier: MR-J5-□G(PLCopen<sup>®</sup> Motion control FB mode)

Primary side of linear servo motor: LM-H3P2A-07P-BSS0

Secondary side of linear servo motor: LM-H3S20-768-BSS0

Linear encoder: Absolute position serial encoder with 0.01 [ $\mu\text{m}$ ] of resolution  
(Z-phase is one pulse only, a two-wire type cable is used)



Parameter No.	Parameter name	Setting value
[Pr.PA01.1]	Operation mode selection	4 (Linear servo motor control mode)
[Pr.PA17]	Servo motor series setting	000000BBh
[Pr.PA18]	Servo motor type setting	00002101h
[Pr.PC04.3]	Encoder cable communication method selection	0h (Two-wire type)
[Pr.PC17.1]	Linear encoder multipoint Z-phase input - Function selection	0h (Disabled)
[Pr.PC27.0]	Encoder pulse count polarity selection (Travel direction selection at a positive direction command)	0h (Encoder pulse increasing direction in linear servo motor positive direction)
[Pr.PC27.2]	ABZ phase input interface encoder ABZ phase connection assessment function selection	0h (Initial value: Disabled because the serial encoder is used)
[Pr.PL02]	Linear encoder resolution setting - Numerator	1
[Pr.PL03]	Linear encoder resolution setting - Denominator	100

(Note) Set the electronic gear (Driver unit conversion) on the controller side (RD78G Motion module) to 100/1.

When using a linear servo motor and direct drive motor, operation to detect the relative position of the magnet and winding, or magnetic pole detection, is required.

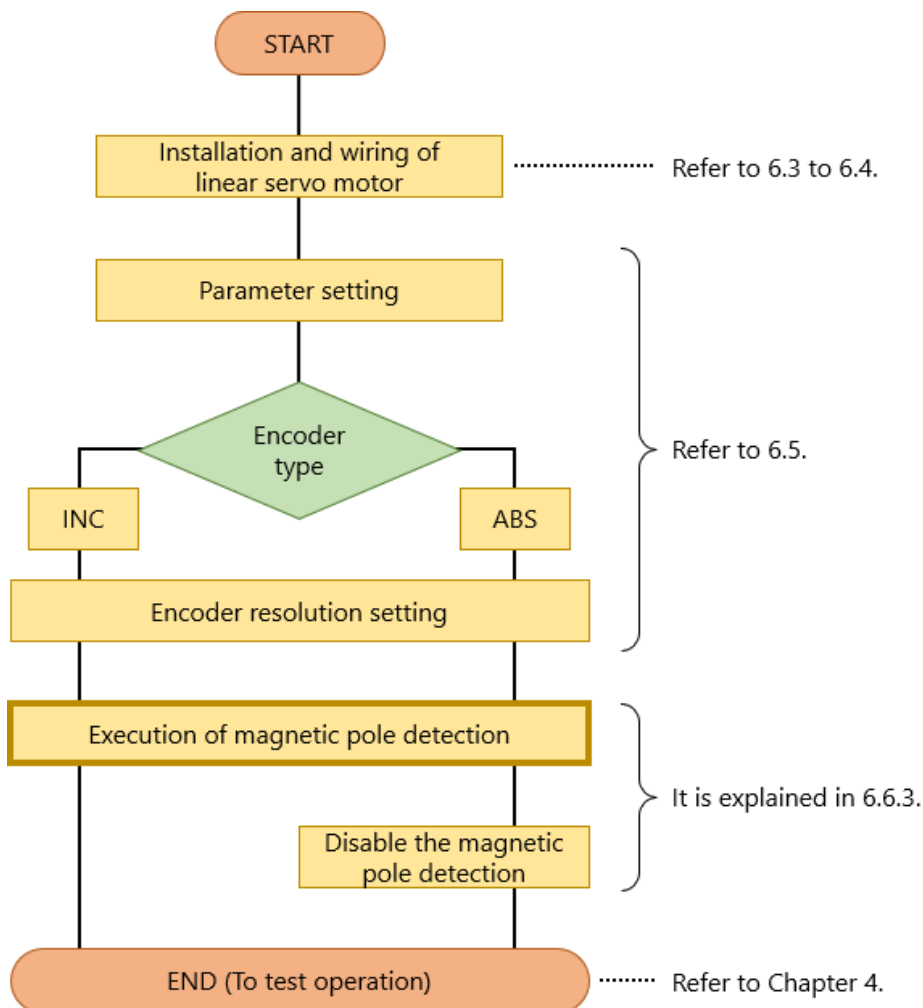
In an incremental system, the magnetic pole detection is executed every time the power is supplied.

In an absolute position detection system, the magnetic pole detection is executed at the first servo-on.

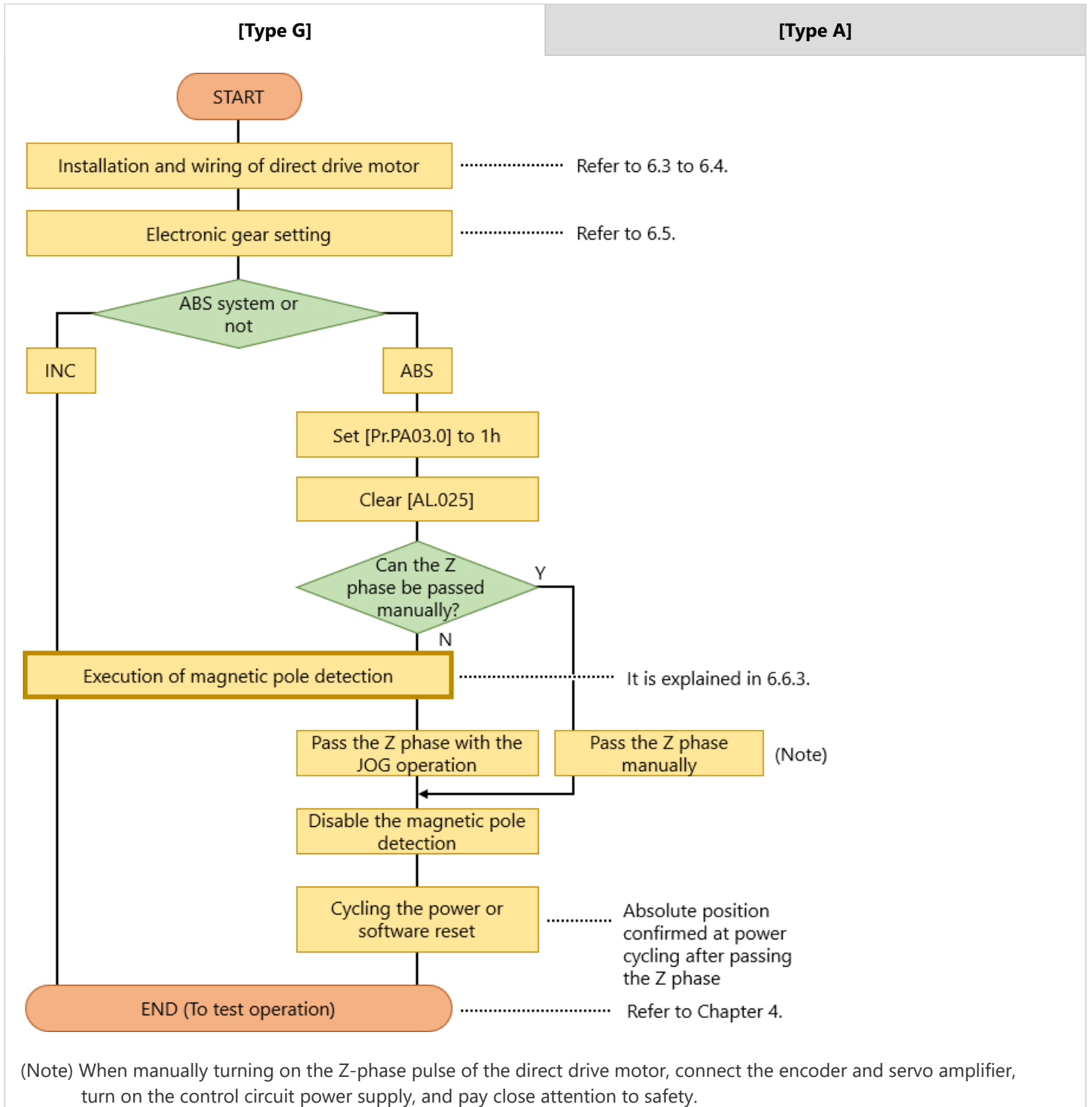
This section describes the startup procedure including the magnetic pole detection.

The following figure shows the procedure for starting up a linear servo motor.

[Common to Type A and G]

