



Programmable Controllers
MELSEC iQ-F
series



Ezi-STEP® CC-Link IE TSN
Micro Stepping System **ALL**

접속 가이드

MELSEC iQ-F series and **Ezi-STEP**® CC-Link IE TSN
Micro Stepping System **ALL**

미쓰비시 전기 제품
FX5-40SSC-G(S), FX5-80SSC-G(S)

파스텍 제품
Ezi-STEP CC-Link IE TSN ALL

시작하기 전에

- 저희 회사의 제품을 이용해 주셔서 감사합니다.
- Ezi-STEP CC-Link IE TSN ALL은 32비트 고성능 ARM 프로세서를 탑재한 드라이브와 다양한 모터로 구성된 스테핑모터 유닛으로, CC-Link IE TSN 네트워크에서 리모트국으로 사용됩니다.
- Ezi-STEP CC-Link IE TSN ALL은 산업용 제품입니다. 다른 용도로는 사용하지 말아 주십시오. 이를 준수하지 않아 손해가 발생한 경우에 저희 회사에서는 어떠한 책임도 지지 않습니다.
- 저희 회사에서 제공하는 이 접속 가이드는 미쓰비시 전기의 MELSEC iQ-F FX5-SSC-G에 Ezi-STEP CC-Link IE TSN ALL을 연결하는 방법을 안내하는 자료로, CSP+ 파일 등록과 시스템 구성, 파라미터 설정, 프로그램 방법 등을 설명합니다.
- PLC 프로그램을 작성하기 전에 이 접속 가이드를 반드시 읽고, 내용을 정확히 이해하신 후 제품을 올바르게 사용하시기 바랍니다.
- 이 접속 가이드는 예고 없이 변경될 수 있습니다. 최신 버전이 필요하신 경우에는 저희 회사의 CC-Link IE TSN 홈페이지 (cltsn.fastech-motions.com)를 참고하시기 바랍니다.

매뉴얼 정보

- Ezi-STEP CC-Link IE TSN ALL 매뉴얼은 파스텍 홈페이지에서 다운로드할 수 있습니다.

<https://cltsn.fastech-motions.com/download/quick>

매뉴얼 명칭	매뉴얼 번호
[매뉴얼][CC-Link IE TSN][Ezi-STEP ALL] Micro Stepping System	
[접속가이드][CC-Link IE TSN][MELSEC iQ-F FX5-SSC-G][Ezi-STEP ALL]	

- MELSEC iQ-F FX5-SSC-G 매뉴얼은 미쓰비시 전기 홈페이지에서 다운로드할 수 있습니다.

<https://www.mitsubishielectric.com/fa/index.html>

매뉴얼 명칭	매뉴얼 번호
MELSEC iQ-F Motion Unit User's Manual (Startup Edition)	IB-0300405
MELSEC iQ-F Motion Unit User's Manual (Network Edition)	IB-0300425
MELSEC iQ-F Motion Unit User's Manual (Simple Motion Mode Application Edition)	IB-0300571
MELSEC iQ-F Motion Unit User's Manual (Simple Motion Mode Advanced Synchronous Control Edition)	IB-0300574
GX Works3 Operating Manual	SH-081214

용어

- 접속 가이드에서 사용되는 용어와 관련된 내용입니다.

용어	내용
CC-Link IE TSN	표준 이더넷 규격을 확장한 'TSN(Time-Sensitive Networking)'을 채택하여, 실시간성을 확보한 제어와 다른 오픈 네트워크의 정보를 동시에 처리할 수 있는 오픈 네트워크입니다.
마스터국(매니저국)	네트워크 전체를 관리하는 국으로, 모든 국과 사이클릭 전송 및 트랜지언트 전송을 할 수 있습니다. MELSEC iQ-F FX5 모션 모듈이 이에 해당합니다.
리모트국	비트 단위의 입출력 신호와 워드 단위의 입출력 데이터를 사이클릭 전송하는 국으로, 트랜지언트 전송도 가능합니다. Ezi-STEP CC-Link IE TSN ALL이 이에 해당합니다.
PDO	Process Data Object의 약칭입니다. 여러 CANopen 노드 간에 주기적으로 전송되는 애플리케이션 오브젝트의 집합체입니다.
오브젝트	CANopen에 대응하는 디바이스국이 보유한 다양한 데이터입니다.

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[부록]

[부록1] 원점복귀 방법

1. 개 요

1-1. 개요

- MELSEC iQ-F FX5-SSC-G와 Ezi-STEP CC-Link IE TSN ALL 접속 가이드

- ◆ 마스터국: FX5-40SSC-G(S) / FX5-80SSC-G(S)

- PLCopen®Motion Control FB(Function Block)

- 국제 표준 규격인 PLCopen Motion Control FB 라이브러리를 사용하여 제어 프로그램을 쉽게 작성할 수 있습니다.
 - 이 프로그램은 제3자도 내용을 쉽게 파악할 수 있기 때문에 설계 및 유지보수 시간을 크게 단축할 수 있습니다.

- ◆ 엔지니어링 소프트웨어

- GX Works3 : Ver. 1.105K 이상
 - 모션 제어 설정 기능 : Ver. 1.055H 이상

- ※ 최신 파일은 미쓰비시 전기 홈페이지를 참조하시기 바랍니다.

