



Dedicated Driver Card for FE/FP/KT

**IB-E03B / IB-E04F**

**IB-E04F-CR-HT1 / IB-E04F-FT**

Driver

## 〈 User Manual 〉

**Read this manual before use**

Thank you for purchasing

IB-E03B / IB-E04F / IB-E04F-CR-HT1 / IB-E04F-FT

### Applicable MDR Model

- IB-E03B : FE / FP
- IB-E04F : KT
- IB-E04F-CR-HT1 : FH/KT
- IB-E04F-FT : FE/KT



Before using this product, carefully read this user manual and fully understand the content.

Keep this document readily accessible for future reference.

For more details on MDR(FE/FP/KT), download the user manual from ITOH DENKI web page.

ITOH DENKI



Home > Download/Support > User Manual

<https://itohdenki.co.jp/english/support/manual.html>





Thank you for purchasing Itoh Denki products.

Before using this product, carefully read this user manual and fully understand the content.

Please retain this document for future references.

### **About the expressions used in this document**

 **WARNING** : The description under this caption includes caution items for causing equipment damage if the operation procedure is not complied with.

 **CAUTION** : This caption is used at a position requiring particular caution for safety.

 : This mark is used for important item during operation or setting.

## **WARNING**

- Install an appropriate protection circuit externally in case that a failure or abnormality of this product could lead to a serious accident of the system,.
- Do not supply power until all of the wirings are completed. Incomplete wirings may lead to electrical shock, fire or equipment failure.
- Do not use this product beyond the described specification. Incorrect use may lead to fire or failure.
- Do not use this product in an environment with flammable or explosive gas.
- Do not touch a charged part such as power terminal.
- Do not disassemble, repair or modify this product. It may lead to electrical shock, fire or failure.
- This product is intended for use with industrial equipment, machine tools, and measuring instrument.  
(Do not use this product in atomic power equipment or medical equipment that may affect human life.)
- When the total wiring length of the input/output signal line of this product is 30m or longer, install an appropriate surge suppression circuit for suppressing surge.
- Be sure to comply with the caution items in this document. Using the product while ignoring the cautions may lead to a serious injury or accident.
- When installing wiring, comply with each regional rule or standard.
- In order to prevent electrical shock, equipment failure or malfunction, supply power after completing all wirings for power, output and input. Also when repairing broken input wiring or replacing output component, turn off the power. Then turn on the power again after completing all wiring works.
- Avoid contamination of metal pieces or particles in the product. Such items may cause electrical shock, fire or failure.
- For ensuring heat dissipation, do not block the spaces around the product.
- Do not connect wires to unused terminals.
- Make sure to turn off the power before and while cleaning.
- Use dry soft cloth to wipe off contamination on the product. Do not use solvent such as paint thinner. It could cause deformation or change of color.
- Apply sufficient countermeasures in case that static electricity or charge could be generated on the equipment.

## CAUTION

- This document assumes that the reader has the basic knowledge about electricity, control, computer, communication, and the related subjects.
- The figures, numerical value examples, and drawings are provided for easy understanding, but the resulting motions are not guaranteed.
- Itoh Denki does not take any responsibilities or liabilities for any damage by the user or third party described below.
  - Damage caused by the effect of using this product
  - Damage by defects that were impossible to be predicted by Itoh Denki.
  - Damage caused by using a copy of this product
  - Others, all indirect damages
- In order to ensure continuous and safe operation of this product, scheduled maintenance is required. Some components used in this product have life-time, and others may change over the years.
- The content of this document may change without notice. Contact Itoh Denki for any questions or unclear points.
- It is strictly prohibited to copy or duplicate any of this manual without permission.
- This product may get hot during use. Be careful not to get burned during its use.



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# Chapter 1

## Introduction

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## 1.1 General description

This procedure describes configuration of motion setting and Ladder Logic assigned with IB-E03/04 (Hereinafter referred to as “IB”) using “ITOH Configurator E/IP” (Hereinafter referred to as “ICE”) PC application software. Ladder Logic (Hereinafter referred to as “Logic”) which is created by the ICE can be built in to IB. Refer “Chapter 2” to create Ladder Logic.

## 1.2 Recommended condition to use

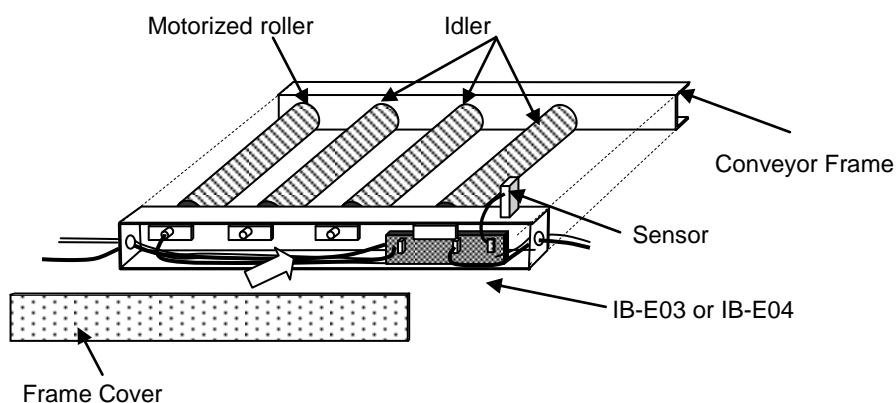
### 1.2.1 Environment for installation

#### 1) General

The described devices in this manual are defined as “Open Type” complying with UL508C standard. Therefore, in order to conform to UL on the installation, the devices must to be installed in the proper enclosure, which tooling to open must be required to restrict access inside to prevent unintended contact failure.

Reference: Required enclosure structure in general.

As far as general motorized roller conveyor, driver card and its wiring are protected by the enclosure that is composed of conveyor frame and frame cover as drawing below. Due to this enclosure, the worker has to use tooling for intentional opening the frame cover. The protective level of this enclosure must to be conformed to UL50 Type 1 or over.



(It is usually made from plastic or steel, and removed from conveyor using tool.)

Fig. 1.2.1 Example of general enclosure's structure

## 2) IB Installation environment

	Available condition	Remark
Surrounding operating Temperature	-20 to 40 deg.C (-4 to 104 deg.F)	No freezing
Humidity	90 % RH or less	No condensation
Atmosphere	No corrosive gas	
Vibration	1.0 G or less	
Installation	Indoor	
Pollution level	2	Conforming to IEC60640-1 and UL840
Overvoltage category	2	

### 1.2.2 Accommodated DC power

DC power source supplied to device of IB need to be accommodated to the following conditions.

#### 1) Recommended specification of power supply

- Stabilized power supply that isolates between output and input.
- Conforming to safety standards as below.

US: UL60950-1, IEC60950-1

Canada: CSA C22.2 No.60950-1

#### 2) Power supply specification for IB-E03/04

	Condition
Input Voltage range	100 to 230 V DC (+/- 15%)
Input frequency range	50 to 60 Hz (+/- 5%)
Output voltage range	24 V DC (+/- 5%)
Rated output current	IB-E03; 8A or over IB-E04; 14A or over
Surrounding operating Temperature	-20 to 40 deg. C
Humidity	90% RH or less (No condensation)
Safety standard	Conforming to UL60950 or IEC60950 in the US. CSA C22.2 No. 60950-1 in Canada.

### 1.2.3 Applicable MDR

#### 1) IB-E03B

Applicable MDR model

Standard model	With Brake option
PM486FE	PM486FE-BR
PM486FS	PM486FS-BR
PM486FP	PM486FP-BR

MDR Speed range (m/min)

	PM486FE		PM486FS / PM486FP	
	Increment	Speed range	Increment	Speed range
1 stage gear reduction	4.44	26.6 ~ 230.0	6.17	37.0 ~ 319.8
2 stage gear reduction	1.25	7.5 ~ 65.0	1.36	8.1 ~ 70.6
3 stage gear reduction	0.35	2.1 ~ 12.3	0.36	2.1 ~ 18.7

Closest speed value applies if speed no list in the selection table is selected.

#### 2) IB-E04 / IB-E04F-CR-HT1

Applicable MDR model

Standard model
PM486FH
PM570/605/635KT w/12pin

MDR Speed range (m/min)

	PM486FH	
	Increment	Speed range
1 stage gear reduction	6.17	37.0 ~ 320.7
2 stage gear reduction	1.36	8.1 ~ 70.5
3 stage gear reduction	0.36	2.2 ~ 18.7

	PM635KT	
	Increment	Speed range
1 stage gear reduction	5.43	32.6 ~ 282.3
2 stage gear reduction	1.43	8.6 ~ 74.3
3 stage gear reduction	0.38	2.3 ~ 19.6

(3)IB-E04F-FT(Motor A)

Applicable MDR mode

Standard model
PM570KT***

MDR Speed range

	PM570KT	
	Increment	Speed range
1 stage gear reduction	4.87	29.3~253.6
2 stage gear reduction	1.28	7.7~66.7
3 stage gear reduction	0.34	2.1~17.6

IB-E04F-FT(Motor B)

Applicable MDR mode

w/o Brake option
PM486FE

MDR Speed range

	PM570KT	
	Increment	Speed range
1 stage gear reduction	4.44	26.6~230.8
2 stage gear reduction	1.25	7.5~65.0
3 stage gear reduction	0.35	2.1~18.3

Closest speed value applies if speed no list in the selection table is selected.

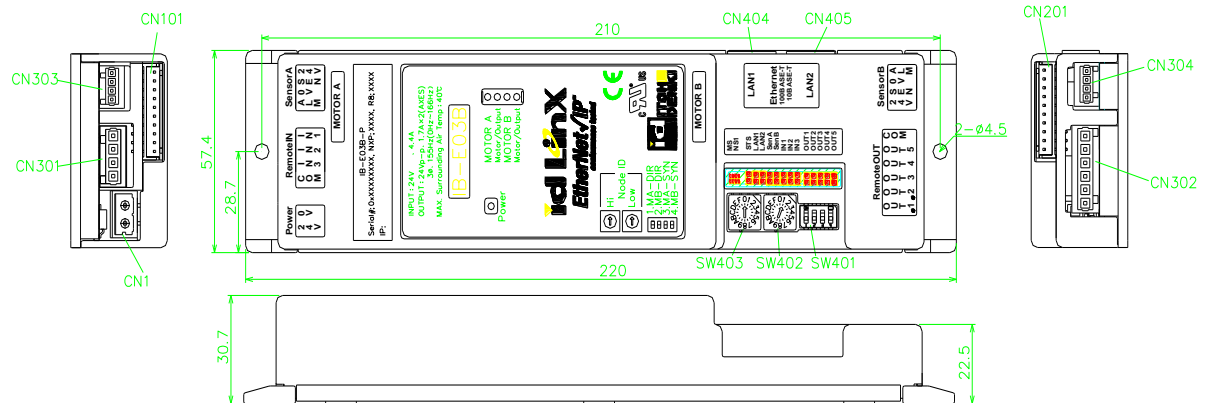


Motor stall time is fixed to 0.5 second, when KE motor is selected.

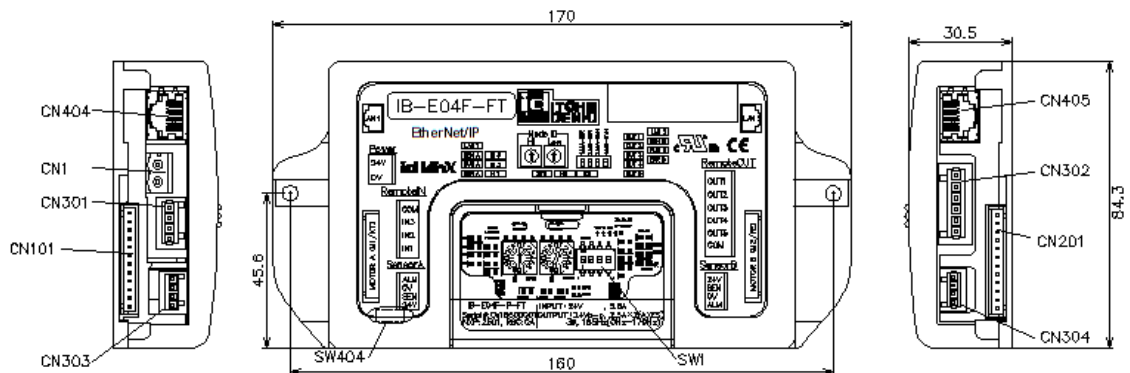
### 1.3 IB switch setting

Connected MDR direction, MDR synchronism, IP address can be set on each device before IB are powered.

#### IB-E03B



#### IB-E04F-FT/ IB-E04F-CR-HT1





【SW 401 #1, #2】MDR direction setting

SW401 #1, #2	Motor A (#1)	Motor B (#2)
OFF	CW	CW
ON	CCW	CCW

【SW 401 #3, #4】MDR synchronism setting

SW401 #3	SW401 #4	Motor A	Motor B
OFF	OFF	-	-
OFF	ON	-	Synchronize with Motor A
ON	OFF	Synchronize with Motor B	-
ON	ON	Initial mode	

- IB does not operate in initial mode. Refers Chapter 2.

【SW 402 SW403】IP address setting

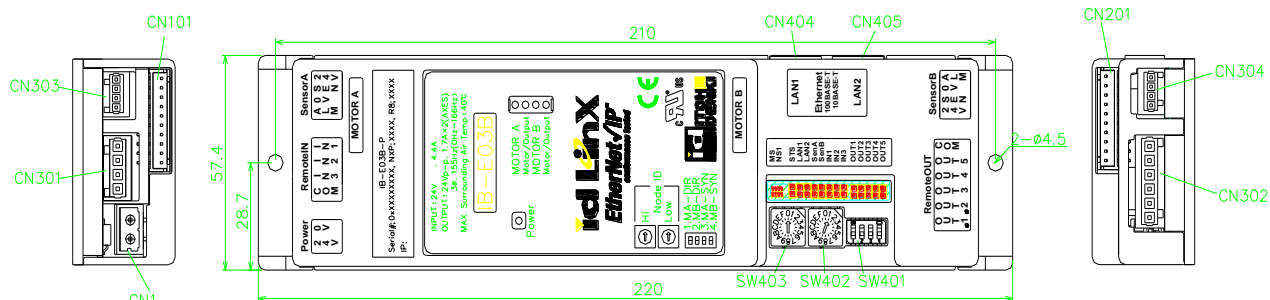
Default IP address setting; 192.168.1.1 / 255. 255. 255. 0

SW402	L-side(hex)
SW403	H-side(hex)

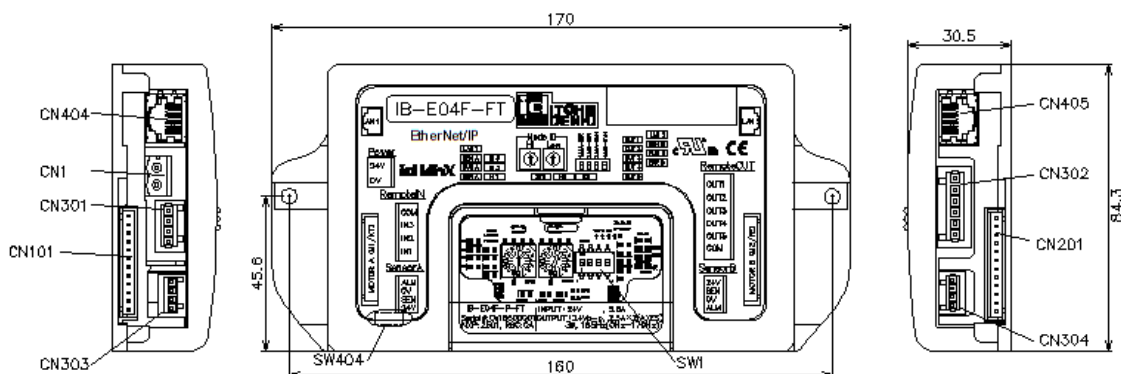
- IP address must not be duplicated in same network.  
IP address is set by hexadecimal from 01 to FE

## 1.4 Connector designation of IB-E03/04

### IB-E03B



### IB-E04F-FT/ IB-E04F-CR-HT1



#### 【CN1】 Power

IB-E03	231-532/001-000(WAGO), 300V, 10A (UL/cUL)
IB-E04	231-562/001-000(WAGO), 300V, 15A (UL/cUL)

1		1; 0VDC
2		2; 24VDC

#### 【CN303, CN304】 Sensor IB-E03/04 733-364(WAGO), 150V, 4A(UL/cUL)

• Dark ON and Light ON can be selected by ICE.

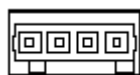
	1; 24 V DC
	2; Sensor
	3; 0 V DC
	4; Alarm

Note;

Sensor input voltage is fixed. Specify sensor input voltage on order.

【CN301】 Remote Input IB-E03/04 734-264(WAGO), 300V, 10A(UL/cUL)

- Input voltage (NPN / PNP) can be select by command.



1

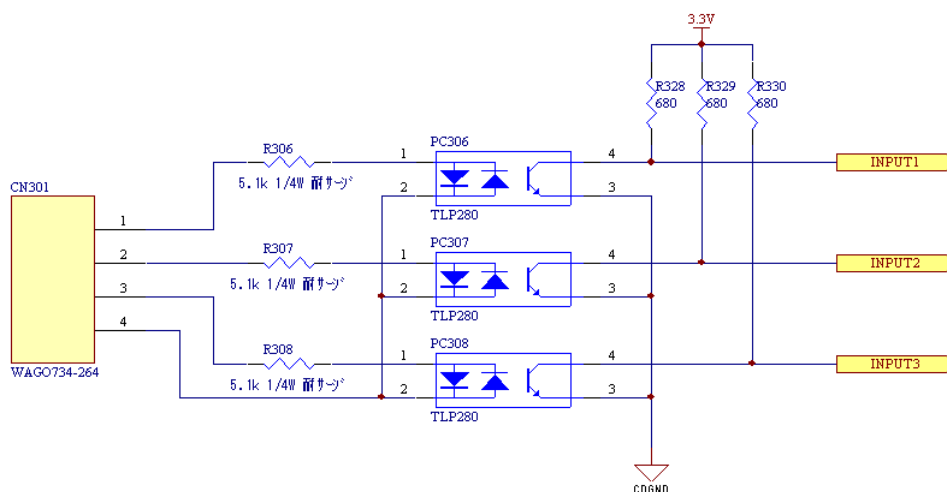
4

1; Remote input 1

2; Remote input 2

3; Remote input 3

4; Common



Remote input interface circuit

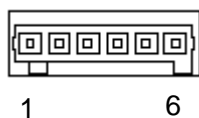


**WARNING**

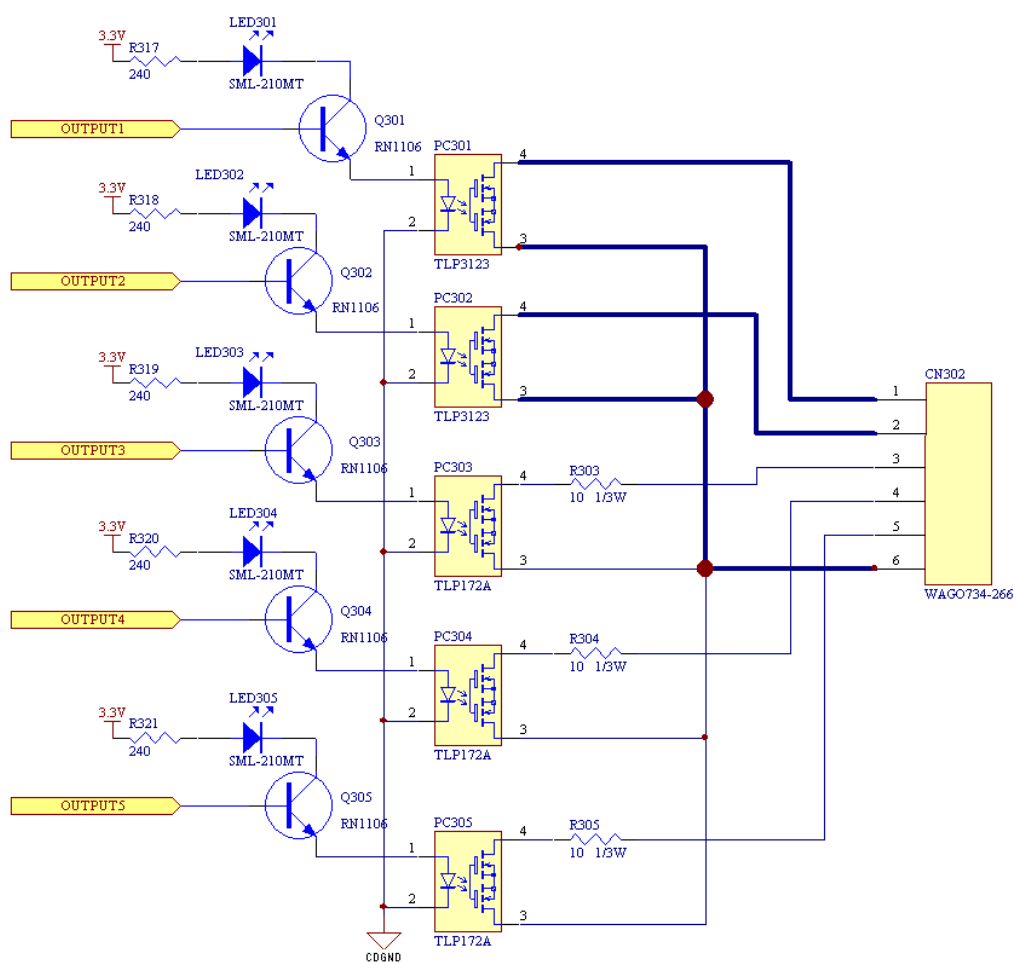
- Input voltage must be 18 VDC to 30 VDC.

【CN303, CN304】 Remote Output 734-266(WAGO), 300V, 10A(UL/cUL)

• Output voltage (NPN / PNP) can be select by command..



- 1; Remote output 1
- 2; Remote output 2
- 3; Remote output 3
- 4; Remote output 4
- 5; Remote output 5
- 6; Common



Remote output interface circuit

A yellow triangle with a black exclamation mark inside, indicating a warning.

## WARNING

- Inject voltage to common must be 18 VDC to 30 VDC.
- 1 A maximum output current for #1 and #2 20 mA for #3 to #5.
- Use relay with surge protection when operating relay coil with remote output.  
Back EMF will be occurred and remote output terminal will be damaged when using relay without surge protection.

【CN101, CN201】 Motor connector

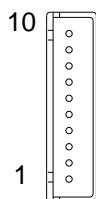
IB-E03/ IB-E04F-FT(Motor B)

S10B-XH-A (JST)

IB-E04/IB-E04F-CR-HT1/IB-E04F-FT(Motor A) S12B-XH-A (JST)

- Motor driver and remote port can be select by Itoh COnfigrator E/IP. (Refer Chapter2)
- 1 A per axis maximum for remote port.

IB-E03

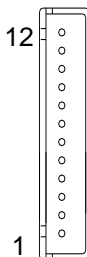


Pin assignment in case of using IB as motor driver.

Pin assignment in case of using IB as remote port.

10: Brake (Yellow)	10: N/A
9: Thermal (Light blue)	9: N/A
8: Hall signal W (Green)	8: N/A
7: Hall signal V (Orange)	7: N/A
6: Hall signal U (Violet)	6: N/A
5: Motor phase W (Black)	5: Motor port output (W)
4: Motor phase V (White)	4: Motor port output (V)
3: Motor phase U (Red)	3: Motor port output (U)
2: 12 V DC	2: N/A
1: GND (Grey)	1: N/A

IB-E04/IB-E04F-CR-HT1/IB-E04F-FT

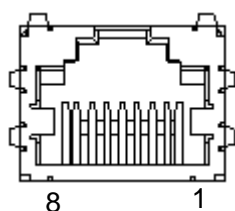


12: Thermal (Light blue)	12: N/A
11: Hall signal W (Green)	11: N/A
10: Hall signal V (Orange)	10: N/A
9: Hall signal U (Violet)	9: N/A
8: Motor phase W (Brown)	8: Remote port W (Brown)
7: Motor phase W (Black)	7: Remote port W (Black)
6: Motor phase V (Yellow)	6: Remote port V (Yellow)
5: Motor phase V (White)	5: Remote port V (White)
4: Motor phase U (Pink)	4: Remote port U (Pink)
3: Motor phase U (Red)	3: Remote port U (Red)
2: 12 V DC	2: N/A
1: GND (Grey)	1: N/A



• NPN output only for remote port.

【CN404, CN405】 EtherNet modular port      TM11R-5M2-88 (Hirose)



- 1; Tx +
- 2; Tx -
- 3; Rx +
- 4; N/A
- 5; N/A
- 6; Rx -
- 7; N/A
- 8; N/A



• Both Cross cable and straight cable can be used.

【Applicable connector】

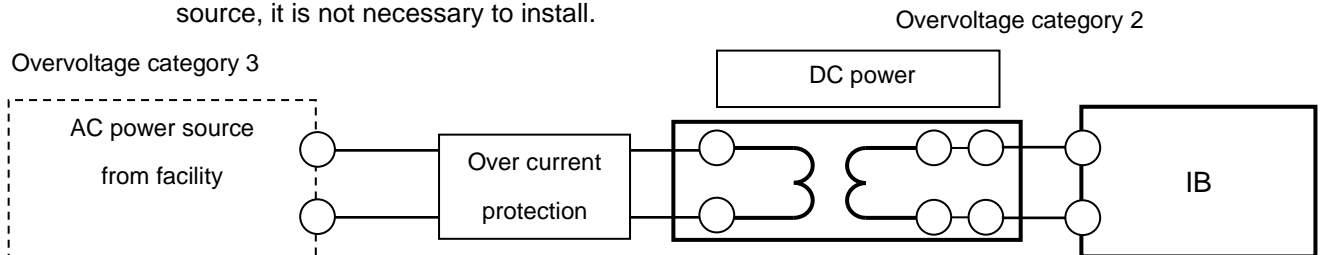
Connector	Usage	Board side	Wiring side
CN1	Power	E03: 231-532/001-000 (WAGO) E04: 231-562/001-000 (WAGO)	231-302/026-000 (WAGO)
CN301	Remote input	734-264 (WAGO)	734-204 (WAGO)
CN302	Remote output	734-266 (WAGO)	734-206 (WAGO)
CN303,CN304	Sensor	733-364 (WAGO)	733-104 (WAGO)
CN101,CN201	Motor	E03/IB-E04F-FT(Motor B): S10B-XH-A(JST) E04/IB-E04F-CR-HT1 /IB-E04F-FT(Motor A): S12B-XH-A(JST)	E03/IB-E04F-FT(Motor B): XHP-10(JST) E04/IB-E04F-CR-HT1 /IB-E04F-FT(Motor A): XHT-12(JST)
CN404,CN405	Ethernet	TM11R-5M2-88 (Hirose)	Category 5 LAN cable (RJ45)

## 1.5 Wiring

### 1.5.1 Wiring for power

#### 1) Installation of Over-current Protection device on DC power source.

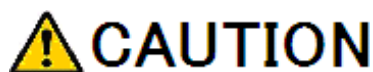
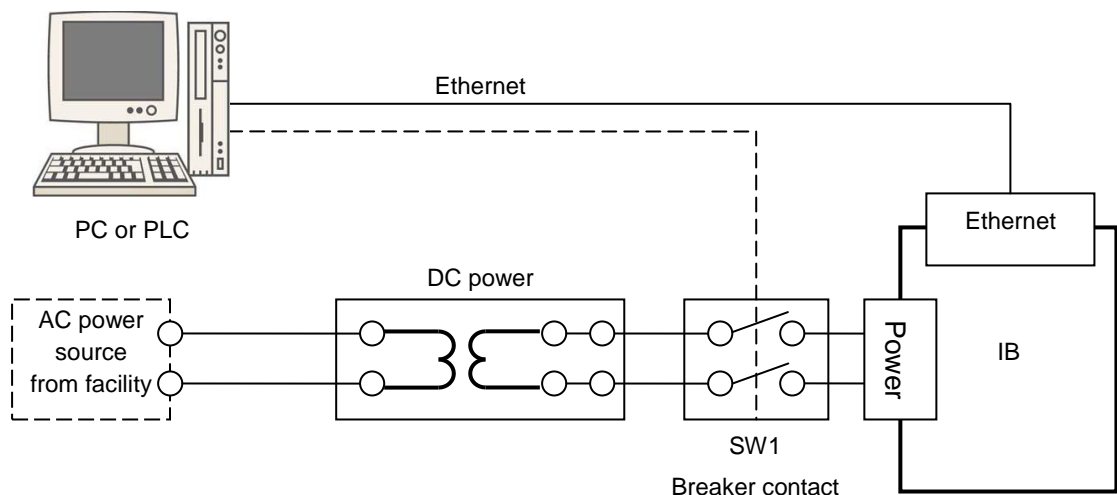
The installation of specific over current protection device in power source might be requested by specification DC power source that would requests safety standard (UL60950-1, etc.). In this case, install specified over current protection device as shown below. If this protection device is not requested by specification of DC power source, it is not necessary to install.



#### 2) Adding the circuit breaker on motor power line when abnormal circumstances.

IB transmits an abnormal status data, when abnormal circumstances such as overload or high temperature rising condition, but does not block out the power. Therefore, if the power needs to be blocked out, add a circuit breaker on motor power line as shown as SW1 below that is controlled by upper layer device (PC or PLC). Upper layer device needs to receive an abnormal status data from driver to block out the power with circuit breaker SW1.

Separate over load detector needs to be added on the power line to block out the motor power, when driver does not have communication to upper layer device.



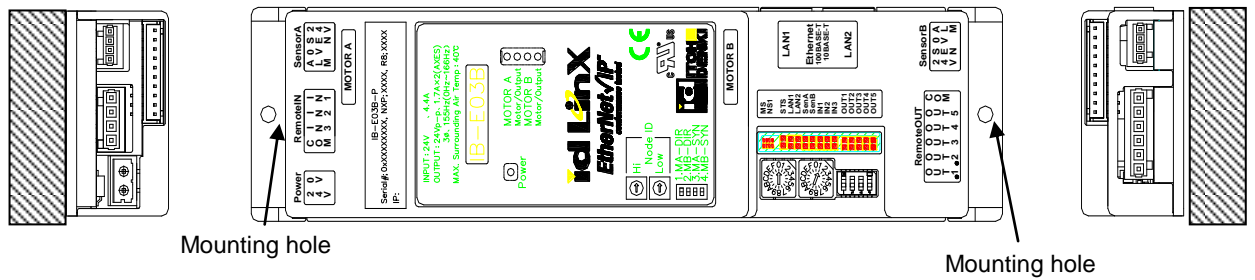
When block out the power, IB can not be operated.



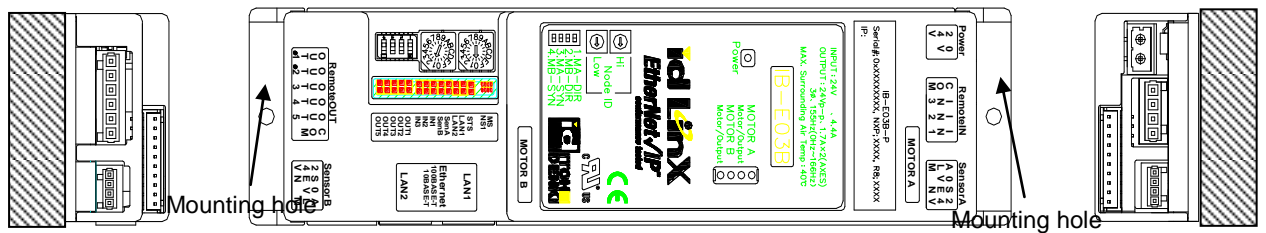
### 1.5.2 Installation of IB-E03/04

IB can be installed in the any way of vertical, horizontal or upside-down as shown below.

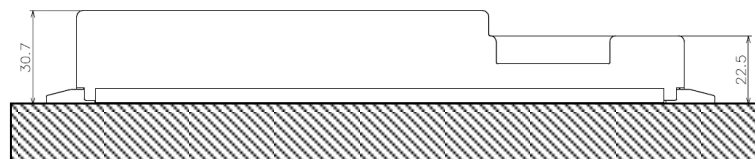
- Mounting screw pitch: 210 mm
- Recommended screw for mounting: Cross-recessed head screw M4
- Tightening torque of mounting screw: 0.74 Nm (7.5 kgfcm)



Vertical way, Upward



Vertical way, Downward



Vertical way, Upward

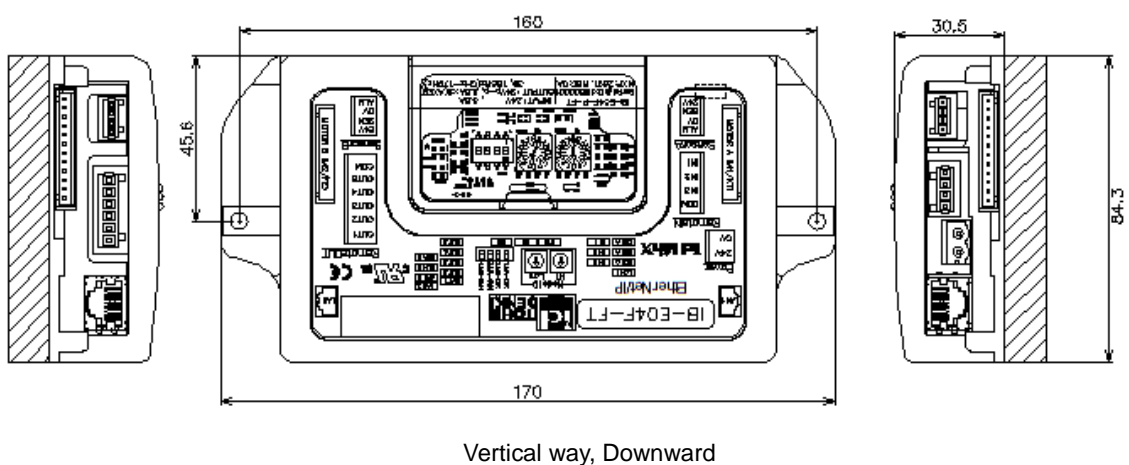
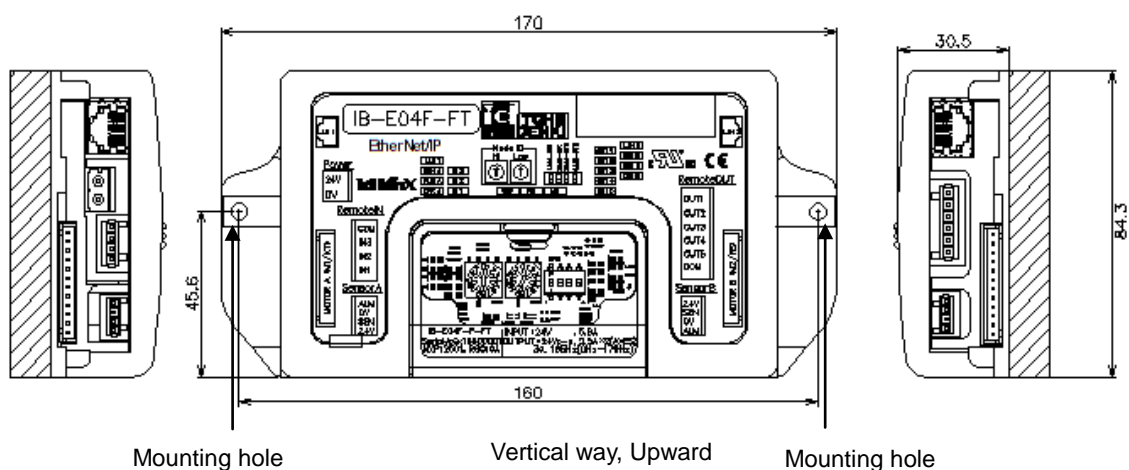


Vertical way, Downward

# IB-E04F-FT/ IB-E04F-CR-HT1

IB can be installed in the any way of vertical, horizontal or upside-down as shown below.

- Mounting screw pitch: 160 mm
- Recommended screw for mounting: Cross-recessed head screw M4
- Tightening torque of mounting screw: 1.0 Nm (10.0 kgfcm)



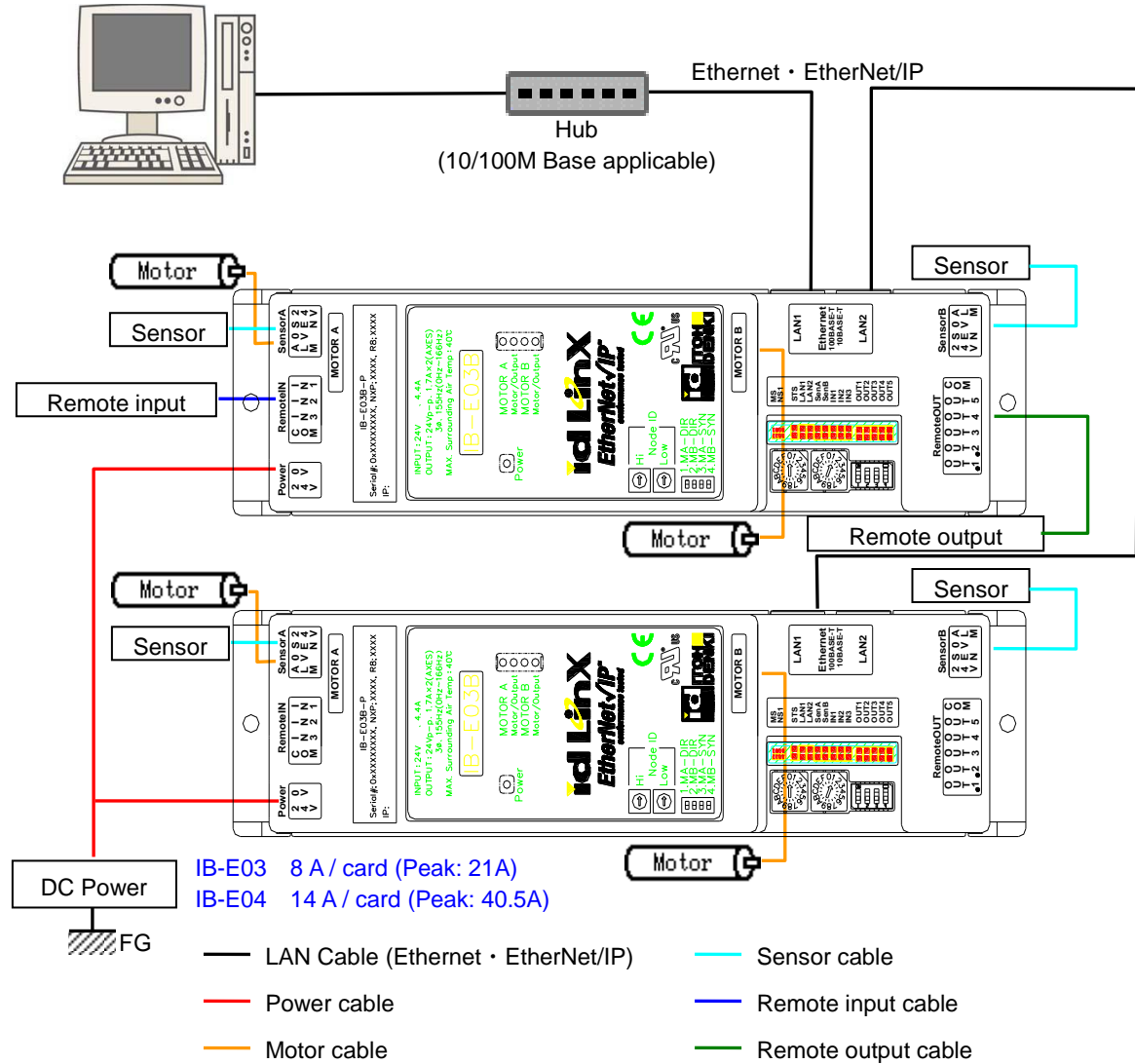
Do not touch the product while its operation or just behind operation stop, otherwise it might cause burn.



Make sure that mounting screw does not come in contact with connector

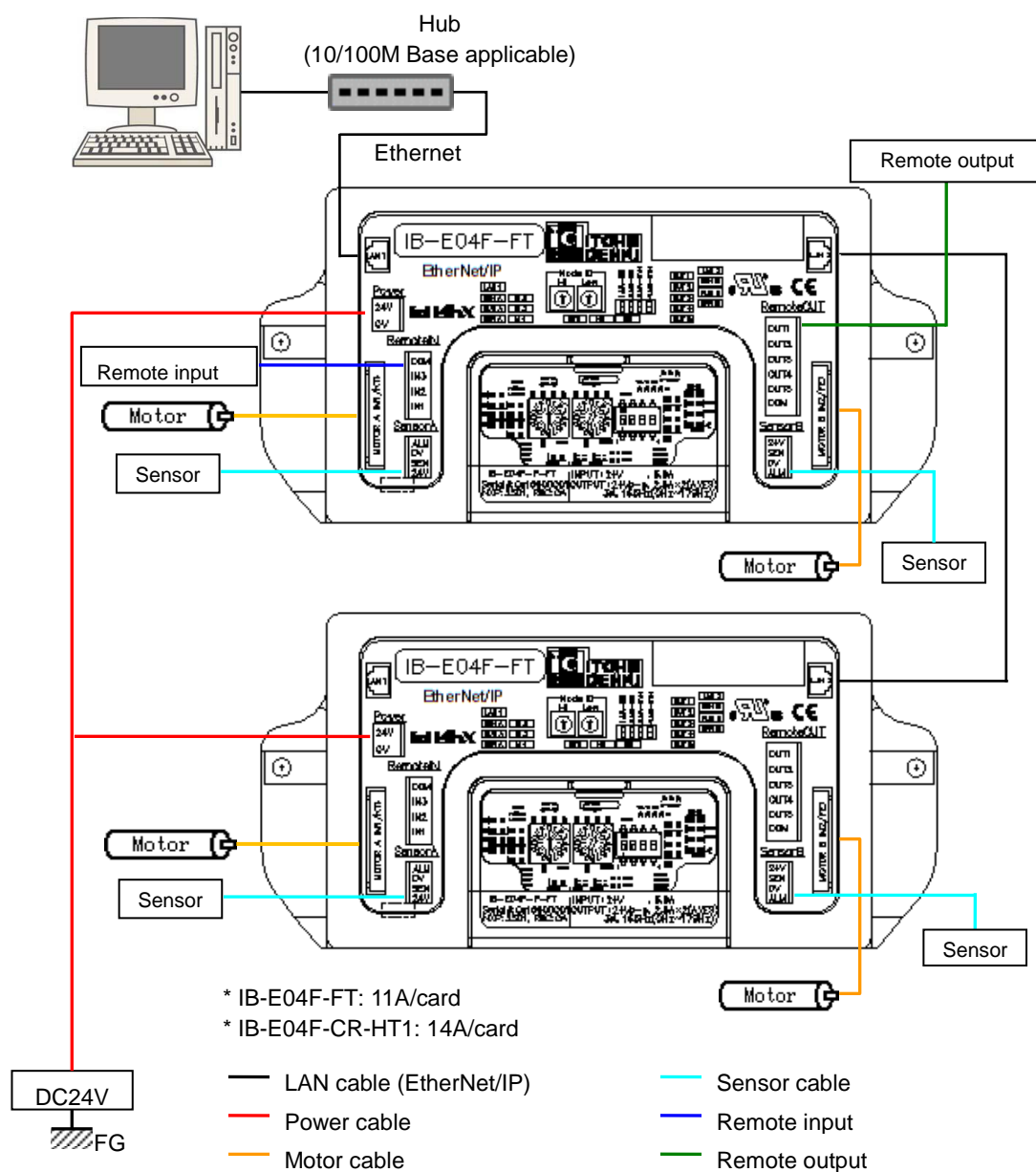
### 1.5.3 Wiring to IB-E03/04

Illustrated below is wiring for IB-E03



- Switching Hub is recommended.
- Shielded LAN cable is recommended.

Illustrated below is wiring for IB-E04F-FT / IB-E04F-CR-HT1



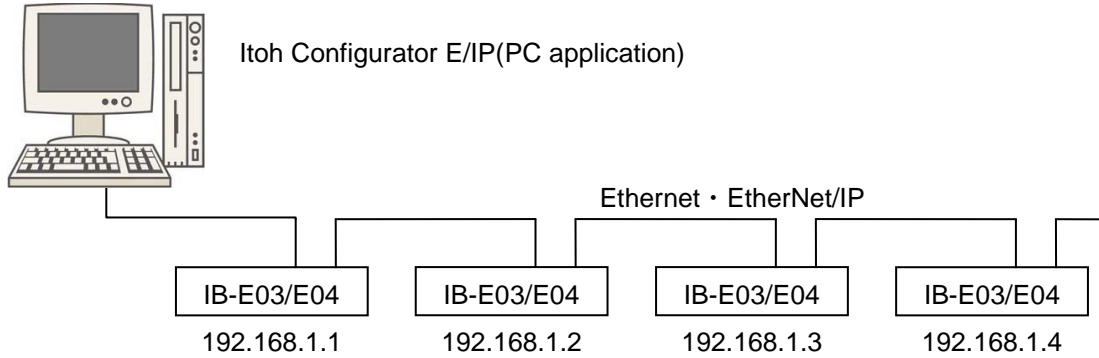
- Switching Hub is recommended.
- Shielded LAN cable is recommended.

#### 1.5.4 Network architecture

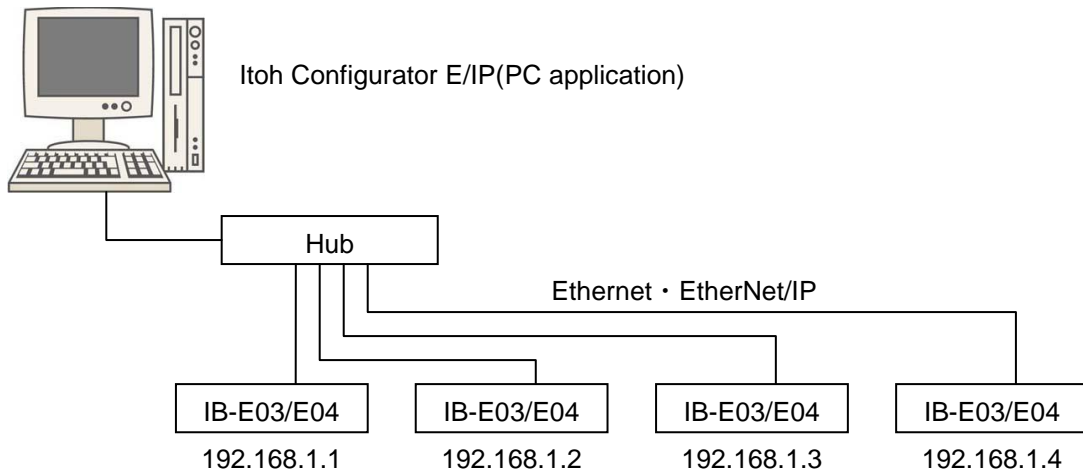
To enable Itoh Configurator E/IP to be operational, it needs to be connected to IB.

