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CIMON-PLC

PLCS USER MANUAL - BASIC

Important User Information

For your safety and effective use, please read Safety Instruction carefully before product installation or operation. Safety instructions must be kept in order to prevent accident or danger with proper and correct uses of the product.

⚠ **WARNING:** identifies information about practices or circumstances that can lead to personal injury, death or economic loss.

⚠ **ATTENTION:** identifies information about practices or circumstances that can lead to severe or slight injury, damages to product or economic loss.

⚠ **SHOCK HAZARD:** Dangerous voltage may be present.

After reading the user manual, please keep the manual in a highly visible place for the next users.

Safety Instructions for design process (⚠WARNING)

Please have a protection circuit installed on the exterior of PLC to protect the whole control system in case of failures from external power or PLC. Abnormal outputs or operations from PLC may cause serious problems for the whole system.

Install protection units on the exterior of PLC such as emergency stop, protection circuit, high/low limit switch and forward/reverse rotation interlock circuit to prevent the system from physical damages.

If any system error (watch-dog timer error, module installation error, etc.) is detected during a CPU operation in PLC, all output signals are designed to be turned off and stopped for safety of the whole system. However, there are exceptions when CPU cannot detect system errors due to device failures in Relay and TR, causing output signals to remain active. Therefore, have an additional circuit installed to monitor the output status for some certain outputs that may cause significant problems.

Do not connect output module with overload of rated current or have a short circuit. It may cause a fire.

Do not design the external power of the output circuit to be turned on earlier than PLC power. This may be a cause for abnormal outputs or operations.

When computers or other external equipment exchange data with PLC or modify operation modes, have interlock circuits installed in the sequence program for safe operations in the system. Communication errors may cause abnormal outputs or operations.

Safety Instructions for design process (⚠ ATTENTION)

I/O signal or communication lines should be wired with a minimum distance of 100mm from a high-voltage line or power line. It may cause abnormal outputs or operation.

Safety Instructions for installation process (⚠ WARNING)

PLC should only be used in the environment stipulated in PLC manual or general standard of data sheet. If not, this may cause electric shock, fire, malfunction or deterioration on the product.

Fix PLC on the DIN rail tightly.

When you insert or remove the module, be sure power is removed. Electric shock can occur and affect module operation.

When you insert expansion module next to module, be sure modules are connected tightly. If not, electric shock, fire or abnormal operation may be caused.

Make sure a PLC is not in direct contact with extreme vibrations under vibrating environments. Fail to do so may cause electric shock, fire or abnormal operations.

Never let metallic foreign substance inside the product. This may cause electric shock, fire or abnormal operations.

Safety Instructions for wiring process (⚠ WARNING)

Before you install and wire module, disconnect power to the controller system.

Be sure that all terminal protective covers are closed before power is supplied to the controller system.

Safety Instructions for wiring process (⚠ ATTENTION)

Have rated voltages and terminal arrangements in each product checked prior to its correct wiring process. If not, it may cause fire, electric shock and abnormal operations.

Wiring process requires that terminal screws be tightly secured with specified torque. If the screws get loose, this could be a cause for short circuit, fire or abnormal operation.

Be sure to use Class 3 wires exclusively for PLC when grounding FG terminals. Unstable grounding may cause an abnormal operation.

Do not allow any foreign substances such as wiring waste inside the module. Fail to do so may cause fire, property damage or abnormal operation.

Safety Instructions for test-operation and maintenance (⚠ WARNING)

Before you install and wire module, disconnect power to the controller system. Electric shock or damage on the product may be caused.

Be sure that all terminal protective covers are closed before power is supplied to the controller system. Fail to do so may cause electric shock.

Safety Instructions for test-operation and maintenance (⚠ ATTENTION)

Do not separate PCB from the module case or make attempts to alter the product. It may cause fire, electric shock or abnormal operation.

When you insert or remove the module, be sure that power is removed. Electric arc can occur and it can affect module operation.

Please keep radio and cellphones away from PLC for a minimum distance of 30cm. This may cause abnormal operation.

Safety Instructions for waste disposal (⚠ ATTENTION)

PLC module and battery contained in the module should be collected separately from any unsorted municipal waste. Do not incinerate or dispose of PLC module and batteries in general waste collection. Batteries may explode or rupture violently.

Table of Contents

1. Introduction

1.1 Introduction of Manual

This manual explains how to install and wire CPU modules. It also describes the features and functions of CPU modules and gives you an overview of CICON software with PLC-S CPU modules.

Manual Name	Description	Manual Number
Basic PLC-S CPU Module	Describes basic features and functions of PLC-S CPU modules and programs	PLCS-CPU-00-1301200
Advanced PLC-S CPU Module	Describes detailed features and functions of PID, High Speed Counter, Communication modules and programs	PLCS-CPU-01-0000000
PLC-S Analog Module	Describes operation methods, configurations and functions of PLC-S Analog modules	PLCS-AMM-00-0000000
PLC-S Communication Module	Describes operation methods, configurations and functions of PLC-S Communication modules	PLCS-COM-00-0000000
CICON Manual	Describes how to build ladder program and use various functions of CICON software to use PLC-S	CICON-USM-00-0000000
CICON PLC Command	Describes each function of Command which is used in CICON software	CICON-FUN-00-0000000

1.2 Features

High Speed MPU built-in
200ns/step 32bit High speed processing

Wide range of I/O
Built-in I/O from 14 to 32 points
Support for local expansion modules up to 384 I/O
Maximum 11 expansion modules

User Friendly Software
Ladder-logic(LD, IL), Function Block programming
Structured text
Easy programming with embedded USB port

Built-in Functions
Maximum 32Loops PID is built-in.
Auto-Tuning and PID monitoring window supported.
Up to 20Kpps HSC inputs (2Channels)
Up to 100Kpps 2 axes of Pulse Output
Embedded RS232C(Option: RS485 and Ethernet)
Real Time Clock(RTC) with no battery required

Compact sized PLC with DIN Rail type
30x90x61mm(120g) size module supports DIN rail mounting

1.3 Specifications

1.3.1 General Specifications

Items	Specification					Reference
Ambient Temp.	-10 ~ 60 ℃					
Storage Temp.	-15 ~ 80 ℃					
Ambient Humidity	5 ~ 95%RH, Non-condensing					
Storage Humidity	5 ~ 95%RH, Non-condensing					
Vibration	Occasional vibration					
	Frequency	Acceleration	Pulse width	Times		IEC61131-2
	10 ≤ f < 57Hz	-	9.8 ㎨	10 times for each direction X ,Y, Z		
	57 ≤ f <150Hz	9.8 ㎨				
	Continuous vibration					
	Frequency	Acceleration	Pulse width	Times		
	10 ≤ f < 57Hz	-	0.035mm	10 times for each direction X ,Y, Z		
	57 ≤ f < 150Hz	4.9 ㎨	-			
Shocks	Peak Acceleration: 147 ㎨ Duration : 11ms Pulse wave type : Half-sine (3times for each direction X, Y, Z)					IEC61131-2
Impulse Noise	Square wave impulse noise	±2,000V				CIMON standard
	Electrostatic discharge	Voltage : 4KV(Contact discharge)				IEC61131-2 IEC1000-4-2
	Radiated electromagnetic field noise	27 ~ 500 MHz 10V/m				IEC61131-2 IEC1000-4-3
	Fast transient Burst noise	Classification	Power supply	Digital Input/Output (24V or more)	Digital Input/Output (24V or less) Analog Input/Output Comm. Interface	IEC61131-2 IEC1000-4-4
		Voltage	3KV	1KV	0.25KV	
Operation ambience	Free from corrosive gases and excessive dust					
Cooling method	Air-cooling					

1.3.2 Performance Specification

Items			Specifications	Remark
Power			DC 12 - 24V / 10W (In case of maximum expansion)	
Program control method			Cyclic execution of stored program, Time Driven Interrupt	
I/O control method			Indirect method, Directed by program instruction	
Program language			LD(Ladder Diagram), IL(Instruction List), SFC(Sequential Function Chart)	
Data processing method			32bit	
Instructions	**Sequence**		55 Instruction	
	Application		389 Instruction	
Processing speed (Sequence)			200 ns/Step	
Program capacity			15K Step	
Maximum I/O points			384 points	
Operation mode			Run, Stop, Remote Run, Remote Stop	
Back-up method			K address by (Latch) parameter	
Total program			128	
Total program (Max. 128)	**Scan**		Scan, Subroutine, Cold/Hot Start initialization, Periodic Interrupts	
	Periodic Interrupts		Maximum 16 scan program (Minimum period :10ms)	
	Special		PID Control, HSC, Positioning, I/O Input Filter	
	Communication		Serial, Ethernet, MODBUS/RTU Master, MODBUS TCP, High Speed Link	
	Etc.		SFC, FBD (Function Block Diagram : under development)	
Self-diagnosis function			Detects delay of scan time, memory, I/O, Battery, Power supply	
Restart			Cold, Hot Restart	
Maximum expansion			1 CPU module + maximum 11expansion modules	
Data memory		**X**	1024 points (X0000 – X063F)	Bit
		Y	1024 points (Y0000 – Y063F)	Bit
		M	8192 points (M0000 - M511F)	Bit
		L	4096 points (L0000 - L255F)	Bit
		K	4096 points (K0000 - K255F)	Bit
		F	2048 points (F0000 - F127F)	Bit
		T	512 points (T0000 – T0511)	Word
		C	512 points (C0000 – C0511)	Word
		S	100 states x 100 set (00.00 - 99.99)	
		D	10000 words (D0000 - D9999)	Word
		Z	1024 words (Call Stack : Z0000 - Z0063, Z1000 - Z1063)	Word
		R	16 points (Index)	
High Speed Counter			20Kpps, 2 Phase 2Ch.(in case of operating 2Ch simultaneously 10kpps) 1Phase pulse Input + Direction signal	
Positioning			X axis: Position/Speed control 100Kpps Y axis: Position control 5Kpps, Speed control 100kpps	
PID			32 Channels, Auto-Tuning	
RTC			Battery (CR2032 Backup)	
Communication channel			Built-in : USB port(for program upload/download), RS232C 1CH.	
			Option : RS485 1Ch / Ethernet 1port (10/100Mbps auto scan)	
Etc.			Real number operation, Online edit	

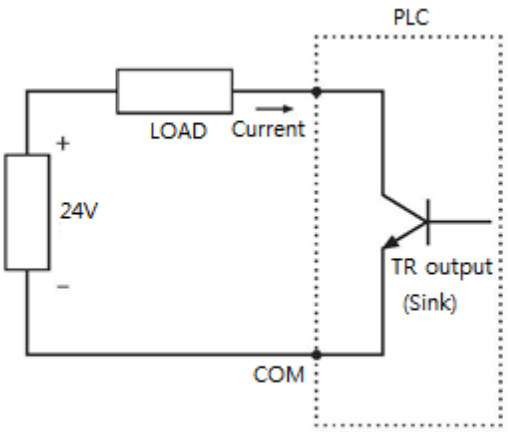
1.4 Product LINE-UP

1.4.1 PLC-S CPU LINE UP

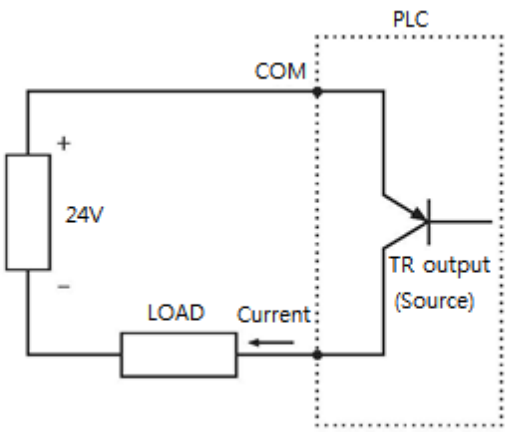
PLC-S CPU is composed of 4 different types such as CM3-SP32MDT, CM3-SP32MDC, CM3-SP16MDR and CM3-SB16MDT. CM3-SP32MDT consists of 16points of TR Sink type output and 16points of Input. CM3-SP32MDC consists of 16points of Input and 16points of TR source type output. CM3-SP16MDR consists of 8points of Input and 8points of Relay output. According to communication option, V, E and F letter is added at the end of CPU module name.

Model name	Input	Output	RS-232C	RS485	Ethernet	Remark
CM3-SP32MDT	16pts	TR Sink type 16pts	O	X	X	SD/MMC option available
CM3-SP32MDTV			O	O	X	
CM3-SP32MDTE			O	X	O	
CM3-SP32MDTF			O	O	O	
CM3-SP32MDC	16pts	TR Source type 16pts	O	X	X	SD/MMC option available
CM3-SP32MDCV			O	O	X	
CM3-SP32MDCE			O	X	O	
CM3-SP32MDCF			O	O	O	
CM3-SP16MDR	8pts	Relay type 8pts	O	X	X	
CM3-SP16MDRV			O	O	X	
CM3-SP16MDRE		Relay type 6pts	O	X	O	
CM3-SP16MDRF			O	O	O	
CM3-SB16MDT	8pts	TR Sink type 8pts	O	X	X	
CM3-SB16MDTV	8pts	TR Sink type 8pts	O	O	X	

● **Sink Type(NPN Type, - COMMON)**



● **Source Type(PNP Type, + COMMON)**



1.4.2 PLC-S Expansion module LINE UP

PLC-S series have Digital I/O modules, Analog modules, RTD and TC modules and Communication modules.

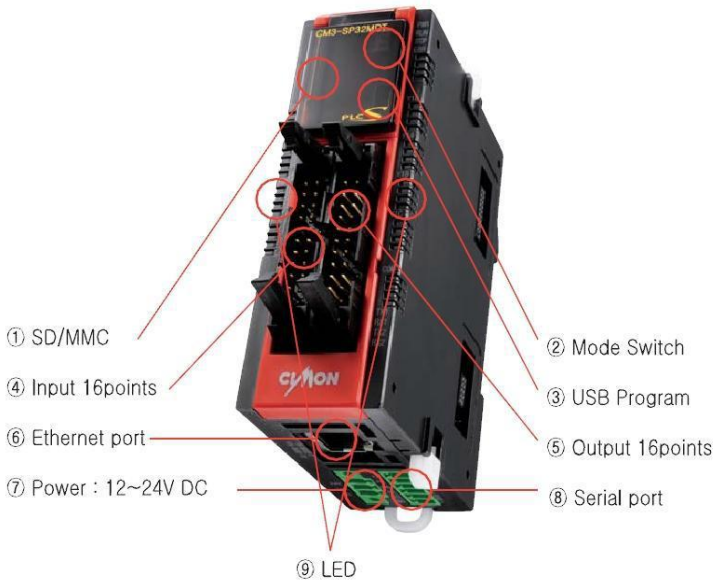
I/O modules: There are Digital Input, Output and Mixed I/O modules. Digital output consists of TR Sink, TR Source and Rely type.

Analog modules: CM3-SP04EAO has 4channels of Voltage and Current Inputs and it converts current and voltage signals into 14-bit binary values. CM3-SP04EAA has 2channels for Voltage and Current Inputs and Outputs respectively. CM3-SP04EOAI has 4channels of Current Outputs and CM3-SP04EOAV has 4channels of Voltage Outputs. CM3-SP04ERO and CM3-SP04ETO have 4channels of temperature control. SP04EAM has 4channels of Analog inputs.

Communication modules: CM3-SP01EET has 1 Ethernet port. CM3-SP02ERR has 2 ports for RS232C. CM3-SP02ERS has RS232C and RS422/485 port.

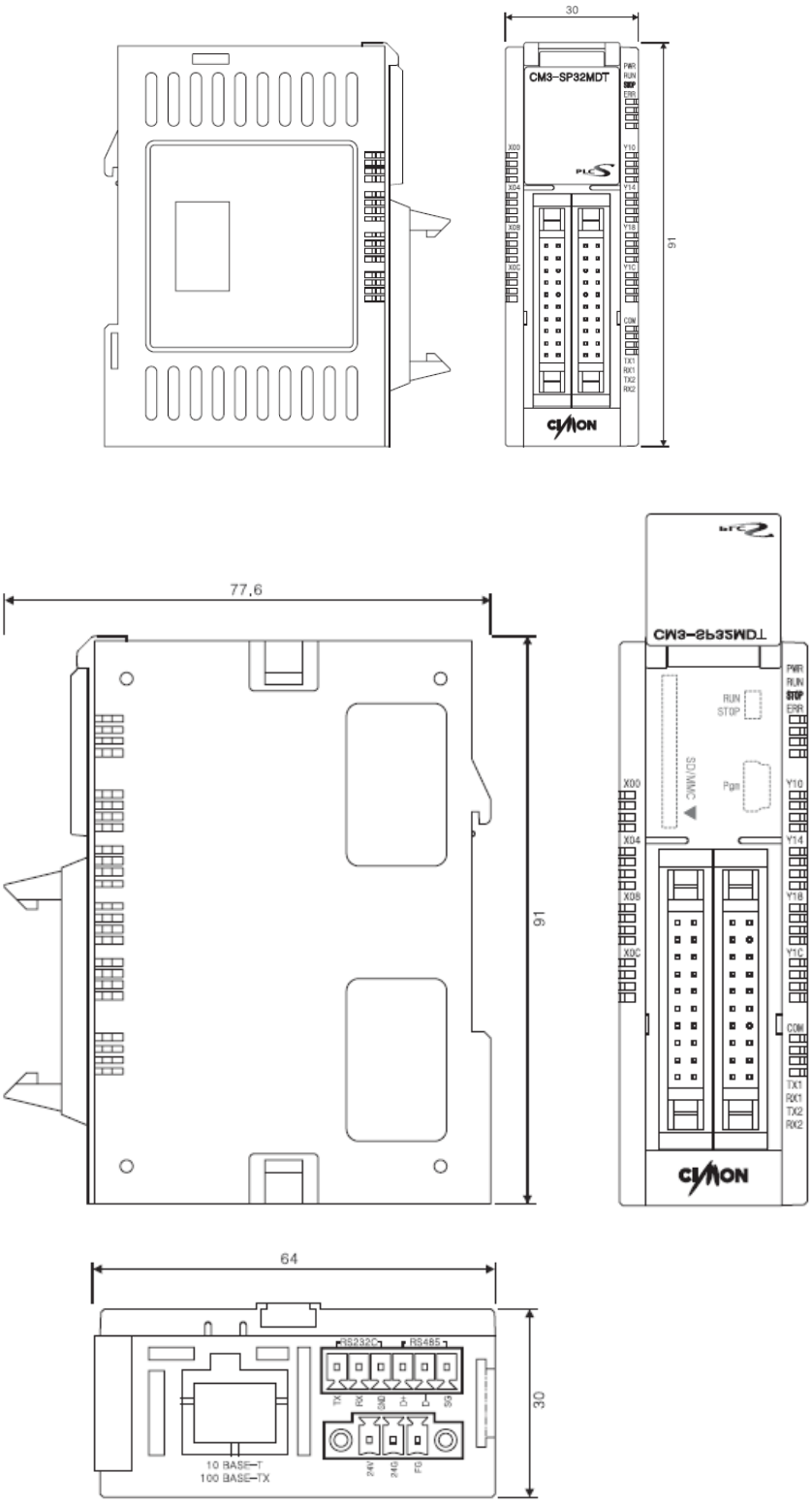
Type	Model name	Description
Digital I/O module	CM3-SP32EDO	DC24V Input 32 points
	CM3-SP32EOT	TR(Sink) Output 32 points
	CM3-SP16EOR	DO 16points Relay / 4 modules can be installed in one(1) station
	CM3-SP32EDT	DI 16 points DC24V, DO 16 points TR(SINK)
	CM3-SP16EDR	DI 8 points DC24V, DO 8 points Relay
Analog I/O module	CM3-SP04EAO	Current/Voltage Input 4Channels, 14bit
	CM3-SP04EAA	Current/Voltage Input 2CH. + Current/Voltage Output 2CH, 16/14 bit
	CM3-SP04EOAI	Current Output 4Channels, 14bit
	CM3-SP04EOAV	Voltage Output 4Channels, 14bit
	CM3-SP04ERO	AI 4ch RTD
	CM3-SP04ETO	AI 4ch TC
	CM3-SP04EAM	Input signal MUX module (4X1) : with RTD, TC and AD modules
Communication module	CM3-SP01EET	Ethernet 1ch, 10/100Mbps
	CM3-SP02ERS	RS-232C 1CH, RS-485 1CH
	CM3-SP02ERR	RS-232C 2CH

1.5 Part Names and Functions

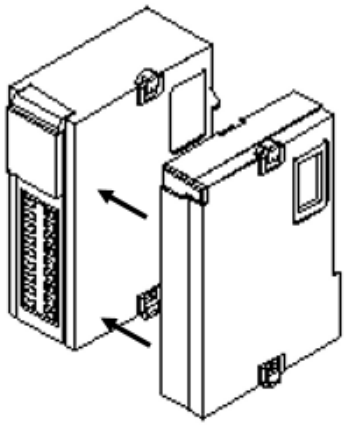


	Item	Function	Description
1	SD / MMC	SD/MMC card	Program download and upload via SD/MMC card
2	Switch	Mode switch	Select Run or Stop mode
3	Mini USB port	Loader port	Program download and upload via mini USB port
4	Input Terminal	Digital Input	16 points Input terminal
5	Output Terminal	Digital Output	16 points Output terminal
6	Ethernet port	Ethernet port	10Mbps, 100Mbps, Modbus Slave
7	Power	CPU Power	12~24VDC / 10W(in case of Maximum expansion)
8	Serial port	RS-232, RS485port	RS232C is built-in, (Option: RS485)
9	LED	Status of PLC-S(CPU, I/O)	Input status : Left LED Output status : Right LED PLC-S status : Upper Right LED (PWR, RUN, STOP, ERR)

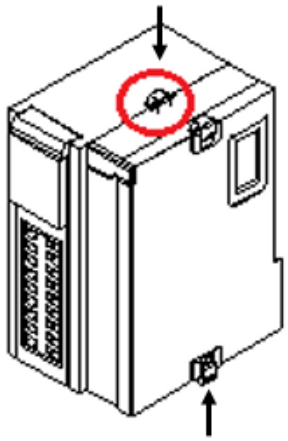
1.6 Dimension



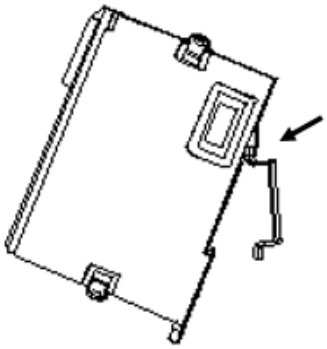
1.7 PLC-S Installation



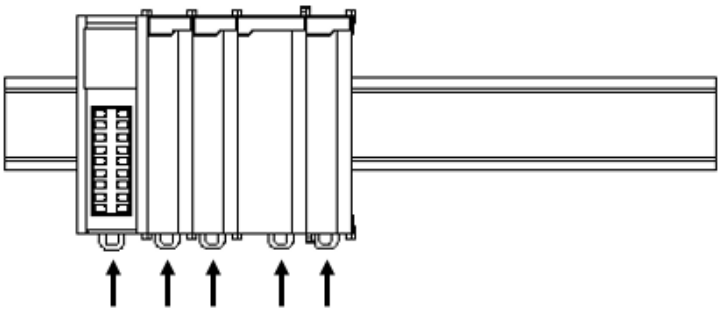
1. Remove Expansion connector sticker and install expansion module



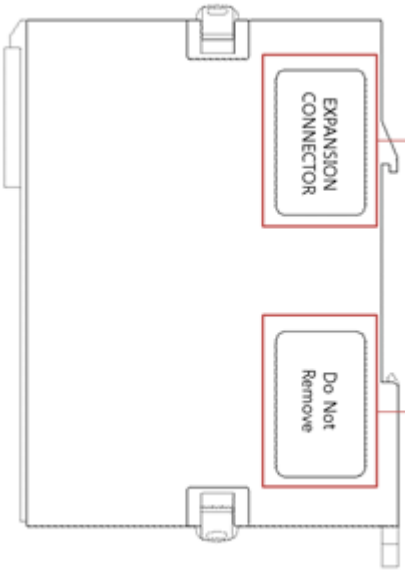
2. Push expansion Lock to prevent disconnection



3. Put module on the Din rail upper edge.



4. Push Din rail Lock to fix modules to the Din rail.

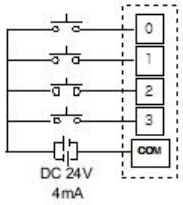
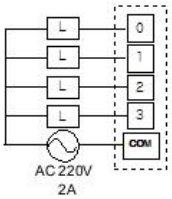
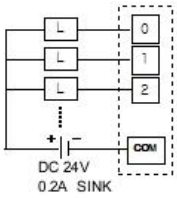


PLC-S Expansion connector
Remove this sticker when you connect expansion module.

RS485 Communication setting
If CPU has RS485 option (EX:MDTV, MDTF), you can change jumper to enhance communication distance or noise.
Please refer to Page 22. Built-in Communication Interface.

1.8 Input and Output Specification

1.8.1 I/O Specification of PLC-S CPU Module

Item	DC Input			Relay Output	TR Output
	DC 12V/DC 24V		DC 24V		
Rated I/O Voltage	DC 12V	DC 12V	DC24V	AC 220V / DC 24V	DC 12/24V
	DC 24V	DC 24V			
Rated I/O Current	DC 12V	4mA	4mA	1points 2A / COM 5A	1point 0.2A, COM 2A
	DC 24V	8mA			
On Voltage/Current	DC 12V	DC 10V / 3mA	DC 19V / 3mA	-	-
	DC 24V	DC 19V / 6mA			
Off Voltage/Current	DC 12V	DC 8V / 1mA	DC 16V / 1mA	-	-
	DC 24V	DC 16V / 2mA			
Response time	3ms or less			10ms or less	1ms or less
Operation indicator	Input ON, LED ON			Input ON, LED ON	Input ON, LED ON
Insulation method	Photo coupler insulation			Relay insulation	Photo coupler insulation
Input type	SINK/SRC			-	-
Output type	-			Relay	Sink/Source
Circuit Diagram					

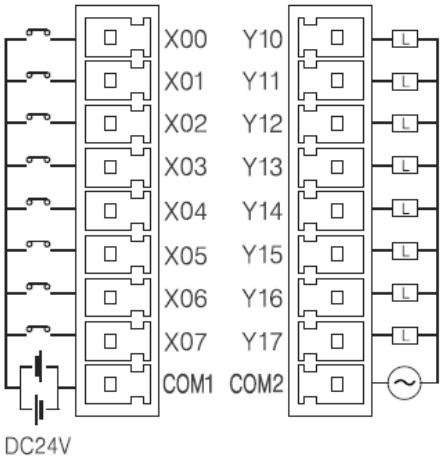
■DC 12V input is for High speed counter function. X00~X03 supports DC 12V input and others support DC 24V input.

Input	Input Voltage	Description		Model
X00	DC 12/24V	High speed counter Ch1 Direction Input	General Input	CM3-SP32MDTx CM3-SP32MDCx CM3-SP16MDRx
X01		High speed counter Ch1 Pulse Input		
X02		High speed counter Ch2 Direction Input		
X03		High speed counter Ch2 Pulse Input		
X04 X05 X06 X07	DC 24V	General Input		
X08 X09 X0A X0B X0C X0D X0E X0F	DC 24V	General Input		CM3-SP32MDT CM3-SP32MDC

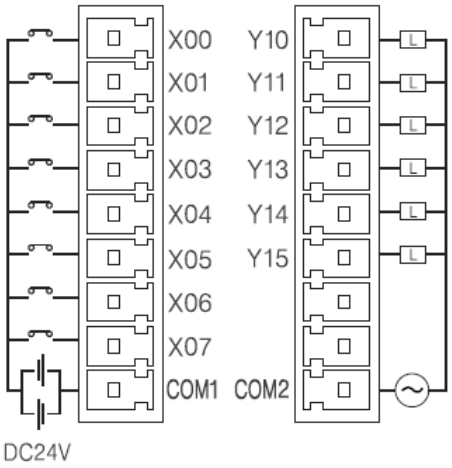
1.8.2 CPU I/O Pin Map

a) CPU I/O Pin Map

▶ CM3-SP16MDR, SP16MDRV I/O

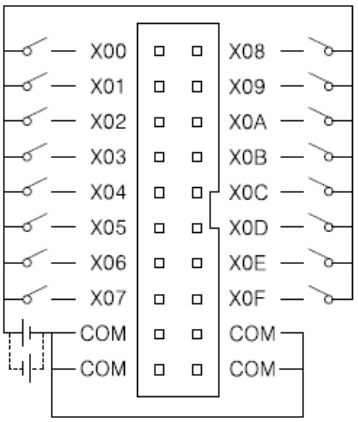


▶ CM3-SP16MDRE, SP16MDRF I/O

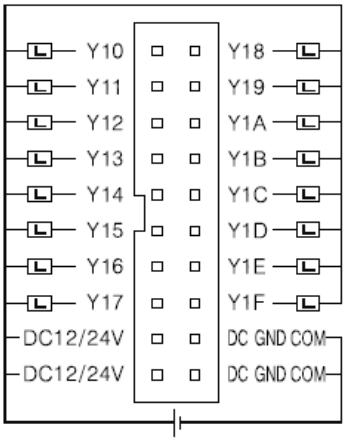


● CM3-SP16MDRE and SP16MDRF have only 6 relay output points.

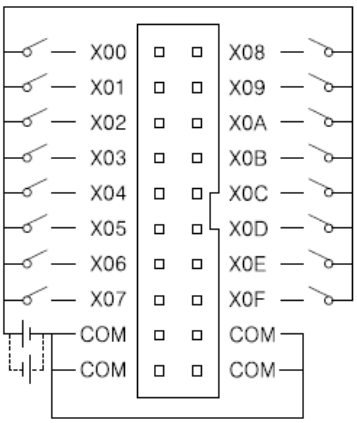
▶ CM3-SP32MDT/V/E/F Input



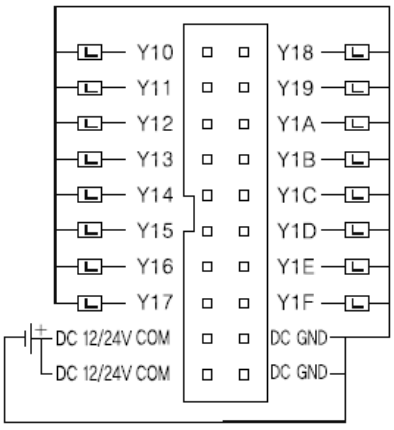
▶ CM3-SP32MDT/V/E/F Output



▶ CM3-SP32MDC/V/E/F Input



▶ CM3-SP32MDC/V/E/F Output

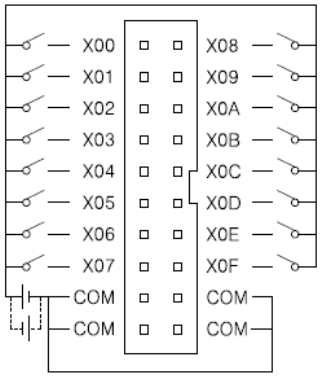


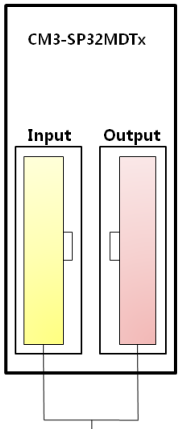
b) Terminal Block (CM0-TM32M) with Cable

CM3-SP32MDT/V/E/F, CM3-SP32EDT

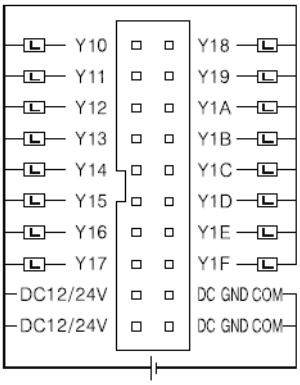
CM3-SP32MDT/V/E/F　　CM0-SCBnnM　　CM0-TB32M

CM3-SP32MDT/V/E/F, CM3-SP32EDT
Input Pin Map

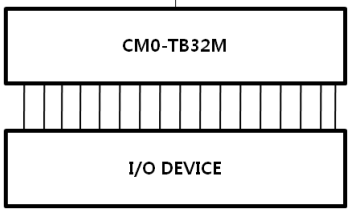




CM3-SP32MDT/V/E/F, CM3-SP32EDT
Output Pin Map



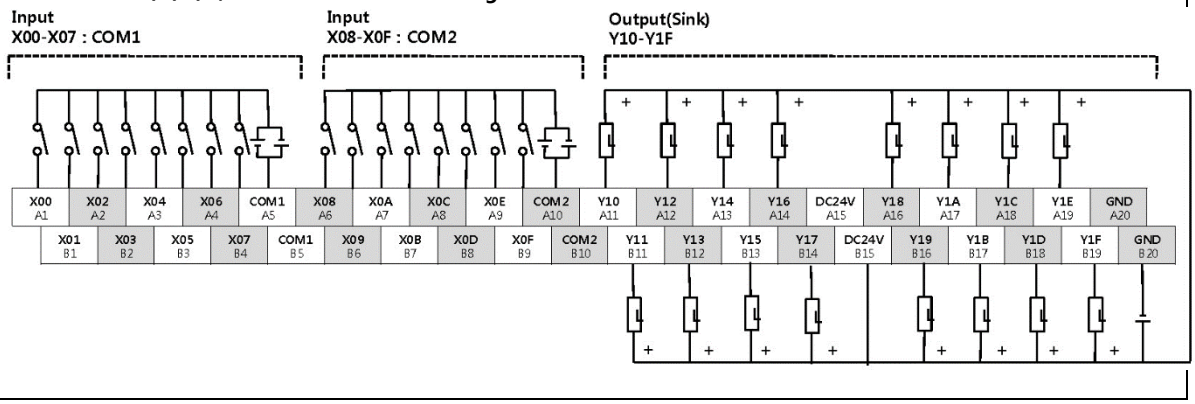
CM0-SCBnnM



CM0-SCBnnM Model Name

Model Number	Cable Length
CM0-SCB10M	1.0M
CM0-SCB15M	1.5M
CM0-SCB20M	2.0M
CM0-SCB30M	3.0M

CM3-SP32MDT/E/V/T, EDT - CM0-TB32M Wiring



Tip COM terminal of PLC-S is connected internally.
EX) COM1-COM1 or COM2-COM2 is connected but COM1-COM2 is not connected.

