

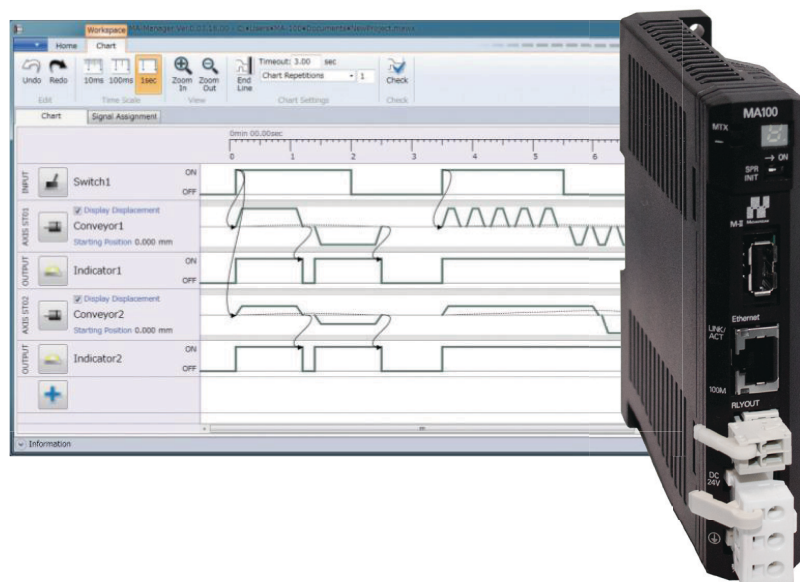
YASKAWA MA100

Motion Adapter Series MA100
Engineering Tool MA-Manager

User's Manual

Model: JEPMC-MA100-E

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.



1. Introduction

Motion Adapter series MA100 is controller only for positioning that executes command to SERVOPACK of MECHATROLINK-II I/F. Before operating Motion Adapter series, read this manual to operate definitely. Keep this manual in a safe place for future reference.

1.1 To operate definitely

How to refer this manual

■ Basic Terms

Unless otherwise specified, the following definitions are used.

- MA100 : Motion Adapter Series MA100
- MA-controller : Generic name of MA series controller
- MA-Manager : Tool for programming , or PC with the tool installed.
- PLC : Programmable Logic Controller

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Safety Information


The following conventions are used to indicate precautions in this manual. Information marked as shown below is important for the safety of the user. Always read this information and heed the precautions that are provided. The conventions are as follows:




Indicates precautions that, if not heeded, could possibly result in loss of life, serious injury, or property damage.



Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or property damage.


If not heeded, even precautions classified under  can lead to serious results depending on circumstances.




Indicates prohibited actions. Specific actions are indicated inside .

For example,  indicates prohibition of open flame.



Indicates mandatory actions. Specific actions are indicated inside .

For example,  indicates mandatory grounding.

The following precautions are for storage, transportation, installation, wiring, operation, maintenance, inspection, and disposal. These precautions are important and must be observed.

 **WARNING**

◆ **General Precautions**

- **Before connecting the machine and starting operation, make sure that an emergency stop procedure has been provided and is working correctly.**
There is a risk of injury.
- **Do not touch anything inside the MA Unit.**
There is a risk of electrical shock.
- **Do not remove the front cover, cables, connector, or options while power is being supplied.**
There is a risk of electrical shock, machine failure or damage to machine.
- **Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch the cables.**
There is a risk of electrical shock, operational failure or burning.
- **Do not attempt to modify the MA Unit in any way.**
There is a risk of injury or device damage.
- **Do not approach the machine after a momentary interruption to the power supply.**
When power is restored, the MA Unit and the device connected to it may start operation suddenly. Provide safety measures in advance to ensure human safety when operation restarts.
There is a risk of injury.
- **The installation must be suitable and it must be performed only by an experienced technician.**
There is a risk of electrical shock or injury.
- **This MA unit was not designed or manufactured for use in devices or systems that are directly related to human life. Users who intend to use this MA unit for special purposes, such as devices or systems that are related to transportation, medical, space aviation, nuclear energy control, or underwater applications, safety devices must be installed to minimize the likelihood of any accident that could be caused by failure of this MA Unit.**
- **This MA unit has been manufactured under strict quality control guidelines. However, if this MA unit is to be installed in any location in which a failure of the MA unit involves a life and death situation or in a facility where failure may cause a serious accident, safety devices MUST be installed to minimize the likelihood of any accident that could be caused by failure of this MA Unit.**

◆ **Storage**

- **Do not store or install the product in the following locations. There is a risk of fire, electrical shock, or device damage.**
 - Direct sunlight
 - Ambient temperature exceeds the storage or operating conditions
 - Ambient humidity exceeds the storage or operating conditions
 - Rapid changes in temperature or locations subject to condensation
 - Corrosive or flammable gas
 - Excessive dust, salt, or metallic powder
 - Water, oil, or chemicals
 - Vibration or shock



WARNING

◆Transportation

- **Hold onto the main body of the MA Unit when transporting it.**

Holding the cables or connectors may damage them or result in injury.

- **Do not overload the MA Unit during transportation. (Follow all instructions.)**

There is a risk of injury or an accident.



CAUTION

◆Transportation

- **Never subject the MA Unit to an atmosphere containing halogen (fluorine, chlorine, bromine, or iodine) during transportation.**

There is a risk of malfunction or damage.

- **If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.**

Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.

If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

◆Installation

- **Never use the MA Unit in an environment subject to water, corrosive gases, flammable gases, or combustibles.** There is a risk of electric shock or fire.

- **Do not step on the MA Unit or place heavy objects on the MA Unit.**

There is a risk of injury or an accident.

- **Do not block the air exhaust ports on the MA Unit. Do not allow foreign objects to enter the MA Unit.** There is a risk of malfunction. There is a risk of internal element deterioration, malfunction, or fire.

- **Always mount the MA Unit in the specified orientation.**

There is a risk of malfunction.

- **Leave the specified amount of space between the MA Unit, and the interior surface of the control panel and other devices.**

There is a risk of fire or malfunction. There is a risk of fire or product failure.

- **Do not subject the MA Unit to strong shock.** There is a risk of injury or product failure.



CAUTION

◆ Wiring

- **Check the wiring to be sure it has been performed correctly.**

There is a risk of motor run-away, injury, or an accident.

- **Always use a power supply of the specified voltage.**

There is a risk of fire or accident.

- **In places with poor power conditions, take all steps necessary to ensure that the input power supply is within the specified voltage range.**

There is a risk of device damage.

- **Install breakers and other safety measure to provide protection against shorts in external wiring.**

There is a risk of fire.

- **Provide sufficient shielding when using the product in the following locations.**

- Noise, such as from static electricity
- Strong electromagnetic or magnetic fields
- Radiation
- Near to power lines

There is a risk of device damage.

- **Configure the circuits to turn ON the power to the MA unit before the 24-V I/O power supply.**

If the power supply to the MA Unit is turned ON after the external power supply, e.g., the 24-V I/O power supply, the outputs from the MA Unit may momentarily turn ON when the power supply to the MA Unit turns ON. This can result in unexpected operation that may cause injury or device damage.

- **Provide emergency stop circuits, interlock circuits, limit circuits, and any other required safety measures in control circuits outside of the MA Unit.**

There is a risk of injury or device damage.

- **If you use MECHATROLINK I/O Modules, use the establishment of MECHATROLINK communications as an interlock output condition.**

There is a risk of device damage.

- **Select the I/O signal wires for external wiring to connect the MA Unit to external devices based on the following criteria:**

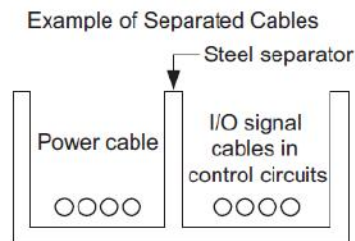
- Mechanical strength
- Noise interference
- Wiring distance
- Signal voltage etc.



CAUTION

- **Separate the I/O signal cables for control circuits from the power cables both inside and outside the control panel to reduce the influence of noise from the power cables.**

If the I/O signal lines and power lines are not separated properly, malfunction may occur.



◆ Operation

- **Follow the procedures and instructions in the user's manuals for the relevant products to perform normal operation and trial operation.**

Operating mistakes while the Servomotor and machine are connected may damage the machine or even cause accidents resulting in injury or death.

- **Implement interlock signals and other safety circuits external to the MA Unit to ensure safety in the overall system even if the following conditions occur.**

- MA Unit failure or errors caused by external factors
- Shutdown of operation due to MA Unit detection of an error in self-diagnosis and the subsequent turning OFF or holding of output signals
- Holding of the ON or OFF status of outputs from the MA Unit due to fusing or burning of output relays or damage to output transistors
- Unexpected outputs due to errors in the power supply, I/O, or memory that cannot be detected by the MA Unit through self-diagnosis.

There is a risk of injury, device damage, or burning.



CAUTION

◆ Maintenance and Inspection

- **Do not attempt to disassemble or repair the MA Unit.**

There is a risk of electrical shock, injury, or device damage.

- **Do not change any wiring while power is being supplied.**

There is a risk of electrical shock, injury, or device damage.

- **If you replace an MA Unit, do not start operation until you have transferred suitable programming and settings to the new MA Unit.**

If you operate the MA Unit without transferring this data, unexpected operation may occur. There is a risk of injury or device damage.

◆ Disposal

- **Dispose of the MA Unit as general industrial waste.**

Observe the following general precautions to ensure safe application.

◆ Other General Precautions

- **The products shown in the illustrations in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual.**
- **The illustrations that are presented in this manual are typical examples and may not match the product you received.**
- **Any and all quality guarantees provided by Yaskawa are null and void if the customer modifies any product in any way. Yaskawa disavows any responsibility for damages or losses that are caused by modified products.**
- **If the manual must be ordered due to loss or damage, inform your nearest Yaskawa representative or one of the offices listed on the back of this manual.**

§Warranty§

◆ Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called "delivered product") is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

■ Warranty Scope

If a failure for which Yaskawa is responsible occurs during the above warranty period, please send the product to Yaskawa. We will check the product when we receive it and provide a substitute free of charge. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.

This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Abuse of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

■ Limitations of Liability

- Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

■ Suitability for Use

- It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
- Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
- Systems, machines, and equipment that may present a risk to life or property
- Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
- Other systems that require a similar high degree of safety
- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

■ Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

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2. Outline of the Product

2.1 Features of MA100

MA100 is a controller that executes positioning command to servo axis of MECHATROLINK- II .

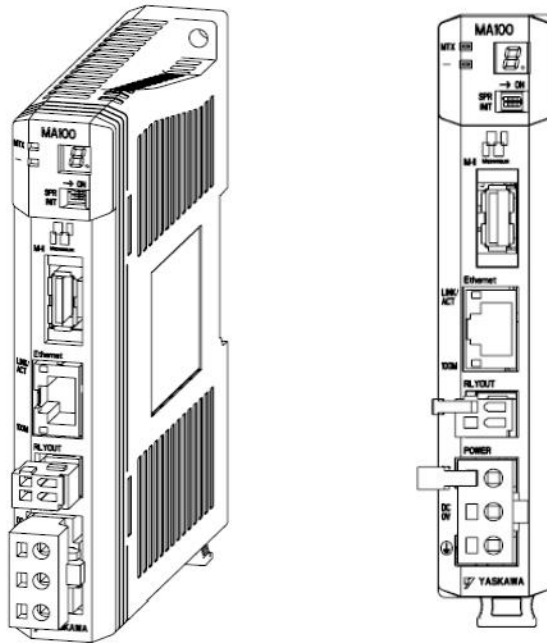
Following is features of MA100.

- Motion network MECHATROLINK- II is equipped.
Servo applied to MECHATROLINK- II could be connected to max 4 axes, and I/O could be connected to max 4 stations.
- Ethernet(100Mbps) is equipped
High-speed communication with engineering tool MA-Manager is possible.
Communication with touch panel is possible. (automatic receive function)
Communication with host PLC is possible. (automatic receive function)
- Plain programming method by time chart
Positioning command could be created easily by command description with speed diagram.

Functions possible to execute are shown below.

Mode	Function	Operation method	
Offline function	Creation of time chart	MA-Manager	
	Definition of configuration		
	Allocation of I/O signal		
Online function	Online connection	MA-Manager	
	Transfer of project		
	Servo ON/OFF (individual /all axis)		
	Alarm monitor		
	Alarm reset		
	Debug operation (START/HOLD/STOP)		
	Manual operation (JOG operation, STEP operation, zero point return, positioning of absolute position, setup of zero point return)		
	Status monitor		
	Function that checks wiring of I/O	DI/HMI/PLC	
	Servo ON/OFF		
	JOG operation, STEP operation, zero point return, zero point return		
	Time chart		START
	Operation program		HOLD
	STOP		
Connection of Ethernet (automatic receive) Protocol	<ul style="list-style-type: none"> •Extended MEMOBUS communication communication •MODBUS(TCP) communication 	HMI/PLC	
Connection of SigmaWin+ (Change of servo parameter)		SigmaWin+	

2.2. Appearance of the Product



2.3. General Specifications

Items		Specifications
Physical Environmental Conditions	Ambient operating temperature	0 to + 55°C
	Ambient storage temperature	- 25°C to +85°C
	Ambient operating humidity	10%RH to 95%RH (Avoid condensation)
	Ambient storage humidity	5%RH to 95%RH (Avoid condensation)
	Pollution Level	Pollution Level 2 (Conforming to JIS B 3502)
	Corrosive gas	There must be no combustible or corroded gas
	Operating altitude	Altitude 2000[m] and less
Mechanical Operation Conditions	Vibration Resistance	Conforms to JIS B3502 •Serial vibration:Amplitude•Acceleration: Frequency: 5Hz to8.4Hz Amplitude :1.75mm Frequency: 8.4Hz to 150Hz Fixed acceleration: 4.9m/sec ² •Intermitted: Frequency: 5~8.4Hz Amplitude: 3.5mm Frequency: 8.4 ~ 150Hz Fixed :acceleration 9.8m/sec ² Both 10 times for direction of X,Y,Z
	Shock Resistance	Conforms to JIS B3502 Peak acceleration : 147m/s ² (15G) Action time: 11ms Each 3 times for direction of X,Y,Z
Electric Operation Conditions	Noise Resistance	Conforms to EN61000-6-2, EN61000-6-4, EN55011(Group1 ClassA) Power noise(FT noise) :±2kV/minute for one minute Radiation noise (FT noise) : ±1kV/min for one minute
Installation Conditions	Earth	Ground to 100Ω max
	Cooling method	Natural air cooling

2.4. Basic Specifications of the Product

Items		Specifications	Comment
Model		JEPMC-MA100-E	
External size		25mm(W)×130mm(H)×108mm(D)	
Power	Input voltage	DC24V (±20%)	
	Input current(*)	Less than 1A (Rated)	
	Inrush current(*)	Less than 40A	
control axis	Max number of control axis	4 axes	
MECHATROLINK	Communication method	MECHATROLINK-II (32byte)	
	Communication cycle	2ms (Fixed)	
	Max number of connection station (M II)	8 stations	Servo: Max 4 stations I/O: Max 4 stations
	Connection of SigmaWin+ through MA100	Possible to connect	
	Servo device	• Σ -V (Rotation type ^{*1} /Linear) • Σ -V mini	Except for large capacity Σ -V Station address is 1~4
	I/O device	Only Simple IO Impossible with intelligent I/O	Station address is 1~4
	Inverter device	Not supported	
Scan time	Fixed cycle scan	10ms	
Communication I/F	Ethernet	10Base-T/100Base-TX	
I/O	Servo I/O	•Only Σ -V IN 3points OUT 3points (Impossible with Σ -V mini)	Input: SI0, EXT2,3 Output: SO1,2,3 Possible to use in program
Memory capacity	SDRAM	16MB	
	FLASH	4MB	
	Program capacity	1MB	
Program	Language	Time chart	Use engineering tool MA-Manager
	Command resolution	10ms	
	Number of chart	1 chart	
	Max time of chart	1 hour	
	Repeat time of chart	1~9999 time or possible to specify ∞	

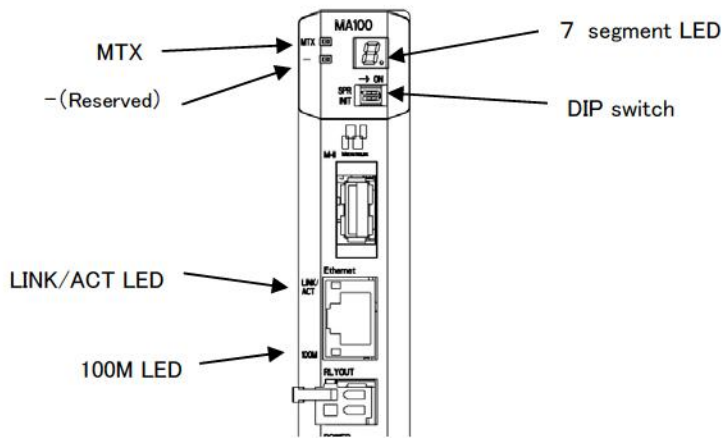
*1: Applied to DD motor. Before using, see appendix D for details of note

2.5. Specifications of Programming

Items		Specifications	Comment
Axis control	Number of positioning	Up to 400 positioning	
	Number of axis	Max 4 axes	
	Type of positioning	Simple positioning	
	Finite length/infinite length	Only finite length	
	Positioning parameter	Start time (Possible to specify with 10ms unit) Amount of the movement Speed Acceleration time/Acceleration Deceleration time/Deceleration	Specified directly by MA-Manager
Input signal	Times of ON/OFF	Up to 400 times	
	Point of input signal	64 points	
Output signal	Times of ON/OFF	Up to 400 times	
	Point of output signal	64 points	

2.6. LED Display and Switch Setting

2.6.1 LED Display



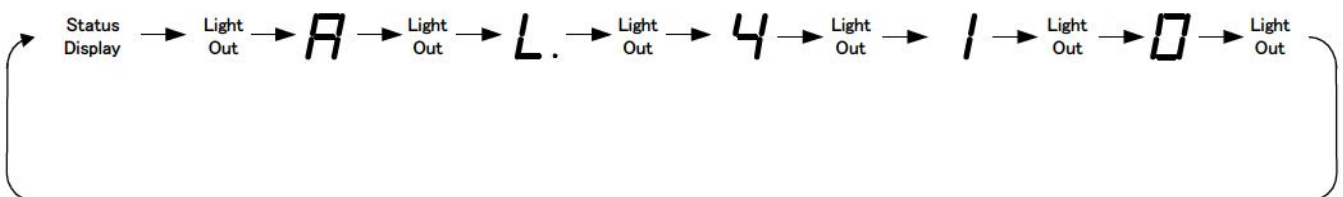
LED that is displayed the motion and abnormality status of Motion Adapter is shown below.

LED	Color	Status when display lamp turns on	Comment
MTX	Green	MECHATROLINK Ready	Turns on when axis is defined and MECHATROLINK communication is ready. Turns off when INIT switch is turned on.
-	-	Reserved	
LINK/ACT	Orange	Lighting: Ethernet connectiong Blinking: Sending/Receiving data	
100M	Green	Lighting: Connected by 100Base-TX Light out: Connected by 10Base-T	
	Red	Lighting: Reset status by power cycle Blinking: Connection check by MA-Manager	
	Red	READY status	Dot: Ready status - : Status that it do not running
	Red	Memory clear status	
	Red	RUN status	
Other	Red	Display of alarm number	See section 7 for the details of alarm number

How to check the display of alarm number

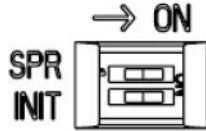
Alarm number is displayed by one character as shown below.

Example: 「AL.410」



2.6.2 Switch Setting

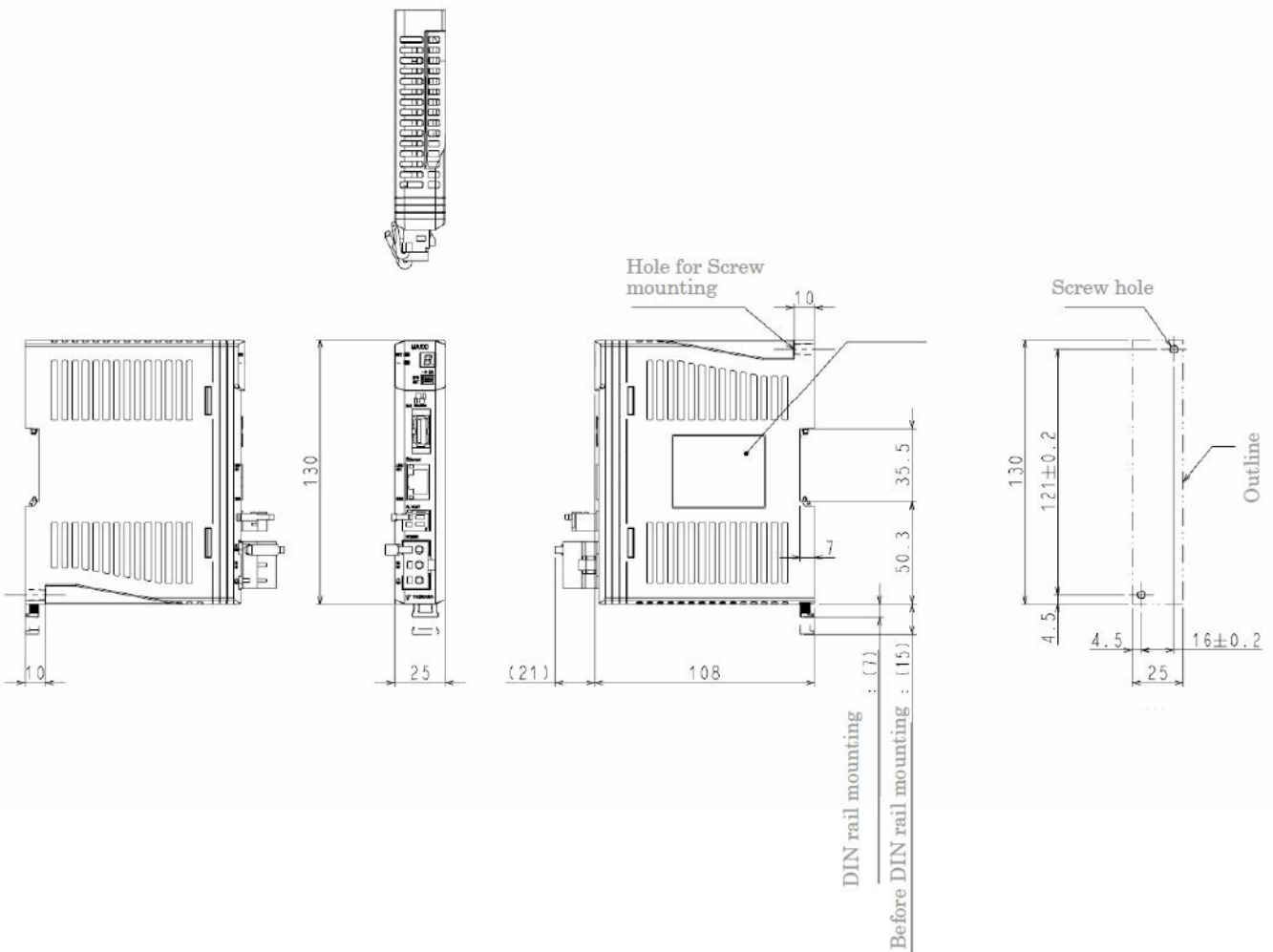
DIP switch



Set up motion mode of Motion Adapter by DIP switch when turning on power.

Names	Status	Motion	Default settings	Comment
SPR	ON	System reservation	OFF	Be sure to set to "OFF".
	OFF			
INIT	ON	Memory clear Initialization of Ethernet transmission parameter	OFF	Execute memory clear when status is "ON.", and set up Ethernet transmission parameter to initial value.
	OFF	Usually		

2.7. Outline Drawings



3. Installation and Wiring

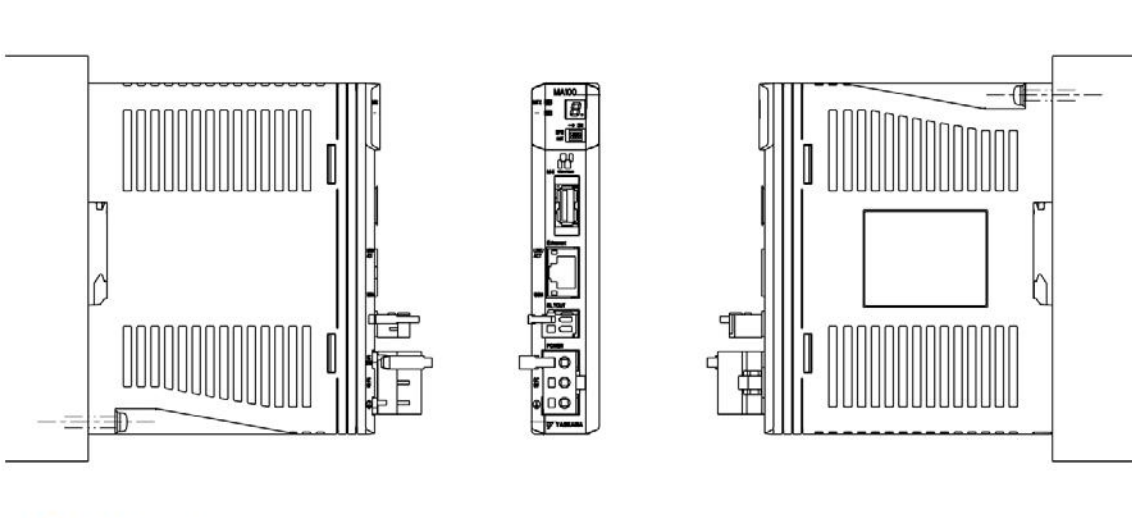
3.1. How to Install MA100

There are screw method and DIN rail method to install MA100.

(1) Screw method

Attach MA100 to the installation side, tighten it by installation screws (2 point).