See below figures for details of wiring for IB. Both cross and straight LAN cable can be used.

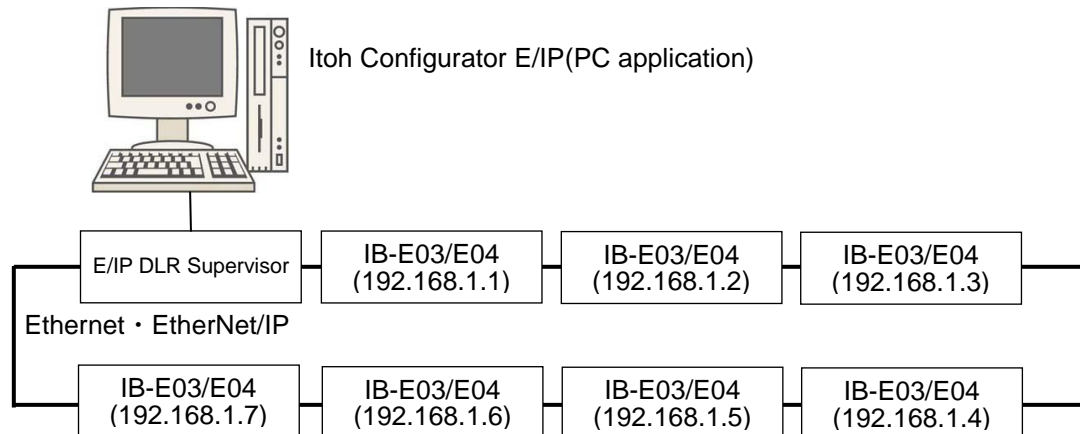
##### 1) Cascade connection



##### 2) Star connection



##### 3) Ring connection



## 1.6 Master / Slave mode

There are two operation made on IB.

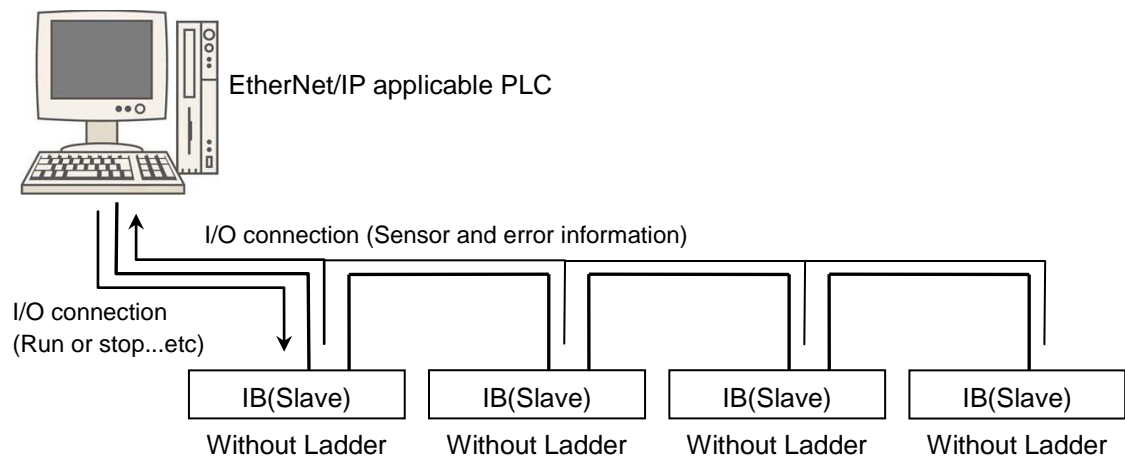
Master IB can be operated by itself and Slave IB can be operated by the other Master IB.

(Refer Chapter 2)

4 different examples showing below.

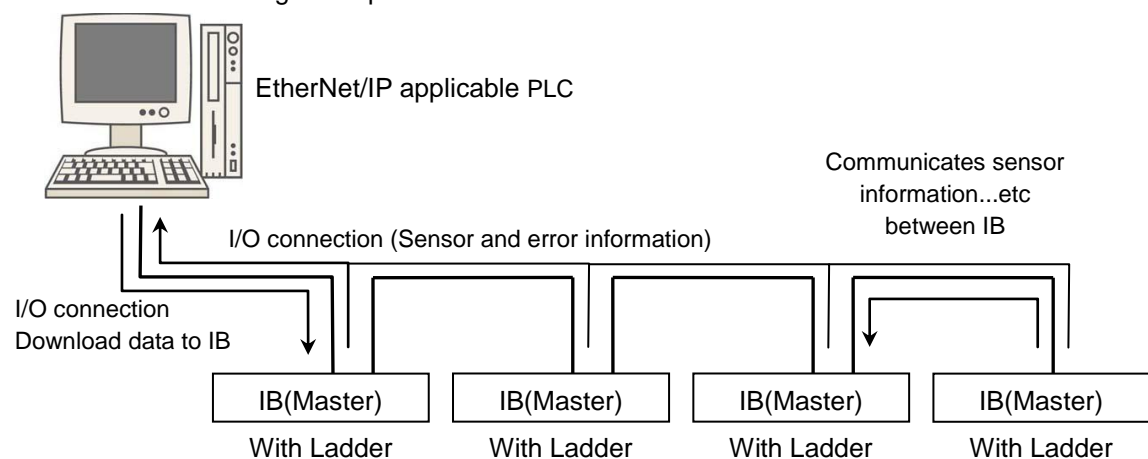
### 1) In case PLC handle slave IB

Set PLC as master and set all of connected IB as slave and control IB through I/O connection between PLC and IB.



### 2) In case IB operate by itself and PLC monitors IB7S condition.

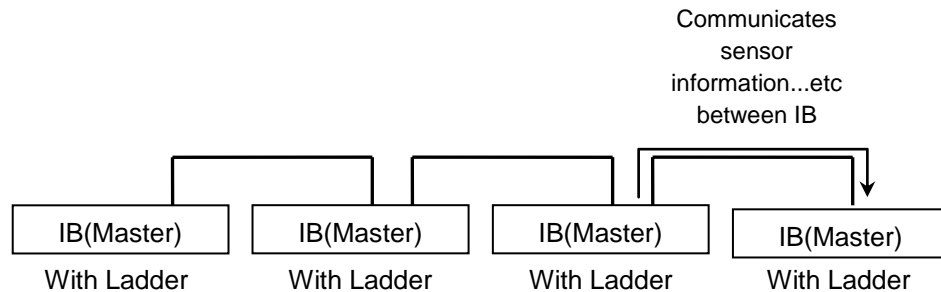
Set all of connected IB as master and PLC monitors each IB's condition and download ladder logic and parameter to IB.



3) In case IB operate itself and PLC monitors IB7S condition.

Set all of connected IBs as master and PLC monitors each IB's condition

and download ladder logic and parameter to IBs. Each IB are controls by own ladder logic.

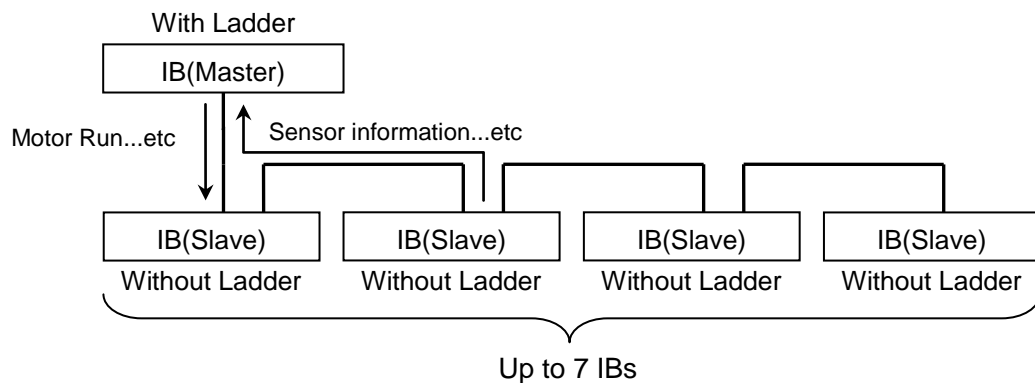


4) In case one IB operate multiple connected IBs.

Download ladder logic to master IB and set the other IB as slave.

Master IB controls itself and the other slave IB.

One master IB can connects up to 7 slave IBs.



## 1.7 Applicable standards

### Conforming to UL and CSA standards.

UL508C and CSA C22.2-No.14 (Recognized component)

- Category Code No. (CCN): NMMS2, NMMS8

- File No. : E333970

### CE Marking

Relevant EC Directives: EMC Directive 2004/108/EC

Applied Standards: EN55011-1: 1998+A2: 2002 (Class A) (Emission)

EN61000-6-2: 2005 (Immunity)

### Reliability test

- Immunity EN61000-6-2/2001 Industrial environment

a) IEC 61000-4-2 Static electricity

Level 4 Criteria B

b) IEC 61000-4-3 Radiation magnetic field

Criteria A

c) IEC 61000-4-4 Burst

Criteria B

d) IEC 61000-4-5 Surge

Criteria B

e) IEC 61000-4-6 Conductive immunity

Criteria A

f) IEC 61000-4-8 Power frequency magnetic field

Criteria A

- Emission EN61000-6-4/2001 Industrial environment

a) VCCI Radiation noise

class A

b) VCCI Noise terminal voltage

class A



## 1.8 ITOH DENKI glossary

Word	Description
IB-E03/IB-E04 (IB)	ITO DENKI EtherNet/IP slave device that operates motor and is I/O device for like a sensor input.
IB-E04-xx-FT	ITO DENKI driver card. Motor A will be connected with 7A MDR, and Motor B will be connected with 4A MDR.
Itoh Configurator E/IP	Configuration and ladder logic programming tool manufactured by ITOH DENKI.
Ladder logic	Ladder logic is a programming language that represents a program by a graphical diagram based diagram on the circuit diagrams of relay logic hardware.
Slave	It is device that operates by receiving command from master.
Master	It is device that control slave device.
JOG operation	Forcible motor run operation for system commissioning. Overrides logic in the IB.
Direction	Motor turning direction viewed from power cable side
Zone	Conveyor area motorized by one motorized roller connected to IB card.
Upstream	Zones from which tote(s) comes into the present zone
Downstream	Zones to which tote(s) are discharged from the present zone.
Tray	Product to be transferred on the conveyor.
JAM timer	Timer to count the ON status time of sensor in the present zone. (This is to detect tote jam in the zone)
JAM error	Error that arises if the JAM timer expires.
Sensor timer	Delay timer that starts when the upstream sensor is cleared, and resets when the sensor in the present zone is blocked. This is used for ZPA applications to detect a lost tray.
Sensor timer error	Delay timer that starts when the upstream sensor is cleared, and resets when the sensor in the present zone is blocked. This is used for ZPA applications to detect a lost tray.
RUN hold timer	Delay timer to keep a motor running after the sensor in the present zone is cleared. This is used for ZPA application.
Sensor-ON delay timer	Timer to count the ON status time of sensor in the present zone. (This is to detect tote jam in the zone)

## 1.9 EtherNet/IP glossary

Word	Description
EtherNet/IP	EtherNet/IP is industrial open network that implements Common Industrial Protocol on Ethernet and TCP/IP.
TCP/IP	It is basic communication protocol that translates data.
CIP	It is Industrial general protocol of OSI application layer. It is used at EtherNet/IP, ControlNet and DeviceNet...etc.
UDP	UDP is a communications protocol that offers a limited amount of service when messages are exchanged between computers in a network that uses the Internet Protocol (IP).
EDS (Electric Data Sheets)	It is text file that defines vendor name, device information.
I/O connection	I/O connection is time-critical data such as a Logic Command and Reference. The terms "input" and "output" are defined from the controller's point of view. Output is produced by the controller and consumed by the module. Input is produced by the module and consumed by the controller.
Explicit message	Explicit Messages are used to transfer data that does not require continuous updates. They are typically used to configure, monitor and diagnose devices over the network.
Multicast	A packet with a special destination address, which multiple nodes on the network may be willing to receive.
Broadcast	A special type of multicast packet that all nodes on the network are always willing to receive.
Unicast	Unicast is the term used to describe communication where a piece of information is sent from one point to another point.
RPI	Request Packet Interval of I/O connection.
IP address	IP address is a numerical label assigned to each device participating in a network that uses the Internet Protocol for communication.
Subnet mask	Subnet mask is a logically visible subdivision of an IP network. The practice of dividing a network into two or more networks is called subnetting.
MAC address	MAC address is a unique identifier assigned to network interfaces for communications on the physical network segment.
Originator	The client responsible for establishing a connection path to the target.
Target	The end-node to which a connection is established.
DLR	Device Level Ring E/IP.

# Chapter 2

## Itoh Configurator E/IP

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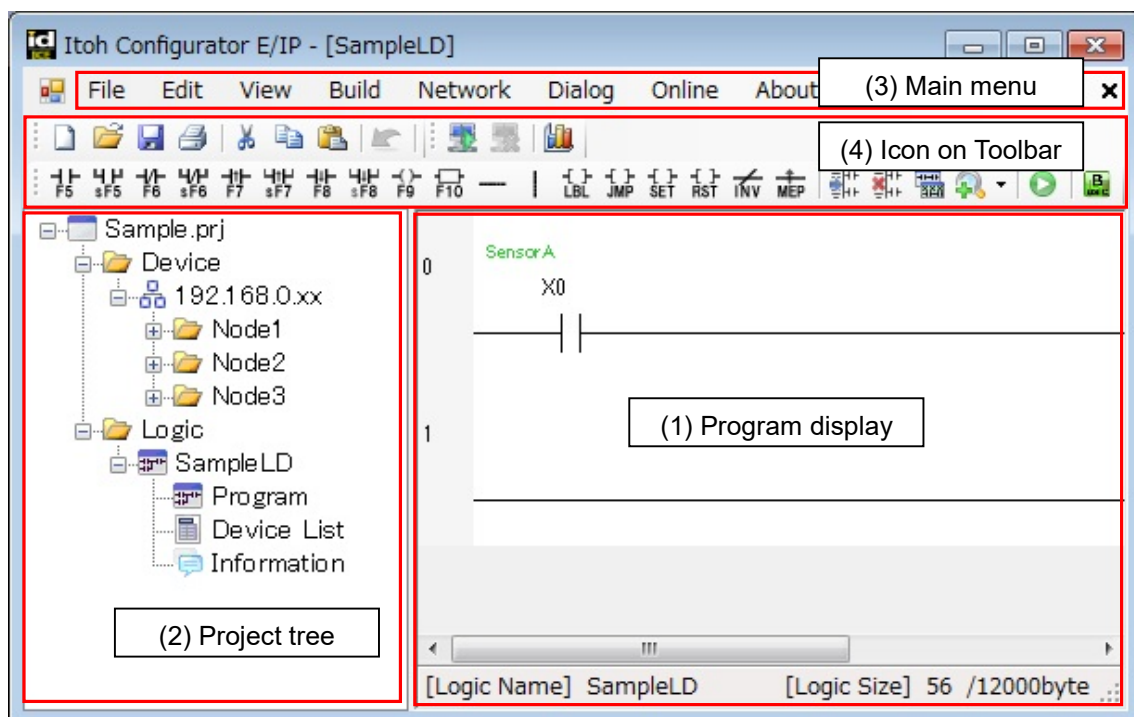
## 2.1 Feature

Itoh Configurator E/IP (ICE) is the software application to configure and program conveyor logic and download to IB-E.

Itoh Configurator E/IP has following features.

- Create ladder logic.
- Monitoring of ladder status.
- Monitoring of error condition.
- Control the motor jog operation connected to IB-E card (forcible operation).
- Configuration and function assignment of motors connected to IB-E card.
- Firmware update connected to IB-E cards.
- Communication setting

### 2.1.1 Main window



#### (1) Program display

Create and edit program area.



































#### (2) Project tree

Displays tree of registered IB and ladder logic on the project.

### (3) Main menu

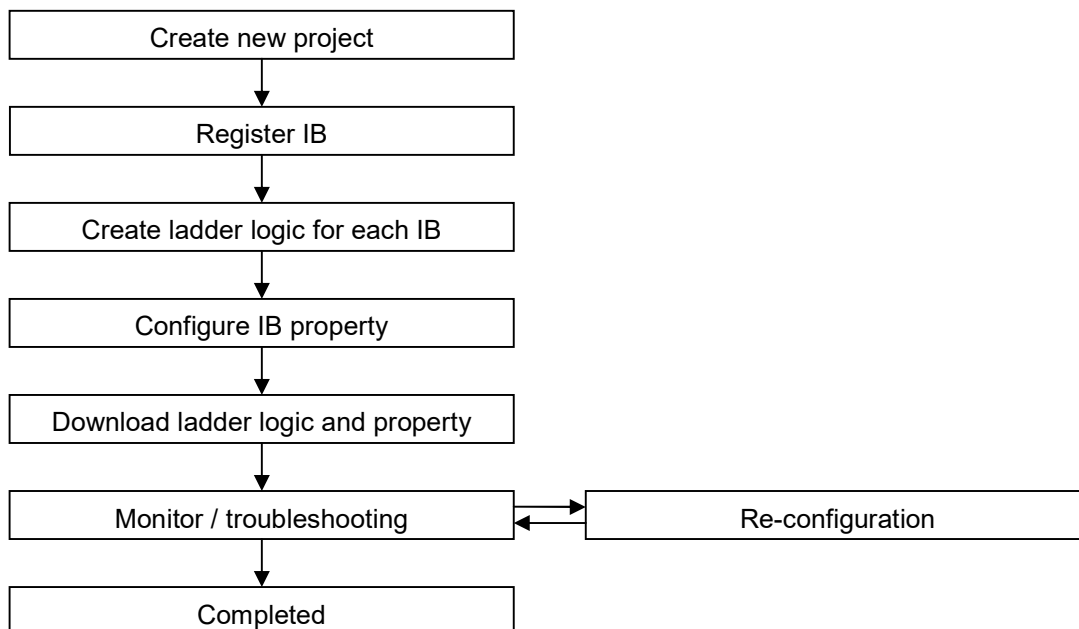
Menu	Sub menu	Description
File	New Project	Create new project
	Open	Open existing project
	Close	Save project
	Save	Save project with new name
	Save As	Close project
	Print Setup	Setup printer
	Print Preview	Print preview
	Print	Print
	Exit	Close LD Programmer
Edit	Undo	Back to previous condition
	Cut	Cut selected area
	Copy	Copy selected area
	Paste	Paste
	Delete	Delete selected area
	Find/Replace	Find / Replace
View	Comment	View or hide comment
	Line Comment	View or hide line comment
	Zoom	Zoom up / down (50%, 75%, 100% and 125%)
Build	-	Build (Compile)
Network	Reset	Reset IB
	Run	Start ladder logic
	Stop	Stop ladder logic
Dialog	Discovery	Find connected IB and change network address
	Information	Displays ladder logic information, verification operation time data, serial number, firmware version and MAC address
	Jog Control	Forcible motor run and remote out.
	Error Information	Displays error information and reset the error
	Auto Download	Automatic download
Online	Start	Start ladder logic monitor
	Stop	Stop ladder logic monitor
About	Firmware Update	Upgrade IB's firmware
	About Itoh Configurator E/IP	Displays Itoh Configurator E/IP version

#### (4) Icon on Toolbar

Menu	Description	Shortcut keys
	Create new project	Ctrl + N
	Open existing project	Ctrl + O
	Save project	Ctrl + S
	Print main display	Ctrl + P
	Cut selected area	Ctrl + X
	Copy selected area	Ctrl + C
	Paste	Ctrl + V
	Back to previous condition	Ctrl + Z
	Start ladder logic monitor	—
	Stop ladder logic monitor	—
	Normally open contact	F5
	Parallel connection of normally open contact	Shift + F5
	Normally closed contact	F6
	Parallel connection of normally closed contact	Shift + F6
	Raising edge pulse contact	F7
	Parallel connection of raising edge pulse contact	Shift + F7
	Falling edge pulse contact	F8
	Parallel connection of falling edge pulse contact	Shift + F8
	Coil device	F9
	Function Block	F10
	Horizontal line	Ctrl + Cursor key
	Vertical line	Ctrl + Cursor key
	Label	—
	Jump	—
	Set a bit device permanently on	—
	Reset a bit device permanently off	—
	Invert operation result	—
	Conversion for operation result to leading edge pulse	—
	Add line	Shift + Insert
	Delete line	Shift + Delete
	View or hide comment	—
	Zoom up / down	Ctrl + scroll wheel
	Build (Compile)	F4
	Select Advanced Mode or Basic Mode	F12

### 2.1.2 System design follow

Algorithm shown below is typical procedure of configuration with IB.



### 2.1.3 Recommended environment to use

OS	Microsoft Windows 7、 Microsoft Windows XP
CPU	Pentium4 2.0GHz or over
Memory	1GB or over
Framework	Ver 3.5 or later
CRTresolution	1024×768 【XGA】
Others	PC needs to have sufficient capacity in its HDD to install this software and further as over 1GB extra empty capacity.

- ※ Framework Ver. 3.5 or more is required.
- ※ If the other problem is found in other factors, it may not be able to corresponding specifications depending on the contents.



## 2.2 Initial setting

### 2.2.1 IP address and Gateway address

Default IP address; 192.168.1.1/255.255.255.0

Default gateway address; 192.168.1.254

1) Change Rotary switch(SW402 and SW403) on IB-E for last 2 lower values of IP address.

192.168.1.XY; SW402 for X, SW403 for Y.

Do not duplicate same IP address on same network.

2) Change network address that belongs to IB-E IP address to 192.168.1.XY/255.255.255.0.

3) Select “Main menu” - “Dialog” – “Discovery”

4) Select IP address from “IP Address” and click “Discovery”

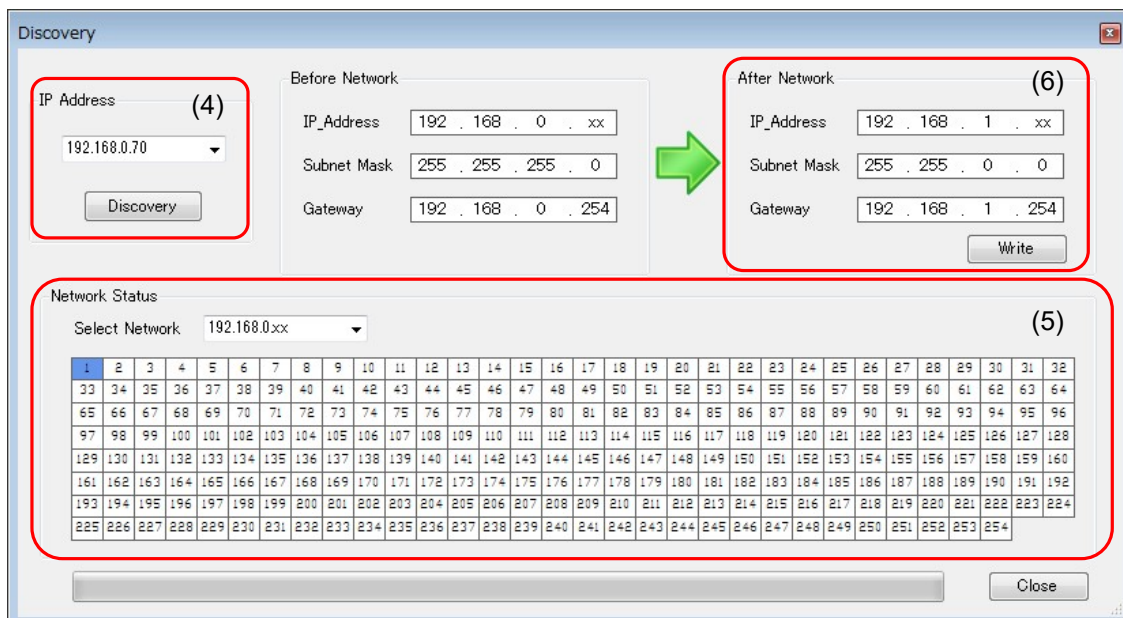
5) Select “192.168. 1 .xx” from “Select Network”.

When network was established, color of Node becomes blue.

If network address and gateway address needs to be changed, follows below procedure.

6) Click “Write” after changed network address and gateway address at “After Network”.

When network address and gateway address was changed, color of Node becomes green.

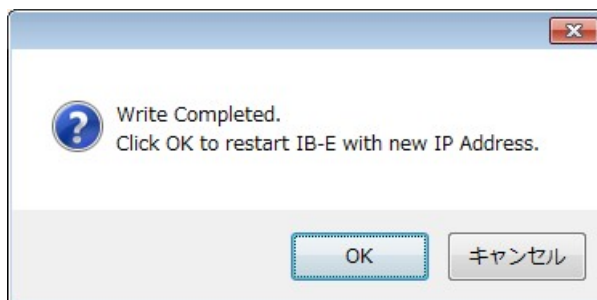


The screenshot shows the 'Discovery' dialog box with the following sections:

- IP Address (4):** A dropdown menu showing '192.168.0.70' and a 'Discovery' button.
- Before Network:** Fields for IP Address (192 . 168 . 0 . xx), Subnet Mask (255 . 255 . 255 . 0), and Gateway (192 . 168 . 0 . 254).
- After Network (6):** Fields for IP Address (192 . 168 . 1 . xx), Subnet Mask (255 . 255 . 0 . 0), and Gateway (192 . 168 . 1 . 254), with a 'Write' button.
- Network Status (5):** A 'Select Network' dropdown showing '192.168.0.xx' and a large grid of 256 nodes (numbered 1 to 255) for selection.

A green arrow points from the 'Before Network' section to the 'After Network' section, indicating a transition or update.

7) Click “OK” to complete. Click “Cancel” to cancel.



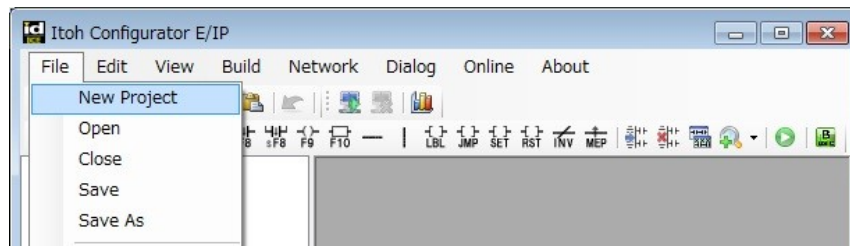
8) Change PC address to network address that belongs to the IB-E address.

## 2.2.2 Create new project

Register devices and ladder logic for conveyor to project.

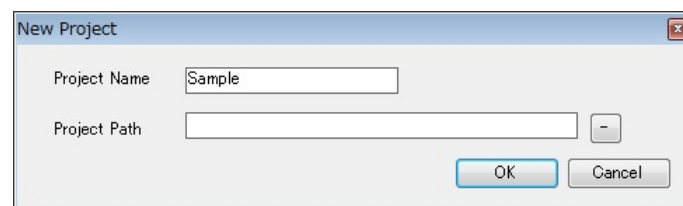
Create new project

- 1) Select "New Project" from Main menu.



- 2) Enter project name and select location of save the project from "Project Path".

Default location is "Documents" – "ICE Project".



Open; Open existing project.

Save; Overwrite the project.

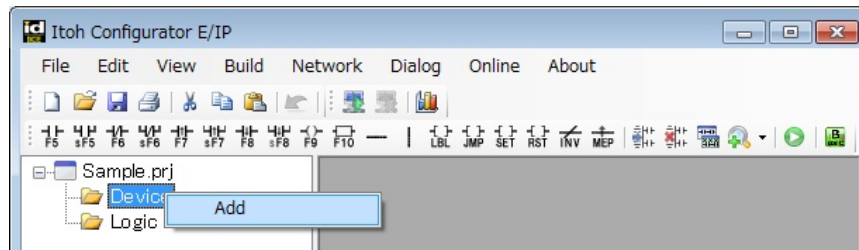
Save As; Save the project with new name.

### 2.2.3 Register devices(IB-E) to project

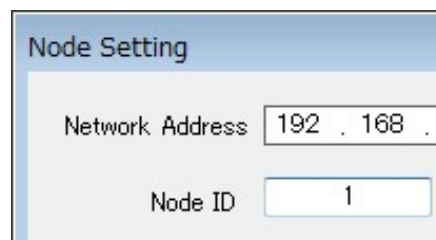
In order to download ladder logic to IB-E, it is necessary to register IB-E to the project.

#### Register IB-E

1) Click “Add” of “Device”.



2) Enter Network address and Node ID and click “OK”.



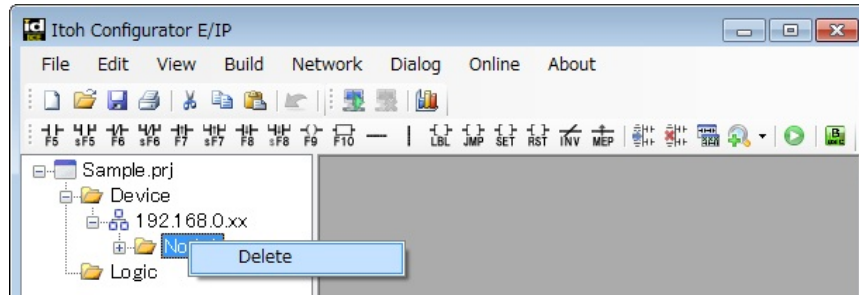
- Available Node ID is 1 to 254.
- Default IP address of IB-E is 192.168.1.1/255.255.255.0. Refer 2.2.1 to change the IP address.

3) Added device is indicated in tree.



## Delete IB-E

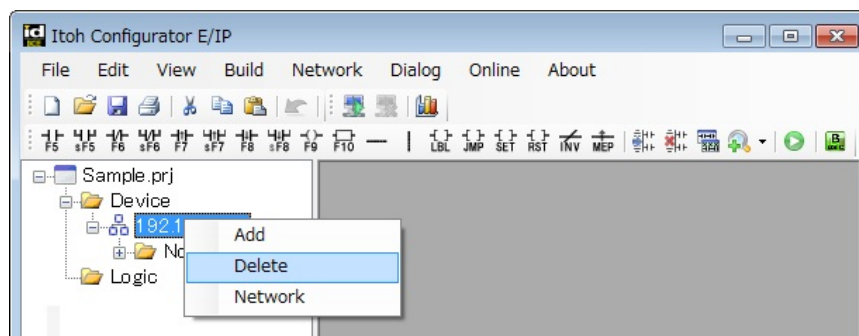
- 1) Right click on IB-E you want to delete and click “Delete”.



## Delete Network

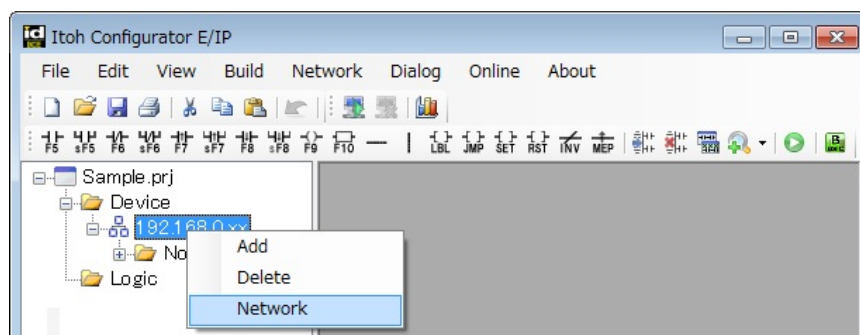
- 1) Right click on network you want to delete and click “Delete”.

All of registered IB-E will be deleted.



## Change network address for IB-E registered in Itoh Configurator E/IP.

- 2) Right click on network you want to change and select “Network”.



2) Enter network address and click “OK”



Network Setting

IP\_Address    10   .   0   .



- Network address of actual IB-E is not changed.
- Refer 2.2.1 to change network address of actual IB-E.

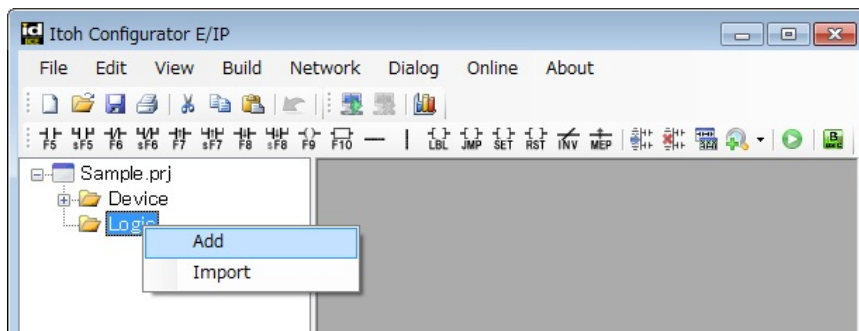
## 2.2.4 Register ladder logic to project

In order to download ladder logic to IB-E, register ladder logic to the project.

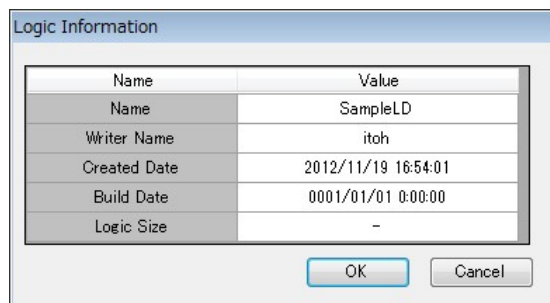
There are two(2) methods to register the ladder logic.

Create new ladder logic

1) Select “Add” by right click on “Logic”.



2) Fill necessary information and click “OK”.



Logic Information

Name	Value
Name	SampleLD
Writer Name	itoh
Created Date	2012/11/19 16:54:01
Build Date	0001/01/01 0:00:00
Logic Size	-

OK Cancel

3) Added ladder logic is indicated on tree.

Ladder logic is not created at this time yet.

Refer chapter 2.4 to make ladder logic.

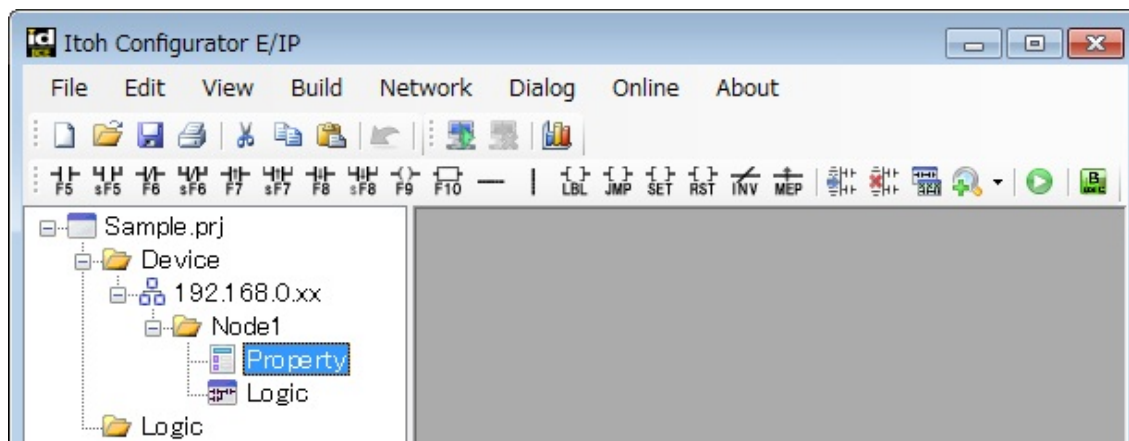


Import existing ladder logic

- 1) Select "Import" by right click on "Logic".
- 2) Click "Open".

## 2.3 Property

Master/Slave, network and motor parameter setting can be set at Property.



### 2.3.1 Property setting window

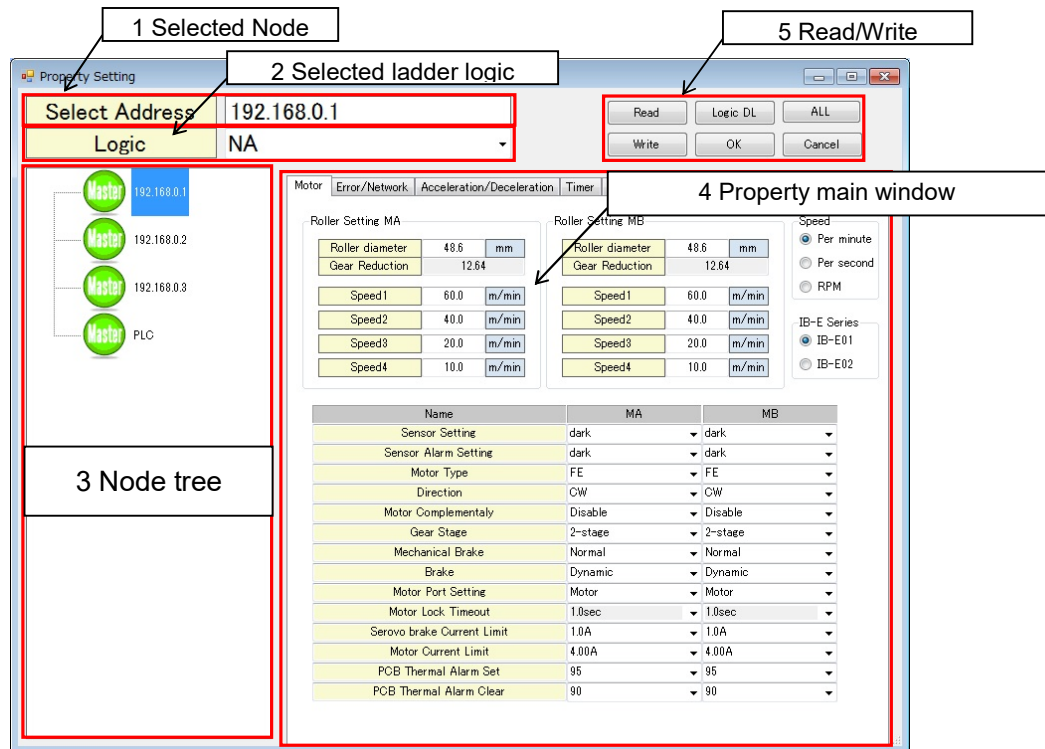
- 1; Select Address;                      Indicates IP address of selected Node (IB-E).  
Double click on the other IB-E to change Node.
- 2; Logic;                                      Select ladder logic.
- 3; Node tree window;                      Indicates Master or Slave.
- 4; Main window of property;

Motor	Motor control setting
Error/Network	Error and communication setting
Acceleration/Deceleration	Acceleration/Deceleration setting
Timer	Timer in ladder logic setting
Counter	Counter in ladder logic setting
Pulse Counter	Pulse Count in ladder logic setting

### 5; Write/Read button

Read	Read from IB-E	Write	Write property to IB-E
Logic DL	Download ladder logic to IB-E	OK	Close property windows with keep property setting.
ALL	Write property and download ladder logic to multiple IB-Es.	Cancel	Close property windows without saving.





Property window

### 2.3.2 Master / Slave

There are three(3) methods to control IB-E.

- 1) Master setting; Controlled by own ladder logic.
- 2) Slave setting by other IB-E; Controlled by the other IB-E's ladder logic.
- 3) Slave setting by PLC; Controlled by EtherNet/IP applicable PLC through I/O connection.

Those three methods should not be duplicated.

#### Master

IB-E is controlled by own ladder logic and the other IB-E or

EtherNet/IP applicable PLC can not control the IB-E. Master IB-E can register up to 7 slave IB-Es. In this case Master IB-E can control these registered slave IB-E.

Table 2.1 Y contact list for control registered IB-E

Device range	Description
Y32~Y63	Command for IB-E of Slave 1
Y64~Y95	Command for IB-E of Slave 2
Y96~Y127	Command for IB-E of Slave 3
Y128~Y159	Command for IB-E of Slave 4
Y160~Y193	Command for IB-E of Slave 5
Y192~Y223	Command for IB-E of Slave 6
Y224~Y255	Command for IB-E of Slave 7



- Default setting is Master
- Establish connection between Master IB-E and Slave IB-E.  
Refer 2.3.5.2 to establish connection.
- EtherNet communication is available with Master setting and changing data register or sensor information connected to IB-E can be monitored.

#### Slave

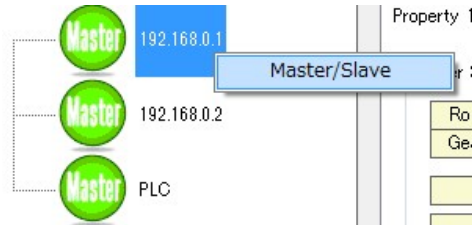
Slave IB needs to received command from the other Master IB-E or EtherNet/IP applicable PLC and it is necessary to designate Master IB-E or EtherNet/IP applicable PLC.

When the Master IB-E has registered the other Slave IB-E, each Slave IB-E is given Slave number (Slave1 to Slave7) by the Master IB-E.

Slave number is used as identification number for Master IB-E can recognize Slave IB-E.

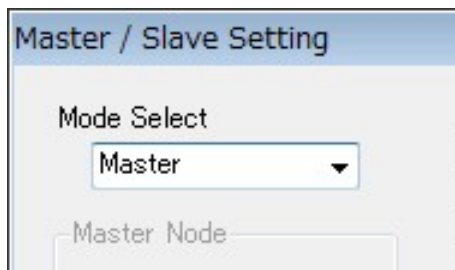
## Master / Slave setting procedure

- 1) Click "Master/Slave" by selecting the node and right click on node tree window

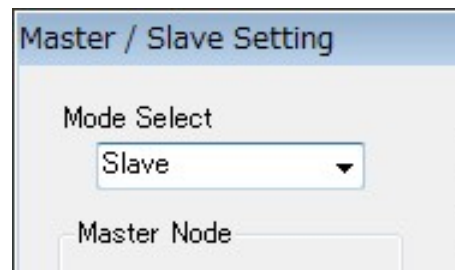


- 2) Select Master or Slave from drop down list of "Master / Slave Setting".

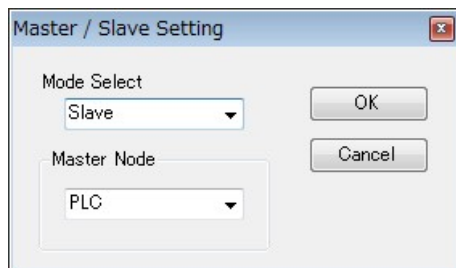
In case setting as Master



In case register the other Slave IB-E.



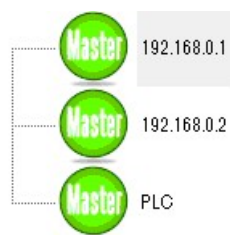
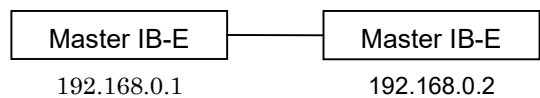
In case setting as Slave IB-E and IB-E designates EtherNet/IP applicable PLC.



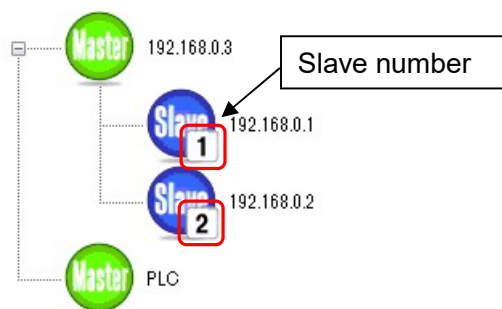
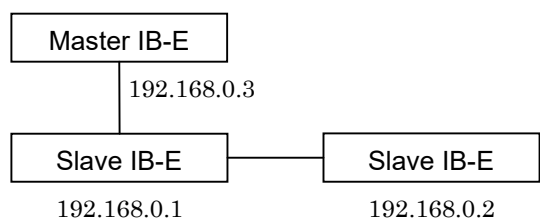
- 3) Click "OK" to complete setting.

## Example for Master / Slave structure

### ① Controlled by own ladder logic.



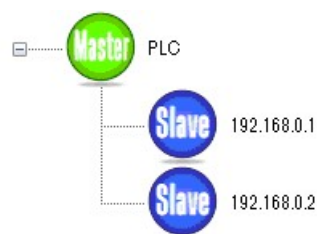
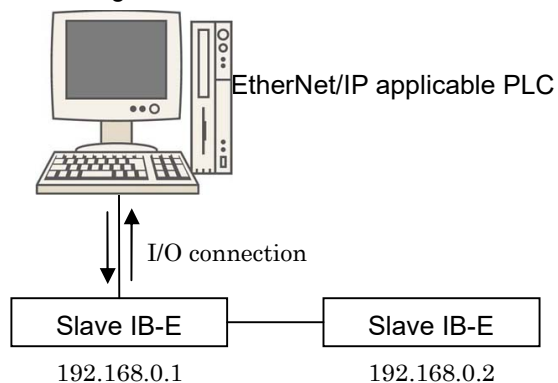
### ② Controlled by the other IB-E's ladder logic.



Slave number is indicated when other slave IB-E is registered on master IB-E. The slave number is assigned in turn. Refer table2 for slave number assignment.

### ③ Controlled by EtherNet/IP applicable PLC

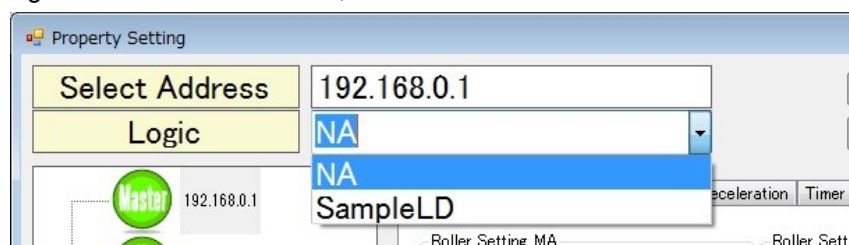
through I/O connection



### 2.3.3 Select ladder logic

Select ladder logic you want to download to the selected IB-E.

If ladder logic will not be downloaded, select "NA".



