LEC-OM07904
(Doc no. JXC※-OMT0074-A)

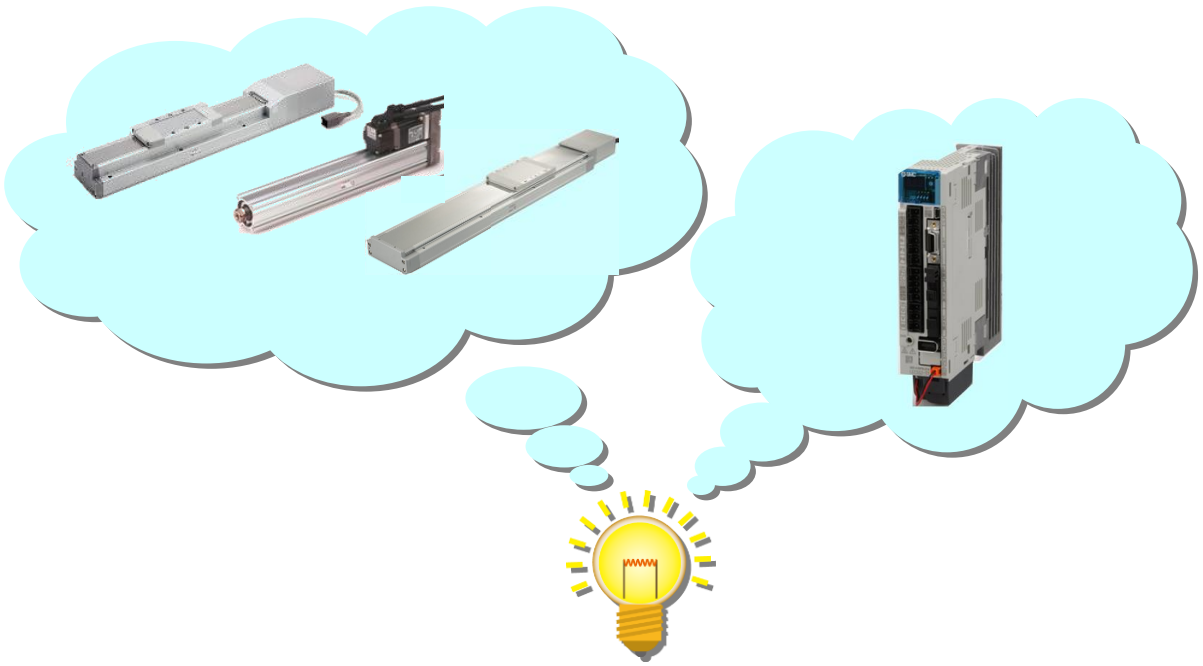
Operation Manual
(Simplified edition)

PRODUCT NAME

AC Servo Motor Driver (SSCNET Ⅲ/H Type)

MODEL / Series / Product Number

LECSS2-T□ Series



SMC Corporation

CONTENTS

LECSS2-T□ 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.

LECSS2-T□ 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.**

Introduction

It is recommended that the operator read the operation manual for LECSS2-T prior to use.
For the handling and details of other equipment, please refer to the operation manual for used equipment.

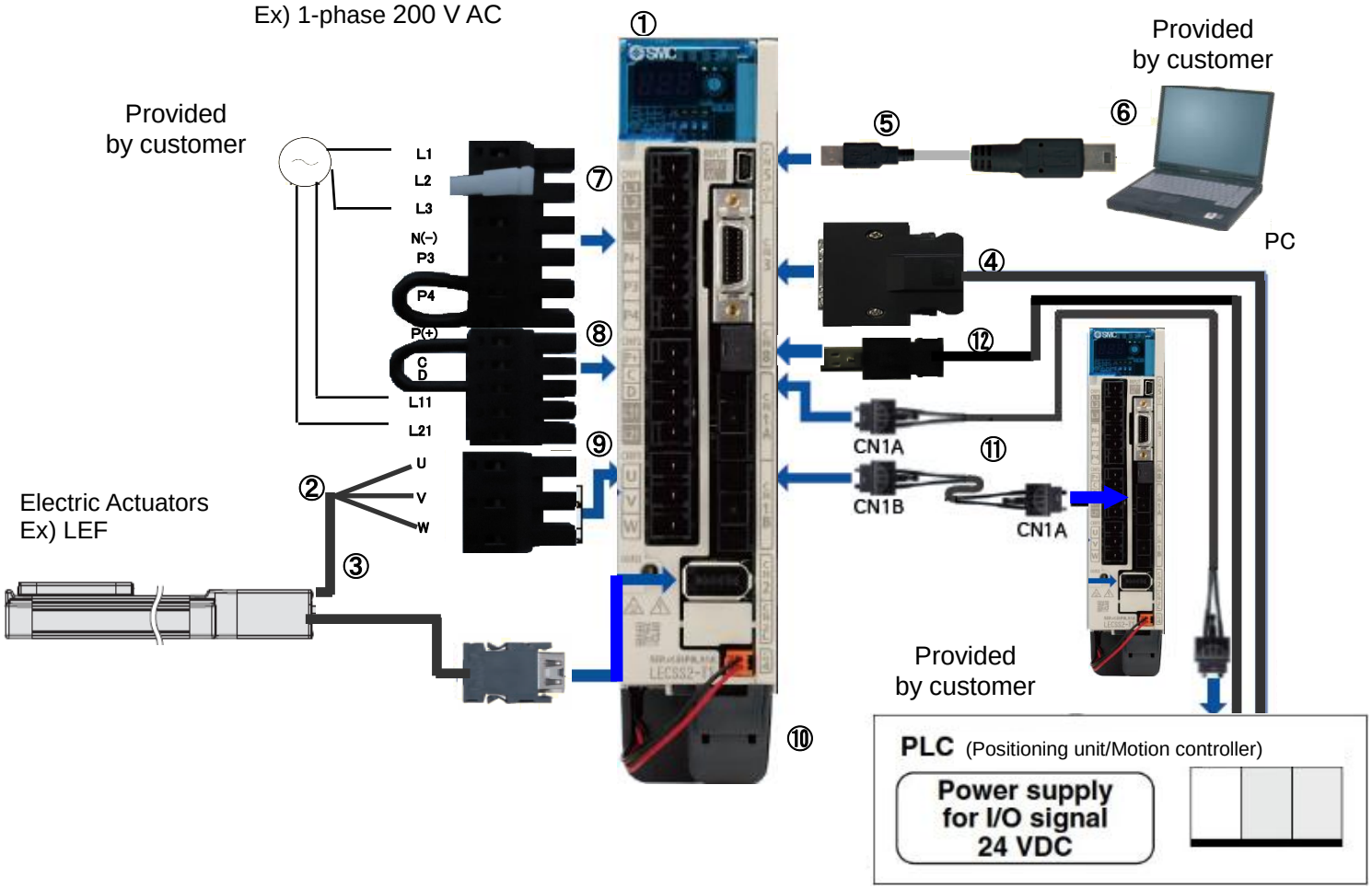
Check that the main circuit power supply (AC200V) and controller circuit power supply (AC200V) are wired correctly.
For wiring, please refer to section 3.1 of LECSS2-T Operation Manual and section 3 of LECSS2-T Operation Manual (Simplified edition).

Please wire EM2 (Forced stop) into the release state (operational).
EM2 (Forced stop) can be set to automatic ON by changing a parameter setting.

When setup software (MR Configurator2™) is used, the LECSS2-T model selection is required.
Select 'MR-J4-B' through “Model" - "New" and "Project".

1. Configuration

Minimum equipment and wiring requirements to get started

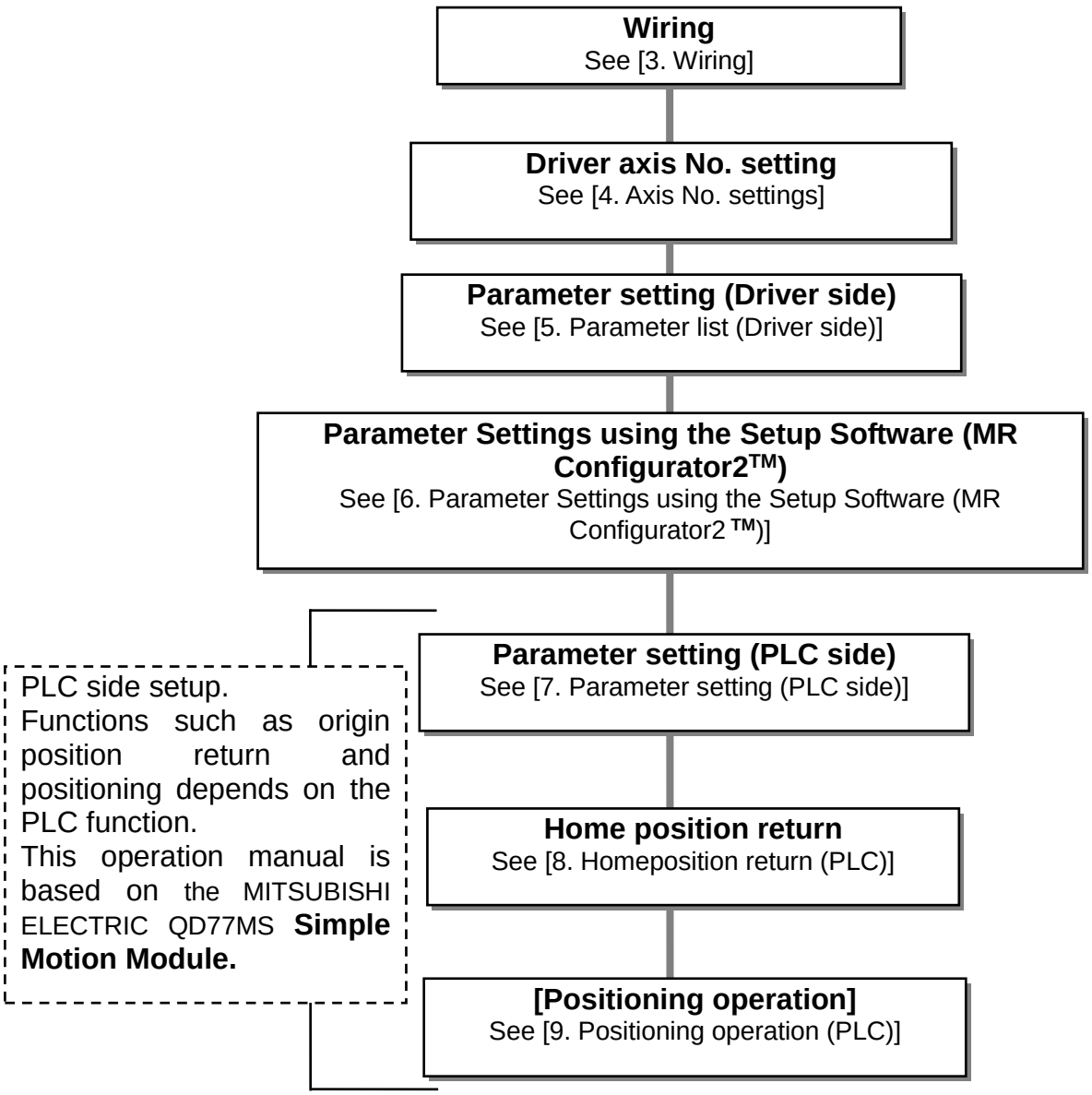


1	Driver	LECSS2-T*
2	Motor cable	LE-CSM-***
3	Encoder cable	LE-CSE-***
4	I/O connector	LE-CSNS
	I/O cable	LEC-CSNS-1
5	USB cable	LEC-MR-J3USB
6	Setup software (MR Configurator2™)	LEC-MRC2*
7	Main circuit power supply connector	CNP1 (Accessory)
8	Control circuit power supply connector	CNP2 (Accessory)
9	Motor connector	CNP3 (Accessory)
10	Battery	LEC-MR-BAT6V1SET (a bundled item) It is unnecessary when using it with the incremental system.
11	SSCNETⅢ optical cable	LE-CSS-*
12	STO cable	LEC-MR-D05UDL3M

Note) The lock cable option is not shown on this drawing. Refer to the “LECSS2-T Operation Manual” for details.

2. Procedure before operation

2.1 Flow chart



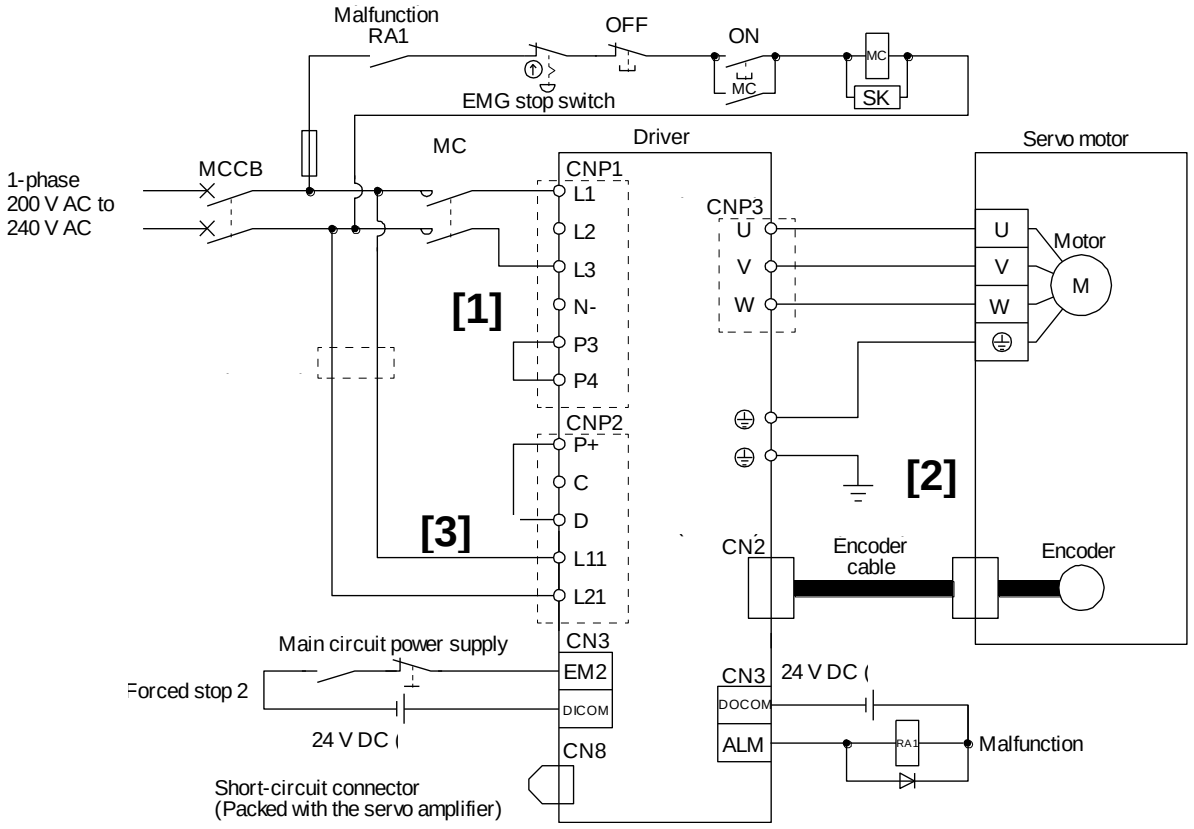
3. Wiring

3.1 Wiring for power supply

Connect the actuator and driver power supply. This wiring diagram is common for each mode.

(1) LECSS2-T□ (Absolute encoder)

EX.) Power supply is AC200V single phase



[1] Power supply input terminals, L_1, L_3: Provide specified power supply to input terminals L_1 and L_2.

[2] ・Connect the motor power supply 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 external power supply to the power supply for the control circuit.

Refer to "LECSS2-T Operation Manual", Chapter 3 for details of how to connect AC200V three phase.

3.2 SSCNETⅢ cable wiring

SSCNETⅢ cable wiring

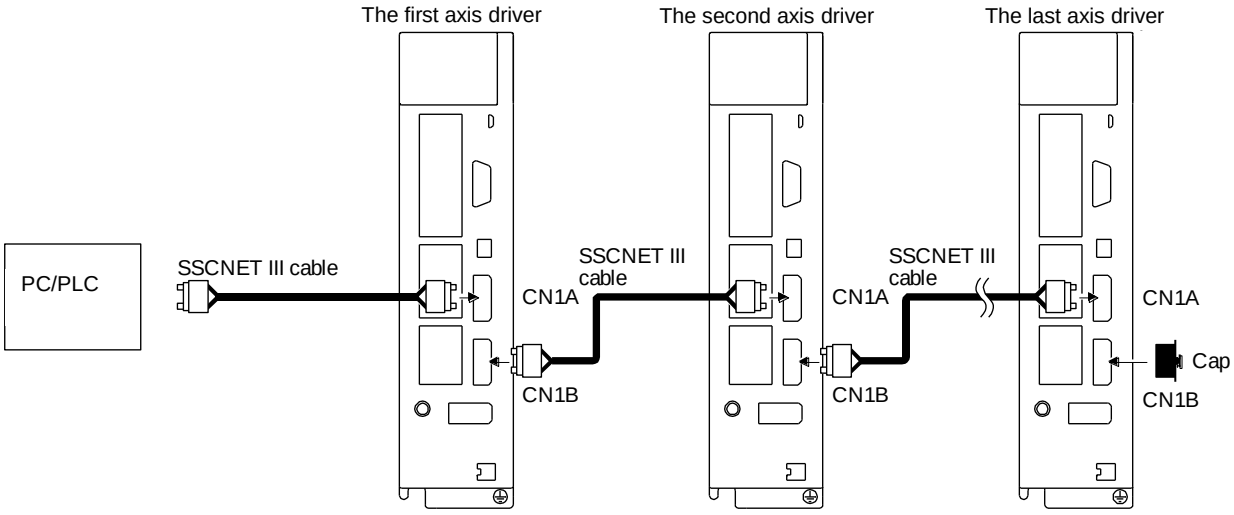
(1) SSCNETⅢ cable connection between the driver and PLC

Connect SSCNETIII cable from the PC/PLC to CN1A of the first driver

Connect the second SSCNETIII cable from CN1B of the first driver to CN1A of the second driver

For the final axis connect the SSCNETIII cable as before and put the end cap in CN1B of the final driver.

This prevents the connector from becoming dirty.



⚠ WARNING

Do not look directly at the light (red) generated from CN1A/CN1B connector of the driver or the end of SSCNET III cable. The light can be a discomfort when it enters the eye.
(For LECSS-S, emitted light (transparent and colorless).)

(2)Removal and insertion of the connector

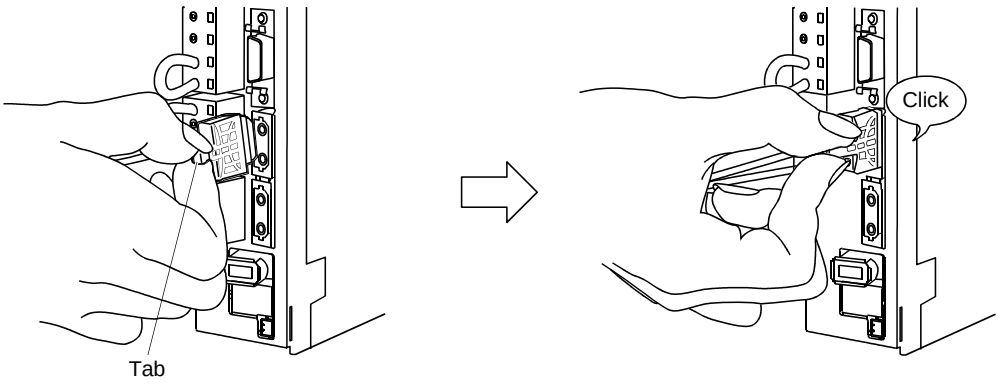
(a) Insertion

While holding the tab on the SSCNETⅢ cable connector, insert the connector into CN1A orCN1B of the driver until you hear a click.

If the exposed tip of the optical cable is dirty, optical transmission may be interrupted and may cause malfunctions.

If the tip becomes dirty, wipe with a bonded textileor similar.

Do not use a solvent such as alcohol.



(b) Removal

While 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.

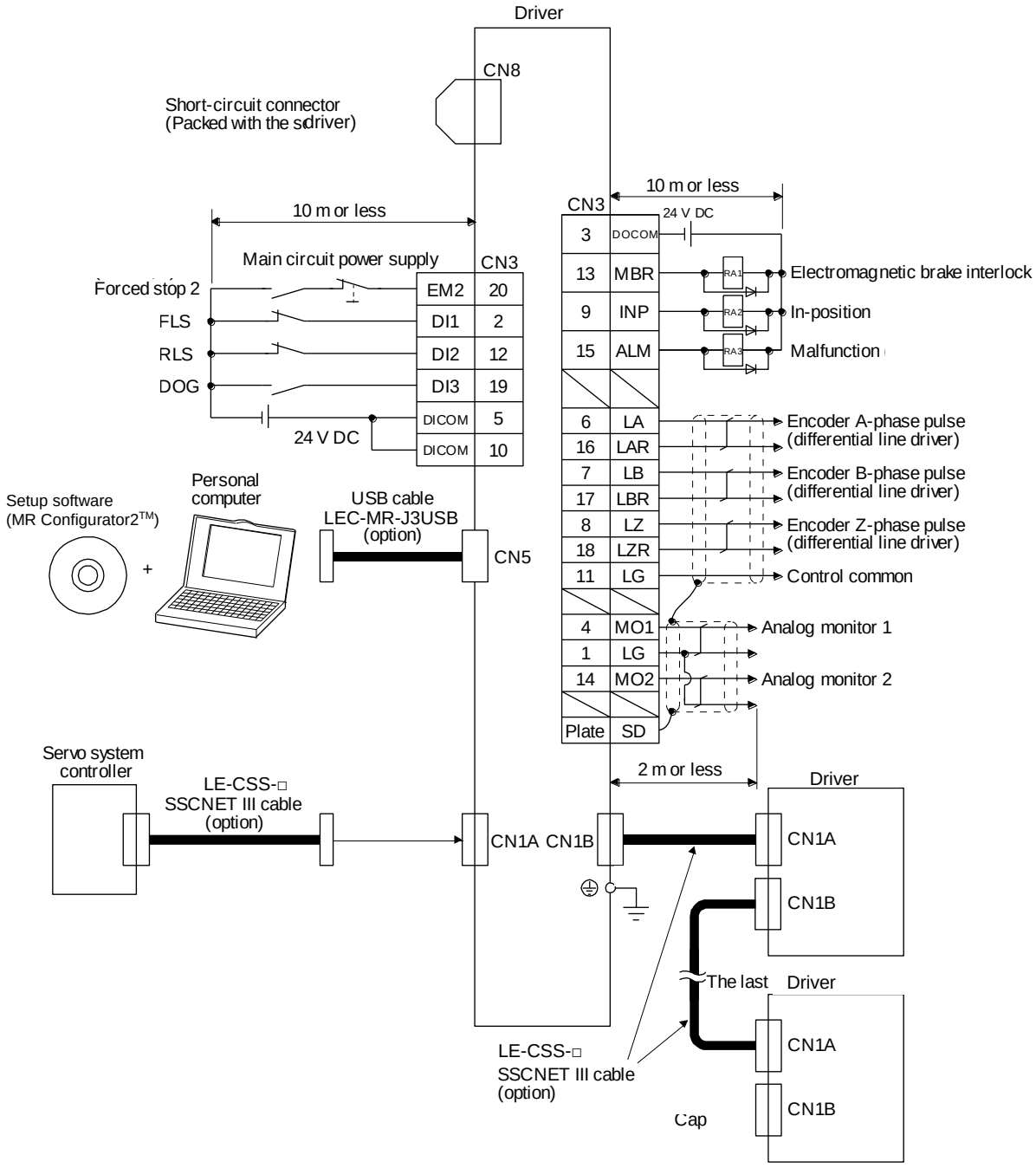
For SSCNETⅢ cable, attach the tube for protection to the end of connector.

