SMC®

Operation Manual

Product Name

Monitor Software for Motor Controller (LECP/A)

Model/Series/Product number

LEC-WM

Please download the latest software from the SMC website.

SMC website http://www.smcworld.com/

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Contents

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LEC-WM / Monitor Software
1. Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions are categorized into three groups, "Caution", "Warning" and "Danger" depending on the level of hazard and damage, and the degree of emergency. They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC), Japan Industrial Standards (JIS)*1 and other safety regulations*2.

*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 10218-1992:   Manipulating industrial robots -- Safety
    JIS B 8370:   General rules for pneumatic equipment
    JIS B 8361:   General rules for hydraulic equipment
    JIS B 9960-1:   Safety of machinery – Electrical equipment for machines. (Part 1: General requirements)
    JIS B 8433-1993:   Manipulating industrial robots - Safety, etc.
*2) Labor Safety and Sanitation Law, etc.

⚠	**Caution**	CAUTION indicates a hazard with a low level of risk, which if not avoided, can result in minor or moderate injury.
⚠	**Warning**	WARNING indicates a hazard with a medium level of risk, which if not avoided, can 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.

An operator who is appropriately trained and experienced must perform the assembly, operation and maintenance of machines or equipment.

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

1) The inspection and maintenance of machinery/equipment should only be performed after measures to prevent dropping of driven objects or run-away of machinery/equipment has been confirmed.

2) 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.

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

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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 location exposed to direct sunlight.

2) Installation of equipment in conjunction with atomic energy, railways, air navigation, space appliances, shipping, vehicles, military, medical equipment, combustion devices, recreation equipment, or equipment which comes in contact with food and beverages, emergency stop circuits, clutch and lock circuits in press applications, safety equipment or any 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) If used in an interlock circuit, please provide a double interlock for possible failure by using a mechanical protective function, etcetera, with periodical checks to confirm proper operation. Check the product regularly in order to confirm normal operation.

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LEC-WM/ Monitor software
Safety Instructions

⚠ Caution

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

Indemnification

When using the monitor software LEC-WM (hereinafter referred to as "this software"), the Indemnification below will be applied.

Read and accept them before using the software.

This agreement comes into effect when the user installs this software to a computer.

The user cannot use or copy this software unless the user agrees to the indemnification.

Indemnification

Article 1 (Grant of license)
 1. This Software is to be used in accordance with this Agreement non-exclusively for the limited purpose of monitoring data to controllers for SMC electrical actuators.
 2. This software can be installed and saved on a PC for the sole purpose specified in the preceding paragraph.

Article 2 (Restrictions)
 1. This software is not to be copied, except as specified in Articles (1)-2.
 2. This software license is not to be transferred or lent wholly or in part to a third party, either free of charge or for payment.
 3. Modification, translation, adaptation or reverse engineering of this software is not permitted.

Article 3 (Precautions)
 1. Read the "Safety Instructions", "Precautions", "Specific Product Precautions" and "Specifications" described in the manual for the equipment when using this software.
 2. The contents and specification of this Software are subject to change without prior notice.

Article 4 (Indemnification)
 1. SMC cannot take any responsibility for any damage incurred by the use of the controller with this software.
 2. SMC cannot take any responsibility for any damage incurred by the use of this software.

Article 5 (Termination)
 1. SMC has the full authority to terminate this agreement in the event of any terms and conditions have been breached.
 2. This software and any copies thereof must be destroyed when this agreement is terminated.

Article 6 (Rights of this software)
 The copyright and any other rights of this Software are owned by SMC, and protected by Japanese copyright laws and international treaty provisions.

Ⓢ SMC

2. Product Outline

2.1 What is the Monitor Software （LEC-WM）?

Monitor software (LEC-WM) is a software to monitor the data such as current position, current speed in the operating motor controller (LECP / A series) using the communication cable of the controller setting kit (LEC-W2).

Applicable for the controllers below.

Step Motor Controller: LECP6*-*

Servo Motor Controller: LECA6*-*

CC-Link Direct Input Type Controller: LECPMJ*-*

Step motor driver：LECPA*-*

Please download this software from the SMC website （http://www.smcworld.com/）.

⚠ Caution

Monitor software is a tool to view the processed data in the controller. It does not measure the position, speed or torque (thrust force) of the electric actuator.

Use this software as a guide to check the operating condition.

⚠ Caution

- To use the monitor software, a communication cable (LEC-W2-C) and a USB cable (LEC-W2-U) contained in the controller setting kit (LEC-W2) are required.

- The monitor software uses the serial IO connector of the controller. Therefore, it cannot be used if the serial IO connector is used for another equipment.

  * Examples of serial IO connector used for another equipment

  - Test operation of teaching box (LEC-T1)   - Test operation of controller setting kit (LEC-W2)

  - Operation with gateway unit (LEC-G*)

- The monitor software cannot used for programless controller (LECP1/LECP2 series), or AC servo motor controller (LECS series).

- Contact SMC about the usability with a controller of made-to-order special product.

2.2 Required Devices When Using the Monitor Software

(1) Monitor software （LEC-WM）

(2) Communication cable and USB cable
  Prepare a communication cable LEC-W2-C and a USB cable LEC-W2-U.
  (These cables are included in the controller setting kit LEC-W2.)

(3) PC

  Refer to **"2.4 Operating Environment"** for the required PC specifications.

(4) Equipment including controller (LEC) and electric actuator

  Prepare a system in which the electric actuator can be operated.

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2.3 System Structure When Using the Monitor Software

The system structure when using the Monitor software software is described below.

An example of the controller structure is shown below.
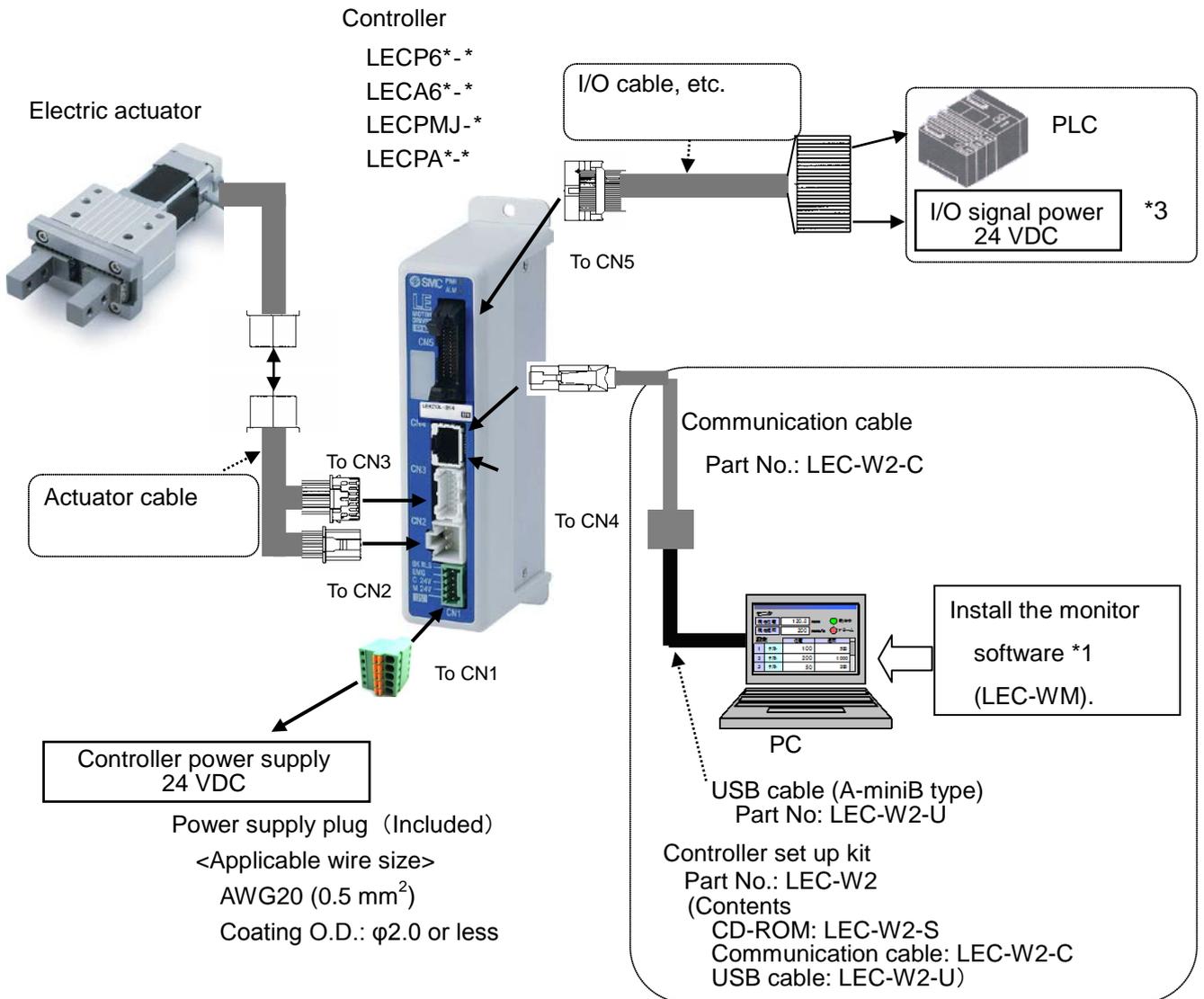
*1 Please download the monitor software from the SMC website. http://www.smcworld.com/

⚠ **Caution**

Do not connect the PC and controller directly with a network cable.

If a network cable is directly connected to the controller, the controller may break.

2.4 Operating Environment

Equipment	Description
Compatible OS	Windows® 7 (English 32bit type), Windows® 7 (English 64bit type), Windows® 8.1 (English 32bit type), Windows®8.1 (English 64bit type)
CPU, Memory	The CPU and memory should meet the requirements to run the OS.
Window specification	Window resolution: 1024 x 768 or more Number of window colors: full-color (24 bit or more)
Hard disk capacity	50MB or more
Interface	USB port (USB 1.1 or USB 2.0) (Communication cable LEC-W2 connected.)
Applicable controller	Step Motor Controller: LECP6□ Servo Motor Controller: LECA6□ CC-Link Direct Input Type Controller: LECPMJ

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3. Preparation

3.1 Procedure Before Use

(1) Preparation of devices

Prepare required devices with reference to **"2. Product Outline".**

Note) When the communication cable is used with the PC for the first time, a USB driver needs to be installed. Please refer to the Installation Manual of controller setting kit (LEC-W2) for installation of the driver. (USB driver and Installation Manual can be downloaded from SMC website. http://www.smcworld.com/）

↓

(2) Installation

Install this software to the PC with reference to **"3.2 Software Installation"**.

↓

(3) Preparation of devices

Connect the devices with reference to **"2.3 System Structure When Using the Monitor Software"**.

↓

(4) Start-up of Monitor software software

Start-up this software with reference to **"5.1 Software Start-Up"**.

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(5) Communication setting

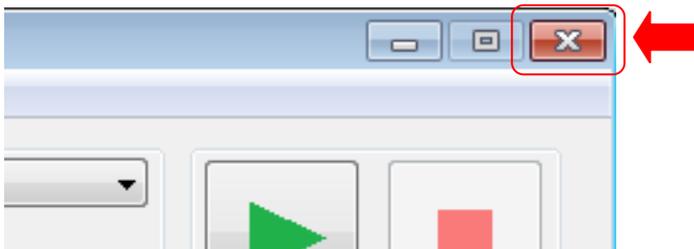Set the communication with reference to **"5.2 Communication Setting"**.

