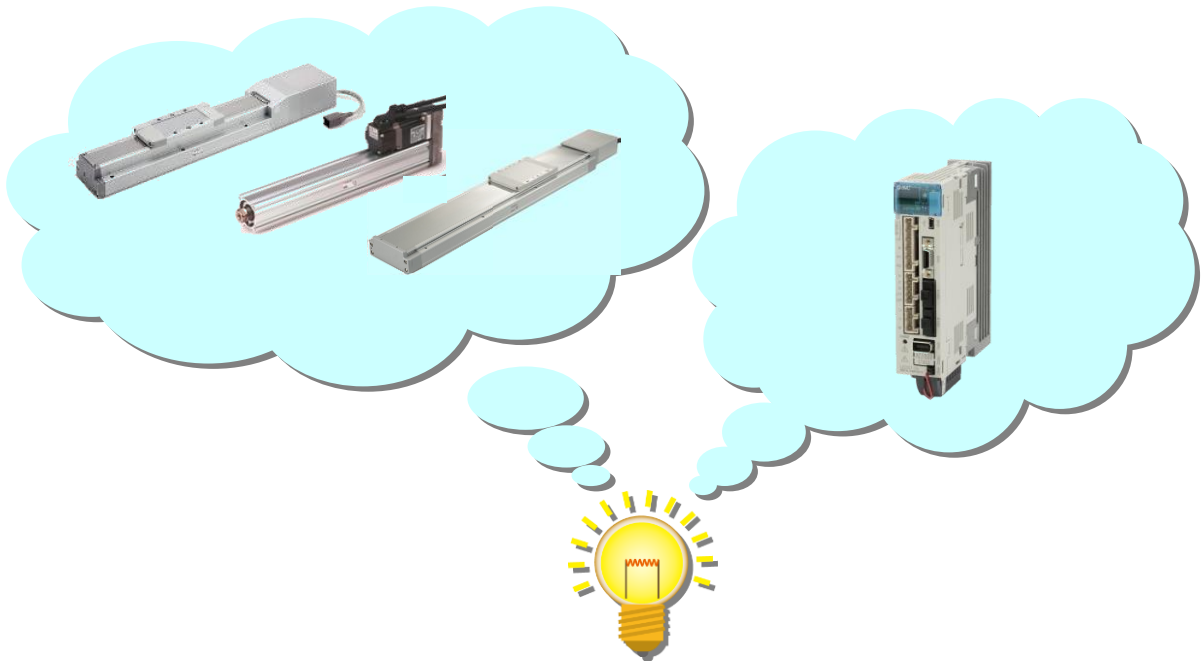**SMC**

Operation Manual
（Simplified edition〉

PRODUCT NAME

AC Servo Motor Driver (SSCNET Ⅲ Type)

MODEL / Series / Product Number

LECSS Series

SMC Corporation

CONTENTS

⑤SMC

SMC

LECSS Series / Driver
Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger."

They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)[*1)], and other safety regulations.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
   ISO 4413: Hydraulic fluid power -- General rules relating to systems.
   IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)
   ISO 10218: Manipulating industrial robots -Safety.
   etc.

⚠	**Caution**	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
⚠	**Warning**	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠	**Danger**	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

 Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

 The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

 This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

 The product specified here may become unsafe if handled incorrectly.

 The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

 The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

 When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

 Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

 1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

 2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

 3) An application which could have negative effects on people, property, or animals requiring special safety analysis.

 4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Note that the ⚠CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

⊜SMC

LECSS Series / Driver
Safety Instructions

⚠ Caution

1.The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1.The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.∗2)
Also, the product may have specified durability, running distance or replacement parts.
Pleaseconsult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

∗2) Vacuum pads are excluded from this 1year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1.   **The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.**

2.   **The exports of SMC products or technology from one country to another are govemed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules goveming that export are known and followed.**

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Introduction

It is recommended that the operator read the operation manual for LECSS prior to use.
For the handling and details of other equipment, please refer to the operation manual for used equipment.

Check that the main circuit power supply (AC100V/AC200V) and controller circuit power supply (AC100V/AC200V) are correctly wired.
For wiring, please refer to section 3.1 of LECSS Operation Manual and section 3 of LECSS Operation Manual (Simplified edition).

Configure EM1 (Forced Stop) to be activated on power up. (Automatic ON by set parameter)
Please refer to section 6.3.5 of this manual for details.

When setup software (MR Configurator2™) is used, the LECSS model selection is required.
Select 'MR-J3-B' through "Model" - "New" and "Project".

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1. Configuration

Minimum equipment and wiring requirements to get started

Ex) 200 V AC (*1)

Provided by customer

Provided by customer

PC

Electric Actuators
Ex) LEF

Provided by customer

PLC (Positioning unit/Motion controller)

Power supply
for I/O signal
24 VDC
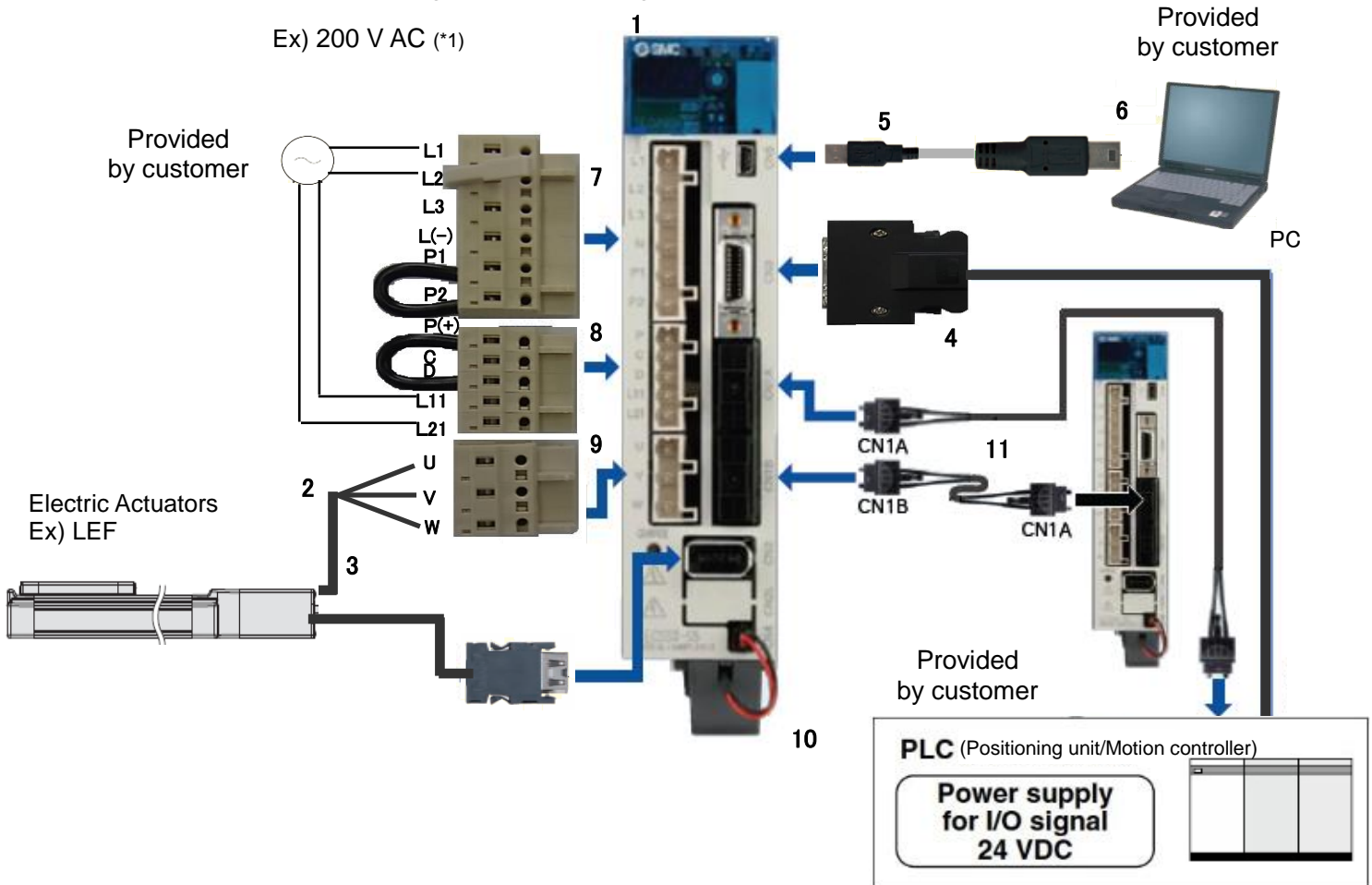
(*1)Refer to "LECSS Operation Manual", Chapter 3 if the power supply voltage is 100VAC.

1	Driver	LECSS*-S*
2	Motor cable	LE-CSM-***
3	Encoder cable	LE-CSE-***
4	I/O connector	LE-CSNS
	I/O cable	LEC-CSNS-1
5	USB cable	LEC-MR-J3USB
6	Setup software （MR Configurator2™）	LEC-MRC2*
7	Main circuit power supply connector	CNP1 (Accessory)
8	Control circuit power supply connector	CNP2 (Accessory)
9	Motor connector	CNP3 (Accessory)
10	Battery	LEC-MR-J3BAT（a bundled item） It is unnecessary when using it with the incremental system.
11	SSCNETⅢ optical cable	LE-CSS-*

Note) The lock cable option is not shown on this drawing. Refer to the "LECSS Operation Manual" for details.

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2. Procedure before operation

2.1 Flow chart

```
                    ┌─────────────────────────────┐
                    │          Wiring             │
                    │      See [3. Wiring]         │
                    └─────────────────────────────┘
                                  │
                    ┌─────────────────────────────┐
                    │    Driver axis No. setting   │
                    │   See [4. Axis No. settings] │
                    └─────────────────────────────┘
                                  │
                    ┌─────────────────────────────┐
                    │ Parameter setting (Driver side)│
                    │ See [5. Parameter lest (Driver side)]│
                    └─────────────────────────────┘
                                  │
           ┌──────────────────────────────────────────────┐
           │ Parameter Settings using the Setup Software (MR │
           │            Configurator2TM)                   │
           │  See [6. Parameter Settings using the Setup Software │
           │           (MR Configurator2 TM)]              │
           └──────────────────────────────────────────────┘
                                  │
                    ┌─────────────────────────────┐
                    │  Parameter setting (PLC side) │
                    │ See [7. Parameter setting (PLC side)]│
                    └─────────────────────────────┘
                                  │
                    ┌─────────────────────────────┐
                    │     Home position return     │
                    │ See [8. Homeposition return (PLC)]│
                    └─────────────────────────────┘
                                  │
                    ┌─────────────────────────────┐
                    │   [Positioning operation]    │
                    │ See [9. Positioning operation (PLC)]│
                    └─────────────────────────────┘
```

Set item of PLC side. Functions such as originposition return and positioning depend on PLC functions.
This operation manual is based on the MITSUBISHI ELECTRIC QD75MH positioning module.
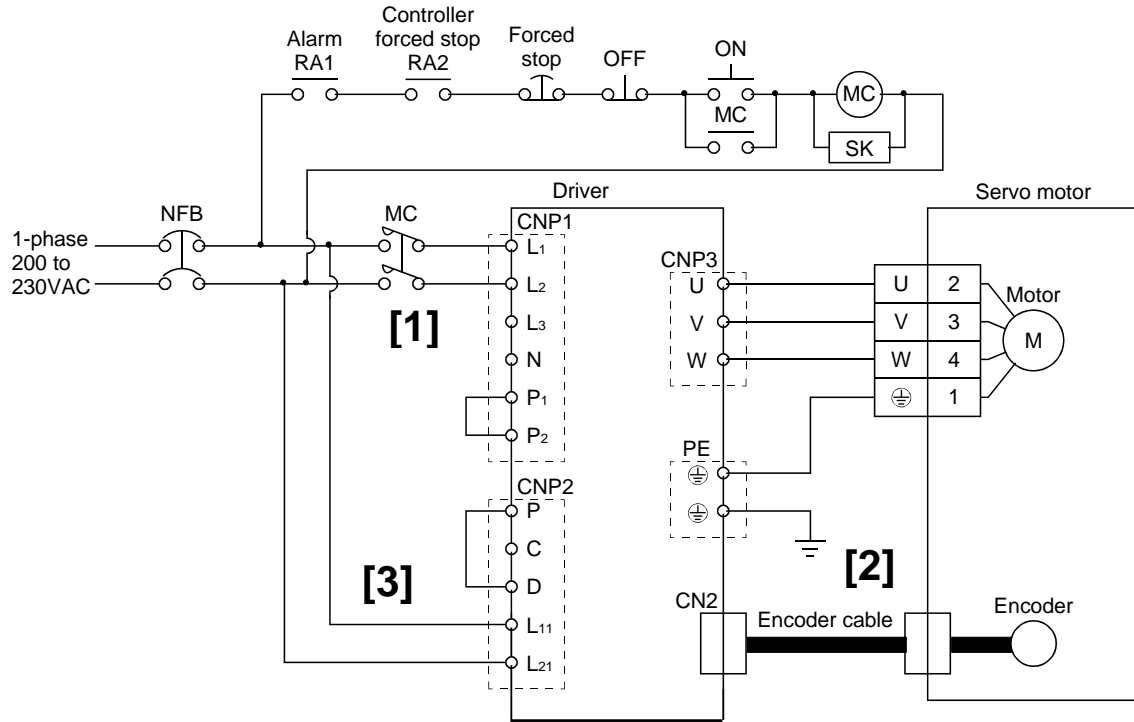
SMC

3. Wiring

3.1 Wiring for power supply

Connect the actuator and driver power supply. This wiring diagram is common for all modes.

(1) LECSS (Absolute encoder)

EX.) Power supply is AC200V single phase

[1] Power supply input terminals, L_1, L_2: Provide specified power supply to input terminals L_1 and L_2.

[2] ・Connect the motor input terminal (U, V, W) to the driver power terminal (U, V, W).
  ・Connect the motor ground terminal to the driver ground terminal.
  ・Connect the cable for the encoder.

[3] Connect the 200VAC to the power the internal power supply for the control circuit.

Refer to "LECSS Operation Manual", Chapter 3 for detailswhen the power supply voltage is 100VAC.

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3.2 SSCNETⅢ cable wiring

SSCNETⅢ cable wiring

(1) SSCNETⅢ cable connection between the driver and PLC

For CN1A connector, connect SSCNETⅢ cable connected to PC or PLC...etc in host side or driver.

For CN1B connector, connect SSCNETⅢ cable connected to driver in lower side.

For CN1B connector of the final axis, use the cap provided with the driver to finalise the connection and prevent the connector from becoming dirty .
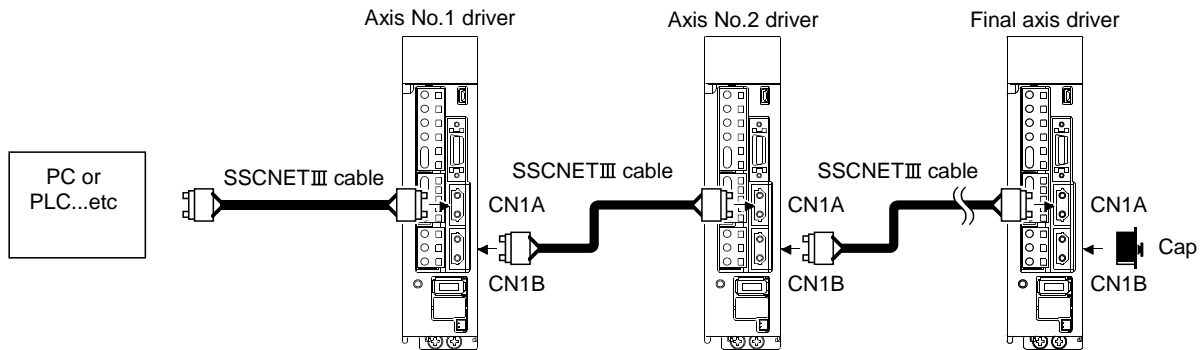
| ⚠ **WARNING** |
|---|
| Do not allow the light beam (transparent and colorless) generated from CN1A・CN1B connector of driver or the end of SSCNETⅢ cable to be exposed directly into eye(s).
 Allowing the light beam to come into direct contact with eye(s), will cause damage to eye(s).
 (The light source of SSCNETⅢ complies with Class1 defined in JIS C6802 or IEC60825-1.) |

(2)Removing and inserting of the connector

(a) Inserting

While holding the tab on the SSCNETⅢ cable connector, insert the connector into CN1A・CN1B of driver until you hear the click.

If the end face of optical code tip is dirty, optical transmission may be interrupted and may cause malfunctions.

If the tip becomes dirty, wipe with a bonded textile, etc.

Do not use a solvent such as alcohol.
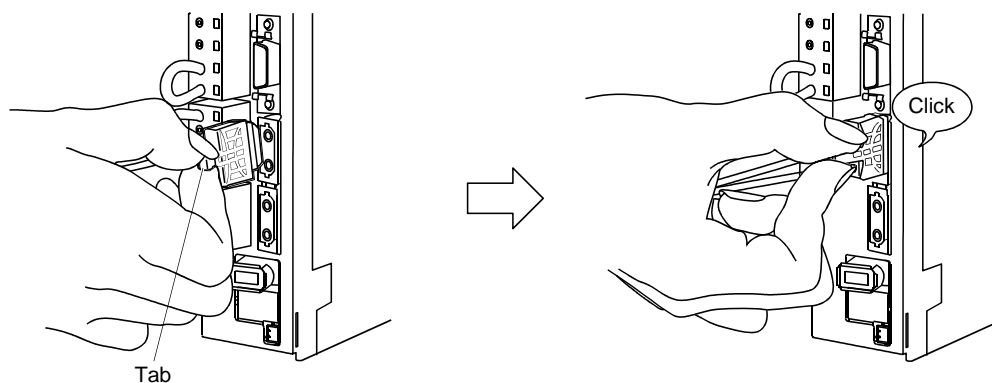
(b) Removal

Whilest holding the tab on the SSCNETⅢ cable connector, remove the connector.

Once the SSCNETⅢ cable has been removed from the driver, be sure to place the cap on the connector end of driver to prevent it from becoming dirty.
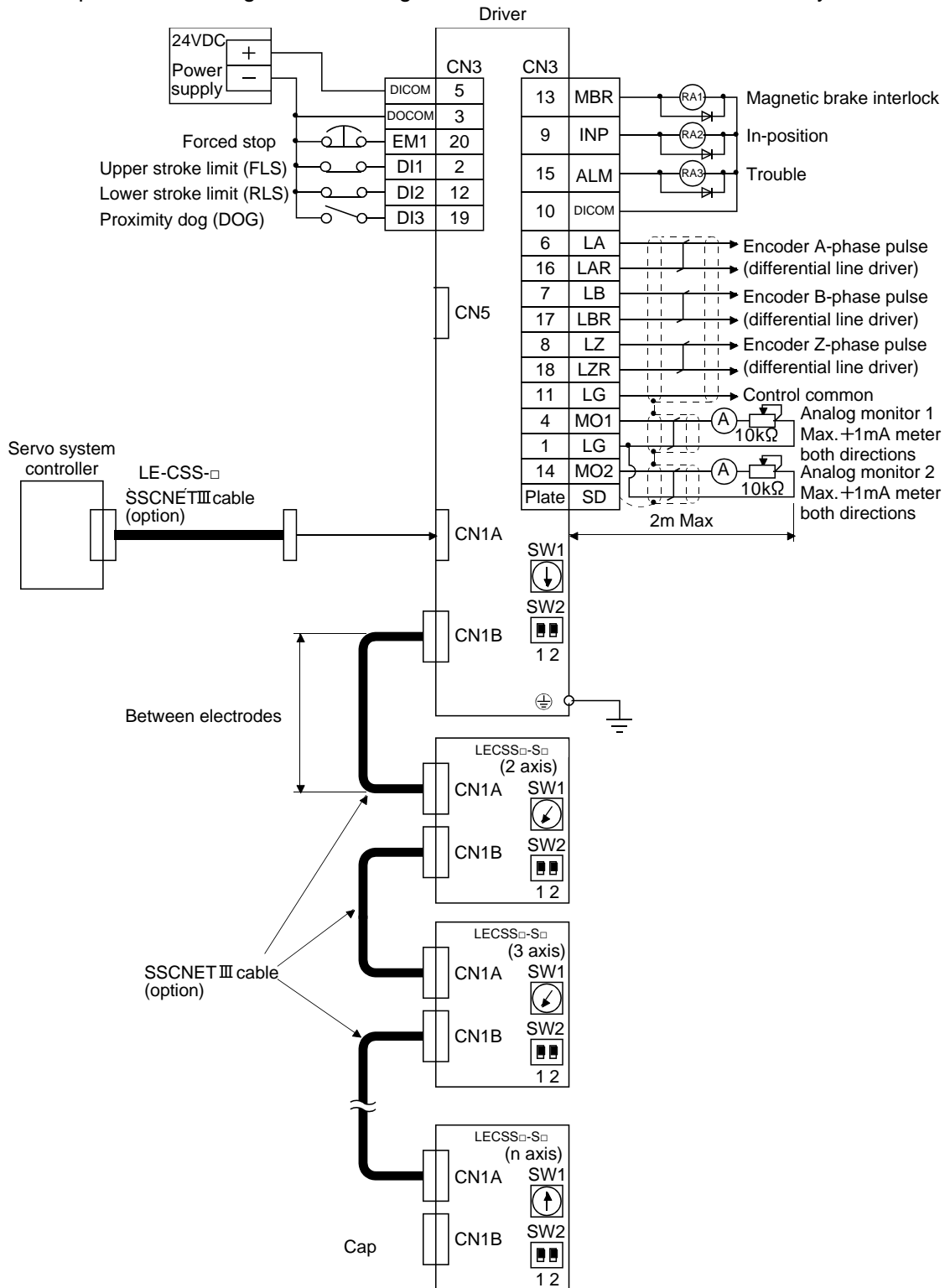
For SSCNETⅢ cable, attach the tube for protection of the optical code's end face on the end of connector.