3.3 I/O signal connection

Example wiring diagrams for the driver's IO signals are shown in the following section.

3.3.1 Sink I/O interfaces Connection example

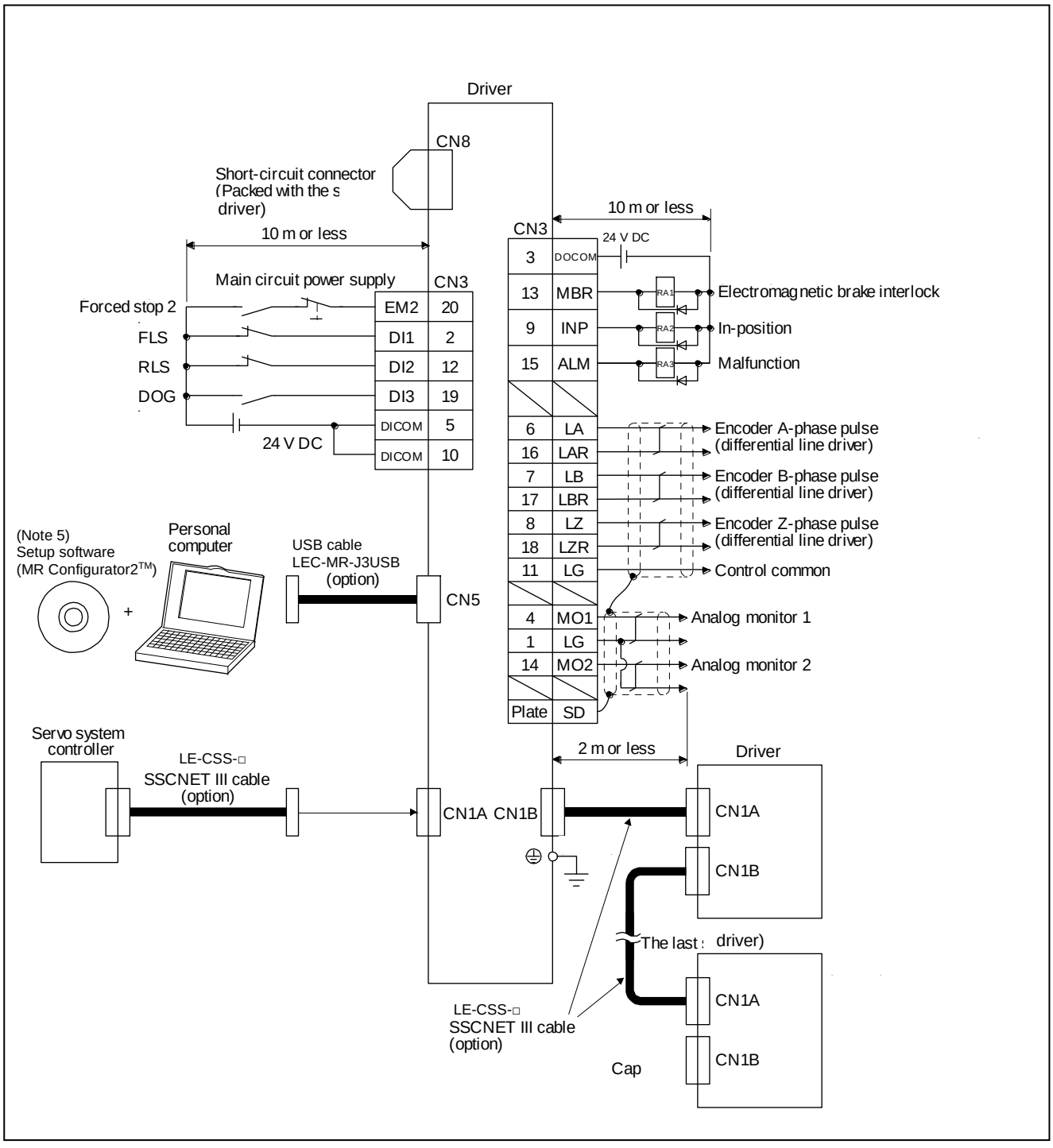
An example wiring diagram for Sink I/O is shown below



Refer to "LECSS2-T Operation Manual",section 3.2 for wiring details.
Refer to "LECSS2-T Operation Manual",section 3.5 for input/output signal details.

3.3.2 Source Sink I/O interfaces Connection example

An example wiring diagram for Sink I/O is shown below



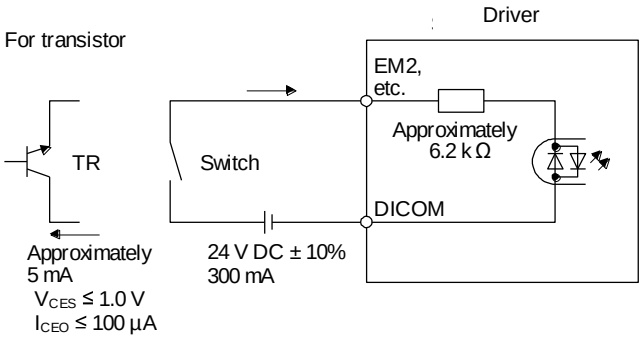
Refer to “LECSS2-T Operation Manual”,section 3.2 for wiring details.

Refer to “LECSS2-T Operation Manual”,section 3.5 for input/output signal details.

In this driver, source type I/O interfaces can be used. 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

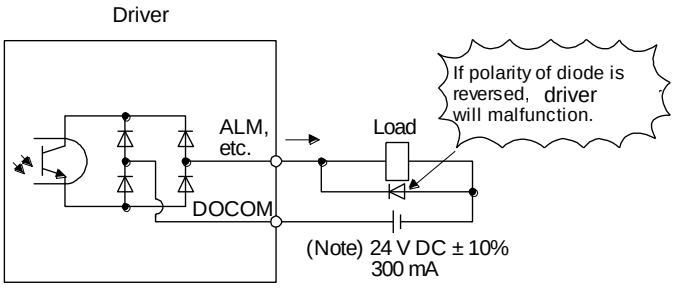
This is an input circuit whose photocoupler anode side is an input terminal. Transmit signals from source (open-collector) type transistor output, relay switch, etc.



(2) Digital output interface DO-1

This is a circuit of the emitter output terminal of the output transistor. When the output transistor is turned on, current will be applied from the output to a load.

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



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

4. Axis No. settings

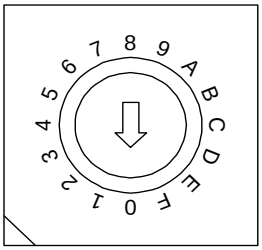
Set the control axis No. with the rotary switch.

POINT

- The control axis number set by 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 of 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)

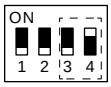


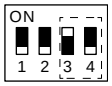
Control axis deactivation switch
Set to the "OFF (down)" position. （SW2-2）

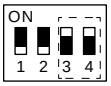
Test operation select switch
Set to the "ON (up)" position. （SW2-1）

Set the test operation select switch to the “Up” Position, when performing the test operation mode by using setup software (MR Configurator2™)

Auxiliary axis number setting switch (SW2-3, SW2-4)	Axis selection rotary switch (SW1)	Control axis No.
	0	1
	1	2
	2	3
	3	4
	4	5
	5	6
	6	7
	7	8
	8	9
	9	10
	A	11
	B	12
	C	13
	D	14
	E	15
	F	16

Auxiliary axis number setting switch (SW2-3, SW2-4)	Axis selection rotary switch (SW1)	Control axis No.
	0	17
	1	18
	2	19
	3	20
	4	21
	5	22
	6	23
	7	24
	8	25
	9	26
	A	27
	B	28
	C	29
	D	30
	E	31
	F	32

Auxiliary axis number setting switch (SW2-3, SW2-4)	Axis selection rotary switch (SW1)	Control axis No.
	0	33
	1	34
	2	35
	3	36
	4	37
	5	38
	6	39
	7	40
	8	41
	9	42
	A	43
	B	44
	C	45
	D	46
	E	47
	F	48

Auxiliary axis number setting switch (SW2-3, SW2-4)	Axis selection rotary switch (SW1)	Control axis No.
	0	49
	1	50
	2	51
	3	52
	4	53
	5	54
	6	55
	7	56
	8	57
	9	58
	A	59
	B	60
	C	61
	D	62
	E	63
	F	64

5. Parameter list (Driver side)

Please configure the appropriate parameters to enable correct driver operation.
Refer to [5. Assignment of input/output signal] and "LECSS2-T Operation Manual", Chapter 5 for details.
Refer to "LECSS2-T Operation Manual", Chapter 5 for parameters which are not mentioned in this clause.

Setup software (MR Configurator2™ : LEC-MRC2E) is required to set the parameters.
*1 Setup software version 1.19 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.
***4 LECSS2-T cannot be used with setup software (MR Configurator™ : LEC-MR-SETUP221)**

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

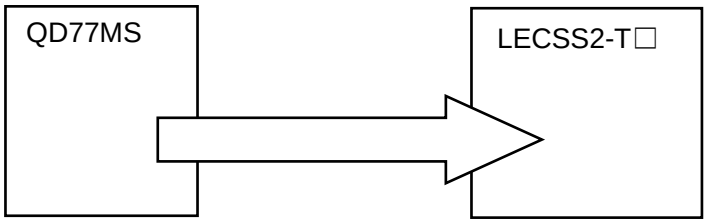
No.	Symbol	Name	Initial value	Unit
PA01	STY	Operation mode	1000h	
PA03	ABS	Absolute position detection system (Note 1)	0000h	
PA04	AOP1	Function selection A-1	2000h	
PA08	ATU	Auto tuning mode (Note 1)	0001h	
PA09	RSP	Auto tuning response (Note 1)	16	
PA10	INP	In-position range (Note 1)	1600	pulse
PA14	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 "LECSS2-T Operation Manual", Section 5.2.4 for details.

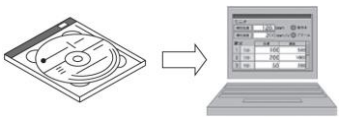
(Note 1)Parameters which can be set by upper level devices.
During PLC operation, parameters are stored in the QD77MS simple motion module and transmitted to the LECSS2-T□. Refer to PLC manual for checking the setting method of parameters.



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 “LECSS2-T Operation Manual” for parameter details.

6.1 Setup software (MR Configurator2™)



*1 Setup software version 1.19V 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

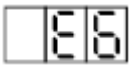
Perform installation according to the “MR Configurator2™ instruction manual” (Manual/ib0300160*.pdf) contained on the setup software (MR Configurator2™) CD-ROM. The “MR Configurator2™” software will be installed to the PC.

6.2 Basic driver set-up for Initial Test Drive

Switch on the main circuit power supply (AC200V) and controller circuit power supply (AC200V) to the LECSS2-T driver.
Please check wiring, etc, if the driver display is not shown as below:

Wait for the servo system controller power to switch ON(SSCNETⅢ/H communication)

When the driver display flashes as shown below, **EM1 (Forced stop1) and EM2 (Forced stop2) must be wired appropriately.**



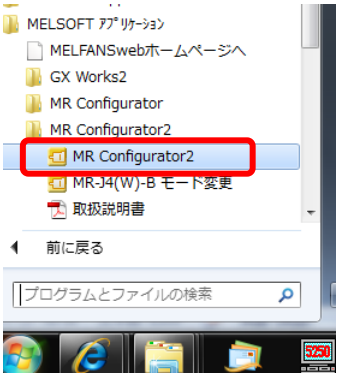
If you turn on the power supply for the first time, refer to "LECSS2-T Operation Manual”, chapter 4.

6.2.1 Start up the Setup software (MR Configurator2™)

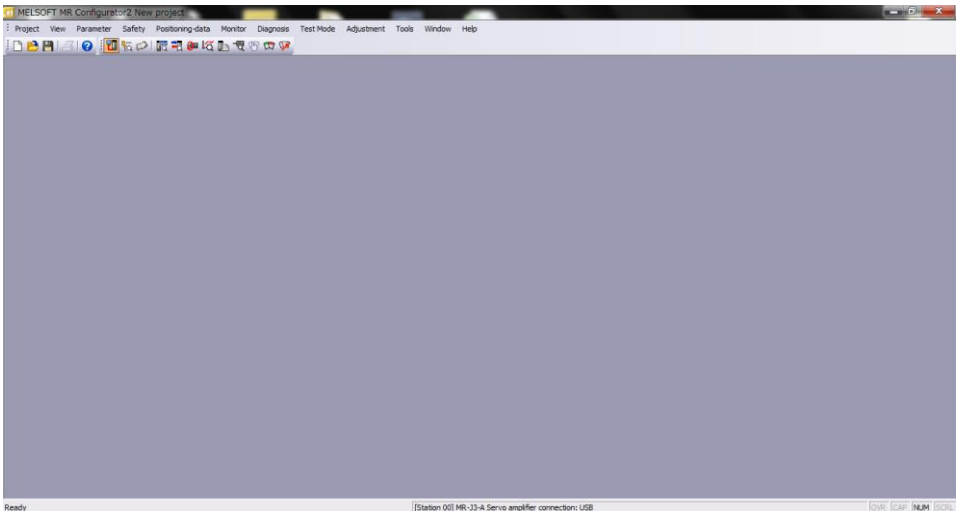
① Connect the PC and LECSS2-T using the USB cable.

② Turn on the power of the LECSS2-T.

③ Start application “MR Configurator2”.

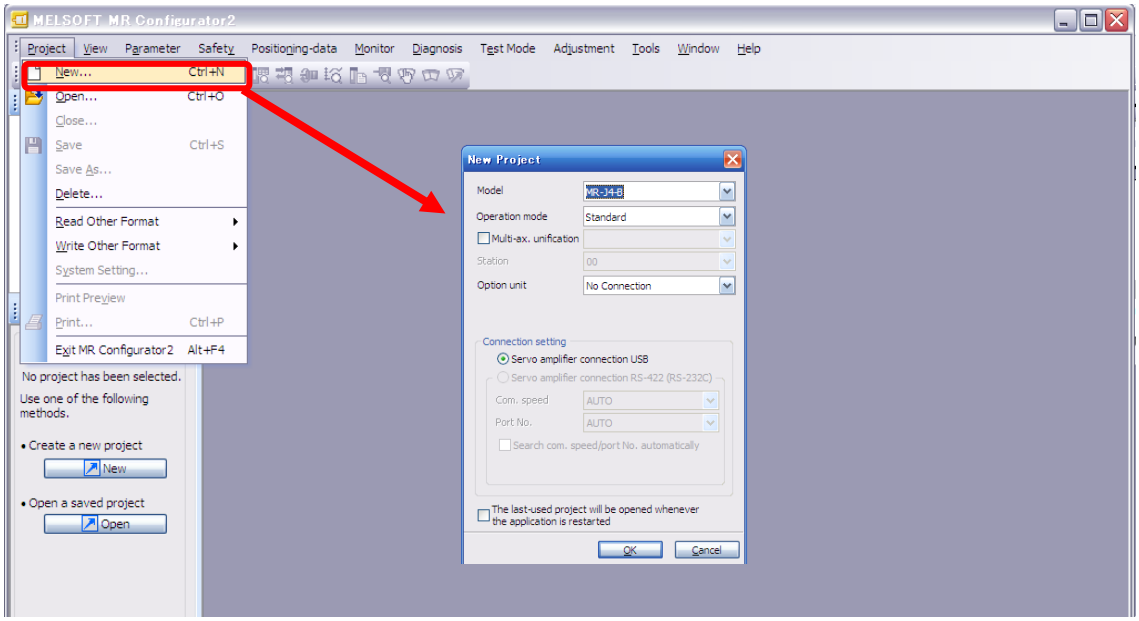


Once the application starts, the screen below will be displayed.



6.2.2 “System Settings”

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



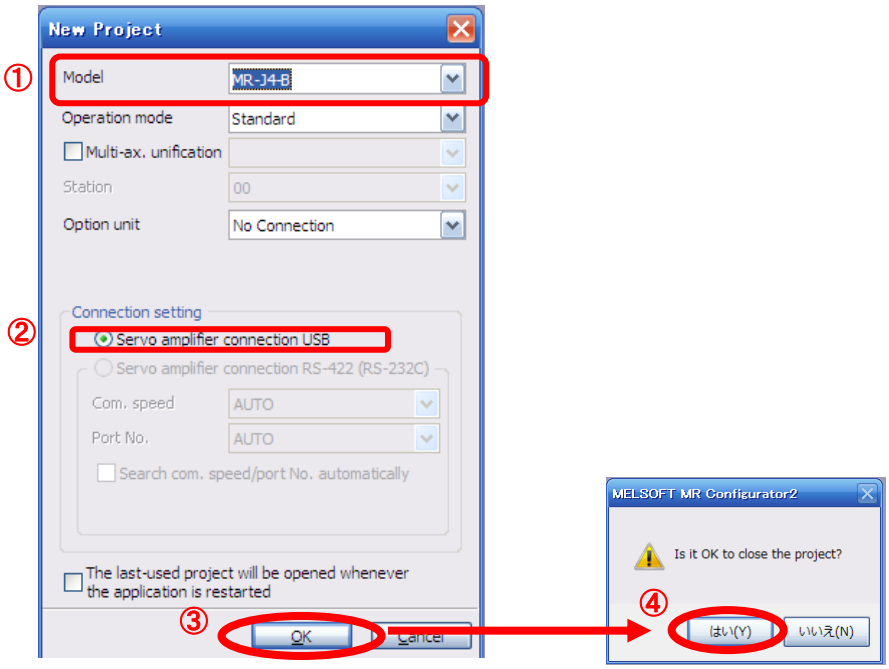
6.2.3 Model Selection

① The Mitsubishi Electric Corporation series will be displayed in the model selection list. Please select MR-J4-B if using the LECSS2-T.

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).

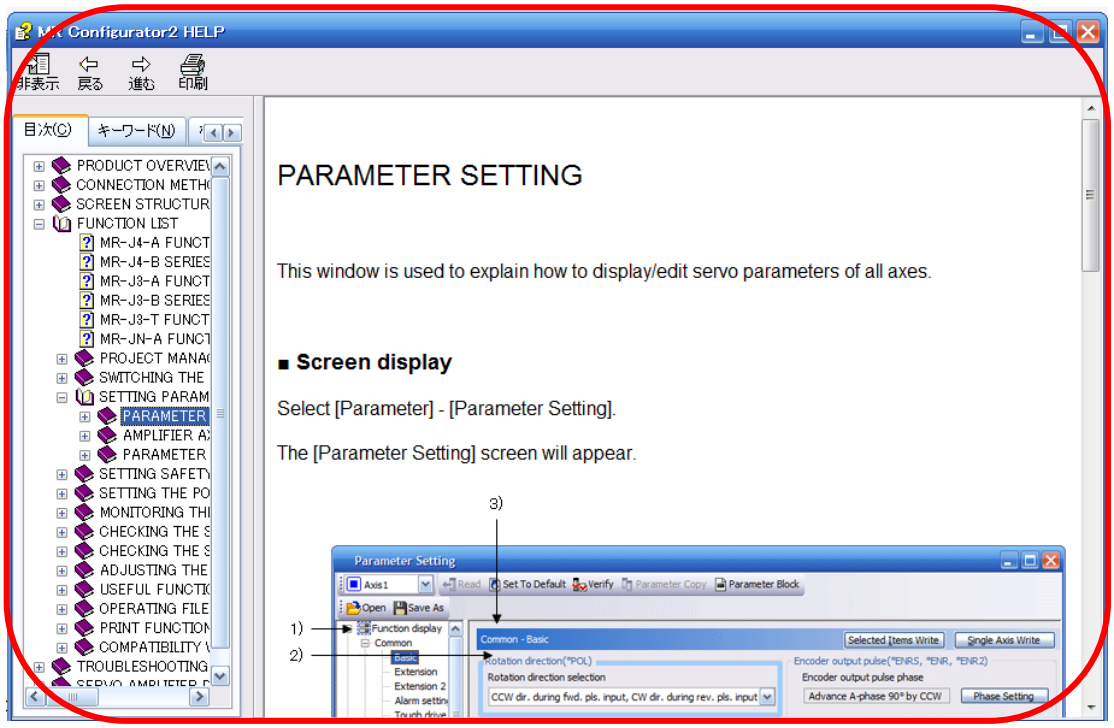
Check that the “ONLINE/OFFLINE” icon is displayed “  ”.

It is OFFLINE when displayed as “  ”.

* When OFFLine, the PC and driver are not communicating correctly. Confirm the following points.
  - Is driver's power supply turning on?
  - Are PC and driver connected with the USB cable?
  - Is the USB driver installed?
  - Is the setting of “Port” for USB connection correct?

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 1.19 or above is required.

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

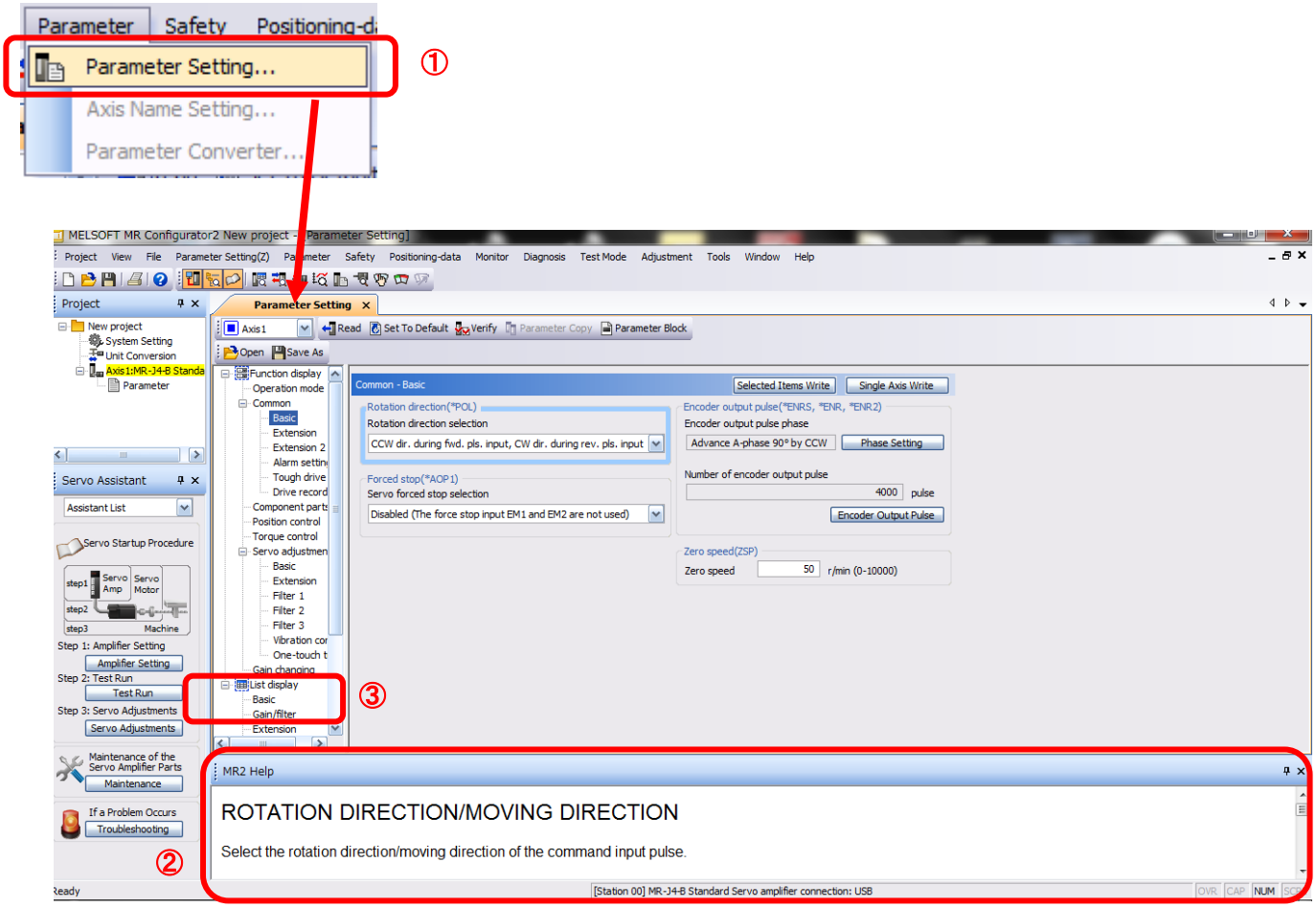
*3 The USB cable (LEC-MR-J3USB) must be purchased as an additional item.