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（6）Use functions

Use each function with reference to **"5.3 Main Window"**.

↓

(7) Completion of the monitor software

Click **X** (close) button shown in the upper right corner of the main screen.

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3.2 Software Installation

(1) Save the compressed file of the downloaded application to an arbitrary location and decompress it.

(2) Copy the decompressed application folder to an arbitrary location.

(3) Installation is complete after confirming that the folder and file shown below are included in the copied application folder.
(It is not necessary to install the software from "Add or Remove Programs".)
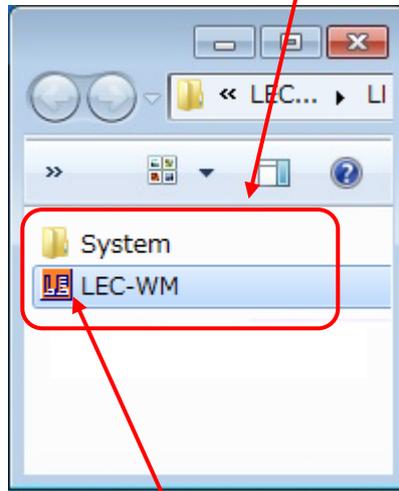
The software starts-up when **LEC-WM. exe** is double-clicked.

3.3 Software Removal

Delete the application folder which was copied during installation.

* It is not necessary to delete it from "Add or Remove Programs".

3.4 Software Update

The latest software is available on the SMC website (http://www.smcworld.com/). Please use the latest version at all times.

When updating the software to the latest version, uninstall the currently installed software before installing the latest version.

4. Functions
4.1 List of Functions

(1) List of Functions

Function	Description
Data monitor	Reads the current position, current speed and torque from the operating controller, and displays them in a graph.
IO monitor	Reads the representative input/output signal condition from the operating controller, and displays them in a graph.

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5. Software Start-Up
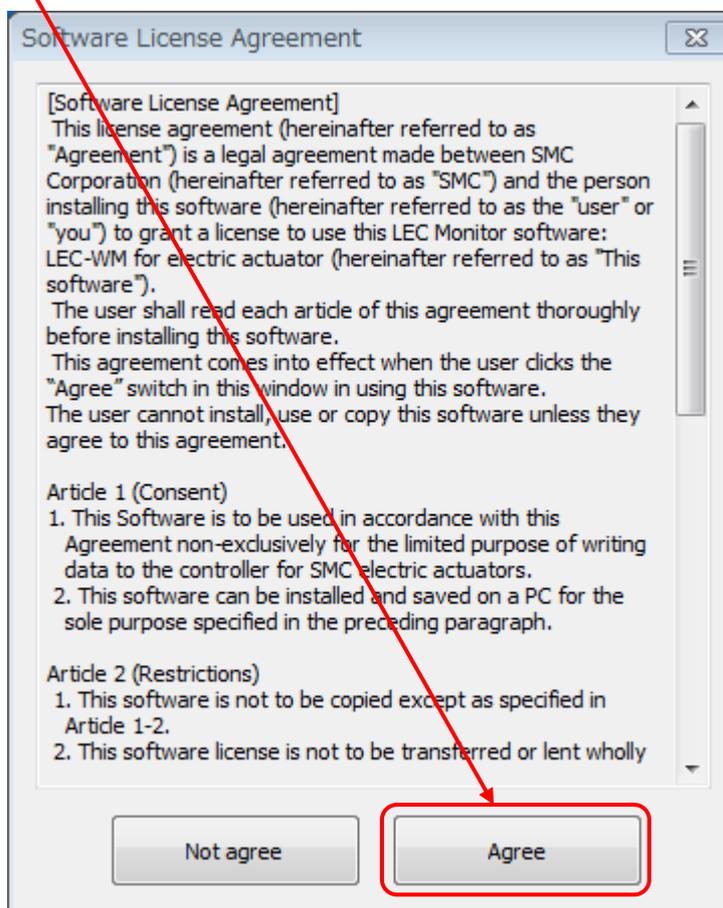
5.1 Software Start-Up

This software starts up when double clicking the **LEC-WM.exe** file.

At starts up, a software license agreement window appears which confirms the use of this software (see the image below).

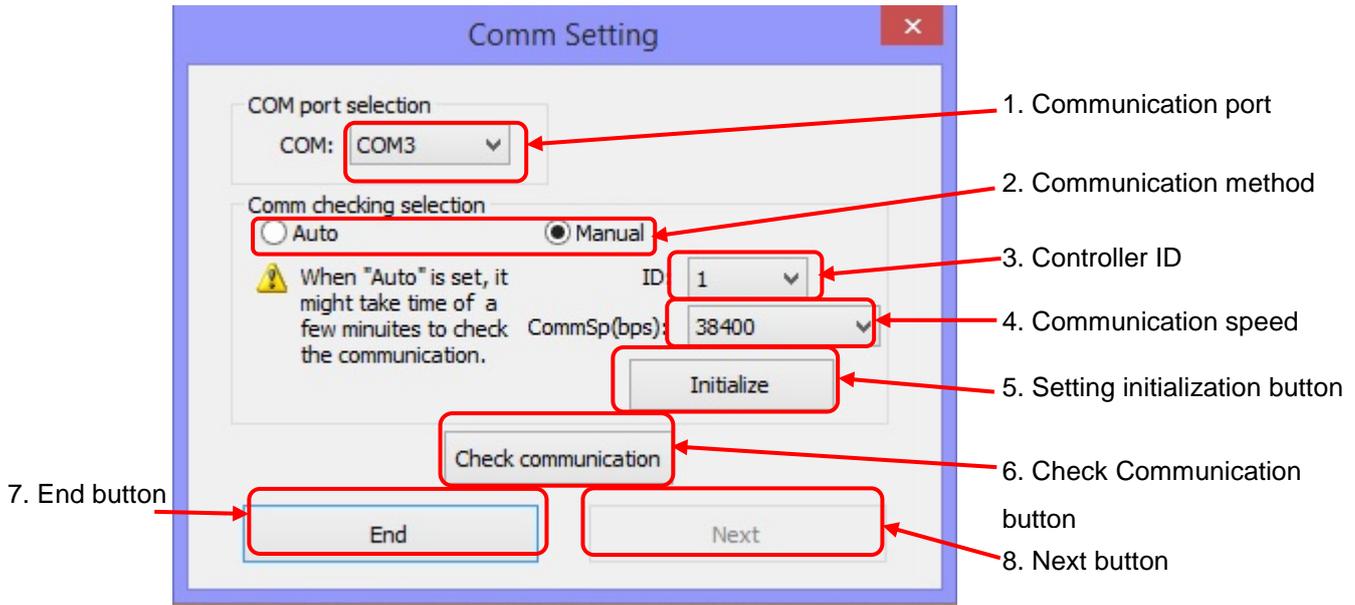After clicking **Agree**, the communication setting window is displayed.

Refer to **"5.2 Communication Setting"** for communication setting method.

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5.2 Communication Setting

Check if the communication can be established under the setting in the communication setting window.

Communication check can be selected from Auto or Manual.

(1) Communication setting window

- 1. Communication port
- 2. Communication method
- 3. Controller ID
- 4. Communication speed
- 5. Setting initialization button
- 6. Check Communication button
- 7. End button
- 8. Next button

(2) Items and functions of the communication setting window

No.	Items	Functions
1	Communication port	Select the communication port (COM number) of the PC in which the communication cable is connected. The COM number can be checked using the Device Manager. Refer to **"5.2 (3) How to Perform Communication Setting"** for details. **Note) Make sure to set the communication port.**
2	Communication method	Select the communication check method from Auto or Manual. - Auto (Automatic): The communication check is performed **without setting the ID or communication speed** which has been set in the controller. **Note) If the controller ID and communication speed are unknown, select the automatic setting.** **Note) It may take a few minutes for the communication confirmation.** - Manual: The communication check is performed **with setting the ID and communication speed** which have been set in the controller. **Note) If the controller ID and communication speed are already known, select the manual setting. It may reduce the time for communication confirmation.**
3	Controller ID	For Manual communication confirmation, the ID which has been set in the controller can be selected. The range of IDs are from 1

		to 32.
4	Communication speed	For Manual communication confirmation, **the communication speed which has been set in the connected controller can be selected.** The communication speed can be set at 9600, 19200, 38400, 57600, 115200 or 230400[bps].
5	Setting initialization button	ID and communication speed are initialized to the default values that are stated below. (These values are the same as the default values of the controller.) - ID: 1 - Communication speed: 38400 [bps]
6	Check Communication button	The communication check is performed using the selected communication check method described above (auto or manual).
7	End button	**End** button: Completion of this software **Return** button: Window returns to the previous page
8	Next button	When communication to the controller is confirmed to be available, it is possible to navigate to the main menu by clicking this button.

(3) How to Perform Communication Setting
  a) Click the list button of **communication port selection** and select the COM number of the communication port in which the communication cable (LEC-W2-C) and USB cable (LEC-W2-U) are connected.
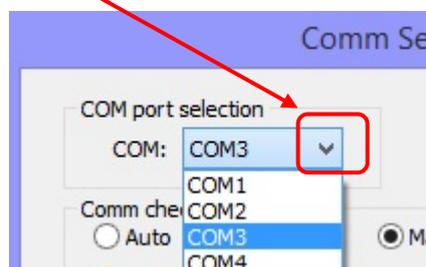

> ## ⚠ **Caution**
> **Make sure to set the COM number of the communication port regardless of Automatic or Manual communication check method.**

<How to check the communication port>

From the start menu, open Control panel, Hardware and Sound, and Device Manager in order. (This start-up method is an example for Window®7. Please start the Device Manager in accordance with the operation procedure of the PC.)

Confirm the COM number of the SMC Serial Port from the devices displayed in Port (COM & LPT).   It is COM3 for this example.
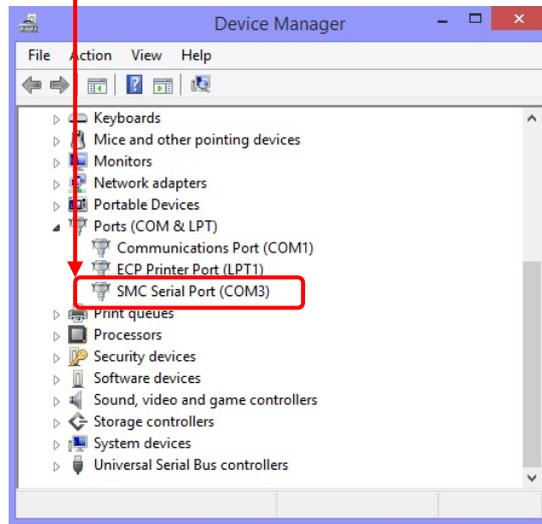
b) Click **Communication checking selection** and select the communication setting method from Auto or Manual.