### 2.3.4 Motor parameter

Set motor parameter

Motor
Error/Network
Acceleration/Deceleration
Timer
Counter
Pulse Counter

Roller Setting MA

Roller diameter	48.6	mm
Gear Reduction	12.64	
Speed1	60.0	m/min
Speed2	40.0	m/min
Speed3	20.0	m/min
Speed4	10.0	m/min

Roller Setting MB

Roller diameter	48.6	mm
Gear Reduction	12.64	
Speed1	60.0	m/min
Speed2	40.0	m/min
Speed3	20.0	m/min
Speed4	10.0	m/min

Speed
☒ Per minute
☐ Per second
☐ RPM

IB-E Series
☒ IB-E01
☐ IB-E02

Name	MA	MB
Sensor Setting	dark	dark
Sensor Alarm Setting	dark	dark
Motor Type	FE	FE
Direction	CW	CW
Motor Complementary	Disable	Disable
Gear Stage	2-stage	2-stage
Mechanical Brake	Normal	Normal
Brake	Dynamic	Dynamic
Motor Port Setting	Motor	Motor
Motor Lock Timeout	1.0sec	1.0sec
Servo brake Current Limit	1.0A	1.0A
Motor Current Limit	4.00A	4.00A
PCB Thermal Alarm Set	95	95
PCB Thermal Alarm Clear	90	90

Motor parameter setting window

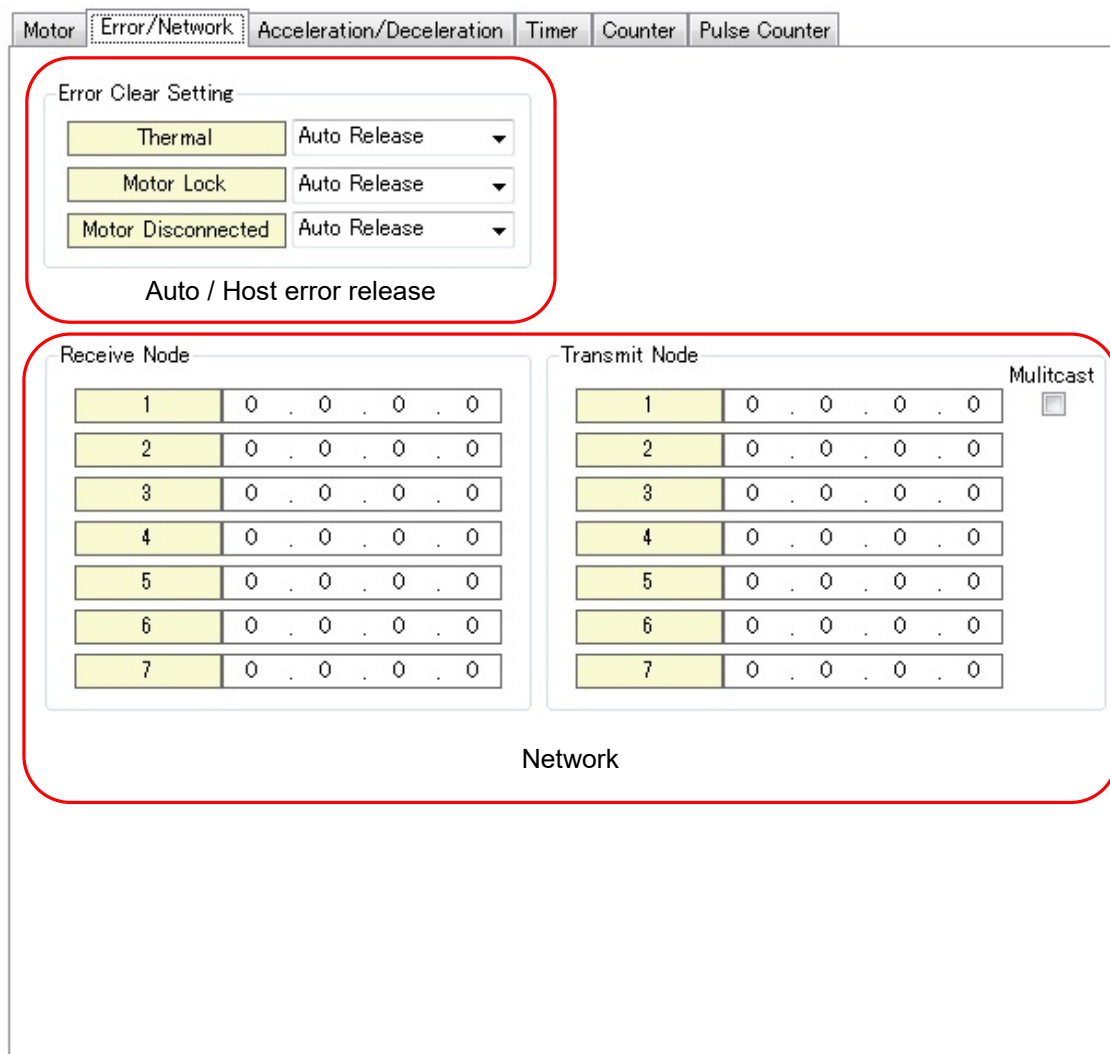
Table 2.3 Motor parameter list

Speed	Selection of a unit for Speed1 to Speed4. (Per minute/Per Second/RPM) Indication only when RPM is selected.
IB Series	Selection of type of IB driver. (IB-E03/IB-E04) IB-E04 is for FH / KT series motor.
Roller diameter	Roller diameter.
Gear Reduction	Indicate gear reduction according selected motor type. When select "Motor Type", the gear reduction can be entered.
Speed1 (※1)	First motor speed. Normal PWM; 621～6,000rpm Complementary PWM; 621～3,725rpm
Speed2 (※1)	Second motor speed. Same speed range as speed1
Speed3 (※1)	Third motor speed. Same speed range as speed1
Speed4 (※1)	Forth motor speed. Same speed range as speed1
Sensor Setting	Sensor Dark ON / Light ON
Sensor Alarm Setting	Sensor alarm Dark ON / Light ON
Motor Type	Selection of motor type. IB-E03; NA / FE / FS / FP / Other IB-E04; NA / FH / KT / Other IB-E04-xx-FT; Motor A: NA / FH / KT / Other Motor B: NA / FE / FS / FP / Other
Direction	Motor turn direction (CW/CCW)
Motor Complementary	Complementary PWM (Enable/Disable)
Gearing	Selection of gear stage
Mechanical Brake	Mechanical brake Normal: Brake is engaged when motor is stopped. Disengage: Brake is constantly disengaged regardless of motor status.
Break	Selection of brake operating mode for each motor. Dynamic: Short-circuit brake Servo: Servo lock brake. Do not use mechanical brake with Coast: Coast without brake
Motor Port Setting	Selection of usage of motor port. Motor: for MDR. Port: Port output. (NPN open drain output.) ※Brake must be "Coast" when "Port" is selected.
Motor Lock Timeout	1 second fixed. (0.5second fixed for KT roller)
Servo brake current limit	0.25A to 1.0A. 0.25A/Step
Motor Current Limit	IB-E03 :0.50A to 4.00A 0.25A/Step IB-E04 :0.50A to 7.00A 0.25A/Step
PCB Drive Thermal Alarm Detection	PCB thermister reaction temperature 45degree to 110degree 5degree/Step
PCB Thermal Alarm Clear	PCB thermister error reset temperature 40degree to 105degree 5degree/Step

※1 In order to change motor speed, active assigned Y contact. Refer 2.4.4.2.

## 2.3.5 Error / Network

Error reset / Network setting.



Motor Error/Network Acceleration/Deceleration Timer Counter Pulse Counter

Error Clear Setting

Thermal	Auto Release
Motor Lock	Auto Release
Motor Disconnected	Auto Release

Auto / Host error release

Receive Node

1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0

Transmit Node

1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0

Multicast ☐

Network

Error/Network setting window

### 2.3.5.1 Auto / Host error release

Thermister, Lock and motor unplugged error can be selected Auto / Host error release.

Auto Release; Error is reset automatically when remove cause of error.


Host Release; Error is reset from upper level, Refer 2.6.2 or section 3 3.4 to reset error.



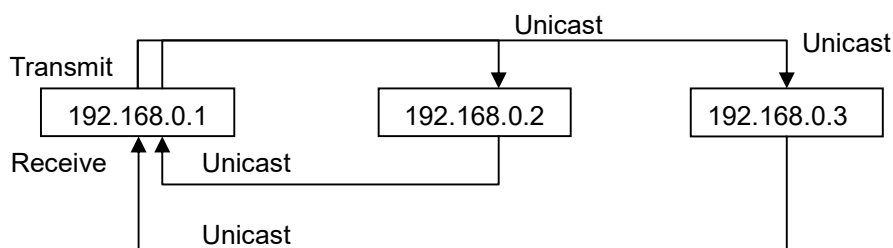
### 2.3.5.2 Communication

Communication setting is required to send/receive sensor,  
internal data to/from the other IB-E.

Register IB-E at Error/Network “Receive Node” and Transmit Node”

-  • Up to 7 node on Receive/Transmit Node can be registered.
- Unicast and Multicast can be set.
- No communication when enter “0.0.0.0”.

(Example 1) Setting for Unicast communication showing below.



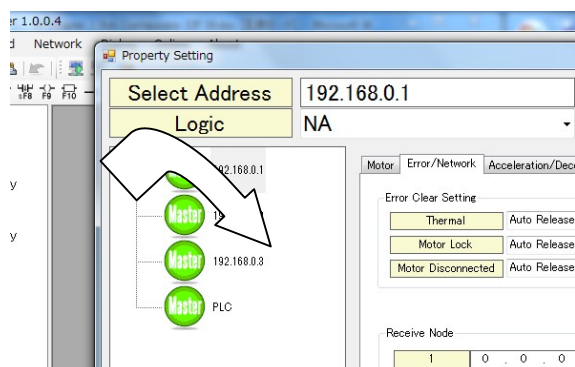
- Setting of Node1(192.168.0.1)

Receive Node		Transmit Node		Multicast
1	192 . 168 . 0 . 2	1	192 . 168 . 0 . 2	<input type="checkbox"/>
2	192 . 168 . 0 . 3	2	192 . 168 . 0 . 3	
3	0 . 0 . 0 . 0	3	0 . 0 . 0 . 0	
4	0 . 0 . 0 . 0	4	0 . 0 . 0 . 0	
5	0 . 0 . 0 . 0	5	0 . 0 . 0 . 0	
6	0 . 0 . 0 . 0	6	0 . 0 . 0 . 0	
7	0 . 0 . 0 . 0	7	0 . 0 . 0 . 0	

- Setting of Node2(192.168.0.2) and Node3(192.168.0.3)

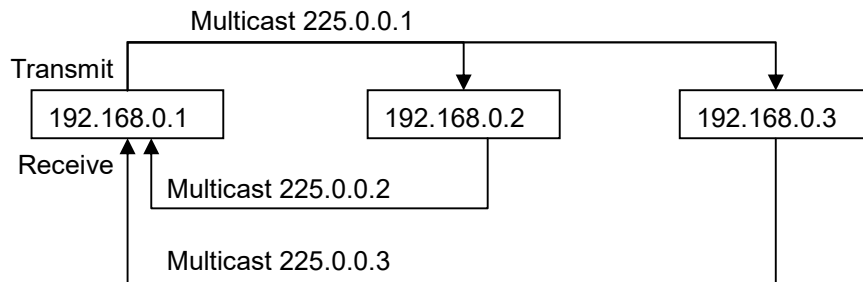
Receive Node		Transmit Node		Multicast
1	192 . 168 . 0 . 1	1	192 . 168 . 0 . 1	<input type="checkbox"/>
2	0 . 0 . 0 . 0	2	0 . 0 . 0 . 0	
3	0 . 0 . 0 . 0	3	0 . 0 . 0 . 0	
4	0 . 0 . 0 . 0	4	0 . 0 . 0 . 0	
5	0 . 0 . 0 . 0	5	0 . 0 . 0 . 0	
6	0 . 0 . 0 . 0	6	0 . 0 . 0 . 0	
7	0 . 0 . 0 . 0	7	0 . 0 . 0 . 0	

※Register IB-E with drag-and-drop from node tree window can be also available.



Register existing IP address on the network.

(Example 2) Setting for Multicast communication showing below.



• Setting of Node1(192.168.0.1)

Receive Node		Transmit Node		Multicast
1	225 . 0 . 0 . 2	1	225 . 0 . 0 . 1	<input checked="" type="checkbox"/>
2	225 . 0 . 0 . 3	2	0 . 0 . 0 . 0	
3	0 . 0 . 0 . 0	3	0 . 0 . 0 . 0	
4	0 . 0 . 0 . 0	4	0 . 0 . 0 . 0	
5	0 . 0 . 0 . 0	5	0 . 0 . 0 . 0	
6	0 . 0 . 0 . 0	6	0 . 0 . 0 . 0	
7	0 . 0 . 0 . 0	7	0 . 0 . 0 . 0	

• Setting of Node2(192.168.0.2)

Receive Node		Transmit Node		Multicast
1	225 . 0 . 0 . 1	1	225 . 0 . 0 . 2	<input checked="" type="checkbox"/>
2	0 . 0 . 0 . 0	2	0 . 0 . 0 . 0	
3	0 . 0 . 0 . 0	3	0 . 0 . 0 . 0	
4	0 . 0 . 0 . 0	4	0 . 0 . 0 . 0	
5	0 . 0 . 0 . 0	5	0 . 0 . 0 . 0	
6	0 . 0 . 0 . 0	6	0 . 0 . 0 . 0	
7	0 . 0 . 0 . 0	7	0 . 0 . 0 . 0	

• Setting of Node3(192.168.0.3)

Receive Node		Transmit Node		Multicast
1	225 . 0 . 0 . 1	1	225 . 0 . 0 . 3	<input checked="" type="checkbox"/>
2	0 . 0 . 0 . 0	2	0 . 0 . 0 . 0	
3	0 . 0 . 0 . 0	3	0 . 0 . 0 . 0	
4	0 . 0 . 0 . 0	4	0 . 0 . 0 . 0	
5	0 . 0 . 0 . 0	5	0 . 0 . 0 . 0	
6	0 . 0 . 0 . 0	6	0 . 0 . 0 . 0	
7	0 . 0 . 0 . 0	7	0 . 0 . 0 . 0	

※Multicast IP address is automatically entered on first “Transmit Node” when checked Multicast.

 • Range of IP address for Multicast are 225.0.0.1 to 225.0.255.254.

# Assignment of each receive Node's data

Sensor status and internal data from the other IB-E are assigned below table.

In case using sensor status information of Node2 on Node1's ladder logic,  
use X16 to X55 and D95 to D110.

Table 2.3 Assignment of receive data area.

Receive Node	Area of data assignment
1	X16~X55 D95~D110
2	X56~X95 D190~D205
3	X96~X135 D285~D300
4	X136~X175 D380~D395
5	X176~X215 D475~D490
6	X216~X255 D570~D585
7	X256~X295 D665~D680

### 2.3.6 Acceleration / Deceleration

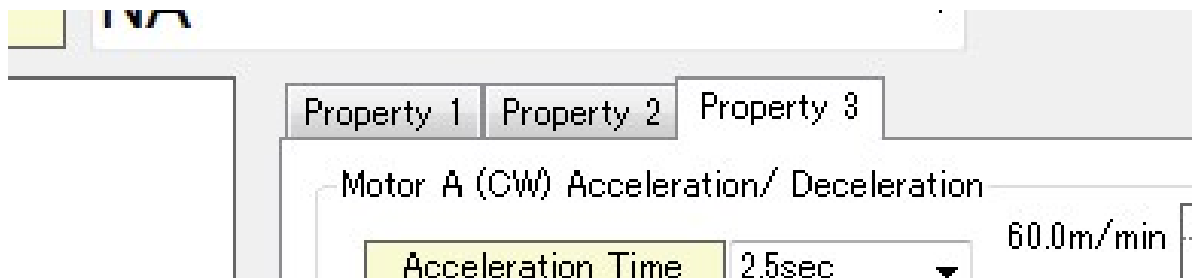
Set motor acceleration and deceleration.

There are two(2) mode is available “Time (sec)” and Acceleration ( $\text{m/s}^2$ ).

0 to 2.5sec 0.1sec/step

- Time mode

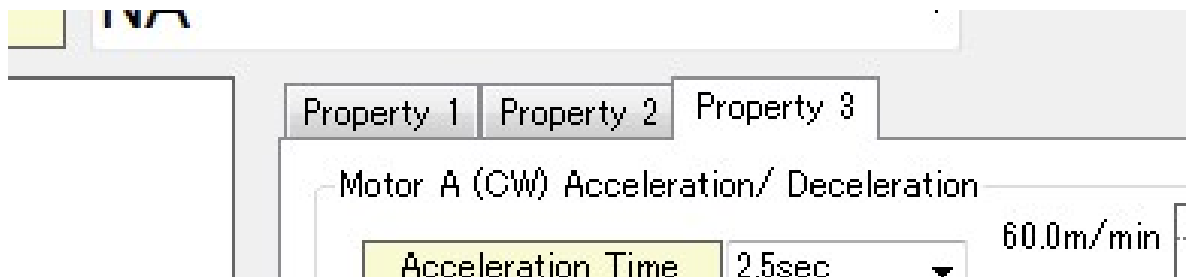
Set target time to achieve maximum speed or stop



- Acceleration mode

Speeds 1 to Speed 2 are set same Acceleration / deceleration degree.

Acceleration / deceleration degree is calculated from Speed 1 setting.



- Monitoring shows “Motor stop” during deceleration.
- Motor Speed 1 should be faster than speed 2 ~ speed 4, otherwise speed 2 ~ speed 4 may not be indicate correctly on graph.

### 2.3.7 Timer / Counter / Pulse Counter

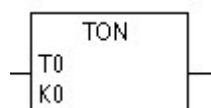
Timer value of TON, TOP and TP can be set on ICE.

#### NOTE

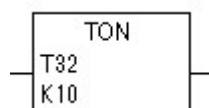
In order to set timer value at ICE, enter K0 on ladder logic as below example1.

When enter some value on K as showing example2, the value can not be changed at ICE.

Example1



Example 2



If value of K is other than "0", it comes gray.

Comments that entered at ladder are indicated.

Motor	Error/Network	Acceleration/Deceleration				Timer	Counter	Pulse Counter			
Timer Setting ( 10msec )						Timer Setting ( 100msec )					
T0	0.00	▼	sec	10msec	Timer_0	T32	0.0	▼	sec	100msec	Timer_0
T1	0.00	▼	sec	10msec	Timer_1	T33	0.0	▼	sec	100msec	Timer_1
T2	0.00	▼	sec	10msec	Timer_2	T34	0.0	▼	sec	100msec	Timer_2
T3	0.00	▼	sec	10msec	Timer_3	T35	0.0	▼	sec	100msec	Timer_3
T4	0.00	▼	sec	10msec	Timer_4	T36	0.0	▼	sec	100msec	Timer_4
T5	0.00	▼	sec	10msec	Timer_5	T37	0.0	▼	sec	100msec	Timer_5
T6	0.00	▼	sec	10msec	Timer_6	T38	0.0	▼	sec	100msec	Timer_6
T7	0.00	▼	sec	10msec	Timer_7	T39	0.0	▼	sec	100msec	Timer_7
T8	0.00	▼	sec	10msec	Timer_8	T40	0.0	▼	sec	100msec	Timer_8
T9	0.00	▼	sec	10msec	Timer_9	T41	0.0	▼	sec	100msec	Timer_9
T10	0.00	▼	sec	10msec	Timer_10	T42	0.0	▼	sec	100msec	Timer_10
T11	0.00	▼	sec	10msec	Timer_11	T43	0.0	▼	sec	100msec	Timer_11
T12	0.00	▼	sec	10msec	Timer_12	T44	0.0	▼	sec	100msec	Timer_12
T13	0.00	▼	sec	10msec	Timer_13	T45	0.0	▼	sec	100msec	Timer_13
T14	0.00	▼	sec	10msec	Timer_14	T46	0.0	▼	sec	100msec	Timer_14
T15	0.00	▼	sec	10msec	Timer_15	T47	0.0	▼	sec	100msec	Timer_15
T16	0.00	▼	sec	10msec	Timer_16	T48	0.0	▼	sec	100msec	Timer_16
T17	0.00	▼	sec	10msec	Timer_17	T49	0.0	▼	sec	100msec	Timer_17

Timer setting window

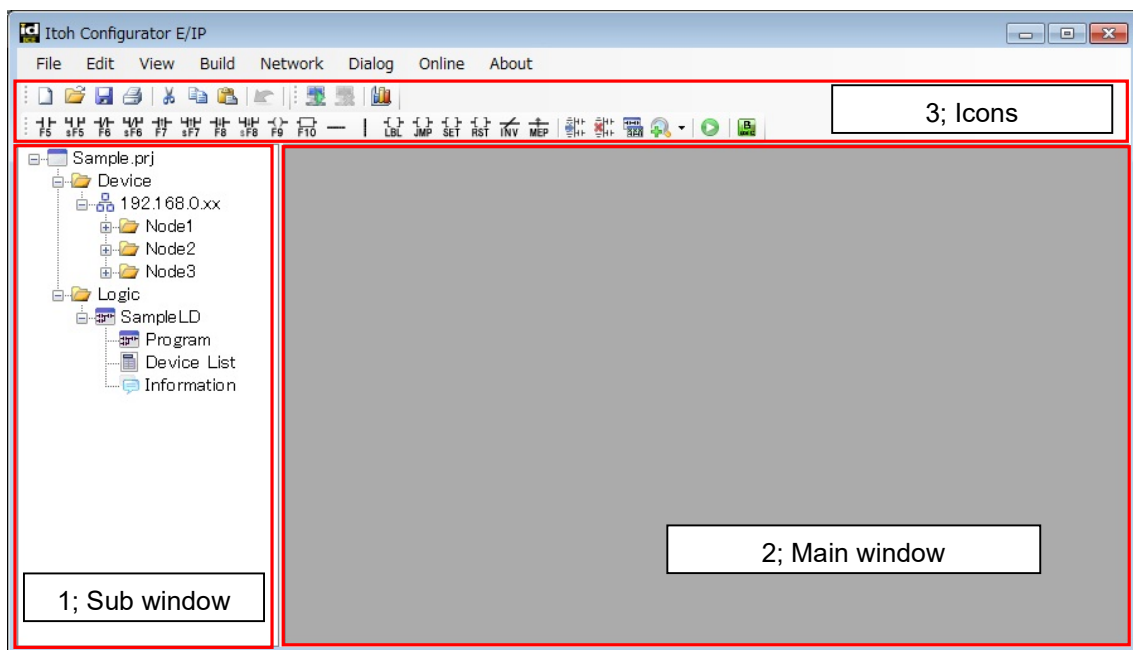
## 2.4 Create ladder logic

One(1) ladder logic can be built in to individual IB-E.

Two(2) axis, motor port and remote output are controlled by the ladder logic.

When slave IB-E are registered, master IB-E can control the slave IB-E by ladder logic.

### 2.4.1 Main window



Ladder logic window

#### 1; Sub window

『Program』 ; Click to indicate ladder program at Main window.



































『Device List』 ; Indication of contact list or device list.

『Information』 ; Click to indicate for ladder logic information.

#### 2; Main window

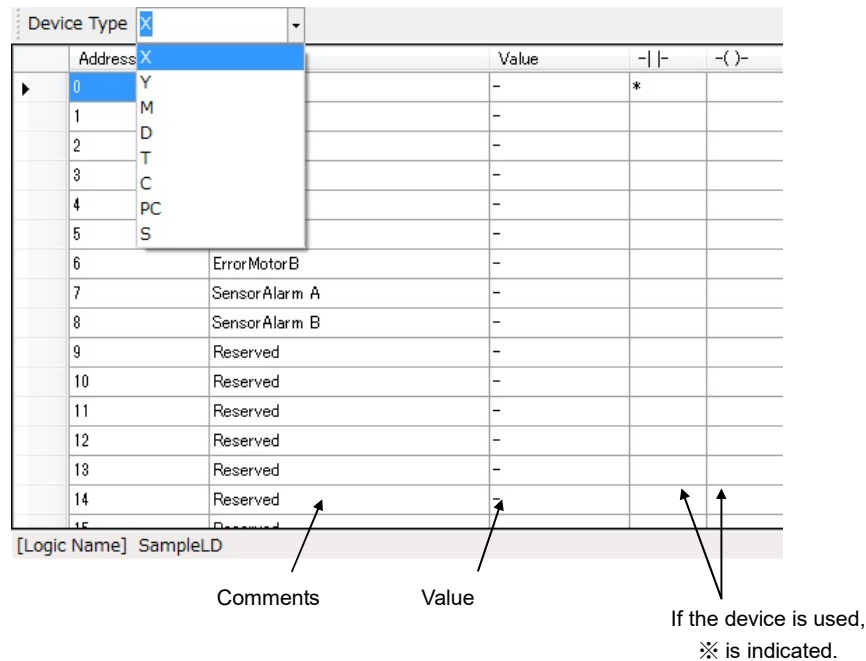
Programming window

### 3; Icons

Menu	Descriptions	Short-cut key
	Create new project	Ctrl + N
	Open existing project	Ctrl + O
	Save project	Ctrl + S
	Print main display ladder program	Ctrl + P
	Cut selected area	Ctrl + X
	Copy selected area	Ctrl + C
	Paste	Ctrl + V
	Back to previous condition	Ctrl + Z
	Start ladder monitoring	—
	Stop monitoring	—
	Normally open contact	F5
	Parallel connection of normally open contact	Shift + F5
	Normally closed contact	F6
	Parallel connection of normally closed contact	Shift + F6
	Rising edge pulse	F7
	Parallel connection of rising edge pulse contact	Shift + F7
	Falling edge pulse	F8
	Parallel connection of falling edge pulse contact	Shift + F8
	Coil device	F9
	Function Block	F10
	Horizontal line	Ctrl + (→←)
	Vertical line	Ctrl + (↑↓)
	Label	—
	Jump	—
	Set a bit device permanently on	—
	Reset a bit device permanently off	—
	Invert operation result	—
	Conversion of operation result to leading edge pulse	—
	Insert line	Shift + Insert
	Delete line	Shift + Delete
	View/hide comments	—
	Zoom up / down main display	Ctrl + mouse wheel
	Build (Compile)	F4
	Advanced Mode / Basic Mode	F12

## Device list window

When open device list below display is coming up.



Address	Value	Comment
0	-	※
1	-	
2	-	
3	-	
4	-	
5	-	
6	-	ErrorMotorB
7	-	SensorAlarm A
8	-	SensorAlarm B
9	-	Reserved
10	-	Reserved
11	-	Reserved
12	-	Reserved
13	-	Reserved
14	-	Reserved
15	-	Reserved


Address Value Comments

If the device is used, ※ is indicated.

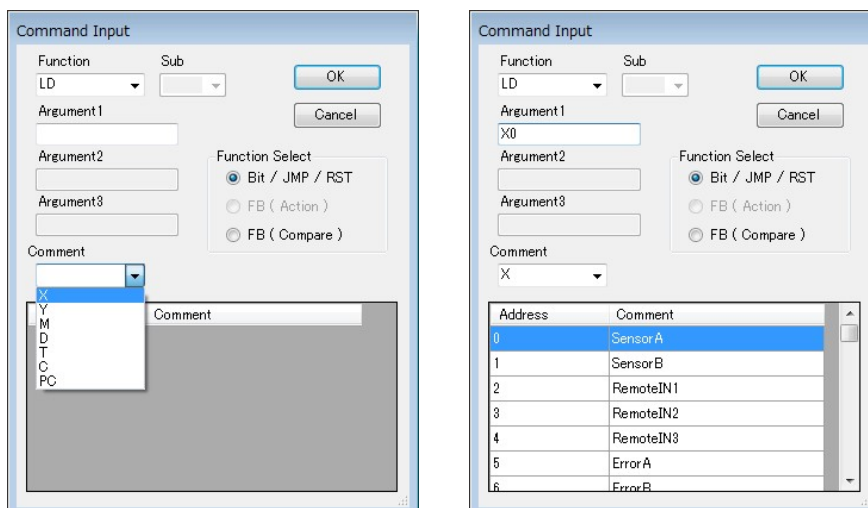
## 2.4.2 Create ladder logic procedure

### 2.4.2.1 Basic mode

This is example to create ladder logic with using “LD X0” command as showing below.

- 1) Click icon  or press F5 to place “LD”.
- 2) Double click or Enter on the LD command and “Command Input” is pop-up.
- 3) Select “X” from drop-down list at “Comment”
- 4) Select “0” at “Address”. X0 (Sensor A) will be displayed on Argument1.

Note; Enter “X0” at Argument1 instead of 3) and 4) are also available.



Command Input

Function: LD Sub: OK Cancel

Argument1: Argument2: Argument3:

Function Select: ☒ Bit / JMP / RST ☐ FB ( Action ) ☐ FB ( Compare )

Comment: X

Address: 0 Comment: SensorA

Address: 1 Comment: SensorB

Address: 2 Comment: RemoteIN1

Address: 3 Comment: RemoteIN2

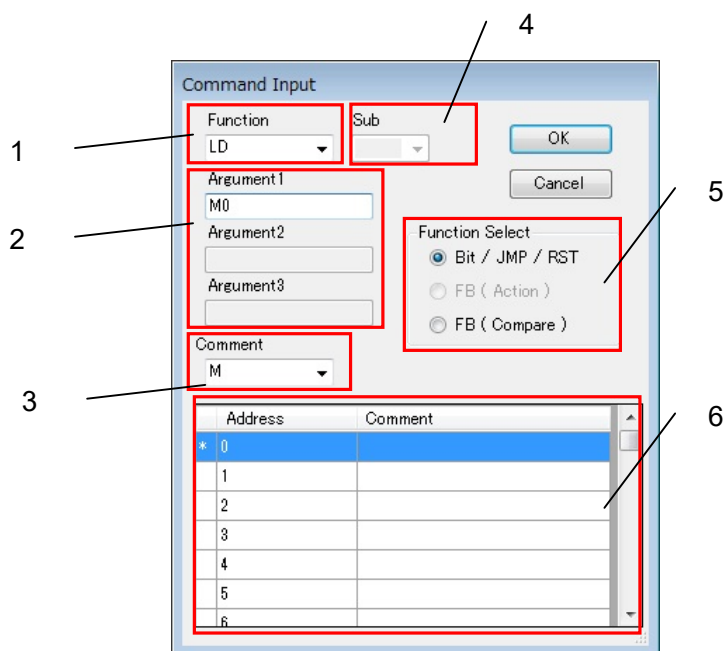
Address: 4 Comment: RemoteIN3

Address: 5 Comment: ErrorA

Address: 6 Comment: ErrorB



## 2.4.2.2 Command Input



The screenshot shows the 'Command Input' dialog box. It contains several fields and a table. Numbered callouts point to specific elements: 1 points to the 'Function' dropdown (set to 'LD'); 2 points to the 'Argument1' text box (containing 'M0'); 3 points to the 'Comment' dropdown (set to 'M'); 4 points to the 'Sub' dropdown; 5 points to the 'Function Select' radio buttons (with 'Bit / JMP / RST' selected); and 6 points to the 'Address' column of the table below.

Address	Comment
* 0	
1	
2	
3	
4	
5	
6	

1; Function;

Select command from dropdown list

Based on "Function select" (5) selection, available command is different.

2; Argument1/ Argument2/ Argument3

Enter device (Input or Output) or select device from "Address" (6).

Depending on kind of commands, it is necessary to enter Argument2 or 3.

3; Comment

Select device. X, Y, M, D, T, C or PC from dropdown list.

4; Sub

Length of data for comparison, move...etc.

5; Function Select

Function Select	Available command
Bit/JMP/RST	LD, LDI, LDP, LDF, OUT, INV, MEP, LBL, JMP, RST, SET
FB(Action)	CTD, CTU, FMOV, MOV, MRA, MRI, MRIC, PCT, RZP, TON, TOF, TP, ZRST
FB(Compare)	EQ(=), GE(>=), GT(>), LE(<=), LT(<), NE(!=)

## 6; Address

Displays device selected at “Comment” (3) and can enter comment for each command.

If the device already has been used, \* is displayed.

Address	Comment
* 0	
1	
2	

### 2.4.2.3 Advance mode

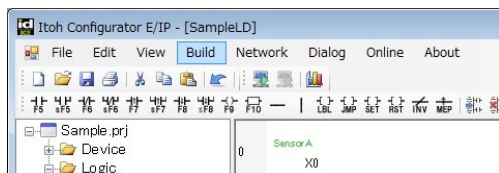
This is example to create ladder logic with using “LD X1” command as showing below.

- 1) Double click or press Enter on the main window.
- 2) Or Enter “LD X1” on the main window.

### 2.4.2.4 Build a ladder logic

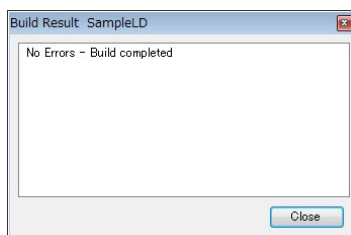
The created ladder logic is converted into a program that can be executed by IB-E.

- 1); Select “Build” from menu.

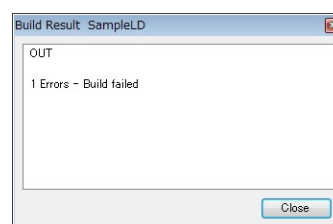


- 2) Result of build(converted) are pop-up.

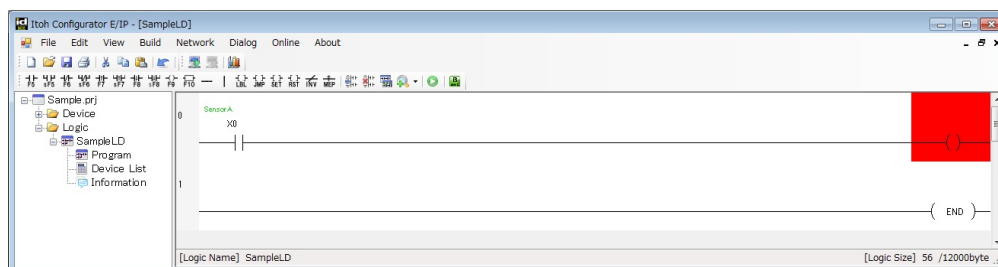
If build result shows error in pop up window, click the error to jump to the error location.



Completed normally



Error

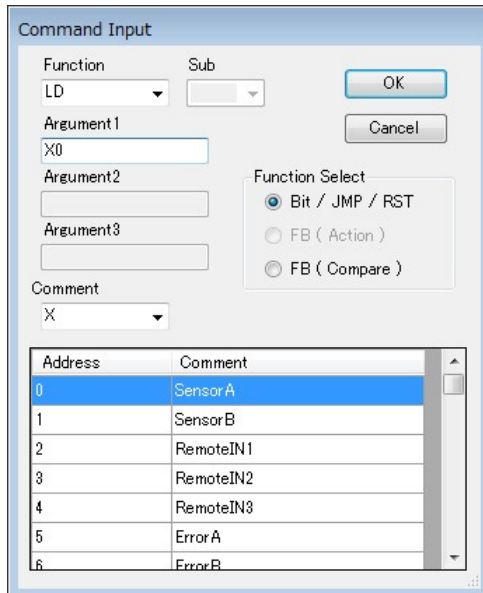


The error parts indicated on Red. Changed the program to fix error and then build again.

## 2.4.3 Command

### 2.4.3.1 Bit / JMP / RST

#### LD /LDI



Command Input dialog box for LD/LDI. The Function dropdown is set to LD. The Sub dropdown is empty. The Argument1 field contains X0. The Argument2 and Argument3 fields are empty. The Comment dropdown is set to X. The Function Select section has three radio buttons: Bit / JMP / RST (selected), FB ( Action ), and FB ( Compare ). Below the dialog is a table with Address and Comment columns.

Address	Comment
0	Sensor A
1	Sensor B
2	RemoteIN1
3	RemoteIN2
4	RemoteIN3
5	Error A
6	Error B

Select contact from 【Argument1】

LD

Normally open contact

LDI

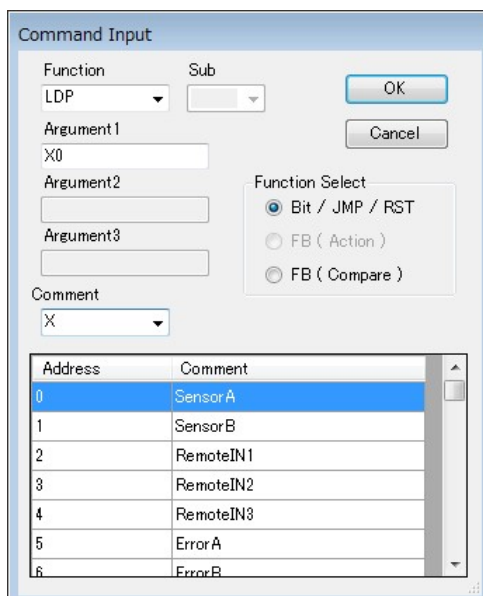
Normally closed contact



Data register can be also assigned.

Enter D5.0 at Argument1 to check first bit of D5.

#### LDP / LDF



Command Input dialog box for LDP/LDF. The Function dropdown is set to LDP. The Sub dropdown is empty. The Argument1 field contains X0. The Argument2 and Argument3 fields are empty. The Comment dropdown is set to X. The Function Select section has three radio buttons: Bit / JMP / RST (selected), FB ( Action ), and FB ( Compare ). Below the dialog is a table with Address and Comment columns.

Address	Comment
0	Sensor A
1	Sensor B
2	RemoteIN1
3	RemoteIN2
4	RemoteIN3
5	Error A
6	Error B

Select contact from 【Argument1】

LDP

Rising edge pulse

LDF

Falling edge pulse



**Date register can not be used on LDP and LDF.**

**Do not use Y and M contacts which has been used at SET and RST. Build result will be error.**

## OUT

Command Input

Function: OUT Sub:

Argument1: Y0

Argument2:

Argument3:

Comment: Y

Function Select

☒ Bit / JMP / RST

☐ FB ( Action )

☐ FB ( Compare )

Address	Comment
0	Motor A Run
1	MotorB Run
2	MotorA Port U
3	MotorA Port V
4	MotorA Port W
5	MotorB Port U
6	MotorB Port V

Select coil from 【Argument1】 .

Coil device.

When choose 【Y】 , assigned output on IB will be worked.



Data register can be also assigned.

OUT D5.0 means turn on first bit of D5.

Note;

D95 to D799 are not available to use.

## INV

Command Input

Function: INV Sub:

Argument1:

Argument2:

Argument3:

Comment:

Function Select

☒ Bit / JMP / RST

☐ FB ( Action )

☐ FB ( Compare )

Address	Comment

Invert operation result.

INV can not be placed left hand bus bar.



## MEP

The screenshot shows a "Command Input" dialog box. It has fields for "Function" (set to MEP), "Sub" (empty), "Argument1", "Argument2", "Argument3", and "Comment". There are "OK" and "Cancel" buttons. A "Function Select" panel is open, showing three options: "Bit / JMP / RST" (selected), "FB ( Action )", and "FB ( Compare )". Below the dialog is a table with two columns: "Address" and "Comment". The table is currently empty.

Conversion of operation result to leading edge pulse.

MEP can not be placed left hand bus bar.



Up to 255 MEP can be used on one ladder logic.

LBL / JMP

Command Input

Function: JMP      Sub:      OK

Argument1: P0      Argument2:      Argument3:      Cancel

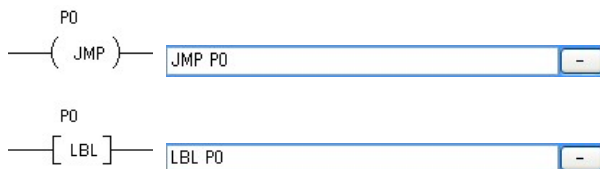
Function Select

- ☒ Bit / JMP / RST
- ☐ FB ( Action )
- ☐ FB ( Compare )

Comment:      Address      Comment

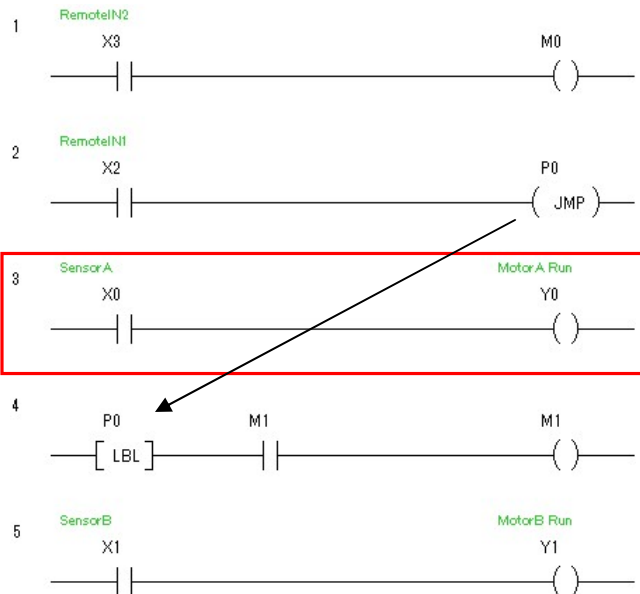
JMP; Select original data from 【Argument1】 . (Jump from)

LBL; Select address of value from 【Argument1】 . (Jump to)



## Example to use JMP and LBL

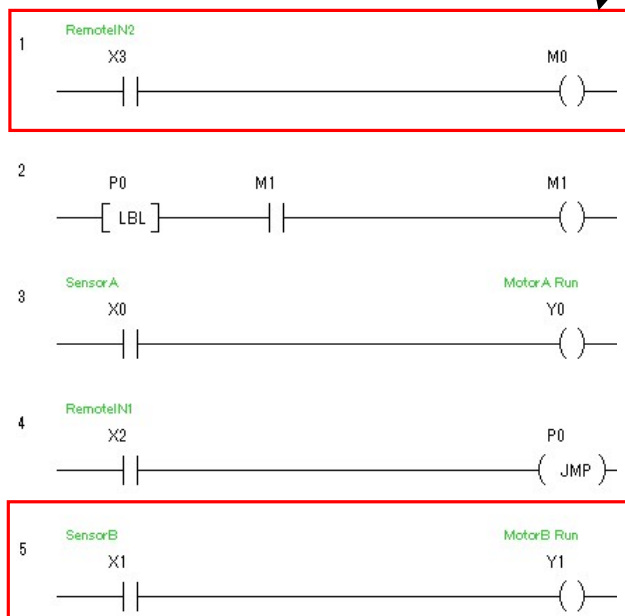
### Place “JMP” before “LBL”



When active **【JMP】**, program jump to **【LBL】**  
Program between **【JMP】** and **【LBL】** will be canceled.

When X2 is ON, red frame showing left will be skipped and jump to line 4.

### Place “LBL” before “JMP” .



Jump to “LBL” and red frame is skipped.

## SET

Command Input

Function: SET Sub:

Argument1: Y0

Argument2:

Argument3:

Comment: Y

Function Select

☒ Bit / JMP / RST

☐ FB ( Action )

☐ FB ( Compare )

Address	Comment
0	Motor A Run
1	MotorB Run
2	MotorA Port U
3	MotorA Port V
4	MotorA Port W
5	MotorB Port U
6	MotorB Port V

Select coil from 【Argument1】

Selected coil is latched by 【SET】 when 【SET】 is active.

In order to reset the latched coil, 【RST】 is needed.

D95 to D799 is not allowed to use on SET command.



**Do not use Y and M contacts which has been used at SET and RST at LDP or LDF. Build result will be error.**

## RST

Command Input

Function: RST Sub:

Argument1: Y0

Argument2:

Argument3:

Comment: Y

Function Select

☒ Bit / JMP / RST

☐ FB ( Action )

☐ FB ( Compare )

Address	Comment
0	Motor A Run
1	MotorB Run
2	MotorA Port U
3	MotorA Port V
4	MotorA Port W
5	MotorB Port U
6	MotorB Port V

Select coil from 【Argument1】 to reset.

The selected coil is reset by 【RST】

【RST】 can reset timer and counter as well.

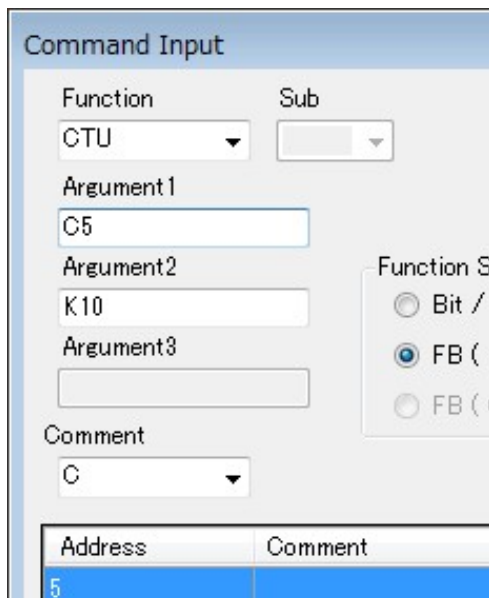
Data register (D) can not be reset by 【RST】



**Do not use Y and M contacts which has been used at SET and RST at LDP or LDF. Build result will be error.**

### 2.4.3.2 FB (Action)

CTU; Up counter



Command Input

Function: CTU Sub: [ ]

Argument1: C5

Argument2: K10

Argument3: [ ]

Function Select:   
☐ Bit /   
☒ FB (   
☐ FB (

Comment: C

Address	Comment
5	

Select counter from 【Argument1】 .

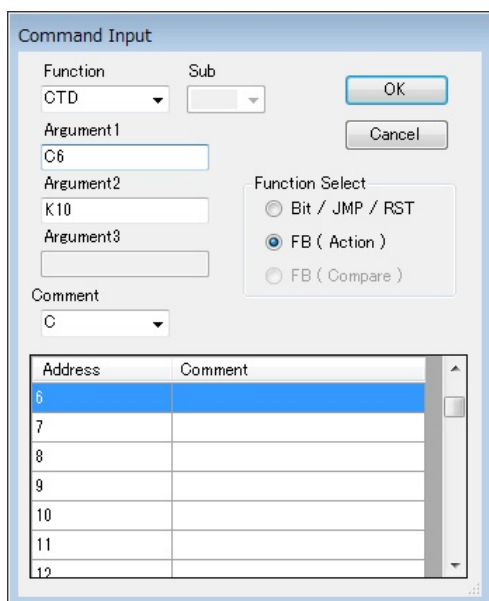
Set counter value at 【Argument2】 .

Increase value when the command is active.

Use 【RST】 to reset the counter.



CTD; Down counter



Command Input

Function: CTD Sub: [ ]

Argument1: C6

Argument2: K10

Argument3: [ ]

Function Select:   
☐ Bit / JMP / RST   
☒ FB ( Action )   
☐ FB ( Compare )

Comment: C

Address	Comment
6	
7	
8	
9	
10	
11	
12	

Select counter from 【Argument1】 .

Set counter value at 【Argument2】 .

Decrease value when the command is active.

Use 【RST】 to reset the counter.





## PCT; Pulse counter

Command Input

Function: PCT Sub:   
 Argument1: PC5   
 Argument2: K100   
 Argument3:   
 Comment: PC

Function Select   
☐ Bit / JMP / RST   
☒ FB ( Action )   
☐ FB ( Compare )

Address	Comment
5	Pulse Counter A_5
6	Pulse Counter A_6
7	Pulse Counter A_7
8	Pulse Counter B_0
9	Pulse Counter B_1
10	Pulse Counter B_2
11	Pulse Counter B_3

Select counter from 【Argument1】 .

Set count value at 【Argument2】 .

Motor Pulse Counter counts when motor pulse is changed.

Use 【RST】 to reset the counter



PC0 to PC7 for Motor A and PC8 to PC15 are for Motor B.

Distance (mm) = Motor pulse / (12pulses x gear reduction) x  $\pi$  x pipe diameter (mm)

Note; 12pulses / rotating of Itoh MDR.