***4 LECSS2-T cannot be used with setup software (MR Configurator™:LEC-MR-SETUP221)**

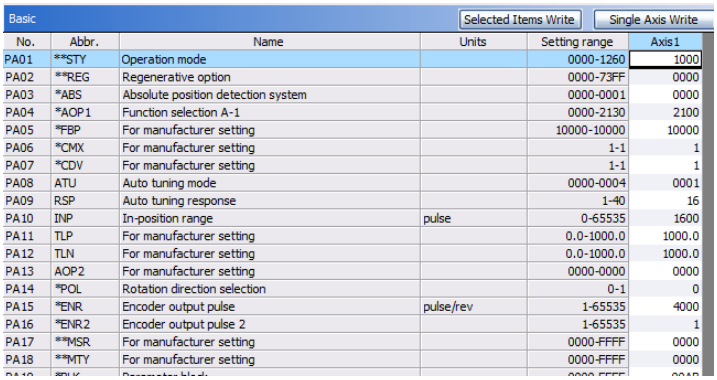
POINT
・When the driver is connected with the servo system controller, the parameters are set to the values of the servo system controller. Switching power off, then on makes the values set on the set up software (MR Configurator2™) invalid and the servo system controller values valid. ・Setting may not 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 selectedthe following is shown.



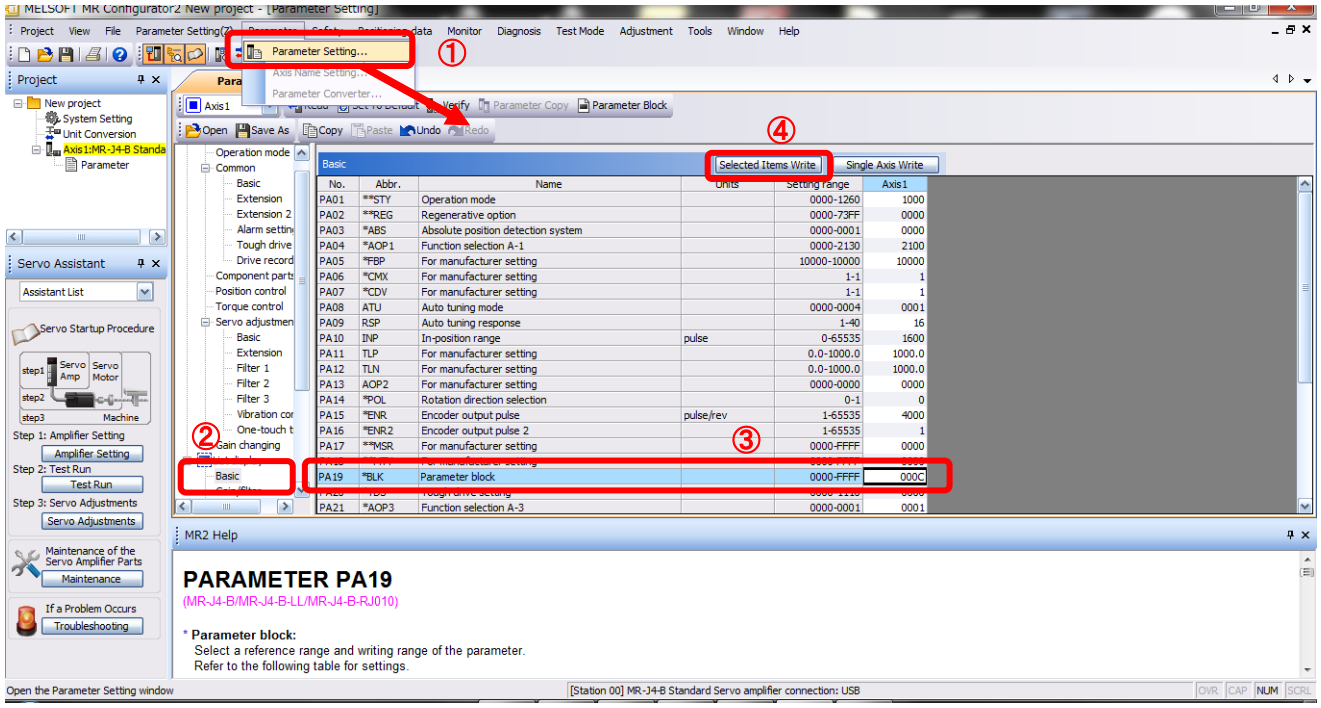
No.	Abbr.	Name	Units	Setting range	Axis1
PA01	**STY	Operation mode		0000-1260	1000
PA02	**REG	Regenerative option		0000-73FF	0000
PA03	*ABS	Absolute position detection system		0000-0001	0000
PA04	*AOP1	Function selection A-1		0000-2130	2100
PA05	*FBP	For manufacturer setting		10000-10000	10000
PA06	*CMX	For manufacturer setting		1-1	1
PA07	*CDV	For manufacturer setting		1-1	1
PA08	ATU	Auto tuning mode		0000-0004	0001
PA09	RSP	Auto tuning response		1-40	16
PA10	INP	In-position range	pulse	0-65535	1600
PA11	TLP	For manufacturer setting		0.0-1000.0	1000.0
PA12	TLN	For manufacturer setting		0.0-1000.0	1000.0
PA13	AOP2	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	Encoder output pulse 2		1-65535	1
PA17	**MSR	For manufacturer setting		0000-FFFF	0000
PA18	**MTY	For manufacturer setting		0000-FFFF	0000

Refer to"LECSS2-T Operation Manual”, chapter 5 for details of each parameter.

6.3.1 Change of parameter block

When turning on the power, the parameter block setting of the driver is set to block most parameters by default. This is done to protect the user from editing special parameters which may render the driver unusable. Please change the parameter block setting to allow editing of the parameters which are required.

① From the “Parameter” menu select “Parameter Setting”, the “parameter setting” window will open.
② Please click "Basic setting" from the “List display", the basic setting screen is then displayed.
③ Select “Basic” tab and change the value of “PA19” to “000C”.
④ Click on the "PA19" row and click “Selected Items Write”.
⑤ **Cycle the power for the parameters to be enabled.**



① Please click “Read".

When changing each parameter, note the following points.

Note1) For any parameter proceeded by *, set the parameter value, switch power off once after setting, and then switch it on again, and it will be valid.. (If you do not the power to OFF, it does not change the data in the driver.)

Note2) “Selected Items Write”: It writes the selected parameter value to the driver.
“Single Axis Write”: It writes ALL of the parameters to the driver.

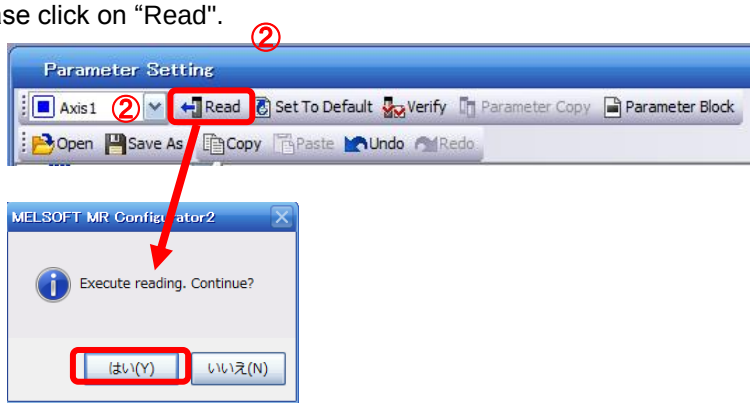
Note3) Do not change parameters called “For manufacturer setting” If you change these by mistake, the driver may not work properly.

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.
please change the parameter values depending upon driver operation.

Refer to "LECSS2-T Operation Manual”,chapter 5 for details of each parameter.

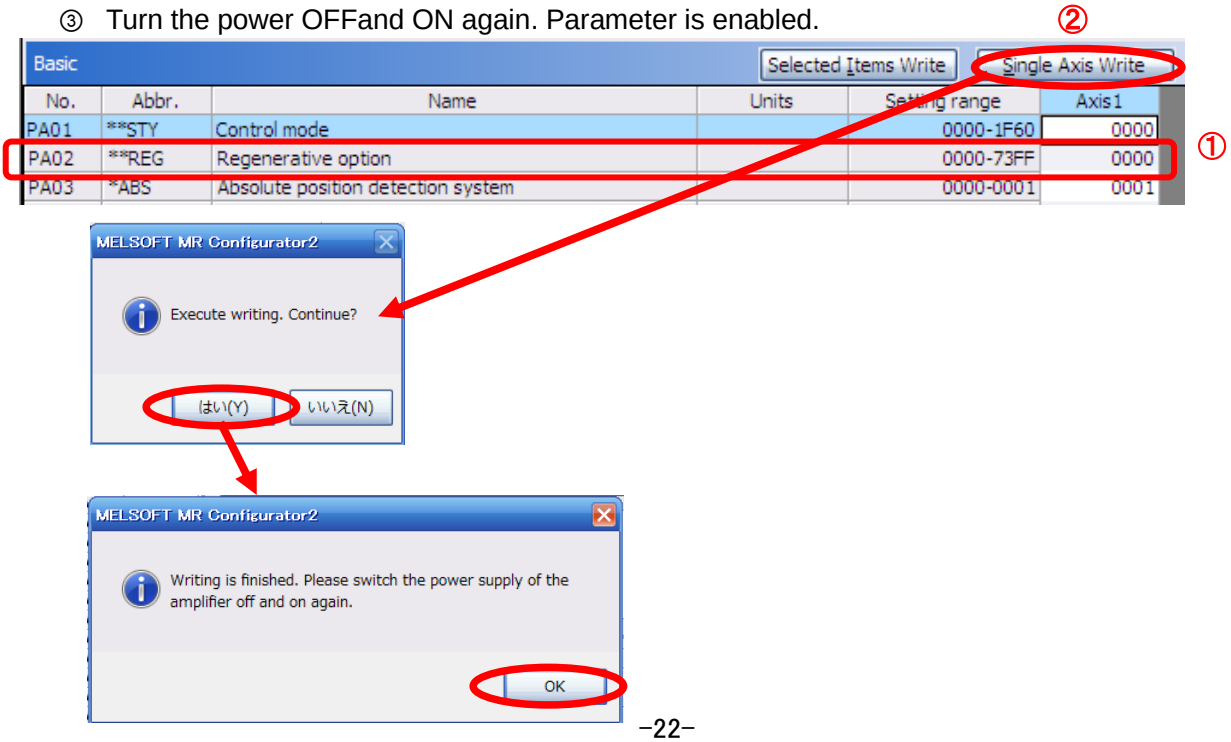
Refer to "LECSS2-T Operation Manual (Simplified Edition)”, section 6.3.4 for details of recommended parameter values for each actuator.

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 OFFand ON again. Parameter is enabled.



6.3.4 The recommended parameters for each actuator

The recommended parameters for each actuator.
Please change the parameter values by use of the customer.

Refer to “LECSS2-T Operation Manual”, section 5 for details.

Recommended Parameter Values [LEF]

Series			LEFS25T6			LEFS32T7			LEFS40T8		
	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	PA14	0	**1(+:Counter motors side)**								
Load to motor inertia moment ratio	PB06	7	7								
Function selection E-3	PE41	0000	0000								

Series			LEFS25(L,R)T6			LEFS32(L,R)T7			LEFS40(L,R)T8		
	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	PA14	0	0(+:Counter motors side)								
Load to motor inertia moment ratio	PB06	7	7								
Function selection E-3	PE41	0000	0000								

Series			LEFB25 T6	LEFB25U T6	LEFB32 T7	LEFB32U T7	LEFB40 T8	LEFB40U T8
	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)
★ Load to motor inertia moment ratio	PB06	7	**50**					
★ Function selection E-3	PE41	0000	**0001 (Robust filter enabled)**					

★ Parameter should be changed.
Different from the initial value.

*1 Parameter is the recommended value. Please change the parameter to make 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 LECSS2-T□, please set the electronic gear with PC, PLC etc. in your application.

Recommended Parameter Values [LEJ]

Series			LEJS40T6			LEJS63T7			LEJB40T6	LEJB63T7
	Lead symbol		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)	
★Load to motor inertia moment ratio	PB06	7	7						**50**	
★ Function selection E-3	PE41	0000	0000						**0001 (Robust filter enabled)**	

★ 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 LECSS2-T□, please set the electronic gear with PC, PLC etc. in your application.

Recommended Parameter Values [LEY]

Series			LEY25T6 / LEYG25T6			LEY25DT6 / LEYG25DT6			LEY32T7 / LEYG32T7			LEY32DT7 / LEYG32DT7		
	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)**		
Load to motor inertia moment ratio	PB06	7	7											
Function selection E-3	PE41	0000	0000											

Series			LEY63T8				LEY63DT8		
	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)**		
Load to motor inertia moment ratio	PB06	7	7						
Function selection E-3	PE41	0000	0000						

Different from the initial value.

*1 Parameter is the recommended value. Please change the parameter to make 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 LECSS2-T□, please set the electronic gear with PC, PLC etc. in your application.

6.3.5 Forced stop input selection

If the product is used with forced stop1 (EM1) / stop2 (EM2), set the parameter [PA04] to "0000".
Forced stop (EM1) must be ON to start the motor.

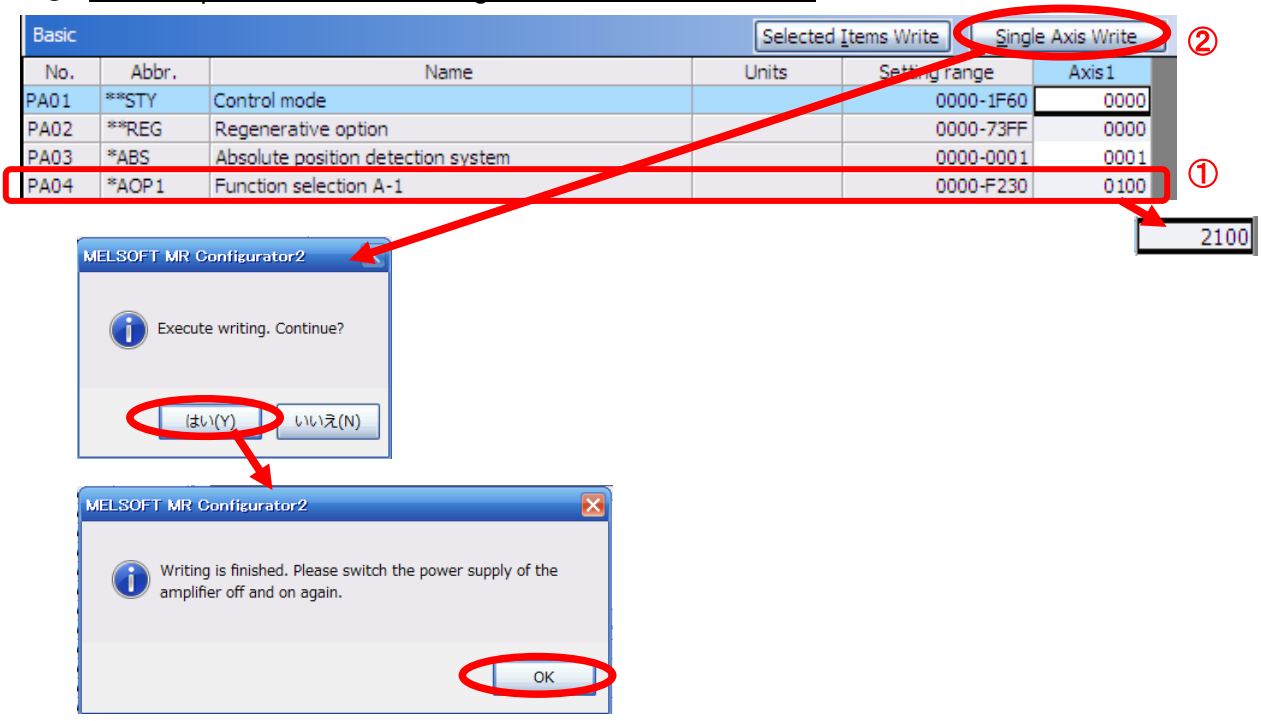
PA04	*AOP1	Function selection A-1 This is used to select the forced stop input and forced stop deceleration function.	Refer to Name and function column.

Setting digit	Explanation	Initial value
_ _ _ x	For manufacturer setting	0h
_ _ x _		0h
_ x _ _	Servo forced stop selection 0: Enabled (The forced stop input EM2 or EM1 is used.) 1: Disabled (The forced stop input EM2 and EM1 are not used.) Refer to table 5.1 for details.	0h
x _ _ _	Forced stop deceleration function selection 0: Forced stop deceleration function disabled (EM1) 2: Forced stop deceleration function enabled (EM2) Refer to table 5.1 for details.	2h

When not using the forced stop1 (EM1) / stop2 (EM2) of driver, set the selection of servo forced stop to invalid (21☐ ☐). At this time, the forced stop (EM1) / stop2 (EM2) automatically turns on inside the driver.

EX.) In order to nullify servo forced stop.
[PA04] = 2100.

① Set the "PA04" to "2100" in the "Basic" tab.
② Click on the "Single Axis Write" button.
③ Turn the power OFF, and ON again. Parameter is enabled.



6.3.6 Absolute position detection system

*If you use the absolute position detection system, set parameter: [PA03]=0001.
Refer to "LECSS2-T 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.

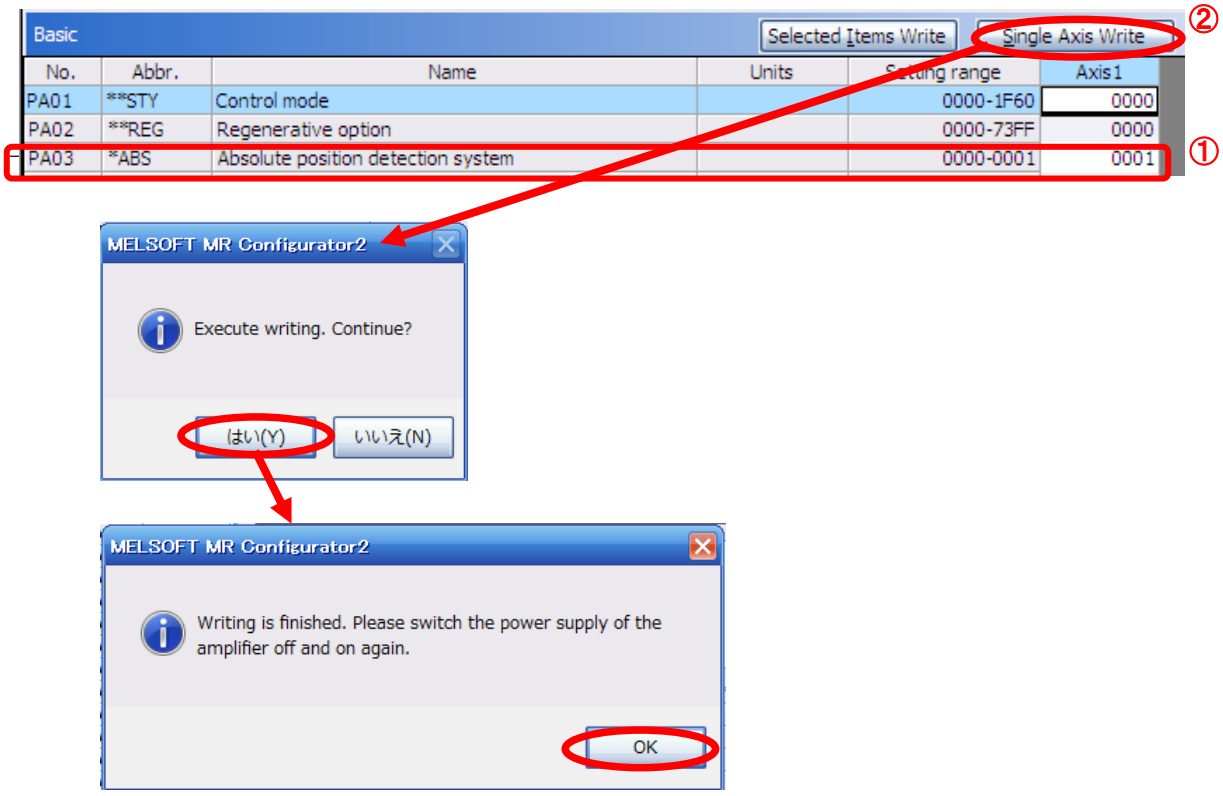
Parameter No.PA03

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.



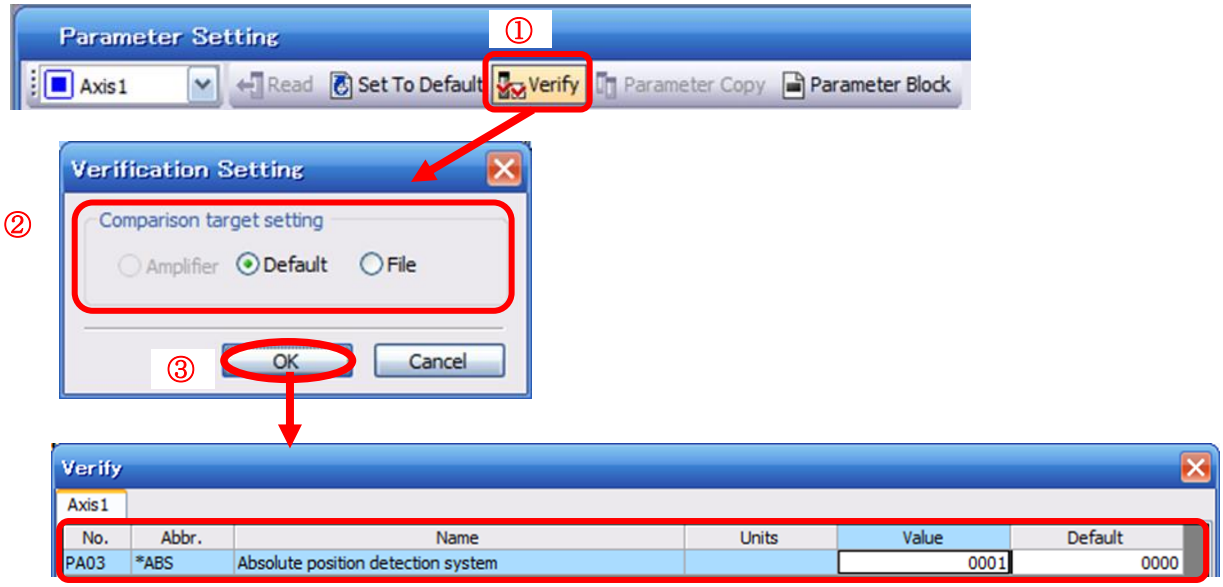
6.3.7 Verify of parameters

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.