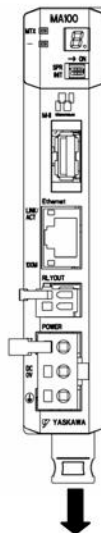
(Screw size:M4)



(2) DIN rail

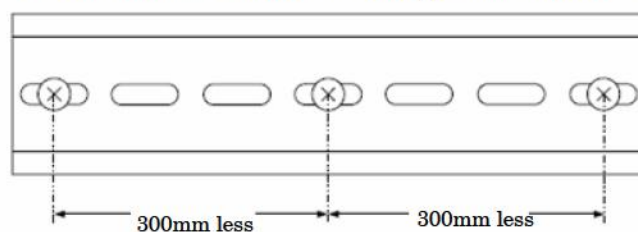
Install MA100 on DIN rail by following method shown below.

1. Pull down DIN rail installation clip and check if the clip is released.

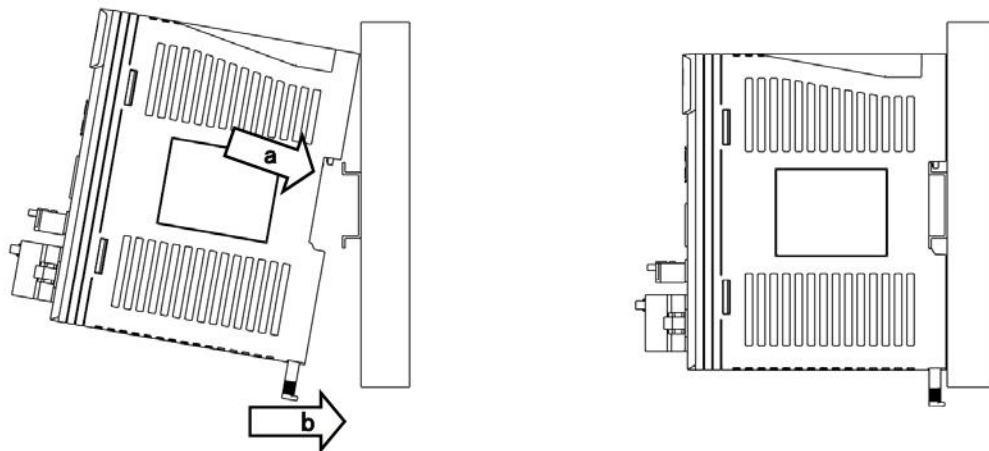


■ Fixation of DIN rail

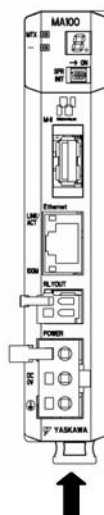
Fix DIN rail with less than 300mm pitch as shown below.



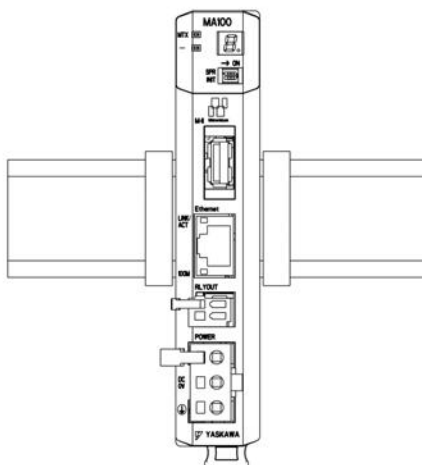
3. Hook MA100 on upper side of DIN rail (Figure. a), push back (Fig.b), and fix MA100 to the installation side.



4. Push back DIN rail installation clip, and lock.



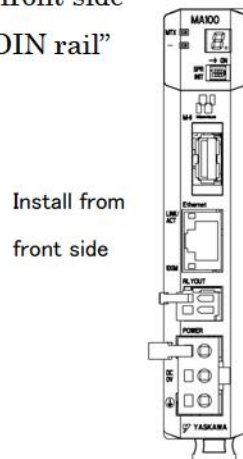
5. Fix DIN rail by putting MA100 in from both side by end palate.



Installation is completed.

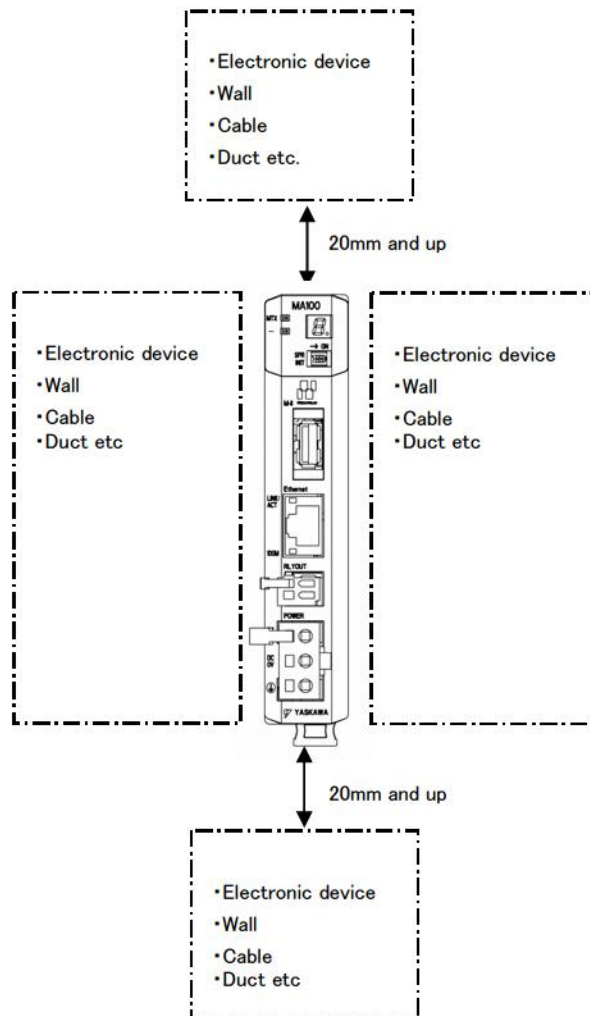
3.2. Direction of Installation of MA100

Install MA100 from front side
“screw method” or “DIN rail”



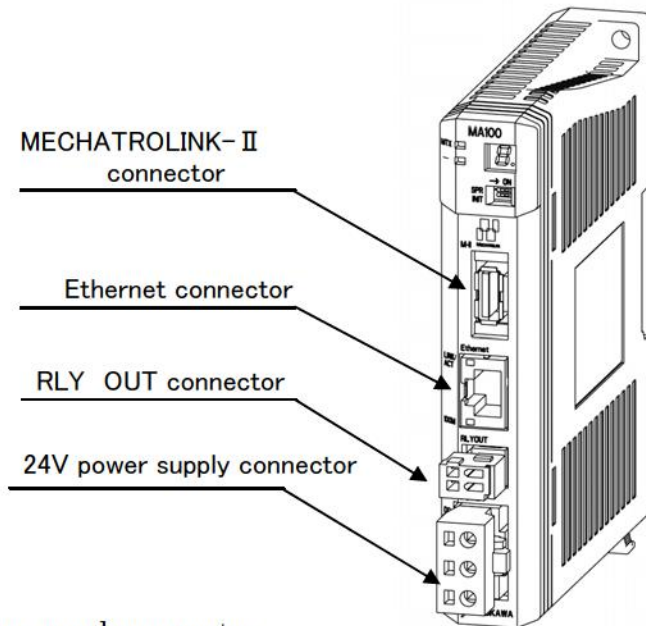
3.3. Space of Installation of MA100

Install MA100 with space as shown in figure below.



3.4. Wiring

Connection connector for MA100 is shown in figure below.



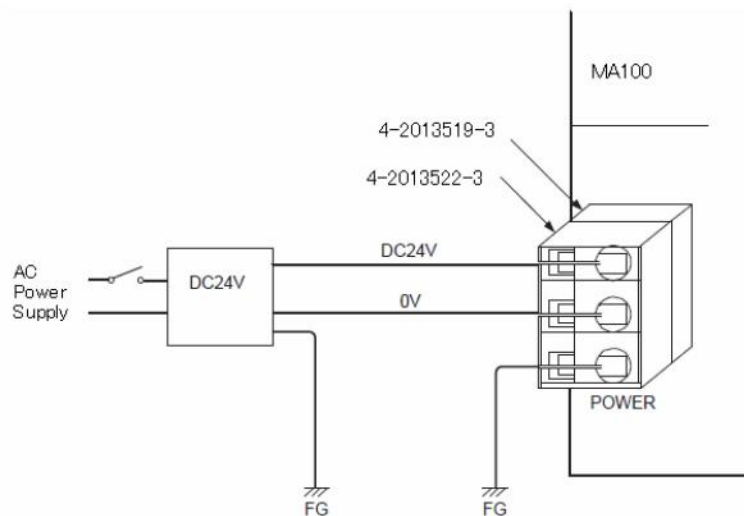
(1) Power supply connector

Connector model

Name	Name of connector	Number of PIN	Connector model			Cable model
			Module side	Cable side	Maker	
24V power supply connector	POWER	3	4-2013519-3	4-2013522-3	AMP	-

PIN assign

Terminal number	Names of signal	Explanation
3	24V	DC24V Input
2	0V	0V Input
1	FG	Connect frame ground (D-type ground)



Notes) Using the isolated type power supply DC24 V, and please attach the switch at AC line.
40A inrush current flows when you attached the switch at DC line.

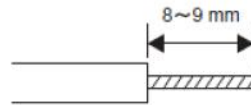
How to create DC24V power cable

Supply terminal has become removable connector. Please wire the power connector on the following procedure.

Use twisted-pair wire and the wire size is AWG24 ~ AWG20 ($0.2 \text{ mm}^2 \sim 0.51 \text{ mm}^2$).

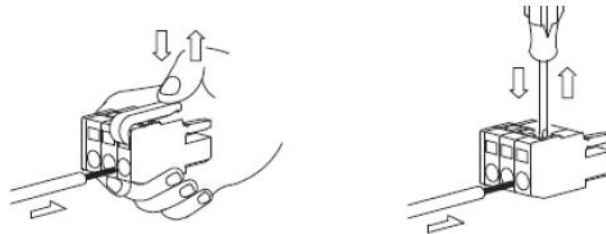
①Strip the wire.

Strip about 8 ~ 9 mm from the tip of the wire, and expose the core wire.



②Cramp the wire

Fully insert the plug wire, and clamp firmly.




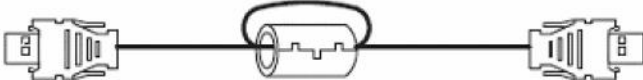
(2)MECHATROLINK connector

Wiring with the SERVOPACK or I / O unit

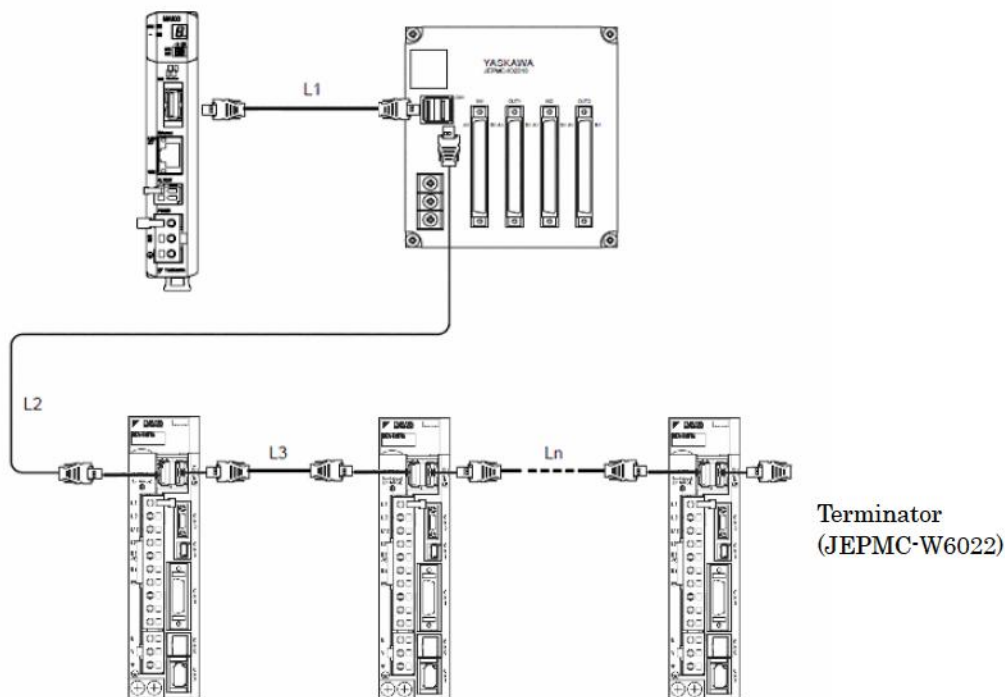
Use MECHATROLINK cable JEPMC-W6002-□□ or JEPMC-W6003-□□ (with ferrite coretype) to connect to the SERVOPACK or I/O unit.

And install terminating resistors (JEPMC-W6022) for terminator.

List of standard cable model

NAME·SPEC/OUTLINE	MODEL	Length
MECHATROLINK Cable MECHATROLINK Connector - MECHATROLINK Connector 	JEPMC-W6002-A5	0.5m
	JEPMC-W6002-01	1 m
	JEPMC-W6002-03	3 m
	JEPMC-W6002-05	5 m
	JEPMC-W6002-10	10 m
	JEPMC-W6002-20	20 m
	JEPMC-W6002-30	30 m
	JEPMC-W6002-40	40 m
	JEPMC-W6002-50	50 m
MECHATROLINK Cable MECHATROLINK Connector - MECHATROLINK Connector (With Ferrite core) 	JEPMC-W6003-A5	0.5 m
	JEPMC-W6003-01	1 m
	JEPMC-W6003-03	3 m
	JEPMC-W6003-05	5 m
	JEPMC-W6003-10	10 m
	JEPMC-W6003-20	20 m
	JEPMC-W6003-30	30 m
	JEPMC-W6003-40	40 m
	JEPMC-W6003-50	50 m
Terminator (Termination resistor)	MECHATROLINK-II, JEPMC-W6022	-

Example: Connection of MA controller to SERVOPACK or IO 2310.



- Notes) 1. Use MECHATROLINK Cable between modules
 2. Use under the condition $L1+L2+ \dots +Ln \leq 50m$

(3) Ethernet connector

Connector Type: RJ-45

Ethernet cable

Use the RJ-45 type cable that corresponds to the following.

Ethernet type	Category	Explanation
10Base-T	More than category 3	With HUB → straight cable Without HUB → crossed cable
100Base-T	More than category 5	

(4) RLY OUT connector

RLY OUT is a terminal for status output, and A contact relay output. RLY OUT is linked to ready status (READY) of MA controller. When the ready status is ON, the RLY OUT (between terminals) results “short”. When the ready status is OFF, the RLY OUT results “open”.

Following is conditions for operation ready status.

- Initialization is completed. (Connected to slave station after power is turned on.)
- Alarm is not occurring.
- Project is not being transferred.

Connector model

Name	Name of connector	Number of PIN	Connector model		
			Module side	Cable side	Maker
RLY OUT	RLY OUT	2	734-162	734-YE102	WAGO

PIN assign

Terminal number	Names of signal	Explanation
1	OUT	Operation ready status: Short circuit Before initialization, when abnormality occurred, when project is being transferred: Release
2	OUT	

Load specification of contact RLY OUT is shown below.

Input voltage	Current capacity
DC24V	0.5A (Resistor load)
	0.25A (Induction load)
AC125V	0.4A (Resistor load)
	0.2A (Induction load)

RLY OUT connector cable

Use cable with line size AWG28~AWG16 (0.08mm² ~ 1.5mm²), and the coating diameter up to φ3.4mm.

3.5. Station number of SERVOPACKs and I/O modules

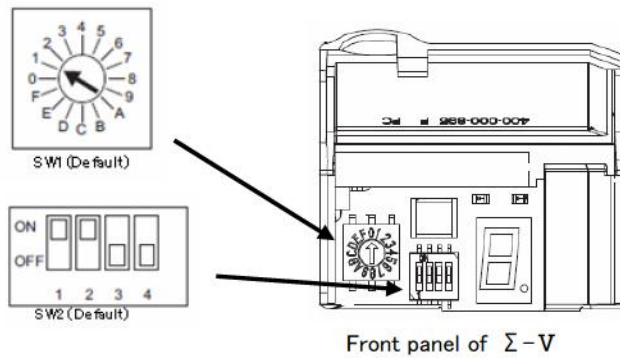
The setting of axis number (called station number below) is set by MECHATROLINK-II setting.

Also number of MECHATROLINK-II I/O as well. The station number is set by 1-4 respectively I / O is also a servo axis. (Station number of servo and I / O is overlapping, but MA controller on the I / O and servo axes are distinguished.)

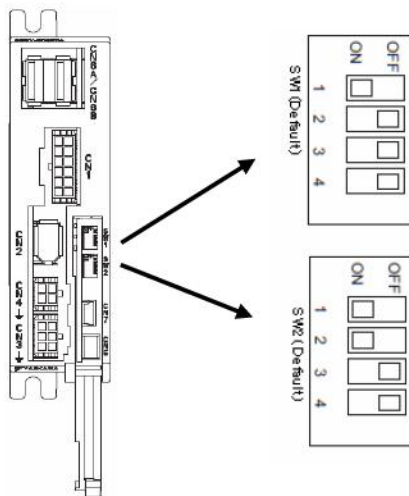
(1) Σ -V setting

You set by DIP switch and rotary switch the axis number of MECHATROLINK-II in Σ -V.

It is set the number of rotary switch SW1 at this station. This setting is in the station number ST□ at MA-Manager (□ 1 ~ 4). Please use the default settings are SW2.



(2) Σ -V mini setting



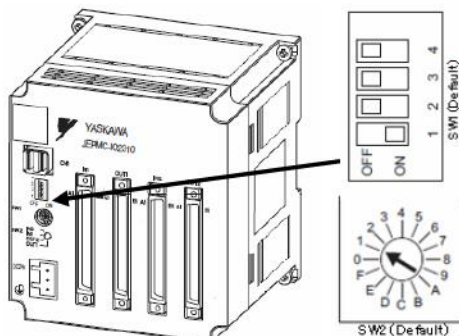
It is set the number of DIP switch SW1 at this station.

This setting is in the station number ST□ at MA-Manager (□ 1 ~ 4).

Please use the default settings are SW2.

ST No.	SW1			
	1	2	3	4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF

(3) Example: IO2310 setting (Please set with reference to the setting of each product MECHATROLINK-II Simple I / O of the other.)



Please use the default settings are SW1.

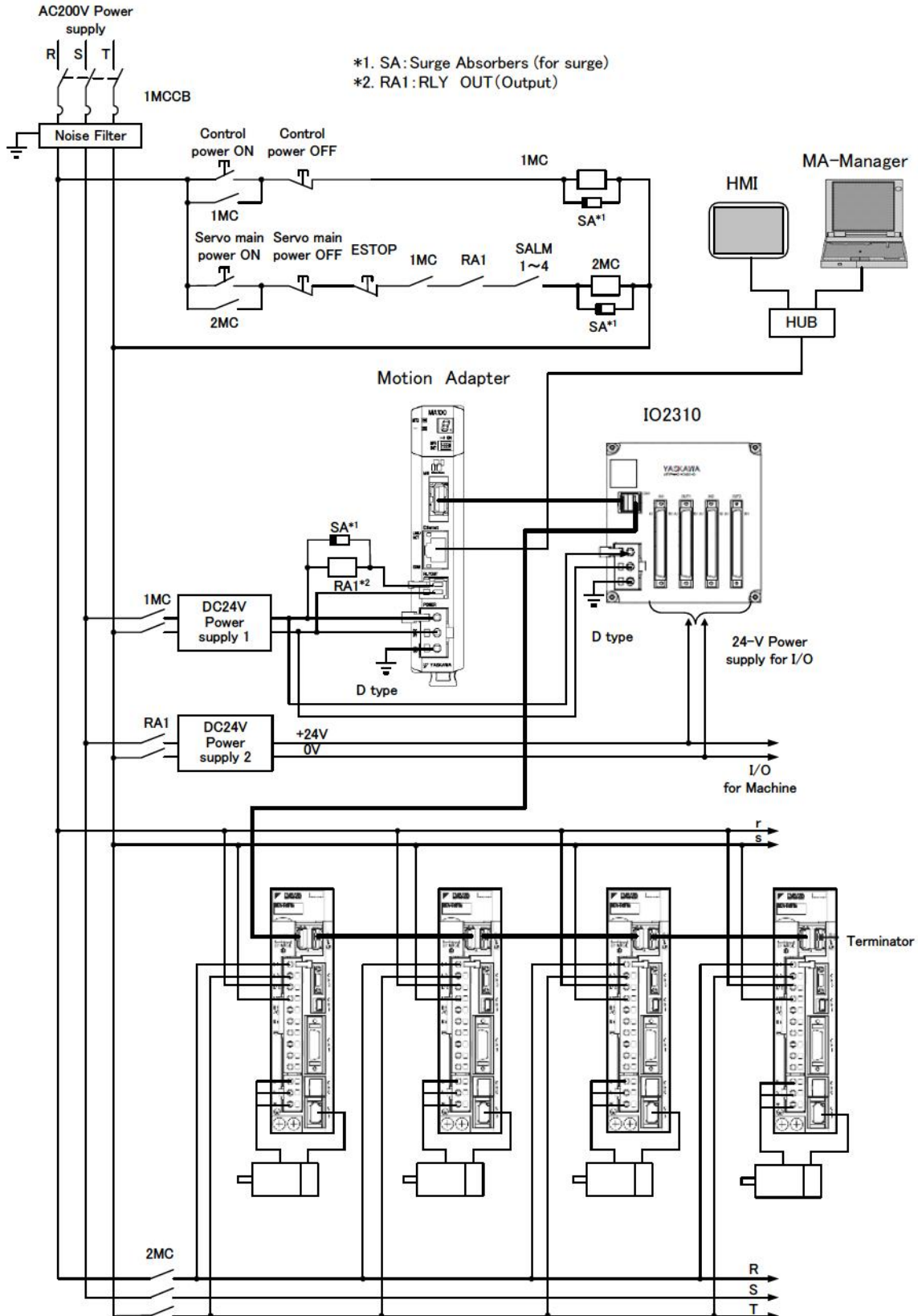
It is set the number of rotary switch SW2 at this station.

This setting is in the station number ST□ at MA-Manager (□ 1 ~ 4).

3.6. Example of System Configuration

Example of system using MA100 is shown below.

Example of AC200V power supply (single phase 200V for Servopack) is shown in figure below. Select Servopack and DC24V power supply according to input specifications.



4. Installation and Uninstallation of MA-Manager

4.1. Operation Environment of MA-Manager

Following operation environment is required for PC MA-Manager

Items	Minimum
Applied OS	Microsoft Windows7 64bit/32bit
CPU	1GHz and up (conforms to OS)
Memory capacity	1GB and up (conforms to OS)
HDD empty capacity	16GB and up (conforms to OS)
Display	Resolution : 1280x720 and up
Necessary run time/application	.NET Framework 4.0 Adobe Reader Communication Platform (made by Yaskawa: Contained in installation file)
Applied language	English, Chinese, Japanese

4.2 Installation of NET Frameworks 4.0

Before installing MA-Manager, installation of NET Frameworks 4.0 is required.

If MA-Manager is installed to PC without installing NET Frameworks 4.0 to it, error occurs and MA-Manager is not installed.

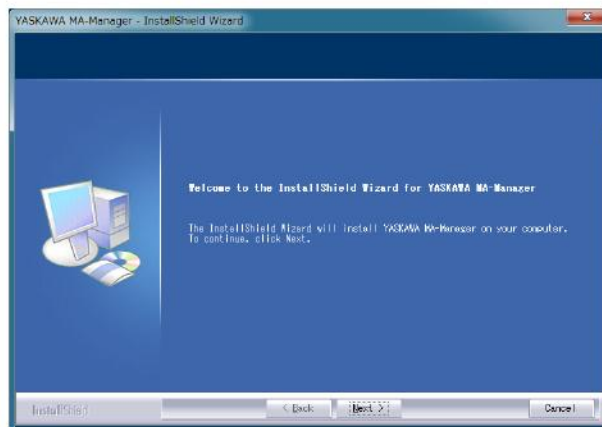
Before installing MA-Manager, install NET Frameworks 4.0 by procedure shown below.

4.3 Installation of MA-Manager

Download install files of MA-Manager and save it to folder.

Installation starts after double-clicking “MAManager_installer.exe”

Please install MA-Manager following install wizard.



4.4 Uninstallation of MA-Manager

Uninstall MA-Manager from addition and delete of application in Windows.

5. How to Operate

5.1. Operational Attention of MA100 and MA-Manager

Following are operational attention when programming to MA100 by MA-Manager

①Change of project is possible only by Offline. (Online edit could not be executed.)

②MA-Manager can not read the program from MA100.

Transferred is in one direction from project of MA-Manager (PC) to MA100.

③If project in MA-Manager and data transferred to MA100 does not match,

Online connection is not executed. If not matched, transfer project to MA100.

④If alarm occurred in MA100, all axes Servo off are executed. If alarm occurred, execute servo on after solving the cause of alarm then restart the operation. If operation stops after alarm occurred when operating in time chart operation, positioning is executed from starting position by trigger of signal, and then the operation starts from the beginning of the time chart. If warning occurred, operation continues.

⑤In order to use SigmaWin+ through MA100, the target servos must be defined in MA100 and the communication is established. SigmaWin+ may not possible to use without the servo definition in MA or communication fault.