<Manual setting>
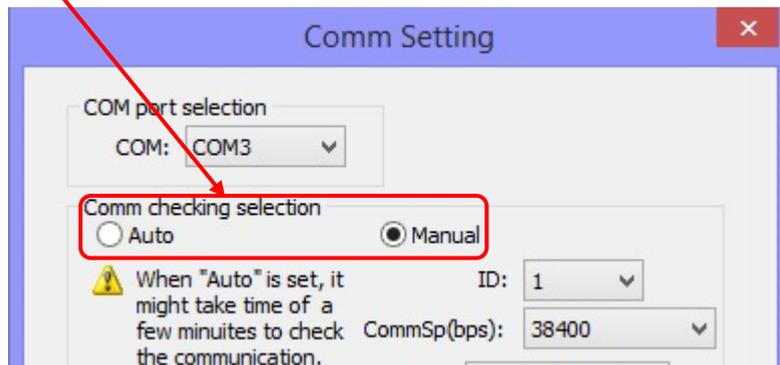
Select the controller ID and communication speed which have been set in the connected controller from the list of **Controller ID** and **Communication speed**.

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c) Click **Check communication** and confirm whether the communication can be established with the set communication method.
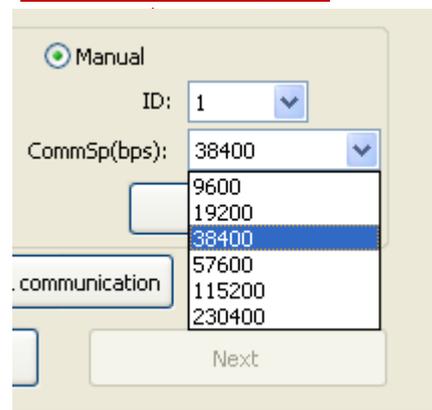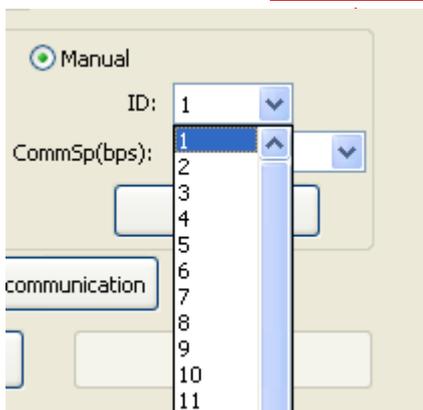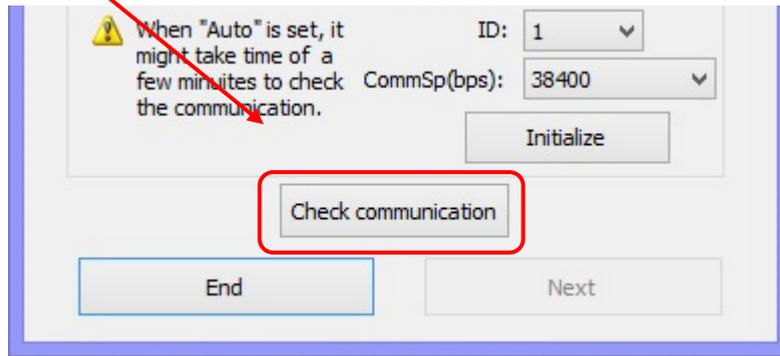
Once the communication is acceptable, the window below is displayed to show the controller ID and communication speed during communication. Click **OK** after confirmation.
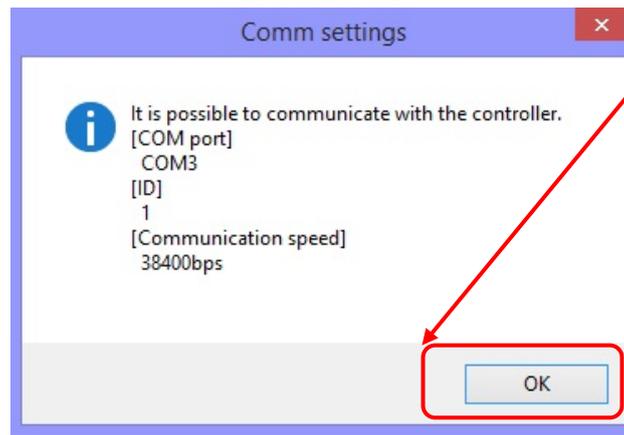
When communication is established

The window below is displayed if the communication cannot be established.
In this case, click **OK** in the alarm screen.
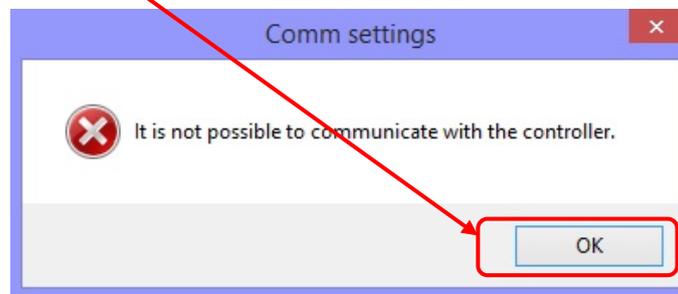
When communication is not established

To perform monitoring of the operating controller, communication confirmation is required. After confirming the communication setting, communication cable connection and controller power supply, check the communication again.
Refer to **"10.1 Confirmation Method of Controller Communication Setting"** to check the contents of the controller communication setting.

When only reading the stored monitor data, the data can be seen even if the communication confirmation is not done.
Move to next step.

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d) Click **Next** on the communication setting window.

When clicking **Next**, the main menu window is displayed.

(See **"5.3 Main Window"**.)
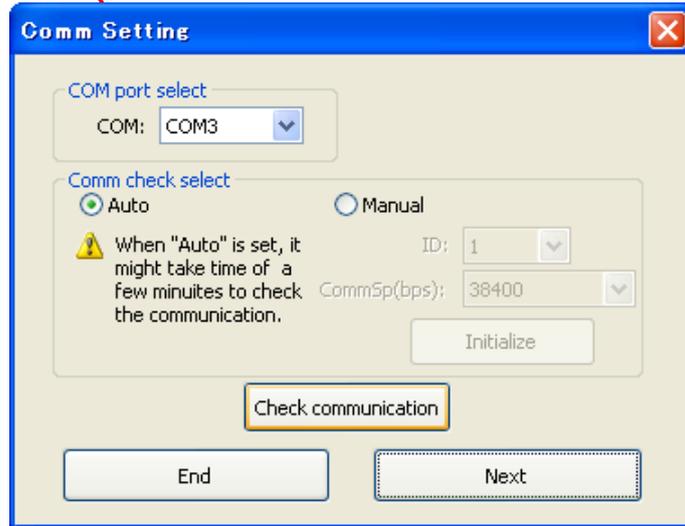
5.3 Main Window

There are two main windows, for data monitor and for I/O monitor. The windows can be switched by clicking the upper left button in the window.

Data monitor window

⟺
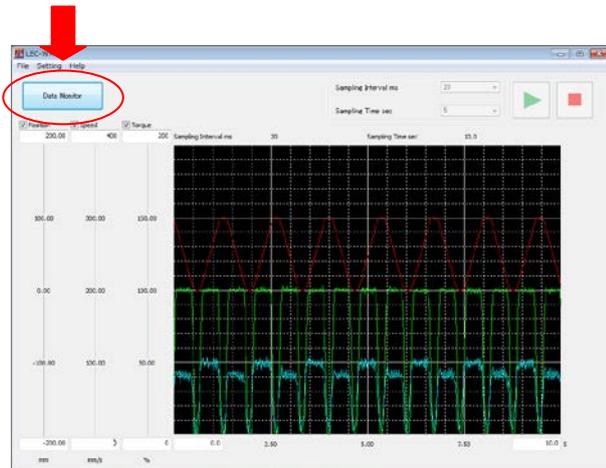
I/O monitor window

| See Chapter 6 for how to use the data monitor. |

| See Chapter 7 for how to use the I/O monitor. |

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6. Data monitor

6.1 Data Monitor Window

The data monitor is a function which reads out data of Position, Speed, and Torque processed in the controller from the operating controller, and displays them in a graph.

No.	Description	Function
(a)	Switching screen	The current function is displayed. Data monitor and I/O monitor are switched by clicking it.
(b)	Sampling Interval Sampling Time	Interval (ms) and time (s) for sampling data can be selected.
(c)	Sampling start button	Data sampling starts when clicking this button.
(d)	Sampling stop button	The sampling stops when clicking this button during sampling. When the sampling is stopped, data which has been read is displayed in a graph.
(e)	Display of measurement conditions	Data measurement conditions (sampling interval and time) shown in the graph are displayed.
(f)	Data axes	These show the data scale (display range) of the graph. When changing the maximum and minimum values, the graph is displayed in accordance with those values. Displayed/non-displayed are switched by selecting the check boxes of the data names shown above.

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(g)	Time axis	This shows the time axis of the graph. When changing the maximum and minimum values, the graph is displayed in accordance with these values.
(h)	Graph window	This shows data in a graph. The graph is changed when the data axes and time axis are changed. * Line colors (for color display) Red: Position Green: Speed Blue: Torque
(i)	Menu	For saving and reading out the data and color selection of the graph window.
(j)	End button	The software exits when clicking **X** button.

6.2 Operating Procedure   (Data Monitor Sampling Method)

(1) Select the sampling interval and time.

  Alternatives are displayed by clicking the select button.

  * Sampling interval range varies depending on the communication speed.

   If inapplicable sampling interval is selected, an error window is displayed.

Communication speed [bps]	Sampling interval range [ms]
9800	50 or more
19200	50 or more
38400 (Default value of controller)	20 or more
57600	20 or more
115200	20 or more
230400	20 or more

(2) Start sampling

  Data sampling starts when clicking the start sampling button.

  During sampling, "Now sampling" is displayed at the top of the window. The measurement is completed after the sampling time passed, then the measurement results are displayed in a graph.
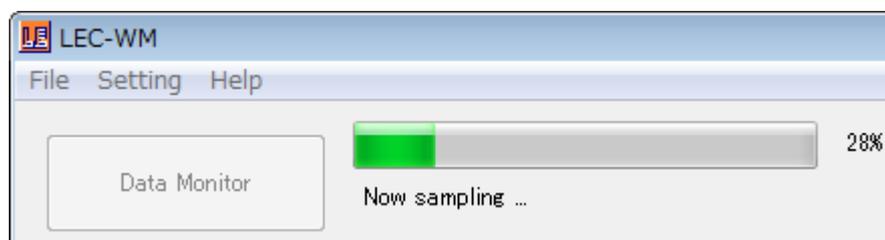
Display example during sampling

  When clicking stop sampling button, the sampling is stopped, then the measurement results which have been measured are displayed in a graph.

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(3) Adjustment of graph window

- The data axes of the graph window are adjusted automatically in accordance with the minimum and maximum value of the sampling data.