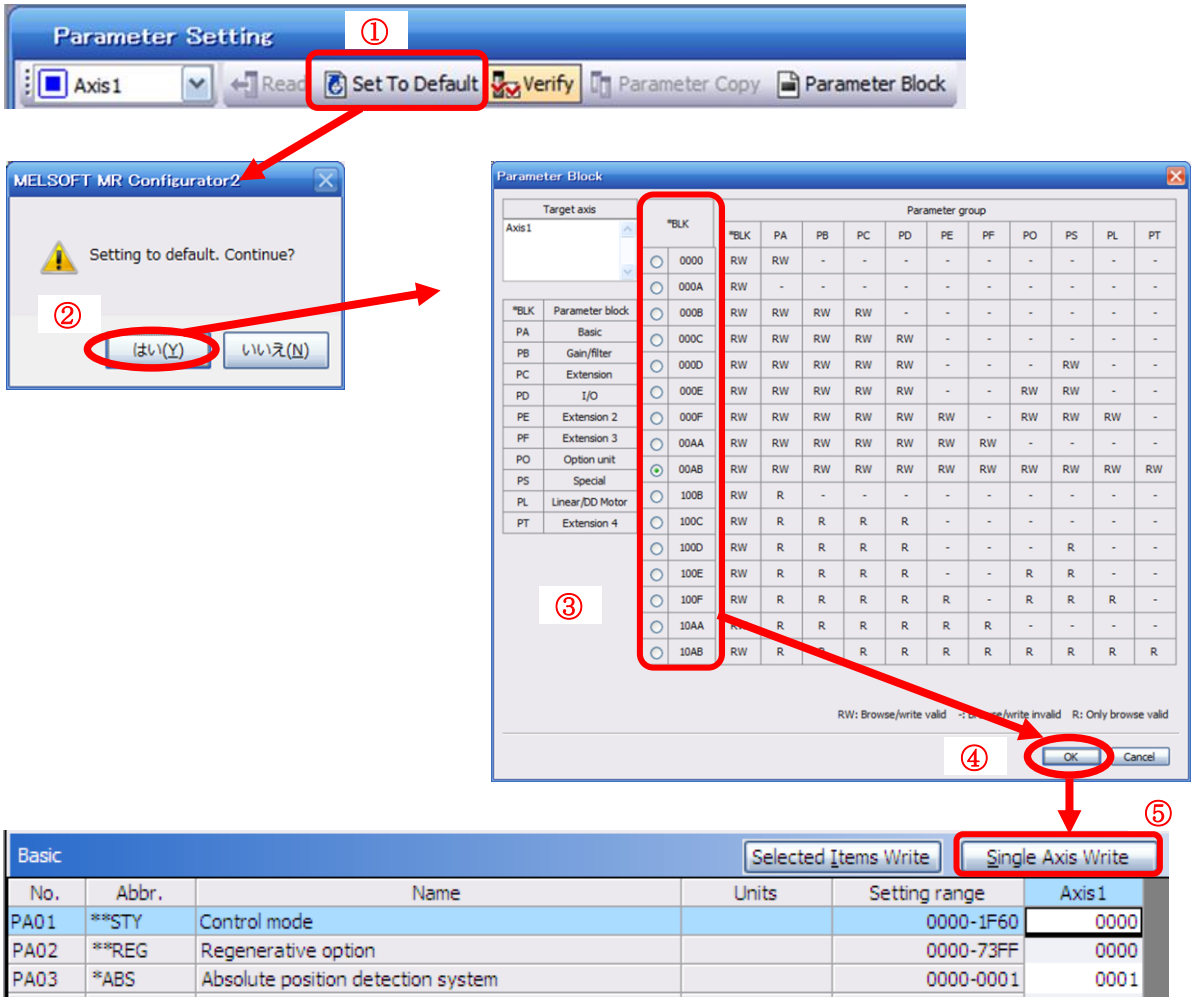
③ Please click "OK" button. The verified result is displayed.



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 “LECSS2-T 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.**

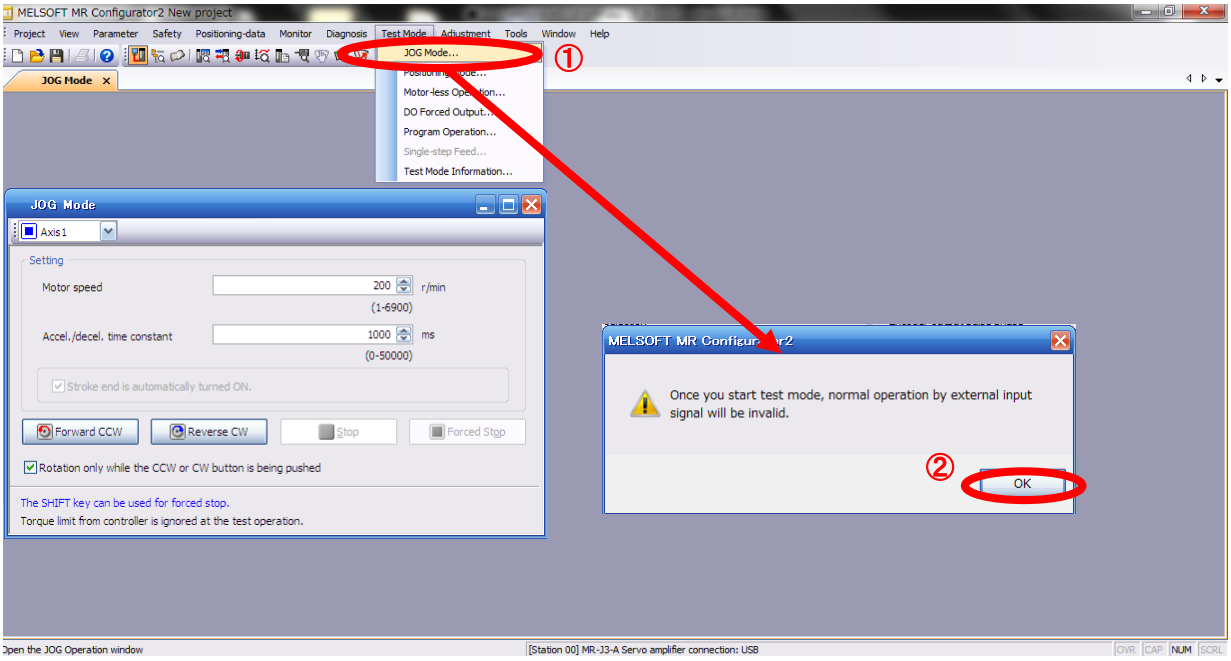


6.4 JOG Mode in the Setup Software

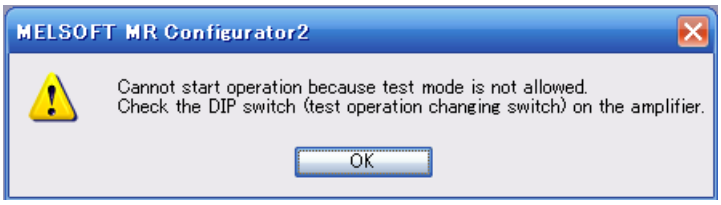
① The “JOG Mode” window can be displayed by selecting “Jog Mode” from the “Test Mode” menu in the **setup software**.

② Click “OK”.

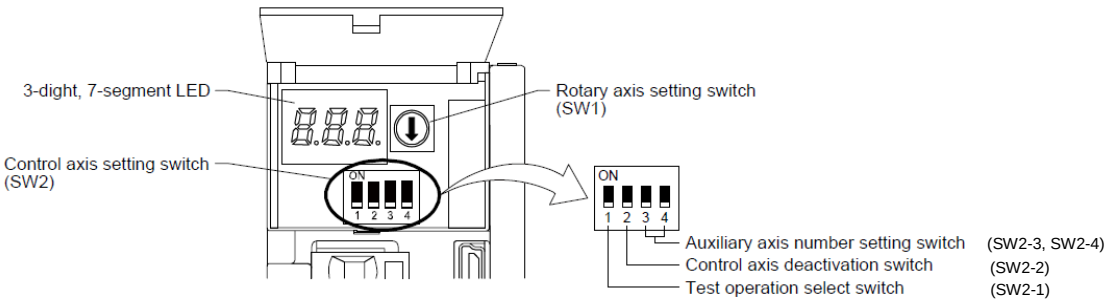
(When using this function, all external input signal operation will be diabled. If controlling using a PLC or other upper device, please turn off the power and reset the device before use.)



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 power off before turning 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.

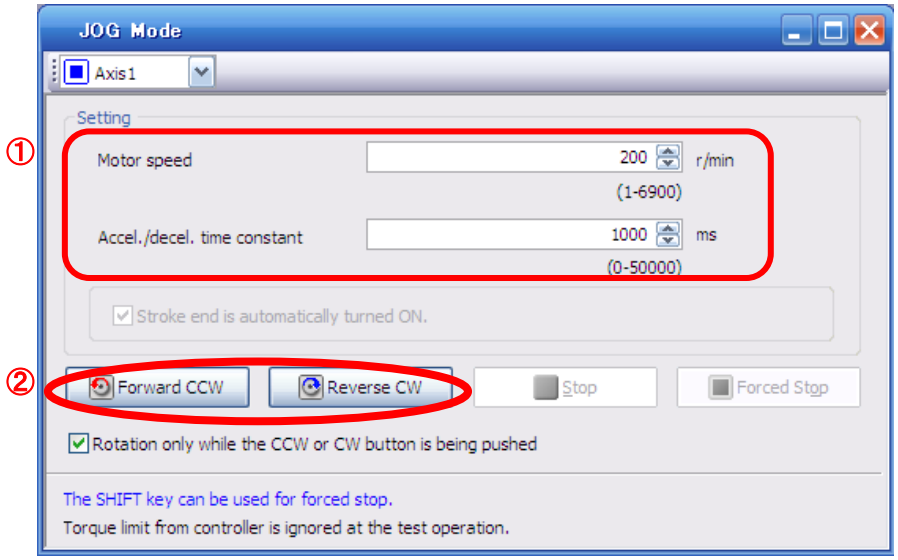


For the test operation select switch（SW2-1）, please refer to section 4 of LECSS2-T Operation Manual (Simplified edition).

6.4.1 JOG Mode

① In order to prevent accidental impact at the end of the stroke, test actuator operation at low speed.
(If motor speed configuration or Acceleration/deceleration time are required, change the value.)
See “LECSS2-T Operation Manual (Simplified Edition)”,section 6.6.2 for motor speed configuration.
See “LECSS2-T 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).

6.5 Changing Input/Output Signal Allocation

Output signal assignment can be changed as appropriate from initial settings. There may be cases when changing the output signal assignments is required for actuator operation.

The allocation of the input signals cannot be changed in the LECSS2-T, 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 “LECSS2-T 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 stop2	EM2	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)

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

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

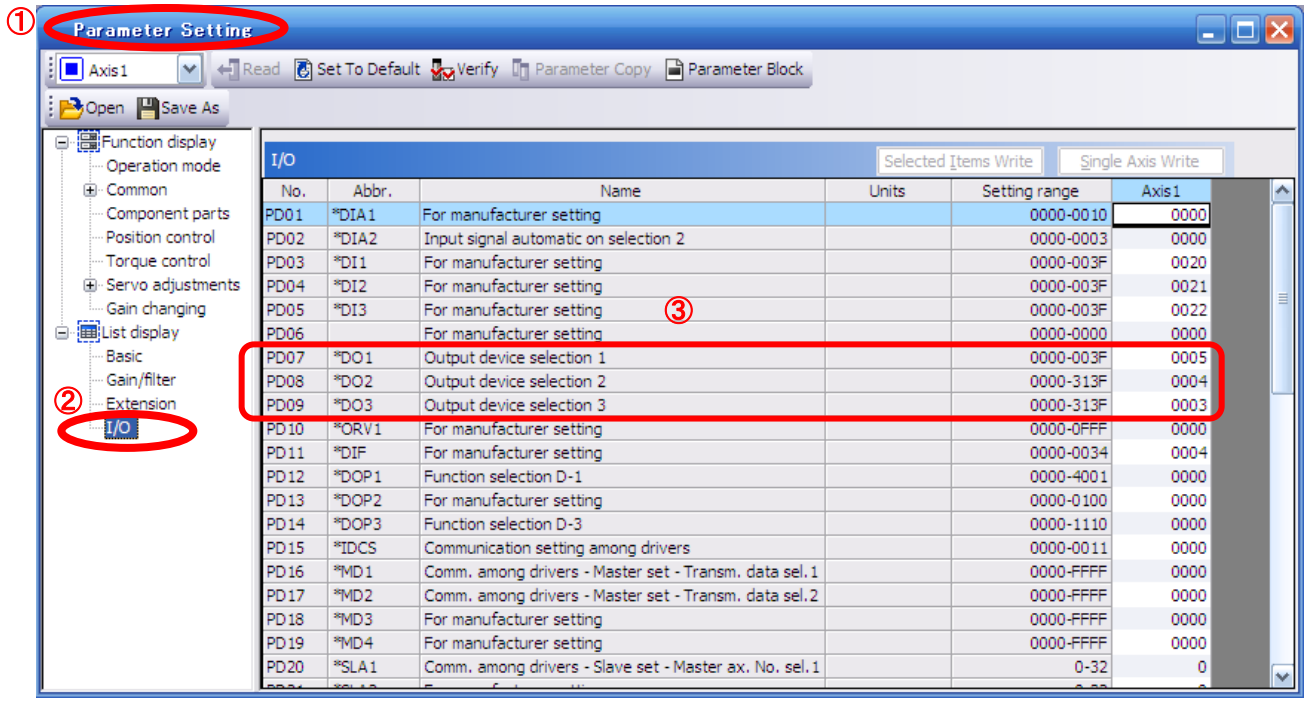
See “LECSS2-T Operation Manual”,section 3.5 for details regarding signals.
See “LECSS2-T Operation Manual”,section 5.2.4 for parameter configuration values.

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.



No.	Abbr.	Name	Units	Setting range	Axis1
PD01	*DIA1	For manufacturer setting		0000-0010	0000
PD02	*DIA2	Input signal automatic on selection 2		0000-0003	0000
PD03	*DI1	For manufacturer setting		0000-003F	0020
PD04	*DI2	For manufacturer setting		0000-003F	0021
PD05	*DI3	For manufacturer setting		0000-003F	0022
PD06		For manufacturer setting		0000-0000	0000
PD07	*DO1	Output device selection 1		0000-003F	0005
PD08	*DO2	Output device selection 2		0000-313F	0004
PD09	*DO3	Output device selection 3		0000-313F	0003
PD10	*ORV1	For manufacturer setting		0000-0FFF	0000
PD11	*DIF	For manufacturer setting		0000-0034	0004
PD12	*DOP1	Function selection D-1		0000-4001	0000
PD13	*DOP2	For manufacturer setting		0000-0100	0000
PD14	*DOP3	Function selection D-3		0000-1110	0000
PD15	*IDCS	Communication setting among drivers		0000-0011	0000
PD16	*MD1	Comm. among drivers - Master set - Transm. data sel. 1		0000-FFFF	0000
PD17	*MD2	Comm. among drivers - Master set - Transm. data sel. 2		0000-FFFF	0000
PD18	*MD3	For manufacturer setting		0000-FFFF	0000
PD19	*MD4	For manufacturer setting		0000-FFFF	0000
PD20	*SLA1	Comm. among drivers - Slave set - Master ax. No. sel. 1		0-32	0

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
Electromagnetic brake interlock	MBR	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 device selection 1

You can assign any output device to the CN3-13 pin.

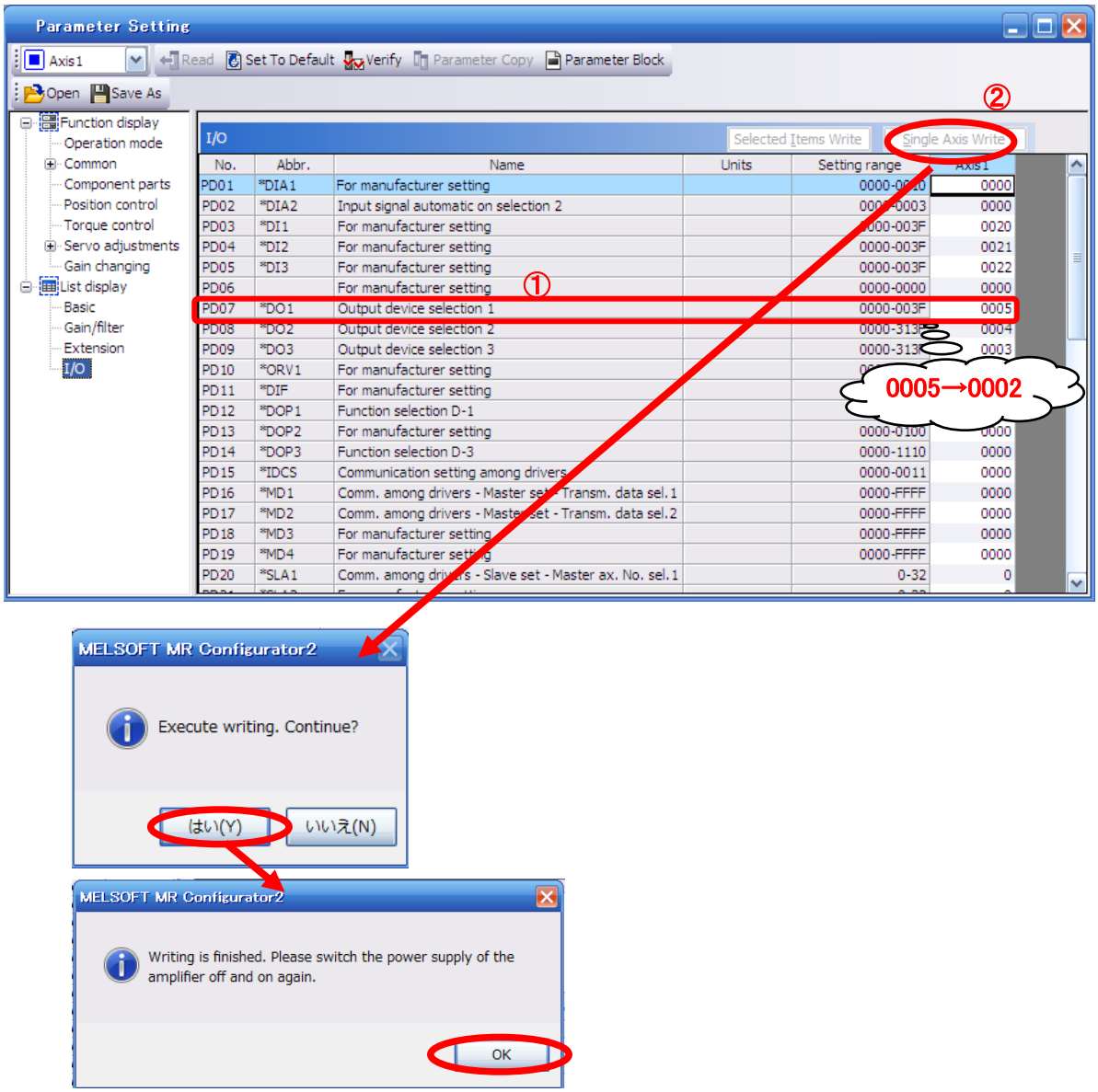
Setting digit	Explanation	Initial value
_ _ x x	Device selection Refer to table 5.8 for settings.	05h →0 2h
_ x _ _	For manufacturer setting	0h
x _ _ _		0h

Table 5.8 Selectable output devices

Setting value	Output device
00	Always off
02	RD (Ready)
03	ALM (Malfunction)
04	INP (In-position)
05	MBR (Electromagnetic brake interlock)
06	DB (Dynamic brake interlock)
07	TLC (Limiting torque)
08	WNG (Warning)
09	BWNG (Battery warning)
0A	SA (Speed reached)
0C	ZSP (Zero speed detection)
0F	CDPS (Variable gain selection)
11	ABSV (Absolute position undetermined)
17	MTTR (During tough drive)

(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 parameters to be enabled.**



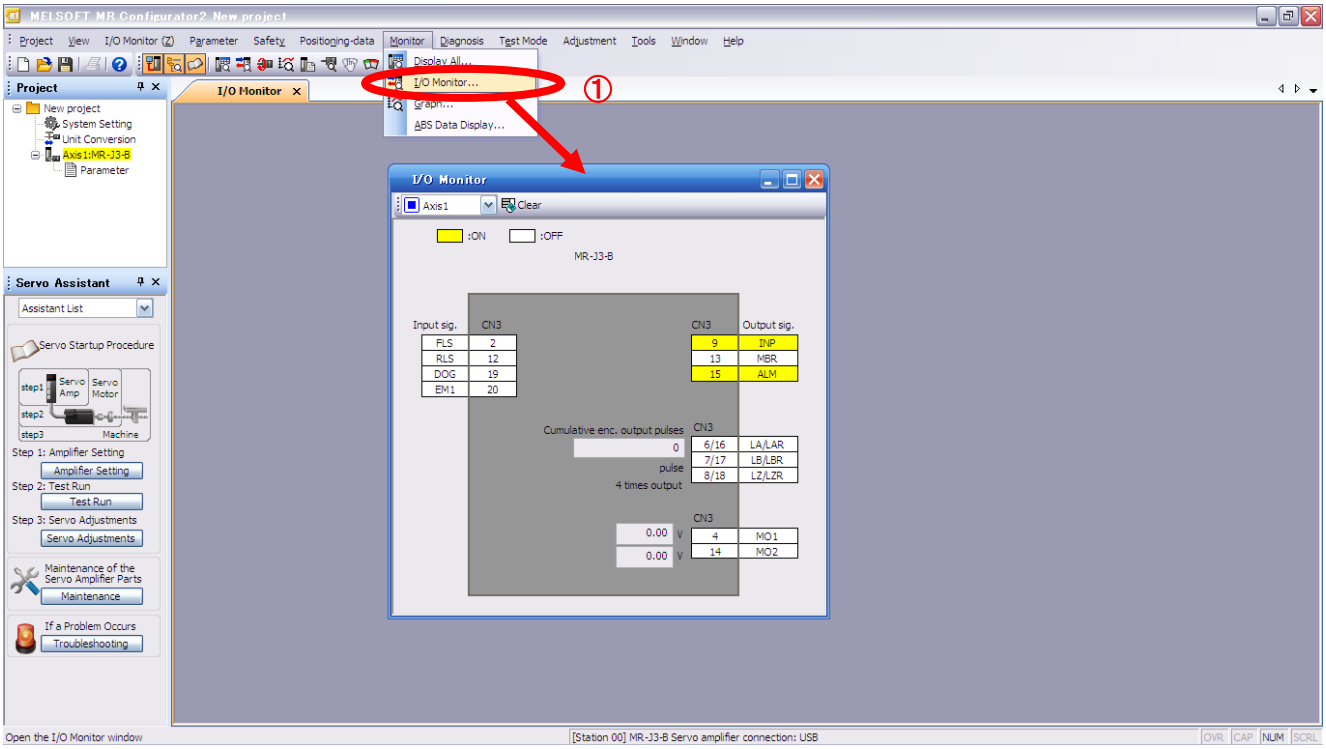
* Please allocate pins CN1-13 separately.

* See “LECSS2-T Operation Manual”,section 5.2.4 for details on allocation of Output signals to pins CN1-9, CN1-13, CN3-15.

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.