## TON; On delay timer

Command Input

Function: TON Sub:

Argument1: T0

Argument2: K100

Argument3:

Comment: T

Function Select:

- ☐ Bit / JMP / RST
- ☒ FB ( Action )
- ☐ FB ( Compare )

Address	Comment
0	10msec Timer_0
1	10msec Timer_1
2	10msec Timer_2
3	10msec Timer_3
4	10msec Timer_4
5	10msec Timer_5
6	10msec Timer_6

Select timer from 【Argument1】 .

Set timer value at 【Argument2】 K = 0 to 65535

【TON】 starts counting until total counted value reached set value at 【Argument2】 or 【TON】 is reset by 【RST】



T0 to T31 is for 10msec timer

T32 to T63 is for 100msec timer



## TOF; OFF delay timer

Command Input

Function: TOF Sub:

Argument1: T0

Argument2: K100

Argument3:

Comment: T

Function Select:

- ☐ Bit / JMP / RST
- ☒ FB ( Action )
- ☐ FB ( Compare )

Address	Comment
0	10msec Timer_0
1	10msec Timer_1
2	10msec Timer_2
3	10msec Timer_3
4	10msec Timer_4
5	10msec Timer_5
6	10msec Timer_6

Select timer from 【Argument1】 .

Set timer value at 【Argument2】 . K = 0 to 65535

Counts time base intervals when the instruction is false.

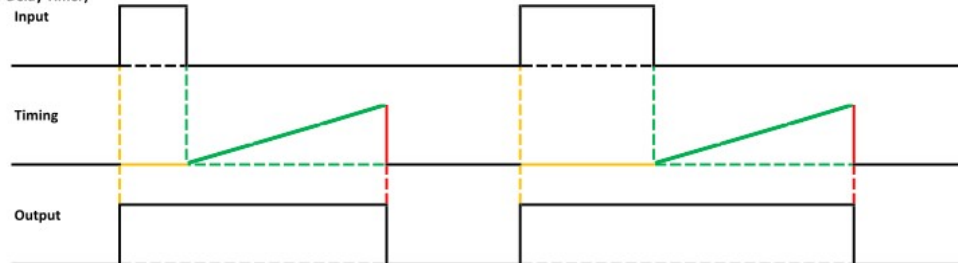
When total counted value reached set value at 【Argument2】 , coil of TOF becoming ON.



T0 to T31 is for 10msec timer

T32 to T63 is for 100msec timer

TOF (Off-Delay Timer)



## TP; Pulse timer

Command Input

Function: TP Sub:

Argument1: T0

Argument2: K100

Argument3:

Comment: T

Function Select:

- ☐ Bit / JMP / RST
- ☒ FB ( Action )
- ☐ FB ( Compare )

Address	Comment
0	10msec Timer_0
1	10msec Timer_1
2	10msec Timer_2
3	10msec Timer_3
4	10msec Timer_4
5	10msec Timer_5
6	10msec Timer_6

Select timer from 【Argument1】 .

Set timer value at 【Argument2】 . K = 0 to 65535

Counts time base intervals when the instruction is false.

When total counted value reached set value at

【Argument2】 , coil of TP becoming ON.



T0 to T31 is for 10msec timer

T32 to T63 is for 100msec timer



## MOV; Move

Command Input

Function: MOV Sub: 3

Argument1: D0

Argument2: D5

Argument3:

Comment: D

Function Select:

- ☐ Bit / JMP / RST
- ☒ FB ( Action )
- ☐ FB ( Compare )

Address	Comment
0	Self Data0
1	Self Data1
2	Self Data2
3	Self Data3
4	Self Data4
5	Self Data5
6	Self Data6

【Argument1】 ; Source of data

【Argument2】 ; Forwarding address of data

【Length】 ; Data length of transfer data.

When 【MOV】command active, transfer data in Argument1 to forwarding address(Argument2). The data size is defined by 【Sub】 .1=1[byte]、2=2[byte]、3=3[byte]、4=4[byte]

MOV [3]

D0

D5

MOV3 D0 D5

Fixed value K = 0 to 255 can be used on Argument1.

This is the case, enter "1" at 【Sub】 .

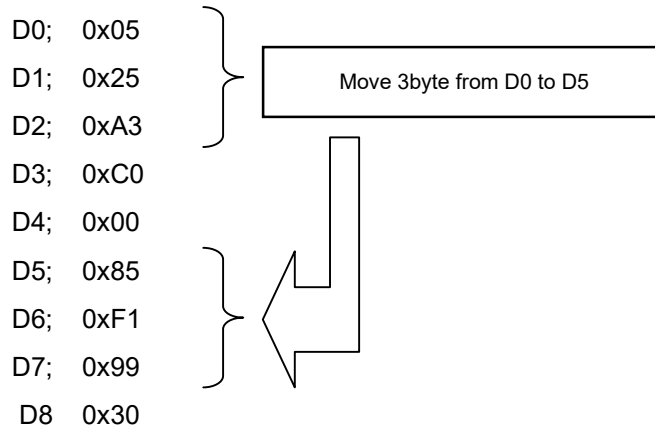
Receive Data (D95 to D110...etc) can not be used at Argument2.

### Example

Argument 1;D0

Argument 2;D5

Sub;3



## FMOV; Fill move

Command Input

Function: FMOV Sub:   
 Argument1: D0   
 Argument2: D5   
 Argument3: K3   
 Comment: D

Function Select   
☐ Bit / JMP / RST   
☒ FB ( Action )   
☐ FB ( Compare )

Address	Comment
0	Self Data0
1	Self Data1
2	Self Data2
3	Self Data3
4	Self Data4
5	Self Data5
6	Self Data6

【Argument1】 ; Source of data

【Argument2】 ; Forwarding address of data

【Argument3】 ; Number of Data of transfer data. k = 1 to 94

When 【FMOV】 command active, transfer data in Argument1 to forwarding address(Argument2). Number of data are defined by 【Argument3】 .



Fixed value K = 0 to 255 can be used on Argument1.

Receive Data (D95 to D110...etc) can not be used at Argument2.

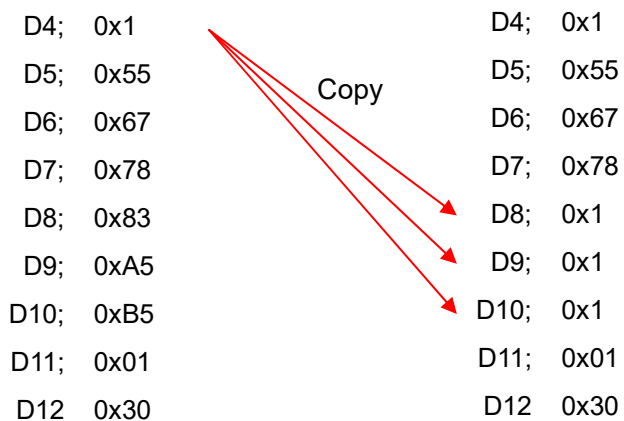
### Example

Argument 1;D4

Argument 2;D8

Argument 3; K3

### Original data



## ZRST; Zone reset

Command Input

Function: ZRST Sub:

Argument1: M0

Argument2: K255

Argument3:

Comment: M

Function Select

☐ Bit / JMP / RST

☒ FB ( Action )

☐ FB ( Compare )

Address	Comment
0	
1	
2	
3	
4	
5	
6	

【Argument1】 ; Enter first device

【Argument2】 ; Enter range of reset.

When Argument1 is Data register, K = 1 to 94

When Argument1 is Internal coil(M), K = 1 to 255



Receive Data (D95 to D110...etc) can not be used at Argument2.

## MRA; Motor Run Absolute

Command Input

Function: MRA Sub: MA OK Cancel

Argument1: M0

Argument2: K100

Argument3:

Comment: M

Function Select

☐ Bit / JMP / RST

☒ FB ( Action )

☐ FB ( Compare )

Address	Comment
0	
1	
2	
3	
4	
5	
6	

【Argument1】 ; Enter device

【Argument2】 ; Range of motor pulse K = -32768 to 32767

【Sub】 ; Select motor (MA or MB)

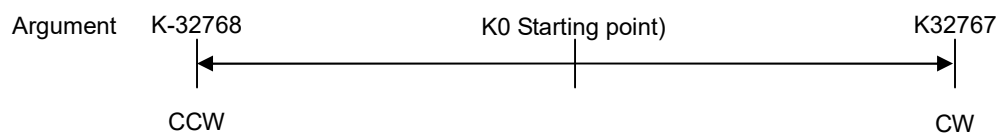


Run motor until the motor pulse active to value of Argument2. Then, entered device is ON.

Default starting point is K=0 which is motor stopped position when power is ON.

When motor is turn to CW direction, value of K is added. CCW direction is negative.

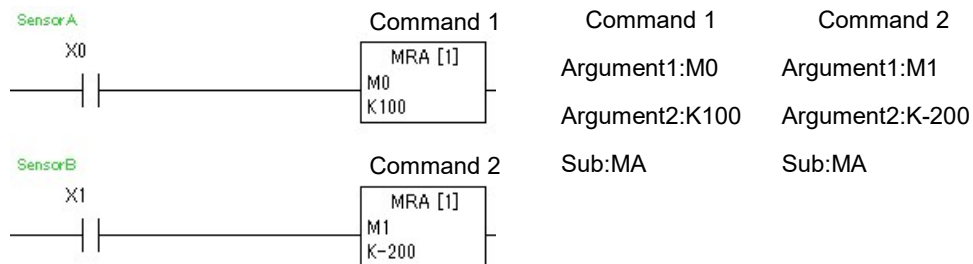
Range of K is - 32768 to 32767 which is  $\pm 32.9\text{m}$  on PM486FE-60. (Dia.48.6mm;Gear 1/12.64)



- Starting point(Zero point) can be changed with RZP.
- Y0 or Y1 contact is active while MRA is active.
- Y20 or Y21 for direction commands is canceled while MRA is active.
- First location of pulse control commands(MRA, MRI and MRIC) on ladder program is high priority.
- First activated pulse control commands is priority.
- Y0,SET Y0, RST Y0 for MA and Y1,SET Y1, RST Y1 for MB are canceled.

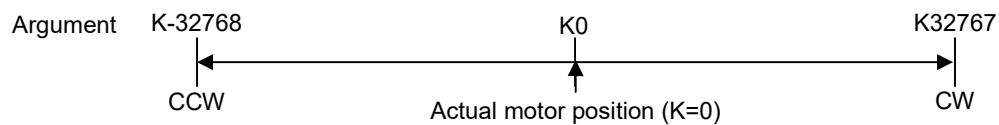


## Example to use for MRA



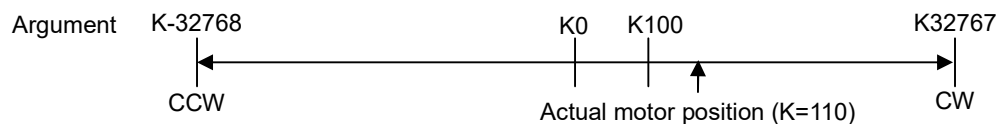
### 1; Power ON

Current motor position becomes K=0.



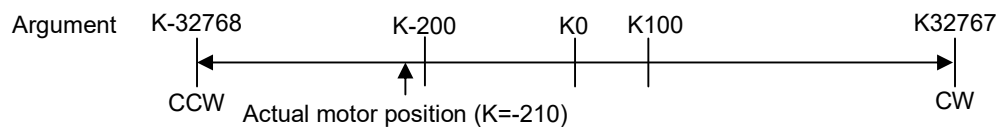
### 2; Active MRA (Command1)

During X0 is ON, command1 is active which is motor turns on to CW direction until motor pulse becomes 100 pulses. When motor pulse becomes 100 pulses, motor is stopped. Then M0 is ON. However there is inertia when motor is stopped, therefore actual motor position is longer than setting value of K.



### 3; Active MRA (Command 2)

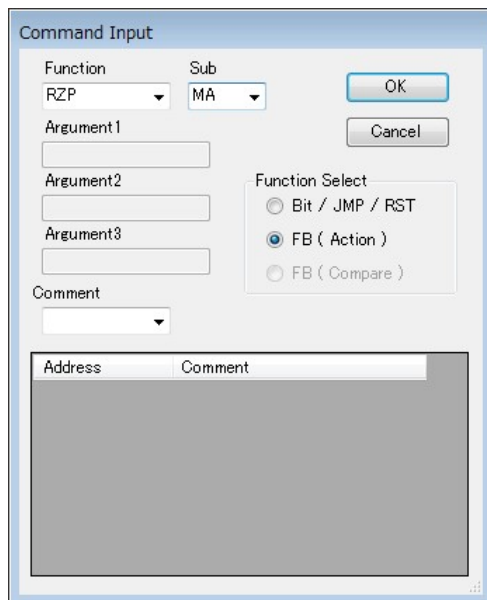
During X1 is ON, command2 is active which is motor turns on to CCW direction until motor pulse becomes -200 pulses from starting point.



If X1 becomes OFF while motor is running by MRA(Command2 on above example)

Motor is stopped immediately and restarts counting motor pulse when X1 is ON again.

## RZP Redefine Zero Point:



Command Input

Function: RZP Sub: MA OK Cancel

Argument1: Argument2: Argument3:

Function Select:  
☐ Bit / JMP / RST  
☒ FB ( Action )  
☐ FB ( Compare )

Comment:

Address	Comment
---------	---------

[Sub] : Specify motor to redefine zero position.

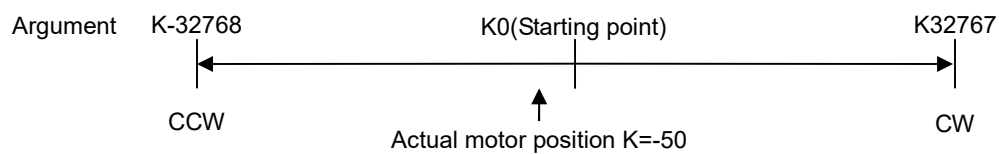
In case entering in Advance Mode, enter 1 for MA 2 for MB



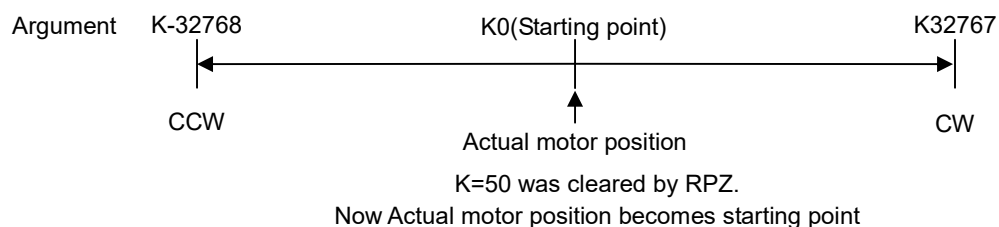
Starting point(Zero point) for MRA is K=0 during RZP is active.

If RZP is continue to active, motor will continue to run by MRA because always actual motor position is K=0. This means MRA can not count motor pulse.

- Before RZP is activated.



- After RZP is activated



## MRI Motor Run Increment

Command Input

Function: MRI Sub: MA

Argument1: M0

Argument2: K100

Argument3:

Comment: M

Function Select:

☐ Bit / JMP / RST

☒ FB ( Action )

☐ FB ( Compare )

Address	Comment
0	
1	
2	
3	
4	
5	
6	

Argument1: Select internal coil (M)

Argument2: Range of motor pulse K = -32768 to 32767

1 to 32767 for CW direction

-32768 to -1 for CCW direction

Sub: Select motor (MA / MB)

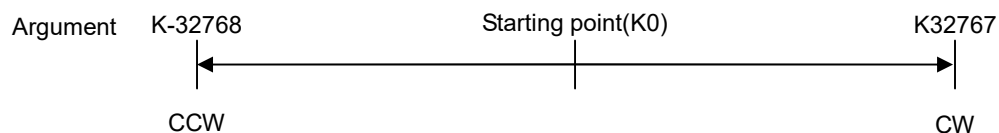


Run motor until the motor pulse active to value of Argument2. Then, entered device is ON.

Starting point(Zero point) is set when MRI is activated.

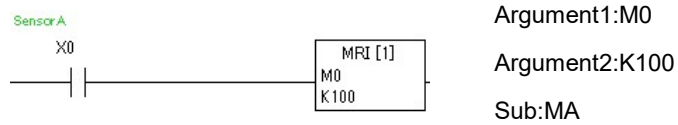
When motor is turn to CW direction, value of K is added. CCW direction is negative.

Range of K is - 32768 to 32767 which is  $\pm 32.9\text{m}$  on PM486FE-60. (Dia.48.6mm;Gear 1/12.64)

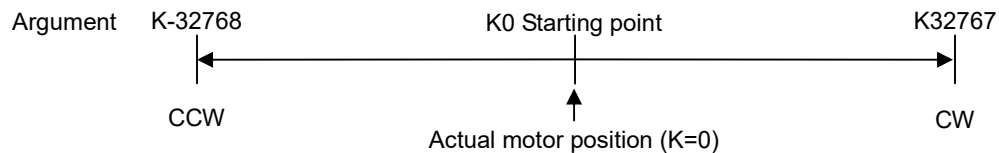


- Y0 or Y1 contact is active while motor is running by MRI.
- Y20 or Y21 for direction commands is canceled while MRI is active.
- First location of pulse control commands(MRA, MRI and MRIC) on ladder program is high priority.
- First activated pulse control commands is priority.
- Y0,SET Y0, RST Y0 for MA and Y1,SET Y1, RST Y1 for MB are canceled.

## Example to use for MRI

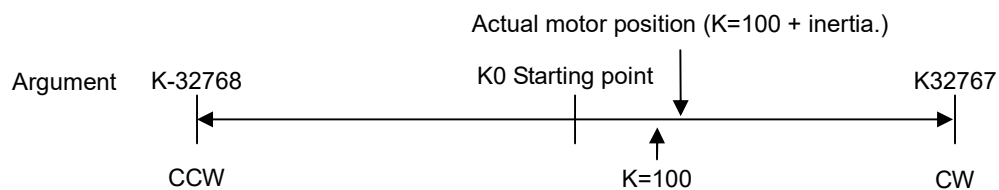


1; When MRI is active by X0, starting point and base position becomes K=0.



Starting point can not be changed by RZP.

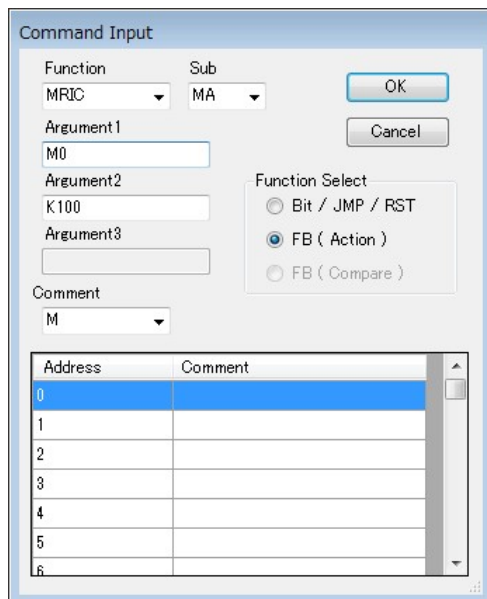
2; During X0 is ON, motor turns on to CW direction until motor pulse becomes 100 pulses. When motor pulse becomes 100 pulses, motor is stopped. Then M0 is ON. However there is inertia when motor is stopped, therefore actual motor position is longer than setting value of K.



## NOTE

You may need to consider additional motor pulses by inertia.

## MRIC Motor Run Increment Correct



Address	Comment
0	
1	
2	
3	
4	
5	
6	

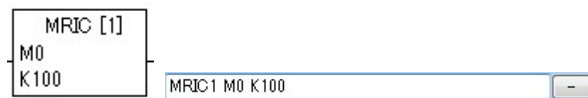
Argument1: Select internal coil (M)

Argument2: Range of motor pulse K = -32768 to 32767

1 to 32767 for CW direction

-32768 to -1 for CCW direction

Sub: Select motor (MA / MB)



Run motor until the motor pulse active to value of Argument2. Then, entered device is ON.

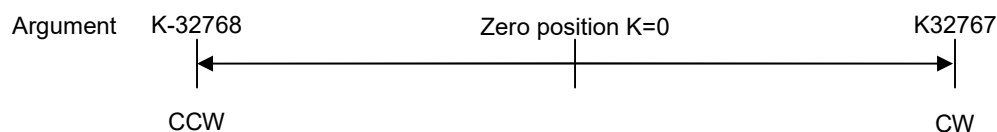
Zero point is set when IB-E powered on.

MRIC also counts motor pulse when the motor is stopped. For example, motor turns on by MRIC from 100pulses however actual motor stopped position is K=100 pulses inertia(10pulses for example). MRIC counts motor pulse K=100 pulses inertia(10pulses) total 110 pulses.

If MRIC is activated again and then the motor turns on for K=200, actual motor will turn only 90pulses to CW direction because actual motor position was K=110.

When motor is turned to CW direction, value of K is added. CCW direction is negative.

Range of K is - 32768 to 32767 which is  $\pm 32.9\text{m}$  on PM486FE-60. (Dia.48.6mm; Gear 1/12.64)



- Y0 or Y1 contact is active while motor is running by MRI.
- Y20 or Y21 for direction commands is canceled while MRI is active.
- First location of pulse control commands(MRA, MRI and MRIC) on ladder program is high priority.
- First activated pulse control commands is priority.
- Y0,SET Y0, RST Y0 for MA and Y1,SET Y1, RST Y1 for MB are canceled.

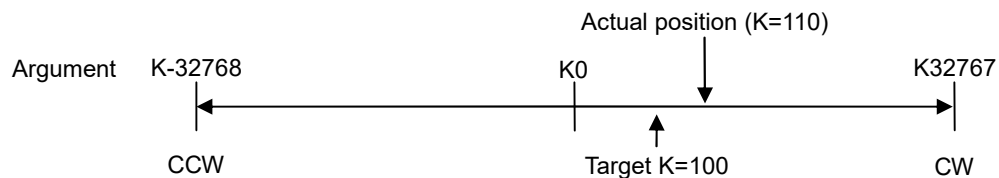
Example to use for MRIC

	Argument1:M0
	Argument2:K100
	Sub: MA
Sensor A	Argument1:M1
X0	Argument2:K-200
	Sub: MA

1; Power ON IB-E

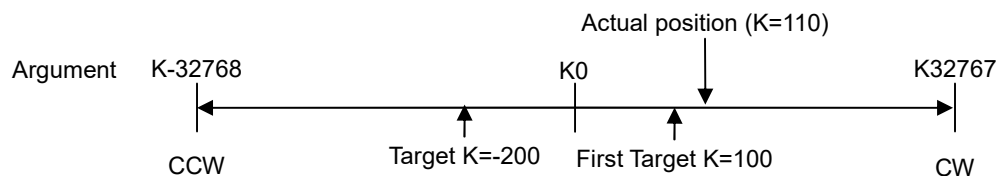
Current motor position becomes K=0.

2; During X0 is ON, command1 is active which is motor turns on to CW direction until motor pulse becomes 100 pulses. When motor pulse becomes 100 pulses, motor is stopped. Then M0 is ON. However there is inertia when motor is stopped, therefore actual motor position is K=100 puls inertia(K=10 for example) total K=110 for actual motor position.



3; When X1 is ON(X0 is OFF), motor starts running to CCW direction.

Actual motor position is K=110, therefore motor will run for 210pulses to CCW direction to achieve K=-200.

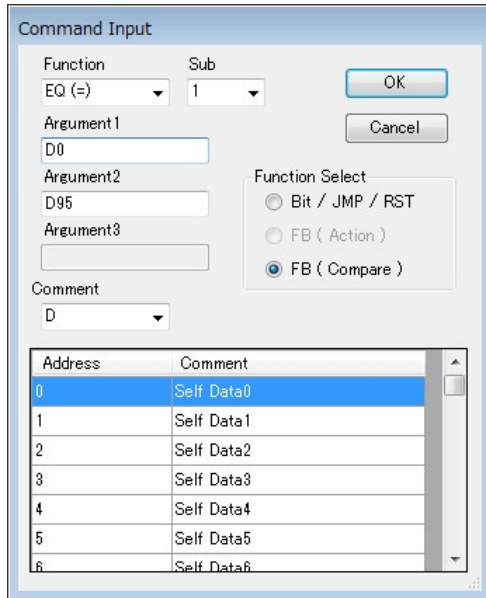


Motor stop distance by MRIC is more accurate.

### 2.4.3.3 FB (Compare)

Compare 2 different data

Data size; 1 byte to 4 byte



Address	Comment
0	Self Data0
1	Self Data1
2	Self Data2
3	Self Data3
4	Self Data4
5	Self Data5
6	Self Data6


Function : Command

Argument1 : Data 1

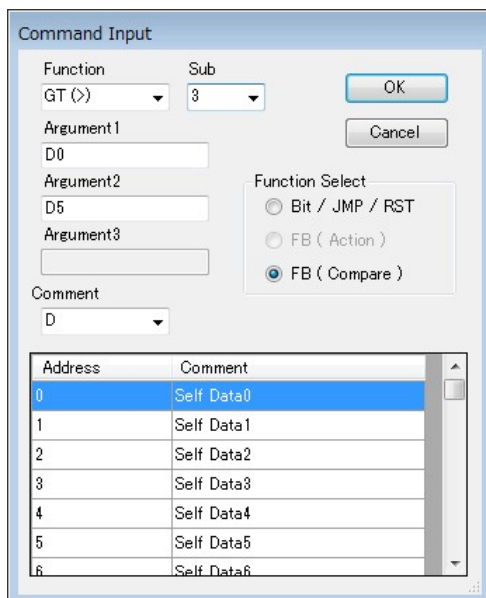
Argument2 : Data 2

Sub : Data size

1=1[byte], 2=2[byte], 3=3[byte], 4=4[byte]



Example to use for Grater than (GT(>))



Address	Comment
0	Self Data0
1	Self Data1
2	Self Data2
3	Self Data3
4	Self Data4
5	Self Data5
6	Self Data6

Function : GT(>)

Argument1 : D0

Argument2 : D5

Sub : 3

[Data register]

D0 : 0x05

D1 : 0x25

D2 : 0xA3

D3 : 0xC0

D4 : 0x00

D5 : 0x85

D6 : 0xF1





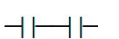
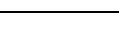
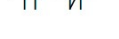
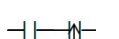




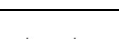





D7 : 0x99

D8 : 0x30























1. Data1 : D0 to D2 (3byte) [D0 · D1 · D2] = [0x05 25 A3] (3375315 in demical)
2. Data2 : D5 to D7 (3byte) [D5 · D6 · D7] = [0x85 F1 99] (8778137 in demical)
3. Compare Data 1 and Data 2 = [0x05 25 A3] and [0x85 F1 99] = Data 1 < Data 2
4. Data 1 is smaller than Data 2, result of GT(>) is not true.

#### 2.4.3.4 Command list

Format	Mnemonic	Description	Available device	Example	Note
	[LD]	Normally open contact	X, Y, M, D, C, T, PC, S	LD X0	-
	[LDI]	Normally closed contact	X, Y, M, D, C, T, PC, S	LDI Y0	-
	[LDP]	Rising edge pulse	X, Y, M, C, T, PC, S	LDP X0	-
	[LDF]	Falling edge pulse	X, Y, M, C, T, PC, S	LDF Y0	-
	[AND]	Serial connection of normally open contact	X, Y, M, C, T, PC, S	AND X0	-
	[ANDI]	Serial connection of normally closed contact	X, Y, M, C, T, PC, S	ANDI Y0	-
	[ANDP]	Serial connection of rising edge pulse contact	X, Y, M, C, T, PC, S	ANDP X0	-
	[ANDF]	Serial connection of falling edge pulse contact	X, Y, M, C, T, PC, S	ANDF Y0	-
	[OR]	Parallel connection of normally open contact	X, Y, M, D, C, T, PC, S	OR X0	-
	[ORI]	Parallel connection of normally closed contact	X, Y, M, D, C, T, PC, S	ORI Y0	-
	[ORP]	Parallel connection of rising edge pulse contact	X, Y, M, C, T, PC, S	ORP X0	-
	[ORF]	Parallel connection of falling edge pulse contact	X, Y, M, C, T, PC, S	ORF Y0	-
	[MEP]	Conversion of operation result to leading edge pulse	-	MEP	Max 256 MEP commands
	[EQ(=)]	Equal to	D	EQ[Len]_[DD] or [DK]or[KD]	Sub=1~4 K=0~255
	[GT(>)]	Greater than	D	GT[Len]_[DD] or [DK]or[KD]	Sub=1~4 K=0~255
	[GE(>=)]	Greater than or Equal to	D	GE[Len]_[DD] or [DK]or[KD]	Sub=1~4 K=0~255
	[LT(<)]	Less than	D	LT[Len]_[DD] or [DK]or[KD]	Sub=1~4 K=0~255
	[LE(<=)]	Less than or Equal to	D	LE[Len]_[DD] or [DK]or[KD]	Sub=1~4 K=0~255



	[NE(=)]	Not Equal to	D	NE[Sub] [DD]or [DK]or[KD]	Sub=1~4 K=0~255
	[TON]	On delay timer	T	TON_[T][K]	K=0~65535
	[TOF]	Off delay timer	T	TOF_[T][K]	K=0~65535
	[TP]	Pulse timer	T	TP_[T][K]	K=0~65535
	[MOV]	Move data to new storage area	D	MOV[Sub] [D1D2]or [KD2]or[KD2]	Sub=1~4 K=0~255 D1=0~799 D2=0~94 C=0~63
	[FMOV]	Move data to new storage area	D	FMOV [D1D2K1] or [K2D2K1]	D1=0~799 D2=0~94 K1=1~95 K2=1~255
	[CTU]	UP Counter	C	CTU_[C][K]	K=0~255
	[CTD]	Down Counter	C	CTD_[C][K]	K=0~255
	[PCT]	Pulse counter	PC	PCT_[PC][K]	K=0~65535
	[INV]	Invert operation result	-	INV	-
	[OUT]	Coil device	Y、M、D	OUT Y0	-
	[JMP]	Jump to	-	JMP_[P]	P=0~255
	[RST]	Reset a bit device	Y, M, C, T, PC, D	RST M0	-
	[ZRST]	Reset area of device	X、Y、M、C、T、 D、PC	ZRST[DK1] or [MK2]	D=0~94 M=0~255 K1=1~95 K2=1~255
	[SET]	Set a bit device	Y、M	SET M0	-
	[LBL]	Label	-	LBL_[P]	P=0~255
	[MRA]	Motor Run Absolute	M	MRA[Sub] [M] [K]	Sub=1(MA) or 2(MB) K=-32768 ~ 32767
	[RZP]	Redefine Zero Point	M	RZP[Sub]	Sub=1(MA) or 2(MB)
	[MRI]	Motor Run Increment	M	MRI[Sub]_[M] _[K]	Sub=1(MA) or 2(MB) K=-32768 ~32767
	[MRIC]	Motor Run Increment Correct	M	MRIC[Sub]_[M] _[K]	Sub=1(MA) or 2(MB) K=-32768 ~32767

## 2.4.4 Device list

### 2.4.4.1 X input contact

	Assignment
X00	Sensor A
X01	Sensor B
X02	RemoteIN 1
X03	RemoteIN 2
X04	RemoteIN 3
X05	Error Motor A
X06	Error Motor B
X07	Sensor Alarm A
X08	Sensor Alarm B
X09	Reserved
X10	Reserved
X11	Reserved
X12	Reserved
X13	Reserved
X14	Reserved
X15	Reserved

	Assignment
X16	Sensor A
X17	Sensor B
X18	RemoteIN 1
X19	RemoteIN 2
X20	RemoteIN 3
X21	Error Motor A
X22	Error Motor B
X23	Reserved
X24	Motor A RUN
X25	Motor B RUN
X26	Motor A Port U
X27	Motor A Port V
X28	Motor A Port W
X29	Motor B Port U
X30	Motor B Port V
X31	Motor B Port W
X32	Motor A Speed1 (First speed)
X33	Motor A Speed2 (Second speed)
X34	Motor A Speed3 (Third speed)
X35	Motor A Speed4 (Fourth speed)
X36	Motor B Speed1 (First speed)
X37	Motor B Speed2 (Second speed)
X38	Motor B Speed3 (Third speed)
X39	Motor B Speed4 (Fourth speed)
X40	Motor A acceleration
X41	Motor A deceleration
X42	Motor B acceleration
X43	Motor B deceleration
X44	Motor A Direction
X45	Motor B Direction
X46	JAM Error MotorA
X47	JAM Error MotorB
X48	RemoteOut 1
X49	RemoteOut 2
X50	RemoteOut 3
X51	RemoteOut 4
X52	RemoteOut 5
X53	Sensor Timer MotorA
X54	Sensor Timer MotorB
X55	Reserved

	Assignment
X56	Sensor A
X57	Sensor B
X58	RemoteIN 1
X59	RemoteIN 2
X60	RemoteIN 3
X61	Error Motor A
X62	Error Motor B
X63	Reserved
X64	Motor A RUN
X65	Motor B RUN
X66	Motor A Port U
X67	Motor A Port V
X68	Motor A Port W
X69	Motor B Port U
X70	Motor B Port V
X71	Motor B Port W
X72	Motor A Speed1 (First speed)
X73	Motor A Speed2 (Second speed)
X74	Motor A Speed3 (Third speed)
X75	Motor A Speed4 (Fourth speed)
X76	Motor B Speed1 (First speed)
X77	Motor B Speed2 (Second speed)
X78	Motor B Speed3 (Third speed)
X79	Motor B Speed4 (Fourth speed)
X80	Motor A acceleration
X81	Motor A deceleration
X82	Motor B acceleration
X83	Motor B deceleration
X84	Motor A Direction
X85	Motor B Direction
X86	JAM Error MotorA
X87	JAM Error MotorB
X88	RemoteOut 1
X89	RemoteOut 2
X90	RemoteOut 3
X91	RemoteOut 4
X92	RemoteOut 5
X93	Sensor Timer MotorA
X94	Sensor Timer MotorB
X95	Reserved

	Assignment		Assignment		Assignment
X96	Sensor A	X136	Sensor A	X176	Sensor A
X97	Sensor B	X137	Sensor B	X177	Sensor B
X98	RemoteIN 1	X138	RemoteIN 1	X178	RemoteIN 1
X99	RemoteIN 2	X139	RemoteIN 2	X179	RemoteIN 2
X100	RemoteIN 3	X140	RemoteIN 3	X180	RemoteIN 3
X101	Error Motor A	X141	Error Motor A	X181	Error Motor A
X102	Error Motor B	X142	Error Motor B	X182	Error Motor B
X103	Reserved	X143	Reserved	X183	Reserved
X104	Motor A RUN	X144	Motor A RUN	X184	Motor A RUN
X105	Motor B RUN	X145	Motor B RUN	X185	Motor B RUN
X106	Motor A Port U	X146	Motor A Port U	X186	Motor A Port U
X107	Motor A Port V	X147	Motor A Port V	X187	Motor A Port V
X108	Motor A Port W	X148	Motor A Port W	X188	Motor A Port W
X109	Motor B Port U	X149	Motor B Port U	X189	Motor B Port U
X110	Motor B Port V	X150	Motor B Port V	X190	Motor B Port V
X111	Motor B Port W	X151	Motor B Port W	X191	Motor B Port W
X112	Motor A Speed1 (First speed)	X152	Motor A Speed1 (First speed)	X192	Motor A Speed1 (First speed)
X113	Motor A Speed2 (Second speed)	X153	Motor A Speed2 (Second speed)	X193	Motor A Speed2 (Second speed)
X114	Motor A Speed3 (Third speed)	X154	Motor A Speed3 (Third speed)	X194	Motor A Speed3 (Third speed)
X115	Motor A Speed4 (Fourth speed)	X155	Motor A Speed4 (Fourth speed)	X195	Motor A Speed4 (Fourth speed)
X116	Motor B Speed1 (First speed)	X156	Motor B Speed1 (First speed)	X196	Motor B Speed1 (First speed)
X117	Motor B Speed2 (Second speed)	X157	Motor B Speed2 (Second speed)	X197	Motor B Speed2 (Second speed)
X118	Motor B Speed3 (Third speed)	X158	Motor B Speed3 (Third speed)	X198	Motor B Speed3 (Third speed)
X119	Motor B Speed4 (Fourth speed)	X159	Motor B Speed4 (Fourth speed)	X199	Motor B Speed4 (Fourth speed)
X120	Motor A acceleration	X160	Motor A acceleration	X200	Motor A acceleration
X121	Motor A deceleration	X161	Motor A deceleration	X201	Motor A deceleration
X122	Motor B acceleration	X162	Motor B acceleration	X202	Motor B acceleration
X123	Motor B deceleration	X163	Motor B deceleration	X203	Motor B deceleration
X124	Motor A Direction	X164	Motor A Direction	X204	Motor A Direction
X125	Motor B Direction	X165	Motor B Direction	X205	Motor B Direction
X126	JAM Error MotorA	X166	JAM Error MotorA	X206	JAM Error MotorA
X127	JAM Error MotorB	X167	JAM Error MotorB	X207	JAM Error MotorB
X128	RemoteOut 1	X168	RemoteOut 1	X208	RemoteOut 1
X129	RemoteOut 2	X169	RemoteOut 2	X209	RemoteOut 2
X130	RemoteOut 3	X170	RemoteOut 3	X210	RemoteOut 3
X131	RemoteOut 4	X171	RemoteOut 4	X211	RemoteOut 4
X132	RemoteOut 5	X172	RemoteOut 5	X212	RemoteOut 5
X133	Sensor Timer MotorA	X173	Sensor Timer MotorA	X213	Sensor Timer MotorA
X134	Sensor Timer MotorB	X174	Sensor Timer MotorB	X214	Sensor Timer MotorB
X135	Reserved	X175	Reserved	X215	Reserved

	Assignment		Assignment
X216	Sensor A	X256	Sensor A
X217	Sensor B	X257	Sensor B
X218	RemoteIN 1	X258	RemoteIN 1
X219	RemoteIN 2	X259	RemoteIN 2
X220	RemoteIN 3	X260	RemoteIN 3
X221	Error Motor A	X261	Error Motor A
X222	Error Motor B	X262	Error Motor B
X223	Reserved	X263	Reserved
X224	Motor A RUN	X264	Motor A RUN
X225	Motor B RUN	X265	Motor B RUN
X226	Motor A Port U	X266	Motor A Port U
X227	Motor A Port V	X267	Motor A Port V
X228	Motor A Port W	X268	Motor A Port W
X229	Motor B Port U	X269	Motor B Port U
X230	Motor B Port V	X270	Motor B Port V
X231	Motor B Port W	X271	Motor B Port W
X232	Motor A Speed1 (First speed)	X272	Motor A Speed1 (First speed)
X233	Motor A Speed2 (Second speed)	X273	Motor A Speed2 (Second speed)
X234	Motor A Speed3 (Third speed)	X274	Motor A Speed3 (Third speed)
X235	Motor A Speed4 (Fourth speed)	X275	Motor A Speed4 (Fourth speed)
X236	Motor B Speed1 (First speed)	X276	Motor B Speed1 (First speed)
X237	Motor B Speed2 (Second speed)	X277	Motor B Speed2 (Second speed)
X238	Motor B Speed3 (Third speed)	X278	Motor B Speed3 (Third speed)
X239	Motor B Speed4 (Fourth speed)	X279	Motor B Speed4 (Fourth speed)
X240	Motor A acceleration	X280	Motor A acceleration
X241	Motor A deceleration	X281	Motor A deceleration
X242	Motor B acceleration	X282	Motor B acceleration
X243	Motor B deceleration	X283	Motor B deceleration
X244	Motor A Direction	X284	Motor A Direction
X245	Motor B Direction	X285	Motor B Direction
X246	JAM Error MotorA	X286	JAM Error MotorA
X247	JAM Error MotorB	X287	JAM Error MotorB
X248	RemoteOut 1	X288	RemoteOut 1
X249	RemoteOut 2	X289	RemoteOut 2
X250	RemoteOut 3	X290	RemoteOut 3
X251	RemoteOut 4	X291	RemoteOut 4
X252	RemoteOut 5	X292	RemoteOut 5
X253	Sensor Timer MotorA	X293	Sensor Timer MotorA
X254	Sensor Timer MotorB	X294	Sensor Timer MotorB
X255	Reserved	X295	Reserved

## 2.4.4.2 Y output contact

	Assignment			Assignment			Assignment	
Y0	Self Node	Motor A RUN	Y32	Slave1	Motor A RUN	Y64	Slave2	Motor A RUN
Y1		Motor B RUN	Y33		Motor B RUN	Y65		Motor B RUN
Y2		Motor A Port U	Y34		Motor A Port U	Y66		Motor A Port U
Y3		Motor A Port V	Y35		Motor A Port V	Y67		Motor A Port V
Y4		Motor A Port W	Y36		Motor A Port W	Y68		Motor A Port W
Y5		Motor B Port U	Y37		Motor B Port U	Y69		Motor B Port U
Y6		Motor B Port V	Y38		Motor B Port V	Y70		Motor B Port V
Y7		Motor B Port W	Y39		Motor B Port W	Y71		Motor B Port W
Y8		Motor A Speed1 (First speed)	Y40		Motor A Speed1 (First speed)	Y72		Motor A Speed1 (First speed)
Y9		Motor A Speed2 (Second speed)	Y41		Motor A Speed2 (Second speed)	Y73		Motor A Speed2 (Second speed)
Y10		Motor A Speed3 (Third speed)	Y42		Motor A Speed3 (Third speed)	Y74		Motor A Speed3 (Third speed)
Y11		Motor A Speed4 (Fourth speed)	Y43		Motor A Speed4 (Fourth speed)	Y75		Motor A Speed4 (Fourth speed)
Y12		Motor B Speed1 (First speed)	Y44		Motor B Speed1 (First speed)	Y76		Motor B Speed1 (First speed)
Y13		Motor B Speed2 (Second speed)	Y45		Motor B Speed2 (Second speed)	Y77		Motor B Speed2 (Second speed)
Y14		Motor B Speed3 (Third speed)	Y46		Motor B Speed3 (Third speed)	Y78		Motor B Speed3 (Third speed)
Y15		Motor B Speed4 (Fourth speed)	Y47		Motor B Speed4 (Fourth speed)	Y79		Motor B Speed4 (Fourth speed)
Y16		Motor A acceleration	Y48		Motor A acceleration	Y80		Motor A acceleration
Y17		Motor A deceleration	Y49		Motor A deceleration	Y81		Motor A deceleration
Y18		Motor B acceleration	Y50		Motor B acceleration	Y82		Motor B acceleration
Y19		Motor B deceleration	Y51		Motor B deceleration	Y83		Motor B deceleration
Y20		Motor A Direction	Y52		Motor A Direction	Y84		Motor A Direction
Y21		Motor B Direction	Y53		Motor B Direction	Y85		Motor B Direction
Y22		JAM Error MotorA	Y54		JAM Error MotorA	Y86		JAM Error MotorA
Y23		JAM Error MotorB	Y55		JAM Error MotorB	Y87		JAM Error MotorB
Y24		RemoteOut 1	Y56		RemoteOut 1	Y88		RemoteOut 1
Y25		RemoteOut 2	Y57		RemoteOut 2	Y89		RemoteOut 2
Y26		RemoteOut 3	Y58		RemoteOut 3	Y90		RemoteOut 3
Y27		RemoteOut 4	Y59		RemoteOut 4	Y91		RemoteOut 4
Y28		RemoteOut 5	Y60		RemoteOut 5	Y92		RemoteOut 5
Y29		Sensor Timer MotorA	Y61		Sensor Timer MotorA	Y93		Sensor Timer MotorA
Y30		Sensor Timer MotorB	Y62		Sensor Timer MotorB	Y94		Sensor Timer MotorB
Y31		Reserved	Y63		Reserved	Y95		Reserved

Assignment			Assignment			Assignment		
Y96	Slave3	Motor A RUN	Y128	Slave4	Motor A RUN	Y160	Slave5	Motor A RUN
Y97		Motor B RUN	Y129		Motor B RUN	Y161		Motor B RUN
Y98		Motor A Port U	Y130		Motor A Port U	Y162		Motor A Port U
Y99		Motor A Port V	Y131		Motor A Port V	Y163		Motor A Port V
Y100		Motor A Port W	Y132		Motor A Port W	Y164		Motor A Port W
Y101		Motor B Port U	Y133		Motor B Port U	Y165		Motor B Port U
Y102		Motor B Port V	Y134		Motor B Port V	Y166		Motor B Port V
Y103		Motor B Port W	Y135		Motor B Port W	Y167		Motor B Port W
Y104		Motor A Speed1 (First speed)	Y136		Motor A Speed1 (First speed)	Y168		Motor A Speed1 (First speed)
Y105		Motor A Speed2 (Second speed)	Y137		Motor A Speed2 (Second speed)	Y169		Motor A Speed2 (Second speed)
Y106		Motor A Speed3 (Third speed)	Y138		Motor A Speed3 (Third speed)	Y170		Motor A Speed3 (Third speed)
Y107		Motor A Speed4 (Fourth speed)	Y139		Motor A Speed4 (Fourth speed)	Y171		Motor A Speed4 (Fourth speed)
Y108		Motor B Speed1 (First speed)	Y140		Motor B Speed1 (First speed)	Y172		Motor B Speed1 (First speed)
Y109		Motor B Speed2 (Second speed)	Y141		Motor B Speed2 (Second speed)	Y173		Motor B Speed2 (Second speed)
Y110		Motor B Speed3 (Third speed)	Y142		Motor B Speed3 (Third speed)	Y174		Motor B Speed3 (Third speed)
Y111		Motor B Speed4 (Fourth speed)	Y143		Motor B Speed4 (Fourth speed)	Y175		Motor B Speed4 (Fourth speed)
Y112		Motor A acceleration	Y144		Motor A acceleration	Y176		Motor A acceleration
Y113		Motor A deceleration	Y145		Motor A deceleration	Y177		Motor A deceleration
Y114		Motor B acceleration	Y146		Motor B acceleration	Y178		Motor B acceleration
Y115		Motor B deceleration	Y147		Motor B deceleration	Y179		Motor B deceleration
Y116		Motor A Direction	Y148		Motor A Direction	Y180		Motor A Direction
Y117		Motor B Direction	Y149		Motor B Direction	Y181		Motor B Direction
Y118		JAM Error MotorA	Y150		JAM Error MotorA	Y182		JAM Error MotorA
Y119		JAM Error MotorB	Y151		JAM Error MotorB	Y183		JAM Error MotorB
Y120		RemoteOut 1	Y152		RemoteOut 1	Y184		RemoteOut 1
Y121		RemoteOut 2	Y153		RemoteOut 2	Y185		RemoteOut 2
Y122		RemoteOut 3	Y154		RemoteOut 3	Y186		RemoteOut 3
Y123		RemoteOut 4	Y155		RemoteOut 4	Y187		RemoteOut 4
Y124		RemoteOut 5	Y156		RemoteOut 5	Y188		RemoteOut 5
Y125		Sensor Timer MotorA	Y157		Sensor Timer MotorA	Y189		Sensor Timer MotorA
Y126		Sensor Timer MotorB	Y158		Sensor Timer MotorB	Y190		Sensor Timer MotorB
Y127		Reserved	Y159		Reserved	Y191		Reserved