　　Adjust the minimum and maximum values of the data axis to resize the graph appropriately. (Adjust the data individually)

e.g.) 0-60% Torque displayed　　　　　　　e.g.) 0-100% Torque displayed
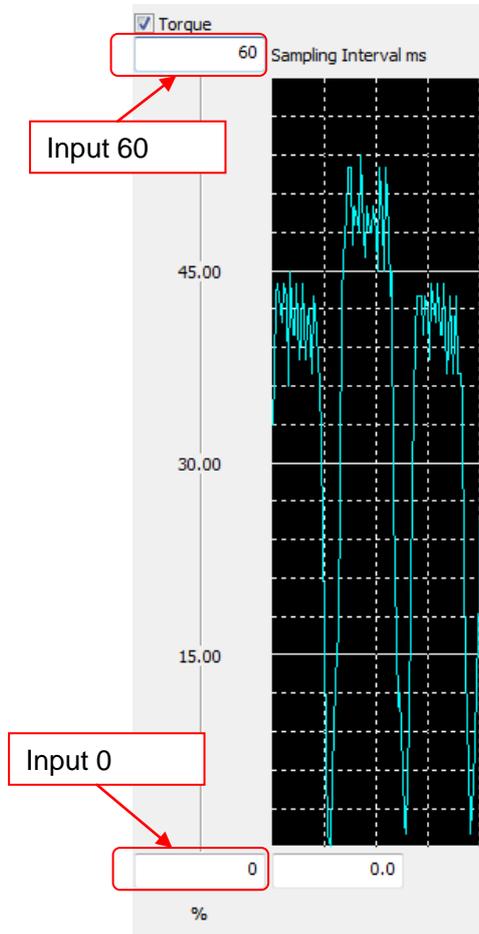
Selected data is displayed in a graph.

e.g.) When all data is selected　　　　　　e.g.) When only Speed is selected
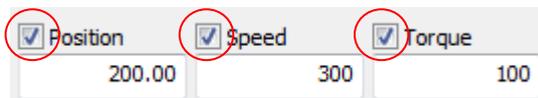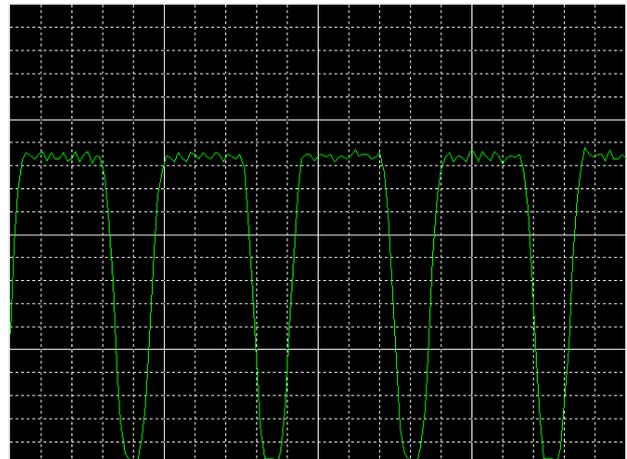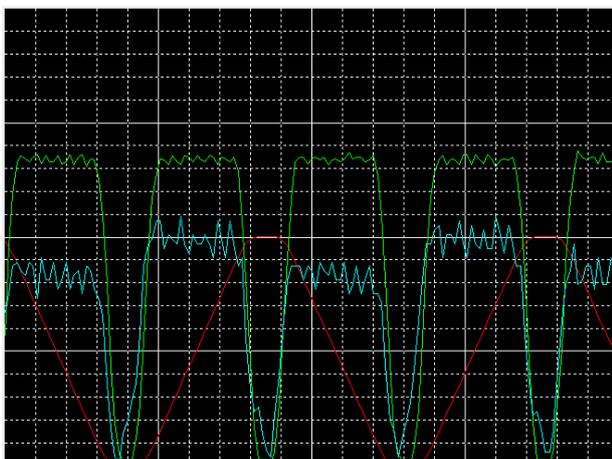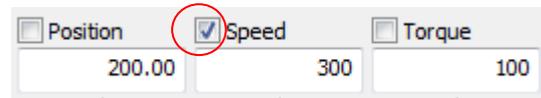
- The time axis shows the sampling time.

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Adjust the minimum and maximum values of the time axis to resize the graph

e.g.) 0-3.0 seconds displayed   e.g.) 0-1.0 seconds displayed

Input 0   Input 3.0   Input 0   Input 1.0

- Monochrome or Color can be selected for the graph window.

    The color of the graph window is changed by selecting from "Graph color scheme" in "Setting" in the main menu.

* Red: Position
Green: Speed
Blue: Torque

Color   Monochrome

(4) Save data

    Data can be saved from "File" in the main menu.

        Data Save: Save the sampling data as a CSV format.

        Image Save: Save the data monitor window image as a BMP format or a JPG format.

        Capture: Save the data monitor window image to clipboard.

  * When selecting Data Save, the read data is saved as it is. The adjustment of the data or time axis is not reflected in the saved data.

  * Image Save and Capture save the display image of the data monitor window area.

    Be careful not to open the data monitor window over another software window.

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(1) Data reading

Select "Data file load" from File in the main menu to open the saved data file (CSV format file).

* Data can only be read in the CSV file format.

* An Error is displayed when the data is any file format other than CSV.
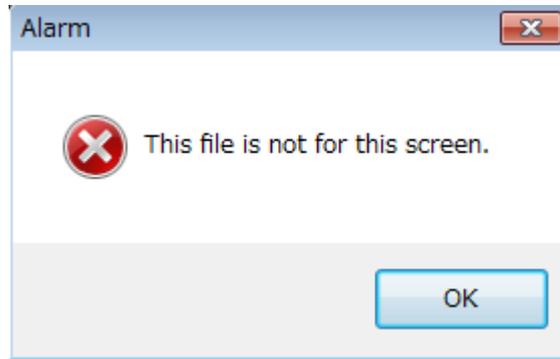
Error displayed

(3) Scale adjustment of the graph window (See "(3) Adjustment of the graph window" in "6.2 Operation Procedure" for detailed examples.

- The data axis of the graph window is adjusted automatically in accordance with the minimum and maximum value of the sampling data.
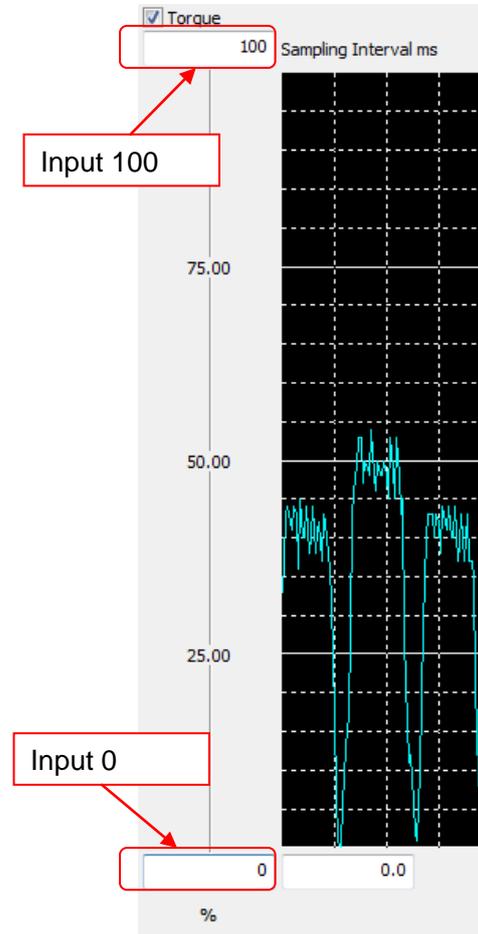
  Adjust the minimum and maximum values of the data axis to resize the graph appropriately.

- Selected data is displayed in the graph.

- The time axis shows the sampling time.

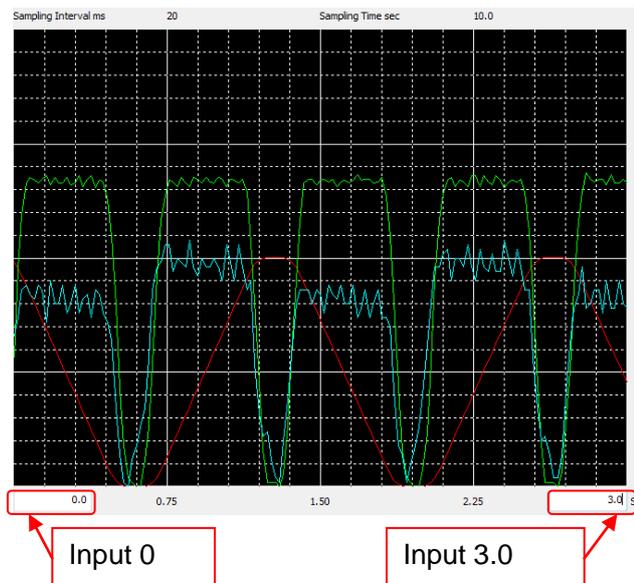 Adjust the minimum and maximum values of the time axis to resize the graph appropriately.

- Monochrome or Color can be selected for the graph window.

  The color of the graph window is changed by selecting from "Graph color scheme" of "Setting" in the main menu.

(4) Save window display

The window display can be saved from "File" in the main menu.

Image Save: Save the data monitor window image as a BMP format or a JPG format.

Capture: Save the data monitor window image to clipboard.

* When selecting Data Save, the read data is saved as it is. The adjustment of the data or time axis is not reflected in the saved data.

* Image Save and Capture save the display image of the data monitor window area.

Be careful not to open the data monitor window over another software window.