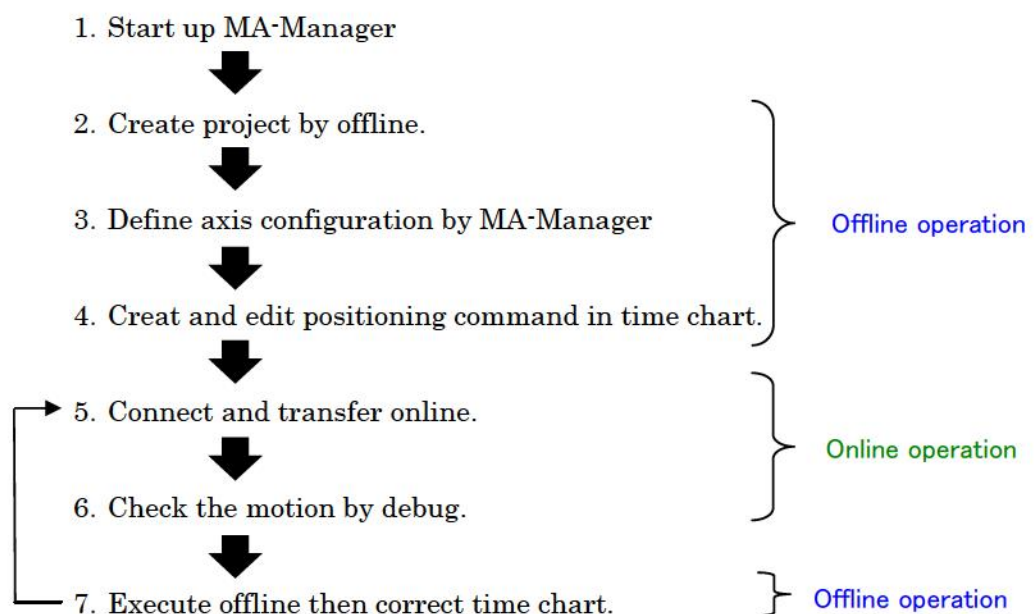
⑥Time chart created by project is ideal time chart.

In fact, delay may occur caused by waiting time for positioning complete, link, and writing parameter to Servopack caused by change of acceleration / deceleration.

(See appendix B for the details)

5.2 Outline of Operation of MA-Manager

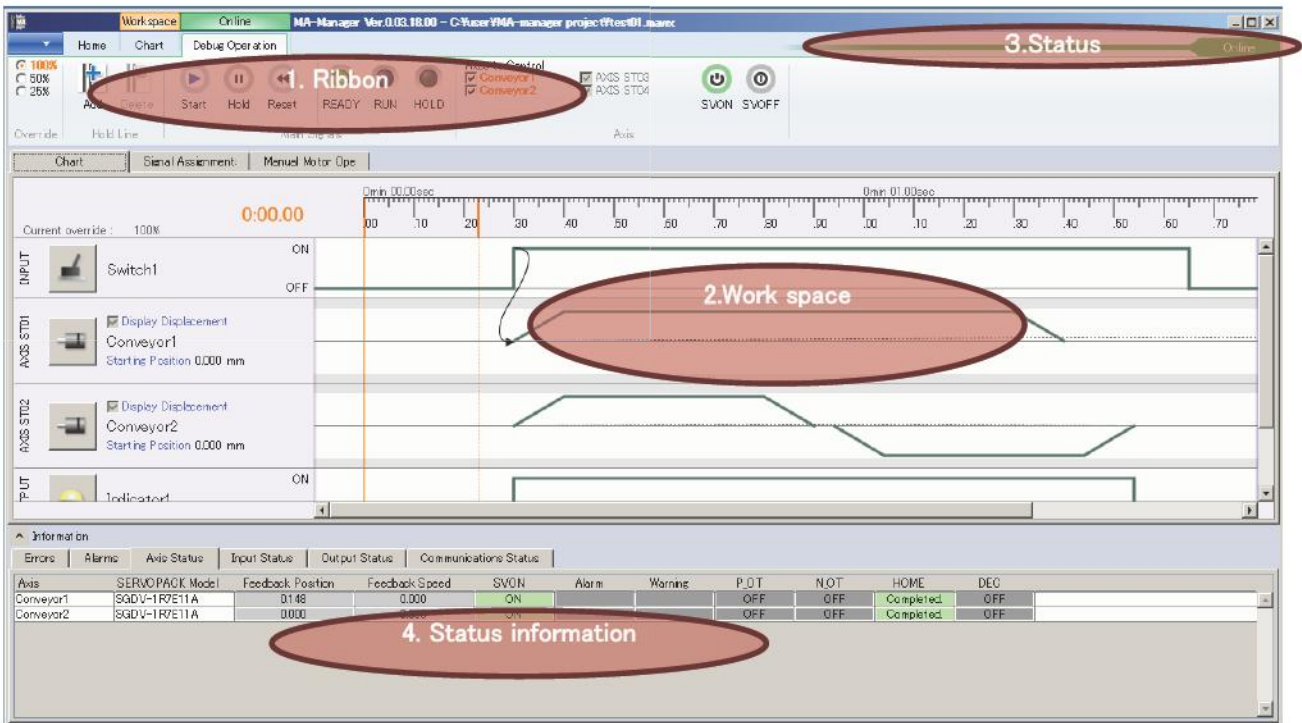
Following is procedure for operation of MA-Manager when operating MA100.



5.3 Basic Operation of MA-Manager (Offline function)

5.3.1. Main Windows

Following is explanation of outline and each area of main Windows.

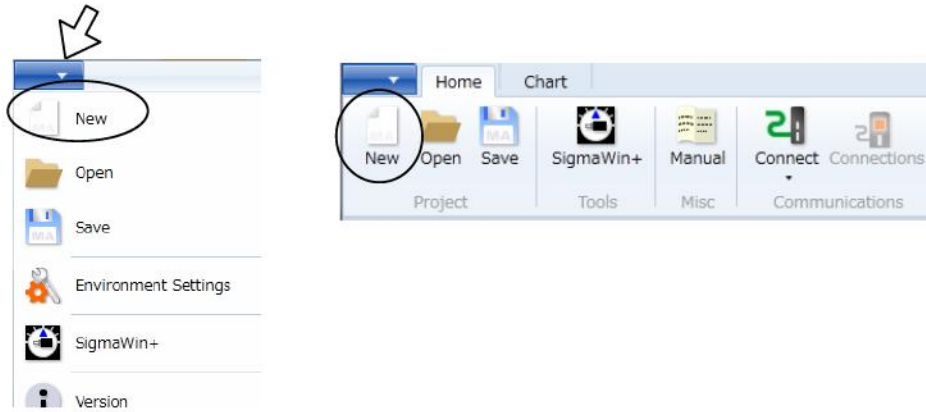


No	Names of area	Explanation
1	Ribbon	Ribbon interface area that provides main operation and display. Works as menu of conventional application. Display of menu changes by switching tab.
2	Work space	Axis is defined, I/O is allocated and time chart is written in this property. The auto program for timechart is created In this workspace.
3	Status	Status of connection to MA100 is displayed in this area.
4	Status Information	Various information is displayed in this area. Display of information changes by switching tab. Height of this area could be changed optionally. Error, alarm, axis information, I/O status, and communication status are display.

5.3.2. Project, File Operation, Setup of Environment, and Check of Version

5.3.2.1. Creation of New Project

① Select “New” icon in blue area of ribbon, or in “HOME” tab.

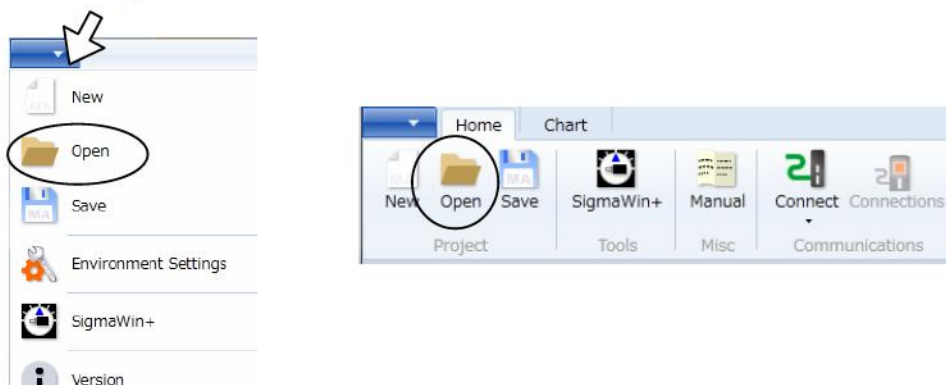


② Specify file name and location of the file.

③ “**** (file name).mawx” file is created in specified folder, and new project opens.

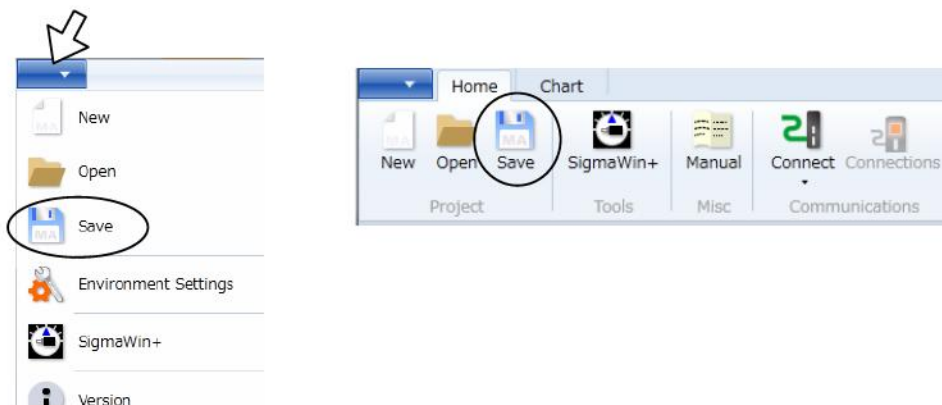
5.3.2.2. How to Open the Project

Saved project can be opened by double-clicking project file or by selecting “Open” as shown in figures below.



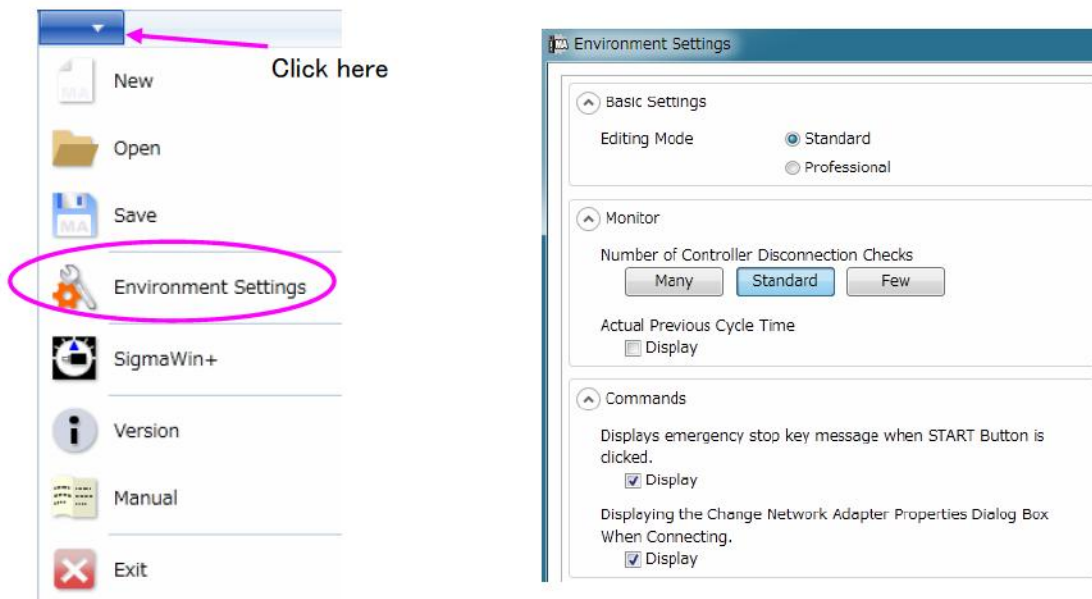
5.3.2.3. Save of Project

Select “Save” shown in figures below to save the change of contents of project.



5.3.2.4. Setup of Environment

Set up environment of MA-Manager.



① Basic Settings

Editing mode... Select standard mode or professional mode

“ Standard ” ... Select this mode when using for standard use.

“ Professional ” ... Select this mode when using for higher level setup and use than standard mode.

Functions		Standard mode	Professional mode
Project/File management	New creation, open, save	○	○
	Export function	×	○
Allocation	Axis definition	○	○
	I/O definition	○	○
	Direct I/O link	×	○
Chart	Creation and edit of operation patterns	○	○
	Setup of acceleration/deceleration for every operation pattern	×	○
	Zooming in and out, full display	○	○
	Timeout setup	×	○
	Chart repeat	○	○
	Addition of Hold	×	○
	Deletion of Hold	×	○
	Check	×	○
	Override	○	○
Communication setup	Setup of connection to PC (MA-Manager)	○	○
	Setup of connection to host PLC	×	○
	Communication status of host PLC	×	○

②Monitor

Times of check of disconnection of Ethernet connection between MA controller and MA- Manager

Pitch of check of disconnection of Ethernet connection between MA controller and MA- Manager is set up.

Selection	
Many	Disconnection is checked 1time/sec
Standard	Disconnection is checked 1time/2 seconds
Little	Disconnection is checked 1 time/5 seconds

If Ethernet disconnection error was detected though normally connected, fix it by reducing times of check of disconnection etc.

Previous cycle time shows time that took for check.

③Command

When clicking start button in MA-Manager, message about emergency stop is displayed.

When “Display” is checked, the message is displayed every time.

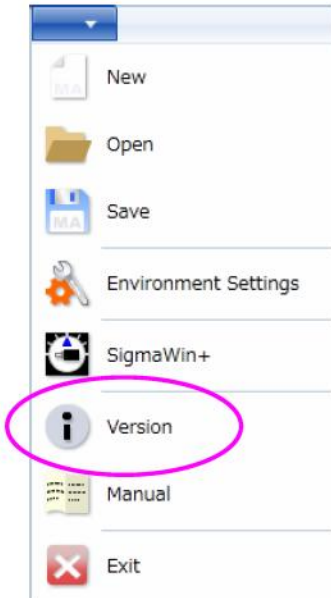
The message is not displayed after uncheck and click “OK” button.

Message displayed after clicking “Start” button



5.3.2.5. How to Check the Version

Click version icon shown below to check the version of MA-Manager and Communication Platform.



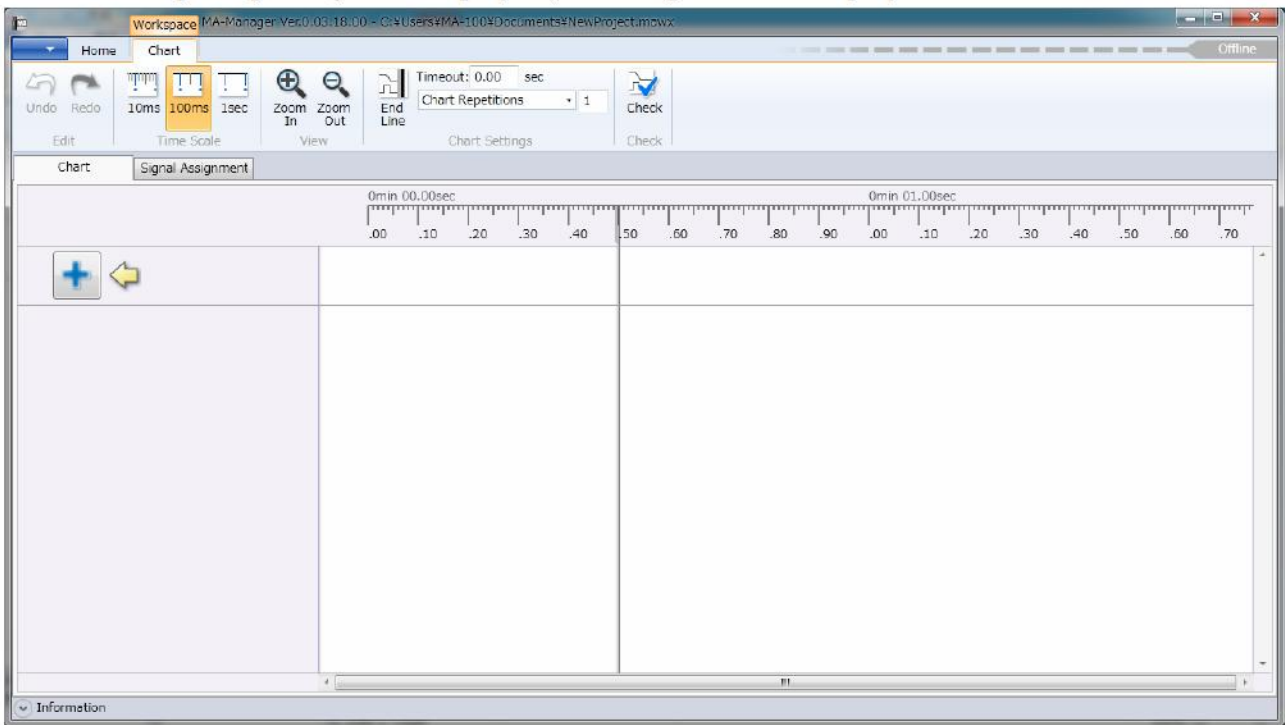
Version of MA-Manager and Communication Platform is displayed.

Version of MA controller is displayed only in online status.


Version of MA controller is not displayed in offline status.

5.3.3. Creation of Definition of Servo Axis and I/O signal

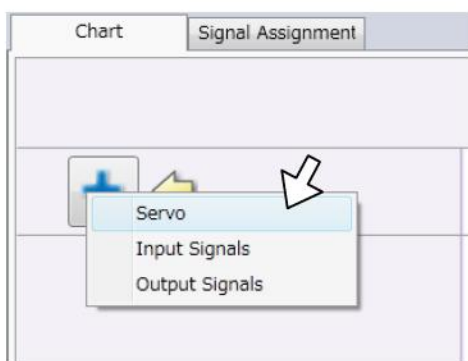
When opening newly created project, following screen is displayed.



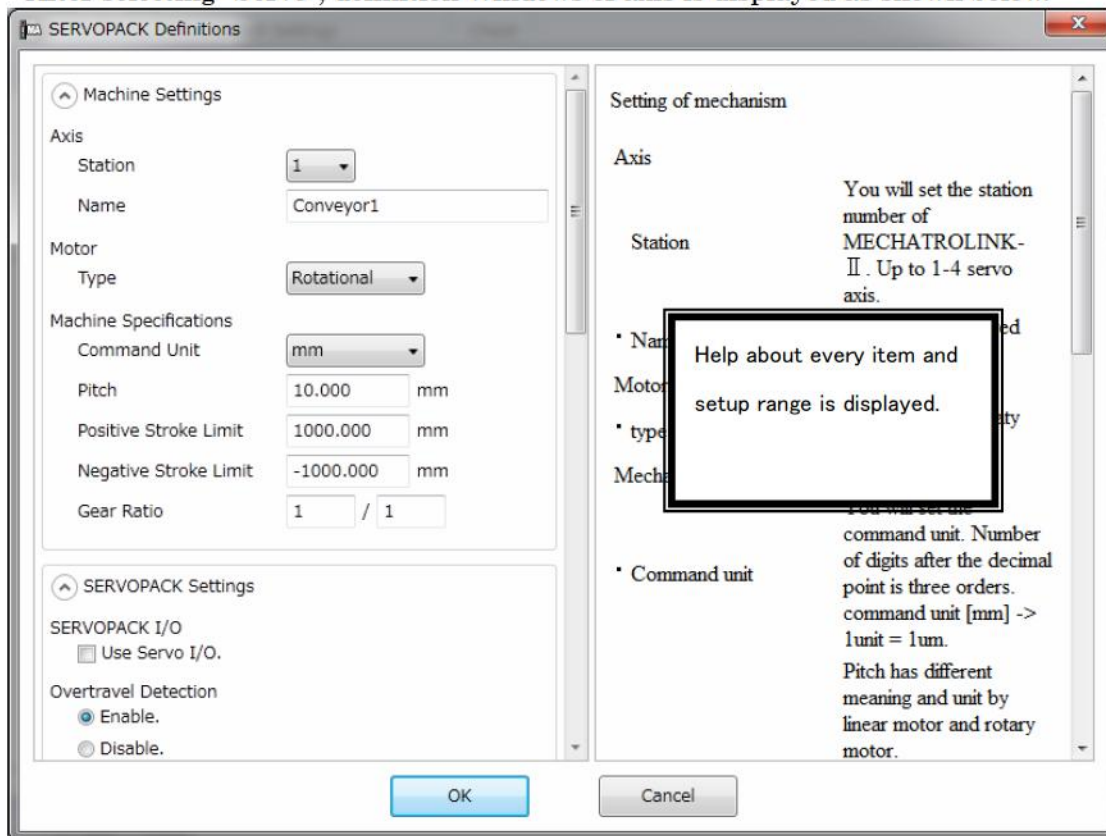
5.3.3.1. Creation of definition of Servo axis

Click  button to define axis.

After clicking “+” button, servo and I/O signal are displayed. Select “Servo” to add axis.



After selecting “Servo”, definition Windows of axis is displayed as shown below.



No	Names	Explanation	Range
①	Station	Select station number of servo (axis number) from 1~4. Station number already selected is not displayed.	1~4
②	Name	Set up unit name. Optional naming is possible. Name in time chart is displayed by name input here. Ex.) Conveyor, Lift, rotation axis, X axis and Y axis	-
③	Type	Select type of servomotor from rotation or linear. Set up to fit to motor to be used.	-
④	Command unit	Select command unit. Select from “mm”, “deg”, and “rev”. If you select the linear type, you could select only “mm”. Command unit is 1/1000 of this after the decimal point of 3. When “mm” is selected, command unit is 0.001mm.	-
④	Pitch	Set up pitch. Set up carefully as meaning and unit of pitch is different by rotation motor and linear. You can select only “mm”. 【Rotation】 : Amount of movement of one rotation of machine. [Command unit 0.001 mm] 【Linear】 : Linear scale pitch [Command unit 0.001um] When you select “deg” or “rev”, the pitch is fixed one rotation. (deg: 360.000deg, rev: 1.000rev)	-
⑥	Positive Stroke Limit	Set up limit value of forward direction.	0~ 2147483.647
⑦	Negative Stroke Limit	Set up limit value of reverse direction.	0~ -2147483.647
⑧	Gear ratio	Set up gear ratio of motor and load by numerator/denominator. For example, when motor rotates 10 times while load rotates 3 times, set up “3/10”.	1~ 2147483647


No	Names	Explanation	Range
⑨	SERVOPACK Settings	Use servo I/O General I/O can be used as signal in time chart when using SGD.V. When using, input check. ※When using servo I/O and MECHATROLINK I/O, I/O could not be operated if communication error occurred.(Alarm occurs) Be sure to install circuit to turn off main circuit of servo if emergency occurs.	
⑩		Overtravel Detection Select use/not use overtravel of Servopack	
⑪	Basic Command Settings	Basic command speed Set up command speed for base value when commanding chart and executing manual operation. Initial value of speed command when creating time chart is speed specified here. Also used as movement speed to start position of time chart. Unit is command/sec specified in ④	
⑫		Moving Average Filter Time Set up moving averaging filter time by 0.1m sec unit.	0.0~510.0
⑬		Acceleration/Deceleration setup unit Select unit used for setup of acceleration from “sec” and “command unit/sec ² ”.	
⑭		Acceleration time ※1 Set up acceleration time that is base value of command of chart and manual operation, with 0.01 sec. Initial value of acceleration time when creating time chart is specified here. It is acceleration time to commanded speed at time chart. And it is acceleration time to basic command speed at manual operation. Input is possible when selecting “sec” in selection of acceleration/deceleration setup unit in ⑬. When “command unit/sec ² ” is selected, input is impossible. In this case, acceleration time calculated by specified acceleration is displayed.	0.00~ 21474836.47
⑮		Deceleration time ※1 Set up deceleration time that is base value of command of chart and manual operation, with 0.01 sec. Initial value of deceleration time when creating time chart is specified here. It is deceleration time from the commanded speed at time chart. And it is deceleration time from basic command speed at manual operation. Input is possible when selecting “sec” in selection of acceleration/deceleration setup unit in ⑬. When “command unit/sec ² ” is selected, input is impossible. In this case, deceleration time calculated by specified deceleration is displayed.	0.00~ 21474836.47
⑯		Acceleration Rate ※1 Set up acceleration ,that is base value of command of chart and manual operation, with command unit/sec ² . Initial value of acceleration when creating time chart is specified here. Input is possible when selecting “command unit/sec ² ” in selection of acceleration/deceleration setup unit in ⑬ When “sec” is selected, input is impossible. In this case, acceleration calculated by specified acceleration time is displayed. Example) 0.001mm/sec ² unit when command unit is mm.	0.001~ 2147483.647
⑰		Deceleration Rate ※1 Set up deceleration ,that is base value of command of chart and manual operation, with command unit/sec ² . Initial value of deceleration when creating time chart is specified here. Input is possible when selecting “command unit/sec ² ” in selection of acceleration/deceleration setup unit in ⑬ When “sec” is selected, input is impossible. In this case, deceleration calculated by specified acceleration time is displayed. Example) 0.001mm/sec ² unit when command unit is mm.	0.001~ 2147483.647
⑱		Positioning completion width Set up positioning completion width. Positioning is completed and positioning complete signal turns on by Target position – Feedback position ≤ Position completion width.	0.000~ 2147483.647

※1 Displayed only in professional mode
Axis definition is completed when setting up axis definition, and clicking “OK” button.
To add an axis, Click “+” button and define again.
To delete an axis, right-click and select “delete”.

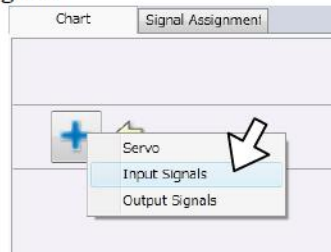
No	名称	説明	範囲	
⑲	Manual Operation Settings	JOG Command Speed	The default value of JOG speed on manual operation panel. 0.001 ~ 2147483.647	
⑳		STEP+/STEP- Command Speed	The default value of STEP speed on manual operation panel. 0.001 ~ 2147483.647	
㉑		STEP+ Travel distance	The default value of STEP+ travel distance on manual operation panel. 0.001 ~ 2147483.647	
㉒		STEP- Travel distance	The default value of STEP- travel distance on manual operation panel. 0.001 ~ 2147483.647	
㉓		HOME Homing Method	The default value of Homing method on manual operation panel. Select from the following. •DEC+Phase C •OT+Phase C •PhaseC pulse method	—
㉔		Homing direction	The default value of Homing direction on manual operation panel. Select from Forward or Reverse.	—
㉕		Homing Speed	The default value of Homing Speed on manual operation panel. 0.001 ~ 2147483.647	
㉖		Approach Speed	The default value of Approach Speed on manual operation panel. 0.001 ~ 2147483.647	
㉗		Creep Speed	The default value of Creep Speed on manual operation panel. 0.001 ~ 2147483.647	
㉘	Homing Travel Distance	The default value of Homing Travel distance on manual operation panel. -2147483.648 ~ 2147483.647		

※ Refer to Section 5.4 about the detail of each manual operation parameter.