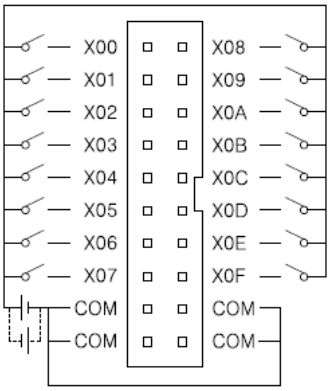
CM3-SP32MDC/V/E/F

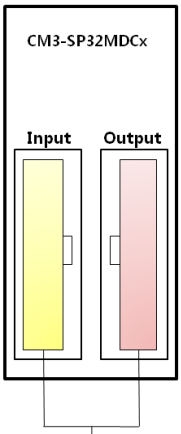
CM3-SP32MDC/V/E/F

CM0-SCBnnM

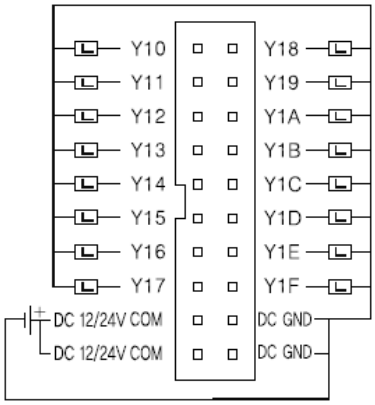
CM0-TB32M

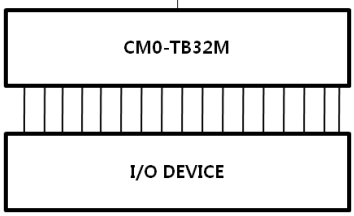
CM3-SP32MDC/V/E/F Input Pin Map





CM3-SP32MDC/V/E/F Output Pin Map

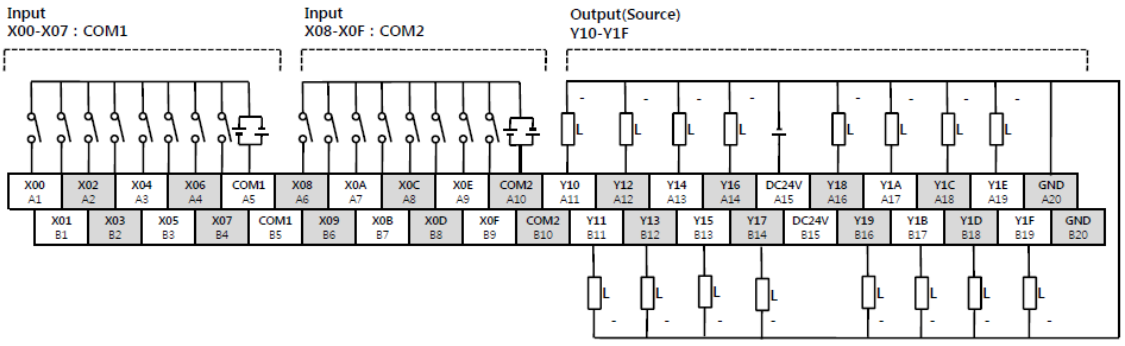




CM0-SCBnnM Model Name

Model Number	Cable Length
CM0-SCB10M	1.0M
CM0-SCB15M	1.5M
CM0-SCB20M	2.0M
CM0-SCB30M	3.0M

CM3-SP32MDC/V/E/F - CM0-TB32M Wiring



Tip COM terminal of PLC-S is connected internally.

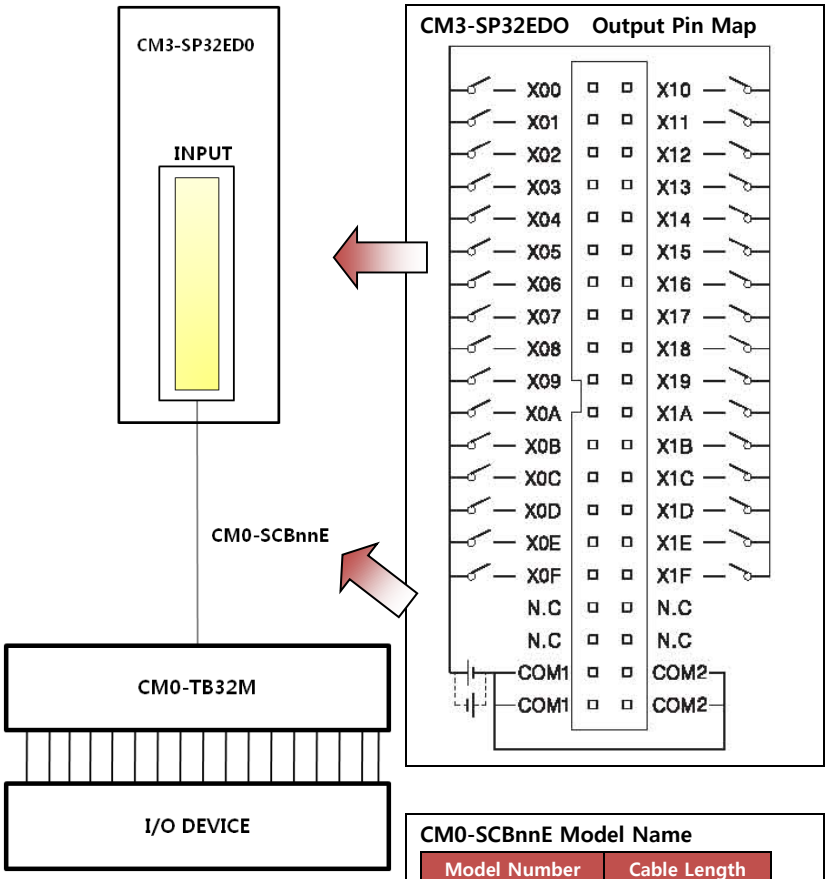
EX) COM1-COM1 or COM2-COM2 is connected but COM1-COM2 is not connected.

CM3-SP32EDO

CM3-SP32EDO

CM0-SCBnnE

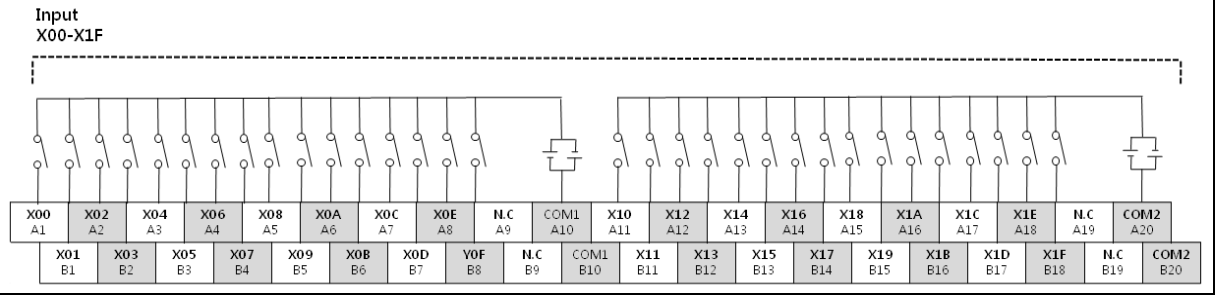
CM0-TB32M



CM0-SCBnnE Model Name

Model Number	Cable Length
CM0-SCB10E	1.0M
CM0-SCB15E	1.5M
CM0-SCB20E	2.0M
CM0-SCB30E	3.0M

CM3-SP32EDO - CM0-TB32M Wiring

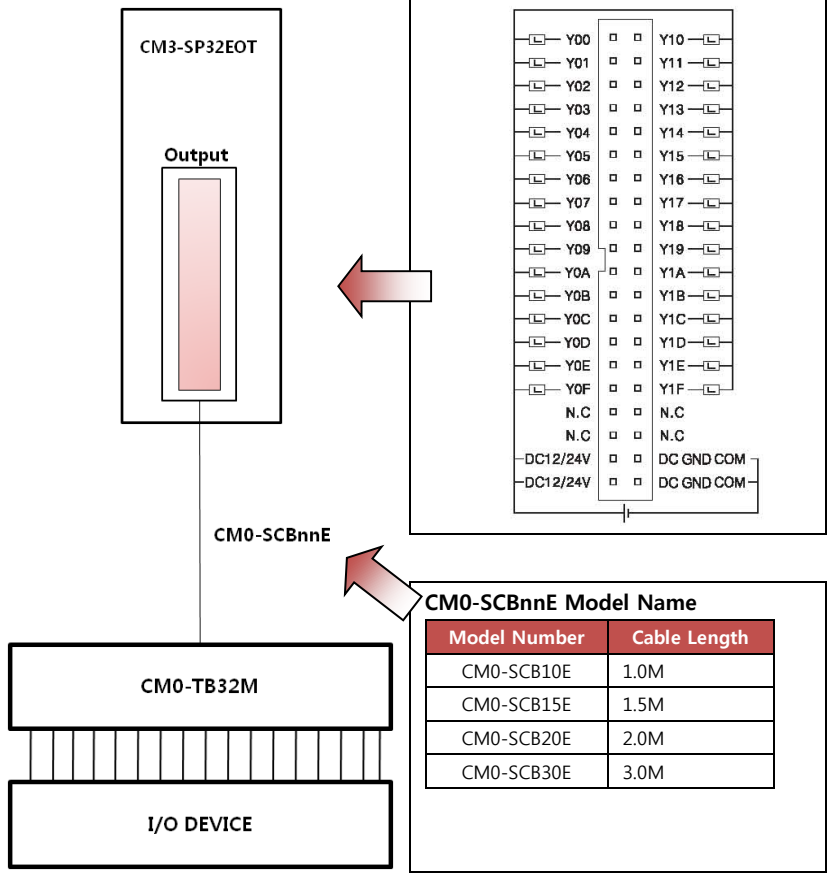


CM3-SP32EOT

CM3-SP32EOT

CM0-SCBnnE

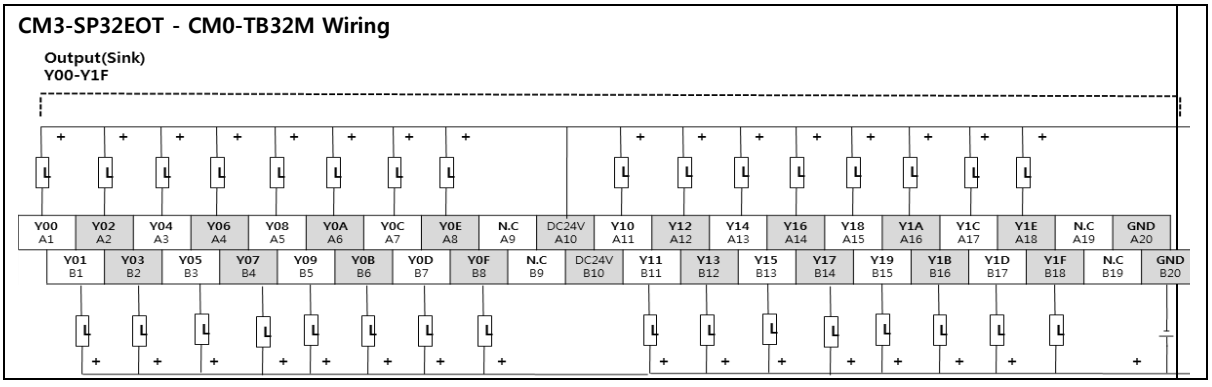
CM0-TB32M



CM0-SCBnnE Model Name

Model Number	Cable Length
CM0-SCB10E	1.0M
CM0-SCB15E	1.5M
CM0-SCB20E	2.0M
CM0-SCB30E	3.0M

CM3-SP32EOT - CM0-TB32M Wiring

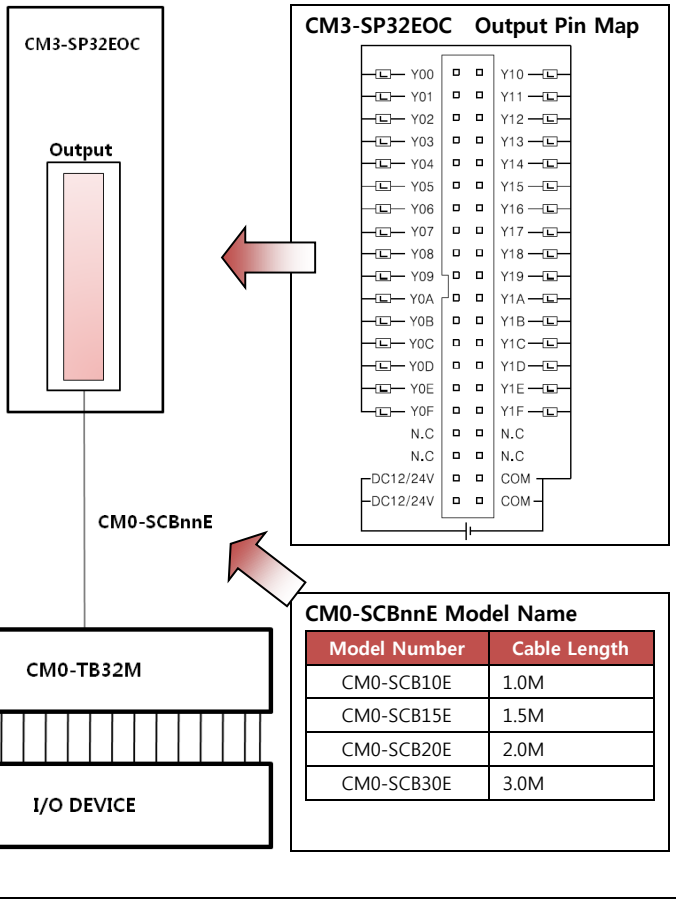


CM3-SP32EOC

CM3-SP32EOC

CM0-SCBnnE

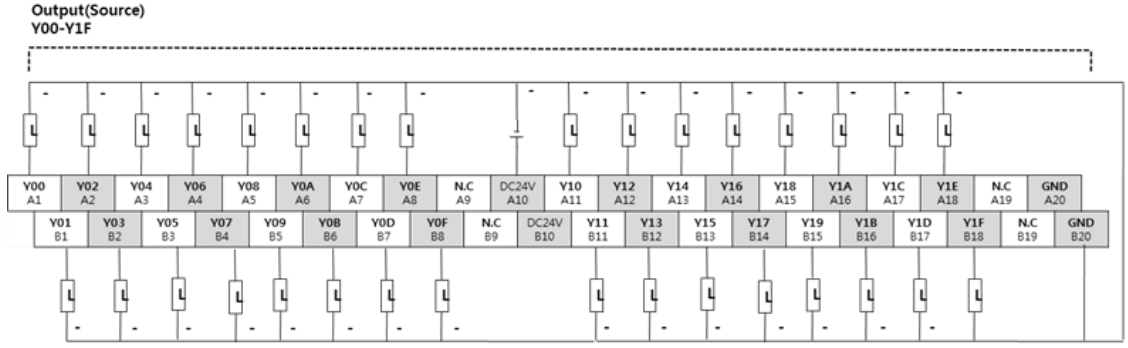
CM0-TB32M



CM0-SCBnnE Model Name

Model Number	Cable Length
CM0-SCB10E	1.0M
CM0-SCB15E	1.5M
CM0-SCB20E	2.0M
CM0-SCB30E	3.0M

CM3-SP32EOC - CM0-TB32M Wiring



1.9 PLC-S CPU Built-in Communication Specification

PLC-S CPU has built-in RS232C 1 channel and you can add Ethernet and RS422/485 as option.

Example) CM3-SP32MDT : RS232C 1 ch
CM3-SP32MDCV : RS232C 1ch, RS485 1 ch
CM3-SP16MDRE : RS232C 1ch, Ethernet 1ch
CM3-SP32MDTF : RS232 1ch, RS485 1ch, Ethernet 1ch

Item		CH 1	CH 2
		RS232C	RS485
Communication mode	CIMON HMI Protocol	CIMON HMI Protocol (1:n)	
	CICON Protocol	O	O
	Protocol Program	O	O
	MODBUS/RTU	Master/Slave	Master/Slave
Types	Data Bit	7 or 8Bit	
	Stop Bit	1 or 2Bit	
	Parity	Even / Odd / None	
Synchronization		Asynchronous	
Baud rate (bps)		300~38400	
Modem		Long distance communication is possible by external modem	X

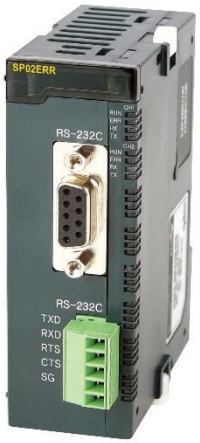
Item		Ethernet
Communication mode	CIMON HMI Protocol	CIMON HMI Protocol
	CICON Protocol	O
	Protocol Program	O
	MODBUS/TCP	Slave
	High speed PLC Link	O
	DHCP	O
Maximum online client		Maximum 5 Client simultaneously (UDP Client 3ea / TCP Client 2ea)
Communication speed		10Mbps, 100Mbps
Communication specification		100 base TX

1.10 Specification of Communication module

CM3-SP01EET

Item		Ethernet
Communication mode	CIMON HMI Protocol	O
	CICON Protocol	O
	Protocol Program	O
	MODBUS/TCP	Master/Slave
	High-speed PLC LINK	O
	DHCP	O
Connection capacity		12ea simultaneously (UDP 12ea, / TCP 12ea)
Communication speed		10Mbps, 100Mbps
Communication specification		100 base TX

CM3-SP02ERR

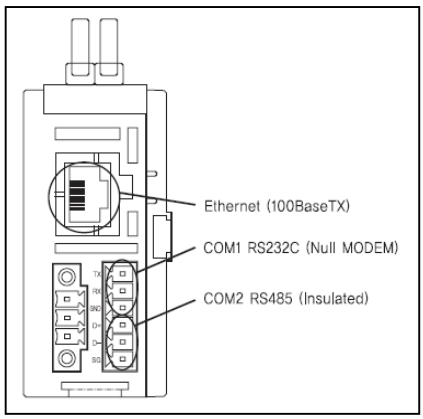


Item		CH 1	CH 2
		RS232C	RS232C
Power		Supplied by CPU module	
Communication mode	CIMON HMI Protocol	O	O
	CICON Protocol	O	O
	Protocol Program	O	O
	MODBUS/RTU	Master/Slave	Master/Slave
Data Type	Data Bit	7 or 8 Bit	
	Stop Bit	1 or 2 Bit	
	Parity	Even / Odd / None	
Synchronous		Asynchronous	
Baud rate (bps)		300~38400	

CM3-SP02ERS

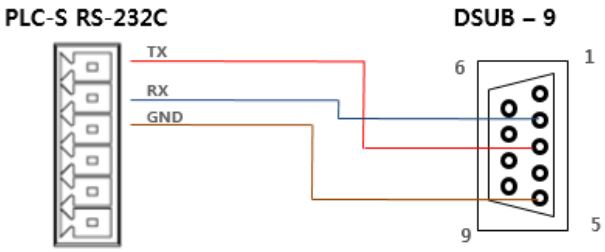
Item		CH 1	CH 2
		RS232C	RS422/485
Power		Supplied by CPU module	
Communication mode	CIMON HMI Protocol	O	O
	CICON Protocol	O	O
	Protocol Program	O	O
	MODBUS/RTU	Master/Slave	Master/Slave
Data Type	Data Bit	7 or 8 Bit	
	Stop Bit	1 or 2 Bit	
	Parity	Even / Odd / None	
Synchronous		Asynchronous	
Baud rate (bps)		300~38400	

1.11 Built-in Communication Interface



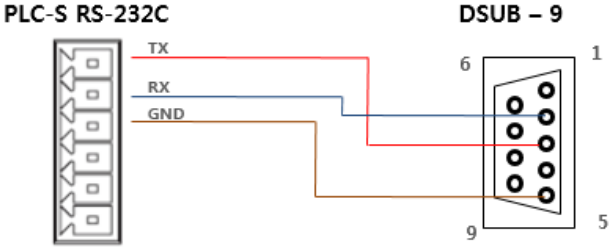
1.11.1 PLC-S CPU RS-232C Wiring

DTE Wiring (PC, HMI or etc.)



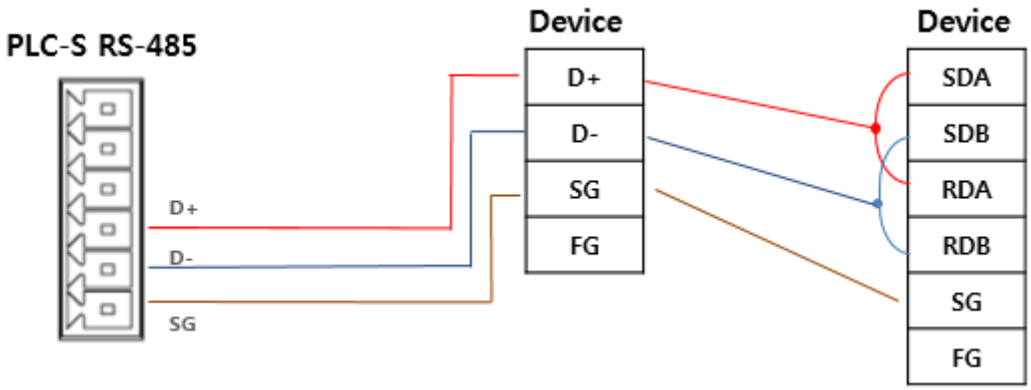
PLC-S RS-232C		DSUB-9	
PIN	NAME	PIN	NAME
1	232 TX	1	N.C
2	232 RX	2	232 RX
3	GND	3	232 TX
4	D+	4	N.C
5	D-	5	GND
6	SG	6	N.C

DCE Wiring (through modem)



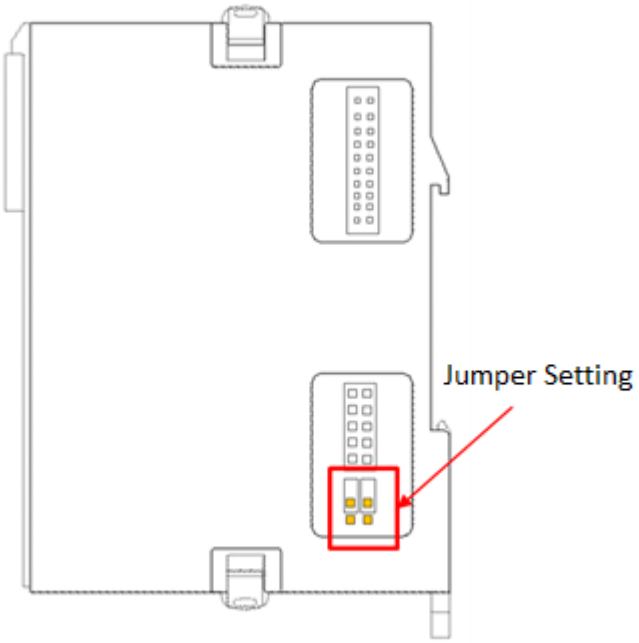
PLC-S RS-232C		DSUB-9	
PIN	NAME	PIN	NAME
1	232 TX	1	N.C
2	232 RX	2	232 RX
3	GND	3	232 TX
4	D+	4	N.C
5	D-	5	GND
6	SG	6	N.C

1.11.2 PLC-S CPU RS-485 Wiring



1.11.3 PLC-S CPU RS485 Option Setting

In case of RS-485 communication, Jumper setting is used to project noise or long distance communication. You can switch jumper for purpose of use.



Jumper Setting	Description
 Default	This default is for normal condition. Maximum distance for communication is1.2km.
 Protect Noise	This setting is used to protect noise but its communication distance is limited to less than 1km.

1.12 Current consumption

Before module configuration, see below current consumption table to select SMPS or Power supply unit. Maximum current consumption of a station (CPU + Expansion 11 modules) is 10W.

Item	Module	Current consumption		Limitation per a station
		Current consumption	Current consumption (Auxiliary Power)	
CPU	CM3-SP32MDT	2.16W	-	-
	CM3-SP32MDT-SD	2.16W	-	-
	CM3-SP32MDTV	2.64W	-	-
	CM3-SP32MDTV-SD	2.64W	-	-
	CM3-SP32MDTE	2.64W	-	-
	CM3-SP32MDTE-SD	2.64W	-	-
	CM3-SP32MDTF	3.12W	-	-
	CM3-SP32MDTF-SD	3.12W	-	-
	CM3-SP16MDR	2.88W	-	-
	CM3-SP16MDRV	3.12W	-	-
	CM3-SP16MDRE	3.36W	-	-
	CM3-SP16MDRF	3.6W	-	-
Digital I/O	CM3-SP32EDO	0.48W	-	-
	CM3-SP32EOT	0.48W	-	-
	CM3-SP32EOC	0.48W	-	-
	CM3-SP16EOR	2.16W	-	4ea
Analog	CM3-SP04EAO	0.36W	1.44W	-
	CM3-SP04EAA	0.36W	1.68W	-
	CM3-SP04EOAI	0.36W	1.68W	-
	CM3-SP04EOAV	0.36W	1.44W	-
	CM3-SP04ERO	0.48W	0.72W	-
	CM3-SP04ETO	0.48W	0.72W	-
Communication	CM3-SP02ERR	0.48W	-	
	CM3-SP02ERS	0.48W	-	
	CM3-SP01EET	0.72W	-	5ea

CM3-SP16EOR can be installed up to 4units with a CPU module.
Recommended SMPS capacity is 24VDC 20W.

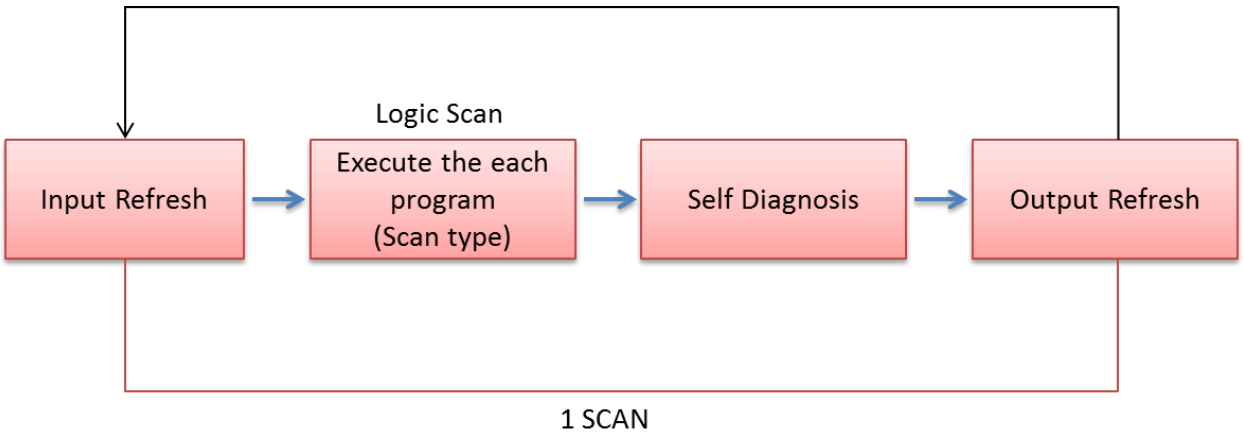
EX) CM3-SP32MDTF + CM3-SP32 EDO 2ea + CM3-SP04EAA + CM3-SP02ERR

6.6W = 3.12+ (0.48*2) + (0.36+1.68) + 0.48

2. Program Execution and Configuration

2.1 CPU Process

2.1.1 Operation Sequence



- Step 1 : Read an input status from Input module.
- Step 2 : Based on the input table in memory, the program is executed sequentially step by step from the first to the last.
- Step 3 : Self-check for defects.
- Step 4 : Output values are updated by Output module.

2.1.2 Scan Time

After Input status is updated in PLC CPU, the CPU executes operations sequentially from the beginning of control program to the end. Then, CPU updates an output status. This series of processes is repeated at a high speed and is called "Cyclic Operation." The time required for one cycle from the beginning to the end is "1 Scan Time."

a) Updating an Input Status

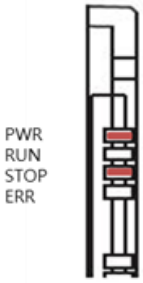
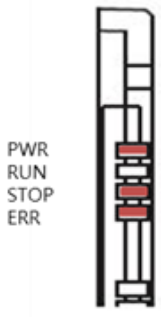
Before running a program, CPU reads the status information from the Input module and then transmits value into the designated Input area (X) of the CPU data memory.

b) Updating an Output Status

After executing an "End" command, CPU sends value of Output address(Y) to the Output module.

2.1.3 CPU Operation Status by Mode Switch

Mode (Run/Stop/Remote) Switch controls a PLC's operation status. Inside the front cover of CPU is a switch to control the CPU status. The switch sets the default status of PLC. After power is applied to CPU, user can switch a CPU status between Remote Run and Remote Stop in CICON program.

	- At Run mode, CPU operation is executed based on the saved program. - At Run mode, CPU mode can be changed on Loader program (CICON).
	- At Stop mode, CPU operation is stopped. - At Stop mode, CPU mode can be changed on Loader program (CICON).
	- When an error occurs, CPU mode is changed to "Stop." - When an error occurs, ERR LED blinks.

2.1.4 Memory Mode

a) ROM Operational Mode

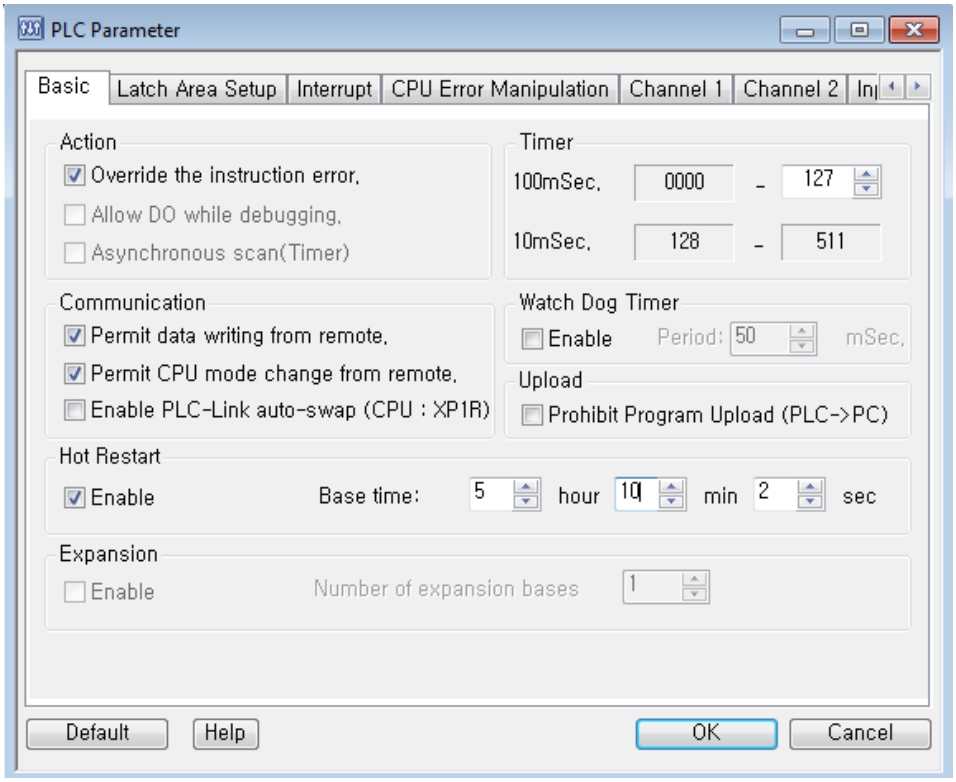
This mode is operated by the saved program at Flash Memory of CPU card. PLC-S operates in ROM mode by default. Ladder program is not deleted after restarting PLC because it has been saved at Flash Memory (ROM).

b) RAM Operational Mode

This mode is operated by the saved program at RAM of CPU card. To prevent the saved program from being deleted, power must be supplied continuously. Once main power is off, the internal battery of CPU supplies the back-up power. When the battery becomes lower than the reference voltage, Flag #3 and #4 are set ON. In this case, battery replacement is required. Without a battery, internal capacitor keeps the PLC only for a few hours.

c) Restart Mode

When starting PLC or switching to RUN mode, Restart mode sets how to initiate the variables and system and operates with these settings in RUN mode. The mode consists of Cold and Hot types. With Hot Restart feature being enabled at CICON Parameter setting, Hot Restart mode is operated during the Base time. If Hot Restart feature is disabled, Cold Restart mode is operated automatically.



■ Cold Restart

With Hot Restart feature being disabled, Cold Restart is executed one time only when CPU mode is switched from Stop → RUN mode after PLC is powered back on. Additionally, Cold Restart is executed when CPU power is OFF→ON status regardless of CPU mode. Cold Restart becomes useful when setting the initial values for scan program or initializing the special modules and I/O modules.

■ Hot Restart

After a power failure in RUN mode and subsequent return of power within the Hot Restart time, PLC-S runs through an initialization routine and automatically executes a Hot Restart. Hot Restart recovers the programs back to previous conditions at the point the power was interrupted. If the power off time exceeds the Hot Restart time, then Cold Restart mode is executed automatically. If the momentary power failure exceeds 20ms, Cold Restart is executed.

※ At the end of Cold or Hot restart program, "INITEND" command must be inserted to end the Cold or Hot restart process.

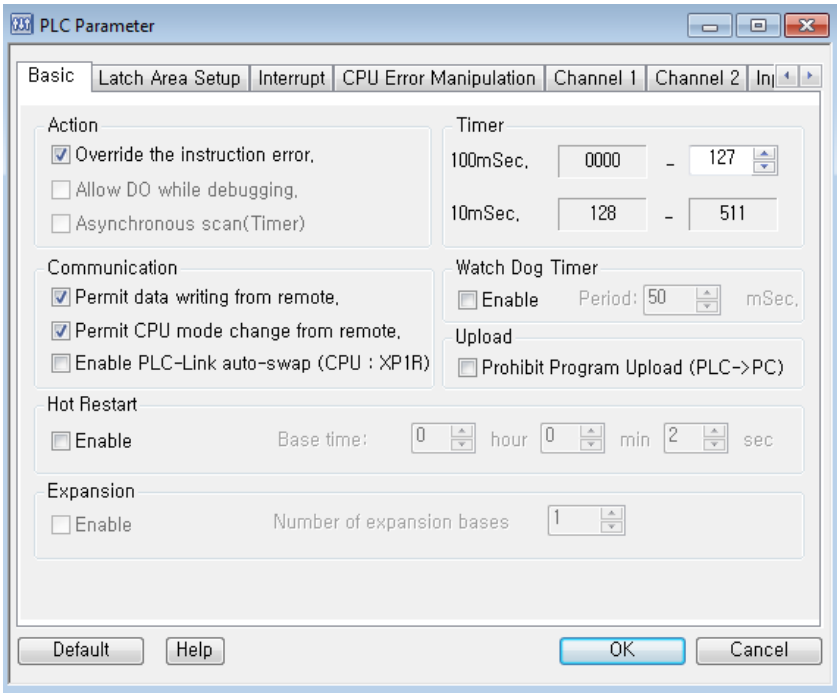
※ Cold or Hot Restart feature only applies to PLC CPU types with RTC feature in it.

Ex) Cold or Hot Restart is not applicable to CM1-CP3A, CM1-CP4A and CM3-SB16MDT.

2.2 Parameter Configuration

2.2.1 General Setting

Go to [Parameter] → [Basic] menu, parameter setting window appears as shown below.



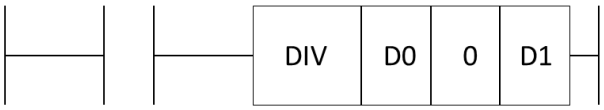
a) Action

- Override the operation error

When an overflow in operation occurs, CPU can ignore this error and continue its operation.

※ Default setting - "override the operation error" is enabled.

Ex) When divide by 0 (DIV instruction).