	Assignment			Assignment	
Y192	Slave6	Motor A RUN	Y224	Slave7	Motor A RUN
Y193		Motor B RUN	Y225		Motor B RUN
Y194		Motor A Port U	Y226		Motor A Port U
Y195		Motor A Port V	Y227		Motor A Port V
Y196		Motor A Port W	Y228		Motor A Port W
Y197		Motor B Port U	Y229		Motor B Port U
Y198		Motor B Port V	Y230		Motor B Port V
Y199		Motor B Port W	Y231		Motor B Port W
Y200		Motor A Speed1 (First speed)	Y232		Motor A Speed1 (First speed)
Y201		Motor A Speed2 (Second speed)	Y233		Motor A Speed2 (Second speed)
Y202		Motor A Speed3 (Third speed)	Y234		Motor A Speed3 (Third speed)
Y203		Motor A Speed4 (Fourth speed)	Y235		Motor A Speed4 (Fourth speed)
Y204		Motor B Speed1 (First speed)	Y236		Motor B Speed1 (First speed)
Y205		Motor B Speed2 (Second speed)	Y237		Motor B Speed2 (Second speed)
Y206		Motor B Speed3 (Third speed)	Y238		Motor B Speed3 (Third speed)
Y207		Motor B Speed4 (Fourth speed)	Y239		Motor B Speed4 (Fourth speed)
Y208		Motor A acceleration	Y240		Motor A acceleration
Y209		Motor A deceleration	Y241		Motor A deceleration
Y210		Motor B acceleration	Y242		Motor B acceleration
Y211		Motor B deceleration	Y243		Motor B deceleration
Y212		Motor A Direction	Y244		Motor A Direction
Y213		Motor B Direction	Y245		Motor B Direction
Y214		JAM Error MotorA	Y246		JAM Error MotorA
Y215		JAM Error MotorB	Y247		JAM Error MotorB
Y216		RemoteOut 1	Y248		RemoteOut 1
Y217		RemoteOut 2	Y249		RemoteOut 2
Y218		RemoteOut 3	Y250		RemoteOut 3
Y219		RemoteOut 4	Y251		RemoteOut 4
Y220		RemoteOut 5	Y252		RemoteOut 5
Y221		Sensor Timer MotorA	Y253		Sensor Timer MotorA
Y222		Sensor Timer MotorB	Y254		Sensor Timer MotorB
Y223		Reserved	Y255		Reserved

### 2.4.4.3 Data register

Register	Assignment	
D0	Self Node	Self Date0
D1		Self Date1
D2		Self Date2
D3		Self Date3
D4		Self Date4
D5		Self Date5
D6		Self Date6
D7		Self Date7
D8		Self Date8
D9		Self Date9
D10		Self Date10
D11		Self Date11
D12		Self Date12
D13		Self Date13
D14		Self Date14
D15		Self Date15
D16~D94	-	Reserved
D95	Receive Node1	Receive Date0(1)
D96		Receive Date1(1)
D97		Receive Date2(1)
D98		Receive Date3(1)
D99		Receive Date4(1)
D100		Receive Date5(1)
D101		Receive Date6(1)
D102		Receive Date7(1)
D103		Receive Date8(1)
D104		Receive Date9(1)
D105		Receive Date10(1)
D106		Receive Date11(1)
D107		Receive Date12(1)
D108		Receive Date13(1)
D109		Receive Date14(1)
D110		Receive Date15(1)
D110~D189	-	Reserved

Register	Assignment	
D190	Receive Node2	Receive Date0(2)
D191		Receive Date1(2)
D192		Receive Date2(2)
D193		Receive Date3(2)
D194		Receive Date4(2)
D195		Receive Date5(2)
D196		Receive Date6(2)
D197		Receive Date7(2)
D198		Receive Date8(2)
D199		Receive Date9(2)
D200		Receive Date10(2)
D201		Receive Date11(2)
D202		Receive Date12(2)
D203		Receive Date13(2)
D204		Receive Date14(2)
D205		Receive Date15(2)
D205~D284	-	Reserved
D285	Receive Node3	Receive Date0(3)
D286		Receive Date1(3)
D287		Receive Date2(3)
D288		Receive Date3(3)
D289		Receive Date4(3)
D290		Receive Date5(3)
D291		Receive Date6(3)
D292		Receive Date7(3)
D293		Receive Date8(3)
D294		Receive Date9(3)
D295		Receive Date10(3)
D296		Receive Date11(3)
D297		Receive Date12(3)
D298		Receive Date13(3)
D299		Receive Date14(3)
D300		Receive Date15(3)
D301~D379	-	Reserved

Register	Assignment	
D380	Receive Node4	Receive Date0(4)
D381		Receive Date1(4)
D382		Receive Date2(4)
D383		Receive Date3(4)
D384		Receive Date4(4)
D385		Receive Date5(4)
D386		Receive Date6(4)
D387		Receive Date7(4)
D388		Receive Date8(4)
D389		Receive Date9(4)
D390		Receive Date10(4)
D391		Receive Date11(4)
D392		Receive Date12(4)
D393		Receive Date13(4)
D394		Receive Date14(4)
D395		Receive Date15(4)
D396~D474	-	Reserved
D475	Receive Node5	Receive Date0(5)
D476		Receive Date1(5)
D477		Receive Date2(5)
D478		Receive Date3(5)
D479		Receive Date4(5)
D480		Receive Date5(5)
D481		Receive Date6(5)
D482		Receive Date7(5)
D483		Receive Date8(5)
D484		Receive Date9(5)
D485		Receive Date10(5)
D486		Receive Date11(5)
D487		Receive Date12(5)
D488		Receive Date13(5)
D489		Receive Date14(5)
D490		Receive Date15(5)
D491~D569	-	Reserved



Register	Assignment	
D570	Receive Node6	Receive Date0(6)
D571		Receive Date1(6)
D572		Receive Date2(6)
D573		Receive Date3(6)
D574		Receive Date4(6)
D575		Receive Date5(6)
D576		Receive Date6(6)
D577		Receive Date7(6)
D578		Receive Date8(6)
D579		Receive Date9(6)
D580		Receive Date10(6)
D581		Receive Date11(6)
D582		Receive Date12(6)
D583		Receive Date13(6)
D584		Receive Date14(6)
D585		Receive Date15(6)
D586~D664	-	Reserved
D665	Receive Node7	Receive Date0(7)
D666		Receive Date1(7)
D667		Receive Date2(7)
D668		Receive Date3(7)
D669		Receive Date4(7)
D670		Receive Date5(7)
D671		Receive Date6(7)
D672		Receive Date7(7)
D673		Receive Date8(7)
D674		Receive Date9(7)
D675		Receive Date10(7)
D676		Receive Date11(7)
D677		Receive Date12(7)
D678		Receive Date13(7)
D679		Receive Date14(7)
D680		Receive Date15(7)
D681~D759	-	Reserved

Register	Assignment	
D760	Receive data from PLC (I/O connection)	Receive Date0(PLC)
D761		Receive Date1(PLC)
D762		Receive Date2(PLC)
D763		Receive Date3(PLC)
D764		Receive Date4(PLC)
D765		Receive Date5(PLC)
D766		Receive Date6(PLC)
D767		Receive Date7(PLC)
D768		Receive Date8(PLC)
D769		Receive Date9(PLC)
D770		Receive Date10(PLC)
D771		Receive Date11(PLC)
D772		Receive Date12(PLC)
D773		Receive Date13(PLC)
D774		Receive Date14(PLC)
D775		Receive Date15(PLC)
D776~D799	-	Reserved

- Data size of Data register is 1 byte.
- Value of Receive Date(D95~D110...etc) can not be used on Ladder Logic.
- Value of Self Data(D0 to D15) is kept when power becoming OFF.

#### 2.4.4.4 S contact

	Assignment		Assignment
S00	Connect Status(1)	S16	Reserved
S01	Connect Status(2)	S17	Reserved
S02	Connect Status(3)	S18	Reserved
S03	Connect Status(4)	S19	Reserved
S04	Connect Status(5)	S20	Reserved
S05	Connect Status(6)	S21	Reserved
S06	Connect Status(7)	S22	Reserved
S07	Reserved	S23	Reserved
S08	Error Host Clear A	S24	Reserved
S09	Error Host Clear B	S25	Reserved
S10	Always ON	S26	Reserved
S11	Always OFF	S27	Reserved
S12	ON in ladder is working	S28	Reserved
S13	OFF in ladder is working	S29	Reserved
S14	Reserved	S30	Reserved
S15	Reserved	S31	Reserved

#### Note

- S contact information can not be sent to the other IB-E.
  - Use S00 to S06 for the other IB-E's status.
  - S08 and S09 becomes one shot ON when error reset command was received.
  - S10 is always ON during power is ON.
  - S11 is always OFF during power is ON.
  - Ladder scan is stopped automatically when low voltage error is occurred.
- S12 is ON if low voltage error is not happend, and OFF in low voltage error is happened.

#### 2.4.4.5 Other device

	Description		Description
M0~M599	Internal device	C0~C63	Counter

	Description	接点	Description
T0~T31	10msec timer	PC0~PC7	Motor A pulse counter
T32~T63	100msec timer	PC8~PC15	Motor B pulse counter

#### Note

- M, C, T and PC contact information can not be sent to the other IB-E.
- Contact for CTU and CTD is C.
- Contact for TON, TOF and TP is T.

## 2.4.5 Precaution to use

### 1) Command limitation

- Up to 9 commands and 1 output can be used on 1 line.
- Maximum 8 contacts and 1 coil device can be placed per 1 line.

Refer 2.4.6 for more precaution.

### 2) Program capacity is maximum 11,996byte. Capacity is calculated automatically at build the program.

### 3) Data register

- Self Data (D0 to D15) will be latched when power becomes OFF.
- Receive Data (D95 to D110) can be edit on Ladder logic.

### 4) C contact is max 64 contacts for CTU and CTD. C0 ~ C64

### 5) T contact is max 64 contacts for TON, TOF and TP. T0 ~ T64

### 6) Speed setting

There are four(4) different speed can be set on each motor by Y8 to Y15.

Priority for speed setting coil device

First speed > Second speed > Third Speed > Fourth speed

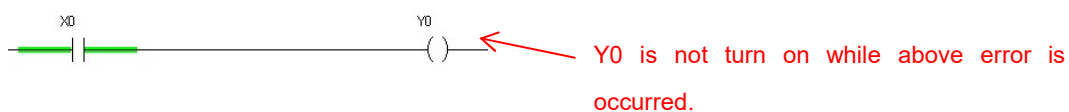
If multiple speed setting coil device are ON, motor speed will be set high priority as showing above.

### 7) Stop ladder logic program flow (scan) by error.

Program flow(scan) is stopped when low voltage errors is appeared. Program is re-started when error is disappeared.

### 8) Motor output while error is occurred.

When error (Motor disconnect error, Motor lock error, Thermal error, Back EMF error) is accrued, the motor will stop automatically, even if the motor is received run command in Ladder program.

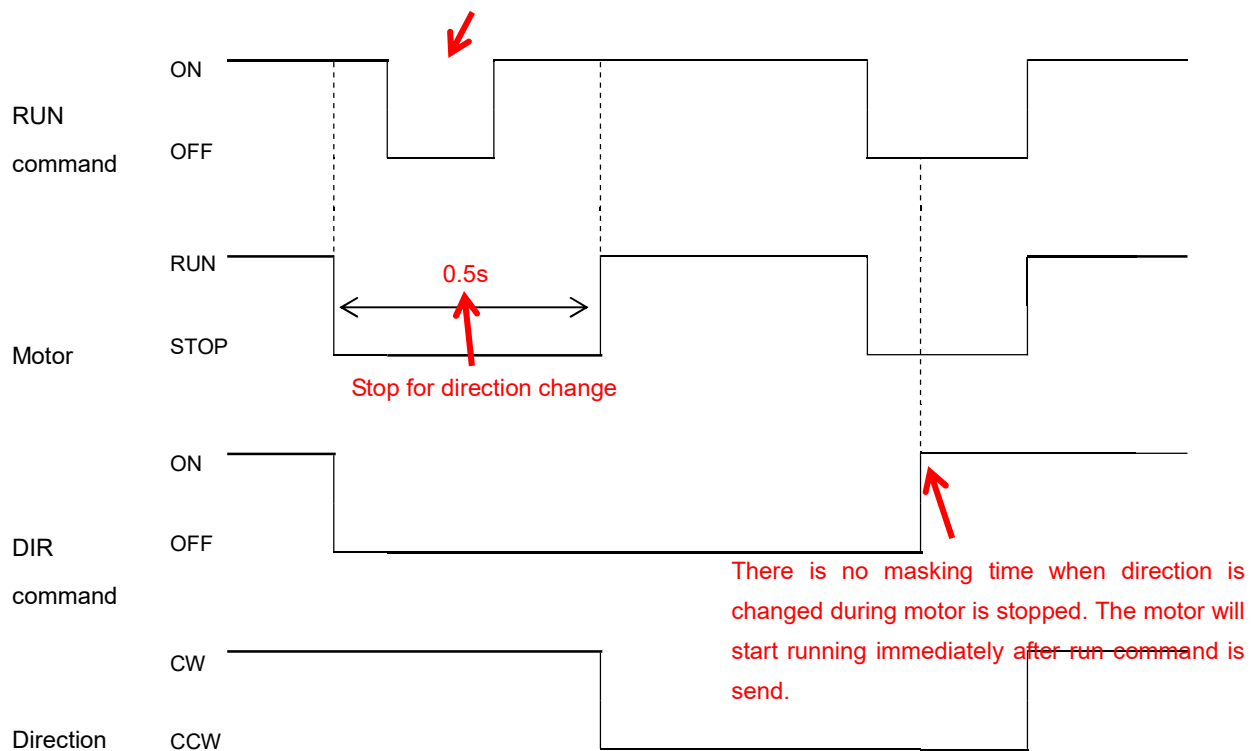


#### 9) Motor output while deceleration.

While motor is running by deceleration, motor output coil is indicating OFF.

#### 10) Motor direction change

When change motor direction during the motor in running, the motor stops for 0.5 second and then start running in the other direction.


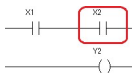
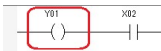
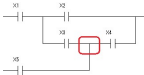

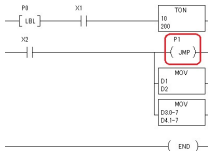

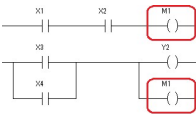


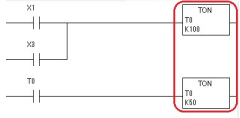
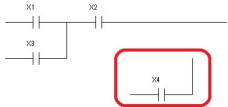

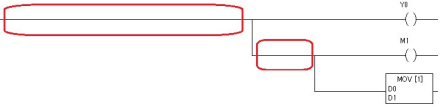
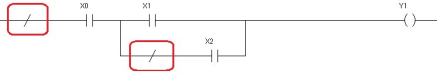
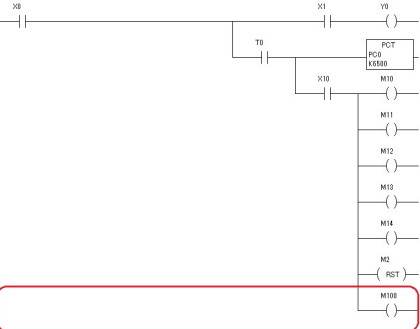
#### 11) Update contact condition on Ladder program.

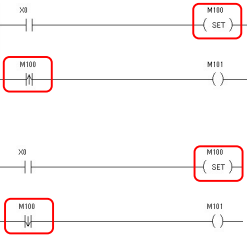
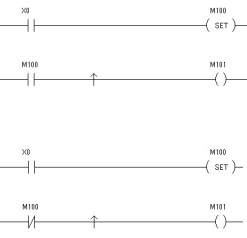
Input contact or out device will be update every one(1) scan.

Data register will update immediately.

## 2.4.6 Precaution to create ladder logic

	Error condition	Reset error
1	<p>Connect “LBL” to other than left hand bus bar.</p> 	<p>Connect “LBL” directly to the left hand bus bar.</p>
2	<p>Connect input device to right hand bus bar.</p> 	<p>Connect input device other than right hand bus bar.</p>
3	<p>Connect coil other than right hand bus bar.</p> 	<p>Connect coil to right hand bus bar.</p>
4	<p>Connect end of ORB to the other ORB.</p> 	<p>Change connection.</p>
5	<p>Wrong value or no value in Argument.</p> 	<p>Enter proper value of Argument.</p>
6	<p>No “LBL” commands.</p> 	<p>Place “LBL” command.</p>
7	<p>Disconnect line</p> 	<p>Modified automatically at Build.</p>
8	<p>Dual coils.</p> 	<p>Change program to avoid dual coils.</p>

9	<p>Dual timer and counter.</p> 	Change program to avoid dual timer and counter
10	<p>Unconnected device.</p> 	Delete the device or connect the device properly.
11	<p>No device on one of ORB line.</p> 	Change program to avoid this error.
12	<p>No condition.</p> 	Place at least one input device.
13	<p>Place “INV” or “MEP” on left hand bus bar.</p> 	Place “INV” or “MEP” on other than left/right hand bus bar.
14	<p>More than 9 blocks.</p> 	Make program below 8 blocks.

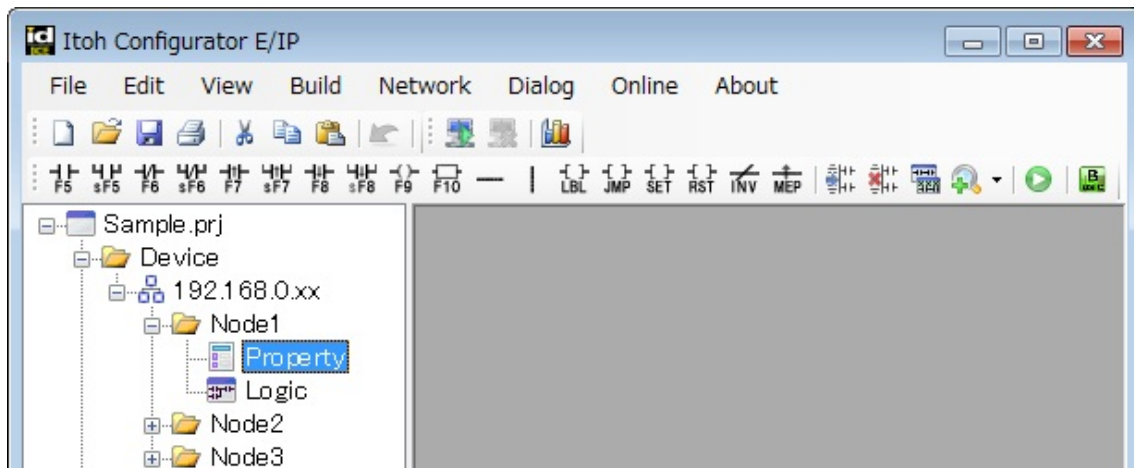
15	<p>Use Y or M which was used on “SET” or “RST” command on “LDF” or “LDF”</p> 	<p>Use “MEP” command instead of.</p> 
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## 2.5 Download / Write / Read

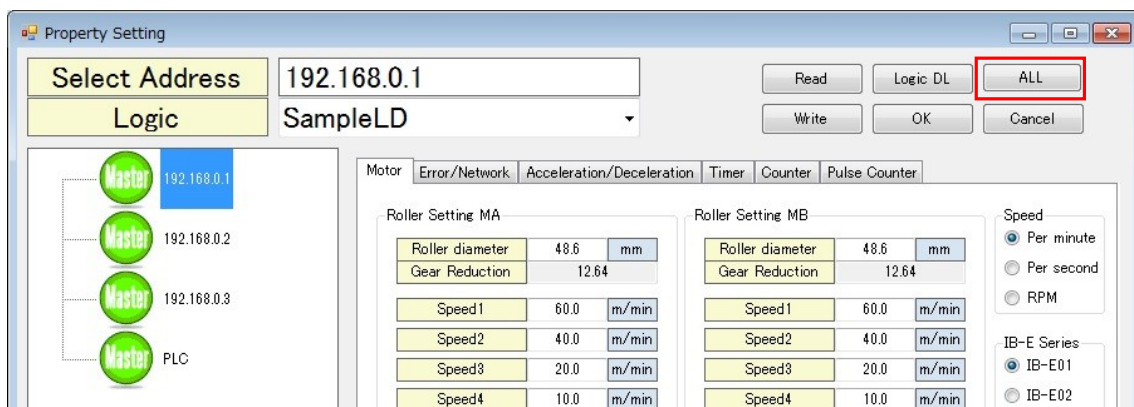
Property and logic(if necessary) need to be downloaded to IB-E.

### 2.5.1 Download ladder logic / parameters to all devices.

1) Open Property window.

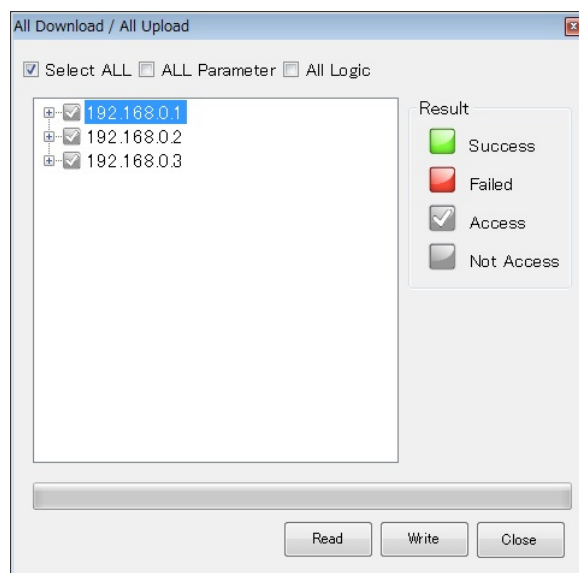


2) Click “ALL” to open All Download/All Upload







3) Click “Write” on “All Download/All Upload”.

Double click on “Not Access” to except IB-E from download list.



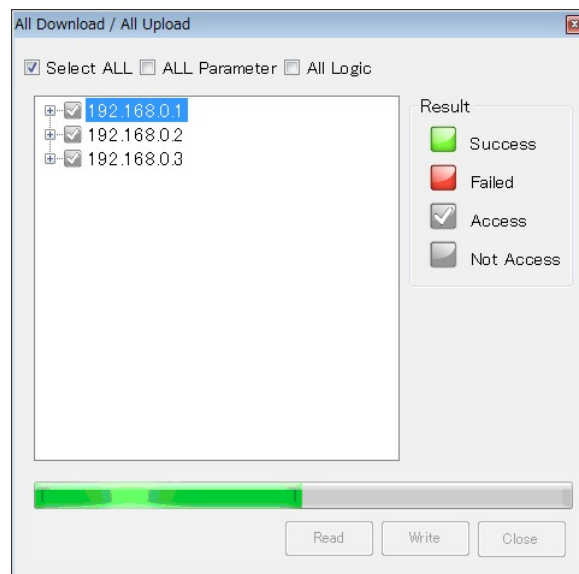
Select ALL	Download logics and parameters to all of IB-E.
ALL Parameter	Download parameters to all of IB-E.
All Logic	Download ladder logics to all of IB-E.

Read	Read ladder logic and parameter from selected IB-E. <ul style="list-style-type: none"> <li>Parameter setting will be uploaded to read parameters.</li> <li>Only ladder logic name can be read.</li> </ul>
Write	Write logic and parameter to selected IB-E.
Close	Close “All Download/All Upload”.

 Success	Succeeded download or read ladder logic and parameter.
 Failed	Failed download or read ladder logic and parameter.
 Access	This IB-E will be downloaded or read.
 Not Access	This IB-E will not be downloaded or read.

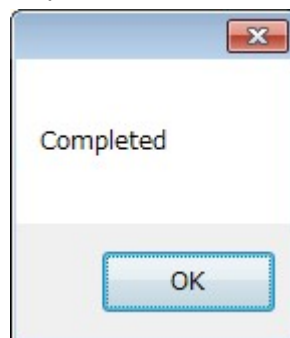


4) Indicate status of downloading.

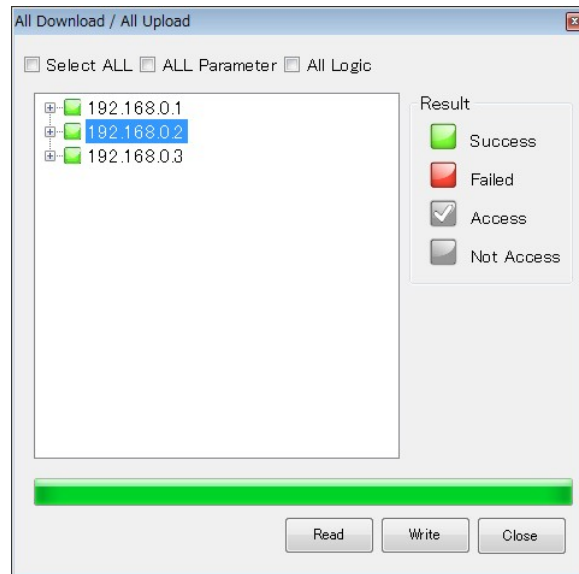


5) Indicate "Completed"

In case failed downloading, refer to Chapter 4.7.



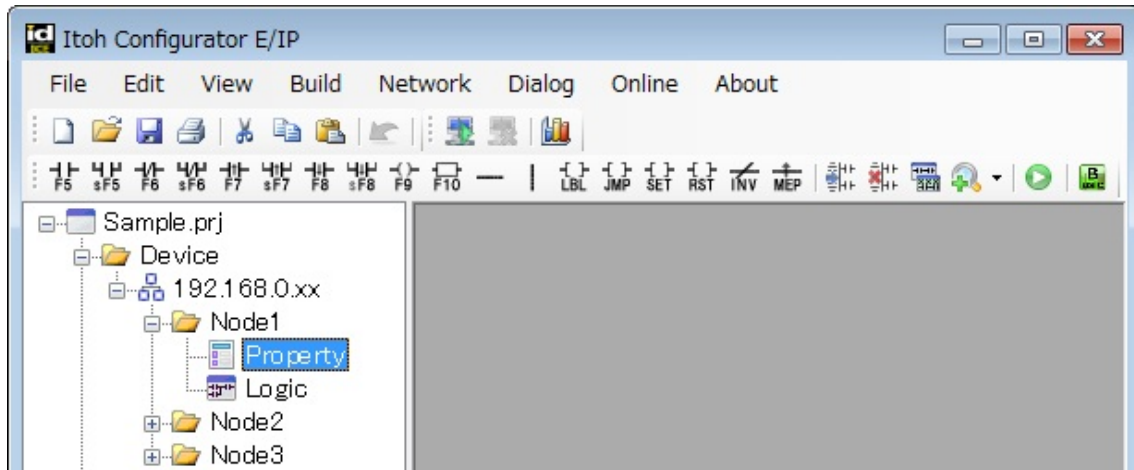
6) Click “Close”



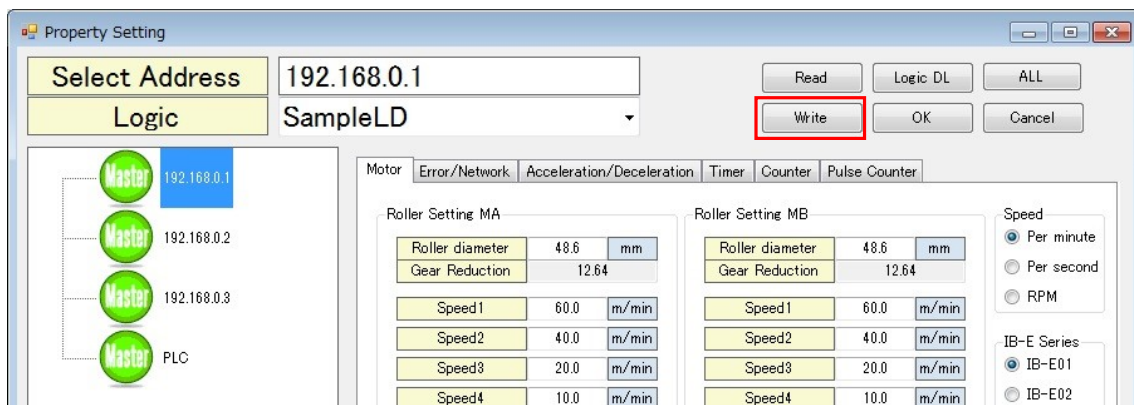
- I/O connection is broken during downloading.
- IB-E is re-start after downloading.
- Non build ladder logic can not be downloaded.

## 2.5.2 Write an each property.

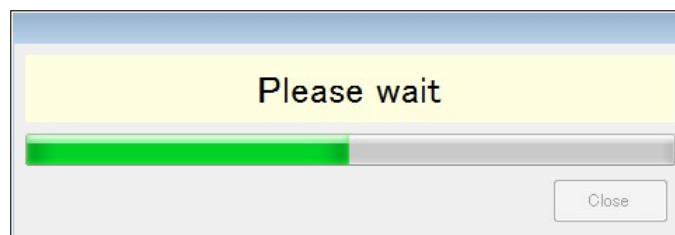
1) Open property window.



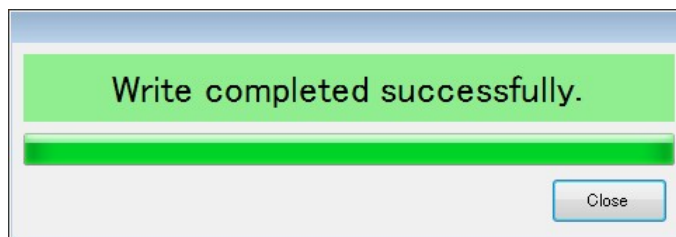
2) Make sure “Select Address” is the IB-E you want to write property and then click “Write”.



3) Writing status indicates.



4) "Write completed successfully" is indicated.



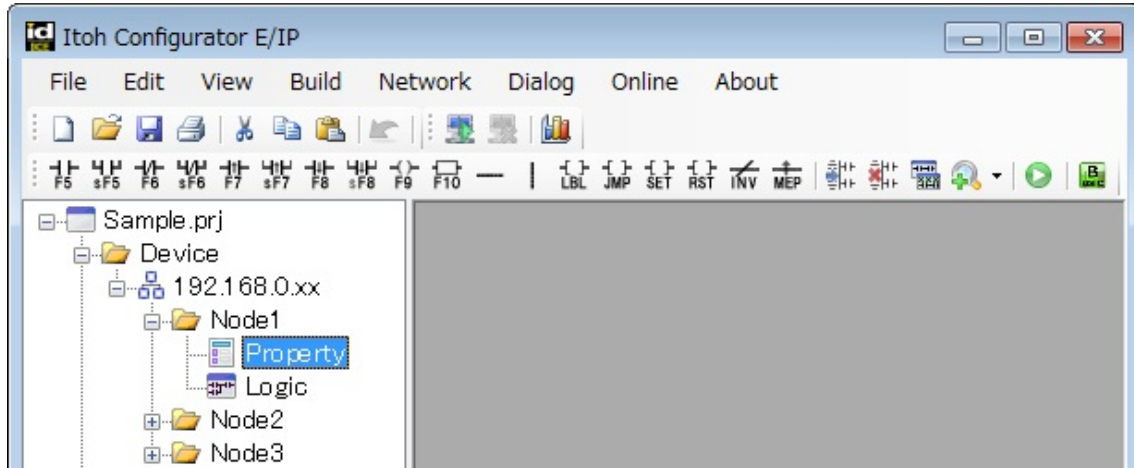
Refer Chapter 4.7 in case write failed or did not start writing.



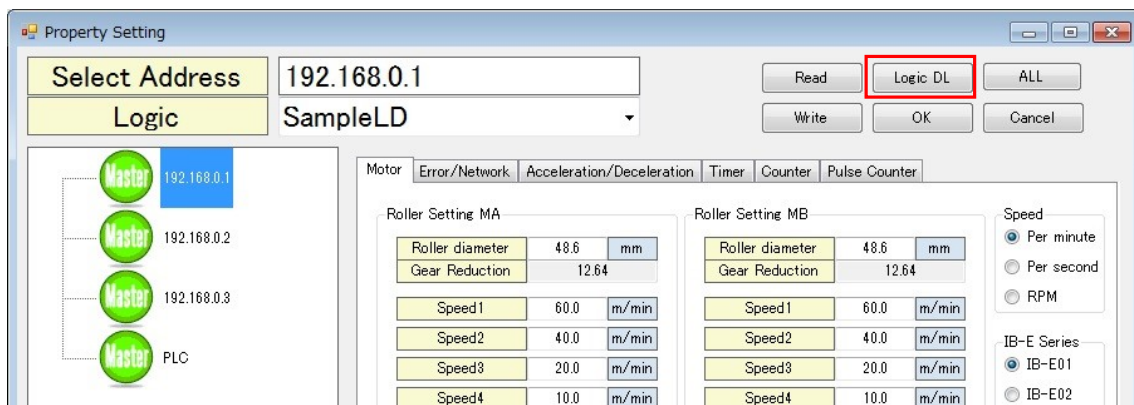
- I/O connection is broken during downloading.
- IB-E is re-start after downloading.

## 2.5.3 Download an each ladder logic

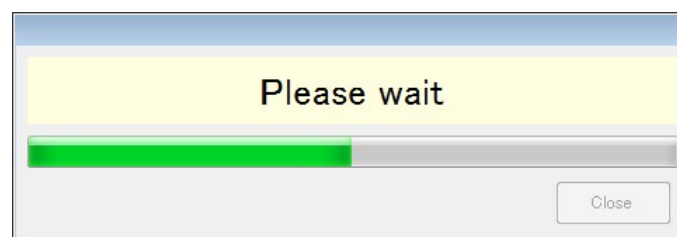
1) Open property window.



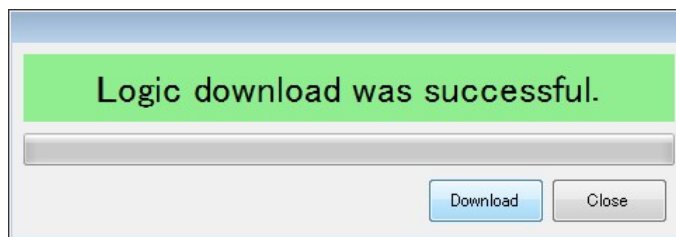
2) Make sure “Select Address” is the IB-E you want to write property and then click “Logic DL”.




3) Writing status indicates.



4) "Logic download was successfully" is indicated.



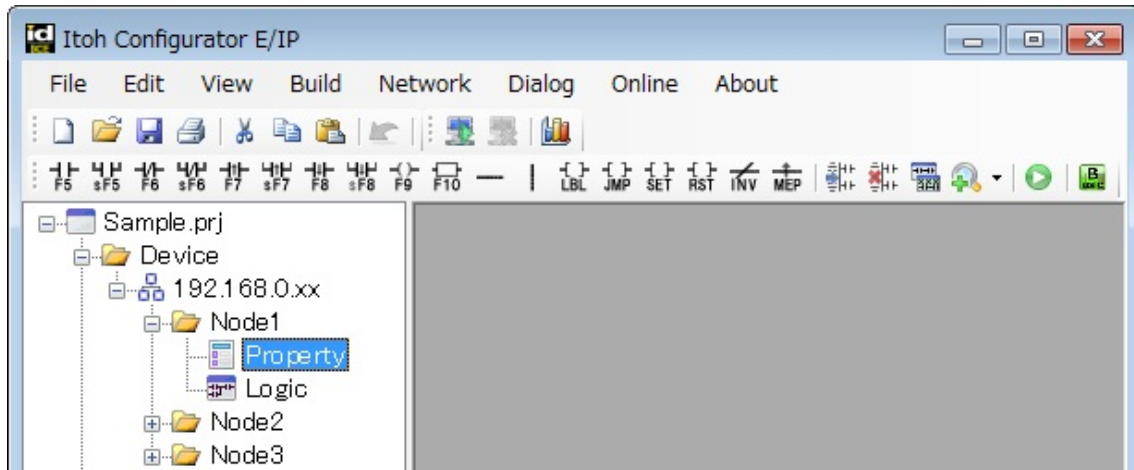
Refer Chapter 4.7 in case write failed or did not start writing.

- 

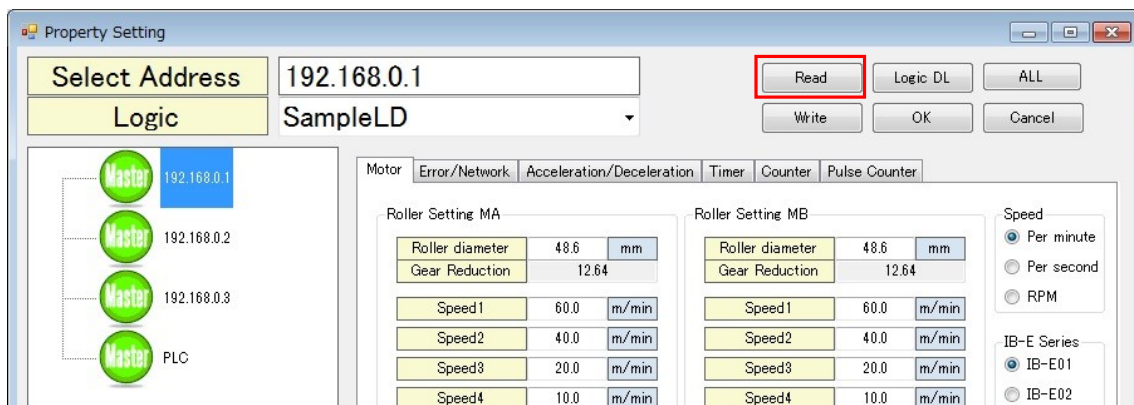
  - I/O connection is broken during downloading.
  - IB-E is re-starting after downloading.
  - Non build ladder logic can not be downloaded.

## 2.5.4 Read ladder logic / parameter

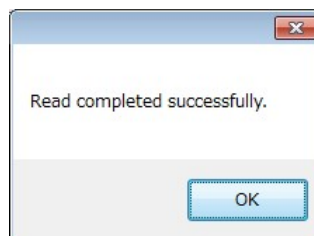
1) Open property window.



2) Make sure “Select Address” is the IB-E you want to write property and then click “Read”.



3) “Read completed successfully” is indicated.



Refer Chapter 4.7 in case write failed or did not start writing.

## 2.6 Monitor function

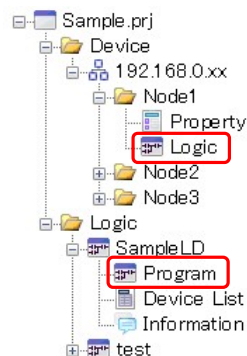
Error, ladder logic condition and motor current can be monitored.

### 2.6.1 Ladder monitor

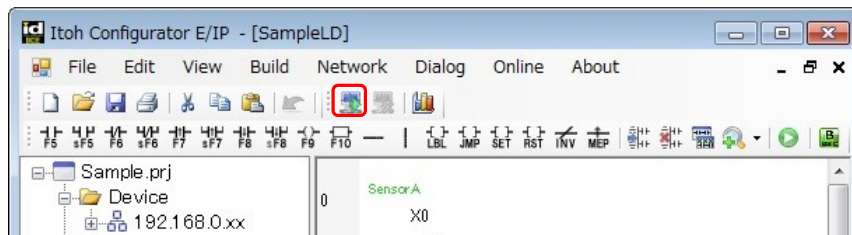
This function can monitor a ladder logic.

#### 2.6.1.1 Start / Stop monitor

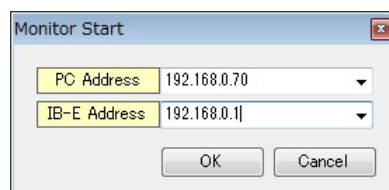
##### 1) Open ladder logic




##### 2) Click .

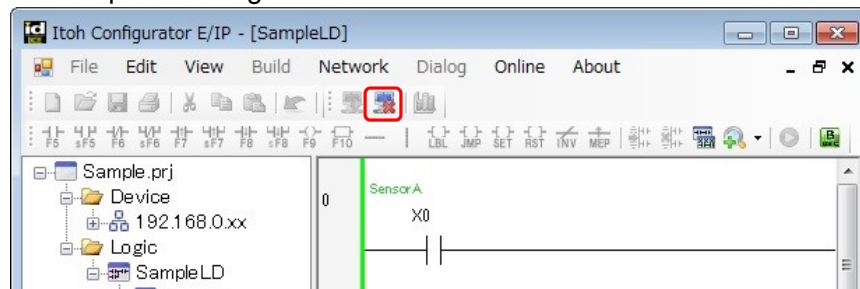


##### 3) Select IP address for PC and IB-E and click "OK".





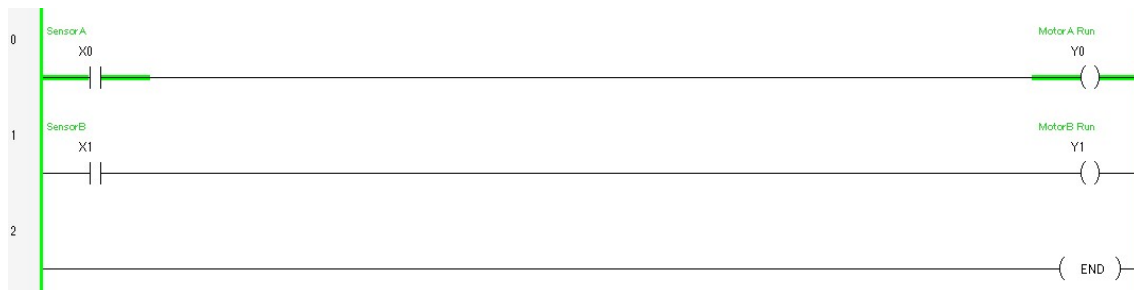
4) Click  to stop monitoring.



### 2.6.1.2 Ladder monitor main window

When input contact or output coil is active during monitoring, color of device becomes green. If specified coil was ON using “SET” command, color of “SET” command is also changed to green. If specified coil was OFF using “RST” command, color of the “RST” command is also changed to green.

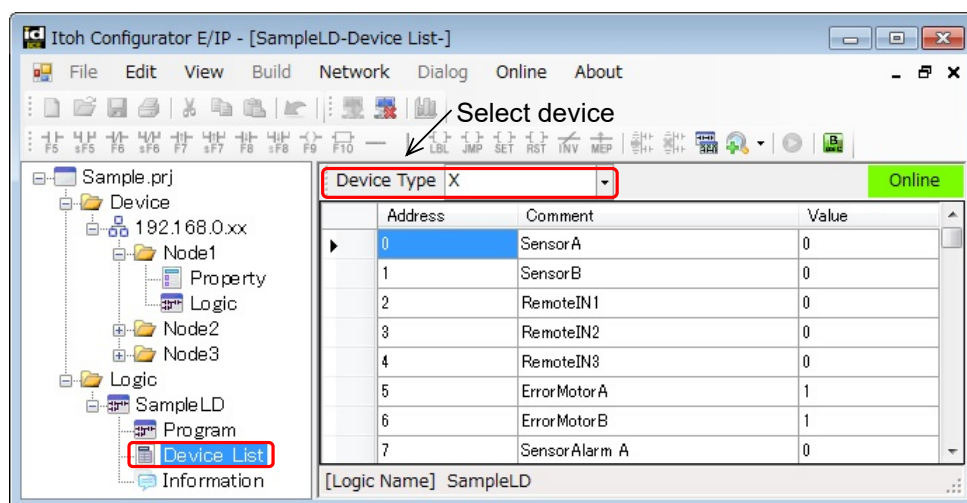
Value of internal for counter is indicated at monitoring.



Click “Device List” to monitor condition at table. Select “Device Type” you want to monitor.

You can change data register (D) by overwriting.

	X	Y	M	D	T	C	PC
Value	ON:1 OFF:0	ON:1 OFF:0	ON:1 OFF:0	Data	ON:1 OFF:0	Number of count	



### 2.6.1.3 Forcible ON OFF the device (X contact)

Force ON or OFF X contact during monitoring.

1) Right click on X contact you want to change condition.

Select “Force ON” or “Force OFF”



2) “ON” or “OFF” indication is indicate during forcible ON or OFF.

During the contact is force to ON or OFF, actual input is ignored.



3) Right click “Force Remove” to finish forcible ON or OFF.



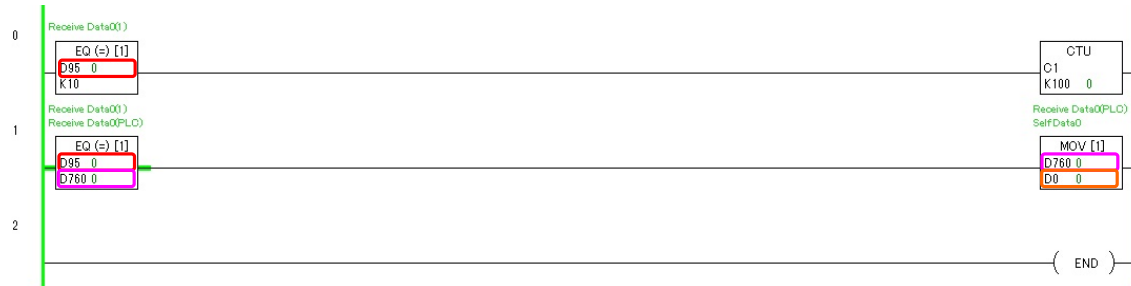
When finished the monitoring function, forcible ON or OFF will be also finished.

#### 2.6.1.4 Over write data register

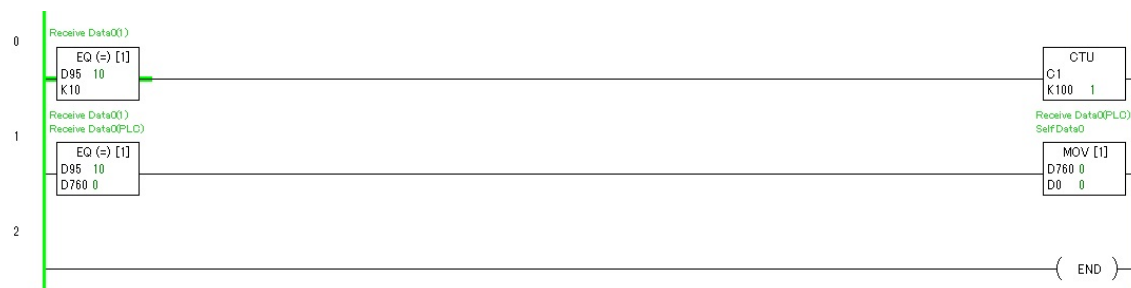
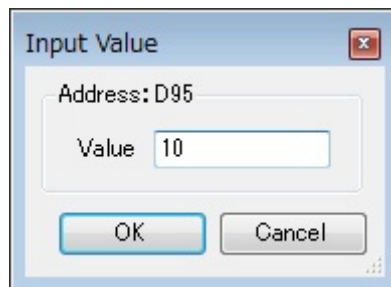
Force to change value on data register during monitoring.