7. I/O Monitor

7.1 What is the I/O Monitor?

The I/O monitor is a function which reads out the ON/OFF condition of the I/O signal of the operating controller, and displays them in a graph.
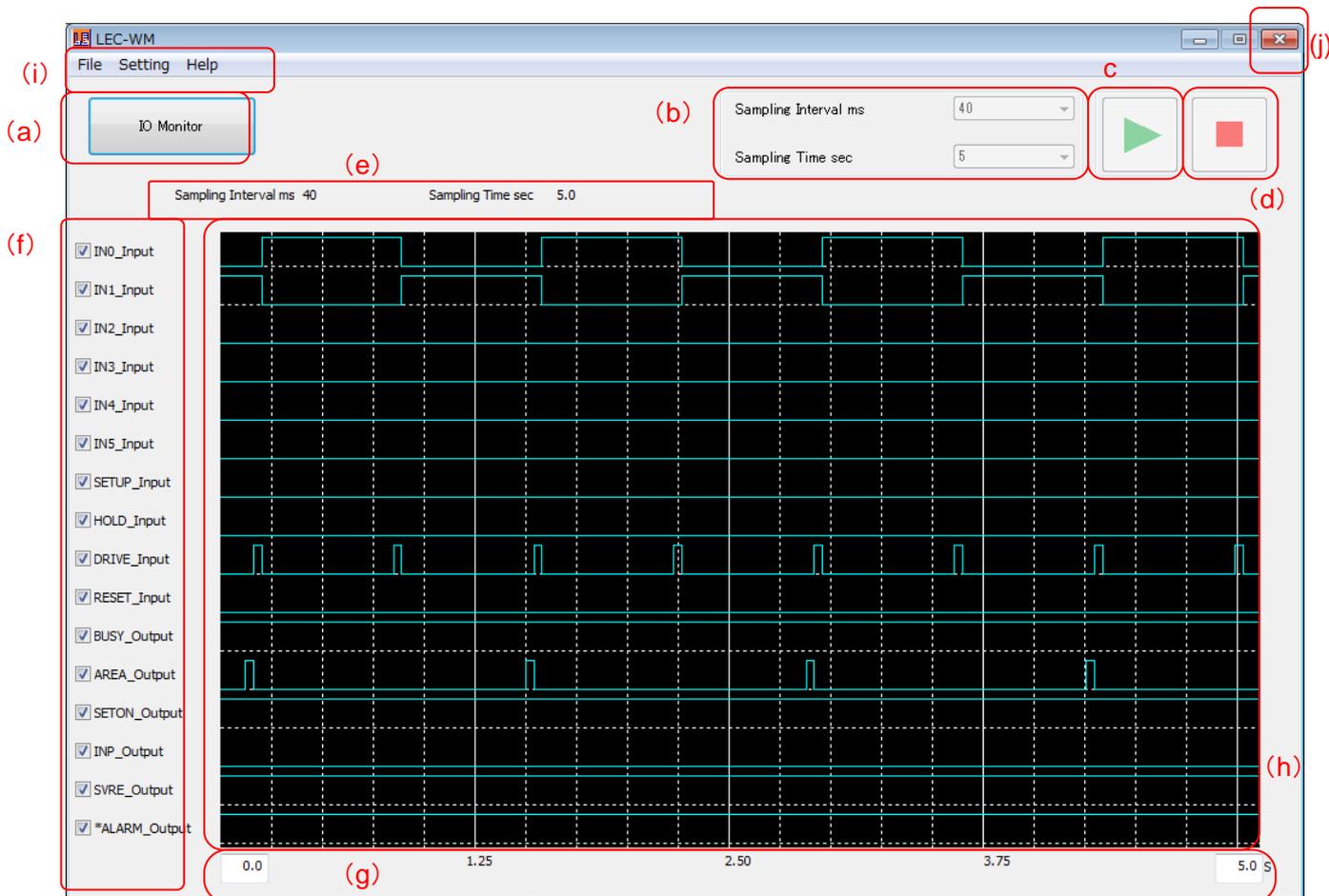
No.	Description	Function
(a)	Switching screen	The current function is displayed. Data monitor and I/O monitor are switched by clicking this button.
(b)	Sampling Interval SamplingTime	Interval (ms) and time (s) for sampling data can be selected.
(c)	Sampling start button	Data sampling starts when clicking this button.
(d)	Sampling stop button	The sampling stops when clicking this button during sampling. When the sampling is stopped, data which has been read is displayed in a graph.
(e)	Display of measurement conditions	Data measurement conditions (sampling interval and time) shown in the graph are displayed.
(f)	Data axes	Signal names. Displayed/non-displayed are switched by selecting the check boxes of signal name.
(g)	Time axis	It shows the time axis of the graph. When changing the

		maximum and minimum values, the graph is displayed in accordance with those values.
(h)	Graph window	It shows data in a graph. The graph is changed when the data axis and the time axis are changed.
(i)	Menu	For saving and reading of the data; controller type (I/O signal type) selection; and graph window color selection.
(j)	End button	The software exits when clicking **X** button.

7.2   Operating Procedure   (I/O Monitor Sampling Method)

(1) Select the sampling interval and time.

Alternatives are displayed by clicking the select button.

* Sampling interval range varies depending on the communication speed.

If inapplicable sampling interval is selected, an error window is displayed.

Communication speed [bps]	Sampling interval range [ms]
9800	100 or more
19200	100 or more
38400 (Default value of controller)	40 or more
57600	40 or more
115200	40 or more
230400	40 or more

(3) I/O signal type selection

Select I/O signal pattern to be read from the three I/O signal combinations.   Select them from "Controller type" of "Setting" in the main Menu.   Selection items and I/O signal patterns are shown below.

LECP6/LECA6/LECPMJ IN-OUT	LECP6/LECA6/LECPMJ INPUT	LECP6/LECA6/LECPMJ OUTPUT	LECPA IN-OUT
IN0 Input	IN0 Input	OUT0 Output	SETUP Input
IN1 Input	IN1 Input	OUT1 Output	RESET Input
IN2 Input	IN2 Input	OUT2 Output	SVON Input
IN3 Input	IN3 Input	OUT3 Output	CLR Input
IN4 Input	IN4 Input	OUT4 Output	TL Input
IN5 Input	IN5 Input	OUT5 Output	TLOUT Output
SETUP Input	SETUP Input	BUSY Output	WAREA Output
HOLD Input	HOLD Input	AREA Output	BUSY Output
DRIVE Input	DRIVE Input	SETON Output	SETON Output
RESET Input	RESET Input	INP Output	INP Output
BUSY Output	SETON Input	SVRE Output	SVRE Output
AREA Output		* ESTOP Output	*ESTOP Output
SETON Output		* ALARM Output	*ALARM Output
INP Output			AREA Output
SVRE Output			
* ALARM Output			

(4) Start sampling

Data sampling starts when clicking the start sampling button.

During sampling, "Now sampling" is displayed at the top of the window. The measurement is completed after the sampling time passed, then the measurement results are displayed in a graph.
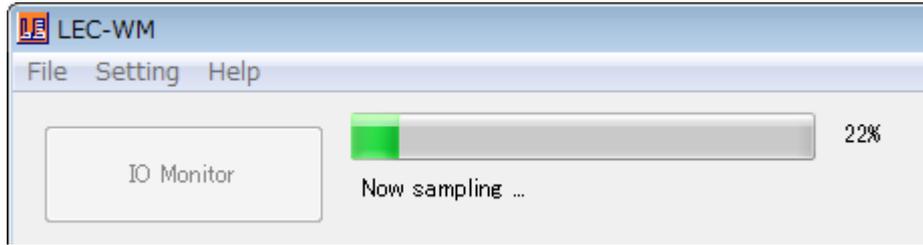
Display example of "Monitoring"

When clicking stop sampling button, the sampling is stopped, then the measurement results which have been measured are displayed in a graph.

(5) Adjustment of graph window

Selected signals on the data axis are displayed in a graph. The graph is not displayed when the check boxes are not selected.
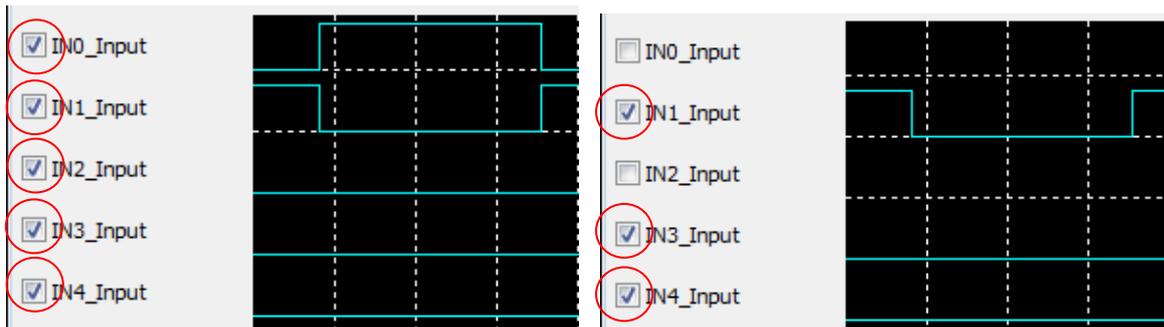
The time axis shows the sampling time. Adjust the minimum and maximum values of the time axis to resize the graph appropriately.

e.g.) 0-5.0 seconds displayed   e.g.) 0-1.0 seconds displayed
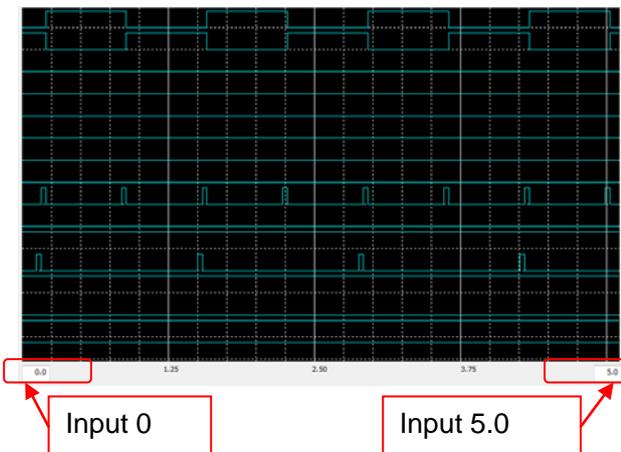
Input 0   Input 5.0   Input 0   Input 1.0

SMC

- Monochrome or Color can be selected for the graph window. The color of the graph window is changed by selecting from "Graph color scheme" of "Setting" in Menu.

Color   Monochrome

(4) Save data

Data can be saved from "File" in the main menu.
- Data Save: Save the sampling data as a CSV format.
- Image Save: Save the I/O monitor window image as a BMP format or a JPG format.
- Capture: Save the I/O monitor window image to clipboard.
* When selecting Data Save, the sampled data is saved as it is. The adjustment of the data axis or time axis is not reflected in the saved data.
* Image Save and Capture save the display image of the I/O monitor window area.
Be careful not to open the I/O monitor window over another software window.

7.3 Operating Procedure   (Display of Saved I/O Monitor Data)

(1) Data reading

Select "Data file load" from File in the main menu to open the saved data file (CSV format file).
* Data other than CSV format file for I/O monitor window cannot be read.
* Error is displayed when the data is other than CSV format file for I/O monitor window.
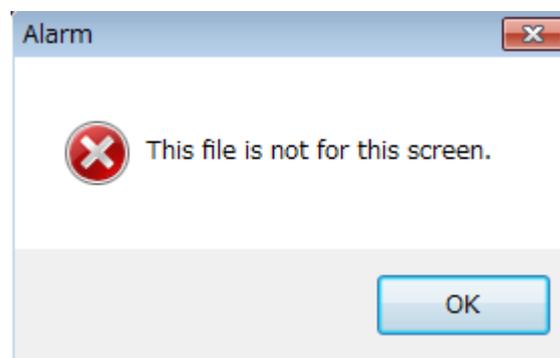
Error display

(3) Adjustment of the graph window (See "(5) Adjustment of the graph window" in "7.2 Operation Procedure" for detailed examples.
- Selected signals on the data axis are displayed in a graph.
A graph is not displayed when the check boxes are not selected.

SMC

- The time axis shows the sampling time.

  Adjust the minimum and maximum values of the time axis to resize the graph appropriately.

- Monochrome or Color can be selected for the graph window.

  The color of the graph window is changed by selecting from "Graph color scheme" in "Setting" in the main menu.

(4) Save window display

   The window display can be saved from "File" in Menu.

   Image Save: Save the data monitor window image as a BMP format or a JPG format.

   Capture: Save the data monitor window image to clipboard.

 * When selecting Data Save, the read data is saved as it is. The adjustment of the data axis or time axis is not reflected in the saved data.