Because denominator is 0, this cause an operational error. In this case, user have a option to set a error Flag or ignore it.

- Allow DO while debugging

At Debugging mode, a user can decide whether digital signal should be output or not.

※ Default setting - "Allow DO while debugging" feature is disabled.

※ PLC-S does not support "Debugging" mode.

b) Timer

Time unit is set up when timer instructions are used.

From the example pictured above, time unit is 100ms for device T0000~T0127. For device T0128~T0511, time unit is 10ms. If 0 ~ -1 is set for 100ms unit, then all timer device is set as 10ms. Once devices are set for 100ms area, the rest of timer devices are set as 10ms area.

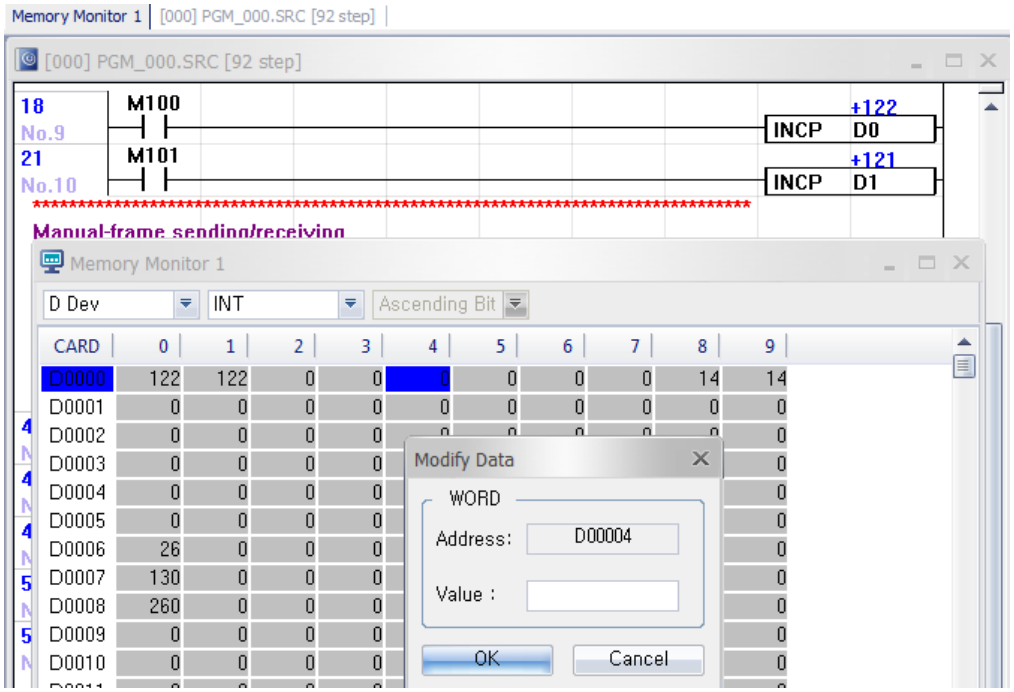
c) Communication

Communication configuration is set up when communicating with other devices.

- Permit data writing from remote

By communication between PLC and other devices, user can write or change the device value of CPU memory. If remote-writing is disabled, only reading a CPU device value is supported by communication. For PLC-S(CM3 series), remote-writing is **always** enabled.

Ex) At communication between PLC and SCADA, SCADA can change the device value of PLC CPU memory.



- Permit CPU mode change from remote

Through communication between PLC and other devices, CPU operational mode can be controlled from other devices between Run and Stop. For PLC-S (CM3 series), remote-mode changing is always enabled. To change the CPU mode, go to [Online] →[Change Mode]menu of CICON or use a mode switch as shown below.

※ Remote CPU mode change is enabled by default.

- Enable PLC-Link Auto-Swap(CPU : XP1R)

When communication failure occurs at one line of redundancy system, switch-over (swap) to another line is executed automatically.

※ PLC-Link Auto-Swap feature is disabled by default.

d) Watch Dog Timer (WDT)
To prevent a PLC operational error, WDT is set from 10ms up to 60,000ms by the 10ms as a unit. If the SCAN time exceeds the pre-defined WDT, this is processed as operational error that forces a change in the CPU mode from Run to Remote Stop (F0032 Flag is set ON). Without user-defined WDT, 1.5 second is applied to WDT.
※ WDT is disabled by default.

e) Hot Restart
After a power failure in RUN mode and subsequent return of power within the Hot Restart time, PLC-S runs through an initialization routine and then automatically

executes a Hot Restart first. After Hot restart program is completed by Command "INITEND", then SCAN program is executed.

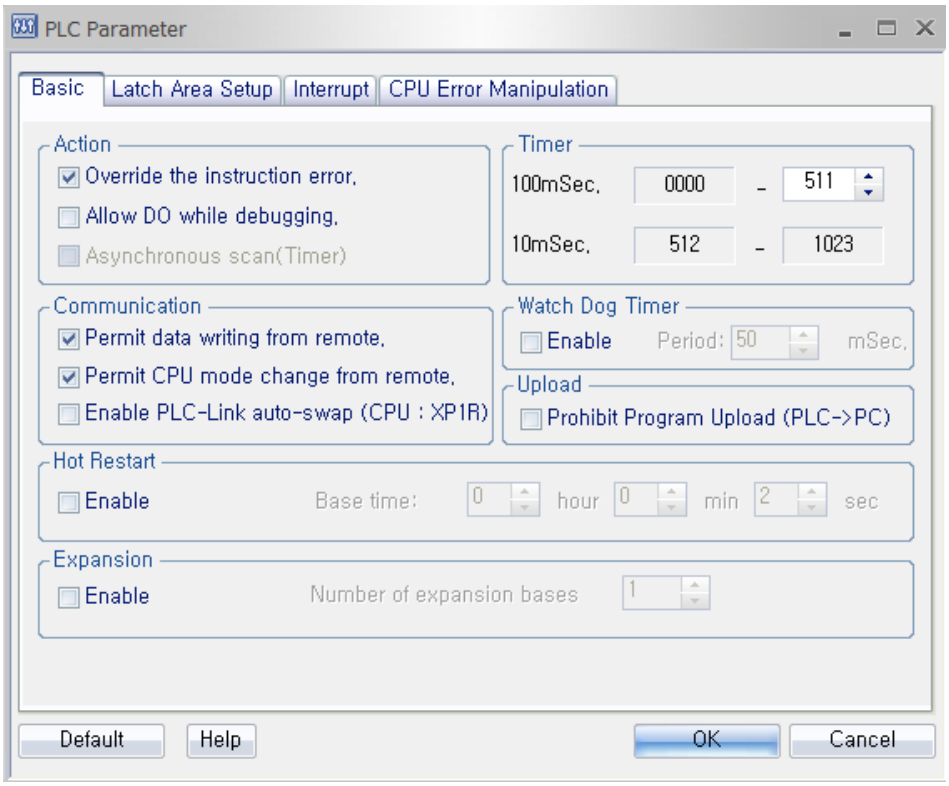
f) Expansion

To use an expansion system next to a local base,

1. Expansion system must be enabled at CICON parameter setting.
2. The number of expansion (Base) systems must be defined.

Expansion features are only supported by CM1 PLC series (XP,CP3), CM3 series are not supported.

※ Expansion feature is disabled by default.



2.2.2 Latch Area Setup

Latch area, a non-volatile storage, is used to keep data under the following conditions:

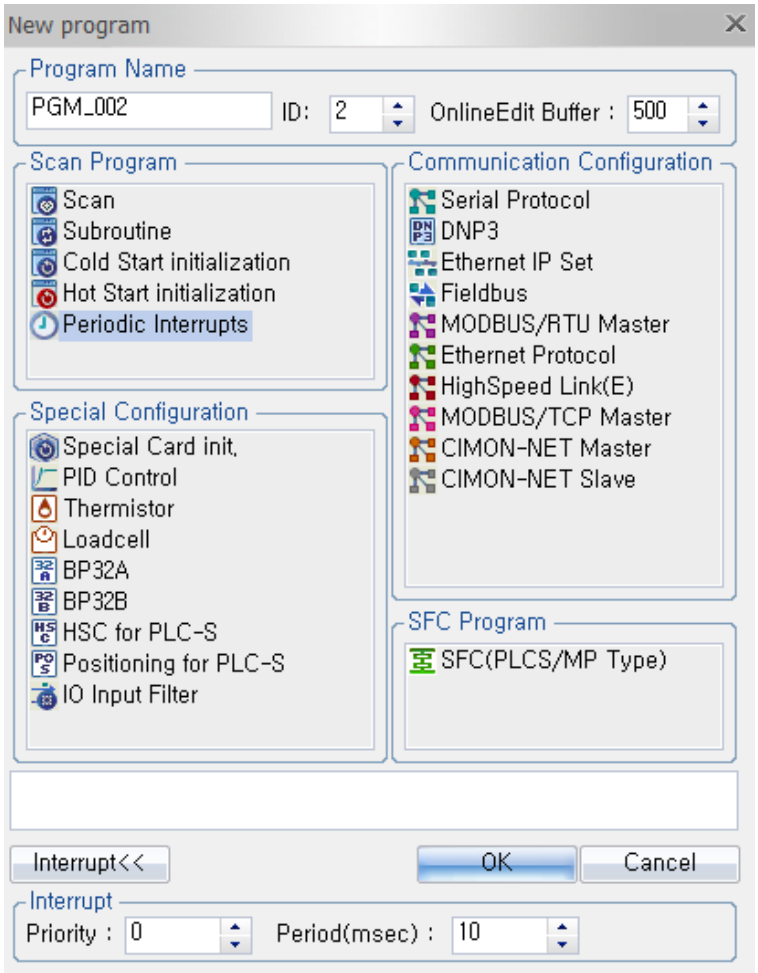
1) When PLC mode switches from “Run→ Stop → Run” with a power ON status.

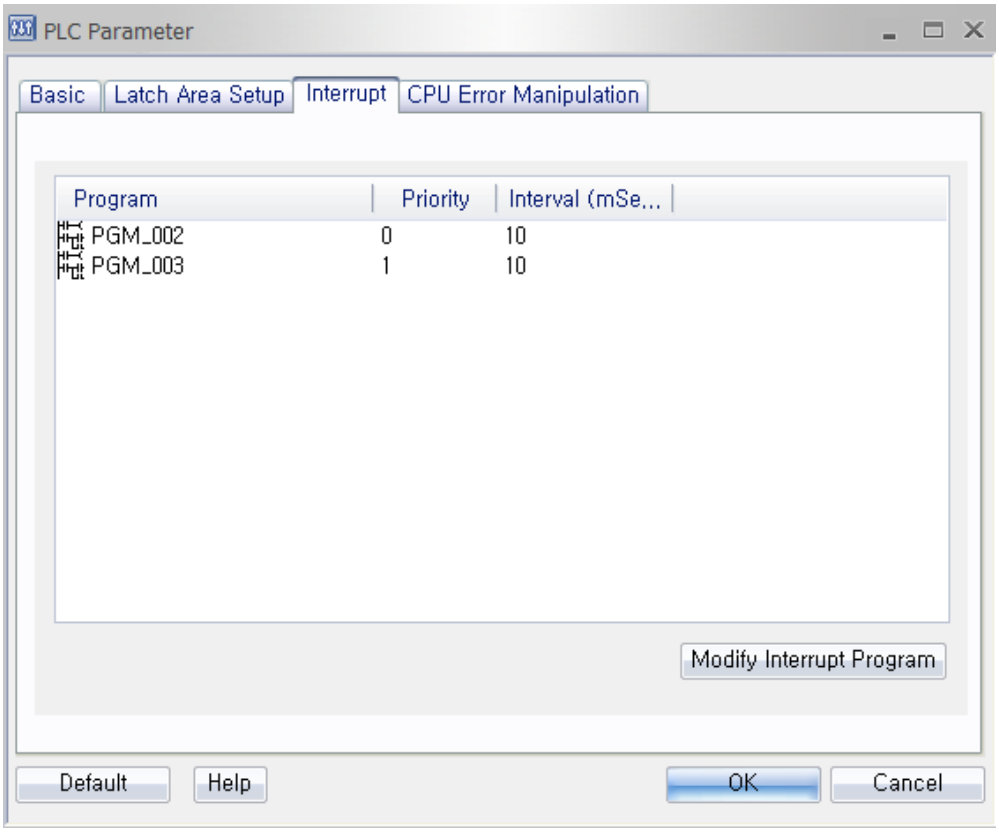
2) After a power failure in RUN mode and subsequent return of power.

According to the PLC CPU type, the range of latch device varies. All devices can support Latch feature except for Q and Z devices. K device provides a Latch area by default.

2.2.3 Periodic Interrupt

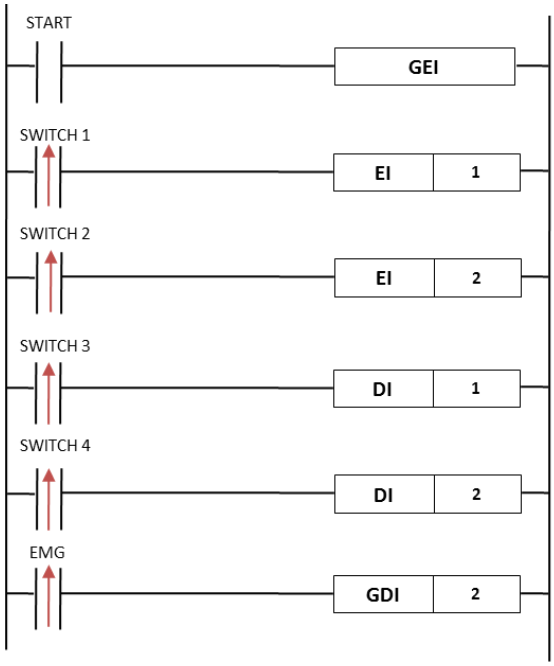
Periodic Interrupt program is supported. Interrupt program is executed in a regular interval with priority number. Interrupt program with priority number “0” has the highest priority. The range of time interval (Period) is between 10 and 655,350ms. Multiple interrupt programs are set up at PLC Parameter menu.





■ Interrupt Instruction

Name	Symbol	Description
EI DI	EI n DI n	Enable Interrupt only for a program with ID "n" Disable Interrupt only for a program with ID "n"
GEI(Global) GDI(Global)	GEI GDI	Enable Interrupt feature for all program Disable Interrupt feature for all program
IRET	IRET	Define the end of interrupt program.



Enable Interrupt for all program

Enable Interrupt program1(PID)

Enable Interrupt program 2(PID)

Disable Interrupt program 1(PID)

Disable Interrupt program 2(PID)

Disable Interrupt for all program

To use an interrupt feature, set “GEI (Global Enable Interrupt)” first.
Then, enable each program using an instruction “EI”.

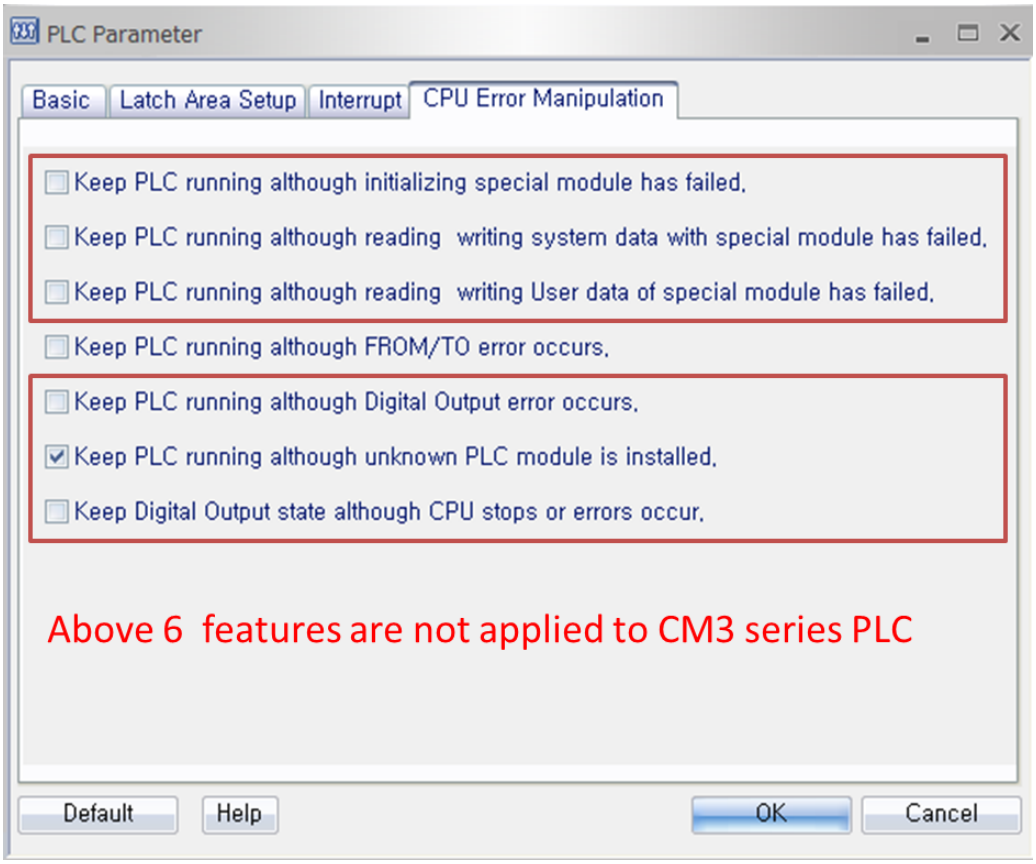
2.2.4 CPU Error Manipulation

1) Error in initializing a special module
When an error occurs in initializing a special module, CPU determines whether to operate normally or not (this feature is disabled by default).

■ Special Module Initialization
When power is applied to special module, it performs internal initialization process. Due to the configuration of special module, initialization time can vary.

■ Special Module Initialization Time
When initialization fails to operate within 2 seconds, the power LED will be blinking and prevents it from its normal operation.

※ This feature is not applied to CM3 series PLC.



2) Error in writing/reading a **system data** of special module
This option determines whether to continue PLC operation when reading/writing the system data of special module has failed (disabled by default).
■ System Data
It refers to the input/output area of Special module.

3) Error in writing/reading a **user data** of special module
This option determines whether to continue PLC operation when reading/writing the user data of special module has failed (disabled by default).
■ User Data
It refers to the measured value of Special module.

4) Error in using instruction “From” or “To”
This option determines whether to continue PLC operation when using an instruction “From” or “To” (disabled by default).
■ From
Instruction “From” is used to read a value from special module and saves it into CPU memory.

■ To
Instruction “To” is used to write a value to special module memory.

5) Error in Digital Output
This option determines whether to continue PLC operation when error occurs on digital output (disabled by default). There are relay and transistor types of digital output. Depending on a module type, it has 8, 16 and 32 points.

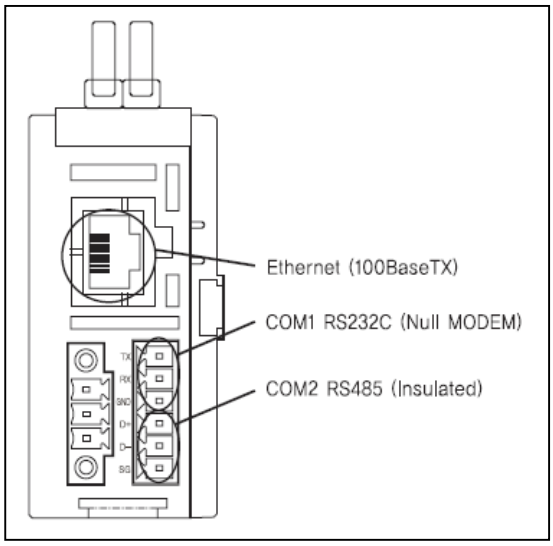
6) Error when unknown PLC module installed
This option determines whether to continue PLC operation when unknown PLC module installation causes an error (Enabled by default).

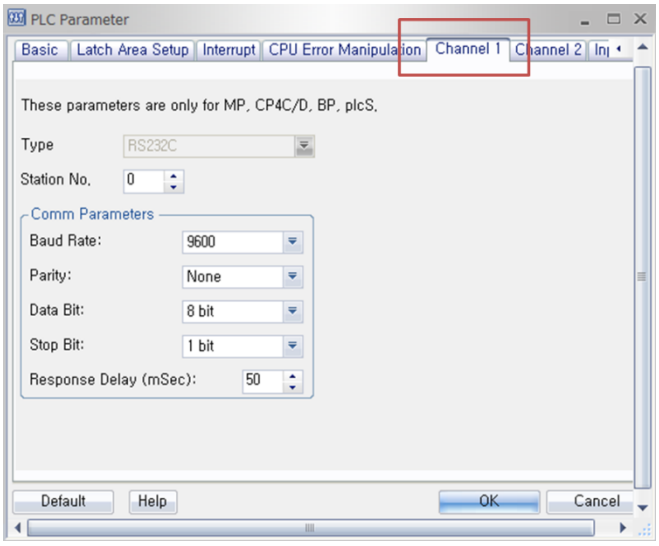
■ Unknown Module

The unknown module installation that CPU cannot recognize might cause an error. This error occurs especially when manufactured date and OS version of CPU module is lower than that of the unknown installed module. In this case, CPU module needs a firmware upgrade.

7) Keep a digital output when CPU stops or an error occurs
This option determines whether to keep a digital output status when CPU module stops operating or an error occurs (disabled by default).

2.2.5 Communication





PLC-S CPU has a built-in RS232C communication on channel 1 and RS485 communication on channel 2. PLC-S CPU also supports Ethernet communication (optional). Communication settings for RS232C and RS485 are configured at the Channel 1 or Channel 2 tap of CICON PLC Parameter menu.

1) Communication Type

- Channel 1: RS232C communication port, Null Modem is supported.
- Channel 2: RS485 communication port

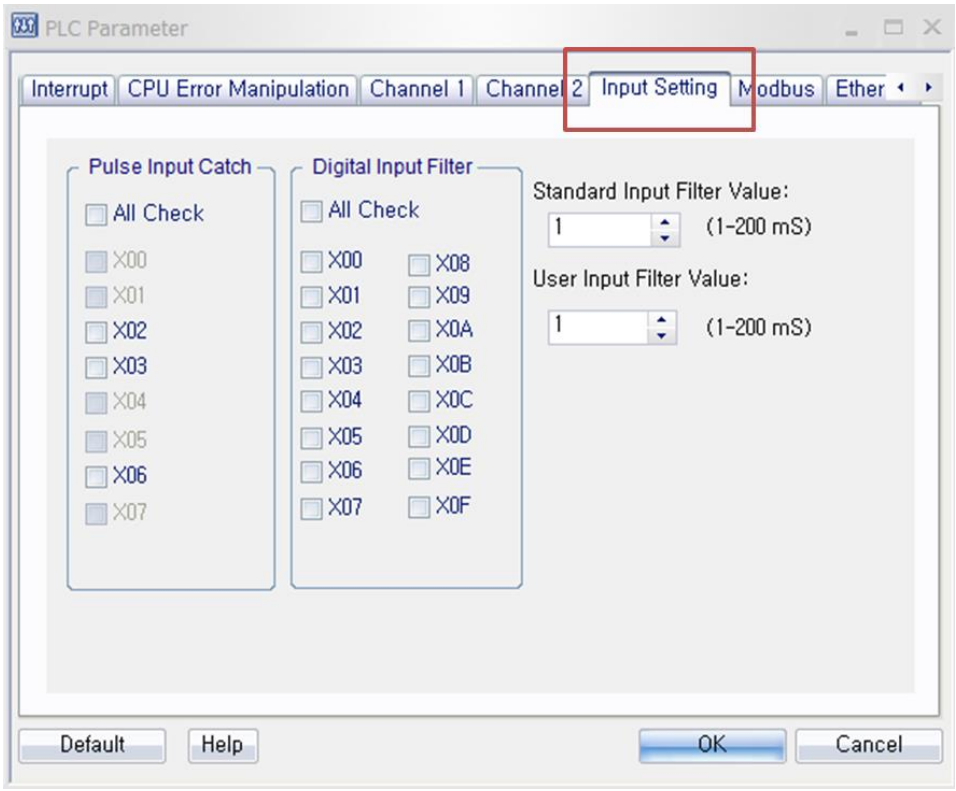
2) Station No.
PLC CPU station number is defined between 0 and 31.

3) Communication Parameter
Baud Rate (BPS), Parity, Data Bit, Stop Bit and Response Delay (msec) are set up.

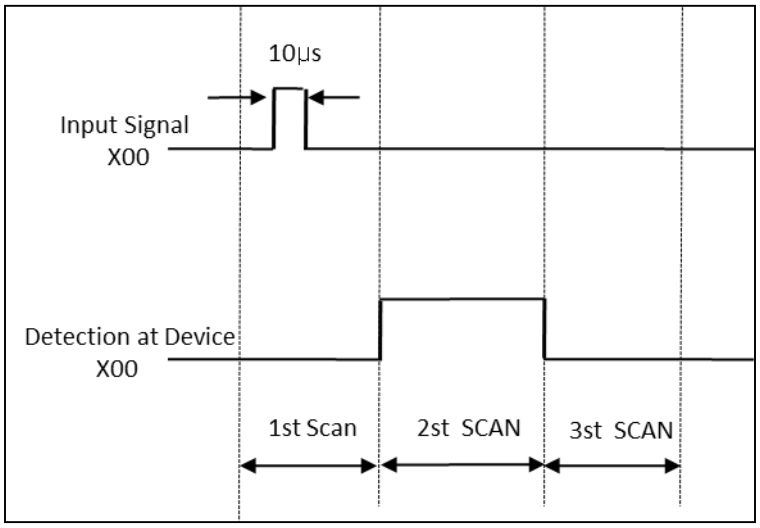
4) Communication Protocol
▪ Auto Detected Protocol (No additional program is required)
- CICON Loader Protocol (Between CICON and CIMON PLC)
- HMI Protocol (between CIMON Products)
- Modbus RTU Slave Protocol
▪ Protocol which requires additional Program (at Communication Configuration)
- Modbus RTU Master Protocol
- Serial or Ethernet Protocol

2.2.6 Input Setting

1) Pulse Input Catch



Pulse Catch Input can take a high speed digital input up to micro seconds (μs) that a common Digital Input device cannot handle. For example, multiple flowmeter signals can be detected without using a High Speed Counter of PLC-S CPU.



Process	Description
1st SCAN	PLC-S CPU takes minimum 10μs pulse input and stores it.
2nd SCAN	At second input refresh, the stored input is written into corresponding device.
3rd SCAN	Without additional input signal during 2nd Scan, the previous input signal is reset to OFF at third input refresh.

2) Digital Input Filter

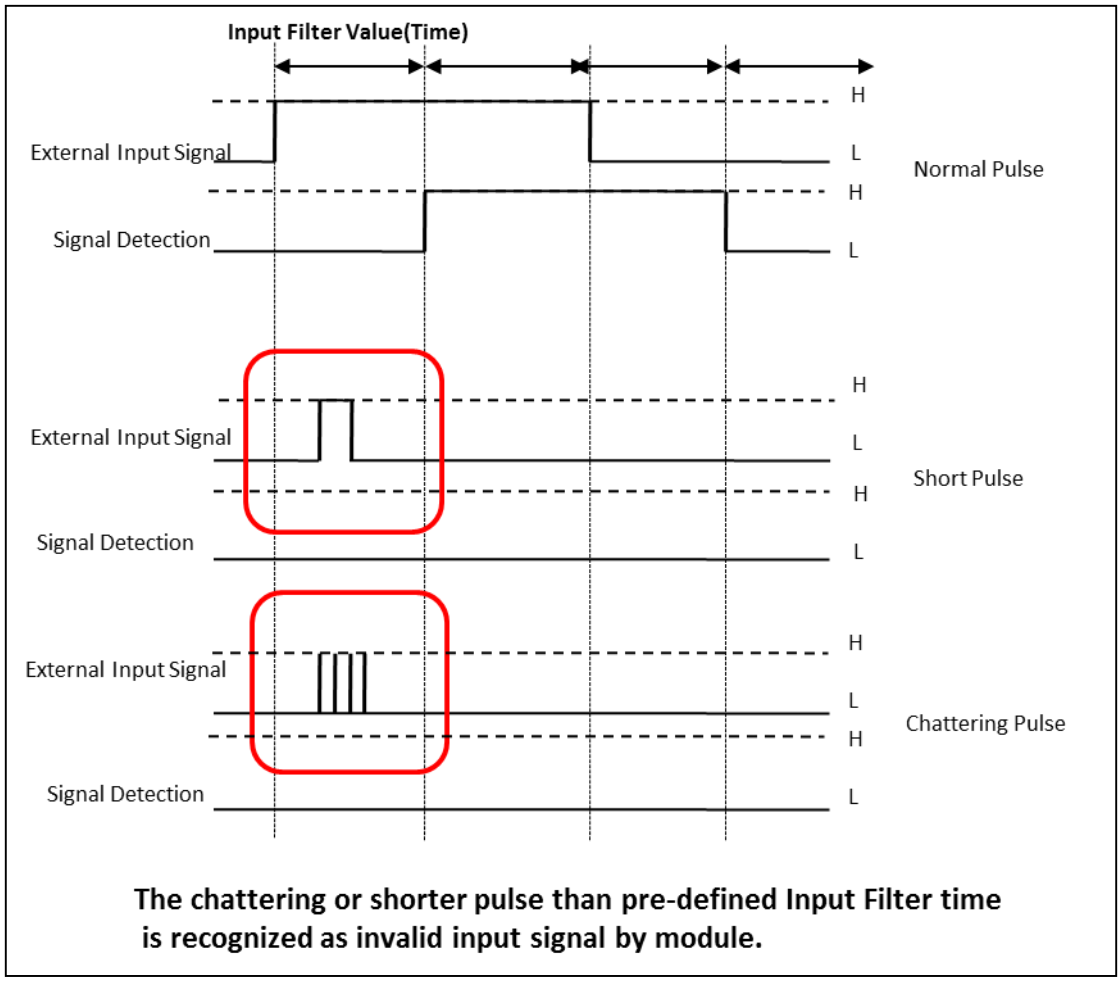
The Digital Input Filter is a feature that eliminates noise from input signals. This is useful when on-site condition is noisy or pulse width is an important factor. By controlling the Digital Input Filter, it can increase the reliability on input pulse.

If Input signal is shorter than the pre-defined Digital Input Filter time (value), this signal is recognized as **invalid** signal and ignored by module. Digital Input Filter also applies to noisy or chattering pulse.

▪ Standard Input Filter
- If input point is unchecked or unmarked, Standard Input Filter values are applied.

▪ User Input Filter
- If input point is checked or marked, User Input Filter values are applied.

※ The minimum Input Filter value(Time) is 1ms.



The chattering or shorter pulse than pre-defined Input Filter time is recognized as invalid input signal by module.

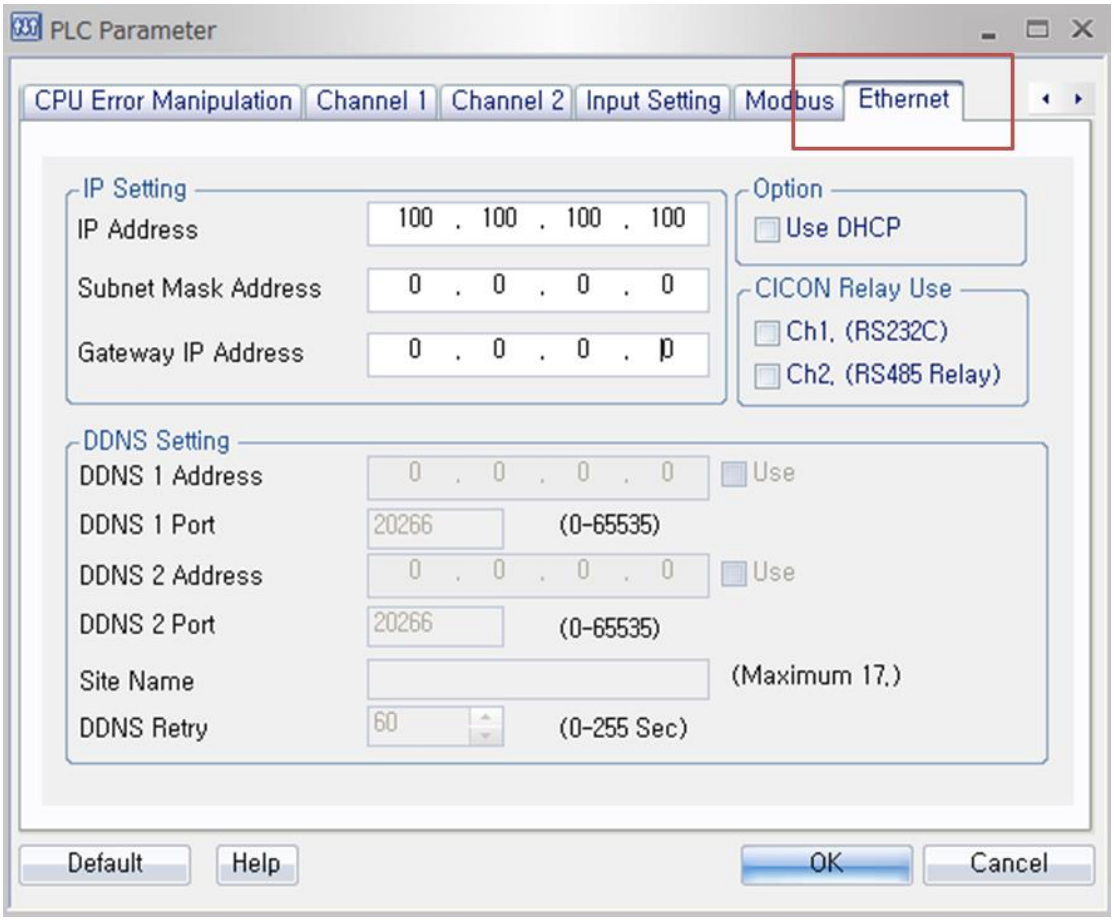
2.2.7 Modbus

At PLC Parameter menu, Modbus communication device can be defined. This feature allows selecting the certain part of PLC-S memory and defines it as Modbus communication device (Modbus TCP slave and RTU Salve). Modbus setting of PLC parameter is especially applied in following cases.

- When PLC-S CPU module is a Modbus slave.
- When CM3-SP01EET module is a Modbus Slave (Optional).

Register Type	Function	Description
Coil Status	Bit Read/Write	Coils are used to force the On/Off status of discrete outputs (DO) to the status of Slave. By using "01 Read Coil Status," slave status can be read. By using "05 Force Single Coil," slave status can be written.
Input Status	Bit Read	Input Status is used for the On/Off state of discrete outputs (DO) to the status of Slave. This register is read only and uses a function code "02 Read Discrete Input."
Holding Register	Word Read/Write	"03 Read Holding Registers" is used to read the contents of a contiguous block of holding registers in a remote device (03 – Read by Word, 06 – Write by Word, 16 – Write double word).
Input Register	Word Read	"04 Read Input Register" is used to read input registers in a remote device by word unit.

2.2.8 Ethernet Configuration



At Ethernet tap, Ethernet communication parameter of PLC-S CPU can be set up.