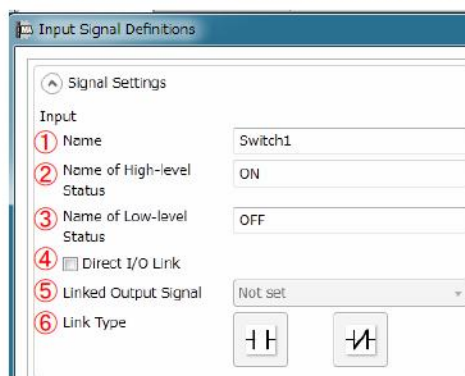
5.3.3.2. Creation of Input Signal Definition

Click  button to define input signal.

Select “Input signal” to add input signal after clicking “+” button from “Servo”, “Input signal”, and “Output signal”



After selecting “INPUT”, definition Windows of input signal is displayed.




No	Names	Explanation
①	Name	Set up unit name. Device name comment in time chart is displayed with name specified here. Example) Sensor 1, switch 2 etc.
②	Name of High-level Status	Set up name when input is in Hi status. Hi status comment in time chart is displayed with name specified here. Example) ON
③	Name of Low-level Status	Set up name when input is in Lo status. Lo status comment in time chart is displayed with name specified here. Example) OFF
④	Direct I/O Link [Displayed only in professional mode]	Put check mark on when using Direct I/O Link. Direct I/O Link is a function to operate directly allocated output signal when specified input signal turns on. Output signal already allocated and programmed in time chart could not be selected. ※Installation of output signal for I/O in advance is required to define output by Direct I/O Link. (See section 5.3.3.4 for the details)
⑤	Link Output Signal [Displayed only in professional mode]	Select direct link output signal. To issue the output signal to be selected as the Link Output Signal, you will need to create the output signal on the chart above, you put a check in the direct I / O link. Select “output” after signal, with check mark put on direct I/O link in output signal allocation, is displayed.
⑥	Link type toggle button [Displayed only in professional mode]	Select direct I/O link type. Select NO contact type when turning output on in ON status of allocated input signal. Select NC contact type when turning output on in OFF status.

Definition is completed when setting up input signal definition, and clicking “OK” button.

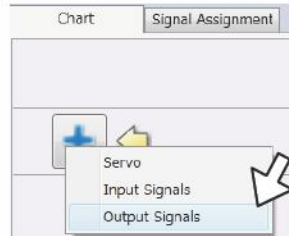
Click “+” button and define input again to add signal.

Right-click and select “delete” to delete defined signal.

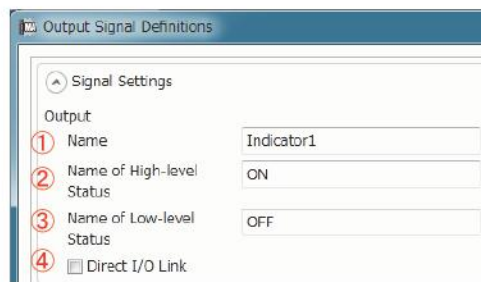
5.3.3.3. Creation of Output Signal Definition

Click  button to define output signal.

Select “Output signal” to add output signal after clicking “+” button ,and “Servo”, “Input signal”,and “Output signal” are displayed.



Define output signal after selecting “OUTPUT”, and definition Windows of input signal is displayed.



No	Names	Explanation
①	Name	Set up unit name. Device name comment in time chart is displayed with name specified here. Example) Lamp 1
②	Name of High-level Status	Set up name when output is in Hi status. Hi status comment in time chart is displayed with name specified here. Example) ON
③	Name of Low-level Status	Set up name when output is in Lo status. Lo status comment in time chart is displayed with name specified here. Example) OFF
④	Direct I/O link	Defined as output signal for direct I/O link after check mark is put on. Outpt signal with check mark on could be selected in link output signal of direct I/O link of output signal definition

Definition is completed when setting up output signal definition, and clicking “OK” button.

Click “+” button and define output again to add signal.

Right-click and select “delete” to delete defined signal.

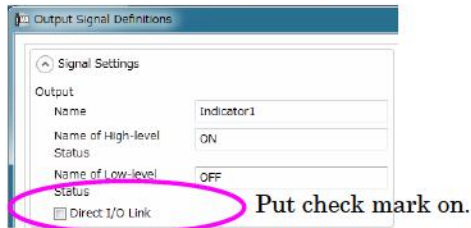
Hint ! — About names of I/O signal —

More comprehensive time chart could be created by setting up name of I/O signal and status of Hi and Lo.

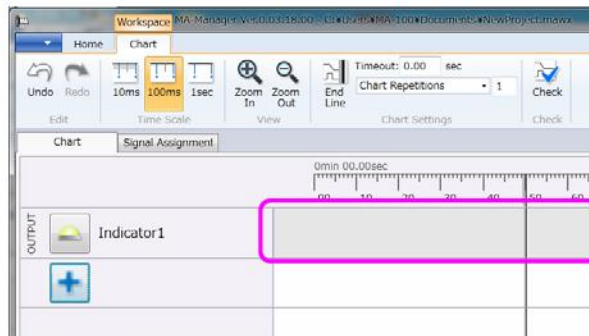
Ex) Name: Hand absorption Hi status :Absorption Lo status: Release
 Name: High and low (air) Hi status: UP Lo status: DOWN
 Name: Clamp Histatus: Clamp Lo status: Release

5.3.3.4. Creation of Direct I/O Link

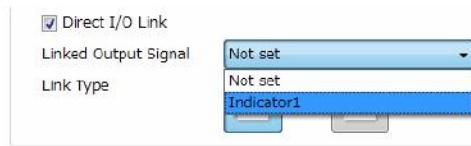
Input signal status could be output with output signal by allocating specified input signal directly. Allocate output signal in time chart to use Direct I/O Link function.



When check mark is put on direct I/O, screen is displayed in gray in time chart.



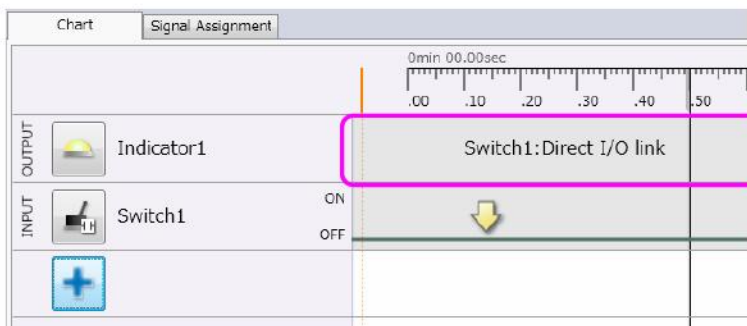
Define input signal. When check mark is put on direct I/O link, output signal with check mark put on direct I/O by link output signal could be selected.



Link type	Explanation
	Output signal turns on when input signal is turns on. Output signal turns off when input signal is turns off.
	Output signal turns off when input signal is turns on Output signal turns on when input signal is turns off.


When selecting output signal with check mark put on direct I/O, and selecting link type, allocation of direct I/O link to output signal in time chart is displayed.

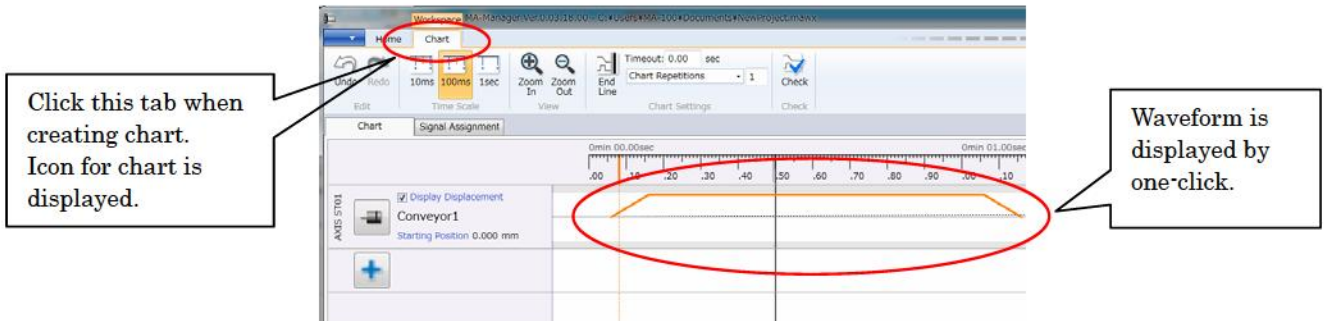
Creation of direct I/O link is completed.



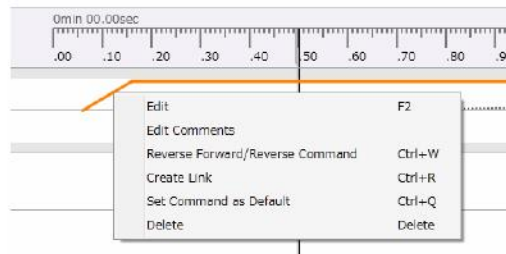
5.3.4. Creation of Time Chart

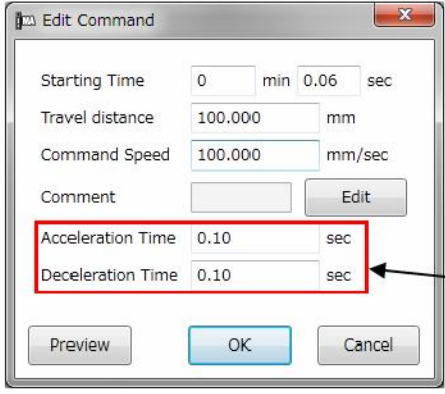
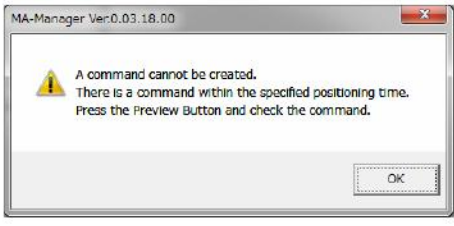
5.3.4.1. Creation of Positioning Command for Servo on Time Chart

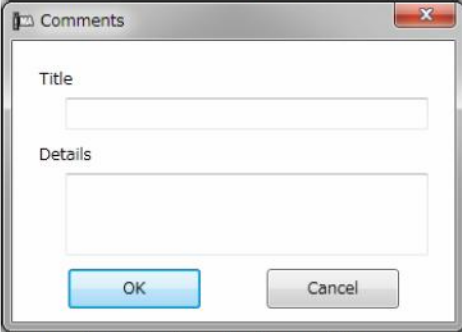
When axis of servo is defined,  is displayed in time chart. When clicking optional position, basic waveform of positioning is displayed.



When right-clicking waveform, edit dialogue is displayed.

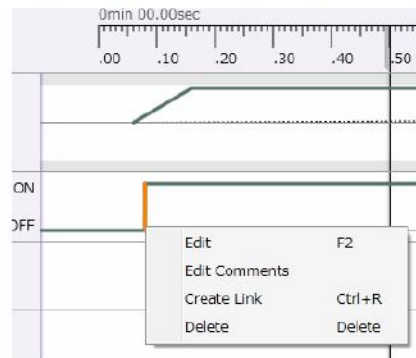


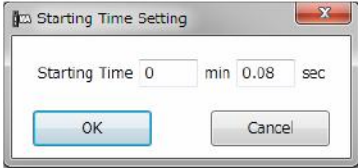
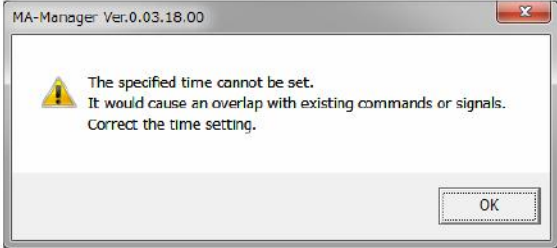
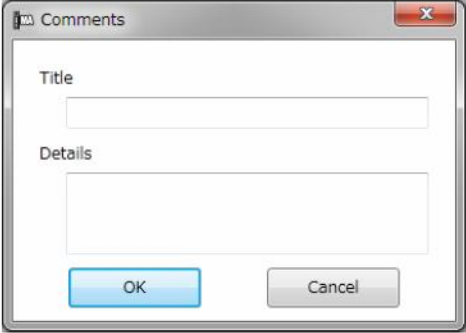
Names	Operation
<p>Edit (F2 key)</p>	<p>Edit waveform Select when changing speed and moving distance. When clicking edit on waveform screen, command edit dialogue is displayed. Change is completed after editing waveform and clicking “OK” button. Changed waveform is displayed while pushing “Preview” button.</p> <div style="text-align: center;">  </div> <p>Following dialogue is displayed if value is overlapping from next command by edited value.</p> <div style="text-align: center;">  </div> <p>In this case the waveform is displayed in red line after clicking “Preview” button.</p>

Names	Operation
Edit Comments	<p>Edit comments to be displayed in waveform. Created command comment is added.</p>  <p>Comment is displayed after putting cursor on the waveform.</p>
Reverse of Forward/Reverse command (Ctrl+W)	<p>Forward/Reverse of direction of waveform is reversed. After selecting Reverse of Forward / Reverse command, command position sign reverses. Forward command is changed to Reverse, and Reverse command is changed to forward.</p>
Create Link (Ctrl+R)	<p>Link is created. Refer to section 5.3.4.4 for link.</p>
Set Command as Default (Ctrl+Q)	<p>This function store the waveform so that the next one click on the chart create the same one. Stored command waveform is different each axis.</p>
Delete (Delete)	<p>Waveform is deleted. Specified command waveform is deleted.</p>

5.3.4.2. Creation of Time Chart of Input Signal

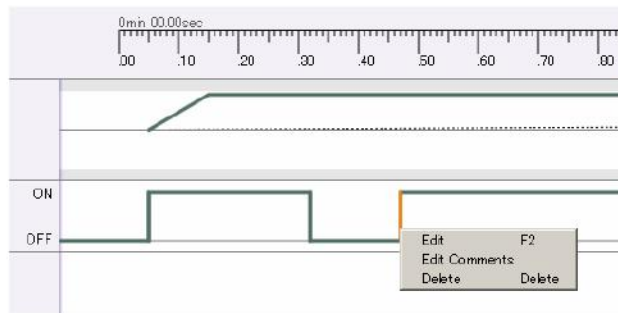
ON/OFF of input signal changes by clicking.

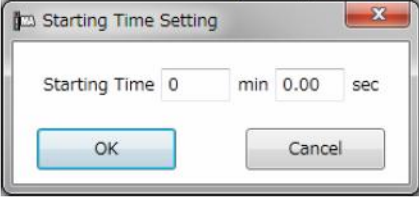
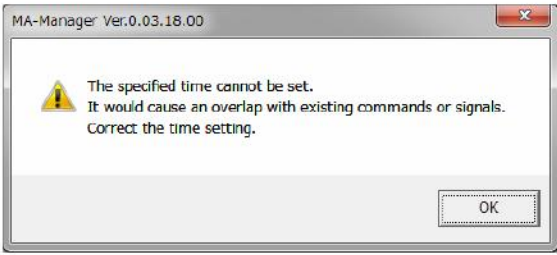
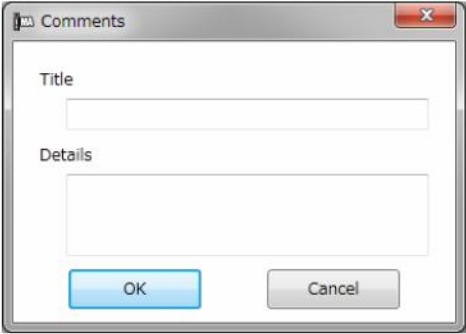


Names	Operation
<p>Edit (F2 key)</p>	<p>Time to turn on/off input signal is changed.</p>  <p>Following dialogue is displayed if value is overlapping from next command by edited value.</p> 
<p>Edit Comments</p>	<p>Edit comment to be displayed in waveform. Created command comment is added.</p> 
<p>Create Link (Ctrl+R)</p>	<p>Link is created. Refer to section 5.3.4.4 for link.</p>
<p>Delete (Delete)</p>	<p>Waveform is deleted. Specified On/OFF is deleted.</p>

5.3.4.3. Creation of Time Chart of Output Signal

ON/OFF of output signal changes by clicking.



Names	Operation
<p>Edit</p>	<p>Time to turn on/off output signal is changed.</p>  <p>Following dialogue is displayed if value is different from next command by edited value</p> 
<p>Comment edit</p>	<p>Edit comment to be displayed in waveform. Created command comment is added</p> 
<p>Create Link (Ctrl+R)</p>	<p>Link is created. Refer to section 5.3.4.4 for link.</p>
<p>Delete (Delete)</p>	<p>Waveform is deleted. Specified On/OFF is deleted.</p>

5.3.4.4. Creation of Link

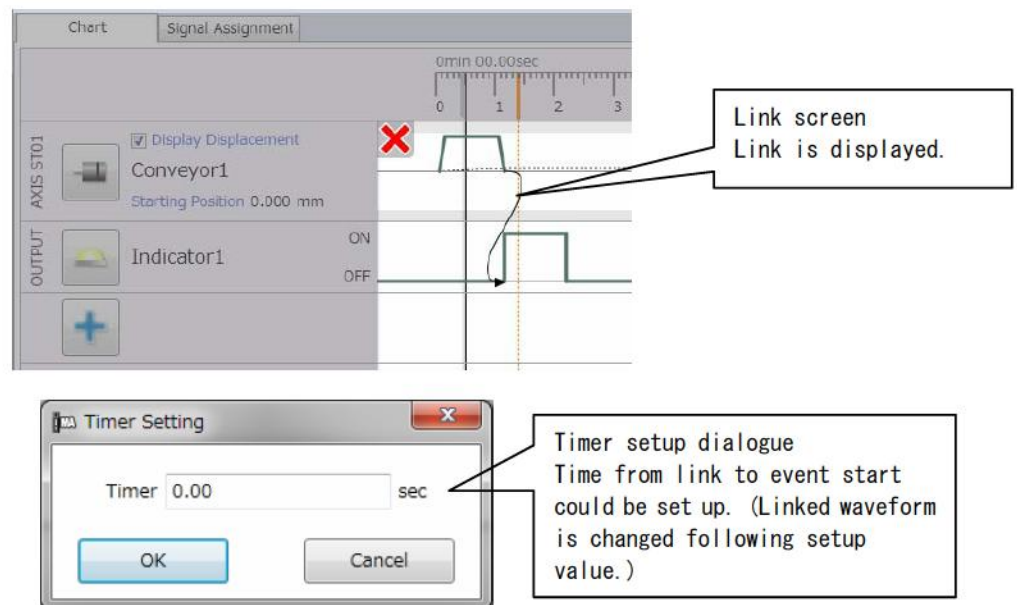
Link is function to link axis motion and I/O.

Moving to next motion is possible triggered by completion of operation by creating link.

If condition for link is not established, elapsed time in time chart stops and waits until condition is established.

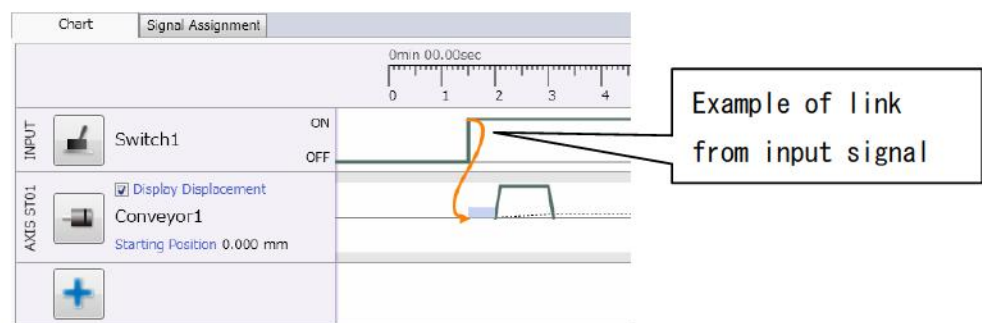
(Ex.1) Turn on “output 1” for 1 second when positioning of the axis No.1 is completed.

- ① Create positioning command.
- ② Turn on output signal near the position of completed positioning.
- ③ When right-clicking positioning waveform and selecting “create Link”, link screen is displayed. Link screen is masked except for chart. Link arrow towards up and down by moving the mouse.
- ④ Link is created by clicking Output signal chart. Then set the delay timer from the link.

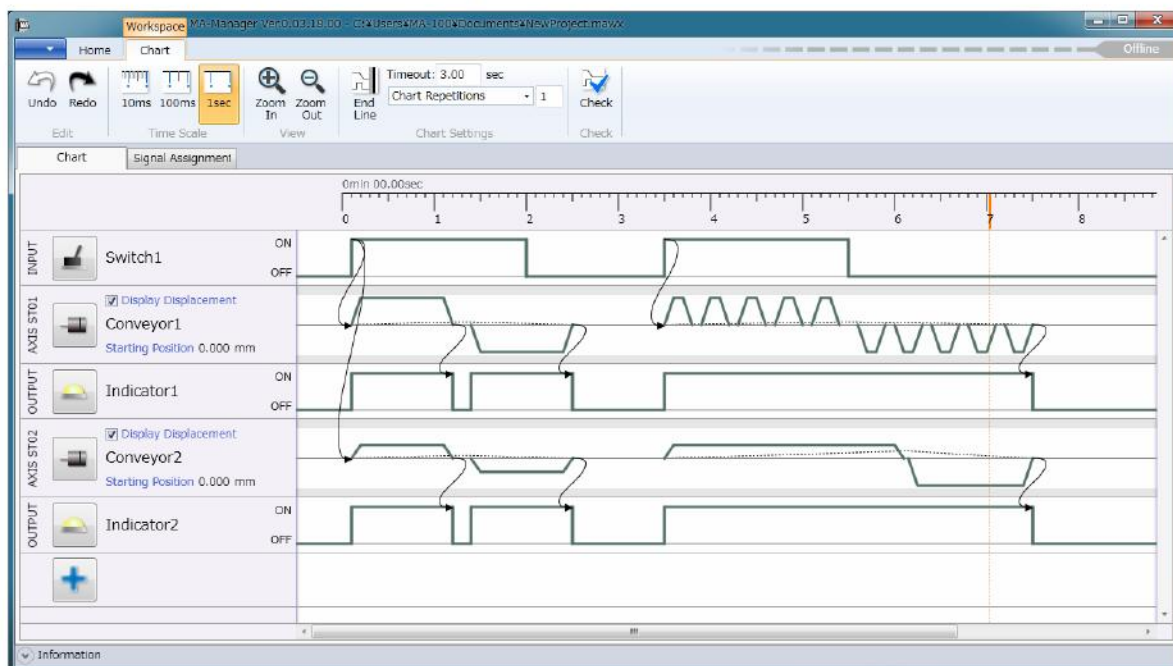


(Ex.2) Turn on “input 1” and positioning starts after 0.5 seconds.

- ① Turn on “input 1” for optional time.
- ② Create positioning behind position mentioned in ①.
- ③ When right-clicking the position to be turned on in input 1 and clicking “creation of link”, link screen is displayed.
- ④ When clicking start position of positioning in time chart, link is created and timer is set from link.



(Ex.3) Example of a little complex link



- ① After starting, wait until switch 1 turns on.
 - ② When switch 1 turns on, positioning of Conveyor 1 and Conveyor 2 starts.
 - ③-1 When Conveyor 1 starts the first positioning, Indicator 1 turns on, and when the first positioning is completed, Indicator 1 turns off.
 - ③-2 When Conveyor 2 starts the first positioning, Indicator 2 turns on, and when the first positioning is completed, Indicator 2 turns off.
- ※ Event created by setup of same time is processed same time. Starting timing of positioning of Conveyor 1 , Conveyor 2 and timing of turning on Indicator 1, Indicator 2 are processed with same timing.
Timing of turning off Indicator 1, Indicator 2 depends on timing of completion of positioning of each Conveyor, so it does not always turns off same time.
- ④ After timer, when conveyor 1 starts reverse rotation and Indicator 1 turns on. In the same way, when Conveyor 2 starts reverse rotation, Indicator 2 turns on. (Processed same time with same setup.)
 - ⑤ It wait until switch 1 turns on again after timer is set up.
- ※When “ON” status continues after the switch 1 turns on, positioning starts after timer is set up soon.
Timing of positioning is judged by the status of switch while link is created.
- ⑥ When switch 1 turns on, Conveyor 1 start short positioning, and Conveyor 2 also starts positioning.
 - ⑦ ON status of Indicator 1 continues until minute positioning of Conveyor 1 is completed.
When positioning is completed, Indicator 1 turns off.
 - ⑧ Indicator 2 turns on while Conveyor 2 rotates or reverses. When positioning is completed, Indicator 2 turns off.

