M0010842J

SANMOTION

MOTOR SETUP SOFTWARE

SERVO SYSTEMS

Instruction Manual

SANYO DENKI

Publication time	Rev	Chapter or Page	Change details
FEB.2014	A		NEW
DEC.2014	B	1-1	Servo adjustment assistance/Adaptive notch filter manual setting are added to No.6 Tuning.
		1-2	Applicable system RS2 amplifier model addition
		Chapter 9.4	Servo adjustment assist function addition
		Chapter 9.5	Adaptive notch filter manual setting function addition
			Below are mistake corrections.
		7-5	1) (C) JOG-operation → Orientation-operation
		7-9	(4) orderly completing → abnormally completing
			update a figure Figure 3-11, 3-13, 3-15, 3-16, 6-1, 7-1, 9-1, 11-1, 11-2
FEB.2015	C	Chapter 7.2	Add "Maximum velocity is limited to 2m/sec, in the system using linear motor with 1nm resolution." to 2) How to operate, Positioning operation.
		Chapter 7.3	Add "this function is not allowed if the system is set for linear motor.".
		Chapter 7.5	Add "This function is not allowed if the serial encoder has EnDat format of Heidenhain.".
		Chapter 9.1	Add "This function is not allowed if the tandem operation is used.".
		Chapter 9.2	Add "This function is not allowed if the tandem operation is used.".
		Chapter 9.4	Add "This function is not allowed if the tandem operation is used.".
		Chapter 10.3	Add "This function is not allowed if the tandem operation is used.".
APR.2015	D	Reference work	Adds the contact info regarding to applicable product update.
		Chapter 1.1	Applicable product update.
		Chapter 1.2	Applicable product update.
		Chapter 2	Applicable product update for connection with servo amplifier/driver.
		Chapter 13	13.2 and 13.3 of Appendix are added.
JUN.2015	E	Chapter 1.1	Applicable product update.
		Chapter 1.2	Applicable product update.
		Chapter 2.4	Applicable product update for connection with servo amplifier/driver.
OCT.2015	F	Chapter 1.1	Applicable product update.
		Chapter 1.2	Applicable product update.
		Chapter 2.5	Update a wiring diagram and connection axis of PB driver.
		Chapter 13.3	Add "Connector number of driver side connector".
MAR.2017	G	Chapter 1.1	Add "Motor brake control function".
		Chapter 7.6	Add "Motor brake control function".
		Chapter 3.5	Delete a part of description for parameter level.

Publication time	Rev	Chapter or Page	Change details
AUG.2017	H	Chapter 1.1	Add "Functional safety module (Safety Module)".
		Chapter 1.2	Add "Functional safety module (Safety Module)" as applicable model.
		Chapter 2.6	Add connection with "Functional safety module".
		Chapter 4.1	Add functions of "Parameter editing authority" and "Parameter initialization" to function list.
		Chapter 4.2	Add menu of functional safety module setting, to "Settings by group".
		Chapter 4.9	Add notification for "Functional safety module".
		Chapter 4.10	Add function of "Parameter editing authority".
		Chapter 4.11	Add function of "Parameter initialization".
		Chapter 7.1	Add notification for during safety function performing.
		Chapter 7.2	Add notification for during safety function performing.
		Chapter 7.3	Add notification for during safety function performing.
		Chapter 7.4	Add notification for during safety function performing.
		Chapter 9.1	Add notification for during safety function performing.
		Chapter 9.2	Add notification for during safety function performing.
		Chapter 9.4	Add notification for during safety function performing. Add notification for the case of functional safety module attached.
		Chapter 10.3	Add notification for during safety function performing.
		Chapter 13.4	Add wiring with "Functional safety module".
MAY.2018	J	Chapter 1.1	RM2 is added to lineup.
		Chapter 1.3	Applicable OS is updated. Delete Windows XP/Vista. Add Windows 10.
		Chapter 6.4	Life-span estimation window is added.
		Chapter 9.4	Manual tuning mode of servo tuning navigation is added.
		Chapter 10.1 Chapter 10.2 Chapter 10.3 Chapter 10.4	Note for save file (.csv) is added.

Preface

Thank you for purchasing our SANMOTION servo system.
This is instruction manual for SANMOTION Motor Setup that is convenient introduction support tool for our servo amplifier.

- ✓ Please refer this at startup and adjustment of the servo system.
- ✓ Also refer a manual of each servo amplifier.

※The screenshot in this manual might differ from actual.

※In this document, RS3 means "SANMOTION R 3E Model", RS2 means "SANMOTION R ADVANCED MODEL", SSmeans "SANMOTION S", F2 means "SANMOTION F2", F5 means "SANMOTION F5" and PB means "SANMOTION Model No.PB".

Table of contents

Reference work

- Please refer each instruction manual of servo amplifier and driver.
  Download instruction manuals from our webpage. Otherwise contact our sales department.

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1. System summary

1.1 Outline of functions

You can connect this SANMOTION MOTOR SETU
P (hereinafter referred to as Setup S/W) to SANYO DENKI AC-servo amplifiers (hereinafter referred to as servo amplifier(s)) and conduct the following functions:

Table 1-1 List of functions and applicable servo amplifier models

No.	Functions		Descriptions	RS3	RS2/ RM2	RF2G pulse	RS2- EtherCAT, RF2J, RF2K	SS1 pulse	SS1 Ether CAT	F2	F5	PB Ether CAT	PB pulse	Safety Module
1	Parameter	Parameter Setting - Each Group	Edits parameters by group. This can edit all the parameters.	○	○	○	○	○	○	○	○	○	○	○
		Parameter Setting - Each Function	Sets parameters by functions. This only can edit representative parameters.	△ ※3	×	×	×	×	×	×	×	×	×	×
		Parameter transmission	Transfer the parameter data between the servo amplifier and a file in the PC.	○	○	○	○	○	○	○	○	○	○	○
		Saving to the Backup Memory/ Restoration from the Backup Memory	Storing parameters into the backup memory built in a servo amplifier. / Restores the backup memory values as the parameters of a servo amplifier.	○	○	○	×	○	×	○	○	×	×	×
		Parameter Verification/ Password Setting	Collates parameters as well as sets passwords to inhibit parameter values from being rewritten.	○	○	○	○	○	○	○	○	○	○	○
		Parameter editing authority	Switches authority for parameter edit/browse.	×	×	×	×	×	×	×	×	×	×	○
		Parameter initialization	Initialize parameters to factory setting.	×	×	×	×	×	×	×	×	×	×	○
2	Monitor	Monitor	Monitors the various data of servo amplifiers.	○	○	○	○	○	○	○	○	○	○	○
3	Diagnosis	Alarm History	Displays current alarm and alarms in the last 15 times indicating estimated route causes and the corrective actions.	○	※1	※1	※1	※1	※1	※1	○	※1	○	○
		Alarm Reset	Releases the alarm states.	○	○	○	○	○	○	○	○	○	○	×
		Warning info	Displays the information on warning.	○	※2	※2	※2	※2	※2	×	○	※2	○	×
4	Test operation	JOG Operation *	Perform velocity JOG-operation.	○	○	○	○	○	○	○	○	○	○	×
		Positioning Operation *	Perform positioning operation.	○	○	○	○	○	○	○	○	○	○	×
		Searching motor origins *	Moves a motor shaft to an original position.	○	×	×	×	×	×	×	×	×	×	×
		Magnetic pole position estimation *	Estimates the magnetic pole position of linear motors.	○	○	○	○	×	×	×	×	×	×	×
		Serial Encoder Clear *	Clears the amount of multiple turning of a serial encoder for motors and alarm status.	○	○	○	○	×	○	×	×	○	×	×
		Motor brake control	It permits a control of motor brake power supply.	○ (400VAC)	×	×	×	×	×	×	×	×	×	×
5	Analog Offset Adjustment	For V-REF/ T-REF Terminal *	Automatically or manually adjust the offset amount of analog velocity command, velocity addition command, or analog torque (force) command.	○	○	×	×	○	×	×	×	×	×	×
		For T-COMP Terminal *	Automatically or manually adjust the offset amount of torque (force) addition command.	○	○	×	×	○	×	×	×	×	×	×
6	Servo tuning Assist	Auto Tuning	Automatically sets notch filter for torque (force) command by searching resonant frequency of mechanical system, sets FF-vibration suppression frequency by searching resonant/antiresonant frequency of mechanical system.	○	○	○	○	○	○	×	×	×	×	×
		Saving Result of Auto Tuning	Stores appropriate gain calculated by auto-tuning function as a parameter.	○	○	○	○	○	○	×	×	×	×	×
		Servo Tuning Navigation	At the servo tuning, adjusts using navigation.	○	×	×	×	×	×	×	×	×	×	×
		Saving Result of Adaptive Notch Filter	Sets the detected frequency as fixed value.	○	×	×	×	×	×	×	×	×	×	×
7	Measurement	Operation Trace ++	Displays states of servo amplifier operation in waveforms.	○	○	○	○	○	○	○	○	○	○	○
		System Analysis *++	Analyzes characteristics such as mechanical frequency response.	○	○	○	○	○	○	×	×	×	×	×
		Operation Scrolling	Displays states of multiple-axis servo amplifier/drivers at once in waveforms.	○	○	○	○	○	○	○	○	○	○	○
		Drive Recorder ++	Records the last 16 states of a servo amplifier/driver in the past and then displays them in waveform.	○	×	×	×	×	×	×	○	×	○	○ (Once)

- ✓ Available functions are marked with "○", non-supported functions are marked with "×". There are cases where some of functions marked with "△" are not available depending on specifications.
  ※1: Store alarm history occurred in the last 7 times. This does not support diagnosis functions.
  ※2: You can check the information on warning by batched monitoring.
  ※3: RS3 EtherCAT interface is not available.
- ✓ The starred functions (*) cannot be used together at the same time.
- ✓ The functions marked with (++) cannot be used together at the same time.
- ✓ Abbreviated servo amplifier symbol in table indicates servo amplifier and driver below.

RS3	・・・「SANMOTION R 3E Model」
RS2, RM2, RF2	・・・「SANMOTION R ADVANCED MODEL」
SS	・・・「SANMOTION S」
F2	・・・「SANMOTION F2」
F5	・・・「SANMOTION F5」
PB	・・・「SANMOTION Model No.PB」
Safety Module	・・・「SANMOTION R 3E Model functional safety module」

1.2 Applicable system

This Setup S/W supports the servo amplifier and driver below.

・SANMOTION R 3E Model servo amplifier	RS3***A*
・SANMOTION R ADVANCED Model servo amplifier	RS2***A*, RF2G****, RF2J**A*, RF2K**A*, RM2*
・SANMOTION S servo amplifier	SS1A15M8**
・SANMOTION F5 5-phase stepping driver, AC input	F5PAA***P1**, F5PAB***P1**
・SANMOTION F2 2-phase stepping driver, AC input	F2BAW*00M100
・SANMOTION Model No.PB Stepping system, closed loop	PB4D003E***, PB4D003P***
・SANMOTION R 3E Model, Functional safety module	

There may be cases some functions are not available depending on servo amplifier models or combinations of a servo motor and encoder. Menu and icons of unusable function will be unselectable.

1.3 System environment

Required performance to perform operation greatly varies depending on operation systems and need to be compliant with each system requirement per operating system. It is recommended to add the following requirements to fulfill more patient performance.

Table 1-2 Recommended system requirements to be added

PC	IBM PC/AT-compatible
Memory	Space more than 512MB
Hard-disk space	More than 600MB (Including Microsoft .NET Framework 3.5)
Display	More than 1024×768 of resolution/ 32 color-bit
Applicable OS	Windows® 7 Windows® 8 Windows® 10 *There is no limit to the edition of operation software.
Required software	The following components are required to operate this software. If they have not been installed before installing this software, they will be automatically installed. ・Microsoft .NET Framework 3.5 ・Crystal Reports Basic Runtime for Visual Studio 2008
Others	RS-232C port or USB port with more than 1 channel

1.4 Installing the program

Install Setup S/W in the following procedure:

(1) Stop all the running programs.
(2) Insert the Installation CD into CD-ROM drive (e.g.: drive E) of your PC.
(3) Select "Run" command on the Start menu of the Windows taskbar, or double click on installation execution file via the Internet Explorer.
(4) Select the language you install and then click “OK” button.

Figure 1-1 Dialog to select languages

(5) Start installing Setup S/W. Click “Next”.

Figure 1-2 Start-up window for installing Setup S/W

(6) The license agreement is displayed. Confirm the contents and click “Next” if you agree with the contents.

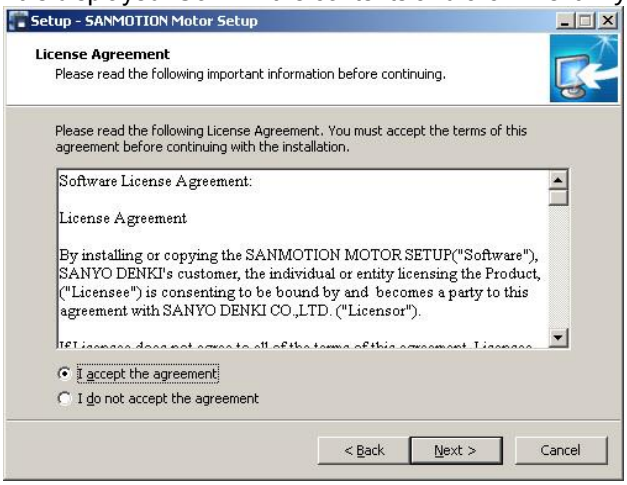


Figure 1-3 The license agreement display window

(7) Designate the folder in which Setup S/W is installed. If you change the folder already displayed, click “Browse….” to designate a new folder to install in. Click “Next”.

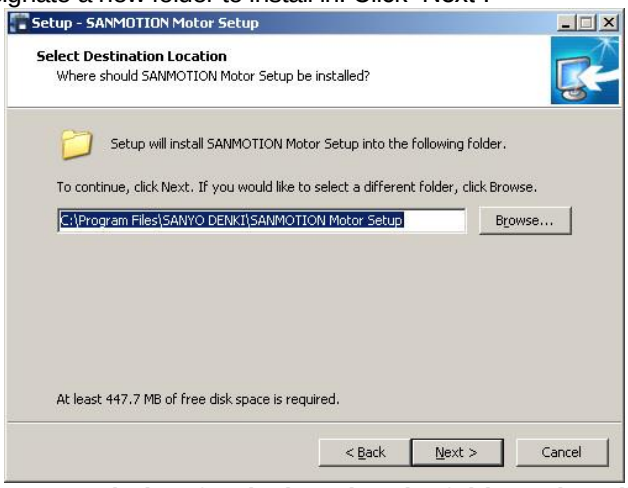


Figure1-4 Window for designating the folder to install S/W in

(8) Input a keyword to make it conform to customized motors. Click “Next” for cases other than that.

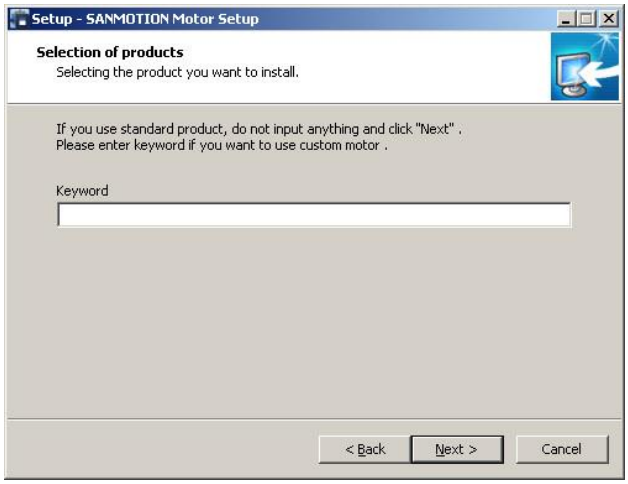


Figure1-5 Keyword-inputting window

(9) The installer installs the S/W after detecting whether or not any of the following modules exist. Click “Install” button.

- Microsoft .Net Framework 3.5 SP1
- Crystal Reports Basic Runtime for Visual Studio 2008

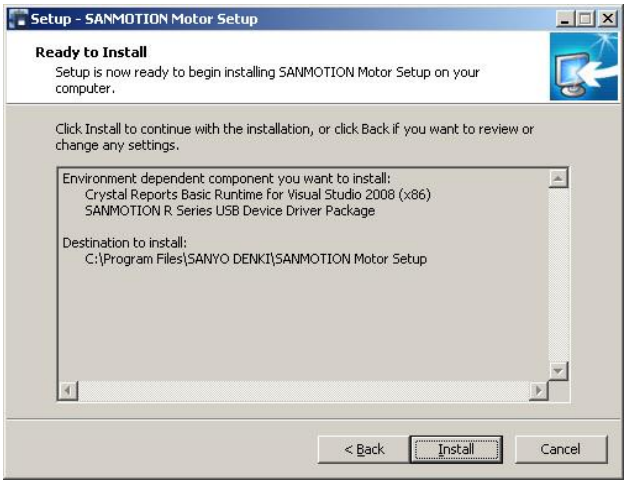


Figure1-6 Window for confirming start of installation

(10) S/W is being installed in this window. Please wait for a while.

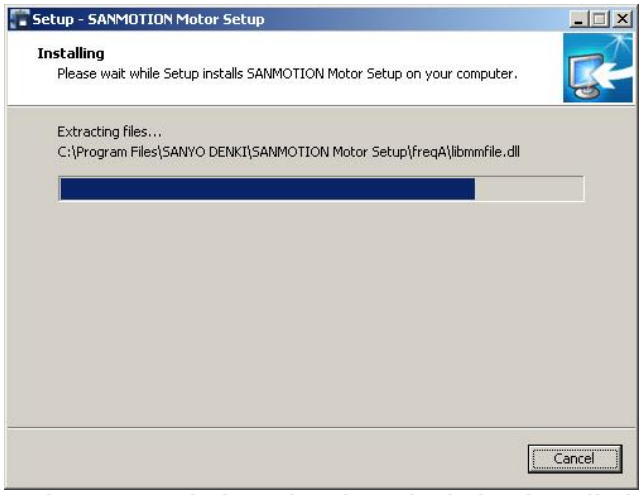


Figure 1-7 Window showing S/W being installed

(11) Now the installation has been completed. Click “Finish” button. The window instructing to reboot the PC appears depending on installation environments. In this case reboot the PC.

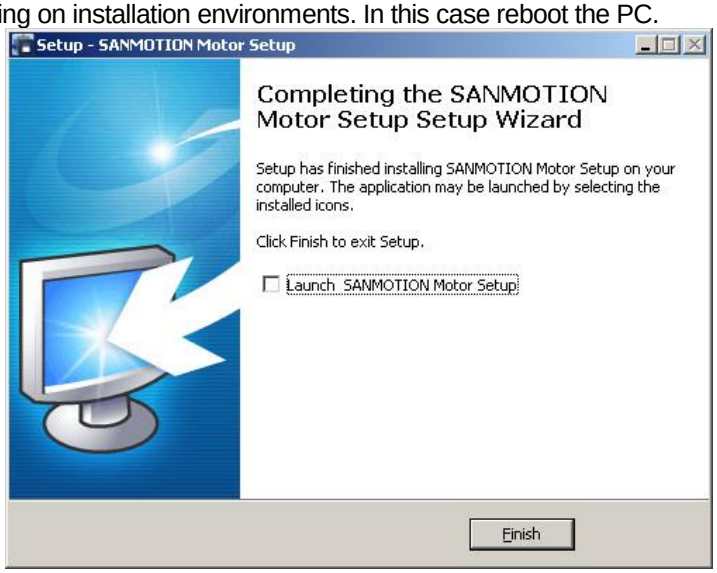


Figure 1-8 Dialog box indicating installation has been completed

1.5 Uninstalling the program

The following describe how to uninstall the setup Software:

(1) Stop all running programs.

(2) Select “Control panel (C)” through “Setting (S)” from the start menu on the Windows taskbar. Doubleclick on “Program and functions” (Windows7) icon to display the window below.

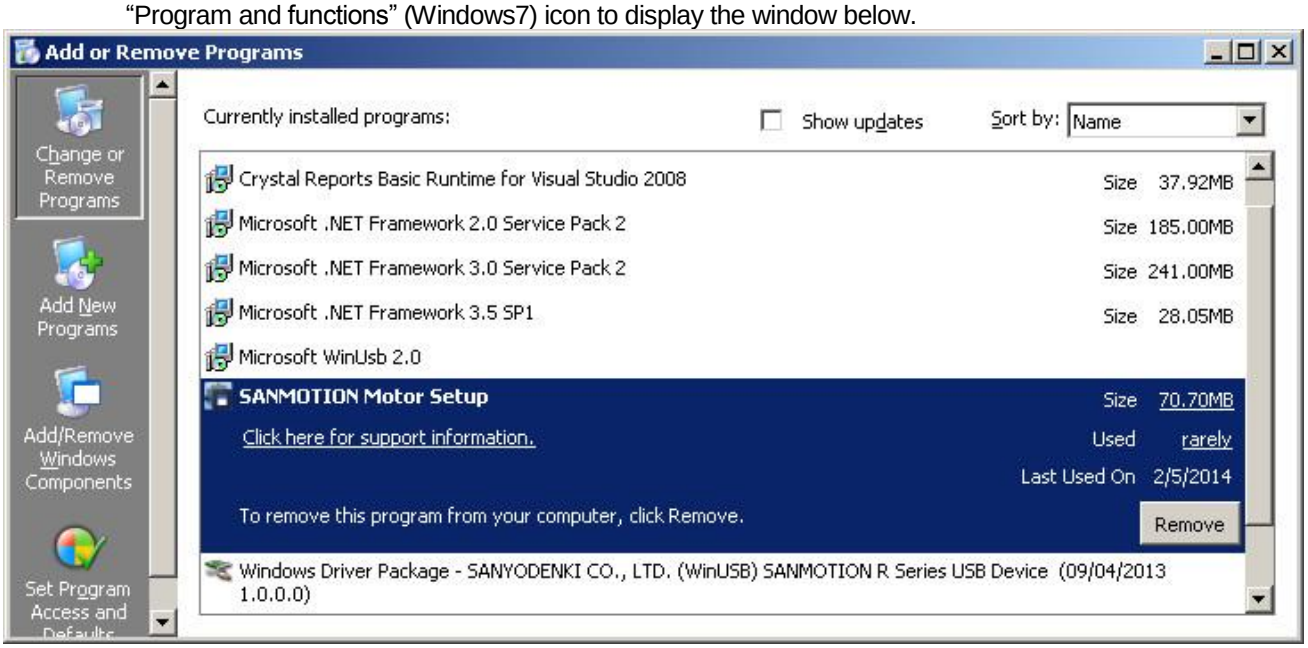


Figure 1-9 Uninstallation window

(3) Select “SANMOTION Motor Setup”, and then click “Remove“.

✓ When uninstalling Setup S/W, the following applications will not automatically uninstalled. If there are no impacts on the other applications, these applications below need to be manually uninstalled.

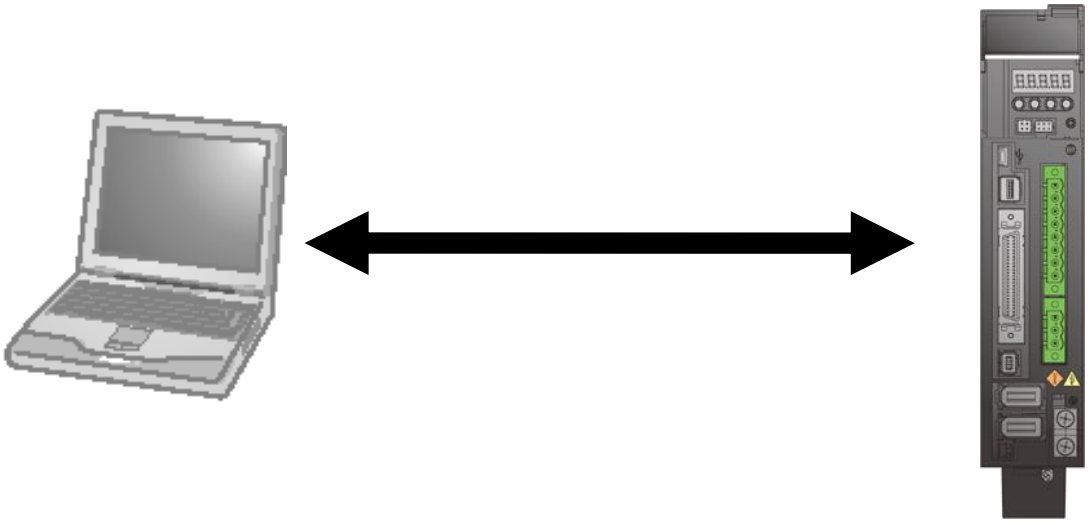
✓

- Microsoft .Net Framework 3.5 SP1
- Crystal Reports Basic Runtime for Visual Studio 2008
- Windows-driver package for SANYODENKI CO.,LTD.(WinUSB) USB Device

2. Connecting to a servo amplifier/driver

2.1 Connecting to a servo amplifier R-3E model

Connecting to a servo amplifier R-3E model should be via USB (FULL-speed).



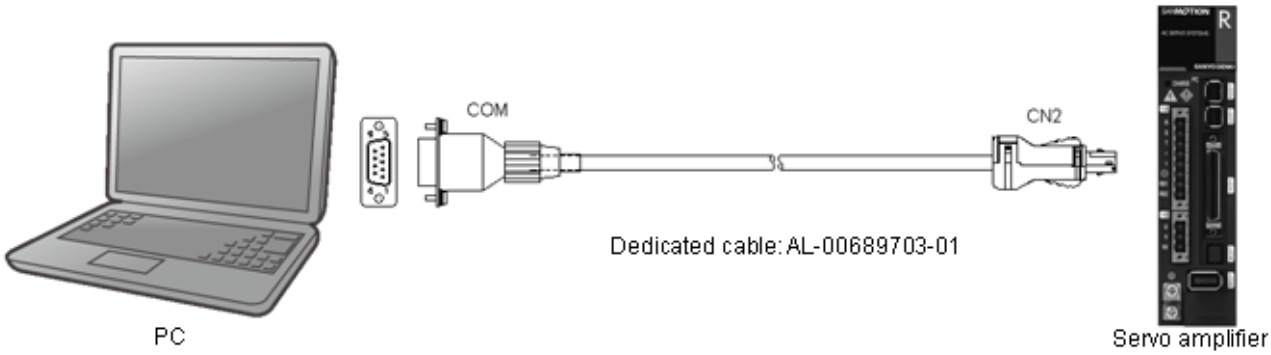
- ✔ Connect to the connector having USB mark (named "PC").
  The connectors on servo amplifiers are USB-mini B (socket)-type.
- ✔ When connecting multiple axes, connect them through USB-hub.

2.2 Connecting to a servo amplifier R-Advanced model AC input type (except EtherCAT IF expanded general input type) and SANMOTION S

1) Connecting to single servo amplifier

Use a dedicated cable (optional part: Product model number: AL-00689703-01) to connect a servo amplifier to a PC.

Connecting port on the servo amplifier : For pulse train IF type・・・CN2 connector on the front panel
For EtheCAT IF type・・・PC connector on the front panel
Connecting port on the PC : Serial communication type connector on the PC (9-pin D-sub)



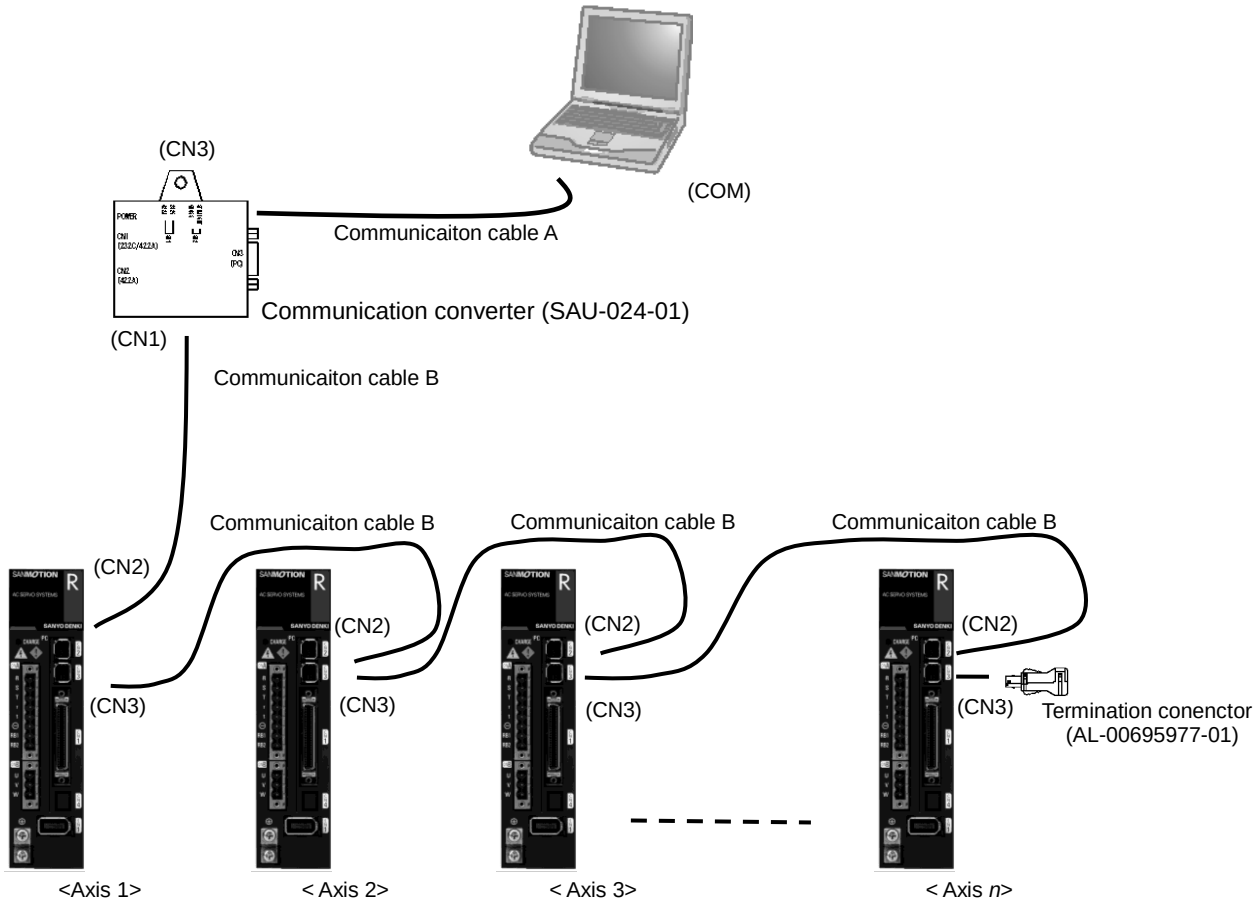
- ✓ Refer to *Chapter 13 Appendix* for the connector product models and wiring methods.
- ✓ For PC side, connect to COM-port.
- ✓ For servo amplifier side, connect to the connector indicated above. Do not to connect to CN3.

2) Connecting to multiple drivers (amplifiers)

Pulse input type and SANMOTION S can connect multiple, depending on amplifier spec. Follows are explain how to connect multiple connection.

Connect servo amplifiers to a PC using communication cables (2 types), communication converters, and termination connectors (those above are all optional parts). Up to 15 servo amplifiers can be connected together at once.

- ✓ Communication converter : SAU-024-01
- ✓ Communication cable A : Commercially available RS-232C-cable (Either straight or crossed type is applicable)
- ✓ * CN3 on the communication converter is 9-pin, D-sub male connector.
- ✓ Communication cable B : AL-00695974-01(0.2m), AL-00695974-02(3m)
- ✓ Termination connector : AL-00695977-01

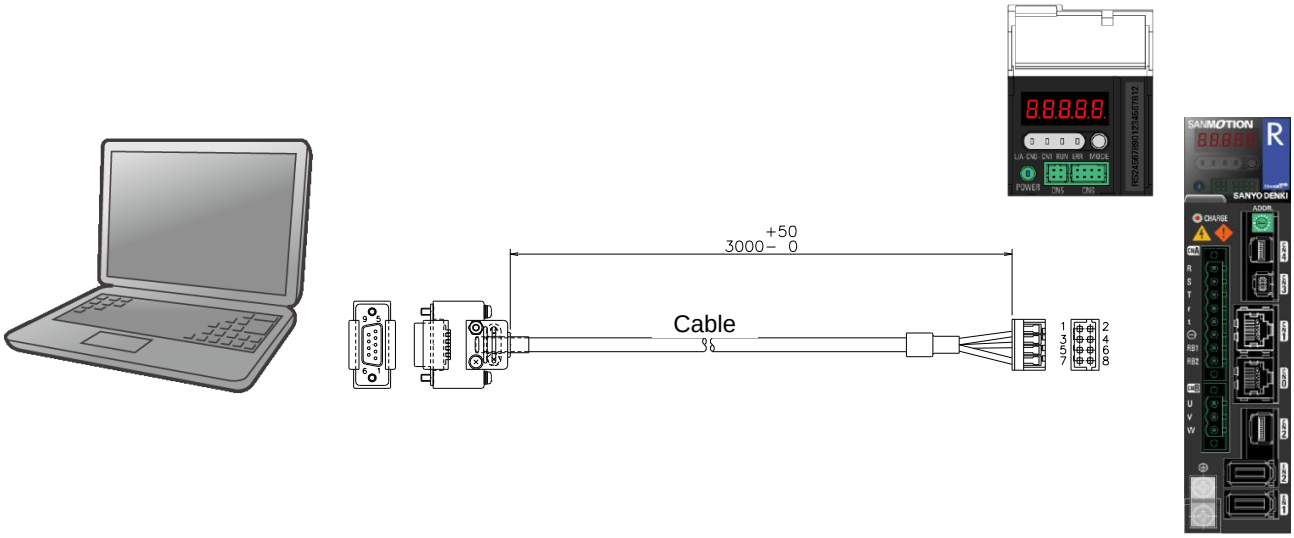


- ✓ Make sure the connections of CN2 and CN3 are as illustrated above. Connecting those above in a wrong way cannot establish communication.
- ✓ Set SW1 of communication converter by making it conform to 422A-side and set SW2 by making it conform to the communication cable (crossed or straight type) which connects to the host PC.

2.3 Connecting to a servo amplifier R-Advanced model AC input type (with EtherCAT IF expanded general input type)

Use a dedicated cable (optional part: Product model number: AL-00745525-01) to connect a servo amplifier to a PC.

Connecting port on the servo amplifier : CN6 under front cover
Connecting port on the PC : Serial communication type connector on the PC (9-pin D-sub)



PC Dedicated cable: AL-00745525-01 (CN6 under front cover) Servo amplifier

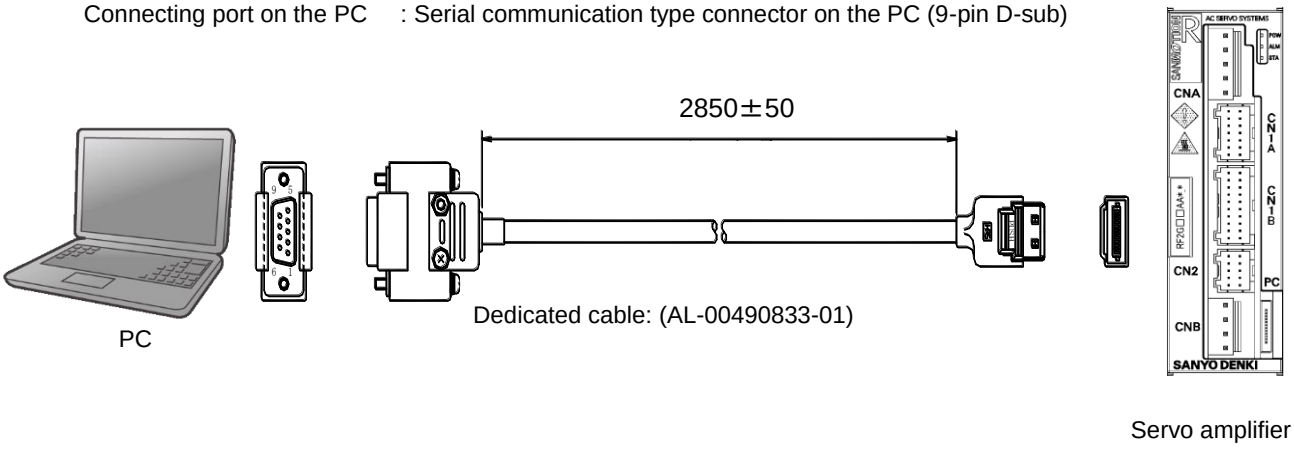
- ✓ Refer to *Chapter 13 Appendix* for the connector product models and wiring methods.
- ✓ For PC side, connect to COM-port.
- ✓ Do not to connect to CN2 and CN4.

2.4 Connecting to a servo amplifier R-Advanced model DC input type

1) Connecting to pulse IF type

Use a dedicated cable (optional part: Product model number: AL-00490833-01) to connect a servo amplifier to a PC.

Connecting port on the servo amplifier : For pulse train IF type・・・PC connector on the front panel
For EtheCAT IF type・・・CN4 connector on the front panel
Connecting port on the PC : Serial communication type connector on the PC (9-pin D-sub)



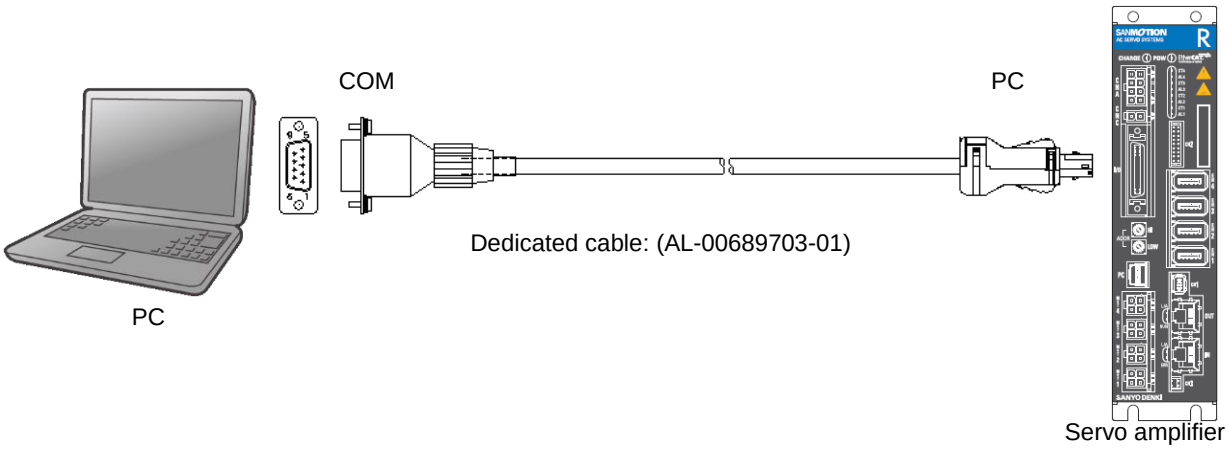
- ✓ Refer to *Chapter 13 Appendix* for the connector product models and wiring methods.
- ✓ For PC side, connect to COM-port.

2) Connecting to EtherCAT IF type

Same as R-Advanced model AC input type (single connection). Refer the section 2.2 and connect it.

Use a dedicated cable (optional part: Product model number: AL-00689703-01) to connect a servo amplifier to a PC.

Connecting port on the servo amplifier : For EtherCAT IF type・・・PC connector on the front panel
Connecting port on the PC : Serial communication type connector on the PC (9-pin D-sub)

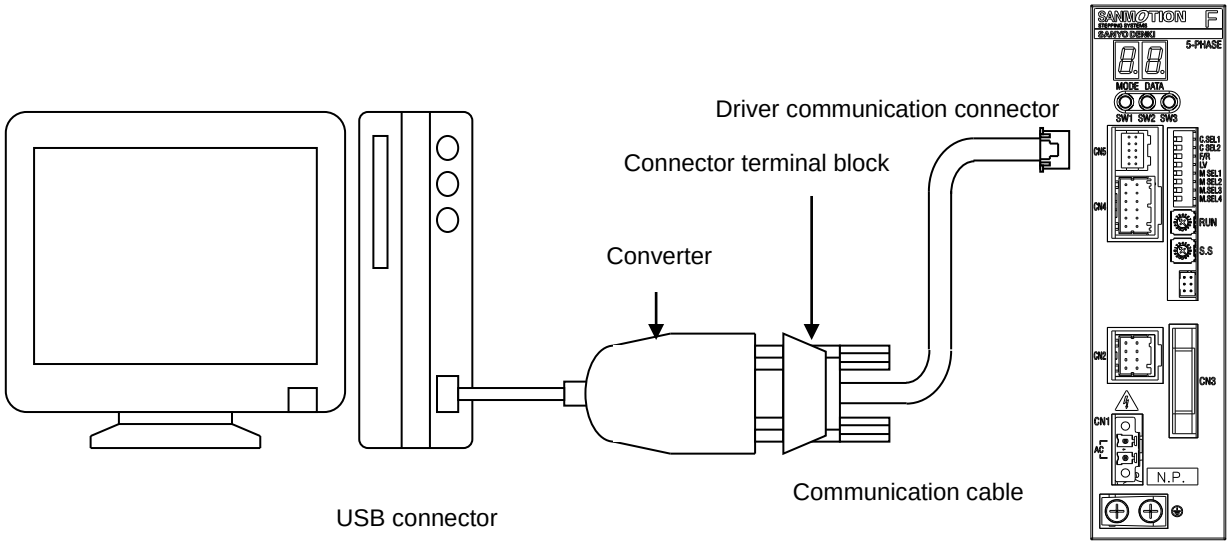


- ✓ Refer to *Chapter 13 Appendix* for the connector product models and wiring methods.
- ✓ For PC side, connect to COM-port.
- ✓ For servo amplifier side, connect to the PC connector indicated above.

2.5 Connecting to a stepping driver

Use a dedicated connection unit (optional part: PBFM-U6) to connect PC and the stepping driver which is applied SANMOTION MOTOR setup software: SANMOTION Model No.PB, SANMOTION F2 and SANMOTION F5.

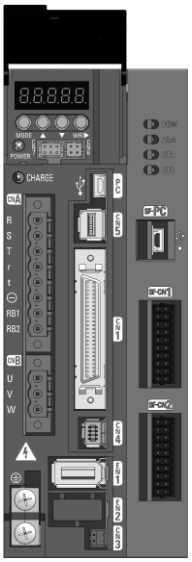
Name	Content	Model number	Instruction manual number
USB/RS485 converter	PC/driver connection unit	PBFM-U6	M0010723



- ✔ Refer to *Chapter 13 Appendix* for the connector product models and wiring methods.
- ✔ For detail, refer to another instruction manual (M0010723) for USB/RS485 converter (PBFM-U6).
- ✔ For the connection with F5 or F2, select the #1 as connection axis, and set 57,600bps as communication baud rate.
- ✔ For the connection with PB, select the connection axis in accord with the axis number, and set 57,600bps as communication baud rate.

2.6 Connecting to R 3E Mofel Functional safety module

Connecting to a servo amplifier, R-3E Model Functional safety module, should be via USB (FULL-speed).



- ✔ Connect to the connector having USB mark (named "PC").
  The connectors on servo amplifiers are USB-mini B (socket)-type.
- ✔ When connecting multiple axes, connect them through USB-hub.

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3. Basic operation

3.1 Starting up Setup S/W

You can start up Setup S/W in the two ways below.

(1) Starting up through Start menu.
(2) Starting up from the shortcut.

The following Start up window appears and then Main menu window is displayed when starting up in either way above.

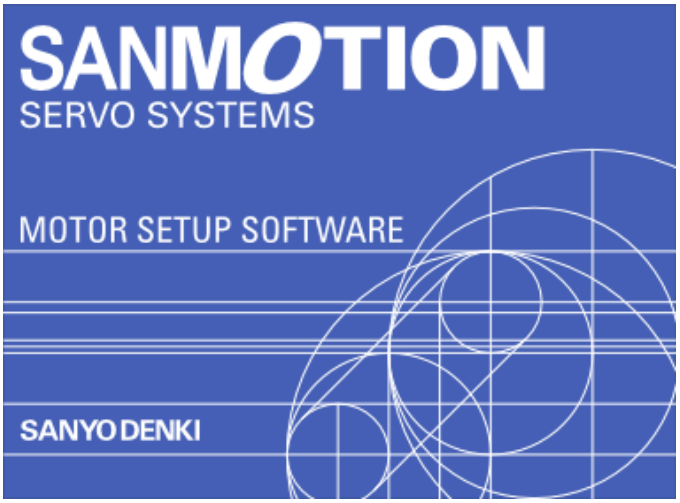


Figure 3-1 Start up screen

1) Starting up from the start menu

(1) Click “Start” on the taskbar.
(2) Click the following in the following order:
“All programs”→”SANYODENKI”→”SANMOTION Motor Setup”

2) Starting up from the short cut icon

Double click on the shortcut icon of Setup S/W on the desktop to start up.

Figure 3-2 Displayed icon

3.2 Communication with servo amplifiers

1) Setting for communication

(1) Start up the window for setting communication.

Set the settings necessary for communicating to servo amplifiers via Communication setting window. The communication setting window is displayed after starting up Setup S/W. When not displayed, start up "Communication setting" from "Communication" on the menu bar or click on the communication setting icon on the toolbar.

(2) Select a communication specification.

Select USB-tab or COM (RS-232C) depending on the specifications of servo amplifier/drivers to be connected.