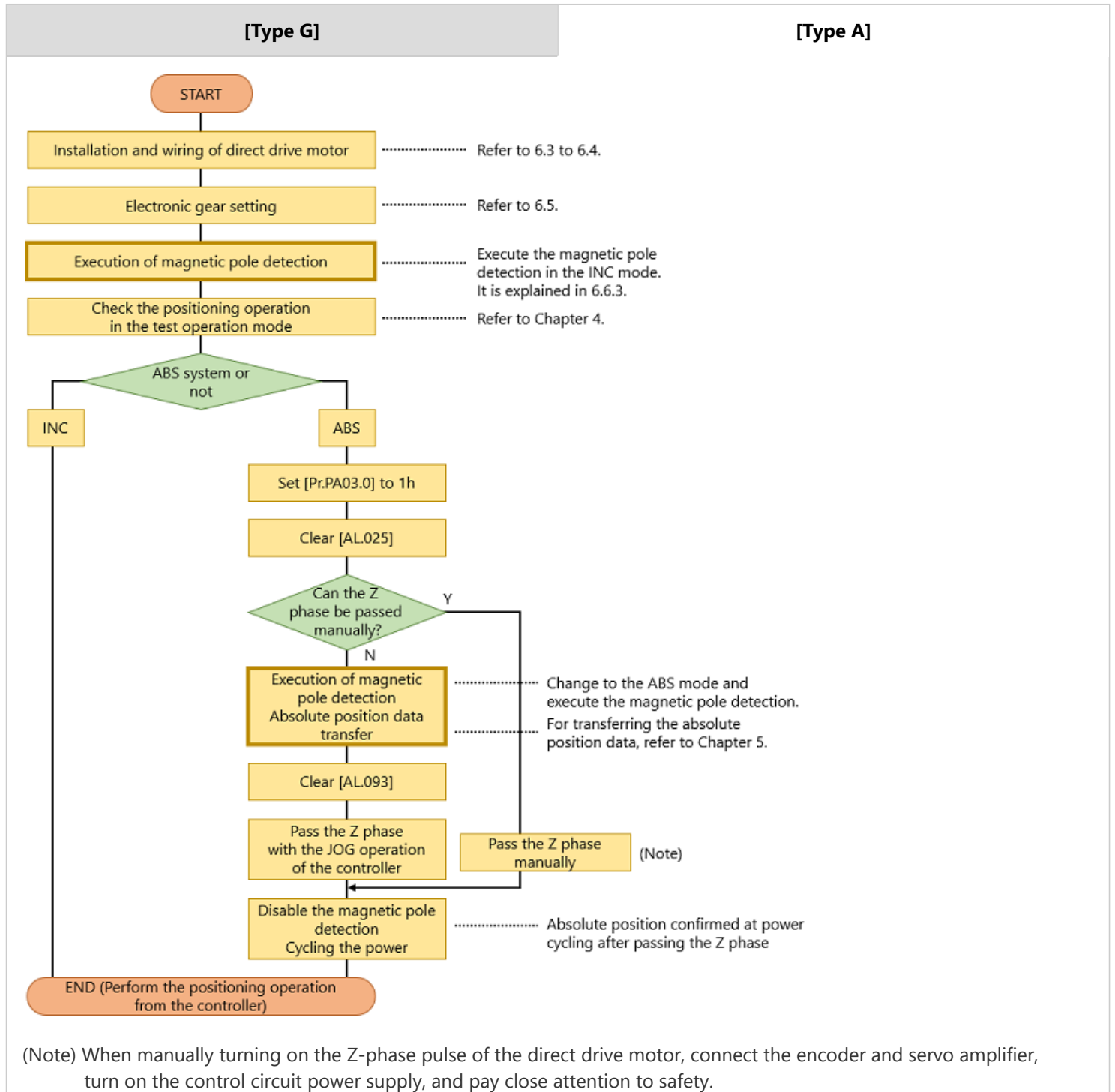


The procedure for starting up the direct drive motor differs depending on the servo amplifier type.



(Note) When manually turning on the Z-phase pulse of the direct drive motor, connect the encoder and servo amplifier, turn on the control circuit power supply, and pay close attention to safety.

The procedure for starting up the direct drive motor differs depending on the servo amplifier type.



## (1) Methods for magnetic pole detection

There are the following two magnetic pole detection methods. Each of them has advantages and disadvantages.

Magnetic pole detection method	Advantage	Disadvantage
Position detection method (Initial value)	<ol style="list-style-type: none"> <li>1. The magnetic pole detection has a high degree of accuracy.</li> <li>2. The adjustment procedure at the magnetic pole detection is simple.</li> </ol>	<ol style="list-style-type: none"> <li>1. The travel distance at the magnetic pole detection is long.</li> <li>2. For equipment with small friction, the initial magnetic pole detection error may occur.</li> </ol>
Minute position detection method	<ol style="list-style-type: none"> <li>1. The travel distance at the magnetic pole detection is short.</li> <li>2. Even for equipment with small friction, the magnetic pole detection is available.</li> </ol>	<ol style="list-style-type: none"> <li>1. The adjustment procedure at the magnetic pole detection is complex.</li> <li>2. If a disturbance occurs during the magnetic pole detection, [AL. 027 Initial magnetic pole detection error] may occur.</li> </ol>

## (2) Criteria for selecting the magnetic pole detection method

- In the position detection method, the linear servo motor and direct drive motor move when the magnetic pole detection is started.

The moving direction is indefinite. Therefore, not to move the machine at the time of magnetic pole detection, use the minute position detection method.

- For the minute position detection method, the load to motor mass ratio or load to motor inertia ratio is required in the parameter setting for the magnetic pole detection.  
If these values are unknown, use the position detection method. Once the magnetic pole detection is performed using the position detection method and the load to motor mass ratio or load to motor inertia ratio value estimated by auto-tuning or other means is used, the minute position detection method can be used thereafter.

## (3) Procedure for magnetic pole detection method

The magnetic pole detection is required to be performed multiple times while adjusting some parameters such as [Pr. PL09] Magnetic pole detection voltage level. The procedure varies depending on the motor type, servo amplifier type, and magnetic pole detection method. Always read the following manual to check the correct procedure.

- 📖 MR-J5 User's Manual (Hardware)  
10 USING A LINEAR SERVO MOTOR  
or  
11 USING A DIRECT DRIVE MOTOR

In this chapter, you have learned:

- Features of Linear Servo Motor and Direct Drive Motor
- Precautions on Linear Servo Motor and Direct Drive Motor
- Installation of Linear Servo Motor and Direct Drive Motor
- Wiring
- Parameter Setting
- Startup<Magnetic Pole Detection>

Important points

Features of Linear Servo Motor and Direct Drive Motor	Linear servo motors and direct drive motors are directly connected to machines. Because linear motion mechanisms such as ball screws and reducers are no longer needed, machines can be made smaller and more rigid.
Precautions on Linear Servo Motor and Direct Drive Motor	<ul style="list-style-type: none"> <li>• On the secondary side of a linear servo motor, strong permanent magnets are used. Pay close attention to the magnetic attraction force.</li> <li>• Fix the direct drive motor securely on a rigid surface to ensure accuracy and heat dissipation and prevent vibration.</li> </ul>
Installation of Linear Servo Motor and Direct Drive Motor	<ul style="list-style-type: none"> <li>• When using a linear servo motor, install the primary side above the area where there is no magnet of the secondary side to avoid danger caused by the attractive force.</li> <li>• When using a direct drive motor, make sure that the Z-phase position can be checked even after the load is mounted.</li> </ul>
Wiring	<ul style="list-style-type: none"> <li>• When using an A/B/Z-phase linear encoder, use MR-J5-RJ.</li> <li>• When a direct drive motor is used in an absolute position detection system, a battery and absolute position storage unit are required.</li> </ul>
Parameter Setting	<ul style="list-style-type: none"> <li>• When using a linear servo motor, set the model of the motor to be used and the specifications of the linear encoder in parameters.</li> <li>• Setting parameters related to the magnetic pole detection is required when a linear servo motor or direct drive motor is used.</li> </ul>
Startup<Magnetic Pole Detection>	<ul style="list-style-type: none"> <li>• Performing the magnetic pole detection is required at the first servo-on. In an absolute position detection system, the magnetic pole detection is not required thereafter.</li> <li>• The magnetic pole detection operation has the position detection method and minute position detection method.</li> </ul>

There are following types of gain adjustment.

(1) Available when using the amplifier alone

Adjustment function	Outline
Quick tuning	Use this function to prioritize reduction of the overshoot rather than shortening the settling time. An adjustment is enabled without the positioning operation.
Auto tuning mode 1	Use this function to adjust the machine while checking the response waveform when the load to motor inertia ratio of the device is unknown. Also, use this function when the load to motor inertia ratio of a machine varies during operation.
Auto tuning mode 2	Use this function to adjust the machine while checking the response waveform when the load to motor inertia ratio of the device is known.
2 gain adjustment mode 1 (Interpolation mode)	Use this function for auto tuning a machine that requires path accuracy improvement, such as an XY table or a tandem mechanism, and to suppress inter-axis interference.
2 gain adjustment mode 2	Use this function to adjust settling time and overshoot amount after one-touch tuning.
One-touch tuning (Controller command method)	Use this function to adjust the gain while operating the machine by commands from the controller. Use this function to reduce the settling time within the commanded In-position range.

(2) Available in combination with MR Configurator2

Adjustment function	Outline
One-touch tuning (Amplifier command method)	Use this function to prioritize time reduction of settling and gain adjustment over overshoot suppression. To generate an optimum command inside the servo amplifier and perform one-touch tuning, simply input a travel distance that avoids collision with the machine (a permissible travel distance) when driving the servo motor on MR Configurator2.

This course explains quick tuning and one-touch tuning (amplifier command method). The following compares their performance and simplicity.

Performance	Quick tuning < One-touch tuning One-touch tuning requires shorter settling time.
Simplicity	Quick tuning > One-touch tuning Quick tuning takes about 300 [ms] to complete adjustment.

Perform quick tuning for quick gain adjustment, and perform one-touch tuning to reduce the settling time.



## (1) Overview of quick tuning

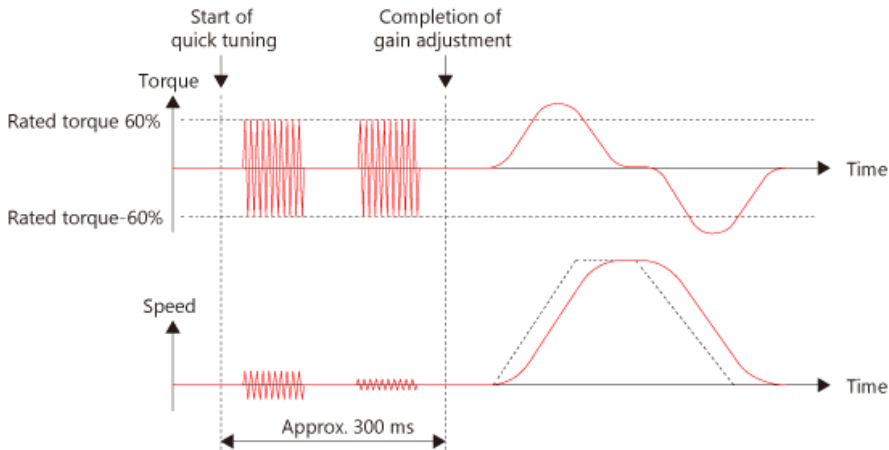
When quick tuning is started, the servo amplifier applies vibration torque instantly, then adjusts each gain and the machine resonance suppression filter by using the response from that excitation.

The maximum vibration torque that can be applied is 60 % of the rated torque. However, the vibration torque is limited by the torque limit value when the torque limit value is less than 60 % of the rated torque. The adjustment takes about 300 [ms].

When magnetic pole detection is executed, quick tuning will be started after the magnetic pole detection.

Once gain adjustment by quick tuning is complete, the gain can be changed as in the manual mode.

In addition, the load to motor inertia ratio will be always estimated as in auto tuning mode 1 after gain adjustment.