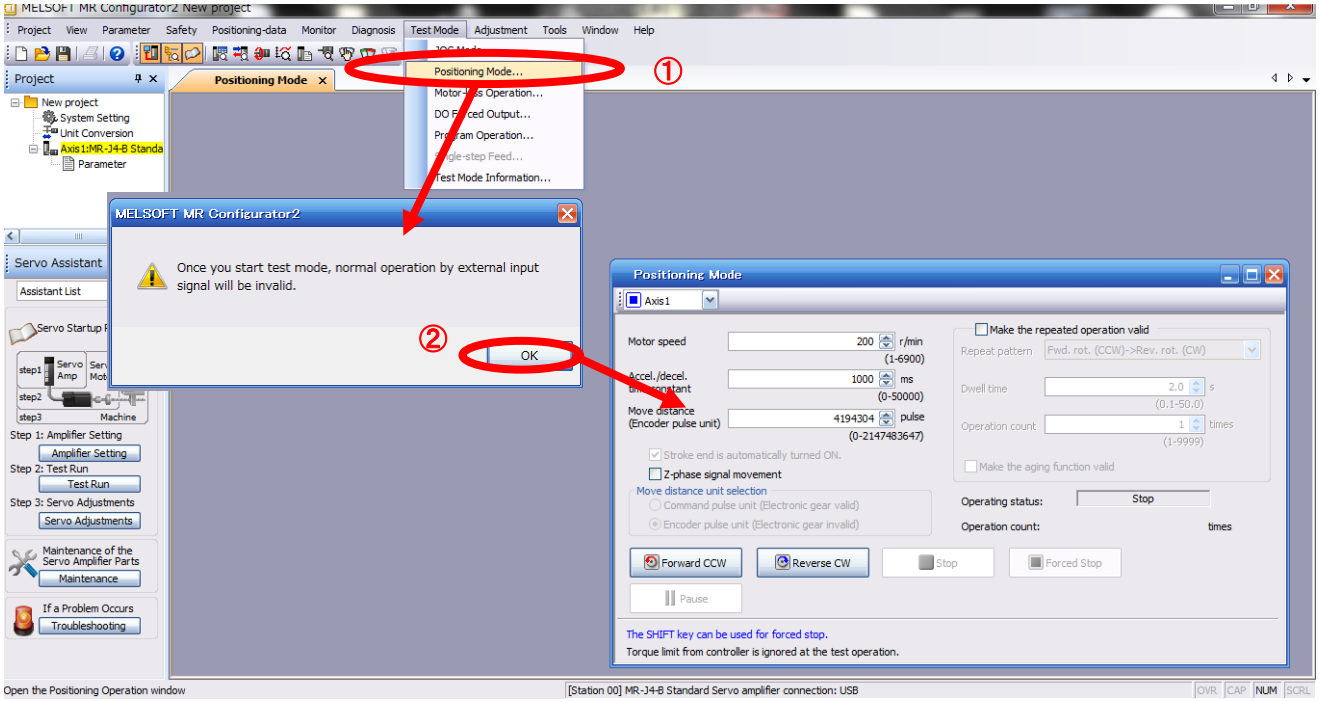


6.6 Positioning Mode in Setup Software

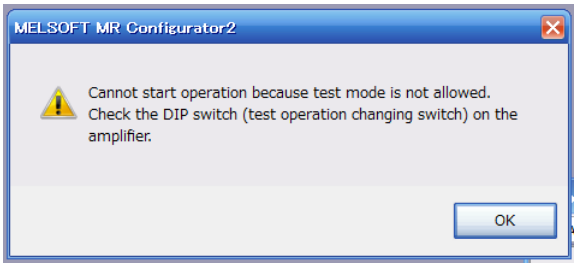
① From the Test Mode menu of the Setup Software select Positioning Mode. Select The Move Distance Unit

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.)

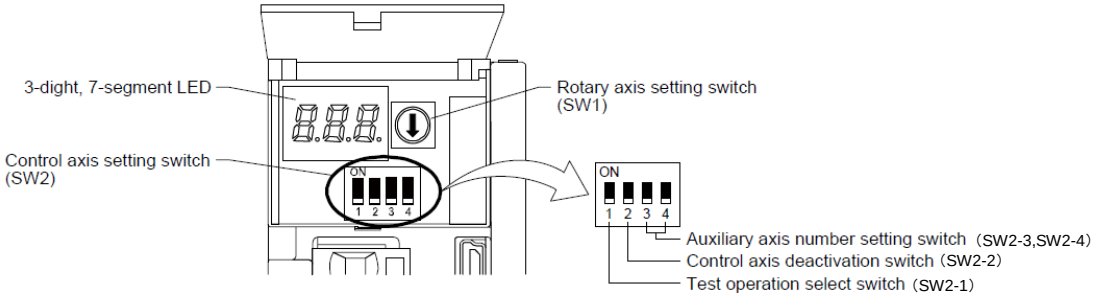
③ The Positioning Mode window opens.



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 power off before turning 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 LECSS2-T Operation Manual (Simplified edition).

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 motor speed, acceleration/deceleration time, movement distance values if required).
See "LECSS2-T Operation Manual (Simplified Edition)",section 6.6.2 for motor speed configuration.
See "LECSS2-T Operation Manual (Simplified Edition)",section 6.6.3 for acceleration/deceleration time configuration.
See "LECSS2-T Operation Manual (Simplified Edition)",section 6.6.4 for movement 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.

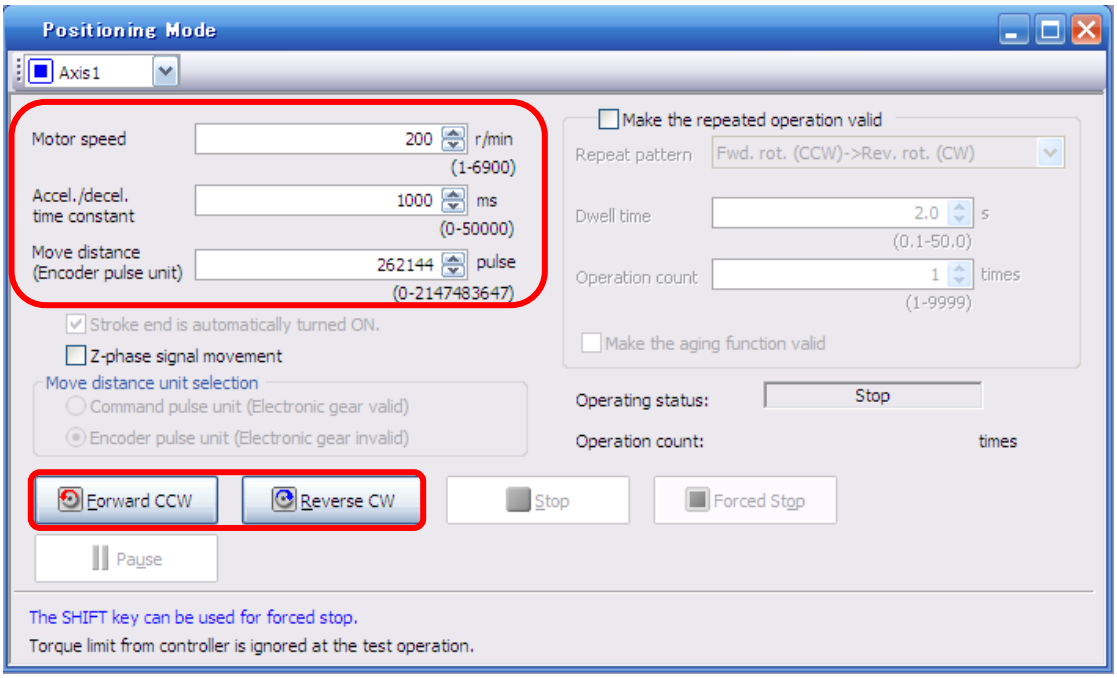
"Actuator's move distance per pulse" is obtained as below:

・actuator's move distance per pulse (mm/pls) ＝ actuator's lead (mm) ※1 / no. of encoder's pulses※2
＝ lead length (mm) / 4194304(pulse)

eg. In case of lead length of 10mm,
actuator's move distance per pulse [mm] ＝ 10(mm) / 4194304(pulse)
≒ 0. 0000024(mm / pulse)

※1 Please refer to section 6.3.4 of LECSS2-T Operation Manual (Simplified edition) for each actuator's lead.
※2 The number of encoder's pulses: 4194304 (pls)

LECSS2-T 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
Motor speed	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>

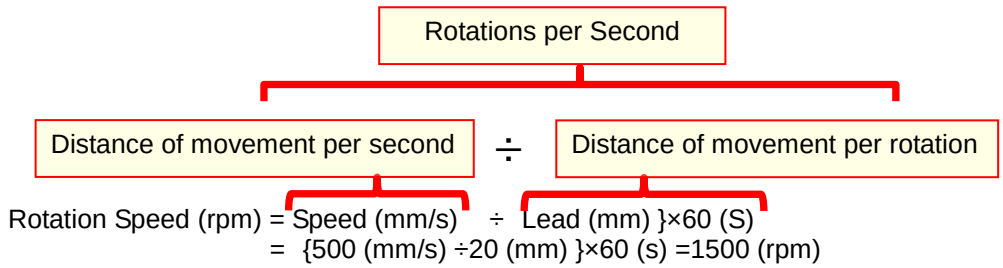
① Motor speed (r/min) configuration.
* r/min (rpm): Indicated motor rotation speed (motor rotations/min)

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.

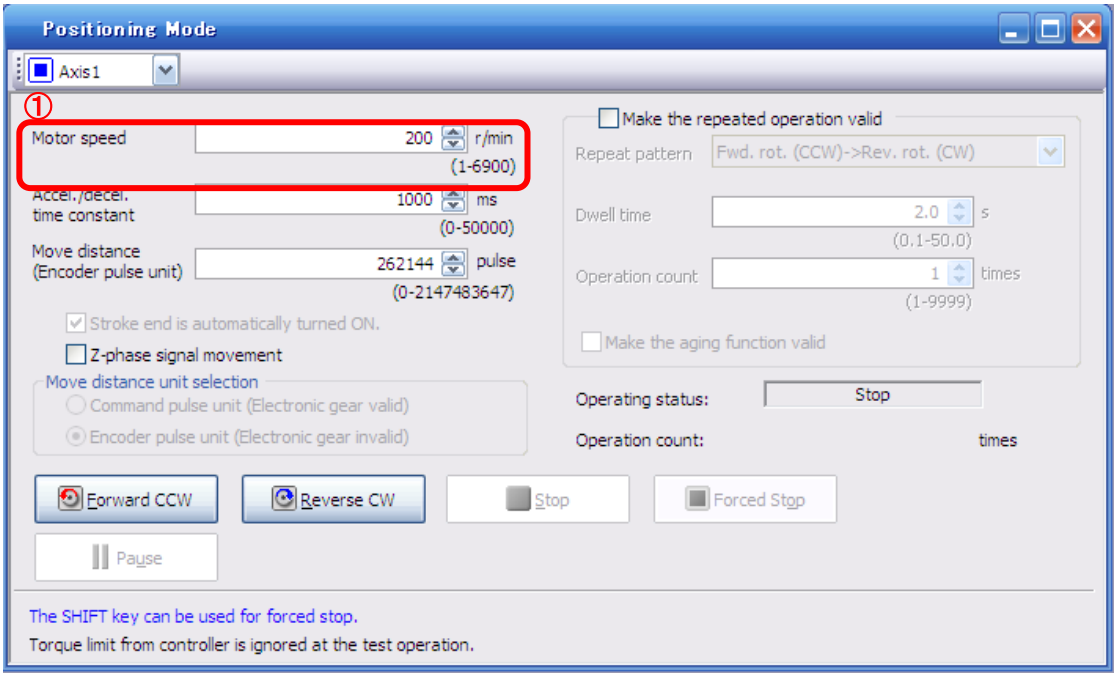
If the rotation speed is too low, this may cause vibration; check the actuator while changing settings.

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.



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



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].

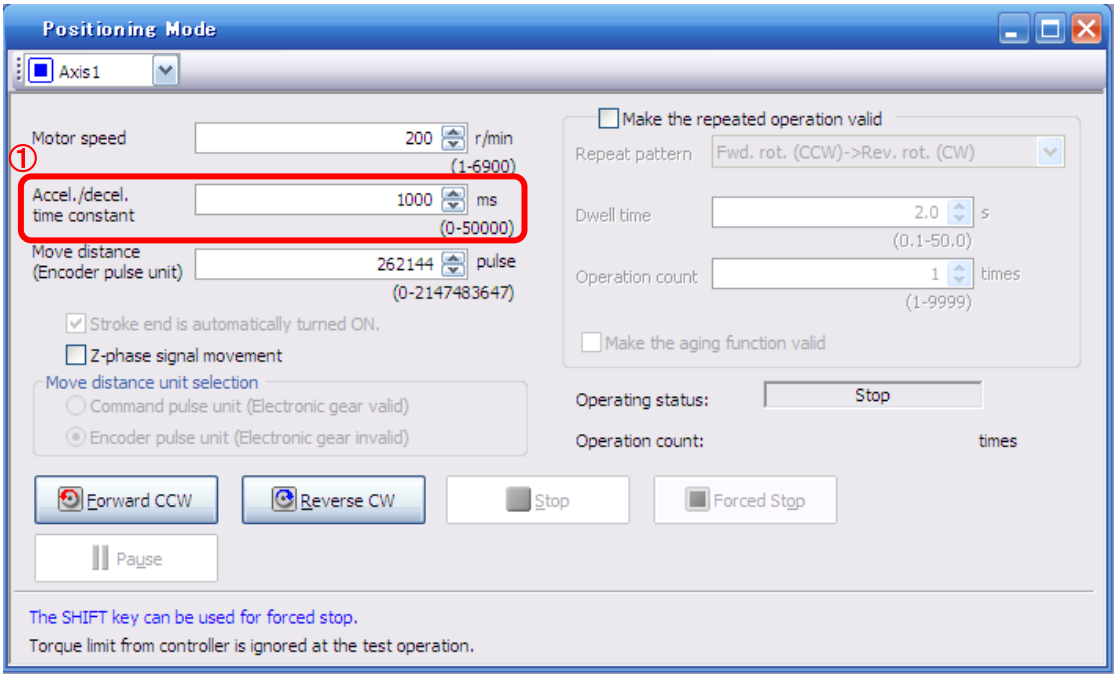
Speed at a rated motor rotation of 3000rpm

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

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

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

$$\fallingdotseq 133 \text{ (ms)}$$



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 move distance per pulse" is obtained as below:

・actuator's move distance per pulse (mm/pls) ＝ actuator's lead (mm) ※1 / no. of encoder's pulses※2
＝ lead length (mm) / 4194304(pulse)

eg. In case of lead length of 10mm,
actuator's move distance per pulse [mm] ＝ 10(mm) / 4194304(pulse)
≒ 0.0000024(mm / pulse)

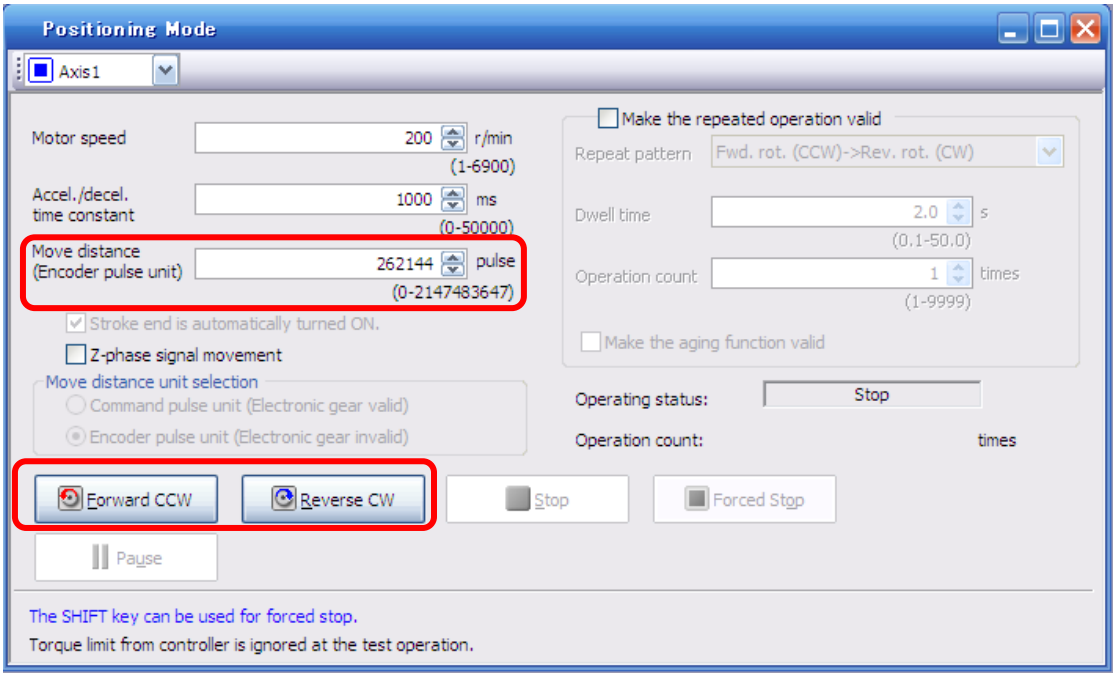
※1 Please refer to section 6.3.4 of LECSS2-T Operation Manual (Simplified edition) for each actuator's lead.
※2 The number of encoder's pulses: 4194304 (pls)

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(mm) / (10(mm) / 4194304(pulse))
≒ 41943040(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 movement distance while checking the driving direction.



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

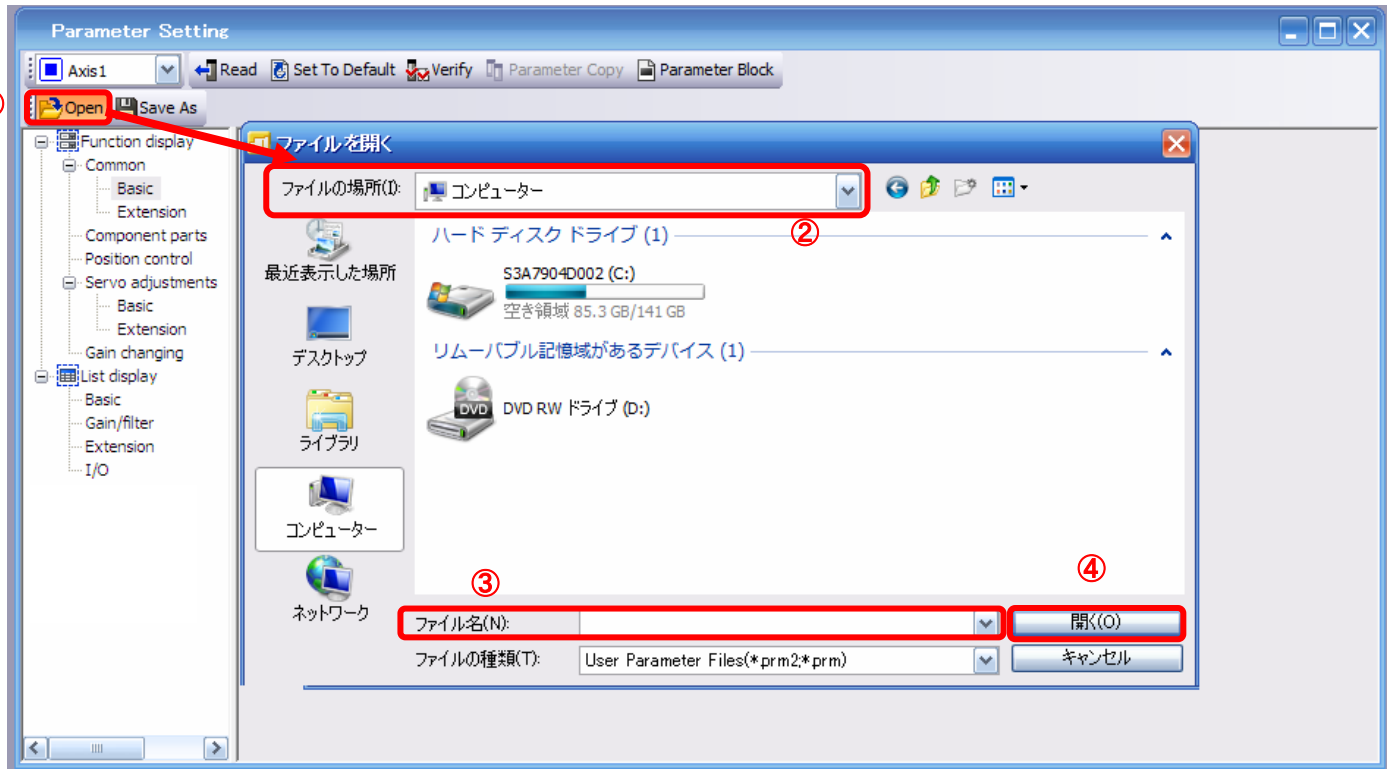
.prm2	Settings files for parameters

* Note Always upload current parameters from the driver to the software before saving.
(See “LECSS2-T Operation Manual (Simplified Edition)”,section 6.3.2 for uploading.)

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.



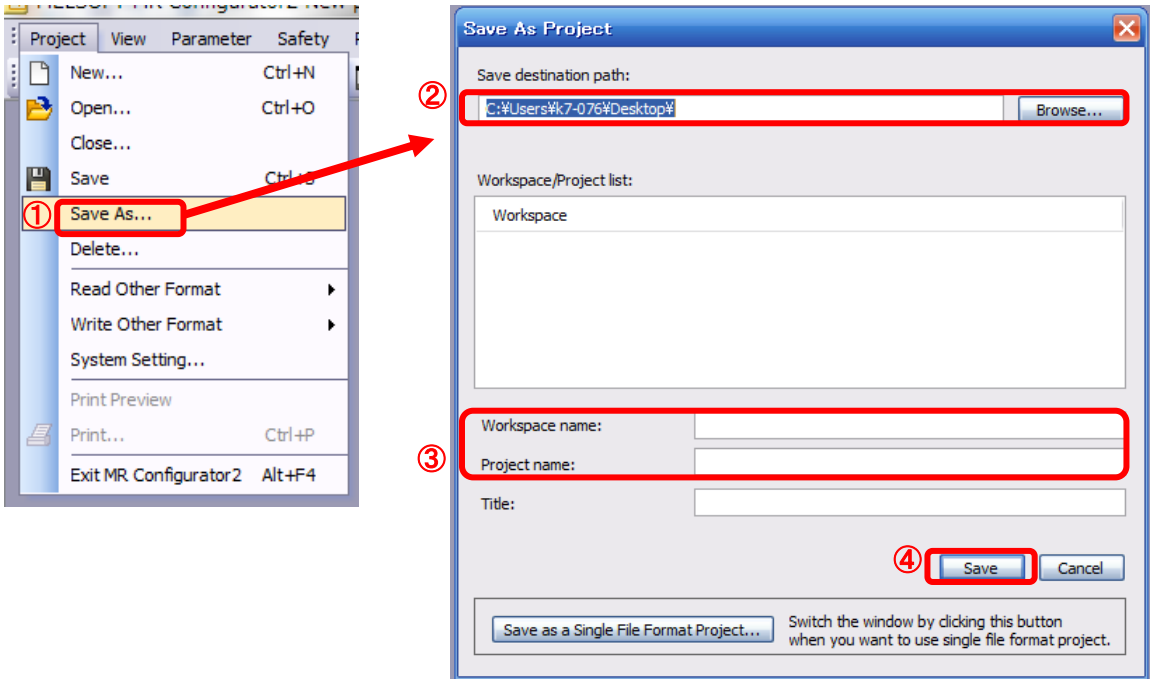
6.8 Saving/Loading Project

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.