3.3 I/O signal connection

The example of connecting driver's I/O signal is shown.

3.3.1 Connection example (Sink I/O interfaces)

The example of connecting driver's I/O signal is shown.Connect wires if necessary.

Refer to "LECSS Operation Manual",section 3.2 for wiring details.
Refer to "LECSS Operation Manual",section 3.5 for input/output signal details.
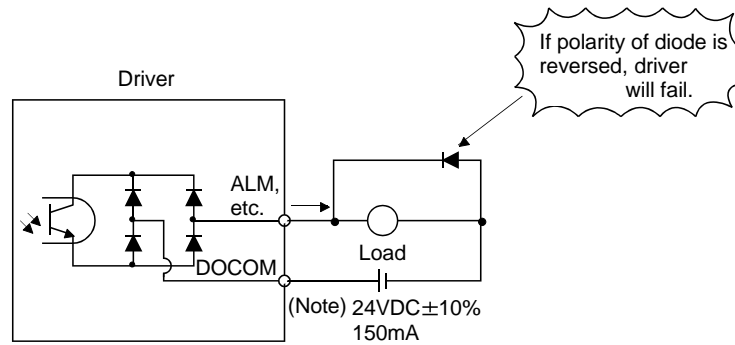
SMC

3.3.2 Source I/O interfaces

The driver can be configured for, source type I/O interfac. In this case, all DI-1 input signals and DO-1 output signals are of source type. Perform wiring according to the following interfaces.

(1) Digital input interface DI-1
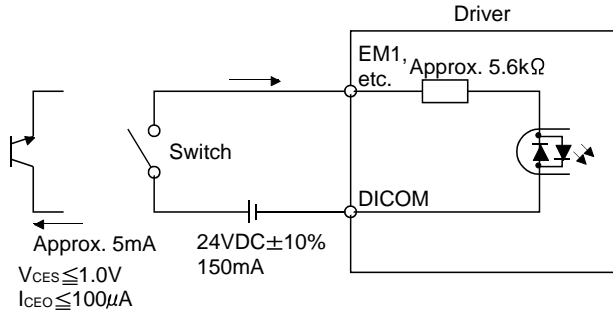
(2) Digital output interface DO-1

A maximum of 2.6V voltage drop occurs in the driver.

Note. If the voltage drop (maximum of 2.6V) interferes with the relay operation, apply high voltage (up to 26.4V) from external source.

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4. Axis No. settings

Set the control axis No. by the rotary switch.

> POINT
>
> - The control axis number set to rotary axis setting switch (SW1) should be the same as the one set to the servo system PC or PLC...etc.
> - Use a flat blade screwdriver with the width of 2.1 to 2.3mm and the end thickness of 0.6 to 0.7mm to change the rotary switch setting.
> - If the test operation mode is selected using the test operation change switch (SW2-1), SSCNETⅢ communication at all points after the driver is disconnected.

Use the rotary axis setting switch (SW1) to set the control axis number for the servo. If the same numbers are set to different control axes in a single communication system, the system will not operate properly. The control axes may be set independently of the SSCNET Ⅲ cable connection sequence.

Rotary axis setting switch (SW1)
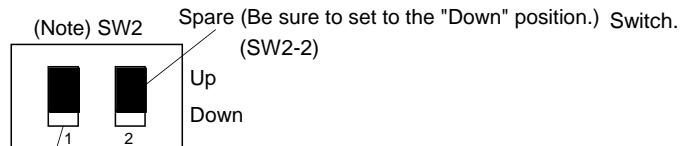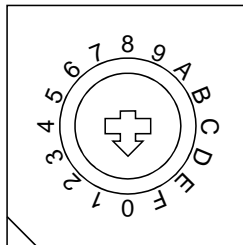
(Note) SW2   Spare (Be sure to set to the "Down" position.) Switch.
(SW2-2)

Up

Down

Test operation select switch (SW2-1)
Set the test operation select switch to the "Up" Position, when performing the test operation mode by using set up software (MR Configurator™)

(Note) This table indicates the status when the switch is set to "Down".
(Default)

Spare (SW2-2)	Rotary axis setting switch (SW1)	Description	Display
Down (Be sure to set to the "Down" position.)	0	Axis No.1	01
	1	Axis No.2	02
	2	Axis No.3	03
	3	Axis No.4	04
	4	Axis No.5	05
	5	Axis No.6	06
	6	Axis No.7	07
	7	Axis No.8	08
	8	Axis No.9	09
	9	Axis No.10	10
	A	Axis No.11	11
	B	Axis No.12	12
	C	Axis No.13	13
	D	Axis No.14	14
	E	Axis No.15	15
	F	Axis No.16	16

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5. Parameter list (Driver side)

Parameters require setting. If necessary, please set the parameters.
Refer to "LECSS Operation Manual",chapter 5 and "LECSS Operation Manual(Simplified Edition)",section 5.3 for details.
Refer to "LECSS Operation Manual",chapter 5 for parameters which are not mentioned in this clause.

Setup software (MR Configurator2™ :LEC-MRC2E) is necessary for the setting of parameter.
*1 Setup software version 1.52E or above is required.
*2 The setup software (MR Configurator2™ : LEC-MRC2E) must be purchased as an additional item.
*3 The USB cable (LEC-MR-J3USB) must be purchased as an additional item.

(1) Basic setting parameters (No.PA□ □)

No.	Symbol	Name	Initial value	Unit
PA01	STY	For manufacturer setting	0000h	
PA03	ABS	Absolute position detection system (Note 1)	0000h	
PA04	AOP1	Function selection A-1	0000h	
PA08	ATU	Auto tuning mode (Note 1)	0001h	
PA09	RSP	Auto tuning response (Note 1)	12	
PA10	INP	In-position range (Note 1)	100	pulse
PA14	POL	Rotation direction selection (Note 1)	0	

(2) Extension setting parameters (No.PC□ □)

| No.	Symbol	Name	Initial value	Unit
PC17	COP4	Function selection C-4	0000h	

(3) I/O setting parameters (No.PD□ □)
Change the assignment of the output signal.
Refer to "LECSS Operation Manual", Section 5.4 for details.

(Note 1)Parameters that can be set by the upstream equipment.
During PLC operation, parameters are stored in the QD75MH module and transmitted to the LECSS. Refer to PLC manual for checking the setting method of parameters.

QD75MH → LECSS

SMC.
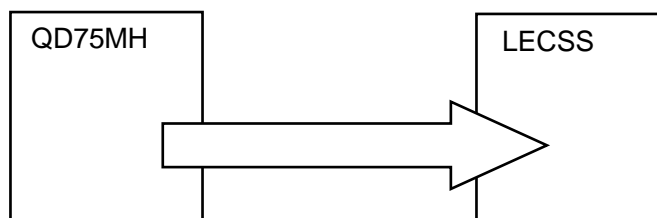
6. Parameter Configuration using Setup software (MR Configurator2™)

This section describes the configuration procedure for main parameters using the setup software (MR Configurator2™: LEC-MRC2E). See chapter 5 of the "LECSS Operation Manual" for parameter details.

6.1 Setup software (MR Configurator2™)
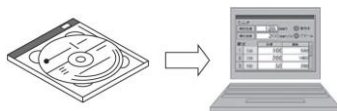
    *1 Setup software version 1.52E or above is required.
    *2 The setup software (MR Configurator2™ :LEC-MRC2E) must be purchased as an additional item.
   *3 The USB cable (LEC-MR-J3USB) must be purchased as an additional item.

6.1.1 Installation Method

Perform installation according to the "MR Configurator2™ instruction manual" (Manual/ib0300160*.pdf) contained on the setup software (MR Configurator2™) CD-ROM. The "MR Configurator2™" software will be added to the PC.

## 6.2 Basic driver set-up for Initial Test Drive

Switch on the main circuit power supply (AC100V/AC200V) and controller circuit power supply (AC100V/AC200V) to the LECSS driver.

Please check the wiring and configuration when the display on the driver is not displayed as follows.
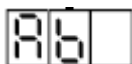
Waiting for servo system controller power to switch ON(SSCNETⅢ communication)

When the driver display flashes as shown below,**the EM1 (Forced stop) needs checking. There is a requirement for wiring of EM1 signal, and it need to be switched ON (state of EM1 release is (operational))**
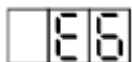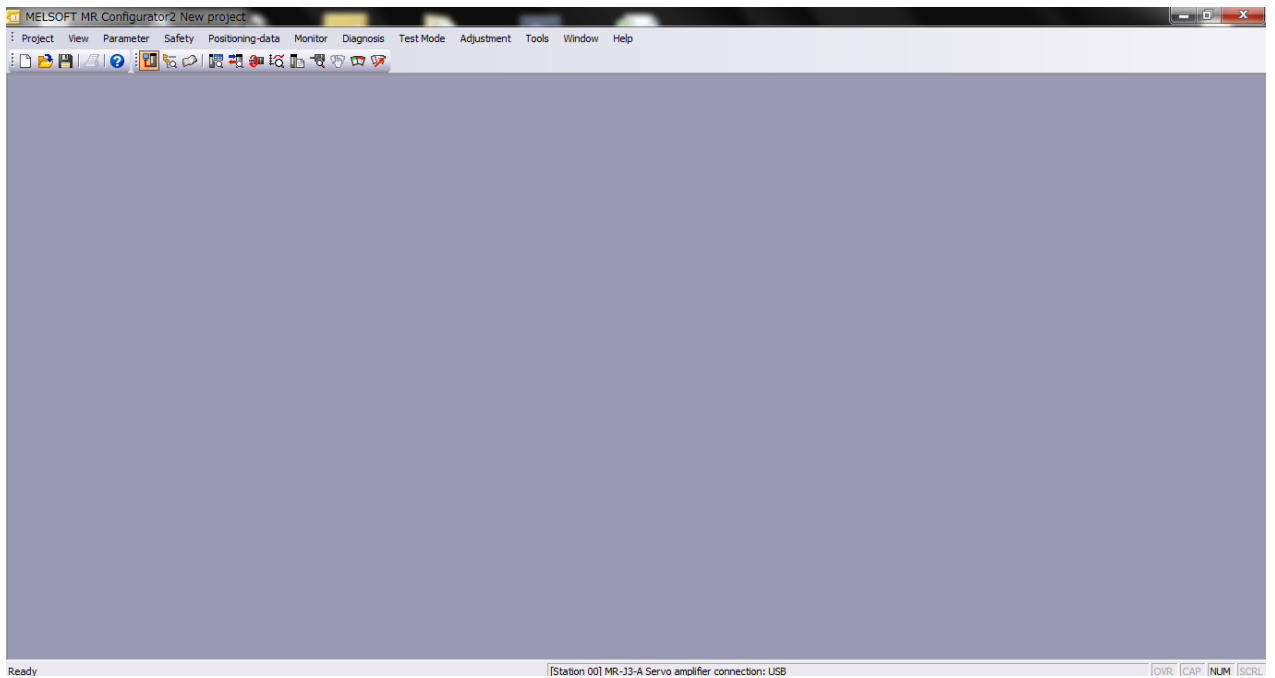

If you turn on the power supply for the first time, refer to "LECSS Operation Manual", chapter 4.

6.2.1 Start up the Setup software (MR Configurator2™)

① Connect the PC and LECSS using the USB cable.

② Turn on the power of the LECSS.
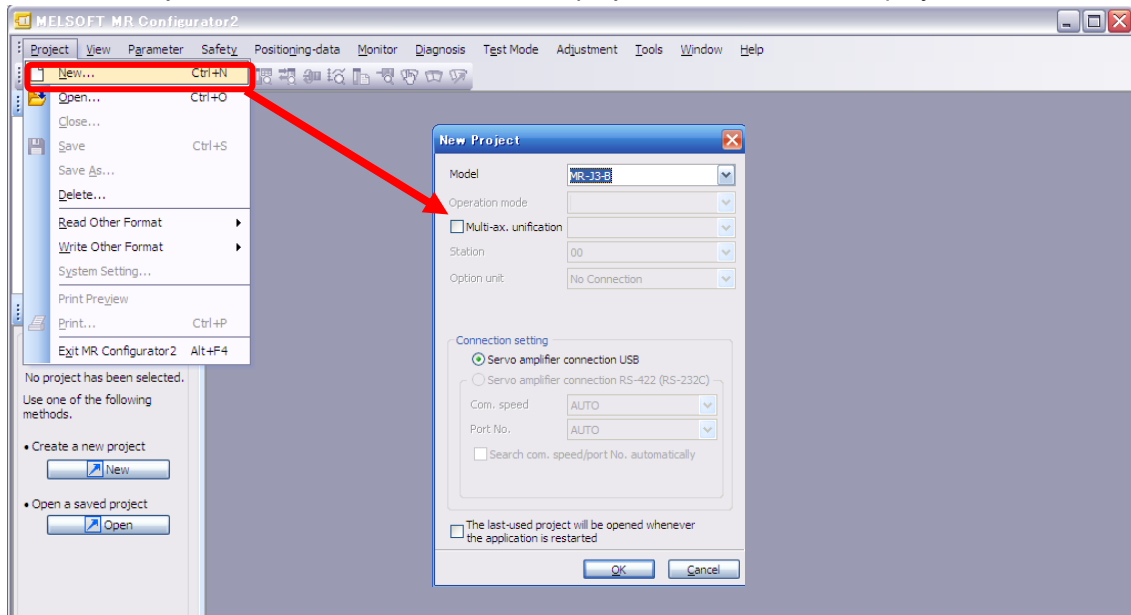
③ Start application "MR Configurator2".

Once the application starts, the screen displayed will be as shown.

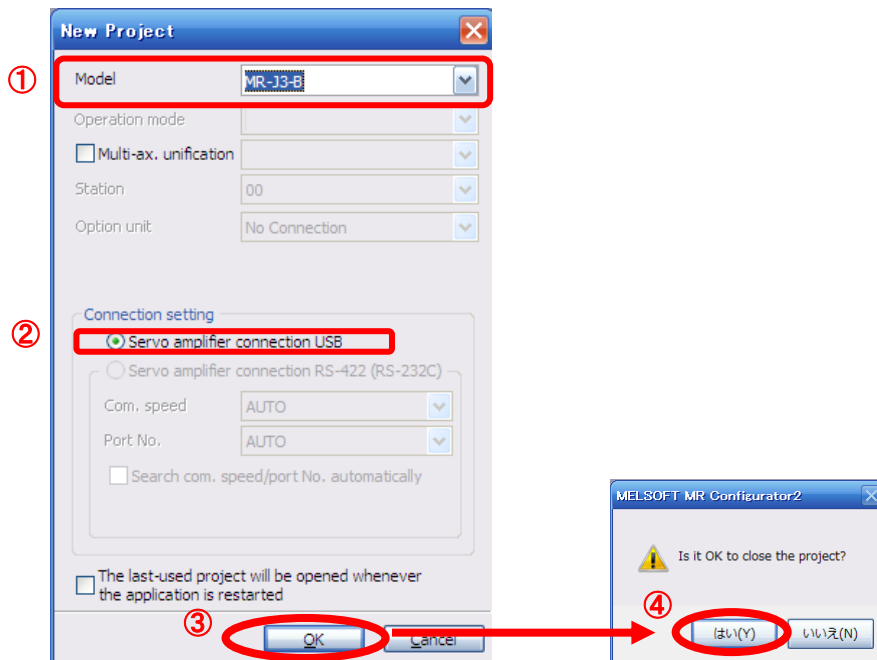## 6.2.2 "System Settings"

① From "Project" menu select "New", the "New project" window will be displayed.

6.2.3 Model Selection

① The Mitsubishi Electric Corporation series will be displayed in the model selection list. Please select MR-J3-B if using the LECSS.

② Please select "servo amplifier connection USB" as the communication device.

③ Click OK.

④ Click OK.

6.2.4 Driver ON LINE Check

Check that the driver is enabled (ON LINE).
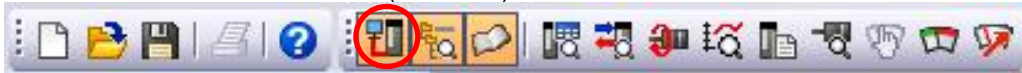
Check that the "ON LINE/OFF LINE" icon is displayed " ".

It is OFF LINE when displayed as " ".

* For OFF Line, and there is no communication between PC and LECSS driver. Confirm the following points.
   - Is driver's power supply turnned on?
   - Is the PC and LECSS driver connected with the USB cable?
   - Is the USB driver installed on the PC?
   - Is the USB driver which is compliant to Windows version installed?

6.2.5 Help Function

By selecting "MR Configurator2 Help" in "Help" from any window of the setup software, a "HELP" screen will be shown.
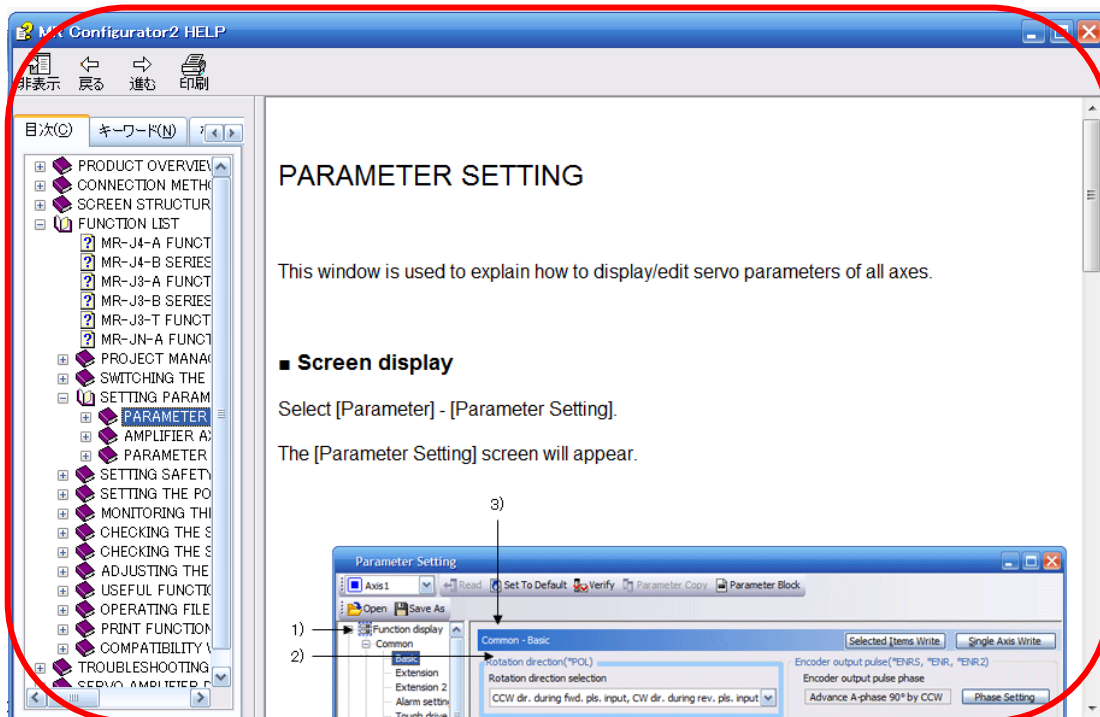
6.3 Parameter setting (Driver side)

The setup software (MR Configurator2™:LEC-MRC2E) is required to set the parameters.

    *1 Setup software version 1.52E or above is required.

    *2 The setup software (MR Configurator2™:LEC-MRC2E) must be purchased as an additional item.

   *3 The USB cable (LEC-MR-J3USB) must be purchased as an additional item.

POINT

・ When the driver is connected with the servo system controller, the parameters are set to the values of the servo system controller. Switching power off, then on makes the values set on the set up software (MR Configurator2™) invalid and the servo system controller values valid.

・ Setting may not be made to some parameters and ranges depending on the model or version of the servo system controller. For details, refer to the servo system controller user's manual.

・ Parameter whose symbol is preceded by * is made valid with the following conditions.

    * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the driver reset.

    **: Set the parameter value, switch power off once, and then switch it on again.

・ Never change parameters for manufacturer setting.

---

① From the "Parameter" menu select "Parameter Setting", the "parameter setting" window will open.