- <https://www.mitsubishielectric.com/fa/download/index.html>

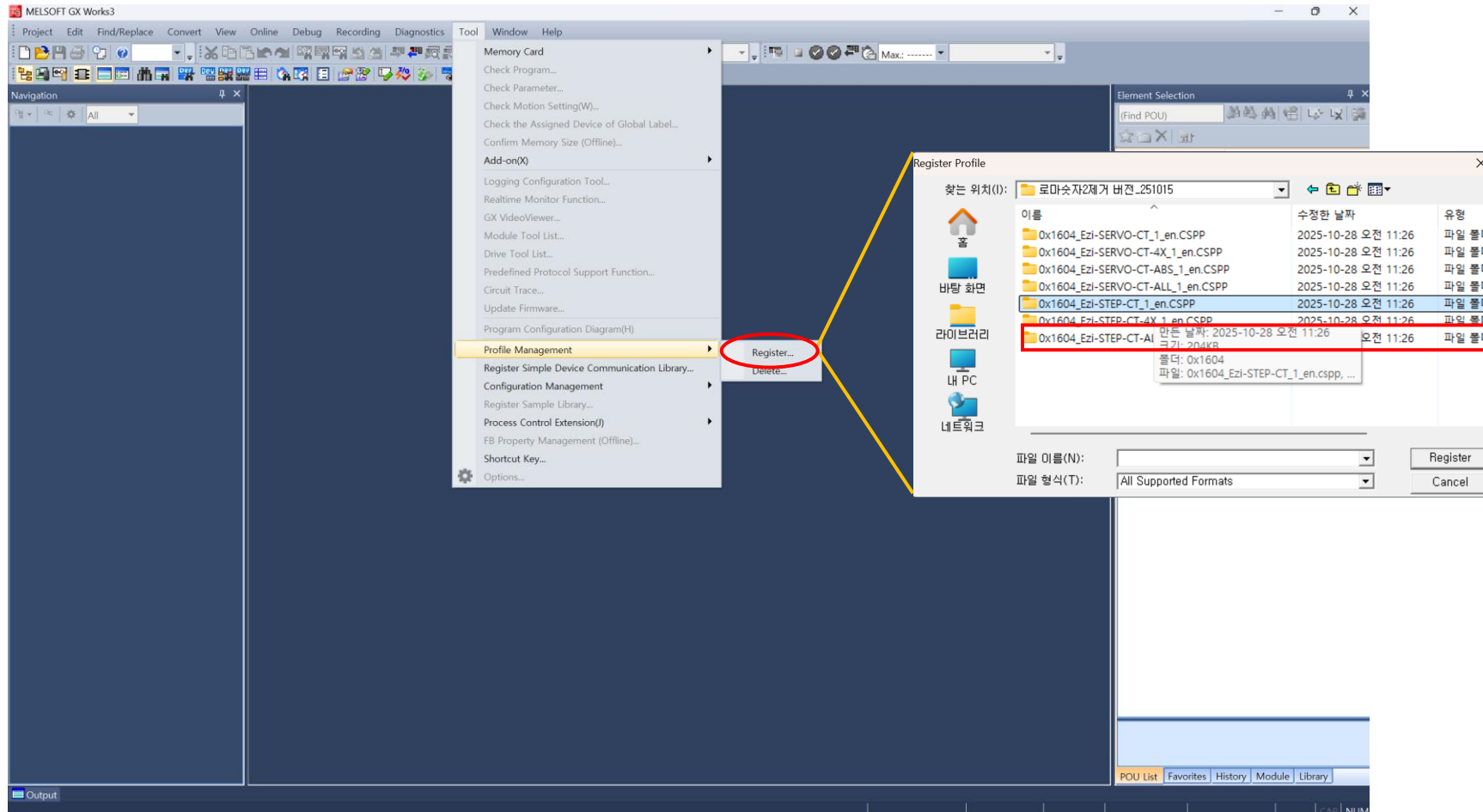
- ◆ 리모트국: Ezi-STEP CC-Link IE TSN ALL

- CSP+ 파일 다운로드 주소 : <https://cltsn.fastech-motions.com/download/quick>
 - 파일명 : 0x1604_Ezi-STEP-CT-ALL_1_en_CSPP

1-2. Ezi-STEP CC-Link IE TSN ALL CSP+ 파일 등록

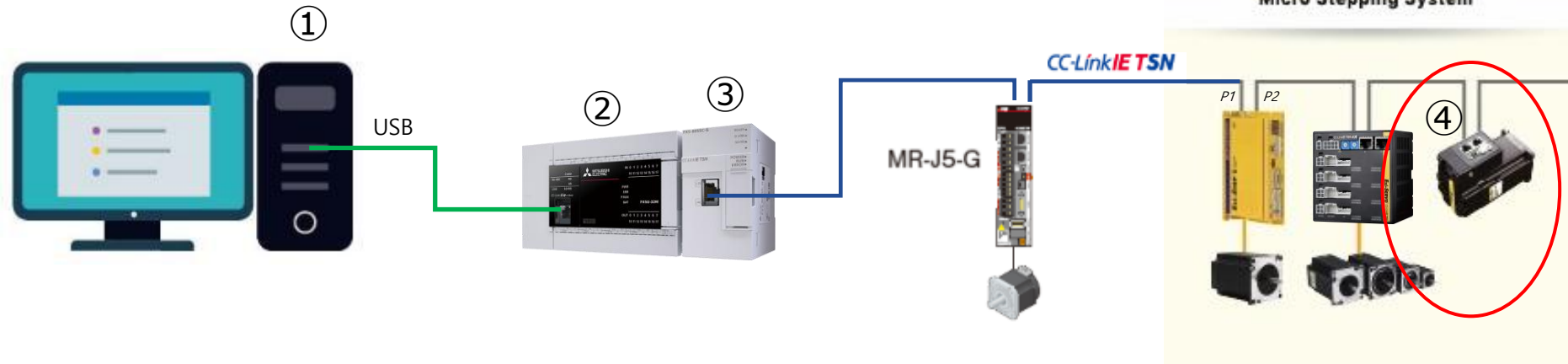
● CSP+ 등록

- [GX Works3] Tool / Profile Management / Register ※ Project를 열기 전에만 등록할 수 있습니다.



1-3. CC-Link IE TSN 구성

- 네트워크 연결



구성	품명	IP 주소
①	엔지니어링 소프트웨어	GX Works3
②	CPU 모듈	FX5U
③	모션 모듈	FX5-40SSC-G(S)
④	드라이브 + 모터	Ezi-STEP-CT-ALL-42S-R

1-3. CC-Link IE TSN 구성

- Ezi-STEP 규격

항목		규격
통신 프로토콜		CC-Link IE TSN Class B
통신 속도		1Gbps / 100Mbps
동작 모드		CiA402 드라이브 프로파일 : 사이클릭 동기 위치 모드 (CSP) / 프로파일 위치 모드 (PP) / 원점복귀 모드 (HM)
동기 방식	시각 동기 방식	IEEE1588 / IEEE802.1AS
	통신 주기	최소 250 μ s
	네트워크 동기 통신	동기 통신 (CSP, PP, HM) / 비동기 통신 (PP, HM)
인코더 타입		인크리멘탈 타입