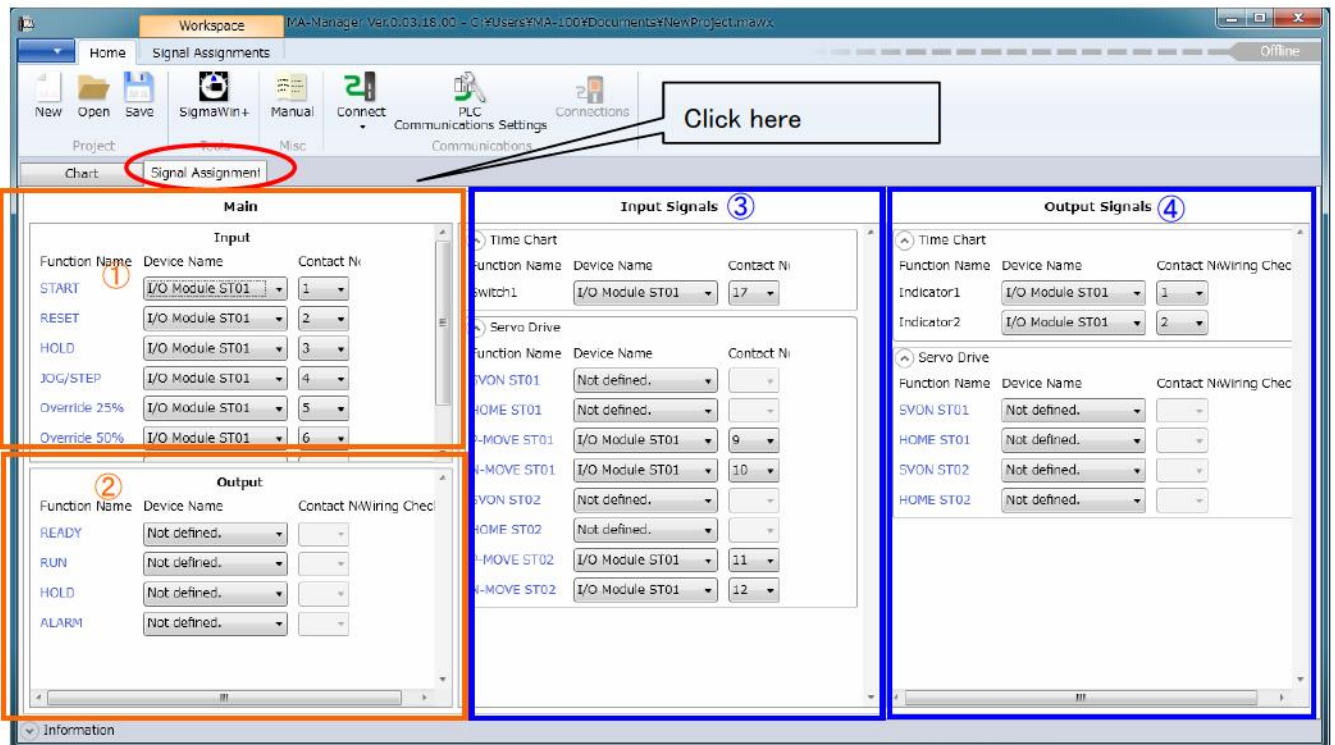
5.3.5. Check and Change of Allocation of Servo Axis and I/O

Check allocation of servo axis and I/O signal after creating time chart.

Signal defined in time chart is automatically allocated. Check allocated function and real signal by device name and signal number. Signal could be changed.

A signal, not to be used, can be set as “Not defined”.

- **FunctionName** : Function of signal is displayed.
 - **Device Name** : Select I/O module of MECHATROLINK- II from station number.
 - **Contact No** : Select signal number to be allocated to each signal.
- **Wiring check function (Refer to 5.5)**
 - “Lamp for monitor“ is displayed for input signal and “Wiring check” is displayed for output signal in Online status.
 - “Wiring check” is a function to forcibly turn on the corresponding output.
 - Use this function when checking the wiring.
 - “Wiring check” could be used only not running time chart program.
 - If used at running, alarm occurs.



5.3.5.1. Main I/O Signal

	Names	Function Name	Specifications
①	Main signal	START	Chart program starts. START signal is operated by rising edge.
	Main input signal (command) used to operate chart program and servo axis. Input signal is allocated.	RESET/STOP	If alarm occurred, the alarm is reset by RESET signal. When turning on RESET signal while operating chart program, the operation stops (STOP).
		HOLD	Chart program temporarily stops. Chart program restarts the operation by turning on "START" signal again.
		JOG/STEP	Switching of JOG operation and STEP operation Select JOG operation or STEP operation when P-MOVE and N-MOVE are executed. OFF: JOG operation is selected ON :STEP operation is selected
		Override 25%	When Override 25% is turned on, operation is executed by override 25%. When Override 50% is turned on, operation is executed by override 50% In the case of both OFF is 100%.
		Override 50%	
		SVON all axes	ON : Servo on is executed for all axes. OFF: Servo off is executed for all axes.
		HOME all axes	Zero point return of all axes starts. Each axis executes zero point return following method that defined to each axis.
②	Output Status of MA controller is output. Output signal is allocated.	READY	MA controller normal status (Operation ready) This signal and RLY OUT are linked. This output turns off when following occurred •Alarm is occurring •CPU stops •Program is being transferred (Executing Flash save)
		RUN	Executing chart program operation
		HOLD	Chart program is in temporarily stop status.
		ALARM	Alarm is occurring See section 7 for the details of the alarm.

5.3.5.2. Optional Signal

	Names	Function Names	Specifications
③ Input Signals	Time chart	(Input 1) (input 2) . . .	Input allocated in time chart is displayed. Defined function names are displayed.
	Servo ST01	SVON ST01	ON: #1 Servo axis (ST01) is enabled individually. OFF: #1 Servo axis (ST01) is disabled individually
		HOME ST01	When this function is turned on, #1 Servo axis (ST01) starts zero point return.
		P-MOVE ST01	When this function is turned on, #1 Servo axis (ST01) executes JOG operation or STEP operation.
		N-MOVE ST01	Switch JOG and STEP by "JOG/STEP" in main signal. P-MOVE: JOG/STEP is executed in direction of forward rotation. N-MOVE: JOG/STEP is executed in direction of reverse rotation.
	Servo ST02	When allocated by axis definition, same items of ST01 are displayed for axis #2.	
	Servo ST03	When allocated by axis definition, same items of ST01 are displayed for axis #3.	
Servo ST04	When allocated by axis definition, same items of ST01 are displayed for axis #4.		
④ Output Signals	Time chart	(Output 1) (Output 2) . . .	Output allocated in time chart is displayed. Defined function names are displayed.
	Servo ST01	SVON ST01	Servo enabled status of #1 Servo axis (ST01).
		HOME ST01	This function is turned on completing zero point return of #1 Servo axis (ST01).
	Servo ST02	When allocated by axis definition, same items of ST01 are displayed for axis #2.	
	Servo ST03	When allocated by axis definition, same items of ST01 are displayed for axis #3.	
	Servo ST04	When allocated by axis definition, same items of ST01 are displayed for axis #4.	

5.3.7. Transfer of Program



(1) After creating and saving time chart and allocation, project shall be transferred to MA controller. When clicking “connect” icon, transfer setup Windows is displayed.

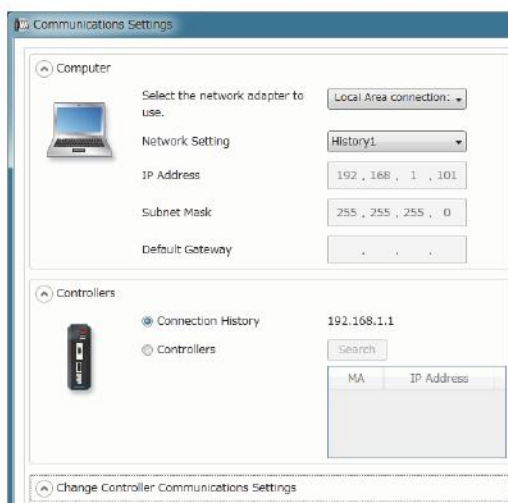
CAUTION

When connecting PC and MA controller, TCP/IP of Ethernet port of PC needs to be changed. It happens at the timing that MA-Manager is connected to MA controller.

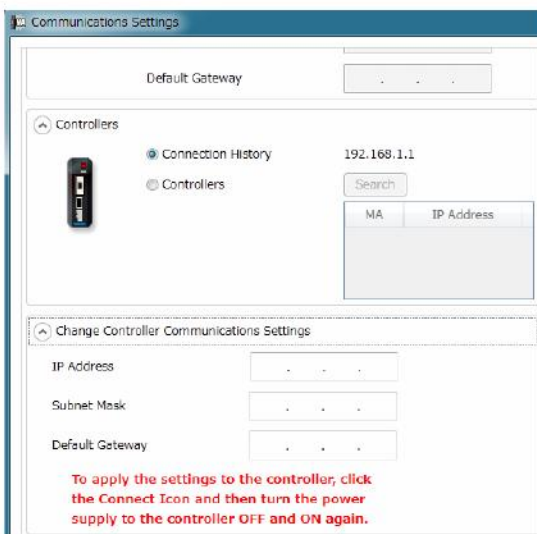
Ethernet setting returns to the original when MA-Manager is closed.

But we recommend users to record the setting of Ethernet in case that setting could not be restored. If setting of Ethernet does not return to the previous setting, connecting to LAN is impossible.

If it becomes unclear, please contact your network administrator.



Names		Items
Computer	Select the network adapter to use.	Select Ethernet port of PC. When PC has plural Ethernet port, select port to be used from them.
	Network setting	When connecting for the first time, select “New setup”. Once connected successfully, “history” is displayed. It is possible to select by selecting history from the next time.
	IP Address Subnet Mask Default Gateway	Set up address to be set up to PC. IP address : 192.168.1.101 Subnet mask : 255.255.255.0 Default gateway : - Use with default value usual.



	Names	Items
Controllers	Connection history	Address of connection history is displayed. Default: 192.168.1.1 Default value of MA controller and IP address when INIT switch is turned on, is 192.168.1.1
	Controllers	By clicking Search button, MA controllers on the network are found. Address of the found MA controller is displayed.
Change Controller Communication Settings	IP Address Subnet Mask Default Gateway	Change IP address of MA controller when there are plural controllers on network, or when connecting to host PLC with Ethernet. Cycle power after transferring the setting to MA controller to activate. If change of setting is activated after power cycle, MA-Manager could not be connected by current setting. Search controller or connect by changed I/P address.

(2) When clicking “OK” button after setup is completed, MA controller is connected. It takes longer time for the first connection as followings are executed.

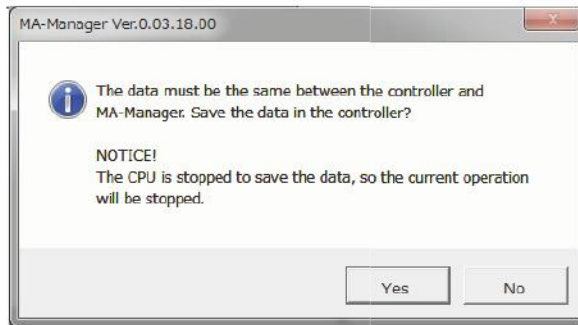
- ① Start “communication platform”
- ② Setting Ethernet connection to communication platform
- ③ Change IP address in PC.



←Task Tray

Connection may fault caused by delay of start of some type of PC. Click “connection” button again. Once successfully connected, connection is executed swiftly from the next time.

- ③After MA controller is found by MA-Manager, the data of project and program of MA controller are compared. If the data does not correspond, following Windows is displayed.



When clicking “Yes” button, project file is transferred to MA controller and connected Online.
No Online when clicking”No” button,
If transferred during operation or servo on, program stops and servo off is executed to stop CPU.

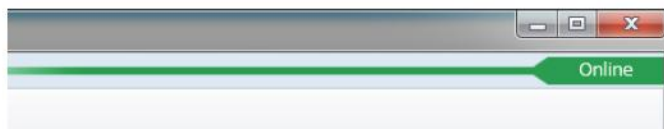


If project data and MA controller data does not correspond, connection online could not be executed. Connect with project that corresponds, or transfer project data to controller to correspond.

- ④Following operation are executed when connecting.

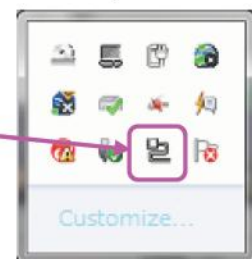
- Project is transferred to MA100 after communication is ready.
- FLASH-save is executed in MA controller after transfer is completed.
 - ※When restarting MA100 with INIT switch off, MA100 starts with FLASH-saved project.
- Parameter is written to connected Servopack (see appendix B for the details)

- ⑤Display of status of MA-Manager changes to “Online” status.



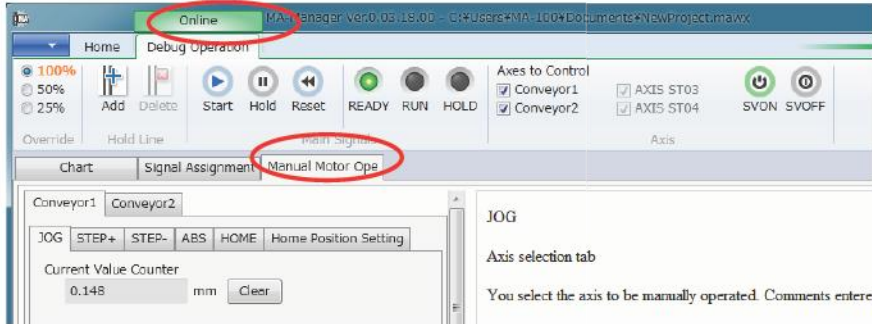
If not changed to Online status, check following.

- Is power supply of MA controller turned on?
- Is Ethernet cable crossed type cable? Is the cable broken?
(Connection by straight type cable may be possible for some types of PC.)
- Is IP address in PC changed to address set up in communication setup?
 - Check the network settings of PC.
- Is communication platform started?
 - Check whether there is the icon is in the task tray.



5.4.Manual Operation Using MA-Manager (Online Function)

Select tab shown below when executing manual operation. Manual operation tab is displayed only in Online status.



5.4.1. Servo ON/Servo OFF



Servo ON/Servo OFF could be executed by icon. Servo ON/Servo OFF command is executed with axis with check mark put on.



If you have changed the parameters of manual operation, the data of MA-controller and project data will be recognized unmatched.

Therefore “Unmatch message” is displayed when you reconnect with MA-controller by MA-Manager.

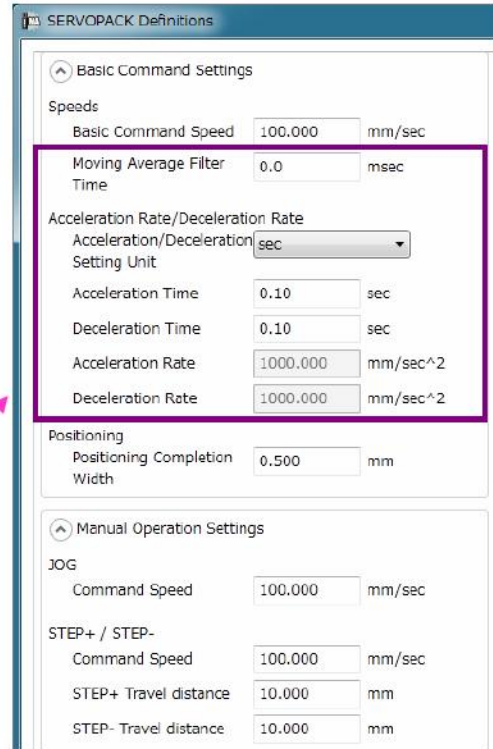
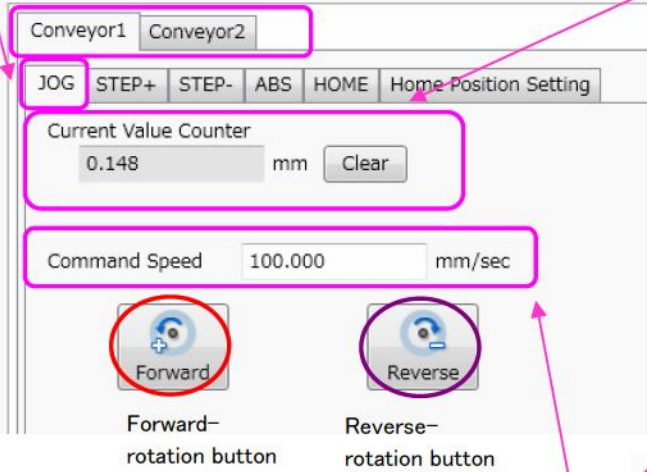
For reconnecting MA-controller, transfer the project file again or do the power OFF and ON of MA-Controller (the data in the MA-controller will return to the data at the time of transfer).

5.4.2. JOG Operation

Select "JOG" to execute JOG operation.

Select axis to execute manual operation. "Name", named by axis definition, is displayed.

Current value counter. When clicking "clear" button, zero clear is executed. Distance from cleared position to current value is displayed.



JOG operation is executed while pressing button.

Set up JOG speed. Initial value, acceleration/deceleration Rate, and acceleration/deceleration time of JOG speed (impossible to change) is displayed with value defined by axis definition.

The setting of acceleration/deceleration time is the time from 0 to basic command speed.

5.4.3. STEP+ Operation

Select axis to execute manual operation. "Name", named by axis definition, is displayed.

Select STEP+ for STEP operation in positive direction

Current value counter. When clicking "clear" button, zero clear is executed. Distance from cleared position to current value is displayed.

Set up travel distance of STEP + and speed when executing STEP + operation. Initial value, acceleration/deceleration and acceleration/deceleration speed (impossible to change) are displayed with value defined by axis definition.

When one-clicking "Operate" button, operation with amount of 1 time STEP of movement is executed in positive direction. When clicking "Stop" button, deceleration to a stop is executed. Once operation started, return to previous position is possible by clicking "Return" button. When switching tab or changing axis, "Return to previous position" is cleared and disabled.

5.4.4. STEP- Operation

Select axis to execute manual operation. "Name", named by axis definition, is displayed.

Select STEP- for STEP operation in negative direction

Current value counter. When clicking "clear" button, zero clear is executed. Distance from cleared position to current value is displayed.

Set travel distance of STEP - and speed when executing STEP - operation. Initial value, acceleration/deceleration and acceleration/deceleration speed(impossible to change) are displayed with value defined by axis definition.

When one-clicking "Operate" button, operation with amount of 1 time STEP of movement is executed in negative direction. When clicking "Stop" button while operating deceleration to a stop is executed. Once operation started, return to previous position is possible by clicking "Return" button. When switching tab or changing axis, "Return to previous position" is cleared and disabled.

Separate setting of travel distance of STEP in positive/negative direction is possible by separating positive tab and negative direction tab. Operation button is positioned in reverse order in positive/negative direction considering user's convenience.

5.4.5. ABS Operation (Positioning to target Absolute Position)

Select axis to execute manual operation. "Name", named by axis definition, is displayed.

Select ABS tab when executing ABS operation

Current value counter. When clicking "clear" button, zero clear is executed. Distance from cleared position to current value is displayed.

Set target position and speed. Initial value, acceleration/deceleration and acceleration/deceleration speed (impossible to change) are displayed with value defined by axis definition.

Operation button Stop button Return to previous position

When clicking "Operate" button, positioning to target position is executed.
 When clicking "Stop" button while operating, deceleration to a stop is executed.
 Once ABS operation started, return to previous position is possible by clicking "Return" button.
 When switching tab or changing axis, "Return to previous position" is cleared and disabled.

When executing ABS operation, checking if feedback position reached to goal is possible by displaying axis status in axis status list.

Information												
Errors		Alarm		Axis Status		Input Status		Output Status			Communications Status	
Axis	SERVOPACK Model	Feedback Position	Feedback Speed	SVON	Alarm	Warning	P_OT	N_OT	HOME	DEC		
Conveyor1	SGDV-1R7E11A	0.148	-0.610	OFF			OFF	OFF	Completed.	OFF		
Conveyor2	SGDV-1R7E11A	0.000	0.000	OFF			OFF	OFF	Not complete	OFF		

5.4.6. HOME Operation (Zero Point Return)

Select HOME tab when executing HOME operation

Select axis to execute manual operation. "Name", named by axis definition, is displayed.

Current value counter. When clicking "clear" button, zero clear is executed. Distance from cleared position to current value is displayed.

Set up parameter of zero point return and speed when executing zero point return operation. Initial value, acceleration/deceleration And acceleration/deceleration speed(impossible to change) are displayed with value defined by axis definition.

Operation button Stop button

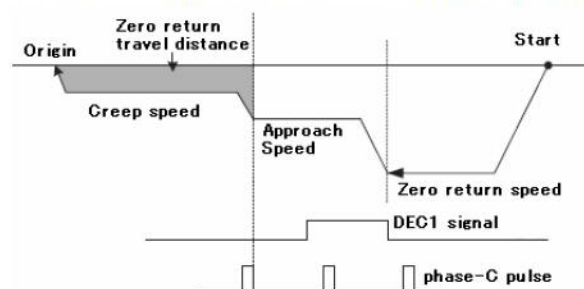
When clicking "Operate" button, zero point return starts.
When clicking "Stop" button while operating, deceleration to a stop is executed.

Zero point return parameter	Explanation
Homing Direction	Select direction of zero point return from positive or negative direction. See method of zeropoint return for the details
Homing speed	Set up zero point return speed
Approach speed	Set up approach speed
Creep speed	Set up creep speed
Homing travel distance	Set up final running distance of zero point return

Homing Method : Select from the following methods of homing.

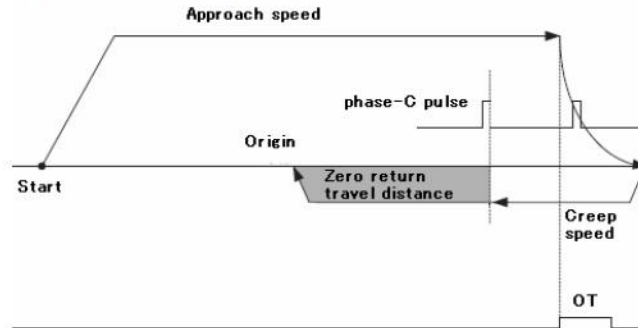
- ①DEC+phase C
- ②OT+phase C
- ③Phase C-pulse method
- ①DEC+phase C

The axis moves at Homing speed to start the zero point return. DEC signal of the servo pack is turn ON, then slowed to approach speed during operation, and The first phase-C pulse is turn ON from DEC signal is turn OFF, then slowed to creep speed. The axis moves to homing travel distance from the phase-C pulse. Then It will complete zero point return. The axis reverses when OT become ON during operation.



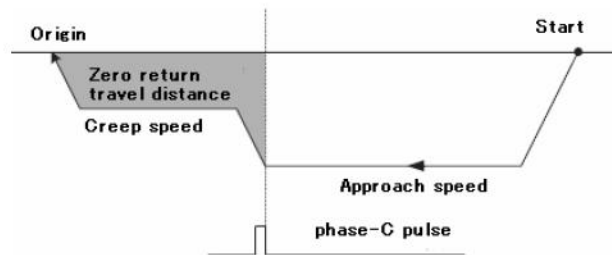
②OT+phase C

The axis moves at approach speed to start the zero point return. OT signal of the servo pack is turn ON, then the axis reserves and slowed to creep speed during operation. The axis moves to homing travel distance from the first phase-C pulse of the motor. Then it will complete zero point return.



③Phase C-pulse method

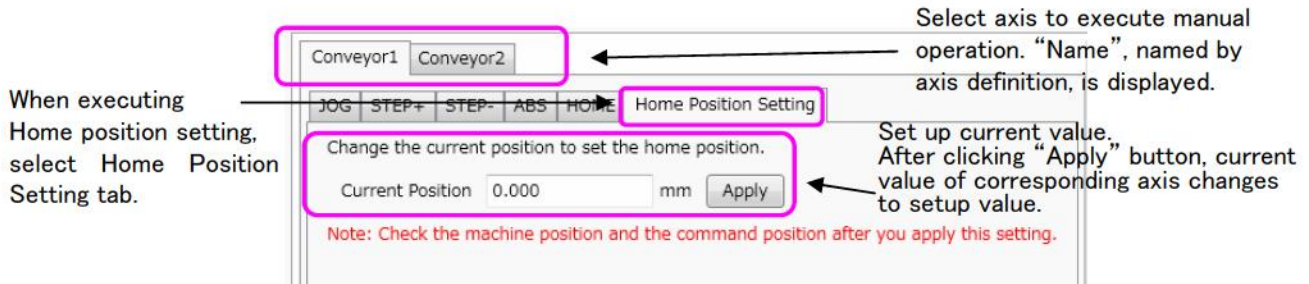
The axis moves at approach speed to start the zero point return. First Phase-C signal of motor from start is turn ON, then the axis reserves and slowed to creep speed. The axis move to Homing travel distance from the phase-C pulse of the motor. Then It will complete zero point return.



Execute positioning to 0 position for absolute encoder motor.

5.4.7. Zero Point Setup

Set up zero point position when using absolute value encoder. Setup is possible when using only absolute value encoder. Setup using incremental encoder is impossible.



- Current Position : Set the value to the target current value you want.
 - (Ex) When changing current position 123.456mm to 0mm, set 0.000.
 - (Ex) When changing current position 123.456mm to 200.000mm, set 200.000mm.
- Apply : Execute zero point setup
 - When Home position setting is executed, MA controller writes the parameter Pn808 by executing unit conversion of Servopack.