② The explanation of the parameter item is displayed in "MR2 Help".
(When it is not displayed, from the "View" menu select "Docking window" – "Docking Help".)
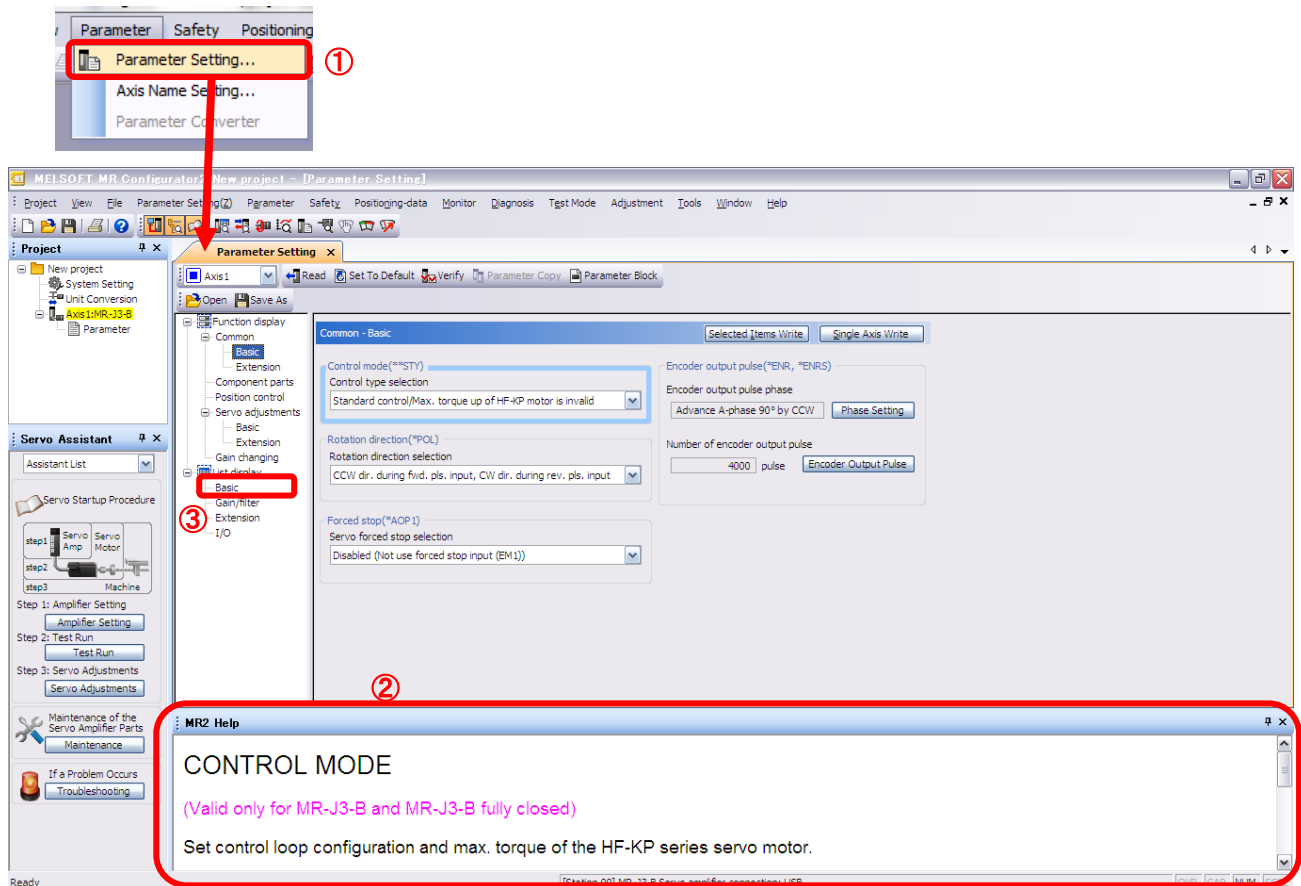
③ When each item of "List display" is clicked, a "Parameter list" screen is displayed.
When "Basic" is selected, the following is shown.

No.	Abbr.	Name	Units	Setting range	Axis 1
PA01	**STY	Control mode		0000-1F60	0000
PA02	**REG	Regenerative option		0000-73FF	0000
PA03	*ABS	Absolute position detection system		0000-0001	0001
PA04	*AOP1	Function selection A-1		0000-F230	0100
PA05	*FBP	For manufacturer setting		0-65535	0
PA06	*CMX	For manufacturer setting		1-32767	1
PA07	*CDV	For manufacturer setting		1-32767	1
PA08	ATU	Auto tuning mode		0000-0003	0001
PA09	RSP	Auto tuning response		1-32	12
PA10	INP	In-position range	pulse	0-65535	100
PA11	TLP	For manufacturer setting	%	0.0-1000.0	1000.0
PA12	TLN	For manufacturer setting	%	0.0-1000.0	1000.0
PA13		For manufacturer setting		0000-0000	0000
PA14	*POL	Rotation direction selection		0-1	0
PA15	*ENR	Encoder output pulse	pulse/rev	1-65535	4000
PA16	*ENR2	For manufacturer setting		0-65535	0
PA17	**MSR	For manufacturer setting		0000-FFFF	0000
PA18	**MTY	For manufacturer setting		0000-FFFF	0000
PA19	*BLK	Parameter block		0000-FFFF	000C

Refer to"LECSS Operation Manual", chapter 5 for details of each parameter.

6.3.1 Change of parameter block

To enable settings for all parameters.

① Select "Basic" tab and change the value of "PA19" to "000C".

② Click on the "PA19" row and click "Selected Items Write".

③ **Cycle the for the parameters to be enabled.**

④ Please click "Read".

When changing each parameter, note the following points.
Note1) Some of the parameters, there is "Enable once on again turning the power OFF after setting". (If you do not cycle the power., the data in the driver is not altered.)
Note2) "Selected Items Write": - the parameter values of the corresponding frame is written to the driver.
"Single Axis Write": All of the parameters are written to the driver.
Note3) "For manufacturer setting" parameter, do not change. If you change by mistake, The driver does not work properly.

6.3.2 Reading parameters

To read the parameters currently configured on the driver, please perform the "read" operation.

① From the View menu bar "parameter (A)" - please click on the "parameter setting (P)". "Parameter Settings" screen will be displayed.

② Please click on "Read".
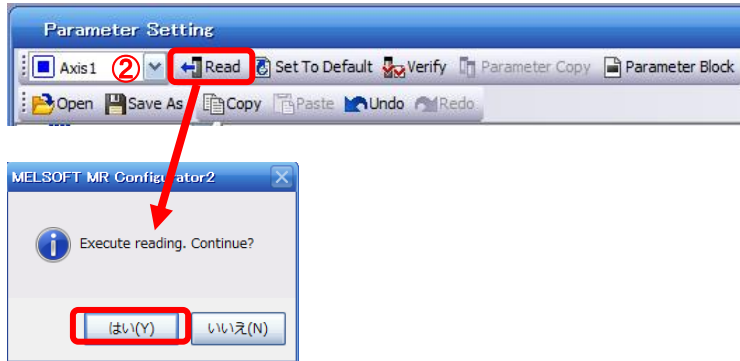
6.3.3 Parameter setting method

Please set the parameters for each actuator.

Refer to "LECSS Operation Manual",chapter 5 for details of each parameter.

Refer to"LECSS Operation Manual (Simplified Edition)",section 6.3.4 for details of the parameters recommended values for each actuator.

Setting example of the Regenerative option (PA02) (in the case of setting to "LEC-MR-RB-032")

① Set the parameters of the PA02 to "0002" in the "Basic" tab.

② Click on the "Single Axis Write" button.

③ Turn the power OFF and ON again. Parameter is enabled.
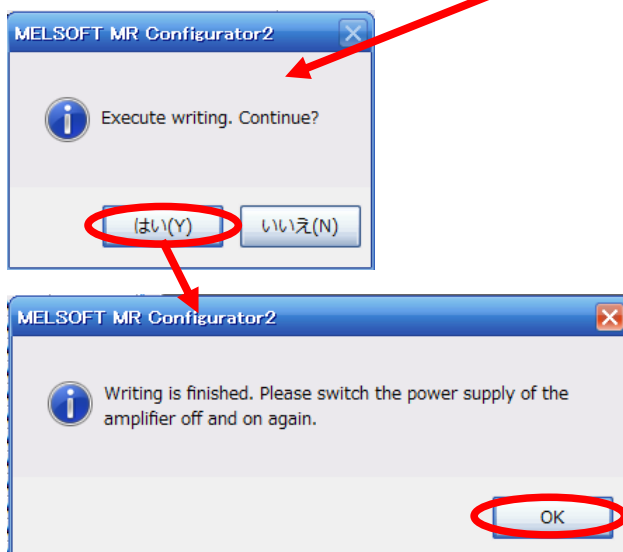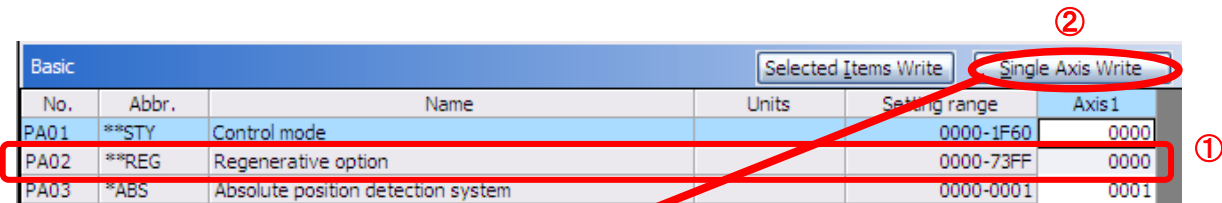
6.3.4 The recommended parameters for each actuator

The recommended parameters for each actuator.

Refer to "LECSS Operation Manual", section 5 for details.

Recommended Parameter Values [LEF]

Series			LEFS25			LEFS32			LEFS40		
	Lead symbol		H	A	B	H	A	B	H	A	B
	Lead		20	12	6	24	16	8	30	20	10
Parameter *1,*2	Para. No.	Initial value	Recommended value								
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**								
Rotation direction selection *3	PA14	0	**1(+：Counter motors side)**								
Adaptive tuning mode	PB01	0000	0000								
Load to motor inertia moment ratio	PB06	7	7								
Machine resonance suppression filter 1	PB13	4500	4500								
Notch shape selection 1	PB14	0000	0000								

Series			LEFB25	LEFB25U	LEFB32	LEFB32U	LEFB40	LEFB40U
	Lead symbol		S					
	Lead		54					
Parameter *1,*2	Para. No.	Initial value	Recommended value					
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**					
Rotation direction selection	PA14	0	**1(+：Counter motors side)**	0(+: Counter motors side)	**1(+：Counter motors side)**	0(+: Counter motors side)	**1(+：Counter motors side)**	0(+: Counter motors side)
★ Adaptive tuning mode	PB01	0000	**0002**		0000			
★ Load to motor inertia moment ratio	PB06	7	**50**					
★ Machine resonance suppression filter 1	PB13	4500	**400**		4500			
★ Notch shape selection 1	PB14	0000	**0030**		0000			

★ Parameter should be changed.

☐ Different from the initial value.

*1 This Parameter is the recommended value. Please change this parameter to an appropriate value for your operating method.

*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.

*3 When the motor mounting position is right side parallel (LEFS*R) or left side parallel (LEFS*L), the rotation direction selection is 0(+: Counter motors side).

* For LECSS, please set the electronic gear with PC, PLC etc. in your application.

SMC

Recommended Parameter Values [LEJ]

Series	Lead symbol		LEJS40			LEJS63			LEJB40	LEJB63
			H	A	B	H	A	B	T	
	Lead		24	16	8	30	20	10	27	42
Parameter *1,*2	Para. No.	Initial value	Recommended value							
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032) / 0003(LEC-MR-RB-12)**							
Rotation direction selection	PA14	0	**1** **(+：Counter motors side)**						0 (+：Counter motors side)	
★Adaptive tuning mode	PB01	0000	0000						**0002**	0000
★Load to motor inertia moment ratio	PB06	7	7						**50**	
★Machine resonance suppression filter 1	PB13	4500	4500						**400**	4500
★Notch shape selection 1	PB14	0000	0000						**0030**	0000

★ Parameter should be changed.

Different from the initial value.

*1 This Parameter is the recommended value. Please change this parameter to an appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.

* For LECSS, please set the electronic gear with PC, PLC etc. in your application.

SMC

Recommended Parameter Values [LEY]

Series			LEY25/ LEYG25			LEY25D/ LEYG25D			LEY32/ LEYG32			LEY32D/ LEYG32D		
	Lead symbol		A	B	C	A	B	C	A	B	C	A	B	C
	Lead		12	6	3	12	6	3	20	10	5	16	8	4
Parameter *1,*2	Para. No	Initial value	Recommended value											
Regenerative option	PA02	0000	**0000 (Non)/ 0002 (LEC-MR-RB-032)**											
Rotation direction selection *3	PA14	0	0 (+:Counter motors side)			**1 (+:Counter motors side)**			0 (+:Counter motors side)			**1 (+:Counter motors side)**		
Adaptive tuning mode	PB01	0000	0000											
Load to motor inertia moment ratio	PB06	7	7											
Machine resonance suppression filter 1	PB13	4500	4500											
Notch shape selection 1	PB14	0000	0000											

Series			LEY63				LEY63D		
	Lead symbol		A	B	C	L	A	B	C
	Lead		20	10	5	2.86	20	10	5
Parameter *1,*2	Para. No	Initial value	Recommended value						
Regenerative option	PA02	0000	**0000 (Non)/ 0002 (LEC-MR-RB-032)/ 0003 (LEC-MR-RB-12)**						
Rotation direction selection *3	PA14	0	0 (+:Counter motors side)				**1 (+:Counter motors side)**		
Adaptive tuning mode	PB01	0000	0000						
Load to motor inertia moment ratio	PB06	7	7						
Machine resonance suppression filter 1	PB13	4500	4500						
Notch shape selection 1	PB14	0000	0000						

☐ Different from the initial value.

*1 This Parameter is the recommended value. Please change this parameter to an appropriate value for your operating method.

*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.

*3 When the motor mounting position is right side parallel (LEY*R / LEYG*R) or left side parallel (LEY*L / LEYG*L), the rotation direction selection is 0(+: Counter motors side).

* For LECSS, please set the electronic gear with PC, PLC etc. in your application.

SMC

6.3.5 Forced stop input selection

If the product is used with forced stop (EM1), set the parameter [PA04] to "0000".
Forced stop (EM1) must be ON to start the motor.

Parameter			Initial value	Unit	Setting range
No.	Symbol	Name			
PA04	AOP1	Function selection A-1	0000h		Refer to the text.

> POINT
> ・This parameter is made valid when power is switched off, then on after setting, or when the driver reset has been performed.

The servo forced stop function is avoidable.
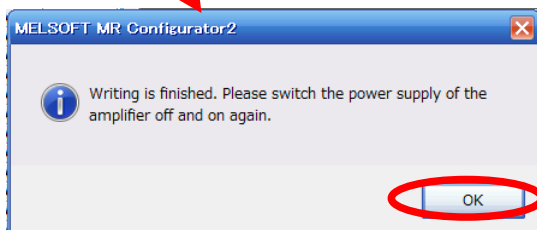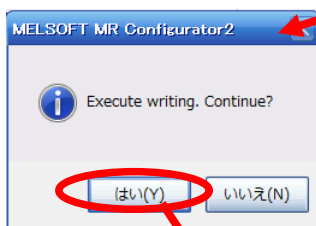
Parameter No.PA04

| 0 | | 0 | 0 |

Selection of servo forced stop
0: Valid (Forced stop (EM1) is used.)
1: Invalid (Forced stop (EM1) is not used.)

When not using the forced stop (EM1) of driver, set the selection of servo forced stop to invalid (□1□ □). At this time, the forced stop (EM1) automatically turns on inside the driver.

EX.) In order to nullify servo forced stop.
[PA04] = 0100.

① Set the "PA04" to "0100" in the "Basic" tab.
② Click on the "Single Axis Write" button.
③ Turn the power OFF and ON again. Parameter is enabled.

Basic				Selected Items Write	Single Axis Write	②
No.	Abbr.	Name	Units	Setting range	Axis1	
PA01	**STY	Control mode		0000-1F60	0000	
PA02	**REG	Regenerative option		0000-73FF	0000	
PA03	*ABS	Absolute position detection system		0000-0001	0001	
PA04	*AOP1	Function selection A-1		0000-F230	0100	①

MELSOFT MR Configurator2

Execute writing. Continue?

はい(Y)   いいえ(N)

MELSOFT MR Configurator2

Writing is finished. Please switch the power supply of the amplifier off and on again.

OK

SMC

6.3.6 Absolute position detection system

*If you use the absolute position detection system, set parameter: [PA03]=0001.
 Refer to "LECSS Operation Manual", chapter 12 for details.

Parameter			Initial value	Unit	Setting range
No.	Symbol	Name			
PA03	ABS	Absolute position detection system	0000h		Refer to the text.

```
 POINT
・This parameter is made valid when power is switched off, then on after setting,
  or when the driver reset has been performed.
・This parameter cannot be used in the speed control mode.
```

Set this parameter when using the absolute position detection system in the position control mode.

Parameter No.PA03

0	0	0	

Selection of absolute position detection system
0: Used in incremental system
1: Used in absolute position detection system

EX.) Use absolute position detection system
  [PA03] = 0001

① Set the "PA03" to "0001" in the "Basic" tab.
② Click on the "Single Axis Write" button.
③ Turn the power OFF and ON again. Parameter is enabled.

6.3.7 Verify of parameters

If you want to compare the "parameter" set in the setup software with the " Parameters set in the driver" / "Initial value parameter" / "Saved parameter", perform " Verify ".

① Click the "Verify" button on the [Parameter Setting] window. "Verfication Setting" screen will display.
② Please select the comparison target.
   Amplifier : Compare with the parameters set in the driver.
   Default   : Compare with the initial value of the parameter.
   File   : Compare with saved parameters.
③ Please click "OK" button. The verified result is displayed.
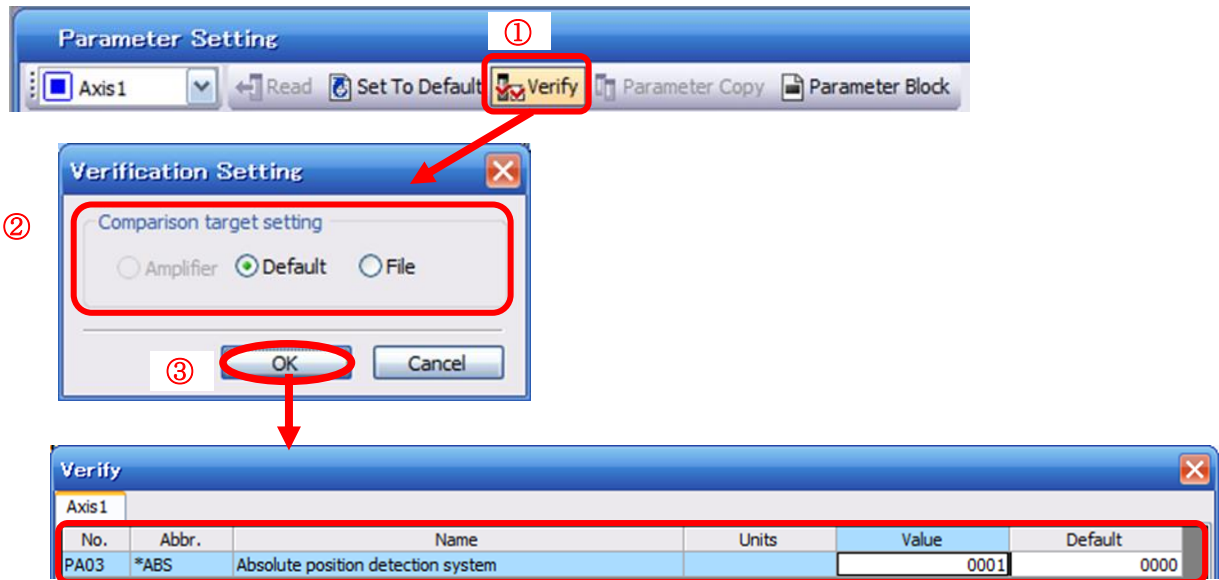
6.3.8 Parameter initialization

If you want to initialize parameters in the driver, please perform "Set to Default".
When you initialize the parameters, parameters can not be undone.
Please be sure to save the parameters in use.
(Refer to "LECSS Operation Manual (Simplified Edition)", section 6.7.1 for the parameter storage method.)

① Click the "Set To Default" button on the [Parameter Setting] window.
② Please click "Yes" button. "Parameter Block" screen will display.
   Set the default using an editable parameter as the browsable range of the selected parameter block.
③ Select the parameter block you want to initialize.
④ Please click "OK" button.
   Set the default using an editable parameter as the browsable range of the selected parameter block.
⑤ Click on the "Single Axis Write" button.
⑥ **Turn the power OFF and ON again. Parameter is enabled.**
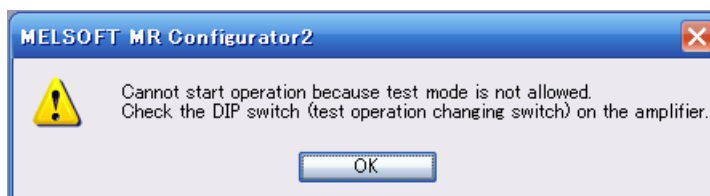
6.4 JOG Mode in the Setup Software

① The "JOG Mode" window can be displayed by selecting "Jog Mode" from the "Test Mode" menu in the **setup software**.

② Click "OK".

(When using this function, all external input signal operation will be diabled. If controlling using a PLC or other upper device, please turn off the power and reset the device before use.)

In the test operaton mode, if the test operation select switch (SW2-1) is in the "Down" position, the following warning is displayed.
Set the test operation select switch (SW2-1) to the "UP" position and **make sure to turn the powor off before turing it on again**.

When performing the test operation mode using the set-up software (MR Configurator2TM), set the test operation select switch to the "UP" position.

(Note) SW2

Spare (Be sure to set to the "Down" position.) Switch.
(SW2-2)

Up

Down

Test operation select switch (SW2-1)
Set the test operation select switch to the "Up" Position,
when performing the test operation mode by usinf set up
software （MR Configurator)

Note. This table indicates the status when the switch is set to "Down".
(Default)

For the test operation select switch（SW2-1）, please refer to section 4 of LECSS Operation Manual (Simplified edition).