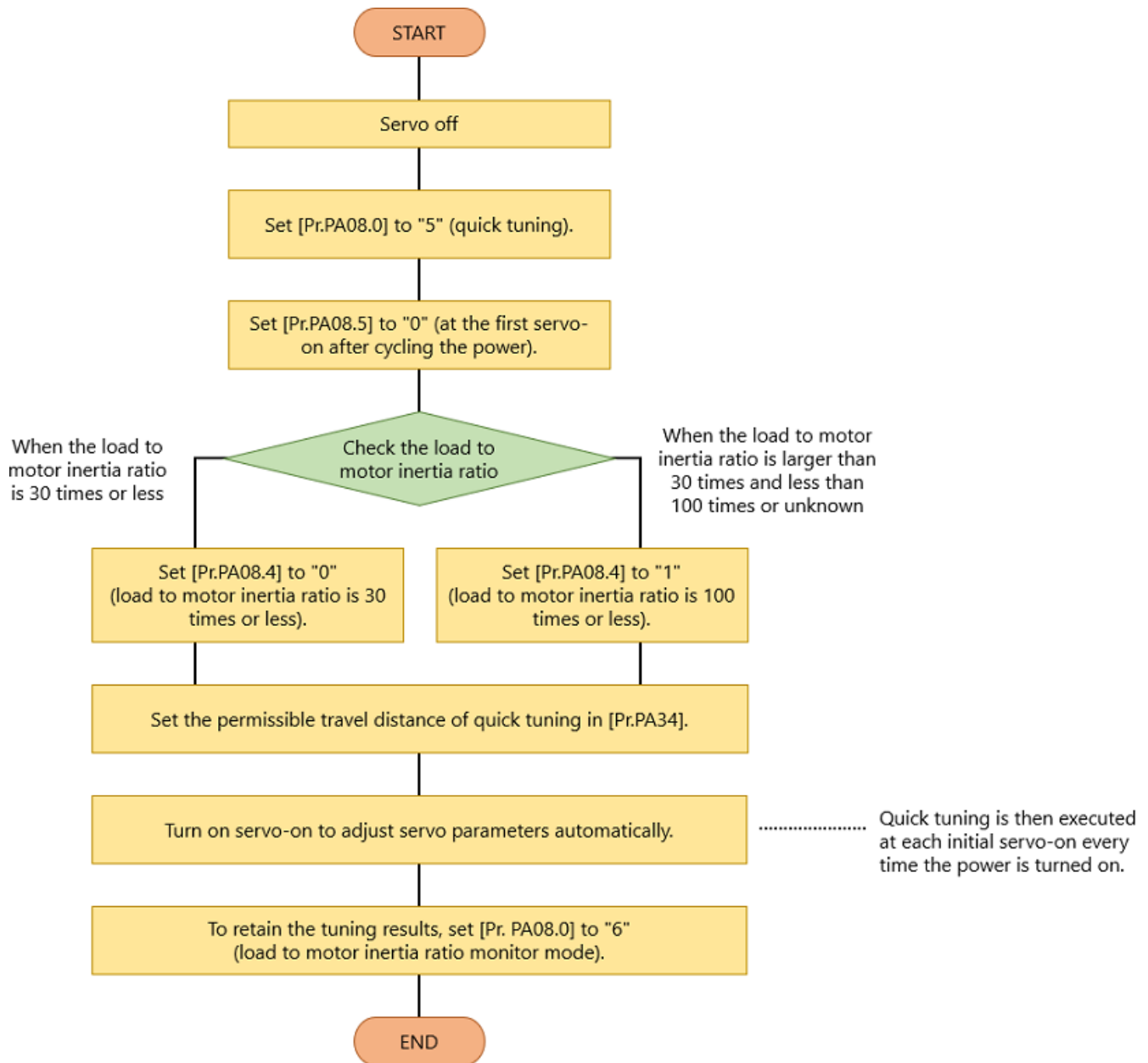
The following servo parameters are adjusted automatically in quick tuning.

No.	Symbol	Name	Setting value after gain adjustment
PB01	FILT	Adaptive tuning mode (adaptive filter II)	Automatic setting
PB06	GD2	Load to motor inertia ratio/load to motor mass ratio	The setting value is set depending on the response waveform during servo motor driving after gain adjustment.
PB07	PG1	Model control gain	Automatic setting
PB08	PG2	Position control gain	
PB09	VG2	Speed control gain	
PB10	VIC	Speed integral compensation	
PB11	VDC	Speed differential compensation	Initial value
PB13	NH1	Machine resonance suppression filter 1	Automatic setting
PB14	NHQ1	Notch shape selection 1	
PB15	NH2	Machine resonance suppression filter 2	
PB16	NHQ2	Notch shape selection 2	
PB18	LPF	Low-pass filter setting	Initial value
PB23.1	—	Low-pass filter selection	1
PB50	NH5	Machine resonance suppression filter 5	Automatic setting
PB51	NHQ5	Notch shape selection 5	
PE41	EOP3	Function selection E=3	Initial value

## (2) Execution method of quick tuning

The following shows the procedure for quick tuning.

On the next page, the operation of quick tuning is explained in the video.



(3) Operation example of quick tuning

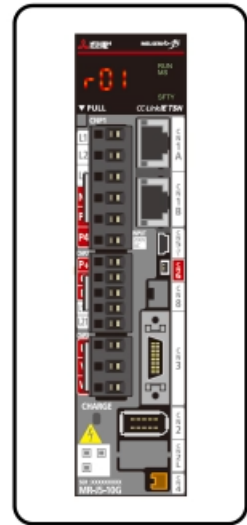
Click the play button at the lower left of the window.

(3) Operation example of quick tuning



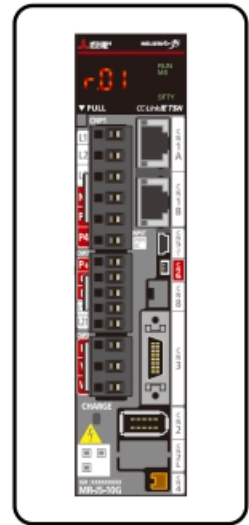
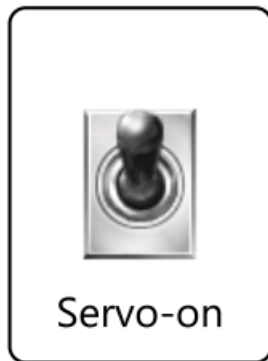
This video provides an operation example of quick tuning.

(3) Operation example of quick tuning



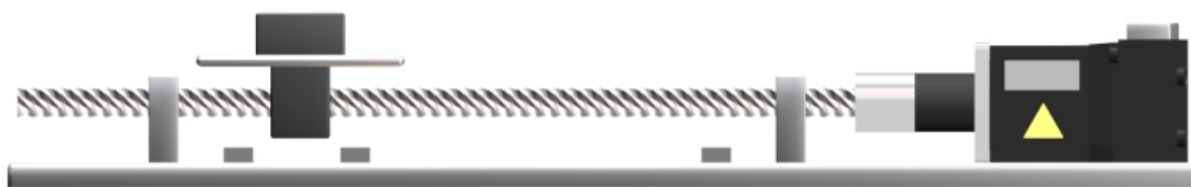
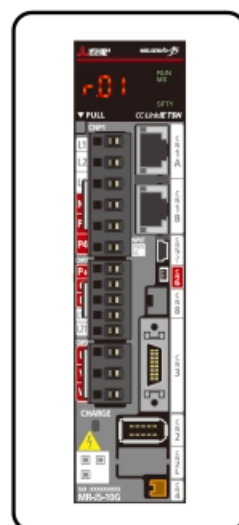
Set the parameter setting for quick tuning,  
and then turn off and on the power supply.

(3) Operation example of quick tuning



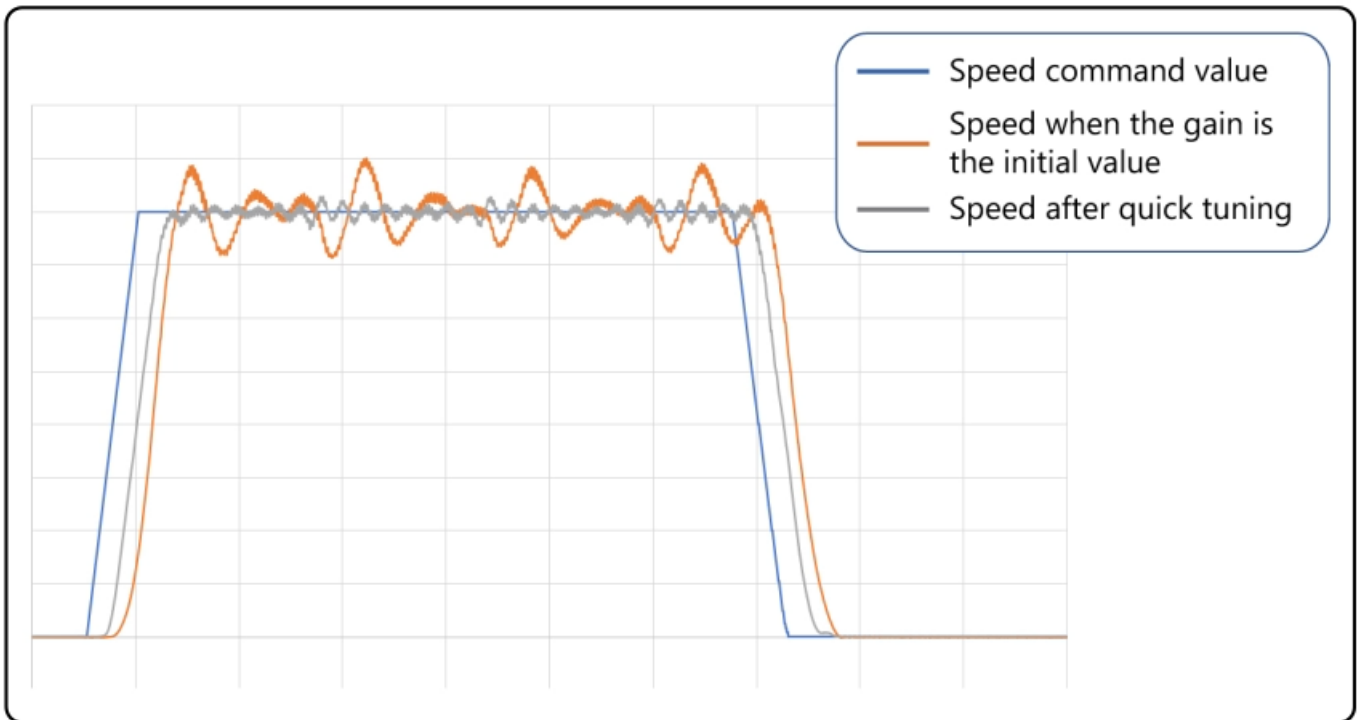
Perform servo-on.  
At the same time as servo-on, quick tuning is performed.  
The servo motor may make noise due to vibration.

(3) Operation example of quick tuning



This completes quick tuning.  
After homing, the positioning command can be executed.

(3) Operation example of quick tuning



In the above graph, the speed waveform when the gain is fixed to the initial value and the one after quick tuning are compared as examples. After quick tuning, both the overshoot and vibration are suppressed.