(3) Allocate each axis.

< When selecting USB-communication>

The servo amplifier/drivers currently recognized as being connected are shown in the line marked (B).

Select the devices you want to connect and then click "Add axis" button. Click "USB Auto allocate" button to allocate all the devices recognized as being connected. The allocated amplifiers are added to the list of axis allocation.

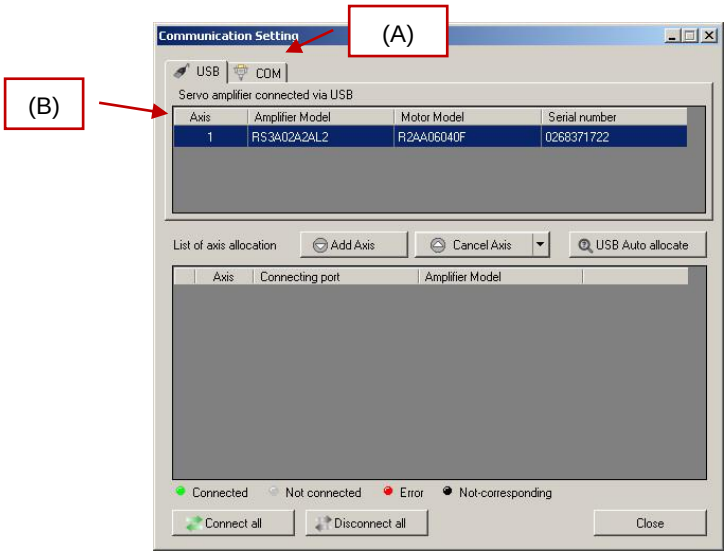


Figure 3-3 Communication setting window (USB-communication)

<When selecting COM-communication (RS-232C)>

Select COM Port number, Axis number, and Baud Rate, and then click "Add axis" button. Then the axis you want to allocate is added to the list of axis allocation with the setting reflected. Clicking "COM Auto allocate" button automatically changes allocation as well as automatically switches Baud Rate and axis number, and then start searching devices which connect to.

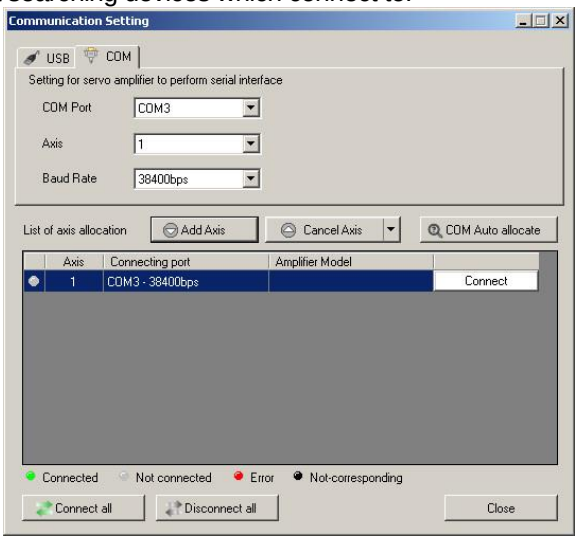


Figure 3-4 Communication setting window (COM-communication)

✓ The communication setting conditions registered into project should be the initial value as the PC automatically reads in the previously created project when starting Setup S/W.

2) Establishing communication

Start the communication with servo amplifiers in the following procedure:

(1) Start through Communication setting window

- ◆ Click on “Connect (C)” button on the right side of each axis to start communication.
- ◆ Click on “Connect all (D)” (in the left corner of the window below) to start communication with the axes applied.

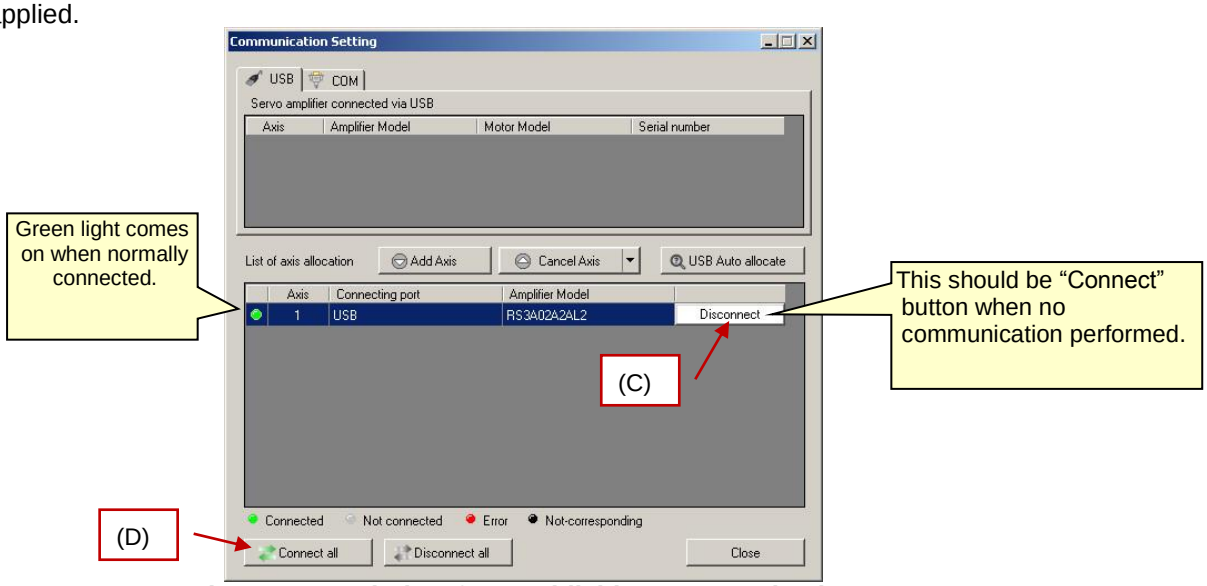


Figure 3-5 Window for establishing communication

✓ When the communication has been normally started, the light comes on in green and display the model number of the amplifier.

(2) Establishing communication through Main menu window

- ◆ Click “Establish communication” through “Communication” on the Main menu, or click on the icon for establishing communication on the Toolbar to start communication for all the allocated axes.
- ◆ Double click on the image for each device on the Main menu to start communication only for the applicable axes.

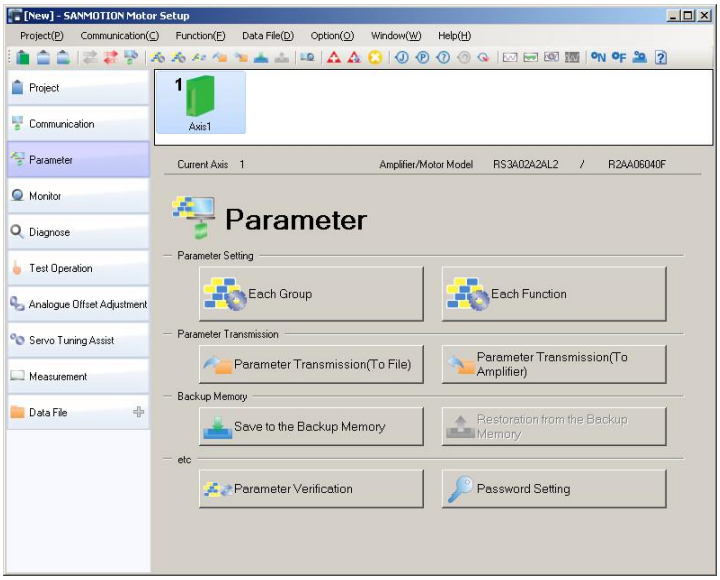


Figure 3-6 Project window when communication being established

✓ When communication established properly, the device color changes form gray to green.

3) Releasing communication

Shut down communication with servo amplifier (s) in the following procedure:

(1) Shut down through Communication setting window

- ◆ Click on “Disconnect” button on the right side of each axis to shut down the communication with the servo amplifiers you selected.
- ◆ Click “Disconnect all” button in the left corner of the window to end the communication with all the servo amplifiers.

(2) Shut down through Main menu window

- ◆ Click “Release communication” through “Communication” on the Main menu, or click on the icon for releasing communication on the Toolbar to end communication for all the allocated axes.
- ◆ Double click on the image for each device on the Main menu to release communication only for the applicable axes.

✓ Once communication normally shut down, the device color changes from green to gray .

3.3 Basic screen operation

The Main window of Setup S/W consists of Side menu, Axis-selector, Functional panel.

1) Main window

You can launch the execution windows for each function through Menu(A) in Main window, Toolbar(B), or each function name displayed in the Project window(C).

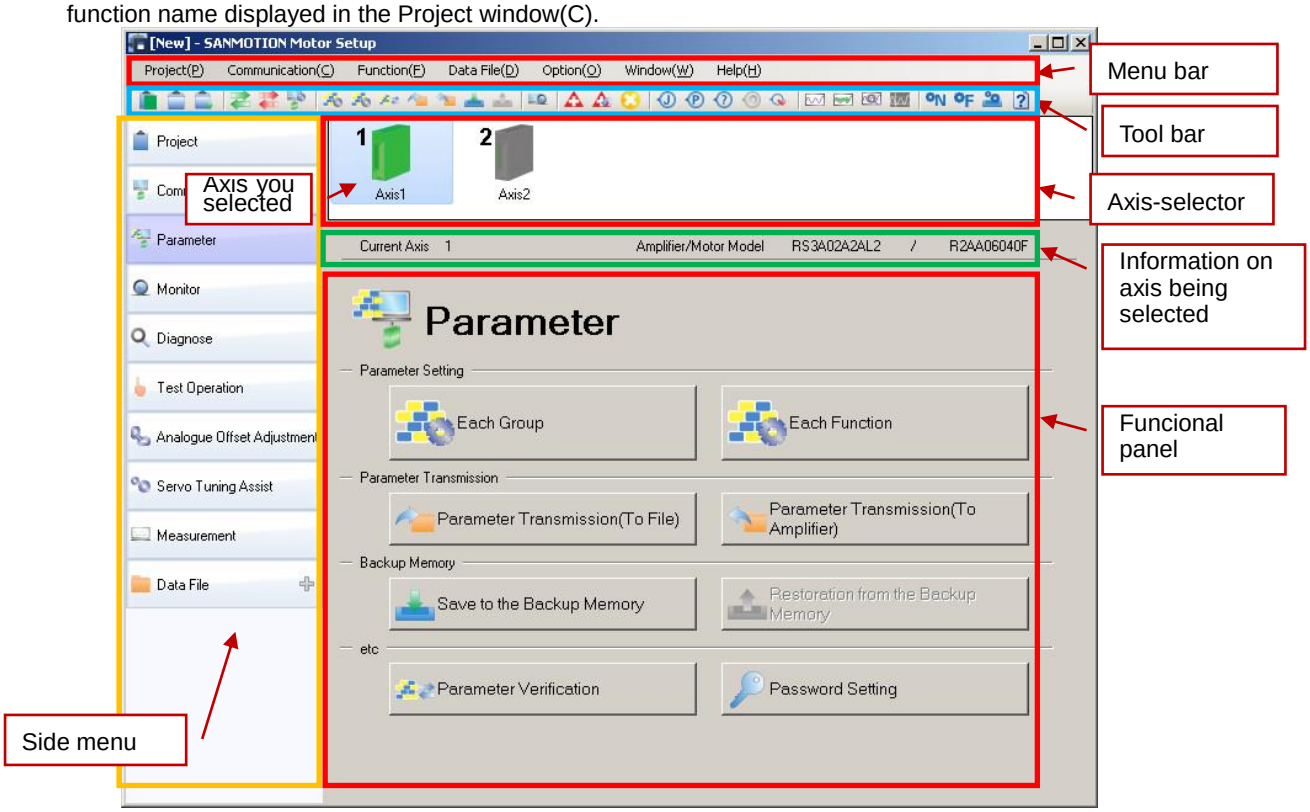


Figure 3-7 Main window (when the communication established)

(A)	Menu bar	:	Selects and execute various settings and functions.
(B)	Tool bar	:	Selects and execute various functions.
(C)	Side menu	:	Shows overview of functions. Selecting this displays various functions in Functional panel.
(D)	Axis-selector	:	Shows the states of being connected of the axes allocated and the axes you are selecting.
(E)	Info on axis being selected	:	Shows the information on the selected axis (amplifier and motor model numbers)
(F)	Functional panel	:	Shows the various functions selected in Side menu.

2) How to start up the window for functions

You can select the following 3 methods to execute various functions.

(1) Staring up through Menu bar

- Select various functions from [Function (F)] in the menu bar in Main menu window.
- Select each function from general categories by function.

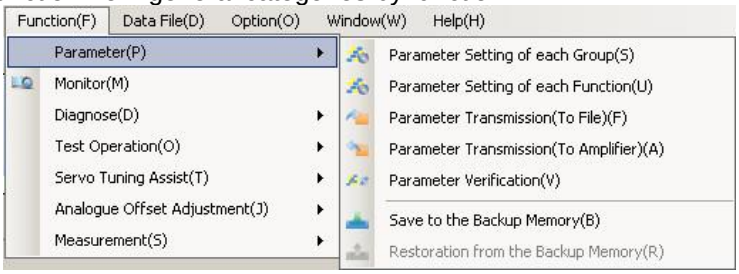


Figure 3-8 Start up window through Menu bar

(2) Starting up form Tool bar

- Directly select each function from the Toolbar in Main menu.
- Not all the functions are allocated.

Figure 3-9 Starting up Function window

(3) Starting up through Sub menu window

- Clicking Sub menu window listed in the left of Main window displays the buttons with which you can access to various functions related to. Click the functional button you want to execute.

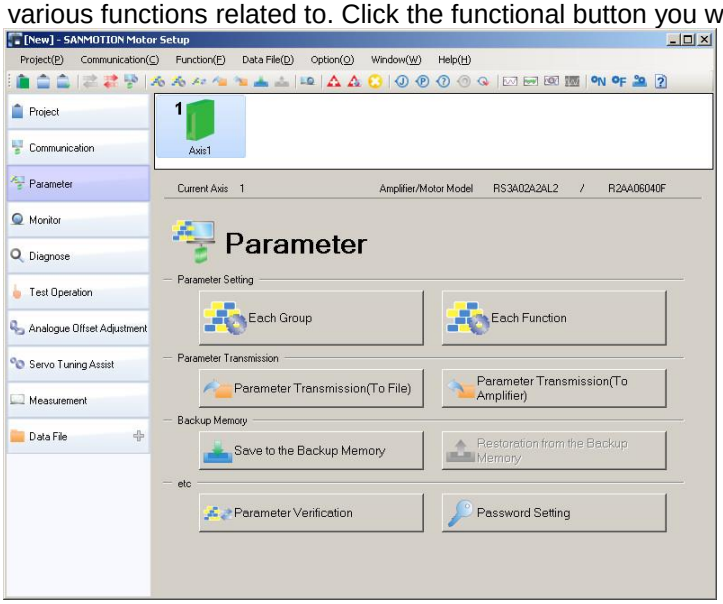


Figure 3-10 Starting up Function window

3.4 Project

You can control and record (store) axes configurations which are connected and various data files as projects.

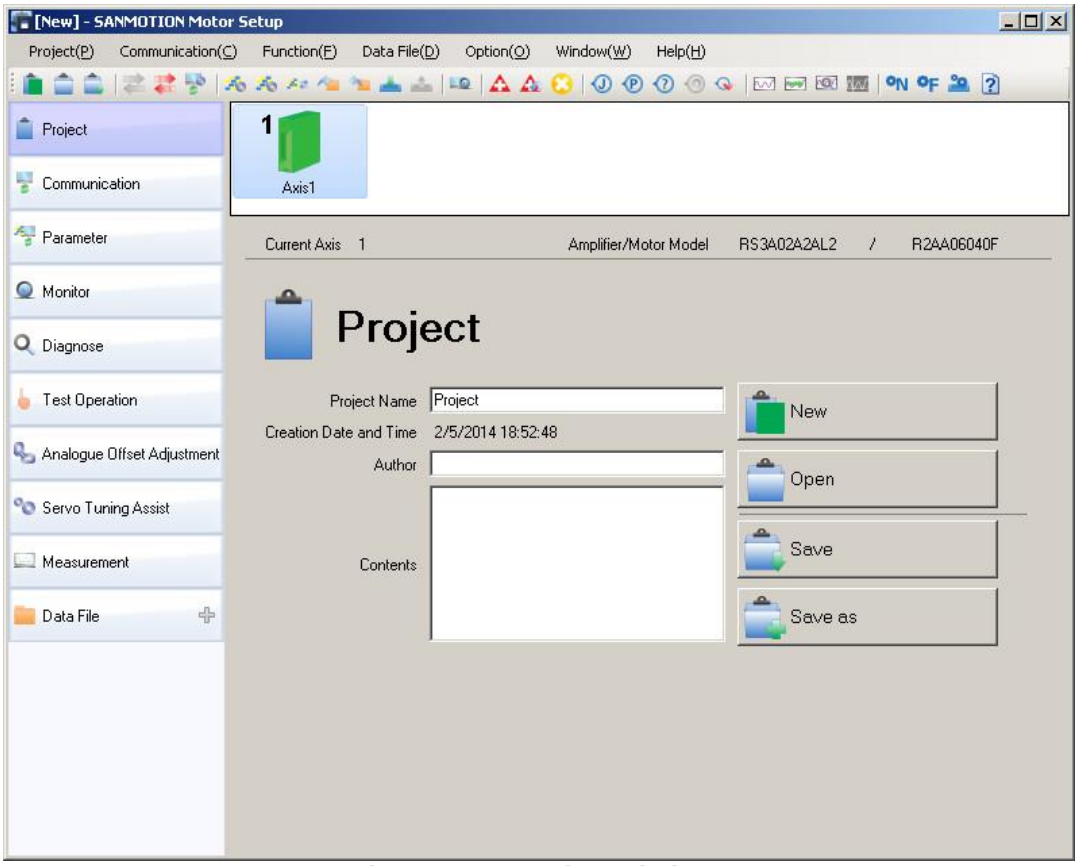


Figure 3-11 Project window

- ✓ You can newly create, open, save, and save as any name a project from this window.
- ✓ Make sure that you need to newly create a project when the type of the servo amplifiers currently connected was changed.

1) Newly creating a project

You need to newly create when initially connecting to servo devices, or connecting the devices other than the ones currently allocated. When you newly create a project, create the project in any of the following procedures.

(1) Select “New (N)” through “Project (P)” from the menu bar in Main menu window.

(2) Select from the Toolbar.

(3) Select “New” through “Project” in Side menu. (Refer to the window above.)

2) Opening an existing project

When you open an existing project, select the project in any of the following procedures:

(1) Select “Open(O)” through “Project(P)” in Main menu window, and then select an existing project file.

(2) Select from the Toolbar.

(3) Select “Open” through “Project “in the Side menu. (Refer to the window above.)

3) Storing projects

When you store projects being opened, store them in any of the following procedures:

(1) Select “Save(S)” through “Project(P)” from the Menu bar in Main menu window to overwrite existing project files. Or select “Save As(A)” to save files with new project names.

(2) Select from Toolbar.(Overwrite-save only)

(3) Select “Save as” or “Save” through “Project” from Side menu. (Refer to the window above.)

4) Settings for a project

You can input various information on a project other its project name.

(1) Set the name, creator, and contents of a project.

(2) You can directly input the name, creator, and contents of a project by selecting “Project” from Side menu.

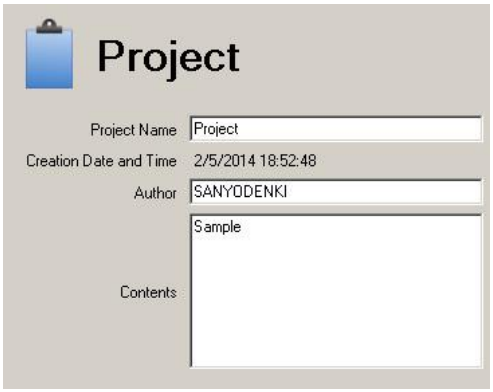


Figure 3-12 Project information setting window (an excerpt)

<Axis property>

(1) Set the name of axis. At the same time you can confirm the software version of applicable servo amplifiers.

(2) Select the axis you want to display from Axis-selector in Main window, and then right-click to open Property window, and then select

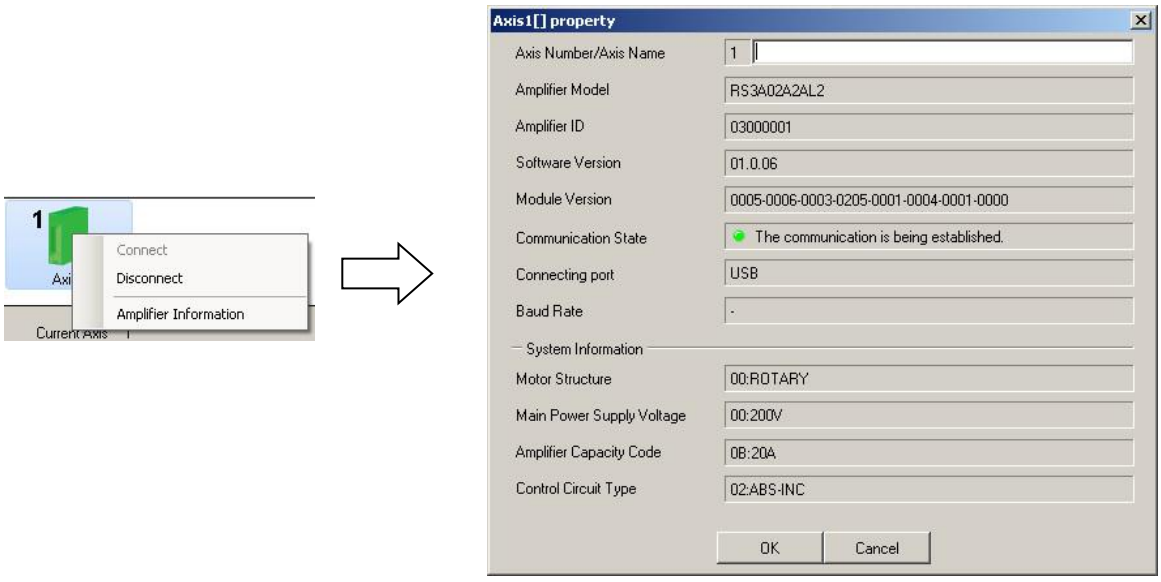


Figure 3-13 Axis property window

✓ You can check the following information: servo device model numbers, amplifier IDs, software version, module version, and communication state.

5) Adding data files to a project

You can register the data files of operation trace, system analysis, and operation scrolling.

(1) To register data files to a project, select “Add to project” through “files” from the menu bar in various functional window with the data files you want to register opened.

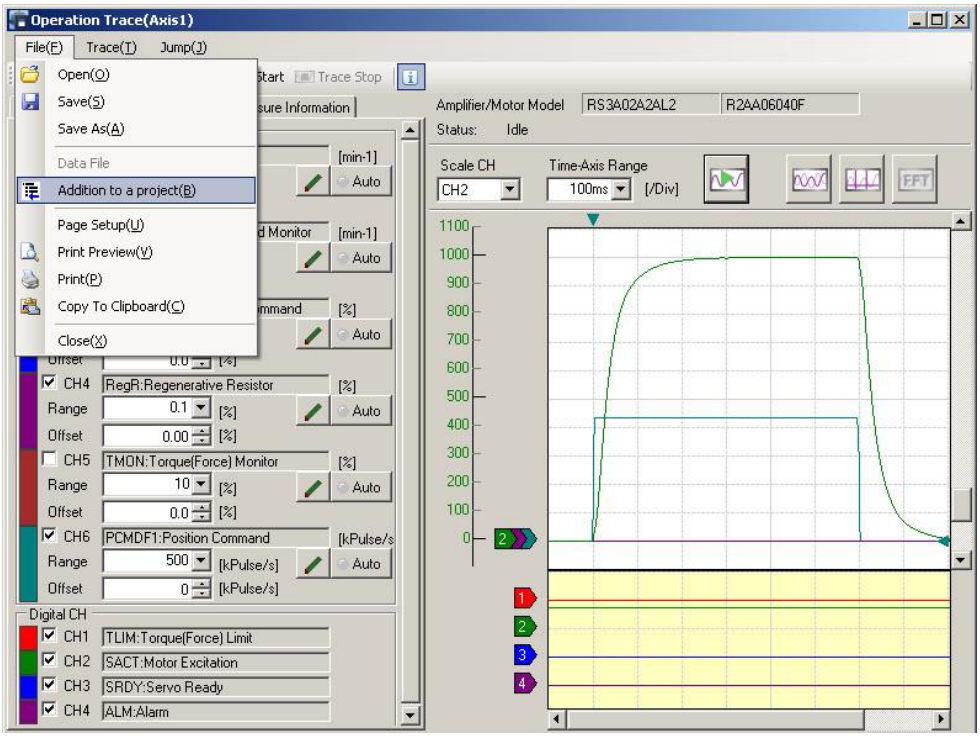


Figure 3-14 “Add to project” menu in Operation trace window

(2) Registered data files are automatically saved with the name consisting of “date+serial number” and displayed in the data file window per function in Side menu.

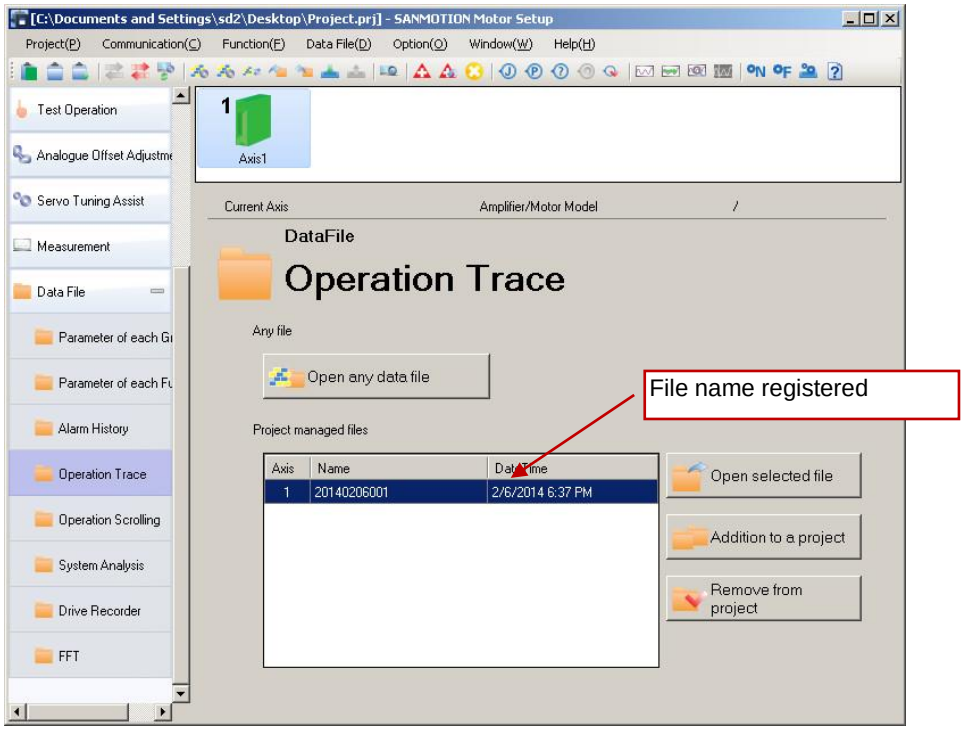


Figure 3-15 Data file registered in a project (e.g.Operation trace)

- ✓ The data files registered in a project are stored in sub-folder under the folder in which project files stored.
- ✓ You can store each data file without registering in a project.
- ✓ You can change data file names later.

6) Reading out data files

Double clicking data file names displayed in Project window reads out (displays) the files you saved.

- ✓ Clicking Toolbar icon  in Main window saves the information on the project you set and data files you registered.

3.5 Option settings

You can set behaviors of applications via option settings. Select “Option” from the toolbar in the Main menu window.

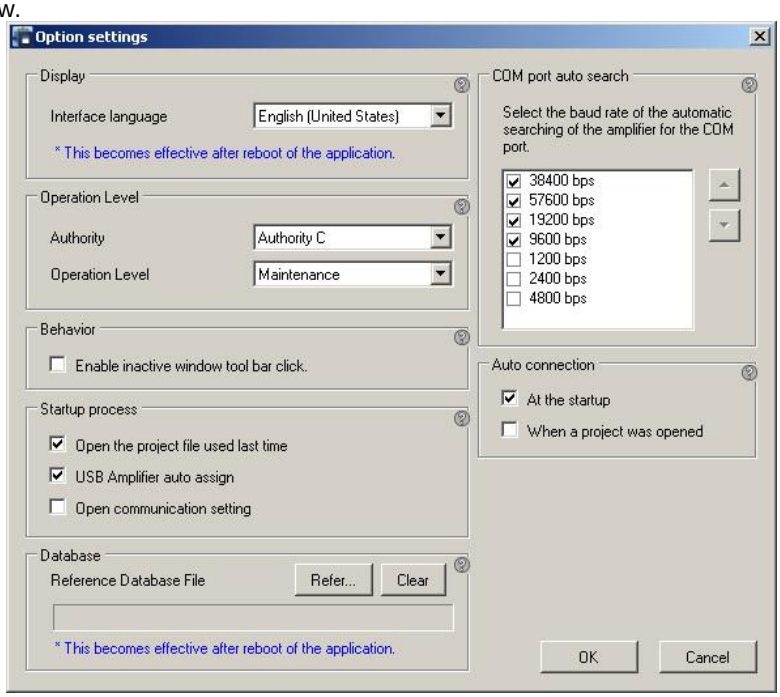


Figure 3-16 Option setting window

1) Display language

You can select the language you use for your system from drop-down list. This becomes valid by re-starting up the application after setting.

2) Classifying operation

You can set operation permission (authorization) level and operation level.

Setting operation level limits the parameters to be edited. There are two types of operation level, “Basic” and “Advanced”.

- ✓ Basic: This can edit only basic level parameters for servo amplifiers.
- ✓ Advanced: This can edit all the parameters for servo amplifiers.
- ✓ “Authority B” and “Authority C” are for maintenance by SANYODENKI.

3) Setting behaviors

- ✓ Checking “Enable inactive toolbar click”, you can click the toolbar in inactive windows with the windows being inactive.

4) Processing at start-up

- ✓ With “Open the project file used last time” checked, the application starts up and opens the project file you previously used.
- ✓ With “USB Amplifier auto assign” checked, the application starts up and automatically allocates the servo devices connected to the PC via USB
- ✓ With “Open communication setting” checked, the application starts up and always opens the communication setting window.

5) Database

- ✓ You can select servo device database file to reference from arbitrary folders. With clear button pressed, or when the destination to reference has not set, it references the database file in the default installation folder. The changes in setting are reflected when the application starts up next time.

6) COM-port auto search

- ✓ You can select the corresponding baudrate to auto-search servo amplifiers connected to COM-port. Searching is done by switching baudrates checked in the order of the list. To change the order of baudrates to search, click the up and down arrow keys on the right side to change the order of the list.

7) Auto connection

- ✓ You can designate the behavior when the application starts up. With “When stating up” checked, the application starts up and tries to auto-connect to the amplifiers being connected. With “When reading in project files” checked, the application tries to auto-connect with the axes allocated as projects when downloading project files.

3.6 Operation manual

Selecting “Operation manual(M)” through “Help(H)” from the Toolbar in Main window, you can open the operating manual for Setup S/W. Refer to this if you have a question or a problem in operating.

- ✓ The instruction manual for Setup S/W covers the same contents.

3.7 Version information

Selecting “Version Information(V)” through “Help(H)” form the Toolbar in Main window, you can confirm the version, database version, and motor version of Setup S/W.

Figure 3-17 Window indicating version information

- ✓ You can confirm the version of Setup S/W here. To confirm the version of the servo device you connect, select “Amplifier Information” property that is displayed by clicking on the axis you connect.

4. Parameters

4.1 Outline of parameter-editing functions

You can edit parameters for amplifiers, forward files, collate, and backup using Setup S/W.

1) List of functions

You can execute the following parameters using Setup S/W.

No	Functions of parameters	Descriptions
1	Setting by group	Edits various parameters for servo amplifiers.
2	Setting by function	Sets parameters by functions. This only can edit representative parameters.
3	Parameter transmission (Amplifier to file)	Stores parameters for servo amplifiers into files.
4	Parameter transmission (File to amplifier)	Forward parameter-file values to servo amplifiers.
5	Storing parameters in backup memory	Back-ups parameters to backup memory built in servo amplifiers. There may be cases that parameters cannot be backuped depending on amplifier driver types you connect.
6	Restoring parameters from backup memory	Restores parameters for servo amplifiers referring to the values in backup memory. There may be cases that parameters cannot be backuped depending on amplifier driver types you connect.
7	Parameter Verification	Collate parameters between servo amplifier and file/ file and file.
8	Password Setting	Sets passwords to protect parameters form being re-written.
9	Parameter editing authority	Switches authority for parameter edit/browse.
10	Parameter initialization	Initialize parameters to factory setting.

2) Parameter types

There are 3 types of parameters as follows. All these parameters can be changed via windows for setting parameters.

(1) General parameters
The parameters set depending on the intended use such as input-output, various servo gains. These are allocated to group 0 to F.

(2) System parameters
Basic system parameters such as ones by input power supply, encoder connected. These are allocated to group “System parameters”.

(3) Motor parameters
The parameters of motors to be connected.

4.2 Settings by group

Edit parameters for servo amplifiers by group.

4.2.1 Parameter settings by group

1) How to start up Window for setting parameters by group

You can start Window for setting parameters in any of the following procedures after selecting amplifiers you want to select through axis-selector.

(1) Select “Parameter Setting of each Group(S)” through “Function(F) - Parameter(P)” from the menu bar in the Main window.

(2) Click the icon for Parameter Setting of each Group in the Toolbar in Main window.

(3) Click “Each Group” after selecting “Parameter” you want to set through Side menu.

After starting up, the window for setting by group is displayed as follows:

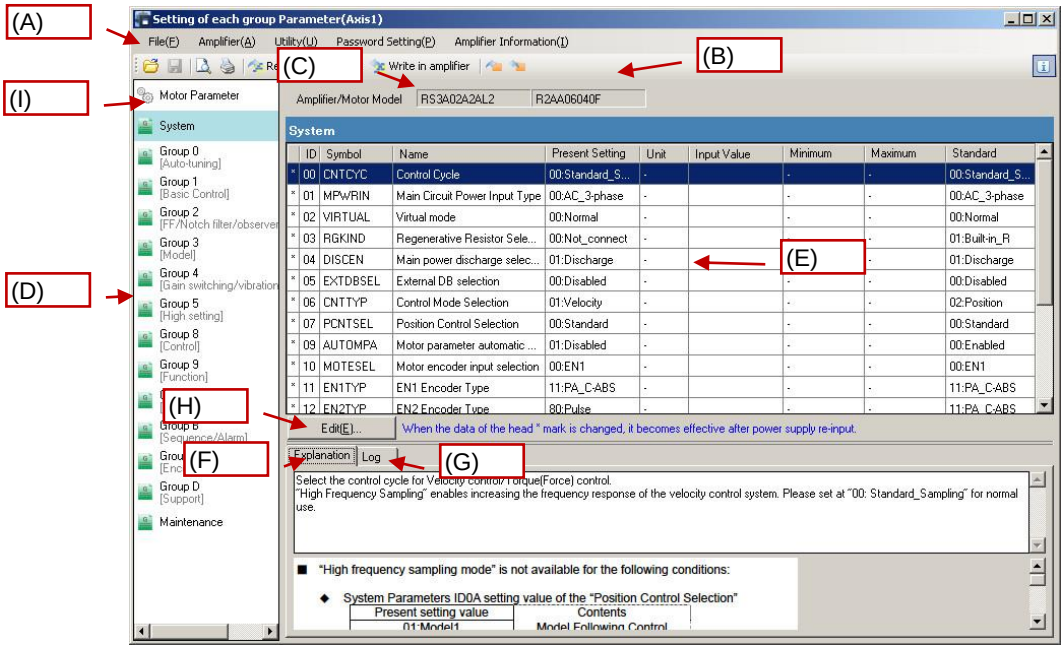


Figure4-1 Parameters: Window for settings by group

(A)	Menu bar	:	Selects functions to execute
(B)	Toolbar	:	Selects respective functions to execute
(C)	Amplifier/motor model No.	:	Shows the servo device and servo motor model numbers being connected
(D)	Group	:	Shows parameter group numbers and names
(E)	List of parameters	:	Shows parameters of the group you selected
(F)	Explanation tab	:	Shows the explanations of parameters being selected
(G)	Log tab	:	Shows the history of parameters changed
(H)	Edit button	:	Button for starting up the window for editing general and system parameters.
(I)	Motor parameters	:	Start up this function when you want to change the motor parameters already set.

2) How to set general and system parameters

The following shows how to set general and system parameters.

(1) Click the group to which the parameter you want to change is allocated to select.

(2) Double click it to open the parameter-editing window.

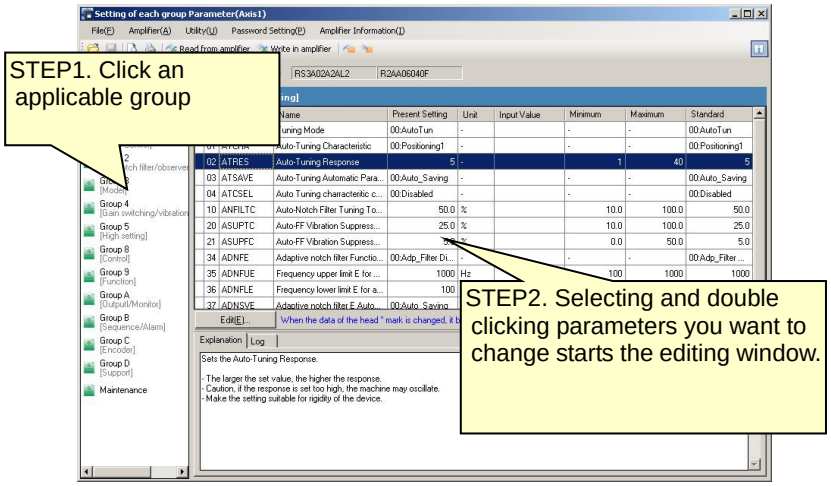


Figure 4-2 Window indicating list of parameters

(3) Input the set values in the text box for input (or select the set value from the list box), and then click “OK” button or Enterkey to confirm the value.

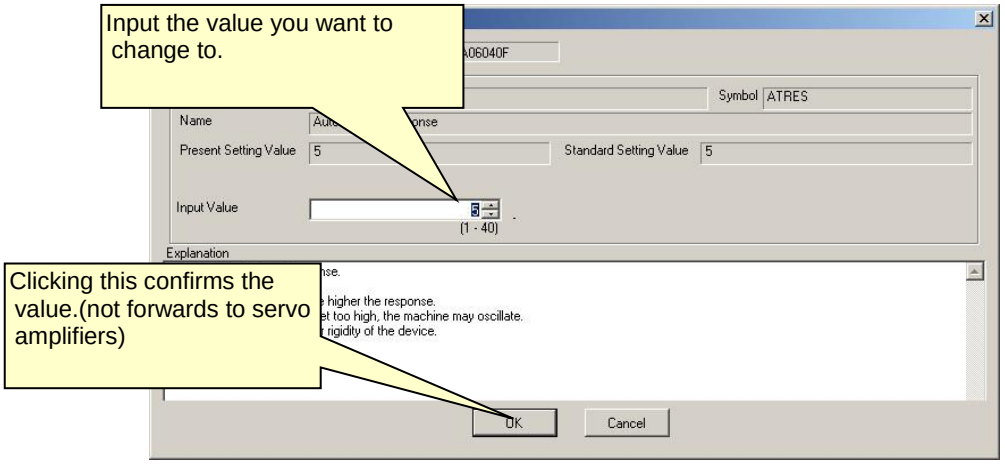


Figure 4-3 Window for editing parameters

(4) Repeat the process (1) to (3) above for the parameters you want to change.

(5) The changed values are shown in Input column of list of parameters. Confirm them and click “Write in amplifier” button to forward them.

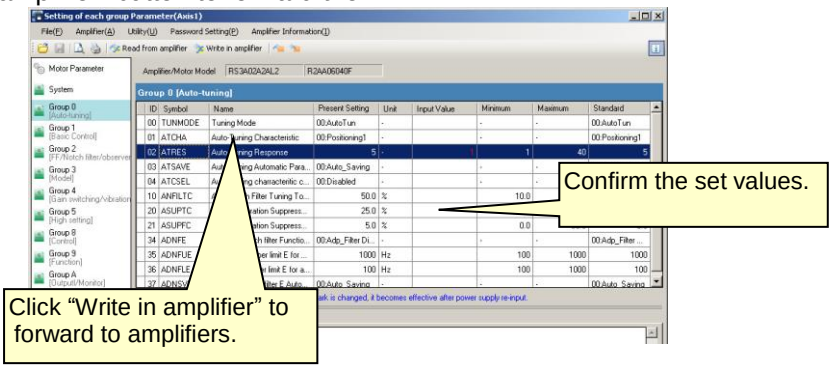


Figure 4-4 Window for displaying list of parameters (after changed)

✓ The parameters you changed are displayed as a log.

3) How to set motor parameters

Motor parameters can be automatically set based on the information from a motor encoder, when connecting motors mounting an absolute encoder in them. (This is limited by servo amplifier types.) The following describe how to automatically and manually set motor parameters.

- ✓ Whether or not motor parameters can be automatically set is depending on the specifications for amplifier and motor. There are cases auto-setting is not available.

(A) When automatically setting motors

(1) Click “Automatic Setup (Recommendation)” button in the window for setting parameters.

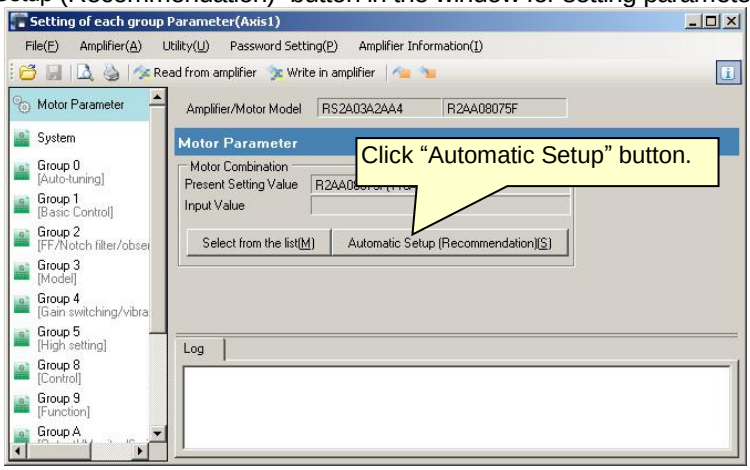


Figure 4-5 Window showing list of parameters (to automatically set motors)

(2) You will see confirmation dialog to execute “Motor Automatic Setting” being displayed, then click “OK” button. To stop the execution, click Cancel button.

Figure 4-6 Confirmation dialog to execute Motor Automatic Setting

(3) The following dialog box indicating execution being processed is displayed while executing.

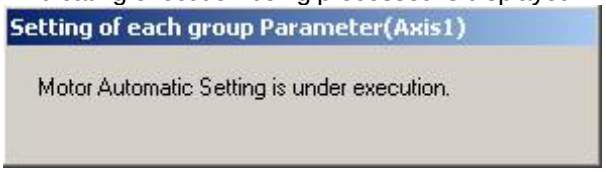


Figure 4-7 Dialog indicating Motor Automatic Setting is being executed

(4) When settings completed, completion window is displayed.
Click”OK” button, and then re-turn on the control power supply of the servo amplifier.

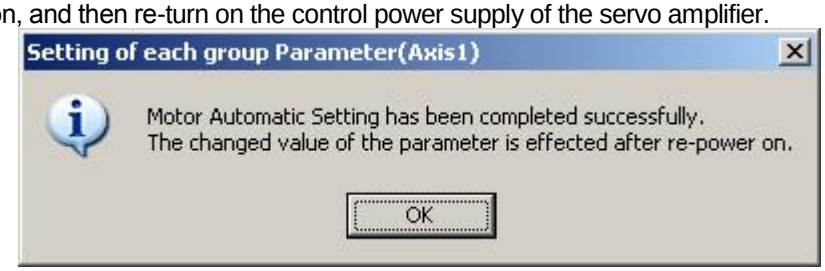


Figure 4-8 Window indicating Motor Automatic Setting has been normally completed

(5) When alarms occur or somehow Motor Automatic Setting is not completed, the following window will indicate as preparation un-completing. Eliminate the cause of not normally being completed and re-execute.

Figure 4-9 Dialog indicating motor automatic setting error

✓ Probable causes for not being automatically set

- An alarm occurred in an amplifier. Or the state is servo-on.
- When the motors not supported are connected.
(When the motors not being shown in the motor selecting window for manual setting are connected.)
- When the motors not corresponding to auto-setting are connected.
- When the combination of amplifiers and motors is not appropriate.
- When encoder clear is being executed.

✓ To enable the motor parameters you changed, re-turn on the control power supply of servo amplifiers.

(B) When manually setting a motor

(1) Click “Select from the list” button in the parameter setting window to start up motor selecting window.

(2) Select motors you connect from the list and click “OK” button or press Enterkey.