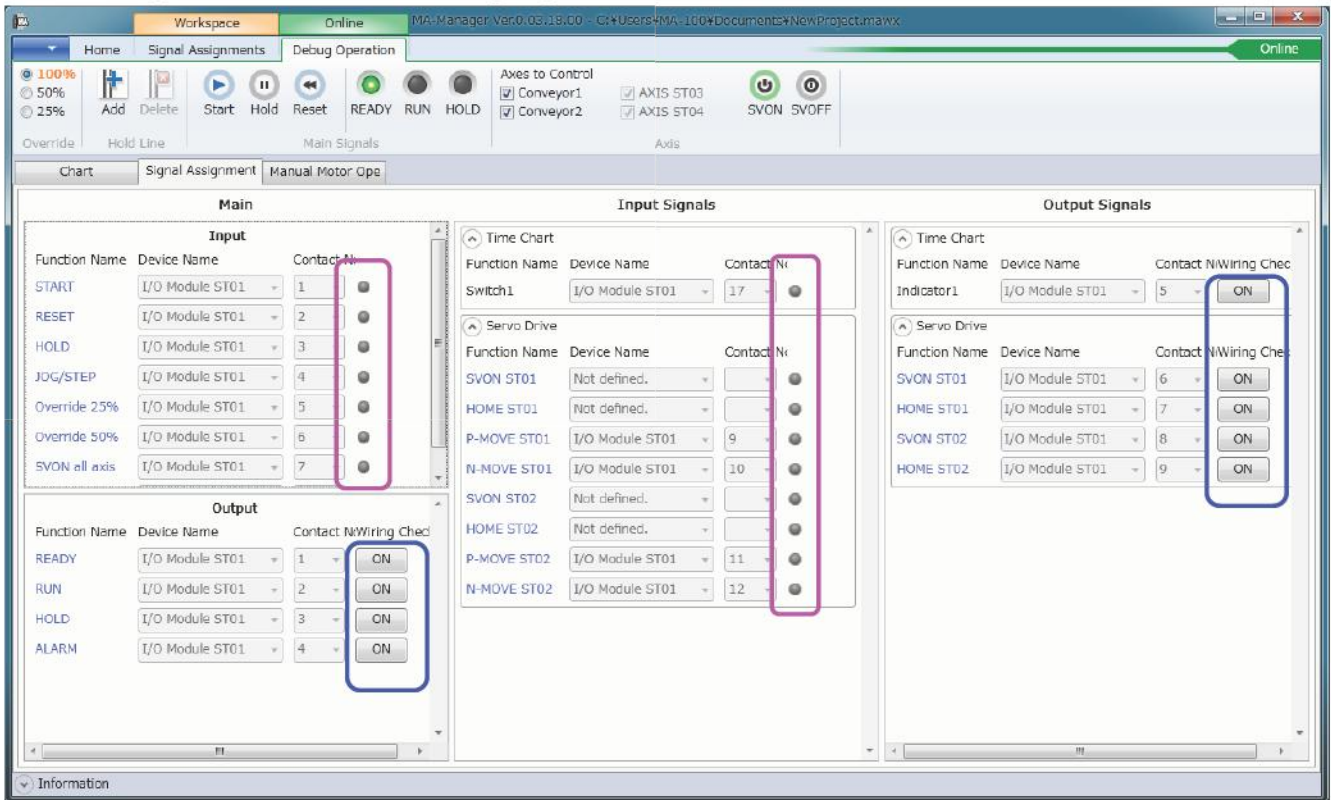
Note)

Values of setting here is conversed to offset value of pulse unit through MA controller, then set up to parameter pn808 of Servopack.

By executing Home position setting, current position is changed. So Home position setting was excuted, check position of machine and command.

5.5. Wiring Check Function of I/O (Online Function)

Wiring of I/O could be checked by signal allocation screen Online.



When input signal turns on, the lamp next to the contact number turns on.

While pushing wiring check button next to the output signal, turning on output is possible.

Wiring check button is not displayed for output signal that is not allocated.



Wiring check of output signal is checked only when not operating.

If clicking wiring check button while operating, AL.C10

(wiring check signal disabled (check wiring while in operation)) alarm occurs.

5.6 Debug Operation Using MA-Manager (Online Function)

When transferring project from MA-Manager, online screen is displayed. Click “Debug operation” tag after online status. When selecting axis status tag of axis information, feedback position, feedback speed, servo on status, alarm status, signal status of SERVOPACK could be monitored.

Debug Operation Tag

Axis Status Tag

5.6.1. Servo ON/Servo OFF Operation

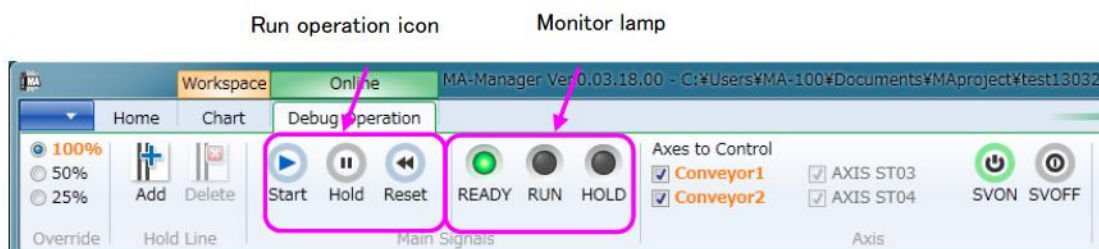
Servo ON/Servo OFF Icon




Servo ON/Servo OFF can be operated from icon. Servo ON/Servo OFF command is executed to only axes that were checked. Letter of the Axes name became Amber, and SVON status in axis information becomes ON when the Servo is enabled.







After servo turns on, SVON turns on.

Axis	SERVOPACK Model	Feedback Position	Feedback Speed	SVON	Alarm	Warning	P_OT	N_OT	HOME	DEC
Conveyor1	SGDV-1R7E11A	3.946	0.000	ON			OFF	OFF	Completed.	OFF
Conveyor2	SGDV-1R7E11A	0.000	0.000	ON			OFF	OFF	Completed.	OFF

5.6.2. Run Operation / Monitor Display



Operation icons	Explanation
Start 	Time chart operation starts. Click "Start" button after executing servo on. Click "Start" button when restarting from "HOLD" status. Completion of zero point return is required to start the program for incremental encoder. If the program starts without completing zero point return, ALA20 occurs.
Hold 	Holds Time chart operation temporarily. Click "Start" button to restart time chart operation. (Release of hold)
Reset 	Time chart operation stops. At the same time, if alarm occurred, the alarm is reset. After clicking "Start" button again, operation starts from the beginning after returning to start point.

Monitor lamps	Explanation
READY  	The lamp turns on when MA controller is "READY" status. When started by switching on by INIT, or project is not transferred, the lamp turns off. If alarm occurred, the lamp also turns off.
RUN  	The lamp turns on time chart operation starts after clicking "Start" button. After operation is completed, the lamp turns off. The lamp also turns off while in "HOLD" status.
HOLD  	The lamp turns on when stopped from "HOLD" button. Click "Start" button again to restart operation.

Note)

Start from debug icon of MA-Manager is possible when allocated to I/O, such as Start signal or Reset signal, or when operating from host PLC. Operation from I/O or PLC is enabled in debug operation screen (Operation from both is enabled).

Attention to safety when executing online operation to prevent other operator from executing unintended operation.

Be sure to complete zero point return before starting operation when using incremental encoder.

Except in the case of A.8□□ (encoder alarm) and AE□□(communication alarm), the HOME status is always turned on when using absolute encoder. Be sure to check the motor position and machine position.

Axis	SERVOPACK Model	Feedback Position	Feedback Speed	SVON	Alarm	Warning	P_OT	N_OT	HOME	DEC
Conveyor1	SGDV-1R7E11A	3.946	0.000	ON			OFF	OFF	Completed.	OFF
Conveyor2	SGDV-1R7E11A	0.000	0.000	ON			OFF	OFF	Completed.	OFF

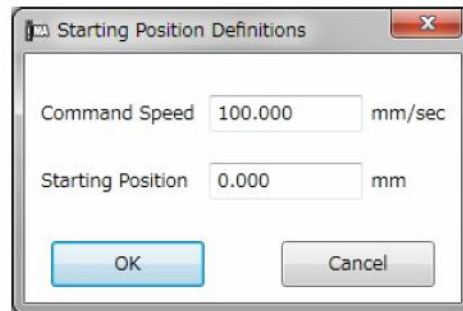
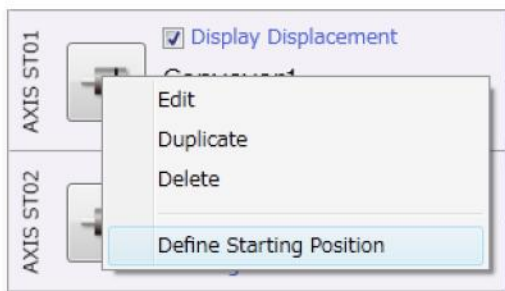
Completion status of servo on

Completion status of zero point return

Operation starts after clicking “Start” button.

Move to start point is executed first.

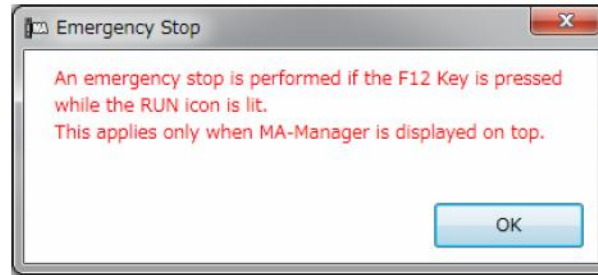
Start point is defined in “start point definition” in axis definition.



Start point could be checked in display of start point of each axis.



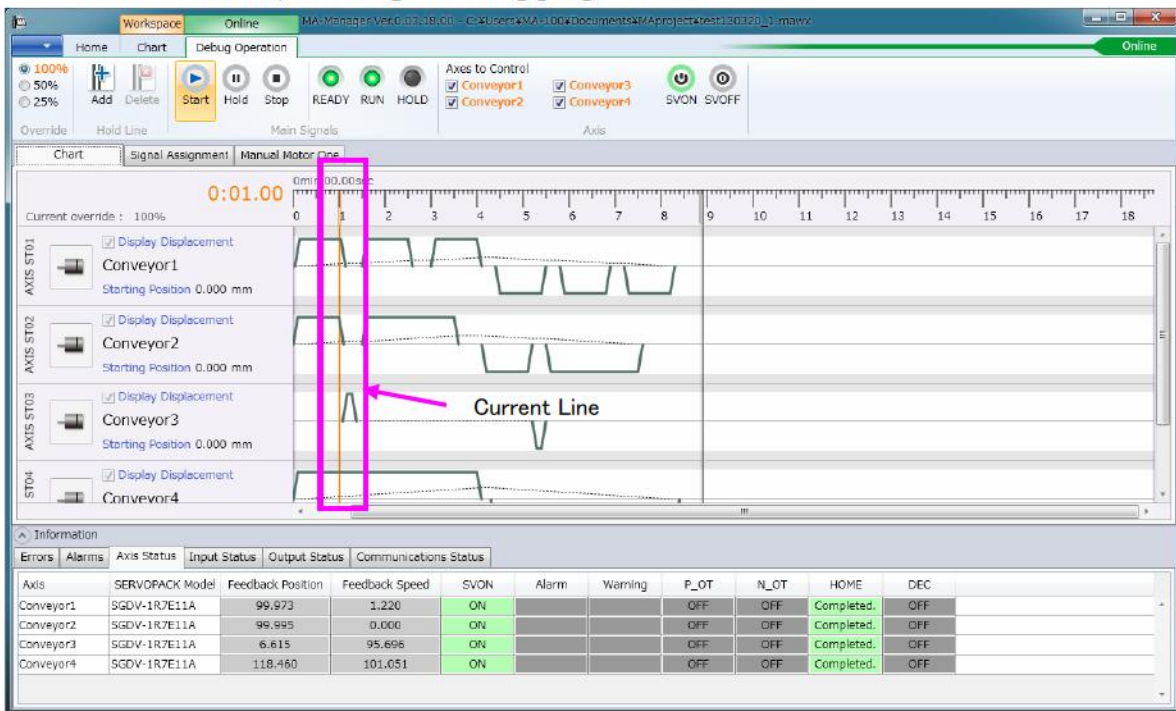
When operation starts, following emergency stop dialogue is displayed.



You can cancel displaying this dialogue from next time by check mark on.

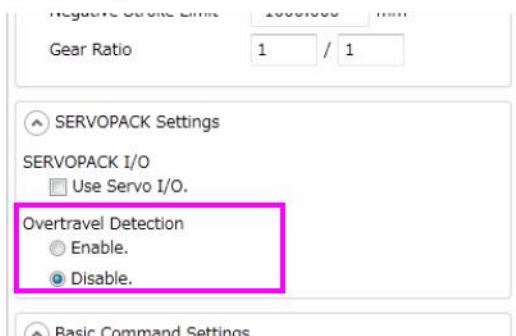
See section 5.3.2.4 to change the setup to display this message again.

When clicking “OK” button, debug operation starts. When operation starts, “RUN” turns on, scrolling following program chart.



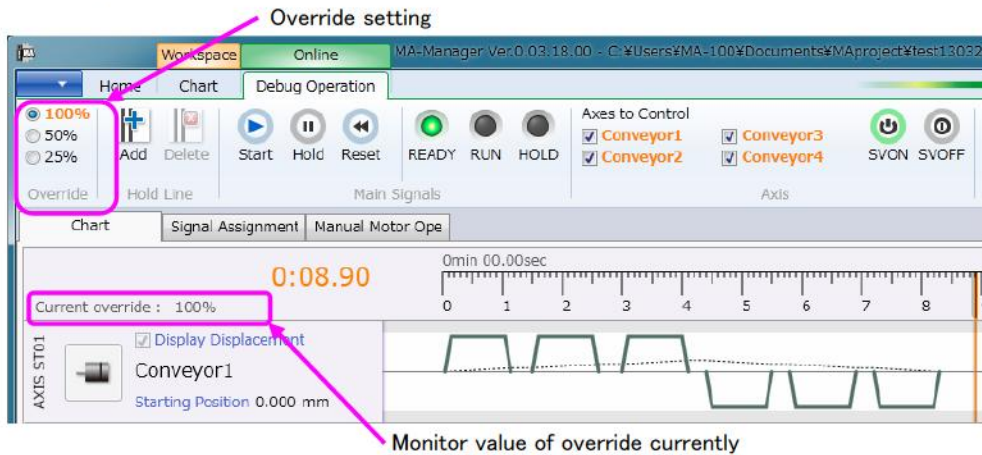
※Current program execution line (Current Line) is at the end line position when operation is completed. Click “Reset” button to return the Current Line to start position of program.

If “Overtravel” is enabled and overtravel signals to Servopack is not wired, overtravel alarm of AL413, or AL414 occurs. Overtravel function can be disabled by selecting disable in axis definition.



When disabled, return to enable after wiring.

5.6.3. Setup of Override



Speed override can be set up with 100%, 50% and 25%.

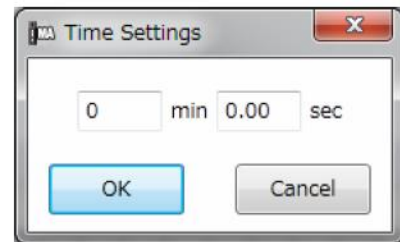
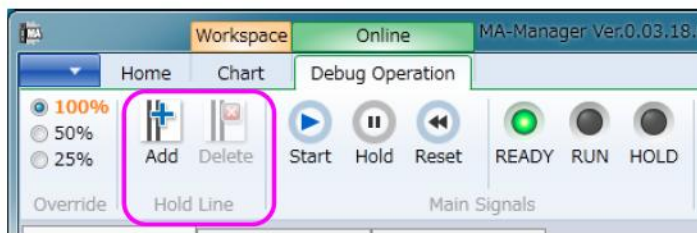
Same setup is possible by I/O or host controller. If it is different setting, the most lowest setting is applied. Current value can be monitored at Current override.

If setup in MA-Manager and current value is different, it is executed from I/O, or HMI/Host PLC.

5.6.4. Setting of HOLD Line

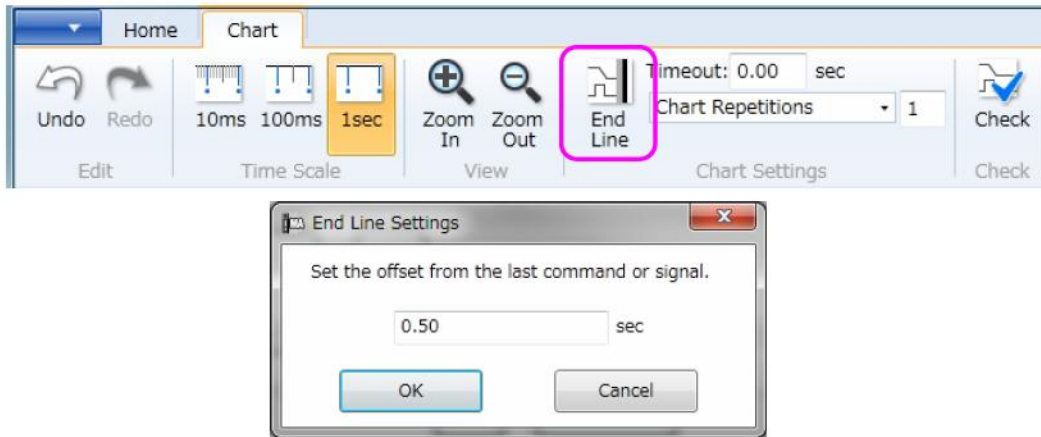
A Hold line in the time chart, that stops operation temporarily, can be set. The operation stops at the set Hold Line after “Start”. The axes start deceleration to stop from Hold Line (the same to clicking “Hold” button while in operation).

Set up Hold Line with the time edit dialogue that appears by clicking additional button. Click “Delete” button to delete.



5.6.5. Setting of End Line (Displayed only in Professional Mode)

Completion of the time chart program is automatically set up 0.5sec after final command or signal. For professional mode, End Line that indicates the completion of the time chart can be set as desired. Set up time from final command or change of final signal after clicking “End Line” button and End Line setup dialogue is displayed.



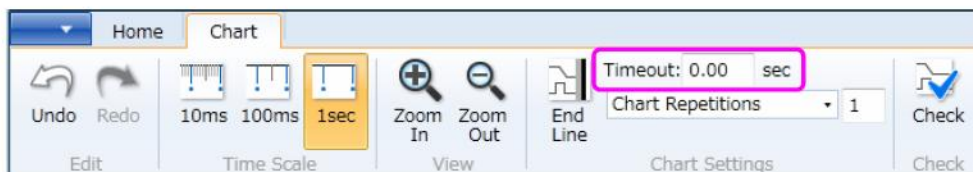
5.6.6. Setting of Timeout (Displayed only in Professional Mode)

Alarm is detected by timeout function if set up time passed after waiting for completion of positioning or signal. Alarms are shown below.

- ①AL.420 (Axis event timeout: event of axis is not completed after time of timeout passed.)
- ②AL.620 (Output event timeout: event of output is not completed after time of timeout passed.)
- ③AL.720 (Input event timeout: event of input is not completed after time of timeout passed.)

When setup value is 0, timeout error is disabled.

Initial value in standard mode and professional mode is 0. (without timeout error check)

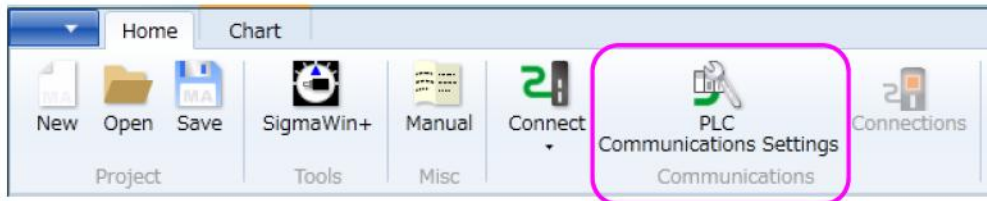


5.7 Applied Operation of MA-Manager

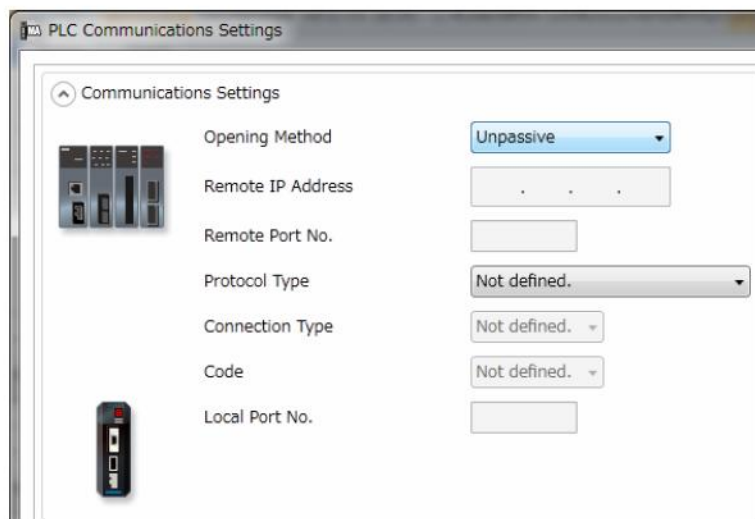
5.7.1. Connection to HMI and Host PLC (Displayed only in Professional Mode)

MA100 is equipped with Ethernet automatic receive function and can communicate with HMI and host controller.

※Communication master is required for HMI and host PLC because of only automatic receive.



PLC communication setup dialogue is displayed after clicking “PLC communication settings”.



Names	Items	Comment
Opening method	Unpassive / Fullpassive	
Remote IP Address	Set up IP address of HMI and PLC. Conform to setup of HMI and PLC, Setup of Unpassive is not required.	
Remote Port No.	Set up port number of HMI and PLC. Match to setup of HMI and PLC. Setup is not necessary for Unpassive.	<ul style="list-style-type: none"> •Range of setup 256~65534 •Prohibited port number: 9997, 9999, 10000
Protocol type	Extended MEMOBUS / MODBUS/TCP	
Connection type	UDP / TCP	
Code	ASCII / BIN (MODBUS/TCP is BIN only.)	
Local Port No.	Set up port number of MA controller. The number is the destination port number set in HMI and PLC.	<ul style="list-style-type: none"> •Range of setup 256~65534 •Prohibited port number: 9997, 9999, 10000

That is the only setting of MA controller. Be sure to cycle power after changing setting and connecting. Communication setting is activated after cycle power.

By connecting to touch panel or host PLC, only Holding resistor of MA controller (M register) can be accessed. I/O register could not be accessed. Refer to the following corresponding function code.

■ Extended MEMOBUS protocol

Function Code	Function	Support
01H	Read Coil Status	○
02H	Read Input Relay Status	—
03H	Read Holding Register Contents	○
04H	Read Input Register Contents	—
05H	Modyfi Status of a Single Coil	○
06H	Write to a Single Holding Register	○
08H	Loopback Test	—
09H	Read Holding Register Contens (Extended)	○
0AH	Read Input Register Contens (Extended)	—
0BH	Write to Holding Register (Extended)	○
0DH	Read Discontinuous Holding Register Contens (Extended)	○
0EH	Write to Discontinuous Holding Register Contens (Extended)	○
0FH	Modify Status of Multiple Coils	○
10H	Write to Multiple Holding Registers	○

※ When connecting to touch panel made by Digital , Please select the protocol MEMOBUS Ethernet (= Extended MEMOBUS). Selecting the MP / servo protocol may cause unexpected behavior.

■ MODBUS/TCP protocol

Function Code	Function	Support
01H	Read Coil Status	○
02H	Read Input Relay Status	—
03H	Read Holding Register Contents	○
04H	Read Input Register Contents	—
05H	Modyfi Status of a Single Coil	○
06H	Write to a Single Holding Register	○
0FH	Modify Status of Multiple Coils	○
10H	Write to Multiple Holding Registers	○
16H	Mask Write to Multiple Holding Registers	○
17H	Read and Write to Multiple Holding Registers	—

Accessible (Read / Write) register of MA controller is **MW00000 ~ MW03999**.

Register that can be written is **MW00000 ~ MW00999**.

Receive code error occurs at HMI and host PLC when writing to more than MW01000.

See appendix A for register list of MA controller.

You can check communication status by communication status in information list.

Transmission Status	Error Status	Send Pass Counter	Receive Pass Counter	Error Counter
CONNECT	No error	11	11	0

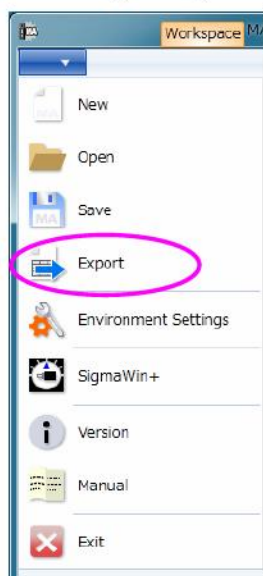


If you have changed the parameters of manual operation from HMI or host PLC, the data of MA-controller and project data will be recognized unmatch. Therefore “Unmatch message” is displayed when you reconnect with MA-controller by MA-Manager. For reconnecting MA-controller, transfer the project file again or do the power OFF and ON of MA-Controller (the data in the MA-controller will return to the data at the time of transfer).

5.7.2. Export Function

Time chart data can be converted to CSV file.

CSV file is created after inputting file name and clicking “OK” button.



※ Import from CSV file is impossible.

Image of CSV file

Type	Name	Start	COIN	Speed	Movement	Acc	Dcc	Acc	Dcc
Servo: AXIS	Name	Start time	Completion time	Speed	Amount of movement	Acceleration	Deceleration	Acceleration time	Deceleration time
AXIS	Conveyor 1				Event ①				
					Event ②				
					Event ③				
Type	Name	Start	Signal						
Input: INPUT	Name	Start time	Signal status						
INPUT	Switch 1	Event ①	1						
		Event ②							
Type	Name	Start	Signal						
Output: OUTPUT	Name	Start time	Signal status						
OUTPUT	Indicator 1	Event ①	1						
		Event ②							

6. Maintenance and Inspection

This section describes inspections that must be performed daily or periodically.

6.1. Daily Inspections

Inspection Item		Inspection	Criteria	Correction
Installation Condition		Loose screws or cover	All screws and covers must be secure.	Tighten the screws.
Connections		Loose terminal screws	No screws must be loose	Tighten the terminal screws.
		Connectors	No connector must be loose	Tighten the lock screws on the connectors.
		Separation between crimped terminal	Suitable gaps must be maintained	Provide correct gaps.
Display LED	7SEG LED	Check the lighting	Sufficient lighting	See section 2.6.1 "Display of LED" for lighting
	Display LED	Check the lighting	Sufficient lighting	

6.2. Periodic Inspections

Inspect following item once at least once a year.

Inspection Item		Inspection period	Discription	Correction
Ambient Conditions	Ambient Temperature *1	At least once a year	Measure the temperature and humidity with a hydrometer and thermometer and measure corrosive gas. They must be specifications	Remove source of contamination or improve installation environment
	Humidity			
	Atmosphere			
Visual exterior inspection		At least once a year	There must be no dirt, dust, oil, or other foreign matter on the MA-controller.	Clean the MA-controller with air or cloth.
Check of power supply voltage		At least once a year	Measurement of voltage between 24V terminals.	Adjust within DC19.2V ~ 28.8V

*1 If the MA-controller is installed in a panel, the temperature inside the panel is the ambient temperature.

6.3. Replacement Guidelines for MA-controller Parts

Electrical and and electronic parts have a limited service life due to mechanical wear and deterioration over time. Perform periodic inspections for preventive maintenance.