(3) Operation example of quick tuning



This completes the explanation of operation example of quick tuning.  
Click  to go to the next page.

## (1) Overview of one-touch tuning

Use this function to prioritize time reduction of settling and gain adjustment over overshoot suppression. It adjusts the servo gain including the machine resonance suppression filter, advanced vibration suppression control II, and the robust filter.

The responsiveness of one-touch adjustment can be selected from three levels. First, execute it in the basic mode. For a low-rigid machine such as a belt driving system, one-touch adjustment in the low mode is suitable. For a high-rigid machine such as a ball screw driving system, performing one-touch adjustment in the high mode reduces the settling time.

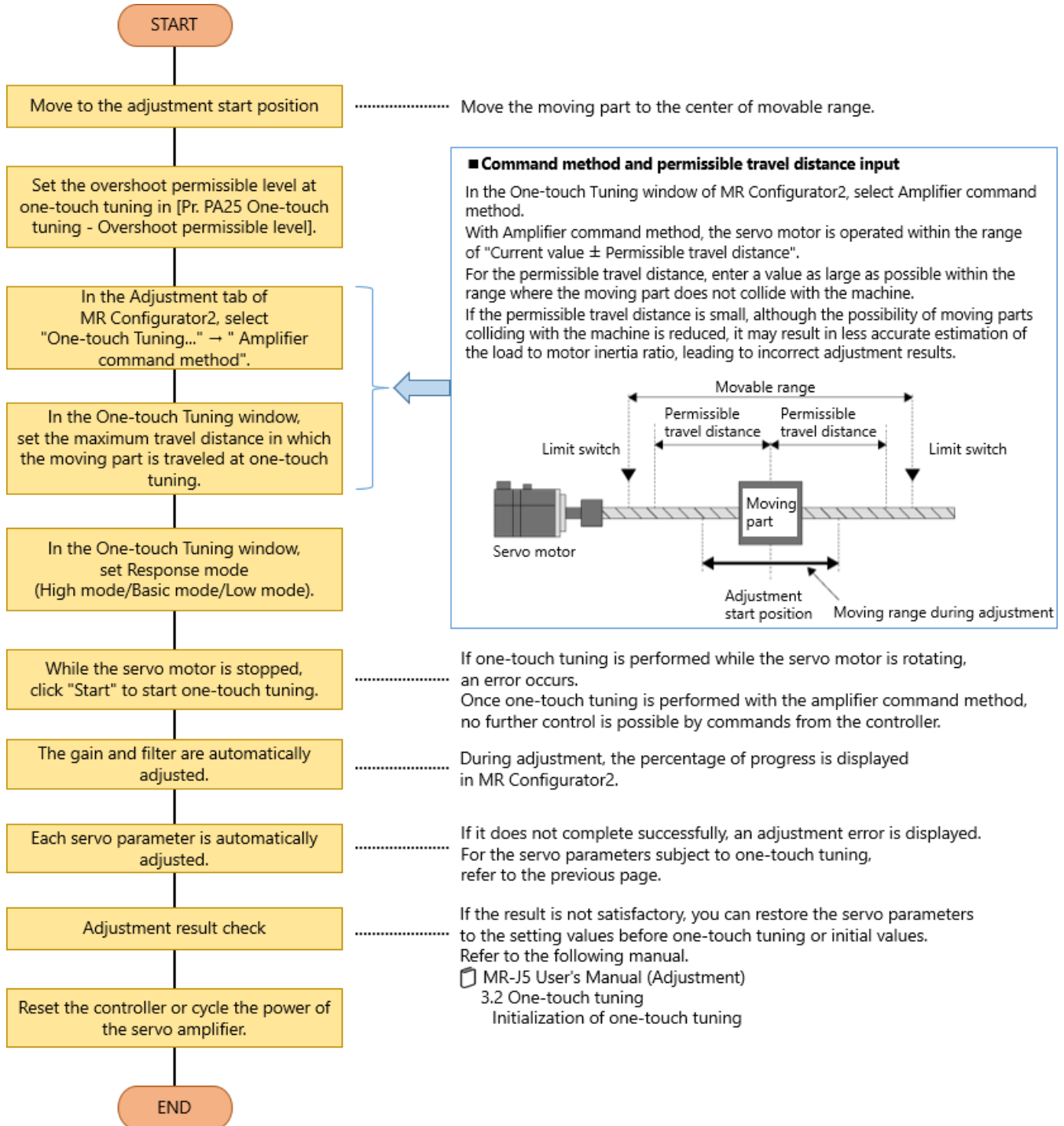
The following servo parameters are adjusted automatically in one-touch tuning. [Pr. PA08.0 Gain adjustment mode selection] is set to "4" (2 gain adjustment mode 2) automatically. Other servo parameters are set to an optimum value in accordance with the setting of [Pr. PA09 Auto tuning response].

Servo parameter	Symbol	Name
PA08	ATU	Auto tuning mode
PA09	RSP	Auto tuning response
PA24	AOP4	Function selection A-4
PB01	FILT	Adaptive tuning mode (adaptive filter II)
PB02	VRFT	Vibration suppression control tuning mode (advanced vibration suppression control II)
PB03	PST	Torque feedback loop gain (position smoothing)
PB06	GD2	Load to motor inertia ratio/load to motor mass ratio
PB07	PG1	Model control gain
PB08	PG2	Position control gain
PB09	VG2	Speed control gain
PB10	VIC	Speed integral compensation
PB12	OVA	Overshoot amount compensation
PB13	NH1	Machine resonance suppression filter 1
PB14	NHQ1	Notch shape selection 1
PB15	NH2	Machine resonance suppression filter 2
PB16	NHQ2	Notch shape selection 2
PB17	NHF	Shaft resonance suppression filter
PB18	LPF	Low-pass filter setting
PB19	VRF11	Vibration suppression control 1 - Vibration frequency
PB20	VRF12	Vibration suppression control 1 - Resonance frequency
PB21	VRF13	Vibration suppression control 1 - Vibration frequency damping
PB22	VRF14	Vibration suppression control 1 - Resonance frequency damping
PB23	VFBF	Low-pass filter selection
PB46	NH3	Machine resonance suppression filter 3

Servo parameter	Symbol	Name
PB47	NHQ3	Notch shape selection 3
PB48	NH4	Machine resonance suppression filter 4
PB49	NHQ4	Notch shape selection 4
PB51	NHQ5	Notch shape selection 5
PB52	VRF21	Vibration suppression control 2 - Vibration frequency
PB53	VRF22	Vibration suppression control 2 - Resonance frequency
PB54	VRF23	Vibration suppression control 2 - Vibration frequency damping
PB55	VRF24	Vibration suppression control 2 - Resonance frequency damping
PE41	EOP3	Function selection E-3

## (2) Execution method one-touch tuning

The following shows the procedure for one-touch tuning with the amplifier command method.  
On the next page, the operation of one-touch tuning is explained in the video.



(3) Operation example of one-touch tuning

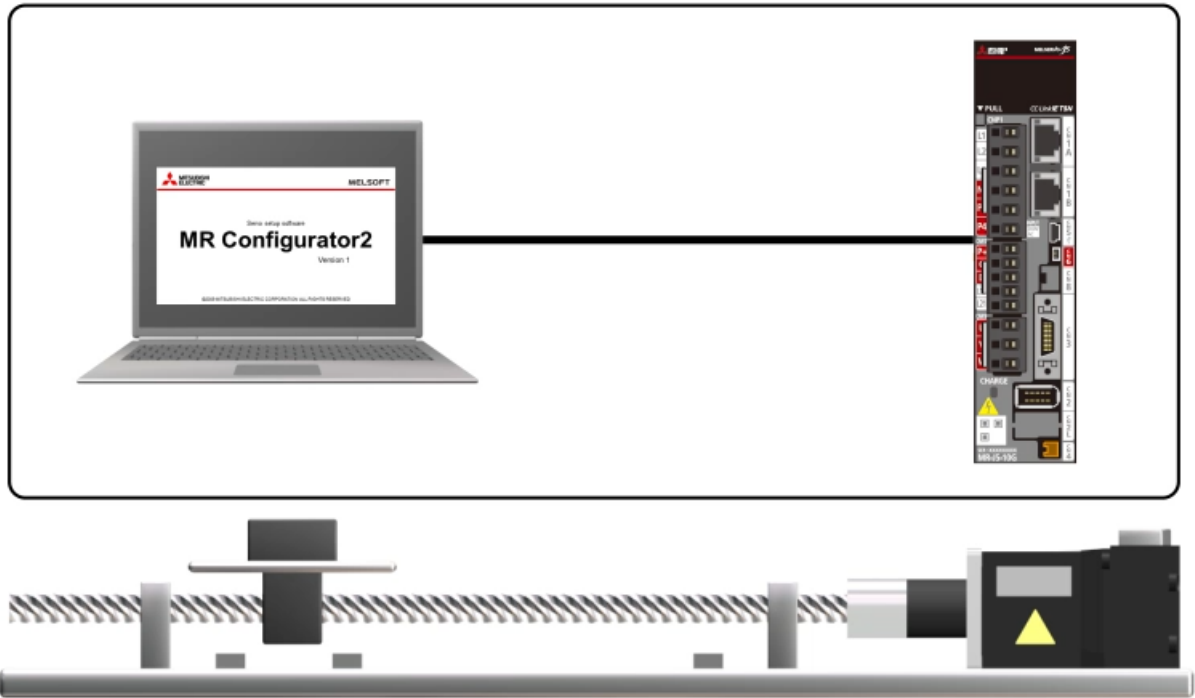
Click the play button at the lower left of the window.