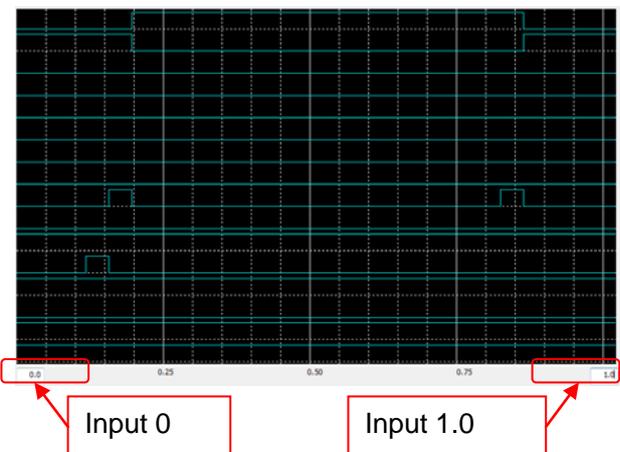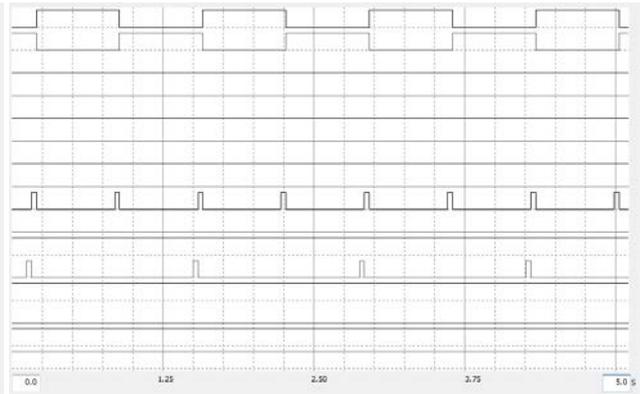 * Image Save and Capture save the display image of the data monitor window area.

   Be careful not to open the I/O monitor window over another software window.

8. Menu

Details of the menu bar at the top of the window are shown below.

LEC-WM		
File Setting Help		
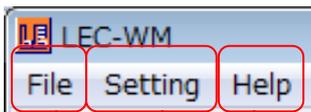
File	Data save	Saves the sampled data as a CSV file. This function can be used after sampling. (This function cannot be used when communication confirmation is not done.)
	Image save	Saves image data (BMP or JPG format)
	Capture	Saves image data to clipboard.
	Data file load	Reads CSV file and displays it in a chart.
Setting	Controller type	Selects data to be displayed in a graph. Used in I/O monitor window. (Not used in data monitor window)
	Graph color scheme	Selects the graph display color from Color or Monochrome.
Help	Version	Displays version No. of this software.

SMC

9. CSV Data Format

CSV files for each window are saved in the PC by selecting "Data save" from "File" in the main menu at each monitor window. The contents of each CSV file are shown below.

9.1 CSV File for Data Monitor Window

Sampling Interval (ms)   Sampling Time (s)

Data unit of items.
It means the unit is 0.01 mm.

Data name of items.

```
20150206 15:22, V100,    data
20,     10
        ,DWORD,              WORD,          WORD
1,      0.01,       1,              1
ms,     mm          ,mm/s           ,%
Time    , Position   , Speed        , Torque
0,      9819,       85,             33
20,     9585,       143,            37
40,     9263,       178,            43
60,     8865,       199,            44
80,     8463,       203,            42
100,    8058,       201,            41
120,    7658,       199,            44
140,    7278,       202,            43
 :       :            :              :
```

Unit of time is in ms.

* The figure shown above is an example for explanation. There are no spaces between data in the actual CSV file.

9.2 CSV File for I/O Monitor Window

Sampling Interval (ms)   Sampling Time (s)

Data name of items.

```
2015/02/06 15:20        V100,   IO
40,     5
Time,   IN0_Input, IN1_Input, IN2_Input, IN3_Input, IN4_Input, ···
0,      0,      1,      0,      0,      0,      ···
40,     0,      1,      0,      0,      0,      ···
80,     0,      1,      0,      0,      0,      ···
120,    0,      1,      0,      0,      0,      ···
160,    0,      1,      0,      0,      0,      ···
200,    1,      0,      0,      0,      0,      ···
 :       :      :       :       :       :
```

Unit of time is in ms.

Displays signal status.
1: ON 0: OFF

* The figure shown above is an example for explanation. There are no spaces between data in the actual CSV file.

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10.Alarm

If an error occurs while the software is used, an alarm window appears to display the alarm name.

Alarm names and countermeasures are shown below.

Alarm names		Countermeasures

It is not possible to communicate with the controller.		Communication with the controller cannot be established.
		Please check the following points.
		   (1) The power supply of motor controller (LEC) has been turned on.
		   (2) LEC-W2 communication cable (LEC-W2-C) is used.
		   (3) There was not a removal of or broken wire on the LEC-W2 communication cable (LEC-W2-C).
		   (4) The USB driver of the communication cable has been correctly installed.
		   (5) The communication setting of this software is correct.

This file is not for this screen.		The file selected in "Reading file" cannot be read correctly.
		Please check the following points.
		   (1) The data has been saved by this software (LEC-WM).
		   (2) The file is for the displayed window.

I can not monitor in this sampling interval. Please change the sampling interval to a large value.		Sampling interval range varies depending on the communication speed. Check the sampling interval. Refer to the items below for details. **6.2　Operating Procedure　(Data Monitor Sampling Method)** **7.2　Operating Procedure　(I/O Monitor Sampling Method)**

Communication data error	Response error	Communication with the controller has stopped during sampling.
		Please check the following points.
		   (1) A power supply of 24 VDC has been supplied to the LEC* controller.
		   (2) There was no abnormality such as a disconnection or broken wire on the LEC-W2 communication cable (LEC-W2-C).
		If the communication setting of the controller has been changed, this alarm may be generated.　Please return the communication setting of the controller to default value.
		 Refer to **"10.1 Confirmation Method of Controller Communication Setting"** for checking of the communication setting.

	CRC error	The response data from the controller could not be received correctly. - If noise is generated in an environment around the controller, the controller may be influenced.　Take countermeasures to avoid the influence of noise. - If the communication setting of the controller has been changed, this

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		alarm may be generated. Please return the communication setting of the controller to the default value. Refer to **"10.1 Confirmation Method of Controller Communication Setting"** for checking of the communication setting.
***.ini Reading Failed		The monitor soft setting file could not be read correctly. (1) File for alarm indication may not be in the System folder or the file link may be broken. Install the monitor software again. (2) If an English version Windows® is not used, the setting file is not recognized correctly. Use with an English version Windows®. Note)

Note) Confirm that Format in "Region" of "Control Panel" is English.

e.g. Region window

SMC
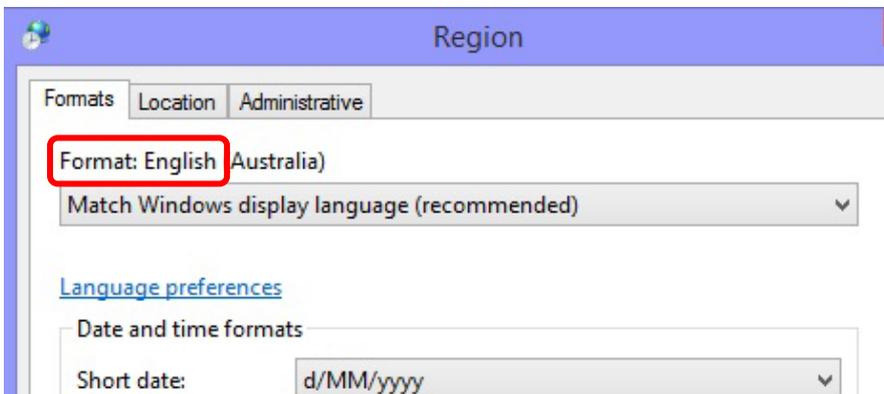
10.1 Confirmation Method of Controller Communication Setting

The monitoring software cannot be used correctly when the controller communication setting is incorrect.

Confirmation method of the communication setting with the setting software (ACTController) in the controller setting kit (LEC-W2) is shown below. Check the communication setting if the communication cannot be established with the setting or "Communication data error" is generated during sampling.

Refer to the Operation Manual of the LEC-W2 for operation of the setting software (ACTController) in the controller setting kit (LEC-W2).

Items	Explanations
Controller ID	This sets the value for identification of the controllers when multiple controllers are connected to the serial communication. Default value is 1. When the manual communication confirmation is performed, the ID setting in "5.2 Communication Setting" should correspond with this setting.

Comm speed	This sets the value of the serial communication speed. They are ranked from 1 to 6. Default value is 3 (38400bps).
	  1: 9800 bps, 2: 19200 bps, 3: 38400 bps (Controller default value)
	  4: 57600 bps, 5: 115200 bps, 6: 230400 bps
	When the manual communication confirmation is performed, the communication speed (bps) in "5.2 Communication Setting" should correspond with this setting.

Silent INT	Value which indicates the end discriminating condition of the received data. Use the software with the default value 1. **If the software is used with a value other than 1, data transmitting and receiving process error may be generated.**
Min Resp delay	Adjustment value of the time after receiving data from the PC until the data is sent from the controller to the PC. Use the software with the default value 5. **If the software is used with a value other than 5, data transmitting and receiving process error may be generated.**

(1) Controller ID confirmation

Start the setting software (ACTController) with Normal mode.

Open the parameter window, and check Controller ID in the Basic tab.

(1) Controller ID
(Default value is 1.)
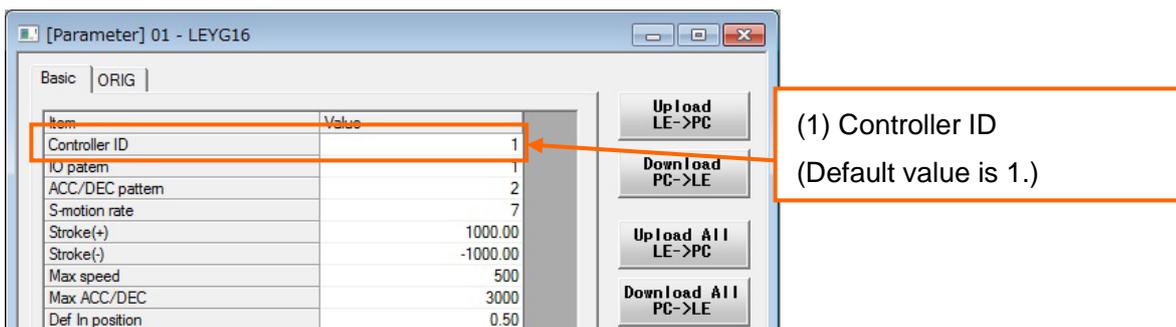
(2) Setting confirmation other than controller ID

a) Start the setting software (ACTController) with Normal mode.
Select "HELP" and then "Password". When the following password input window is displayed, enter "password" and click **OK**.

b) To allow the parameter of the communication setting to be browsed, change the setting of Para protect in the Basic tab of the parameter window to "3. Common+Extend+Step".
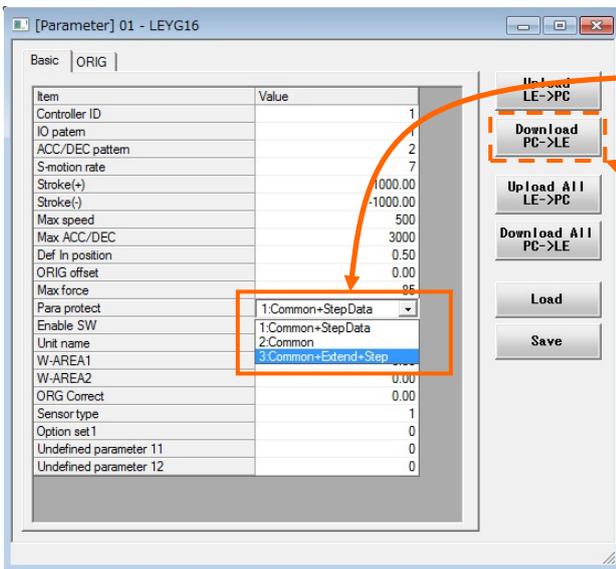
b)-1 Change Para protect to
    "3: Common+Extend+Step".

b)-2
Click Download only for editing.