A. IP Setting
The IP address of PLC-S CPU is entered.

B. Use DHCP
DHCP assigns dynamic IP addresses to device on a network. Please refer to Chapter 4.2.6 or PLC-S Advanced Manual.

C. Programming Bridge
When multiple PLC-S are connected over RS232C or RS485(N:N), CICON can provide a communication bridge channel between PLC-S. Please refer to Chapter 4.2.5 for the details.

D. DDNS Setting
DDNS setting is used to make a connection between PLC and CIMON SCADA especially when dynamic IP address is assigned to PLC. After setting DDNS Address and port, Site Name (ID) and DDNS Connection Retry must be set up. Please refer to Chapter 4.2.6 or PLC-S CPU Advanced Manual for the details.

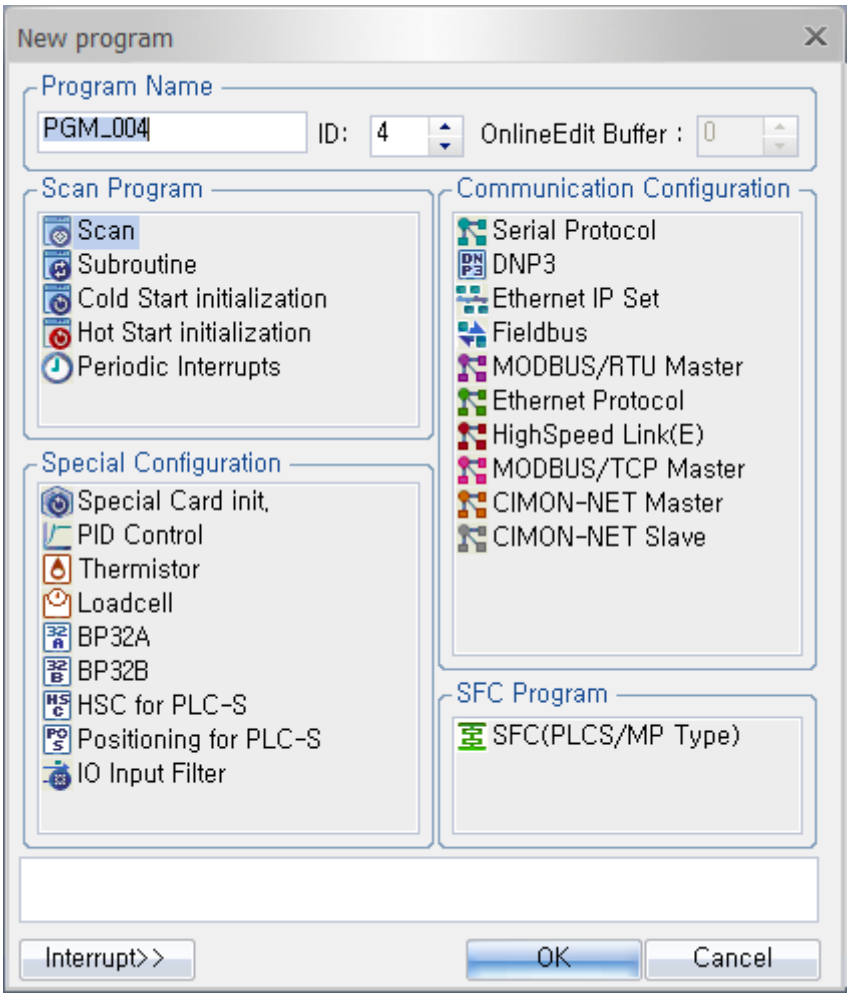
3. PLC-S CPU Features

3.1 Outline of PLC-S CPU Features

This chapter contains scan program and built-in functions. For Special Configuration and Communication Configuration, refer to PLC-S CPU advance manual. You can find out which program supports PLC-S CPU.

Type	Program name	PLC-S CPU	Remark	Manual
Scan Program	Scan	O	Up to 110 programs (include Scan, Special, Communication) can be registered.	PLC-S CPU Basic User
	Subroutine	O		
	Cold Start initialization	O		
	Hot Start initialization	O		
	Periodic Interrupts	O	Up to 16 programs	
Special Configuration	Special Card initialization	O	-	PLC-S CPU Advance User
	PID Control	O	-	
	Thermistor	X	-	-
	Loadcell	X	-	-
	BP 32A CPU series	X	-	-
	BP 32B CPU series	X	-	-
	High-speed counter for PLC-S	O	-	PLC-S CPU Advance User
	Positioning for PLC-S	O	-	
	IO Input Filter	O	-	
Communication Configuration	Serial Protocol	O	-	PLC-S CPU Advance User
	DNP3	X	-	-
	Ethernet IP Set	X	-	-
	Fieldbus	X	-	-
	MODBUS/RTU Master	O	-	PLC-S CPU Advance User
	Ethernet Protocol	O	CM3-SP01EET : Supported PLC-S CPU : Not supported	
	High Speed Link (Ethernet)	O	-	
	MODBUS/TCP Master	X	CM3-SP01EET : Supported PLC-S CPU : Not supported	
	CIMON-NET Master	X	-	-
	CIMON-NET Slave	X	-	-
SFC Program	SFC (PLC-S/MP Type)	O	-	PLC-S CPU Advance User

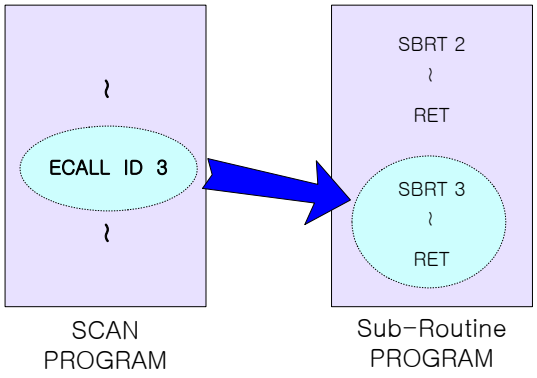
3.2 Program Type



3.2.1 Scan Program

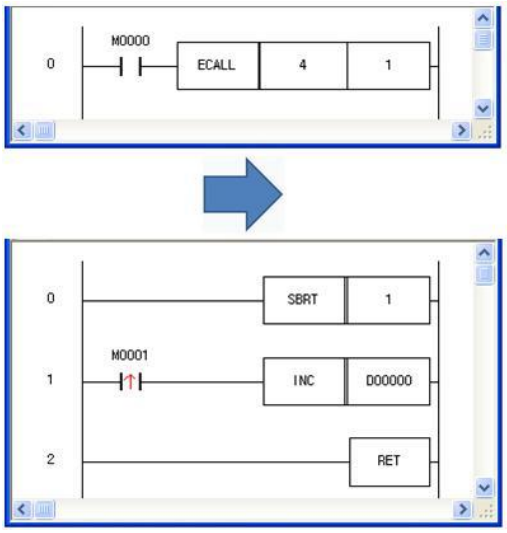
PLC CPU continuously reads Inputs, solves Logic, and writes to the Outputs. This process is called the PLC Scan. Registered scan programs in PLC-S CPU execute sequentially from beginning ID to end of ID. Scan is fundamental to a program and at least one scan program must be saved in PLC CPU.

3.2.2 Subroutine Program



Subroutine program is executed by ECALL instruction of scan program. Sub-Routine Program in SBRT n ~ RET will be executed by ECALL instruction. Subroutine ID and number must be used with ECALL instruction as below example.

Tip Subroutine Instruction



When M000 is ON, number 1 Subroutine which is in ID number 4 will be executed. If M0001 is ON, D0000 is increased to D0001 and finishes Subroutine and then goes back to Scan program where Subroutine was called.

Tip Limitation of Subroutine

Up to 128 subroutines can be registered in a subroutine ID. You can edit only one subroutine online. For example, if you edit number 1 and number 2 of Subroutine online simultaneously, an error will occur.

3.2.3 Cold Start initialization

This program is executed when PLC CPU Power is ON or CPU mode is switched STOP to RUN mode. This program is executed at first before scan program. It is used to set data or initialize special module to run scan program.

3.2.4 Hot Start initialization

After a power failure in RUN and subsequent return of power, this program runs through an initialization routine and then automatically executes a hot restart. PLC CPU remains last valid values and run Hot Start initialization before running scan program.

Tip INTEND Instruction

END instruction is used at the end of program to finish scan program. However, in case of initialization program is finished up with INTEND instruction instead of END.

3.2.5 Periodic Interrupts Program

This program is executed by certain period.

Maximum of 15 Periodic Interrupt programs [i000~i014] can be generated. (Its ID number starts initial “i” in front of number) Interrupt program runs low ID number from 0 and ID number must not be duplicated with other ID number. Set Priority and Period (Range 10ms ~ 655,350ms) when you make Periodic Interrupts program.

In order to activate Periodic Interrupts Program, use “GEI” instruction and use “EI” to run Interrupt program.

Tip : How to operate Interrupt program

Activate all Interrupt program by M00 and then run Program ID 1 by M01.

3.3 Watchdog

3.3.1 Scan Watch Dog Timer

The Watchdog timer informs you if the scan time of the PLC goes over specified limits. (Watchdog time can be set from 10ms to 6 sec. by parameter in CICON.) If the scan takes too long to complete due to a poorly written loop, the watchdog timer will expire and fault out the PLC. (it turns PLC mode to Remote STOP mode) In order to clear watchdog error, Power ON again or turn switch to STOP mode. If watchdog occurs, F0032 will be turned ON.

3.3.2 Module Installation Detection

It is used to detect disconnected module on the base. If module is disconnected on the base, 0x0308 error occurs and PLC is turned to Remote STOP mode.

3.3.3 Expansion Error

If error occurs while CPU module is communicating to Expansion module, error will be marked at F address.

From 0 (the 1st expansion module) to A(the last expansion module), you can find out which module has error.
Example) 3rd expansion module has error

F 영역	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
F0290	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

F0292 has “1” value.

3.3.4 Battery Error

Battery Specification (Model: CR2032)

Item	Description
Voltage	DC 3.0 V
Purpose	RTC
Specification	Lithium battery, 3V, CR2032, 220mAh

If Power is Off, battery will be used for operate RTC. In order to operate RTC, PLC needs 0.24μAh. 5.76μAh is needed for a day and 2.1mAh is needed for a year. Therefore, this battery can be used semi permanently.

3.3.5 Monitoring external power

PLC-S can be operated with DC12 to 24V. If voltage is decreased less than 10V, CPU stops and all output is turned off.

3.4 Built-in Function

3.4.1 Clock

It is used to read time from RTC and save it to F address.

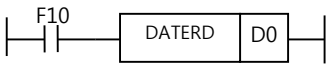
F address	Description	Example	
		HEX	Decimal
F0400	Year	H07d1	2001
F0410	Month and Date	H07 14	July 20
F0420	Hour and Minute	H0c 1e	12 o'clock 30Min.
F0430	Second and Date	H0a 05	10sec. Friday

Date

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0	1	2	3	4	5	6

Hexadecimal is saved to F0400 ~ F0430. Without data converting, time data can be read through "DATERD" command. Time data is written on a 24-hour system. In order to write the time, use "DATEWR" command.

Tip: Read time data through "DATERD"



Clock Device →

D0 : YEAR
D1 : Moth
D2 : Day
D3 : Hour
D4 : Minute
D5 : Second
D6 : Day of Week

Time date is assigned from D0 to D6.

3.4.2 Auto detection for expansion modules

If expansion module such as I/O, AD, DA, Communication and TC/RTD module is installed to CPU module, CICON will show I/O points(X and Y) with module information.

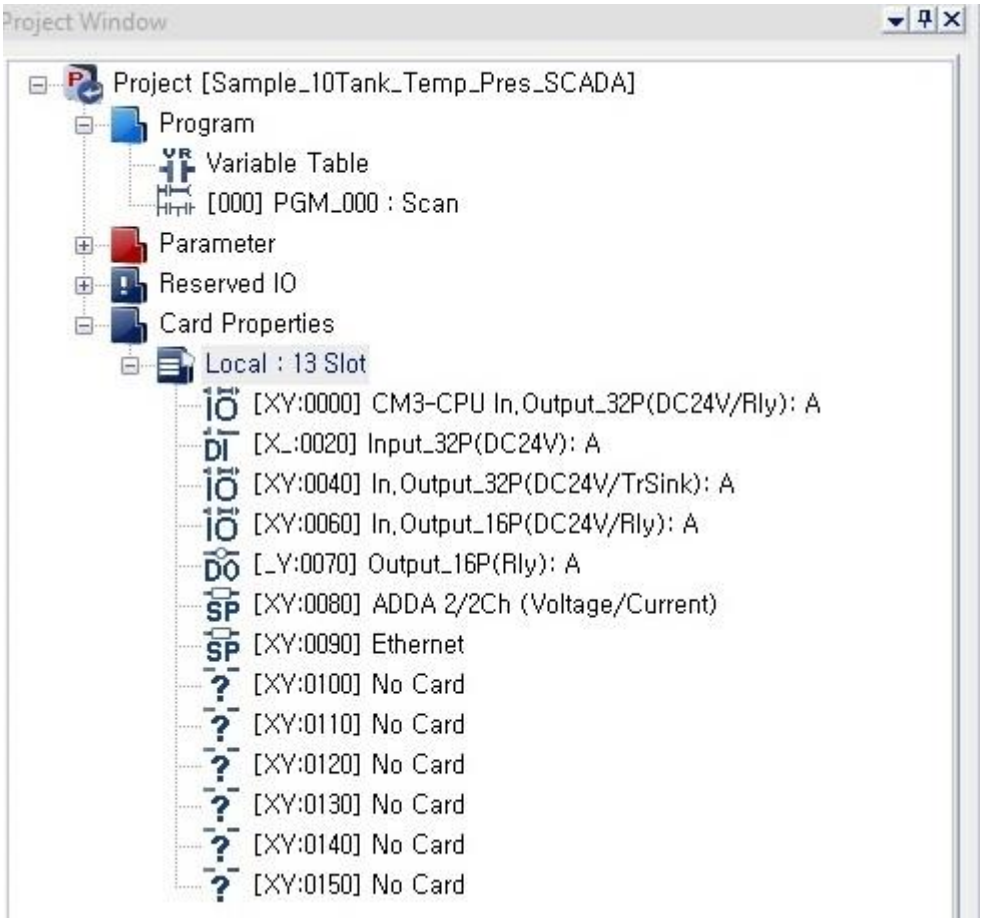
<table>
<tr><th>Item</th><th>Module</th><th>Description</th><th>Total I/O points</th><th>X or Y address</th></tr>
<tr><td rowspan="12">CPU</td><td>CM3-SP32MDT(C)</td><td rowspan="8">Digital Input 16 points

TR(Sink/Source)Output 16 points</td><td rowspan="16">32 points</td><td rowspan="10">X00 ~ X0F
Y10 ~ Y1F</td></tr>
<tr><td>CM3-SP32MDT(C)-SD</td></tr>
<tr><td>CM3-SP32MDT(C)V</td></tr>
<tr><td>CM3-SP32MDT(C)V-SD</td></tr>
<tr><td>CM3-SP32MDT(C)E</td></tr>
<tr><td>CM3-SP32MDT(C)E-SD</td></tr>
<tr><td>CM3-SP32MDT(C)F</td></tr>
<tr><td>CM3-SP32MDT(C)F-SD</td></tr>
<tr><td>CM3-SP16MDR</td><td rowspan="2">Input 8pts / Relay Output 8pts</td></tr>
<tr><td>CM3-SP16MDRV</td></tr>
<tr><td>CM3-SP16MDRE</td><td rowspan="2">Input 8pts / Relay Output 6pts</td></tr>
<tr><td>CM3-SP16MDRF</td></tr>
<tr><td rowspan="5">Digital Module</td><td>CM3-SP32EDT</td><td>Input 16pts / TR(Sink) Output 16pts</td></tr>
<tr><td>CM3-SP32EDO</td><td>Input 32 points</td><td>X00 ~ X1F</td></tr>
<tr><td>CM3-SP32EOT</td><td rowspan="2">TR(Sink/Source)Output 32points</td><td>Y00 ~ Y1F</td></tr>
<tr><td>CM3-SP32EOC</td></tr>
<tr><td>CM3-SP16EOR</td><td>Relay Output 16 points</td><td rowspan="14">16 points</td><td>Y00 ~ Y0F</td></tr>
<tr><td>CM3-SP16EDR</td><td>Input 8pts / Relay Output 8pts</td><td>X00 ~ X07
Y08 ~ Y0F</td></tr>
<tr><td rowspan="6">Analog Module</td><td>CM3-SP04EAO</td><td>AI 4ch</td><td rowspan="13">X00 ~ X0F
Y00 ~ Y0F</td></tr>
<tr><td>CM3-SP04EAA</td><td>AI 2ch / AO 2ch</td></tr>
<tr><td>CM3-SP04EOAI</td><td>AO Current 4ch</td></tr>
<tr><td>CM3-SP04EOAV</td><td>AO Voltage 4ch</td></tr>
<tr><td>CM3-SP04ERO</td><td>RTD 4ch</td></tr>
<tr><td>CM3-SP04ETO</td><td>TC 4ch</td></tr>
<tr><td rowspan="5">Communication Module</td><td>CM3-SP02ERR</td><td>RS-232C 2ch</td></tr>
<tr><td>CM3-SP02ERS</td><td>RS-232C 1ch, RS-422/485 1ch</td></tr>
<tr><td>CM3-SP02ERRC</td><td>CDMA 1ch, RS-232C 1ch</td></tr>
<tr><td>CM3-SP02ERSC</td><td>CDMA 1ch, RS-232C 1ch</td></tr>
<tr><td>CM3-SP01EET</td><td>Ethernet 1port</td></tr>
</table>

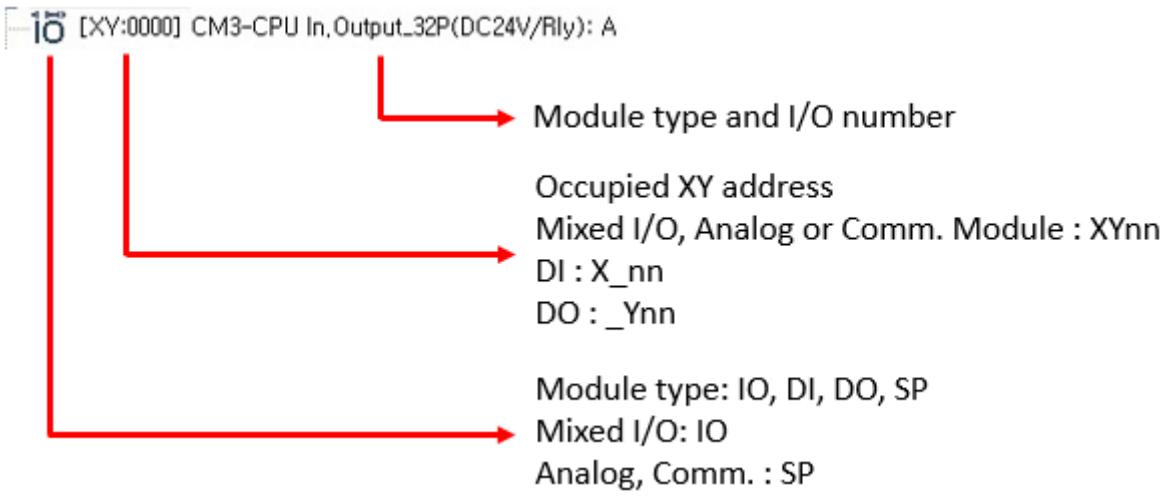
CPU module and 32points Digital module occupy 32points. Although CM3-SP16MDRx has 8points each for both input and output, total 32points are occupied. In case of Mixed I/O module, Input has X00 to X0F and Output has Y10 to Y1F but not Y00 to Y0F. CM3-SP16EDR is an exception. It occupies input from X00 to X07 and output from Y08 to Y0F but not from Y10. So total 16 points are occupied (X08~X0F and Y00~Y07 are not used.)

In order to find out occupied points, an example picture is attached as below.

PLC Configuration: CM3-SP32MDT, CM3-SP32EDO, CM3-SP32EDT, CM3-SP16EDR, CM3-SP16EOR, CM3-SP04EAA, CM3-SP01EET (Total 7modules).



You can see the connected PLC properties in CICON. There are IO type and the number of points in the Card Properties.



Slot No.	0	1	2	3	4	5	6
Module name[1)]	SP32MDTx	SP32EDO	SP32EDT	SP16EDR	SP16EOR	SP04EAA	SP01EET
XY address[2)]	X00 ~ X0F Y10 ~ Y1F	X20 ~ X3F	X40 ~ Y5F	X60 ~ X67 Y68 ~ Y6F	X70 ~ X77 Y78 ~ Y7F	X80 ~ X8F Y80 ~ Y8F	X90 ~ X9F Y90 ~ Y9F
Module location No.[3)] (HEX)	-	H00 01	H00 02	H00 03	H00 04	H00 05	H00 06

1) All modules is PLC-S line up so that CM3 is omitted.

2) XY address means that module occupies Input and Output points.

3) This “Module location number” is used with FROM and TO command. Module number starts from expansion module which is next to CPU.

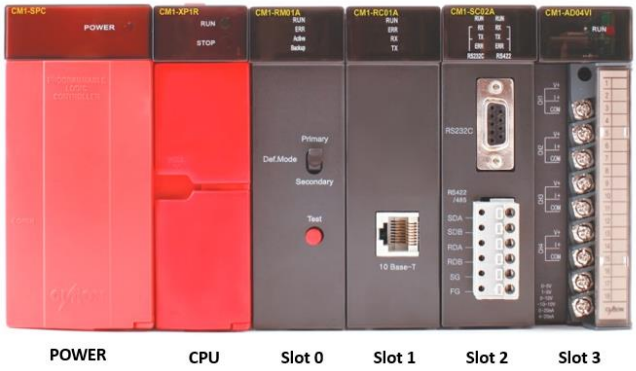
Tip : **Module location number**

Module location number is used when reading and writing value with FROM or TO command. It is Hexadecimal and has 4 digit numbers. The first two digit number indicates number of expansion base and next two digit number indicates slot number. As PLC-S is not expandable, the first two digit number is always “00”.

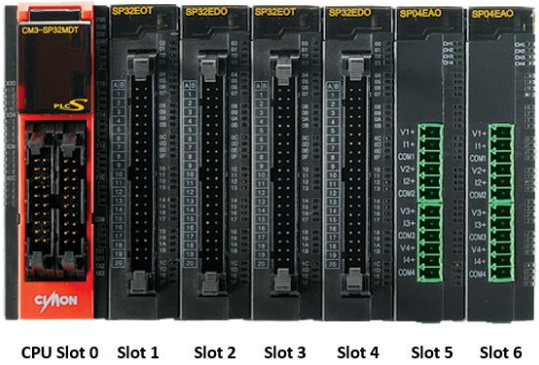
EX) H02 03 : The module is installed at 2nd Base and 4th Slot. (In case of XP and CP series, slot number starts from “0” Expansion module.
H00 01 : The module is installed at Main Base and 2nd Slot. (In case of PLC-S, slot number starts from “0” CPU module)
H00 0A : The module is installed at Main Base and 11th Slot

H0000 of CM1 (XP and CP series) starts from first expansion module but in case of CM3 (PLC-S), H0000 starts from CPU module because PLC-S CPU module has I/O points. If module location number is wrong with FROM or TO command, CICON reads value from other module or 0x030C error occurs.

CM1-Series



CM3-Series



3.4.3 I/O Reservation

It is used to reserve Input and Output points in order to replace module without changing I/O number in case of breakdown or detecting whether correct module is installed at an assigned slot number. Each slot can have 0, 16, 32 and 64 I/O points.

If reserved I/O point is less than real I/O point, you can use reserved I/O points. If reserved I/O point is more than real I/O point, increased reserved I/O point will be dummy I/O point. If installed module is different from reserved module, error occurs.

a) Example of I / O Reservation (8 expansion modules)

I/O points without parameter setting.

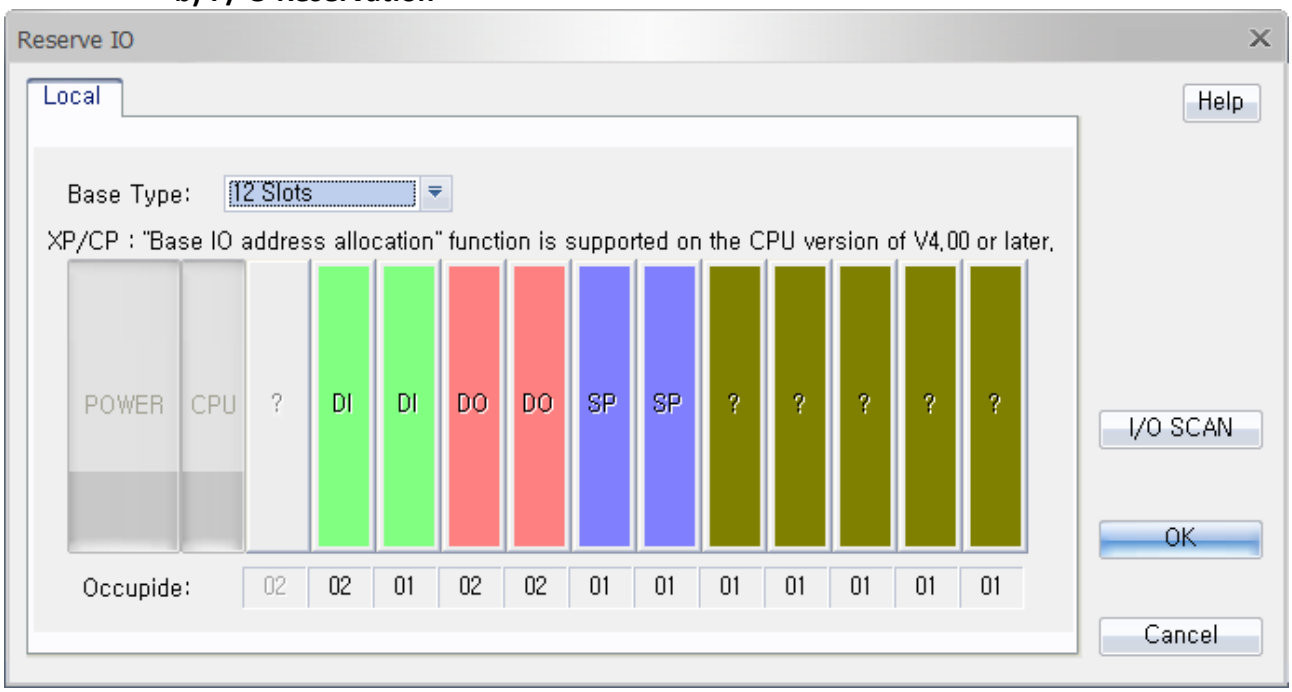
CPU 00~1F	20 ~ 2F	30 ~ 3F	40 ~ 4F	50 ~ 5F	60 ~ 6F	70 ~ 7F	80 ~ 8F	90 ~ 9F

I/O points with parameter setting

CPU	Input 16pts	Input 32pts	Output 16pts	Output 16pts	Output 16pts	Output 32pts	Output 16pts	Special 16pts
00~1F	20 ~ 2F	30 ~ 4F	50 ~ 5F	60 ~ 6F	70 ~ 7F	80 ~ 9F	A0 ~ AF	B0 ~ BF

Click [Tool] → [I/O Reservation] or click “Reserved I/O” at the Project window. Select Base Type. If you select “Auto”, I/O points are automatically occupied according to installed modules.

b) I / O Reservation



I/O point can be reserved by each slot manually or automatically.

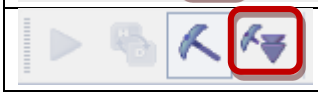
If I/O points of installed module is different with reserved I/O points, an error occurs.

Occupied number is displayed at the bottom of a slot.

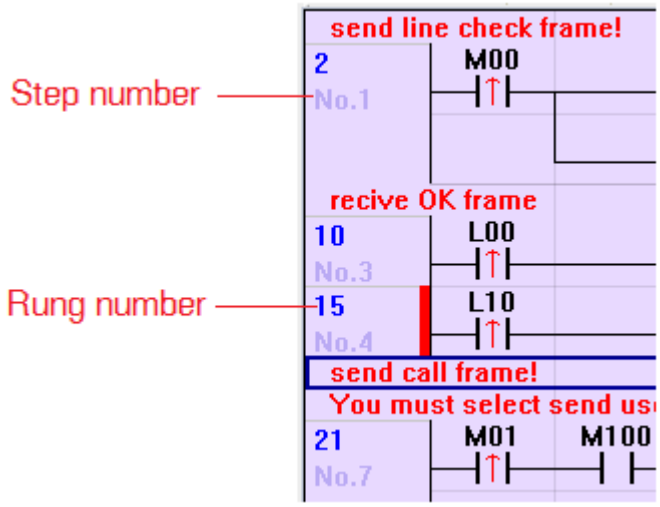
3.4.4 Online Edit

This function is used to edit ladder program by in real time while PLC is running.

After downloading project to PLC, click “Monitor Start” and “Online-Edit Start” icon to start online edit.

Status	Description
	It is used to start monitoring ladder program.
	It is used to edit ladder program in real time.
	It is used to download edit ladder program to PLC in real time.

Limitation of Online Edit.



Number of steps you can edit in real time is limited to 60 steps. If you edit more than 60 steps in a Rung, a warning message will pop up.

3.5 Firmware Updating

3.5.1 Requirements for firmware download to PLC

PLC-S Type supports updating firmware for CPU and Expansion modules.

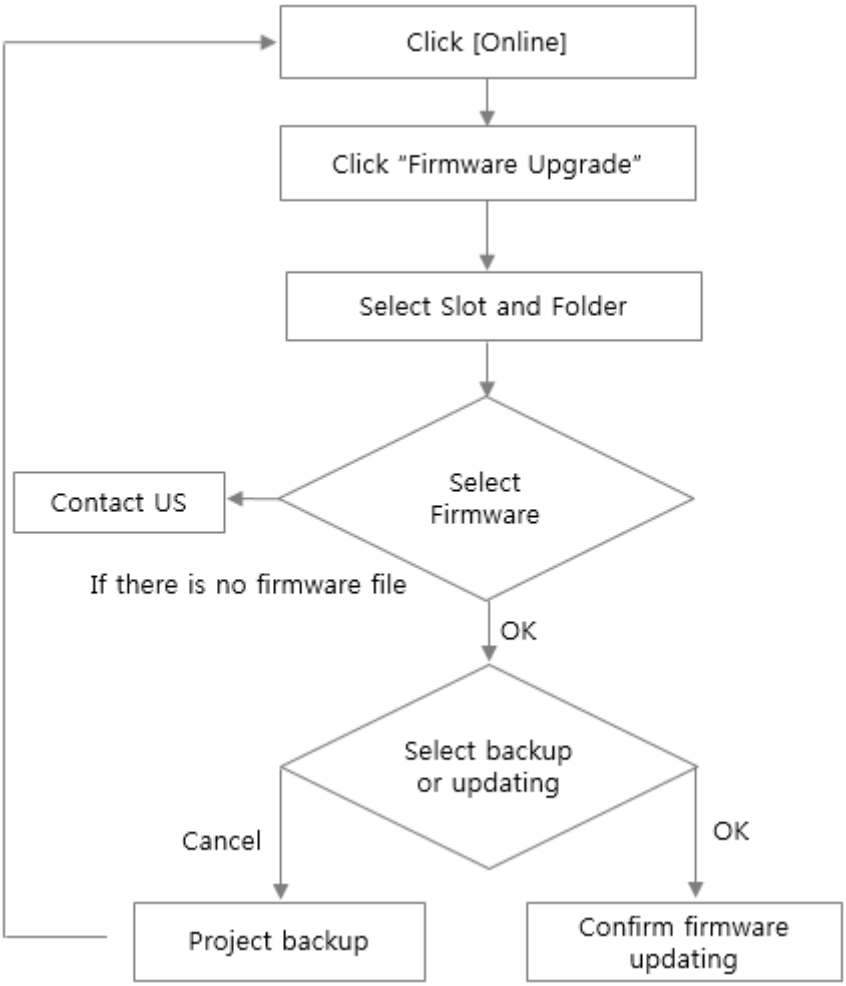
a) CICON Ver.2.29 or higher version must be installed in PC.

b) USB DRIVER must be installed in PC.

From CICON version 3.08, the latest firmware folder is in CICON folder when CICON is installed in PC. Click [Online] → [PLC Status] to check the firmware of CPU module.

*You can find out only CPU firmware in CICON folder. Please contact Cimon technical support team if you need firmware for other expansion modules.

3.5.2 Firmware Updating for CPU module



1. Connect DC 24V to PLC-S CPU module.

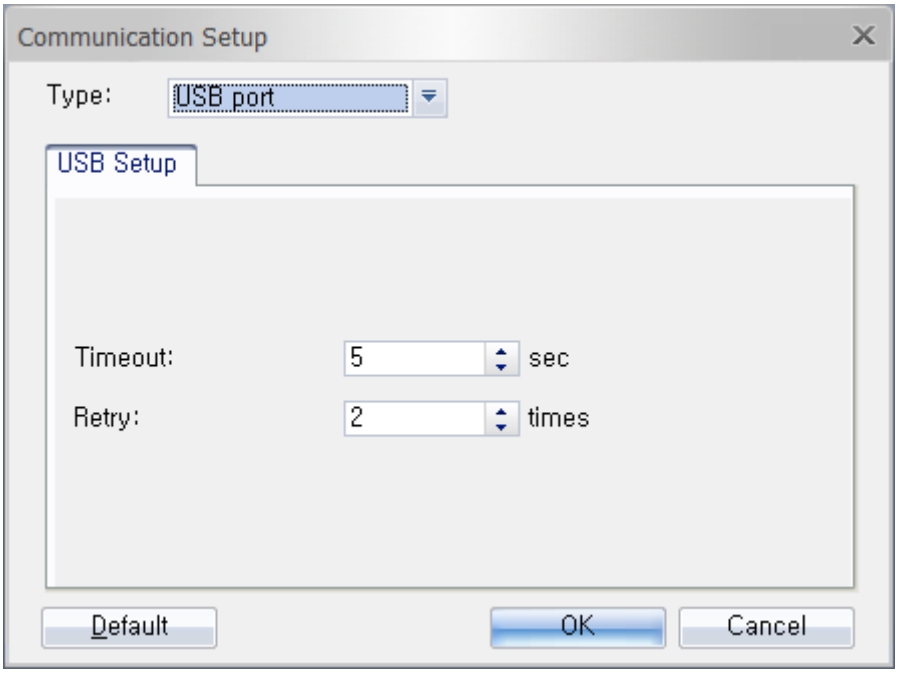
2. Turn MODE switch to STOP mode.