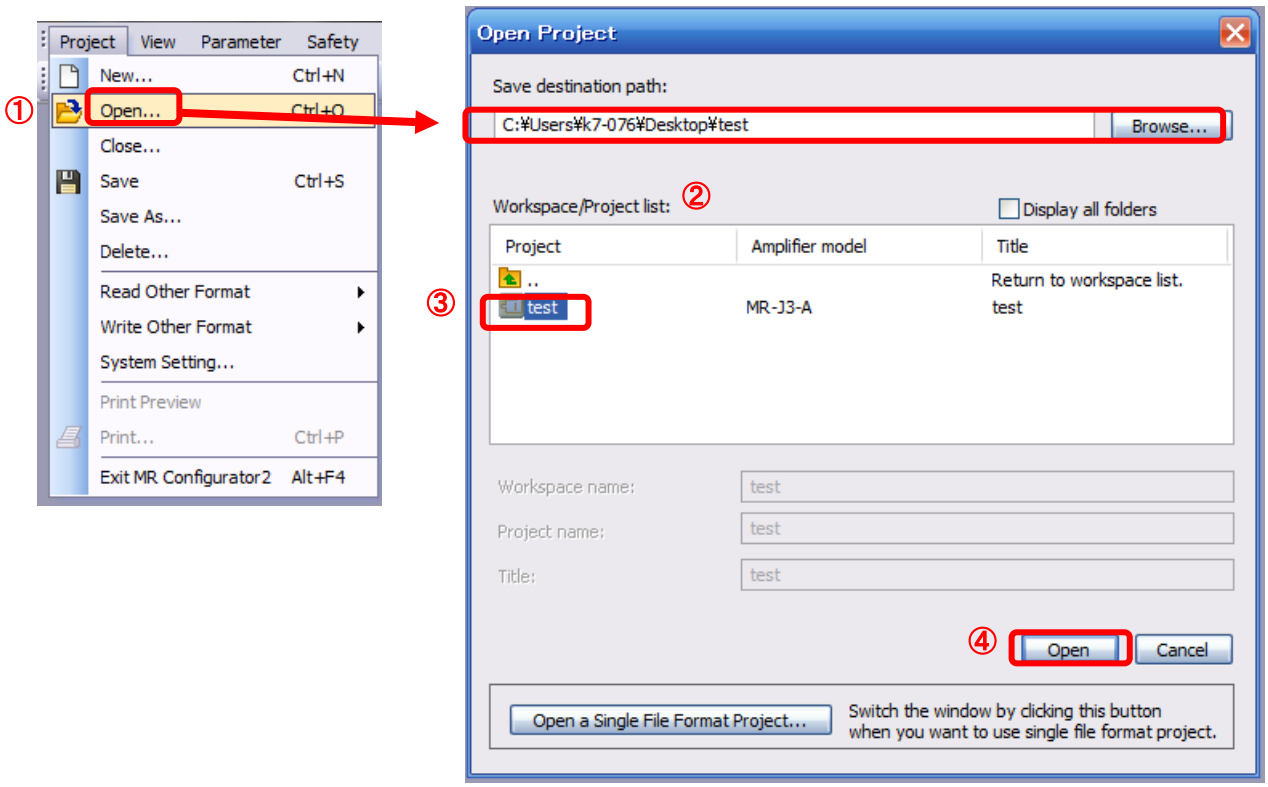
* Note Always upload current parameters from the driver to the software before saving.
(See “LECSS2-T Operation Manual (Simplified Edition)”,section 6.3.2 for uploading.)



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”.

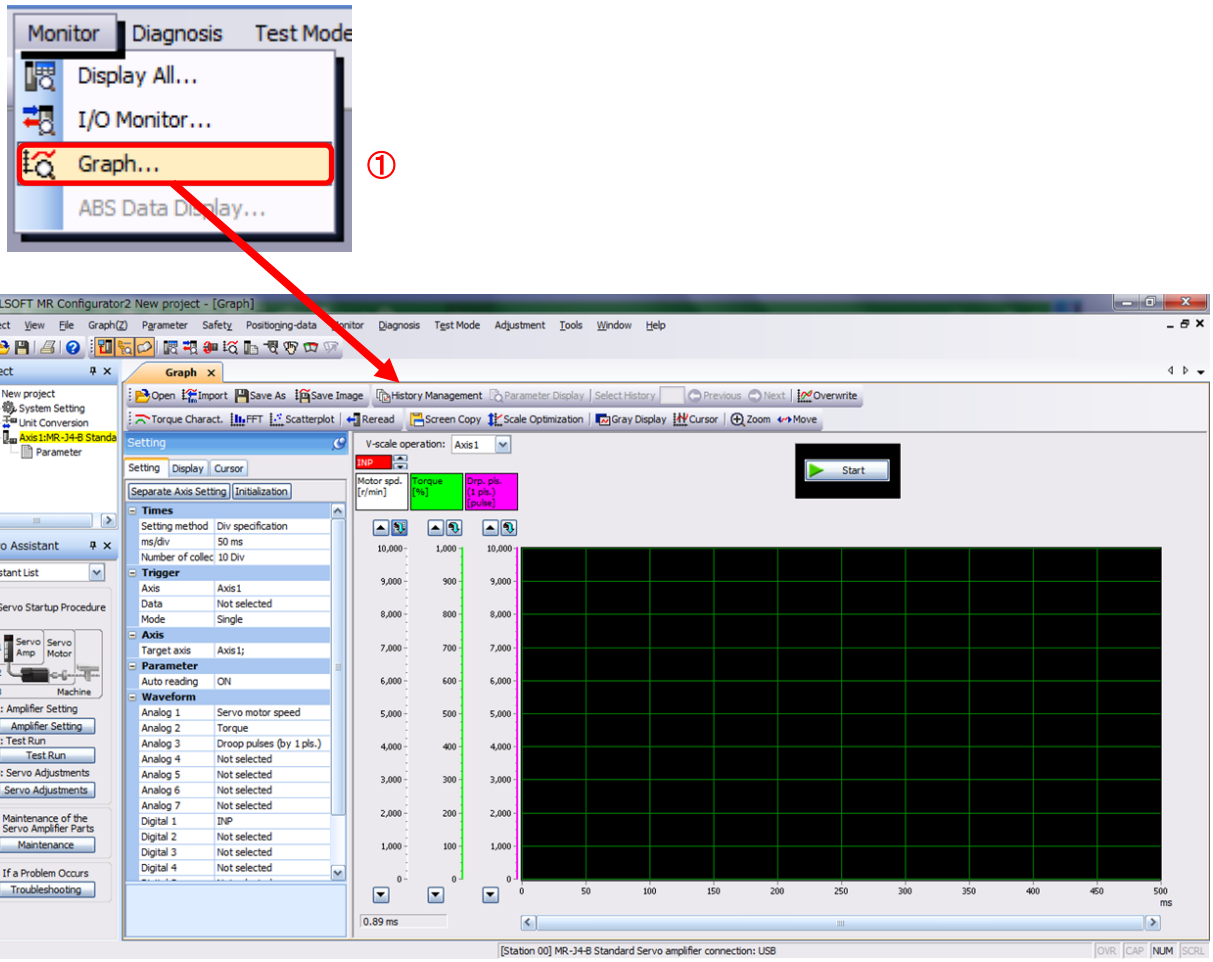
Project will be loaded.



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.

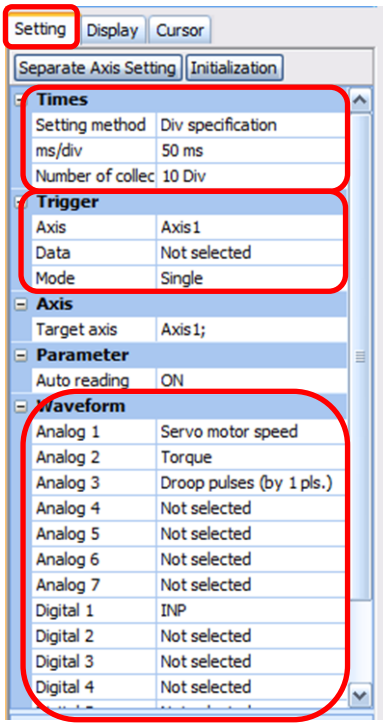


6.9.1 Under the setting Tab: Setting of the items to display the graph

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.

7 types analogue waveform (analogue 1 to 7) and 8 types of digital waveform (digital 1 to 8) can be set.

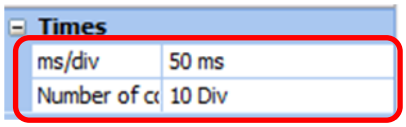


(1) Time

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

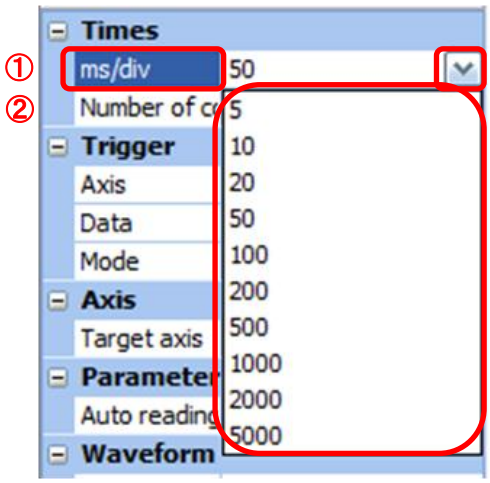
For LECSS2-T, set [ms/div] and [Number of collection Div] to the horizontal axis (time axis).

[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.

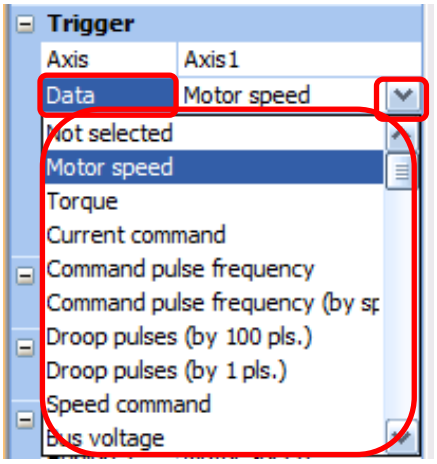
② Click " ▼ " of [Number of collection Div] and set the time.



(2) Trigger

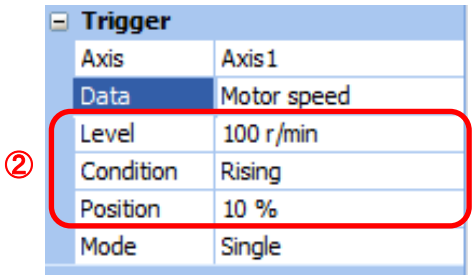
"Trigger" is a condition which decides the display timing of the graph.
If trigger conditions are not satisfied, waveform will not be displayed.

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）

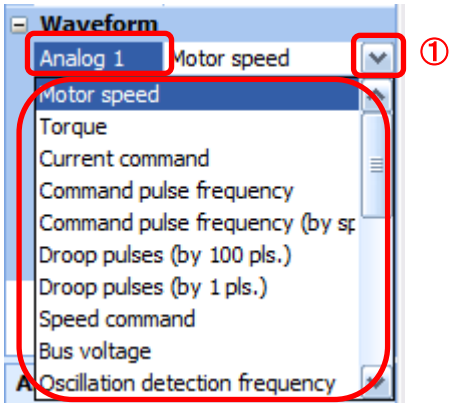
Operating direction	"Level" [r/min]	"Condition"
Positive direction operation	100	Startup
Negative direction operation	-100	Fall

"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 LECSS2-T are shown below.

■Analogue waveform

The name of analog signal with "+" is 32bit extension data.
Note that is occupied by 2ch.
The name of analog signal without "+" will be 16bit data.

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 (by speed)	The command pulse frequency is converted into the motor speed and displayed.	1r/min	
5	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	
6	Speed command	The speed command to be given to the motor is displayed.	1r/min	
7	Bus voltage	The bus voltage of the driver amplifier is displayed.	1V	
8	Effective load ratio	The continuous effective load torque is displayed. The effective value for the last 15 seconds is displayed.	0.1%	
9	Regenerative load ratio	The ratio of regenerative power to permissible regenerative power is displayed in %.	0.1%	
10	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	
11	Load inertia moment ratio	The estimated ratio of the motor axis converted load inertia moment to the motor inertia moment is displayed.	0.01times	
12	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%	

No.	Name	Function	Unit	Note
13	Overload alarm margin	The margin until the load reaches the overload (AL50, AL51) alarm level is displayed in %. An overload alarm will occur when margin is 0%.	0.1%	
14	Settling time	The settling time for position control is displayed. The method for measuring the settling time can be selected from the graph selection window.	1ms	
15	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 graph selection window.	1pulse	
16	Motor speed (by 0.1 r/min)	The motor speed is displayed.	0.1r/min	
17	Command pulse frequency (0.1 r/min by speed)	The command pulse frequency is converted into the motor speed unit and displayed.	0.1r/min	
18	Speed command (by 0.1 r/min)	The speed command to be given to the motor is displayed.	0.1r/min	
19	Torque command	The torque command at torque control or torque target value at stopper control is displayed. Turn to "0" in the position control and speed control.	0.1%	
20	Speed limit value (by 1 r/min)	The speed limit value at the torque control or stopper control is displayed. Turn to "0" in the position control and speed control.	1r/min	
21	Speed limit value (by 0.1 r/min)	The speed limit value at the torque control or stopper control is displayed. Turn to "0" in the position control and speed control.	0.1r/min	
22	Encoder inside temperature	The detected internal temperature by the encoder is displayed.	1°C	
23	Motor thermistor temperature	When the linear motor within thermistor is used, thermistor temperature is displayed. However, "9999" will be displayed when connect to motor without the motor thermistor. Or when the thermistor is disconnected, the displayed values will be variable. At this time, AL46.3 (Thermistor disconnected) occurs.	1°C	
24	Load side encoder information 1	Within one-revolution position of load side encoder is displayed.	16pulse	(Note 1)
25	Load side encoder information 2	The multi-revolution counter of the load side encoder is displayed.	1rev	(Note 1)
26	Motor speed+	The motor speed is displayed.	0.1r/min	
27	Command pulse frequency+	The command pulse frequency is displayed.	1.125 kpulse/s	
28	Command pulse frequency (by speed)+	The command pulse frequency is converted into the motor speed and displayed.	0.1r/min	
29	Droop pulses+	The droop pulse on the deviation counter is displayed in units of a pulse. Pulses greater than 32768 can be measured.	1pulse	
30	Speed command+	The speed command to be given to the motor is displayed.	0.1r/min	
31	Within one-revolution position+	The within one-revolution position is displayed in encoder pulse unit.	1pulse	

No.	Name	Function	Unit	Note
32	Load side encoder information 1+	Within one-revolution position of load side encoder is displayed.	1pulse	(Note 1)
33	Load side encoder information 2+	The multi-revolution counter of the load side encoder is displayed.	1pulse	(Note 1)
34	Command position+	Display the command position from controller.	1pulse	
35	Position F/B+	Current position of the motor is displayed.	1pulse	
36	Excessive error alarm margin+	The margin until the error reaches the excessive error alarm level is displayed in encoder pulses. An excessive error alarm will occur when margin is 0 pulse.	1pulse	

■Digital waveforms

CSON, PC, RES, CSV1, CSV2, CTL1, CTL2, EMG, EM2/1, CRDY, CDP, CLD, CABS, CZCT, CRSTP, CSV3, D1, D2, D3, D4 (Note 2)

RD, SA, ZSP, TLC, VLC, INP, WNG, ALM, OP, MBR, DB, BWNG, ALM2, RDY, STO, SMPD, CDPS, CLDS, ABSV, IPF, SPC, MTTR, SSV1, SSV2, STL1, STL2, ZPASS, SABS, SABSE, FLS, RLS, DOG, SSV3

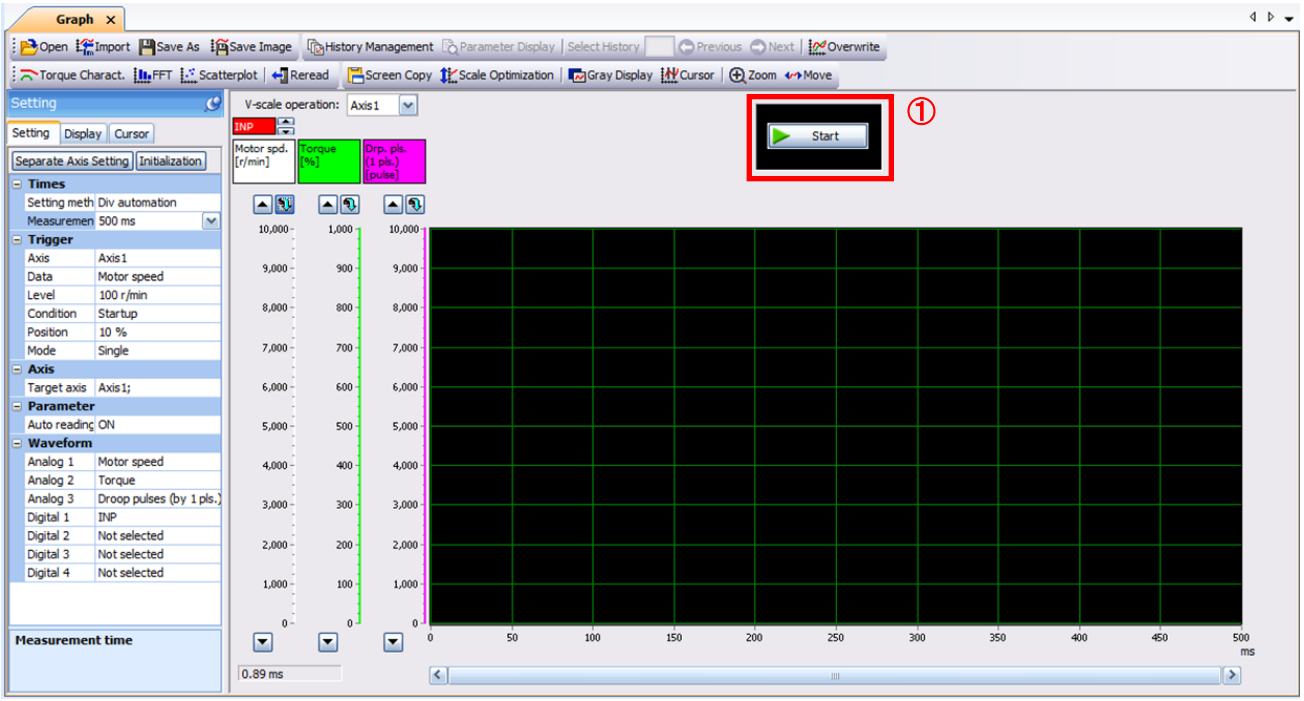
(Note 1) It is supported by the driver whose software versions are A3 or later.
(Note 2) D1, D2, D3 and D4 are for the manufacturer setting.

See “LECSS2-T Operation Manual”, section 3.5 for details of each digital waveform.

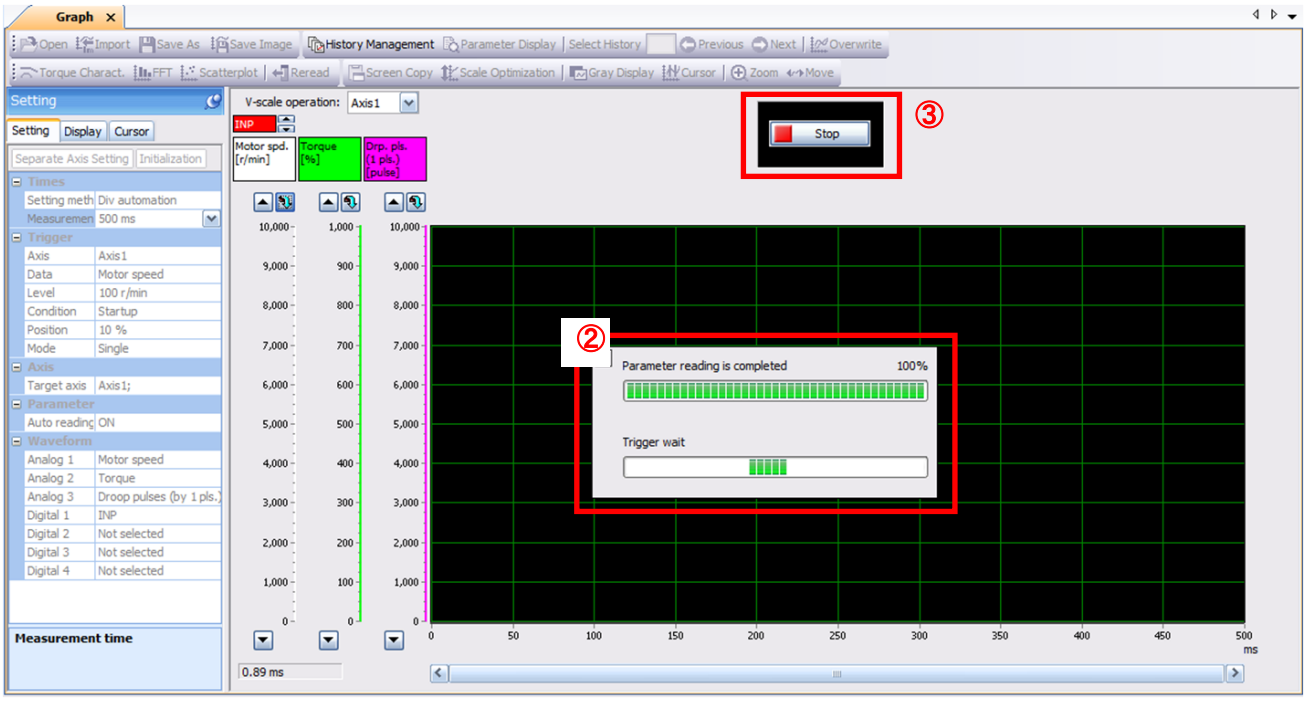
6.9.2 Trigger wait

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.

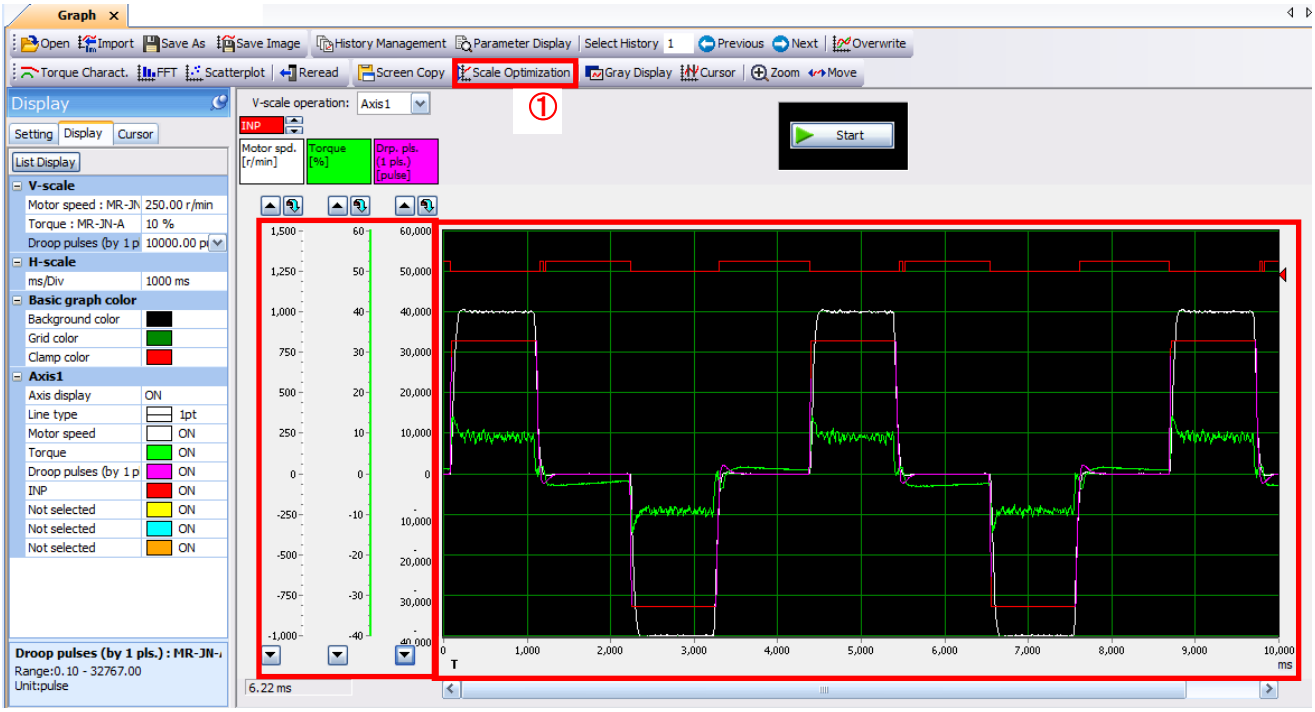


6.9.3 Operation Instruction

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.