* The default value of the parameter protect is "1: Common+StepData".

Click the Download button only for editing the communication setting. The changed data is transmitted to the controller. Once downloaded, the parameter protect set values which have been displayed in blue will be displayed in black. **Do not click Download button when confirming only.**

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c) The communication setting can be checked by selecting the "Motor" tab in the parameter window.

[Parameter] 01 - LEYG16

Basic | ORIG | Drive | **Motor** | Default | ALM

Item	Value
Phase Det Dir	1
Phase Det time	2
Limit SW	2
Limit SW type	1
Pole sensor	1
Maker Setting 001	100
Maker Setting 002	45
Maker Setting 003	100
Brake timing	200
AUTO PD	1
PD I limit	40
PD delay time	3
Maker Setting 004	120
Maker Setting 005	55
Maker Setting 006	45
Maker Setting 007	1
Maker Setting 008	
Maker Setting 009	1
Maker Setting 010	50
Maker Setting 011	95
Comm speed	3
Silent INT	1
Min Resp delay	5
Table Rev	3
Maker Setting 012	120
Maker Setting 306	0

1 - 6

Upload LE->PC
Download PC->LE
Upload All LE->PC
Download All PC->LE
Load
Save

c)-1 Select "Motor" tab.

c)-2 Check "Comm speed", "Silent INT", and "Min Resp delay".

c-3) Click Download only once the parameter has been edited.
- For editing, click Download in the window b) as well.
- The changed setting will be reflected after cycling power to the controller.

The edited data is transmitted to the controller by clicking the Download button. Once the transmission is completed, the edited set values which have been displayed in blue will be displayed in black.

d) After confirmation, change the parameter protect in the window c) shown above to "1: Common+StepData", and click Download button. Then, exit the setting software (ACTController).

⚠ Warning

(1) Adjustment, mounting, inspection or wiring change should never be carried out before disconnecting the power supply to the product.

An electric shock, malfunction, and breakage can result.

(2) Never disassemble the cable. Never use cables other than specified.

(3) Never connect or disconnect the cable or connector with power on.

⚠ Caution

(1) Wire the connector securely. Do not apply any voltage to the terminals other than those specified in the Operation Manual.

(2) Wire the connector securely.

Check for correct connector wiring and polarity.

(3) Take appropriate measures against noise.

Noise in a signal line may cause malfunction.

As a countermeasure, high voltage and low voltage cables should be separated, and keep wiring lengths short, etc.

(4) Do not route wires or cables together with power or high voltage cables.

The product may malfunction due to interference and surge voltages. Route the wires of the product separately from power or high voltage cables.

(5) Take care that actuator movement does not damage cables.

(6) Operate with cables secured. Avoid bending cables at sharp angles where they enter the product.

(7) Avoid twisting, folding, rotating or applying an external force to the cable. Also avoid operating at sharp angles.

Risk of electric shock, broken wires, contact failure and loss of control of the product can occur.

(8) Fix the motor cable protruding from the product in place before using.

The motor cable is not robotic type cable and can be damaged when moved.

Do not place Part A in the diagram below in a flexible cable duct.
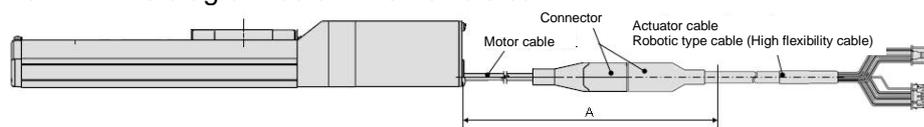
(9) Select "Robotic type cables" when deflecting actuator-cables repeatedly. Do not put cables into a flexible moving tube with a radius smaller than the specified value (minimum 50mm).

Risk of electric shock, wire damage, contact failure and loss of control of the product can occur if "Standard cables" are used in case of inflecting the cables repeatedly.
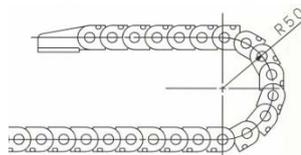
(10) Confirm proper wiring of the product.

Poor insulation (interference with other circuits, poor insulation between terminals etc.) can apply excessive voltage or current to the product causing damage.

(11) The speed/ pushing force may vary, depending on the cable length, load and mounting conditions etc.

If the cable length exceeds 5m, the speed/ pushing force will decrease by a maximum of 10% per 5m. (If cable length is 15m: Maximum 20% reduction.)

[Transportation]
⚠Caution
(1) Do not carry or swing the product by the motor or the cable.

12. Common Precautions for the Electric Actuator

12.1 Design and Selection

⚠Warning

(1) Operation Manual needs to be 37horoughly read.

Handling or usage/operation other than that specified in the Operation Manual may lead to breakage and product failure.

Any damage attributed to use beyond the specifications is not guaranteed.

(2) If the change of force is generated to the actuator due to the stress of the sliding surface, the operating may be accompanied with impact with the speed exceeding the set speed.

In such cases, human injury may occur; e.g., hands or feet caught in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be designed to operate smoothly and avoid such dangers.

(3) A protective cover is recommended to minimize the risk of personal injury.

If a driven object and moving parts of the product are in close proximity, personal injury may occur. Design the system to avoid contact with the human body.

(4) Securely tighten all stationary parts and connected parts so that they will not become loose.

When the product operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

(5) Consider a possible loss of power source.

Take measures to prevent injury and equipment damage in the case of a power supply failure.

(6) Consider the behavior of an emergency stop of the whole system.

Design the system so that human injury and/or damage to machinery and equipment will not be caused, when it is stopped by a safety device for abnormal conditions such as a power outage or a manual emergency stop of the whole system.

(7) Consider the action when operation is restarted after an emergency stop or abnormal stop of the whole system.

Design the machinery so that personal injury or damage to equipment will not occur upon restart of operation.

(8) Disassembly and modification is prohibited.

Do not disassemble the product or make any modifications, including additional machining. This may cause human injury and/or an accident.

(9) Do not use stop signal, "EMG" of the controller and stop switch on the teaching box as the emergency stop of system.

The stop signal, "EMG" of controller and the stop switch on the teaching box are only to be used for decelerating and stopping the actuator. Design the system with an emergency stop circuit which is applied to the relevant safety standard separately.

(10) When using it for vertical application, it is necessary to build in a safety device.

Install safety equipment which does not cause human injury or damage the equipment. Refer to Precautions for Lock if using the product with lock.

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⚠ Caution

(1) Use the product for the maximum usable stroke.
The product will be damaged if it is used with a stroke exceeding the maximum stroke. Refer to the specifications of the product.

(2) When the product repeatedly cycles with partial strokes, operate it at a full stroke at least once a day or every 1,000 strokes.
Otherwise, lubrication can be lost.

(3) Do not use the product in applications where excessive external force or impact force is applied to it.
The product can be damaged. Components including motors are manufactured to precise tolerances, so the slightest deformation may cause faulty operation.

(4) Return to origin cannot be performed while operating.
This function cannot be carried out during positioning operation or pushing operation.

(5) Refer to the common auto switch precautions when an auto switch is built in and used.

(6) When conformity to UL is required, the electric actuator and controller should be used with a UL1310 Class 2 power supply.

12. 2 Mounting

⚠ Warning

(1) Install and operate the product only after reading the Operation Manual carefully and understanding its contents.
Keep the manual in a safe place for future reference.

(2) Tighten threads with the proper tightening torque.
Tighten the screws to the recommended torque for mounting the product.

(3) Do not make any alterations to this product.
Alterations made to this product may lead to a loss of durability and damage to the product, which can lead to human injury and damage to other equipment and machinery.

(4) When using an external guide, the guide axis should be parallel to the actuator axis.
If not, stress will be generated, causing wearing and breakage.

(5) When an external guide is used, connect the moving parts of the actuator and the load in such a way that there is no interference at any point within the stroke.
Do not scratch or damage the sliding part by hitting it with an object. Components are manufactured to precise tolerances, so the slightest deformation may cause faulty operation.

(6) Prevent the seizure of rotating parts (pins, etc.) by applying lubricating grease.

(7) Do not use the product before verifying that the equipment can operate properly.
After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted properly.

(8) Cantilever
When a cylinder is operated with high speed while it is fixed at one end and free at another end (basic style, flange type, direct mount type), bending moment may be applied to the actuator by vibration generated at the stroke end and it can damage the actuator. In such a case, install a

support bracket to suppress the vibration of the actuator body or reduce the speed so that the actuator does not vibrate. Use a support bracket also when moving the actuator body or when a long stroke actuator is mounted horizontally and fixed at one end.

(9) When mounting the actuator or attaching to the work piece, do not apply strong impact or large moment.

If an external force over the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.

(10) Maintenance space

Allow sufficient space for maintenance and inspection.

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12. 3 Handling Precautions

⚠ Warning

(1) Do not touch the motor / lock during energizing.
Energizing alone may also cause this temperature increase. Do not touch the motor and the lock when in operation as it may cause burns.

(2) If abnormal heating, smoking or fire, etc., occurs in the product, immediately shut off the power supply.

(3) Immediately stop operation if abnormal operation noise or vibration occurs.
If abnormal operation noise or vibration occurs, the product may have been mounted incorrectly. Unless operation of the product is stopped for inspection, the product can be seriously damaged.

(4) Never touch the rotating part of the motor or moving part of the actuator while in operation.

(5) When installing, adjusting, inspecting or performing maintenance on the product, controller and related equipment, be sure to shut off the power supply to each of them. Then, lock it so that no one other than the person working can turn the power on, or implement measures such as a safety plug.

In the case of the actuator that has a servo motor (24 VDC), the "motor phase detection step" is done by inputting the servo on signal just after the controller power is turned on. The "motor phase detection step" moves the table/rod for the distance of one screw-lead maximum. (The motor rotates in the reverse direction if the table hits an obstacle such as the end stop damper.)
Take the "motor phase detection step" into consideration for the installation and operation of this actuator.

⚠ Caution

(1) Use the controller and actuator in combination as delivered.
The product parameters are set before shipment. If the controller is combined with a different actuator, failure can result.

(2) Check the product for the following points before operation.
a) Damage to power supply line and signal line
b) Looseness of the connector to the power and signal lines
c) Looseness of the actuator/cylinder and controller/driver mounting
d) Abnormal operation
e) Emergency stop function

(3) When more than one person is performing work, decide on the procedures, signals, measures for emergency and how to start the operation after the measures taken. Also, designate a person to supervise work other than those performing work.

(4) Actual speed of the product will depend on the workload.
Before selecting a product, check the catalog for the instructions regarding selection and specifications.

(5) Do not apply a load, impact or resistance in addition to a transferred load during return to origin.
In the case of the return to origin by pushing force, additional force will cause displacement of the origin position since it is based on detected motor torque.

(6) Do not remove the name plate.

(7) Operation test should be done at a low speed. Start operation at the specified speed after confirming there is no trouble.

[Grounding]
⚠️Warning
(1) Provide a good earth connection to the actuator.

(2) Dedicated grounding should be used if possible. Grounding should be to a D-class grounding. (Ground resistance 100Ω or less)

(3) The earth cable length should be as short as possible.