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6.4.1 JOG Mode

① In order to prevent accidental impact at the end of the stroke, test the actuator operation at low speed.
(If motor speed configuration or Acceleration/deceleration time are required, change the value.)
See "LECSS Operation Manual (Simplified Edition)",section 6.6.2 for motor speed configuration.
See "LECSS Operation Manual (Simplified Edition)",section 6.6.3 for Acceleration/deceleration time.

② Check actuator JOG operation using [Forward (CCW)] and [Reverse (CW)] in JOG mode.
(If operation is not correct , please check wiring and parameters)
When performing JOG operation in the setup software, the rotation direction of the actuator does not
change if you change the setting of parameter PA14 (Rotation direction selection). The actuator moves
in the direction of [Forward (CCW)] button and [Reverse (CW)] button.
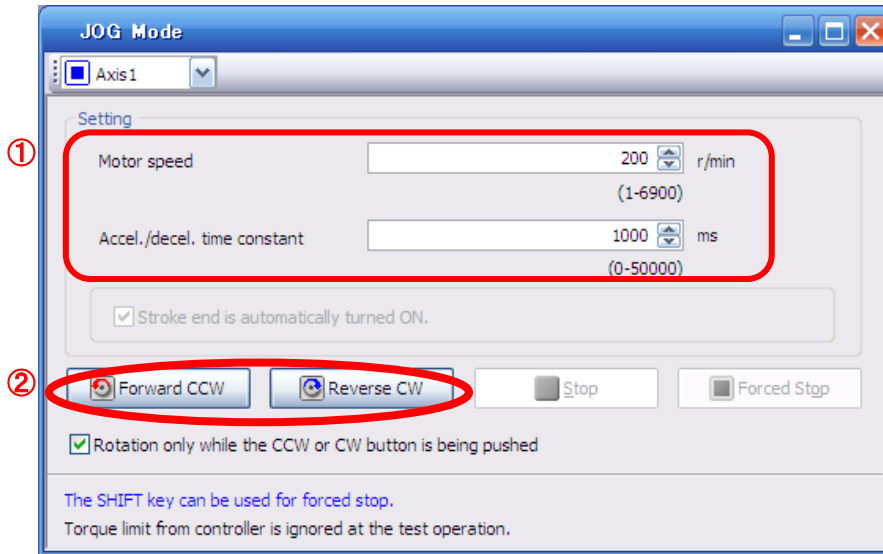
Item	Setting range	Unit	Description
Motorspeed	0 ~ allowable actuator speed	r/min	Set the command speed of the servo motor for execution of positioning (**motor rotations/minute**).
Acceleration/deceleration time	0 ~ 50000	ms	Set the time until the servo motor reaches/stops to the rated speed (3000 r/min).

SMC

6.5 Changing Output Signal Allocation

Output signal assignment can be changed as appropriate from initial settings. There may be cases when changing the output signal assignment are required for actuator operation.
The allocation of the input signals cannot be changed in the LECSS, this must be changed by a higher level device.
Please be aware that any changes will alter signals entered as initial settings.
Please allocate the signals according to your system specification.
*When configuring PD**, please set parameter write inhibit [PA19] to 000C.

See "LECSS Operation Manual",section 5.4 for details.

6.5.1 Initial I/O Signal Allocation

The initial (Default) allocation of I/O signals is shown below.

> **Fixation   Input signal assignment （CN3-2、CN3-12、CN3-19、CN3-20）**
> **PD07 to PD09 Output signal assignment（CN3-9、CN3-13、CN3-15）**

Input signal points (4) and initial assignment

Device	Symbol	Connector pin No.	I/O division	Parameters No.	Initial value
Forced stop	EM1	CN3-20	DI-1	- (Fixation)	- (Fixation)
Device 1	DI1[Note1]	CN3-2	DI-1	- (Fixation)	- (Fixation)
Device 2	DI2[Note1]	CN3-12	DI-1	- (Fixation)	- (Fixation)
Device 3	DI3[Note1]	CN3-19	DI-1	- (Fixation)	- (Fixation)

Output signal points (3) and initial assignment

Device	Symbol	Connector pin No.	I/O division	Parameters No.	Initial value
Electromagnetic brake interlock	MBR	CN3-13	DO-1	PD07	0005
In-position (Positioning completed)	INP	CN3-9	DO-1	PD08	0004
Trouble	ALM	CN3-15	DO-1	PD09	0003

Devices can be assigned for DI1 DI2 DI3 with PC or PLC...etc setting.
For devices that can be assigned, refer to the PC or PLC...etc instruction manual.

See "LECSS Operation Manual",section 3.5 for details regarding signals.
See "LECSS Operation Manual",section 5.4 for parameter configuration values.

6.5.2 Signal Allocation using Setup Software

① The "Parameter Setting" window will be displayed when "Parameter Setting" is selected from the "Parameter" menu in the setup software.

② Click the I/O tab.

③ When changing the allocation of signals, parameters for "PD07" - "PD09" can be altered.
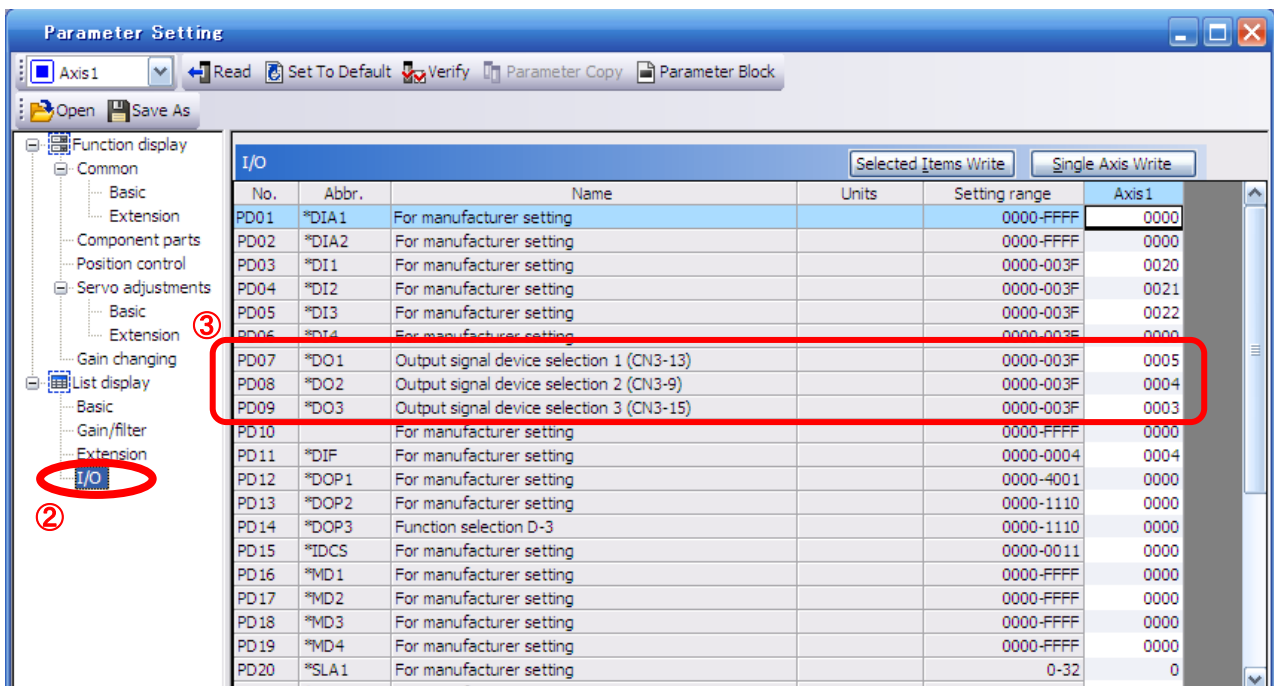
6.5.3 Allocation Examples

(1) Example of Ready (RD) Settings
  Changing pins CN1-13 to Ready (RD).

Output signal points (3) and initial assignment

Device	Symbol	Connector pin No.	I/O division	Parameters No.	Initial value
Electromagnetic brake interlock	MBR	CN3-13	DO-1	PD07	0005
In-position (Positioning completed)	INP	CN3-9	DO-1	PD08	0004
Trouble	ALM	CN3-15	DO-1	PD09	0003

Device	Symbol	Connector pin No.	I/O division	Parameters No.	Initial value
Ready	RD	CN3-13	DO-1	PD07	0005→0002
In-position (Positioning completed)	INP	CN3-9	DO-1	PD08	0004
Trouble	ALM	CN3-15	DO-1	PD09	0003

① Changing PD07 from 0005 to 00**02**

PD07	*DO1	Output signal device selection 1 (CN3-13)

Any input signal can be assigned to the CN3-13 pin.

0 0 **0 2**

Select the output device of the CN3-13 pin.

Setting	Device	Setting	Device
00	Always OFF	0A	Always OFF (Note 2)
01	For manufacturer setting (Note 3)	0B	For manufacturer setting (Note 3)
02	RD	0C	ZSP
03	ALM	0D	For manufacturer setting (Note 3)
04	INP (Note 1)	0E	For manufacturer setting (Note 3)
05	MBR	0F	CDPS
06	DB	10	For manufacturer setting (Note 3)
07	TLC	11	ABSV (Note 1)
08	WNG	12 to 1F	For manufacturer setting (Note 3)
09	BWNG	20 to 3F	For manufacturer setting (Note 3)

Note 1. It becomes always OFF in speed control mode.
    2. It becomes SA in speed control mode.
    3. For manufacturer setting
       Never change this setting.

(2) Symbol allocation using the setup software:
Changing pins CN1-13 to Ready (RD).

①　Change PD07 from 0005 to 0002 in the I/O tab.
②　Select "Single Axis Write".
③　**Cycle the power for the parametersto be enabled.**
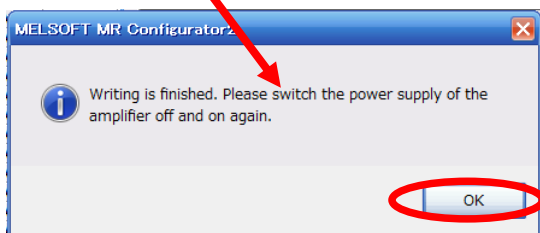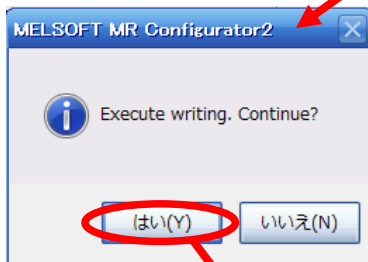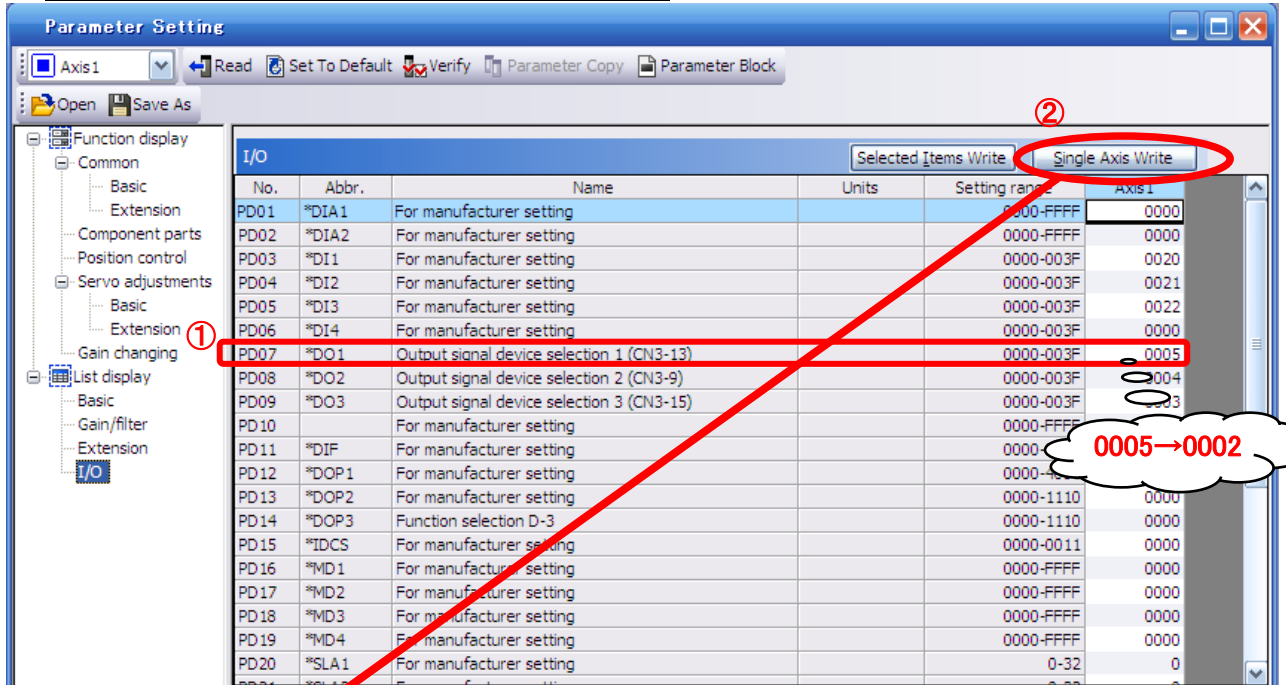
* Please allocate pins CN1-13 separately.

* See "LECSS Operation Manual",section 5.4.2 for details on allocation of Output signals to pins CN1-9, CN1-13, CN3-15.

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6.5.4 I/O Signal Allocation Check

The ON/OFF state (including layout check) and signal names allocated to CN3 can be checked. When parameters for PD07 – PD09 have been changed, it is necessary to confirm these are correctly assigned.

① From the Monitor menu of the Setup Software select I/OMonitor. The I/O Monitor window opens.

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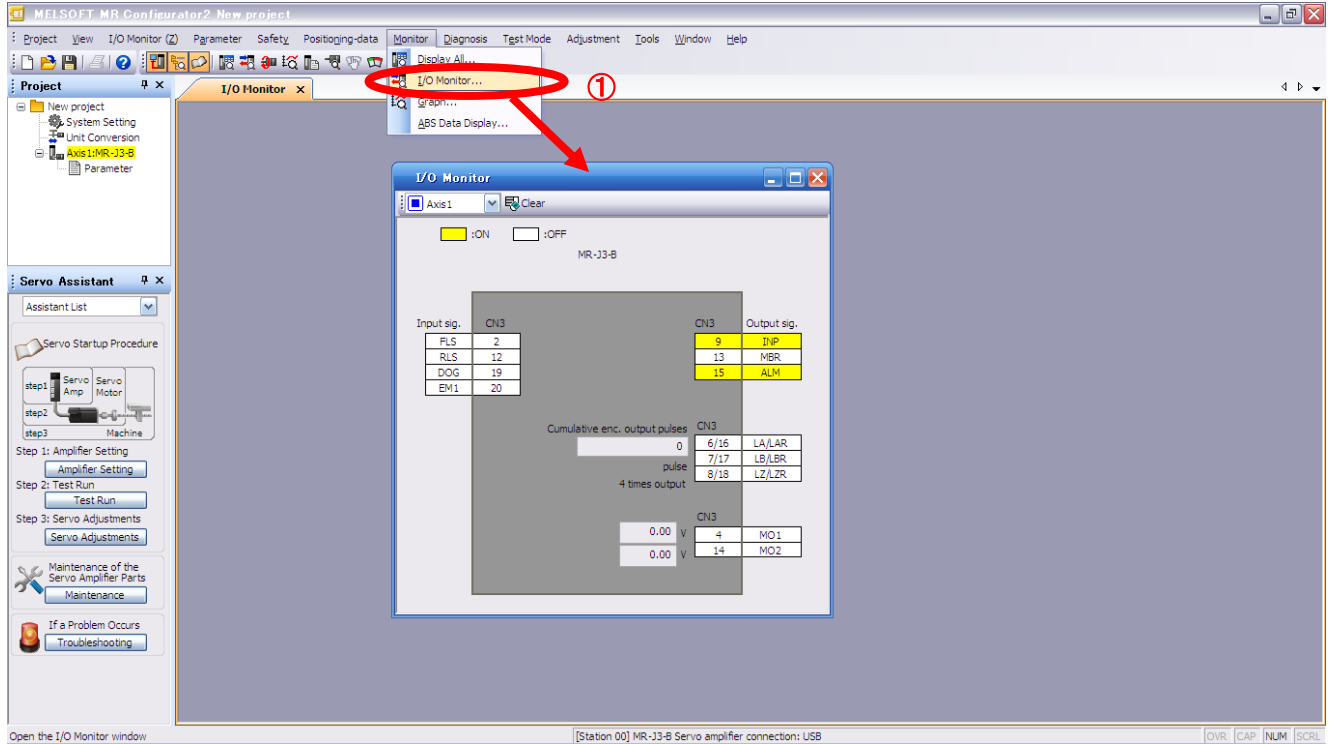
6.6 Positioning Mode in Setup Software

① From the Test Mode menu of the Setup Software select Positioning Mode. Select The Move Distance Unit
② Click OK.
(When using this function, external input signal operation will be disabled. When controlling from a PLC or upper level device, the power must be turned off and then on.)
③ The Positioning Mode window opens.

in the test operaton mode, if the test operation select switch (SW2-1) is in the "Down" position, the following warning is displayed.
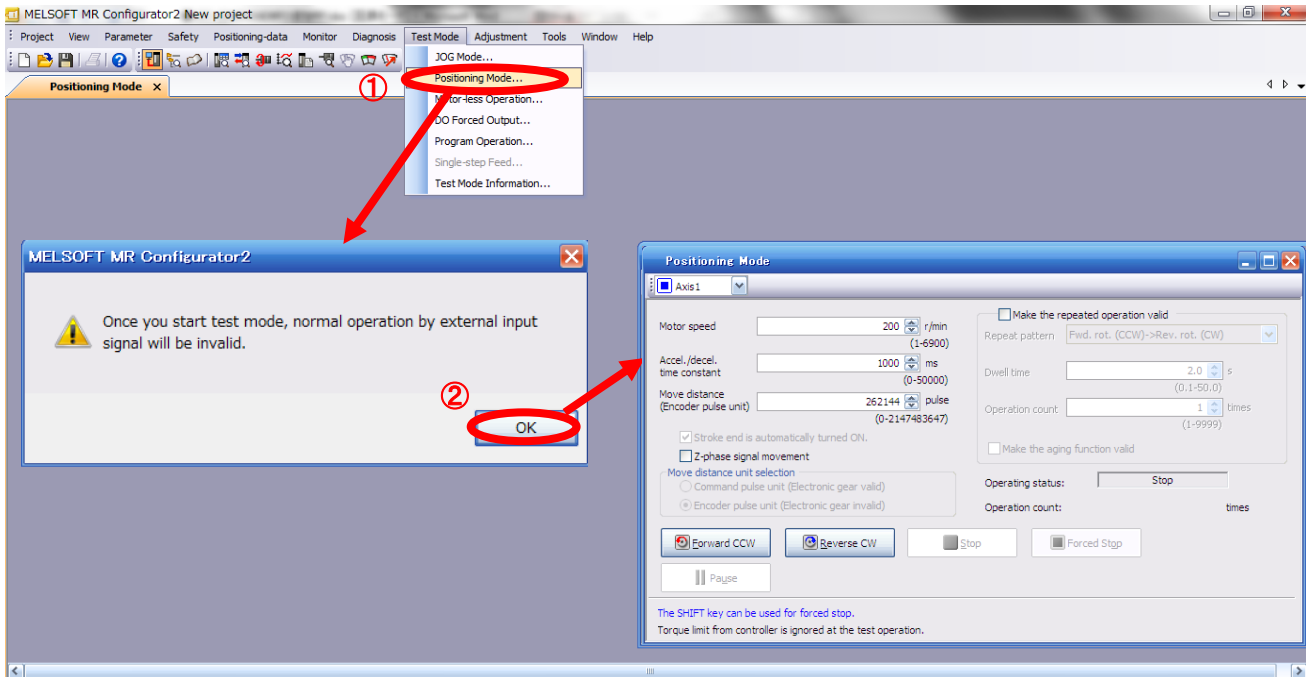Set the test operation select switch (SW2-1) to the "UP" position and **make sure to turn the powor off before turing it on again**.
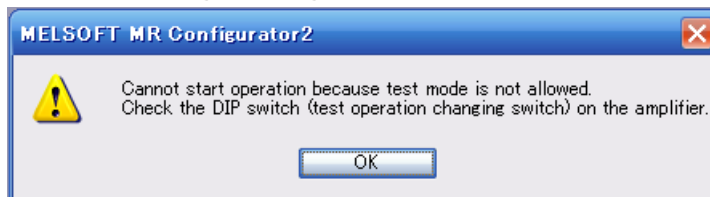
When performing the test operation mode using the set-up software (MR Configurator2™), set the test operation select switch to the "UP" position.
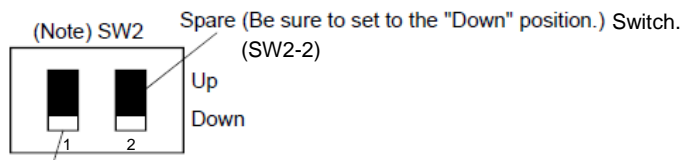
For the test operation select switch（SW2-1）, please refer to section 4 of LECSS Operation Manual (Simplified edition).

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6.6.1 Positioning Mode

① In order to prevent accidental impact at the end of the stroke, operate the actuator at a low speed initially. When changing speed or movement, increase the values whilst checking operation (Change motorspeed, acceleration/deceleration time, movement distance values if required).
See "LECSS Operation Manual (Simplified Edition)",section 6.6.2 for motorspeed configuration.
See "LECSS Operation Manual (Simplified Edition)",section 6.6.3 for acceleration/deceleration time configuration.
See "LECSS Operation Manual (Simplified Edition)",section 6.6.4 for move distance configuration.