1) Double click on data register you want to change.

Below example is changing value of D95. Click Red frame to change the value.



2) Enter value and click “OK”.



#### 2.6.1.5 Precaution to use ladder logic monitor

Ladder monitor function is required to allow communication of Itoh Configurator E/IP by firewall.

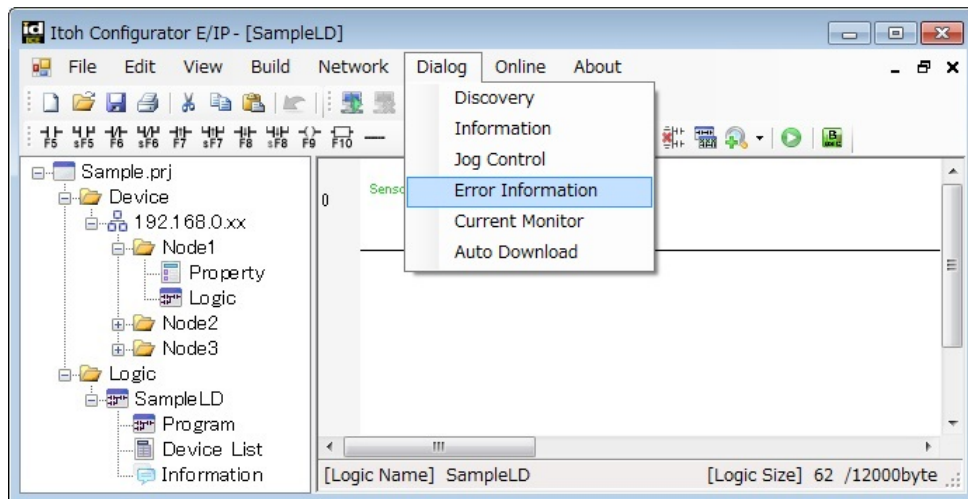
Refer Chapter 4.6 for more information.

## 2.6.2 Error monitor

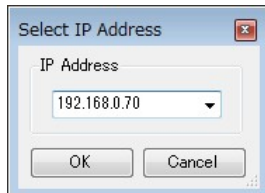
Error monitor function can reset error manually.

### 2.6.2.1 Start error monitor

- 1) Select “Error Information” from Dialog on menu bar.

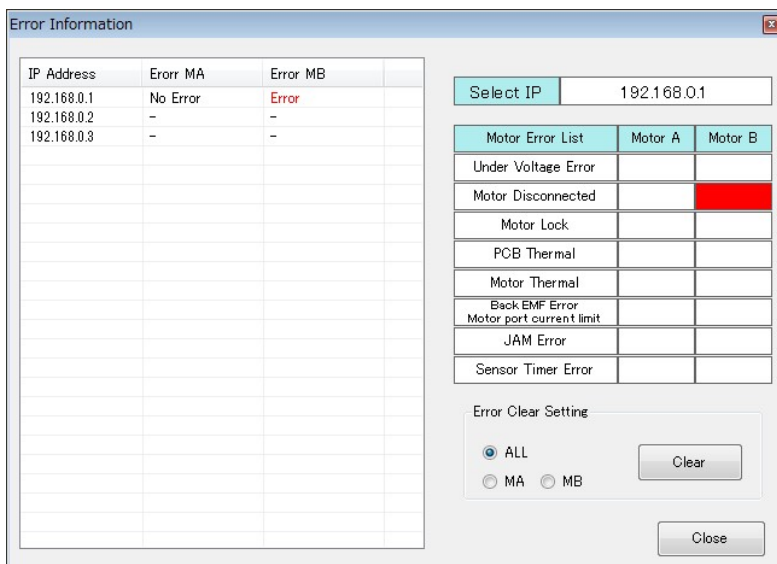


- 2) Select IP address of PC and click “OK”.



### 3) Error Information window..

Error of IB-E is appeared on this window as showing below.



IP Address	Error MA	Error MB
192.168.0.1	No Error	Error
192.168.0.2	-	-
192.168.0.3	-	-

Select IP: 192.168.0.1

Motor Error List	Motor A	Motor B
Under Voltage Error		
Motor Disconnected		
Motor Lock		
PCB Thermal		
Motor Thermal		
Back EMF Error		
Motor port current limit		
JAM Error		
Sensor Timer Error		

Error Clear Setting

☒ ALL ☐ MA ☐ MB

Clear

Close

#### • Main window

Left of the main window shows error condition for each IB.

If error is not occurred, indicates “No Error” and if there are errors on IB-E, indicates “Error” on the indication. If registered IB-E is not connected on line, indicates “-”.

Right of the main window shows IP address of IB-E and detail of error condition selected IB-E. Click the other IP address on left of the main window to change indication of IB-E.

#### 2.6.2 Manual error reset

Manual error reset is available from “Error Information” clicking “Clear” at “Error Clear Setting”. Motor unplugged error, Lock error, PCB thermal error, Motor thermal error, Back EMF error and Remote port current error can be reset by this function. However it is necessary to remove cause of the error before reset.



I/O connection will be broken when error is reset by Error Clear Setting.

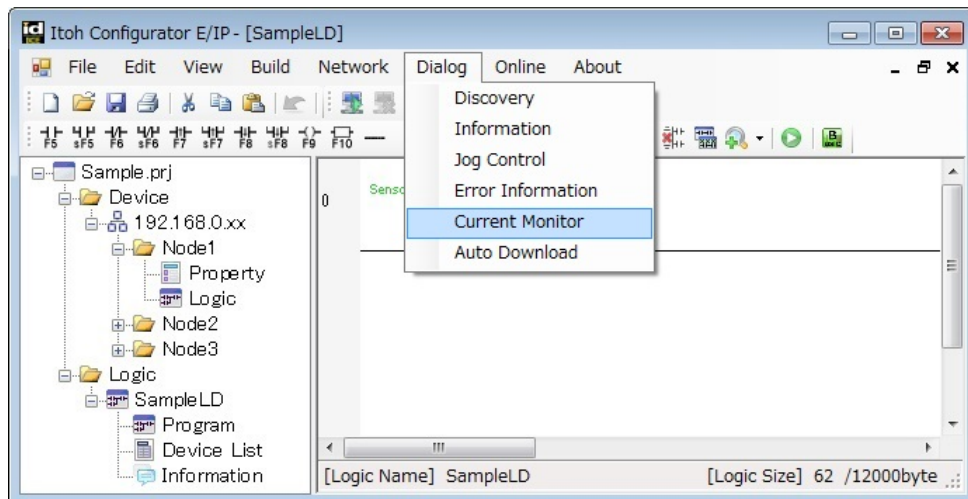
### 2.6.3 Current monitor

This function allows current monitoring for each motor.

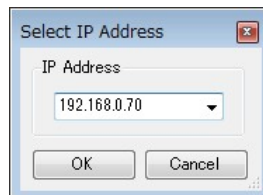
The sampling rate can set to 0.01, 0.1 and 1seconds.

#### 2.6.3.1 Start current monitor

- 1) Select "Current Monitor" from "Dialog".



- 2) Select IP address of PC and click "OK".



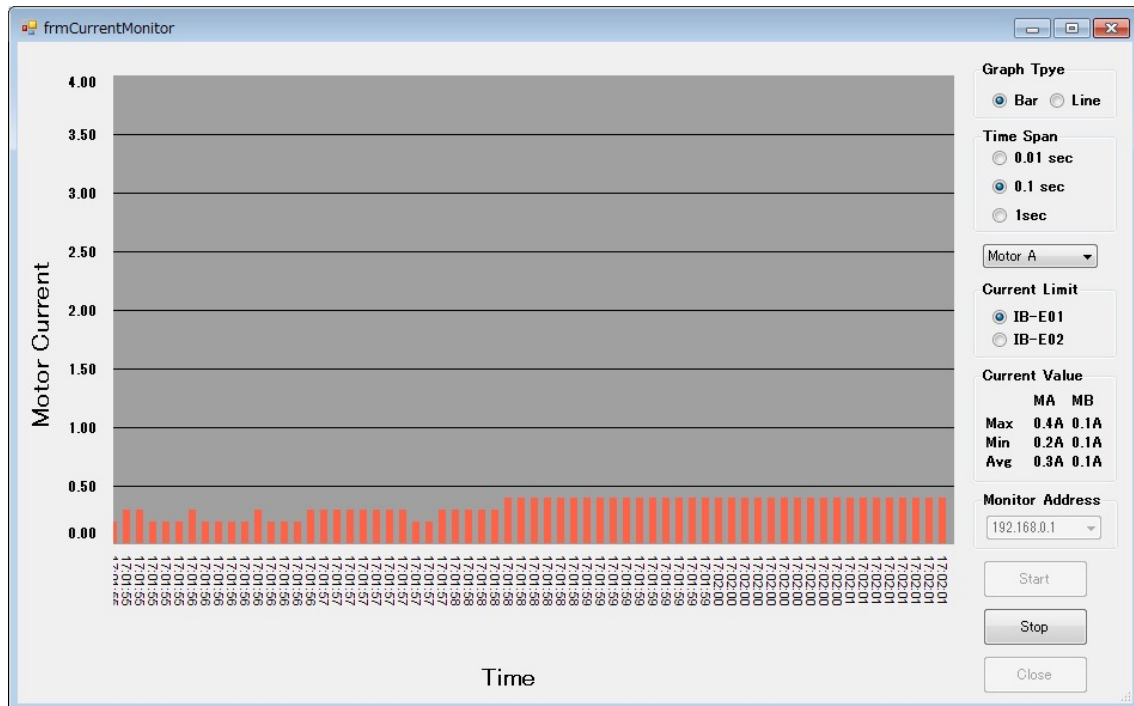
3) Check a check box for monitoring condition.



• Window detail

	Description
Graph Type	Bar type or Line type for current indication.
Time Span	Sampling rate from 0.01sec, 0.1sec or 1sec. IB-E is sampling every 0.01 second. 0.01sec → Indicates raw sampling data. 0.1sec → Indicates average for 10 of 0.01sec samplings. 1sec → Indicates average for 100 of 0.01sec samplings.
Motor A/B	Select Motor A/B, Motor A or Motor B for current indication. Motor A/B → Indicates A axis and B axis on same time. Motor A → Indicates only A axis. Motor B → Indicates only B axis.
Current limit	Select motor type IB-E03 or IB-E04(High torque type motor)
Current Value	Indicates maximum, minimum and average currents of range displaying.
Monitor Address	Select IP address of IB-E you want to monitor.

4) Click “Start” to start sampling and displaying.



5) Click “Stop” to stop monitoring.

#### 2.6.3.2 Precaution to use current monitor

- Only one(1) IB-E can be monitored on same time.
- I/O connection will be broken shortly when start and stop current monitor.
- Current monitor function is required to allow communication of Itoh Configurator E/IP by firewall. Refer Chapter 4.6 for more information.

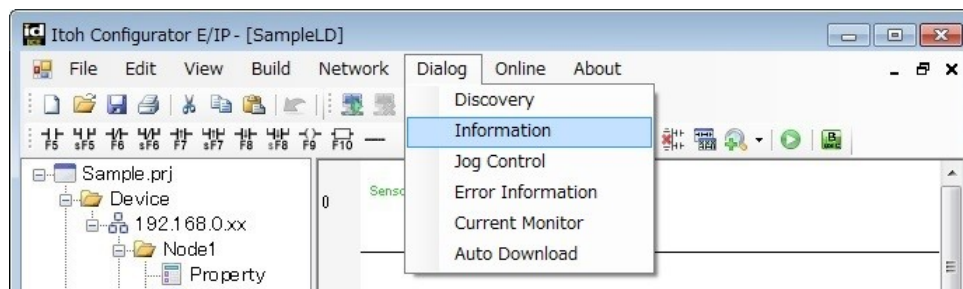


## 2.7 Other function

### 2.7.1 Information

Ladder logic name, build date for the ladder logic, motor life time, serial number, CPU version and MAC address can be read.

1) Select "Information" from "Dialog".



Status	Node Address	Logic Name	Build Date	Life Time(A)	Life Time(B)	Serial No	Firm Ver(1)	Firm_Ver(2)	Firm_Ver(3)	MAC
Connected	192.168.0.1	SampleLD	2013/01/28 15:56:52	0h	0h	FFFFFFF	000C	013D	0707	00-22-21-00-00-01
Disconnected	192.168.0.2	-	-	-	-	-	-	-	-	-
Disconnected	192.168.0.3	-	-	-	-	-	-	-	-	-

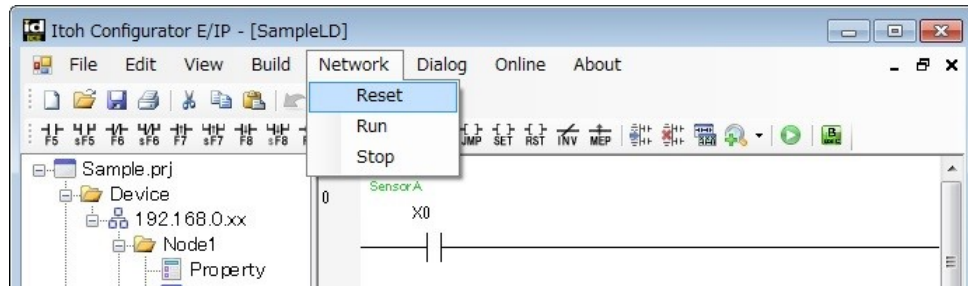
	Description
Status	Status of IB-E (Connected / Disconnected)
Node Address	IP address of IB-E.
Logic Name	Ladder logic name
Build Date	Build date of the ladder logic.
Life Time(MA)	Life time for MA. This is estimated operation time estimated according to condition.
Life Time(MB)	Life time for MB. This is estimated operation time estimated according to condition.
Serial	Serial number of IB-E.
Firm_Ver(1)	Firmware version of NXP.
Firm_Ver(2)	Firmware version of FPGA.
Firm_Ver(3)	Firmware version of R8C. First 2 figures are for MA, last 2 figures are for MB.
MAC Address	MAC address for IB-E.

## 2.7.2 Network command

### 2.7.2.1 Reset IB

IB-E will restart by reset the IB-E.

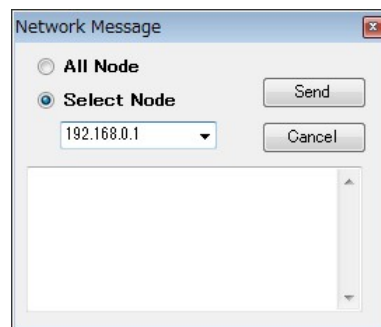
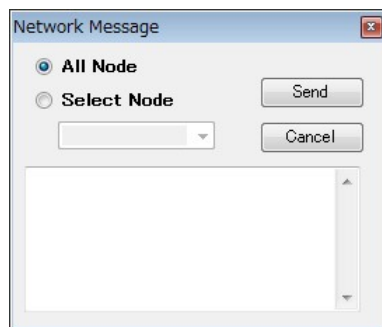
1) Select "Reset" from "Network".



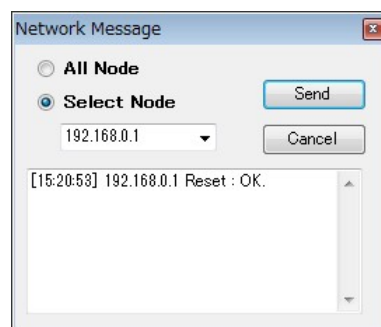
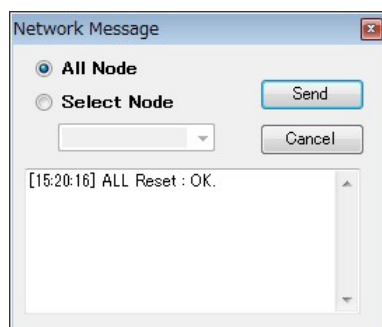
2) Select "All Node" or "Select Node".


All Node; Reset all of connected IB-E.

Select Node; Reset selected IB-E. Select IP address and click "Send" to reset the IB-E.



3) Complete the reset.

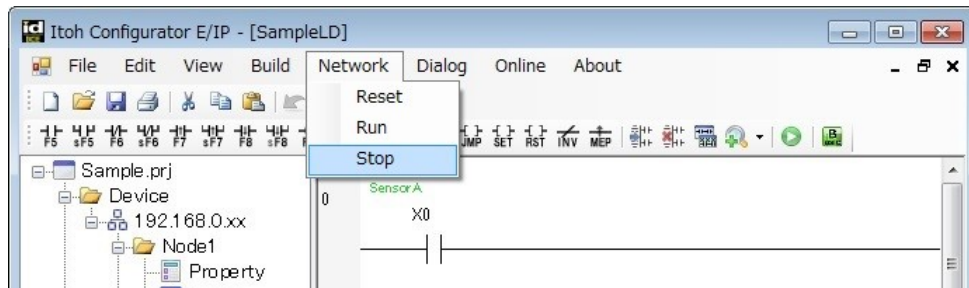


 It will take about 15second to restart.

### 2.7.2.2 Stop ladder logic

Ladder logic process is stopped by following procedure.

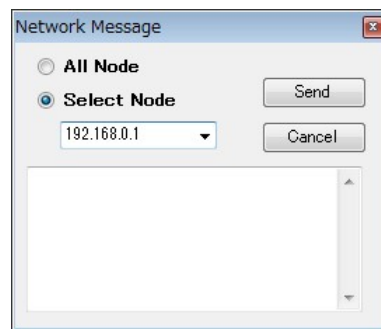
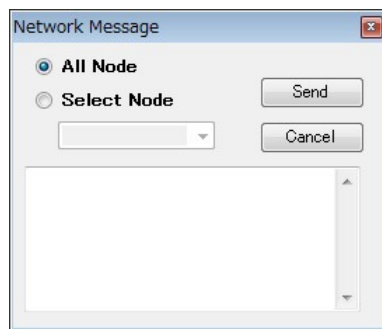
- 1) Select "Stop" from "Network" of Main menu.



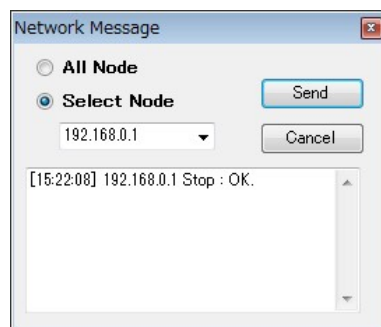
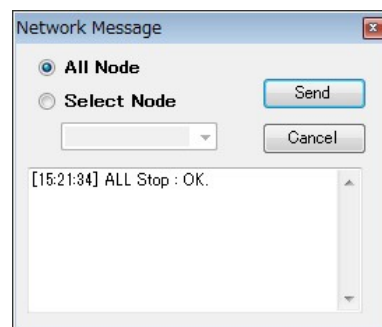
- 2) Select "All Node" or "Select Node".

All Node; Stop ladder logic process all of connected IB-E.

Select Node; Stop ladder logic process selected IB-E. Select IP address and click "Send".



- 3) Complete to stop.

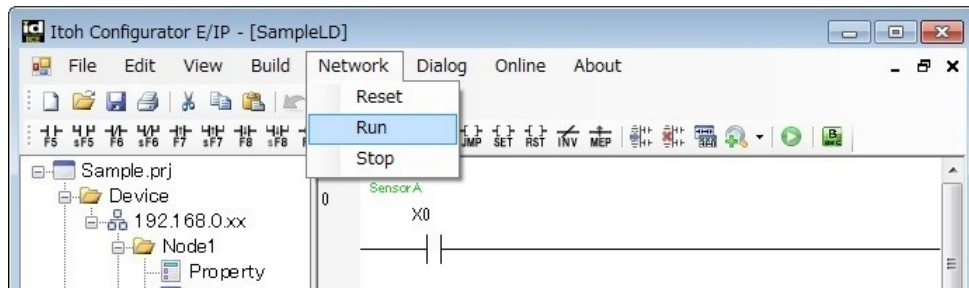


Refer Chapter 2.7.2.3 to re-start ladder logic or cycle power ON or reset the IB-E.

### 2.7.2.3 Start(Re-start) ladder logic

Re-start ladder logic by following procedure.

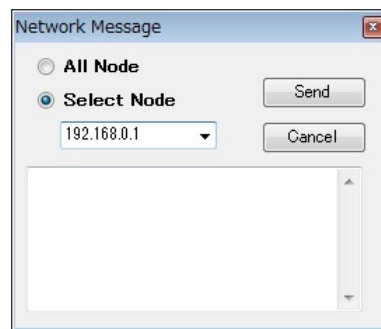
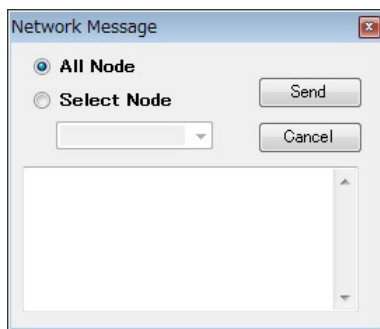
- 1) Select "Run" from Network of main menu.



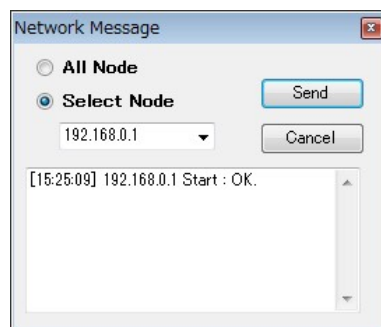
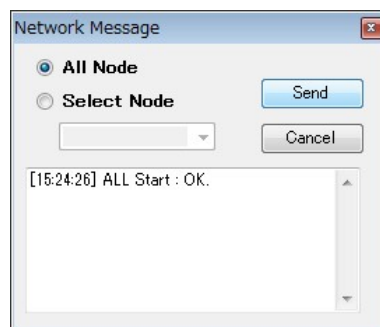
- 2) Select "All Node" or "Select Node".


All Node; Re-start ladder logic process all of connected IB-E.

Select Node; Re-start ladder logic process selected IB-E. Select IP address and click "Send".



- 3) Ladder logic process re-start.

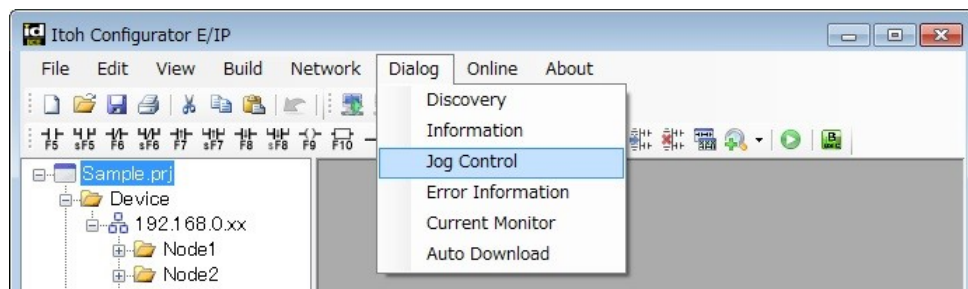


 Make sure safety before click "Send". MDR or remote output may be turns ON.

### 2.7.3 Jog operation

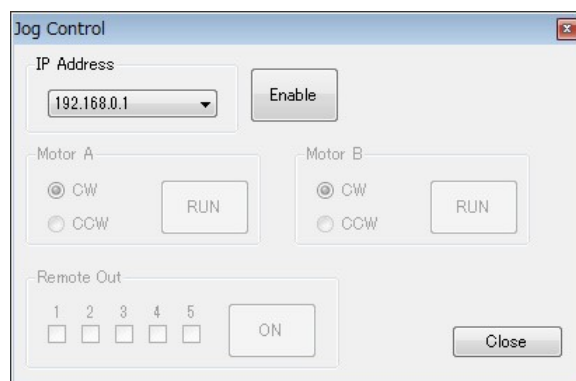
MDR which is connected to IB-E is forced to RUN by Jog operation function.

- 1) Select “Jog Control” from Dialog” of main menu.



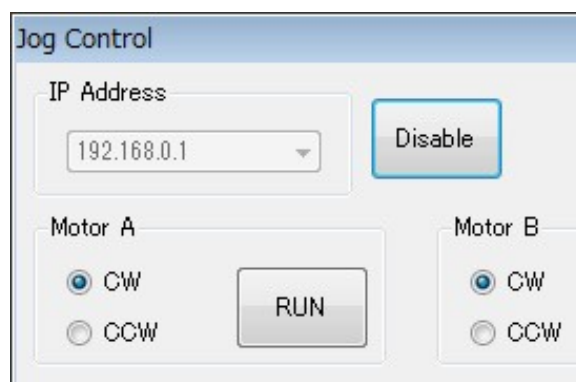
- 2) Select IP address of IB-E you want to force to MDR run and click “Enable”.

Ladder logic process is stopped when clicked “Enable”.




- 3) Select direction of MDR and click “RUN” to start running.

Select 1 to 5 of Remote Out and click “OK” to turn on Remote out.



Click “Disable” and “Close” to finish Jog operation. Or Click 

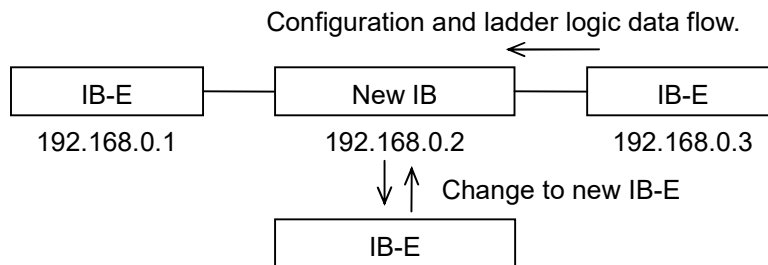
 Make sure safety before click “RUN” or “OK”. MDR or remote output will be turns ON.

#### 2.7.4 Automatic download

The Automatic download function will automatically detect un-configuration IB and set the node properties, logic assignment and initialization.

The configuration and ladder logic data is kept in IB-E which IP address is 1 larger from target IB-E. For example if new IB-E's IP address is 192.168.0.2, configuration and ladder logic data is kept in 192.168.0.3 that is 1(one) larger IP address from new IB-E. If there is no 1(one) large IP address on network line, the configuration data is kept in 1(one) small IP address IB-E.

It is necessary to enable automatic download function at Itoh Configurator E/IP.

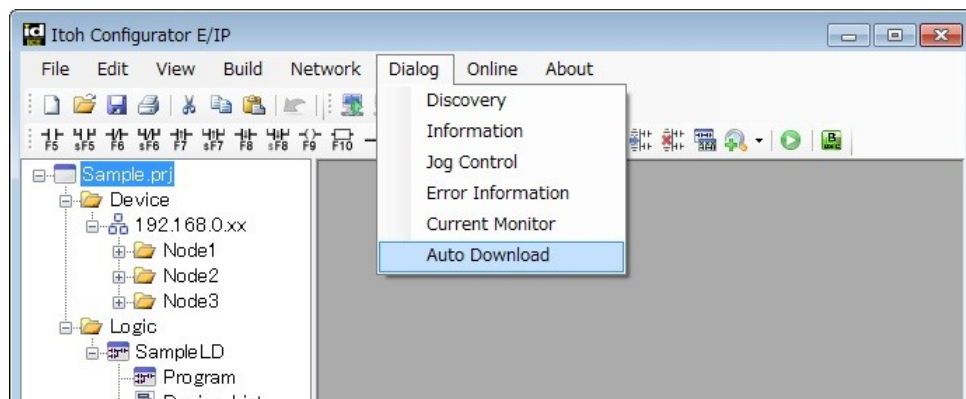


##### 2.7.4.1 Automatic download setting

- 1) Write property to all of IB-E before enable automatic download.

Refer chapter 2.5 for write property.

- 2) Select “Auto Download” from “Dialog” of main menu.

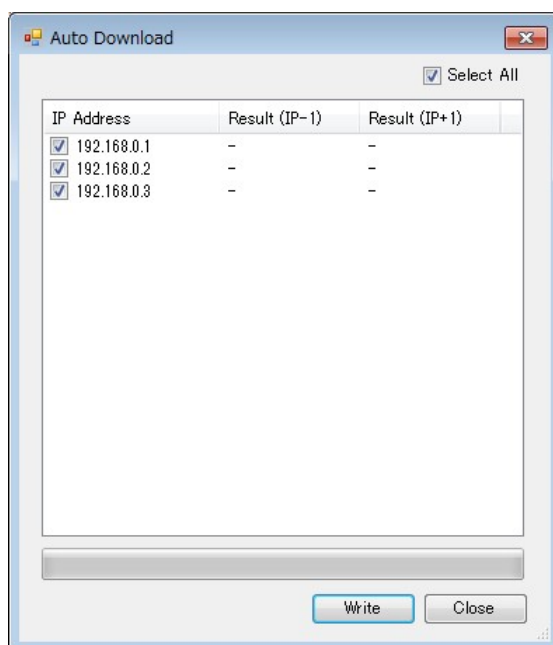


3) Check a check box of IP address that you want to enable automatic download function.  
And click "Write". Checked IB-E saves configuration and ladder logic data for own and 1(one) small IP address IB-E and 1(one) large IP address.

For example)

Node 2 (192.168.0.2) saves configuration and ladder logic data for Node2(own),  
Node 1 (192.168.0.1) and Node 3 (192.168.0.3).

Node1 saves for Node1, Node 254 and Node 2. Node254 saves for Node254, Node253  
and Node 1.

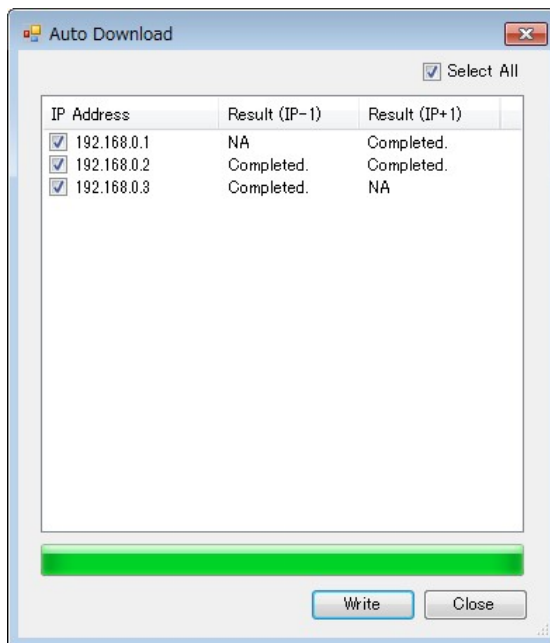


4) Setting results are indicated.

Completed; Succeed with setting

Failed; Failed to setting. It may be required try again.

NA; There is no IB-E on network.



#### 2.7.4.2 Automatic download procedure

- 1) Set IP address for new IB-E. Refer chapter 2.2.1 to set IP address.
- 2) Power off the IB-E and then replace IB-E.
- 3) Power on IB-E. Download will start automatically.
- 4) Download IB-E will be reset automatically after completed download.



Replaced IB-E does not enable automatic download function.  
It is necessary to enable automatic download by ICE.



## CAUTION

- Make sure safety during automatic downloading.

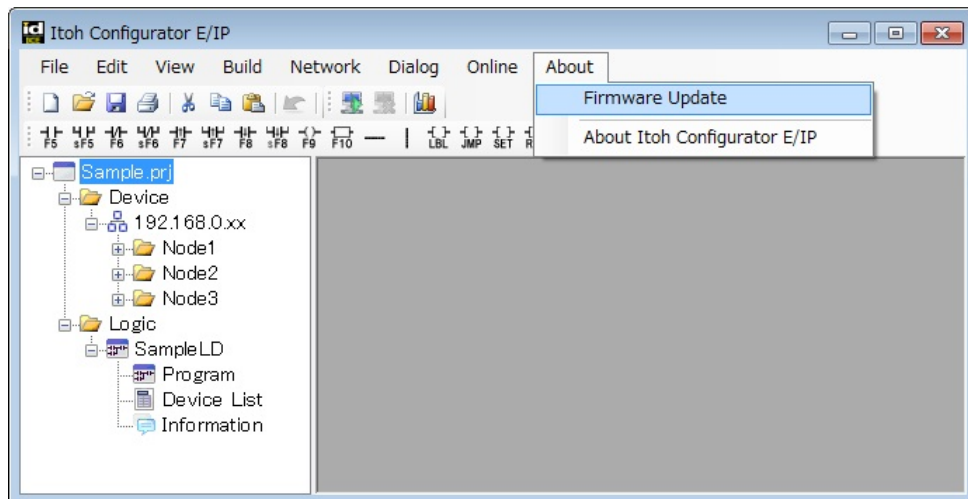


## 2.7.5 Firmware

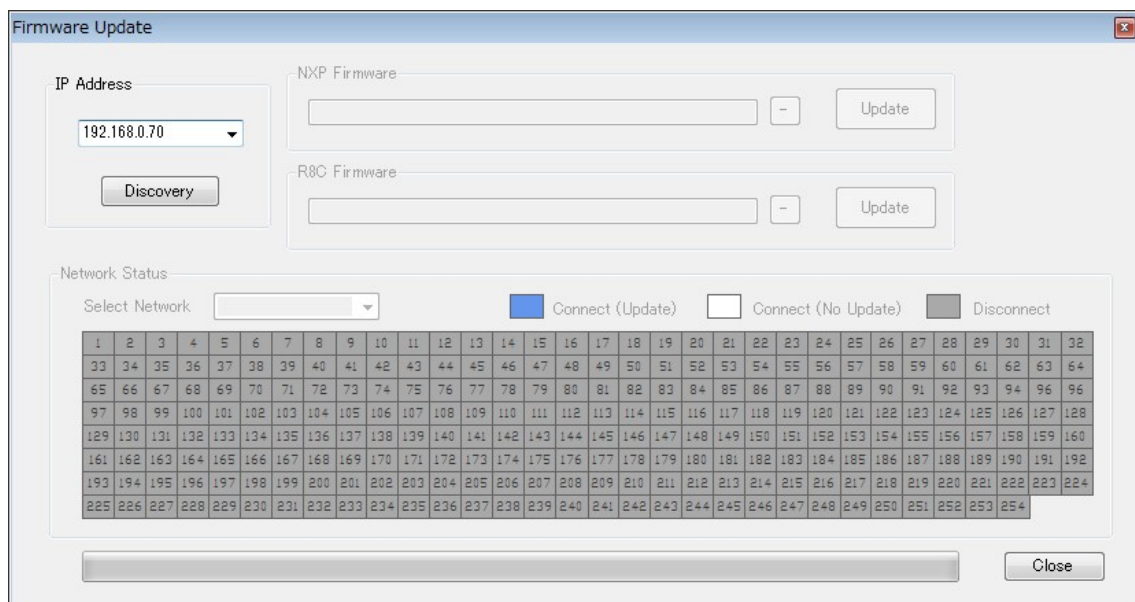
Firmware can be update though Ethernet for firmware version up.

All of connected IB-E's ladder logic process are stopped while updating. 2.7.5 ファーム

- 1) Disconnect I/O connection by PLC side.
- 2) Select "Firmware Update" from "About".



- 3) Select IP address of PC and click "Discovery" to find connected IB-E.

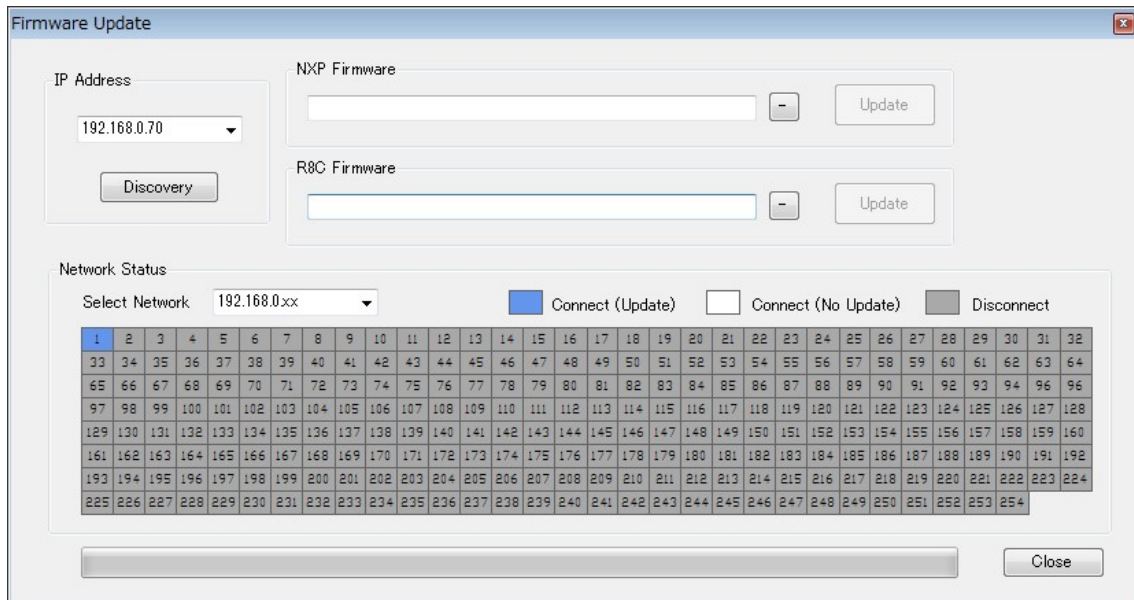


4) Select IB-E to update firmware.

Blue; Firmware will be updated.

White; Firmware will not be updated.

Gray; No IB-E on the network.



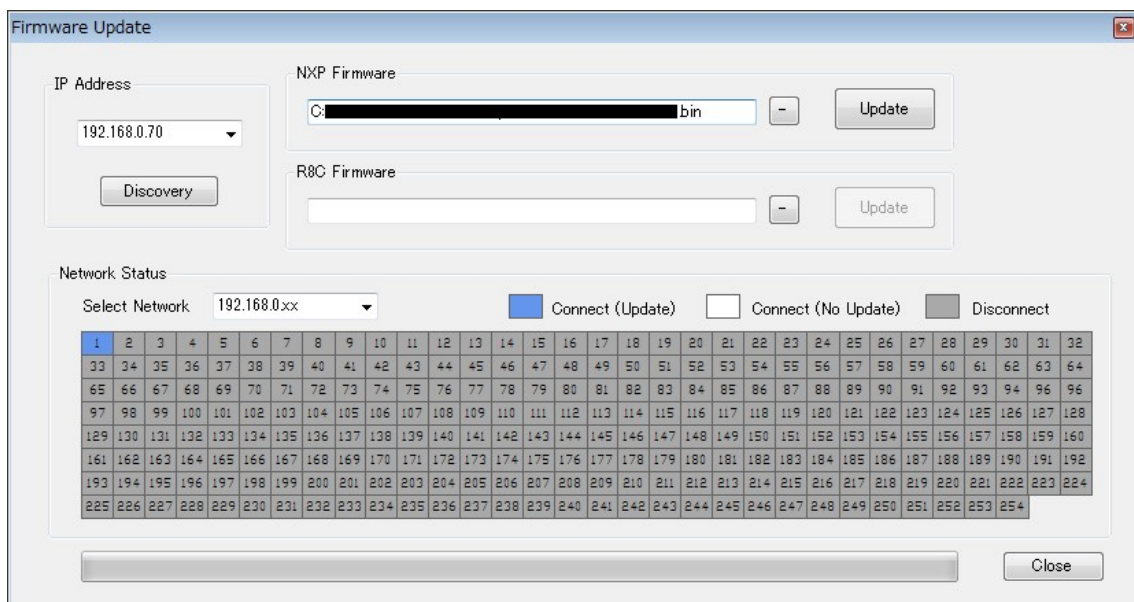
The screenshot shows the 'Firmware Update' window. It has a title bar with a close button. Inside, there are two sections for firmware updates: 'NXP Firmware' and 'R8C Firmware'. Each section has a text input field, a minus button, and an 'Update' button. To the left of these is an 'IP Address' dropdown menu showing '192.168.0.70' and a 'Discovery' button. Below these sections is a 'Network Status' section. It includes a 'Select Network' dropdown showing '192.168.0.xx', three radio buttons for 'Connect (Update)' (selected), 'Connect (No Update)', and 'Disconnect', and a large grid of 256 numbered cells (1 to 254 visible). The grid is mostly white, with some cells highlighted in blue. At the bottom right is a 'Close' button.

5) There are 2 different firmware on the IB-E.

NXP Firmware; Mainly control network.

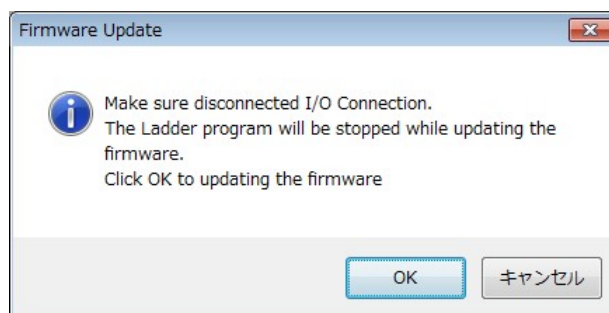
R8C Firmware; Mainly controls motor.

Select binary(bin) file from folder and click "Update".



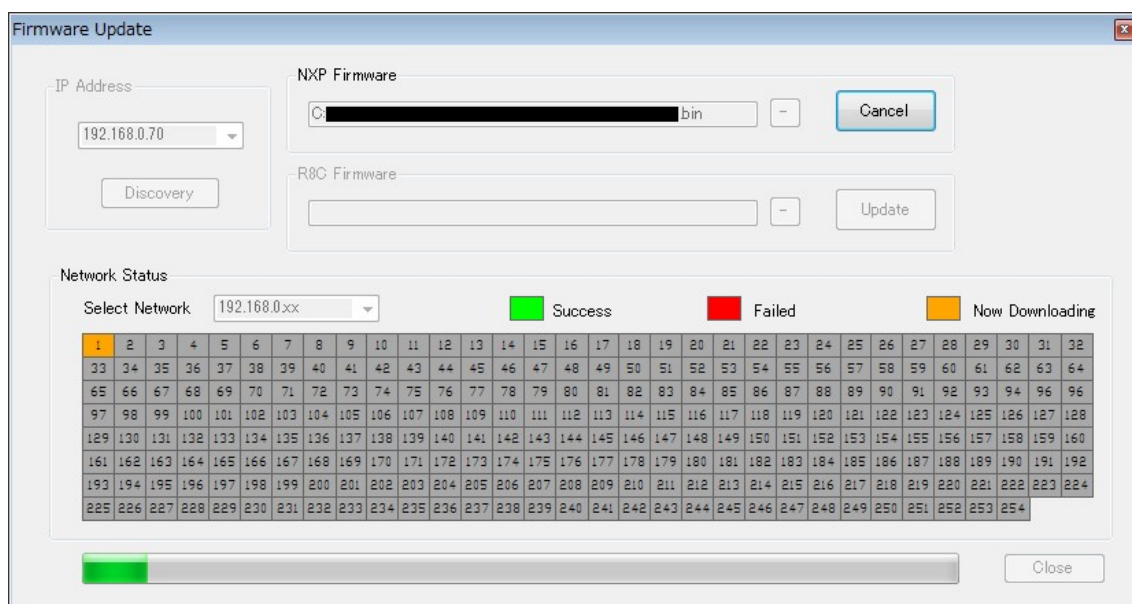
This screenshot is similar to the previous one, but the 'NXP Firmware' text input field now contains a file path: 'C:\...bin'. The 'R8C Firmware' section remains empty. All other elements, including the IP address, network status grid, and buttons, are identical to the previous screenshot.

6) Read contents on pop-up window and then click “OK”.



7) Start up-dating.

It will take about 2.5 minutes per each IB-E.

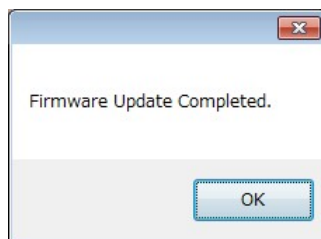


## ! WARNING

- Disconnect I/O connection before firmware update by PLC side.
- Do not power OFF while firmware updating.

8) When firmware update is completed, below display is indicated.

Try re-update if failed.



9) Execute "Information" to see firmware version.

Select "Information" from "Dialog" of main menu. Refer Chapter 2.7.

Status	Node Address	Logic Name	Build Date	Life Time(A)	Life Time(B)	Serial No	Firm_Ver(1)	Firm_Ver(2)	Firm_Ver(3)	MAC
Connected	192.168.0.1	SampleLD	2013/01/28 15:56:52	0h	0h	FFFFFFFF	000C	013D	0707	00-22-21-00-00-01
Disconnected	192.168.0.2	-	-	-	-	-	-	-	-	-

If status of IB-E shows Disconnected, the IB-E is not connected or memory error is happened on IB-E. In this case initialization of IB-E is required. Refer to Chapter 2.7.6 to initialization. After initialization, re-update firmware again.

10) IB-E will be initialized after firmware update.

Write property and download ladder logic are necessary. Refer chapter 2.5.

## 2.7.6 Initialization

Initializes internal data(property, ladder logic, IP address...etc) and back to factory setting.

- 1) Power OFF IB-E.
- 2) Rotary Switch(SW402 and SW403); Both "0". Dip switch (SW401 #3 and #4) ON
- 3) Initialization will be start when power ON the IB-E.
- 4) When completed initialization, LED of SenA, SenB, IN1, IN2, IN3 and OUT1 are turn ON.
- 5) Change Rotary Switch and Dip switch back to original setting.
- 6) IP address setting and parameter writing and ladder logic downloading is required.

# Chapter 3

## Connection with Ethernet / IP applicable PLC

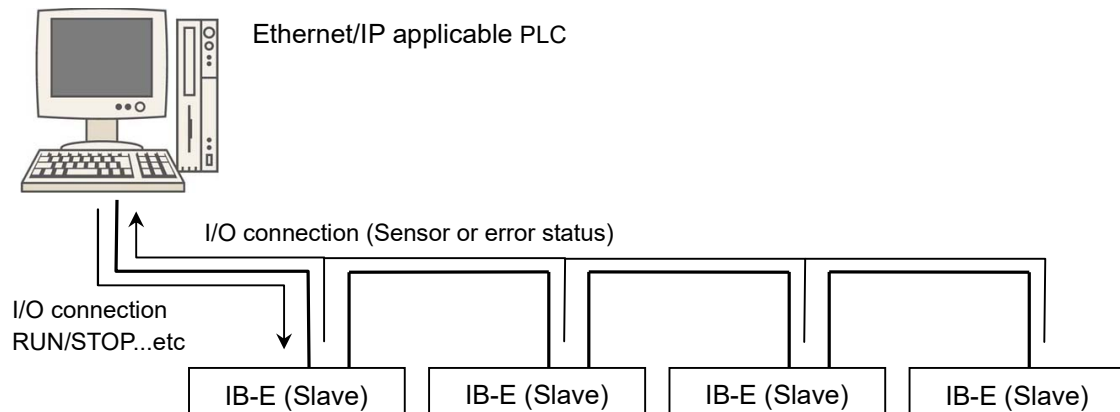
---

### 3 Index

3.1	General information	3-2
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3.3	Setting procedure for RSLogix and SoftLogix	3-5
3.4	Setting procedure for EtherNet Module	3-6
3.5	Setting procedure for AOP	3-8
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### 3.1 General Information

Motor on IB-E can be operated by Ethernet/IP applicable PLC.