1-4. 설정 순서

● Ezi-STEP, FX5 파라미터 설정

No.	항목	내용
1	Ezi-STEP 설정 	드라이브 설정 프로그램(Ezi-CT Manager)을 이용하여 파라미터를 설정합니다. 설정 프로그램과 사용 방법은 (주)파스텍 홈페이지에서 다운로드하시기 바랍니다. ※ 주소: https://cltsn.fastech-motions.com/download/quick
2	PLC FX5 CPU 설정 	GX-Works3를 사용해 FX5 CPU 모듈의 프로젝트를 만든 다음, 유닛 파라미터(통신 방식, 접속 대상)와 축 파라미터(모션 제어용)를 설정합니다.
3	FX5 + Ezi-STEP 동작 확인 	FX5 CPU 모듈과 Ezi-STEP이 올바르게 설정되어 있는지 확인하기 위한 프로그램을 작성합니다. 라벨을 조작해 모터가 정상적으로 작동하는지 확인합니다

1-4. 설정 플로우

● Ezi-STEP 설정 참고 사항

항목	내용
IP 주소 설정	① 드라이브의 로터리 스위치로 설정 ② 로터리 스위치 → '00', IP address (Index: 2101h, Subindex: 01~04h) 값으로 설정
드라이브 원점복귀 방법 설정	① Homing method (Index: 6098h, Subindex:00h) 설정 - '0'(초깃값) → '33' 등 원점복귀 방법 설정 ※ [부록1] 원점복귀 방법 참조 ② Home offset (Index: 607Ch, Subindex:00h) → '0' 설정 필요 주의) 0이 아닌 값을 설정하면, 원점복귀가 완료될 때 급가속하거나 급감속하는 경우가 있습니다.
리미트 정지 방법 설정	① Limit stop method (Index:2003h, Subindex:00h) 설정 - 0: PP, HM → 급정지 / CSP → 정지하지 않음 - 1: PP, HM → 감속 정지 / CSP → 정지하지 않음 ② '0' 또는 '1'이 아닌 값을 설정하면, 하드웨어 스트로크 리미트를 감지할 때 '1ED0H: 드라이브 오류'가 발생할 수 있습니다
인포지션 범위	① In-position range (Index:2B21h, Subindex:00h, Data type:Unsigned32) 설정 - 사용 환경을 고려하여 인포지션 범위(5~20000 pulse) 내의 값을 등록 ② [Md.102: 편차 카운터 값]이 이 설정값보다 작을 경우, [Md.108: 서보 상태 1: 인포지션]이 ON됩니다. 이 오브젝트는 공개하지 않는 것이 원칙이므로 FX5 CPU 모듈의 서보 트랜지언트 전송 기능을 이용하여 설정해 주십시오.

1-5. 제약 사항

● 모션 제어 기능 제약 사항 (FX5와 Ezi-STEP)

항목	제약 사항
속도 제어	드라이브가 사이클릭 동기 속도 모드(CSV)를 지원하지 않으므로 속도 제어를 사용할 수 없습니다.
토크 제어	드라이브가 사이클릭 동기 토크 모드(CST)를 지원하지 않으므로 토크 제어를 사용할 수 없습니다.
정압 제어	MELSERVO만 정압 제어를 지원하므로, 정압 제어를 사용할 수 없습니다.
어드밴스트 동기 제어	[Pr.320 : 동기 인코더 축 종류]에 '서보 앰프 경유 동기 인코더'를 설정할 수 없습니다.
토크 제한 기능	드라이브가 아래 오브젝트를 지원하지 않아 토크 제한 기능을 사용할 수 없습니다. • Positive torque limit value (Index:60E0h, Subindex:00h) • Negative torque limit value (Index:60E1h, Subindex:00h)
절대 위치 시스템	인코더가 인크리멘탈 타입이기 때문에 절대 위치 시스템을 사용할 수 없습니다
폴로 업(Follow up) 기능	이 제품은 반드시 서보 ON 시에 원점복귀를 실시해 주십시오. 오픈 루프 제어 시스템이므로 서보 OFF 상태에서는 'Position actual value (Index:6064h, Subindex: 00h)'를 업데이트하지 않습니다. 폴로 업 기능에서는 'Position actual value (Index:6064h, Subindex:00h)'를 기준으로 모터의 회전량을 컨트롤러의 명령에 반영하기 때문에, 서보 OFF 중에 모터가 회전한 만큼 컨트롤러 명령과 모터의 위치가 어긋납니다.
가상 서보 앰프 기능	MR-J5-G로 에뮬레이트됩니다.
마크 검출 기능	[Pr.800: 마크 검출 신호 설정]에 드라이브의 TPR1(터치 프로브 1)을 사용할 수 없습니다.
임의 데이터 모니터 기능	임의 데이터 모니터 기능을 사용할 경우, [Pr.91~94: 임의 데이터 모니터 데이터 종류 설정 1~4]와 [Pr.591~594: 임의 데이터 모니터 데이터 종류 확장 설정 1~4]에 모니터링할 오브젝트를 설정해 주십시오. 초깃값은 "0: 미설정"입니다. 따라서 [Md.109~112: 임의 데이터 모니터 출력 1~4]는 '0'이 됩니다.