(3) Operation example of one-touch tuning



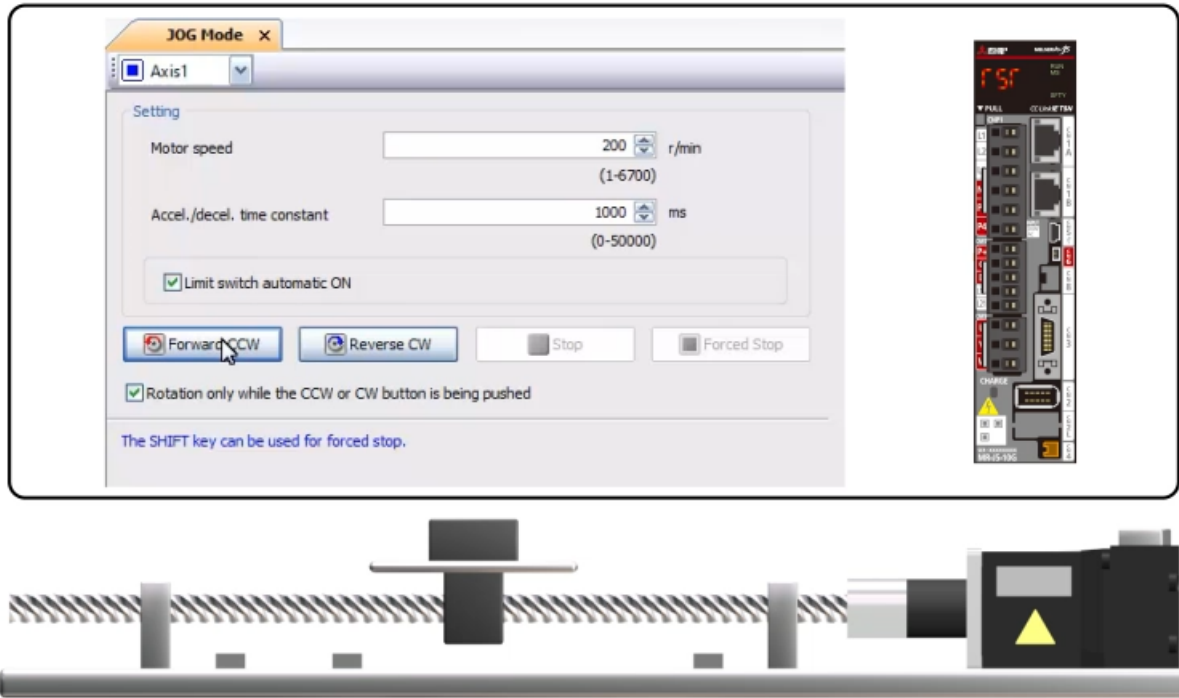
This video provides an operation example of one-touch tuning.

(3) Operation example of one-touch tuning



Connect the servo amplifier and personal computer, and then start MR Configurator2 on the personal computer.

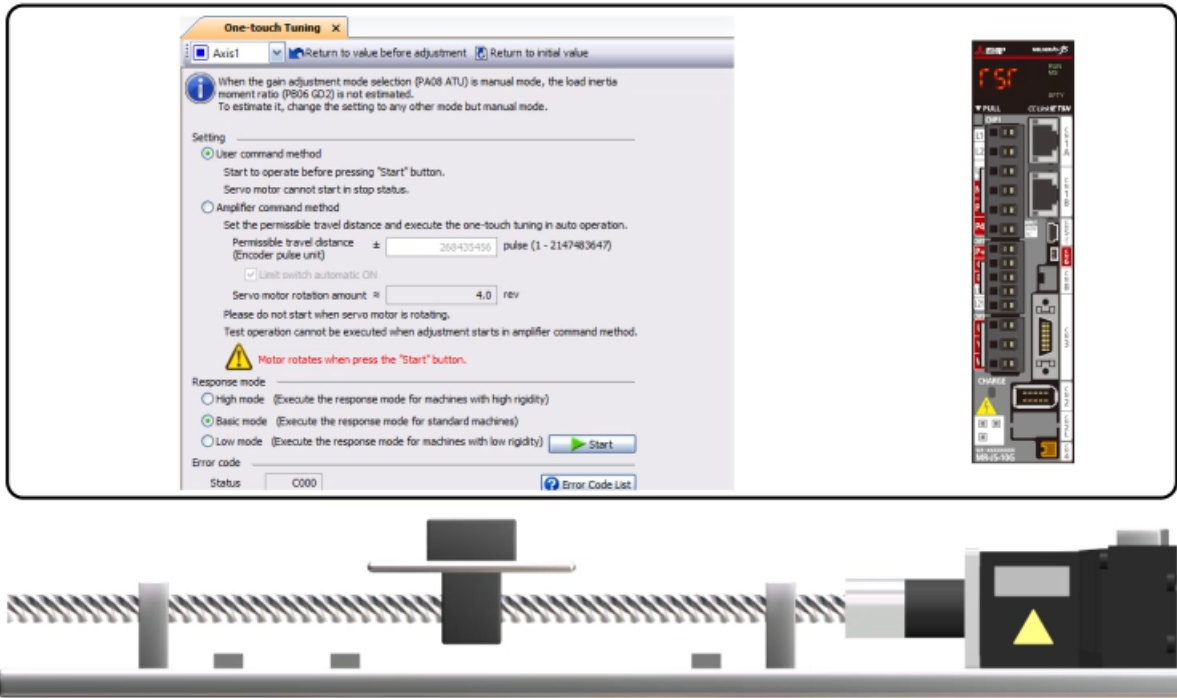
## (3) Operation example of one-touch tuning



Before performing one-touch tuning, move the moving part to the center of movable range by using the JOG operation or other means.  
(Note) For Type G, change the DIP switch to set the test operation mode before using the JOG operation function of MR Configurator2.

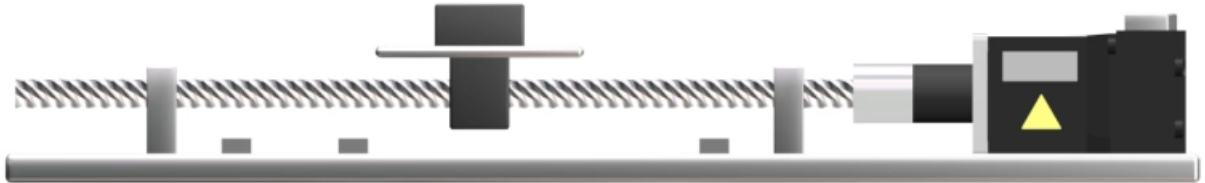
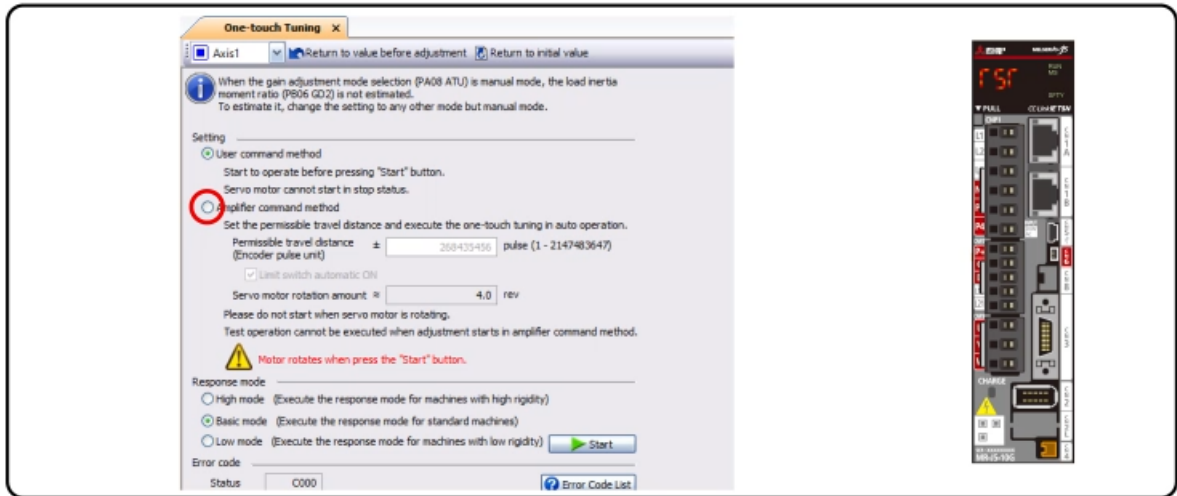


## (3) Operation example of one-touch tuning



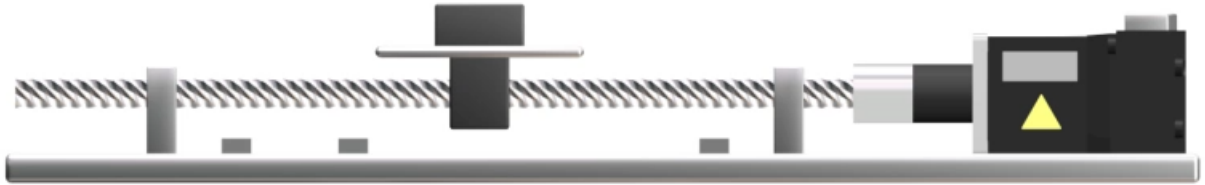
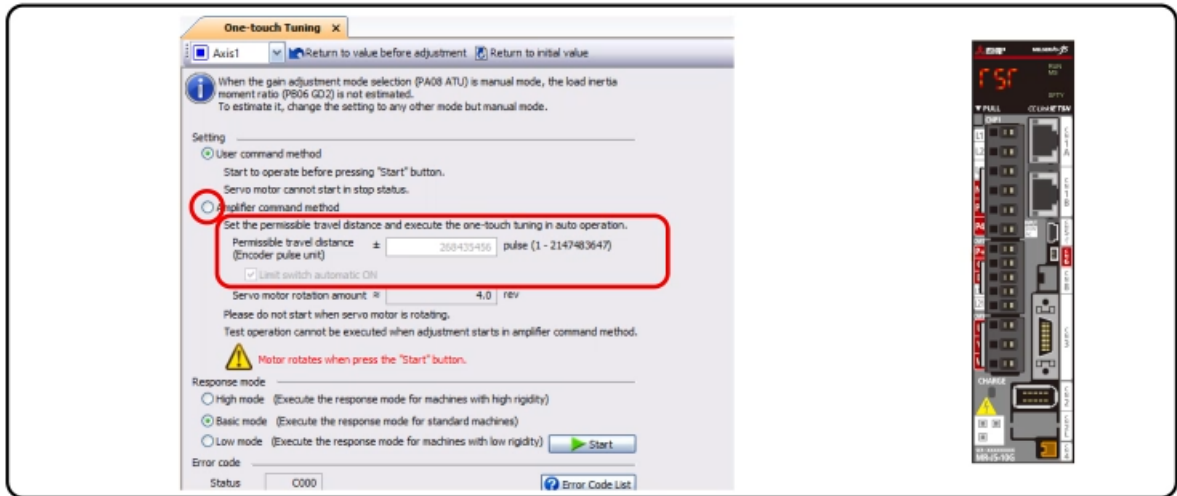
Open the One-touch Tuning window of MR Configurator2.