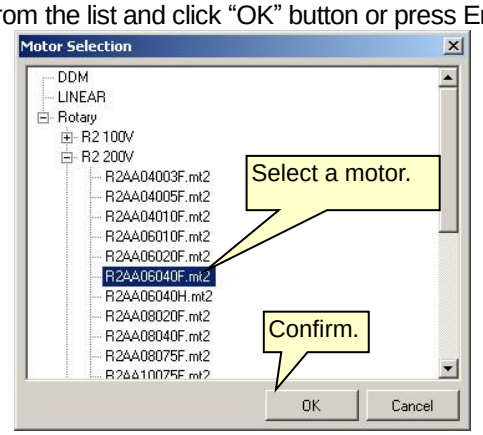


Figure 4-10 Window for selecting motors

(3) Selected motor model numbers are shown in the column for input motor values in parameter setting window. Select the icon Write in amplifier “Write in amplifiers” in the Toolbar to forward the motor parameters you selected to servo amplifiers.

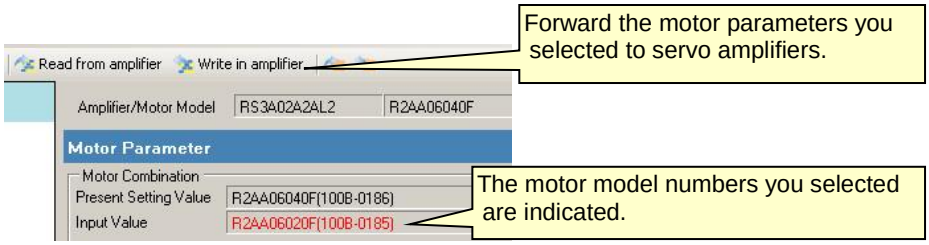


Figure 4-11 Indication of motors connected

✓ When writing into servo amplifiers, the history is indicated in “Parameter change history window”.

✓ Cycle-power the control power supply to enable the motor parameters you changed.

4.2.2 Parameter settings by group (Functional safety module)

1） How to start up Window for setting parameters by group

You can start Window for setting parameters in any of the following procedures after selecting amplifiers you want to select through axis-selector.

(1) Select “Parameter Setting of each Group(S)” through “Function(F) - Parameter(P)” from the menu bar in the Main window.

(2) Click the icon for Parameter Setting of each Group  in the Toolbar in Main window.

(3) Click “Each Group” after selecting “Parameter” you want to set through Side menu.
After starting up, the window for setting by group is displayed as follows:

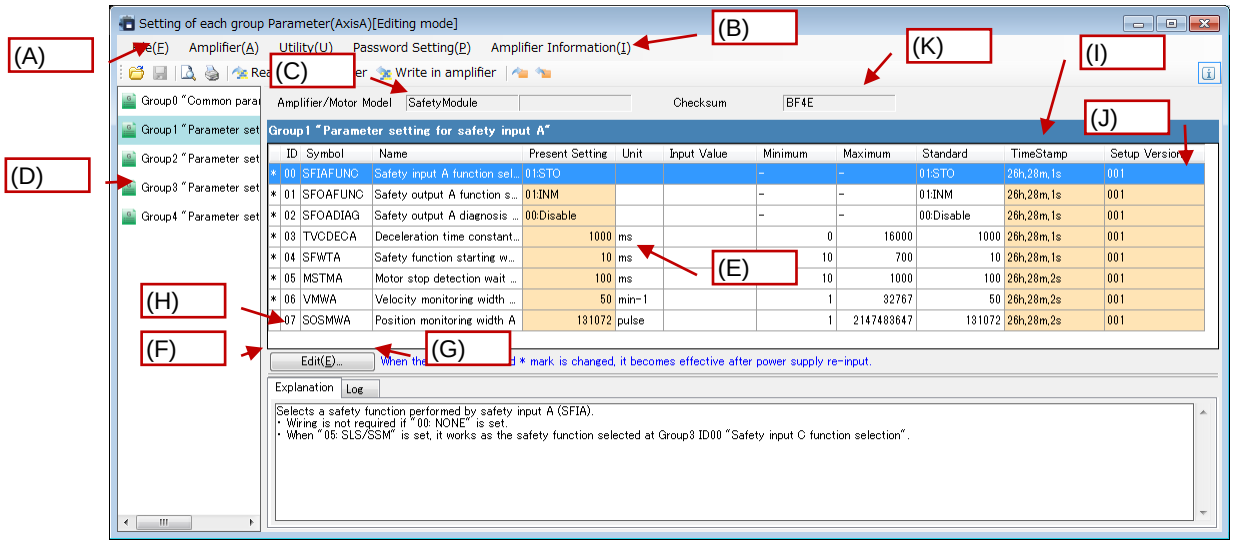


Figure4-12 Parameters: Window for settings by group (Editing mode)

(A)	Menu bar	: Selects functions to execute.
(B)	Toolbar	: Selects respective functions to execute.
(C)	Amplifier/motor model No.	: Shows the servo device model numbers being connected. Servo motor is not shown.
(D)	Group	: Shows parameter group numbers and names.
(E)	List of parameters	: Shows parameters of the group you selected.
(F)	Explanation tab	: Shows the explanations of parameters being selected.
(G)	Log tab	: Shows the history of parameters changed.
(H)	Edit button	: Button for starting up the window for editing general parameters.
(I)	Timestamp	: Shows timestamp of when parameter update.
(J)	Setup Version	: Shows the Setup software version of when parameter update.
(K)	Checksum	: Shows checksum of parameters.

For browsing mode, "Write in amplifier" becomes gray as below and writing is prohibited.

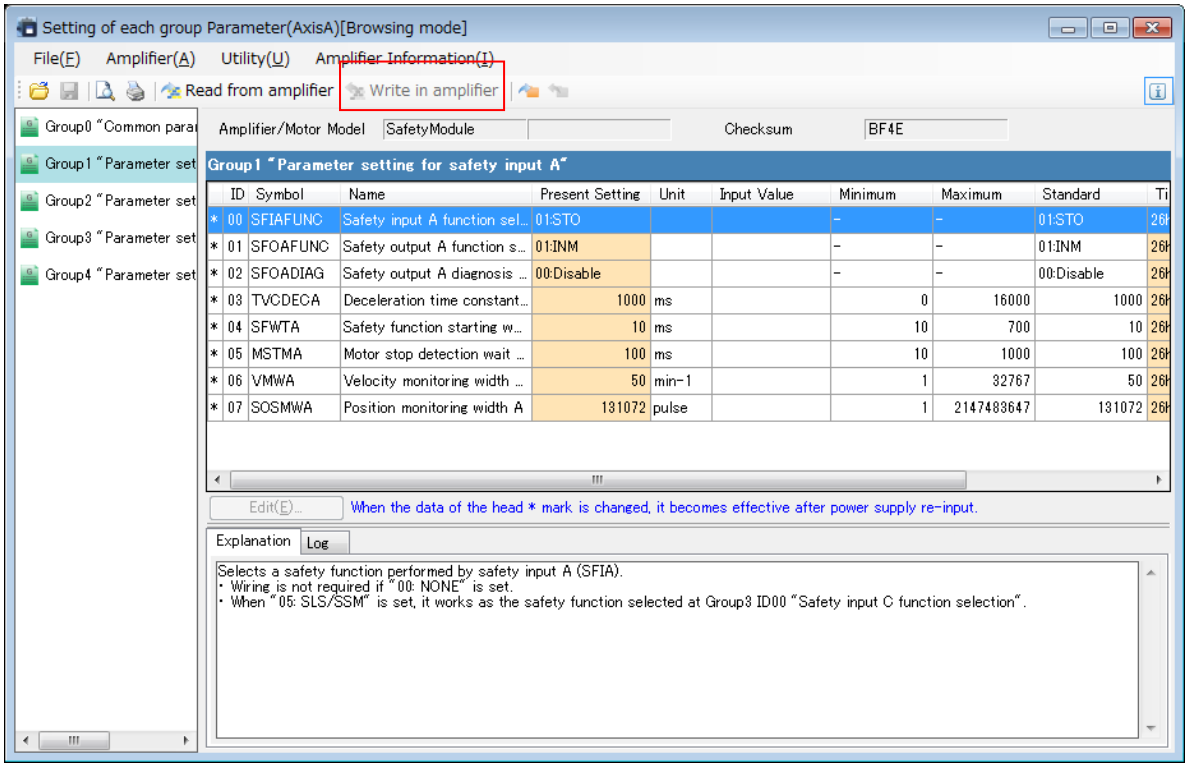


Figure4-13 Parameters: Window for settings by group (Browsing mode)

To perform writing, switch to "editing mode" via the selecting function of parameter editing authority. For detail of the selecting function of parameter editing authority, refer the section "4.10 Parameter editing authority".

2) How to set general parameters

The following shows how to set general parameters.

(1) Click the group to which the parameter you want to change is allocated to select.

(2) Double click it to open the parameter-editing window.

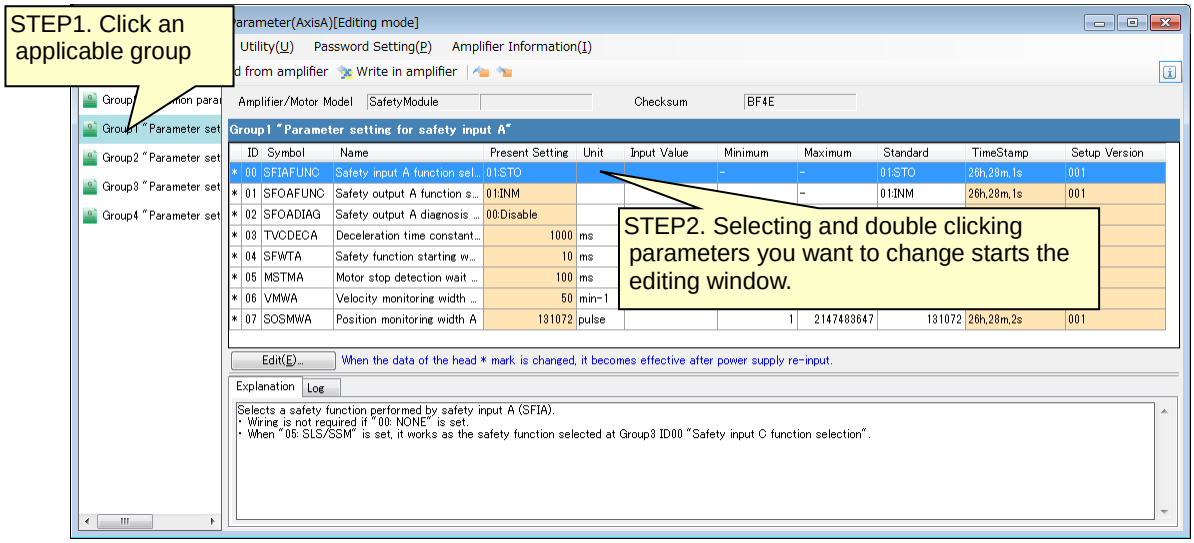


Figure 4-14 Window indicating list of parameters

(3) Input the set values in the text box for input (or select the set value from the list box), and then click “OK” button or Enterkey to confirm the value.

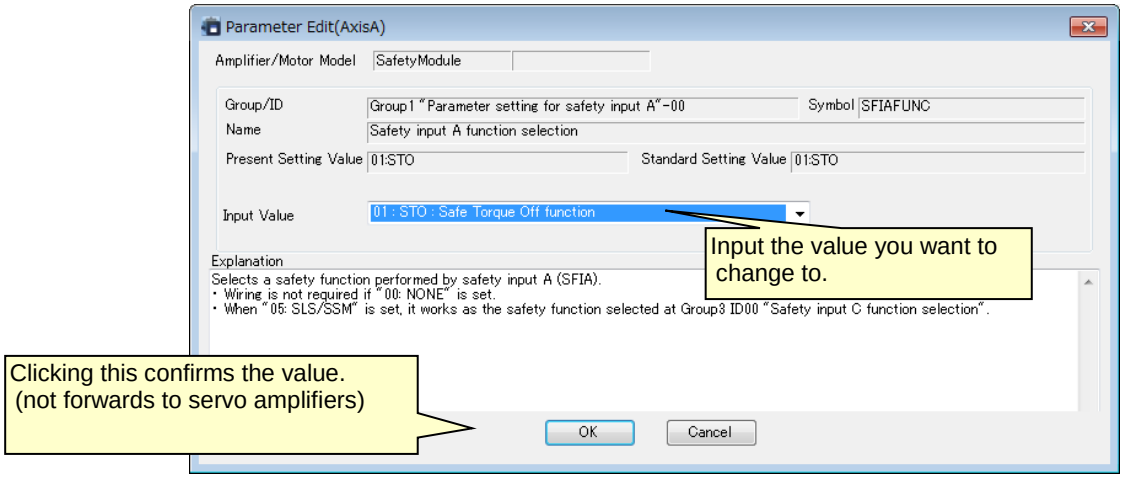


Figure 4-15 Window for editing parameters

(4) Repeat the process (1) to (3) above for the parameters you want to change.

(5) The changed values are shown in Input column of list of parameters. Confirm them and click “Write in amplifier” button to forward them.

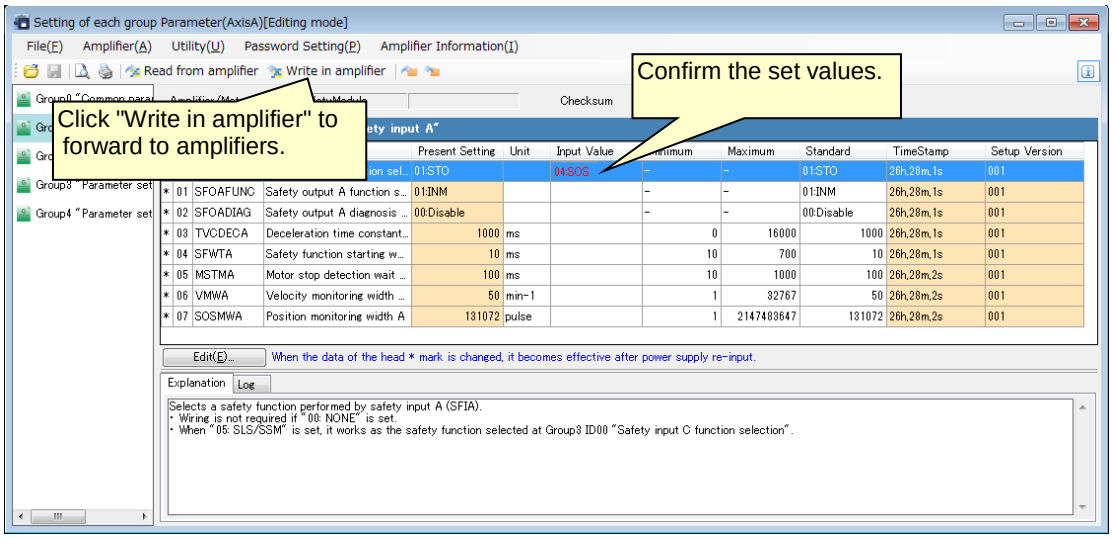


Figure 4-16 Window for displaying list of parameters (after changed)

✔ The parameters you changed are displayed as a log.

(6) Parameter update confirmation window opens so click "OK" button. Parameter will transfer.

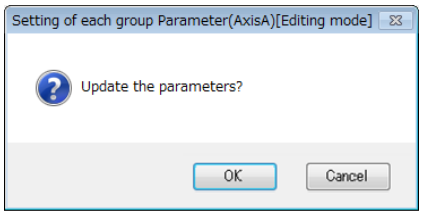


Figure 4-17 Parameter update confirmation window

(7) Parameter update completion window opens after update completion. Click "OK", and perform a control power cycle.

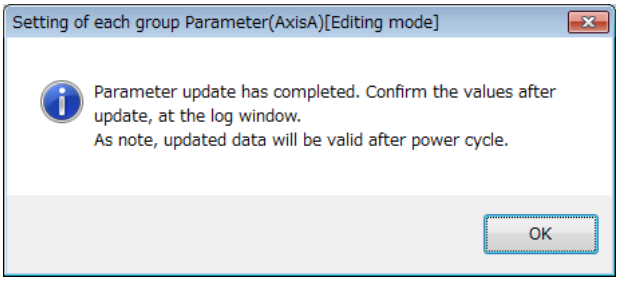


Figure 4-18 Parameter update completion window

✔ After parameter setting, perform a control power cycle, and confirm a changed parameter is correct by starting parameter setting window again. If parameters were set incorrectly, perform parameter setting operation again.

4.3 Settings by function

Edit parameters by function.

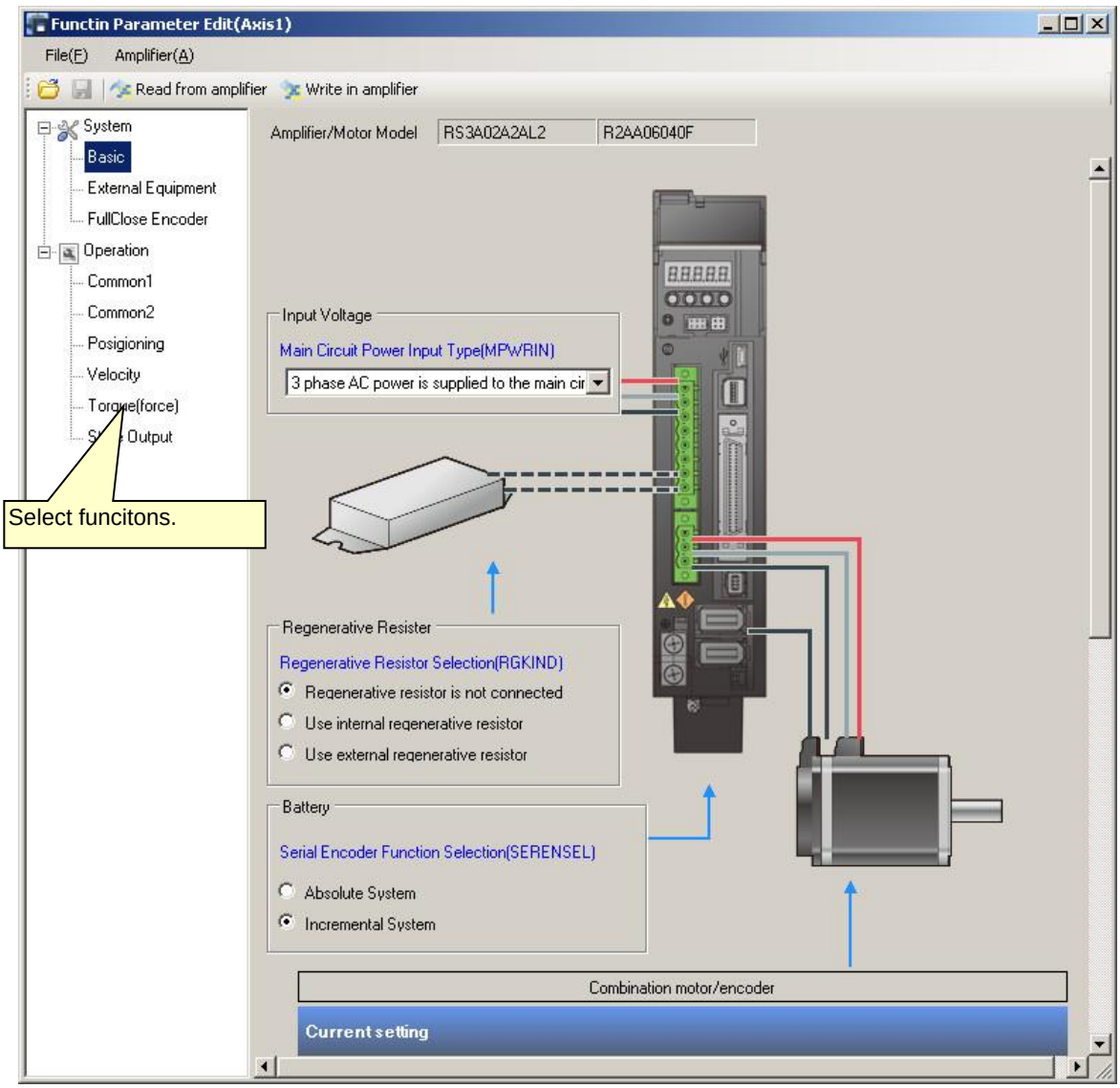


Figure 4-19 Window for setting parameters by function (Basic)

1) How to operate

Functions can fall into “system” and “operation”. Related parameters by function are displayed. Select functions you need from the Function tree view at left side to set parameters.

2) Explanations for window (when connecting external devices)

This section explains actual windows and how to operate/set the windows. The setting window for external device connection and position control is explained here.

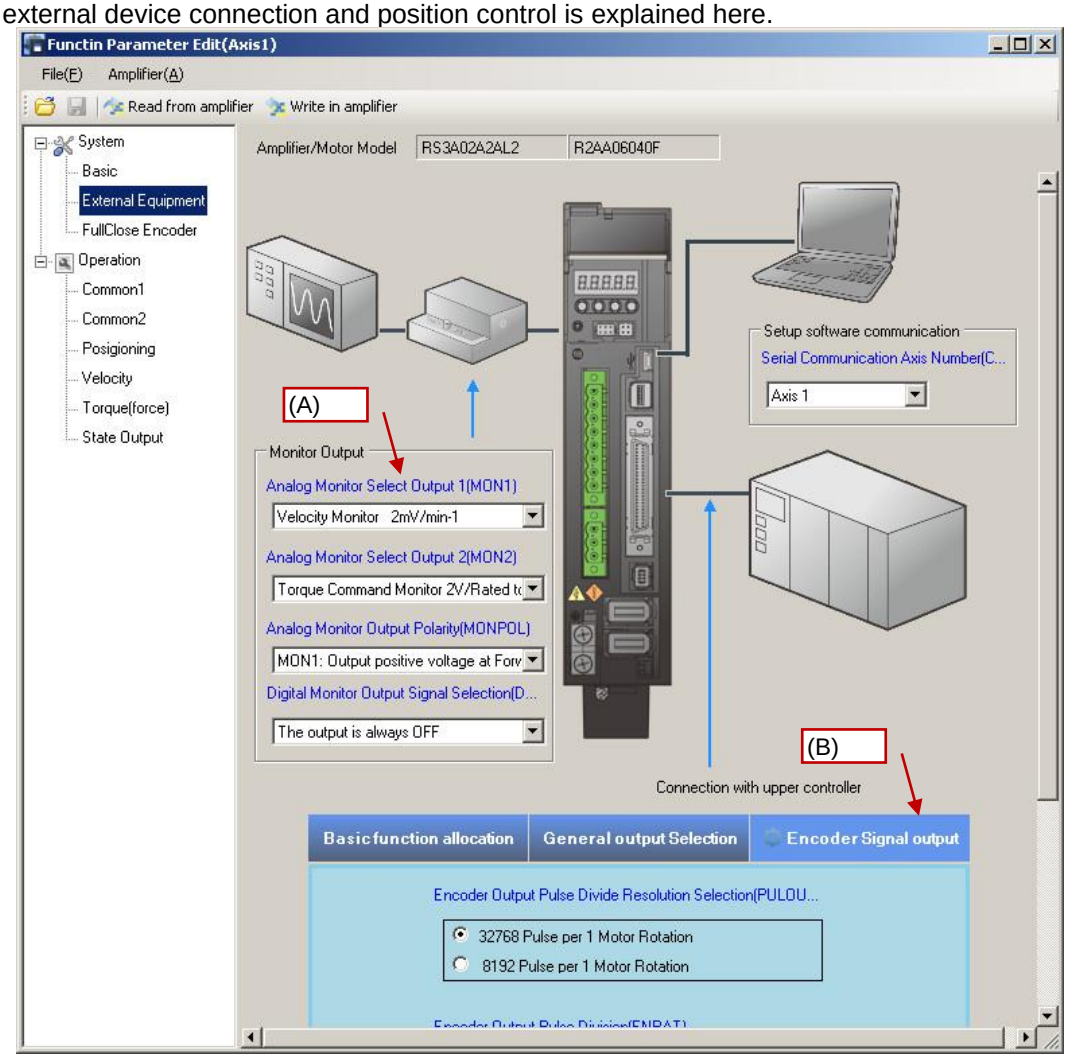


Figure 4-20 Window for setting parameters by function (External Equipment)

(A) Parameter names : shows parameters. Clicking the names displays the explanations for them. Select form drop-down list or input values.

(B) Function switching tab : when each function has multiple parameters, you can set each parameter by switching functions through tabs. Click tabs to switch.

3) Explanations for window (for position control)

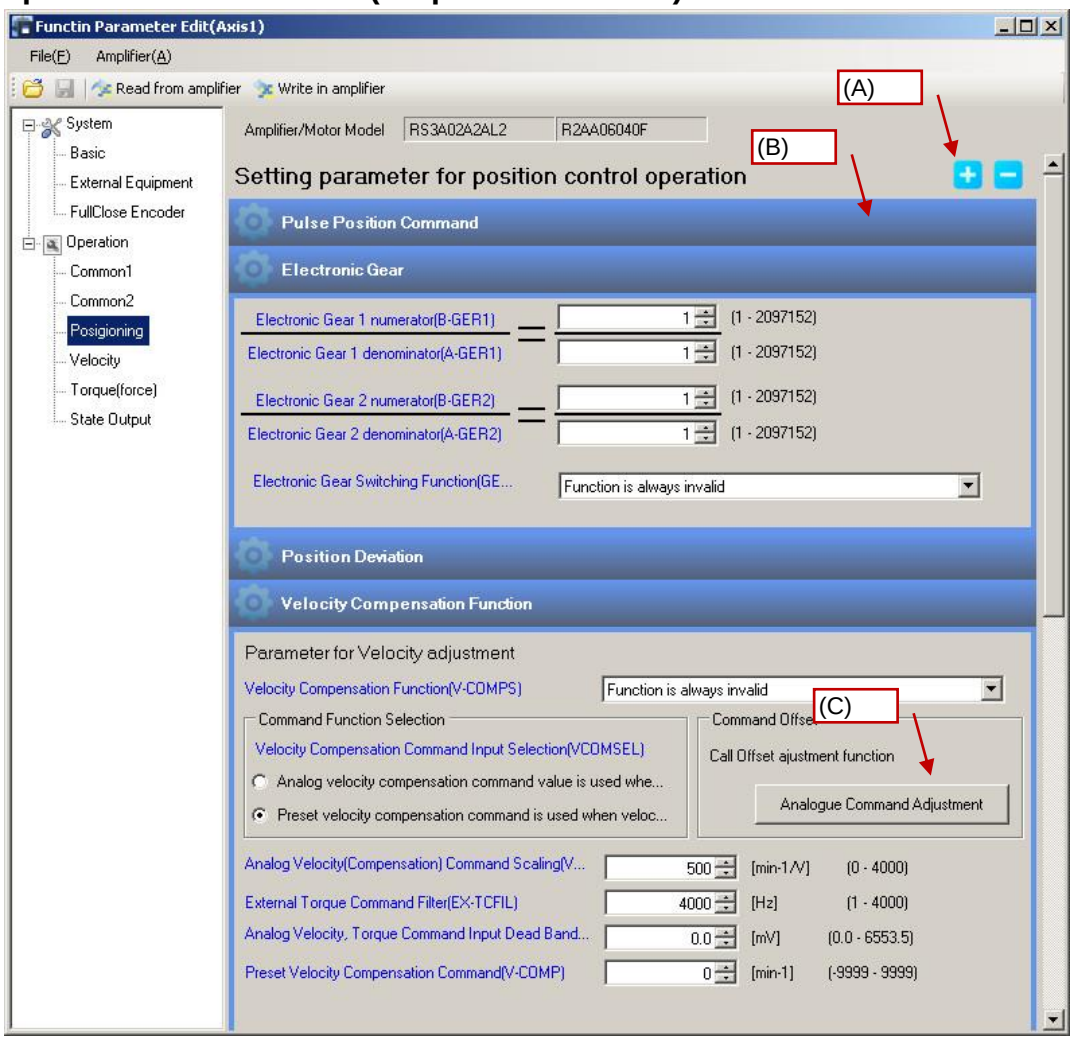


Figure 4-21 Window for setting parameters by function (position control)

(A) Expand/collapse button : designates whether only detailed function names are displayed or all the parameters are displayed with them all expanded. Button marked with “+” expands all the parameters, button marked with "-" displays only functional blocks.

(B) Functional block : Clicking the parts displayed can select whether or not parameters are displayed per function blocks.

(C) Function call button : calls supportive functions displayed.

4.4 Parameter transmission (To file)

You can save the parameters set for servo amplifiers in files. You can confirm parameters for an amplifier and set parameters for the other servo amplifiers without connecting servo amplifiers.

1) How to operate

(1) Executing parameter-forwarding from servo amplifiers to files performs any of the following three types. Select the axes you execute by Axis-selector before executing.

A) Select in the following order of ”Function-Parameter-Parameter transmission (To file) (F)” in the menu bar in the Main window.

B) Click the icon “Parameter transmission (To file)” in the Toolbar in Main window.

C) Select “Parameter transmission (To file)” through “Parameter” from the Side menu.

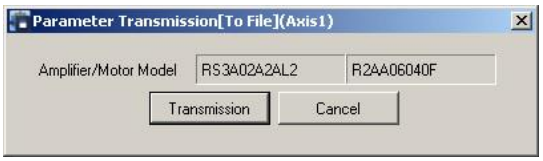


Figure 4-22 Window for executing Parameter transmission [To file]

(2) Clicking “Forward” button in the Parameter transmission (To file) window shows the dialog window ”Save as”. Set the file name to save. The extension name is “*.ap1”. Click “Save” button after setting.

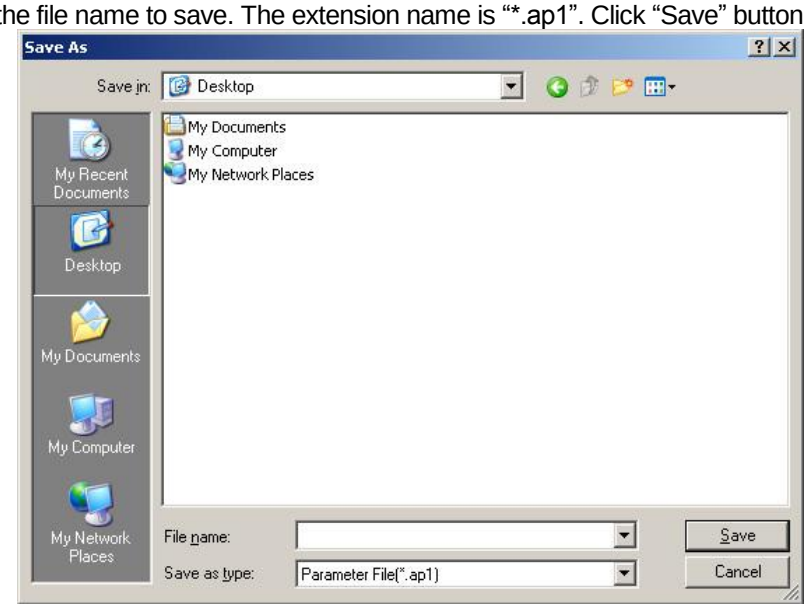


Figure 4-23 Dialog window for saving with name

(3) Wait for a few seconds until the transmission-window is closed.

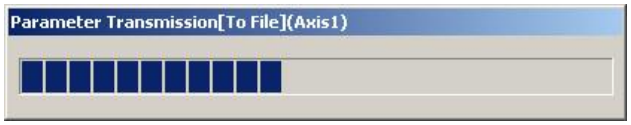


Figure 4-24 Window for indicating being transmitted

(4) The file is created in the designated folder.

4.5 Parameter transmission (To amplifier)

You can forward the parameters saved in files to servo amplifiers. Select the type of parameters you want to forward to forward necessary parameters only.

1) How to operate

(1) Executing parameter-forwarding from servo amplifiers to files performs any of the following three types. Select the axis you execute by Axis-selector before executing.

A) Select in the following order of “Function-Parameter- Parameter transmission (To amplifier) (A)” in the menu bar in the Main window.

B) Click the icon “Parameter transmission (To amplifier)” in the Toolbar in Main window.

C) Select “Parameter transmission (To amplifier)” through “Parameter” from the Side menu.

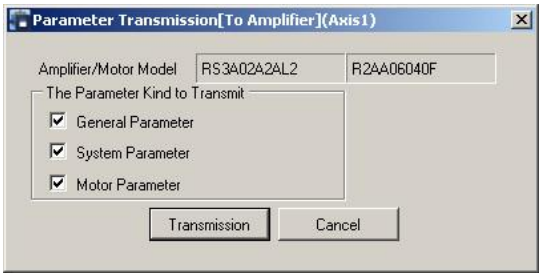


Figure 4-25 Parameter transmission window (To amplifier)

(2) Check the boxes of types of parameters you want to forward in the Parameter transmission window [To amplifier], and click “Transmission” button.

(3) Select the files you forward from “Open” dialog window, and click “Open” button.

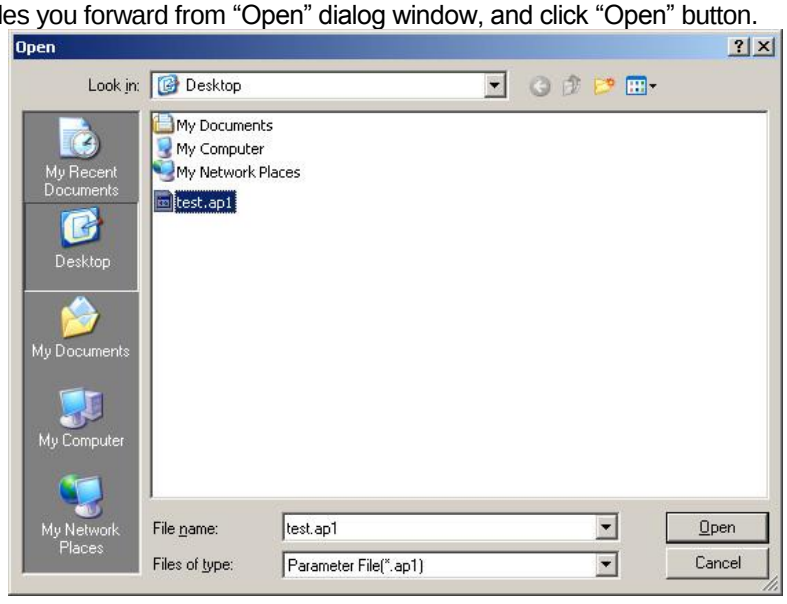


Figure 4-26 Dialog window for opening files

(4) Wait for a few seconds until the transmission-window is closed.

Figure 4-27 Window for indicating being transmitted

(5) When the window indicating being forwarded is closed, the parameter-forward is completed. Re-turn on the control power supply of servo amplifiers as needed.

- ✓ There are the parameters requiring initialization. So it is recommended to once turn off the power supplies of servo amplifiers (drivers).

4.6 Save to the Backup memory

You can store current parameter values of servo amplifiers in the area of backup memory inside of servo amplifiers. Storing parameter setting values in the backup area can restore the parameters any time.

- ✓ The factory setting values are set in the backup memory area at delivery. If you once save values in the backup memory, you cannot restore to the factory setting state. It is recommended to store parameters to files before executing. Refer to Section 4.4 Parameter transmission (To file) for the details of how to store in files.
- ✓ Do not shut down the control power supply of servo amplifiers while saving in the backup memory. If you shut down it in mid-course, make sure to save in the backup memory again.

1) How to operate

(1) You can save in the backup memory in any of the following procedures. Select the applicable axes through Axis-selector before executing.

(A) Select in the following order of in “Function-Parameter-Save to the Backup Memory(B)” in Main window.

(B) Click the icon “Save to the Backup Memory” in the Toolbar in Main window. When the selecting window is displayed, select the axis numbers you execute.

(2) Clicking “OK” button in the window for saving to backup memory starts executing backup.

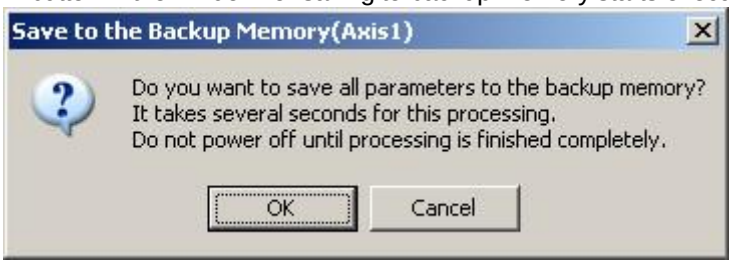


Figure 4-28 Window confirming storing in backup memory being executed

(3) The following dialog window is shown while executing backup. You can confirm the rest of the number of data.

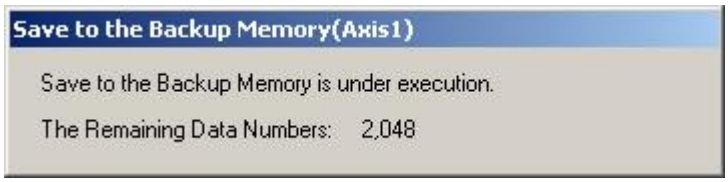


Figure 4-29 Window indicating being stored in backup memory

(4) When backup orderly completed, the following window is shown. Click “OK” button.

Figure 4-30 Window indicating storing in backup memory orderly completed

4.7 Restoration from the Backup Memory

You can restore servo amplifier parameters using backup memory values.

1) How to operate

(1) You can store in the backup memory in any of the following procedures. Select target axes through axis-selector before executing.

(A) Select in the following orders of “Functions-Parameter-Restoration from the Backup Memory (R)” in the menu bar in the Main window.

(B) Click the icon “Restoration from the Backup Memory” in the Toolbar in Main window. After axes selecting window is shown, select the axis numbers you execute.

(2) Clicking “OK” button in the window for Restoration from the Backup Memory starts restoring process by backup memory values.

Figure 4-31 Window confirming to restore from backup memory

(3) The following window is shown while restoring. The rest of the number of data is shown.

Figure 4-32 Window indicating Restoration from the Backup Memory being executed

(4) When restoring is orderly completed, the following window is shown. Click “OK” button.

Figure 4-33 Window indicating Restoration from the Backup Memory completed

- ✓ Do not shut down the control power supply of servo amplifiers while restoring. Make sure to restore from backup memory again when shutting down in mid-course.
- ✓ There are parameters which become enabled after re-turning on the power supply. So make sure to re-turn on the control power supply of servo amplifiers everytime after executing.

4.8 Parameter Verification

This function shows the list of the parameters having difference after collating parameter values between servo amplifiers and parameter files. This function can also copy the parameters having difference to amplifiers or files.

1) How to operate

(1) Start up Parameter Verification window in any of the following procedures.

(A) Select “Parameter Verification” through “Parameter” in Sub menu in Main window.

(B) Click the icon “Parameter Verification” in the Toolbar in Main window. Then axes selecting window is shown, so select the axis numbers to collate parameters.

(2) Window selecting target parameters for comparison is shown. Select the targets to compare. Click “Compare” button after setting.

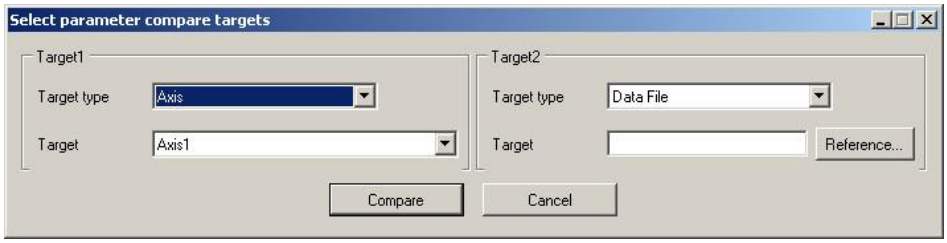


Figure 4-34 Window selecting target parameter for comparison

- ✓ Possible target parameters for comparison are ones of servo amplifiers, drivers, and data files (*.ap1) being connected. You can compare between servo amplifiers or between data files.
- ✓ You cannot compare if the types of amplifiers or data files to be compared are different (amplifier driver series, input power supply, ad motor configuration)

(3) The window indicating Parameter Verification result is shown.

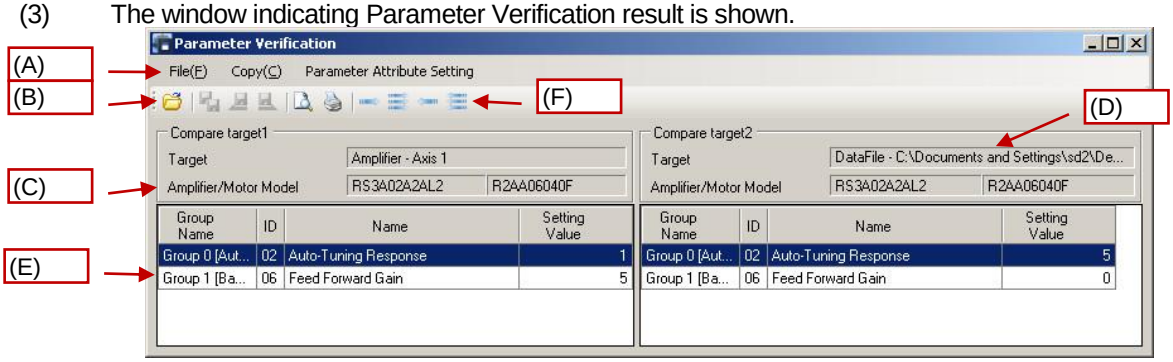


Figure 4-35 Window indicating Parameter Verification result

(A) Menu: Executes various functions by selecting them.
(B) Toolbar: Executes various functions by selecting them.
(C) Information on servo amplifiers: Shows the model numbers of servo amplifiers and servomotors being connected.
(D) Information on files: Shows the model numbers of servo amplifiers and servo motor in the files.
(E) Verification results: Shows parameters having difference after collating. If there is no difference, no information displayed.
(F) Copy button: Copies parameters having difference.

4.9 Password Setting

You can limit functions of servo amplifiers partly by setting a password to servo amplifiers. The parameters of servo amplifiers to which passwords set cannot be changes as well as not partly used unless passwords are canceled. (Refer to Table 3-1.)

Table 3-1 Functions which cannot be used with password set

No	Functions		Descriptions
1	Parameter	Parameter Setting	This cannot edit parameters, can only brose.
		Parameter transmission (To amplifier)	Not available
		Parameter Verification	This cannot copy file values to servo amplifiers.
		Save to the backup memory	Not available
		Restoration from backup memory	Not available
2	Alarm	Displaying alarm history	This cannot clear alarm history, can only browse.
3	Test operation	Serial Encoder Clear	Not available
4	Auto Tuning	Auto Notch Filter Tuning	Not available
		Auto FF Vibration Suppression Frequency Tuning	
		Save Result of Auto Tuning	
5	Adjustment	Offset Adjustment of V-REF/T-REF Terminal	Not available
		Offset Adjustment of T-COMP Terminal	

1) How to set password

(1) Open password setting window in the following procedures.

1 Select “Password Setting” in the Toolbar in the window for setting parameters by group.

2 Select “Password Setting” through “Parameter” from Side menu.

(2) Input new password you set in the text boxes of “New password” and “New password (for a check)”, and then click “OK” button. If the both values do not collate, the password cannot be set.

- ✓ Make sure to set passwords in 4-digit hexadecimal characters (‘0’ to ‘9,’ ‘A’ to ‘F’).
- ✓ Set “0000” to cancel password function.
- ✓ “FFFF” is not available.
- ✓ Re-turn on the control power supply of servo amplifiers to enable new password.

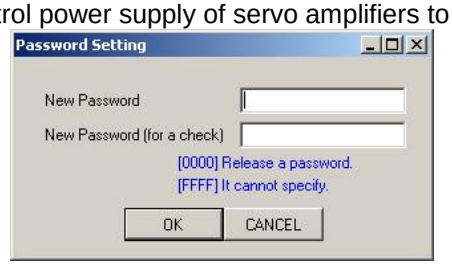


Figure 4-36 Password setting window

- ✓ For functional safety module, selection window of parameter editing authority opens if password setting window is open with state of selecting "browsing mode"of parameter editing authority. To change password, switch to "editing mode" via the selecting function of parameter editing authority. For detail of the selecting function of parameter editing authority, refer the section "4.10 Parameter editing authority".

2) How to collate passwords

Starting up the functions shown in Table 3-1 with a password set shows Password-setting window. If the password is not collated, each function cannot be used.

(1) Input a password into the text box and then click "OK" button.

(2) If the password set for the servo amplifier is collated by the password you input, the function can be executed.

Figure 4-37 Password input window

4.10 Parameter editing authority

You can select an editing authority of functional safety module parameters from "Editing mode" or "Browsing mode".

- ✔ Functional safety module parameters shall be edit by the person in charge which has training against safety standards. And change to "Browsing mode" after edit.
- ✔ Selection function of parameter editing authority, is dedicated to functional safety module.

1) How to operate

(1) Selection window of parameter editing authority starts up by any of the following ways.

A) Select in the following order of "Parameter - Parameter editing authority" in the sub menu in the Main window.

B) Click the icon "Parameter editing authority" in the Toolbar in Main window.

(2) Shows a selection window of the parameter editing authority. The window opens with condition of checked a current selection (with indication of [Current items]).