[Unpacking]
⚠️Note:
(1) Check the received product is as ordered.
   If a different product is installed, other than that ordered, injury or damage can result.

12. 4 Operating Environment

⚠️Warning

(1) Avoid use in the following environments.
   1. Locations where a large amount of dust and cutting chips are airborne.
   2. Locations where the ambient temperature is outside the range of the temperature specification
      (refer to specifications).
   3. Locations where the ambient humidity is outside the range of the humidity specification
      (refer to specifications).
   4. Locations where corrosive gas, flammable gas, seawater, water and steam are present.
   5. Locations where strong magnetic or electric fields are generated.
   6. Locations where direct vibration or impact is applied to the product.
   7. Areas that are dusty, or are exposed to splashes of water and oil drops.
   8. Areas exposed to direct sunlight (ultraviolet rays).
   9. Environment at an altitude of 1000 meters or higher
        Heat radiation and withstand voltage will decrease. Contact SMC for details.

(2) Do not use in an environment where the product is directly exposed to liquid, such as cutting oils.
   If cutting oils, coolant or oil mist contaminates the product, failure or increased sliding resistance can result.

(3) Install a protective cover when the product is used in an environment directly exposed to foreign matter such as dust, cutting chips and spatter.
   Play or increased sliding resistance can result.

(4) Shade the sunlight in the place where the product is applied with direct sunshine.

(5) Shield the product if there is a heat source nearby.
   When there is a heat source surrounding the product, the radiated heat from the heat source can increase the temperature of the product beyond the operating temperature range. Protect it with a cover, etc.

(6) Grease oil can be reduced due to the external environment and operating conditions. The

lubrication performance may deteriorate and shorten the life of the product.

[Storage]

⚠️Warning

(1) Do not store the product with direct contact to rain or water drops. Do not store the product where it is exposed to harmful gases or liquid.

(2) Store in an area that is shaded from direct sunlight and has a temperature and humidity within the specified range (-10°C to 60°C, up to 90%, No condensation or freezing.) (Controller storage condition: -10 to 60°C, up to 90%, No condensation or freezing)

(3) Do not apply vibration and impact to the product during storage.

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12. 5 Maintenance Precautions

⚠Warning

(1) Do not disassemble or repair the product.
   It may cause an electric shock.

(2) Work on wiring or inspection in 5 minute or more after the power supply is turned off, and check the voltage using a tester before wiring or inspection.
   Otherwise, it may cause an electric shock.

⚠Caution

(1) Maintenance should be performed according to the procedure indicated in the Operating Manual.
   Incorrect handling can cause injury, damage or malfunction of equipment and machinery.

(2) Removal of product
   When equipment is serviced, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc, then cut the power supply to the system. When machinery is restarted, check that operation is normal with actuators in the proper positions.

[Lubrication]

⚠Caution

(1) The product has been lubricated for life at the manufacturer's and does not require lubrication in service.
   If lubrication is necessary, use the grease pack on page 5.

12. 6 Precautions for Actuator with Lock

⚠Warning

(1) Do not use the lock as a safety lock or a control that requires a locking force.
   The lock used for the product with a lock is designed to prevent dropping of work pieces.

(2) For vertical mounting, use the product with a lock.
   If the product is not equipped with a lock, the product will move and drop the work piece when the power is removed. If the actuator with lock is not used, preventive measure should be take by the design of equipment.

(3) "Measures against drops" means preventing a work piece from dropping due to its weight when the product operation is stopped and the power supply is turned off.

(4) Do not apply an impact load or strong vibration while the lock is activated.
   If an external impact load or strong vibration is applied to the product, the lock will lose it's holding force and damage to the sliding part of the brake or shortening of lifespan can result. The same situations will happen when the lock slips due to a force over the thrust of the product, as this accelerates the wear to the lock.

(5) Do not apply liquid or oil and grease to the lock or its surrounding.
   If liquid or oil and grease is applied to the sliding part of the lock, its holding force will reduce significantly.

(6) Take measures against drops and check that safety is assured before mounting, adjustment and inspection of the product.
   If the lock is released with the product mounted vertically, a work piece can drop due to its weight.

(7) When the actuator is operated manually (when SVRE output signal is off), supply 24 VDC to the [BK RLS] terminal of the power supply connector.
   If the product is operated without releasing the lock, wear of the lock sliding surface will be accelerated, causing a reduction in the holding force and the life of the locking mechanism.

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(8) Do not supply 24VDC power supply constantly to the [BK RLS (Lock release)] terminal.

Only supply 24 VDC power supply to the [BK RLS (Lock release)] terminal during normal operation.　If power is supplied to the [BK RLS] terminal continuously, the lock will be released, and workpieces may be dropped at stop (EMG).

/ For details of wiring please refer to the operation manual for the controller (LEC series).

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13. 1 Design and Selection

⚠Warning

(1) Make sure to apply the specified voltage.

Otherwise, malfunction and breakage of the controller may result.

If the applied voltage is lower than the specified voltage, it is possible that the load cannot be moved due to an internal voltage drop. Please check the operating voltage before use.

(2) Do not operate beyond the specifications.

Fire, malfunction, or damage to the actuator can result. Check the specifications before use.

(3) Install an emergency stop circuit.

Install an emergency stop outside of the enclosure so that it can stop the system operation immediately and intercept the power supply.

(4) In order to prevent danger and damage due to the breakdown and the malfunction of this product, which may occur at a certain probability, a backup system should be established in advance by giving a multiple-layered structure or a fail-safe design to the equipment, etc.

(5) If a fire or personal injury is expected due to abnormal heat generation, ignition, smoking of the product, etc., cut off the power supply for this product and the system immediately.

13.2 Handling Precautions

⚠Warning

(1) The inside of the controller and its connector should not be touched.

It may cause an electric shock or damage to the controller.

(2) Do not perform the operation or setting of this equipment with wet hands.

It may cause an electric shock.

3. A product that is damaged or missing any components should not be used.

Electric shock, fire, and injury can result.

(4) Use only the specified combination of controller and electric actuator.

It may cause damage to the controller or the actuator.

(5) Be careful not to be caught or hit by the workpiece while the actuator is moving.

Otherwise an injury can result.

(6) Connect the power supply or turn on the power supply switch after confirming the safety in the area within the work load moves.

The movement of the workpiece may cause an accident.

(7) Do not touch the product when it is energized and for some time after power has been disconnected, as it is very hot.

It may cause burns due to the high temperature.

(8) Before modifying or checking the wiring, the voltage should be checked with a tester 5 minutes after the power supply is turned off.
Electric shock, fire, and injury can result.

(9) Do not use in an area where dust, powder dust, water or oil is in the air.
It will cause failure or malfunction.

(10) Do not use in an area where a magnetic field is generated.
It will cause failure or malfunction.

(11) Do not install in an environment containing flammable gas, corrosive gas or explosive gas.
Otherwise, fire, explosion or corrosion may occur.

(12) Do not subject the product to radiant heat from strong heat supplies such as a furnace, direct sunlight, etc.
It will cause failure of the controller or its peripheral devices.

(13) Do not use the product in an environment subject to a temperature cycle.
It will cause failure of the controller or its peripheral devices.

(14) Do not use in a place where surges are generated.
When there are units that generate a large amount of surge around the product (e.g., solenoid type lifters, high frequency induction furnaces, motors, etc.), this may cause deterioration or damage to the product's internal circuit. Avoid surge generation and crossed lines.

(15) Do not install this product in an environment subject to vibration and impact.
It will cause failure or malfunction.

(16) If this product is used with a relay or solenoid valve, they should be the surge absorbing element built-in type.

(17) Use the teaching box in accordace with the displayed content after the window display is completely switched. .
Otherwise, malfunction or accident may result.

13.3 Mounting

⚠ Warning

(1) The controller and its peripheral devices should be installed on a fire-proof material.
Direct installation on or near a flammable material may cause fire.

(2) Do not install this product in a place subject to vibration and impact.
It may cause an electric shock, fire, or injury.

(3) Take measures so that the operating temperature of this controller and its peripheral devices are within the range of the specifications.
Also, this controller should be installed with at least 50mm space between each side of it and other structures or components.
The failure of the controller or peripheral equipment can result.

(4) Do not mount this controller and its peripheral devices together with large electromagnetic contactor or no-fuse breaker, which generates vibration, on the same panel. Mount them on different panels, or keep the controller and its peripheral devices away from such sources of vibration.

(5) This controller and its peripheral devices should be installed on a flat surface.
If the mounting surface is distorted or not flat, an unacceptable force may be added to the housing, etc. to cause troubles.

13.4 Wiring

⚠ Warning

(1) Do not damage the cable or apply a heavy object or pinch the cable. Avoid repeatedly bending or stretching the cable.
Electric shock, fire, and breaking wire can result.

(2) Connect wires and cables correctly.
Incorrect wiring could damage the controller or its peripheral devices depending on the seriousness.

(3) Do not connect wires while the power is supplied.
It can damage the controller or its peripheral devices could be damaged, causing malfunction.

(4) Do not carry this product by holding its cables.
It may cause an injury or damage to the product.

(5) Do not connect power cable or high-voltage cable in the same wiring route as the unit.
The wires to the controller or its peripheral devices can be interrupted with noise or induced surge voltage from power lines or high-voltage lines, causing malfunction.
Separate the wiring of the controller and its peripheral devices from power lines and high voltage lines.

(6) Verify the insulation of wiring.
Poor insulation (interference with other circuits, poor insulation between terminals etc.) can allow excessive voltage or current to the product causing damage.

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13.5 Power Supply

⚠ Caution

(1) Use a power supply that has low noise between lines and between power and ground.
In cases where noise is high, an isolation transformer should be used.

(2)The controller input power supply and the I/O power supply should be separated by using the instantaneous power supply.
If the power supply is of the "in-rush current limiting type", a voltage drop may occur during the acceleration of the actuator.

(3) Take appropriate measures to prevent surges from lightning.   Ground the surge absorber for lightning separately from the grounding of the controller and its peripheral devices.

13.6 Grounding

⚠ Warning

(1) Ensure that the product is grounded to allow the noise tolerance of the controller.
Otherwise it may cause an electric shock or fire.

(2) Dedicated grounding should be used.
Grounding should be to a D-class ground. (Ground resistance of 100 Ω or less)

(3) The grounding point should be as near as possible to the controller to keep the cable length short.

(4) In the unlikely event that malfunction is caused by the ground, it may be disconnected.

13.7 Maintenance

⚠ Warning

(1) Perform maintenance checks periodically.
Confirm wiring and screws are not loose.
Loose screws or wires may cause unexpected malfunction.

(2) Conduct an appropriate functional inspection after completing the maintenance.
In case of any abnormalities (if the actuator does not move, etc.), stop the operation of the system.
Otherwise, an unexpected malfunction may occur and it will become impossible to ensure safety.
Give an emergency stop instruction to confirm safety.

(3) Do not disassemble, modify or repair this controller and the peripheral equipment.

(4) Do not put anything conductive or flammable inside of this controller.
Burning or explosion can result.

(5) Do not conduct an insulation resistance test and withstand voltage test on this product.

(6) Ensure sufficient space for maintenance.
Design the system allowing the required space for maintenance.

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Please download this software from the SMC website.

SMC website http://www.smcworld.com/

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