② Actuator positioning operates using [Forward (CCW)] and [Reverse (CW)].
(Check wiring and parameters if operation cannot be performed correctly).
When performing JOG operation in the setup software, the rotation direction of the actuator does not change if you change the setting of parameter PA14 (Rotation direction selection). The actuator moves in the direction of [Forward (CCW)] button and [Reverse (CW)] button.

"Actuator's movement distance per pulse" is obtained as below:

$$\cdot \text{actuator's movement distance per pulse (mm/pls)} = \text{actuator's lead (mm)}^{※1} / \text{no. of encoder's pulses}^{※2}$$
$$= \text{lead length (mm)} / 4194304(\text{pulse})$$

eg. In case of lead length of 10mm,
$$\text{actuator's movement distance per pulse [mm]} = 10(\text{mm}) / 262144(\text{pulse})$$
$$\fallingdotseq 0.00003810000024(\text{mm / pulse})$$

※1 Please refer to section 6.3.4 of LECSS Operation Manual (Simplified edition) for each actuator's lead.
※2 The number of encoder's pulses: 262144(pls)

LECSS cannot set an electronic gear ratio.
Therefore, in performance of "Test Operation (T)" – "Positioning Operation (I)" with the set-up software, "actuator's move distance per pulse" is set per pulse unit of the encoder.
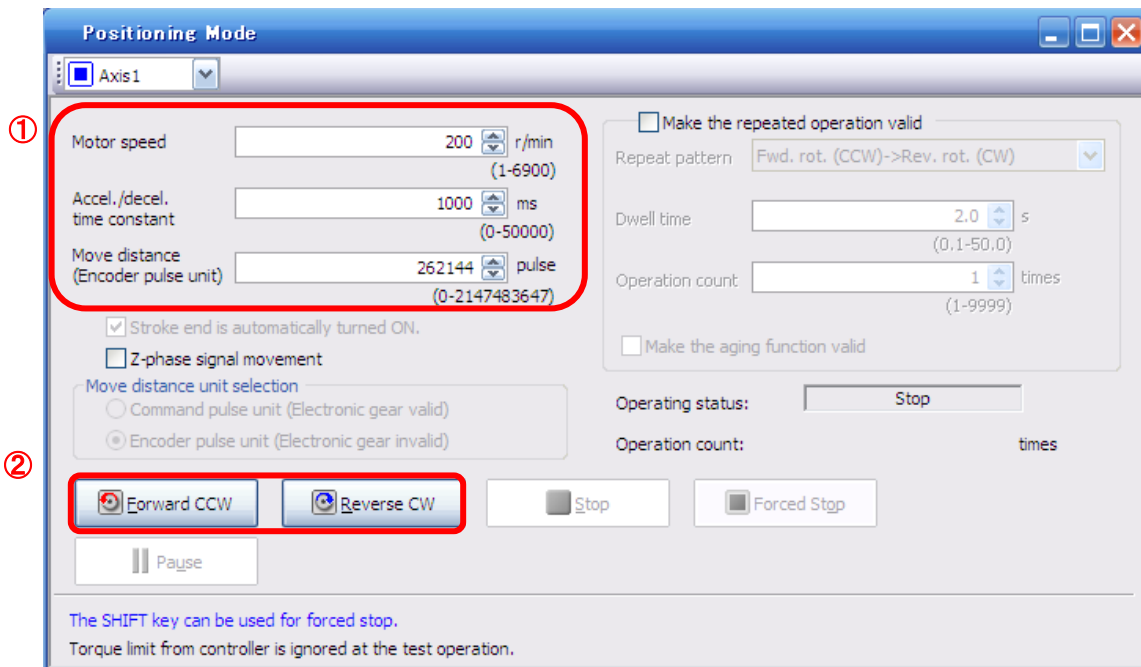
Item	Setting range	Unit	Description
Motorspeed	0 ~ Allowed Speed for each actuator	r/min	Set the command speed of the servo motor for execution of positioning (**Motor rotations/min**).
Acceleration/ deceleration time	0 ~ 50000	ms	Set the time until the servo motor reaches/stops to the rated speed **(3000 r/min)**
Move distance	0 ~ 2147483647	pulse	Sets movement distance.

6.6.2 Motor speed Configuration

<Rotation Speed Configuration>

① Motorspeed (r/min) configuration.
   * r/min (rpm): Indicated motor rotation speed (motor rotations/min)

   Rotation speed must be between 0 and the allowable speed limit for each actuator. Please be aware that the actuator will not operate if this is set to 0.

If the rotation speed is too low, this may cause vibration; check the actuator while changing settings.

   Movement speed (mm/s) must be converted into rotation speed (r/min).
   See below for the conversion formula.

Calculating motor speed conversion example using an actuator with a 20mm lead and 500[mm/sec] speed.

Rotations per Second

Distance of movement per second   ÷   Distance of movement per rotation

Rotation Speed (rpm) = Speed (mm/s)   ÷   Lead (mm) }×60 (S)
                = {500 (mm/s) ÷20 (mm) }×60 (s) =1500 (rpm)

Positioning Mode

Axis1

① Motor speed   200 r/min
   (1-6900)

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

Move distance (Encoder pulse unit)   262144 pulse
   (0-2147483647)

☑ Stroke end is automatically turned ON.
☐ Z-phase signal movement

Move distance unit selection
   ○ Command pulse unit (Electronic gear valid)
   ● Encoder pulse unit (Electronic gear invalid)

☐ Make the repeated operation valid

Repeat pattern   Fwd. rot. (CCW)->Rev. rot. (CW)

Dwell time   2.0 s
   (0.1-50.0)

Operation count   1 times
   (1-9999)

☐ Make the aging function valid

Operating status: Stop

Operation count: times

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

[Pause]

The SHIFT key can be used for forced stop.
Torque limit from controller is ignored at the test operation.

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6.6.3 Acceleration/deceleration Time Configuration

< Acceleration/deceleration Time Configuration>

① Acceleration/deceleration time (ms) configuration:
The acceleration/deceleration time sets the amount of time (ms) in which a prescribed number of rotations (3000[r/min]) is reached.
The acceleration/deceleration time must be set to a value between 0 and the allowable acceleration/deceleration speed for each actuator.

The acceleration/deceleration time must be converted from the acceleration/deceleration speed. See below for the conversion formula.

Calculating Acceleration/deceleration conversion example using an actuator with a 8 [mm] lead with an acceleration of 3000[mm/sec^2].

Speed at a rated motor rotation of 3000rpm

Accel/decel time **(ms)** = $\dfrac{\{\text{Rated Rotation Speed (r/min)} \div 60\text{ (S)}\} \times \text{Screw Lead (mm)} \times 1000\text{ *}}{\text{Acceleration/deceleration speed (mm/s}^2)}$

***Acceleration speed is measured in ms, so this must be calculated as (s) ×1000**

Acceleration/deceleration time (ms) = $\dfrac{\{3000\text{ (r/min)} \div 60\text{ (S)}\} \times 8\text{ (mm)} \times 1000}{3000\text{ (mm/s}^2)}$

$\doteqdot 133\text{ (ms)}$
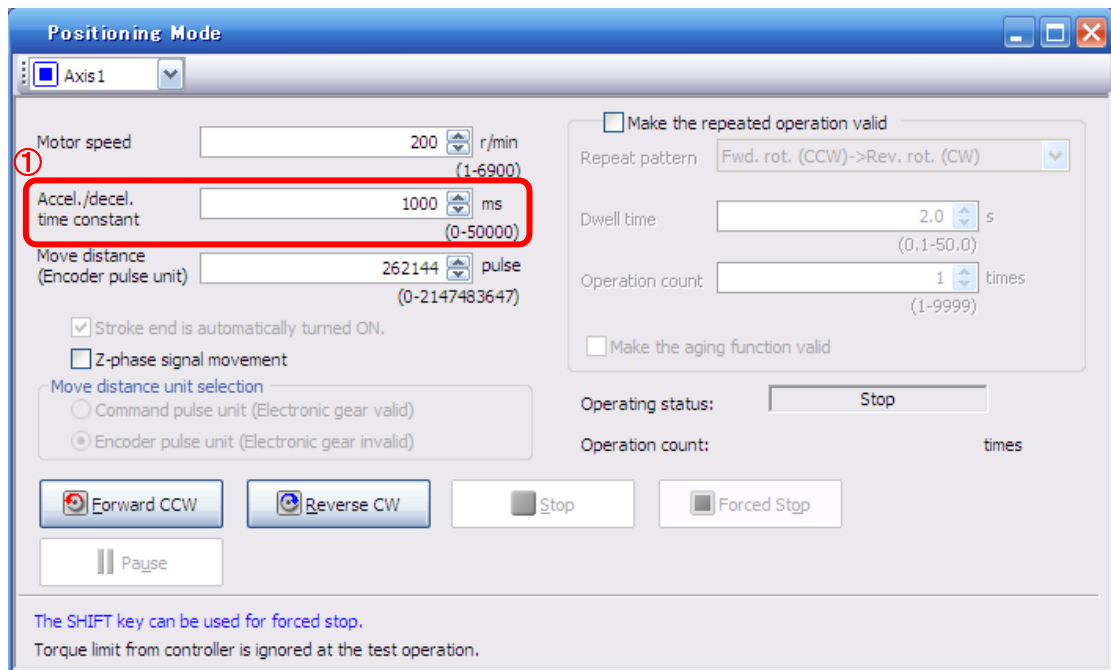
6.6.4 Movement distance Configuration and Operation

< Movement distance Configuration>

①　Set the movement distance [pulse]. Select a value within the stroke range.

②　Actuator position will operate using [Forward (CCW)], [Reverse (CW)].
The position at which power is turned ON will be set as the home position, and the actuator will travel the amount set as movement distance (check wiring and parameters if operation is not performed correctly). When performing JOG operation in the setup software, the rotation direction of the actuator does not change if you change the setting of parameter PA14 (Rotation direction selection). The actuator moves in the direction of [Forward (CCW)] button and [Reverse (CW)] button.

"Actuator's movement distance per pulse" is obtained as below:

・actuator's movement distance per pulse (mm/pls) ＝ actuator's lead (mm) [※1] / no. of encoder's pulses[※2]
$$= \text{lead length (mm)} / 262144\text{(pulse)}$$

eg. In case of lead length of 10mm,
actuator's movement distance per pulse [mm] ＝ 10(mm) / 262144(pulse)
$$≒ 0.0000381\text{(mm / pulse)}$$

※1　Please refer to section 6.3.4 of LECSS Operation Manual (Simplified edition) for each actuator's lead.
※2　The number of encoder's pulses:　262144(pls)

Travel distance (mm) must be converted to travel distance (pulse).
See below for the conversion formula.

To move the actuator of which lead is 10mm for 100mm:

move distance[pulse] ＝ 100(mm) / actuator's move distance per pulse[mm/pls]
$$= 100\text{(mm)} / (10\text{(mm)} / 262144\text{(pulse)})$$
$$≒ 2621440\text{(pulse)}$$

* Ensure that the [Forward (CCW)] and [Reverse (CW)] driving directions are checked. If the driving direction is unclear, operate the actuator slowly with a small move distance while checking the driving direction.

SMC
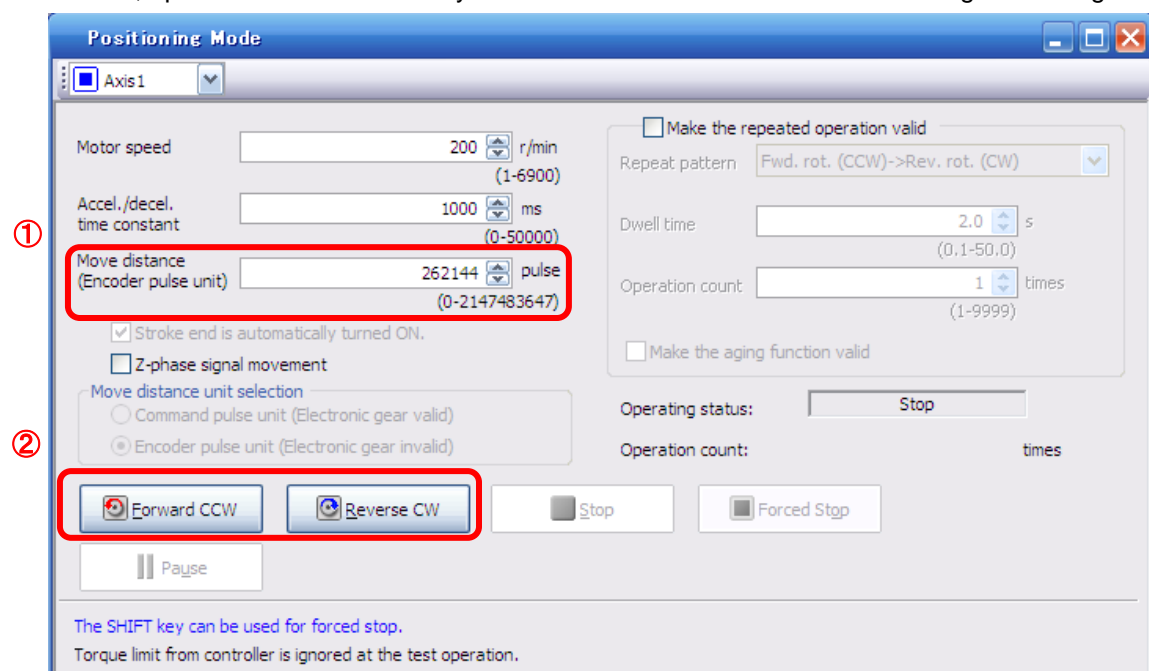
6.7 Saving/Loading Parameters

6.7.1 Saving Parameters

① From the "Parameter Setting" window in the setup software, select "Save As".
② Please specify location to be saved.
③ Please enter any file name.
④ Click "Save".

Files Saved

.prm2	Settings files for parameters

* Note　Always upload current parameters from the driver to the software before saving.
 (See "LECSS Operation Manual (Simplified Edition)",section 6.3.2 for uploading.)

SMC
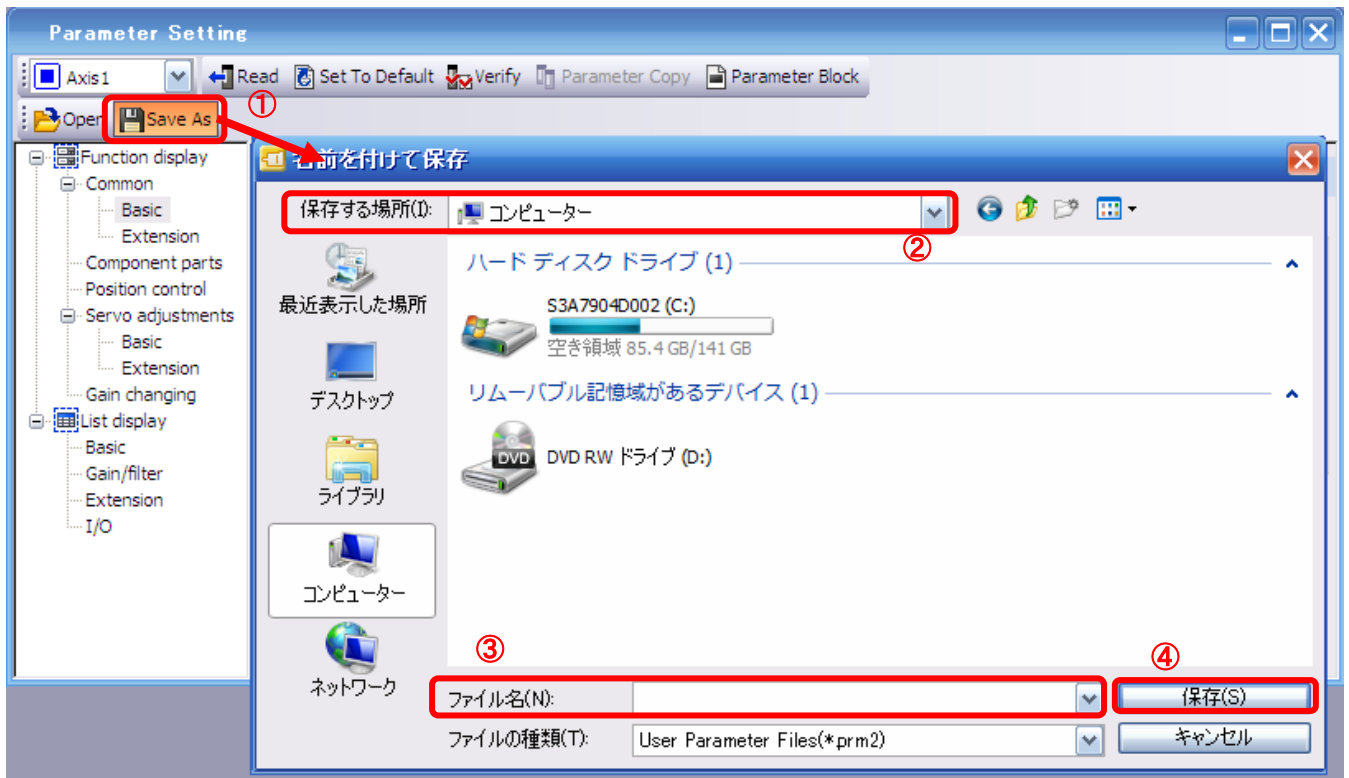
6.7.2 To Load saved Parameters

① From the "Parameter Setting" window in the setup software, select "Open".
② Please specify location of the file.
③ Please select the file from which you wish to import parameters [.prm2].
④ Click "Open".

Parameters will be loaded.

6.8 Saving/Loading Project

6.8.1 Saving Project

①　From the "Project" menu in the setup software, select "Save As".
②　Please specify location to be saved.
③　Please enter any project name.
④　Click "Save".

Project will be saved in the specified folder.
If you change the drive / path name, it will be saved in the "drive ¥path name ¥ project name" folder you have changed.

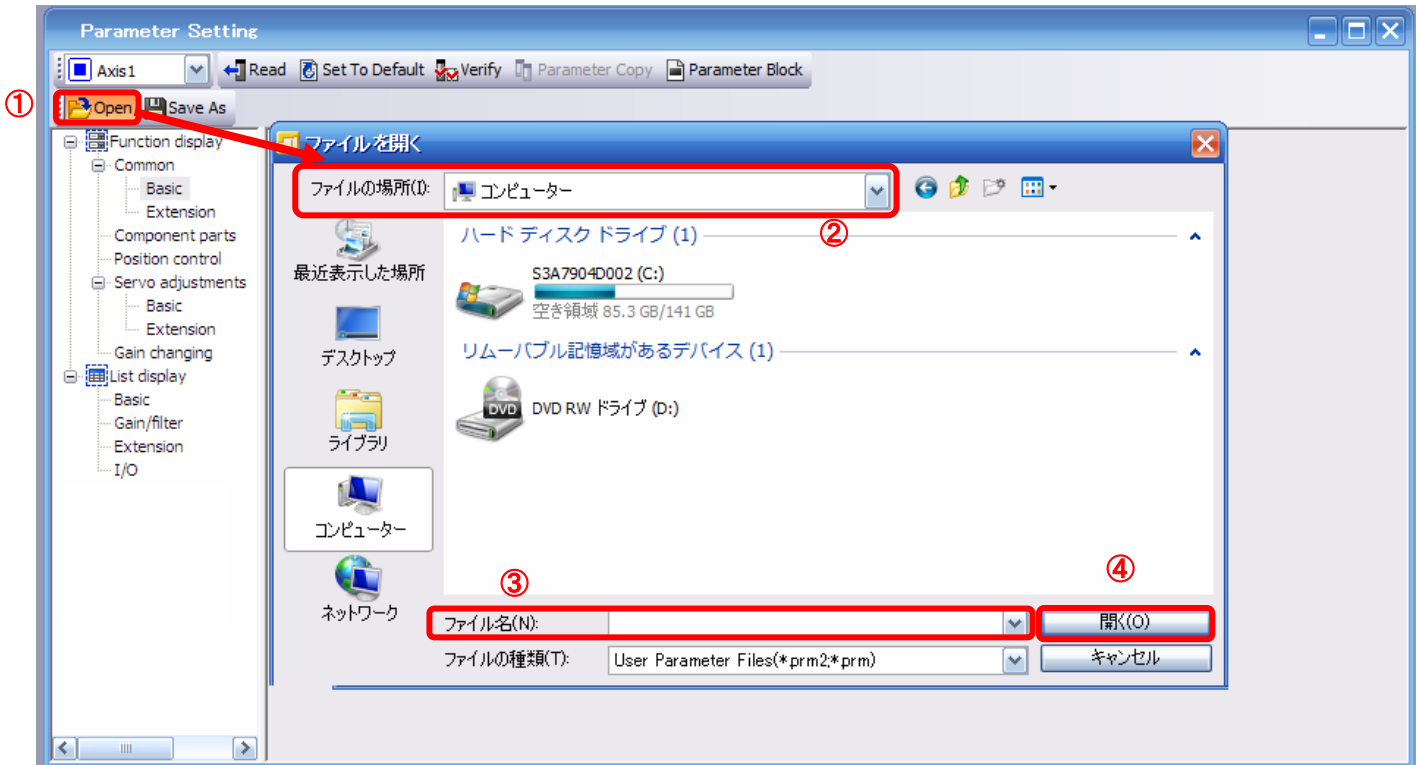* Note　Always upload current parameters from the driver to the software before saving.
  (See "LECSS Operation Manual (Simplified Edition)",section 6.3.2 for uploading.)