1-5. 제약 사항

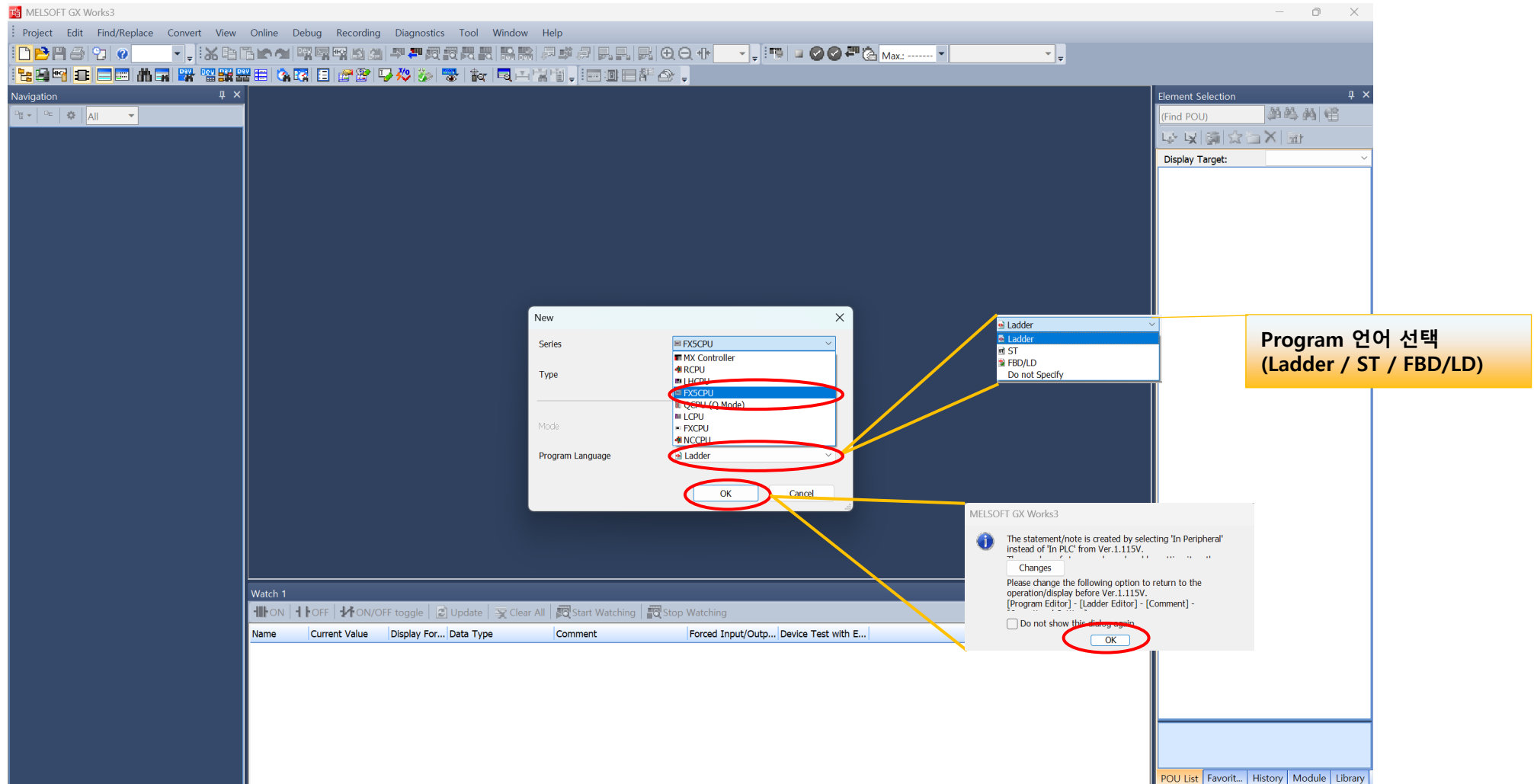
● 모션 제어 기능 제약 사항 (FX5와 Ezi-STEP)

항목	제약 사항
Md.103: 모터 회전수	드라이브가 'SI unit velocity (Index:60A9h, Subindex:00h)'를 지원하지 않기 때문에 pulse/s 단위로 모터 회전수를 출력합니다.
Md.104: 모터 전류값	드라이브가 'Torque actual value (Index:6077h, Subindex:00h)'를 지원하지 않기 때문에 항상 "0"으로 표시됩니다.
Md.108: 서보 상태 1	모니터 데이터 중 아래 비트는 항상 'OFF' 상태입니다. · 게인 전환 중 (b4) · 풀 클로즈드 제어 전환 중(b5) · 토크 제한 중(b13) · 절대 위치 소실 중 (b14) · 경고 중(b15)
Md.119: 서보 상태 2	모니터 데이터 중 아래 비트는 항상 'OFF' 상태입니다. · 영점 통과(b0) · 영속도 중(b3) · 속도 제한 중(b4) · PID 제어 중(b8)
Md.115: 서보 알람 상세 번호	지원되지 않습니다. 이 모니터 데이터는 항상 '0'으로 표시됩니다
Cd.108: 게인 전환 명령 플래그	지원되지 않습니다. MELSERVO만 이 데이터에 대응합니다.
Cd.133: 세미-풀 전환 요구	지원되지 않습니다. MELSERVO만 이 데이터에 대응합니다..
Cd.136: PI-PID 전환 요구	지원되지 않습니다. MELSERVO만 이 데이터에 대응합니다.