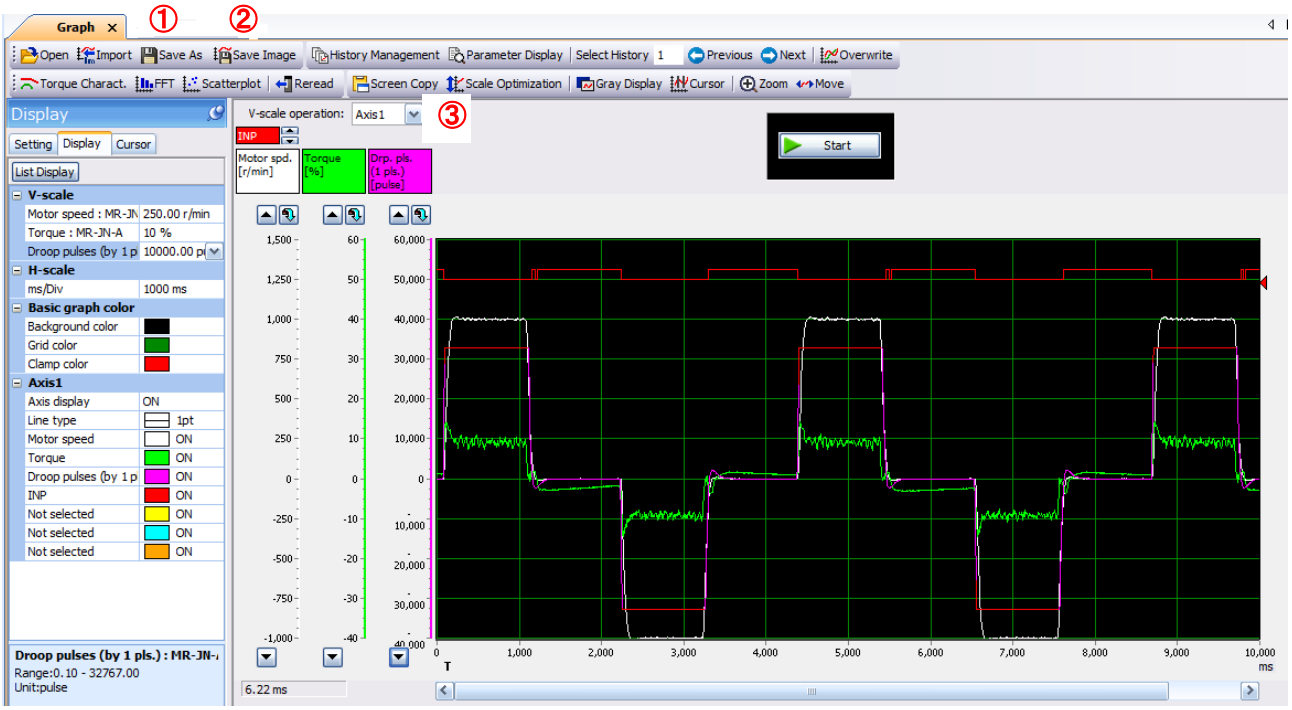
6.9.4 Saving of waveform

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.

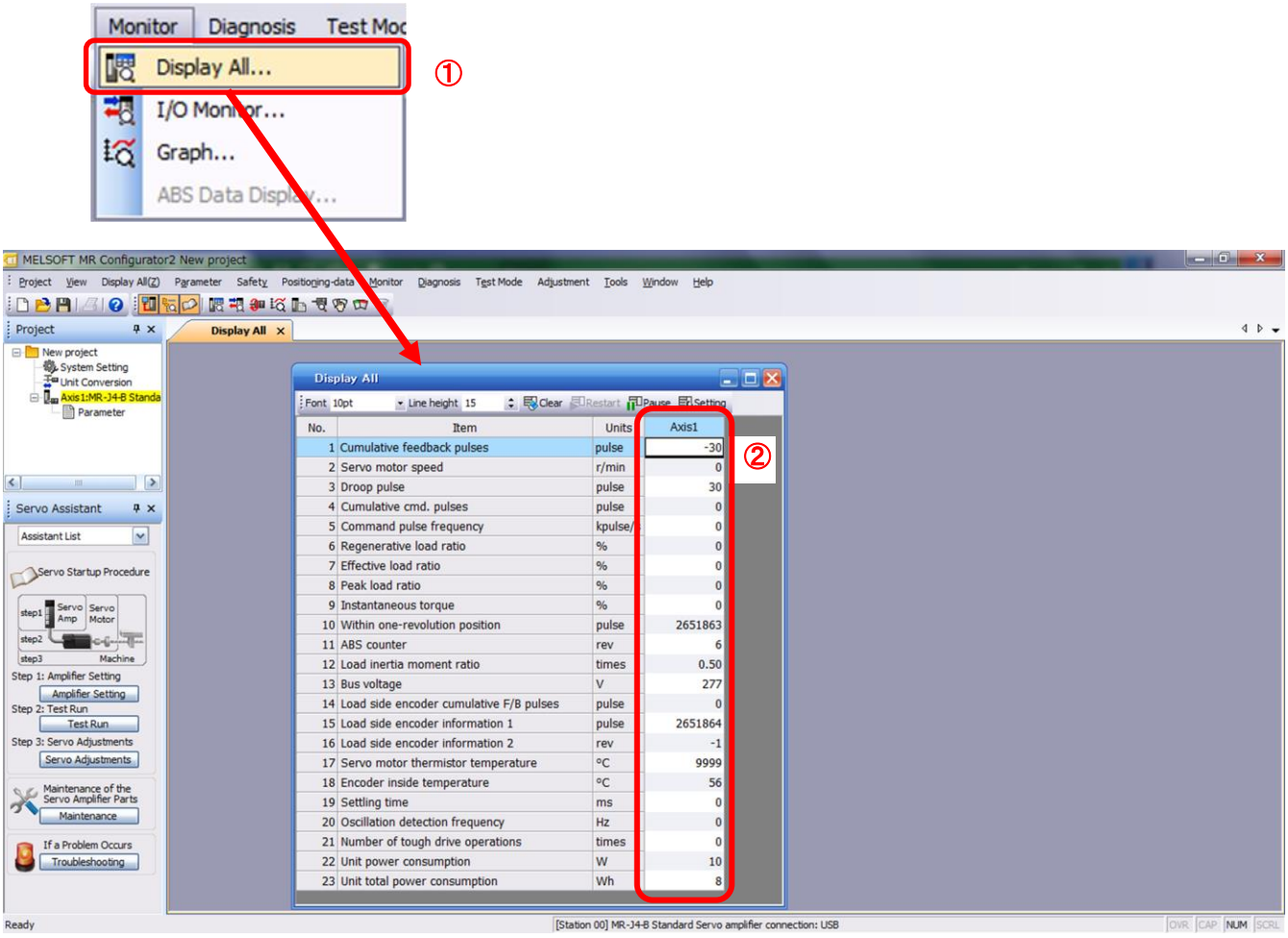
③ Click the “Screen Copy” button.
Save the displayed waveform screen (print screen).



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 LECSS2-T.

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. Reverse rotation is indicated by a minus (-) sign.	-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 to 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 to 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 option. The guideline is 80% or less.	0 to 100	%
7	Effective load ratio	The continuous effective load torque is displayed. The effective value is displayed relative to the rated torque of 100%.	0 to 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 to 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 to 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 to 4194303	pulse
11	ABS counter	The travel distance from the home position (0) is displayed as multi-revolution counter value of the absolution position encoder in the absolution position detection system.	-32768 to 32767	rev
12	Load inertia moment ratio	The estimated ratio of the motor axis converted inertia moment to the motor inertia moment is displayed.	0.00 to 300.00	times
13	Bus voltage	The voltage (across P-N) of the main circuit converter is displayed.	0 to 900	V
14	Motor thermistor temperature	There is no thermistor to the corresponding motor. Display will be "9999" fixed.	9999	-
15	Encoder inside temperature	The detected internal temperature is displayed by the encoder.	-20 to 120	°C
16	Settling time	The settling time are displayed.	0 to 32767	ms
17	Oscillation detection frequency	The frequency at oscillation detection is displayed.	100 to 4500	Hz
18	Number of tough drive operations	The times moving to the tough drive is displayed.	0 to 65535	times
19	Unit power consumption	The unit power consumption is displayed.	-2147483648 to 2147483647	W
20	Unit total power consumption	The unit total power consumption is displayed.	-2147483648 to 2147483647	Wh

7. Parameter setting (PLC side)

The setting of PLC parameters in this operation manual is based on the MITSUBISHI ELECTRIC QD77MS simple motion module.
Parameter setting for the PLC side cannot be set at driver side.
Refer to the operation manual for the positioning units or motion controllers used.

7.1 SSCNET Setting

Pr.97 SSCNET setting

Set the servo network. (Only the value specified against the axis 1 is valid.)
0 :SSCNETⅢ （LECSS□-S□）
1 :SSCNETⅢ/H（LECSS2-T□）

The connectable driver differs by this parameter. When an incorrect driver is set in "[Pr.100] Servo series", the error "SSCNET setting error" (error code:1003) occurs, and communication with the driver is not executed.
The following shows about this parameter and connectable driver (setting value of "[Pr.100] Servo serise").

Setting value of "[Pr.97] SSCNET setting"	Driver	Setting value of "[Pr.100] Servo series"
0 :SSCNETⅢ	LECSS□-S□	1:MR-J3-□B
1 :SSCNETⅢ/H	LECSS2-T□	32:MR-J4-□B

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	
				QD77MS2, QD77MS4	QD77MS16
Pr.100 Servo serise	Used to select the servo driver series which is connected to the QD77MS. **POINT** Be sure to set up the servo driver. Communication with the servo driver is not started by the initial value "0" in default value. (The LED indication of servo driver indicates "Ab") The connectable driver differs by the setting of "[Pr.97] SSCNET" setting.	0 : Servo driver is not set 1 : MR-J3-□B (LECSS□-S□) 32:MR-J4-□B (LECSS2-T□)	0	30100＋200n	28400＋100n

n:Axis No.− 1

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. QD77MS2, QD77MS4, QD77MS16
Pr.1 Unit setting		0:mm 1:inch 2:degree 3:PLS	3	0＋150n
Movement amount per pulse	Pr.2 Pulse number per rotation(AP) (Unit: PLS)	1 to 200000000 (Note 1)	20000	2＋150n 3＋150n
	Pr.3 Moving amount per rotation (AL)	The setting value range differs according to the "Pr.1 Unit setting".	20000	4＋150n 5＋150n
	Pr.4 Unit magnification (AM)	1:1 times 10:10 times 100:100 times 1000:1000 times	1	1＋150n

(Note 1) LECSS2-T sets [4194304]
(Note 2) Axis No.-1

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 QD77MS performs positioning control.
The settings are made using Pr.2 to Pr.4
The electronic gear is expressed by the following equation.

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

- 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 LECSS2-T, set the value given as the "resolution per servomotor rotation" in the speed/position detector specifications.

Number of pulses per rotation (AP) = Resolution per servomotor rotation (Note 1)

(Note 1) LECSS2-T sets [4194304]

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)” so that it does not exceed this maximum value.

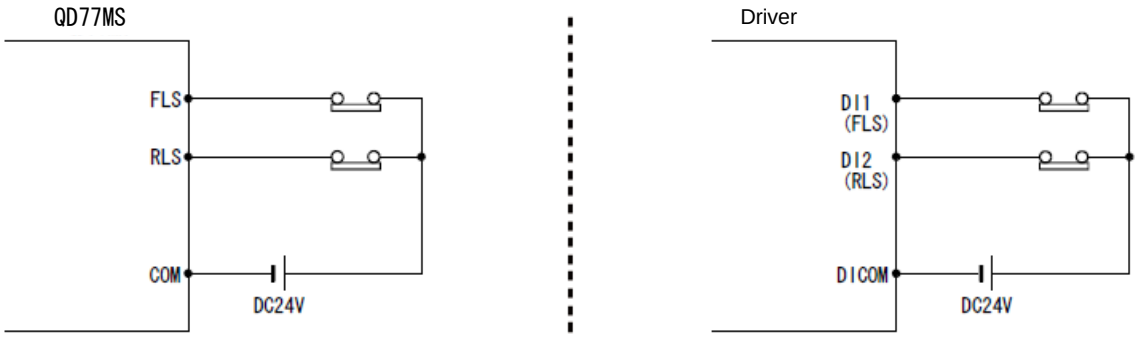
Movement amount per rotation (AL) = PB×1/n
= Movement amount per rotation (AL) × Unit magnification (AM)

7.3 Stroke limit

Wiring for 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, QD77MS/ 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	
				QD77MS2, QD77MS4	QD77MS16
Interface signal	PLC READY signal	ON	PLC CPU preparation	Y0	
	QD77MS READY signal	ON	QD77MS preparation	X0	
	All axis servo ON	ON	All axis servo ON	Y1	
	Synchronization flag(Note1)	ON	QD77MS buffer memory Accessible	X1	
	Axis stop signal	OFF	Axis stop signal is OFF	Y4～Y7	[Cd.180] Axis stop
	M code ON signal	OFF	M code ON signal is OFF	X4～X7	[Md.31] Status:b12
	Error detection signal	OFF	There is no error	X8～XB	[Md.31] Status:b13
	BUSY signal	OFF	BUSY signal OFF	XC～XF	X10～X1F
	Start complete signal	OFF	Start complete signal is OFF	X10～X13	[Md.31] Status:b14
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 turnrd ON when calculation is performed by the PLC CPU.

Refer to the operation manual for used equipment.

8. Home position return (PLC)

Home position return in this operation manual is based on the MITSUBISHI ELECTRIC QD75MH simple motion module,.

- The original position return parameter cannot be set at driver side. Refer to the operation manual for the positioning units or motion controllers 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. (Note1) QD77MS2, QD77MS4, QD77MS16
Pr.43 OPR method	0:Near-point dog method 4:Count method 1) 5:Count method 2) 6:Data set method 7:Scale origin signal detection method	0	70＋150n
Pr.44 OPR direction	0:Positive direction (address increase direction) 1:Negative direction (address increase direction)	0	71＋150n
Pr.45 OP address	The setting value range differs according to the "Pr.1 Unit setting".	0	72＋150n 73＋150n
Pr.46 OPR speed		1	74＋150n 75＋150n
Pr.47 Creep speed		1	76＋150n 77＋150n
Pr.48 OPR retry	0:Do not retry OPR with limit switch 1:Retry OPR with limit switch	0	78＋150n
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＋150n 81＋150n
Pr.51 OPR acceleration time selection	0:Pr.9 Acceleration time 0 1:Pr.25 Acceleration time 1 2:Pr.26 Acceleration time 2 3:Pr.27 Acceleration time 3	0	82＋150n
Pr.52 OPR deceleration time selection	0:Pr.10 Deceleration time 0 1:Pr.28 Deceleration time 1 2:Pr.29 Deceleration time 2 3:Pr.30 Deceleration time 3	0	83＋150n
Pr.53 OP shift amount	The setting value range differs according to the "Pr.1 Unit setting".	0	84＋150n 85＋150n
Pr.54 OPR torque limit value	1 to 1000（%）	300	86＋150n
Pr.55 Operation setting for incompletion of OPR	0: Positioning control is not executed. 1: Positioning control is executed.	0	87＋150n
Pr.56 Speed designation during OP shift	0: OPR speed 1: Creep speed	0	88＋150n
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＋150n

(Note 1) Axis No.-1

The methods for origin position return compatiable with the MITSUBISHI ELECTRIC QD77MS (Simple Motion Module) 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 original position.
Count method (1)	The deceleration starts by the OFF --> ON of the near-point dog and the 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)	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.
Scale origin signal detection method	The machine moves in the opposite direction against of Pr.44 “OPR direction” at the Pr.46 “OPR speed” by the OFF → ON of the near-point dog, and a deceleration stop is carried out once at the first zero signal. Later the operation moves in direction of Pr.44 “OPR direction” at the Pr.47”Creep speed”, and then stops at the detected nearest zero point to complete the machine OPR.

9. Positioning operation (PLC)

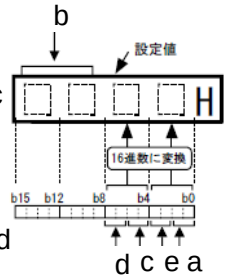
Positioning in this operation manual is based on the MITSUBISHI ELECTRIC QD75MH simple motion module.

- The positioning parameters cannot be set at driver side. Refer to the operation manual for 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 (Note2)	
					QD77MS2 QD77MS4	QD77MS16
Positioning identifier	Da.1 Operation pattern	00: Positioning complete 01: Continuous positioning control 11:Continuous path control	a	0000H	2000+ 6000n	6000+ 1000n
	Da.2 Control system	(Note 1)	b			
	Da.3 Acceleration time No.	0:Pr.9 Acceleration time 0 1:Pr.25 Acceleration time 1 2:Pr.26 Acceleration time 2 3:Pr.27 Acceleration time 3	c			
	Da.4 Deceleration time No.	0:Pr.10 Deceleration time 0 1:Pr.28 Deceleration time 1 2:Pr.29 Deceleration time 2 3:Pr.30 Deceleration time 3	d			
	Da.5 Axis to be interpolated	0: Axis 1 1: Axis 2 2: Axis 3 3: Axis 4	e			
	Da.6 Position address/ movement amount	The setting value range differs according to the "Da.2 Control system".		0	2006+ 6000n 2007+ 6000n	6006+ 1000n 6007+ 1000n
	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+ 6000n 2005+ 6000n	6004+ 1000n 6005+ 1000n
Pr.9 Acceleration time 0		1～8388608(ms)		1000	12+150n 13+150n	
Pr.10 Deceleration time 0		1～8388608(ms)		1000	14+150n 15+150n	

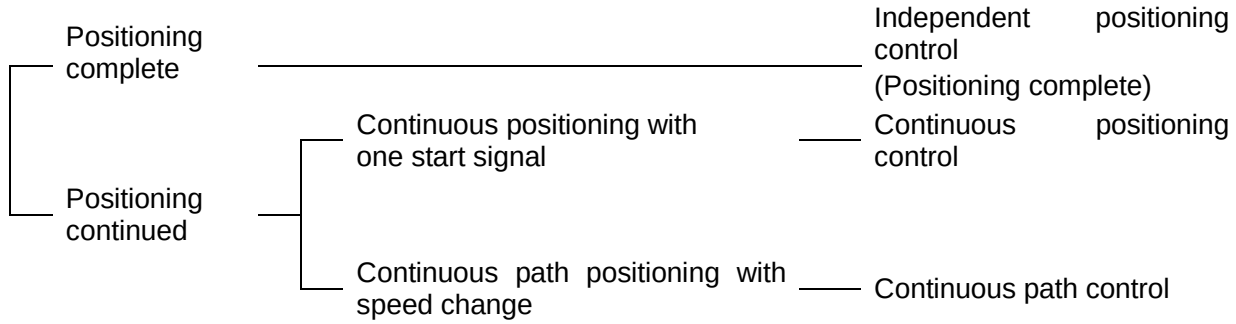


(Note 1) Refer to the operation manual for used equipment for details.
(Note 2) Axis No.-1

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]



1) Positioning complete
   Set to execute positioning to the designated address, and then complete positioning.
2) 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.
3) 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 from the other cases.
・In cases you selectd "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"

Da.5 Axis to be interpolated (QD77MS2, QD77MS4)

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)

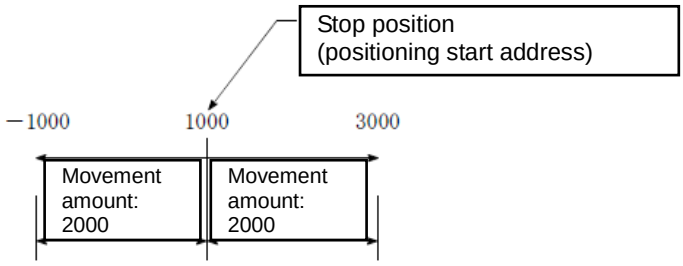
(Note) ・Do not specify its own axis number or any number except the above.
If you do, the "Illegal interpolation description command error" will occur during the program execution (error code: 521).
・No setting is needed for 3 or 4-axis interpolation.]

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 for 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 for continuing positioning data, and the speed is changed, the following speed will also change.

Note that when starting positioning, if "-1" speed is set 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 for used equipment for details on the errors.

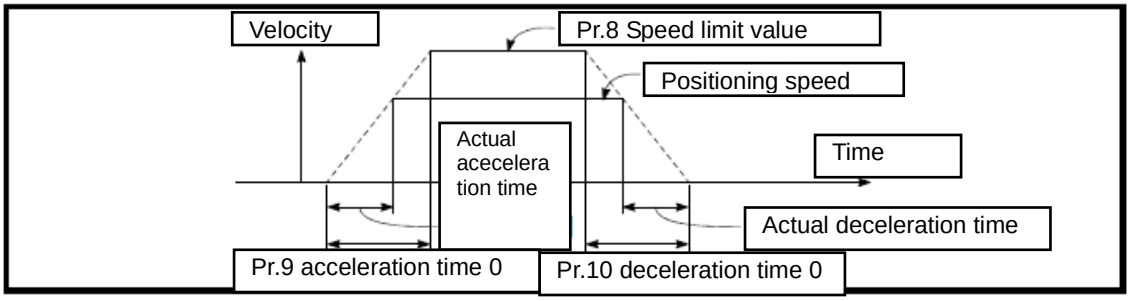
Pr.1 Setting value	Set value set by PLC program (Unit)
0:mm	1 to 2000000000(x10^{-2}mm/min)
1:inch	1 to 2000000000(x10^{-3}inch/min)
2:degree	1 to 2000000000(x10^{-3}degree/min) (Note 1)
3:PLS	1 to 50000000(PLS/s)

(Note 1) The command speed range by setting Pr.83 “Speed control 10 x multiplier setting for degree axis" to valid: 1 to 2000000000(x10^{-2}degree/min).

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" (or to “Pr.31 JOG speed limit value” in case of JOG operation control).

Pr.10 “Acceleration speed 0" specifies the time for the speed to decrease from the Pr.8 “speed limit value" to zero (or to“Pr.31 JOG speed limit value” in case of JOG operation control).