## (3) Operation example of one-touch tuning



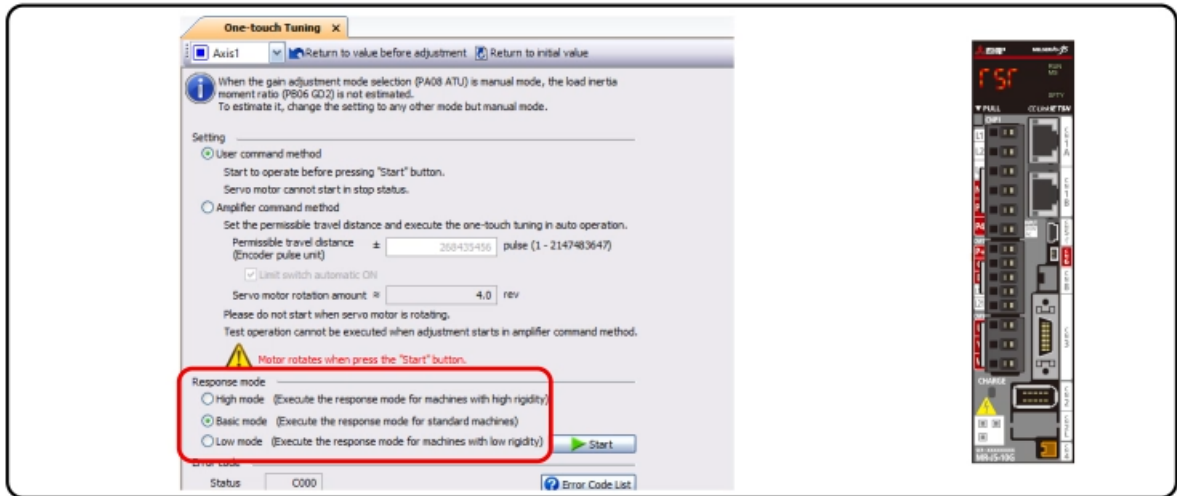
Select Amplifier command method.

## (3) Operation example of one-touch tuning



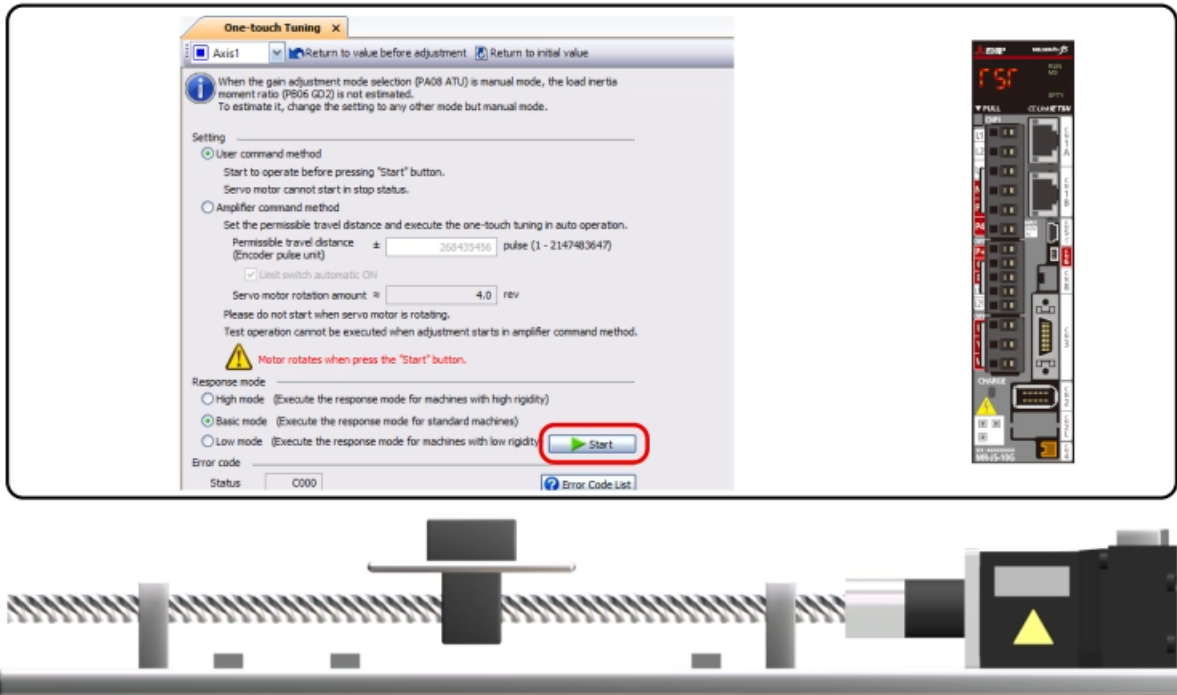
Enter the permissible travel distance.

## (3) Operation example of one-touch tuning



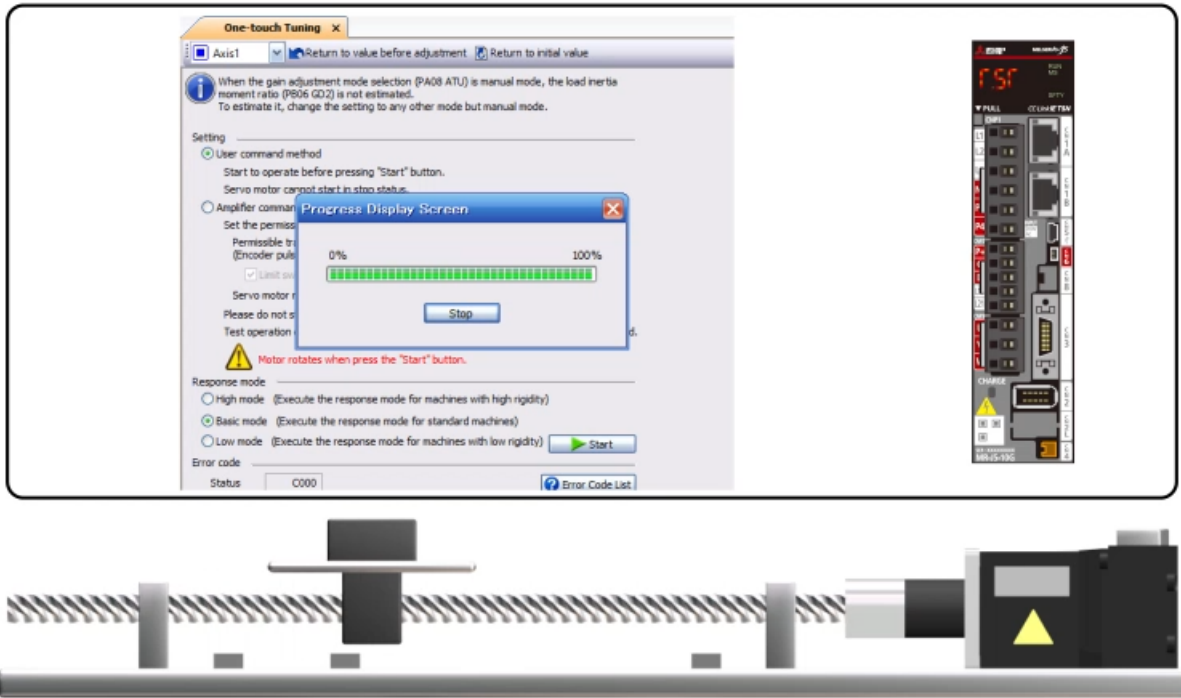
Set Response mode to Basic mode for now.

## (3) Operation example of one-touch tuning



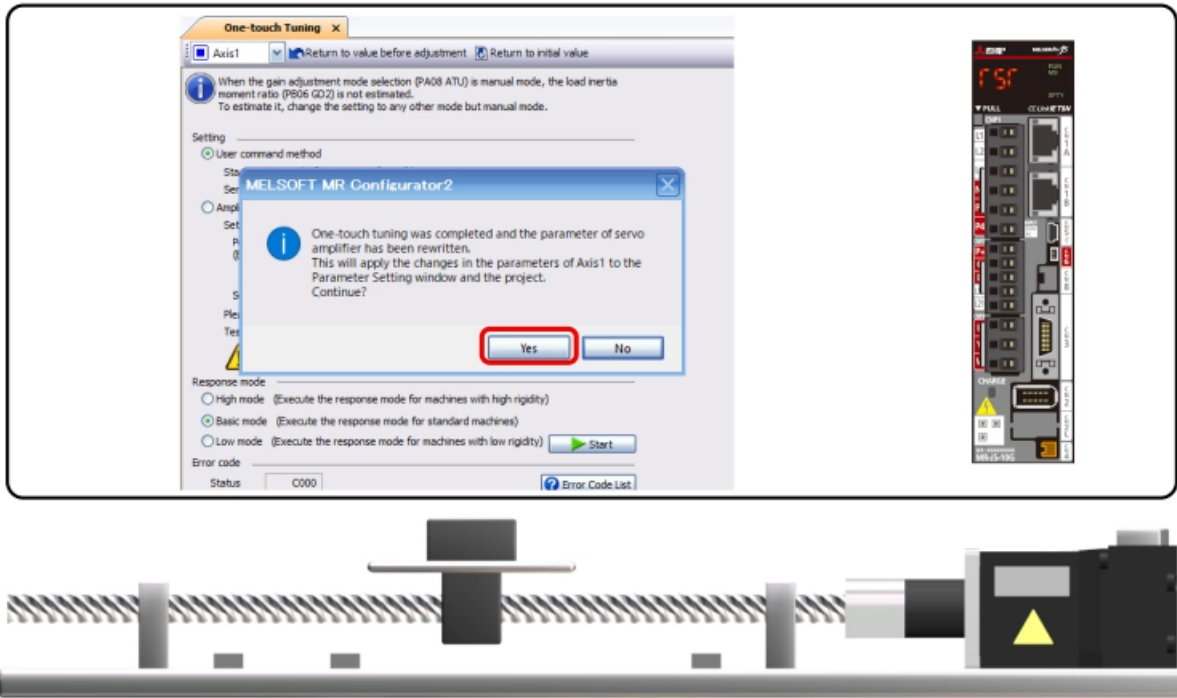
Click the Start button to start the motor and one-touch tuning.