SMC
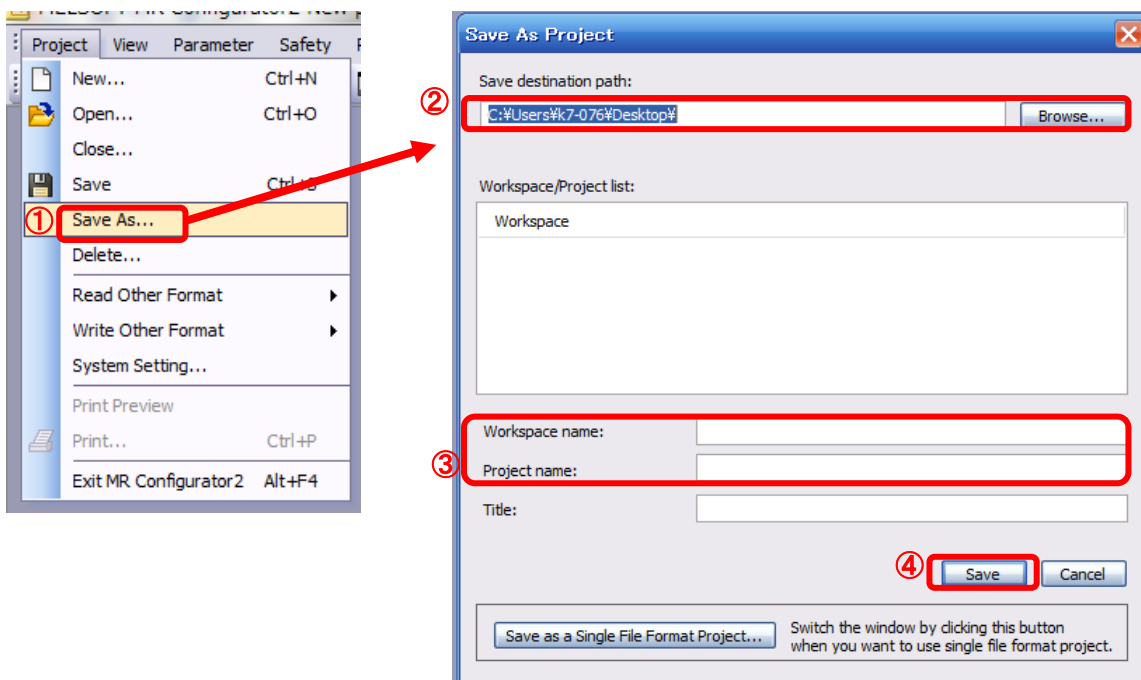
6.8.2 To Load saved Parameters

① From the "Project" menu in the setup software, select "Open".
② Please select the "drive ¥ path name ¥ project name" that you want to read parameters from.
③ Click "Open".

Project will be loaded.
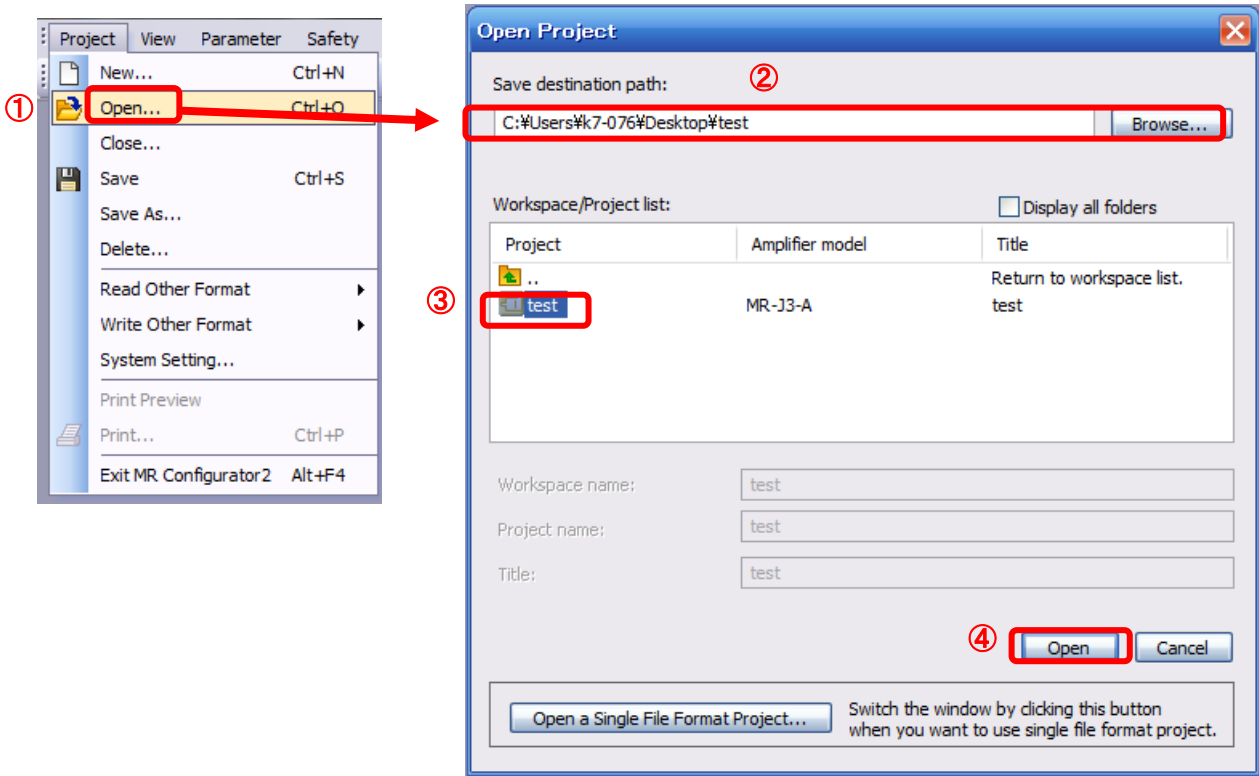
6.9 Acquisition of motion waveform with graph monitor

With the setup software (MR Configurator2™: LEC-MRC2E) monitor graph function, the motion waveform during electric actuator operation can be obtained as described below.

① Click "Monitor" - "Graph" of Setup software to display "Graph" window.

6.9.1 Under the setting Tab: Setting of the items to display the graph

Set the items to display analogue and digital waveform, trigger conditions and time for the horizontal axis of the graph.

Click the [Setting] tab of the [Setting] window to set the items to display the waveform, trigger conditions and horizontal axis of the graph.

3 types analogue waveform (analogue 1 to 3) and 4 types of digital waveform (digital 1 to 4) can be set.
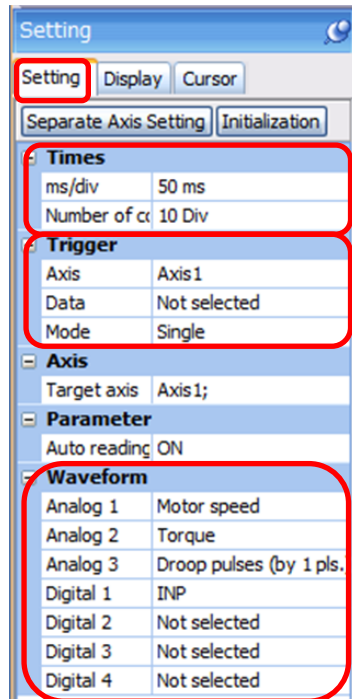
(1) Time

Set the horizontal axis (time axis) of the graph.

For LECSS, set [ms/div] and [Number of collection Div] to the horizontal axis (time axis).

[ms/div] × [Number of collection Div] will be [Measurement time].
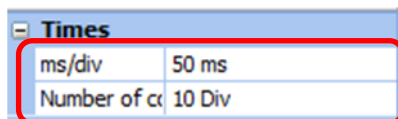
① Click " ⌄ " of [ms/div] and set the DiV number.

The unit ms of [Number of collection Div] is 1000ms＝1s.

② Click " ⌄ " of [Number of collection Div] and set the time.

SMC
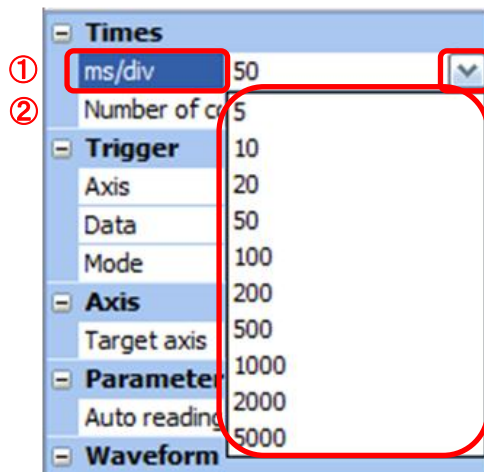
(2) Trigger
"Trigger" is a condition which decides the display timing of the graph.
If trigger conditions are not satisfied, waveform will not be displayed.

① Click " ⌄ " of [Data] to set the condition.
(In general, set the Motor speed.)
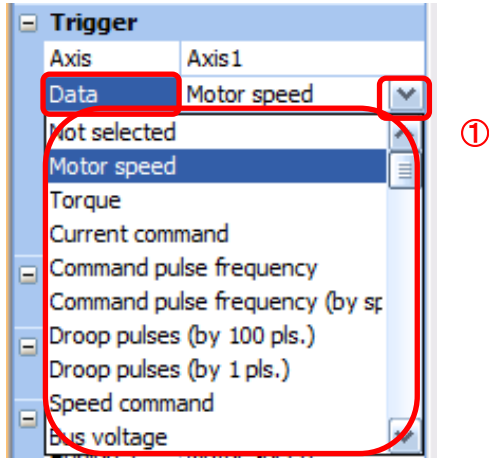
(3) "Level" / "Condition" / "Position" are displayed.
① Click " ⌄ " of "Level" / "Condition" to set the condition.
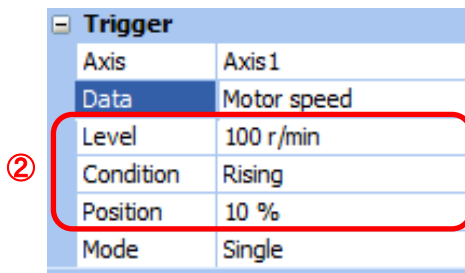
For Motor speed, when the operation direction is positive, "Level" should be100 and when the operation direction is negative, "Level" should be -100.
Align the setting of "Condition" to the operation direction too.

"Level" / "Condition" setting（For Motor speed）

Operating direction	"Level" [r/min]	"Condition"
Positive direction operation	100	Startup
Negative direction operation	-100	Fall

"Position" should be 10%.

(4) Waveform
Set the waveform data which will be displayed in the graph.

① Click " " of each "Analog" or "Digital" and set the type of waveform to be displayed.
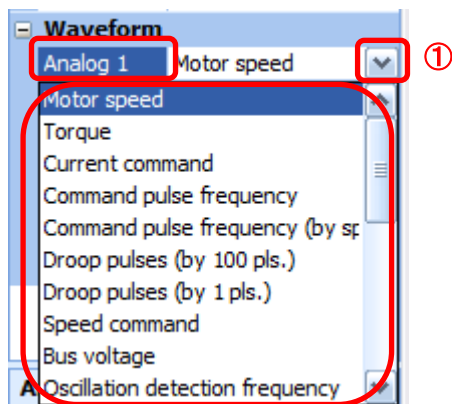
The analogue and digital waveforms that can be set with LECSS are shown below.

■Analogue waveform

No.	Name	Function	Unit	Note
1	Motor speed	The motor speed is displayed.	1r/min	
2	Torque	The motor torque is displayed.	0.1%	
3	Current command	The current command to be given to the motor is displayed.	0.1%	
4	Command pulse frequency	The command pulse frequency is displayed.	1.125 kpulse/s	
5	Command pulse frequency (by speed)	The command pulse frequency is converted into the motor speed and displayed.	1r/min	
6	Droop pulse (by 100 pulse)	The droop pulse on the deviation counter is displayed in units of 100pulse. The pulse count is displayed in encoder pulses.	100pulse	
7	Droop pulse (by 1 pulse)	The droop pulse on the deviation counter is displayed in units of 1 pulse. (Note) Any area beyond the display range (-32768 pulses to 32767 pulses) is clamped and displayed in red.	1pulse	
8	Speed command	The speed command to be given to the motor is displayed.	1r/min	
9	Bus voltage	The bus voltage of the driver amplifier is displayed.	1V	
10	Effective load ratio	The continuous effective load torque is displayed. The effective value for the last 15 seconds is displayed.	0.1%	
11	Regenerative load ratio	The ratio of regenerative power to permissible regenerative power is displayed in %.	0.1%	
12	Within one-revolution position	The position is displayed in encoder pulses` to the accuracy of one revolution.	16pulse	
13	ABS counter	The move distance from the home position in the absolute position detection system is displayed in the multiple-revolution counter value of the absolute position encoder.	1rev	
14	Load inertia moment ratio	The estimated ratio of the motor axis converted load inertia moment to the motor inertia moment is displayed.	0.1times	

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No.	Name	Function	Unit	Note
15	Torque equivalent to disturbance	The difference between the torque required driving the motor and the actually required torque (torque current value) is displayed in torque equivalent to disturbance.	0.1%	
16	Overload alarm margin	The margin until the load reaches the overload (AL.50, AL.51) alarm level is displayed in %. An overload alarm will occur when margin is 0%.	0.1%	
17	Excessive error alarm margin	The margin until the error reaches the excessive error (AL.52) alarm level is displayed in encoder pulses. An excessive error alarm will occur when margin is zero pulses.	16pulse	
18	Settling time	The settling time for position control is displayed. The method for measuring the settling time can be selected from the separate axis setting.	1ms	
19	Overshoot amount	The overshoot amount for position control is displayed in encoder pulses. The method for measuring the overshoot amount can be selected from the separate axis setting.	1pulse	
20	Motor speed (by 0.1 r/min)	The motor speed is displayed.	0.1r/min	(Note 1)
21	Command pulse frequency (0.1r/min by speed)	The command pulse frequency is converted into the motor speed and displayed.	0.1r/min	(Note 1)
22	Speed command (by 0.1 r/min)	The speed command to be given to the motor is displayed.	0.1r/min	(Note 1)
23	Torque command	Control the torque at the torque control or stopper control.	0.1%	(Note 1)
24	Speed limit	Control the speed at the torque control or stopper control.	1r/min	(Note 1)

■Digital waveforms
　CSON, PC, EMG, EM1, CDP, CSV3 (Note 1), D1, D2, D3, D4 (Note 2)
　RD, SA, ZSP, TLC, VLC, INP, WNG, ALM, OP, MBR, DB, BWNG, CDPS, ABSV, SSV3 (Note 1)

　(Note 1) They will be supported in the driver of software version C7 or later.
　(Note 2) D1, D2, D3 and D4 are for the manufacturer setting.

See "LECSS Operation Manual", section 3.5 for details of each digital waveform.

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6.9.2 Trigger wait

When the "Start" button is clicked, the screen will be on stand-by.

When trigger conditions are satisfied during the trigger wait, waveforms can be captured and displayed.

Click the "Start" button every time measurement fresh capture is required.

(The advantage of this method of capturing the waveform is a waveform will not be updated in the case of an incorrect operation.)

① Click the "Start" button.
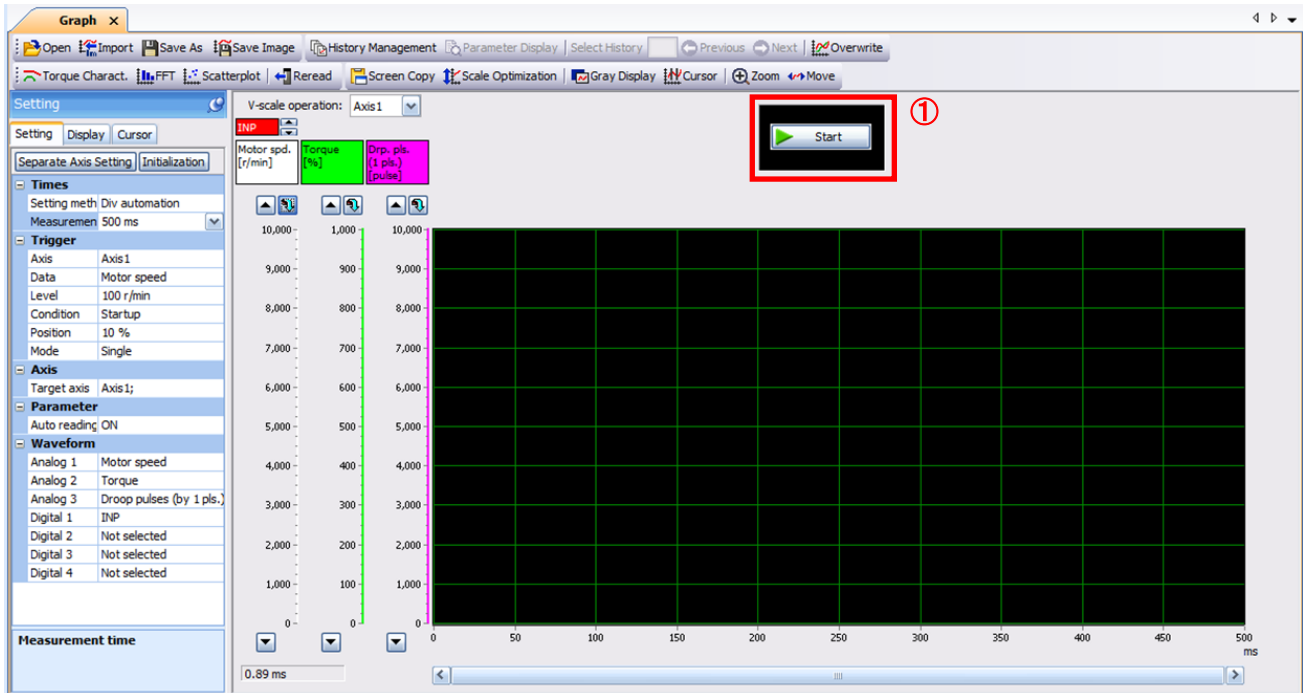
② Trigger wait is displayed.

③ The acquisition of waveform will be canceled with "Stop" button.

⊜SMC
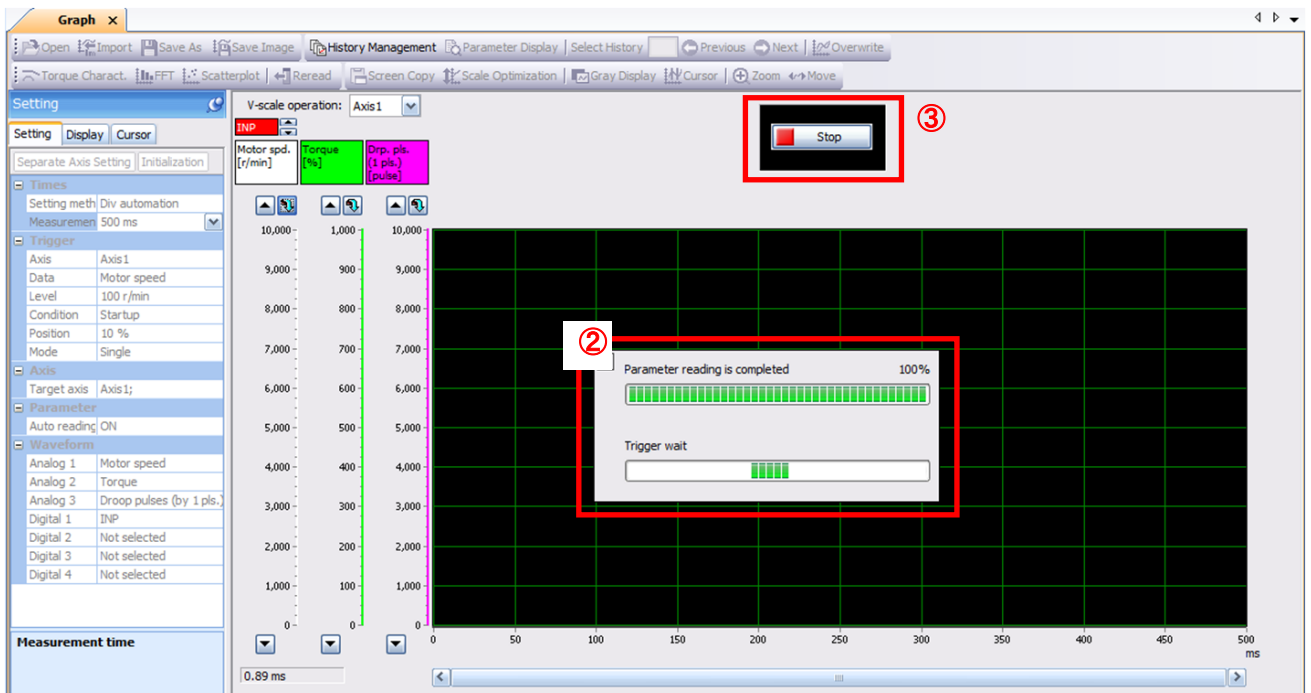
6.9.3 Operation Instruction

When the PLC on the master side sends the operation command, the actuator will operate.
When the trigger conditions in 6.9.1 (2) are satisfied, the operation waveforms can be captured.

When the time set in 6.9.1 (1) has passed after the acquisition start, the acquisition of the waveforms will complete and waveforms are displayed on the screen.

① When the "Scale Optimization" button is clicked, the vertical axis range is adjusted automatically.