3. Check POWER and STOP LED are turned ON.

4. Run CICON and click [File] → [New Project]

5. Select CM3-PLCS type as CPU Type.

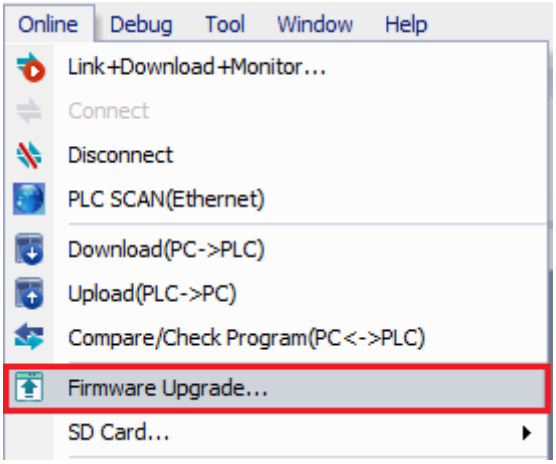
6. Click [Tool] → [Connection Setup]



7. Select “USB port”

(Timeout must be 5sec. or more)

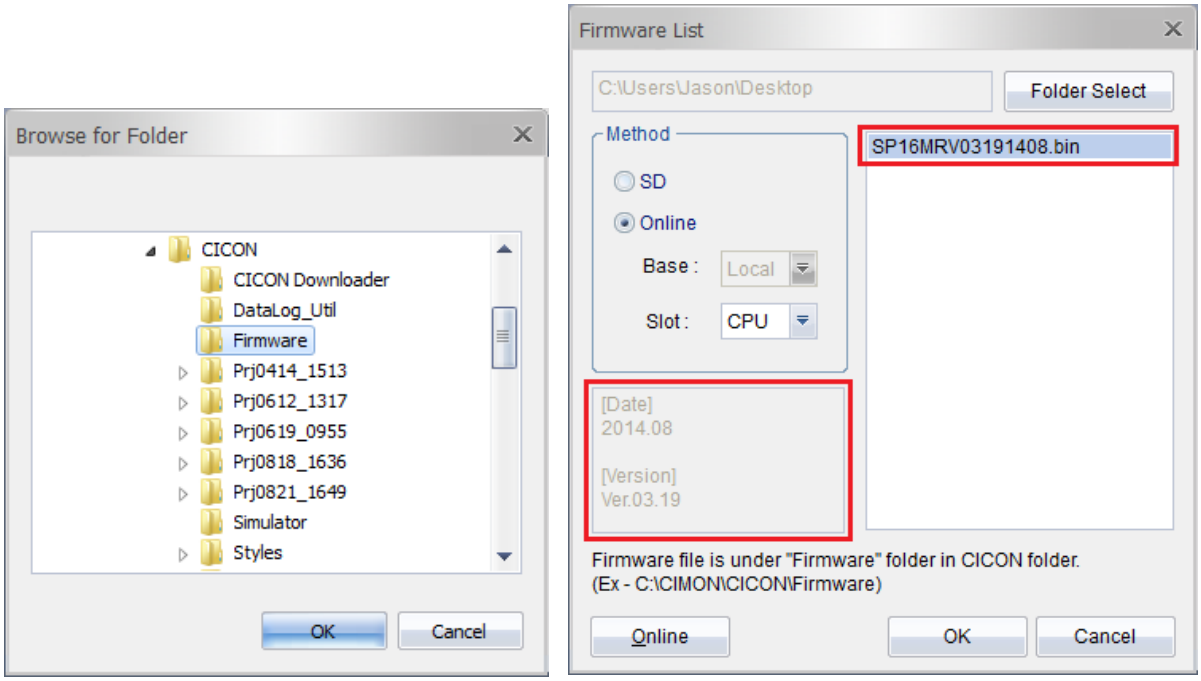
8. Click [Online] → [Connect] and then click [Online] → [Firmware Upgrade]



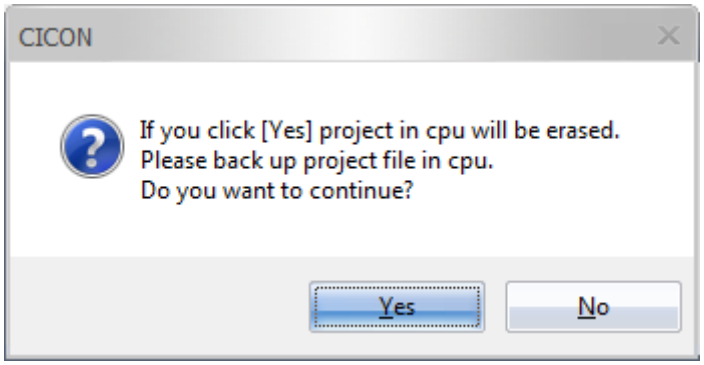
9. Select “Online” and click “Folder Select”.

Select the folder which has firmware file.

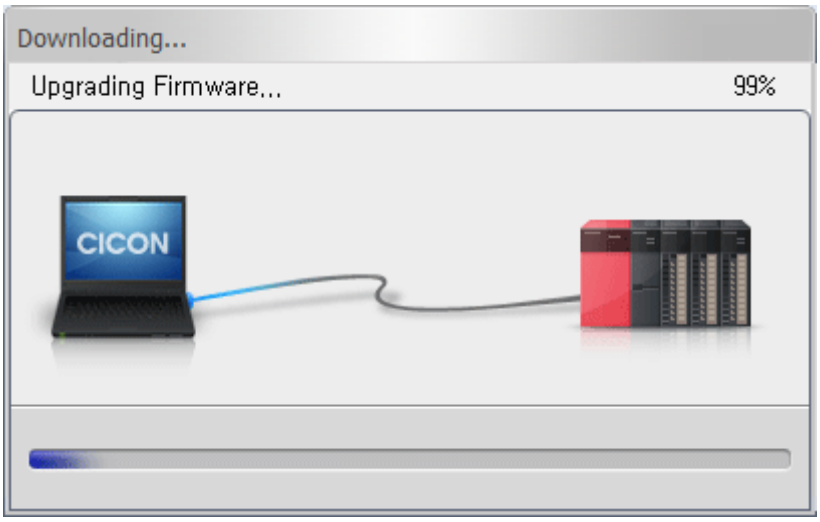
(If you click the firmware file, firmware version and date of built are displayed.)



10. If you click “OK”, a warning message will pop up as below.



11. Click OK and wait until updating is completed 100%.

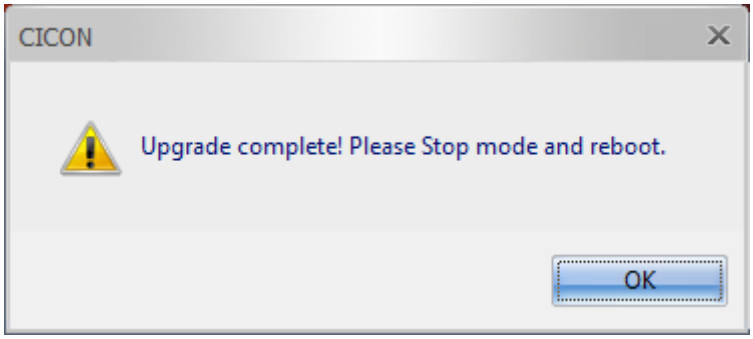


Notice

Do not remove cable or turn power off until firmware updating is completed 100% (Upgrading firmware at the point of 99% takes a while to complete 100% as PLC is applying downloaded firmware files internally). If you remove cable or turn off Power at 99%, CPU will be seriously damaged and then there is no way but to replace CPU module.

If firmware upgrading is completed successfully, below message will pop up.

(Power LED is ON but RUN, STOP and ERROR LED are blinking by 0.5sec. interval)



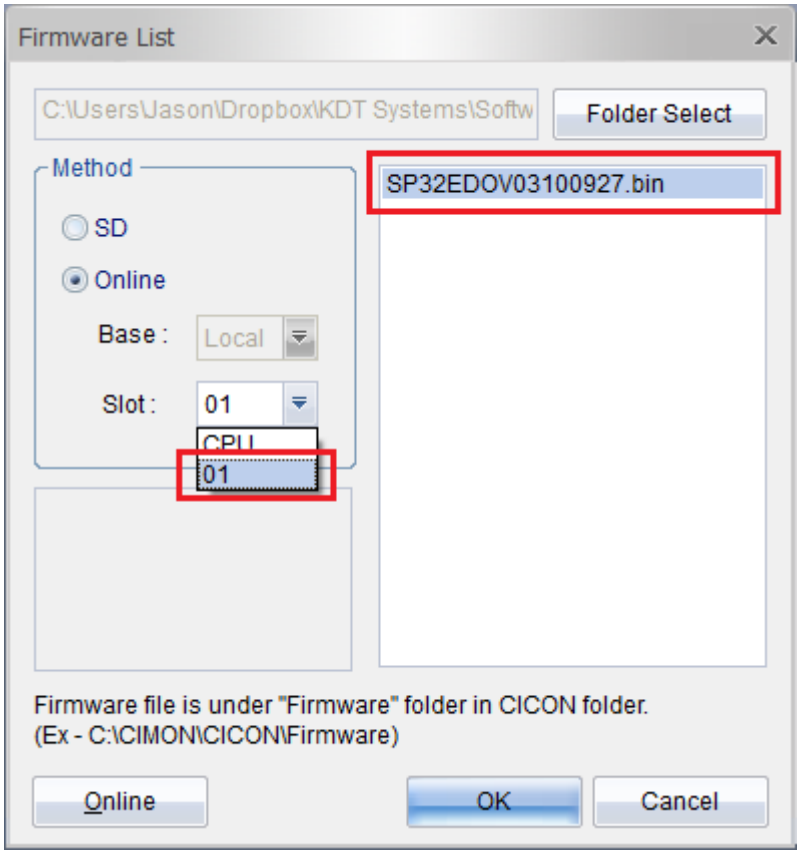
Turn Power Off and On again. Click [Online] → [PLC Status] to check firmware version.

It is also the same way to update firmware by SD card.

3.5.3 Firmware Updating for Expansion module

The updating process is the same as CPU firmware updating except selecting slot number as below.

(Example: only one expansion module is installed)



Select Slot number and click Folder Select.

Select the folder which has firmware file.

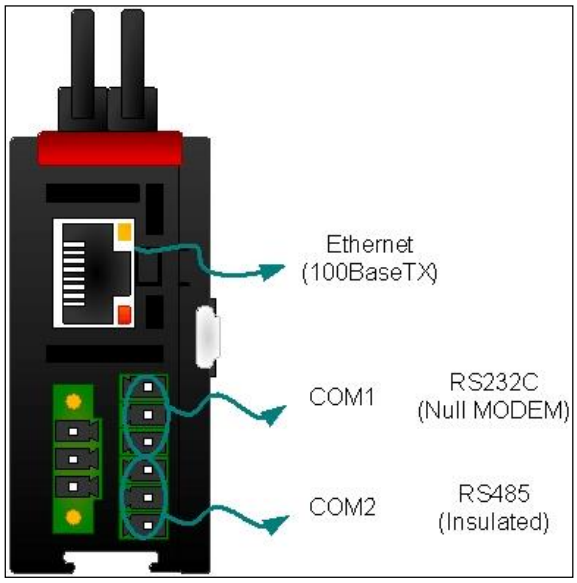
The rest of process is the same as CPU firmware update.

Notice

Do not remove cable or turn power off until firmware updating is completed 100%. (Upgrading firmware at the point of 99% takes a while to complete 100% as PLC is applying download firmware files internally). If you remove cable or turn off Power at 99%, CPU will be seriously damaged seriously then there is no way but to replace CPU module.

4. PLC-S Built-in Communication

4.1 Built-in Communication



Depending on PLC-S CPU options, built-in communication can vary. For the details, please refer to Chapter 1.9 '**PLC-S CPU built-in communication specification**.'

Comm. Port	Comm. Type	Protocol	Description
Ethernet	100Base-TX	CIMON HMI Protocol (TCP/IP, UDP/IP) MODBUS/TCP (Slave) High Speed Link CICON Communication Bridge CICON Protocol	- Programming Bridge - DHCP + CIMON DDNS
COM1	RS232C	CIMON HMI Protocol MODBUS/RTU (Master) MODBUS/RTU (Slave) Protocol Program CICON Protocol	- Auto-detect communication protocol
COM2	RS485	CIMON HMI Protocol MODBUS/RTU (Master) MODBUS/RTU (Slave) Protocol Program CICON Protocol	- Auto-detect communication protocol - Photo coupler isolation between communication and PLC inner circuit.

4.2 ETHERNET

4.2.1 Specification

A. Capacity
PLC-S CPU can support data transmission up to maximum 5 clients simultaneously. For TCP/IP protocol, **the number of simultaneous client connections is limited to 3**. In terms of UDP user, 5 simultaneous clients are recommended to configure a system. If more than 5 clients are connected to PLC-S CPU at the same time, then it could reduce the network performance.

B. Network Speed
Without any required setting, network speed is automatically detected between 10Mbps and 100Mbps and applied to the connection.

4.2.2 CIMON HMI Protocol (TCP/IP, UDP/IP)

All CIMON PLCs support 'CIMON HMI Protocol.' A client decides the protocol type between TCP/IP and UDP/IP. The number of maximum supported clients is **5**. In case of TCP/IP, maximum nodes are 3.

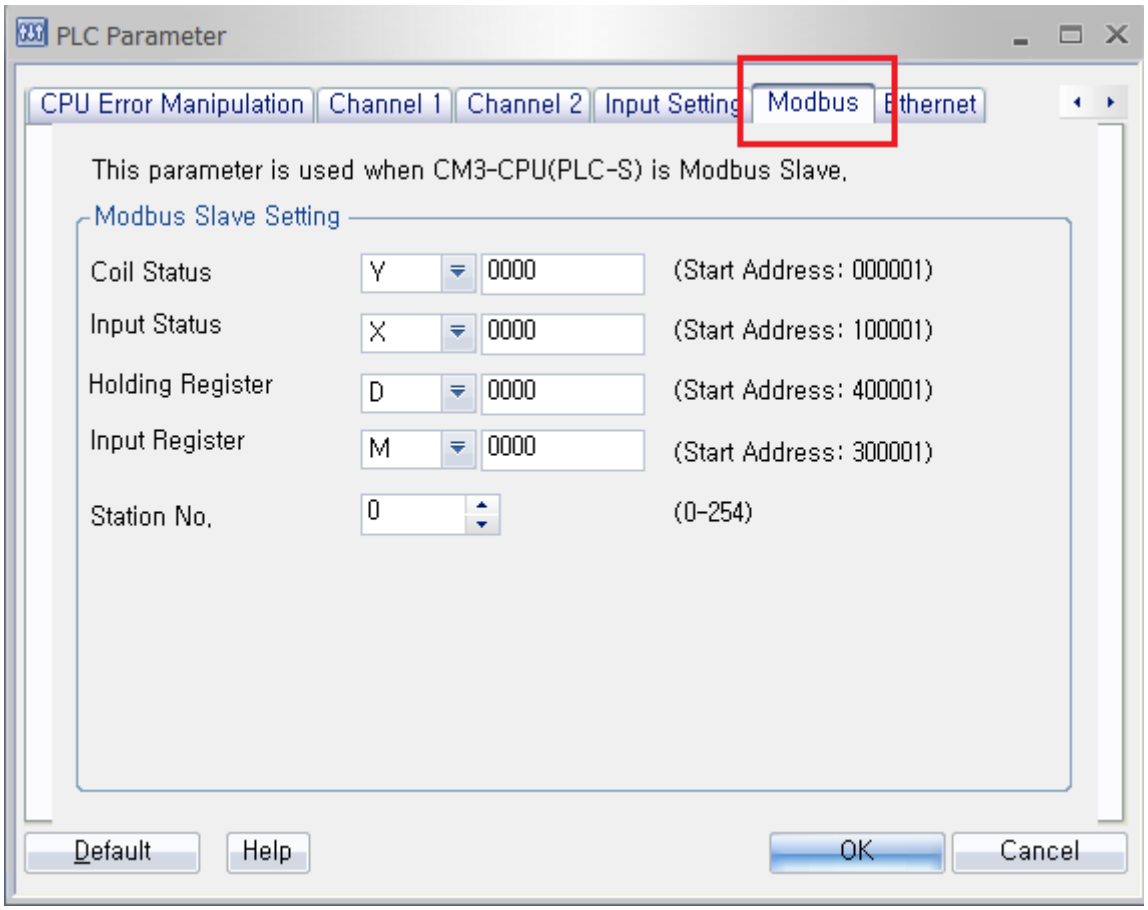
※ For additional information on protocol, please refer to PLC-S Advanced Manual or Communication Manual.

TIP CIMON HMI Protocol Port

When a Router is used, please use following communication port number to open a port by Port Forwarding.

▶ **Communication Port: UDP/IP = 10262, TCP/IP = 10260**

4.2.3 Modbus TCP Slave



At PLC Parameter configuration, Modbus memory mapping is available. This feature allows users to select the one part of PLC-S inner memory and set it as Modbus memory. Modbus memory mapping is applied to Modbus RTU protocol that is configured at COM1 and COM2.

Register Type	Function	Description
Coil Status	Bit Read/Write	Coils are used to force the On/Off status of discrete outputs (DO) to the status of Slave. By using “01 Read Coil Status”, slave status can be read. By using “05 Force Single Coil”, slave status can be written.
Input Status	Bit Read	Input Status is used for the On/Off state of discrete outputs (DO) to the status of Slave. This register is read only and uses a function code “02 Read Discrete Input”.
Holding Register	Word Read/Write	“03 Read Holding Registers” is used to read the contents of a contiguous block of holding registers in a remote device (03 – Read by Word, 06 – Write by Word, 16 – Write double word).
Input Register	Word Read	“04 Read Input Register” is used to read input registers in a remote device by word unit.

TIP Modbus TCP Port

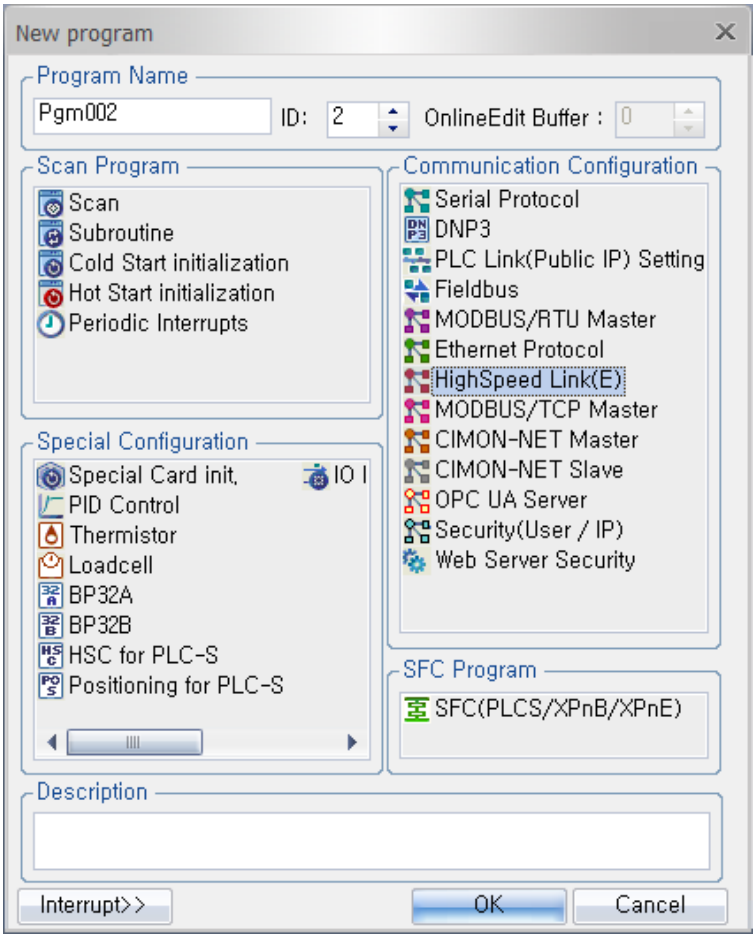
When a Router is used, please use following communication port number to open a port by Port Forwarding.

▶ **Communication Port : TCP/IP = 502**

4.2.4 HighSpeed PLC Link

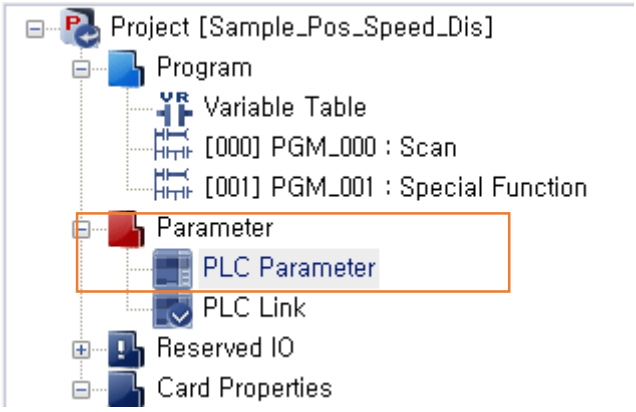
HighSpeed Link supports high-speed data transmission between CIMON PLC up to 64 stations. Each PLC can send/receive maximum of 64 data blocks. The maximum number for sending blocks is up to 32.

One sending/receiving data block can include the consecutive data of up to 64 Words. To use 'HighSpeed Link' feature, user should create a 'HighSpeed Link(E)' communication program as shown below. PLC Link 'Public' is used for CIMON PLC XP or CP type. PLC Link 'CIMON Dedicated' is 10Mbps communication, and 'HighSpeed Link' is 100Mbps over Ethernet. Communication between PLC-S CPU and CIMON PLC over Ethernet should be 'HighSpeed Link' of PLC Link. See the PLC-S Advanced manual or PLC-S Communication manual for details.



TIP

PLC-S CPU type **does not** support a **CIMON PLC Link** communication that is configured at "PLC Parameter" of CICON. Please use 'HighSpeed Link(E)' for PLC-S CPU type.



"HighSpeed PLC Link" is a UDP/IP broadcasting type. Accordingly, network Hub device is not required to be a switching Hub necessarily.

To achieve a normal communication performance, it is required to separate "HighSpeed PLC Link" from other networks. If not, this could reduce the network performance significantly.

TIP Port Number for "HighSpeed PLC Link"

When a Router is used, please use following communication port number to open a port by Port Forwarding.

▶ **Communication Port: UDP/IP = 10264**

TIP Supported Module for "HighSpeed PLC Link"

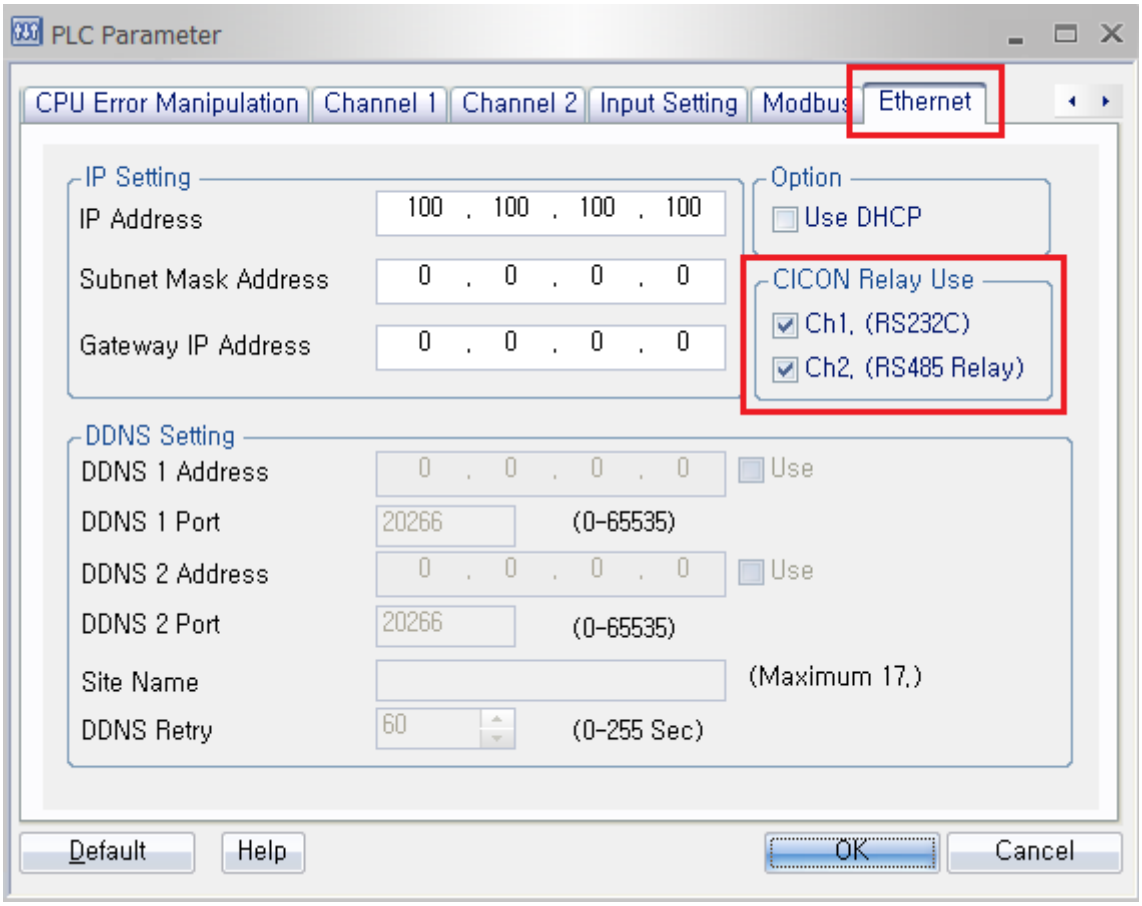
- CM3-SP01EET (Ethernet Module)
- CM1-EC10A (Ethernet Module)

※ CM1-EC01A (Ethernet Module) does not support "HighSpeed PLC Link" communication.

4.2.5 Programming Bridge

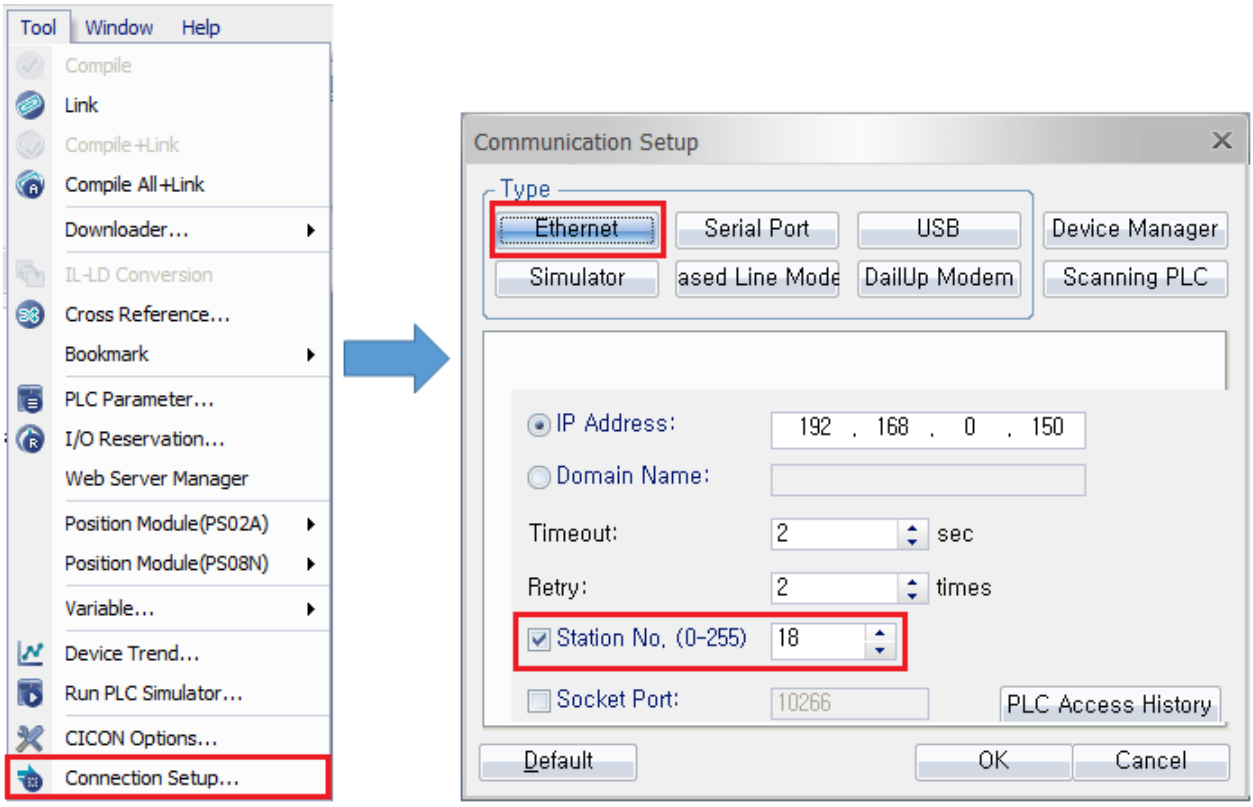
Programming Bridge requires one master PLC-S CPU module with Ethernet option. By using COM1 or COM2 port of this master module, CICON can link to other PLC-S CPU modules that are connected to master PLC-S CPU.
When multiple PLC-S CPU modules are installed on site in which loader connection is not allowed to modify a program directly, one master PLC-S CPU with Ethernet option can provide a channel over Ethernet for project modification on remote PLC-S. Communication between master PLC-S CPU and CICON(PC) is as follows:

- Communication Type(Loader protocol) – UDP/IP
- Port Number - 10266



Example) Modbus RTU(Serial) Communication

※ If both communications (Modbus RTU RS232C at COM1 and RTU RS485 at COM2) are used for PLC-S CPU simultaneously, then slave PLC of **COM1** takes station numbers between **0 ~ 127**. For **COM2**, slave PLC takes station number between **128~254**. Modbus Master PLC can take any station numbers.
To access and modify the program in remote PLC-S CPU, enable a Programming Bridge feature for COM1 or COM2 port of master module. Go to [Tool]→[Connection Setup] menu of CICON.
If you set the connection setup as shown below, connection is made to the PLC-S CPU of corresponding station number.



The serial port of PLC-S CPU can detect the received communication protocol automatically. Due to the **automatic protocol detection**, PLC-S CPU communication can be switched from Modbus/RTU to CICON Loader communication automatically.

One serial port cannot support multiple communication protocols. While Programming Bridge is executed, other PLCs become **stand-by** mode except for Master PLC connected to CICON.

When Programming Bridge process is completed, Ethernet connection between Master PLC and CICON is **closed**. If Master PLC cannot receive any data from CICON more than **2 second**, then previous Modbus RTU communication is **resumed** automatically. Multiple Slave PLCs detect the received protocol as Modbus RTU and respond to their own station Address (number).

TIP Time out at [Connection Setup] menu

Regarding a "Time Out" at [Connection Setup] configuration, **2 second** is recommended to optimize the Programming Bridge configuration between Master and Slave PLC-S CPU.

4.3 Serial Communication (COM1 / COM2)

4.3.1. Specification

a) Automatic Protocol Detection

PLC-S can detect communication protocol on received frames from other device automatically without additional setting. Here are the few lists below (user needs to set communication parameter such Baud Rate manually).

- Modbus RTU Slave
- CIMON HMI
- CIMON CICON Loader

※ If a serial port is already registered at the Communication Configuration of CICON, then this port does not support Automatic Protocol Detection when CPU status is on RUN mode.

b) Communication Line Isolation(COM2)

The COM2 port of PLC-S CPU supports RS485(Serial) communication only. There is a photo-coupler isolation between communication line and PLC inner circuit.

Here are benefits from internal circuit isolation as follows:

- prevent the degradation of communication quality or electric shock due to a potential difference between devices
- obtain a stable communication quality in high noise environments
- reduce a surge damage caused by welding, etc.

c) Separation between COM ports

Each COM1 and COM2 port operates independently, allowing a flexible network configuration. On each port, different protocols can be used simultaneously. Therefore, different special programs can operate on different serial port without interfering each other.

4.3.2 Programming Bridge

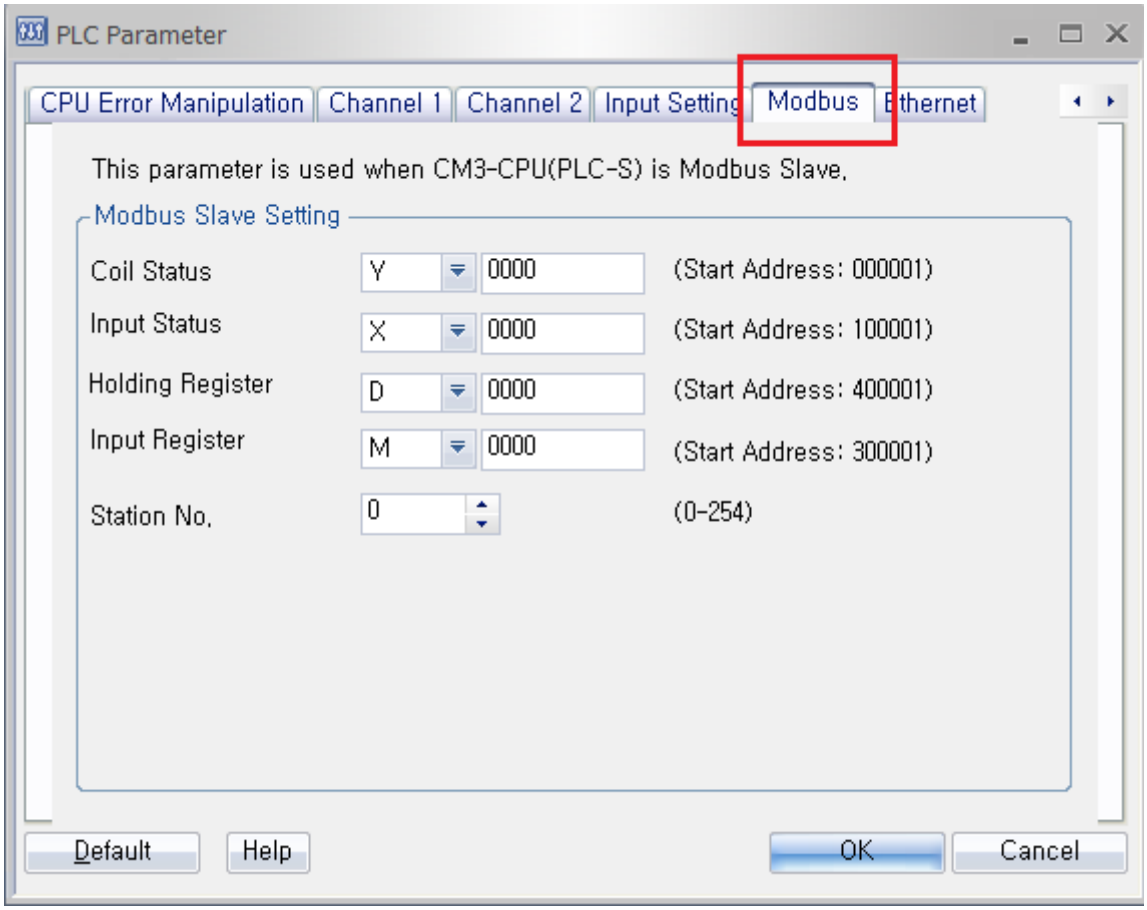
By using an Ethernet connection, Programming Bridge feature is supported. Please refer to chapter **4.2.5** for details on **Programming Bridge**.

4.3.3 CIMON HMI Protocol

All CIMON PLCs support a CIMON HMI protocol. Please refer to PLC-S CPU Advanced manual or Communication manual for details.