2. FX5-40SSC-G(S) 설정

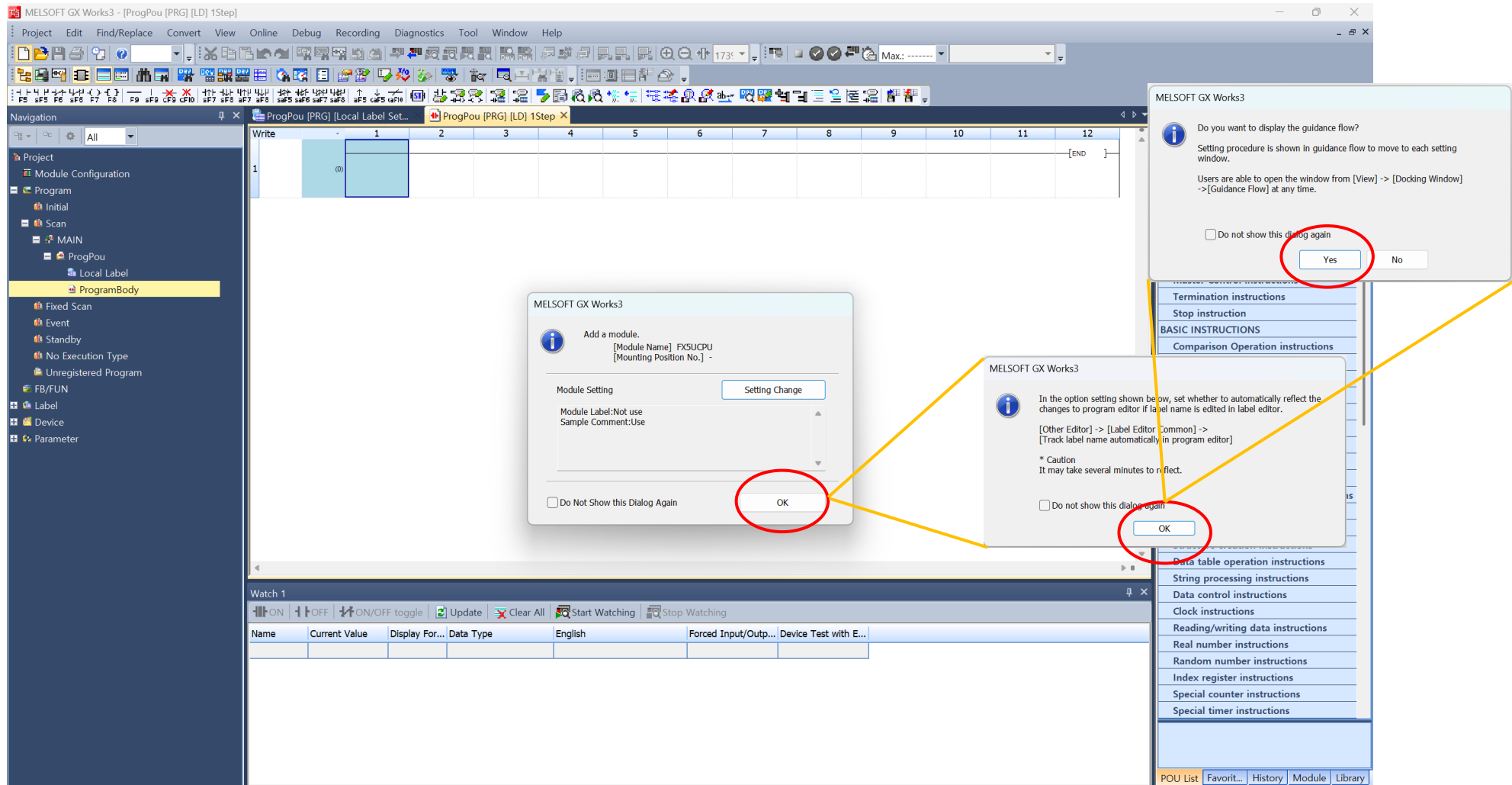
2-1. Project 생성

- 신규 Project 생성 시 FX5CPU, 모델명, 사용 축수, Program 언어를 선택



2-2. Module 등록

- FX5UCPU 등록



2-2. Module 등록

- FX5UCPU 등록

The screenshot shows the MELSOFT GX Works3 interface in the 'Module Configuration' mode. The 'Navigation' pane on the left shows the project structure with 'Module Configuration' selected. A red box and a yellow arrow labeled '1' point to this selection. The main workspace shows a rack configuration with a CPU module (ST A#) and a blank slot. A yellow box with a red arrow labeled '2' points to the 'FX5-40SSC-G(S) 4 axes CC-Link IE TSN' module in the 'Element Selection' pane on the right. A yellow callout box with the text '[클릭 & 드래그] 1. FX5UCPU가 생성됨. 2. FX5-40SSC-G(S)' is positioned between the CPU and the selected module. A dialog box in the bottom-left corner contains the message: 'When you finish editing Module Configuration, fix the parameters to reflect to their respective functions. Do not show this dialog again. You are able to change this setting through the Options menu.' with an 'OK' button circled in red.

[클릭 & 드래그]
1. FX5UCPU가 생성됨.
2. FX5-40SSC-G(S)

MELSOFT GX Works3

When you finish editing Module Configuration, fix the parameters to reflect to their respective functions.
☐ Do not show this dialog again.
You are able to change this setting through the Options menu.