### 3.2 Connection with Ethernet/IP applicable PLC

Setting procedure for Ethernet/IP applicable PLC.

Refer User's manual of Ethernet/IP applicable PLC.

RSLogix from Rockwell is used on this manual.

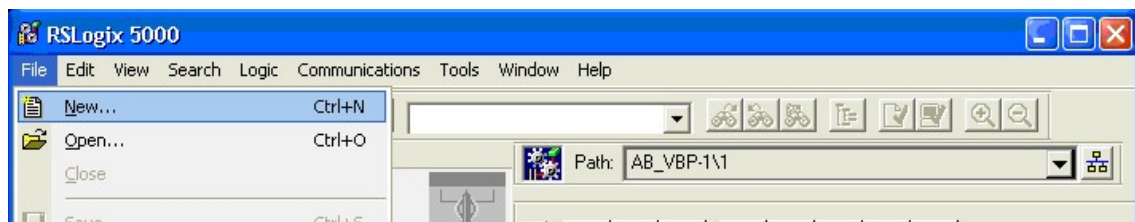
There are 2 methods to connect with Rockwell PLC as showing below.

- 1) Register IB-E as General EtherNet Module (Refer 3.4)
- 2) Register IB-E as AOP applicable module (Refer 3.5)

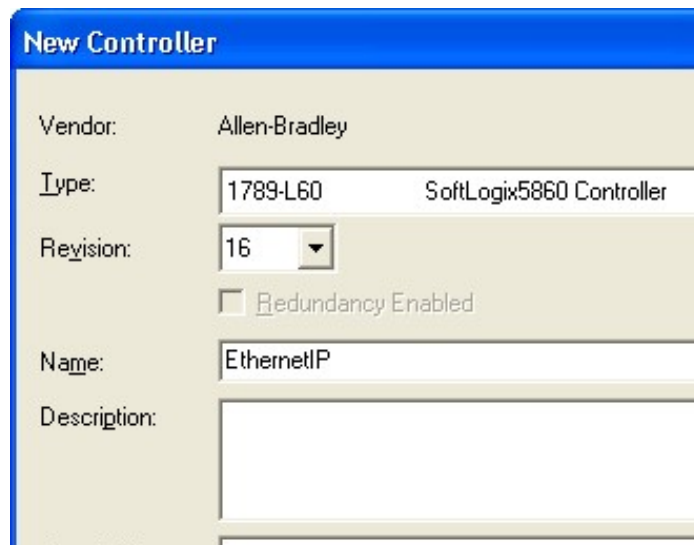
Note; Refer 1) for the other than Rockwell PLC.

### 3.3 Setting procedure for RSLogix and SoftLogix

- 1) In RSLogix 5000 software, from File menu, choose New.



2) Click “OK” at “New Controller” display after entering necessary information.

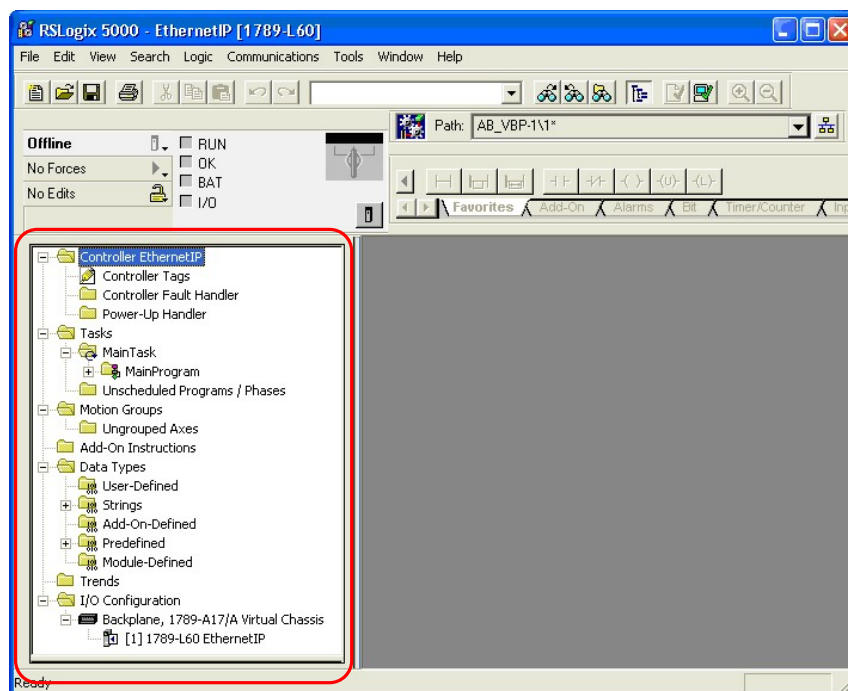


The "New Controller" dialog box is shown with the following fields:

- Vendor: Allen-Bradley
- Type: 1789-L60 SoftLogix5860 Controller
- Revision: 16 (dropdown menu)
- ☐ Redundancy Enabled
- Name: EthernetIP
- Description: (empty text area)

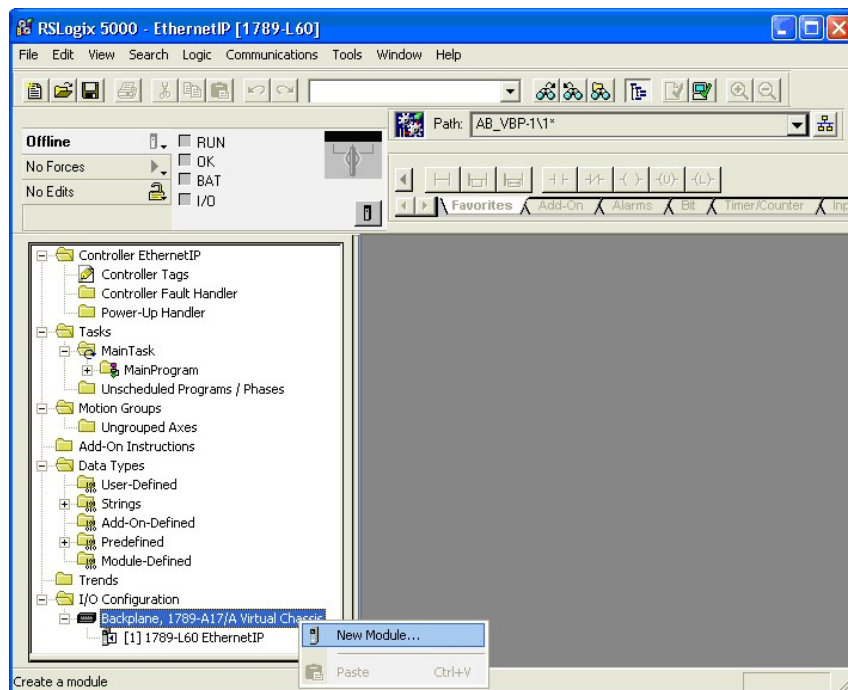
Type	『1789-L60 SoftLogix5860 Controller』
Revision	『16』
Name	Project name. (EthernetIP on this example)
Slot	Select slot number of created new controller project.
Create In	Location to save the project

3) Created New controller in Controller Organizer's I/O Configuration of RS Logix 5000.

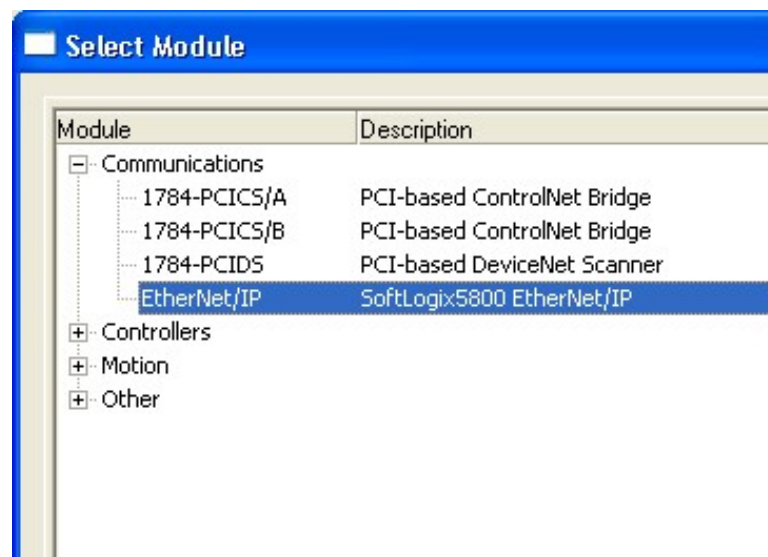


4) Set communication port of Ethernet/IP.

Right click “Backplane, 1789-A17/A Virtual Chassis” of “I/O Configuration” and select “New Module...”

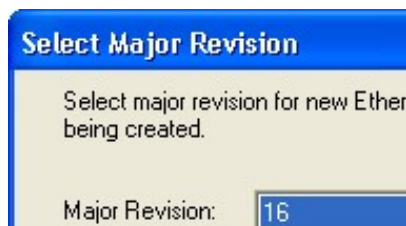


5) Select “Communications” – “Ethernet/IP” from “Select Module” and click “OK”.





6) Select revision number of SoftLogix and click “OK”.

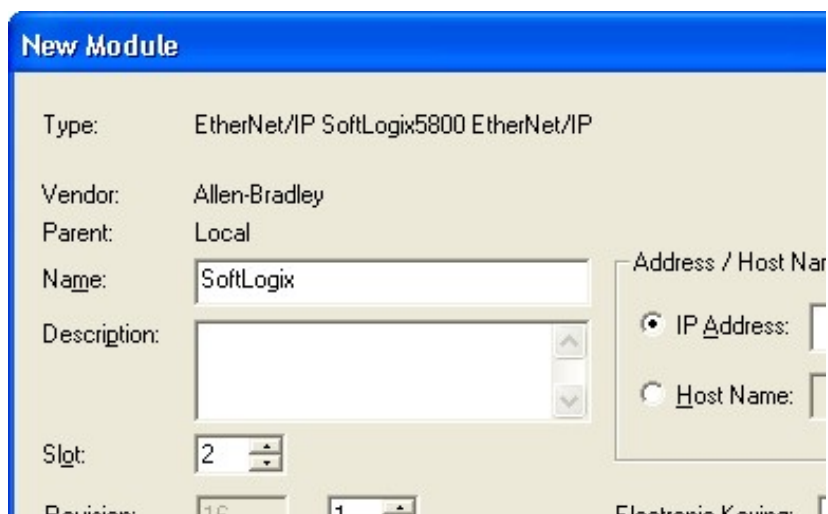


**Select Major Revision**

Select major revision for new EtherNet/IP being created.

Major Revision:

7) Set necessary information and click “OK”.



**New Module**

Type: EtherNet/IP SoftLogix5800 EtherNet/IP

Vendor: Allen-Bradley

Parent: Local

Name:

Description:

Slot:

Address / Host Name:

☒ IP Address:

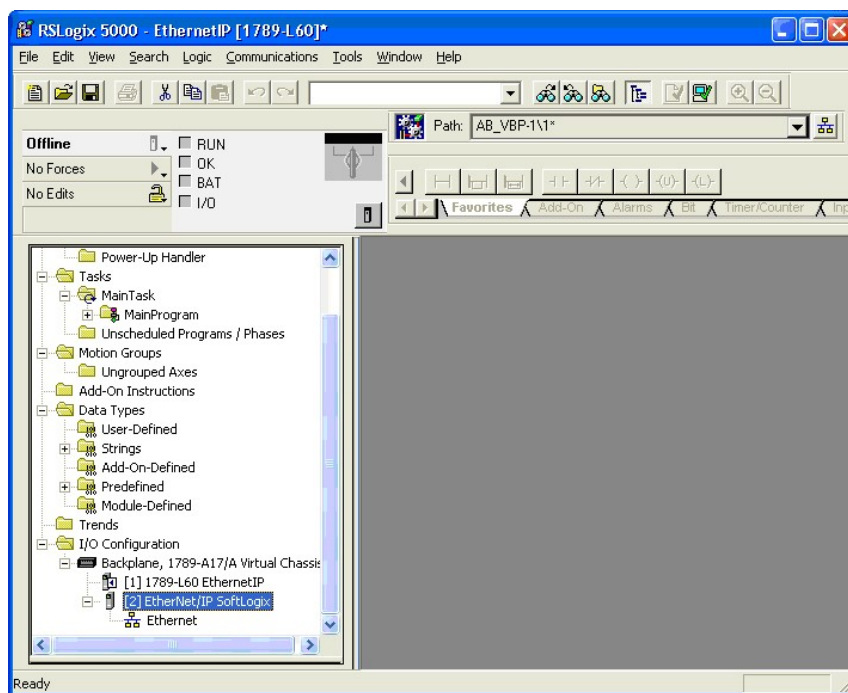
☐ Host Name:

Revision:

Electronic Keying:

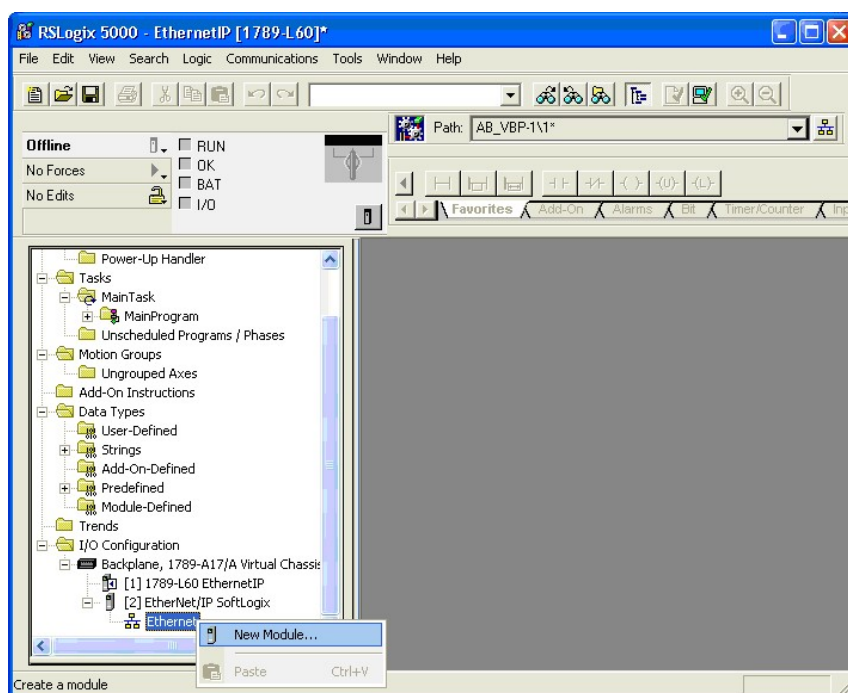
Name	Name of Ethernet/IP communication port. SoftLogix on this example.
Slot	Select slot number of SoftLogix5860 Controller that created at “SoftLogix Chassis Monitor”.
IP Address/Host Name	Enter IP address of PC which installed RSLogix

- 8) "SoftLogix5800 EtherNet/IP" and "Ethernet" was added under I/O Configuration of tree.  
And setting of Ethernet/IP communication port has been completed.

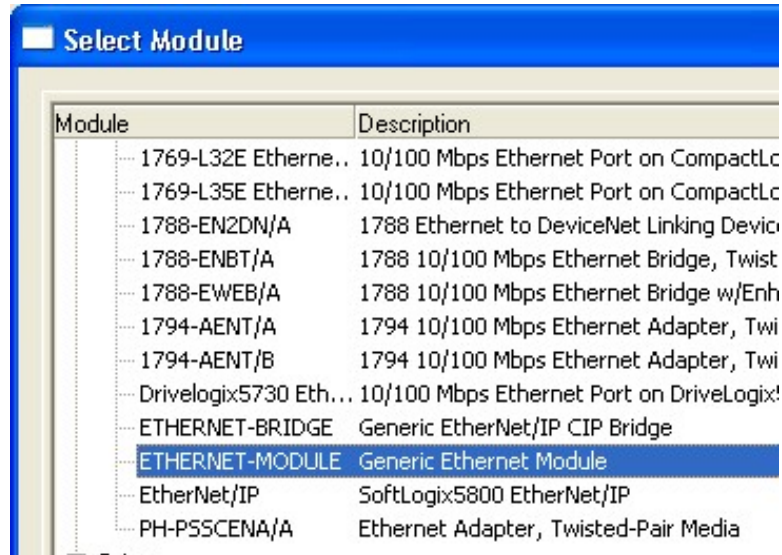


### 3.4 Setting procedure for EtherNet Module

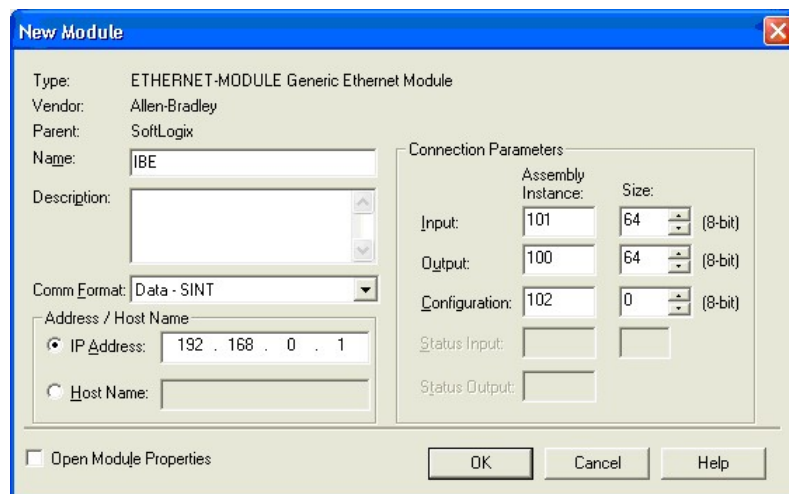
- 1) Right click on "Ethernet" of "I/O Configuration" and select "New Module"



2) Select “Communications” - “ETHERNET-MODULE” and “click “OK”.



3) Enter IP address of IB-E and I/O connection setting then click “OK”.



Name	Device name. “IBE” on this example.
Comm_Format	Definition of array size for the I/O connection data. 1 BYTE – SINT on this example.
IP Address/Host Name	Enter IP address.

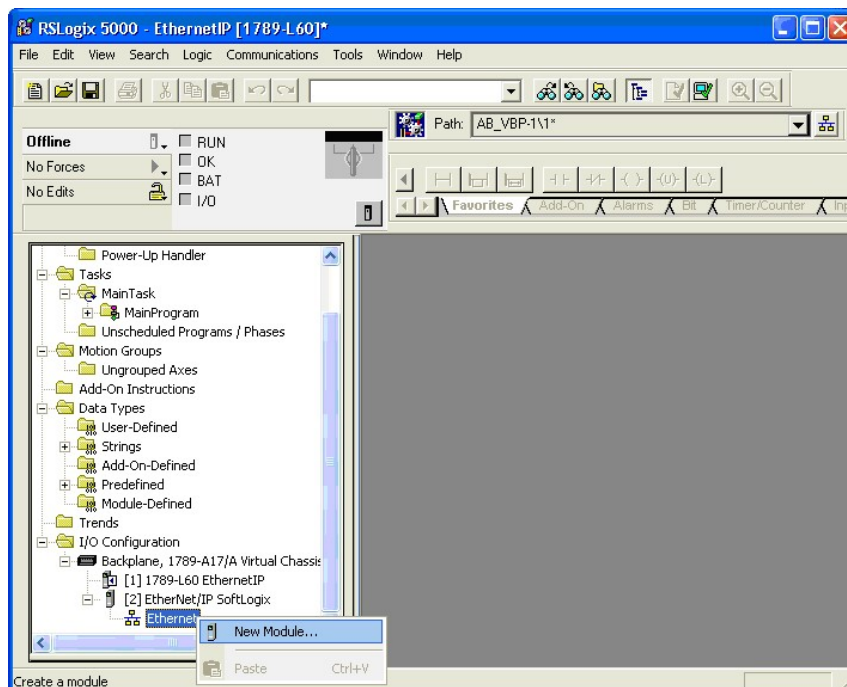
• Connection Parameters setting

	Assembly Instance	Size
Input	Enter 『101』	I/O connection size from IB-E to PLC is 64byte. In case select SINT(1byte) at Comm_Format", enter 64. (64÷1) DINI(2byte); enter 32 (64÷2)
Output	Enter 『100』	I/O connection size from PCL to IB-E is 64byte. In case select SINT(1byte) at Comm_Format", enter 64. (64÷1) DINI(2byte); enter 32 (64÷2)
Configuration	Enter 『102』	Enter 『0』

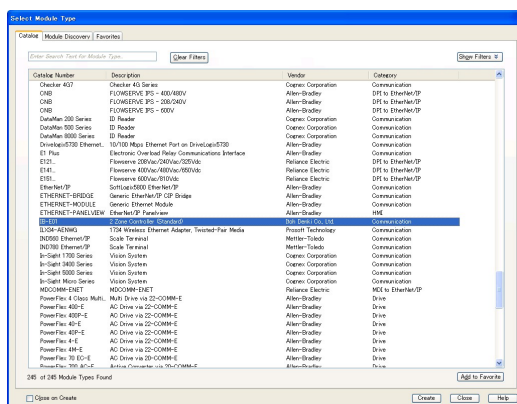
### 3.5 Setting procedure for AOP (Add-On-Profile)

IB-E is configured using the Add-On-Profile

- 1) Right click on "Ethernet" of "I/O Configuration" and select "New Module".

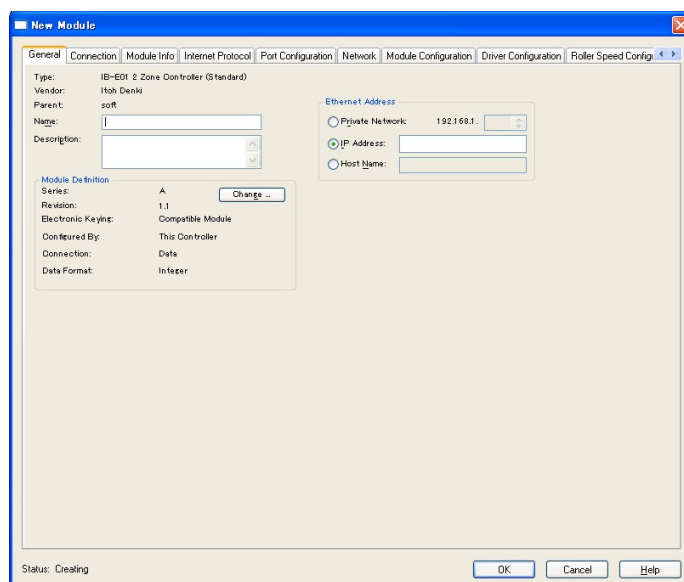


2) Select ITOH DENKI products (IB-E03 or IB-E04) from list on “Select Module Type” and click “Create”



3) Select “New Module” - “General” and enter name of IB into “Name”.

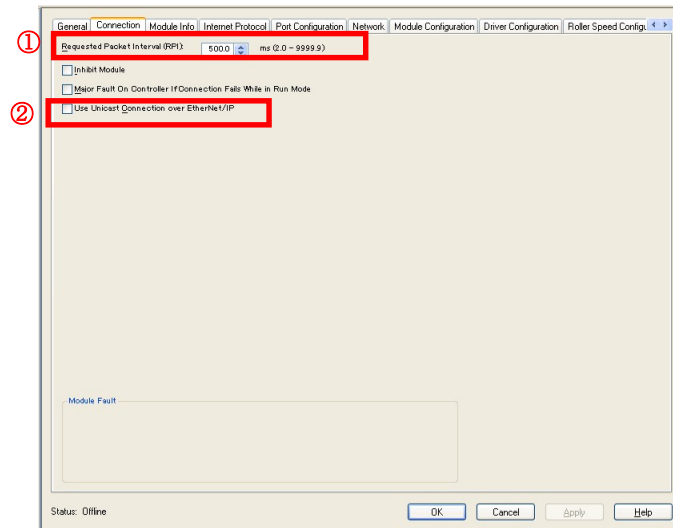
Enter IP address for IB. Default IP address is 192.168.1.xx (Set xx at Rotary switch on IB-E)



Download the parameter to establish connection between PLC and IB-E.

Below is explanation about AOP.

#### 4) “Connection” tag

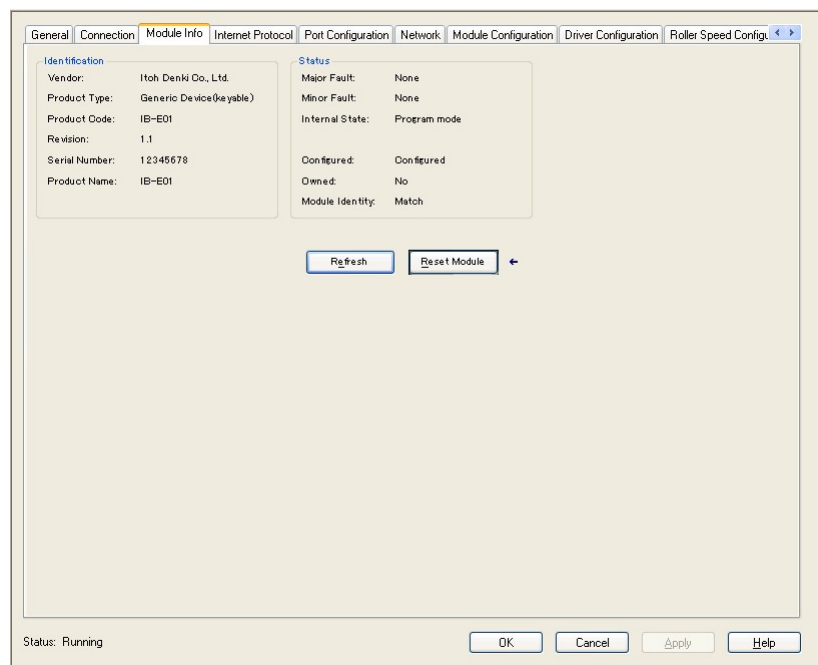


① Setting for RPI between PLC and IB-E.

② Type of UDP from IB-E to PLC. Unicast / Multicast

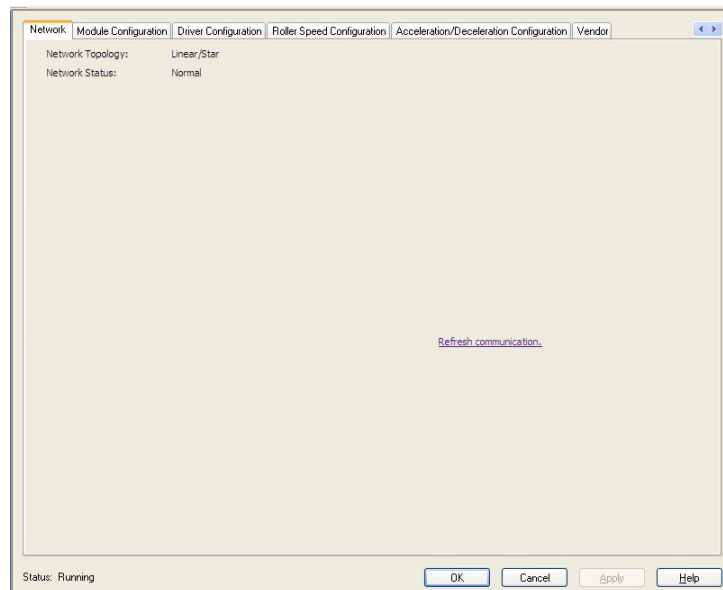
#### 5) “Module Info” tag

Indicates module information.



PLC is required to “online” to get(indicate) module information.

6) “Network” tag



Indicates Network topology and network status

Procedure of motor parameter setting.

Connected IB-E must be slave mode and PLC must be master.

#### 7) "Module Configuration" tag

The Module Configuration tab allows the selection of parameters which effect error handling for both motor drivers.

Errors can be reset using the output tag created by the Add-On-Profile.

#### Thermal Error Reset

The Thermal Error status activates when the motor or the driver circuit reaches thermal limit (triggered by thermistors).

- Automatic – The error resets automatically when the motor or the driver cools to the operating temperature range.
- Manual – After the motor or the driver cools to the operating temperature range, the error can reset by the controller.

#### Motor Disconnected Error Reset

The Motor Disconnected Error status activates when the motor is not plugged into the motor port AND the Motor Port Function parameter (Driver Configuration tab) is set to Motor Driver.

- Automatic – The error resets automatically when the motor has been plugged into the motor port.
- Manual – After the motor has been plugged into the motor port, the error can be reset by the controller.

#### Motor Stalled Error Reset

The Motor Stalled Error activates when the motor is being driven, but the motorized roller cannot turn.

- Automatic – The error resets automatically when the motor is turned by hand (manually).
- Manual – The error can be reset by the controller.



## 8) “Driver Configuration” tag

The Driver Configuration tab allows the selection of parameters which affect the brushless DC driver circuit and sensor operation.

The parameters are separated for both motor drivers, A and B.

### Motor Type

The Motor Type selection determines the type of motor (model) connected to the IB-E Series Dual Motor Driver. It affects baseline gear reduction and motor direction parameters.

- NA – This setting is only for when the motor port is not being used.
- FE – Default setting, “standard” torque motor. If the motorized roller is a PM635FS (2.5” diameter), use this setting.
- FS – This setting is for different “standard” torque motor. Due its design, it has a slightly lower gear reduction and rotates in the opposite direction of an “FE”.
- FP – This setting is for a “high” torque motor. It has the same gear reduction and rotation as the “FS”.

### Current Limit

The Current Limit selection adjusts the maximum current that can be drawn by the motorized roller. Current draw may be reduced to lower overall power consumption. However, this will also reduce motor performance. It can be adjusted in 0.25A increments from 0.50 to 4.00A.

### Electric Brake Mode

The Electric Brake Mode selection determines the way in which the motor behaves when it is not driven.

- Dynamic Brake – Default setting in which the power generated by the motor is consumed in order to stop the motor quickly. The effect of the dynamic brake is proportional to the speed of the motor. The faster the motor is spinning, the stronger the braking force of the dynamic brake.
- NA or Coast – This setting allows the motor to freely spin. The only resistance to the motorized roller is mechanical. If a motorized roller with a mechanical brake is used with this setting, the mechanical brake will be disengaged.
- Servo – This setting activates a dynamic brake for 0.2s then monitors the motor’s position. Depending on conditions, the servo brake mode will resist turning and/or nearly return to the original position in which the motor’s position was being monitored. If a motorized roller with a mechanical brake is used with this setting, the mechanical brake will be disengaged.

### Servo Brake Current Limit

The Servo Brake Current Limit selection adjusts the amount of current the motorized roller will draw when in servo brake mode. It can be adjusted in 0.1A increments from 0.1 to 1.0A.

### Sensor Operation

The Sensor Operation selection determines the way the sensor status bit responds to the sensor input signal. The naming is based on the output signal of photoelectric sensors, either being dark or light operate.

- Dark – Default setting in which the sensor status bit is “1” when the input is ON and “0” when the input is OFF.
- Light – This setting reverses the sensor status bit, so that it is “1” when the input is OFF and “0” when the input is ON.

### Sensor Alarm Operation

The Sensor Alarm Operation selection determines the way the sensor alarm status bit responds to the sensor alarm input signal. For the sensors which use it, the sensor alarm is a status bit to indicate the “health” of a sensor.

- Dark – Default setting in which the sensor alarm status bit is “1” when the input is ON and “0” when the input is OFF.
- Light – This setting reverses the sensor alarm status bit, so that it is “1” when the input is OFF and “0” when the input is ON.

### Mechanical Brake

The Mechanical Brake selection determines if the mechanical brake (an option for the motorized roller) operates normally or is disengaged even when the motor is not running. By disengaging the mechanical brake, the motorized roller with the mechanical brake option operates as a standard motorized roller without the brake. This only applies while the IB-E is powered.

- Normal – Default setting in which the mechanical brake is engaged while the motor is OFF.
- Disengaged – This setting keeps the mechanical brake disengaged while the motor is OFF.

### Circuit Board Thermal Protection

The Circuit Board Thermal Protection selection adjusts the thermal triggers for the brushless DC motor driver.

- Error Set – When the motor driver reaches this temperature, the motor will stop and an error status will be reported.
- Error Clear – The error status is cleared when the driver cools to this temperature. The Error Clear temperature must be less than the Error Set temperature.

### Roller Direction

The Roller Direction sets the default turning direction of the motorized roller. The direction is always referenced from the cable-side of the motorized roller. It is also dependent upon the Motor Type parameter.



- Clockwise - CW
- Counter-Clockwise – CCW

### Speed Control

The Speed Control selection determines the way the driver circuit maintains the set speed.

- Normal – Default setting which allows the full range of RPM for a given motor and maintains the set speed by increasing power (within the usable power range) to the motor as the load increases. The increase in power is inversely proportional to the motor's set RPM. The slower the motor's RPM is set, the more power will be available to maintain the set speed. However, the usable power range is affected by the Current Limit setting.
- Complementary Mode – This setting operates the motor in a lower range of RPM. It is designed to maintain the set speed whether the roller is moving faster or slower. Due to power limitations, the ability to slow down is much less than that of speeding up. If slowing the speed requires too much power, the motor will shut off and use the dynamic brake to stop.

### Motor Port Function

The Motor Port Function determines the mode of operation for the driver circuit.

- Motor Driver – Default setting which is used to drive the brushless DC motorized roller.
- Discrete Outputs – This setting is not used to drive a motor. Rather, each motor driver phase functions as a discrete output providing an additional three outputs per motor driver. The outputs are NPN (sinking) only. This setting also disables the Motor Disconnected Error status.

Note: Refer to the section on “Configuration” for more information on wiring precautions when using the motor port discrete output function.

#### 9) “Roller Speed Configuration” tag

The Roller Speed Configuration tab allows the selection of parameters which affect the operating speed of the motorized roller.

The parameters are separated for both motor drivers, A and B.

#### Gear Reduction

The Gear Reduction selection determines the value of the gear ratio based on the number of planetary gear stages within the motorized roller’s gearbox. The model’s speed code determines the number of stages present within the roller.

Speed Codes For PM486FE/FS/FP	Gear Stages
5 8 10 15 17	3
20 30 45 55 60	2
70 100 140 190 210 255	1

Example: PM486FE-60 (“60” is the speed code) has 2 gear stages.

Speed Codes For PM635FS	Gear Stages
6 10 15 20	3
25 40 60 75	2

Example: PM635FS-6 (“6” is the speed code) has 3 gear stages.

Note: When using a PM635FS motorized roller, use the “FE” motor type setting (Driver Configuration tab) for proper speed and direction settings.

#### Gear Ratio

The Gear Ratio is the calculated value of motor revolutions per tube revolution. It is determined by the Gear Reduction setting and the Motor Type setting (Drive Configuration tab). This field is not selectable.



### Speed Units

The Speed Units selection determines which unit (English or metric) and time (minute or second) bases are used.

- ft/min – Feet per minute
- ft/sec – Feet per second
- m/min – Meters per minute
- m/sec – Meters per second

### Roller Diameter

The Roller Diameter field is a user defined input. This diameter is in reference to the overall diameter of the motorized roller including any coating (rubber lagging) or cover (urethane sleeve). The units for this field are set by the Speed Units selection.

### Roller Speed

The Roller Speed fields are user defined inputs. The roller speed is in reference to the surface speed of the motorized roller including any coating or cover. The units for these fields are set by the Speed Units selection.

There are four presets. By using the appropriate output bits, the motorized roller can be changed to one of these preset speeds while in operation.

- Speed 1 – This field sets the default speed. If no preset speed is chosen by the controller logic, this is the speed in which the motorized roller will operate. This should always be set as the fastest speed.
- Speed 2 – This field sets a second speed preset. Speed 2 must be less than Speed 1.
- Speed 3 – This field sets a third speed preset. Speed 3 must be less than Speed 2.
- Speed 4 – This field sets a fourth speed preset. Speed 4 must be less than Speed 3.

### RPM

The RPM is the calculated value of motor revolutions per minute. It is determined by the Gear Ratio, Speed Units, Roller Diameter, and Roller Speed data. This field is not selectable.

Note: Regardless of the motorized roller, the operating range of the brushless DC driver is 621 to 6000 RPM. If any Roller Speed setting is out of the driver's operating range, a warning will be indicated.

#### 10) “Acceleration / Deceleration Configuration” tag

The Acceleration/Deceleration Configuration tab allows the configuration of acceleration and deceleration for each speed and direction of the motorized roller.

The parameters are separated for both motor drivers, A and B.

Note: Acceleration and Deceleration settings are not in effect when switching between set speeds.

##### Acceleration Time

The Acceleration Time selection determines time which elapses for a motorized roller to increase its speed from 0 (stopped) to the set speed. The time range is 0 to 2.5s in 0.1s increments.

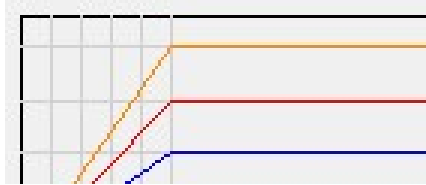
##### Deceleration Time

The Deceleration Time selection determines time which elapses for a motorized roller to decrease its speed from the set speed to 0 (stopped). The time range is 0 to 2.5s in 0.1s increments.

## Mode

The Mode selection determines the way in which the acceleration and deceleration function.

- Secs – Default setting in which the acceleration and deceleration are based on time (seconds). Each speed setting accelerates/decelerates within the same time period.



- m/sec<sup>2</sup> or ft/sec<sup>2</sup> – This setting sets the acceleration and deceleration on rate, not time. The rate is calculated by the acceleration/deceleration time values and Speed 1. The units displayed are based on the Speed Units selection (Roller Speed Configuration tab).



## 11) "Vendor" tag

Basic Module Information for IB-E series.



### 3.6 Data area of I/O connection for RSLogix and IB-E

Area for I/O data that is used between RSLogix and IB-E at I/O connection

has been created.

- i . Select 『Tasks』 - 『MainTask』 - 『MainProgram』 - 『ProgramTags』  
from tree.
- ii . Once I/O connection has been established, IBE:I and IBE:O is updated periodically.



Tag	Detail
IBE:C	Storage for data of AOP.
IBE:I	Storage for data from IB-E to RSLogix.
IBE:O	Storage for data from RSLogix to IB-E.

### 3.7 Example of ladder logic programming

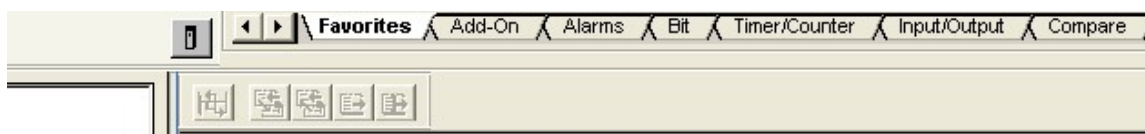
Sample of Ladder program for RSLogix

This chapter is simple explanation to programming ladder program.

- When Sensor A on IB-E is blocked, Motor A runs.

Status of Sensor A; IBE:I.Data[4].0

Output to Motor A run; IBE:O.Data[0].0

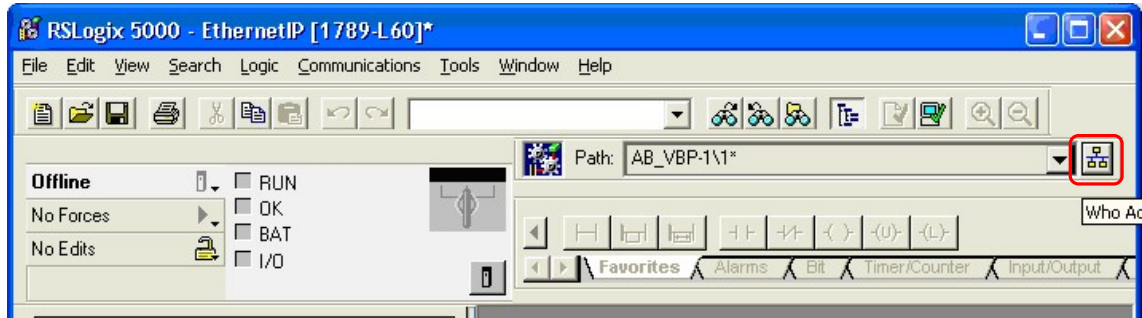


#### 1) Startup procedure of I/O connection for RSLogix

Ladder program must be downloaded to IB-E to PLC.

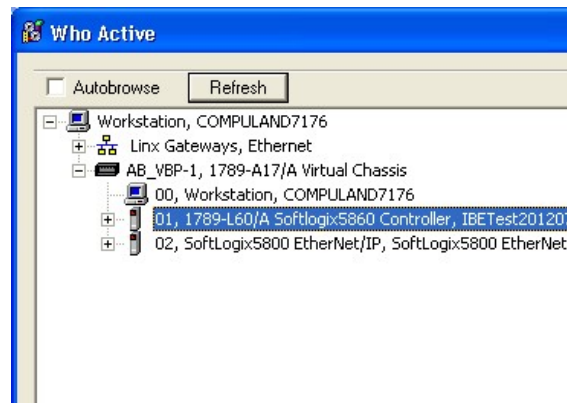
2) In order to run the ladder logic, it is necessary to download from RSLogix to SoftLogix.

- Click “Who Active” (Red frame in below picture)

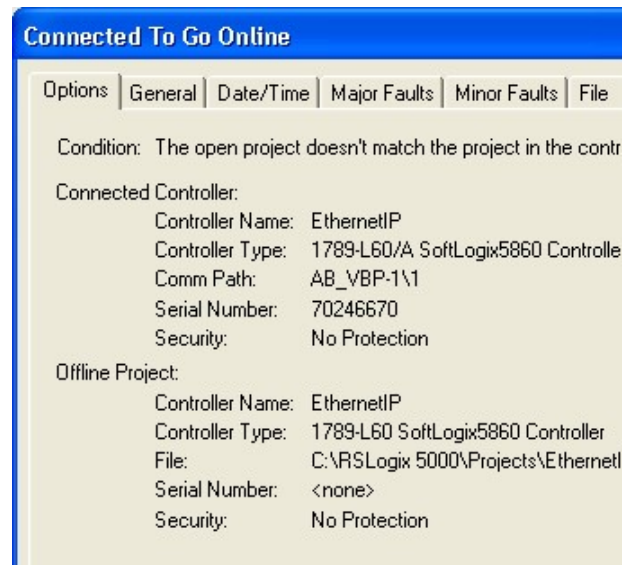


3) Select SoftLogix “01.1789-L60/A SoftLogix5800 Controller” and

Click “Go Online”.



4) Click "Download"

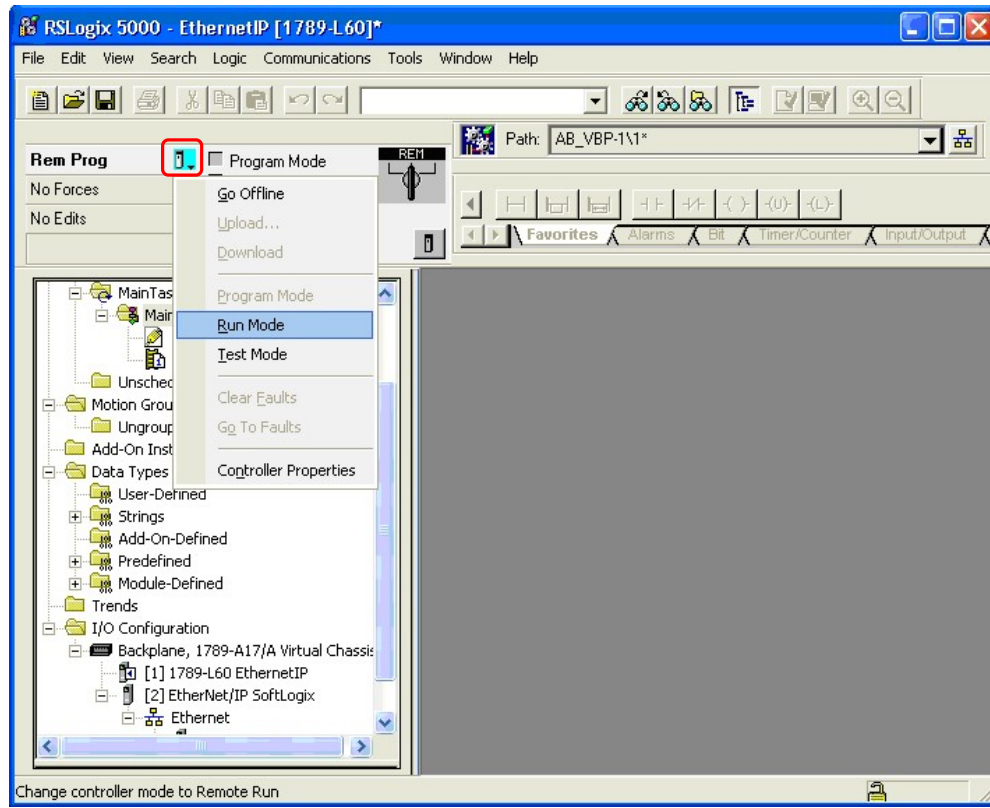


5) Click "Download"

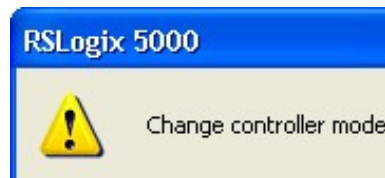


Note; Follow PLC user's manual.

6) Click “Run Mode” at below red frame to run ladder logic.



7) Click “Yes”



Note; Follow PLC user's manual.