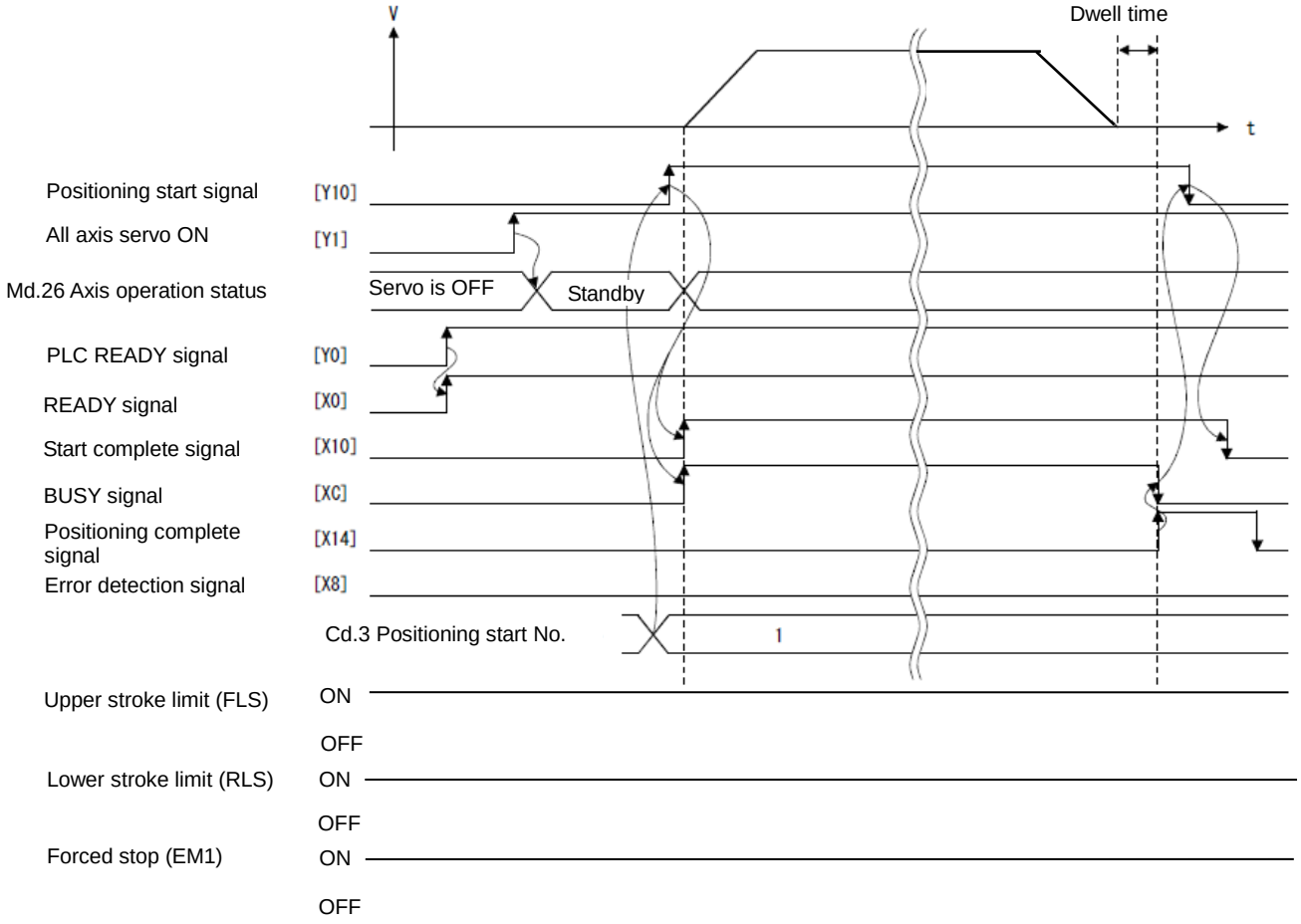


1) If the positioning speed is set lower than the parameter-defined speed limit value, the actual acceleration/deceleration time will be relatively short. Thus, set the maximum positioning speed equal to or only a little lower than the parameter-defined speed limit value.
2) These settings are valid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

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

When a fault occurs during operation, the corresponding alarm or warning is displayed. If any alarm or warning has occurred, refer to “LECSS2-T Operation Manual”,section 8.3 or 8.4 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.

For the alarms and warnings in which "SD" is written in the stop method column, the axis stops with the dynamic brake after forced stop deceleration. For the alarms and warnings in which "DB" or "EDB" is written in the stop method column, the axis stops with the dynamic brake without forced stop deceleration.

	No.	Name	Detail display	Detail name	Stop Method (Note3, 4)	Alarm reset		
						Error reset	CPU reset	Power off → on
Alarm	10	Undervoltage	10.1	Voltage drop in the control circuit power	EDB	○	○	○
			10.2	Voltage drop in the main circuit power	SD	○	○	○
	12	Memory error 1 (RAM)	12.1	RAM error 1	DB			○
			12.2	RAM error 2	DB			○
			12.3	RAM error 3	DB			○
			12.4	RAM error 4	DB			○
			12.5	RAM error 5	DB			○
	13	Clock error	13.1	Clock error 1	DB			○
			13.2	Clock error 2	DB			○
	14	Control process error	14.1	Control process error 1	DB			○
			14.2	Control process error 2	DB			○
			14.3	Control process error 3	DB			○
			14.4	Control process error 4	DB			○
			14.5	Control process error 5	DB			○
			14.6	Control process error 6	DB			○
			14.7	Control process error 7	DB			○
			14.8	Control process error 8	DB			○
			14.9	Control process error 9	DB			○
			14.A	Control process error 10	DB			○
	15	Memory error 2 (EEP-ROM)	15.1	EEP-ROM error at power on	DB			○
			15.2	EEP-ROM error during operation	DB			○
	16	Encoder initial communication error 1	16.1	Encoder initial communication - Receive data error 1	DB			○
			16.2	Encoder initial communication - Receive data error 2	DB			○
			16.3	Encoder initial communication - Receive data error 3	DB			○
			16.5	Encoder initial communication - Transmission data error 1	DB			○
			16.6	Encoder initial communication - Transmission data error 2	DB			○
			16.7	Encoder initial communication - Transmission data error 3	DB			○
			16.A	Encoder initial communication - Process error 1	DB			○
			16.B	Encoder initial communication - Process error 2	DB			○
			16.C	Encoder initial communication - Process error 3	DB			○
			16.D	Encoder initial communication - Process error 4	DB			○
			16.E	Encoder initial communication - Process error 5	DB			○
			16.F	Encoder initial communication - Process error 6	DB			○

	No.	Name	Detail display	Detail name	Stop Method (Note3, 4)	Alarm reset		
						Error reset	CPU reset	Power off → on
Alarm	17	Board error	17.1	Board error 1	DB			○
			17.3	Board error 2	DB			○
			17.4	Board error 3	DB			○
			17.5	Board error 4	DB			○
			17.6	Board error 5	DB			○
			17.8	Board error 6 (Note 5)	EDB			○
	19	Memory error 3 (FLASH-ROM)	19.1	Flash-ROM error 1	DB			○
			19.2	Flash-ROM error 2	DB			○
	1A	Servo motor combination error	1A.1	Servo motor combination error	DB			○
			1A.2	Servo motor control mode combination error	DB			○
	1E	Encoder initial communication error 2	1E.1	Encoder malfunction	DB			○
			1E.2	Load-side encoder malfunction	DB			○
	1F	Encoder initial communication error 3	1F.1	Incompatible encoder	DB			○
			1F.2	Incompatible load-side encoder	DB			○
	20	Encoder normal communication error 1	20.1	Encoder normal communication - Receive data error 1	EDB			○
			20.2	Encoder normal communication - Receive data error 2	EDB			○
			20.3	Encoder normal communication - Receive data error 3	EDB			○
			20.5	Encoder normal communication - Transmission data error 1	EDB			○
			20.6	Encoder normal communication - Transmission data error 2	EDB			○
			20.7	Encoder normal communication - Transmission data error 3	EDB			○
			20.9	Encoder normal communication - Receive data error 4	EDB			○
			20.A	Encoder normal communication - Receive data error 5	EDB			○
	21	Encoder normal communication error 2	21.1	Encoder data error 1	EDB			○
			21.2	Encoder data update error	EDB			○
			21.3	Encoder data waveform error	EDB			○
			21.4	Encoder non-signal error	EDB			○
			21.5	Encoder hardware error 1	EDB			○
			21.6	Encoder hardware error 2	EDB			○
			21.9	Encoder data error 2	EDB			○
	24	Main circuit error	24.1	Ground fault detected by hardware detection circuit	DB			○
			24.2	Ground fault detected by software detection function	DB	○	○	○
	25	Absolute position erased	25.1	Servo motor encoder - Absolute position erased	DB			○
	27	Initial magnetic pole detection error	27.1	Magnetic pole detection - Abnormal termination	DB			○
			27.2	Magnetic pole detection - Time out error	DB			○
			27.3	Magnetic pole detection - Limit switch error	DB			○
			27.4	Magnetic pole detection - Estimated error	DB			○
			27.5	Magnetic pole detection - Position deviation error	DB			○
			27.6	Magnetic pole detection - Speed deviation error	DB			○
			27.7	Magnetic pole detection - Current error	DB			○
	28	Linear encoder error 2	28.1	Linear encoder - Environment error	EDB			○
	2A	Linear encoder error 1	2A.1	Linear encoder error 1-1	EDB			○
			2A.2	Linear encoder error 1-2	EDB			○
			2A.3	Linear encoder error 1-3	EDB			○
			2A.4	Linear encoder error 1-4	EDB			○
			2A.5	Linear encoder error 1-5	EDB			○
			2A.6	Linear encoder error 1-6	EDB			○
			2A.7	Linear encoder error 1-7	EDB			○
			2A.8	Linear encoder error 1-8	EDB			○
	2B	Encoder counter error	2B.1	Encoder counter error 1	EDB			○
			2B.2	Encoder counter error 2	EDB			○

	No.	Name	Detail display	Detail name	Stop Method (Note3, 4)	Alarm reset		
						Error reset	CPU reset	Power off → on
Alarm	30	Regenerative error (Note 1)	30.1	Regeneration heat error	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
			30.2	Regeneration signal error	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
			30.3	Regeneration feedback signal error	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
	31	Overspeed	31.1	Abnormal motor speed	SD	○	○	○
	32	Overcurrent	32.1	Overcurrent detected at hardware detection circuit (during operation)	DB			○
			32.2	Overcurrent detected at software detection function (during operation)	DB	○	○	○
			32.3	Overcurrent detected at hardware detection circuit (during a stop)	DB			○
			32.4	Overcurrent detected at software detection function (during a stop)	DB	○	○	○
	33	Overvoltage	33.1	Main circuit voltage error	EDB	○	○	○
	34	SSCNET receive error 1	34.1	SSCNET receive data error	SD	○	○ (Note 2)	○
			34.2	SSCNET connector connection error	SD	○	○	○
			34.3	SSCNET communication data error	SD	○	○	○
			34.4	Hardware error signal detection	SD	○	○	○
	35	Command frequency error	35.1	Command frequency error	SD	○	○	○
	36	SSCNET receive error 2	36.1	Continuous communication data error	SD	○	○	○
	37	Parameter error	37.1	Parameter setting range error	DB		○	○
			37.2	Parameter combination error	DB		○	○
	3A	Inrush current suppression circuit error	3A.1	Inrush current suppression circuit error	EDB			○
	3E	Operation mode error	3E.1	Operation mode error	DB			○
	42	Servo control error (for linear servo motor and direct drive motor)	42.1	Servo control error by position deviation	EDB	○ (Note 3)	○ (Note 3)	○
			42.2	Servo control error by speed deviation	EDB	○ (Note 3)	○ (Note 3)	○
			42.3	Servo control error by torque/thrust deviation	EDB	○ (Note 3)	○ (Note 3)	○
		Fully closed loop control error (during fully closed loop control)	42.8	Fully closed loop control error by position deviation	EDB	○ (Note 3)	○ (Note 3)	○
			42.9	Fully closed loop control error by speed deviation	EDB	○ (Note 3)	○ (Note 3)	○
			42.A	Fully closed loop control error by position deviation during command stop	EDB	○ (Note 3)	○ (Note 3)	○
	45	Main circuit device overheat (Note 1)	45.1	Main circuit device overheat error	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
	46	Servo motor overheat (Note 1)	46.1	Abnormal temperature of servo motor 1	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			46.2	Abnormal temperature of servo motor 2	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			46.3	Thermistor disconnected	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			46.5	Abnormal temperature of servo motor 3	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
			46.6	Abnormal temperature of servo motor 4	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
	47	Cooling fan error	47.1	Cooling fan stop error	SD			○
			47.2	Cooling fan speed reduction error	SD			○

	No.	Name	Detail display	Detail name	Stop Method (Note3, 4)	Alarm reset		
						Error reset	CPU reset	Power off → on
Alarm	50	Overload 1 (Note 1)	50.1	Thermal overload error 1 during operation	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			50.2	Thermal overload error 2 during operation	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			50.3	Thermal overload error 4 during operation	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			50.4	Thermal overload error 1 during a stop	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			50.5	Thermal overload error 2 during a stop	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
			50.6	Thermal overload error 4 during a stop	SD	○ (Note 1)	○ (Note 1)	○ (Note 1)
	51	Overload 2 (Note 1)	51.1	Thermal overload error 3 during operation	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
			51.2	Thermal overload error 3 during a stop	DB	○ (Note 1)	○ (Note 1)	○ (Note 1)
	52	Error excessive	52.1	Excess droop pulse 1	SD	○	○	○
			52.3	Excess droop pulse 2	SD	○	○	○
			52.4	Error excessive during 0 torque limit	SD	○	○	○
			52.5	Excess droop pulse 3	EDB	○	○	○
	54	Oscillation detection	54.1	Oscillation detection error	EDB	○	○	○
	56	Forced stop error	56.2	Over speed during forced stop	EDB	○	○	○
			56.3	Estimated distance over during forced stop	EDB	○	○	○
	63	STO timing error	63.1	STO1 off	DB	○	○	○
			63.2	STO2 off	DB	○	○	○
	70	Load-side encoder initial communication error 1	70.1	Load-side encoder initial communication - Receive data error 1	DB			○
			70.2	Load-side encoder initial communication - Receive data error 2	DB			○
			70.3	Load-side encoder initial communication - Receive data error 3	DB			○
			70.5	Load-side encoder initial communication - Transmission data error 1	DB			○
			70.6	Load-side encoder initial communication - Transmission data error 2	DB			○
			70.7	Load-side encoder initial communication - Transmission data error 3	DB			○
			70.A	Load-side encoder initial communication - Process error 1	DB			○
			70.B	Load-side encoder initial communication - Process error 2	DB			○
			70.C	Load-side encoder initial communication - Process error 3	DB			○
			70.D	Load-side encoder initial communication - Process error 4	DB			○
			70.E	Load-side encoder initial communication - Process error 5	DB			○
			70.F	Load-side encoder initial communication - Process error 6	DB			○

	No.	Name	Detail display	Detail name	Stop Method (Note3, 4)	Alarm reset		
						Error reset	CPU reset	Power off → on
Alarm	71	Load-side encoder normal communication error 1	71.1	Load-side encoder communication - Receive data error 1	EDB			○
			71.2	Load-side encoder communication - Receive data error 2	EDB			○
			71.3	Load-side encoder communication - Receive data error 3	EDB			○
			71.5	Load-side encoder communication - Transmission data error 1	EDB			○
			71.6	Load-side encoder communication - Transmission data error 2	EDB			○
			71.7	Load-side encoder communication - Transmission data error 3	EDB			○
			71.9	Load-side encoder communication - Transmission data error 4	EDB			○
			71.A	Load-side encoder communication - Transmission data error 5	EDB			○
	72	Load-side encoder normal communication error 2	72.1	Load-side encoder data error 1	EDB			○
			72.2	Load-side encoder data update error	EDB			○
			72.3	Load-side encoder data waveform error	EDB			○
			72.4	Load-side encoder non-signal error	EDB			○
			72.5	Load-side encoder hardware error 1	EDB			○
			72.6	Load-side encoder hardware error 2	EDB			○
			72.9	Load-side encoder data error 2	EDB			○
	8A	USB communication time-out error	8A.1	USB communication time-out error	SD	○	○	○
	8E	USB communication error	8E.1	USB communication receive error	SD	○	○	○
			8E.2	USB communication checksum error	SD	○	○	○
			8E.3	USB communication character error	SD	○	○	○
			8E.4	USB communication command error	SD	○	○	○
			8E.5	USB communication data number error	SD	○	○	○
	888	Watchdog	88._	Watchdog	DB			○

Note 1. Leave for about 30 minutes of cooling time after removing the cause of occurrence.
2. In some controller communication status, the alarm factor may not be removed.
3. Stop method indicates as follows:
   - DB: Stops with dynamic brake. (Coasts for the driver without dynamic brake.)
   - EDB: Stops with electronic dynamic brake for 400 W or less drivers
     Stops with dynamic brake for 750 W drivers
   - SD: Forced stop deceleration
4. This is applicable when [Pr. PA04] is set to the initial value. The stop system of SD can be changed to DB using [Pr. PA04].
5. This alarm will occur only in the J3 compatibility mode.

	No.	Name	Detail display	Detail name	Stop method (Note 2, 3)
Warn	91	Servo amplifier overheat warning (Note 1)	91.1	Main circuit device overheat warning	
	92	Battery cable disconnection warning	92.1	Encoder battery cable disconnection warning	
			92.3	Battery degradation	
	95	STO warning	95.1	STO1 off detection	DB
			95.2	STO2 off detection	DB
	96	Home position setting warning	96.1	In-position warning at home positioning	
			96.2	Command input warning at home positioning	
	9F	Battery warning	9F.1	Low battery	
			9F.2	Battery degradation warning	
	E0	Excessive regeneration warning (Note 1)	E0.1	Excessive regeneration warning	
	E1	Overload warning 1 (Note 1)	E1.1	Thermal overload warning 1 during operation	
			E1.2	Thermal overload warning 2 during operation	
			E1.3	Thermal overload warning 3 during operation	
			E1.4	Thermal overload warning 4 during operation	
			E1.5	Thermal overload error 1 during a stop	
			E1.6	Thermal overload error 2 during a stop	
			E1.7	Thermal overload error 3 during a stop	
			E1.8	Thermal overload error 4 during a stop	
	E2	Servo motor overheat warning	E2.1	Servo motor temperature warning	
	E3	Absolute position counter warning	E3.2	Absolute position counter warning	
			E3.5	Encoder absolute positioning counter warning	
	E4	Parameter warning	E4.1	Parameter setting range error warning	
	E6	Servo forced stop warning	E6.1	Forced stop warning	SD
	E7	Controller forced stop warning	E7.1	Controller forced stop warning	SD
	E8	Cooling fan speed reduction warning	E8.1	Decreased cooling fan speed warning	
			E8.2	Cooling fan stop	
	E9	Main circuit off warning	E9.1	Servo-on signal on during main circuit off	DB
			E9.2	Bus voltage drop during low speed operation	DB
			E9.3	Ready-on signal on during main circuit off	DB
	EC	Overload warning 2 (Note 1)	EC.1	Overload warning 2	
	ED	Output watt excess warning	ED.1	Output watt excess warning	
	F0	Tough drive warning	F0.1	Instantaneous power failure tough drive warning	
			F0.3	Vibration tough drive warning	
	F2	Drive recorder - Miswriting warning	F2.1	Drive recorder - Area writing time-out warning	
			F2.2	Drive recorder - Data miswriting warning	
	F3	Oscillation detection warning	F3.1	Oscillation detection warning	

Note 1. Leave for about 30 minutes of cooling time after removing the cause of occurrence.

2. Stop method indicates as follows:
   - DB: Stops with dynamic brake. (Coasts for the driver without dynamic brake.)
   - SD: Decelerates to a stop

3. This is applicable when [Pr. PA04] is set to the initial value. The stop system of SD can be changed to DB using [Pr. PA04].

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.

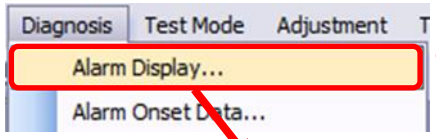
Display	Description	Cause	Checkpoint	Action
AA	Communication with the servo system controller has disconnected.	The power of the servo system controller was turned off.	Check the power of the servo system controller.	Switch on the power of the servo system controller.
		An SSCNET III cable was disconnected.	"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 disabling control axis switch (SW2-2) is 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 When using 32 axes or less: 0.888 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).
off	Operation mode for manufacturer setting is set.	Operation mode for manufacturer setting is enabled.	Check if all of the control axis setting switches (SW2) are on (up).	Set the control axis setting switches (SW2) correctly.

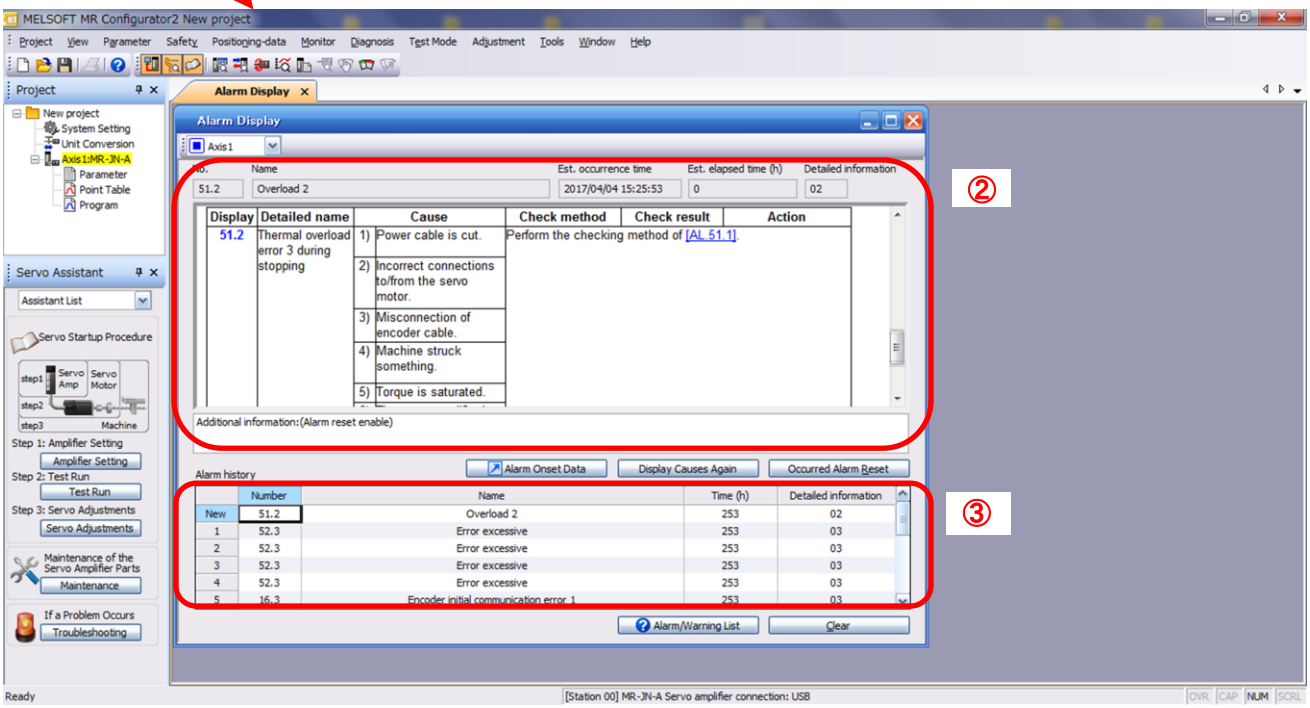
Note. ## indicates axis No.

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 16 cases) of alarms that occurred in the past.
(Warnings are not displayed.)





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