4.3.4 Modbus RTU Slave

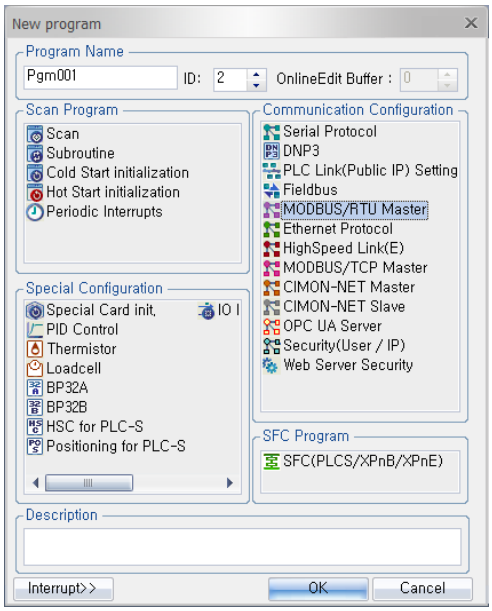
Modbus memory mapping is available at “PLC Parameter” window.

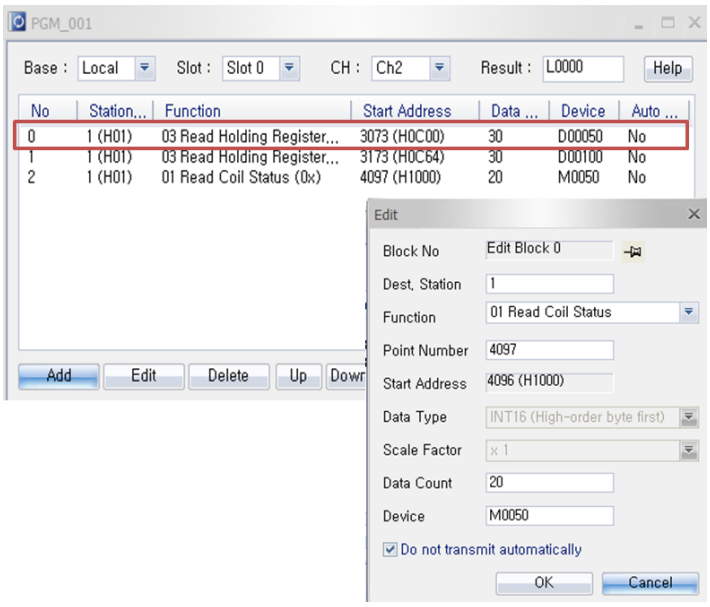


This feature allows users to select the one part of PLC-S inner memory and sets it as Modbus memory. Modbus memory mapping is applied to Modbus TCP protocol that is configured over Ethernet.

Register Type	Function	Description
Coil Status	Bit Read/Write	Coils are used to force the On/Off(Bit) status of discrete outputs(DO) to the status of Slave. By using “01 Read Coil Status,” slave status can be read. By using “05 Force Single Coil,” slave status can be written.
Input Status	Bit Read	Input Status is used for the On/Off state of discrete outputs (DO) to the status of Slave. This register is read only and uses a function code “02 Read Discrete Input.”
Holding Register	Word Read/Write	“03 Read Holding Registers” is used to read the contents of a contiguous block of holding registers in a remote device (03 – Read by Word, 06 – Write by Word, 16 – Write double word).
Input Register	Word Read	“04 Read Input Register” is used to read input registers in a remote device by word unit.

4.3.5 Modbus RTU Master





PLC-S CPU supports a Modbus RTU Master feature and is configured at “Modbus/RTU Master” configuration of CICON. User must select a Base and Slot number.

※ For PLC-S CPU, Slot number ‘0’ means a CPU module itself.

Here is a table for Modbus RTU functions and descriptions below. Please refer to PLC-S Advanced Manual for more details.

Function	Feature	Description
01 Read Coil Status	Read the ON/OFF(Bit) status of discrete outputs in Slave(Y,M,L,K)	Read the defined size of discrete output status (Read/Write) from the starting address and save it into device area.
02 Read Input Status	Reads the ON/OFF(Bit) status of discrete inputs in Slave (X)	Read the defined size of discrete input status (Read-only) from the starting address and save it into device area.
03 Read Holding Register	Reads the binary contents(Word) of holding registers in Slave(Y,M,L,K,D)	Read the defined size of discrete output status (Read/Write) from the starting address and save it into device area.
04 Read Input Register	Reads the binary contents(Word) of Input registers in Slave(X,F)	“04 Read Input Register” is used to read input registers in a remote device by word unit.
05 Force Single Coil	Forces(write) a single coil(Bit) to either ON or OFF	Read the defined size of discrete output status (Read/Write) from the starting address and save it into device area.
06 Preset Single Register	Presets(write) a value(word) into a single holding register	Read the defined size of discrete output status (Read/Write) from the starting address and save it into device area.
16 Preset Single Register	Presets(write) values(multiple word) into a sequence of holding registers	Read the defined size of discrete output status (Read/Write) from the starting address and save it into device area. Can be used when using Float Data or Double Word Data that exceeds 1 word.

4.4 Web Server

4.4.1 Features of Web Server

Web server of PLCS allows you to monitor and contorl device value of PLC online through internet.

a) Provide Web Server Manager tool to configurate web server page.
b) No need to install extra software for configuration and monitoring viewer.
c) Security is enhenced. Only authorized ID, IP Address or Mac Address are allowed to access web server. There are 15 different security levels for user and page.
d) Provide easy tool to create web page by CICON.
e) Web pages are stored in SD card of PLCS CPU module so that they don't need program memory of CPU module.
f) .htm file can be uploaded in web server.
g) Maximum 3 concurrent users can access web page when Modbus and HMI protocol are not being used. (Xpanel can use Loader protocol to connect to PLC)

4.4.2 Required CPU module and CICON

CICON version : 6.10 or higher

PLC TYPE	MODULE	Firmware version
CM3 PLCS Series	CM3-SP32MDTE-SD	6.11 or higher
	CM3-SP32MDTF-SD	
	CM3-SP32MDCE-SD	
	CM3-SP32MDCF-SD	

4.4.3 Specification of Web Server

Item	Web Server
HTTP version	1.1
Memory of SD card	FAT32 Format, Maximum 8GB
Security level of Web page	Level 1 ~ 15
Refresh time of Web page	1 ~ 10 sec.
Number of Web page	Maximum 30pages
Memory of Web page	Maximum 60 kbyte per a page

*Notice
a) File name must be less than 8 characters.
b) Only .htm is supported. (.html is not yet supported.)
c) Attached file (PDF or Images) must be less than 60kbyte.

4.4.4 Supported Web Browser

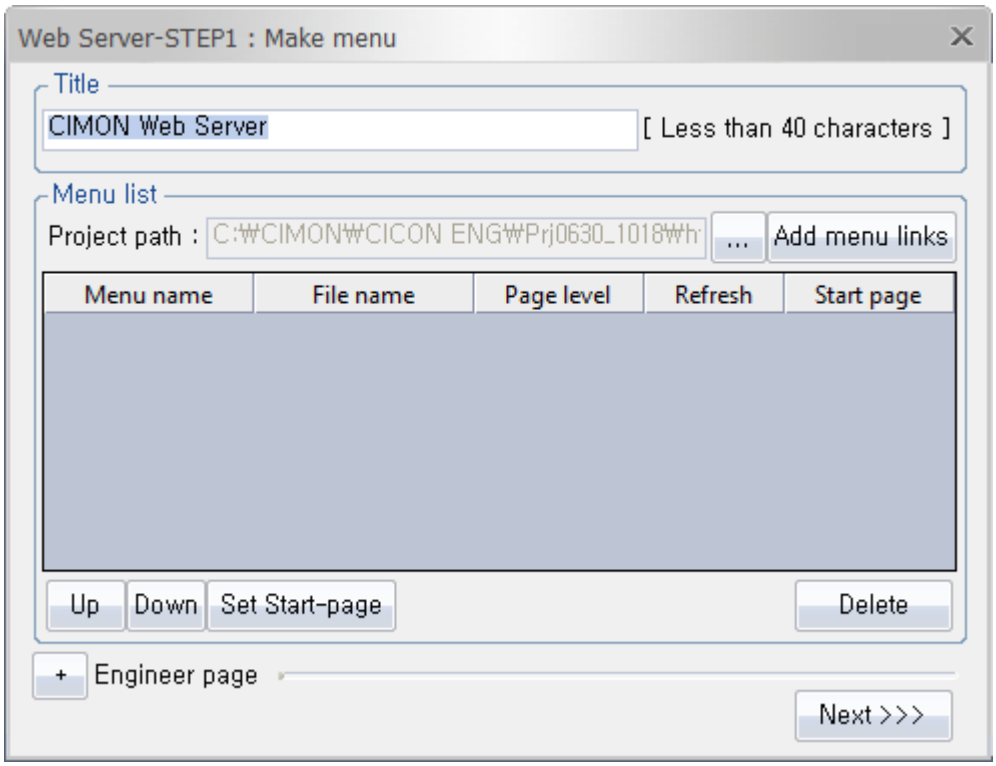
The following browser supports to open a web page.

Browser name	Version	Company
Internet Explorer	V11.0	Microsoft
Crome	V43.0	Google
Safari	V5.1.7	Apple
Firefox	V38.0.5	Mozilla

4.4.5 Web Server Manager Setting

***Create folder named "WEB" in your SD card before you download htm folder to SD card.**

1) Click Web Server Manager after creating a new project.



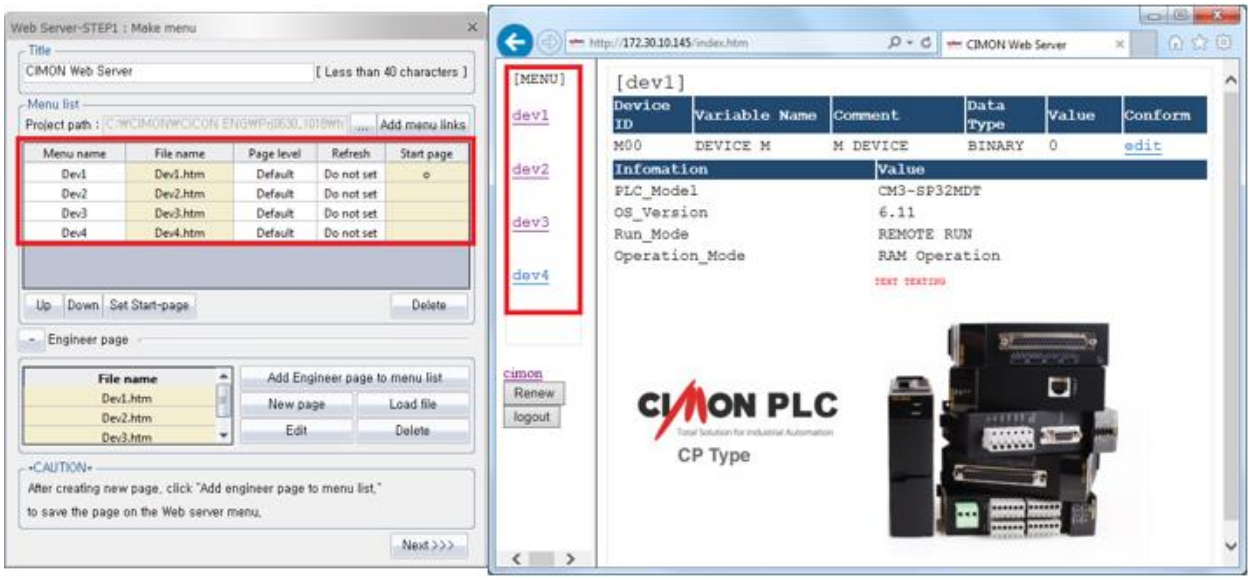
Write a name of web server on the Title.

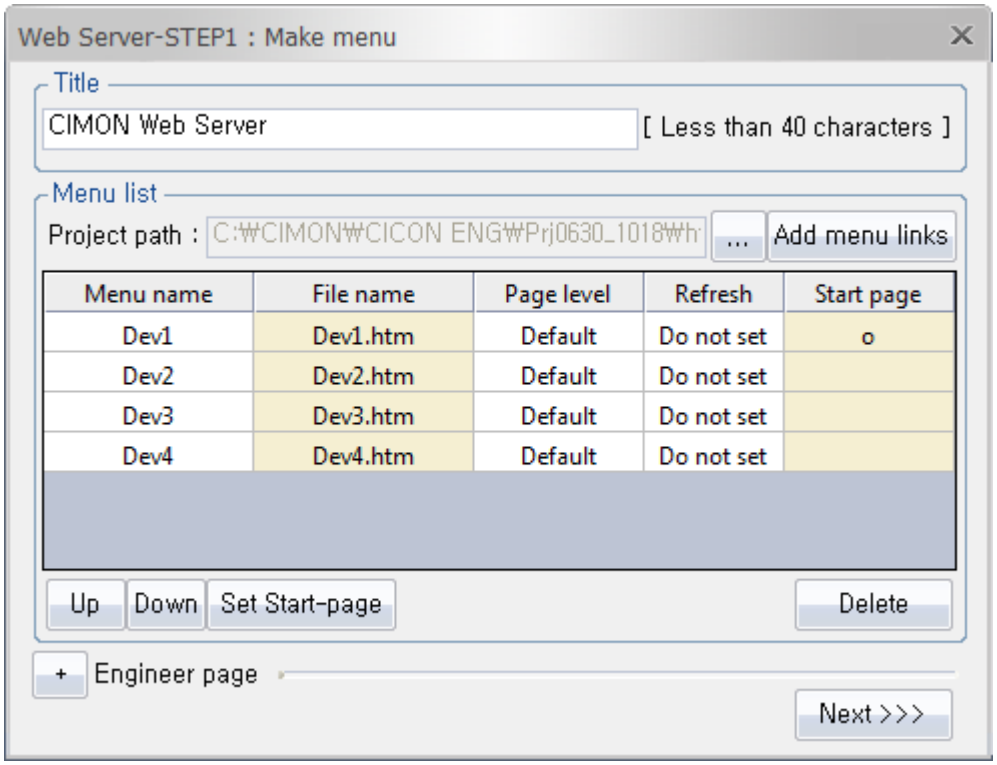
This Tile will be used in Web page name and log in page as shown below.

2) Menu List

This menu list will appear on the web server menu.

(Maximum 30 .htm can be added)





- Menu name: Click here to change the name.

- Page level: Choose from 1 to 15 security level or Default. (No.1 is the highest level)

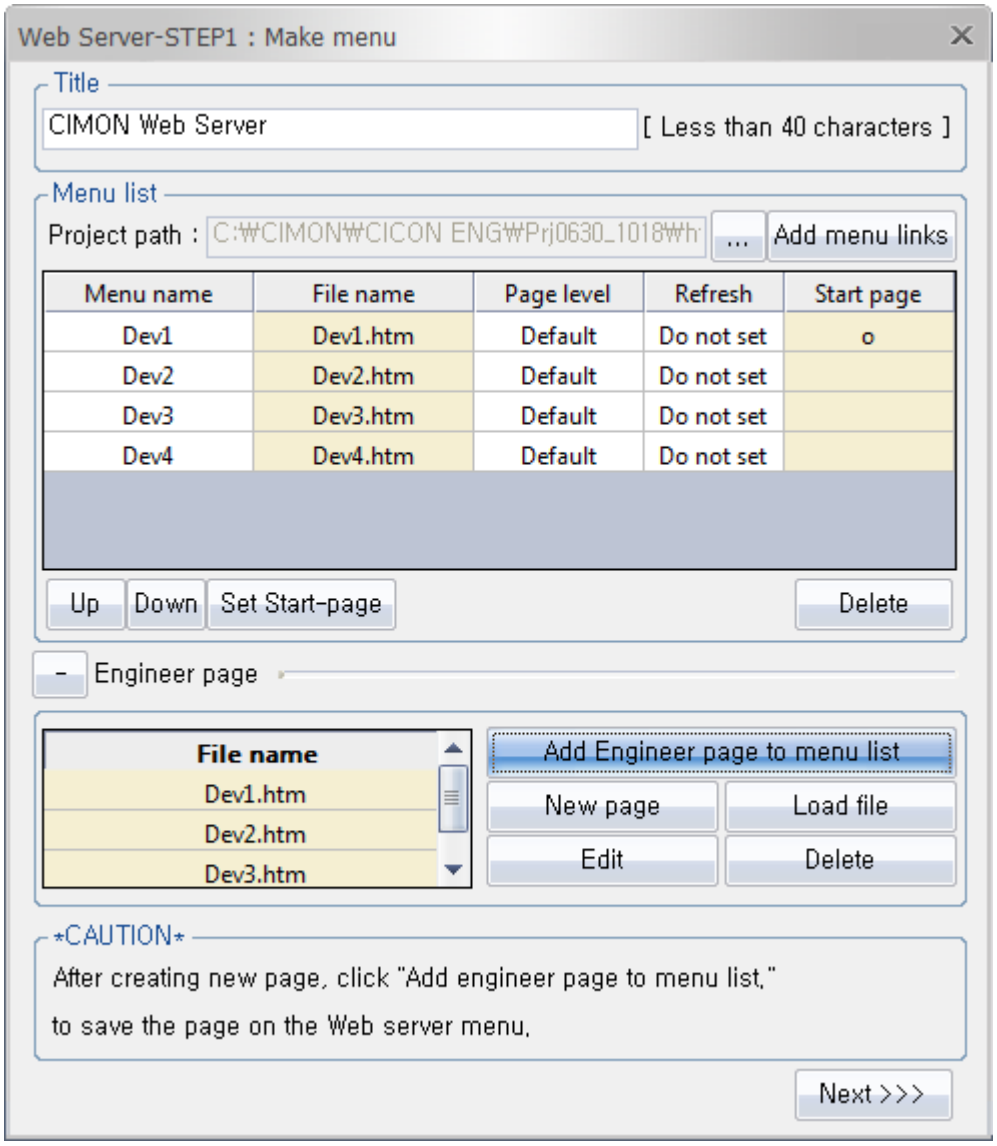
If you choose “Default”, the default level will be effected by “User Security Default Level” of Web Server Security program. If User Security Default Level is Level 15, Default of Page level will be level 15.

(Refer to Chapter 3. Security Setting for more details.)

- Refresh: It is refresh duration time to update value. Choose from 1 to 10 sec or “Do not set”.

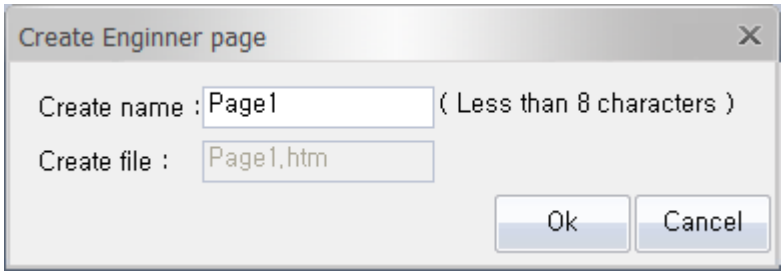
a) Add menu links: Choose .htm file to upload on the Menu list
b) Up and Down: You can arrange the sequence of pages
c) Set Start-page: Click the page that you want to have it on the first page when you open web server and click the Set Start-page.
d) Delete : Remove the page from the Menu list but original .htm file still exsits in the folder.

3) Click + Engineer page ate a new web page or edit a web page.

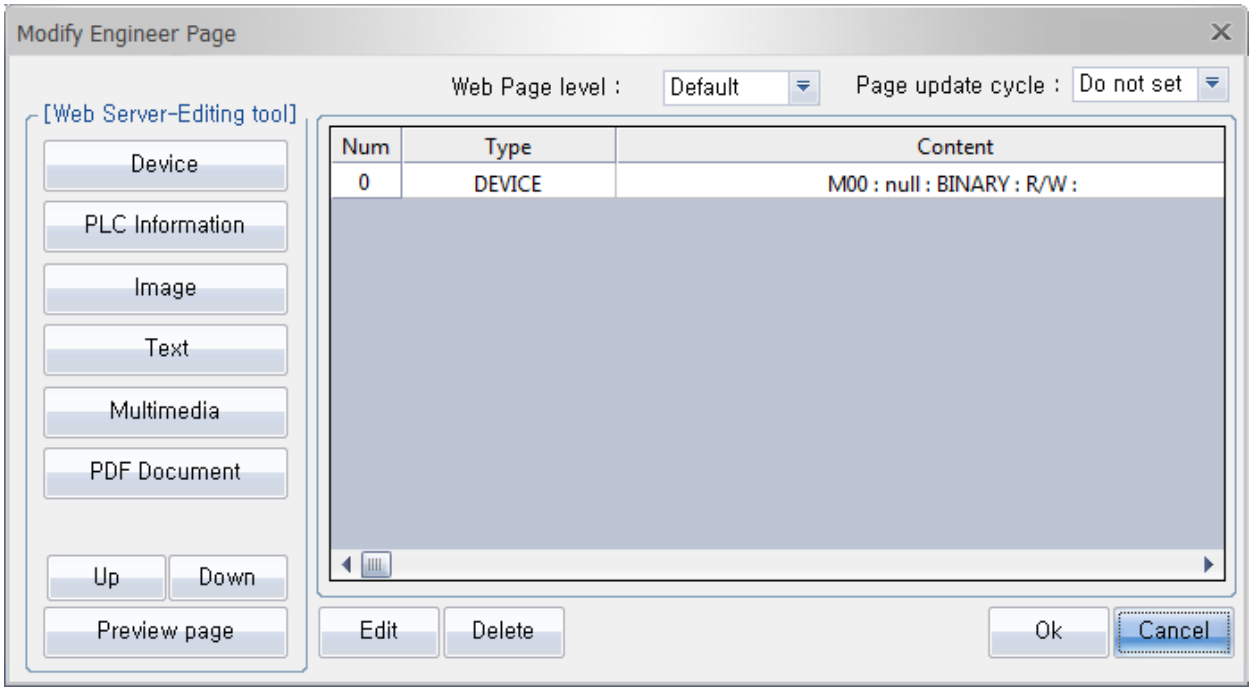


a) Add Engineer page to menu list : If an engineer page is not on the menu list, web server page will not show menu. Therefore, after creating a new page, click the “Add Engineer page to menu list” to add pages on the web server menu.
b) New page : Create a new engineer page to display on the web server page.
c) Load file : Update .htm file from other folder.
d) Edit : Modify an engineer page
e) Delete : Remove an engineer page from File name.
Even though you delete an engineer page on File name, the .htm file still exsits in the htm folder in Project folder.

4) Click New page.



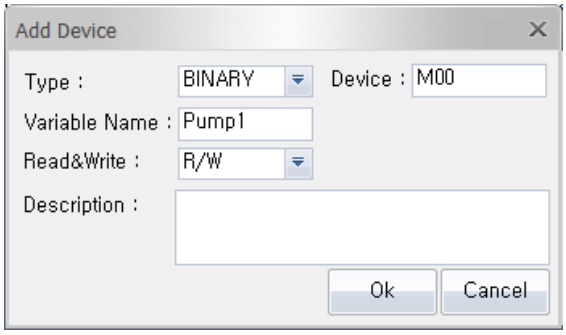
Write a name and click OK then a new engineer page configuration window appears.



Through Web Server Editing tool, you can add different contents on the web page.

According to content's number, the web page will be displayed from the top page in order.

a) Device : In order to control or monitor a value of variable, you can add device address here.



Type : Choose the type of device from pull down Type menu.

Device : Wirte a device address (Ex: M00, D01)

- X, Y, M, K, L, F, T, C, D : Read and Write (R/W)

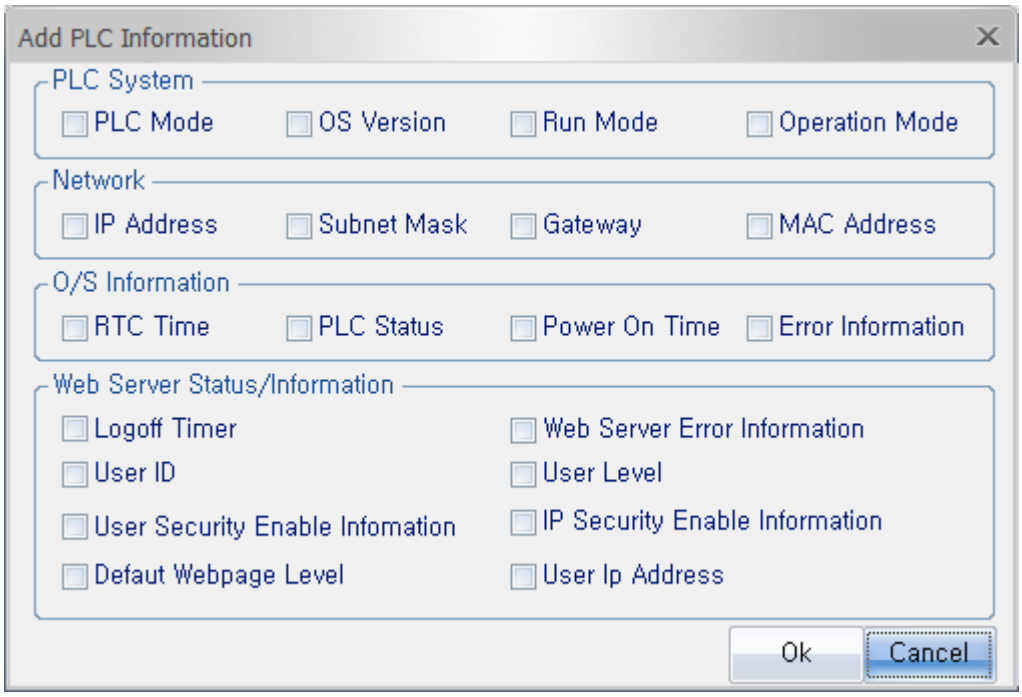
- X, F, T, C : Only Read (R)

Variable Name (option) : Write a variable name

Read & Write : Choose the Read or Read/Write

Description (option) : you can also write the description of device address.

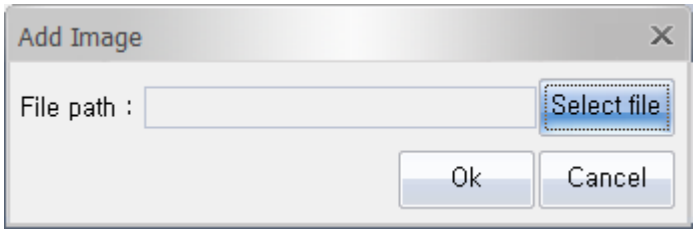
b) PLC Information : This information will appear on the web page.



You can select maximum 4 items for a content.

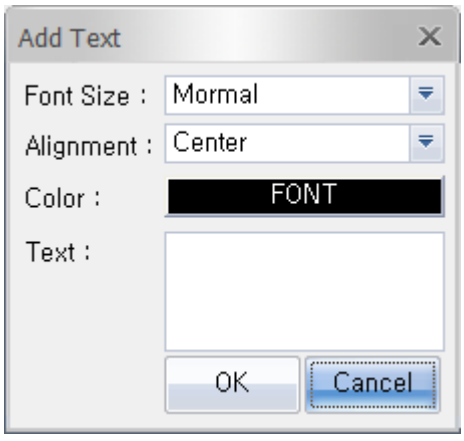
If you want to add more PLC information on the web page, add more PLC Information contents.

c) Image : Choose a image file to display on the web page.



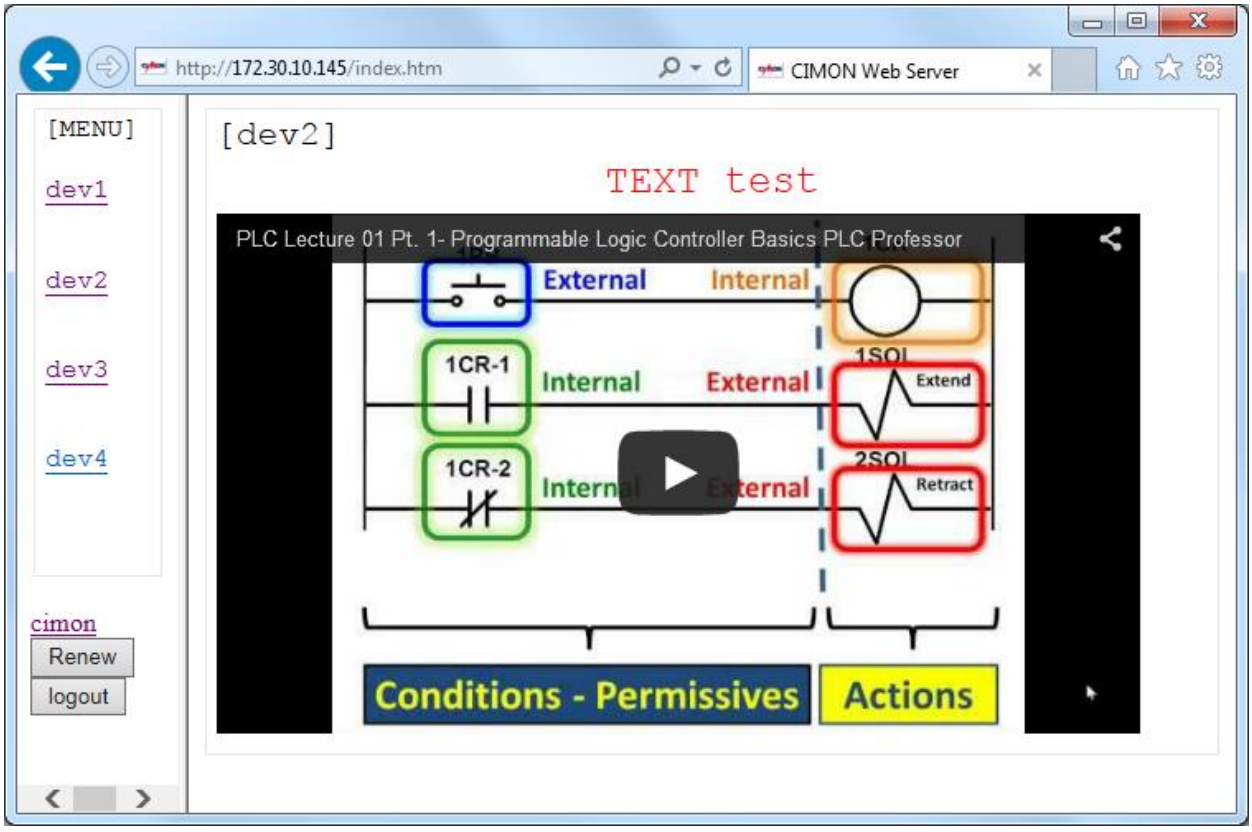
- Image type : jpg, png, gif
- Image size : Less than 60kb.

d) Text : Write text to display on the web page.



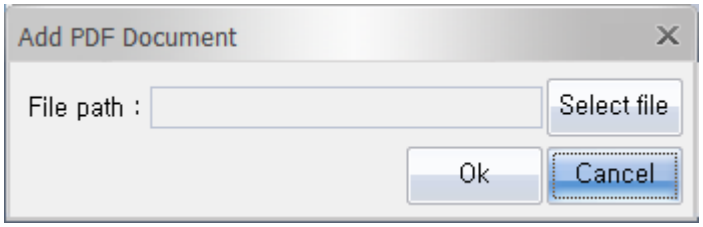
- Font Size : Small, Normal, Large, Big
- Alignment : Left, Center, Right

e) Multimedia : Make a link for media source



Through iframe, you can add mp3, asf, wma, wmv, swf and etc. on the web page.

f) PDF Document : Make a link for PDF.



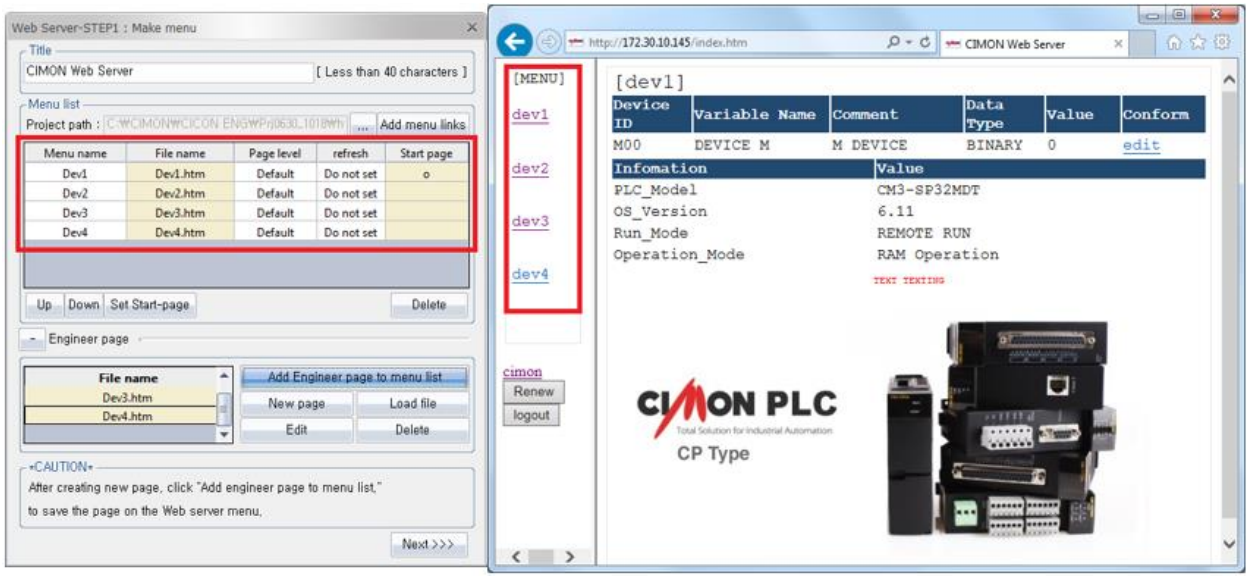
Choose the pdf file and add it.

5) after creating each contents, click the Preview page to find out how they display on the web page.

If the web page is ok, click OK to save the engineer page.