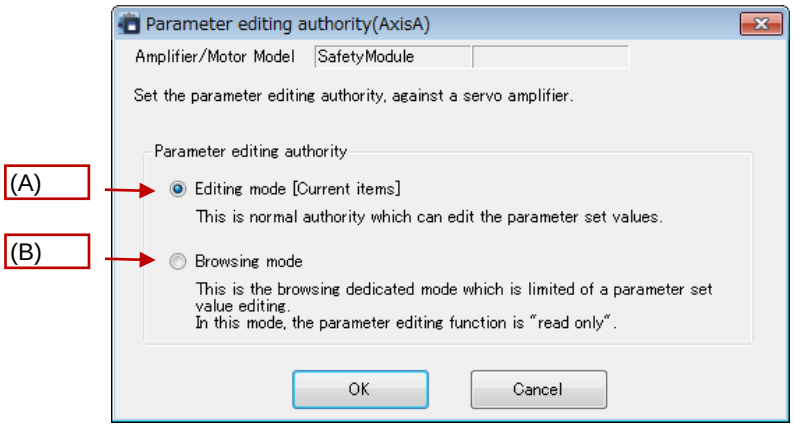


Figure 4-38 Selection window of parameter editing authority (selecting "Editing mode")

(A) "Editing mode" selection button : Selects "Editing mode"
(B) "Browsing mode" selection button : Selects "Browsing mode"

(3) To switch to "Browsing mode" from "Editing mode", click "Browsing mode" selection button and then click "OK" button.

- ✔ If parameter editing authority is changed to "Browsing mode" during editing window of each group, below message is shown. Click "OK". (Editing window of each group is quit forcedly.)

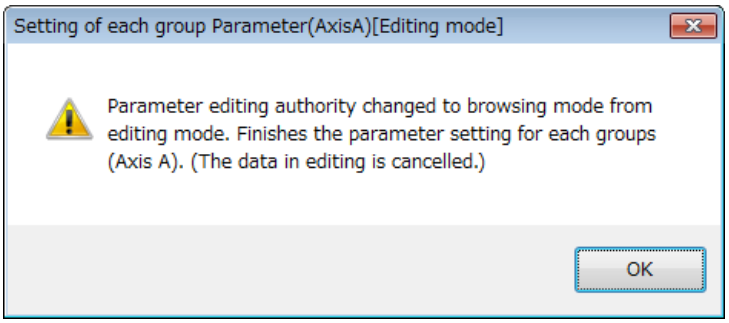


Figure 4-39 Quitting message of setting of each group parameter

(4) To switch to "Editing mode" from "Browsing mode", click "Editing mode" selection button and then click "OK" button.

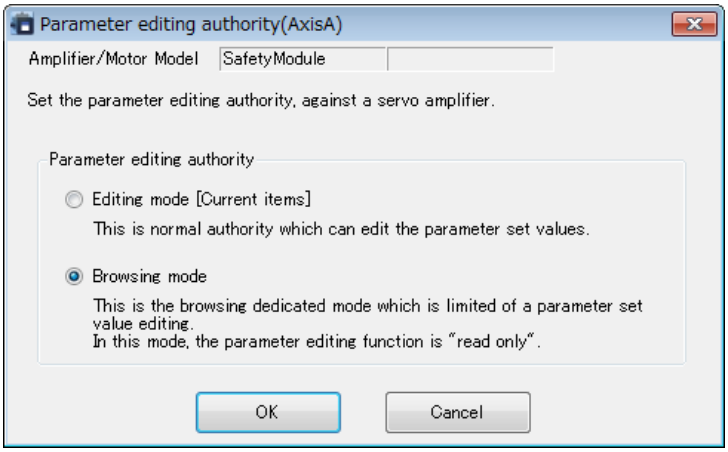


Figure 4-40 Selection window of parameter editing authority (selecting "Browsing mode")

(5) Password input window opens when switching to "Editing mode". Input a password and then click “OK” button.

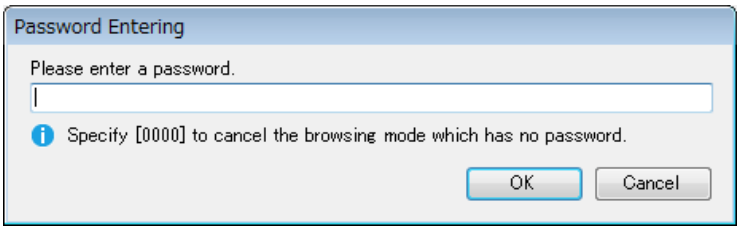


Figure 4-41 Password input window

✔ Password input window opens even if password is not set. Specify "0000" and then click “OK” button.
✔ If parameter editing authority is changed to "Editing mode" during editing window of each group, below message is shown. Click "OK" and restart an editing window of each group. (Browsing mode is kept until restart.)

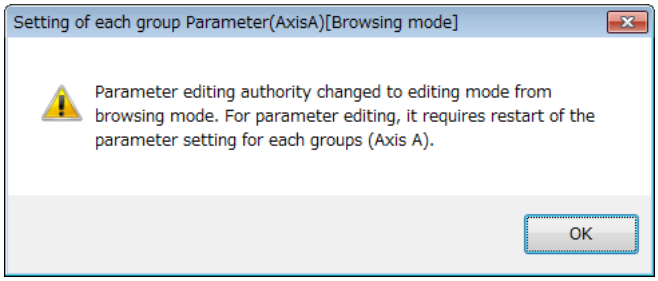


Figure 4-42 Quitting message of setting of each group parameter

4.11 Parameter initialization

This function returns all parameters to factory setting.

- ✔ Functional safety module parameters shall be edit by the person in charge which has training against safety standards. Select "Editing mode" for initialization.
- ✔ Parameter initialization function is dedicated to functional safety module.

2) How to operate

(1) Window of parameter initialization starts up by any of the following ways.

A) Select in the following order of "Parameter - Parameter initialization" in the sub menu in the Main window.

B) Click the icon "Parameter initialization" in the Toolbar in Main window.

(2) Shows a window of the parameter initialization. Start initialization by clicking "OK".

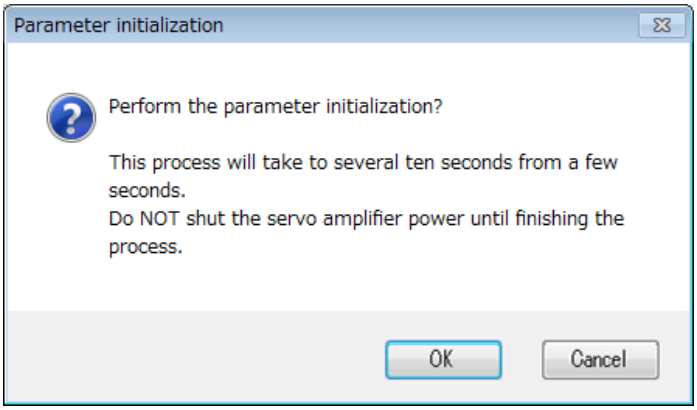
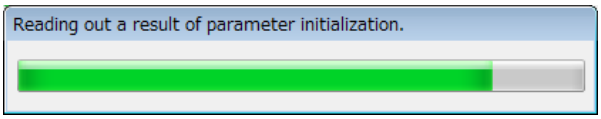


Figure 4-43 Parameter initializing window

(3) Wait for a while until the transmission-window is closed. (several tens of seconds)



(4) Parameter transmission completes when transmission-window is closed. Perform control power cycle of servo amplifier.

- ✔ To enable the parameters of functinal safety module, control power cycle of servo amplifier is required.

5. Monitor

5.1 Monitor

You can check various data on servo amplifiers on a real-time basis. Also you can select parameters you monitor from list.

1) How to operate

(1) Select “Monitor (M)”through “Function (F)”in the menu bar.

(2) Click on “Monitor  in Toolbar.

(3) Click on “Monitor”  through “Monitor” in Sub menu.

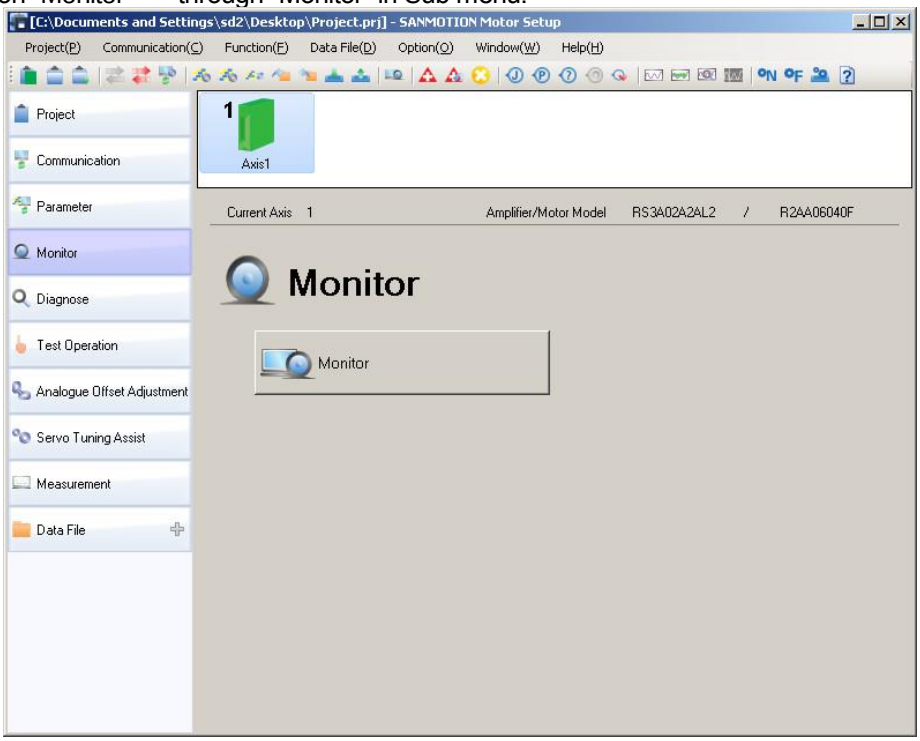


Figure 5-1 Monitor selecting window in Sub menu

(4) Clicking “Start monitor” starts updating monitor data.

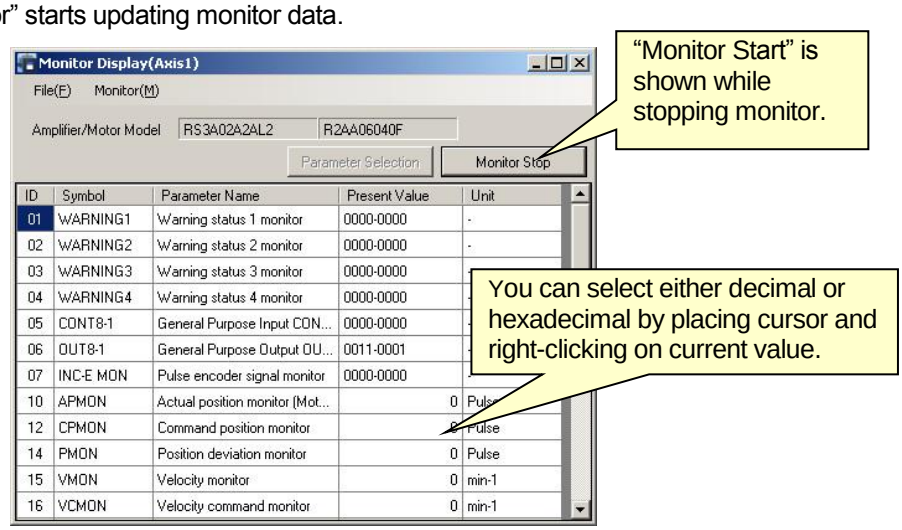


Figure 5-2 Monitor window

- ✓ The window above is indicating “Monitor Stop”.
- ✓ To stop monitor updating, click “Monitor Stop” button.

2) Selecting monitor parameters

(1) Click “Parameter Selection” button while monitor is being stopped. The following parameter selecting window is shown.

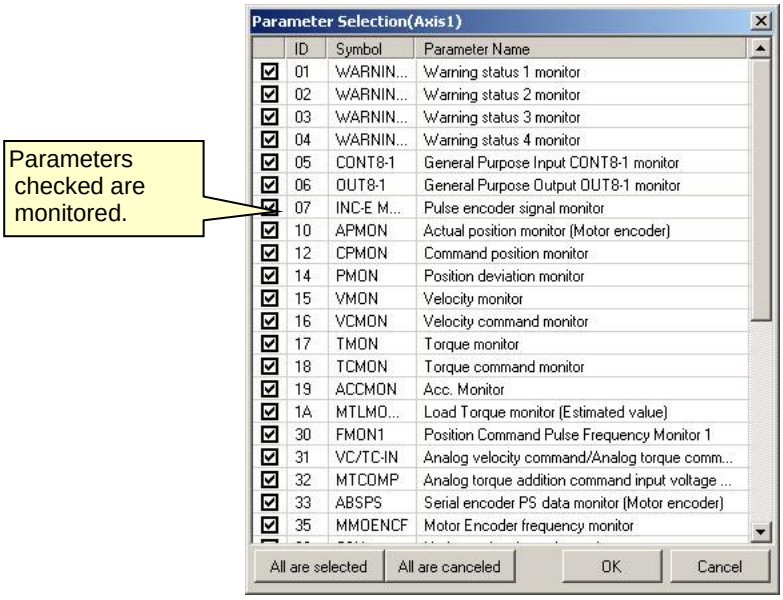


Figure 5-3 Parameter selecting window

(2) Check the head of parameters to monitor. Click “OK” button.

6. Diagnosis

You can execute various functions of alarm history, alarm reset, warning information from Diagnosis window in Sub menu.

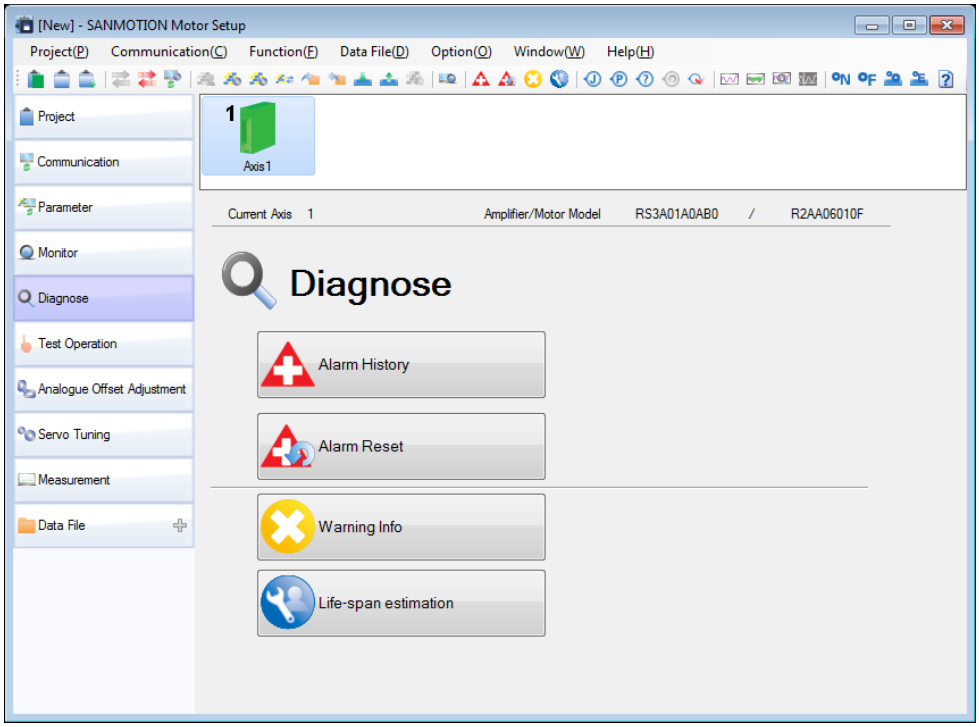


Figure 6-1 Diagnosis window in Sub menu

6.1 Alarm history

You can display and clear alarm history, and reset alarm. The alarm history occurred in servo amplifiers in the last 7 times. The display shows the types of alarms, the states of servo amplifiers when alarms occur as well as the time alarms occur.

1) How to operate

(1) Start up alarm history window in any of the following procedures.

(A) Select “Alarm history” through “Diagnosis” in Sub menu in Main window.

(B) Select in the following order of “Function-Diagnosis-Alarm history” in the menu bar in Main window.

(C) Click the icon  ”Alarm history” in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers to show alarm history.

(2) Alarm history is shown.

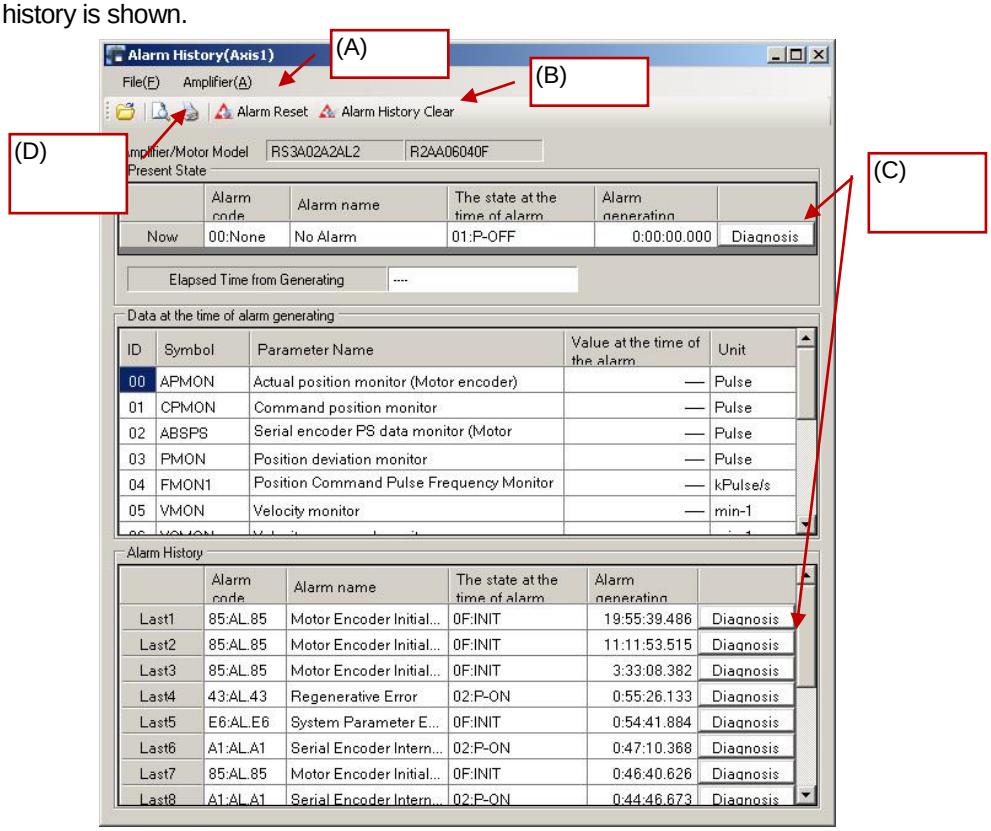


Figure 6-2 Alarm history window

A) Alarm reset : resets alarms currently being occur
B) Clear alarm history : clears alarm history stored
C) Diagnosis : shows alarm diagnosis window
D) Printout : prints alarm occurrence history

(3) Clicking Diagnosis button displays alarm diagnosis window.

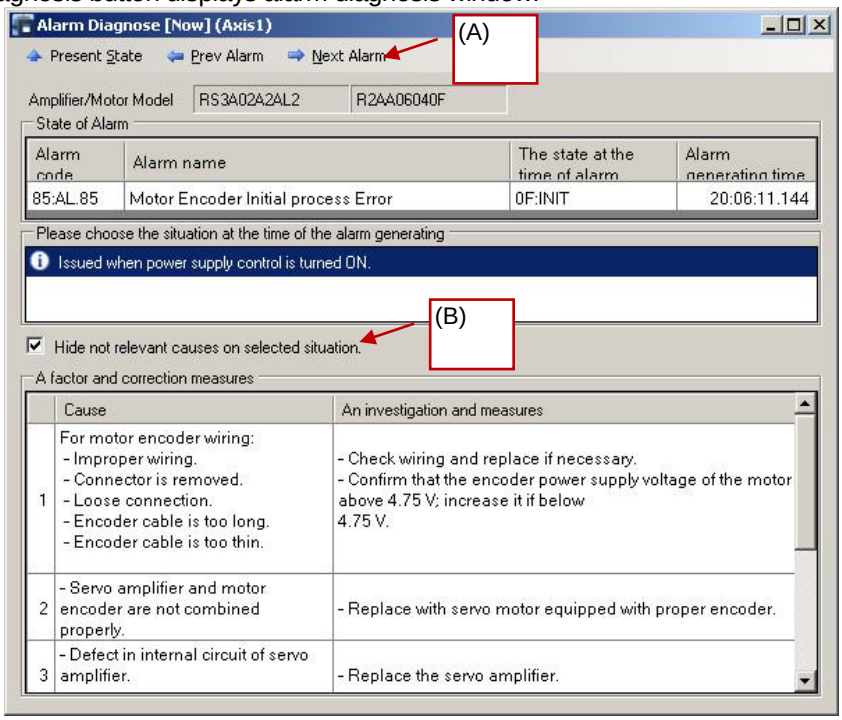


Figure 6-3 Alarm diagnosis window

A) Display alarm history : you can switch the alarm diagnosis windows of current alarm, alarm one alarm before, and after by clicking once.

B) Hide causes : Checking here hides the causes not applied to the conditions selected when alarms occur.

2) Clearing alarm history

You can clear alarm occurrence history from alarm history window.

(1) Select the icon "Alarm History Clear" through "Amplifier" from the Toolbar.

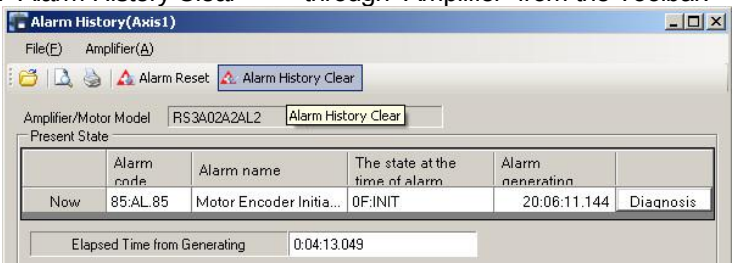


Figure 6-4 Alarm history clear window

(2) Window confirming to execute to clear alarm history is shown. Click "OK" button to execute, click Cancel button not to execute.

Figure 6-5 Window confirming to execute alarm history clear

(3) Window indicating alarm history clear orderly completed is shown. Click "OK" button.

Figure 6-6 Window indicating alarm history clear orderly completed

6.2 Alarm Reset

You can reset alarms in the following conditions:
Alarms occurred in servo amplifier/driver, and then the alarm causes have been eliminated as well as the alarm types are resettable.

1) How to operate

(1) You can reset alarms in any of the following three procedures.

(A) Select in the following order of "Function-Diagnosis-Alarm Reset" in the menu bar.

(B) Click the icon "Alarm reset" in the Toolbar.

(C) Click "Diagnosis" in Side menu, and then click"Alarm Reset" in Functional panel. After axes selecting window is shown, select the axis numbers you want to reset alarms, and then click "OK" button. To cancel it, click Cancel button.

(2) Window confirming to execute Alarm reset is shown.

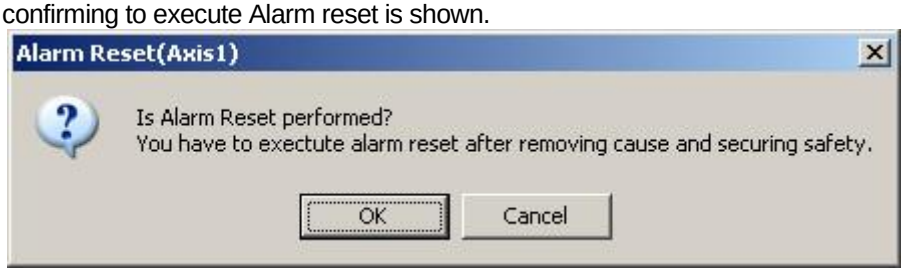


Figure 6-7 Window confirming to execute Alarm reset

(3) If there are no problems with execution, click "OK" button. To cancel it, click Cancel button.

(4) Window indicating orderly completion is shown when alarm causes have been eliminated and alarms can be reset, the window indicating abnormal termination is shown if not so.

Figure 6-8 Window indicating alarm reset orderly completed

Figure 6-9 Window indicating alarm reset abnormally terminated

6.3 Warning information

You can confirm the state of being warned of servo amplifier/drivers.
The state of being warned means the state of operation being worse not to the extent of system stop, but alarms may occur if the operation is kept.

1) How to start up

You can start up warning information window in any of the following procedures.

(A) Select “Warning info” through “Diagnosis” in Sub menu in Main window.
(B) Select in the following order of “Function-Diagnosis-Warning info” in the menu bar in Main window.
(C) Click the icon ”Warning info” in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers to display alarm history.

2) How to operate

(1) Detailed description of warning information is shown in the bottom of window.
(2) The state is updated every 1 second.
(3) Clicking “Close” button closes the window.

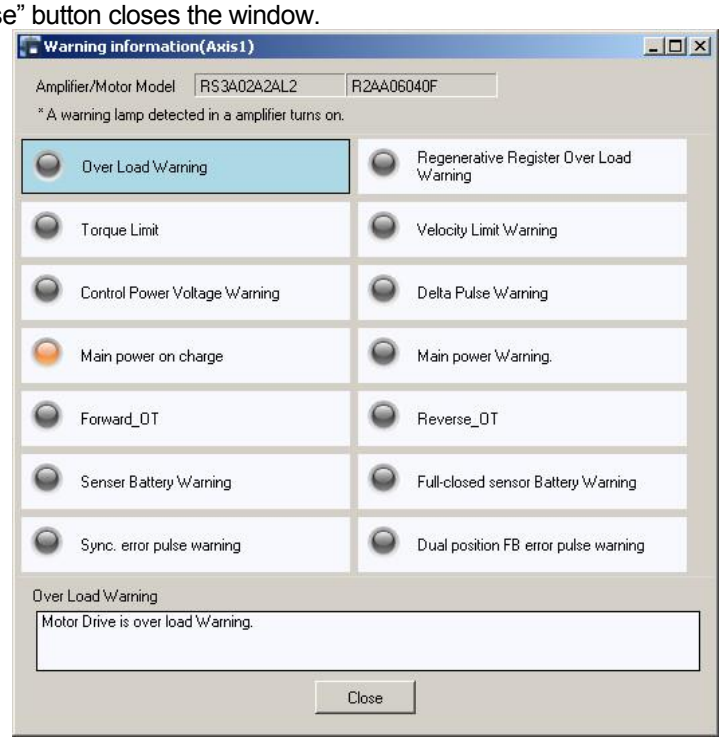


Figure 6-10 Warning information window

✓ It is recommended to deal in the state of being warned as much as possible to prevent servo systems being abnormally terminated in advance.

6.4 Life-span estimation

It can confirm remaining life of the parts used in servo amplifier/driver.
Current state is shown as a percentage against total life-span of parts.

1) How to start up

You can start up warning information window in any of the following procedures.

(A) Select "Life-span estimation" through "Diagnosis" in Sub menu in Main window.
(B) Select in the following order of "Function-Diagnosis-Life-span estimation" in the menu bar in Main window.
(C) Click the icon  "Life-span estimation" in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers of displaying the life-span estimation.

2) How to operate

(1) Detailed description of life-span estimation is shown in the bottom of window.
(2) The state is updated every 1 second.
(3) Clicking “Close” button closes the window.

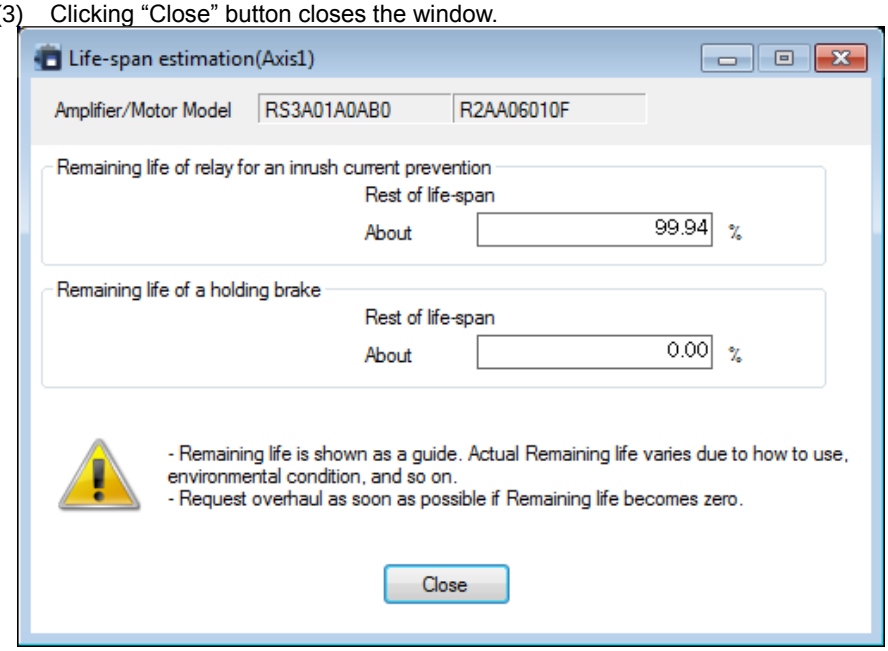


Figure 6-11 Life-span estimation window

✔ Early overhaul is recommended if remaining life becomes near to zero, to prevent abnormal shutdown of servo amplifier.

7. Test operation

You can execute the following as functions of Test operation:
JOG-operation, positioning operation, motor origin searching, estimating magnetic pole position, clearing serial encoder

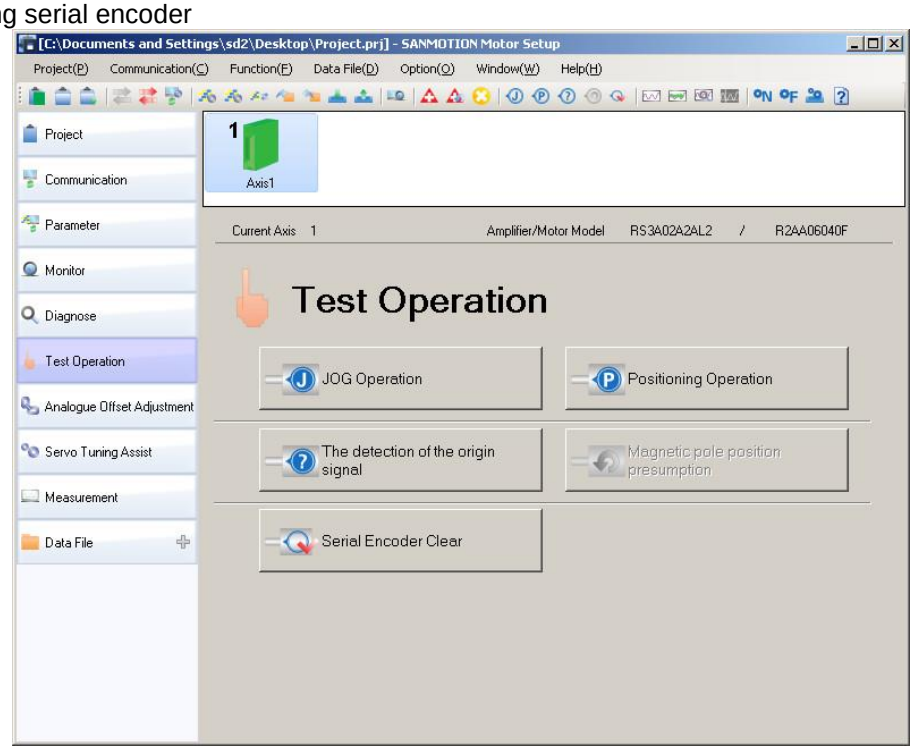


Figure 7-1 Test operation window

- ✓ There are functions which cannot be used depending on servo amplifier types and parameter settings.

7.1 JOG Operation

Performing JOG Operation, you can set commanded velocity for servo motors to perform test operation of servo motors at constant velocity.

- ✓ Make sure to ensure safety for the environment around your system as servo motors move.
- ✓ Motor excitation will be turned off when amplifier alarms occur while executing "JOG-operation". Execute this after surely preparing so that controlling equipment can be used immediately.
- ✓ This function is not available when the function of STO/SS1/SS2 is performed from functional safety module.

1) How to start up

You can start up JOG Operation in any of the following procedures.

(A) Select "JOG Operation" through "Test operation" in Sub menu in Main window.

(B) Select in the following order of "Function (F)-Test operation (O)-JOG Operation (J) in the menu bar in Main window.

(C) Click the icon "JOG Operation" in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers to perform JOG Operation.

- ✓ When the situation JOG Operation is not available both when starting up and executing, the following indication is shown to terminate execution. Confirm if the main control power is turn on, or any alarms occur.

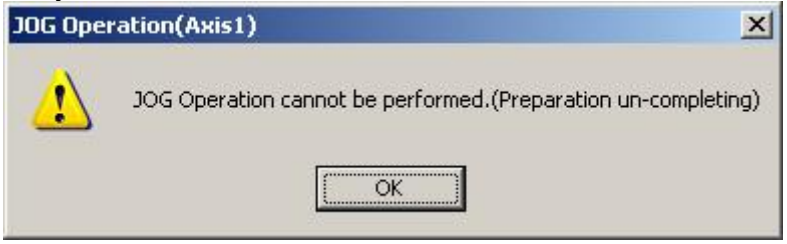


Figure 7-2 Window indicating JOG Operation not available

2) How to operate

Opening JOG Operation window shows the following display.

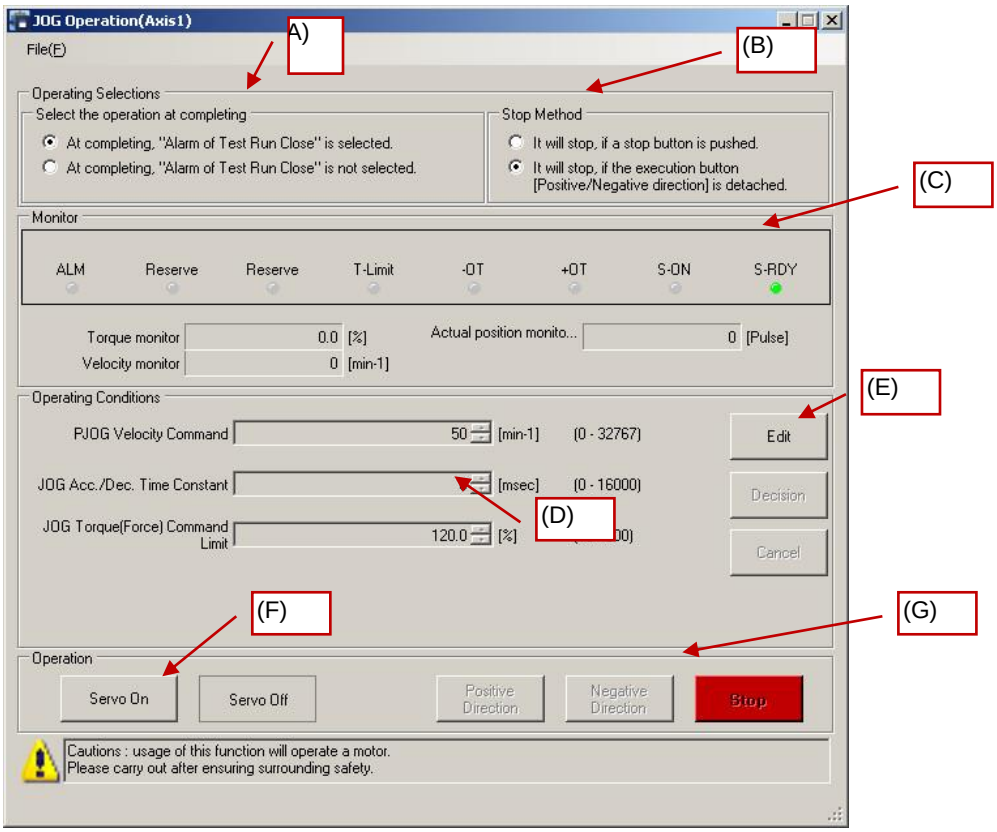


Figure 7-3 JOG Operation window

(A) Select the operation at completing : Selects whether or not a supportive function alarm (ALM_DF) activates when completed

(B) Selecting stop method : You can select whether the operation continues until clicking stop button or the operation activates only while clicking execute button once execute button (forward/backward) is clicked.

(C) Monitor : You can confirm current amplifier state, torque monitor, velocity monitor, and present position.

(D) Operating conditions: Sets behavior conditions such as velocity command, accelerating/decelerating constant, torque (force) command limit value

(E) Edit : Click “Edit” button to edit. Click “Confirm” button after completing editing. To cancel editing, click “Cancel” button.

(F) Servo On/Off : Turns on or off motor excitation. You cannot operate servo motors unless the state is servo-on.

(G) “Positive/Negative Direction” “Stop” : Click the button in the direction which you want to move servo amplifiers. When selecting “Stop when pressing stop-button” as a condition on how to stop, note that you cannot stop motors unless you click stop-button.

✔ For the servo amplifier with functional safety module, changes to Safe Torque Off state after resetting supportive function alarm (ALM_DF) if JOG operation starts with servo ON state and the operation at completing selects ALM_DF activation. To start an operation again, transite to servo-ready state by turning OFF servo ON input once.

7.2 Positioning Operation

Performing positioning operation, you can set feeding velocity of servo motors and shift pulse to perform Test operation with constant pulse shifted.

- ✓ Make sure to ensure safety for the environment around your system as servo motors move.
- ✓ Motor excitation will be turned off when amplifier alarms occur while executing “Positioning operation”. Execute after surely preparing so that controlling equipment can be used immediately.
- ✓ This function is not available when the function of STO/SS1/SS2 is performed from functional safety module.

1) How to start up

You can start up the positioning operation window in any of the following procedures.

(A) Select “Positioning operation” through “Test operation” in Sub menu in Main window.

(B) Select in the following order of “Function (F)-Test operation (O)-Positioning operation (P)” in the menu bar in Main window.

(C) Click the icon “Positioning operation” in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers to perform positioning operation.

- ✓ When the situation positioning operation is not available both when starting up and executing, the following indication is shown to terminate execution. Confirm if the main control power is turn on, or any alarms occur.
- ✓

Figure 7-4 Window indicating positioning operation error

2) How to operate

Opening positioning operation window shows the following display.

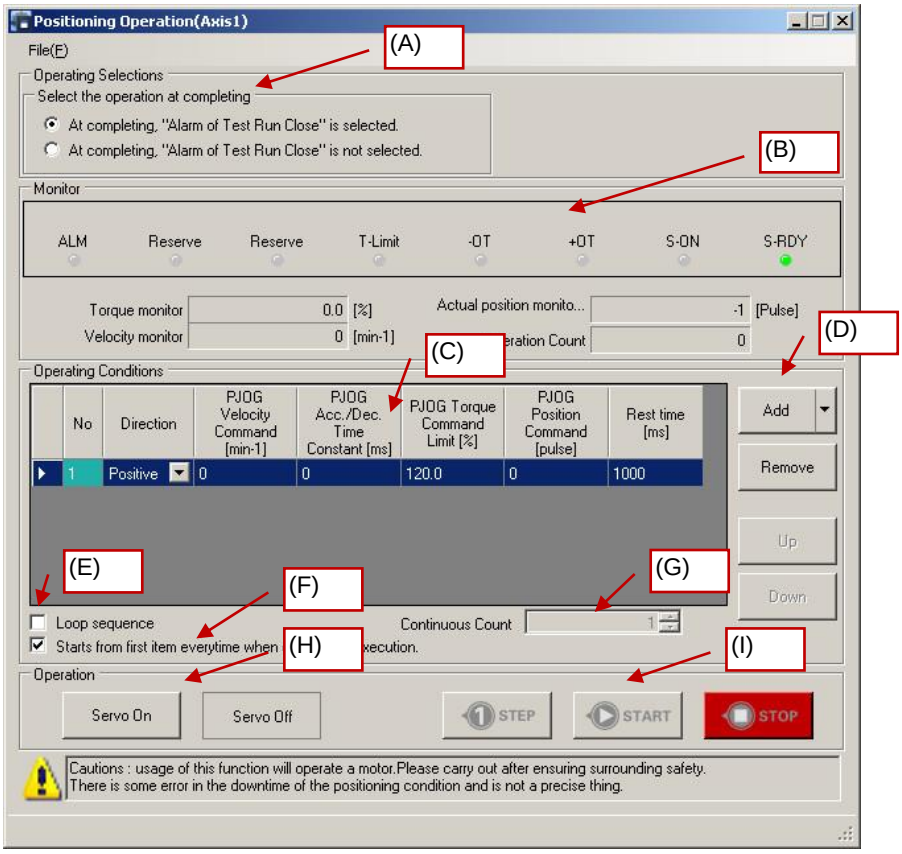


Figure 7-5 Positioning operation window

(A) Select the operation at completing	:	Selects whether or not a supportive terminating alarm (ALM_DF) activates when completed.
(B) Monitor	:	Confirm the following: Present state of amplifier, torque monitor, velocity monitor, present position, the number of operation for continuous repetition operation
(C) Operationg Conditions	:	Set conditions of operation. Clicking Add/delete buttons to set multiple conditions, you can create complicated operating patterns.
(D) Add/Remove/Up/Down	:	Add or remove conditions of operation. You can change the order of operation pattern you set by using Up and Down buttons.
(E) Loop sequence	:	Checking this performs condition for execution repeatedly. If this is not checked, the operation pattern already set is performed only once and stopped.
(F) Start from first item…	:	Checking this always returns to the head of the next continuous operation when newly starting operation, in the case the operation stopped in mid-course.
(G) Continuous Count	:	Designate the number of repetition of continuous operation pattern.
(H) Servo On/Off	:	Turn on/off motor excitation.
(I) [STEP][START][STOP]	:	Start and stop operation in the set operation pattern. Clicking [STEP] button performs operation pattern in increments of 1 step.

- ✓ There is an error of a maximum of 0.5 seconds in stop-setting time.
- ✓ Maximum velocity is limited to 2m/sec, in the system using linear motor with 1nm resolution.
- ✓ For the servo amplifier with functional safety module, changes to Safe Torque Off state after resetting supportive function alarm (ALM_DF) if positioning operation starts with servo ON state and the operation at completing selects ALM_DF activation. To start an operation again, transite to servo-ready state by turning OFF servo ON input once.

7.3 The detection of the origin signal

Using origin-detecting function, you can set feeding speed of servo motor/ accelerating and decelerating constant/searching directions, and then search and move the origins of motor shaft.

<What is motor origin?>
Motor origin here is the position as follows:

(A) When a serial encoder being connected
: the position at which the data of within a 360-degree roll of motor shaft is zero

(B) When a pulse encoder being connected
: the position in which Z-phase is output

- ✓ Make sure to ensure safety for the environment around your system as servo motors move.
- ✓ Motor excitation will be turned off when amplifier alarms occur while executing “Estimate magnetic pole position”. Execute after surely preparing so that controlling equipment can be used immediately.
- ✓ Origin search is available only with the encoder equipped to motor. It is not allowed to the encoder for full-closed system.
  Also, this function is not allowed with the system using linear motor.
- ✓ This function is not available when the function of STO/SS1/SS2 is performed from functional safety module.

1) How to start up

Start up motor origin searching window in any of the following procures.

(A) Select “The detection of the origin signal” through “Test operation“ in Sub menu in Main window.

(B) Select in the following order of ”Function (F)-Test operation (O)- The detection of the origin signal” in the menu bar in Main window.

(C) Click the icon “Search motor origin” in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers to perform Orientation-operation.

- ✓ When the situation The detection of the origin signal is not available both when starting up and executing, the following indication is shown to terminate execution. Confirm if the main control power is turn on, or any alarms occur.
- ✓

Figure 7-6 Window indicating motor origin detecting error

2) How to operate

Opening motor origin detecting window shows the following display.

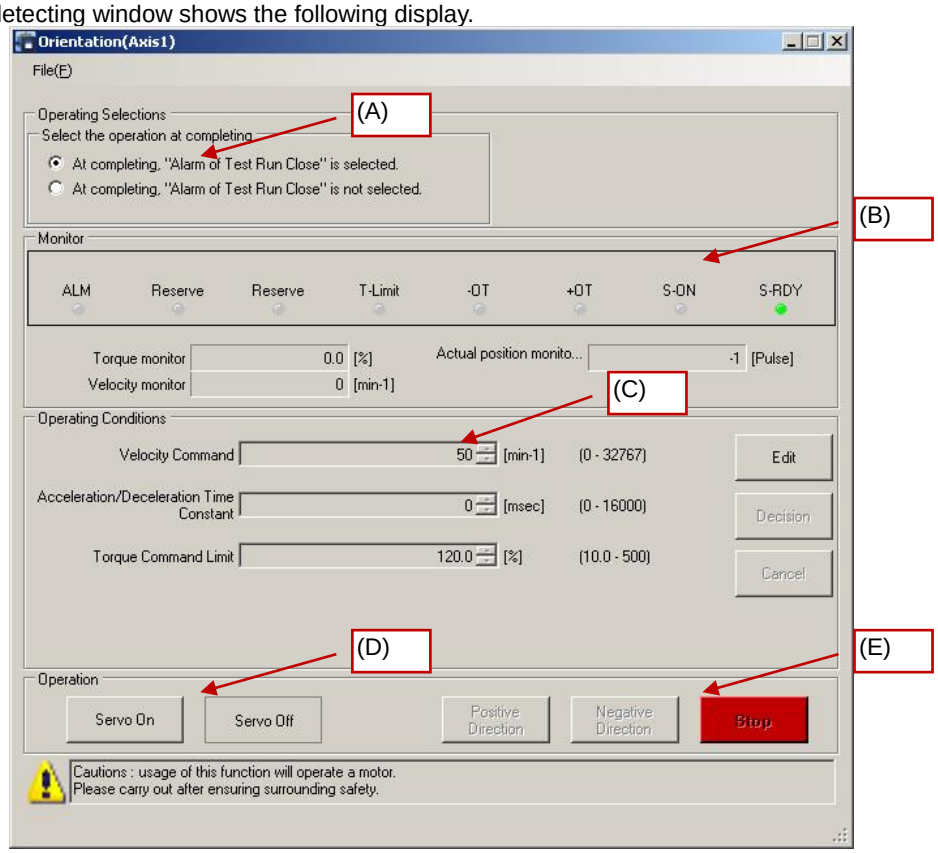


Figure 7-7 Motor origin searching execution window

(A) Select the operation at completing : Selects whether or not a supportive function alarm (ALM_DF) activateswhen completed
(B) Monitor : You can confirm current amplifier state, torque monitor, velocity monitor, and present position.
(C) Operating conditions : Sets behavior conditions
(D) Servo On/Off : Turns on or off motor excitation
(E) "Positive/Negative Direction" "Stop" : Positions to origin by moving in a designated direction

The following window is shown when orderly or abnormally completed.