### 3.8 Data structure of I/O connection

#### 3.3.1 Structure of transmit data from IB to PLC

Byte	Bit	Details	Byte	Bit	Details
0	-	Reserved	8	-	Data register D0
1	-		9	-	Data register D1
2	-		10	-	Data register D2
3	-		11	-	Data register D3
4	0	Sensor A (OFF/ON)	12	-	Data register D4
	1	Sensor B (OFF/ON)	13	-	Data register D5
	2	Sensor Alarm A (OFF/ON)	14	-	Data register D6
	3	Sensor Alarm B (OFF/ON)	15	-	Data register D7
	4	Motor Status A (Stop/Run)	16	-	Data register D8
	5	Motor Status B (Stop/Run)	17	-	Data register D9
	6~7	Reserved	18	-	Data register D10
5	0	Back EMF error (MA)	19	-	Data register D11
	1	Remote port current error (MA)	20	-	Data register D12
	2	Motor thermal error (MA)	21	-	Data register D13
	3	Driver card thermal error (MA)	22	-	Data register D14
	4	Stall error (MA)	23	-	Data register D15
	5	Unconnected motor error (MA)	24	-	Life Time LL (MA)
	6	JAM error (MA)	25	-	Life Time LH (MA)
	7	Sensor timer error (MA)	26	-	Life Time HL (MA)
6	0	Back EMF error (MB)	27	-	Life Time HH (MA)
	1	Remote port current error (MB)	28	-	Life Time LL (MB)
	2	Motor thermal error (MB)	29	-	Life Time LH (MB)
	3	Driver card thermal error (MB)	30	-	Life Time HL (MB)
	4	Stall error (MB)	31	-	Life Time HH (MB)
	5	Unconnected motor error (MB)	32~	Reserved	
	6	JAM error (MB)	63		
	7	Sensor timer error (MB)			
7	0	Remote IN 1 (OFF/ON)			
	1	Remote IN 2 (OFF/ON)			
	2	Remote IN 3 (OFF/ON)			
	3~7	Reserved			

### 3.3.2 Structure of transmit data from PLC to IB

Byte	Bit	Details	Byte	Bit	Details
0	0	Motor A RUN (STOP/RUN)	4	-	Data register D760
	1	Motor A RUN (STOP/RUN)	5	-	Data register D761
	2	Motor A Port U (OFF/ON)	6	-	Data register D762
	3	Motor A Port V (OFF/ON)	7	-	Data register D763
	4	Motor A Port W (OFF/ON)	8	-	Data register D764
	5	Motor B Port U (OFF/ON)	9	-	Data register D765
	6	Motor B Port V (OFF/ON)	10	-	Data register D766
	7	Motor B Port W (OFF/ON)	11	-	Data register D767
1	0	Motor A Speed1 (First speed)	12	-	Data register D768
	1	Motor A Speed2 (Second speed)	13	-	Data register D769
	2	Motor A Speed3 (Third speed)	14	-	Data register D770
	3	Motor A Speed4 (Forth speed)	15	-	Data register D771
	4	Motor B Speed1 (First speed)	16	-	Data register D772
	5	Motor B Speed2 (Second speed)	17	-	Data register D773
	6	Motor B Speed3 (Third speed)	18	-	Data register D774
	7	Motor B Speed4 (Forth speed)	19	-	Data register D775
2	0	Motor A Slow start (OFF/ON)	20~ 63	-	Reserved
	1	Motor A Slow down (OFF/ON)			
	2	Motor B Slow start (OFF/ON)			
	3	Motor B Slow down (OFF/ON)			
	4	Motor A Direction (OFF/ON)			
	5	Motor B Direction (OFF/ON)			
	6	Motor A Error Release (OFF/ON)			
	7	Motor B Error Release (OFF/ON)			
3	0	Remote Out 1 (OFF/ON)			
	1	Remote Out 2 (OFF/ON)			
	2	Remote Out 3 (OFF/ON)			
	3	Remote Out 4 (OFF/ON)			
	4	Remote Out 5 (OFF/ON)			
	5~7	Reserved			

### 3.9 Use precautions of I/O connection

Usage precautions for I/O connection are as follows.

#### (1) Operation for stopping I/O connection

When you operates with ITOH's application 『Itoh Configurator E/IP』 as mentioned below, I/O connection stops temporarily.

- Writing of property setting
- Download of ladder logic
- Execution of Reset
- Start and stop of current monitor
- Reset error with Error Information manually

And, I/O connection should be stopped at PLC side when you update the firmware.

#### (2) Requested Packet Interval (RPI)

Determine PRI in consideration for throughput of Ethernet / IP applicable PLC. For IB, it can be used from 2[msec] to 10[sec] by 1[msec].

#### (3) Manual error release

When bit for Error Release starts (0 to 1) and IB recognizes that it's in the error release conditions, it releases error.

After error release, bit for Error Release must be returned to 0 at PLC side.

Errors that make manual error release are as follows.

- Back EMF error
- Remote port current error
- Motor thermal error
- Driver card thermal error
- Stall error
- Unconnected motor error

#### (4) IB control (When PLC is not its master.)

When IB is set as master, slaved IB having a master other than PLC is not directly controlled operation including motor RUN with I/O connection. But writing, readout and manual error reset can be made for all IB.

#### (5) Motor speed setting

The first speed setting is made when all speed from the first to 4<sup>th</sup> is OFF.

In order priority valid, speed setting is determined when some speed from the 1<sup>st</sup> to the 4<sup>th</sup> is ON.

- Priority order

1<sup>st</sup> speed > 2<sup>nd</sup> speed > 3<sup>rd</sup> speed > 4<sup>th</sup> speed

#### (6) Motor RUN when error occurs

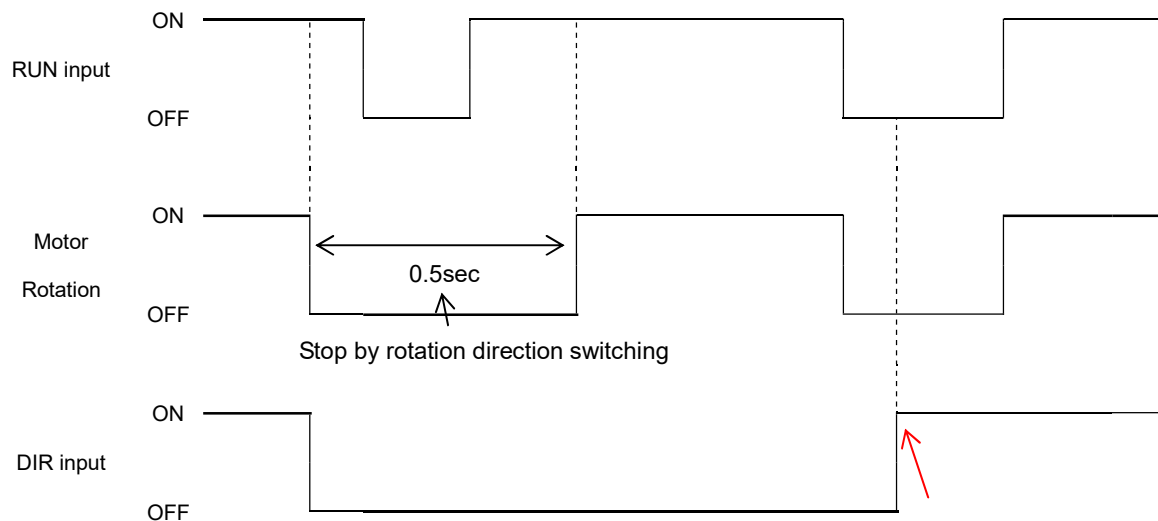
When motor error such as unconnected motor error, Stall error, Thermal error, Back EMF error, occurs, the motor does not run even if conditions for RUN are satisfied.

#### (7) Motor Status in slowing down

When slow down setting is enabled, the motor rotates with decreased speed after Motor-RAN is made in OFF. In slowing down, even if the motor rotates, Motor Status remains in OFF status.

#### (8) Motor running in switching the rotation direction

When the rotation direction is switched in motor running, the motor starts in the reverse direction after stopping for 0.5sec. While the motor is stopping for 0.5sec, even if RUN input is made, the motor does not run. In addition, there is no motor stop for 0.5sec when the rotation direction is switched while the motor is normally stopping.



There is no stop for 0.5 sec. when the rotation direction is switched in normal stop.



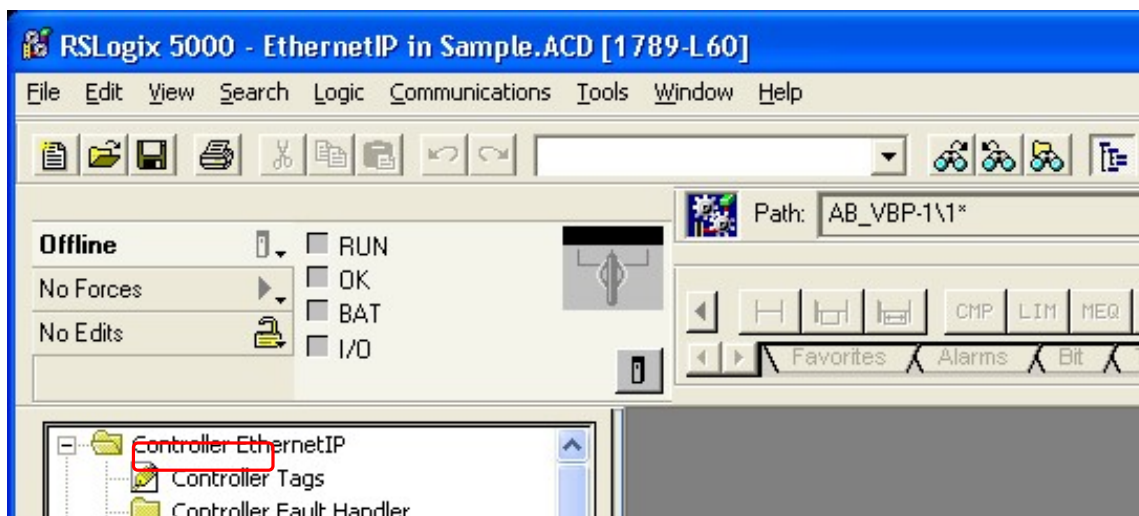
### 3.10 Explicit message

IB is compatible with Explicit message.

This manual is showing how to use 『Device Reset』 command and 『Get Attribute Single』 command with RSLogix.

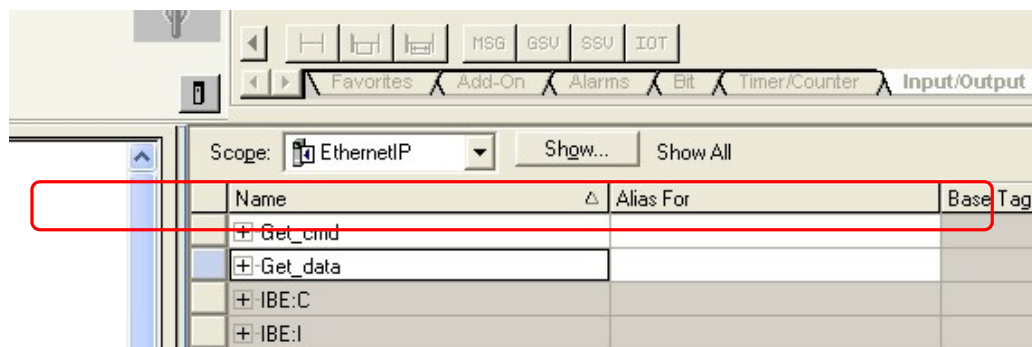
#### 3.10.1 Sample of Device Reset command

- (1) In the tree view, find 『Tasks』 ⇒ 『MainTask』 ⇒ 『MainProgram』 and finally choose 『ProgramTags』 .



- (2) Choose the project name from Scope list and add the tag (Reset\_cmd and Reset\_data) to Edit Tags』 .

Tag	Data Type
Reset_cmd ( Tentative name )	MESSAGE
Reset_data ( Tentative name )	SINT

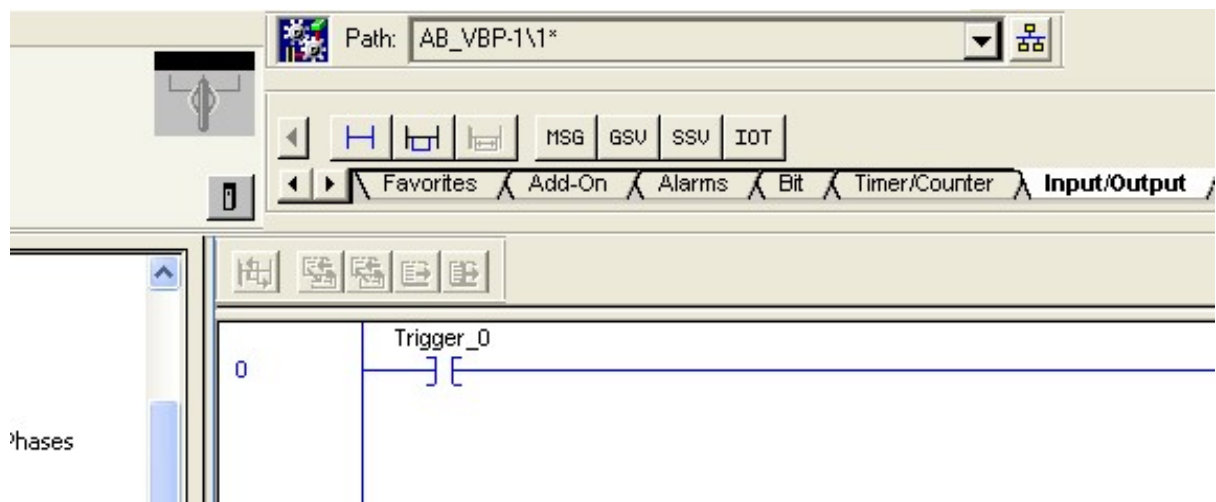


- (3) In the tree view, find 『Tasks』 ⇒ 『MainTask』 ⇒ 『MainProgram』 and finally choose 『MainRoutine』 .



- (4) As the picture below is showing, input contact and MSG command.

There is Contact in 『Bit』 and MSG command in 『Input/Output』 .



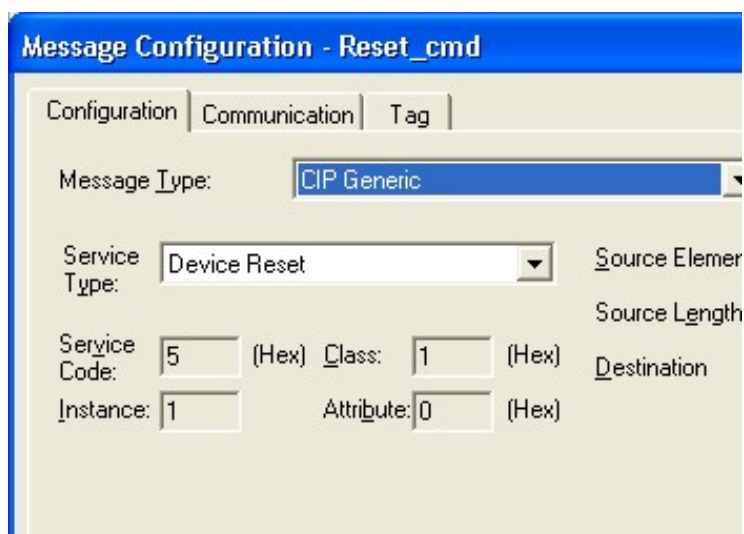
- (5) Input 『Reset\_cmd』 ( it's Data Type: MESSAGE's tag added in item (2)) to Message Control of MSG command. After inputting, click the red mark.



(6) Message Configuration display, set up as follows and choose 『OK』 when the setup is completed.

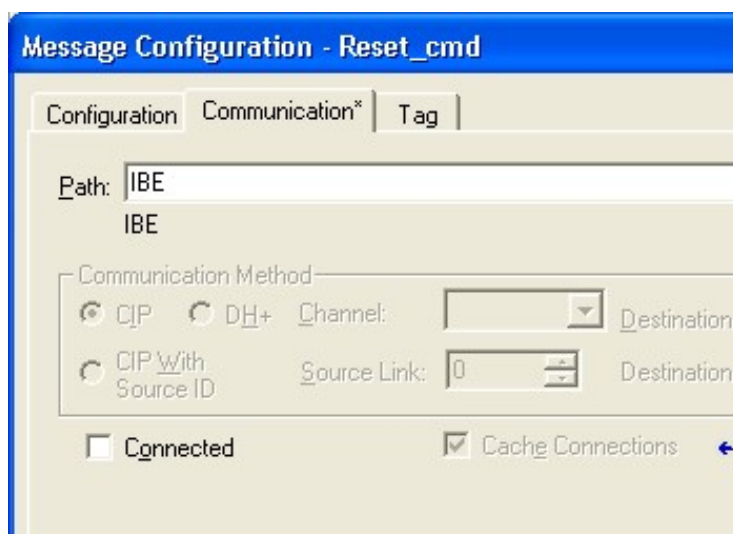
• Configuration

Item	Setting
Message Type	CIP Generic
Service Type	Device Reset
Source Element	Reset_data ※Data Type: MESSAGE's tag added in item (2)
Source Length	1



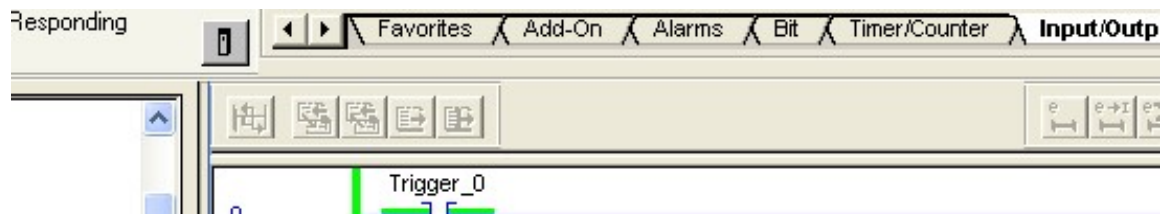
• Communication

Item	Setting
Path	Device to make a Device Reset ※ Click 『Browse...』 to see the selection screen



(7) Completion of setting

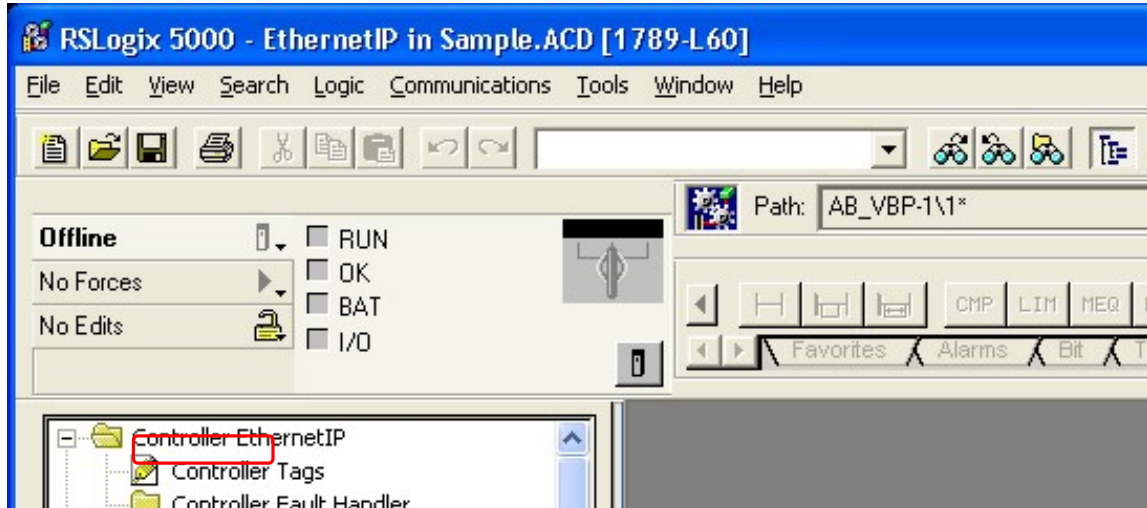
When I/O connection starts according to 『3.2.3 I/O connection starting of RSLogix』 , in Contact Trigger\_0 starting, IB specified in the item (5) is released.



### 3.10.2 Sample of Get Attribute Single command

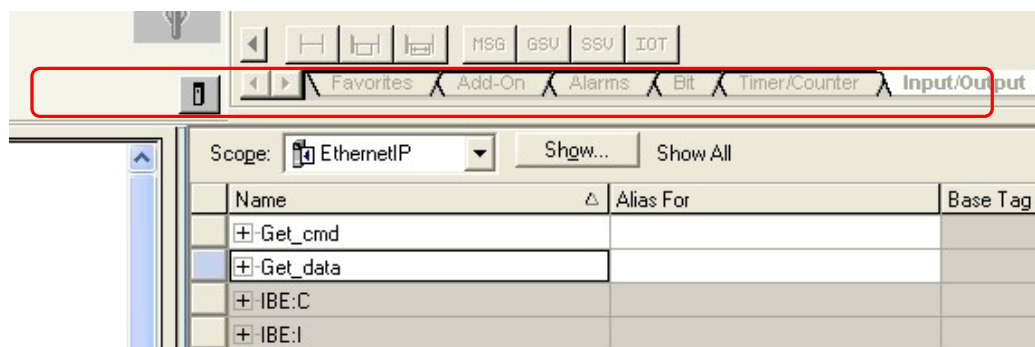
<Sample> Read out IB's MAC address

(1) In the tree view, find 『Tasks』=『MainTask』⇒『MainProgram』and choose 『ProgramTags』.

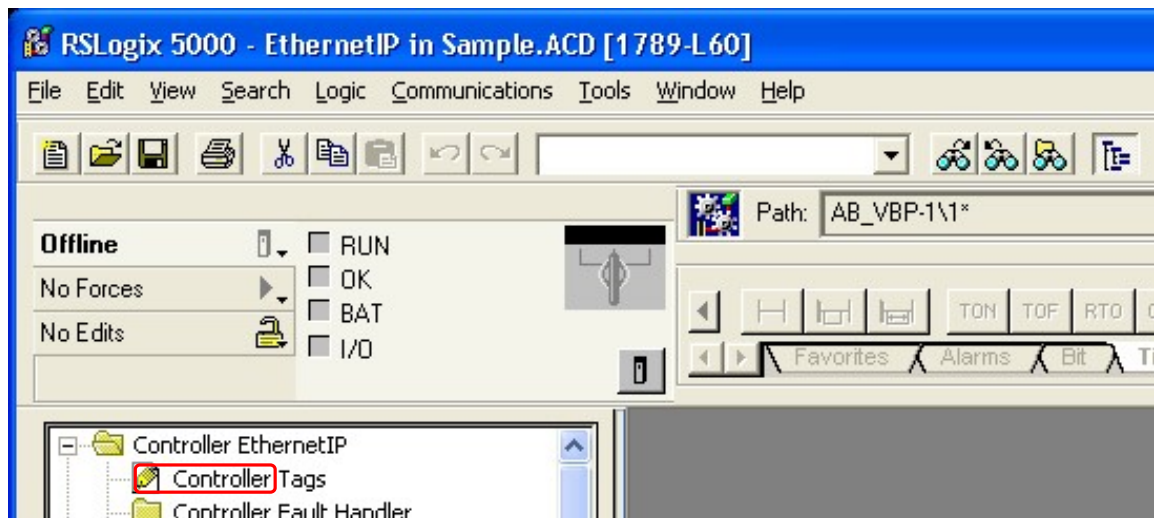


(2) Choose the project name from Scope list, Add the tag (Reset\_cmd and Reset\_data) to 『Edit Tags』.

Tag	Data Type
Get_cmd ( Tentative name )	MESSAGE
Get_data ( Tentative name )	SINT[6] ※Due to MAC address date size, 6Byte

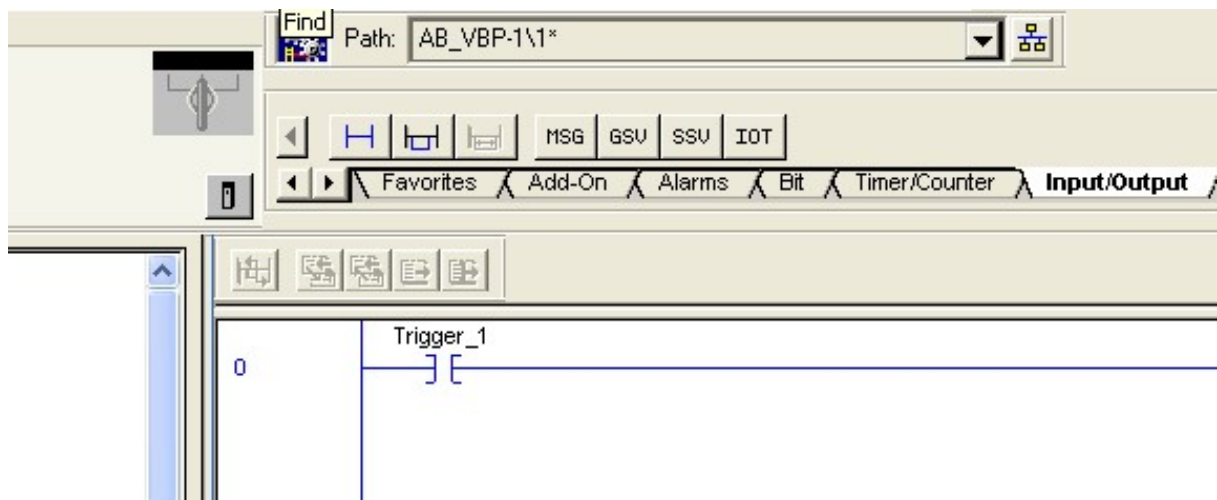


(3) In the tree view, find 『Tasks』⇒『MainTask』⇒『MainProgram』 and choose 『MainRoutine』.



(4) As the picture below is showing, input contact and MSG command.

There is Contact in 『Bit』 and MSG command in 『Input/Output』.



(5) Input 『Reset\_cmd』 ( it's Data Type: MESSAGE's tag added in item (2)) to Message Control of MSG command. After inputting, click the red mark.

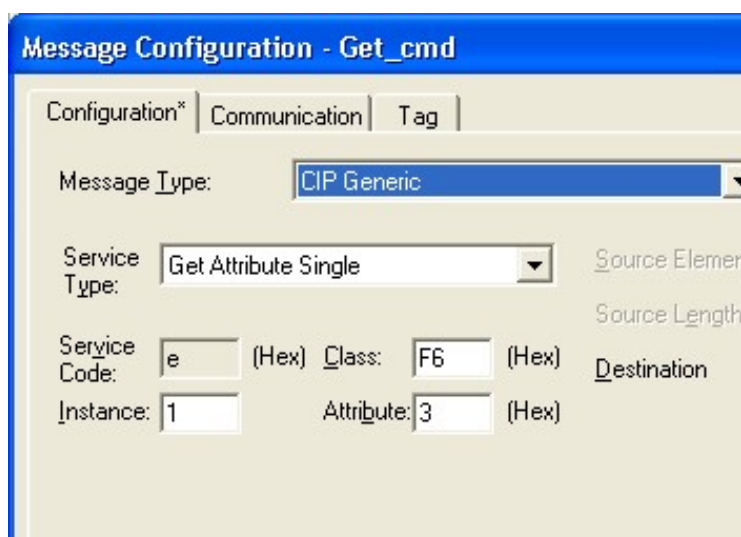


(6) Message Configuration display, set up as follows and choose 『OK』 when the setup is completed.

• Configuration

Item	Setting
Message Type	CIP Generic
Service Type	Get Attribute Single
Class	F6 (Hex) ※
Instance	1 (Hex) ※
Attribute	3 (Hex) ※
Destination	Get_data ※Data Type: SINT [6]'s tag added in item

※ Please note that the valued of MAC address is stored in Class:F6, Instance:1 and Attribute:3.



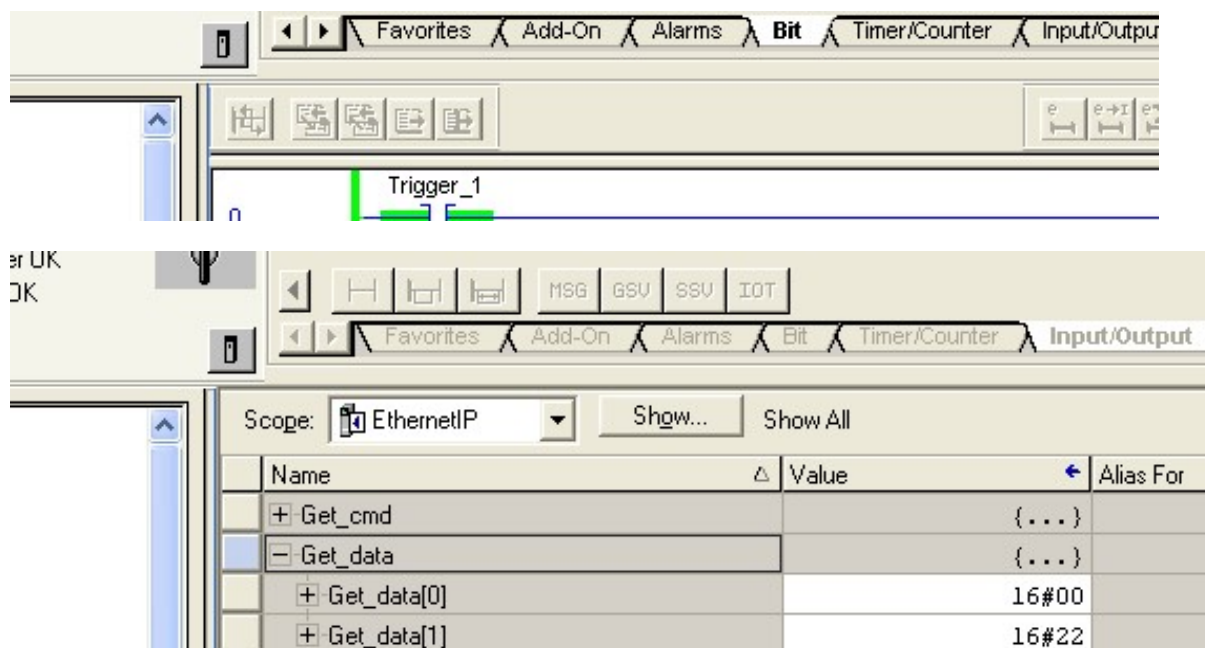
• Communication

Item	Setting
Path	Device to make a Get Attribute Single ※Click 『Browse...』 to see the selection screen

### (7) Completion of setting

When I/O connection starts according to 『3.2.3 I/O connection starting of RSLogix』, in Contact Trigger\_1 starting, IB specified in the item (5) is read out and it is stored in Get\_data.

In this case, MAC address of IB is 『00:22:21:00:00:30』.



The screenshot displays the RSLogix software interface. The top window shows a ladder logic diagram with a contact labeled 'Trigger\_1'. The bottom window shows the 'Input/Output' tab with a table of I/O data.

Name	Value	Alias For
+ Get_cmd	{...}	
- Get_data	{...}	
+ Get_data[0]	16#00	
+ Get_data[1]	16#22	



### 3.11 Ethernet Communication specifications

LAN interface	10BASE-T / 100BASE-TX automatic recognition
Connector specs.	RJ-45
Device type	Generic device
Corresponding message	Explicit message, I/O connection (2~10,000msec:1msec unit)
I/O data length	64Byte for both input/output
IP address	Initial setting: 192.168.0.1(Customizable)
Corresponding object (Class code)	Identity (0x01) Message Router (0x02) Assembly (0x04) Connection Manager (0x06) Device Level Ring (0x47) Qos (0x48) TCP/IP Interface (0xF5) Ethernet Link (0xF6)

# Chapter 4

## Troubleshooting

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## 4.1 Feature

This chapter describes troubleshooting methods, along with anticipated causes and suggested solutions.

## 4.2 LED indication

The IB-E has self diagnostic functions with LED indications.

### 4.2.1 Network LED

LED	LED indication pattern		Symptoms
	Green	Red	
MS LED (LED318)	OFF	OFF	No network power (※1)
	ON	OFF	Normal operation
	ON	Flash(1Hz)	No setting on device
	OFF	Flash(1Hz)	Network error at LAN 1 or LAN 2
	OFF	ON	Network error at LAN 1 and LAN 2
	Flash(1Hz)	Flash(1Hz)	Preparing to start-up
NS LED (LED319)	OFF	OFF	No communication
	Flash(1Hz)	OFF	Normal operation
	ON	OFF	I/O connection
	OFF	Flash(1Hz)	I/O connection timeout error
	OFF	ON	IP address duplicated error
	Flash(1Hz)	Flash(1Hz)	Preparing to start-up
STS LED (LED309)	ON	-	Power ON on Network PCB
	Flash(6Hz)	-	Low voltage error
	Flash(1Hz)	-	Firmware up-greating
	OFF	-	No power on cNetwork PCB
LAN LED (LED401・403)	Flash	-	LAN connection has activity
	OFF	-	No LAN connection
Sensor LED (LED310・311)	ON	-	Sensor ON (※2)
	OFF	-	Sensor OFF
Remote_IN LED (LED306~308)	ON	-	Remote input was injected (※2)
	OFF	-	No Remote input
Remote_OUT LED (LED301~305)	ON	-	Remote outout was discharged (※2)
	OFF	-	No Remote output

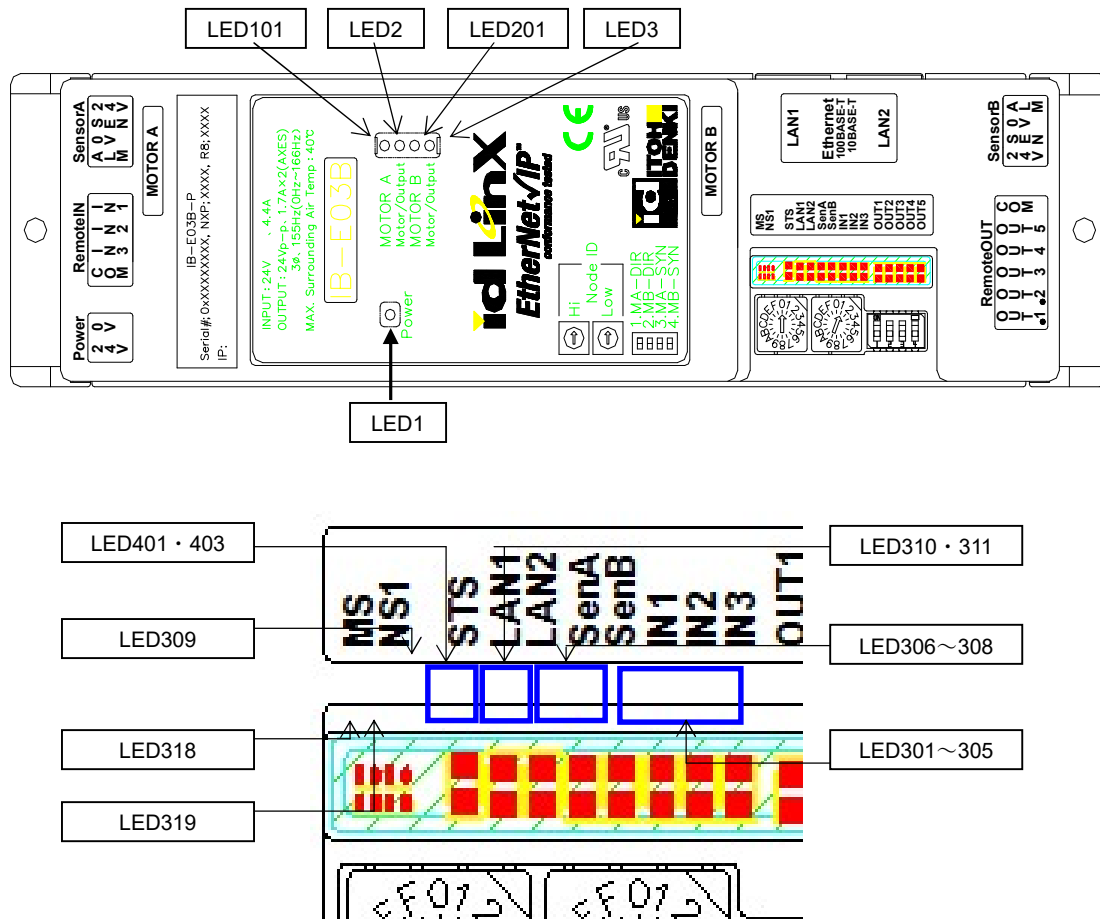
(※1) In case both SW402 and SW403 are "00", the MS LED becomes OFF.

(※2) Sensor LED, Remote\_IN LED and Remote\_OUT LED1 will be ON while IB-E initialization.

#### 4.2.2 Motor driver LED

LED	LED indication patern		Symptoms
	Green	Red	
PowerLED (LED1)	ON	-	"Power ON" to motor driver
	OFF	-	"No power" to motor driver
Motor/Output LED (LED2・3)	ON	-	Assigned as motor
	OFF	-	Assigned as remotor output
MOTOR LED (LED101・201)	OFF	OFF	Normal (Motor stop)
	Flash(1Hz)	OFF	Motor is turning to CW direction
	ON	OFF	Motor is turning to CCW direction
	OFF	Flash(6Hz)	Low voltage error
	OFF	Flash(1Hz)	Motor unplugged error
	ON	Flash(1Hz)	Motor lock error
	OFF	ON	Thermal error
	ON	Flash(1.7s6Hz x2times)	Back EMF error
	Flash(1Hz)	Flash(1Hz)	JAM error
	Flash(6Hz)	Flash(6Hz)	Sensor timer error

【LED and Switch location on IB-E03】



### 4.3 Error list on IB-E

Descriptions of each error are shown below table.

Refer Chapter 2.6.2, Chapter 2.6.2 and Chapter 4.2.2 to see more error information.

Error type	No (※1)	Suspected Causes	Suggested Solution(※2)	Reset method	Ladder	Motor
Under Voltage	1	Drop voltage below 20 V DC	Keep voltage 20 V DC or over	Auto	Stop	Stop
Fuse blown		Fuse has been blown	Replace to new IB-E	-	Run	Stop
Motor Disconnected	2	Motor disconnected	Connect motor	Auto/Manu	Run	Stop
Motor Lock	3	Hall pulse status does not change for 1sec. KE motor is 0.5sec to be motor stall error	Auto; Change hall pulse status or reset by upper level. Manu; Reset by upper level.	Auto/Manu	Run	Stop
PCB Thermal	4	Temperature on PCB rises	Remove the heat on PCB	Auto/Manu	Run	Stop
Motor Thermal	5	Temperature on motor rises	Remove the heat on motor	Auto/Manu	Run	Stop
Back EMF	6	40 V DC over for 2sec or more 60 V DC over for 0.1sec or more	40 V DC or less	Manu	Run	Stop
Motor Port current limit		Port current 4A for 0.1sec	4A or less	Manu	Run	Stop
Jam	7	Active Y22 or Y23	Remove causes and turn OFF Y22 or Y23.	Reset by Ladder logic	Run	Base on ladder logic
Sensor Timer	8	Active Y29 or 30	Remove causes and turn OFF Y29 or 30		Run	
Sensor Alarm	9	Sensor alarm signal is injected to CN303 or CN304	Remove sensor alarm input		Run	

(※1) When multiple error are appeared, high priority error is indicated on LED.  
Low priority error also are reset when high priority error was reset.

(※2) Refer Chapter 2.6.2.2 and Chapter 3.4 to reset error manually.

## 4.4 Motor does not run

In case motor does not run, check below procedure.

### 1) Check error

Check status of IB-E by Error Information of Itoh Configurator E/IP. (Chapter 2.6.2)

If errors are appeared, remove causes of the error.

Refer Chapter 4.3 to see error information.

### 2) JOG operation

Turn on motor by forcible run of Itoh Configurator E/IP.

Refer Chapter 2.7.3

If motor did not run by forcible run, make sure wiring is correct.

If the wiring is correct, contact to distributor.

### (3) Switch setting

Check if SW401 is set properly. Refer Chapter 1.3 for detail of switch setting.

If the motor is set as synchronize, the motor will not run by own motor run command.

### (4) Wiring

- Check sensor LED is ON when the sensor was blocked.  
If the LED was not ON, check wiring of the sensor. If wiring is correct, replace the sensor.  
If replaced LED was not ON, please contact to distributor.
- Check remote output LED is ON when remote input was injected.  
If the LED was not ON, check wiring of the input.  
If wiring is correct, please contact to distributor.
- ※ In case remote input was not used, it is not necessary to check.

#### (5) Property setting

Read property by Itoh Configurator E/IP and check the properties are set correctly.

Refer Chapter 2.5 to read/write property.

- Motor port setting

Motor will not run if the port is set as motor port.

- Motor type

Motor will not run if NA is selected on motor type.

- Master / Slave

Master mode; Motor runs by ladder logic's motor run commands.

Slave mode; Motor runs by commands from the other master IB-E or PLC.

- Communication between IB-E.

Check communication setting for receive/transfer data are correct.

※ In case motor is controlled by I/O connection, it is not necessary to check.

#### (6) Ladder logic download

Check ladder logic was downloaded properly.

Refer Chapter 2.7.1 to check ladder logic information by Itoh Configurator E/IP.

※ In case motor is controlled by I/O connection, it is not necessary to check.

#### (7) Ladder logic

Review ladder logic by ladder monitor Itoh Configurator E/IP.

Refer Chapter 2.6.1 to monitor the ladder logic.

※ In case motor is controlled by I/O connection, it is not necessary to check.



(8) I/O connection

Check LED on IB-E or LED on PLC to I/O connection is established.

NS LED(green) is ON when I/O connection was established. Refer Chapter 4.2.1

- I/O connection was not established.

Check I/O connection setting. Refer Chapter 3 to check I/O connection.

If setting of I/O connection is correct, refer Chapter 4.5.

- I/O connection was established

Review PLC ladder program.

Refer data structure of I/O connection at Chapter 3.3.

## 4.5 Communication error

If lost communication, check receive/transfer data of property  
or I/O connection setting of PCL

(1) Check MS LED on IB-E

- If MS LED indicates communication error.

Contact to distributor.

- If MS LED indicates unspecified.

Check IP address of IB-E.

(2) Check NS LED on IB-E

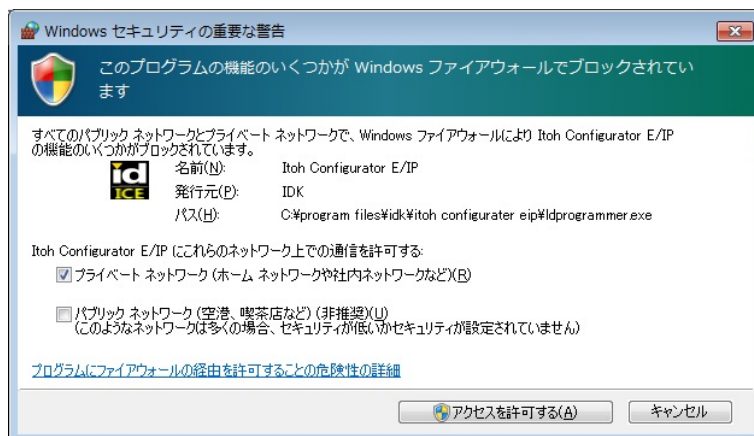
- If NS LED indicates duplicated IP address, check other equipment's IP address.

(3) Check LAN LED

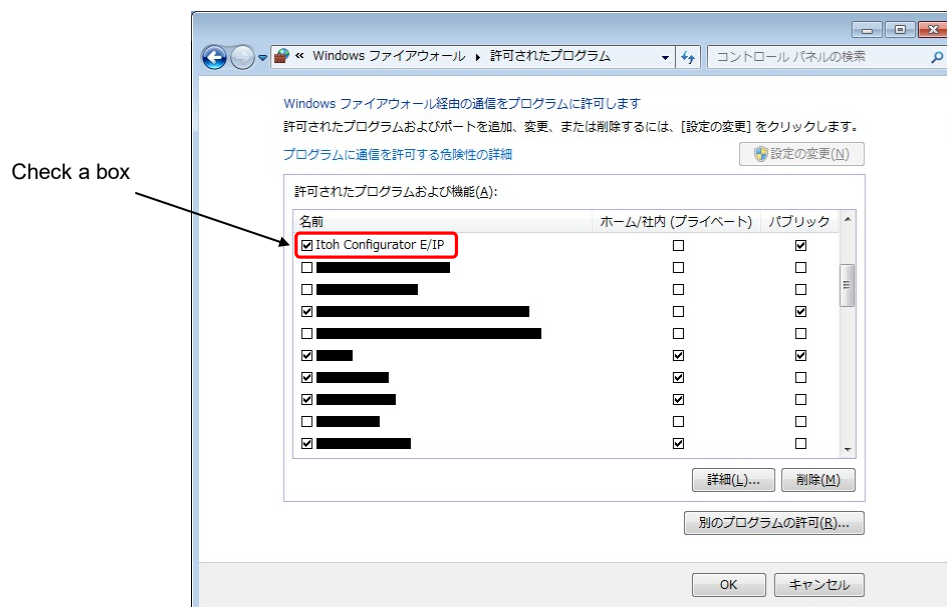
If LED is not blinking, make sure LAC cable is connected.

## 4.6 Firewall setting

When Itoh Configurator E/IP connects to IB-E at first time, below message will be shown. Click “Allow” to allow access.




Or allow connect with Itoh Configurator I/IP from “Control Panel” as showing below.



This display is Windows7.

In case connection was not allowed, below feature can not be functional.

Feature	Symptom
Download ladder logic	FtpPutFile Error 
Ladder monitor	Can not monitor
Current monitor	

Open each port if set individually by security software.

Type	Port number	Detail
UDP	40002	Monitor, Discovery
TCP	50001	Read/Write property, Jog operation
FTP	20	Download ladder logic
FTP	21	

#### 4.7 Read/Write failure from device

When failed read/write from device, make sure below table.

Condition of IB-E is still boot up. (IB-E is not ready to communicate)	It will take time to complete boot-up after cycle power or reset IB-E.
IB-E does not exist on the network.	Make sure IP address.
Disconnected LAN	Make sure connection of LAN cable.
Ladder logic was not compiled. (Build the ladder logic)	Ladder logic can not be downloaded
Itoh Configurator E/IP was not allowed to connect by firewall.	Refer Chapter 4.6

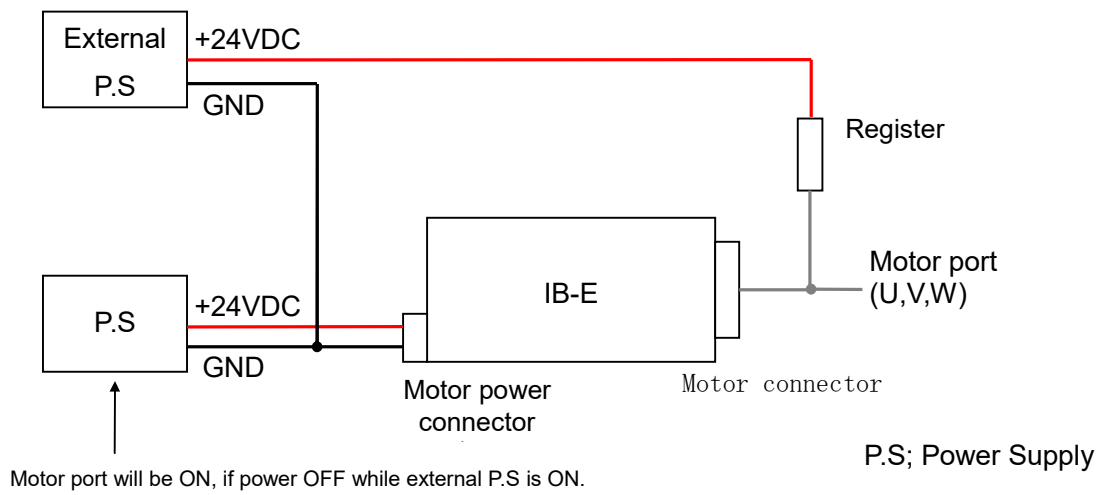
## 4.8 Precaution to use remote output

- Motor port output

Motor connector can be used output when “Port” is selected at Motor Port Setting.

The port is only available NPN open drain output.

Do not turn OFF the power if external power supply is used for motor port, otherwise unexpected behavior will be appeared. IB-E may be broken.



# Technology for tomorrow



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