## (3) Operation example of one-touch tuning



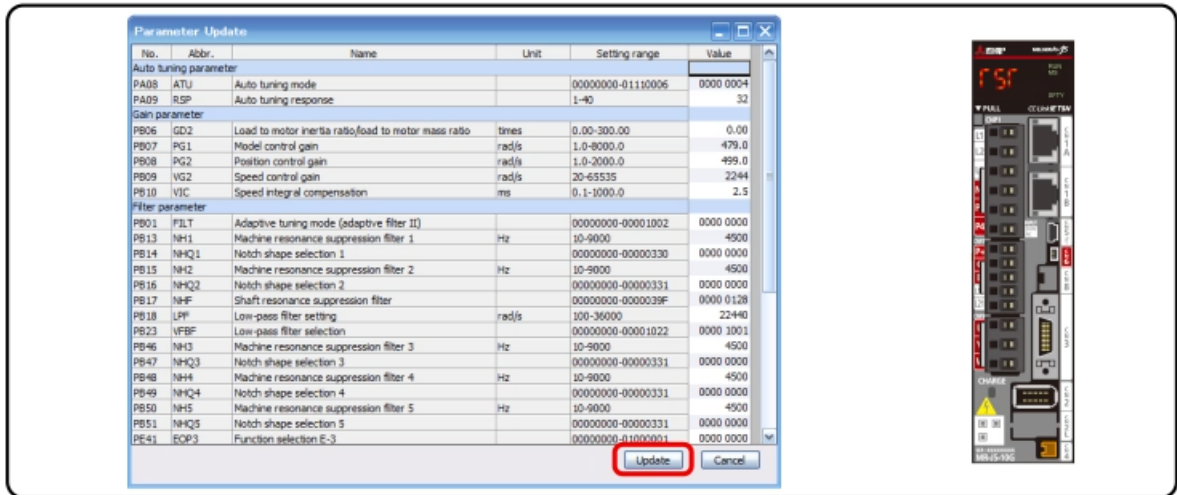
During one-touch tuning, the motor repeats operation within the set range of travel distance.  
The rotation of the motor is accelerated.

## (3) Operation example of one-touch tuning



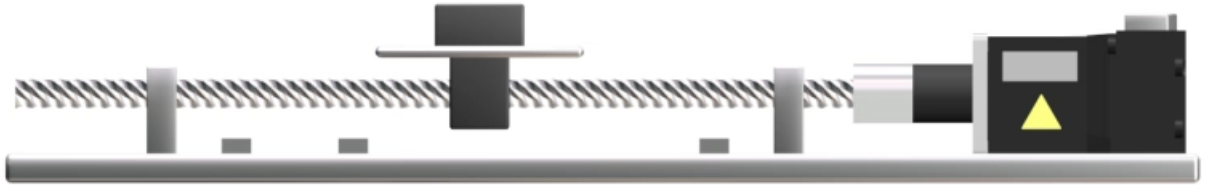
When one-touch tuning is completed, the servo motor stops. After the adjustment, a window will open asking if you want to apply the changes to parameters. Click the [Yes] button.

## (3) Operation example of one-touch tuning



The screenshot shows a 'Parameter Update' dialog box with a table of parameters. The 'Update' button is highlighted with a red box. To the right is a photograph of the motor controller hardware.

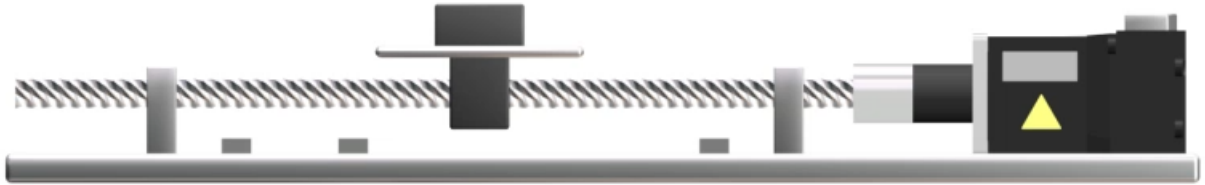
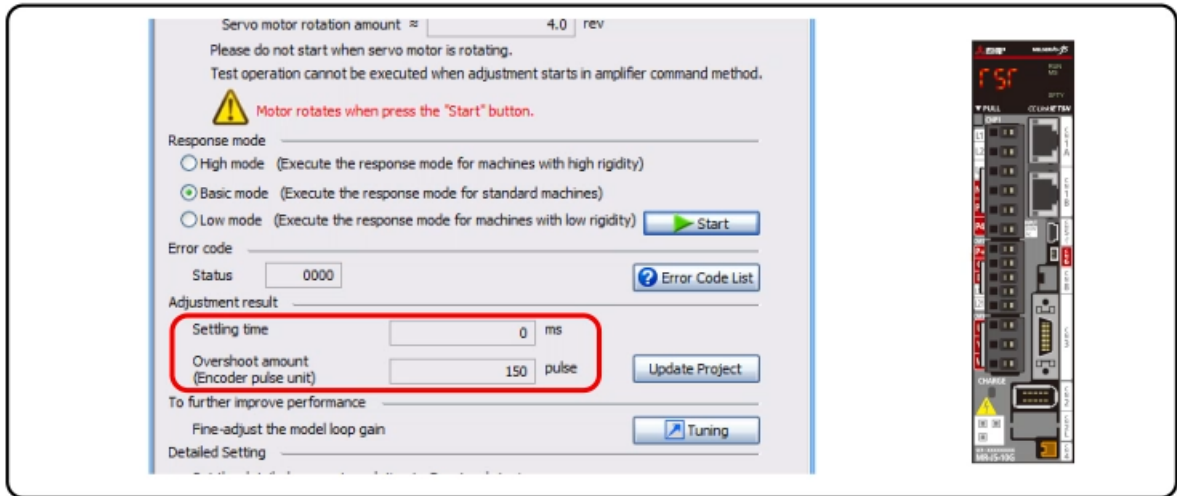
No.	Abbr.	Name	Unit	Setting range	Value
<b>Auto tuning parameter</b>					
PA08	ATU	Auto tuning mode		00000000-01110006	0000 0004
PA09	RSP	Auto tuning response		1-40	32
<b>Gain parameter</b>					
PB06	GD2	Load to motor inertia ratio/load to motor mass ratio	times	0.00-300.00	0.00
PB07	PG1	Model control gain	rad/s	1.0-8000.0	479.0
PB08	PG2	Position control gain	rad/s	1.0-2000.0	499.0
PB09	VG2	Speed control gain	rad/s	20-65535	2244
PB10	VIC	Speed integral compensation	ms	0.1-1000.0	2.5
<b>Filter parameter</b>					
PB01	FILT	Adaptive tuning mode (adaptive filter II)		00000000-00001002	0000 0000
PB13	NH1	Machine resonance suppression filter 1	Hz	10-9000	4500
PB14	NHQ1	Notch shape selection 1		00000000-00000330	0000 0000
PB15	NH2	Machine resonance suppression filter 2	Hz	10-9000	4500
PB16	NHQ2	Notch shape selection 2		00000000-00000331	0000 0000
PB17	NHF	Shaft resonance suppression filter		00000000-0000039F	0000 0128
PB18	LPF	Low-pass filter setting	rad/s	100-36000	22440
PB23	VFBF	Low-pass filter selection		00000000-00001022	0000 1001
PB46	NH3	Machine resonance suppression filter 3	Hz	10-9000	4500
PB47	NHQ3	Notch shape selection 3		00000000-00000331	0000 0000
PB48	NH4	Machine resonance suppression filter 4	Hz	10-9000	4500
PB49	NHQ4	Notch shape selection 4		00000000-00000331	0000 0000
PB50	NH5	Machine resonance suppression filter 5	Hz	10-9000	4500
PB51	NHQ5	Notch shape selection 5		00000000-00000331	0000 0000
PE41	FOP3	Function selection F-3		00000000-01000001	0000 0000



Adjusted parameters are displayed in a list.  
Click the [Update] button to complete one-touch tuning.

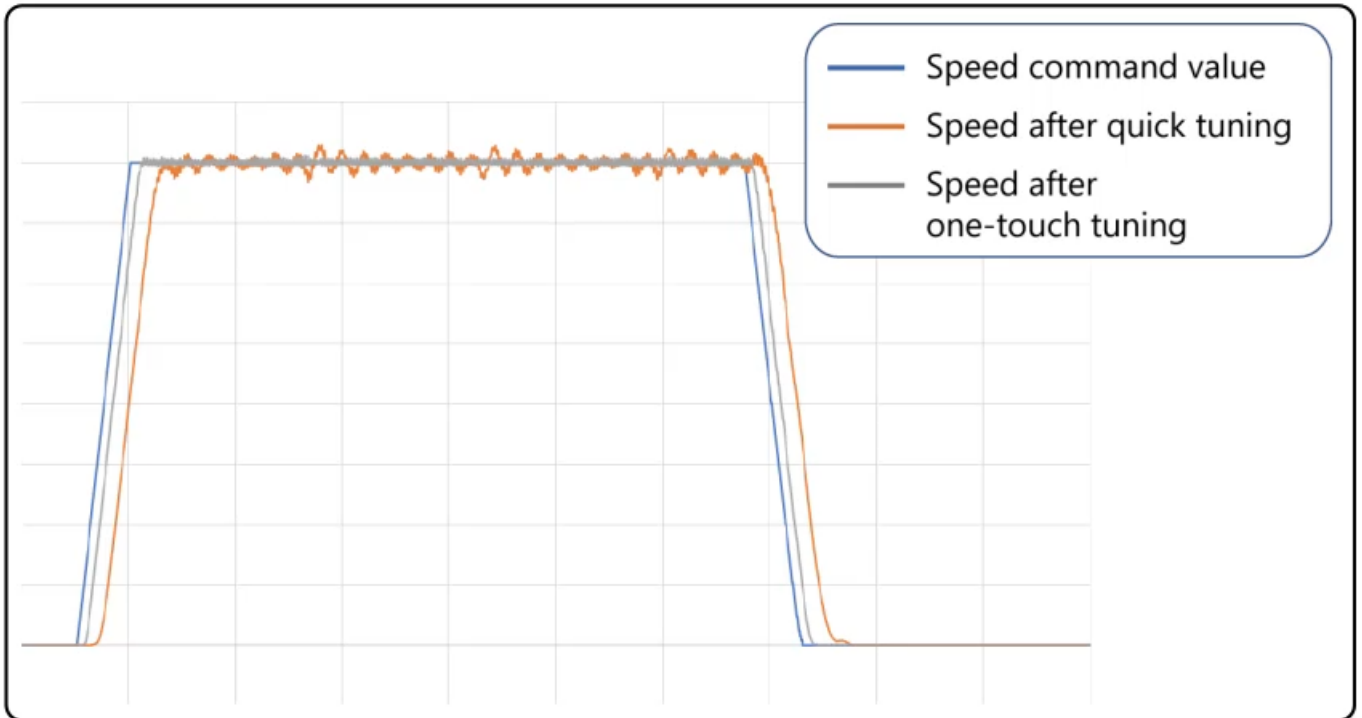


## (3) Operation example of one-touch tuning



In the Adjustment result field, Settling time and Overshoot amount will be displayed.

(3) Operation example of one-touch tuning



In the above graph, the speed waveform after quick tuning and the one after one-touch tuning are compared as examples. After one-touch tuning, the settling time is reduced.

(3) Operation example of one-touch tuning



This completes the explanation of operation example of one-touch tuning.

Click  to go to the next page.