Figure 7-8 Window indicating motor origin detecting orderly completed (e.g.)

✓ For the servo amplifier with functional safety module, changes to Safe Torque Off state after resetting supportive function alarm (ALM_DF) if origin-detecting function starts with servo ON state and the operation at completing selects ALM_DF activation. To start an operation again, transite to servo-ready state by turning OFF servo ON input once.

7.4 Magnetic pole position estimation

Executing “Magnetic pole position estimation” can estimate the magnetic pole position with slightly moving motors. “Magnetic pole position estimation” can be executed when using linear motors.

- ✓ Make sure to ensure safety for the environment around your system as servo motors move.
- ✓ Motor excitation will be turned off when amplifier alarms occur while executing “Estimate magnetic pole position”. Execute it after surely preparing so that controlling equipment can be used immediately.
- ✓ This function is not available when the function of STO/SS1/SS2 is performed from functional safety module.

1) How to start up

You can start up the window of Magnetic pole position estimation in any of the following procedures.

(A) Select “Magnetic pole position estimation” through “Test operation” from Sub menu in Main window.

(B) Select in the following order of ” Function (F)- Test operation(O)- Magnetic pole position estimation (M)” in the menu bar in Main window.

(C) Click the icon “Magnetic pole position estimation” in the Toolbar in Main window.

When axes selecting window is shown, select the axis numbers to estimate magnetic pole position.

- ✓ When the situation Magnetic pole position estimation is not available both when starting up and executing, the following indication is shown to terminate execution. Confirm if the main control power is turn on, or any alarms occur.

Figure 7-9 Window indicating Magnetic pole position estimation abnormally terminated

2) How to operate

(1) The window confirming to execute is shown. Click “OK” button. Clicking “Cancel” button ends “Magnetic pole position estimation”.

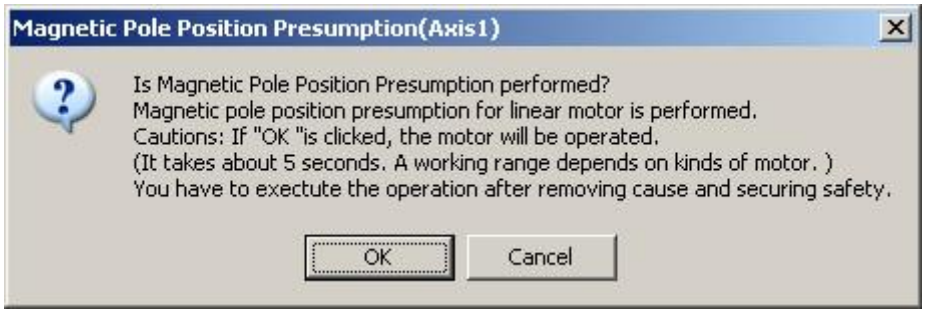


Figure 7-10 Window confirming to execute Magnetic pole position estimation

(2) Now “Magnetic pole position estimation” is being executed. Be aware that motors can slightly move.

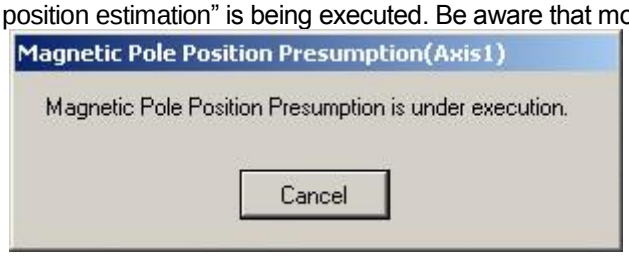


Figure 7-11 Window indicating Magnetic pole position estimation being executed

- ✓ Motor moves actually when this function use. Get safety of surrounding before use.

(3) Completing Magnetic pole position estimation ends motor excitation.

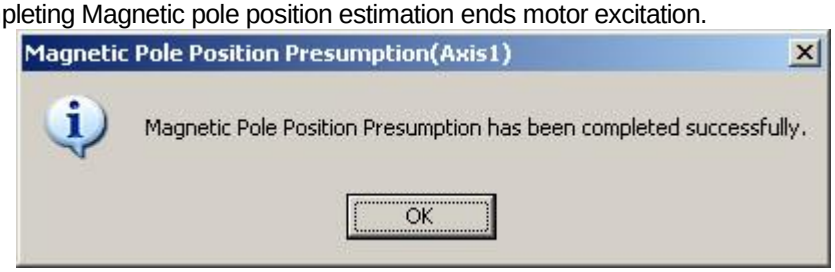


Figure 7-12 Window indicating Magnetic pole position estimation orderly completed

(4) When magnetic pole position cannot be estimated orderly, it becomes abnormal termination. Confirm the status.

<Probable causes of abnormal termination>

- Current command value is too small to move motors.
- Motor cannot move as it hits.
- etc.

Figure 7-13 Window indicating preparation of Magnetic pole position estimation not completed

7.5 Serial Encoder Clear

You can execute zero-clear of multi-turn data in the encoder and clear of encoder status by executing this function when the encoder connected to servo amplifiers is serial communication type.

✓ This function is not allowed if the serial encoder has EnDat format of Heidenhain.

1) How to start up

Start up the window for Serial Encoder Clear in any of the following procedures.

(A) Select “Serial Encoder Clear” through “Test operation” from Sub menu in Main window.

(B) Select in the following order of ”Function (F)- Test operation (O)- Serial Encoder Clear (E)” from the menu bar in Main window.

(C) Click the icon “Serial Encoder Clear” in the Toolbar in Main window. When axes selecting window is shown, select the axis numbers to execute “Serial Encoder Clear”.

2) How to operate

(1) The window confirming to execute is shown. Click “OK” button.

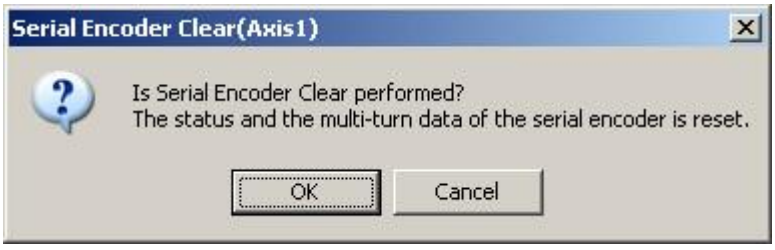


Figure 7-14 Window for confirming to execute serial encoder clear

(2) The window indicating being executed is shown. Click “Cancel” to stop in mid-course.

Figure 7-15 Window indicating serial encoder clear being executed

(3) After a few seconds elapsed and orderly completing, the following window is shown. Click “OK” button.

Figure 7-16 Window indicating serial encoder clear orderly completed

(4) After a few seconds elapsed and abnormally completing, the following window is shown. Click “OK” button.

Figure 7-17 Window indicating serial encoder clear not completed

- ✓ At the same time, it make the supportive functional alarm (ALM_DF) occur.

<Probable causes of abnormal termination>

- ◆ The motor was driven externally.
- ◆ Zero-clear is not available.
- ◆ Alarm causes have remained.
- ◆ Other cases

- ✓ There are cases that the only encoder status is cleared but multiple-turn data is not cleared depending on the settings of servo amplifier parameters.
- ✓ There are cases encoder clear is being executed in spite of that message “Serial encoder clear not executed” is shown after terminating operation through “Terminate” button. Make sure to confirm serial encoder PS data monitor in Monitor window.

7.6 Motor brake control function

In case of connecting the servo amplifier which has motor brake power output, forced ON/OFF of motor brake power is controllable by using this function.

- ✓ It is not available with the servo amplifier which does not have motor brake power output.
- ✓ Motor brake is released when turning ON a motor brake power. Pay attention with gravity axis because self-weight fall will happen.

1) How to start up

Start up the motor brake control window by clicking the function of motor brake control in either of Project tree, Tool bar or Menu bar. It cannot start up under the conditions below.

- Servo amplifier does not support the motor brake control function.
- Normal response does not come against preparation request. (State of using other supporting function (Test operation, Adjustment, Tuning or System analysis), State of disabling release of motor brake (during servo ON), etc)

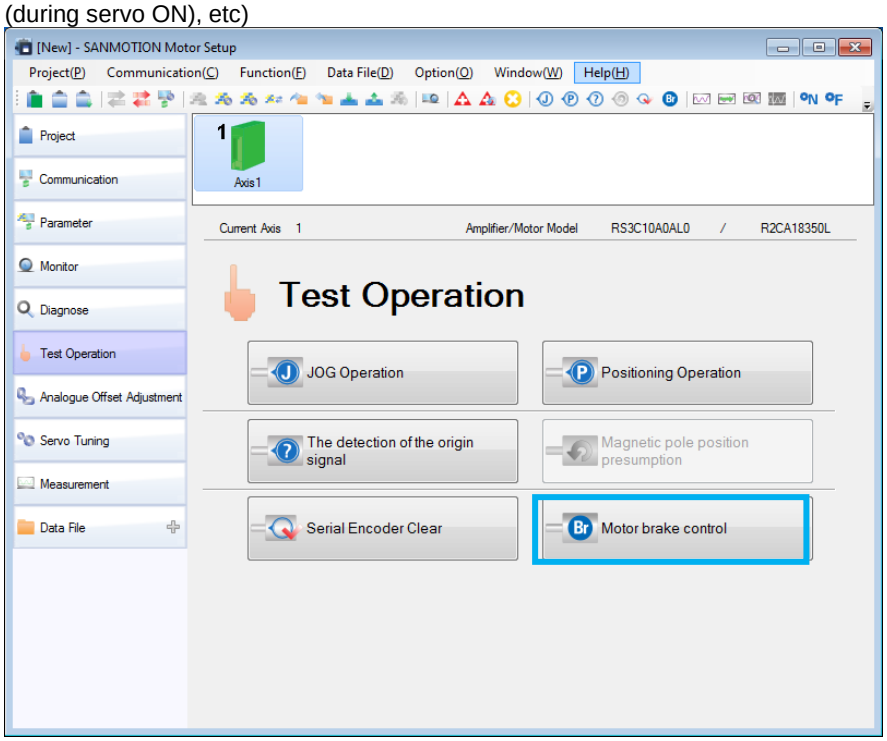


Figure 7-18 Test operation window

2) How to operate

(1) After start up

Window confirming to perform is indicated if the motor brake control is selected in Tool bar, Menu bar or sub panel of Test operation.

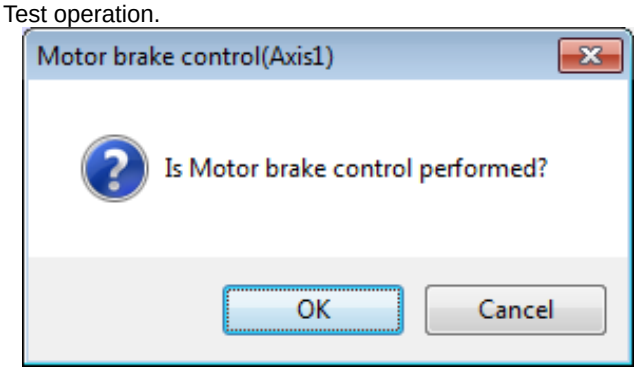


Figure 7-19 Window confirming to perform motor brake control

Window is closed if "Cancel" or "Exit" is clicked.

After confirmation of no problem for motor brake release, click "OK".
Execution window of (2) is indicated.
It cannot perform during in use of other support function, during servo ON or during charge/discharge of main circuit power.

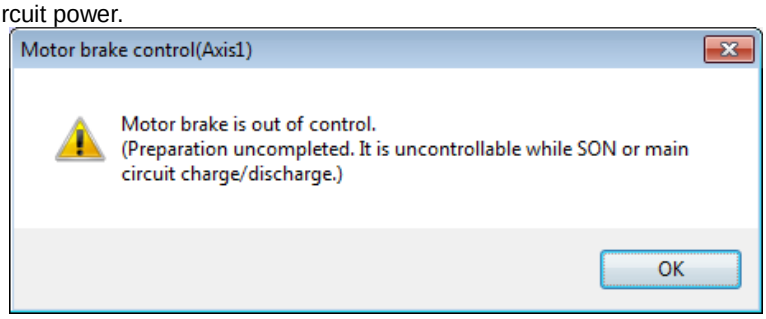


Figure 7-20 Indication window for preparation incompletion of response code of motor brake control

(2) Execution window
Start up the execution window.

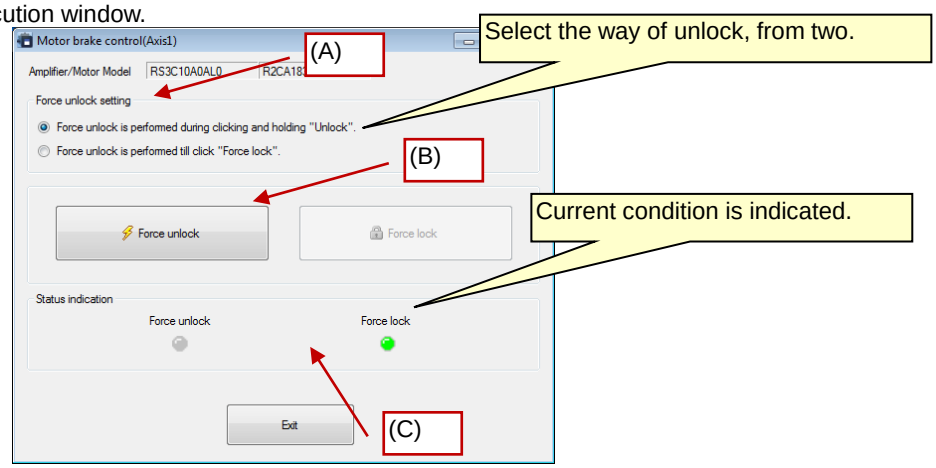


Figure 7-21 Execution window for motor brake control

【Indication content of the window and setting】
Initial value of buttons and each set values are below.

(A) Unlock setting for motor brake: Select the way of unlock, from two.

① Unlock motor brake while "Unlock" button is pressed.
Unlock motor brake while "Force unlock" button is pressed.
Window for confirming start is shown when clicking "Force unlock" button.
Continue pressing "Unlock" button while unlock is desired.

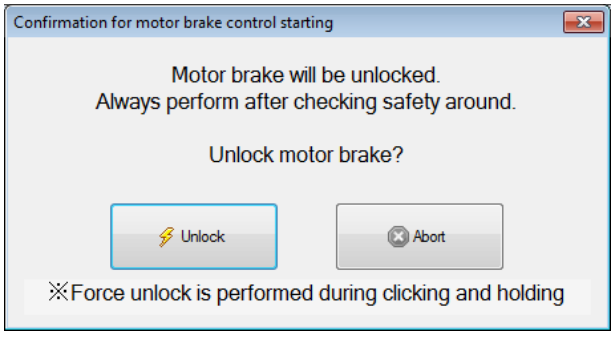


Figure 7-22 Window for final confirmation of motor brake control①

② Unlock motor brake until "Force lock" button is pressed.
When "Unlock" button is clicked, motor brake is unlocked and return to execution window of (2). If unlock is not performed, click "Abort" button.

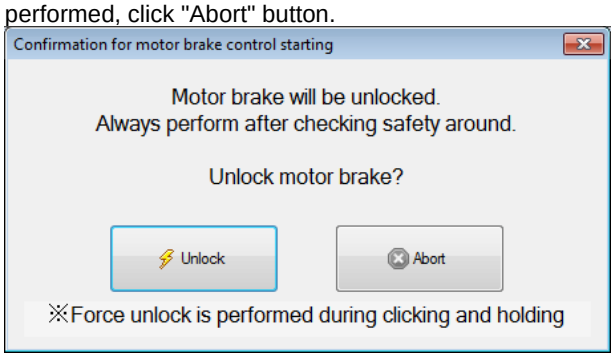


Figure 7-23 Window for final confirmation of motor brake control②

(B) Control button: It controls by two buttons of "Unlock" and "Abort".

(C) Status indication: Current condition ("Force unlock" or "Force lock") is indicated with lamps.

(3) Abnormal completion
Abnormal completion window for motor brake control is indicated if error is occurred.
Returns to main window after clicking "OK" button.

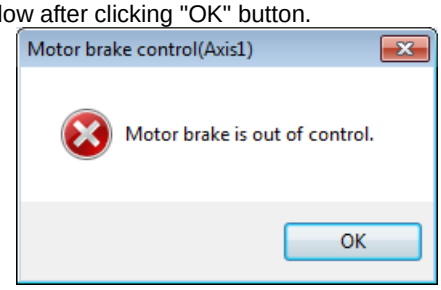


Figure 7-24 Abnormal completion window for motor brake control

(4) Exiting
Exit confirmation window is indicated if "Exit" button is clicked.

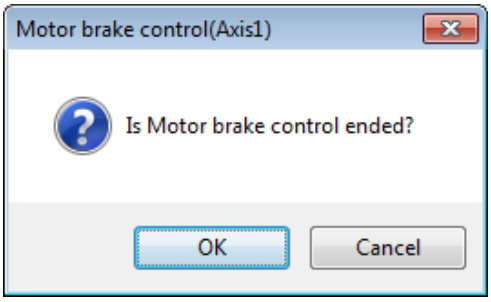


Figure 7-25 Completion confirmation window for motor brake control

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8. Adjustment

You can perform the following functions as adjustment functions:
Analog velocity command/ velocity adding command/ torque (force) command offset adjustment/ analog torque (force) adding command offset adjustment.

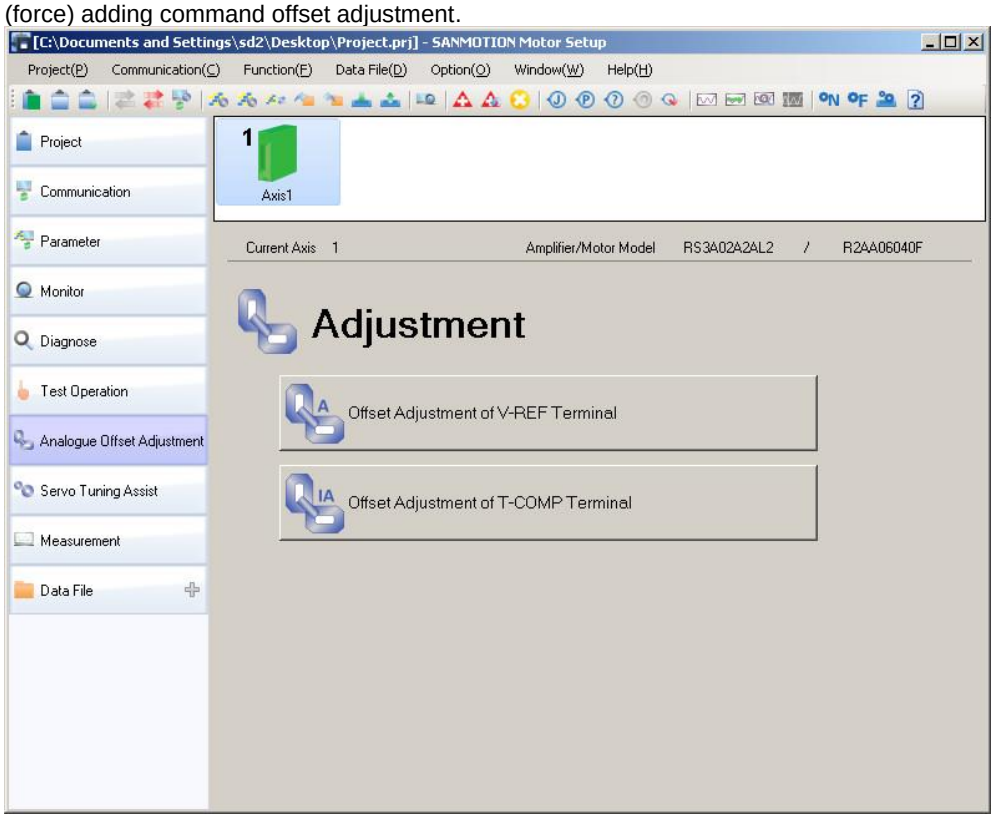


Figure 8-1 Adjustment menu window

8.1 Offset Adjustment of V-REF/T-REF Terminal

This button automatically performs analog velocity command/ velocity adding command/ torque (force) command off-set adjustment.

1) How to operate

(1) Select in the following order of “Function”, “Adjustment”, “Offset Adjustment of V-REF/T-REF Terminal” or click “Offset Adjustment of V-REF/T-REF Terminal” through “Adjustment” in the Side menu.

(2) “Window confirming to execute” is shown. Click “OK” button.

Figure 8-2 “Offset Adjustment of V-REF/T-REF Terminal” window to confirm the execution

(3) Adjustment execution window is shown.

<Auto-adjustment window>

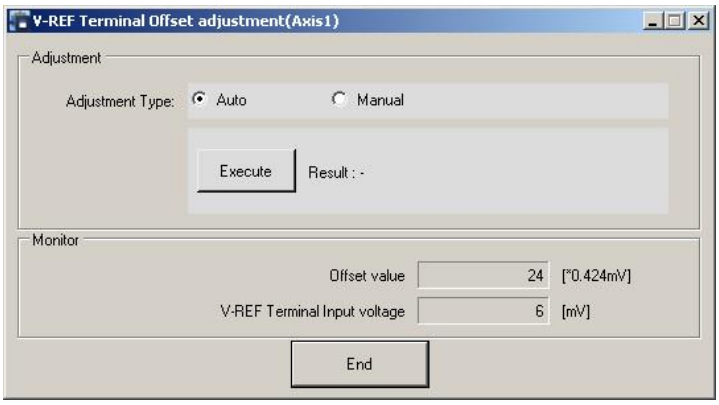


Figure 8-3 Offset Adjustment of V-REF/T-REF Terminal execution window

✓ Select "Auto" and then click "Execute" button to automatically adjust. This can monitor the adjustment results, the set off-set amount, the input voltage after adjustment. When an extremely-high voltage is input as a commanded input, the automatic off-set cannot normally complete. (when it is 5V or over as a guide)

<Manual adjustment window>

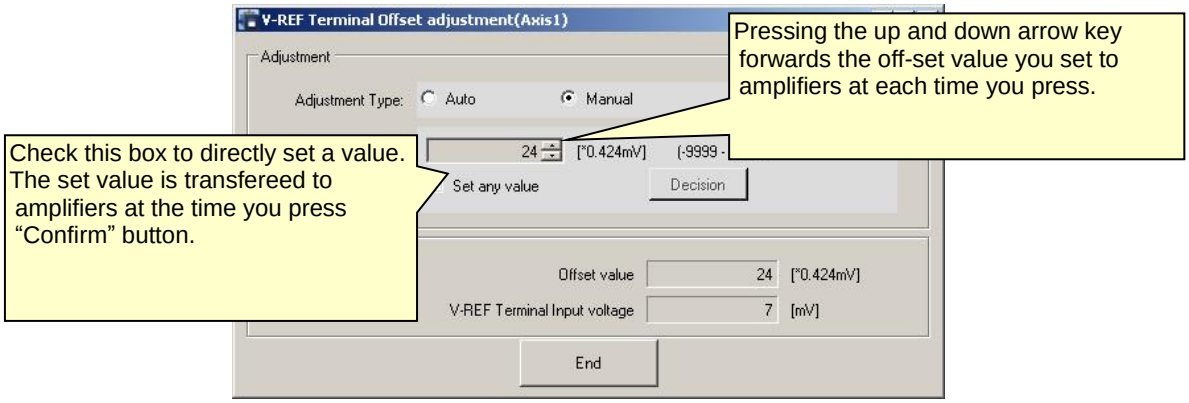


Figure 8-4 Offset Adjustment of V-REF/T-REF Terminal execution window

✓ Set an arbitrary value after selecting "Manual" to manually adjust. This can monitor the set off-set amount, the input voltage after adjustment.

8.2 Offset Adjustment of T-COMP Terminal

This is to adjust off-setting of analog torque (force) adding commend.

Select in the following order of "Function"-->"Adjustment"-->" Offset Adjustment of V-REF/T-REF Terminal", or click " Offset Adjustment of V-REF/T-REF Terminal " through "Adjustment" in the Side menu. Refer to *Section 8.1 Offset Adjustment of V-REF/T-REF Terminal* for the details of actual operation.

9. Servo-tuning

You can perform auto-tuning notch filter, auto-tuning vibration suppression frequency, storing results of auto-tuning, as auto-tuning functions.

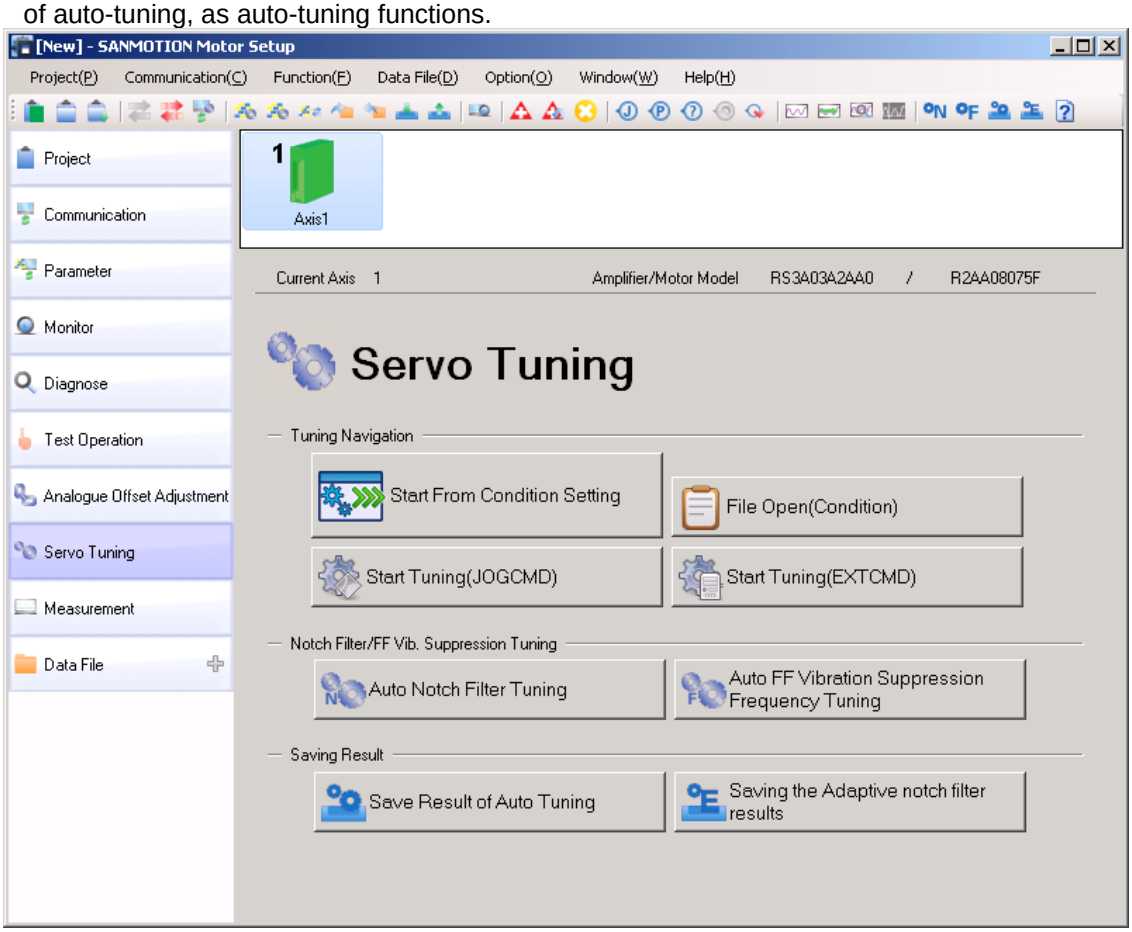


Figure 9-1 Servo-tuning menu window

9.1 Auto Notch Filter Tuning

This function is to automatically detect resonant frequency, set it as Torque (force) command notch filter, and suppress the vibration.

- ✓ This function is not allowed if the tandem operation is used.
- ✓ This function is not available when a safety function is performed from functional safety module.

1) How to start up

You can start up Auto-tuning notch filter in any of the following procedures:

(A) Select “Auto-tuning notch filter” through “Servo Tuning Assist” from the Sub menu in Main window.

(B) Select in the following order of ”Function(F)” -” Servo Tuning Assist (T)” - ” Auto Notch Filter Tuning(N)” from the menu bar in Main window.

(C) Click ” Auto Notch Filter Tuning” in the Toolbar in Main window. When Axis-selecting window is shown, select the axes you perform Auto-tuning notch filter.

2) How to operate

(1) Window confirming to execute is shown. Click “OK” button.

Figure 9-2 Window confirming Auto Notch Filter Tuning execution

(2) Click “Servo-on” button after confirming the operational conditions shown on the window.

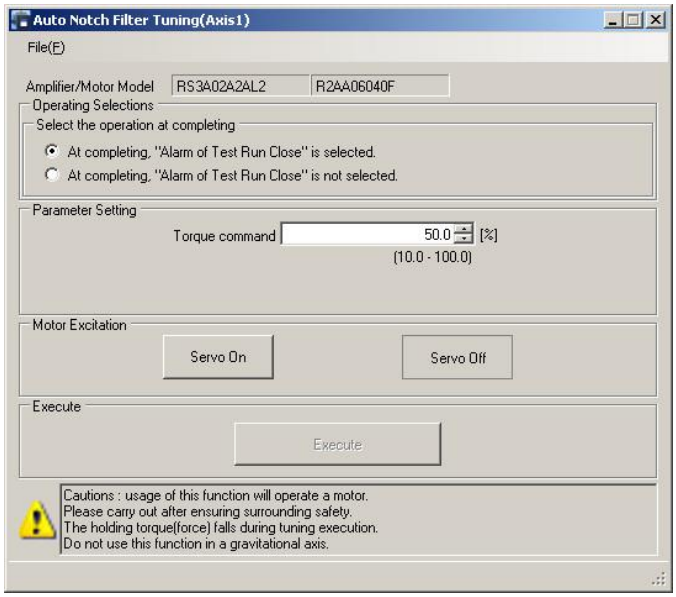


Figure 9-3 Auto Notch Filter Tuning window

(3) To tune click “Execute” button, to once servo-off click “Servo-off” button.

(4) Executing “tuning” displays Widow indicating tuning being processed. Wait till it is completed.

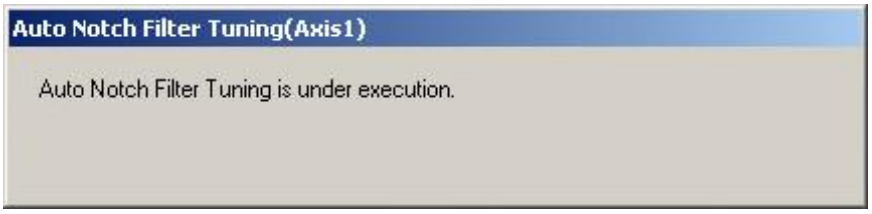


Figure 9-4 Window indicating Auto Notch Filter Tuning being executed

(5) When “tuning” is normally completed, Window indicating tuning normally completed is shown. At this time confirm the frequency you set. Note that the servo-off state has continued till you click “OK” button in this window.

(6) Clicking “OK” button shows the window for tuning in the (3) above.

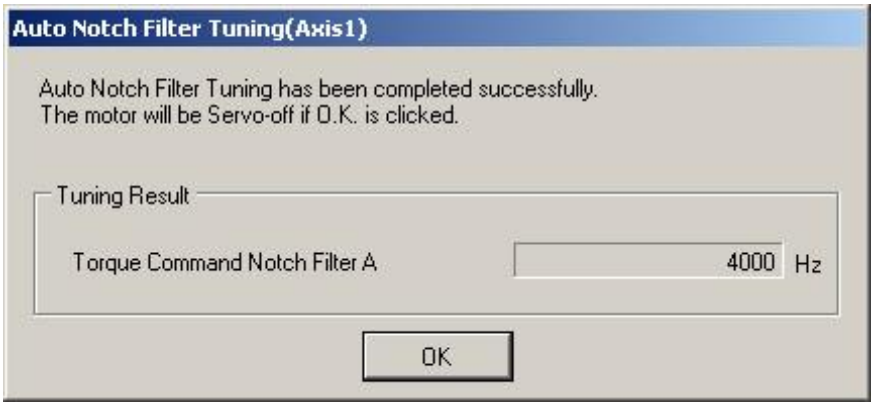


Figure 9-5 Window indicating results of Auto Notch Filter Tuning

(7) In the window for tuning in the (3) above, clicking “Terminate” button in the upper right shows the Window confirming completed (termination) below. If it is ok to terminate, click “OK” button, if you do not terminate, click “Cancel” button.

Figure 9-6 Window for confirming Auto Notch Filter Tuning completed (terminated)

(8) If you cannot execute Tuning or if any of errors occurs during tuning, the following window is shown and then force-quite the tuning operation.

Figure 9-7 Window indicating preparation of Auto Notch Filter Tuning not completed

9.2 Auto FF Vibration Suppression Frequency Tuning

Executing this function automatically set vibration suppression frequency.

- ✓ This function is not allowed if the tandem operation is used.
- ✓ This function is not available when a safety function is performed from functional safety module.

1) How to start up

You can start up Window for Auto FF Vibration Suppression Frequency Tuning in any of the following procedures.

(A) Select “Auto FF Vibration Suppression Frequency Tuning” through “Servo Tuning Assist” from the Sub menu in Main window.

(B) Select in the following order of ”Function (F)” - ” Servo Tuning Assist (T)” - “Auto FF Vibration Suppression Frequency Tuning” in the menu bar in Main window.

(C) Click on icon ”Auto FF Vibration Suppression Frequency Tuning” in the Toolbar in Main window.

When Axis-selecting window is shown, select the axes numbers you perform Auto FF Vibration Suppression Frequency Tuning.

2) How to operate

(1) Window confirming to execute is shown. Click “OK” button.

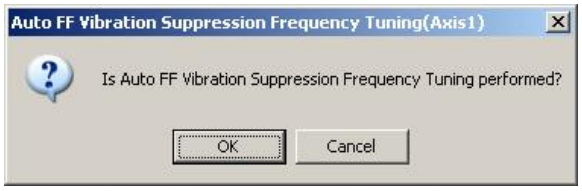


Figure 9-8 Window confirming Auto FF Vibration Suppression Frequency Tuning to execute

(2) Confirm the conditions for operating in the displayed window, and then click “Servo-on” button.

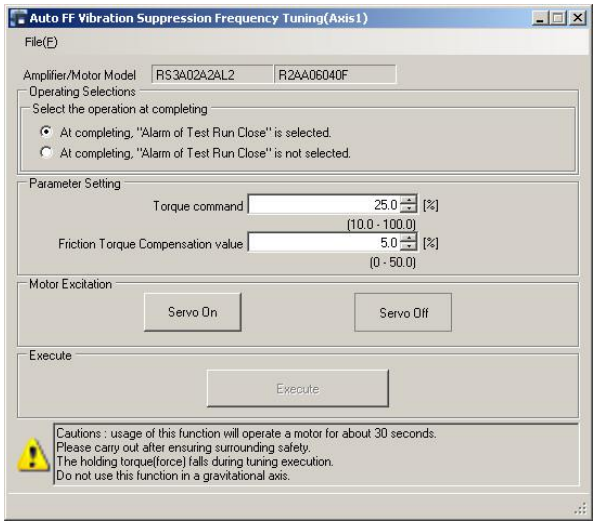


Figure 9-9 Auto FF Vibration Suppression Frequency Tuning window

(3) To tune click “Execute” button, to once servo-off click “Servo-off” button.

(4) Executing “tuning” displays Widow indicating tuning being processed. To terminate it click “Cancel “button.

Figure 9-10 Window indicating Auto FF Vibration Suppression Frequency Tuning being executed

(5) This is Window indicating execution results. Confirm the results you executed tuning, and then click "OK" button.

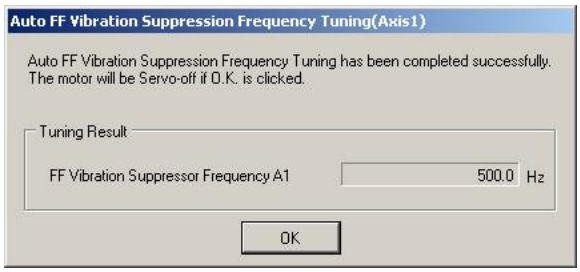


Figure 9-11 Window indicating Auto FF Vibration Suppression Frequency Tuning results

- ✓ It takes approximately 10 seconds to complete tuning.
- ✓ When the set value is 500.0Hz, vibration suppression frequency is not detected.

9.3 Save Result of Auto Tuning

You can store the parameters adjusted via Auto-tuning. You can store 5 types of parameter combinations.

1) How to start up

Start the window for Save Result of Auto Tuning in any of the following procedures.

(A) Select “Save Result of Auto Tuning“ through “Servo Tuning Assist” from the Sub menu in Main window.

(B) Select in the following order of ”Function(F)” - ” Servo Tuning Assist (T)” - ” Save Result of Auto Tuning (S)” in the menu bar in Main window.

(C) Click on the icon “Storing auto-tuning results” in the Toolbar in Main window.

When Axis-selecting window is shown, select the axes numbers you perform Storing auto-tuning results.

2) How to operate

(1) Window confirming to execute is shown, click “OK” button.

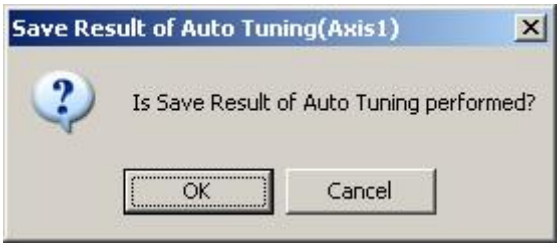


Figure 9-12 Window confirming Save Result of Auto Tuning to execute

(2) Confirm the conditions for operation shown in the window, select the parameters you store, and then click “Save the Monitor Value” button.

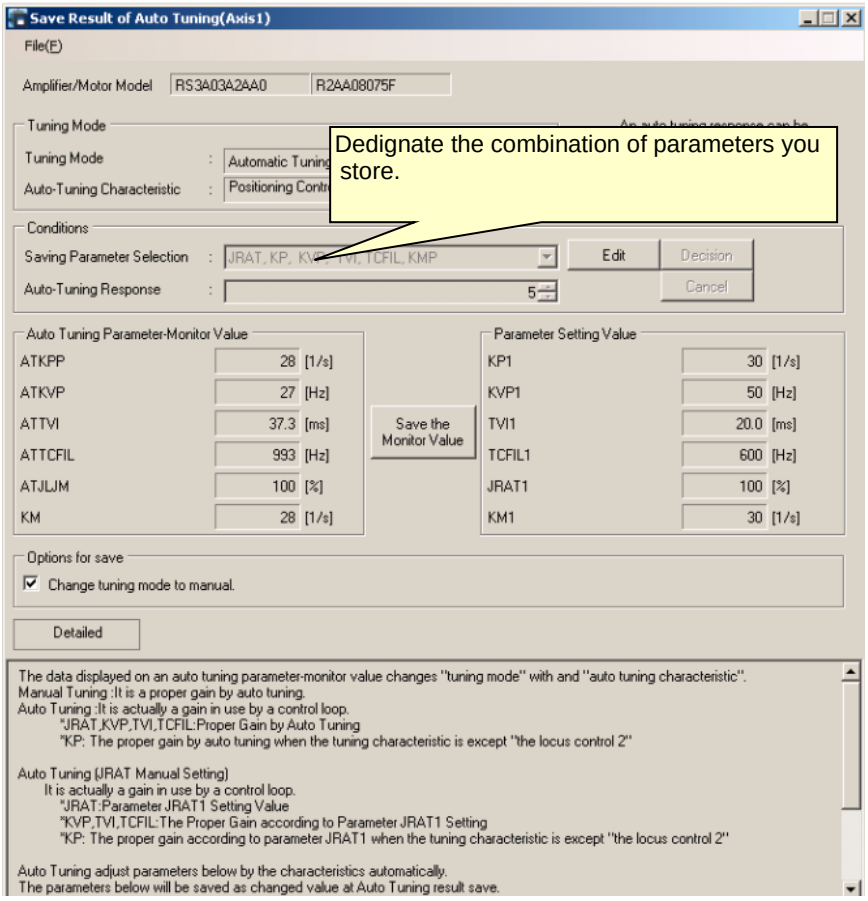


Figure 9-13 Save Result of Auto Tuning execution window

(3) The parameters you selected are set at the values monitored with Auto-tuning parameter monitor values.

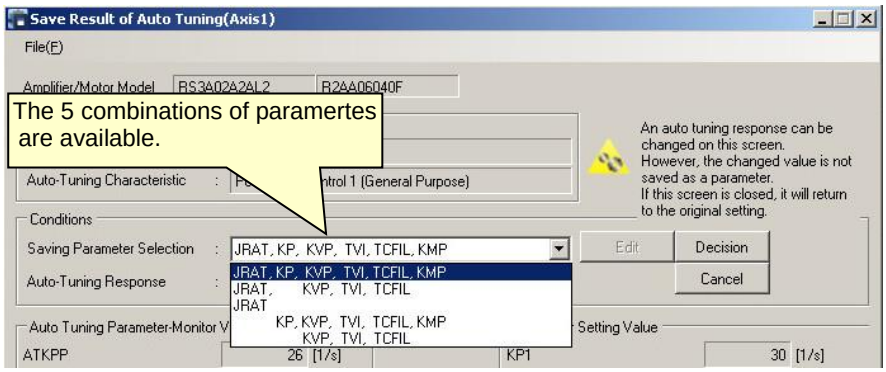


Figure 9-14 Parameter selecting window for Save Result of Auto Tuning

(4) To terminate the operation, click “Terminate” button in upper right of the window. Termination (completion) confirming window is shown, click “OK” button.

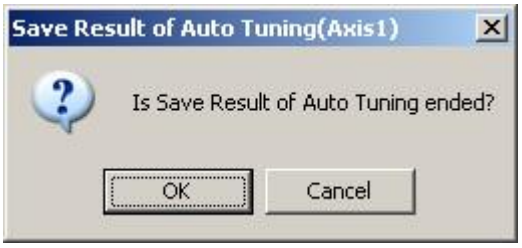


Figure 9-15 Window for confirming Save Result of Auto Tuning completion

9.4 Servo Tuning Navigation

Assists the servo tuning with selecting optimum tuning mode depending on set machine condition.
By treating a complex tuning easier, completion time will be shorter.
It is able to start from machine condition setting, but also able to do servo tuning only, abbreviating machine condition setting.

- ✔ Current setting will be initialized to reset machine characteristics.
- ✔ This function is not allowed if the tandem operation is used.
- ✔ This function is not available when a safety function is performed from functional safety module.

1) How to start

Depending on flow chart below, select the button of starting servo tuning.