OK

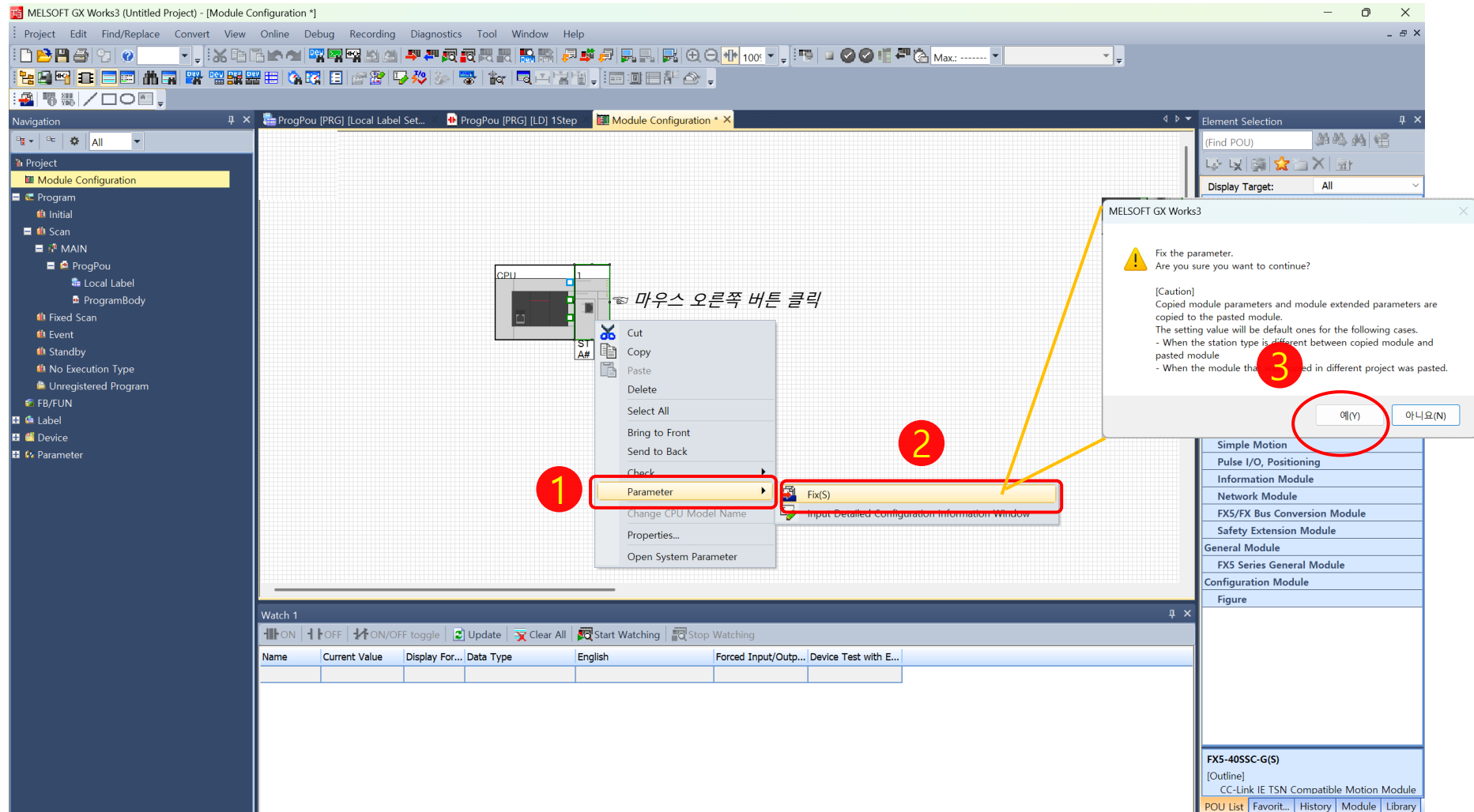
Watch 1

Name	Current Value	Display For...	Data Type	English	Forced Input/Outp...	Device Test with E...

FX5-40SSC-G(S)
[Outline]
CC-Link IE TSN Compatible Motion Module
POU List | Favorit... | History | Module | Library

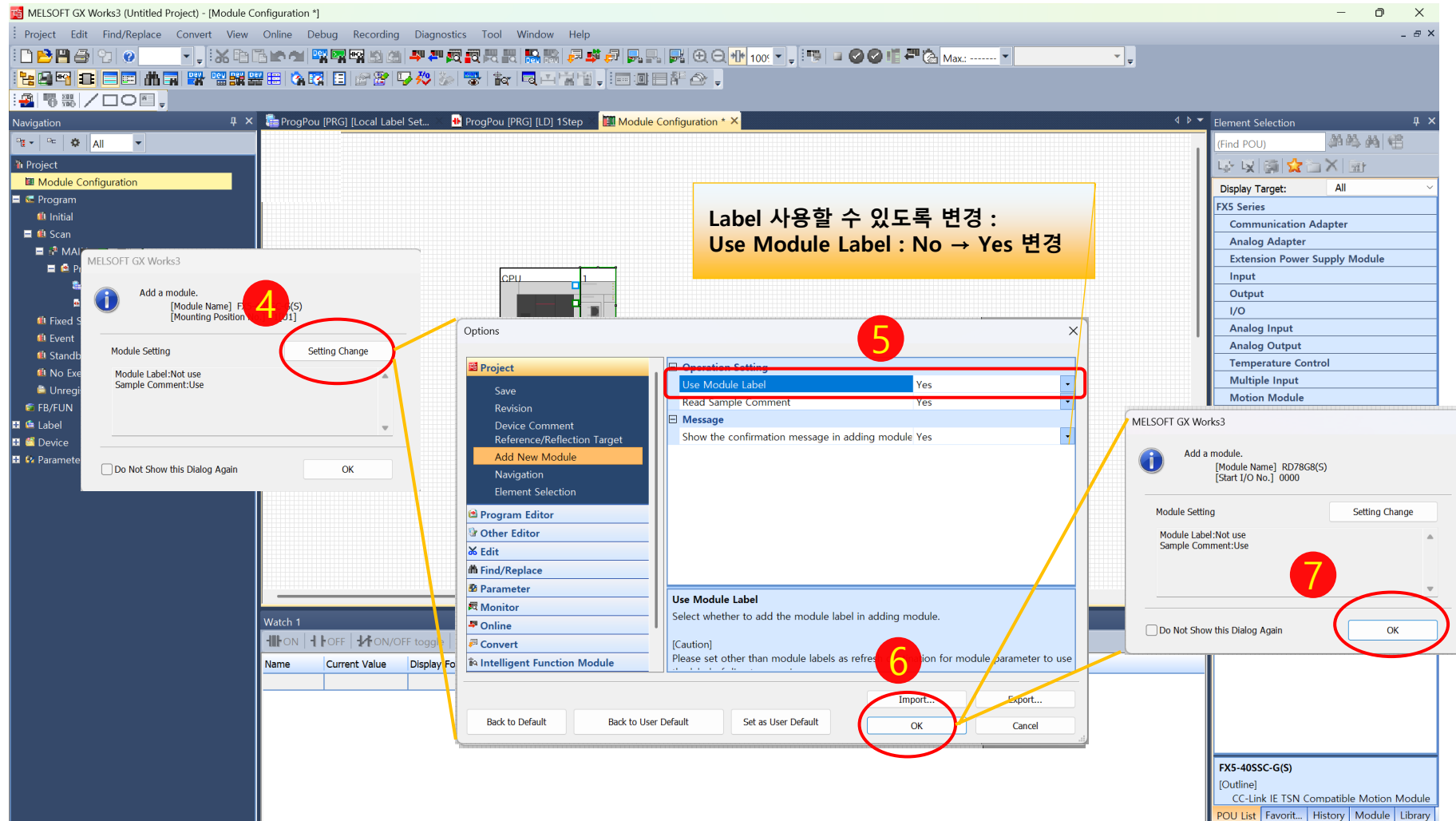
2-3. Module Configuration – H/W

- 마우스의 오른쪽 버튼을 클릭하여 Fix(S) 선택으로 Module 구성 완료 (1/2)



2-3. Module Configuration – H/W

- 마우스의 오른쪽 버튼을 클릭하여 Fix(S) 선택으로 Module 구성 완료 (2/2)



2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- Station No./IP Address Setting : 예) IP Address → 192.168.3.253

1 Module Information

2 Station No./IP Address Setting

3 Apply

Network 국번 : 1

IP Address : 192.168.3.253
Subnet Mask : 255.255.255.0
※ 참고: Ezi-STEP Default IP는 192.168.3.xxx

Explanation
Set to determine how many bits of the IP address are used as the network address, which is used to identify the network.
Masked bit has been specified from top between the top bit and bit 2.
For example, set '255.255.255.0 (FF.FF.FF.0)' to assign the upper 24 bits of IP address to the subnet mask.
[Setting range]
- Empty
- 0.0.0.1 to 255.255.255.255 (00.00.00.01 to FF.FF.FF.FF)

Name	Current Value	Display For...	Data Type	English	Forced Input/Outp...	Device Test with E...