SMC
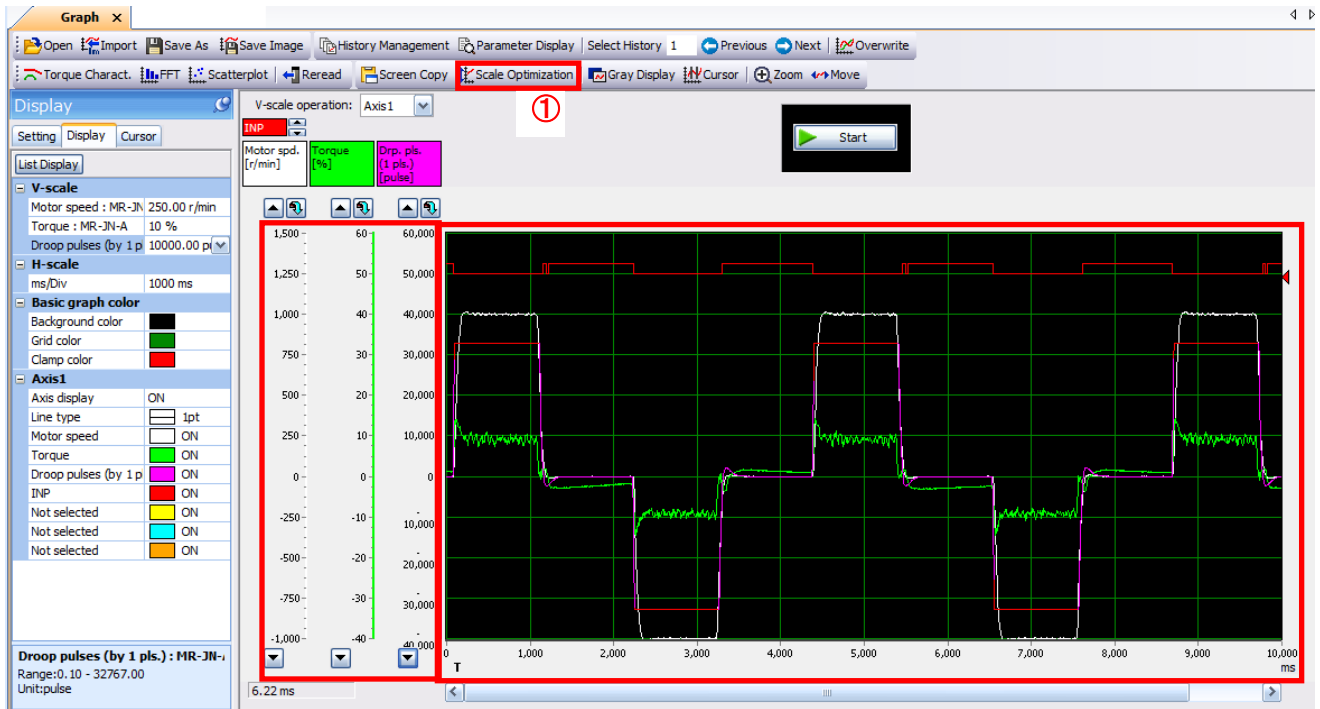
6.9.4 Saving of waveform

After the waveform is displayed, it is possible to save the data in 3 ways.

① Click the "Save As" button.
　Select the folder in which the step data is to be saved and save the data.
　Waveform data file (extension: gpf2) will be prepared.
　If the waveform condition needs to be checked, it can be displayed on the graph window.

② Click the "Save Image" button.
　Select the folder in which the step data is to be saved and save the data.
　An Image file (extension: jpg) will be prepared.

③ Click the "Screen Copy" button.
　Save the displayed waveform screen (print screen).

SMC
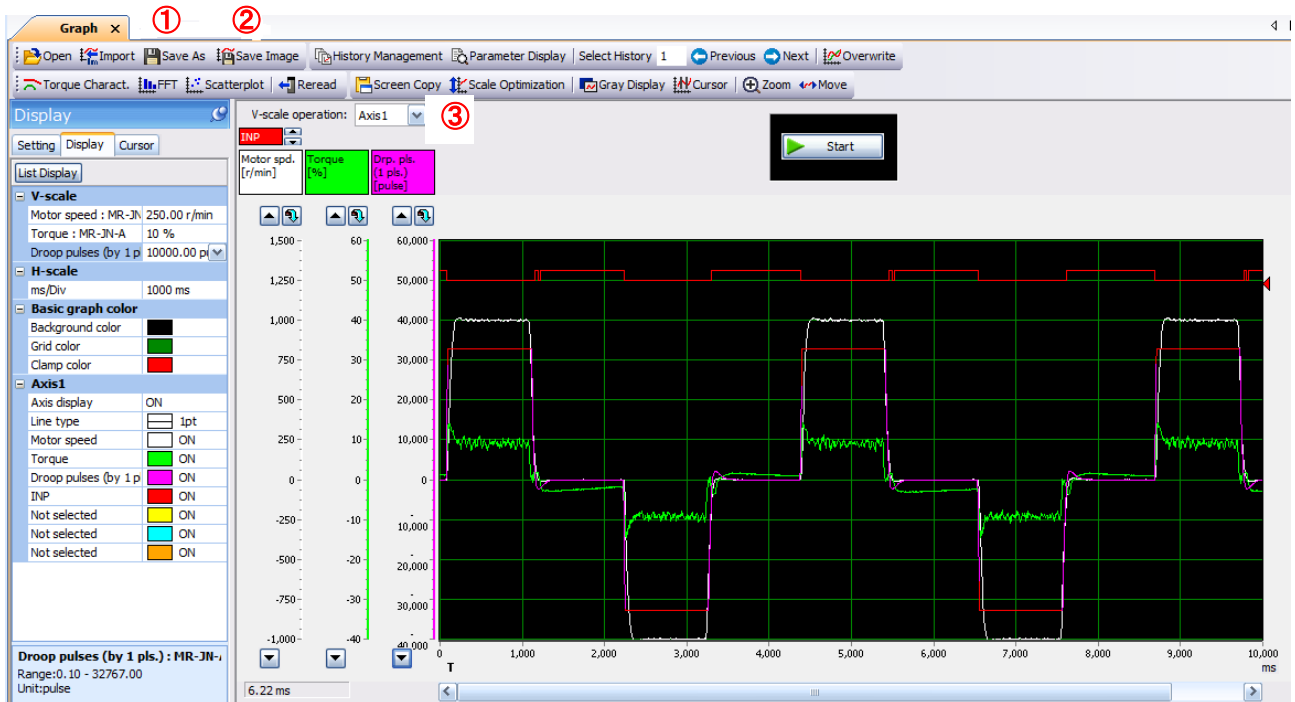
6.10 Display All Monitor List

The method how to obtain the electric actuator condition is described with the display all function of the setup software.

① Click "Monitor" - "Display All" of the setup software to display "Display All" window.
② The condition of each item is displayed.
  For off line of the setup software, [----] will be displayed.
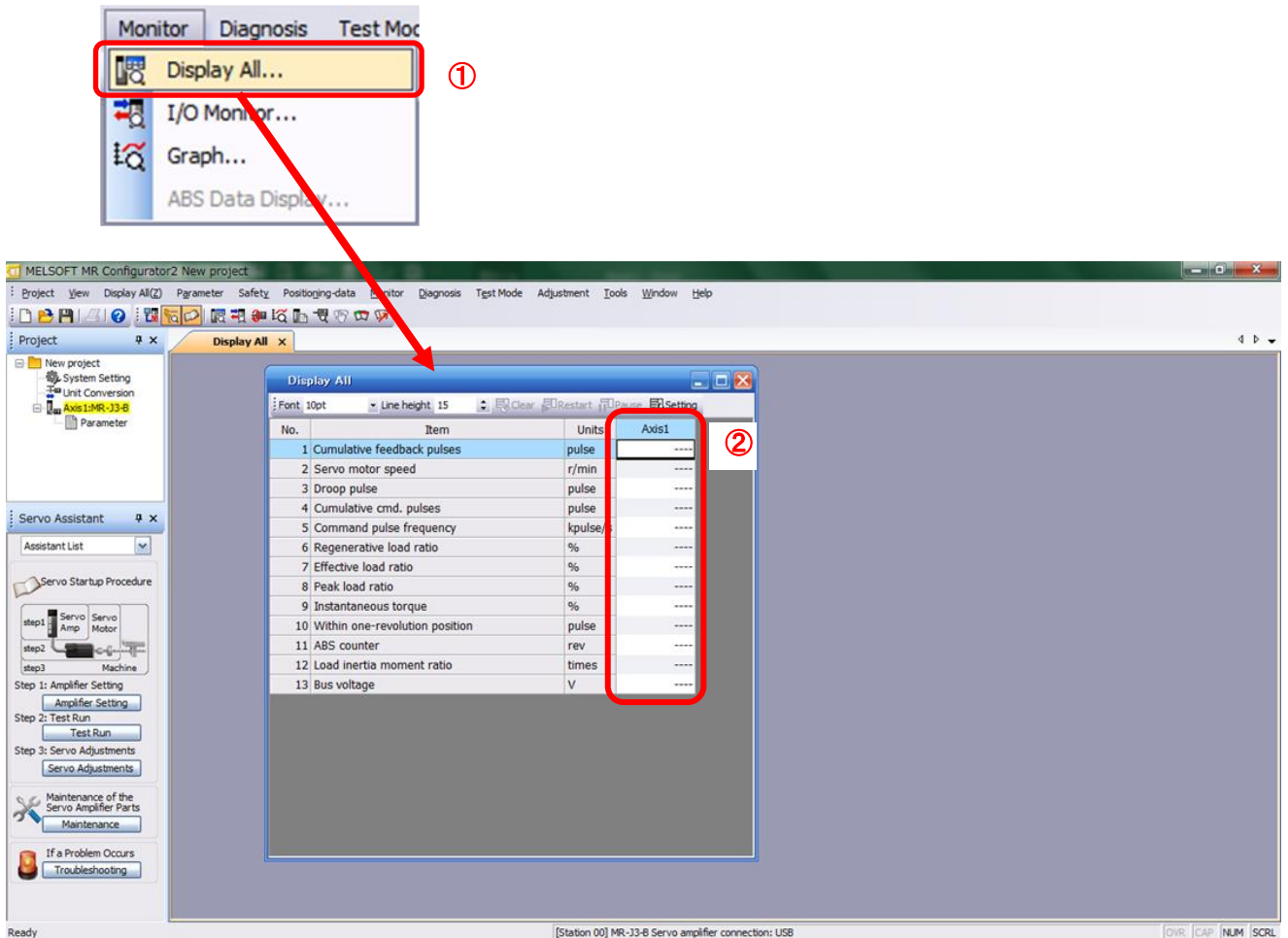
The following items are displayed for LECSS.

No.	Name	Function	Display range	Unit
1	Cumulative feedback pulses	Feedback pulses from the motor encoder are counted and displayed. When exceeding 999999999, it returns to zero. Press the [Clear] button to reset the display value to 0 (zero). Reverse rotation is indicated by a minus (-) sign.	-999999999 to 999999999	pulse
2	Motor speed	The motor speed is displayed. The value rounded off is displayed in 0.1r/min.	-7200 to 7200	r/min
3	Droop pulses	The number of droop pulses in the deviation counter is displayed. Reverse rotation is indicated by a minus (-) sign.	-999999999 to 999999999	pulse

No.	Name	Function	Display range	Unit
4	Cumulative command pulses	The position command input pulses are counted and displayed. Press the [Clear] button to reset the display value to zero. Reverse rotation is indicated by a minus (-) sign.	-999999999～999999999	pulse
5	Command pulse frequency	The frequency of the position command input pulses is displayed. Reverse rotation is indicated by a minus (-) sign.	-999999999～999999999	kpulse/s
6	Regenerative load ratio	The ratio of regenerative power to permissible regenerative power is displayed in %. As the permissible regenerative power depends on whether there is the regenerative brake option or not. Set Parameter PA02 correctly according to the regenerative brake option. The guideline is 80% or less.	0～100	%
7	Effective load ratio	The continuous effective load current is displayed. The effective value is displayed relative to the rated current of 100%.	0～300	%
8	Peak load ratio	The maximum torque is displayed. The highest value in the past 15 seconds is displayed relative to the rated torque of 100%.	0～400	%
9	Instantaneous torque	Torque that occurred instantaneously is displayed. The value of the torque that occurred is displayed in real time relative to the rated torque of 100%.	0～400	%
10	Within one-revolution position	Position within one-revolution is displayed in encoder pulses. The value returns to 0 when it exceeds the maximum number of pulses.	0～262143	pulse
11	ABS counter	The move distance from the home position (0) in the absolute position detection system is displayed in terms of the absolute position detector's multi-revolution counter value.	-32768 ～ 32767	rev
12	Load inertia moment ratio	The estimated ratio of the motor axis converted inertia moment to the motor inertia moment is displayed.	0.0～300.0	times
13	Bus voltage	The voltage (across (P) - (N)) of the main circuit converter is displayed.	0～900	V

7. Parameter setting (PLC side)

The setting of PLC parameter in this operation manual is based on the MITSUBISHI ELECTRIC QD75MH positioning unit.
Parameter setting for the PLC side cannot be set at driver side.
Refer to the operation manual for used equipment when other positioning units or motion controllers are used.

7.1 SSCNET Setting

Pr.100 Servo series
Be sure to set up servo driver.
Communication with servo driver is not started by the initial value "0" in default value.

Item	Setting details	Setting Value	Default value	Setting value buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
Pr.100 Servo serise	Used to select the servo driver series, whith is connected to the QD75MH. **POINT** Be sure to set up servo driver. Communication with servo driver is not started bythe initial value "0" in default value. (The LED indication of servo driver indicates "Ab")	0 : Servo driver is not set 1 : MR-J3-□B (LECSS□-S□)	0	30100	30300	30500	30700

7.2 Movement amount per pulse

Set the unit. Set the number of pulses per rotation of the actuator lead or motor.

Item		Setting value, setting range	Default value	Setting value buffer memory address.			
				AXIS 1	AXIS 2	AXIS 3	AXIS 4
Pr.1 Unit setting		0:mm 1:inch 2:degree 3:PLS	3	0	150	300	450
Movement amount per pulse	Pr.2 Pulse number per rotation(AP) (Unit: PLS)	1 to 200000000 (Note 1)	20000	2 3	152 153	302 303	452 453
	Pr.3 Moving amount per rotation (AL)	The setting value range differs according to the "Pr.1 Unit setting".	20000	4 5	154 155	304 305	454 455
	Pr.4 Unit magnification (AM)	1:1 times 10:10 times 100:100 times 1000:1000 times	1	1	151	301	451

(Note 1) LECSS sets [262144]

Pr.1 Unit setting
   Set the unit used for defining positioning operations. Choose from the following units depending on the type of control target : mm, inch, degree, or PLS. Different units can be defined for different axes(axis 1 to 4).

   (Ex.) Different units (mm, inch, degree, and PLS) are applicable to different systems:
   ・mm、inch   X-Y table, conveyor (Select mm or inch depending on the machine specifications)
   ・degree   Rotating body (360 degrees/rotation)
   ・PLS   X-Y table, conveyor

-   When you change the unit, note that the values of other parameters and data will not be changed automatically.
    After changing the unit, check if the parameter and data values are within the allowable range.
    Set "degree" to exercise speed-position switching control (ABS mode)

Pr.2 to Pr.4 Electronic gear (Movement amount per pulse)
   Mechanical system value used when the QD75MH performs positioning control.
   The settings are made using Pr.2 to Pr.4
   The electronic gear is expressed by the following equation.

$$\text{Electronic gear} = \frac{\text{No. of pulse per motor rotation(AP)}}{\text{Movement amount per rotation (AL)} \times \text{Unit magnification (AM)}}$$

-   When positioning has been performed, an error (mechanical system error) may be produced between the specified movement amount and the actual movement amount.
    If this occurs, the error can be corrected using the Electronic gear.
    Refer to the operation manual for used equipment for details.

Pr.2 No. of pulse(s) per rotation(AP)
Set the number of pulses required for a complete rotation of the motor shaft.
If you are using the LECSS, set the value given as the "resolution per servo motor rotation" in the speed/position detector specifications.

Number of pulses per rotation (AP) = Resolution per servo motor rotation (Note 1)
(Note 1) LECSS sets [262144]

Pr.3 Movement amount per rotation (AL), Pr.4 Unit magnification (AM)
The amount the workpiece moves with one motor rotation is determined by the mechanical structure.
If the worm gear lead (μm/rev) is PB, then

Movement amount per rotation (AL) = PB.

However, the maximum value that can be set for this "movement amount per rotation (AL)" parameter is 20000000.0μm(20m). Set the "movement amount per rotation (AL)" does not exceed this maximum value.

Movement amount per rotation (AL) = PB×1/n
= Movement amount per rotation (AL) × Unit magnification (AM)

7.3 Stroke limit

Wiring for the stroke limit. If no wiring is used, set the parameter for signal logic selection.

Wiring of hardware stroke limit.
If the hardware stroke limit function is used, QD75MH/ driver upper limit/ lower stroke limit wiring should be configured as shown below.
(When Pr.22, "Input signal logic selection" is default value)
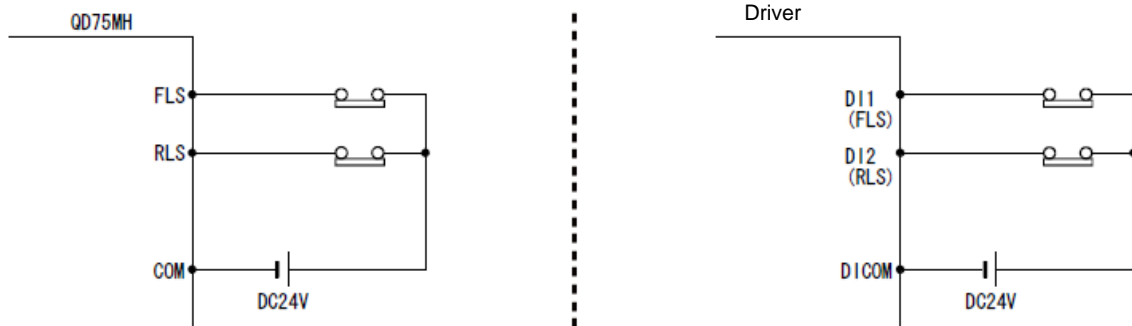
Note) The upper limit switch should be installed in the direction in which the "Current feed value" increases. The lower limit switch should be installed in the direction in which the "Current feed value" decreases.
If the install position of the upper/lower limit switches is inverted, the hardware stroke limit function will not operate properly. In addition, the servomotor will not stop.

When the logic of FLS and RLS is set to "positive logic" using Pr.22, "Input signal logic selection", positioning control can be performed, even if FLS and RLS are not wired.

7.4 Operating conditions

The following conditions must be satisfied in order to start operation.

Signal name		Signal status		Device			
				AXIS 1	AXIS 2	AXIS 3	AXIS 4
Interface signal	PLC READY signal	ON	PLC CPU preparation	Y0			
	QD75 READY signal	ON	QD75MH preparation	X0			
	All axis servo ON	ON	All axis servo ON	Y1			
	Synchronization flag(Note1)	ON	QD75MH buffer memory Accessible	X1			
	Axis stop signal	OFF	Axis stop signal is OFF	Y4	Y5	Y6	Y7
	M code ON signal	OFF	M code ON signal is OFF	X4	X5	X6	X7
	Error detection signal	OFF	There is no error	X8	X9	XA	XB
	BUSY signal	OFF	BUSY signal OFF	XC	XD	XE	XF
	Start complete signal	OFF	Start complete signal is OFF	X10	X11	X12	X13
External signal	Forced stop input signal	ON	There is no forced stop input	-			
	Stop signal	OFF	Stop signal is OFF	-			
	Upper limit (FLS)	ON	Within limit range	-			
	Lower limit (RLS)	ON	Within limit range	-			

(Note1) When the synchronous setting of the PLC CPU is made in the asynchronous mode, this must be provided as an interlock.
When it is made in the synchronous mode, no interlock must be provided in the program because the flag is turned ON when calculation is run on the PLC CPU.

Refer to the operation manual for the equipment used.

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8. Home position return (PLC)

Home position returning in this operation manual is based on the MITSUBISHI ELECTRIC QD75MH positioning unit,.

- The original position returning parameter cannot be set at driver side. Refer to the operation manual for used equipment when other positioning units or motion controllers are used.

8.1 Returning to home position

Setting the home position returning parameter

Item	Setting value, setting range	Default value	Setting value buffer memory address.			
			AXIS 1	AXIS 2	AXIS 3	AXIS 4
Pr.43 OPR method	0:Near-point dog method	0	70	220	370	520
	4:Count method 1)					
	5:Count method 2)					
	6:Data set method					
Pr.44 OPR direction	0:Positive direction (address increase direction)	0	71	221	371	521
	1:Negative direction (address increase direction)					
Pr.45 OP address		0	72 73	222 223	372 373	522 523
Pr.46 OPR speed	The setting value range differs according to the "Pr.1 Unit setting".	1	74 75	224 225	374 375	524 525
Pr.47 Creep speed		1	76 77	226 227	376 377	526 527
Pr.48 OPR retry	0:Do not retry OPR with limit switch	0	78	228	378	528
	1:Retry OPR with limit switch					
Pr.50 Setting for the movement amount after near-point dog ON	The setting value range differs according to the "Pr.1 Unit setting".	0	80 81	230 231	380 381	530 531
Pr.51 OPR acceleration time selection	0:Pr.9 Acceleration time 0	0	82	232	382	532
	1:Pr.25 Acceleration time 1					
	2:Pr.26 Acceleration time 2					
	3:Pr.27 Acceleration time 3					
Pr.52 OPR deceleration time selection	0:Pr.10 Deceleration time 0	0	83	233	383	533
	1:Pr.28 Deceleration time 1					
	2:Pr.29 Deceleration time 2					
	3:Pr.30 Deceleration time 3					
Pr.53 OP shift amount	The setting value range differs according to the "Pr.1 Unit setting".	0	84 85	234 235	384 385	534 535
Pr.54 OPR torque limit value	1 to 1000（％）	300	86	236	386	536
Pr.55 Operation setting for incompletion of OPR	0: Positioning control is not executed.	0	87	237	387	537
	1: Positioning control is executed.					
Pr.56 Speed designation during OP shift	0: OPR speed	0	88	238	388	538
	1: Creep speed					
Pr.57 Dwell time during OPR retry	0 to 65535 (ms) 0 to 32767　　　: Set as a decimal 32768 to 65535: Convert into hexadeciamal and set	0	89	239	389	539

The methods of origin position return compatiable with the MITSUBISHI ELECTRIC QD75MH (Positioning Modules) are shown below.