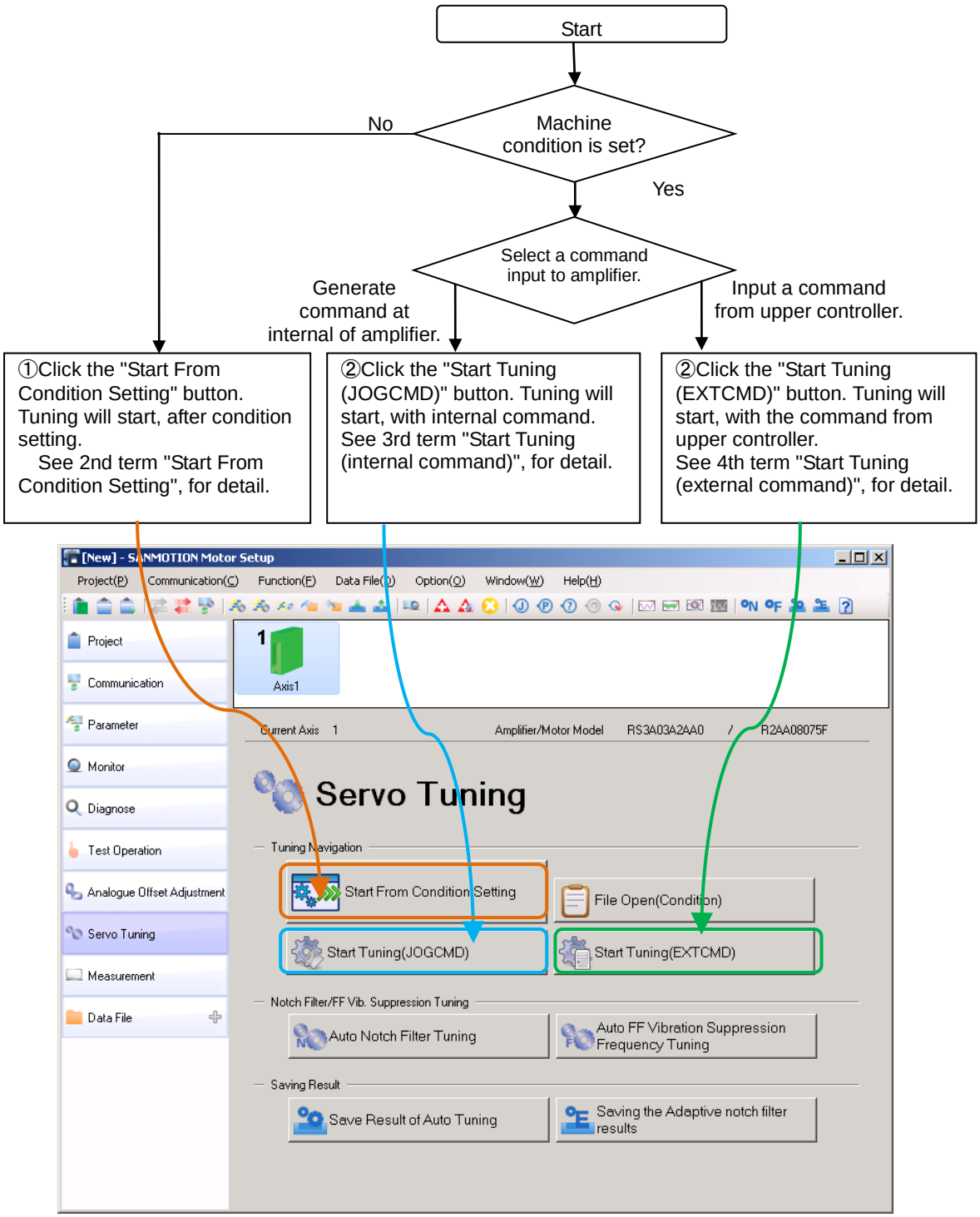


Figure 9-16 Servo-tuning starting window

2) Start From Condition Setting

Decides optimum tuning mode before servo-tuning by setting of machine condition.

(1) **Step1: Parameter initialization**

Indicates parameters which are changed at initialization. Click "Next>", if changes have no problem. Click "Exit", if changes are not desired.

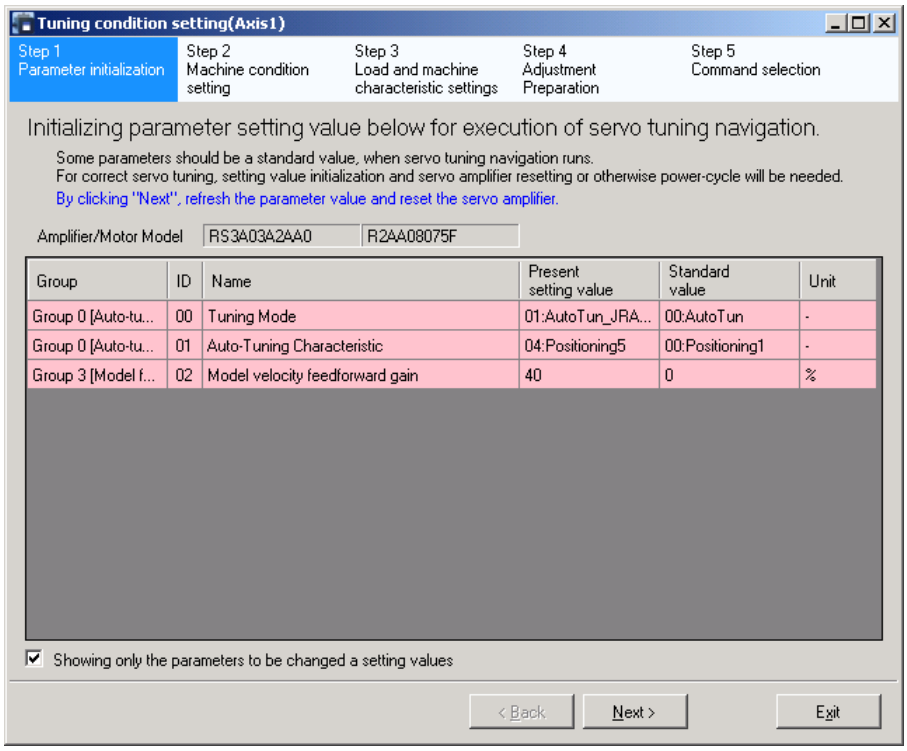


Figure 9-17 step1 Initializing parameters display window

・Amplifier will reboot when "Next>" button is clicked. Wait a minute. In case of use of pulse encoder or of amplifier with safety module, please make control power cycle manually.

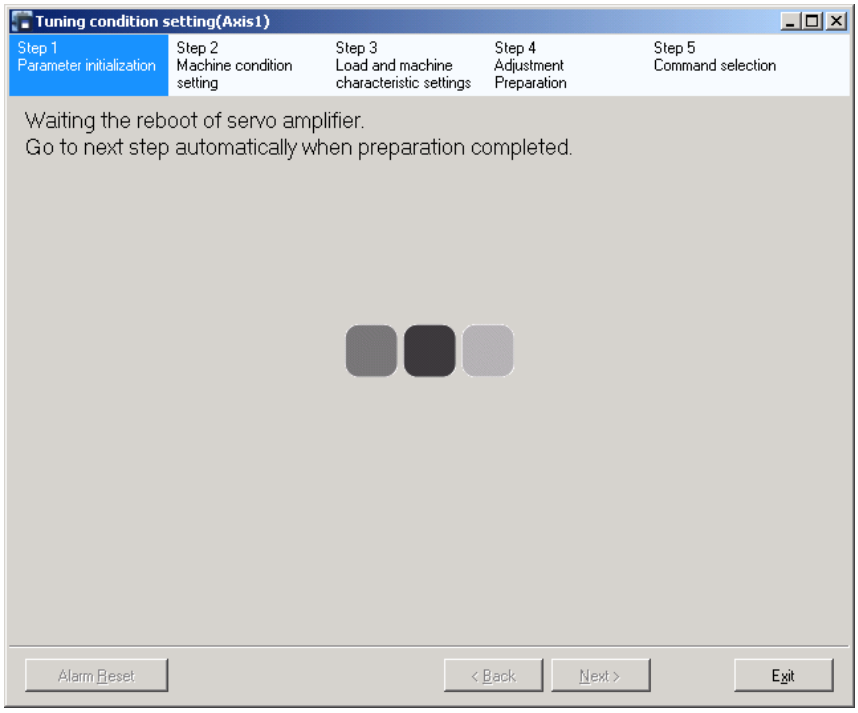


Figure 9-18 step1 Parameter now being initializing

(2) **Step2: Machine condition setting**

Select item which is nearest the machine in use, from the window. After setting completion, click "Next>" button.

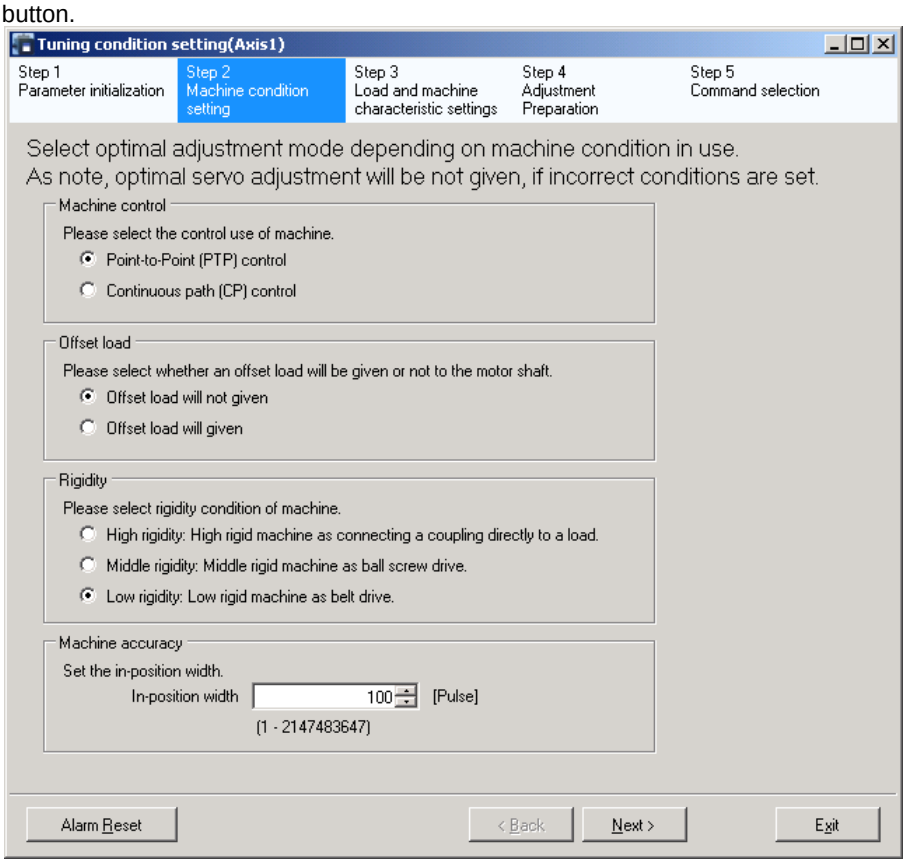


Figure 9-19 step2 Machine condition setting window

(3) **Step3: Load and machine characteristics setting**

Sets the load inertia ratio and the machine characteristics (Resonant frequency and machine stand-anti-resonant/resonant frequency).

(A) Load inertia measurement

Set the load inertia ratio, at first. In case of known inertia ratio, set the value directly, and then click "Next>" button. In case of unknown inertia ratio, load-inertia ratio estimation is available by response of actual motor operation. Click "Load inertia ratio measurement" button.

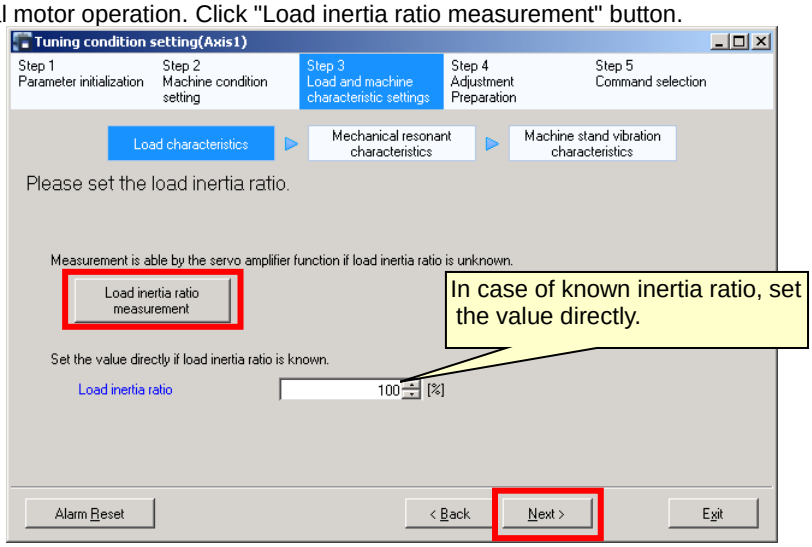


Figure 9-20 step3 Load characteristic setting window

When "Load inertia ratio measurement" button is clicked, the window like next is indicated. Set the operation condition, and then estimate load inertia by operating motor actually.

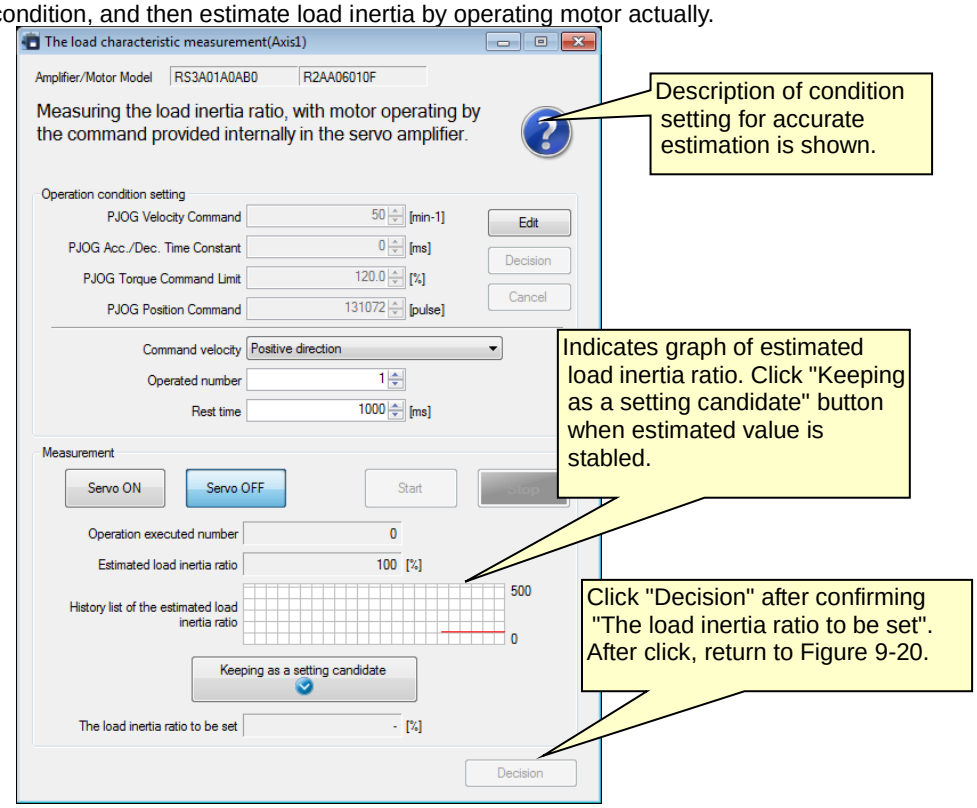


Figure 9-21 step3 Load characteristic measurement window

✔ Motor will rotate actually when this function is used. Take care of safety around for operation.

✔ Estimation error might be larger when operates with load-less operation condition. Please set operation condition that requires load near to motor rated torque.

(B) Machine resonant characteristic setting

Next, sets the machine resonant characteristic. In case of known resonant frequency of machine, set the value directly as torque command notch filter, and then click "Next>" button. In case of unknown resonant frequency of machine, resonant frequency estimation of machine is available by measurement. Click "Machine resonance measurement" button.

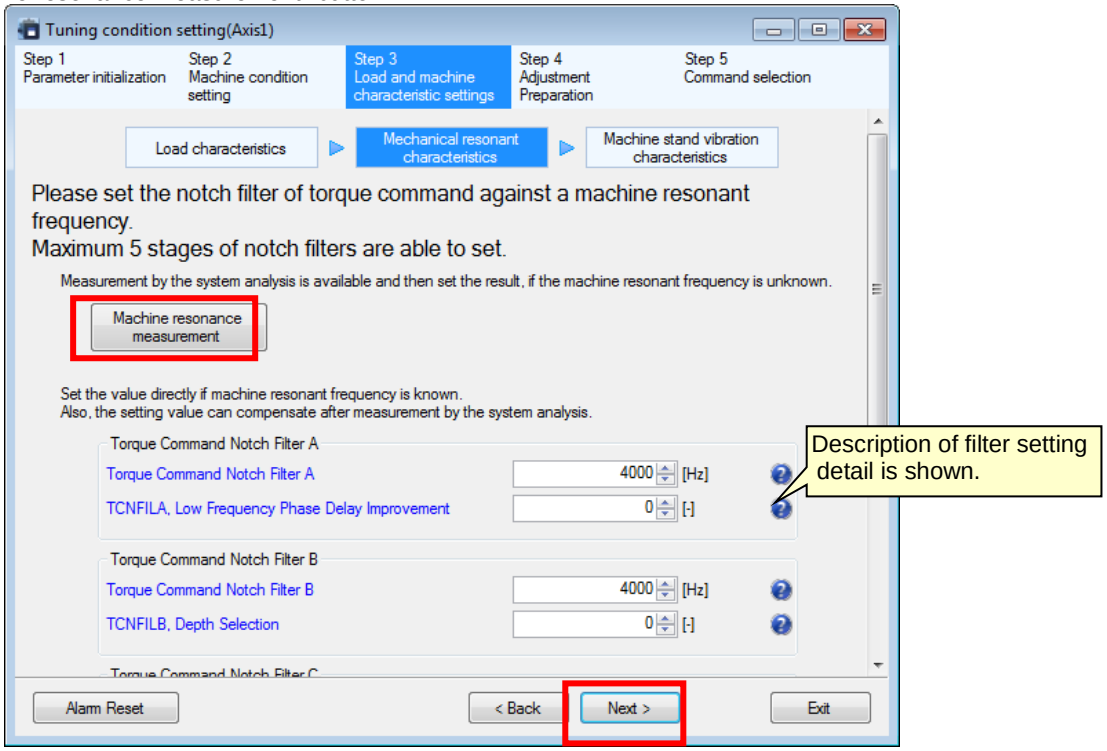


Figure 9-22 step3 Machine resonant characteristic setting window

Indicates measurement condition setting window as below. Default torque command value is 50% of motor rated torque. Change the command value depending on the machine condition in use, activate "Servo On" button, and then click "Execute" button.

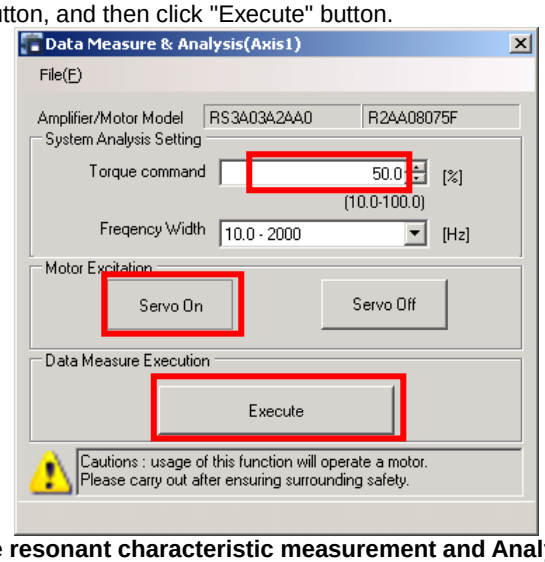


Figure 9-23 step3 Machine resonant characteristic measurement and Analysis window

When measurement completed normally, displays system analysis measurement result window like below and indicates auto measured resonant frequency as setting candidate.

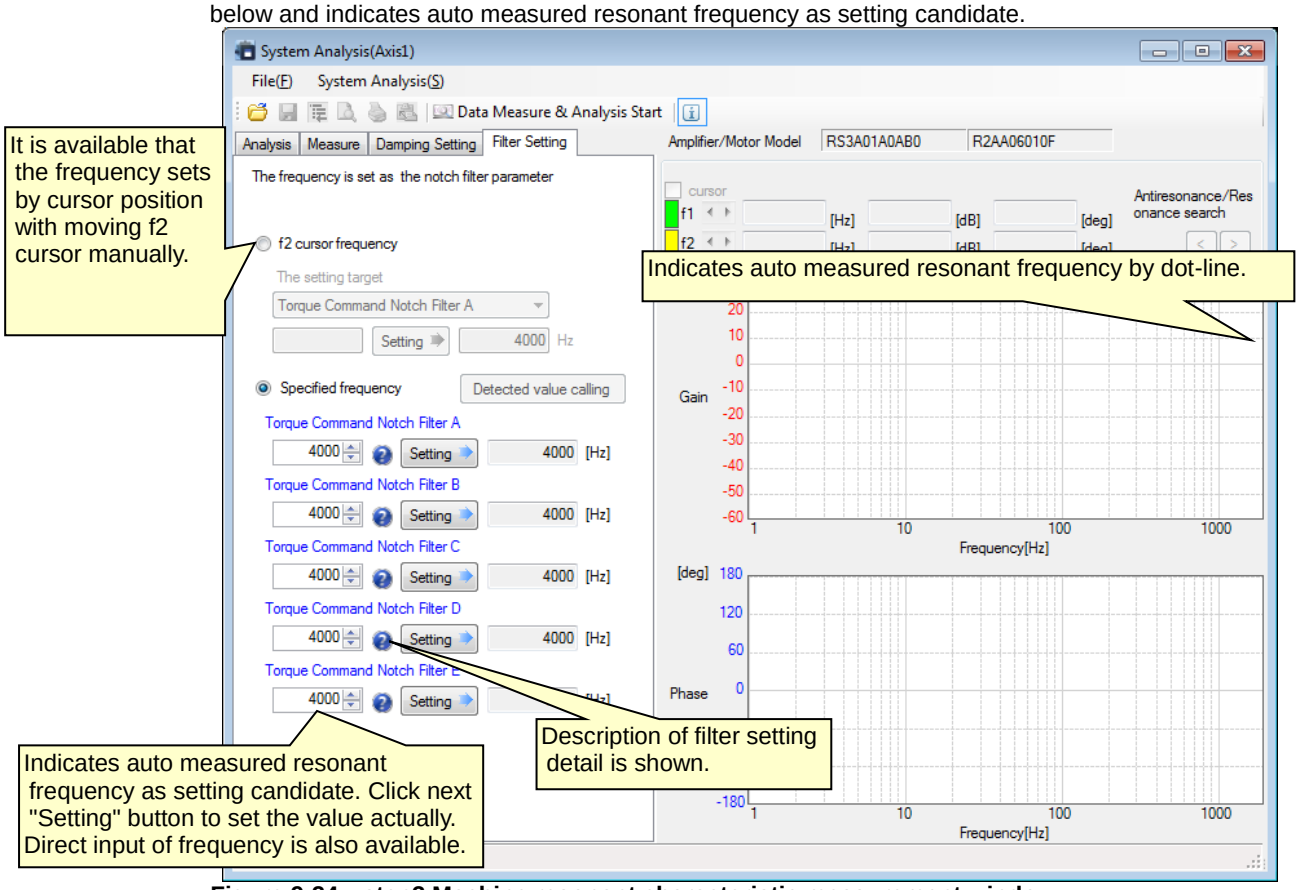


Figure 9-24 step3 Machine resonant characteristic measurement window

✔ Motor will rotate actually when this function is used. Take care of safety around for operation.

✔ 100 Hz or less frequency can not set.

(C) Machine stand vibration characteristic measurement

Sets the machine stand vibration characteristic. In case of known anti-resonant/resonant frequency of machine stand, set the value directly, and then click "Next>" button. In case of unknown anti-resonant/resonant frequency of machine stand, machine stand vibration characteristic is able to measure. Give check mark to "Use the model-following vibration suppression control." and click "Machine stand vibration measurement" button.

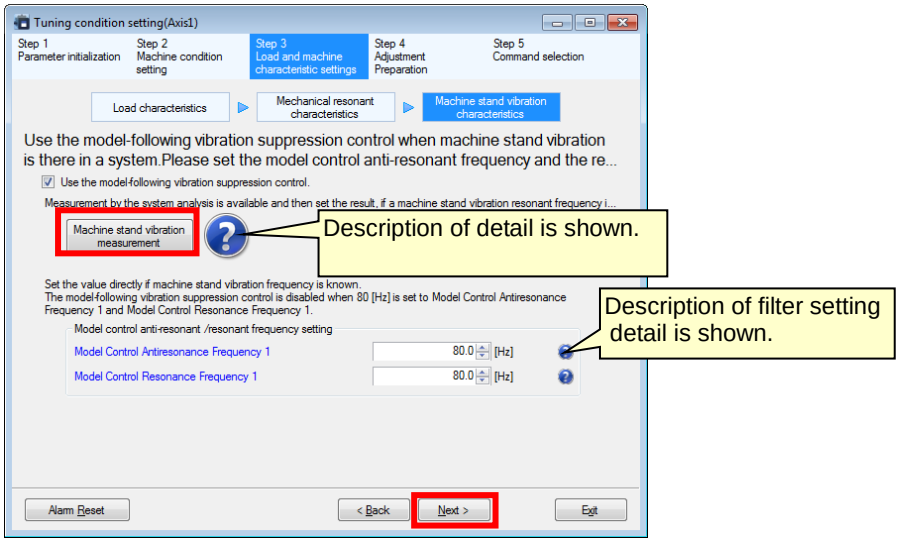


Figure 9-25 step3 Machine resonant characteristic setting window

Indicates measurement condition setting window as below. Default torque command value is 50% of motor rated torque. Change the command value depending on the machine condition in use, activate "Servo On" button, and then click "Execute" button.

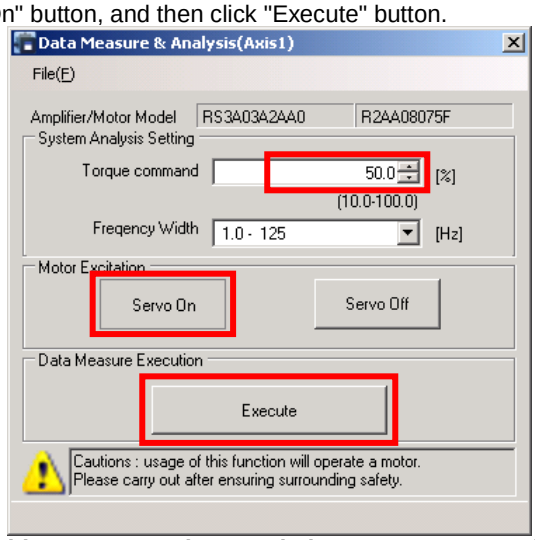


Figure 9-26 step3 Machine resonant characteristic measurement and Analysis window

When measurement completed normally, displays system analysis measurement result window like below and indicates auto measured resonant frequency as setting candidate. Confirm set value, and correct it if needed, and then close the window.

Not only auto measurement but also set by cursor position or direct input are able to set frequencies.

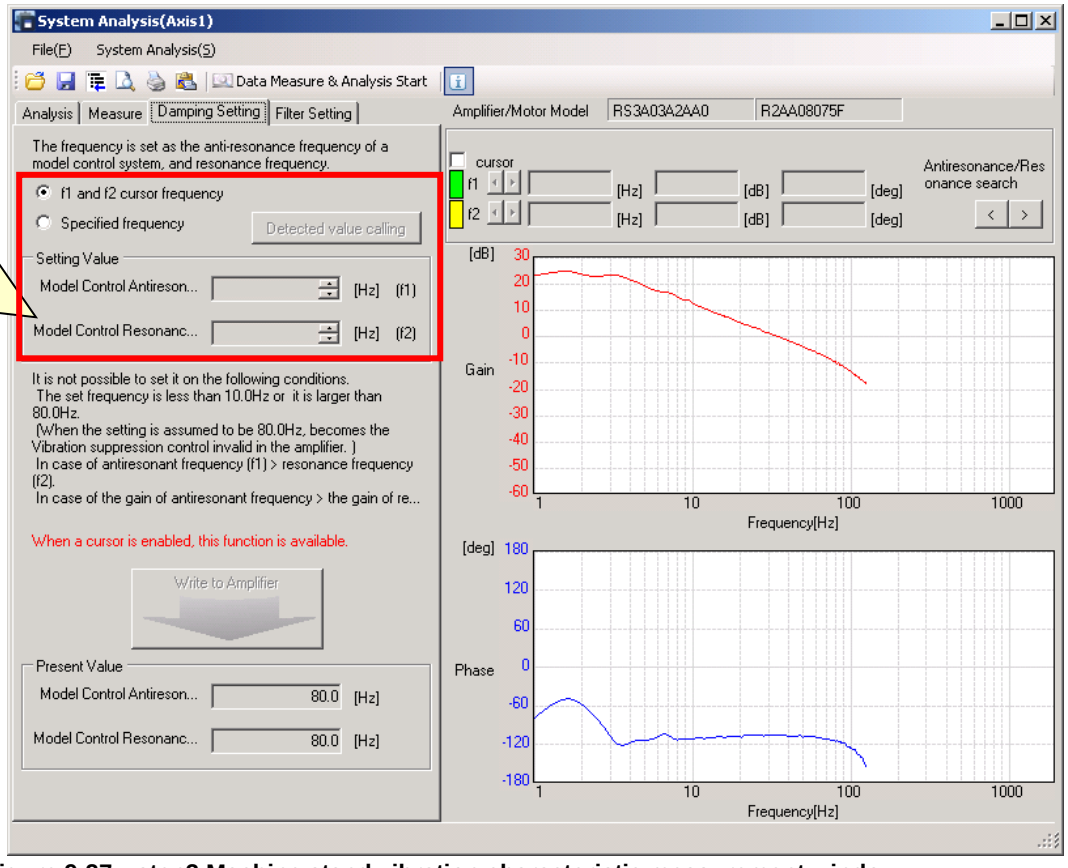


Figure 9-27 step3 Machine stand vibration characteristic measurement window

✔ Motor will rotate actually when this function is used. Take care of safety around for operation.
✔ The value can not set if measured value is out of setting range, or not satisfied setting condition.

(4) **Step4: Adjustment preparation**

Confirm machine characteristics setting and optimum real-time auto tuning setting.

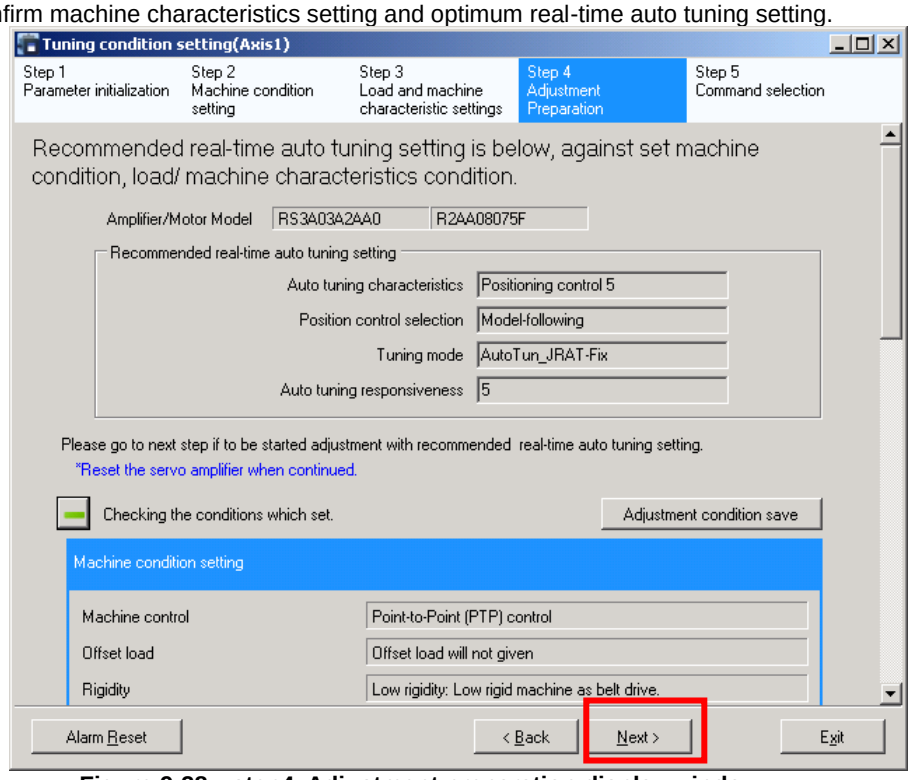


Figure 9-28 step4 Adjustment preparation display window

Click "Next>", if settings have no problem. Click "<Back" if settings have problem, and set again. Amplifier will reboot with set condition when "Next>" button is clicked. In case of use of pulse encoder or of amplifier with safety module, please make control power cycle manually.

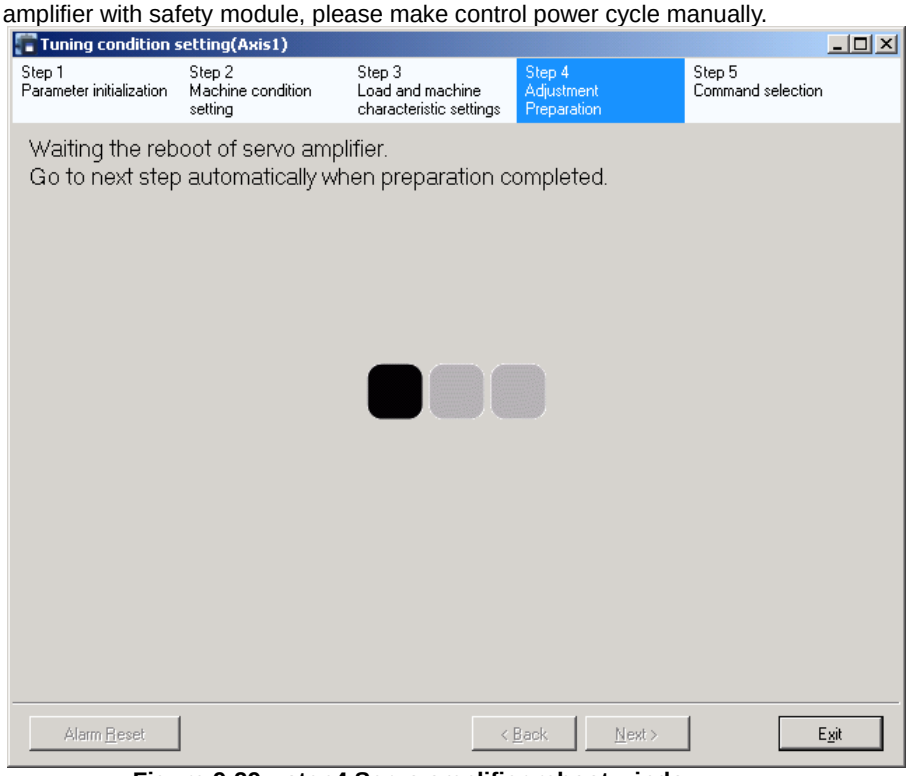


Figure 9-29 step4 Servo amplifier reboot window

(5) **Step5: Command selection**

Selects the input command at tuning. Click "Operate by the internal command of servo amplifier" when perform tuning with internal positioning operation function of servo amplifier, or click "Operate by the command of upper controller" when input command from upper controller.

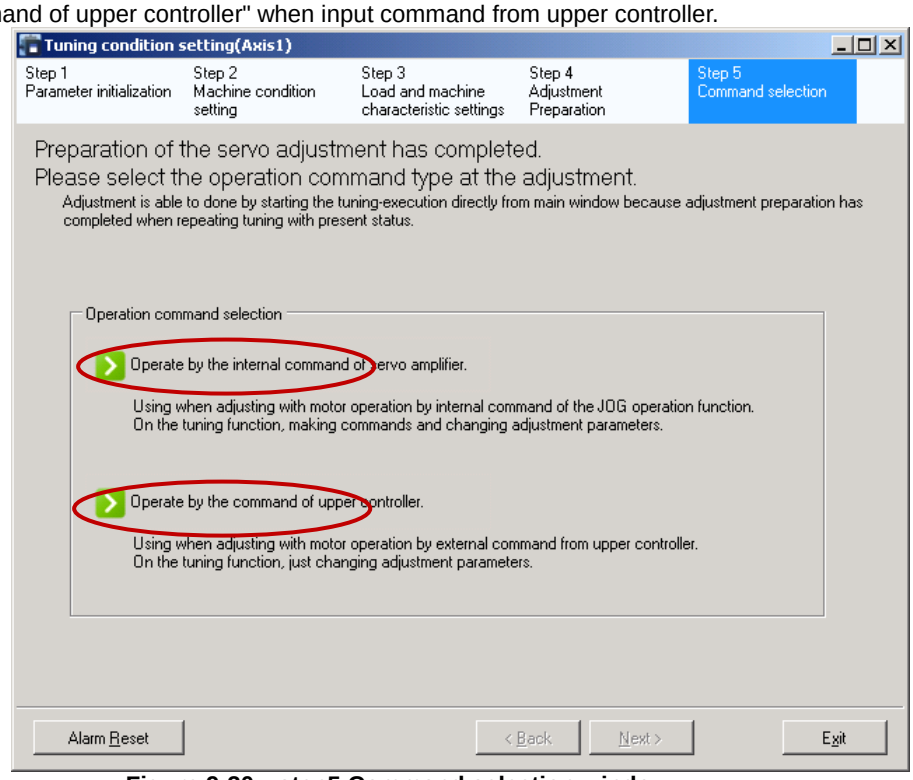


Figure 9-30 step5 Command selection window

3) Start Tuning (JOGCMD)

Perform servo tuning using internal positioning operation function of servo amplifier, without upper controller. Follow the sequence below.

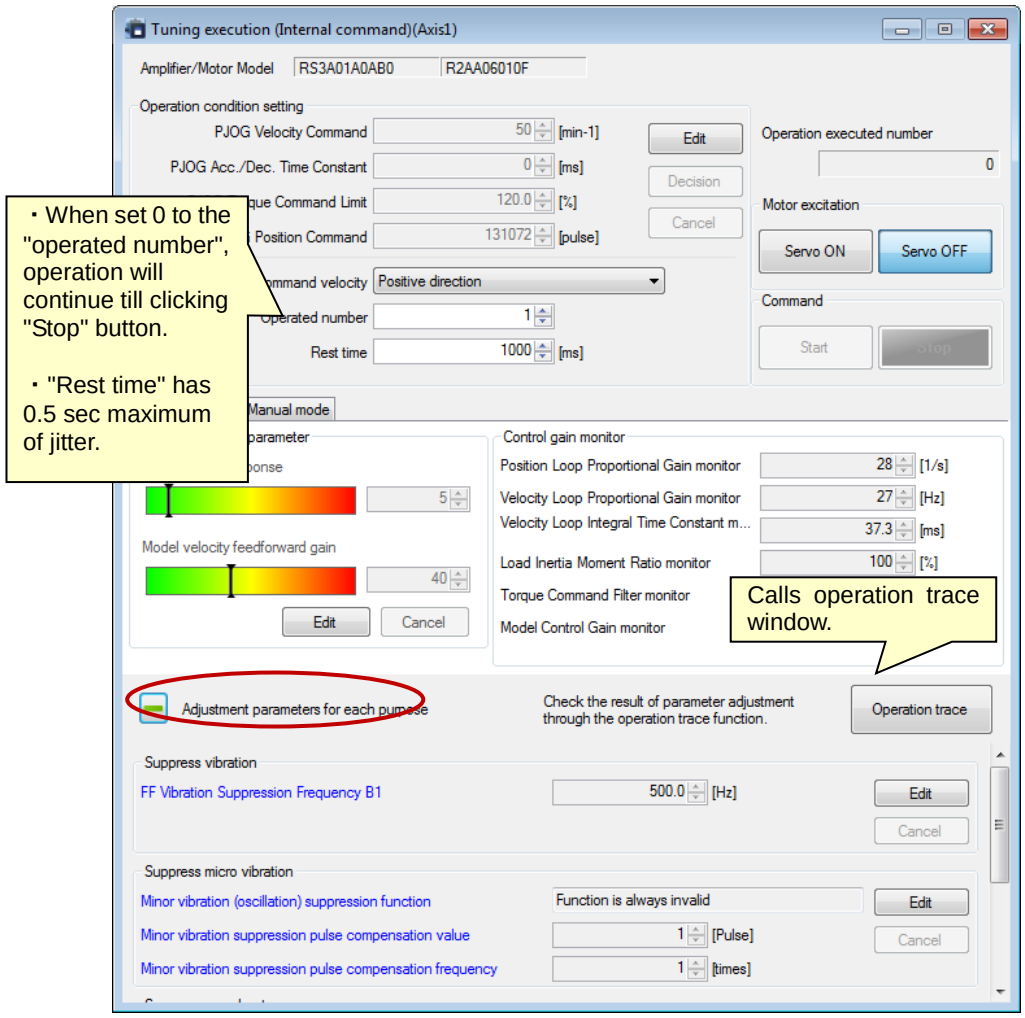


Figure 9-31 Start Tuning (JOGCMD) window

✔ Motor will rotate actually when this function is used. Take care of safety around for operation.

(1) Tune by Basic adjustment parameter

Tuning by Basic adjustment parameter shown in the window. Tune with checking operation waveform at the operation trace window.
Basic adjustment parameters depend on selection of machine control.

・Selects Point-to-point (PTP) control・・・ ① Auto tuning response
② Model velocity feedforward gain

・Selects Continuous path (CP) control・・・ ① Auto tuning response
② Velocity feedforward gain
③ Position loop proportional gain

✔ At continuous path (CP) control, please refer the position loop gain which is recommended by auto tuning response setting value, shown in screen.

(2) Tune by parameter for each purpose

When desired performance is not given by Basic adjustment parameter tune, call "parameters for each purpose" window and perform adjustment for each purpose.

(3) More improvement of performance is needed

When desired performance is not given by "parameters for each purpose", manual servo tuning is needed.

4) Start Tuning (EXTCMD)

Perform servo tuning using upper controller. Follow the sequence below.

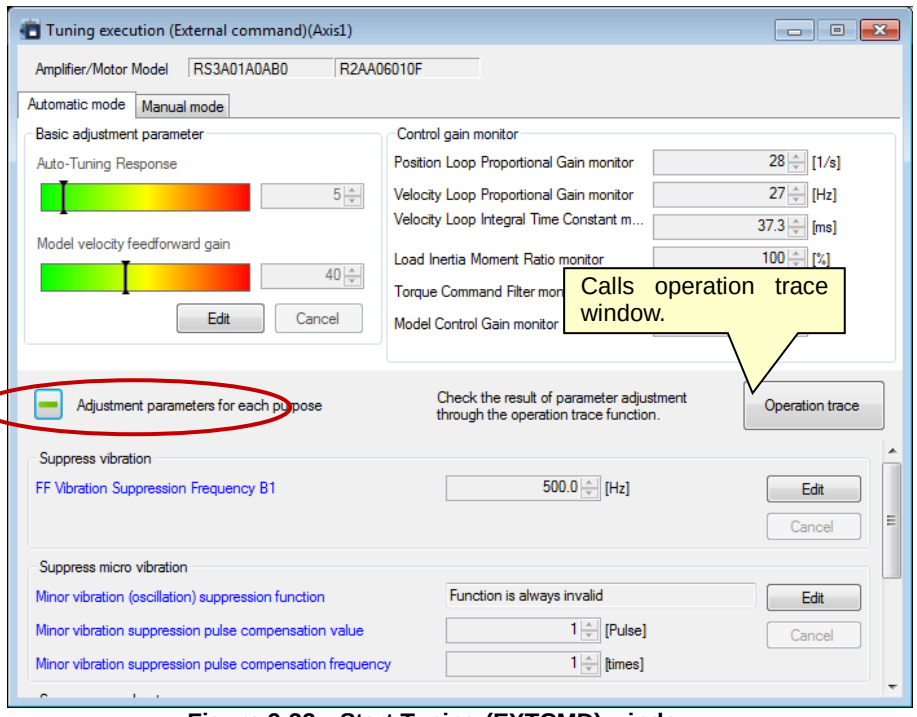


Figure 9-32 Start Tuning (EXTCMD) window

(1) Tune by Basic adjustment parameter

Tuning by Basic adjustment parameter shown in the window. Tune with checking operation waveform at the operation trace window.
Basic adjustment parameters depend on selection of machine control.

・Selects Point-to-point (PTP) control・・・
① Auto tuning response
② Model velocity feedforward gain

・Selects Continuous path (CP) control・・・
① Auto tuning response
② Velocity feedforward gain
③ Position loop proportional gain

✔ At continuous path (CP) control, please refer the position loop gain which is recommended by auto tuning response setting value, shown in screen.

(2) Tune by parameter for each purpose

When desired performance is not given by Basic adjustment parameter tune, call "parameters for each purpose" window and perform adjustment for each purpose.

(3) More improvement of performance is needed

When desired performance is not given by "parameters for each purpose", manual servo tuning is needed.

5) Manual tuning mode

If adjustment by auto-tunig mode is not enough, change each parameters individually for servo tuning (Manual tuning mode). Follow the sequence below.

(1) Switch to manual mode

Click manual mode tab in the Tuning execution window.

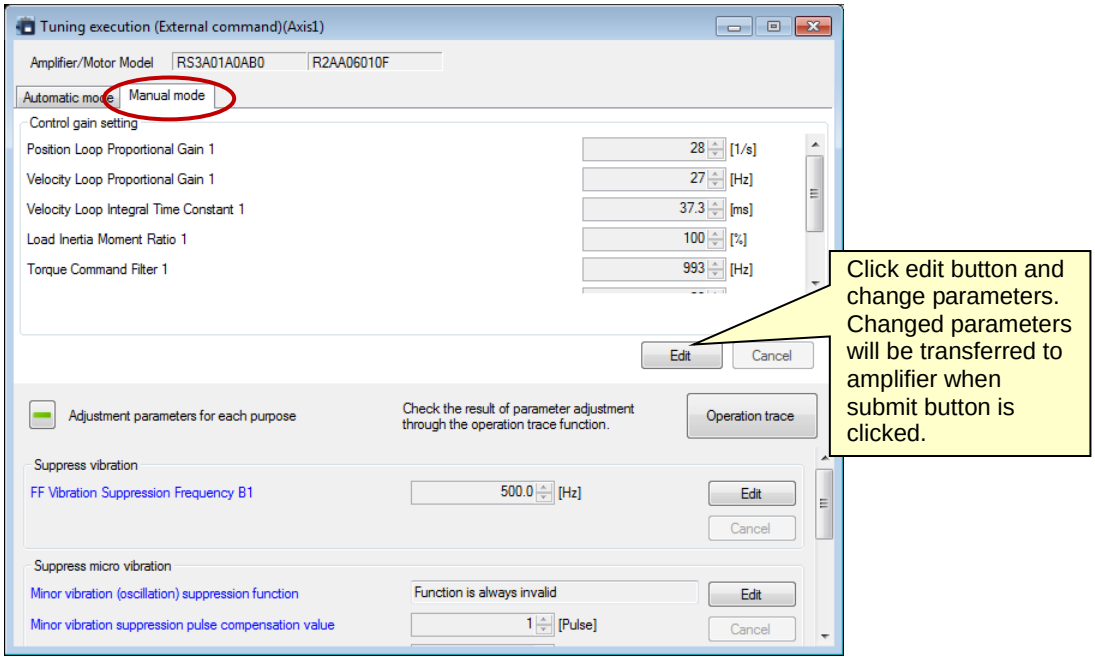


Figure 9-33 Manual tunig window

Mode change confirmation window is shown. Click OK if there is no problem on changed setting.