POU List Favorit... History Module Library

2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

● Network Configuration Settings

The screenshot displays the MELSOFT GX Works3 software interface for configuring a 1[U1]:FX5-40SSC-G(S) module. The interface is divided into several panes:

- Project Tree (Left):** Shows the project structure. The 'Module Information' section is highlighted with a red circle labeled '1'.
- Setting Item List (Center):** Lists the configuration items. The 'Network Configuration Settings' item is highlighted with a red circle labeled '2'.
- Configuration Window (Right):** Displays the 'CC-Link IE TSN Configuration' settings. The 'Detailed Setting' button is highlighted with a red circle labeled '3'.

The 'CC-Link IE TSN Configuration' window shows the following details:

- Mode Setting:** Online (Unicast Mode)
- Cyclic Transmission Time (Min.):** 50.00 us
- Module List:** A list of modules connected to the network, including 'General CC-Link IE TSN Module' and 'CC-Link IE TSN Module (Mitsubishi Ele)'. The 'CC-Link IE TSN Module (Mitsubishi Ele)' is selected.
- Output:** A section for monitoring the module's status, showing 'Error', 'Warning', and 'Information'.

The bottom of the window features a 'Watch' section with a table for monitoring the module's status:

Name	Current Value	Display For...	Data Type	English	Forced Input/Outp...	Device Test with E...

2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- N/W 미연결 상태 : CC-Link IE TSN Module을 수동(클릭&드래그)으로 구성

CC-Link IE TSN Configuration (Start I/O: 0000)

CC-Link IE TSN Configuration Edit View Close with Discarding the Setting Close with Reflecting the Setting

Mode Setting: Online (Unicast Mode) Assignment Method: Detailed Display

Cycle Transmission Time (Min.)	IP Address	Subnet Mask	Station Type	Communication Period Interval (Min.)	Points	R/W Setting	R/Ww Setting	Parameter Automatic Setting	PDO Mapping Setting	IP Address	Subnet Mask
0	Host Station	0	Master Station	250.00 usg	Points	Points	Points	Points		192.168.3.253	255.255.255.0
1	Ezi-STEP-CT-ALL	1	Remote Station			16	16		<Detail Setting>	192.168.3.1	255.255.255.0

2

[Ezi-STEP CC-Link IE TSN ALL IP Address 임의로 수정]

1. 192.168.3.1

※ IP Address 변경 후 전원 RESET 필요

1

마우스 클릭 & 드래그 (반복)

Module List

CC-Link IE TSN Selection Find Module My

- General CC-Link IE TSN Module
- CC-Link IE TSN Module (Mitsubishi Electr
- Master/Local Module
- Motion Module
- GOT3000 Series
- GOT2000 Series
- General-Purpose AG Servo
- General purpose Inverter
- DC Input
- Transistor Output
- I/O Combined
- Analog Input
- Analog Output
- EnergyMeasuringUnit
- Bridge module
- FPGA module
- CC-Link IE TSN Module (FASTECH Co. L
- Closed-loop Step Drive
- Open-loop Step Drive
- Ezi-STEP-CT Open-Loop st
- Ezi-STEP-CT-4X Open-Loop st
- Ezi-STEP-CT-ALL Open-Loop st

[참고] Ezi-STEP CC-Link IE TSN ALL IP Address 설정 16진수 로터리 스위치

(x16) (x1)

FASTECH Co., Ltd.
[Station Type]
Remote Station

2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- CC-Link IE TSN Module을 Motion Control Station 및 Synchronous 선택

The screenshot displays the 'CC-Link IE TSN Configuration' software window. The main table lists two stations: Station 0 (Host Station) and Station 1 (Ezi-STEP-CT-ALL). Station 1 is highlighted with a red box and a callout '1' pointing to the 'Station' column, with the text 'Motion Control Station - Check (마우스 클릭)'. The 'Network Synchronous Communication' dropdown for Station 1 is also highlighted with a red box and a callout '2' pointing to the 'Synchronous' option, with the text 'Synchronous 선택'. The 'Module List' on the right shows the selection of 'CC-Link IE TSN Module (Mitsubishi Electric)' and 'Motion Module'. The bottom status bar shows 'STA#1' and 'Ezi-STEP-CT-ALL'.

Mode Setting	Cyclic Transmission Time (Min.)	us	Station Type	Station	Points	Points	Points	Points	RWw Setting	Parameter Automatic Setting	PDO Mapping Setting	IP Address	Subnet Mask	Default Gateway	Reserved/Error Invalid Station	Network Synchronous Communication
0	Host Station	17.00	0	Master Station								192.168.3.253	255.255.255.0			Asynchronous
1	Ezi-STEP-CT-ALL		1	Remote Station					16	16	<Detail Setting>	192.168.3.1	255.255.255.0		No Setting	Synchronous

Module List

- CC-Link IE TSN Selection
- Find Module
- My 4
- General CC-Link IE TSN Module
- CC-Link IE TSN Module (Mitsubishi Electric)
- Master/Local Module
- Motion Module
- GOT3000 Series
- GOT2000 Series
- General-Purpose AC Servo
- General-purpose Inverter
- DC Input
- Transistor Output
- I/O Combined
- Analog Input
- Analog Output
- EnergyMeasuringUnit
- Bridge module
- FPGA module
- CC-Link IE TSN Module (FASTECH Co. Ltd.)
- Closed-loop Step Drive
- Open-loop Step Drive
- Ezi-STEP-CT
- Ezi-STEP-CT-4X
- Ezi-STEP-CT-ALL

[Outline]
Step Drive
[Specification]
Closed-Loop Step Drive
Motor: Max. NEMA 24
Mode: Homing, OSP, FP
CC-Link IE TSN Class B
[Manufacturer Name]
FASTECH Co. Ltd.
[Station Type]
Remote Station

2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- PDO Mapping Setting은 아래와 같이 자동으로 할당되어 설정됩니다.