Replace product based on the standard replacement periods that are given in the following table. And also replace product before non-operation time for the product reaches to one year (8760 hours).

Parts name	Standard Replacement period	Operating condition
Relay	—	Ambient temperature : Less than 45°C
Aluminum electrolytic capacitor on print board	5 years	

7. Trouble Shooting

7.1. How to Check Alarm

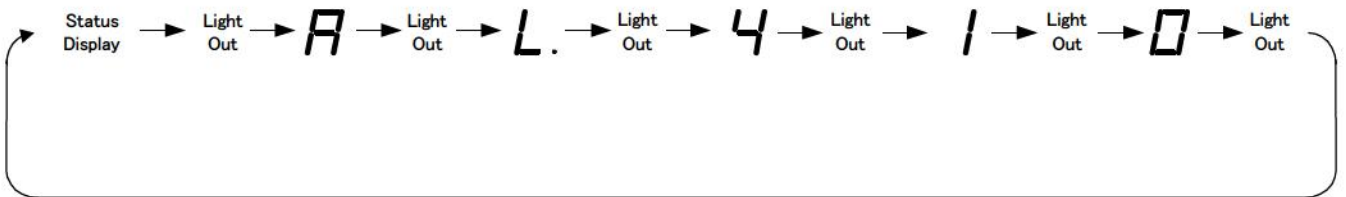
There are 2 methods to check alarm information if alarm occurred,

(1) Check by 7SEG LED of MA – Controller

How to check the display of alarm number

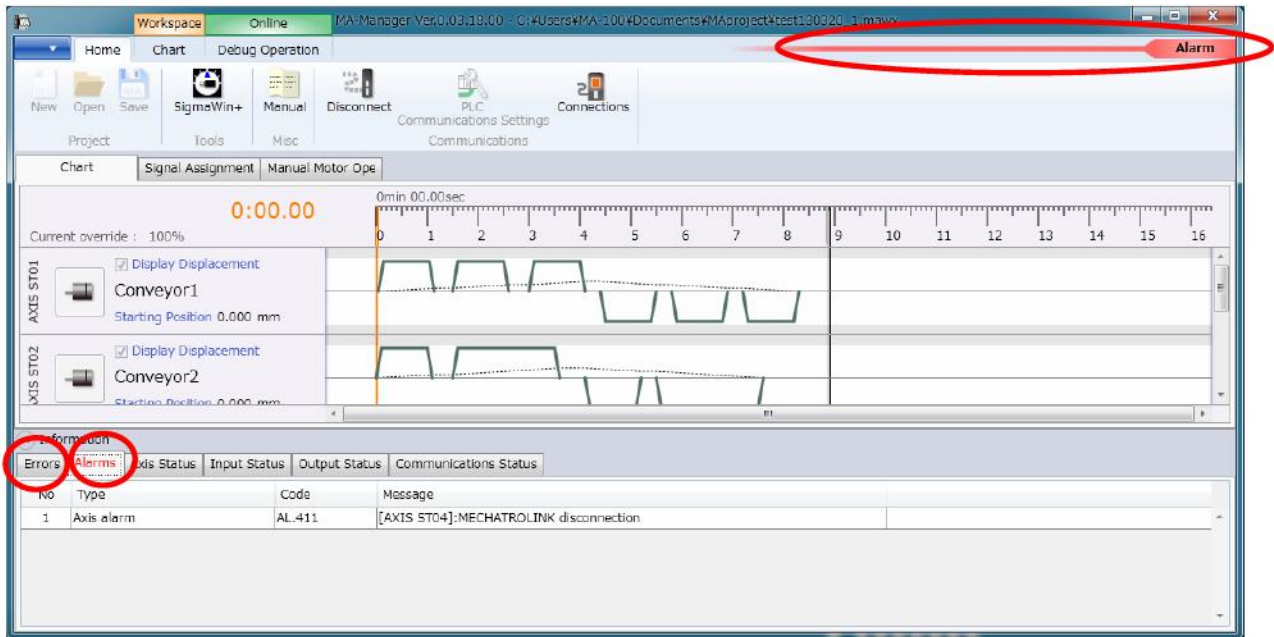
Alarm number is displayed character by character as shown below.

Ex:「AL.410」



(2) Check by MA-Manager

When MA-Manager is connected online, contents of occurring alarm could be checked in status information.



Errors ... Program Error detected by MA-Manager

Alarms ... Alarm detected by MA-Controller

7.2. Contents and Correction of Alarm

7.2.1. Alarm List

Following is list and correction of alarm.

Classification	Alarm No.	Alarm display	Correction
CPU Alarm	AL.001	Illegal General Instruction Exception	Initialize MAController. If same error occurs again after initialization, unit may malfunction. Replace with spare unit, and send module that alarm is occurring back to Yaskawa.
	AL.002	Slot Illegal General Instruction Exception	
	AL.003	CPU Address error	
	AL.004	NMI	
	AL.005	RAM Diagnosis error	
	AL.006	FLASH Diagnosis error	
	AL.007	CPU Diagnosis error	
M-II Alarm	AL.101	M-II WDT Over	This error occurs when axis configuration is changed by MA-Manager and project is transferred. Turn on power supply of controller and Servopack again.
	AL.102	M-II Receive FIFO Overrun error	
	AL.103	M-II Send FIFO Underrun error	
	AL.110	Request of power on again of controller and Servopack by change of slave configuration	
	AL.111	Request of power on again of controller and Servopack by reset of absolute encoder	
Ethernet Alarm	AL.201	MA-Manager Ethernet cable disconnection	This alarm is detected if Ethernet cable between MA-Manager (PC) and MA controller is disconnected. Reset after checking cable, LINK, and LED.
	AL.202	External Device Ethernet cable disconnection	This alarm is detected if Ethernet cable between HMI or host PLC and MA controller is disconnected. Reset after checking cable, LINK, and LED.
Axis Alarm	AL.410	Station connection timeout	This alarm occurs if MA-controller could not recognize the Servopack allocated. Check following : <ul style="list-style-type: none"> • Servopack series is Σ-V or Σ-V mini. • Axis allocated by MA100 and station address of Servopack conforms • Servopack is MECHATROLINK-II (10Mbps), 32 byte mode.
	AL.411	MECHATROLINK Disconnection	This alarm occurs if MA-Controller could not be connected to MECHATROLINK. Check wiring of MECHATROLINK.
	AL.412	Servo alarm	This alarm occurs if alarm occurred to connected Servopack. Check cause of the alarm number displayed in Servopack. Contents of alarm could be also checked by status information from MA-Manager. After removing the cause of the alarm, execute alarm reset and check alarm is reset.

Classification	Alarm number	Alarm display	Correction
Axis Alarm	AL.413	P_OT Detection	This alarm occurs if overtravel signal in positive direction turns on. Execute servo on after executing reset, and move in negative position.
	AL.414	N_OT Detection	This alarm occurs if overtravel signal in negative direction turns on. Execute servo on after executing reset, and move in positive position.
	AL.415	Abnormal power off of main power supply	This alarm occurs main circuit of Servopack turns off while operating. Check main power supply of servopack.
	AL.416	Nonconformity of rotation/linear motor type	This alarm occurs if type of connected motor (rotation/ linear type) and axis definition does not conform. Check type of motor of axis definition.
	AL.417	Detection of upper limit value of stroke	This alarm occurs if reached to upper limit value of stroke, or executed position command to reach. Execute servo on after resetting , then move to reverse direction.
	AL.418	Detection of lower limit value of stroke	This alarm occurs if reached to lower limit value of stroke, or executed position command to reach. Execute servo on after resetting , then move to forward direction.
	AL.420	Event timeout	This alarm occurs if axis event time of time chart in MA-Controller is not completed after timeout time passed. Check event status with motion when alarm occurred. <ul style="list-style-type: none"> •If positioning completion does not turn on, adjust gain of Servopack or positioning completion width. •If Setup of timeout time is short, adjust timeout time longer.
	AL.421	Move command while executing servo off	This alarm occurs if motion command such as “operation start signal” and “manual operation” is executed without executing servo on. Execute motion command after executing servo on.
	AL.422	Max speed over	Speed that exceeds max speed of motor is set up. Check setup value of speed.
	AL.423	Position range over (Position command or upper/lower limit value of stroke)	This alarm occurs if command position after unit conversion of Servopack to command unit, or upper/lower limit value of stroke exceeds range as shown below. Adjust setup. $[-(2^{30}) -1 \sim +(2^{30}) -1]$ <ul style="list-style-type: none"> - Amount of movement of timechart - Final running distance of zero point return - Offset of position of zero point - Amount of movement of STEP - Start point - Manual positioning position - Upper/Lower limit value of stroke <p>* If the alarm occurred at setting of Home position setting, It may be caused by writing over range to Pn808. In this case, Please set 0 to Pn808, reset rotation number of absolute encoder, and do the power cycle. Then set up Home position setting again.</p>

※ $-(2^{30}-1) \sim 2^{30}-1$ [command unit(SERVOPACK)] is about $-1024 \sim 1024$ rotations of device side (after gear ratio) when using 20 Bit encoder. (about $-8192 \sim 8192$ rotation using 17 Bit encoder.)

For Example : Using 10mm pitch ball screw, it means about $-10240.000\text{mm} \sim 10240.000\text{mm}$.

It should be noted that it is not related to gear ratio because of gear ratio is set to SERVOPACK.

Classification	Alarm number	Alarm display	Correction
I/O Alarm	AL.510	Station connection timeout	This alarm occurs if MA-controller could not recognize I/O of MECHATROLINK-II allocated. Check following <ul style="list-style-type: none"> • I/O module must be simple I/O. Intelligent module is not supported. • I/O allocated by MA-Manager, and station address of I/O conforms. • I/O module is MECHATROLINK-II (10Mbps), 32 byte mode. If the alarm that do not use has occurred, Please check whether there is any assignment on signal assign definition You can delete unnecessary signals by selecting "Not defined".
	AL.511	MECHATROLINK Disconnection	• Check wiring of MECHATROLINK
Output Signal Alarm	AL.610	Servo I/O Unusable	This alarm occurs if output signal of servo I/O after putting check mark on "use servo I/O by connecting Σ -V mini". Select servo I/O function only when connecting Σ -V.
	AL.620	Event timeout	This alarm occurs if event of output of signal of time chart is not completed. <ul style="list-style-type: none"> • Check the cause that event of link allocation source is not completed. • If setup of timeout time is short, adjust timeout time longer.
Input Signal Alarm	AL.710	Servo I/O Unusable	This alarm occurs if input signal of servo I/O after putting check mark on "use servo I/O by connecting Σ -V mini". Select servo I/O function only when connecting Σ -V.
	AL.720	Event timeout	This alarm occurs if event of input of signal of time chart is not completed. <ul style="list-style-type: none"> • Check the cause that input signal does not turn on or turn off. • If setup of timeout time is short, adjust timeout time longer.

7.2.2. Warning List

Following is list and correction of warning

Classification	Alarm number	Alarm display	Correction
Axis Warning	AL.A10	Servo warning	Warning of connected Servopack occurred. Check the cause of warning following servo warning displayed in Servopack. Contents of warning of Servopack could be checked in status information in MA-Manager. After removing the cause of the warning. Execute warning reset and check warning is reset
	AL.A20	Impossible to start the time chart. (cause of start operation before Zero point return.)	If you start before Zero return using incremental encoder, it is occurred. Please start after Zero return.
Output signal Warning	AL.C10	Check wiring while executing program operation	Alarm occurs after clicking "check of wiring of output" button in signal allocation tab while executing program operation with online connection. Click check button of wiring when program stops.

Appendix A Register List

Refer to register list as shown below when connecting through touch panel, host PLC, and Ethernet.

Names	Register	bit	Read/Write	Register Contents
Program Control	MW00000	bit0	Write	Program Start (rising)
		bit1	Write	0: Release the Reset / 1:Reset (Abort+AlarmClear) (rising)
		bit2	Write	0:Release hold command / 1:Hold (rising)
		bit3	Write	0:Servo off to all axes (falling) / 1:servo on to all axes (rising)
		bit4	Write	0:non / 1: Zero point return to all axes (rising)
		bit5	Write	0:JOG mode / 1:STEP mode (Level)
		bit6~F		Reserve
Control of Axis 1	MW00001	bit0	Write	AX 1 0:Servo off to the axis (falling) / 1:servo on to the axis (rising)
		bit1	Write	AX 1 0:STOP / 1: RUN of JOG/STEP to positive direction. (JOG:Level, STEP:rising)
		bit2	Write	AX 1 0:STOP / 1: RUN of JOG/STEP to negative direction. (JOG:Level, STEP:rising)
		bit3	Write	AX 1 0:non / 1: Zero point return to the axis (rising)
		bit4		Reserve
		bit5	Write	AX 1 0:non / 1: Absosute target positioning to the axis (rising)
		bit4~F		Reserve
Control of Axis 2	MW00002	bit0	Write	AX 2 0:Servo off to the axis (falling) / 1:servo on to the axis (rising)
		bit1	Write	AX 2 0:STOP / 1: RUN of JOG/STEP to positive direction. (JOG:Level, STEP:rising)
		bit2	Write	AX 2 0:STOP / 1: RUN of JOG/STEP to negative direction. (JOG:Level, STEP:rising)
		bit3	Write	AX 2 0:non / 1: Zero point return to the axis (rising)
		bit4		Reserve
		bit5	Write	AX 2 0:non / 1: Absosute target positioning to the axis (rising)
		bit4~F		Reserve
Control of Axis 3	MW00003	bit0	Write	AX 3 0:Servo off to the axis (falling) / 1:servo on to the axis (rising)
		bit1	Write	AX 3 0:STOP / 1: RUN of JOG/STEP to positive direction. (JOG:Level, STEP:rising)
		bit2	Write	AX 3 0:STOP / 1: RUN of JOG/STEP to negative direction. (JOG:Level, STEP:rising)
		bit3	Write	AX 3 0:non / 1: Zero point return to the axis (rising)
		bit4		Reserve
		bit5	Write	AX 3 0:non / 1: Absosute target positioning to the axis (rising)
		bit4~F		Reserve
Control of Axis 4	MW00004	bit0	Write	AX 4 0:Servo off to the axis (falling) / 1:servo on to the axis (rising)
		bit1	Write	AX 4 0:STOP / 1: RUN of JOG/STEP to positive direction. (JOG:Level, STEP:rising)
		bit2	Write	AX 4 0:STOP / 1: RUN of JOG/STEP to negative direction. (JOG:Level, STEP:rising)
		bit3	Write	AX 4 0:non / 1: Zero point return to the axis (rising)
		bit4		Reserve
		bit5	Write	AX 4 0:non / 1: Absosute target positioning to the axis (rising)
		bit4~F		Reserve
	MW00005~MW00008			Reserve
Override Setting	MW00009	bit0	Write	0:Override100% 1:Override25%
		bit1		2:Override50% 3:Override25%
		bit2~F		Reserve
Control of Chart	ML00010	WORD	Write	Repeat No. of time chart(0~9999) 0=∞
	ML00012	LONG	Write	Hold Line(1~360000=1h)
	ML00014	LONG	Write	0:non / 1: request response of connect
	MW00015	WORD		Reserve
	MW00016	WORD	Write	0: Disable check disconnection of Ethernet /1:Enable check disconnection of Ethernet
	MW00017	WORD	Write	1=500ms
	MW00018	WORD	Write	MA-controller will check every 500ms.
	MW00019~MW00099			Reserve
AX 1 Parameter	ML00100	LONG	Write	AX 1 Acceleration Ratio [0.001command unit/sec ²]
	ML00102	LONG	Write	AX 1 Deceleration Ratio [0.001command unit/sec ²]
	MW00104	WORD	Write	AX 1 Filter type 0:non / 1: Exponential Filter /2: Moving Average Filter
	MW00105	WORD	Write	AX 1 Time constant of Filter [0.1msec]
	ML00106	LONG	Write	AX 1 JOG Speed [0.001command unit/sec]
	ML00108	LONG	Write	AX 1 Amount of STEP forward [0.001Command Unit]
	ML00110	LONG	Write	AX 1 Amount of STEP reverse [0.001Command Unit]
	ML00112	LONG	Write	AX 1 STEP Speed [0.001Command Unit/sec ²]
	ML00114	LONG	Write	AX 1 Target positon (ABS of manual operation) [0.001Command Unit]
	ML00116	LONG	Write	AX 1 Speed of positioning [0.001Command Unit/sec]
	MW00118	WORD	Write	AX 1 Zero Point Return method 0:DEC+ pulse-C /1: pulse-C /2: OT+pulse-C
	MW00119	WORD	Write	AX 1 Zero Point Return direction 0:Forward 1:Reverse
	ML00120	LONG	Write	AX 1 Zero Point Return Speed [0.001Command Unit/sec]
	ML00122	LONG	Write	AX 1 Approach Speed [0.001Command Unit/sec]
	ML00124	LONG	Write	AX 1 Creep Speed [0.001Command Unit/sec]
	ML00126	LONG	Write	AX 1 Homing Travel Distance [0.001Command Unit]
	ML00128	LONG	Write	AX 1 Width of positioning Completion [0.001Command Unit]
	ML00130	LONG	Write	AX 1 Starting position [0.001Command Unit]
	ML00132	LONG	Write	AX 1 Speed to starting position [0.001Command Unit/sec]
	ML00134	LONG	Write	AX 1 Speed to previous position [0.001Command Unit/sec]
	MW00136~MW00149			Reserve

Note) Operation pattern in time chart does not change when acceleration /deceleration or speed is changed.

Change by edit in time chart.

Acceleration /deceleration or speed disabled as parameter for manual operation.

Names	Register	bit	Read/Write	Register Contents
AX 2 Parameter	ML00150	LONG	Write	AX 2 Acceleration Ratio [0.001command unit/sec ²]
	ML00152	LONG	Write	AX 2 Deceleration Ratio [0.001command unit/sec ²]
	MW00154	WORD	Write	AX 2 Filter type 0:non / 1: Exponential Filter /2:Moving Average Filter
	MW00155	WORD	Write	AX 2 Time constant of Filter [0.1msec]
	ML00156	LONG	Write	AX 2 JOG Speed [0.001command unit/sec]
	ML00158	LONG	Write	AX 2 Amount of STEP forward [0.001Command Unit]
	ML00160	LONG	Write	AX 2 Amount of STEP reverse [0.001Command Unit]
	ML00162	LONG	Write	AX 2 STEP Speed [0.001Command Unit/sec ²]
	ML00164	LONG	Write	AX 2 Target positon (ABS of manual operation) [0.001Command Unit]
	ML00166	LONG	Write	AX 2 Speed of positioning [0.001Command Unit/sec]
	MW00168	WORD	Write	AX 2 Zero Point Return method 0:DEC+ pulse-C /1: pulse-C /2: OT+pulse-C
	MW00169	WORD	Write	AX 2 Zero Point Return direction 0:Forward 1:Reverse
	ML00170	LONG	Write	AX 2 Zero Point Return Speed [0.001Command Unit/sec]
	ML00172	LONG	Write	AX 2 Approach Speed [0.001Command Unit/sec]
	ML00174	LONG	Write	AX 2 Creep Speed [0.001Command Unit/sec]
	ML00176	LONG	Write	AX 2 Homing Travel Distance [0.001Command Unit]
	ML00178	LONG	Write	AX 2 Width of positioning Completion [0.001Command Unit]
	ML00180	LONG	Write	AX 2 Starting position [0.001Command Unit]
	ML00182	LONG	Write	AX 2 Speed to starting position [0.001Command Unit/sec]
	ML00184	LONG	Write	AX 2 Speed to previous position [0.001Command Unit/sec]
MW00186~ MW00199			Reserve	
AX 3 Parameter	ML00200	LONG	Write	AX 3 Acceleration Ratio [0.001command unit/sec ²]
	ML00202	LONG	Write	AX 3 Deceleration Ratio [0.001command unit/sec ²]
	MW00204	WORD	Write	AX 3 Filter type 0:non / 1: Exponential Filter /2:Moving Average Filter
	MW00205	WORD	Write	AX 3 Time constant of Filter [0.1msec]
	ML00206	LONG	Write	AX 3 JOG Speed [0.001command unit/sec]
	ML00208	LONG	Write	AX 3 Amount of STEP forward [0.001Command Unit]
	ML00210	LONG	Write	AX 3 Amount of STEP reverse [0.001Command Unit]
	ML00212	LONG	Write	AX 3 STEP Speed [0.001Command Unit/sec ²]
	ML00214	LONG	Write	AX 3 Target positon (ABS of manual operation) [0.001Command Unit]
	ML00216	LONG	Write	AX 3 Speed of positioning [0.001Command Unit/sec]
	MW00218	WORD	Write	AX 3 Zero Point Return method 0:DEC+ pulse-C /1: pulse-C /2: OT+pulse-C
	MW00219	WORD	Write	AX 3 Zero Point Return direction 0:Forward 1:Reverse
	ML00220	LONG	Write	AX 3 Zero Point Return Speed [0.001Command Unit/sec]
	ML00222	LONG	Write	AX 3 Approach Speed [0.001Command Unit/sec]
	ML00224	LONG	Write	AX 3 Creep Speed [0.001Command Unit/sec]
	ML00226	LONG	Write	AX 3 Homing Travel Distance [0.001Command Unit]
	ML00228	LONG	Write	AX 3 Width of positioning Completion [0.001Command Unit]
	ML00230	LONG	Write	AX 3 Starting position [0.001Command Unit]
	ML00232	LONG	Write	AX 3 Speed to starting position [0.001Command Unit/sec]
	ML00234	LONG	Write	AX 3 Speed to previous position [0.001Command Unit/sec]
MW00236~ MW00249			Reserve	
AX 4 Parameter	ML00250	LONG	Write	AX 4 Acceleration Ratio [0.001command unit/sec ²]
	ML00252	LONG	Write	AX 4 Deceleration Ratio [0.001command unit/sec ²]
	MW00254	WORD	Write	AX 4 Filter type 0:non / 1: Exponential Filter /2:Moving Average Filter
	MW00255	WORD	Write	AX 4 Time constant of Filter [0.1msec]
	ML00256	LONG	Write	AX 4 JOG Speed [0.001command unit/sec]
	ML00258	LONG	Write	AX 4 Amount of STEP forward [0.001Command Unit]
	ML00260	LONG	Write	AX 4 Amount of STEP reverse [0.001Command Unit]
	ML00262	LONG	Write	AX 4 STEP Speed [0.001Command Unit/sec ²]
	ML00264	LONG	Write	AX 4 Target positon (ABS of manual operation) [0.001Command Unit]
	ML00266	LONG	Write	AX 4 Speed of positioning [0.001Command Unit/sec]
	MW00268	WORD	Write	AX 4 Zero Point Return method 0:DEC+ pulse-C /1: pulse-C /2: OT+pulse-C
	MW00269	WORD	Write	AX 4 Zero Point Return direction 0:Forward 1:Reverse
	ML00270	LONG	Write	AX 4 Zero Point Return Speed [0.001Command Unit/sec]
	ML00272	LONG	Write	AX 4 Approach Speed [0.001Command Unit/sec]
	ML00274	LONG	Write	AX 4 Creep Speed [0.001Command Unit/sec]
	ML00276	LONG	Write	AX 4 Homing Travel Distance [0.001Command Unit]
	ML00278	LONG	Write	AX 4 Width of positioning Completion [0.001Command Unit]
	ML00280	LONG	Write	AX 4 Starting position [0.001Command Unit]
	ML00282	LONG	Write	AX 4 Speed to starting position [0.001Command Unit/sec]
	ML00284	LONG	Write	AX 4 Speed to previous position [0.001Command Unit/sec]
MW00286~ MW00299			Reserve	
MW00300~ MW00499				
Wiring check	MW00500~ MW00503	Bit		Each Bit corresponds to each output. 0: not require checking of wiring. /1: Turn on Output
	MW00504~ MW00999	3WORD		

Names	Register	bit	Read/Write	Register Contents
System Monitor	MW01000	bit0	Read	0:Not Ready /1: Ready
		bit1	Read	0:Normal /1:Alarm
		bit2	Read	0:Normal /1:Warning
		bit3~F		Reserve
Alarm Type	MW01001	bit0	Read	0:Normal / 1 :CPU Alarm
		bit1	Read	0:Normal / 1 :M-II Alarm
		bit2	Read	0:Normal / 1 :Ethernet Alarm
		bit3	Read	0:Normal / 1 :Serial Alarm (Reserve)
		bit4	Read	0:Normal / 1 :Axis Alarm
		bit5	Read	0:Normal / 1 :I/O Alarm
		bit6	Read	0:Normal / 1 :Output Signal Alarm
		bit7	Read	0:Normal / 1 :Input Signal Alarm
		bit8		Reserve
		bit9		Reserve
		bitA	Read	0:Normal / 1 :Axis Warning
		bitB	Read	0:Normal / 1 :I/O Warning(Reserve)
		bitC	Read	0:Normal / 1 :Output Signal Warning
		bitD	Read	0:Normal / 1 :Input Signal Warning (Reserve)
		bitE		Reserve
		bitF		Reserve
CPU Alarm	MW01002	WORD	Read	0x001:Illegal General Instruction Exception 0x002:Slot illegal General Instruction Exception 0x003:CPU Adress Error 0x004:NMI
MECHATRO-LINK Alarm	MW01003	WORD	Read	0x101:WDT over 0x102:Receive FIFO Overrun Error 0x103:Send FIFO Underrun Error 0x110:Request of power on again by change of slave configuration 0x111:Request of power on again by reset Absolute Encoder
Ethernet Alarm	MW01004	WORD	Read	0x201:MA-Manager Ethernet cable disconnection 0x202:External device Ethernet cable disconnection
	MW01005	WORD		Reserve
Switch setting Monitor	MW01006	bit0	Read	INIT SW
		bit1	Read	SPARE SW
		bit2	Read	E-MAC SW (Reserve)
		bit3	Read	TEST SW(Reserve)
	bit4~bitF			Reserve
	MW01007~MW01009			Reserve
Communication Status	MW01010	WORD	Read	Transmission Status
	MW01011	WORD	Read	Error Status
	MW01012	WORD	Read	Send Pass Counter
	MW01013	WORD	Read	Receive Pass Counter
	MW01014	WORD	Read	Error Counter
	MW01015~MW01099			Reserve
Program Status	MW01100	bit0	Read	0: Program STOP/1: Program Running
		bit1	Read	0: Not Holding /1:Holding
		bit2~bitF		Reserve
Time Chart Status	MW01101	WORD	Read	Current Override setting 25/50/100 1=1%
	MW01102	WORD	Read	Excuting time of 1 cycle (include the time that return to starting position, and waiting time such as signals and completion of positioning.) Updated to run once every time chart
	ML01104	LONG	Read	Timeline time [10msec]
	ML01106	LONG	Read	Repeat Number of Time Chart
Output Monitor	ML01108	Bit	Read	Each Bit corresponds to each output. (64 points) 0: Output is OFF /1: Output is ON
Input Monitor	ML01112	Bit	Read	Each Bit corresponds to each output. (64 points) 0: Input is OFF /1: Input is ON
	ML01114	Bit	Read	Each Bit corresponds to each output. (64 points) 0: Input is OFF /1: Input is ON
	MW01115~MW01199			Reserve