The following table outlines four methods that can be used for the OPR method. (The OPR method is one of the variables set in the OPR parameters. It is set in Pr.43 "OPR method" for basic OPR parameters.)

Pr.43 OPR method	Operation details
Near-point dog method	Deceleration is initiated by the OFF --> ON of the near-point dog. (Speed is reduced to Pr.47 "Creep speed"). The operation stops once after the near-point dog turns ON and then OFF. Later the operation restarts and then stops at the first zero signal to complete the OPR. That position is specified as the origin position.
Count method (1) (Note 1)	The deceleration starts by the OFF --> ON of the near-point dog and then moves at Pr.47 "Creep speed". The machine stops once after moving the distance set in Pr.50 "Setting for the movement amount after near-point dog ON" from the OFF --> ON position. Later the operation restarts and then stops at the first zero signal to complete the machine OPR.
Count method (2) (Note 1)	The deceleration starts by the OFF --> ON of the near-point dog, and the machine moves at Pr.47 "Creep speed" The machine moves the distance set in the Pr.50 "Setting for the movement amount after near-point dog ON" from the near-point dog OFF --> ON position, and stops at that position. The machine OPR is then regarded as completed.
Data set method	The position where the machine OPR has been performed becomes an OP. The current feed value and feed machine value are overwritten to the OP address.

(Note 1): Near-point dog is used as an external input signal for the QD75MH module. The "Illegal near-point dog signal" (error code: 220) will occur if operator uses the external input signal from the servo amplifier.

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9. Positioning operation (PLC)

Position in this operation manual is based on the MITSUBISHI ELECTRIC QD75MH positioning unit.
The position parameters cannot be set at driver side. Refer to the operation manual of the positioning modules or motion controllers used.

9.1 Setting of Operation data
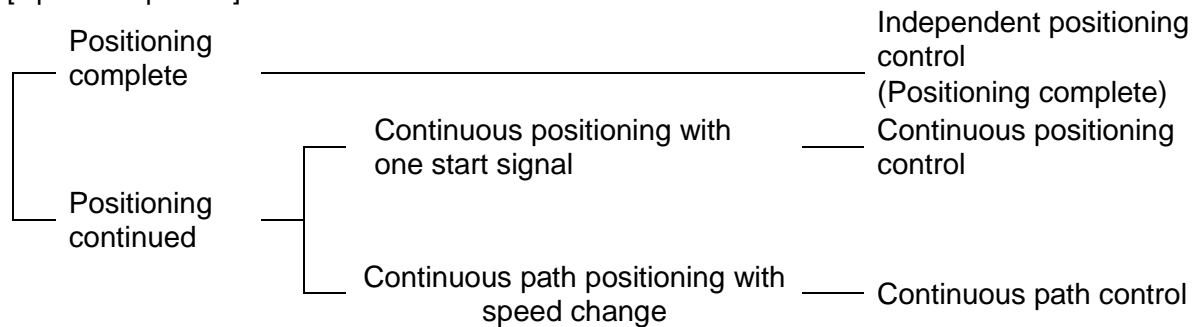
Set operation parameters.

Item		Setting value		Default value	Setting value buffer memory address for setting			
					AXIS 1	AXIS 2	AXIS 3	AXIS 4
Positioning identifier	Da.1 Operation pattern	00: Positioning complete	a	0000H	2000	8000	14000	20000
		01: Continuous positioning control						
		11: Continuous path control						
	Da.2 Control system	(Note 1)	b					
	Da.3 Acceleration time No.	0:Pr.9 Acceleration time 0	c					
		1:Pr.25 Acceleration time 1						
		2:Pr.26 Acceleration time 2						
		3:Pr.27 Acceleration time 3						
	Da.4 Deceleration time No.	0:Pr.10 Deceleration time 0	d					
		1:Pr.28 Deceleration time 1						
		2:Pr.29 Deceleration time 2						
		3:Pr.30 Deceleration time 3						
	Da.5 Axis to be interpolated	0: Axis 1	e					
		1: Axis 2						
		2: Axis 3						
		3: Axis 4						
	Da.6 Position address/ movement amount	The setting value range differs according to the "Da.2 Control system".		0	2006 2007	8006 8007	14006 14007	20006 20007
	Da.8 Command speed	The setting value range differs depending on the "Pr.1 Unit setting". -1: Current speed (Speed set for previous positioning data No.)		0	2004 2005	8004 8005	14004 14005	20004 20005
Pr.9 Acceleration time 0		1 to 8388608(ms)		1000	12 13	162 163	312 313	462 463
Pr.10 Deceleration time 0		1 to 8388608(ms)		1000	14 15	164 165	314 315	464 465

(Note 1) Refer to the operation manual for used equipment for details.

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Da.1 Operation pattern
The operation pattern designates whether positioning of a certain data No. is to be ended with just that data, or whether the positioning for the next data No. is to be carried out in succession.

[Operation pattern]

```
Positioning                                              Independent positioning
complete  ───────────────────────────────────────       control
                                                         (Positioning complete)
                    ┌─ Continuous positioning with  ──   Continuous positioning
                    │  one start signal                  control
Positioning  ───────┤
continued           │
                    └─ Continuous path positioning with  Continuous path control
                       speed change              ──────
```

00: Positioning complete
Set to execute positioning to the designated address, and then complete positioning.
01: Continuous positioning control
Positioning is carried out successively in order of data Nos. with one start signal.
The operation halts at each position indicated by a positioning data.
11: Continuous path control
Positioning is carried out successively in order of data Nos. with one start signal.
The operation does not stop at each positioning data.

Da.2 Control system
Set the "control system" for carrying out positioning control.
Note) ·When "JUMP instruction" is set for the control system, the "Da.9 Dwell time" and "Da.10 M code" setting details will differ.
·In cases when you selected "LOOP" as the control system, the "Da.10 M code" should be set differently from other cases.
·If "degree" is set for "Pr.1 Unit setting", circular interpolation control cannot be carried out.
(The "Circular interpolation not possible error" will occur when executed (error code: 535).)

Da.3 Acceleration time No.
Set "acceleration time 0 to 3" to use for the acceleration time during positioning.
0: Use the value set in "Pr.9 Acceleration time 0"
1: Use the value set in "Pr.25 Acceleration time 1"
2: Use the value set in "Pr.26 Acceleration time 2"
3: Use the value set in "Pr.27 Acceleration time 3"

Da.4 Deceleration time No.
Set "deceleration time 0 to 3" to use for the deceleration time during positioning.
0: Use the value set in "Pr.10 Deceleration time 0"
1: Use the value set in "Pr.28 Deceleration time 1"
2: Use the value set in "Pr.29 Deceleration time 2"
3: Use the value set in "Pr.30 Deceleration time 3"

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Da.5 Axis to be interpolated
Set the target axis (partner axis) for operation under the 2-axis interpolation control.
  0: Select the axis 1 as the target axis (partner axis)
  1: Select the axis 2 as the target axis (partner axis)
  2: Select the axis 3 as the target axis (partner axis)
 3: Select the axis 4 as the target axis (partner axis)

(Note) ·Do not specify the own axis number or any number except the above.
         (If you do, the "Illegal interpolation description command error" will occur during the program execution (error code: 521)
       ·This item does not need to be set in 3 or 4-axis interpolation is selected.

Da.6 Position address/movement amount
Set the address to be used as the target value for positioning control.
The setting value range differs according to the "Da.2 Control system".

Absolute (ABS) system, current value changing
  ·The setting value (positioning address) for the ABS system and current value changing is set with an absolute address (address from OP).
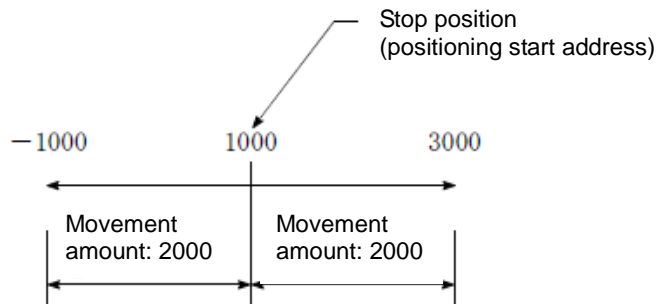
Da.8 Command speed
Set the command speed for positioning.
  (1) If the set command speed exceeds "Pr.8 Speed limit value", positioning will be carried out at the speed limit value.
  (2) If "-1" is set as the command speed, the current speed (speed set for previous positioning data No.) will be used for positioning control.   Use the current speed for uniform speed control, etc. If "-1" is set as the command speed for continuing positioning data, and the speed is changed, the following speed will also change.

  (Note that When starting positioning, if "-1" is set as the command speed for the positioning data that carries out positioning control first, the error "Command speed is not set" (error code: 503) will occur, and the positioning will not start.
  Refer to the operation manual of the equipment used for details on the errors.

Pr.1 Setting value	Set value set by PLC program (Unit)
0:mm	1 to 2000000000($\times 10^{-2}$mm/min)
1:inch	1 to 2000000000($\times 10^{-3}$inch/min)
2:degree	1 to 2000000000($\times 10^{-3}$degree/min) (Note 1)
3:PLS	1 to 50000000(PLS/s)

(Note 1) The command speed range is 1 to 2000000000($\times 10^{-3}$degree/min), but it will changed to 1 to 2000000000($\times 10^{-2}$degree/min) by setting Pr.83 "Speed control 10 x multiplier setting for degree axis" to valid.

Pr.9 Acceleration time 0, Pr.10 Deceleration time 0

Pr.9 "Acceleration time 0" specifies the time for the speed to increase from zero to the Pr.8 "speed limit value"

Pr.10 "Acceleration speed 0" specifies the time for the speed to decrease from the Pr.8 "speed limit value" to zero.
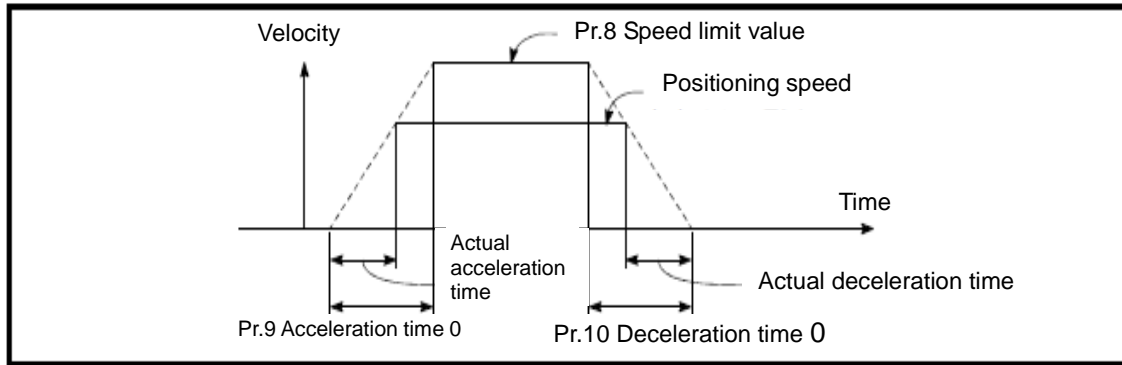

1) If the positioning speed is set lower than the parameter-defined speed limit value, the actual acceleration/deceleration time will be relatively short. Thus, set the maximum positioning speed equal to or only a little lower than the parameter-defined speed limit value.
2) These settings are valid for OPR, positioning and JOG operations.
3) When the positioning involves interpolation, the acceleration/deceleration time defined for the reference axis is valid.

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9.2 Movement MOD

Timing chart for positioning.

Timing chart to start "main positioning control"
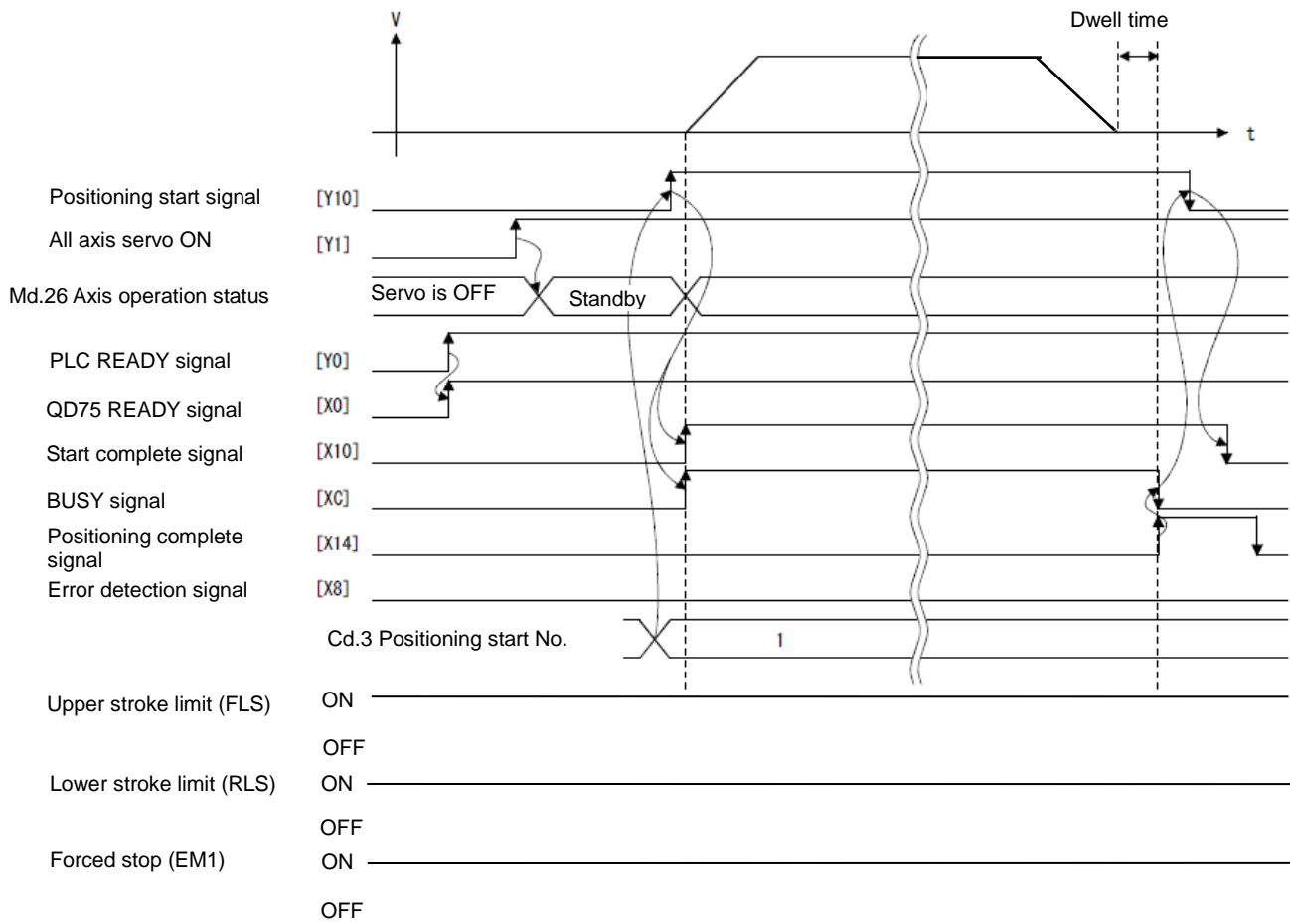
Refer to the operation manual for used equipment for details.

10. Troubleshooting

10.1 Alarms and warning list

> POINT
>
> ・As soon as an alarm occurs, turn the Servo off and interrupt the main circuit power.

When a fault occurs during operation, the corresponding alarm or warning is displayed. If any alarm or warning has occurred, refer to "LECSS Operation Manual",section 8.2 or 8.3 and take the appropriate action. When an alarm occurs, the ALM turns OFF.

After its cause has been removed, the alarm can be deactivated in any of the methods marked ○ in the alarm deactivation column. The alarm is automatically canceled after removing the cause of occurrence.

	Display	Name	Alarm deactivation		
			Power OFF→ON	Error reset	CPU reset
Alarms	10	Undervoltage	○	○	○
	12	Memory error 1 (RAM)	○		
	13	Clock error	○		
	15	Memory error 2 (EEP-ROM)	○		
	16	Encoder error 1 (At power on)	○		
	17	Board error	○		
	19	Memory error 3 (Flash-ROM)	○		
	1A	Motor combination error	○		
	20	Encoder error 2	○		
	24	Main circuit error	○	○	○
	25	Absolute position erase	○		
	30	Regenerative error	(Note 1) ○	(Note 1) ○	(Note 1) ○
	31	Overspeed	○	○	○
	32	Overcurrent	○		
	33	Overvoltage	○	○	○
	34	Receive error 1	○	(Note 2) ○	○
	35	Command frequency error	○	○	○
	36	Receive error 2	○	○	○
	37	Parameter error	○		
	45	Main circuit device overheat	(Note 1) ○	(Note 1) ○	(Note 1) ○
	46	Servo motor overheat	(Note 1) ○	(Note 1) ○	(Note 1) ○
	47	Cooling fan error	○		
	50	Overload 1	(Note 1) ○	(Note 1) ○	(Note 1) ○
	51	Overload 2	(Note 1) ○	(Note 1) ○	(Note 1) ○
	52	Error excessive	○	○	○
	8A	USB communication time-out error	○	○	○
	8E	USB communication error	○	○	○
	888	Watchdog	○		

	Display	Name
Warnings	92	Battery cable disconnection warning
	96	Home position setting warning
	9F	Battery warning
	E0	Excessive regeneration warning
	E1	Overload warning 1
	E3	Absolute position counter warning
	E4	Parameter warning
	E6	Servo forced stop warning
	E7	Servo system controller forced stop warning
	E8	Cooling fan speed reduction warning
	E9	Main circuit off warning
	EC	Overload warning 2
	ED	Output watt excess warning

Note 1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

2. In some servo system controller communication status, the alarm factor may not be removed.

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10.2 Troubleshooting at power on

When the servo system does not start and a system error occurs when the servo system controller is turned on, it could be due to an improper boot of the driver. Check the display of the driver, and take actions according to this section.

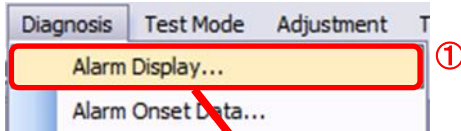| Display	Description	Cause	Checkpoint	Action
AA	Communication with the servo system controller has disconnected.	The power of the servo system controller was turned off.	Check the power of the servo system controller.	Switch on the power of the servo system controller.
		An SSCNET III cable was disconnected.	"AA" is displayed in the corresponding axis and following axes.	Replace the SSCNET III cable of the corresponding axis.
			Check if the connectors (CNIA, CNIB) are unplugged.	Connect it correctly.
		The power of the driver was turned off.	"AA" is displayed in the corresponding axis and following axes.	Check the power of the driver.
				Replace the driver of the corresponding axis.
Ab	Initialization communication with the servo system controller has not completed.	The control axis is disabled.	Check if the spare switch (SW2-2) is turned on (up).	Turn off (down) the disabling control axis switch (SW2-2).
		The setting of the axis No. is incorrect.	Check that the other driver is not assigned to the same axis No.	Set it correctly.
		Axis No. does not match with the axis No. set to the servo system controller.	Check the setting and axis No. of the servo system controller.	Set it correctly.
		Information about the servo series has not set in the simple motion module.	Check the value set in Servo series (Pr.100) in the simple motion module.	Set it correctly.
		Communication cycle does not match.	Check the communication cycle at the servo system controller side. When using 8 axes or less: 0.222 ms When using 16 axes or less: 0.444 ms	Set it correctly.
		An SSCNET III cable was disconnected.	"Ab" is displayed in the corresponding axis and following axes.	Replace the SSCNET III cable of the corresponding axis.
			Check if the connectors (CNIA, CNIB) are unplugged.	Connect it correctly.
		The power of the driver was turned off.	"Ab" is displayed in an axis and the following axes.	Check the power of the driver.
		The driver is malfunctioning.	"Ab" is displayed in an axis and the following axes.	Replace the driver of the corresponding axis.
b##. (Note)	The system has been in the test operation mode.	Test operation mode has been enabled.	Test operation setting switch (SW2-1) is turned on (up).	Turn off (down) the test operation setting switch (SW2-1).

Note. ## indicates axis No.

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10.3 Alarm Display

The contents of the alarm / warning that is currently occurring in the driver are displayed in the alarm display function of the setup software.

In addition, history is listed for alarms that occurred in the past.

① Click "Diagnosis" - "Alarm Display" of the setup software to display "Alarm Display" window.

② Alarms / warnings currently occurring in the driver display the contents.
   If no alarm / warning has occurred, it will not be displayed.

③ Lists the history (Maximum 6 cases) of alarms that occurred in the past.
   (Warnings are not displayed.)

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SMC Corporation

4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN
Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362
URL http://www.smcworld.com