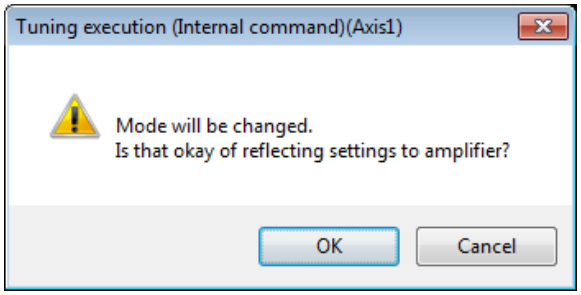


Figure 9-34 Mode change confirmation window

(2) Tuning in manual mode

Automatic mode values are reflected when switch to manual mode. Start tuning in manual mode from automatic mode values.

Changeable parameters:

① Position loop proportional gain
② Velocity loop proportional gain
③ Velocity loop integral time constant
④ Load inertia ratio
⑤ Torque command filter
⑥ Model control gain

Below parameters also changeable but there is no automatic mode values reflection when switch to manual mode.

① Velocity feedforward gain
② Velocity feedforward filter

✔ "Parameters for each purpose" are effective in manual mode also. Perform the tuning meets each purpose, for more performance improvement.

9.5 Saving Result of Adaptive Notch Filter

Save the notch filter frequency estimated by Adaptive notch filter as fixed value.

1) How to start up

Adaptive notch filter result saving window is start by either way below.

(A) Select "Saving the Adaptive notch filter result" through "Servo tuning" from the Sub menue in Main window.

(B) Select in the following order of ”Function(F)” - ” Servo Tuning (T)” - ”Saving the Adaptive notch filter result (A)” in the menu bar in Main window.

2) How to operate

(1) Confirm the monitor value, and click "Save" button.

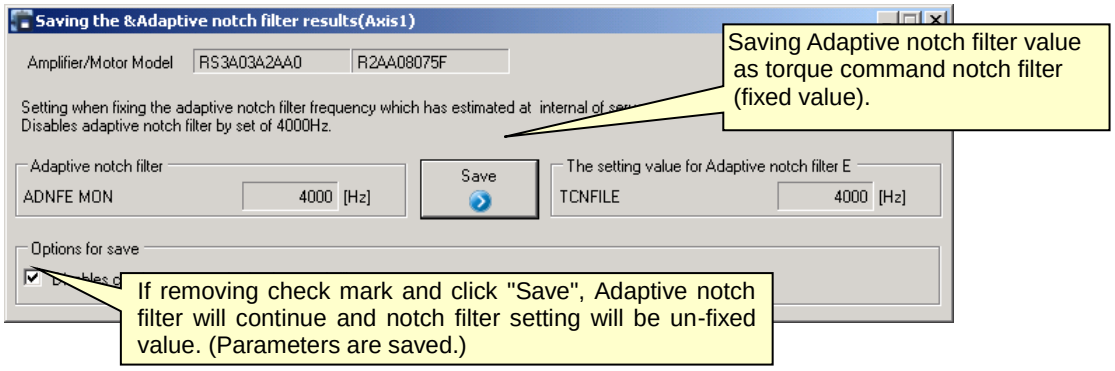


Figure 9-35 Adaptive notch filter results saving window

(2) Click close button on the right above of window for exit.

10. Measurement

This function can perform the following:

- Shows graphically operating states. (as Operation Trace)
- Scrolls operation data in real time to check conditions. (as Operation Scrolling)
- Checks mechanical frequency characteristics. (as System Analysis)
- Displays the data in flash ROM from stored inside amplifiers. (as Drivie Recorder)

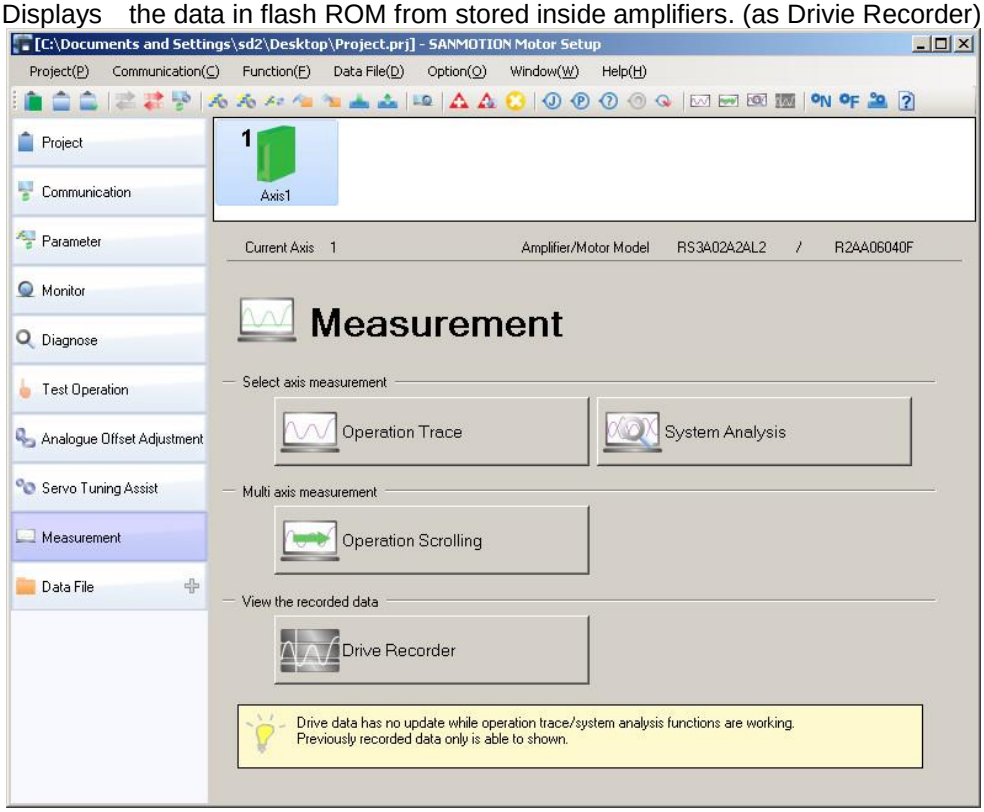


Figure 10-1 Measurement menu window

10.1 Operation Trace

This function shows operational state in waveform display on an oscilloscope. This monitors operational state when adjusting servo.

✔ Saved file shall not save again via Excel etc. Format is different so the file will be disabled to read by this software.

1) How to start up

You can start up the window for operational tracing in any if the following procedures:

(A) Select “Operation Trace” through “Measurement” from Sub menu in Main window.

(B) Select in the following order of ”Function(F)” -”Measurement(S)” - ”Operation Trace(T)” in the menu bar in Main window.

(C) Click on the icon “Operation Trace”  in the Toolbar in Main window.

When Axis-selecting window is shown, select the axis number you perform Operation Trace.

2) How to operate

(1) The following Operation Trace window is shown. To change various conditions for tracing, click “Trace conditions” tab.

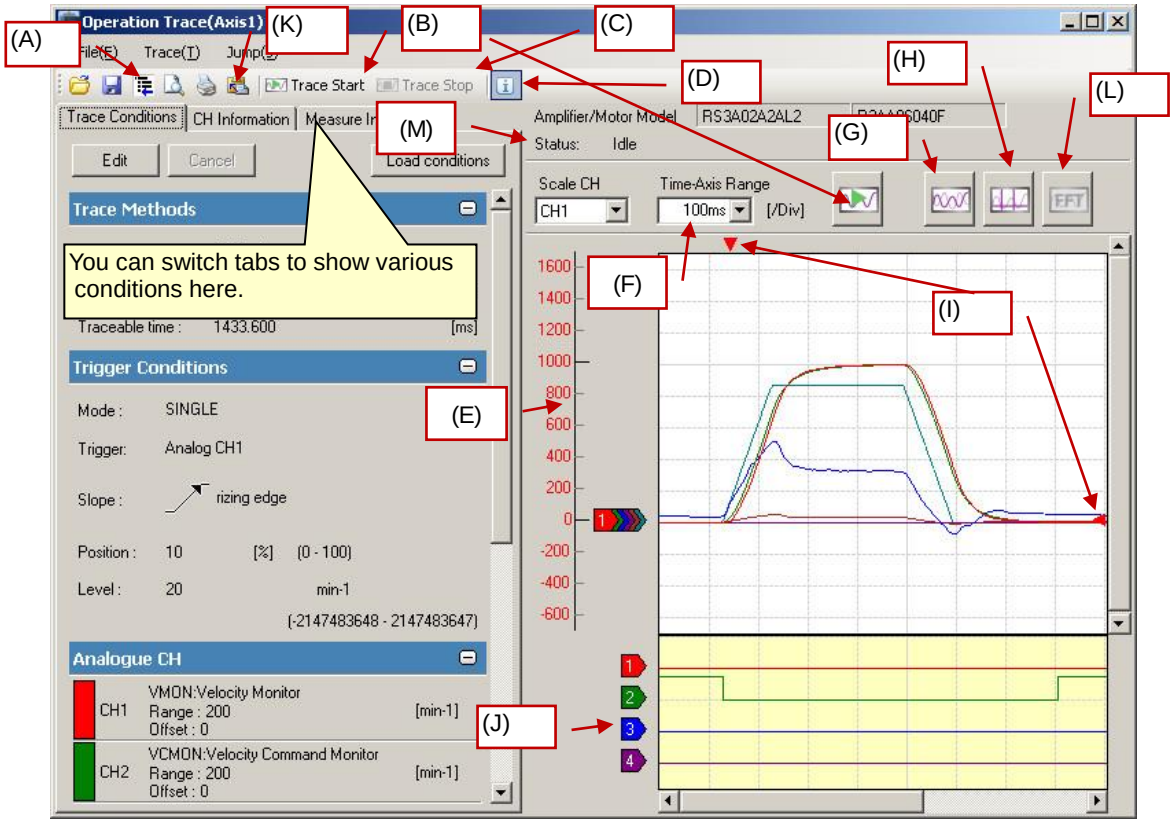


Figure 10-2 Operation Trace window (Trace conditions tab)

(A)	Addition to a project	:	Registers and stores measured data to the data files of projects.
(B)	Trace Start	:	Starts tracing operation in set conditions.
(C)	Trace Stop	:	Stops tracing operation.
(D)	Toggle display information area	:	Selects display/non-display of info-display area.
(E)	CH-scale	:	Displays CH-scale selected via Scale CH. Make sure this is just the CH-scale selected via Scale CH, not linked to other CH-scales.
(F)	Time-axis Range	:	Sets time axis.
(G)	Display waveforms overlapped	:	Clicking this displays waveforms overlapped.
(H)	Call cursor window	:	Clicking this displays cursor-related setting in a new window.
(I)	Trigger position	:	Shows trigger positions in vertical and horizontal directions respectively.
(J)	Display zero-level position	:	Shows zero-level positions for each CH.
(K)	Paste to clipboard	:	Copies tracing conditions and measured waveforms to clipboard.
(L)	FFT	:	Executes FFT-analysis between cursors. Setting analysis period with cursor is needed to enable this button.
(M)	Monitor states	:	Displays present tracing state.

(2) Clicking “Set tracing conditions” shows the follwing window for setting operational tracing conditions. Check each condition in the window to set. After setting, clicking “OK” button can diable the changes in the settings. After changing setings, clicking “Trace Start” button starts sampling.

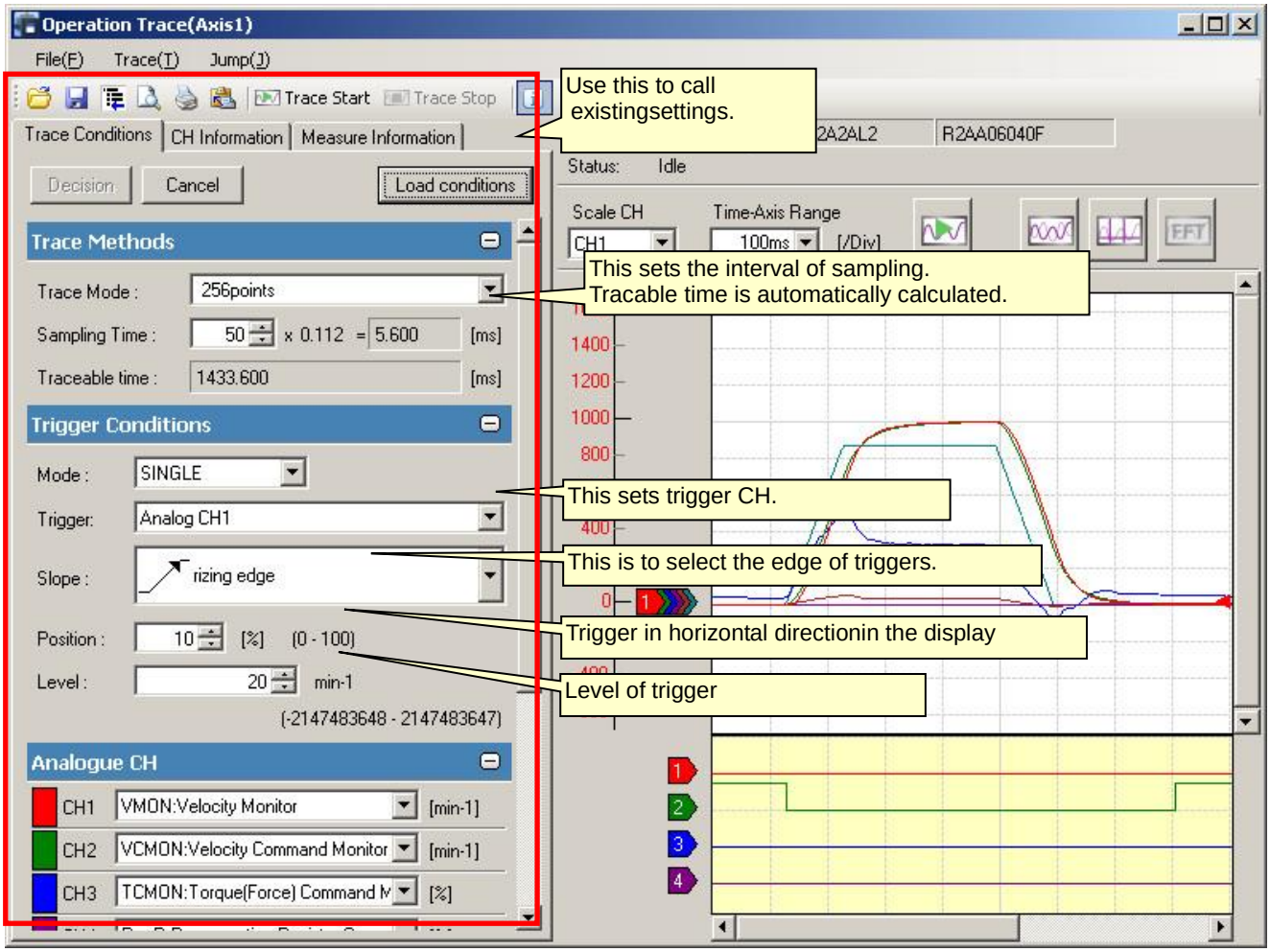


Figure 10-3 Window displaying tabs for setting tracie conditions

- ✔ The following data can be selected only with CH1, 3, and 5. When selecting these data, each CH of CH2, 4, and 6 cannot be selected.
  1) Monitor positions (for motor)
  2) Monitor positions (for external devices)
  3) Position command integrated value
  4) PS data of motor serial-type encoder
- ✔ Analog 6 channels are selectable when buffering point is 256.
- ✔ Only analog 3 channels are selectable when buffering point is 512.
- ✔ Only analog 1 channel is selectable when buffering point is 1024.

(3) This is the case of making “Channel infomation tab” being shown.

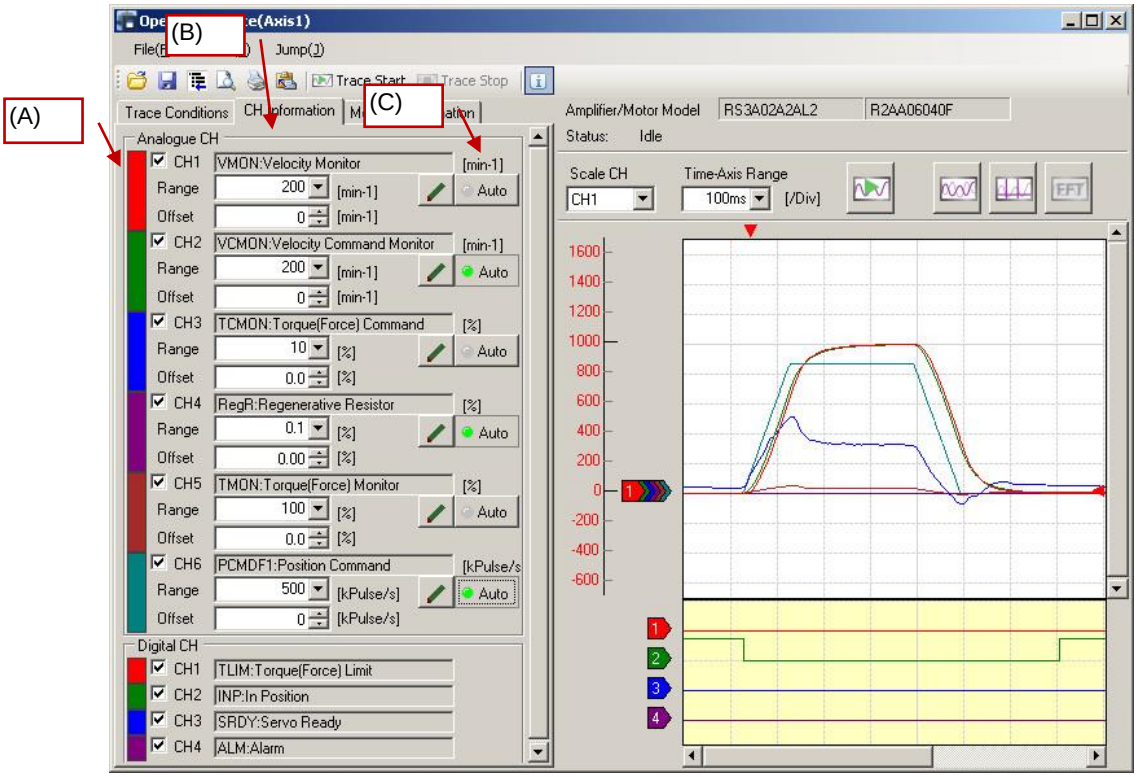


Figure 10-4 Operation trace window (CH information tab)

(A) Select display : Shows graphically the channels checked.

(B) Waveform items : Shows the signal names selected each channel. Signal range and off-set are set here.

(C) Auto : Clicking “Auto” button automatically set range and off-set to show them graphically.

(4) This is the case of making “Measure Information tab” being shown.

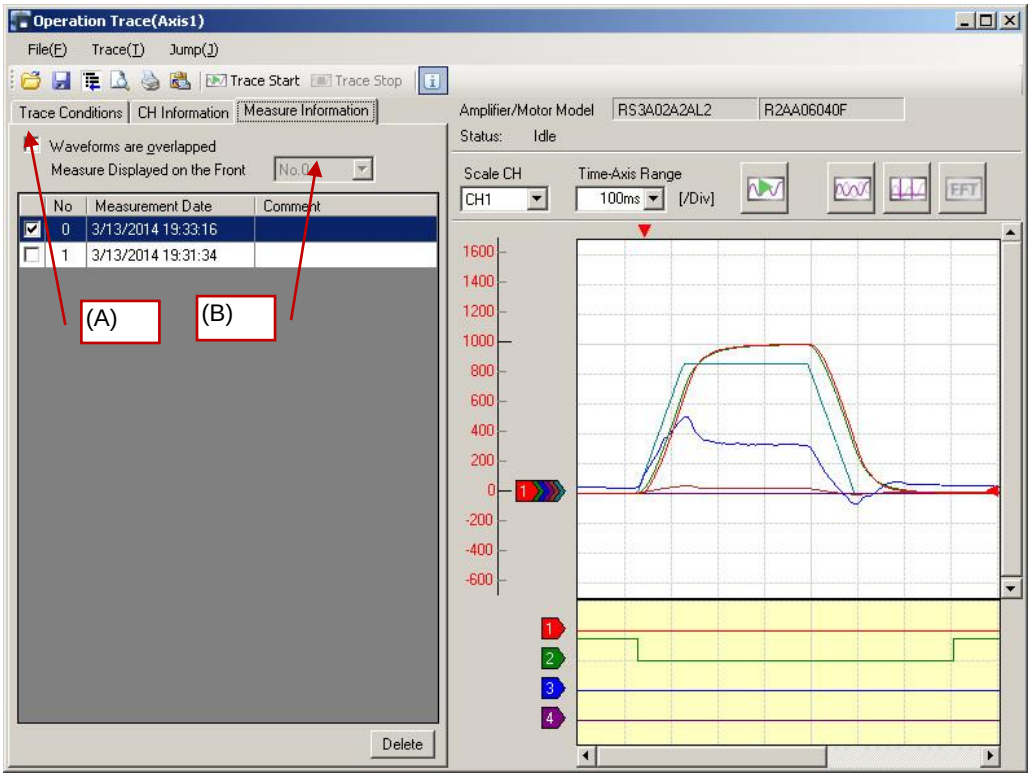
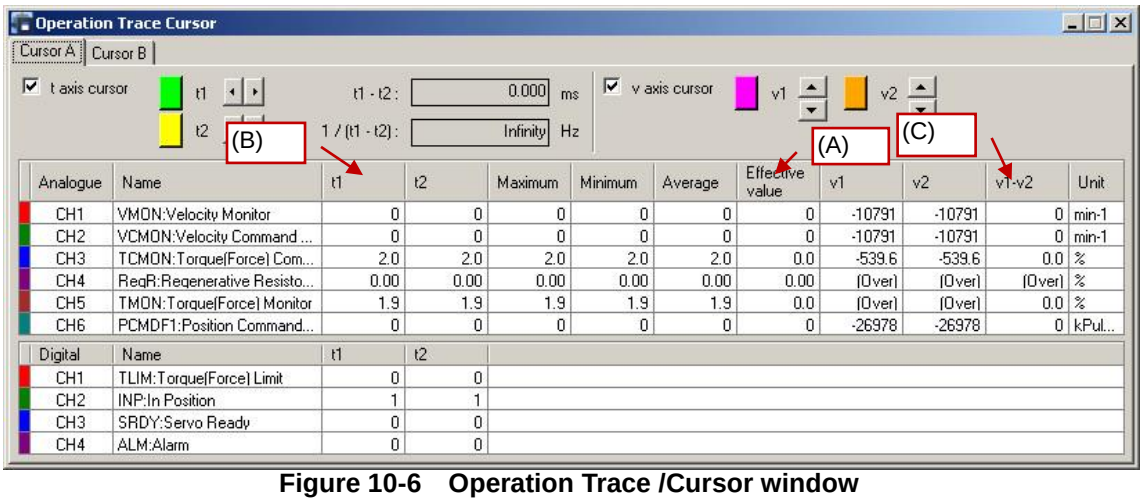


Figure 10-5 Operation trace window (measure information tab)

(A) Overlapping waveforms : Display this time measured waveform overlapped on previously measured Waveform.

(B) Data displayed on top : Shows selected waveforms in solid line.

(5) Clicking “Display cursor window” button displays Cursor window, automatically calculating data on cursor positions, time/data difference between cursors, Max/Min values, andeffective value.



Analogue	Name	t1	t2	Maximum	Minimum	Average	Effective value	v1	v2	v1-v2	Unit
CH1	VMON:Velocity Monitor	0	0	0	0	0	0	-10791	-10791	0	min-1
CH2	VCMON:Velocity Command ...	0	0	0	0	0	0	-10791	-10791	0	min-1
CH3	TCMON:Torque(Force) Com...	2.0	2.0	2.0	2.0	2.0	0.0	-539.6	-539.6	0.0	%
CH4	RegR:Regenerative Resisto...	0.00	0.00	0.00	0.00	0.00	0.00	(Over)	(Over)	(Over)	%
CH5	TMON:Torque(Force) Monitor	1.9	1.9	1.9	1.9	1.9	0.0	(Over)	(Over)	0.0	%
CH6	PCMDF1:Position Command...	0	0	0	0	0	0	-26978	-26978	0	kPul...

Digital	Name	t1	t2
CH1	TLIM:Torque(Force) Limit	0	0
CH2	INP:In Position	1	1
CH3	SRDY:Servo Ready	0	0
CH4	ALM:Alarm	0	0

Figure 10-6 Operation Trace /Cursor window

(A) Effective value : Displays results of calculation for data between cursors in axis t of CH.

(B) Cursor position data : Displays data values designated with cursor t1.

(C) Cursor differential data : Displays data differential designated with v1-v2 in vertical cursor.

(6) Clicking FFT button executes FFT-analysis.
Note that without setting the period you want to analyze, you cannot enable this button.
At first, select the analog channel you execute, and then click “OK” button.

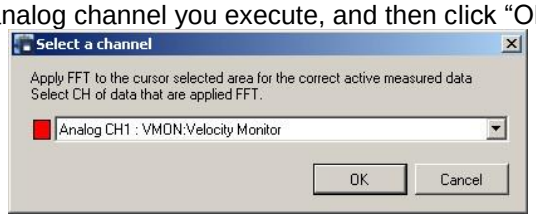


Figure 10-7 Operation trace - Window for selecting FFT-analysis channel

FFT-analysis results are shown.

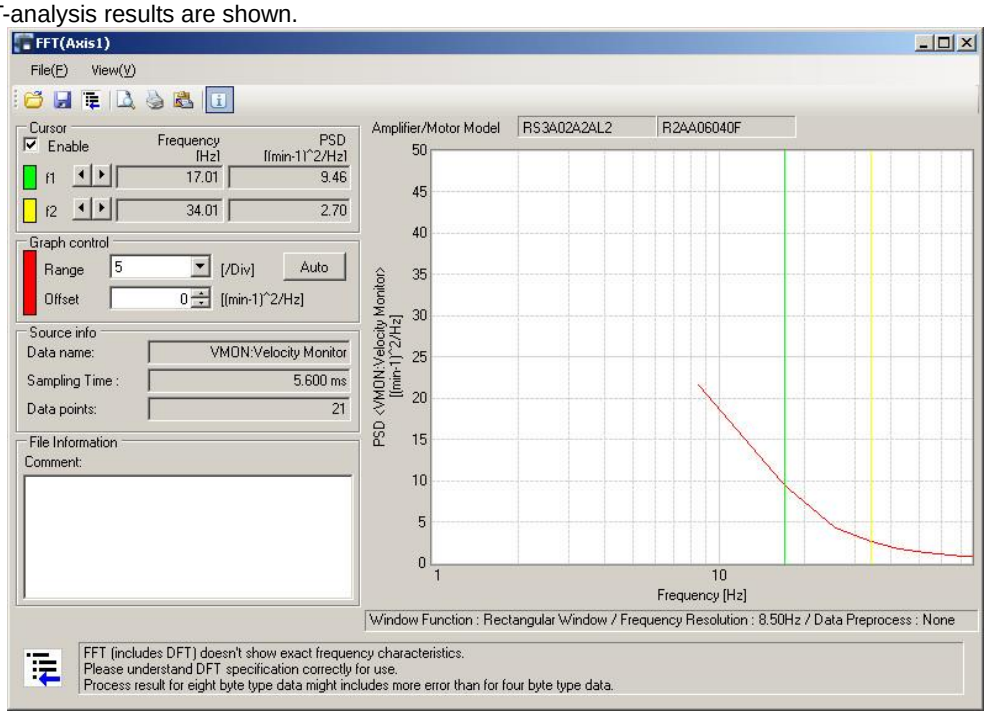


Figure 10-8 Operation trace / FFT-analysis window

10.2 Operation scrolling

This function displays operation states in waveform in real time.
When connecting multiple axes, you can display waveforms of each axis at the same time.

- ✔ Sampling time is limited depending on the throughput of PCs you use.
- ✔ Saved file shall not save again via Excel etc. Format is different so the file will be disabled to read by this software.

1) How to start up

You can start up Operation Scrolling window in any of the following procedures:

(A) Select “Operation Scrolling” through “Measurement” from Sub menu in Main window.
(B) Select in the following order of ”Function (F)” - ”Measurement (S)” - ”Operation Scrolling(S)” in the menu bar in Main window.
(C) Click on the icon “Operation Scrolling” in the Toolbar in Main window.

The window asking to select whether on-line display (check the states of amplifiers you connected) or off-lone display (check the states already measured) depending on situation, select applicable one.

2) How to operate

(1) The following operation scrolling window is shown. To change conditions for obtaining waveform, click “Scrolling Conditions tab”.

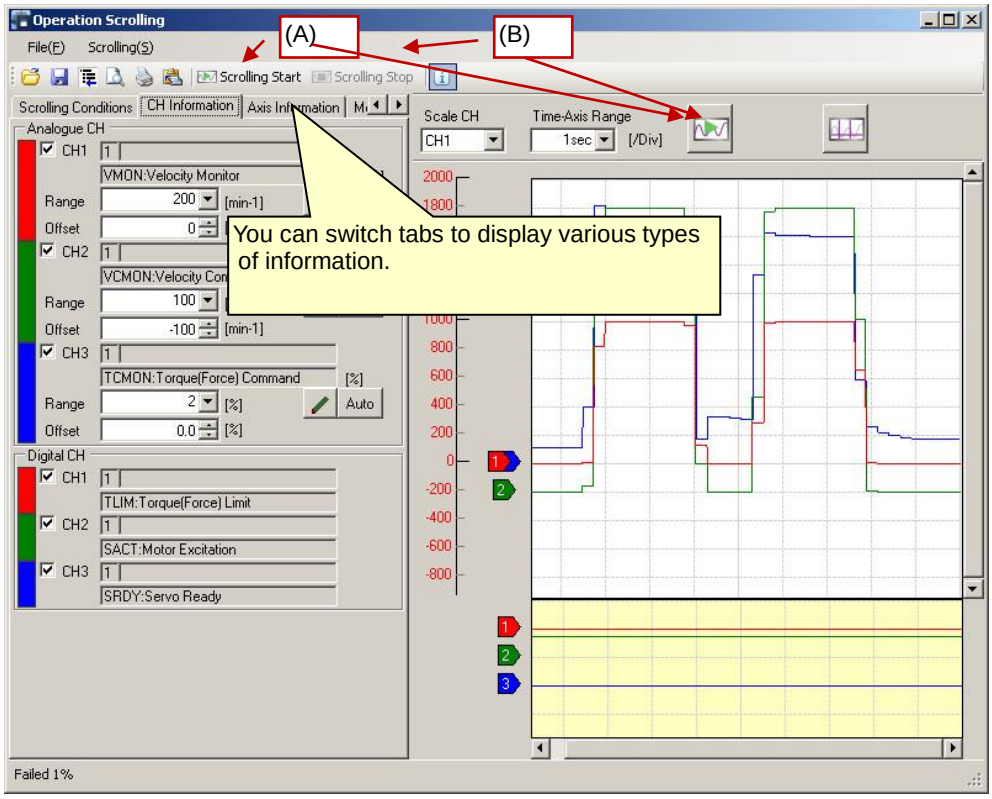


Figure 10-9 Operation scrolling window

A) Start scrolling : Starts scrolling operation in set conditions.
B) Stop scrolling : Stop scrolling operation.

(2) The following shows Operation Scrolling conditions window.

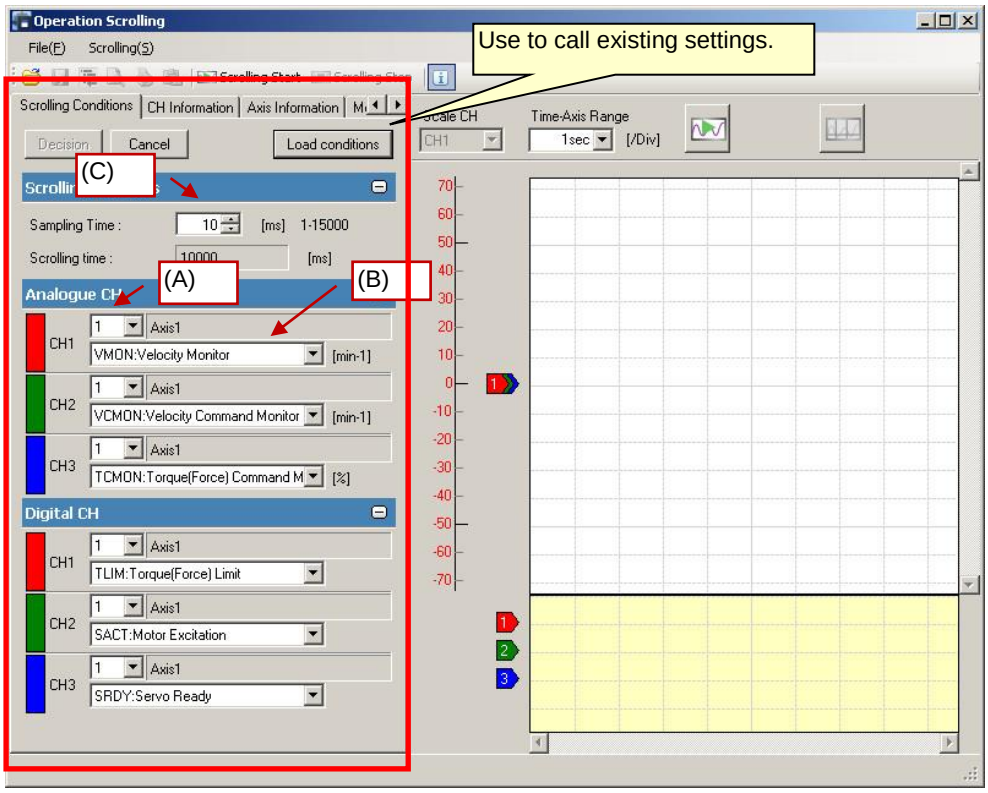


Figure 10-10 Operation Scrolling Conditions setting window

(A) Select axis : Selects the axis of servo amplifier/drivers you want to show.
(B) Select item : Displays the signal names selected by each channel. The range and off-set of signals are set here.
(C) Sampling cycle : Sets the cycles of requesting data for to servo amplifiers. Note that when using PCs with low throughput and set the cycles to small value, the behavior is extremely slow. Total number of sampling is 1000. Scrollable time is automatically calculated.

- ✔ FFT-analysis is not available.
- ✔ You can obtain waveforms in axis-wide, however up to 3 channels of both analog and digital are available to obtain at the same time.
  Note that the times to obtain data among channels are not the same timing.
- ✔ The number of data is a maximum of 1000. Data which is over 1000 should be overwritten.
- ✔ The other operation methods follow tracing operation.

10.3 System Analysis

System analysis function can easily perform system analysis by operating a servo amplifier and motor several hundreds ms to for several tens of seconds.

- ✔ Make sure to keep the safety around the system you operate as servo motors move.
- ✔ When any of amplifier alarm occurs during executing this function, motor excitation is turned off. Make sure to perform this function after ensuring necessary braking equipment is ready to operate.
- ✔ This function is not allowed if the tandem operation is used.
- ✔ Saved file shall not save again via Excel etc. Format is different so the file will be disabled to read by this software.

1) How to start up

You can start up System analysis window in any of the following procedures:

(A) Select “System Analysis” through “Measurement” from the Sub menu in Main window.

(B) Select in the following order of ”Function (F)” - ”Measurement (S)” - ”System Analysis(A)”in the menu bar in Main window.

(C) Click on the icon ”System Analysis” in the Toolbar in Main window.

When Axis-selecting window is shown, select the axes numbers you perform System analysis.

2) How to operate

(1) System analysis execution window is shown. Click “Start measuring and analyzing Data” button.

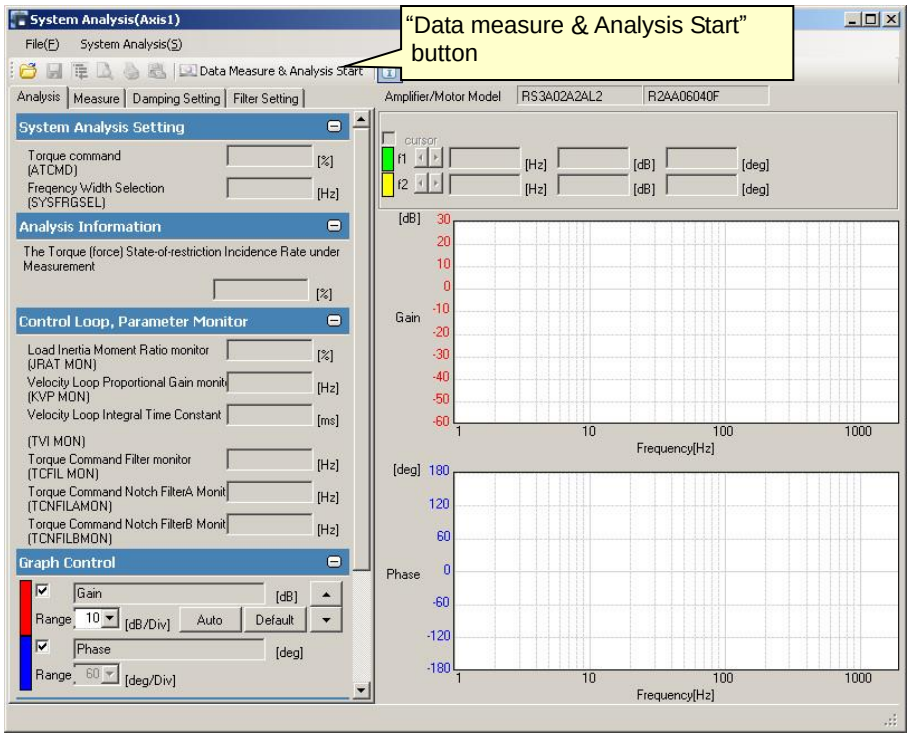


Figure 10-11 System Analysis execution window

(2) The following Window confirming to execute is shown. If it is OK to execute, click “OK” button, to cancel, click “Cancel” button.

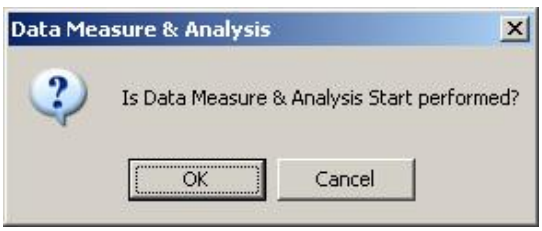


Figure 10-12 Window confirming System analysis to execute

(3) Data measure & Analysis window is shown. Set the conditions for measuring.

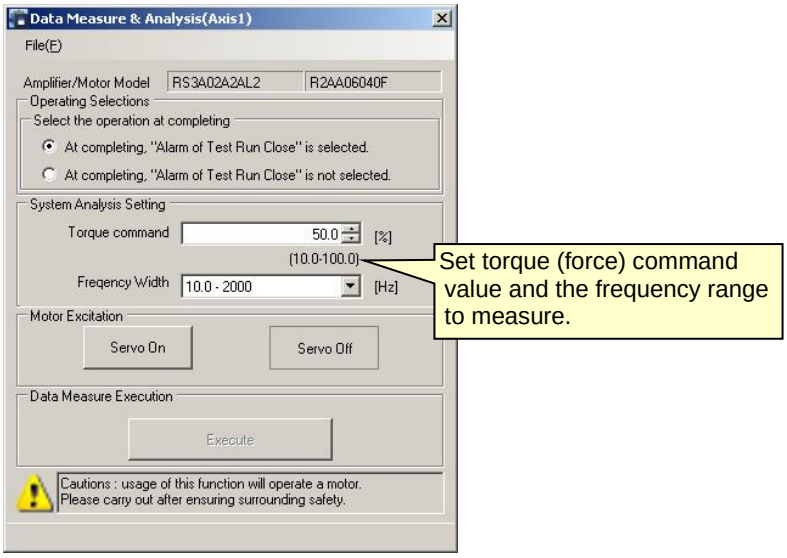


Figure 10-13 Data measure & Analysis window

(4) After setting conditions, make sure that no problem with that motors move, and then click “Servo On” button. After that motor excitation starts and “Execute” button becomes enabled.

(5) Clicking “Execute” button starts measuring. The execution state is shown in the progress bar.

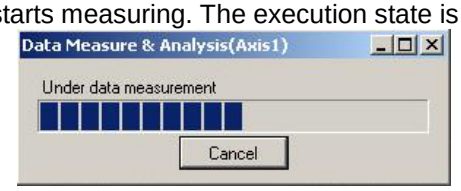


Figure 10-14 System analysis data read-in window

(6) The following window is shown at the time measuring and data read-in are completed. After that click “OK” button. Motor excitation continues until “OK” button is clicked.

Figure 10-15 System analysis data/ waiting for analyzing window

(7) Now the system is analyzing data. Wait for a while.

Figure 10-16 System analysis data/ indicating data being analyzed window

(8) The results are shown graphically when the analysis completed.

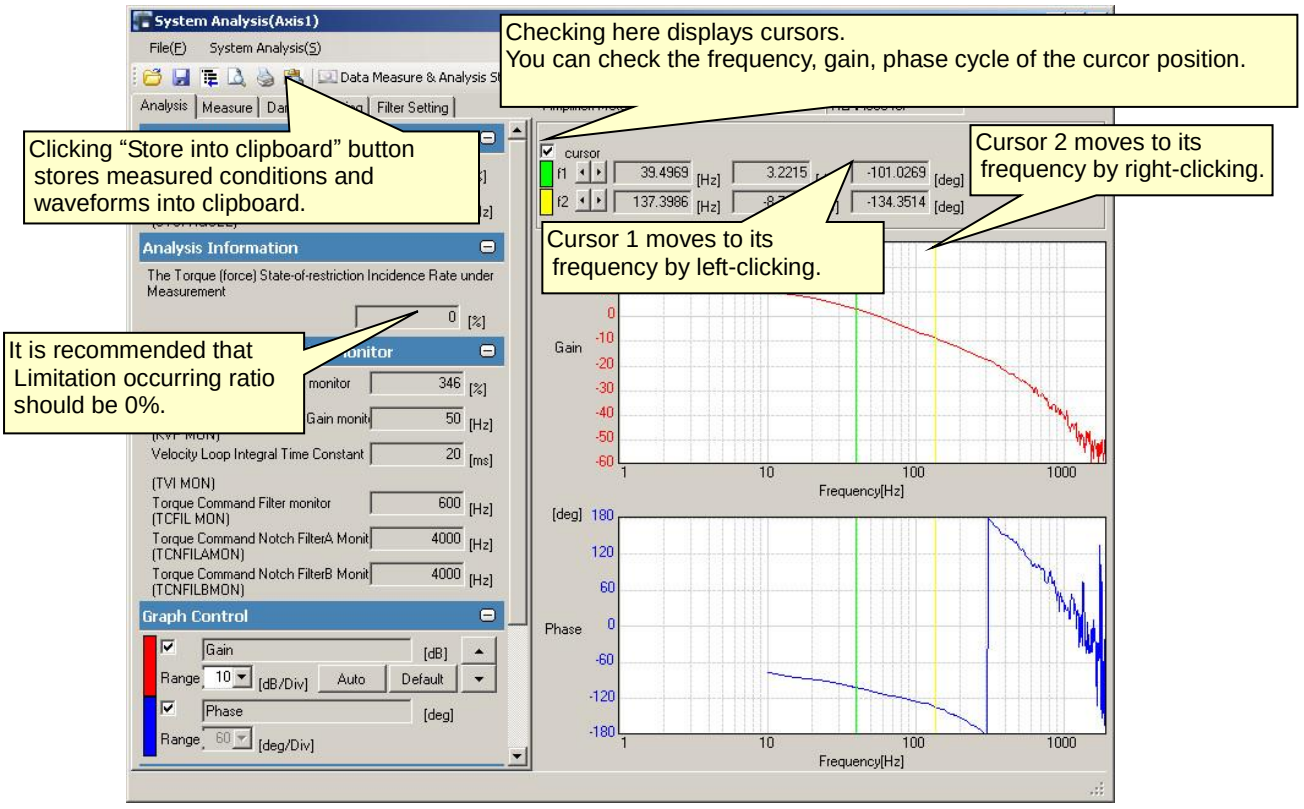


Figure 10-17 Window indicating system analysis results

✔ Adjust torque (force) command value so that the torque (force) State-of restriction Incidence Rate under Measurement being measure should be 0%.

(9) Clicking Measuring tab automatically calculates gain margin and phase margin to show them in the window. Gain margin and phase margin are shown by marker.