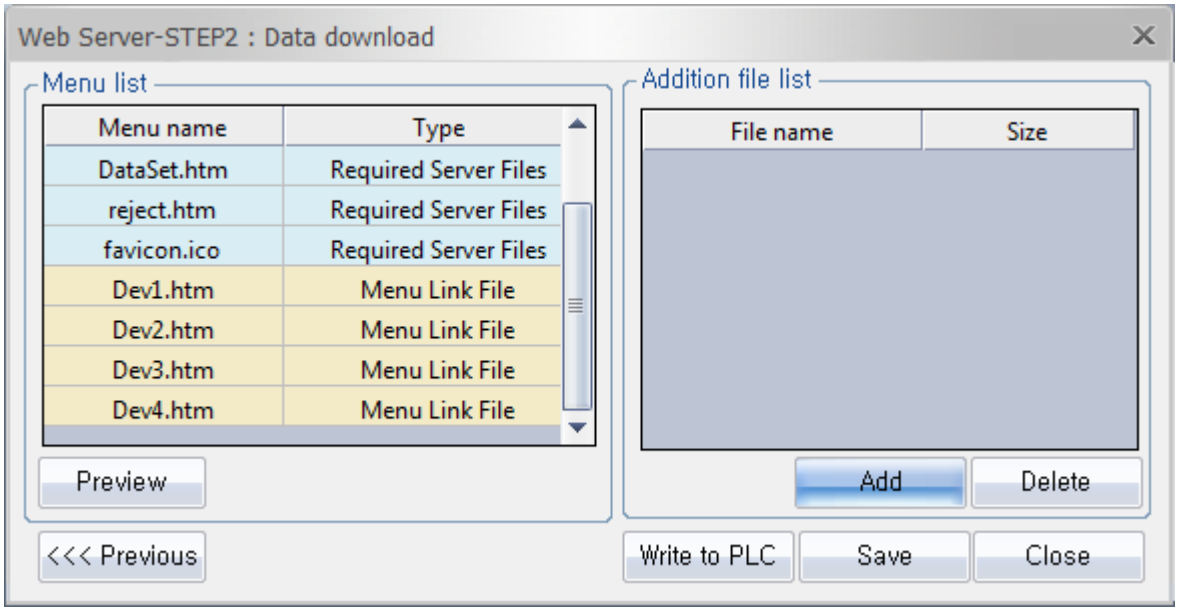
6) Click “Add Engineer page to menu list” to save the web page on the web server menu.

*If you don’t add engineer page on the Menu list, the web server will not show any menu.

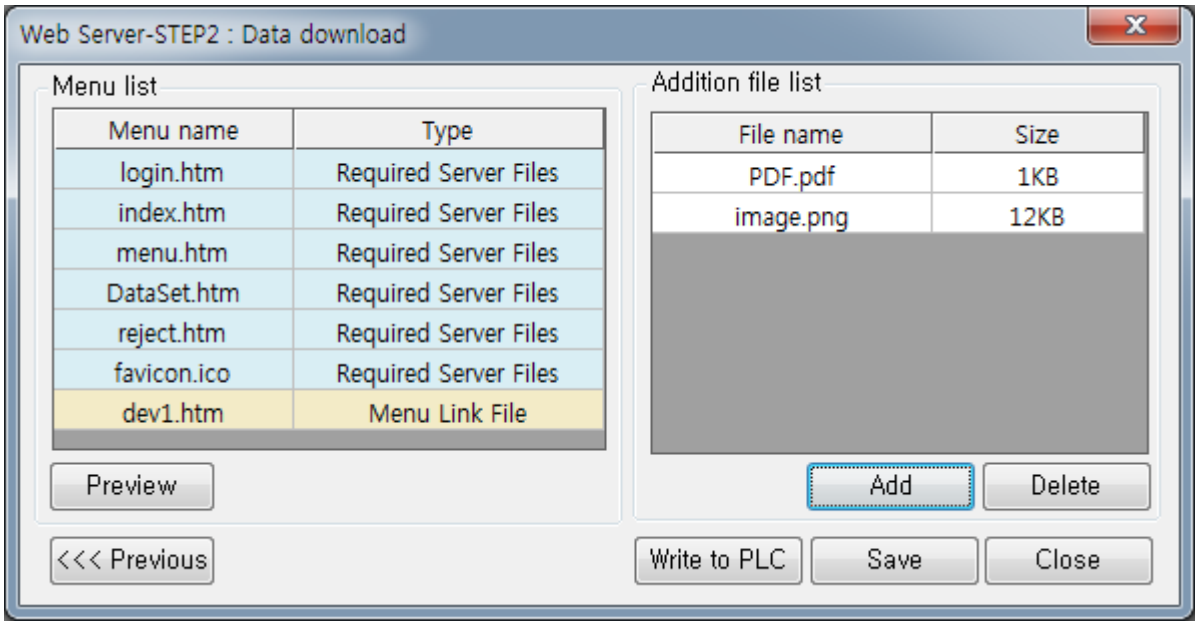


7) In order to set Start page, click the page that you want to have it on the first page when you open web server and click the Set Start-page.

8) Click the Next then Web Server STEP2 : Data download window appears.



9) In order to display links, pdf, and images that you already seleted on the engineer page on the web server, click Add and choose all links, pdf, and images again here.



(If you don't add links, pdf and images on the Additional file list, they will not display on the web page.)

10) Click Save and then click Write to PLC to download web page settings and contents to PLC CPU.

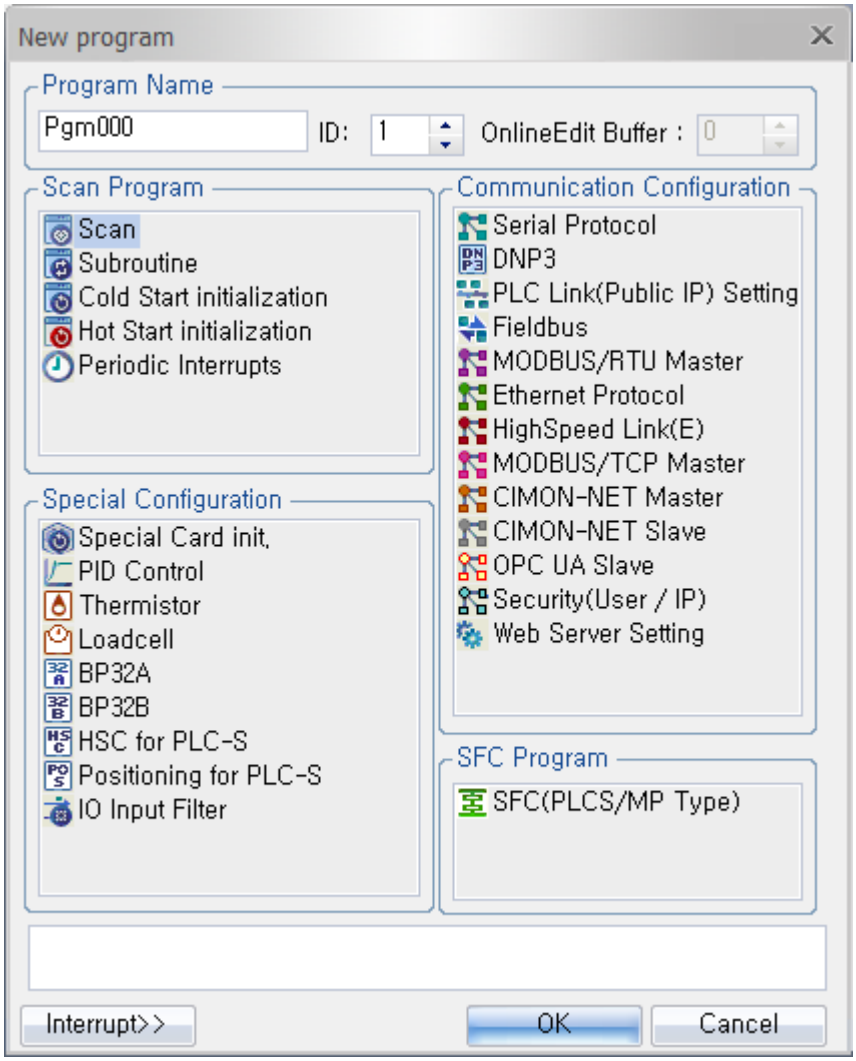
(*Unless you click Write to PLC, PLC CPU will not have a web page even if project is downloaded to PLC.)

4.4.6 Web Server Security Setting

Security (User/IP) Program

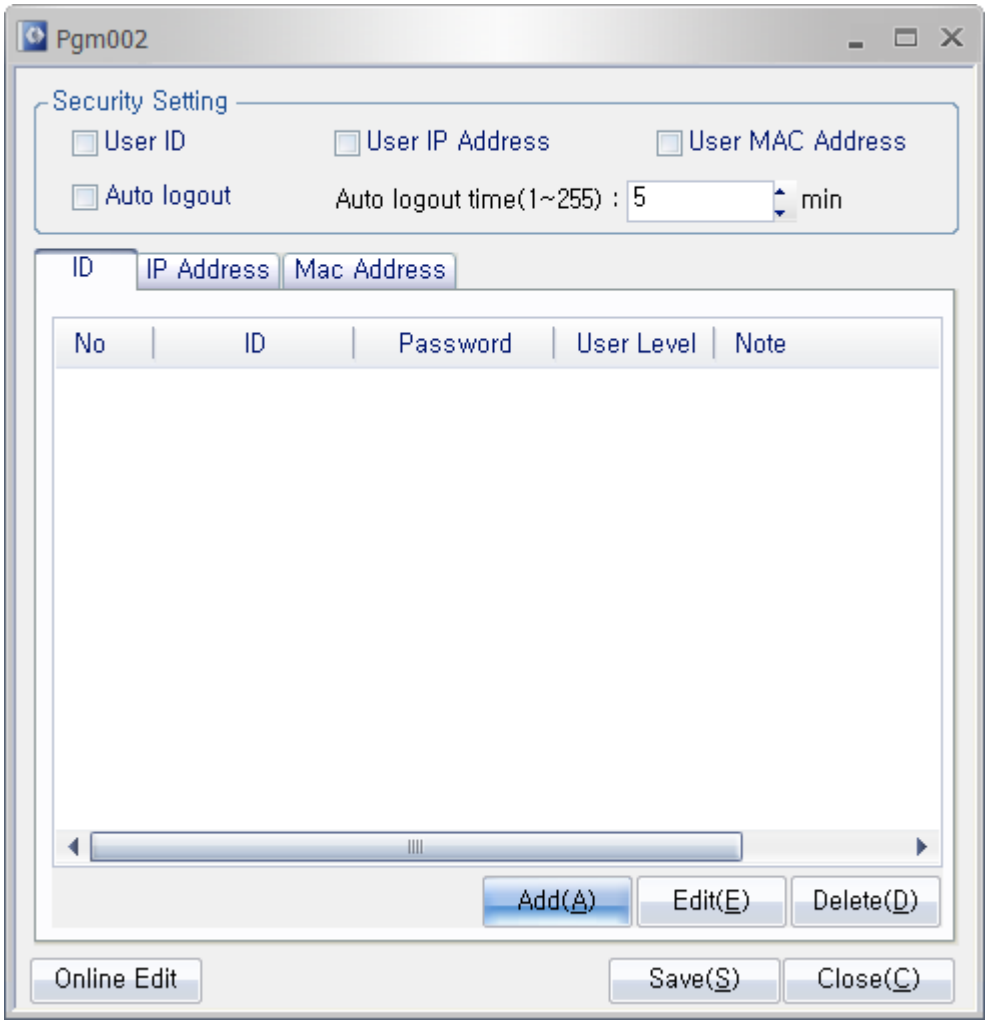
In order to build security on the web server, Security program must be configured.

1) Right-click on the Program and choose New Program and then choose Security(User / IP)



2) Security Setting

Choose the security option that you want to use for web server.



- User ID : Only registered user ID can access the web server page with password.

  Maximum 16 ID can be registered.

- IP Address : Only registered IP address can access the web server page.

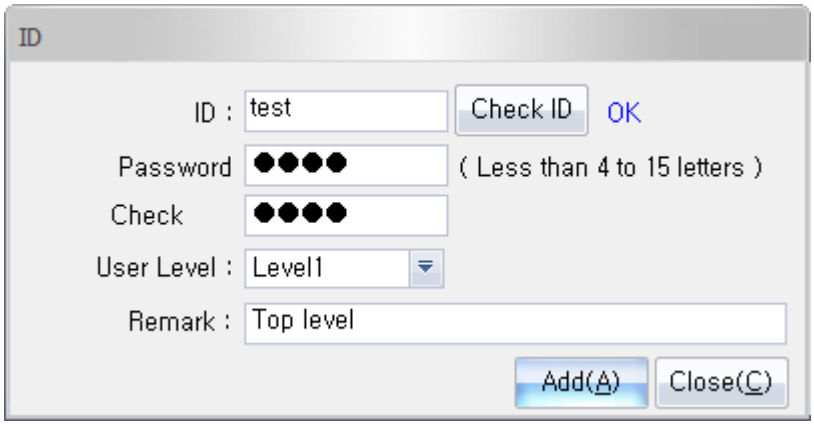
  Maximum 16 IP address can be registered.

- MAC Address : Only registered PC can access the web server page.

  Maximum 16 MAC address can be registered.

- Auto logout : Web page will be logged out after set time.

3) Click ID tab and click Add.



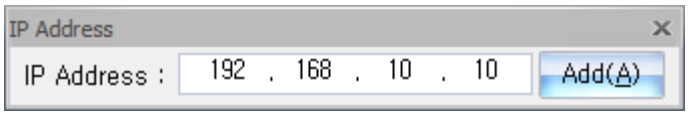
Write ID name and click Check ID.

You can choose 1 to 15 security level. (Level 1 is the top that you can access all levels of pages.)

Example) Level 5 : Level 1 ~5 users can access web page.

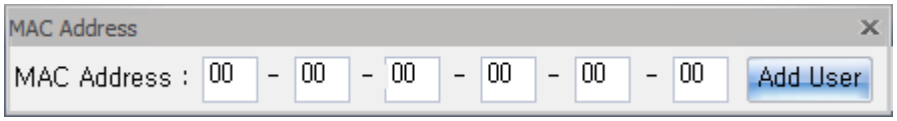
(If you want to use only ID and Password for web server, you don't have to set up IP Address and Mac Address.)

4) Click IP Address tab and click Add.



Write the IP Address where you want to access the web server from.

5) Click MAC Address tab and click Add.



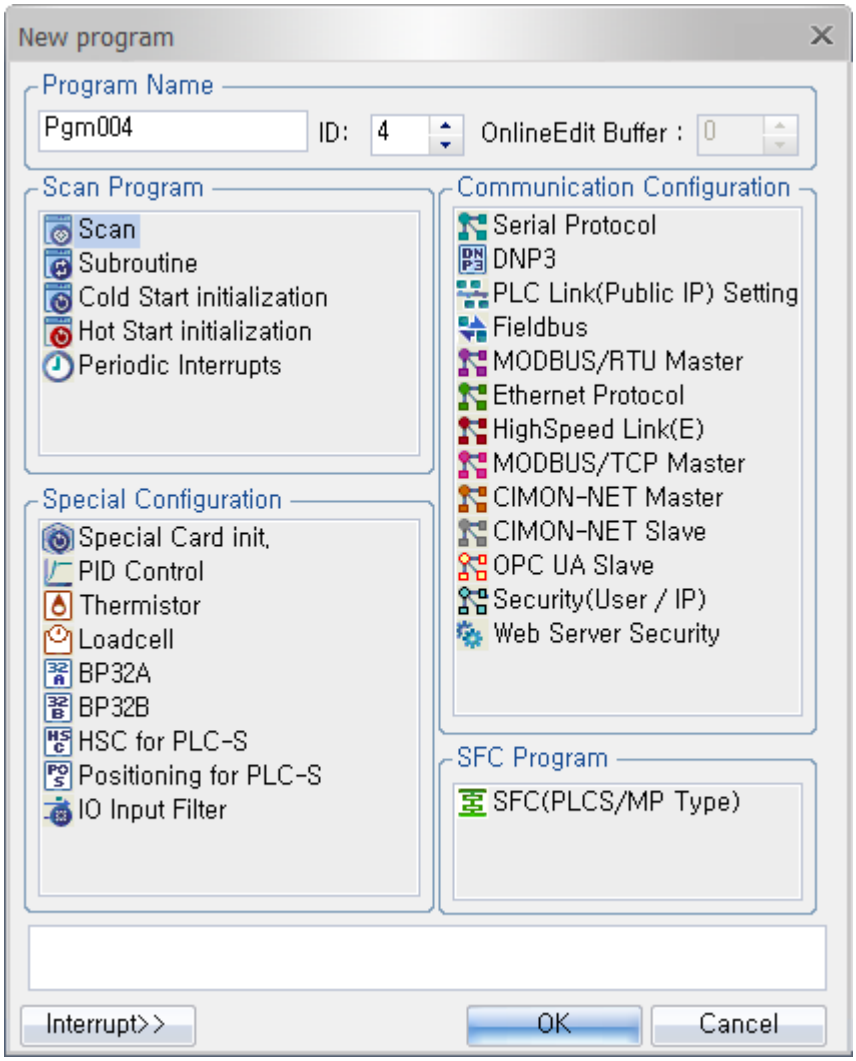
Write the Mac address of the PC where you want to access the web server from.

* If you want to use those 3 types of security, choose User ID, User IP Address and User MAC Address.

Web Server Security Program

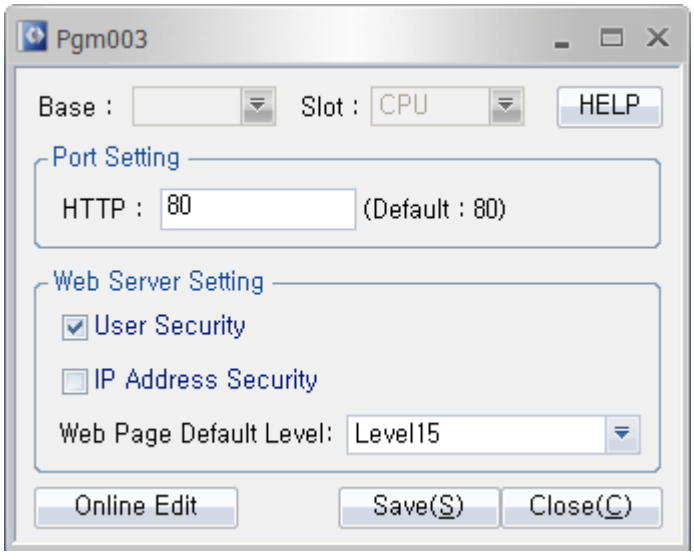
After configurating Security program, create a Web Server Security Program to apply security to Web server.

1) Right-click on the Program and choose New Program and then choose Web Server Security Setting.



2) Web Server Setting

Choose the security option that you want to use for web server.



If you want to use either User ID or IP Address for web server security, they must be set up at the Security (User / IP) program.

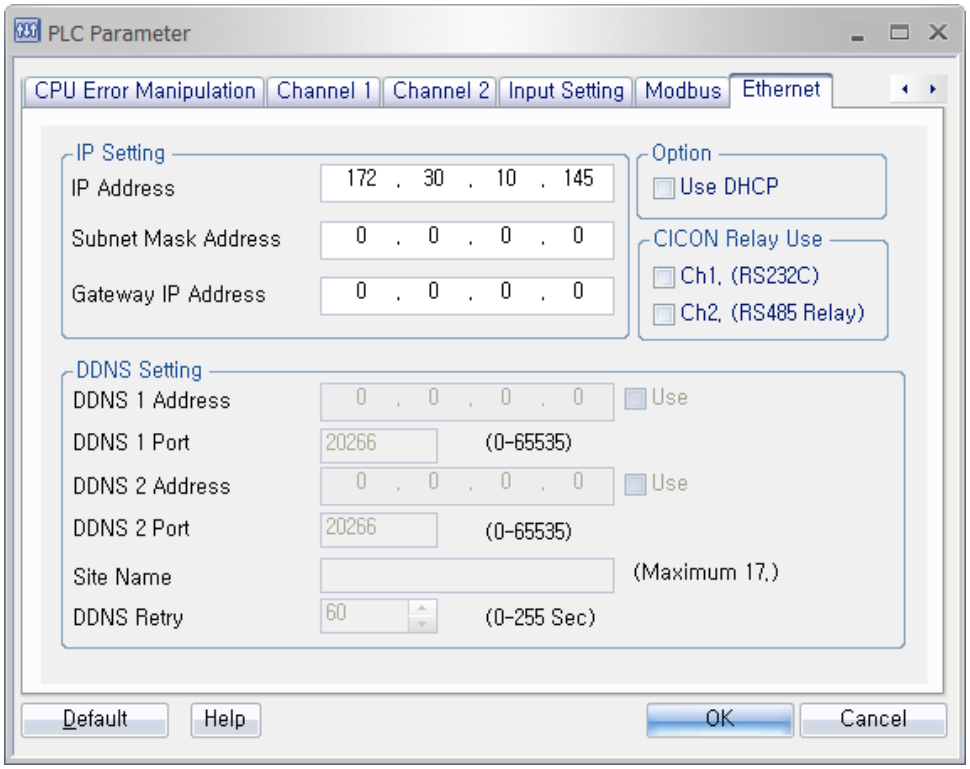
The User Security Default Level is related with Page Level of Menu list at the Web Server Manager.

If you choose Level 15, “Page level” will be level 15 too.

*Online Edit : While you access web server, you can also edit security.

4.4.7 Web Server Parameter Setting (Ethernet IP configuration)

In order to access web server of PLCS, click the PLC Parameter and configurate Ethernet IP address.



Write IP address of PLCS CPU module that will be web server IP address.

4.4.8 HTML Source Code

The standard for all HTML pages is HTML5 so if you want to create a web page without Web Server Manager, you should follow format of source code as below.

1. Data CODE Table for Device Type

Data Type	Data CODE	Data Size (bit)	Description
ON/OFF	'O'	1	ON/OFF
HIGH/LOW	'H'	1	HIGH/LOW
UP/DOWN	'N'	1	UP/DOWN
BINARY	'b'	1	'0', '1'
UINT16	'u;	16	0 ~ 65535
INT16	'i'	16	-32768 ~ 32767
UINT32	'U'	32	0 ~ 4294967296
INT32	'I'	32	-2147483648 ~ 2147483647
FLOAT	'F'	32	-

2. Data Write Setting (Web page → PLC)

The HTTP method is **POST(<form method="POST">)** to send data. In order to write a value from web page to PLC, a device address should be registered in CICON in advance.

• Format

```
<a href="POPUP/][Device symbol][Device address]/[Device type]/[Variable Name]"
target="_blank">[Link name]</a>
```

- ✓ Refer to Data CODE table for Data CODE.
- ✓ The bit is included when bit type such as binary, ON/OFF, HIGH/LOW, and UP/DOWN is set.

• Example

```
<a href="POPUP/D1500/u/PUMP1" target="_blank">edit</a>
```

You can update DataSet.htm file with data information.

3. Data Send Setting (PLC → Web page)

In order to read a device value from PLC to web page, try out below format.

• Format

```
<!--REF:$[Data CODE][Device symbol][Device address]------------------------->
```

• Example

```
<!--REF:$uD1500------------------------------>
```

If the value of D1500 is 1235, <!--REF:$uD1500------------------------->sends 1235 to web page.

4. Data Refresh Time

• Example : Refresh time is 5 sec.

```
<meta http-equiv="refresh" content="5">
```

5. Web page level

• Example : Web page level is 15.

```
<!DOCTYPE html>
<!--REF:&LV15-->
<html>
```

If web page level is not configured, the default level will be level 15.

6. PLC Information

Total 24 PLC information can be displayed.

• Format

```
<!--REF:#[PLC Information Data CODE]---------------------------------->
```

Refer to PLC Information Data CODE table at the below.

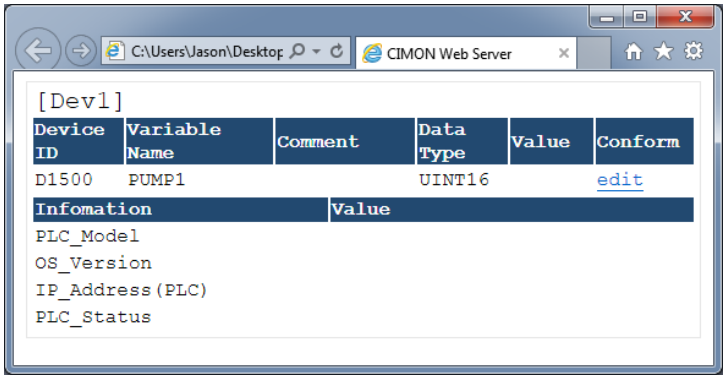
• Example : PLC Information is PLC Model (Data Code : PM)

```
<!--REF:#PM---------------------------------->
```

- PLC Information Data CODE Table

Data Type	CODE	Description
PLC Model	“PM”	"CM3-SP32MDT"
OS Version	"OV"	“%d.%d%d”
Run Mode	"RM"	"REMOTE RUN" or "REMOTE STOP"
Operation Mode	"OM"	"ROM Operation" or "RAM Operation"
IP Address (PLC)	"IA"	"%3d.%3d.%3d.%3d"
Subnet Mask	"SM"	"%3d.%3d.%3d.%3d"
Gateway	"GW"	"%3d.%3d.%3d.%3d"
MAC Address	"MA"	"%02X.%02X.%02X.%02X.%02X.%02X"
RTC Time	"RT"	"%4d/%02d/%02d"" SUN"" %02d:%02d:%02d"
PLC Status	"PS"	"Major Fault" or "Minor Fault" or "Normal"
Power On Time	"PT"	"%4d/%02d/%02d"" SUN"" %02d:%02d:%02d"
Error Information	"EI"	"ERROR CODE: %4X" or "No Error"
Logoff Timer	"LT"	"%02d:%02d” or "Auto Logoff Disabled"
Web Server Error	“WE”	Refer to “3.2 Web Server Status code”
Device Value	"DV"	Value of Device address
User ID	"UI"	“User ID” or "User Security Disabled"
User Level	"UL"	“User Level “ or "User Security Disabled"
User Security Enable Info	"US"	"Enabled” or "Disabled”
IP Security Enable Info	"IS"	"Enabled” or "Disabled”
WebPage Level Default	"WL"	Security leve of web page
User IP Address	"UP"	"%3d.%3d.%3d.%3d"
Device ID	“DV”	Device name
Data Type	“DT”	Type of Device
DataSet Result	“DR”	Result of Writing device value

- Example of Source code for Web page



file:///C:/Users/Jason/Desktop/WebServer/Prj0731_1123/htm/tmp.htm - Original Source

File Edit Format

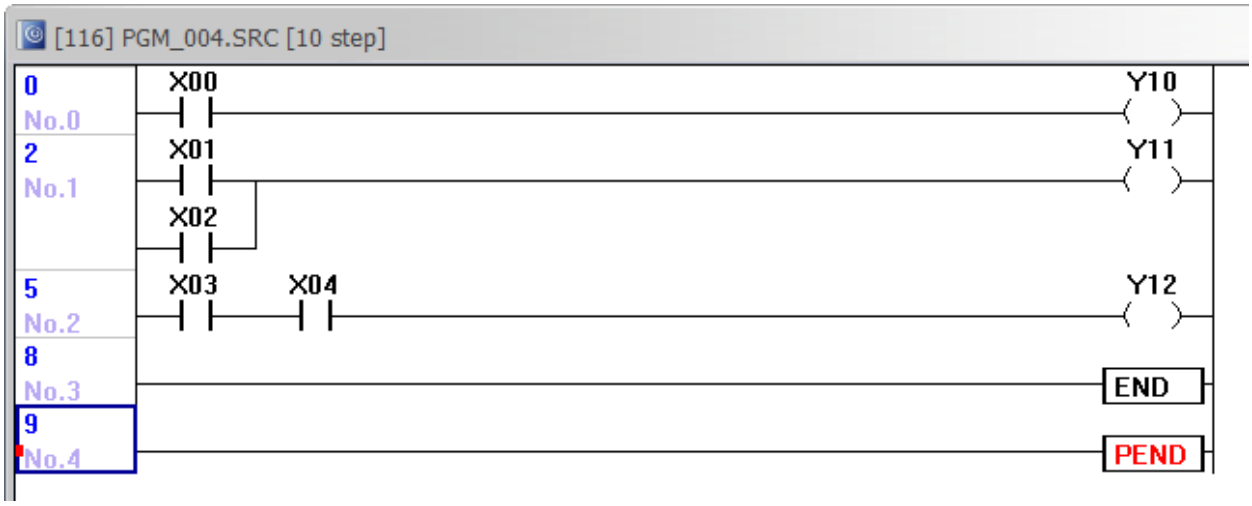
```
<!--KSC_CPSPF-->
<!DOCTYPE html>
<!--REF:&LV15-->
<html>
<title>CIMON Web Server</title>
<meta http-equiv="refresh" content="5">
<meta http-equiv="Content-Type" content="text/html; charset=utf-8">
<body>
<fieldset>
<font style="color:#000000; font-size:16pt; font-family:Courier New">
<legend>[Dev1]</legend>
</font>
<font style="color:#000000; font-size:12pt; font-family:Courier New">
<table border="0" align="center" width="100%">
<!--DEVICE-->
<tr bgcolor="224970">
<td width="100"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Device ID</font></strong></td>
<td width="200"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Variable Name</font></strong></td>
<td width="200"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Comment</font></strong></td>
<td width="100"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Data Type</font></strong></td>
<td width="100"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Value</font></strong></td>
<td width="100"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Conform</font></strong></td>
</tr>
<tr>
<!--D1500:PUMP1:UINT16:R/W:-->
<td>D1500</td>
<td>PUMP1</td>
<td></td>
<td>UINT16</td>
<td><!--REF:$uD1500------------------------------></td>
<td><a href="POPUP/D1500/u/PUMP1" target="_blank">edit</a></td>
</tr>
</table>
<table border="0" align="center" width="100%">
<!--PLC_INFO-->
<tr  bgcolor="224970">
<td width="300px"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Infomation</font></strong></td>
<td width="400px"><strong><font style="color:#ffffff; font-size:12pt; font-family:Courier New">Value   </font></strong></td>
</tr>
<tr>
<!--PLC_Model:PM-->
<td>PLC_Model</td>
<td><!--REF:#PM----------------------------------></td>
</tr>
<tr>
<!--OS_Version:OV-->
<td>OS_Version</td>
<td><!--REF:#OV----------------------------------></td>
</tr>
<tr>
<!--IP_Address(PLC):IA-->
<td>IP_Address(PLC)</td>
<td><!--REF:#IA----------------------------------></td>
</tr>
<tr>
<!--PLC_Status:PS-->
<td>PLC_Status</td>
<td><!--REF:#PS----------------------------------></td>
</tr>
</table>
</font>
</fieldset>
</body>
</html>
```

5. Device Memory

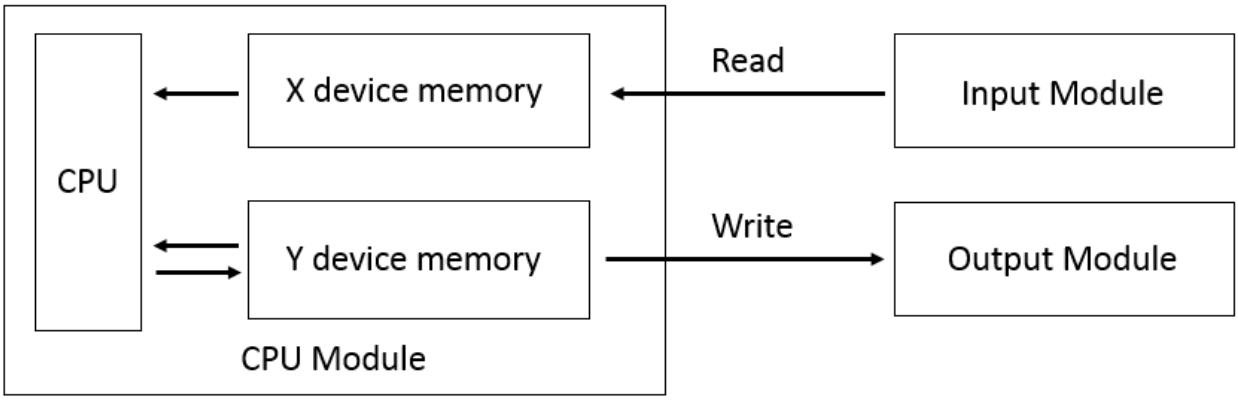
5.1 Device Memory Type

5.1.1 Input (X) and Output (Y)

Input X and Output Y can correspond with other device. X type is data to receive Input signal from device like a push button switch and limited switch, and Y type is data to send Output signal to device like a solenoid valve, motor, lamp and etc. As Input status can be stored in PLC, A and B contact are available with X memory type and only A contact is available with Y memory type.



Example of I/O Logic program



Input and Output field devices are wired to PLC discrete Input/Output (I/O) module. When CPU scans ladder program, it operates with X and Y device memory.

5.1.2 Internal Bit and Word (M)

This device is internal memory which stores internal relay logic and outputs throughout X and Y device memory. When Power is ON or PLC is turned Run mode, address which is not assigned as non-volatile will be cleared “0”. Contact A(Open Contact) and B(Closed Contact) can be used.

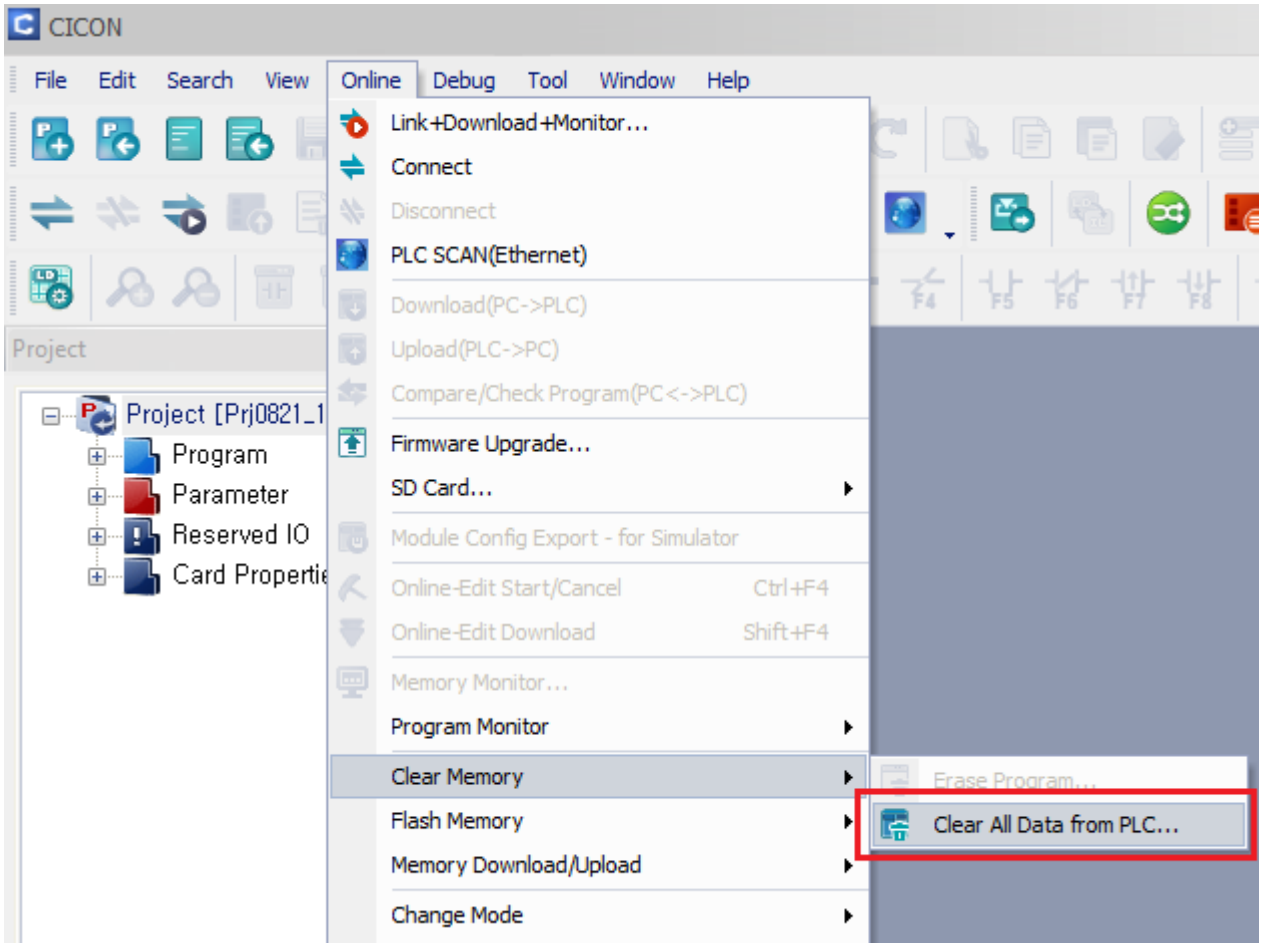
5.1.3 Keep Relay (K)

Generally, the purpose of use for “K” device is the same as “M” device. When Power is ON or PLC is turned Run mode, it keeps Contact A and B and is used to keep previous data. However, data will be deleted if below operation is executed.