Names	Register	bit	Read/Write	Register Contents
AX 1 Monitor	MW01200	bit0	Read	AX 1 0:Servo OFF /1: Servo ON Status
		bit1	Read	AX 1 0:Not complete positioning /1: complete positioning
		bit2	Read	AX 1 0:During Command output /1: Complete Command Output
		bit3	Read	AX 1 0:Not Complete Zero Point Return /1: Complete Zero point Return
		bit4	Read	AX 1 0:Non /1: Positioning to Starting Position.
		bit5~bitF	Read	Reserve
AX 1 Servo Alarm Code	MW01201	WORD	Read	AX 1 SERVOPACK Alarm Code
AX 1 Alarm	MW01202	WORD	Read	AX 1 0x410: Station Time Out 0x411: MECHATROLINK Disconnection 0x412: Servo Alarm 0x413: P-OT Detection 0x414: N-OT Detection 0x415: Main Power OFF Alarm 0x416: Rotary/Linear Motor type Unmatch 0x417: Upper Stroke Limit Detection 0x418: Lower Stroke Limit Detection 0x420: Event time Out 0x421: Moving command while Servo OFF 0x422: Over Speed 0x423: Position Range over (Command or Stroke Limit)
AX 1 Warning	MW01203	WORD	Read	AX 1 0xA10: Servo Warning 0xA20: Request before complete of Zero Point Return
AX 1 I/O Monitor	MW01204	bit0	Read	AX 1 0:P-OT OFF /1: P-OT ON
		bit1	Read	AX 1 0:N-OT OFF /1: N-OT ON
		bit2	Read	AX 1 0:DEC OFF /1: DEC ON
		bit5~bitB		Reserve
		bitC	Read	AX 1 0:Servo Input 1 OFF /1: Servo Input 1 ON
		bitD	Read	AX 1 0:Servo Input 2 OFF /1: Servo Input 2 ON
		bitE	Read	AX 1 0:Servo Input 3 OFF /1: Servo Input 3 ON
		bitF		Reserve
AX 1 Information	MW01205	WORD	Read	AX 1 Monitor of Event Number (Executed Event Number:1~400)
	ML01206	LONG	Read	AX 1 Feedback Position [0.001Command Unit]
	ML01208	LONG	Read	AX 1 Command Positon [0.001Command Unit]
	ML01210	LONG	Read	AX 1 Feedback Speed [0.001Command Unit/sec]
	ML01212	LONG	Read	AX 1 Torque Command [0.001%]
	ML01214	LONG	Read	AX 1 Position Error [0.001Command Unit]
	MW01216~MW01231			Reserve
	MW01232~MW01241	10WORD	Read	AX 1 MODEL of SERVOPACK
	ML01242	WORD	Read	AX 1 Version of SERVOPACK
	MW01243			Reserve
	MW01244	8LONG	Read	AX 1 MODEL of Motor
	MW01252	WORD	Read	AX 1 Version of Encoder
	MW01253	WORD	Read	AX 1 Encoder type 0:incremental /1: Absolute
	MW01254	WORD	Read	AX 1 Motor type 0:Rotary /1: Linear
	MW01255	WORD	Read	AX 1 Reserve
	MW01256	WORD	Read	AX 1 Max Speed of Motor
MW01257~MW01299			Reserve	

Names	Register	bit	Read/Write	Register Contents	
AX 2 Monitor	MW01300	bit0	Read	AX 2	0:Servo OFF /1: Servo ON Status
		bit1	Read	AX 2	0:Not complete positioning /1: complete positioning
		bit2	Read	AX 2	0:During Command output /1: Complete Command Output
		bit3	Read	AX 2	0:Not Complete Zero Point Return /1: Complete Zero point Return
		bit4	Read	AX 2	0:Non /1: Positioning to Starting Position.
		bit5~bitF	Read	Reserve	
AX 2 Servo Alarm Code	MW01301	WORD	Read	AX 2	SERVOPACK Alarm Code
AX 2 Alarm	MW01302	WORD	Read	AX 2	0x410: Station Time Out 0x411: MECHATROLINK Disconnection 0x412: Servo Alarm 0x413: P-OT Detection 0x414: N-OT Detection 0x415: Main Power OFF Alarm 0x416: Rotary/Linear Motor type Unmatch 0x417: Upper Stroke Limit Detection 0x418: Lower Stroke Limit Detection 0x420: Event time Out 0x421: Moving command while Servo OFF 0x422: Over Speed 0x423: Position Range over (Command or Stroke Limit)
AX 2 Warning	MW01303	WORD	Read	AX 2	0xA10: Servo Warning 0xA20: Request before complete of Zero Point Return
AX 2 I/O Monitor	MW01304	bit0	Read	AX 2	0:P-OT OFF /1: P-OT ON
		bit1	Read	AX 2	0:N-OT OFF /1: N-OT ON
		bit2	Read	AX 2	0:DEC OFF /1: DEC ON
		bit5~bitB			Reserve
		bitC	Read	AX 2	0:Servo Input 1 OFF /1: Servo Input 1 ON
		bitD	Read	AX 2	0:Servo Input 2 OFF /1: Servo Input 2 ON
		bitE	Read	AX 2	0:Servo Input 3 OFF /1: Servo Input 3 ON
		bitF		Reserve	
AX 2 Information	MW01305	WORD	Read	AX 2	Monitor of Event Number (Executed Event Number:1~400)
	ML01306	LONG	Read	AX 2	Feedback Position [0.001Command Unit]
	ML01308	LONG	Read	AX 2	Command Positon [0.001Command Unit]
	ML01310	LONG	Read	AX 2	Feedback Speed [0.001Command Unit/sec]
	ML01312	LONG	Read	AX 2	Torque Command [0.001%]
	ML01314	LONG	Read	AX 2	Position Error [0.001Command Unit]
	MW01316~MW01331				Reserve
	MW01332~MW01341	10WORD	Read	AX 2	MODEL of SERVOPACK
	ML01342	WORD	Read	AX 2	Version of SERVOPACK
	MW01343				Reserve
	MW01344	8LONG	Read	AX 2	MODEL of Motor
	MW01352	WORD	Read	AX 2	Version of Encorder
	MW01353	WORD	Read	AX 2	Encorder type 0:incremental /1: Absolute
	MW01354	WORD	Read	AX 2	Motor type 0:Rotary /1: Linear
	MW01355	WORD	Read	Reserve	Reserve
MW01356	WORD	Read	AX 2	Max Speed of Motor	
MW01357~MW01399				Reserve	

Names	Register	bit	Read/Write	Register Contents	
AX 3 Monitor	MW01400	bit0	Read	AX 3	0:Servo OFF /1: Servo ON Status
		bit1	Read	AX 3	0:Not complete positioning /1: complete positioning
		bit2	Read	AX 3	0:During Command output /1: Complete Command Output
		bit3	Read	AX 3	0:Not Complete Zero Point Return /1: Complete Zero point Return
		bit4	Read	AX 3	0:Non /1: Positioning to Starting Position.
		bit5~bitF	Read		Reserve
AX 3 Servo Alarm Code	MW01401	WORD	Read	AX 3	SERVOPACK Alarm Code
AX 3 Alarm	MW01402	WORD	Read	AX 3	0x410: Station Time Out 0x411: MECHATROLINK Disconnection 0x412: Servo Alarm 0x413: P-OT Detection 0x414: N-OT Detection 0x415: Main Power OFF Alarm 0x416: Rotary/Linear Motor type Unmatch 0x417: Upper Stroke Limit Detection 0x418: Lower Stroke Limit Detection 0x420: Event time Out 0x421: Moving command while Servo OFF 0x422: Over Speed 0x423: Position Range over (Command or Stroke Limit)
AX 3 Warning	MW01403	WORD	Read	AX 3	0xA10: Servo Warning 0xA20: Request before complete of Zero Point Return
AX 3 I/O Monitor	MW01404	bit0	Read	AX 3	0:P-OT OFF /1: P-OT ON
		bit1	Read	AX 3	0:N-OT OFF /1: N-OT ON
		bit2	Read	AX 3	0:DEC OFF /1: DEC ON
		bit5~bitB			Reserve
		bitC	Read	AX 3	0:Servo Input 1 OFF /1: Servo Input 1 ON
		bitD	Read	AX 3	0:Servo Input 2 OFF /1: Servo Input 2 ON
		bitE	Read	AX 3	0:Servo Input 3 OFF /1: Servo Input 3 ON
		bitF			Reserve
AX 3 Information	MW01405	WORD	Read	AX 3	Monitor of Event Number (Executed Event Number:1~400)
	ML01406	LONG	Read	AX 3	Feedback Position [0.001Command Unit]
	ML01408	LONG	Read	AX 3	Command Positon [0.001Command Unit]
	ML01410	LONG	Read	AX 3	Feedback Speed [0.001Command Unit/sec]
	ML01412	LONG	Read	AX 3	Torque Command [0.001%]
	ML01414	LONG	Read	AX 3	Position Error [0.001Command Unit]
	MW01416~MW01431				Reserve
	MW01432~MW01441	10WORD	Read	AX 3	MODEL of SERVOPACK
	ML01442	WORD	Read	AX 3	Version of SERVOPACK
	MW01443				Reserve
	MW01444	8LONG	Read	AX 3	MODEL of Motor
	MW01452	WORD	Read	AX 3	Version of Encoder
	MW01453	WORD	Read	AX 3	Encoder type 0:incremental /1: Absolute
	MW01454	WORD	Read	AX 3	Motor type 0:Rotary /1: Linear
	MW01455	WORD	Read		Reserve
	MW01456	WORD	Read	AX 3	Max Speed of Motor
	MW01457~MW01499				Reserve

Names	Register	bit	Read/Write	Register Contents		
AX 4 Monitor	MW01500	bit0	Read	AX 4	0:Servo OFF /1: Servo ON Status	
		bit1	Read	AX 4	0:Not complete positioning /1: complete positioning	
		bit2	Read	AX 4	0:During Command output /1: Complete Command Output	
		bit3	Read	AX 4	0:Not Complete Zero Point Return /1: Complete Zero point Return	
		bit4	Read	AX 4	0:Non /1: Positioning to Starting Position.	
		bit5~bitF	Read	Reserve		
AX 4 Servo Alarm Code	MW01501	WORD	Read	AX 4	SERVOPACK Alarm Code	
AX 4 Alarm	MW01502	WORD	Read	AX 4	0x410: Station Time Out 0x411: MECHATROLINK Disconnection 0x412: Servo Alarm 0x413: P-OT Detection 0x414: N-OT Detection 0x415: Main Power OFF Alarm 0x416: Rotary/Linear Motor type Unmatch 0x417: Upper Stroke Limit Detection 0x418: Lower Stroke Limit Detection 0x420: Event time Out 0x421: Moving command while Servo OFF 0x422: Over Speed 0x423: Position Range over (Command or Stroke Limit)	
AX 4 Warning	MW01503	WORD	Read	AX 4	0xA10: Servo Warning 0xA20: Request before complete of Zero Point Return	
AX 4 I/O Monitor	MW01504	bit0	Read	AX 4	0:P-OT OFF /1: P-OT ON	
		bit1	Read	AX 4	0:N-OT OFF /1: N-OT ON	
		bit2	Read	AX 4	0:DEC OFF /1: DEC ON	
		bit5~bitB			Reserve	
		bitC	Read	AX 4	0:Servo Input 1 OFF /1: Servo Input 1 ON	
		bitD	Read	AX 4	0:Servo Input 2 OFF /1: Servo Input 2 ON	
		bitE	Read	AX 4	0:Servo Input 3 OFF /1: Servo Input 3 ON	
		bitF		Reserve		
AX 4 Information	MW01505	WORD	Read	AX 4	Monitor of Event Number (Executed Event Number:1~400)	
	ML01506	LONG	Read	AX 4	Feedback Position [0.001Command Unit]	
	ML01508	LONG	Read	AX 4	Command Positon [0.001Command Unit]	
	ML01510	LONG	Read	AX 4	Feedback Speed [0.001Command Unit/sec]	
	ML01512	LONG	Read	AX 4	Torque Command [0.001%]	
	ML01514	LONG	Read	AX 4	Position Error [0.001Command Unit]	
	MW01516~MW01531				Reserve	
	MW01532~MW01541	10WORD	Read	AX 4	MODEL of SERVOPACK	
	ML01542	WORD	Read	AX 4	Version of SERVOPACK	
	MW01543				Reserve	
	MW01544	8LONG	Read	AX 4	MODEL of Motor	
	MW01552	WORD	Read	AX 4	Version of Encoder	
	MW01553	WORD	Read	AX 4	Encoder type 0:incremental /1: Absolute	
	MW01554	WORD	Read	AX 4	Motor type 0:Rotary /1: Linear	
	MW01555	WORD	Read	Reserve	Reserve	
MW01556	WORD	Read	AX 4	Max Speed of Motor		
MW01557~MW01599				Reserve		

Names	Register	bit	Read/Write	Register Contents	
ST 1 I/OAlarm	MW02000	WORD	I/OAlarm	ST 1	0x510: Station Time Out 0x511: MECHATROLINK Disconnect
	MW02001~ MW02009			Reserve	
ST 2 I/OAlarm	MW02010	WORD	I/OAlarm	ST 2	0x510: Station Time Out 0x511: MECHATROLINK Disconnect
	MW02011~ MW02019			Reserve	
ST 3 I/OAlarm	MW02020	WORD	I/OAlarm	ST 3	0x510: Station Time Out 0x511: MECHATROLINK Disconnect
	MW02021~ MW02029			Reserve	
ST 4 I/OAlarm	MW02030	WORD	I/OAlarm	ST 4	0x510: Station Time Out 0x511: MECHATROLINK Disconnect
	MW02031~ MW02039			Reserve	
	MW02040~ MW02099			Reserve	
Output No.1	MW02100	WORD		Monitor of Output (0:OFF /1: ON)	
	MW02101	WORD	Alarm	0x610: Could not use Servo I/O 0x620: Event Time Out	
	MW02102	WORD	Warning	0xC10: Unavailable Check wiring function. (Doing while running)	
	MW02103	WORD		Executing Event No (1~400)	
	MW02104~ MW02109	WORD		Reserve	
Output No.2	MW02110	WORD		Monitor of Output (0:OFF /1: ON)	
	MW02111	WORD	Alarm	0x610: Could not use Servo I/O 0x620: Event Time Out	
	MW02112	WORD	Warning	0xC10: Unavailable Check wiring function. (Doing while running)	
	MW02113	WORD		Executing Event No (1~400)	
	MW02114~ MW02119	WORD		Reserve	
				:	
				:	
				:	
Output No. n	MW02100+ (n-1) × 10	WORD		Monitor of Output (0:OFF /1: ON)	
	MW02101+ (n-1) × 10	WORD	Alarm	0x610: Could not use Servo I/O 0x620: Event Time Out	
	MW02102+ (n-1) × 10	WORD	Warning	0xC10: Unavailable Check wiring function. (Doing while running)	
	MW02103+ (n-1) × 10	WORD		Executing Event No (1~400)	
	MW02104+ (n-1) × 10 ~ MW02109+ (n-1) × 10	WORD		Reserve	
				:	
				:	
				:	
Output No.64	MW02730	WORD		Monitor of Output (0:OFF /1: ON)	
	MW027301	WORD	Alarm	0x610: Could not use Servo I/O 0x620: Event Time Out	
	MW027302	WORD	Warning	0xC10: Unavailable Check wiring function. (Doing while running)	
	MW02733	WORD		Executing Event No (1~400)	
	MW02734~ MW027309	WORD		Reserve	
	MW02040~ MW02099			Reserve	

Names	Register	bit	Read/Write	Register Contents
Input No.1	MW02740	WORD		Monitor of loutput (0:OFF /1: ON)
	MW02741	WORD	Alarm	0x710: Could not use Servo I/O 0x720: Event Time Out
	MW02742	WORD	Warning	Reserve
	MW02743	WORD		Executing Event No (1~400)
	MW02744~ MW02749	WORD		Reserve
Input No.2	MW02750	WORD		Monitor of loutput (0:OFF /1: ON)
	MW02751	WORD	Alarm	0x710: Could not use Servo I/O 0x720: Event Time Out
	MW02752	WORD	Warning	Reserve
	MW02753	WORD		Executing Event No (1~400)
	MW02754~ MW02759	WORD		Reserve
:				
:				
Input No.n	MW02740+ (n-1) × 10	WORD		Monitor of loutput (0:OFF /1: ON)
	MW02741+ (n-1) × 10	WORD	Alarm	0x710: Could not use Servo I/O 0x720: Event Time Out
	MW02742+ (n-1) × 10	WORD	Warning	Reserve
	MW02743+ (n-1) × 10	WORD		Executing Event No (1~400)
	MW02744+ (n-1) × 10 ~ MW02749+ (n-1) × 10	WORD		Reserve
:				
:				
Input No.64	MW03370	WORD		Monitor of loutput (0:OFF /1: ON)
	MW03371	WORD	Alarm	0x710: Could not use Servo I/O 0x720: Event Time Out
	MW03372	WORD	Warning	Reserve
	MW03373	WORD		Executing Event No (1~400)
	MW03374~ MW03379	WORD		Reserve
MW03380~ MW03999				Reserve

Appendix B Details of Processing method of Time Chart Program

Details of processing method to execute program of time chart by MA controller is shown below. Program input in time chart is “ideal time chart”. When program actually starts, following delay occurs.

- ①Communication delay when MA controller executes processing command to Servopack.
- ②Communication delay when MA controller receives data from Servopack
- ③Time to execute processing of MA controller
- ④Waiting time for positioning completion of Servopack
- ⑤Waiting time for establishment of condition for Link.
- ⑥Time to change acceleration/deceleration parameter to Servopack when executing positioning if it was changed.

MA controller starts countup of own after program starts.

Event, edit in the same start time, is processed with same timing.

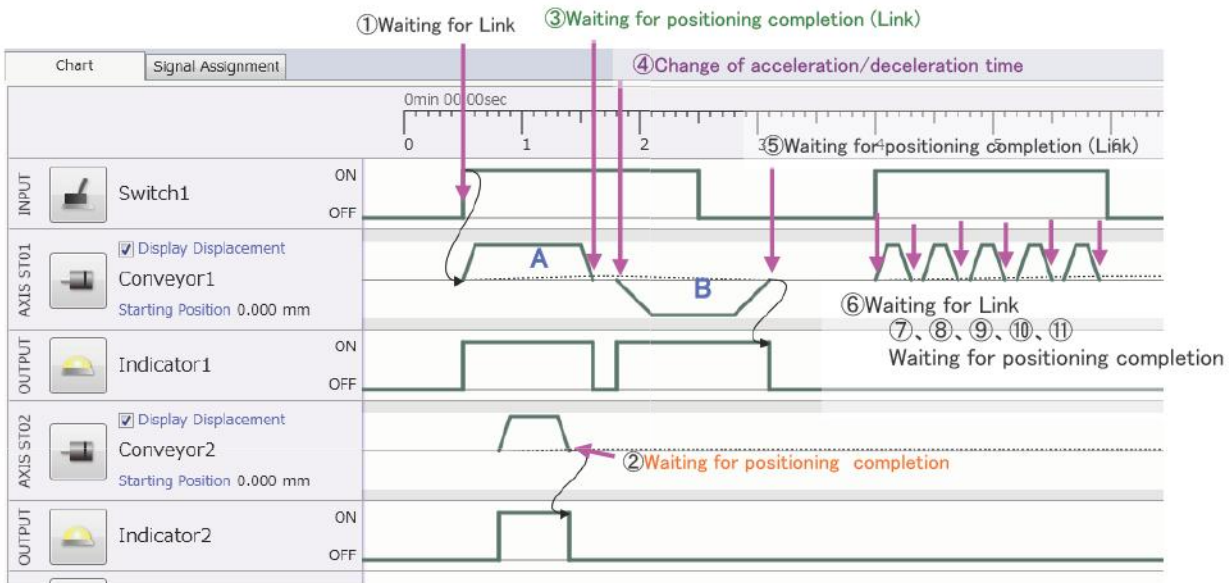
When there is positioning event, countup continues until expected time of positioning completion, and countup stops in expected time. Wait until positioning completion signal is responded by Servopack. (Counter time stop)

When positioning completion is confirmed, countup of time counter restarts and count continues until start time of next event.

MA controller executes processing time from event completion to the start of next event, however, time between time chart and actual execution time differs as in time shown in ①~④.

Example is shown in next page.

Ex) Example of time counter stop



In time chart as shown above, total number of point, that time counter is stopped by MA controller, is 10. The sum, delay of communication and processing are causes of difference from actual time.

For example, in Conveyor 1 of time chart shown above, time from positioning completion of A to start of positioning of B is 200msec.

Positioning of A starts after waiting for Link of switch 1.

Delay time occurs from positioning completion of A to start of positioning of B as shown below.

- 「Waiting time for positioning completion of Conveyor 2 (②)」
- 「Waiting time for positioning completion of Conveyor 1 (③)」
- 「Change of acceleration/deceleration time of positioning of B (④)」
- Processing time of inside MA controller
- Delay of communication between MA controller and Servopack

Delay, about 120msec ~200msec, occurs caused by these mentioned above. Time from positioning completion of A to start of positioning of B is about 320msec~400msec..

(Actual delay time depends on positioning completion width etc.)

Appendix C Parameter to Be Written to Servopack from Controller

Writing parameter to Servopack from MA controller at the following timing.

- ①When turning on power supply, establishing communication, and transferring program.
- ②When starting positioning of time chart and manual operation

①Parameter to be written after turning on power supply, and establishing communication

Parameter	Explanation	Comment	Σ -V	Σ -V mini
Pn20E	Electronic gear ratio (Numerator)	Axis definition :Denominator of Gear ratio	○	○
Pn210	Electronic gear ratio (Denominator)	Axis definition :Numerator of gear ratio	○	○
Pn282	Linear scale pitch	Set up pitch of axis definition only when using linear.	○	—
Pn50A	Input signal select1	P_OT Enabled/Disabled setup	○	○
Pn50B	Input signal select2	N_OT Enabled/Disabled setup	○	○
Pn50E	Output signal select1	Set up 0 only when servo output is enabled	○	—
Pn50F	Output signal select2	Set up 0 only when servo output is enabled	○	—
Pn510	Output signal select3	Set up 0 only when servo output is enabled	○	—
Pn81E	Input signal monitor select	Set up 0x0761 only when servo inout is enabled	○	—
Pn81F.0	Option bit allocation enabled	Set up 1 only when servo output is enabled	○	—
Pn82E	OUT_SIGNAL enabled	Set up 1 only when servo output is enabled	○	—
Pn833.0	Expansion acceleration / deceleration enabled	1	○	○
Pn838	Change acceleration constant disabled	0	○	○
Pn83E	Change deceleration constant disabled	0	○	○

Execute PRM_WR (colored in yellow) only when Servo I/O is enabled.

②When starting positioning of time chart and manual operation

Σ -V, Σ -V mini common

Parameter	Explanation	Setup value
Pn522	Positioning completed width	Value that setup of positioning completed width of axis definition is converted to command unit of servopack
Pn811	Index acceleration/deceleration time constant	Setup value of filter time constant when selecting index acceleration/deceleration filter. (access is possible only from PLC/HMI)
Pn812	Average moving time	Setup value of average moving filter time of axis definition
Pn836	Linear acceleration constant 2	Value that setup of acceleration/acceleration time is converted to command unit of Servopack
Pn83C	Linear deceleration constant2	Value that setup of deceleration/deceleration time is converted to command unit of Servopack

Appendix D Note When Using DD (Direct Drive) Motor

MA controller is applied to only finite system, however, as one-rotation absolute motor is mounted on DD motor, amount of multi-rotation data is not in DD motor.

Therefore, Current position is shifted by “the mount of rotation” when power supply is on again.

(Position within one rotation is in the same position)

The current position is displayed at the range of $-179.999 \sim 180.000$ [deg]

(You must use 1/1 to gear ratio when using DD motor)

(Ex1) When selecting command unit “deg”, and current position is 12345.678deg

When power supply is turned on again, the result is shown as below.

$12345.678 \div 360.000 = 34(\text{rotations}) \cdots 105.678 \text{ deg} \rightarrow 105.678\text{deg}$ is displayed

(Ex2) When current position is 3456.789deg

$3456.789 \div 360.000 = 9(\text{rotations}) \cdots 216.789 \text{ deg} \rightarrow -143.211\text{deg}$ is displayed

In the case of EX1, if the starting position is 0 deg, the motor reverse 105.678deg and start the time chart when program is started.

In the case of EX2, the motor rotate forward 143.211deg and time chart is started

Therefore, Use the following conditions when you want use DD motor as absolute encoder.

- Gear Ratio = 1/1
- Command Unit = deg
- The range of position : $-179.999 \sim 180.000$ deg (within one rotation), or position within one rotation of uses may be performed if the same when power cycle.

In addition, the need to Zero point return, you will be able to use as incremental encoder by Pn002.2=1.

Revision History

Information of revision of this document is mentioned with document number on the lower right of back cover of this document

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↑
Revision No

Date of issue	Revision No.	Page	Contents of revision

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