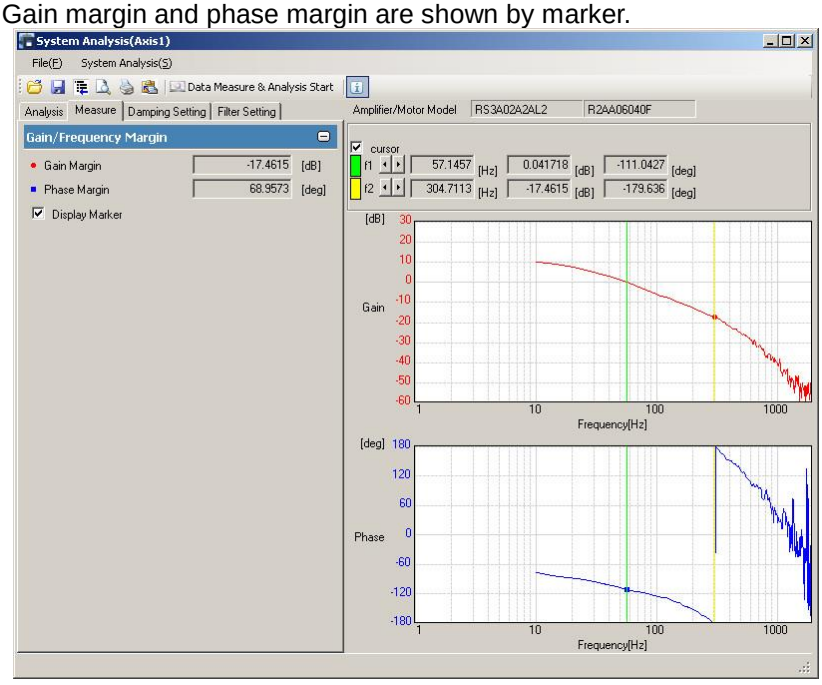


Figure 10-18 System analysis window for setting resonance/anti-resonance frequency

✔ Move the cursors by manually right- and left-clicking.

(10) This function can set Model vibration suppression anti-resonance frequency and resonance frequency according to the graphical results.
Select “Damping Setting” tab, move cursor t1(green) to the frequency you want to set as Model vibration suppression anti-resonance frequency, move cursor t2(yellow) to the frequency you want to set as Model vibration suppression anti-resonance frequency, and then click "Write to Amplifier" button. Or you can directly set frequency.

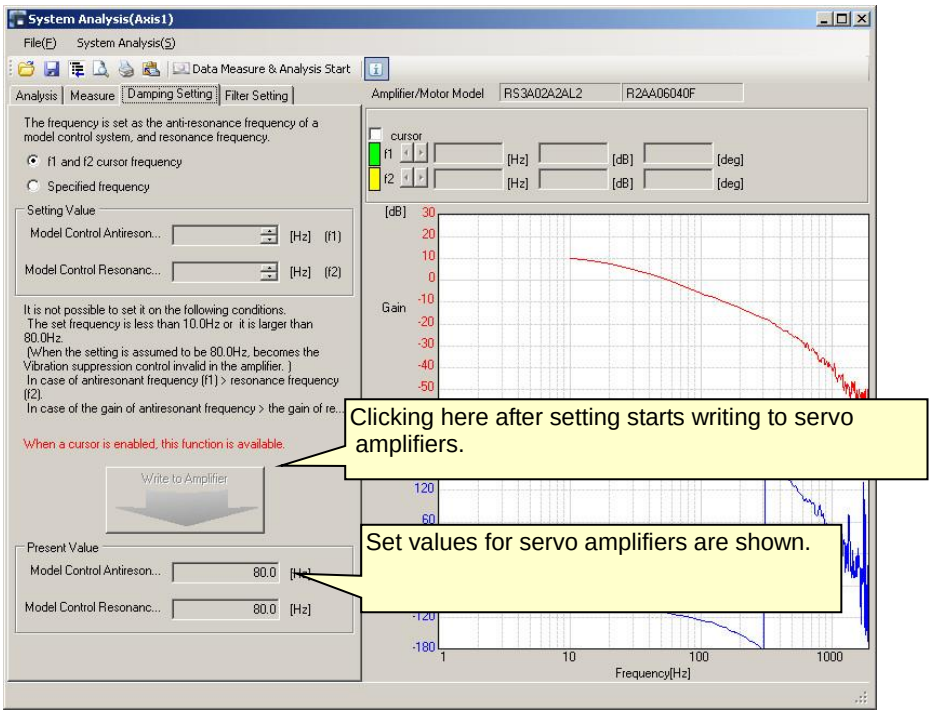


Figure 10-19 Model vibration suppression anti-resonance frequency and resonance frequency window

✔ Setting value has limitation. You cannot set the value out of the limitation range.

(11) You can set torque command notch-filter to suppress mechanical resonance frequency. Select "Filter setting" tab, and then directly input resonance frequency by using cursor or frequency. Click "Setting" button. At the same time parameters are forwarded to servo amplifiers.

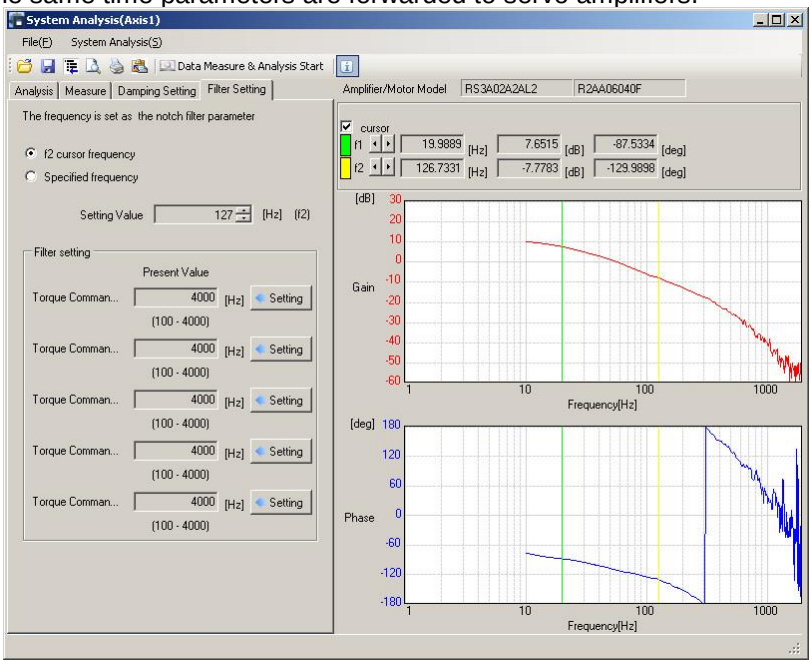


Figure 10-20 Torque (force) command notch-filter setting window

✔ Number of settable notch-filter varies depending on the specifications of servo amplifier/drivers you use.

10.4 Drive recorder

Drive recorder is a function to do the following items:
Always samples servo amplifier's operational states.
Automatically stores operational data into flash ROM inside amplifiers under set trigger conditions.
Makes it possible to check operational data subsequently.

- ✔ No all the servo amplifier/drivers have Drive recorder functions.
- ✔ You can store data over the past 16 times. The data before that should be overwritten.
  For a functional safety module, past 1 time data is shown, only. That data will be cleared when turning power OFF. Moreover, there is no limit to the frequency of storing data.
- ✔ Note that there is a limit to the frequency of storing data in flash ROM.
- ✔ You can store and access the data in files.
- ✔ Saved file shall not save again via Excel etc. Format is different so the file will be disabled to read by this software.

1) How to start up

You can start up Drive recorder window in any of the following procedures:

(A) Select "Drive recorder" through "Measurement" from Sub menu in Main window.

(B) Select in the following order of "Function (F)" - "Measurement(S)" - "Drive recorder(D)" in the menu in Main window.

(C) Click on the icon "Drive recorder"  in the Toolbar in Main window.

When Axis-selecting window is shown, select the axes numbers you check Drive recorder data.

2) How to operate

(1) Drive recorder execution window is shown. Click "OK" button to read-in the data, click "No" to cancel.

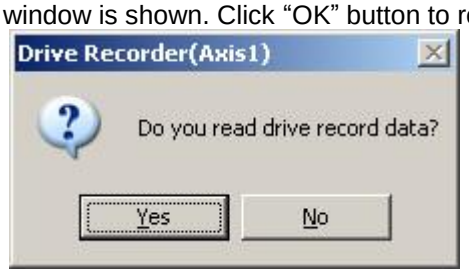


Figure 10-21 Drive recorder data read-in window

(2) Clicking "OK" button shows Data read-in window. When the number of data to read-in, it takes up to 30 seconds to read all data.

Figure 10-22 Window indicating Drive recorder data now being read-in

(3) Clicking “No” button in the (1) above, or completing data read-in shows Drive recorder list window.

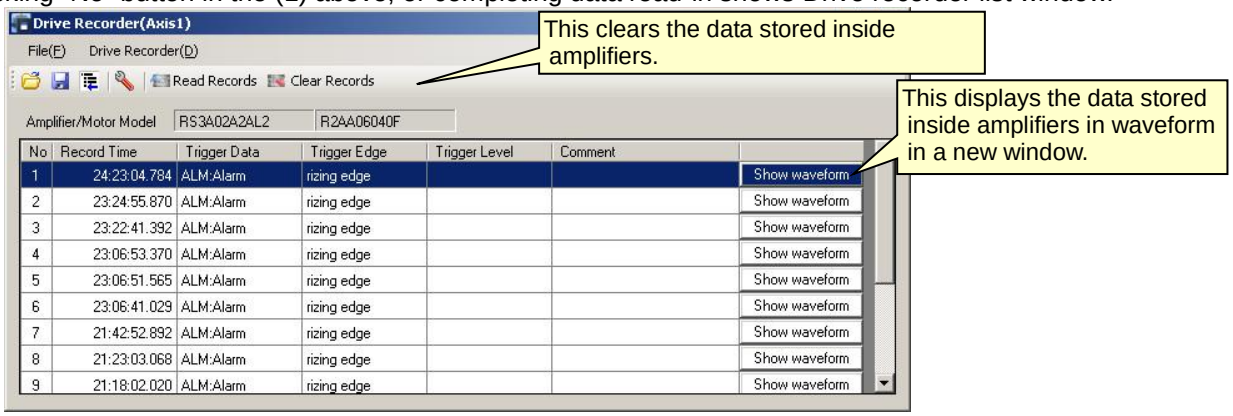


Figure 10-23 Drive recorder list window

(4) Clicking “Waveform display” displays the data selected in waveform in a new window.

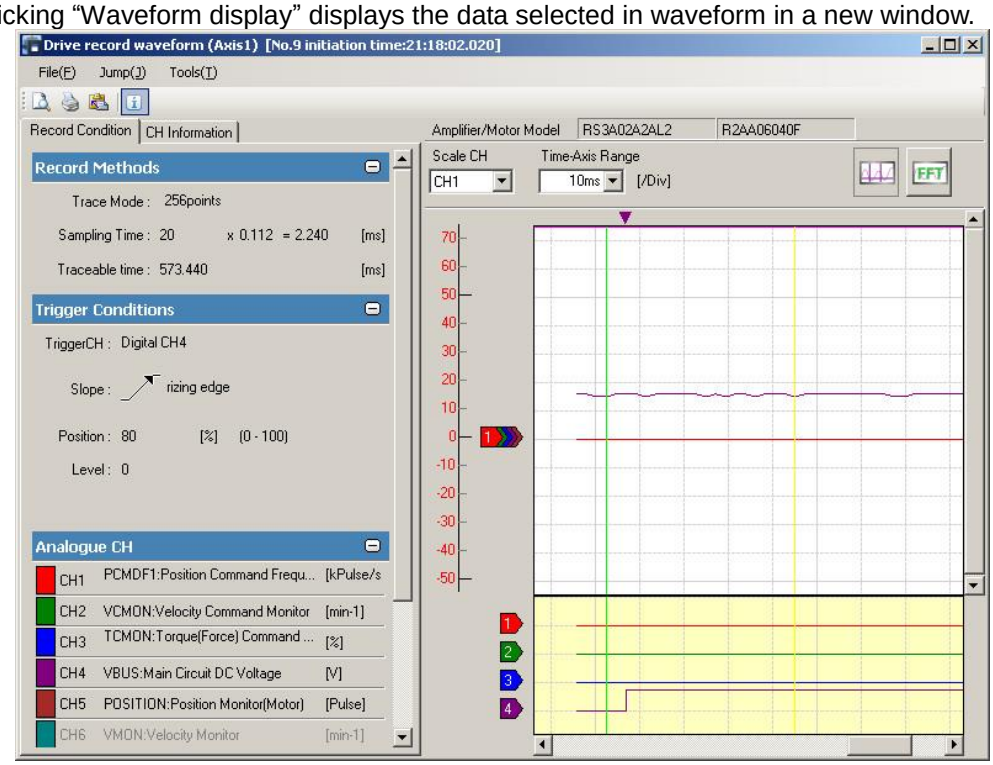


Figure 10-24 Drive recorder waveform display

(5) Clicking “Clear all records” in Drive recorder list display shows the following window. Click “OK” button to continue.

Figure 10-25 Window asking to continue Clear Records

(6) Clicking “Clear all records” in Drive recorder list display shows the following window to ask to continue clearing data. Click “OK” button to continue.

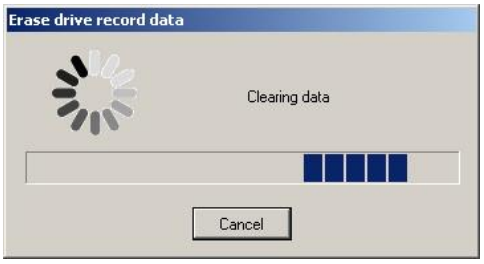


Figure 10-26 Window indicating Drive recorder data being erased

(7) Once record data have been erased, the following window is shown. Click “OK" button.

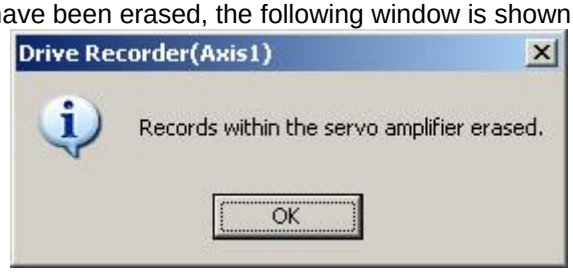


Figure 10-27 Window indicating Drive recorder data cleared

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11. Data files

Selecting Data File from the Side menu shows the following window.

11.1 Overview

Drag and drop each data file (parameters, operational tracing, operation scrolling, system analysis, and Drive recorder) to confirm their contents. You can also firstly select each data type you call from Sub menu in the Side menu data files, and then control the data as projects.

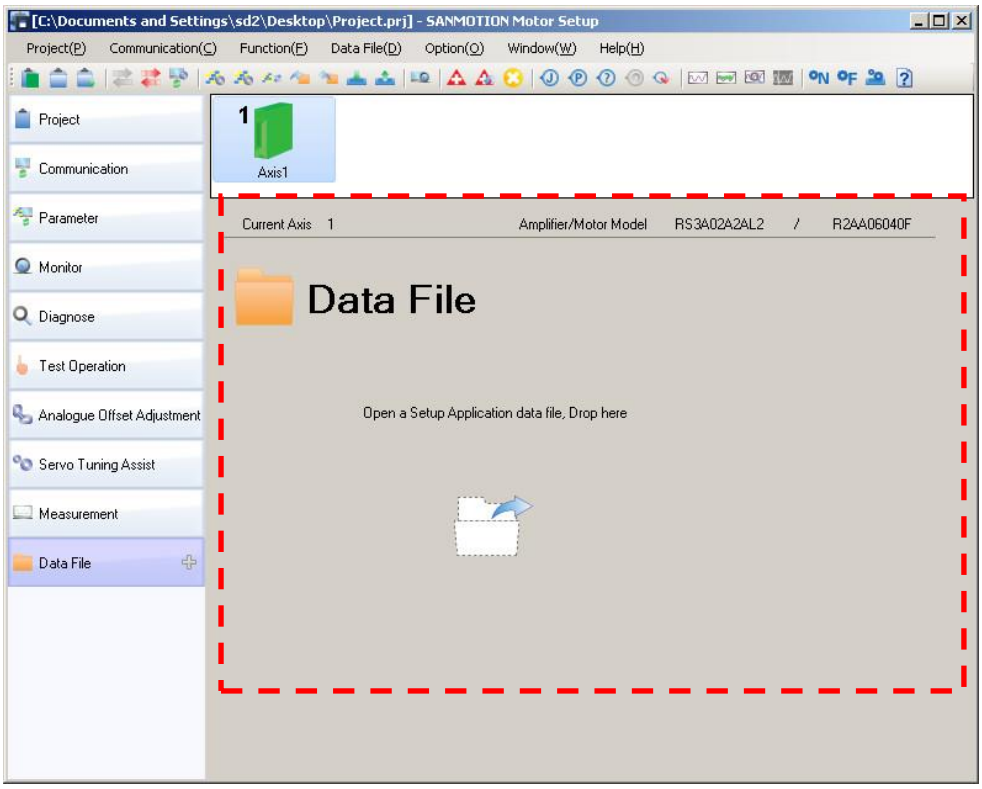

Figure 11-1 Data file window

11.2 How to use

You can open each data file in the following 2 procedures.

(1) Drag & drop the data files you select.

Dragging and dropping data files into the area boxed in red dot of Figure 11-1 Data file window automatically identify the type of data files to show the contents in the window. Provided that, parameter file (*.ap1) always shows parameter setting window. To check alarm history, separately open alarm history checking window or open the file in the procedure specified in (2) below.

(2) Open files by data file type.

Select Sub menu per data file type from Side menu, and then click “Open any data files” to open designated files as shown in Figure 11-2.

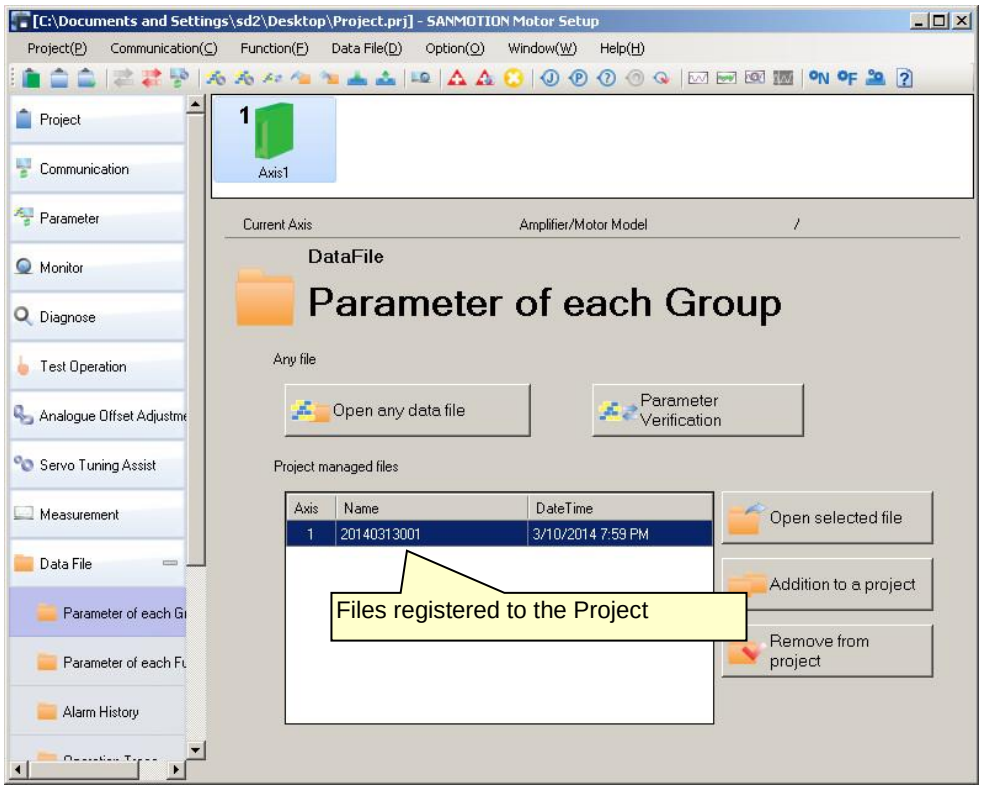

Figure 11-2 Window for selecting by data file (parameters by group)

11.3 Adding to projects

You can add to/delete from projects from each window displayed when selecting Sub menu through data file.

5) Clicking “Addition to a project” can add data files to projects. Registering to projects can display the registered files as files of project control file list.
6) Clicking “Remove from project” can delete selected data files from projects.

12. Troubleshooting

12.1 When installing

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	Lack of disk space	Lack in HDD-volume	This application needs the environment of Microsoft .NET Framework 3.5 in addition to this system, so 400MB-disk space is required. Re-install after securing sufficient HDD-volume.
2	Cannot be installed	OS version is old.	Installation cannot be continued when OS version is old. Re-construct the environment by referring to Section1.3 System environment.
		Not logged on as administrator authority	Installation needs the right of administrator. Re-install after logging on as administrator authority.

12.2 Wiring, Connection and establishing communication with servo amplifiers

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"An error occurred when opening port"	Software cannot use communication port.	Check if the communication port (PC side) to which cables is connected is used by other application. Otherwise, Setup S/W has already started up.
2	The confirmation results of communication state become "errors in received data"	Setting error of communication port	Check if the communication port (PC side) to which cables is connected conforms to COM port.
3	The confirmation results of communication state become "timeout"	Setting error of communication baudrate Note1)	Check if servo amplifier communication baudrate setting corresponds to "communication speed."
		Setting error of axis-selection Note1)	Check if servo amplifier communication axis selection corresponds to the axis selection you selected.
		Connecting error of communication cables	Check if communication cables are properly connected to PC side (USB or COM) and servo amplifier/driver.
			Check if any damages on communication cables.
		Control power supply error	Check if control power supply is supplied to servo amplifier/driver.
		Malfunction due to noise	Take some actions to noise. Note 2)
4	The confirmation results of communication state become "Overlap" Note3)	Setting error of communication (when connecting multiple axes)	Check if any servo amplifier/driver communication axis numbers overlapped among amplifiers being connected. Note 1)
		Malfunction due to noise	Take some actions to noise. Note 2)
5	The confirmation results of communication state become "Not-corresponding"	Version discrepancy	Setup S/W does not correspond to the software version of the servo amplifiers you use. Install the latest Setup S/W.
		Software discrepancy	R ADVANCED MODEL SETUP Software cannot communicate with RS1, RR1-model servo amplifiers. Use R-SETUP Software to communicate with these servo amplifiers.
			R ADVANCED MODEL-servo amplifier cannot communicate with R-SETUP Software.
6	Performing the following functions becomes "Communication released" ・Write-in/forward parameters ・Test operation ・Auto-tuning ・Adjustment ・Measurement	Parameter locking function by password is enabled.	Authorize parameter editing. Refer to Section 4.9 Setting Password for the details.

Note 1) You can set communication baudrate for RS2-model servo amplifier (GroupA-20) and communication axis numbers (GroupA-21) by parameters. The initial values are 38400bps and #1, respectively. These settings become valid when re-turning on amplifier control power supply. Provided that, the initial values and setting methods vary depending on the type of amplifiers. Or there may be cases settings cannot be changed. When connecting RS3-model amplifier via USB, there is no setting for communication baudrate.

Note 2) When communication cannot be executed normally due to noise, take the following actions to noise:
7) Grounding servo amplifiers and PC correctly.
8) Keep servo amplifier or PC away from the noise-generating area.
9) Place noise filter.

Note 3) When "Overlap" won't canceled even if taking corrective actions, take any of the following actions:
10) Re-turn servo amplifier control power.
11) Re-connect communication cable (on amplifier side) after disconnecting once.

12.3 Parameter Setting

1) Parameter Verification

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"Verification cannot be performed as the amplifier and file amplifier main ID is different"	The type of amplifier is not correct.	Cannot be collated as the target parameter file type and the amplifier type you are connecting is different.
2	"Amplifier ID** is not supported"	Tried to collate old-version amplifier files.	Update to the latest Setup S/W.

2) Parameter transmission (To amplifier)

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"Collation cannot be executed as the amplifier and file amplifier main ID is different"	The type of amplifier is not correct.	Cannot be collated as the parameter file type to forward and the amplifier type you are connecting is different.
	"Some parameters could not be forwarded as amplifier software version is incorrect"	Parameters have been updated due to software version upgrading.	Check added parameters, manually set them if necessary. In most cases, added parameters do not have to be changed their settings.
		Parameter setting values are invalid.	When the parameter values you forward are out of settable range, they cannot be forwarded.

12.4 Various supportive functions

1) Monitor

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"Communication error occurred in axis*. Cause: timeout"	Communication cables disconnected	Check if the communication cables between servo amplifiers and PC have come off.

2) Alarms

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"Alarm reset could not be executed"	Alarm-state is still continued.	Reset cannot be executed as the alarm still continues. Eliminate the cause of the alarm.
			The alarms which cannot be reset are occurring. Re-turn on amplifier driver control power supply after eliminating the alarm causes.

3) Test operation

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"***cannot be performed.(Preparation un-completing)"	The state has not become SRDY-state. Other supportive functions are now being executed.	Is any alarm-state continuing? Eliminate the conditions of the alarm.
			Check if the primary power supply has been established.
			Terminate other supportive functions (velocity-JOG, position-JOG, various Auto-tuning, various adjusting functions, system analysis) if any of them has start up.
			Error in communication occurs due to any of causes. Re-establish communication.
			This function cannot be executed when executing any of the following (Test operation, Auto-tuning, Adjustment) from Digital operator.
			This function cannot be executed during switching control modes.
2	Encoder clear cannot be executed (ALM_DF is output)	The motor is driven externally.	When motors are driven externally at 50min^{-1}(mm/s) or over in any of causes, you cannot perform encoder clear.
3	Motor will not move in positioning operation and velocity-JOG operation	Error in setting, OT-valid	Check velocity command setting or command pulse number.
			OT became valid. Eliminate the causes of becoming OT.
4	"Estimate magnetic pole position has abnormally completed" "(ALM_44h)	Could not normally complete due to any of causes.	Check the motor motion range. (approximately ±10mm)
			Check force command value when estimating magnetic pole position. "Estimate magnetic pole position" cannot be normally completed unless setting the value large enough for static friction.
			Check the polarity of linear encoder signal or wiring of motor power line. There may be possibility of connecting reversely.

4) Auto-tuning

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"***cannot be performed (Preparation un-completing)"	The state has not become SRDY-state. Other supportive functions are now being executed.	Is any alarm-state continuing? Eliminate the conditions of the alarm.
			Check if the primary power supply has been established.
			Terminate other supportive functions (velocity-JOG, position-JOG, various Auto-tuning, various adjusting functions, system analysis) if any of them has start up.
			Error in communication occurs due to any of causes. Re-establish communication.
			This function cannot be executed when executing any of the following (Test operation, Auto-tuning, Adjustment) from Digital operator.
			This function cannot be executed during switching control modes.
			System analysis cannot be executed when Overtravel (OT) is occurring. Eliminate all the cause of OT.
			After servo-on, the measurement is not accurate enough during the time to wait motor brake releasing. Execute this after the time of motor brake operation releasing delay (BOFFDLY) elapsed.

5) Adjusting

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"***Automatic offset cannot be performed. (Preparation un-completing)"	5.2V or over is input into designated analog inputs.	Check analog input voltage. When the voltage is 5.2V or over at adjustment, you cannot execute automatic offset.
			Error in communication occurs due to any of causes. Re-establish communication.
			This function cannot be executed when executing any of the following (Test operation, Auto-tuning, Adjustment) from Digital operator.
			This function cannot be executed during switching control modes.
2	Executing automatic offset changes manual offset values		Executing automatic offset changes manual off-set amount as both offset amounts are the same data.

6) Measurement

No.	Abnormal operation/message	Primary cause	Check the contents and corrective actions
1	"System analysis cannot be performed (Preparation un-completing)"	The state has not become SRDY-state. Other supportive functions are now being executed.	Is any alarm-state continuing? Eliminate the conditions of the alarm.
			Check if the primary power supply has been established.
			Terminate other supportive functions (velocity-JOG, position-JOG, various Auto-tuning, various adjusting functions, system analysis) if any of them has start up.
			Error in communication occurs due to any of causes. Re-establish communication.
			This function cannot be executed when executing any of the following (Test operation, Auto-tuning, Adjustment) from Digital operator.
			This function cannot be executed during switching control modes.
			System analysis cannot be executed when Overtravel (OT) is occurring. Eliminate all the cause of OT.
			After servo-on, the measurement is not accurate enough during the time to wait motor brake releasing. Execute this after the time of motor brake operation releasing delay (BOFFDLY) elapsed.
2	Window reaction get slower during scrolling	Limit of the throughput of the PC you use	This depends on the throughput of the PC you use as the system communicates with amplifier drivers in real time and displays waveforms in the window. Quit other applications, or set the time to sample of scrolling operation.

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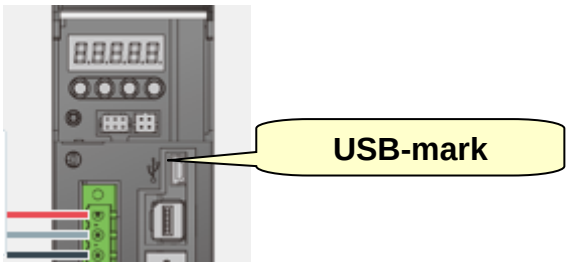
13. Appendix

13.1 Wiring for R 3E MODEL servo amplifiers



- ✔ Connect to connectors with marked with USB.
- ✔ Connect multiple axes via USB-hub.

13.2 Wiring for R ADVANCED servo amplifiers

1) Servo amplifiers connectors

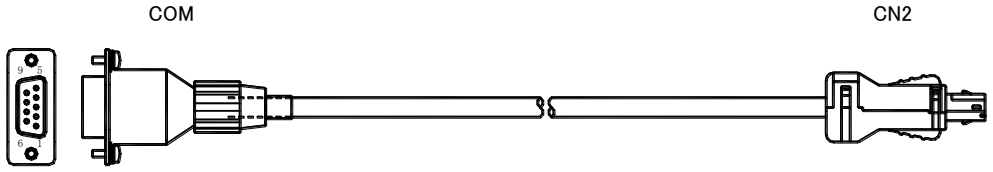
CN2 on servo amplifier side	
MUF-RS8DK-GKXR (JST Mfg. Co., Ltd.-manufactured)	
Pin No.	Signal name
1	422RXD+
2	422RXD-
3	422TXD+
4	+5V
5	232RXD
6	422TXD-
7	232TXD
8	GND
Shell	Shield

CN3 on servo amplifier side	
MUF-RS8DK-GKXR (JST Mfg. Co., Ltd.-manufactured)	
Pin No.	Signal name
1	422RXD+
2	422RXD-
3	422TXD+
4	+5V
5	NC
6	422TXD-
7	NC
8	GND
Shell	Shield

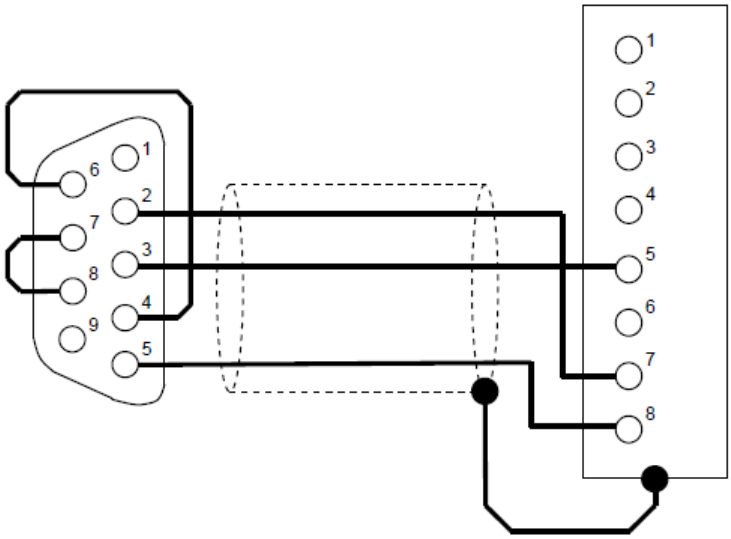
- ✔ Connect a cable to CN2 to connect to the host computer.
- ✔ To connect multiple axes, connect the cable from the former amplifier (or upper level PC) to CN2, connect the cable from the latter amplifier to CN3.

2) Connecting cable A

This is a cable to connect between a host computer (terminal of RS-232C) and RS2 series servo amplifier side.



Connecting cable A : AL-00689703-01



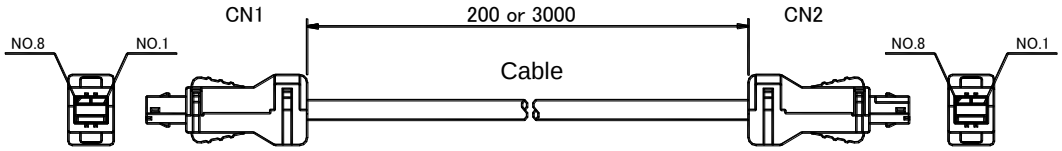
COM on host PC side	
JEZ-9S-3(LF) (JST Mfg. Co., Ltd.-manufactured)	
Pin No.	Signal name
1	DCD
2	RD
3	TD
4	DTR
5	SG
6	DSR
7	RS
8	CS
9	RI

CN2 on servo amplifier side	
MUF-PK8K-X (JST Mfg. Co., Ltd.-manufactured)	
Pin No.	Signal name
1	NC
2	NC
3	NC
4	NC
5	RXD
6	NC
7	TXD
8	SG
Case	Shield

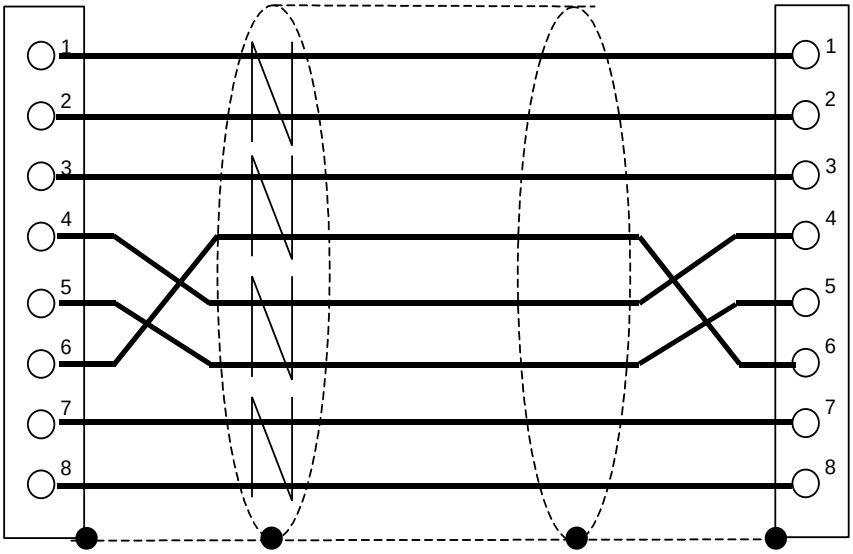
- ✔ Use shielded wire for cables.
- ✔ Connect the shielded wire of the cables to the connector on amplifier side.
  Do not connect to the case of connectors on PC (D-Sub9 pin).
- ✔ Do not wire the terminals other than the ones whose destinations to connect are specified in Wiring diagram.

3) Connecting cable B

This is a cable to connect between servo amplifiers to connect multiple RS2-model servo amplifiers.
(RS422A-connection)



AL-00695974-02(3m)



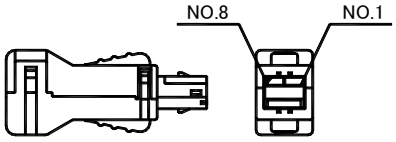
Shielding

Note: ⋀⋁ means twisted-pair.

CN1 and CN2-shared
MUF-PK8K-X (JST Mfg. Co., Ltd.-manufactured)

4) Termination connector

This is a connector to terminate RS422A-communication when connecting multiple RS2-model servo amplifiers.

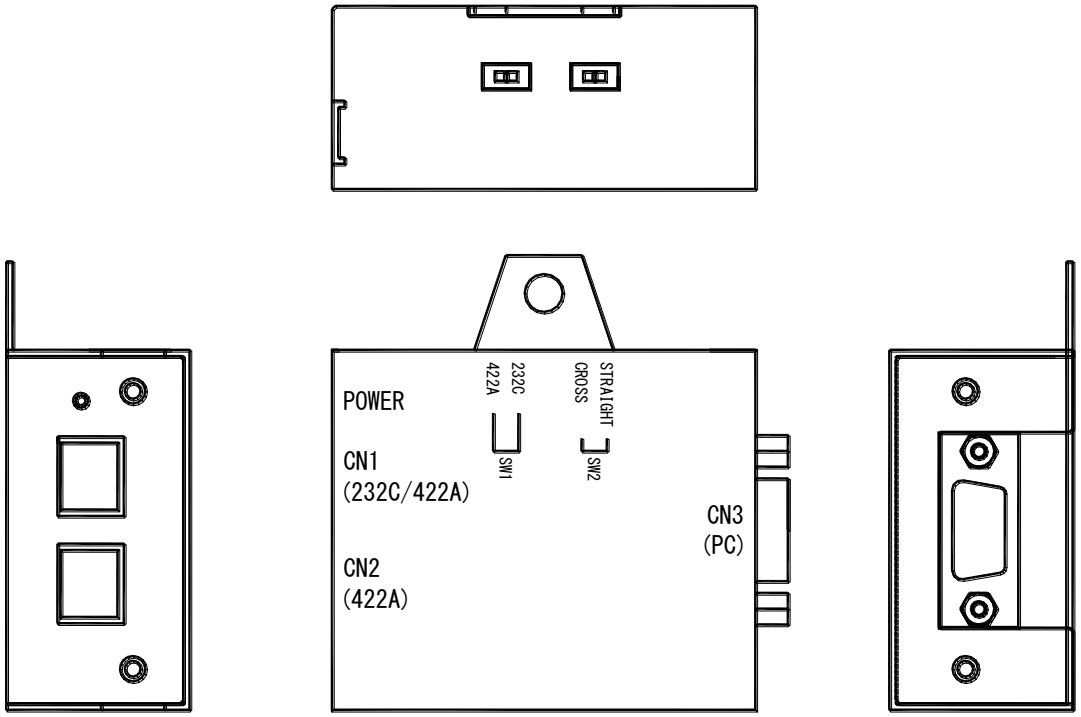


Termination connector: AL-00695977-01
(Terminal resistor (120Ω) is inserted between pin1 and pin2.)

Connector model number
MUF-PK8K-X (JST Mfg. Co., Ltd.-manufactured)

5) Communication converter

This is a module needed to connect multiple RS2-model servo amplifiers, converting RS232C-communication to RS422A-communication.



Communication converter: SAU-024-01

CN1	
MUF-RS8DK-GKXR (JST Mfg. Co., Ltd.-manufactured)	
Pin No.	Signal name
1	422TXD+
2	422TXD-
3	422RXD+
4	+5V
5	232TXD
6	422RXD-
7	232RXD
8	GND
Shell	Shield

CN2	
MUF-RS8DK-GKXR (JST Mfg. Co., Ltd.-manufactured)	
Pin No.	Signal name
1	422TXD+
2	422TXD-
3	422RXD+
4	+5V
5	-
6	422RXD-
7	-
8	GND
Shell	Shield

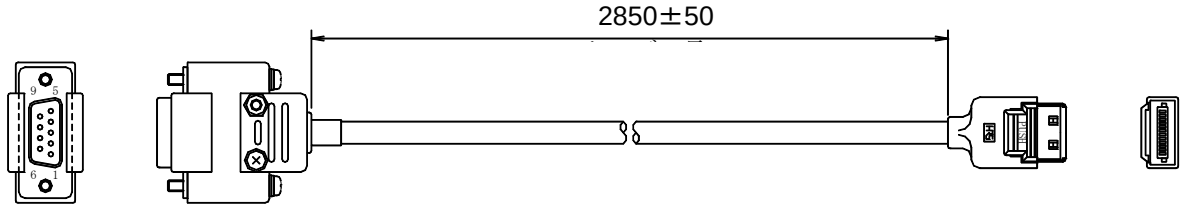
CN3	
DELC-J9PAF-23L9E (Japan Aviation Electronics Industry, Limited -manufactured)	
Pin No.	Signal name
1	DCD
2	RD
3	TD
4	DTR
5	SG
6	DSR
7	RS
8	CS
9	RI
Shell	Shield

SW-selection		
No,	Options	
SW1	232C	422A
	CN1/ RS232C-signal enabled	CN1/ RS422A-signal enabled
SW2	STRAIGHT	Crossed
	When using a straight cable between PC and CN3	When using a crossed cable between PC and CN3

6) Servo amplifier connector B (for connection with RF2G servo amplifier)

Connector No.	Content	Model number
PC	Cable for PC connection	AL-00490833-01

Cable for PC connection (AL-00490833-01)

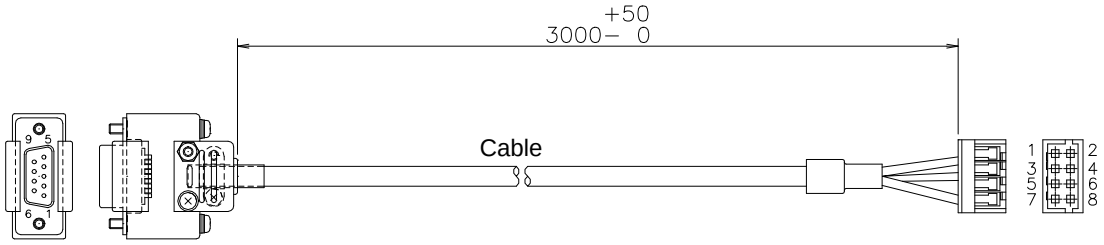


7) Servo amplifier connector C (for EtherCAT IF expanded input)

Optional model number

Connector No.	Content	Model number
PC	Cable for PC connection	AL-00745525-01

Cable for PC connection (AL-00745525-01)



13.3 Wiring for stepping driver

■Optional model number

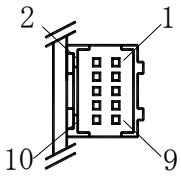
Name	Content	Model number	Instruction manual
USB/RS485 converter	PC/driver connection unit	PBFM-U6	M0010723

■ Connector number of driver side connector

Driver model number	Connector number
F5PAA***P1**, F5PAB***P1**	CN5
F2BAW***M1**	CN5
PB4D003E***	CN8
PB4D003P***	CN12

■ Signal name of driver side connector

Pin No.	Signal name	Pin No.	Signal name
1	A	6	VCC (Normally, connection is not required)
2	B	7	–
3	N.C. (Connection is not required)	8	–
4	N.C. (Connection is not required)	9	–
5	GND	10	–

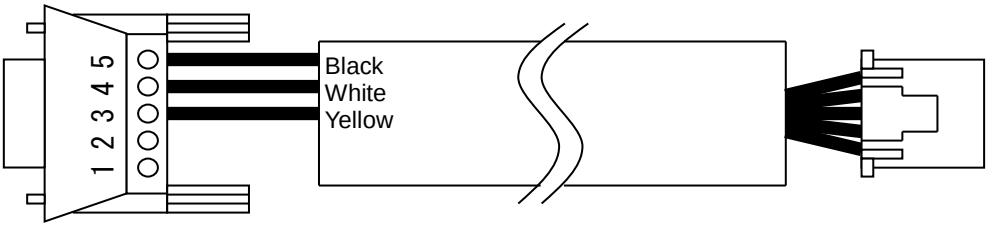


■ Connector model number

PCB side	Post with base	S10B-PADSS-1GW	JST
Cable side	Housing	PADP-10V-1-S	
	Contact	SPH-002T-P0.5L	

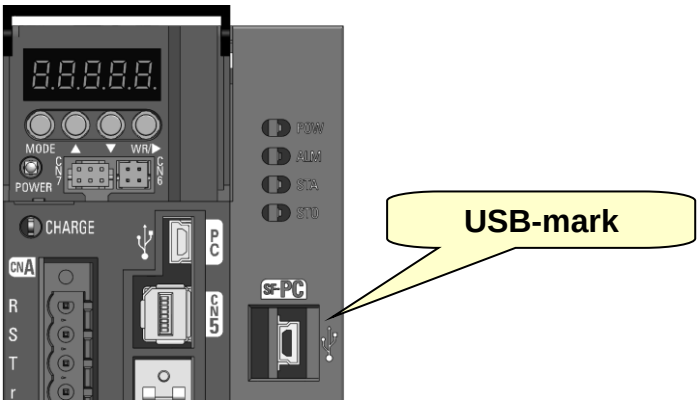
■ Signal name for converter unit side

Connector terminal block		Communication cable
Pin No.	Signal name	
1	-	N.C.
2	-	N.C.
3	R+(D+)	Yellow
4	R-(D-)	White
5	GND	Black



✔ Connect with condition of RS-485, half-duplex.

13.4 Wiring for SANMOTION R 3E Model Functional safety module



✔ Connect to connectors with marked with USB.
✔ Connect multiple axes via USB-hub.

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Release	
Revision A	May. 2014
Revision B	Dec. 2014
Revision C	Feb. 2015
Revision D	Apr. 2015
Revision E	Jun. 2015
Revision F	Oct. 2015
Revision G	Mar. 2017
Revision H	Aug. 2017
Revision J	May. 2018

■Precautions For Adoption

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident.
Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The Products presented in this Instruction Manual are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

* For any question or inquiry regarding the above, contact our Sales Department.

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Translated version of the original instructions