1) If initialization program is executed

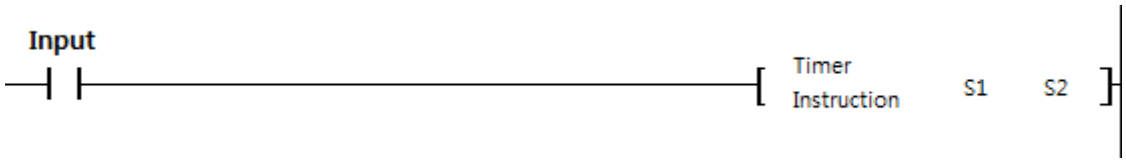
2) If PLC data is deleted by CICON

CICON → Online → Clear Memory → Clear All Data from PLC



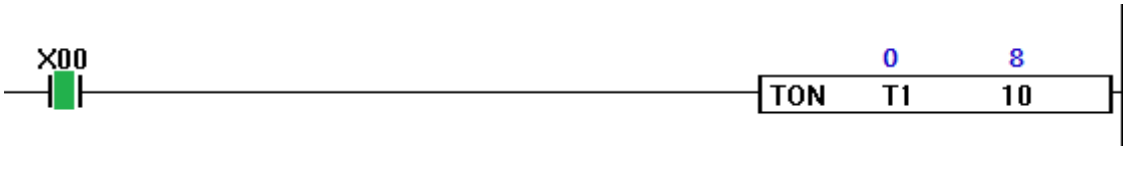
5.1.4 Timer (T)

There are two general timer 10ms and 100ms and 5 Timer commands. Depending on Timer commands, counting method is different. The maximum up to hFFFF(65535) is available by decimal or hexadecimal.



S1 : Timer Contact number (Example : T01)
S2 : Set value (In case of 100ms timer, 10 is for 1 second)

Example

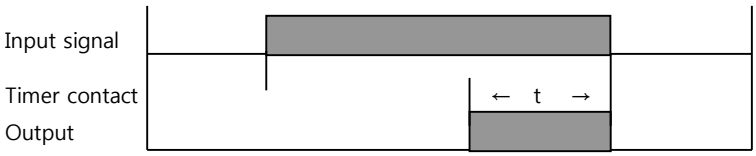
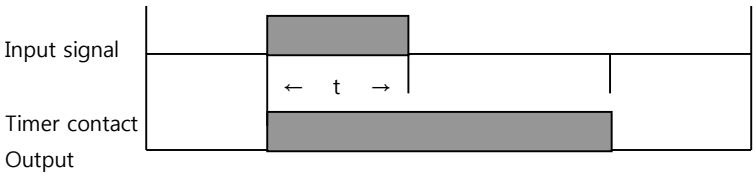
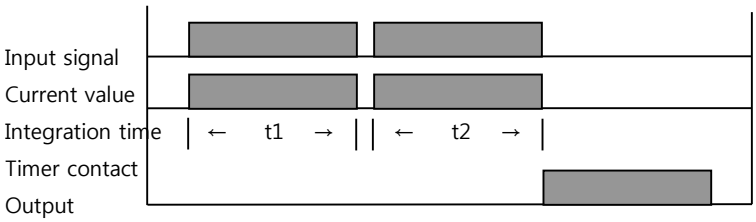
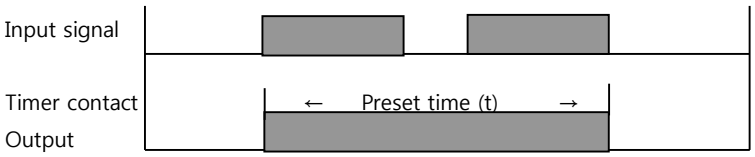
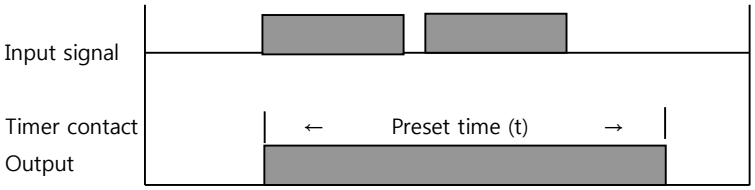


When X00 is ON, Timer starts after 1 second.

TC (Timer current value) is 8 and TS(Timer preset value) is 10(1 second) which means Timer will start after 0.2 second.

TC and TS are Word device, and T is bit device. TS can be set by LD program (Timer command). If TS is set as fixed value it can't be changed, however if it refers to other devices such as "D" device, TS can be changed.

c) Timer Type

Type	Description	Counting method	Time Chart
TON	On Delay	Acceleration	
TOFF	Off Delay	Deceleration	
TMR	Integration ON Delay	Acceleration	
TMON	Mono stable	Deceleration	
TRTG	Retrigger	Deceleration	

5.1.5 Counter (C)

This device is sub-relay for Counter command. The maximum up to hFFFF(65535) is available by decimal or hexadecimal.

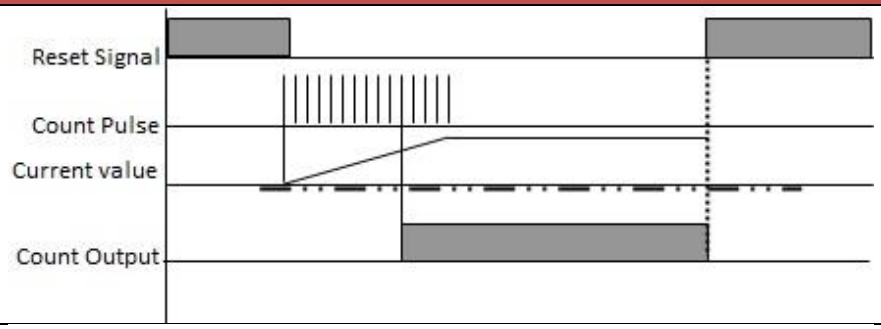
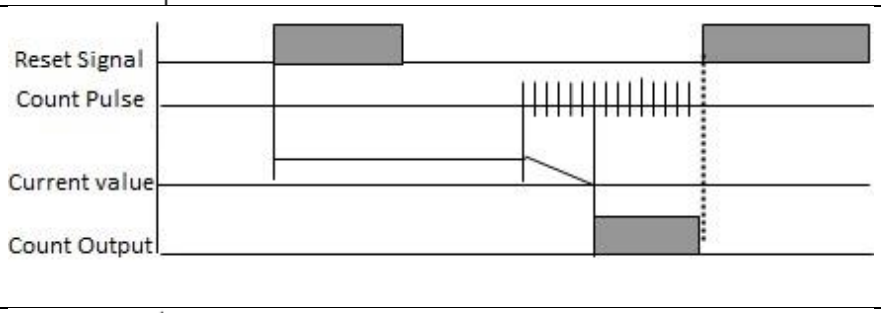
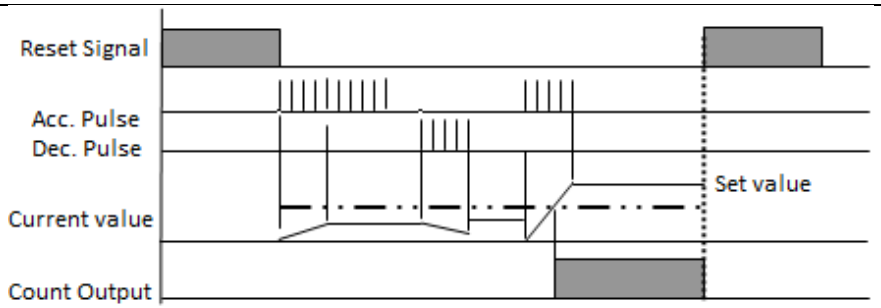
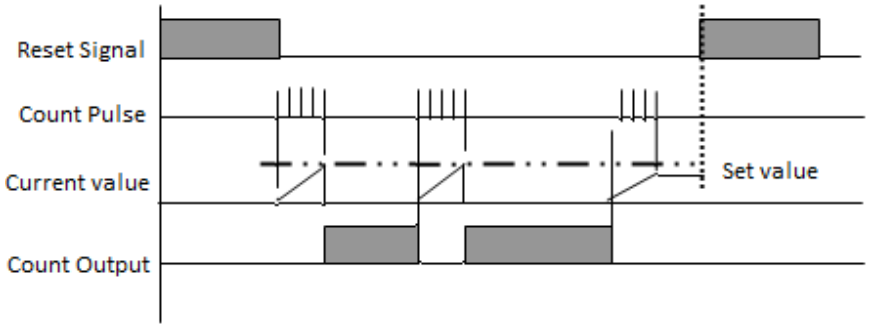
Example

When X00 is ON, Counting is started. As Set value(CS) is 10, if X00 is On ten times, C1 device can be ON.

This example shows that Set value (CS) is 10 and Current value (CC) is 3. It can be monitored by CICON Memory Monitor or controlled by SCADA and Xpanel.

CICON LD program can't control those values.

d) Counter Type

Type	Mode	Counting method	Input condition	Time Chart
CTU	Up counter	Acceleration	1	
CTD	Down Counter	Deceleration	1	
CTUD	Up/ Down Counter	Acceleration / Deceleration	2	
CTR	Ring Counter	Acceleration	1	

5.1.6 Data Register (D)

This device stores internal data that is readable and writable 16bit and 32bit. In case of 32bit, assigned number is low 16bit and number+1 is high 16bit.

Example) In case of assigning 999888(h000F 41D0) to D0010 with 32bit command

Data Type	D0010	D0011	D0012	D0013
	L	H	L	H
INT	16848	15	0	0
HEX	41D0	000F	0	0
DWORD	999888		0	

D0010 : Low 16bit

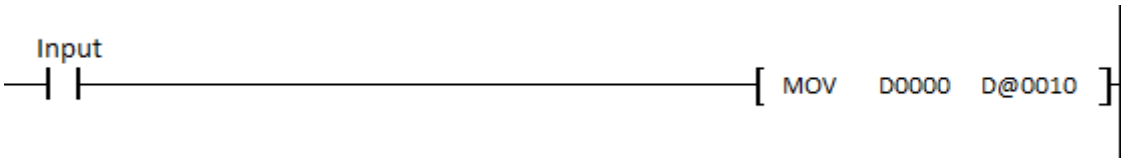
D0011 : High 16bit

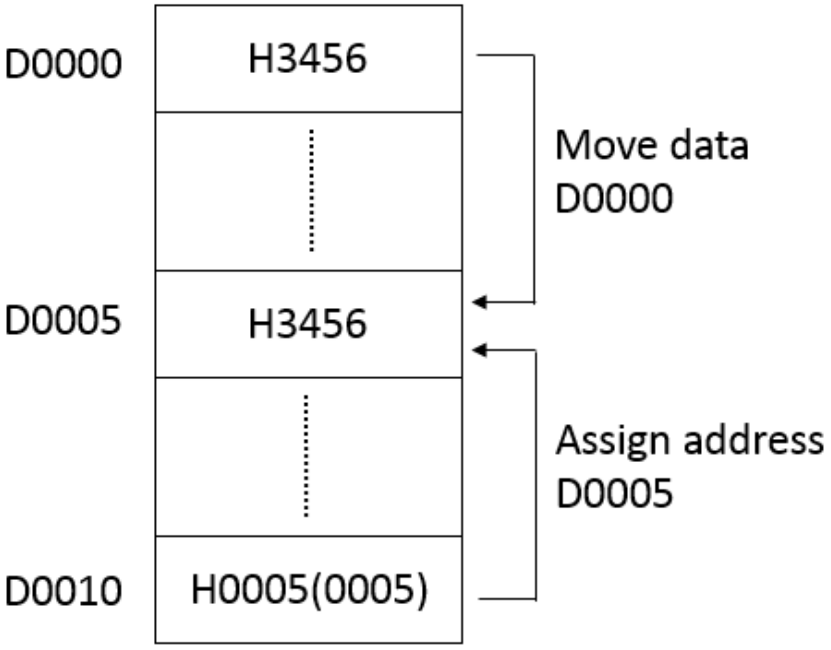
D0010 is the starting address for operation.

5.1.7 Sub-Data Register (@D)

Data values stored in Data register are designated as destination number of an instruction.

Example)





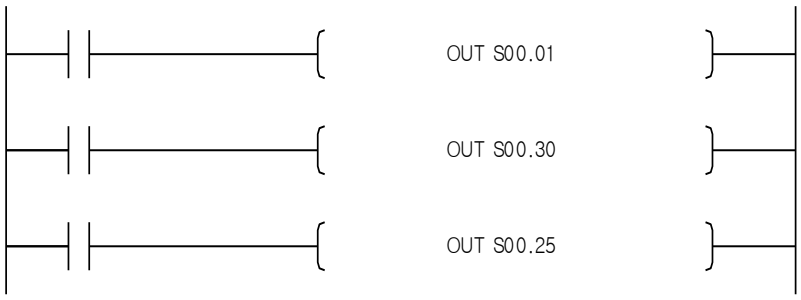
5.1.8 Link Relay (L)

When Computer Link or Data Link module is used, L is used for special contact point which can't output external directly. Unless it is used with computer link or data link module, L can be operated as "M" device.

5.1.9 Step Relay (S)

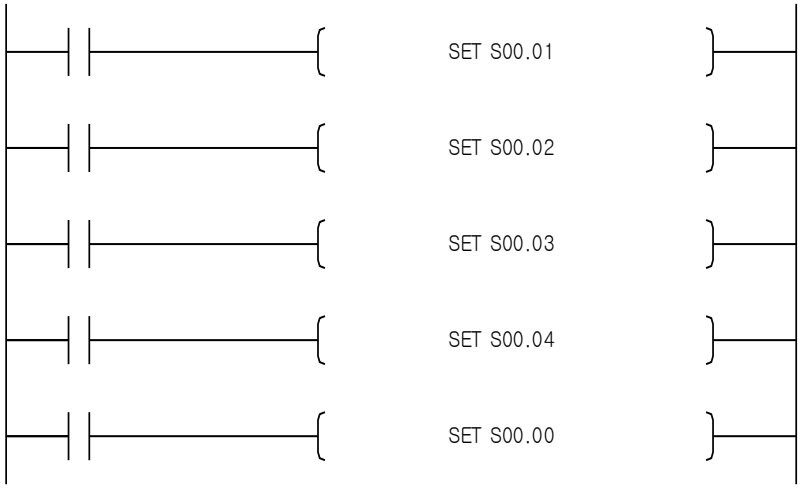
According to Command (OUT, SET), it is divided into sequence control and last-in control. When CPU is ON or RUN mode, device will be reset 0. On the same conditions, the latest programmed step gets the first priority. If current step is ON, Self-hold is ON. Therefore, if Input is OFF, current step keep being ON.

OUT S00.30 : Last-In Control (Only last step can be operated.)



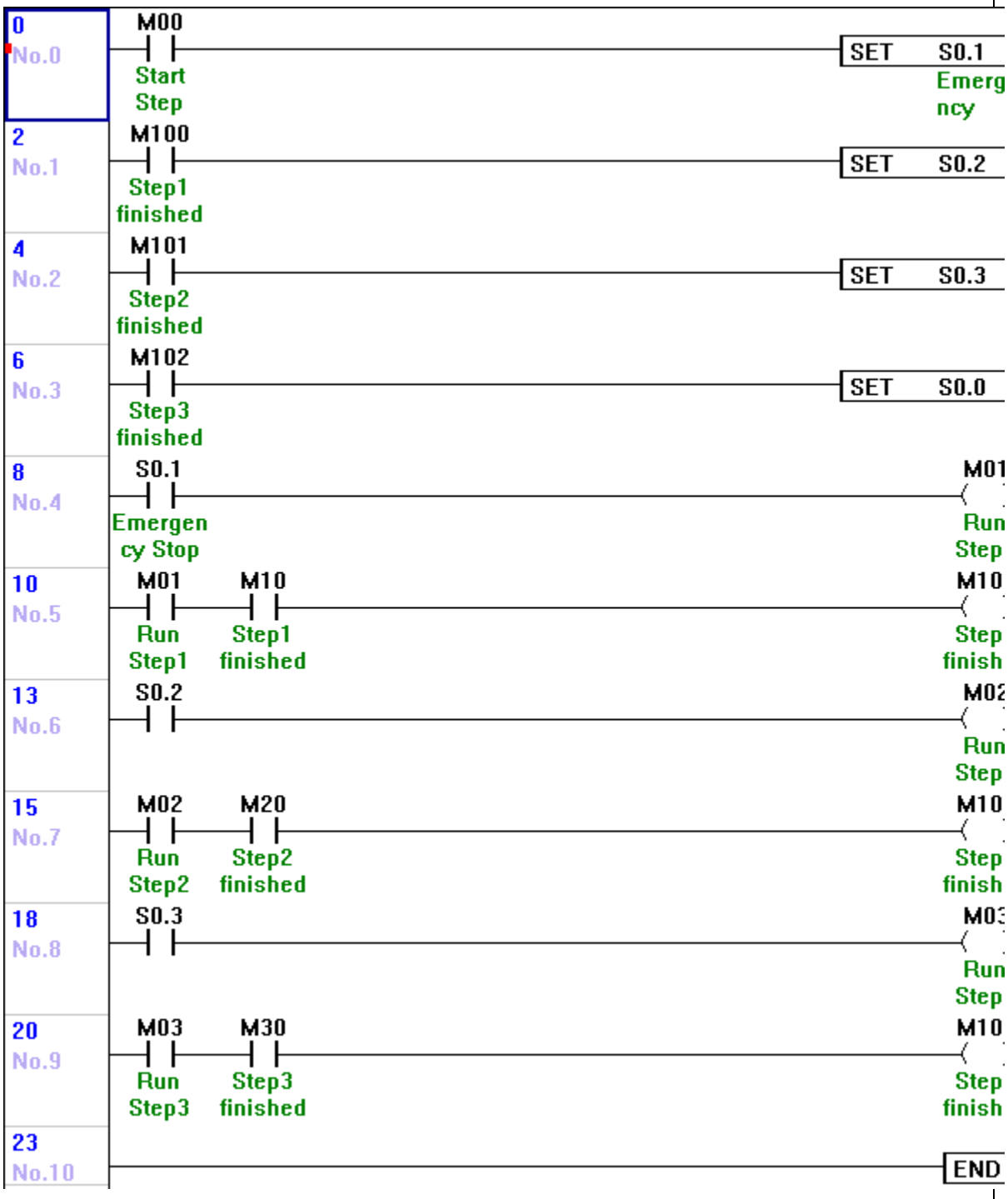
SET S00.02 : Sequence control (sequence works step by step in a row.)

SET S00.00 : Clear condition SET xx.00 can be operated regardless of sequence.

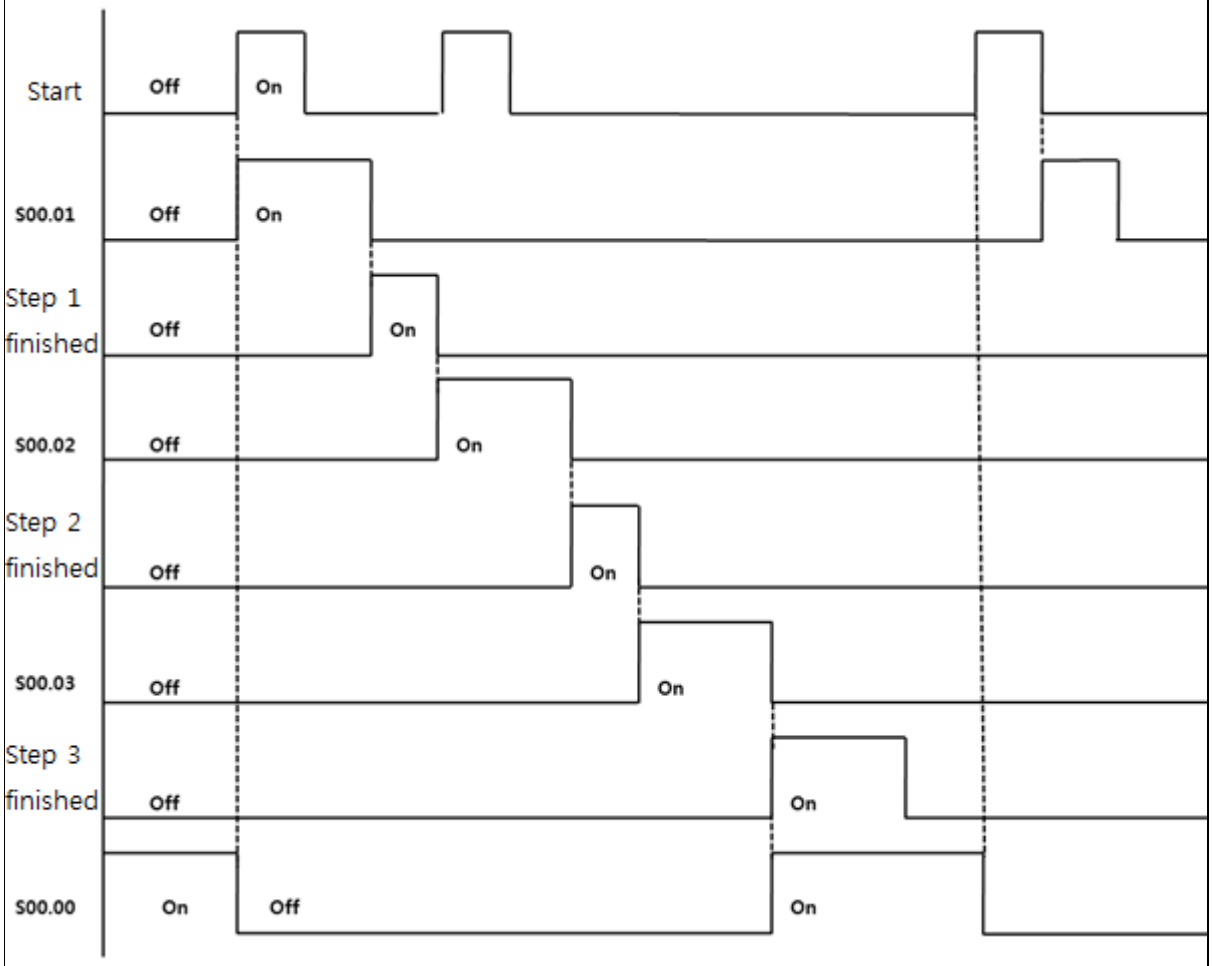


Example) Sequence Control

LD starts from M00 to M102 in a row. It operates step by step.
Only if current step is finished, next step can be executed.



Sequence flow



This Sequence flow chart is for Sequence Control example. Even if Start is On again while sequence is operating, S00.01 will not be ON. If S00.00 is ON, S00.01 will be turned ON again.

Example) Last-In Control

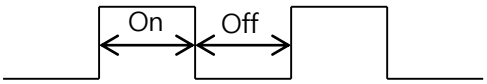
Only last ON step can operate regardless of sequence.

No	X00	X01	X02	X03	X10	S00.01	S00.02	S00.03	S00.04	S00.00
1	On	Off	Off	Off	Off	On				
2	On	On	Off	Off	Off		On			
3	On	On	On	Off	Off			On		
4	On	On	On	On	Off				On	
5	On	On	On	On	On					On

5.1.10 Special Relay (F)

It is used to indicate PLC time, date or special contact point.

F address	Function		Description
F0000	F0000 : RUN Mode F0001 : Program Mode F0007 : Remote Mode F000E : Hot Restart On F000F : Stop		RUN Mode is turned ON Program Mode is turned ON Remote Mode is turned ON Hot Restart is turned On It is ON when STOP command
F0010	F0010 : Always On F0011 : Always Off F0012 : 1 SCAN ON F0013 : 1 SCAN OFF F0014 : Bit On and OFF for every SCAN F0015 – F001F : Not used		Always ON Always OFF 1 SCAN ON 1 SCAN OFF Bit On and OFF for every SCAN Not used
F0020	Reserved		Reserved
F0030	F0030 : Major error F0031 : Minor error F0032 :WDT Error F0033 : I/O combination error F0034 : Battery voltage error F0037 : Run Forced I/O ON/OFF		It is On when major error occurs. It is On when minor error occurs. It is ON when User Watchdog Timer error occurs. It is ON when I/O combination error occurs. It is ON when battery voltage is less than standard It is ON when Forced I/O is turned ON or OFF
F0040	Reserved		Reserved
F0050	F0057~0 :ERROR CODE description F005F~8 : ERROR CODE description		It is used to show ERROR CODE description
F0060	Reserved		Reserved
F0070	It indicates expansion module location number in the BASE. (0= First module, 0..11)		It is used with CM1 series.
F0080	CPU1 : ‘1’, CPU2: '2', CPU3 :‘3’, CPU4 : ‘4’ CPU1A :'A1', CPU2A: 'A2', CPU3A : ‘A3’	SP32MDT : u1 SP16MDR : u2 SP32MDC : u3 SB16MDT : uB	It shows PLC type as ASCII number.

F address	Function	Description
F0090	F0090 : 0.02 sec. Period SYSTEM CLOCK F0091 : 0.1 sec. Period SYSTEM CLOCK F0092 : 0.2 sec. Period SYSTEM CLOCK F0093 : 1 sec. Period SYSTEM CLOCK F0094 : 2 sec. Period SYSTEM CLOCK F0095 : 10 sec. Period SYSTEM CLOCK F0096 : 20 sec. Period SYSTEM CLOCK F0097 : 1 min. Period SYSTEM CLOCK F0098 – F009F : Not used	It becomes ON/OFF by certain period and it happens with only RUN mode. (Initial value is 0 when RUN mode) 
F0100	F0100 : USER CLOCK 0 F0101 : USER CLOCK 1 F0102 : USER CLOCK 2 F0103 : USER CLOCK 3 F0104 : USER CLOCK 4 F0105 : USER CLOCK 5 F0106 : USER CLOCK 6 F0107 : USER CLOCK 7 F0108 - F10F : Not used	It keeps ON and OFF by SCAN TIME and it is turned OFF when Power is ON. Set duty to each Clock through “DUTY” command.
F0110	F0110 : It is ON, when logic is not true. F0111 : ZERO FLAG F0112 : CARRY FLAG F0118 : It is ON when All outputs are OFF. F0119 : Dual Port RAM Access Error	Refresh for every scan ZERO FLAG CARRY FLAG It is ON when All outputs are OFF. Details will be saved at F07
F0120	F0120 : S1 < S2 F0121 : S1 ≤ S2 F0122 : S1 = S2 F0123 : S1 > S2 F0124 : S1 ≥ S2 F0125 : S1 ≠ S2	UCMP Command Comparison result Flag
F0130 F0140 F0150 F0160 F0170 F0180 F0190 F0200 F0210 F0220 F0230	Reserved	

F address	Function	Description
F0240		
F0250		
F0260		
F0270		
F0280		
F0290	Detect error module(Location bitmap, b0=first expansion module)	
F0300	Minimum Scan Time(ms sec)	
F0310	Current Scan Time(ms sec)	
F0320	Maximum Scan Time(ms sec)	
F0330	Reserved	
F0340	Global Interrupt Enable / Disable (Enable b0=1, Disable b0=0)	
F0350	Interrupt Program Enable / Disable (Enable b0=1, Disable b0=0) b0 : Interrupt Program 0, b1 : Interrupt Program 1…. bf = Interrupt Program 15	
F0360	Reserved	
F0370		
F0380		
F0390		
F0400	Save Year (Example:2001)	
F0410	Save Month and Date (first two digit number : Month, others : Date)	
F0420	Save Hour and Minute (first two digit number : Hour, others : Minute)	
F0430	Save Second and Day (first two digit number : Second, others : Day)	
F0440	Reserved	
F0450	Save Year when Power is turned ON. (Example:2001)	
F0460	Save Month and Date when Power is turned ON.	
F0470	Save Hour and Minute when Power is turned ON.	
F0480	Save Second and Day when Power is turned ON.	
F0490	Reserved	
F0500	It counts Power failure.	
F0510	Save Year when Power is turned OFF. (Example:2001)	
F0520	Save Month and Date when Power is turned OFF.	
F0530	Save Hour and Minute when Power is turned OFF.	
F0540	Save Second and Day when Power is turned OFF.	
F0550 ~ F0660	Reserved	
F0670 ~ F0680	PLC-S IP address	
F0690 ~ F0700	Net Mask	

F address	Function	Description
F0710 ~ F0720	Gateway IP address	
F0730 ~ F0750	Ethernet MAC address	
F0760 ~ F0790	Reserved	
F0800 ~ F087F	Program enable / disable bitmap	
F1240	Call Level Counter	

5.2 Device Address Notation

5.2.1 Bit Data Format

The Notation system of Bit Device Address is as follows.

[Device Symbol] + [Card Number] + [Bit Number]

Device Symbol	Card Number	Bit Number
X	000	E
M	034	F

Card Number : Decimal 3 Character
Bit Number : Hexadecimal 1 Character
Example : X000E, Y0012, M034F, K0120, L023C, F0093

Device Symbol for Bit Address is X, Y, M, K, L, F, and Q.

5.2.2 Word Data Format

The Notation system of Word Device Address is as follows.

[Device Symbol] + [Card Number]

Device Symbol	Card Number
D	1234
Z	0001

Device Symbol for Word Address : D, Z
Card Number : Decimal 4 Character
Example : D1234, Z0001

5.2.3 Timer and Counter Format

The Notation system for Timer and Counter Device Address is as follows.

[Device Symbol] + [Bit No.]

Device Symbol	Bit Number
T	0003
C	0567

Device Symbol for Timer and Counter : T, C
Card Number : Decimal 4 Character
Example : T0003, C0567

5.2.4 Step Controller Format

The Notation system of Step controller is as follows.

[Device Symbol] + [Card Number] + [.] + [Bit Number]

Device Symbol	Card Number	[.]	Bit No.
S	00	.	00
S	12	.	78

Device Symbol for Step Controller : S
Card Number : Decimal 2 Character
Step Number : Decimal 2 Character
Example : S00.00, S12.78

5.2.5 Word Format for Bit Device

The Notation system for Word of Bit Device is as follows.

[Device Symbol] + [Card Number] + [0]

Device Symbol	Card Number	0
Y	011	0
M	044	0

Device Symbol for Word of Bit Device : X, Y, M, K, L, F, Q
Card No. : Decimal 3 Character
Example : X0110, Y0330, M0440, K0000, L0040, F0130

6. ERROR CODE

If STOP LED blinks every 1 seconds or 0.5 seconds, PLC has errors. In this case, refer to Error code at the Chapter 8.1.

Before troubleshooting, make you sure that below check list is ok

① The Power of PLC is ok.

② All modules are installed tightly.

③ The wiring for each module is made correctly.

Error Code	Description	Diagnosis time	CPU Status	LED Status		Troubleshooting
				RUN	STOP	
0x0102	flash Memory Error	Any time	STOP	OFF	On	Flash Memory has an error. Contact Cimon service team.
0x0109	PBT Check Sum Error	Any time	RUN	Off	On	Program download error. Download project to PLC again.
0x0201	RTC Data Error	Between Scans (after END)	RUN	ON	Off	RTC of CPU module is error. Contact Cimon service team.

Error Code	Description	Diagnosis time	CPU Status	LED Status		Troubleshooting
				RUN	STOP	
0x0205	Dead battery Error	Any time	STOP	OFF	On	CR2032 is installed in CPU module in order to operate clock when power is off. Batter is dead. Replace battery.
0x0303	Reserved IO Error	Any time	RUN	ON	Off	Installed module is not matched with Reserved IO module in CICON. Check module configuration and download parameter.
0x0308	No response from expansion module.	Any time	STOP	Off	Blink	If it happens while PLC is operating, switch PLC mode to STOP and RUN. This error may occurs if there is noise around module or module is not installed tightly. So check F0070 and you can find out base and slot number that occurs error. (High Byte: Base number, Low Byte: Slot number)
0x030C	Base or slot number in FROM/TO instruction is error.	Any time	STOP	Off	ON	The slot or base number which is assigned to FROM/TO/DFRO/DTO command is wrong. Check ladder program or module configuration.
0x0317	Out of Max. number of SP16EOR installed	Any time	STOP	Off	ON	Maximum 4units of SP16EOR can be installed to a CPU module.
0x040D	Duplicated Comm. port	Any time	STOP	Off	ON	It occurs when two different special programs (MODBUS/RTU Master program or Protocol program) use the same comm. Port. Check the comm. program and download it again.
0x040E	Duplicated HSC special program	Any time	STOP	Off	ON	It occurs when more than one HSC special program is made in a program. Delete one of them.
0x040F	Duplicated Positioning special program	Any time	STOP	Off	ON	It occurs when more than one Positioning special program is made in a program. Delete one of them.
0x0410	Duplicated High Speed LINK Special program	Any time	STOP	Off	ON	It occurs when more than one High Speed LINK special program is made in a program. Delete one of them.
0x0504	Comm. Port Error	After command	STOP	Off	Blink	Wrong comm. port is assigned. Check protocol special program and SEND/RCV command.
0x0505	Wrong memory address is used.	After command	STOP	Off	Blink	If FIFW / FIFR / FPOP / FINS / FDEL /BXCH / DSFR / DSFL /BITMOV /DECO / DIS command is wrong, it occurs error. Check those command with memory address. Download project file again and switch PLC mode from STOP to RUN.

Error Code	Description	Diagnosis time	CPU Status	LED Status		Troubleshooting
				RUN	STOP	
0x0509	Periodic Interrupt Error	After command	STOP	Off	Blink	It occurs if more than 16 periodic Interrupts programs are running. If there are many short periodic Interrupts are registered or there are too long scan program is registered, possibility of this error is increased.
0x0601	SFC Error	After command	STOP	Off	Blink	It occurs when SFC program is wrong. Check timeout at the address Q12.

CIMON CO.,LTD.

H.Q Address : Zip Code 13503 / 5F KDT BLDG, #48, Beolmal-ro, Bundang-gu, Seongnam-si, GyeongGi-do, Korea
Tel: +82-31-778-3071

USA : Zip Code 90010 / 3699 Wilshire Blvd, Suite 1250 Los Angeles CA 90010
Tel : 213-384-8703
Website : www.cimon.com