In this chapter, you have learned:

- Gain Adjustment Type
- Quick tuning
- One-touch tuning

Important points

Gain Adjustment Type	<ul style="list-style-type: none"> <li>• The following adjustment functions are available when the servo amplifier is used alone: Quick tuning, auto tuning mode 1, auto tuning mode 2, 2 gain adjustment mode 1, 2 gain adjustment mode 2, and one-touch tuning (controller command method).</li> <li>• The following adjustment function is available in combination with MR Configurator2: One-touch tuning (amplifier command method).</li> <li>• Perform quick tuning for quick gain adjustment, and perform one-touch tuning to reduce the settling time.</li> </ul>
Quick tuning	<ul style="list-style-type: none"> <li>• In quick tuning, vibration torque is applied at the first servo-on. From the response at this time, each gain and resonance suppression filter are adjusted.</li> <li>• To maintain the gain after the execution of quick tuning, set the load to motor inertia ratio monitor mode in which the load to motor inertia ratio is always estimated.</li> </ul>
One-touch tuning	<ul style="list-style-type: none"> <li>• When one-touch adjustment with the amplifier command method is executed from MR Configurator2, the servo motor starts reciprocating. From the response at this time, each gain and resonance suppression filter are adjusted.</li> <li>• The settling time is shorter than that of quick tuning.</li> <li>• The responsiveness of one-touch adjustment can be selected from three levels.</li> </ul>

Now that you have completed all of the lessons of the **MELSERVO Basic (MR-J5)** Course, you are ready to take the final test. If you are unclear on any of the topics covered, please take this opportunity to review those topics.

**There are a total of 6 questions (12 items) in this Final Test.**

You can take the final test as many times as you like.

**Score results**

The number of correct answers, the number of questions, the percentage of correct answers, and the pass/fail result will appear on the score page.

		1	2	3	4	5	6	7	8	9	10	
Retry	Final Test 1	✓	✓	✓	✗							Total questions: <b>28</b> Correct answers: <b>23</b> Percentage: <b>82 %</b>
	Final Test 2	✓	✓	✓	✓							
	Final Test 3	✓										
	Final Test 4	✓	✓									
	Final Test 5	✓	✓									
Retry	Final Test 6	✓	✗	✗	✗							Total questions: <b>28</b> Correct answers: <b>23</b> Percentage: <b>82 %</b>
	Final Test 7	✓	✓	✓	✓							
	Final Test 8	✓	✓	✓	✓	✓						
	Final Test 9	✓										
Retry	Final Test 10	✗										

To pass the test, **60%** of correct answers is required.

Regarding the installation and wiring of the servo amplifier, select the correct answer(s). (Multiple selections are available)

- Always observe the mounting direction of the servo amplifier and dimensions of the wiring allowance.
- Even if multiple servo amplifiers are closely mounted, their performance does not change.
- To the main circuit power supply input of the servo amplifier, connect either of a molded-case circuit breaker (MCCB) or magnetic contactor (MC).
- Connect external circuits such as the stroke limit to CN3, and connect functional safety circuits such as the STO signal to CN8.

Regarding the parameter setting of a servo amplifier, select the correct word for ( ) in the following sentences.

- Set the parameters of Type A using (Q1) or MR Configurator2.
- The electronic gear function is for adjusting the relationship between the position command value and travel distance of the machine as shown in the following formula.

$$(Q2) \times \frac{(\text{Electronic gear numerator})}{(\text{Electronic gear denominator})} = (Q3)$$

Q1

-- Select --



Q2

-- Select --



Q3

-- Select --



- Q1: • 1 : Push button switches on the front of the servo amplifier  
• 2 : From the controller via the network

- Q2: • 1 : Travel distance of the machine  
• 2 : Position command value

- Q3: • 1 : Travel distance of the machine  
• 2 : Position command value

Regarding the test operation, select the correct word for ( ) in the following sentences.

The test operation of MR-J5 is performed in the order of (Q1), (Q2), and (Q3).

Execute (Q2) at low speed, and check the rotation direction of the servo motor and travel direction of the machine.

Using the (Q4) function, check the operation such as whether MC is shut off when the ALM signal turns off (0 V).

With the (Q5) function, check that the wiring of stroke limit or others is correct.

Q1

-- Select --



Q2

-- Select --



Q3

-- Select --



Q4

-- Select --



Q5

-- Select --



- Q1:
- 1 : JOG operation from MR Configurator2
  - 2 : Test operation by commands from the controller
  - 3 : Power supply or servo motor wiring

- Q2:
- 1 : JOG operation from MR Configurator2
  - 2 : Test operation by commands from the controller
  - 3 : Power supply or servo motor wiring

- Q3:
- 1 : JOG operation from MR Configurator2
  - 2 : Test operation by commands from the controller
  - 3 : Power supply or servo motor wiring

- Q4:
- 1 : External output signal (DO) forced output
  - 2 : I/O monitor display
  - 3 : Motor-less operation

- Q5:
- 1 : External output signal (DO) forced output
  - 2 : I/O monitor display
  - 3 : Motor-less operation



Regarding the absolute position detection system, select the correct answer(s). (Multiple selections are available)

- When a servo motor with a battery-less encoder such as an HK motor is used, no battery is required to retain the absolute position data.
- At the startup of an absolute position detection system, the alarm "AL.25 Absolute position erased" occurs when the power supply is turned on for the first time after the absolute position detection system is enabled in the parameter setting. Cycling the power clears the alarm.
- Type G requires wiring and programing for transferring the absolute position data.

Regarding the use of a linear servo motor and direct drive motor, select the correct answer(s). (Multiple selections are available)

- Before using a linear servo motor or direct drive motor, the magnetic pole detection is required.
- For both the linear servo motor and direct drive motor, no battery is required to retain the absolute position data.
- Since linear servo motors use strong permanent magnets, magnetic materials should be kept away from them.
- When using a direct drive motor, make sure that the position of the Z-phase can be checked.
- If the direct drive motor swings at a small angle, rotate it at least one revolution once a week.

Regarding the gain adjustment, select the correct answer(s). (Multiple selections are available)

When quick tuning is executed, vibration torque is applied to the servo motor.

For quick tuning, the acceleration/deceleration operation is required.

Performing one-touch tuning reduces the settling time.

For one-touch turning, the response mode cannot be selected.

Regarding the installation and wiring of the servo amplifier, select the correct answer(s). (Multiple selections are available)

- Always observe the mounting direction of the servo amplifier and dimensions of the wiring allowance.**
- Even if multiple servo amplifiers are closely mounted, their performance does not change.**
- To the main circuit power supply input of the servo amplifier, connect either of a molded-case circuit breaker (MCCB) or magnetic contactor (MC).**
- Connect external circuits such as the stroke limit to CN3, and connect functional safety circuits such as the STO signal to CN8.**

Regarding the parameter setting of a servo amplifier, select the correct word for ( ) in the following sentences.

- Set the parameters of Type A using (Q1) or MR Configurator2.
- The electronic gear function is for adjusting the relationship between the position command value and travel distance of the machine as shown in the following formula.

$$(Q2) \times \frac{\text{(Electronic gear numerator)}}{\text{(Electronic gear denominator)}} = (Q3)$$

Q1

Push button switches on the front of the servo amplifier



Q2

Position command value



Q3

Travel distance of the machine



Q1: • 1 : Push button switches on the front of the servo amplifier  
• 2 : From the controller via the network

Q2: • 1 : Travel distance of the machine  
• 2 : Position command value

Q3: • 1 : Travel distance of the machine  
• 2 : Position command value

Regarding the test operation, select the correct word for ( ) in the following sentences.

The test operation of MR-J5 is performed in the order of (Q1), (Q2), and (Q3).

Execute (Q2) at low speed, and check the rotation direction of the servo motor and travel direction of the machine.

Using the (Q4) function, check the operation such as whether MC is shut off when the ALM signal turns off (0 V).

With the (Q5) function, check that the wiring of stroke limit or others is correct.

Q1

Power supply or servo motor wiring



Q2

JOG operation from MR Congfigurator2



Q3

Test operation by commands from the controller



Q4

External output signal (DO) forced output



Q5

I/O monitor display



- Q1:
- 1 : JOG operation from MR Congfigurator2
  - 2 : Test operation by commands from the controller
  - 3 : Power supply or servo motor wiring

- Q2:
- 1 : JOG operation from MR Congfigurator2
  - 2 : Test operation by commands from the controller
  - 3 : Power supply or servo motor wiring

- Q3:
- 1 : JOG operation from MR Congfigurator2
  - 2 : Test operation by commands from the controller
  - 3 : Power supply or servo motor wiring

- Q4:
- 1 : External output signal (DO) forced output
  - 2 : I/O monitor display
  - 3 : Motor-less operation

- Q5:
- 1 : External output signal (DO) forced output
  - 2 : I/O monitor display
  - 3 : Motor-less operation

Regarding the absolute position detection system, select the correct answer(s). (Multiple selections are available)



**When a servo motor with a battery-less encoder such as an HK motor is used, no battery is required to retain the absolute position data.**



**At the startup of an absolute position detection system, the alarm "AL.25 Absolute position erased" occurs when the power supply is turned on for the first time after the absolute position detection system is enabled in the parameter setting. Cycling the power clears the alarm.**



**Type G requires wiring and programing for transferring the absolute position data.**

Regarding the use of a linear servo motor and direct drive motor, select the correct answer(s). (Multiple selections are available)

Before using a linear servo motor or direct drive motor, the magnetic pole detection is required.

For both the linear servo motor and direct drive motor, no battery is required to retain the absolute position data.

Since linear servo motors use strong permanent magnets, magnetic materials should be kept away from them.

When using a direct drive motor, make sure that the position of the Z-phase can be checked.

If the direct drive motor swings at a small angle, rotate it at least one revolution once a week.



Regarding the gain adjustment, select the correct answer(s). (Multiple selections are available)

When quick tuning is executed, vibration torque is applied to the servo motor.

For quick tuning, the acceleration/deceleration operation is required.

Performing one-touch tuning reduces the settling time.

For one-touch turning, the response mode cannot be selected.

You have completed the Final Test. Your results area as follows.  
To end the Final Test, proceed to the next page.

	1	2	3	4	5	6	7	8	9	10
Final Test 1	✓									
Final Test 2	✓	✓	✓							
Final Test 3	✓	✓	✓	✓	✓					
Final Test 4	✓									
Final Test 5	✓									
Final Test 6	✓									
Final Test 7										
Final Test 8										
Final Test 9										
Final Test 10										

Total Questions: **12**

Correct Answers: **12**

Percentage: **100 %**

Clear

**You have completed the "MELSERVO Basic (MR-J5)" Course.**

Thank you for taking this course.

We hope you enjoyed the lessons and the information you acquired in this course is useful for configuring systems in the future.

You can review the course as many times as you want.

**Review**

**Close**