■ TPDO

Index	Sub index	Data Type	내용
1D02	01	U16	Watchdog counter UL 1
6061	00	I8	Modes of operation display
0000	00	U8	GAP
6064	00	I32	Position actual value
60F4	00	I32	Following error actual value
6041	00	U16	Stausword
2B12	00	U16	Status DO 1
603F	00	U16	Error code
60FD	00	U32	Digital inputs
0000	00	U32	GAP
0000	00	U32	GAP

■ RPDO

Index	Sub index	Data Type	내용
1D01	01	U16	Watchdog counter DL 1
6060	00	I8	Modes of operation
0000	00	U8	GAP
607A	00	I32	Target position
6040	00	U16	Controlword
2B02	00	U16	Control DI 5
0000	00	U32	GAP
0000	00	U32	GAP
0000	00	U32	GAP
0000	00	U32	GAP

2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- CC-Link IE TSN Module을 Motion Control Station 및 Synchronous 선택

CC-Link IE TSN Configuration (Start I/O: 0000)

CC-Link IE TSN Configuration Edit View **Setting** Close with Discarding the Setting Close with Reflecting the Setting

Mode Setting: Online (Unicast Mode) Assignment Method:

Cyclic Transmission Time (Min.):	17.00	us	Station Type	Communication Period Interval (Min.):	250.00	usg	R/Wr Setting	R/Ww Setting	Parameter Automatic Setting	PDO Mapping Setting	IP Address	Subnet Mask
0	Host Station	0	Master Station								192.168.3.253	255.255.255.0
1	Ezi-STEP-CT-ALL	1	Remote Station				16	16		<Detail Setting>	192.168.3.2	255.255.255.0

클릭하면 바로 반영됨

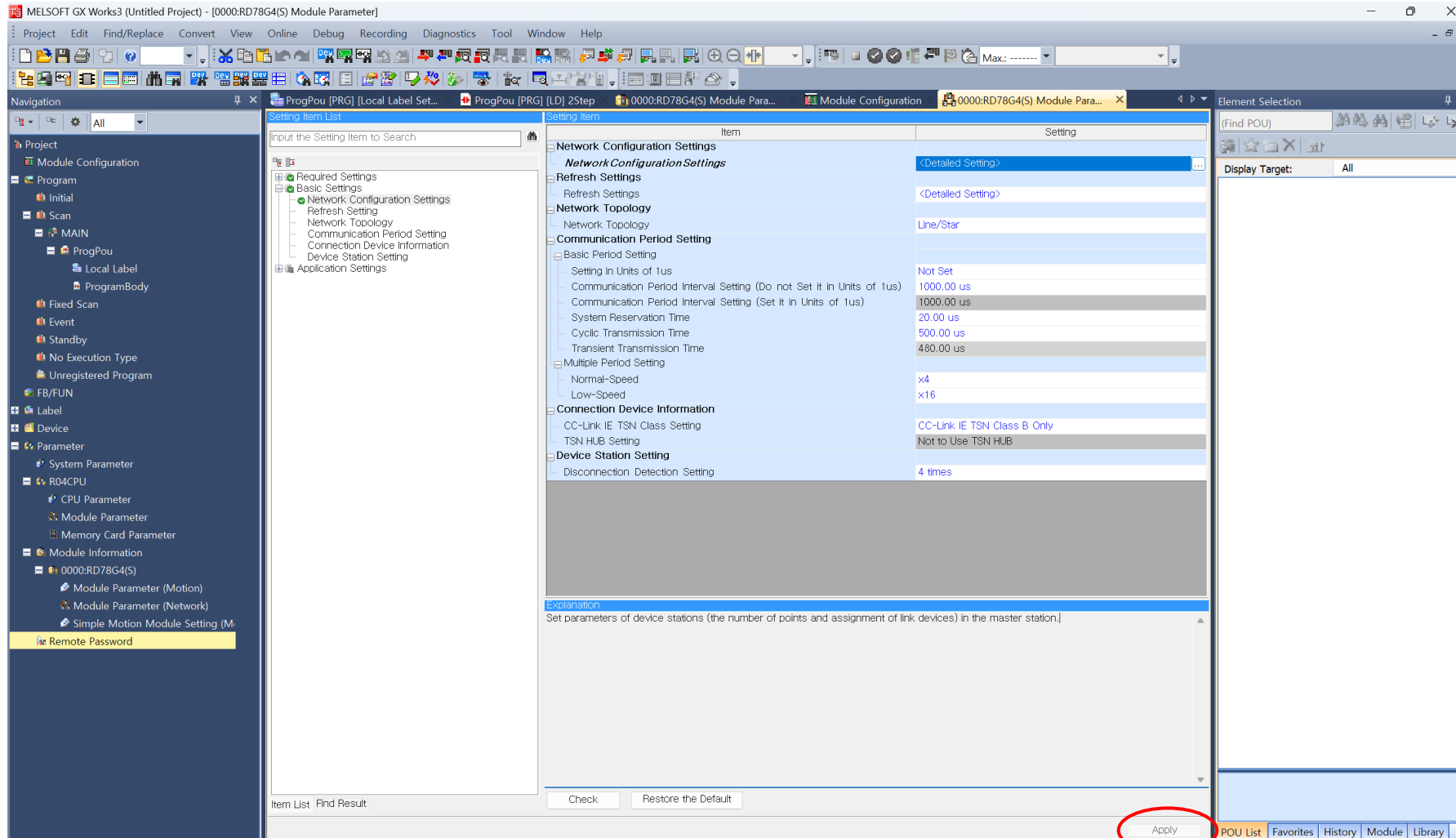
Module List

- CC-Link IE TSN Selection Find Module My
- General CC-Link IE TSN Module
- CC-Link IE TSN Module (Mitsubishi Electric)
- Master/Local Module
- Motion Module
- GOT3000 Series
- GOT2000 Series
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- DC Input
- Transistor Output
- I/O Combined
- Analog Input
- Analog Output
- EnergyMeasuringUnit
- Bridge module
- FPGA module
- CC-Link IE TSN Module (FASTECH Co. Ltd.)
- Closed-loop Step Drive
- Open-loop Step Drive
- Ezi-STEP-CT Open-Loop st
- Ezi-STEP-CT-4X Open-Loop st
- Ezi-STEP-CT-ALL Open-Loop st

[Outline]
Step Drive
[Specification]
Closed-Loop Step Drive
Motor Max. NEMA 24
Mode Homing, CSP, PP
CC-Link IE TSN Class B
[Manufacturer Name]
FASTECH Co. Ltd.
[Station Type]
Remote Station

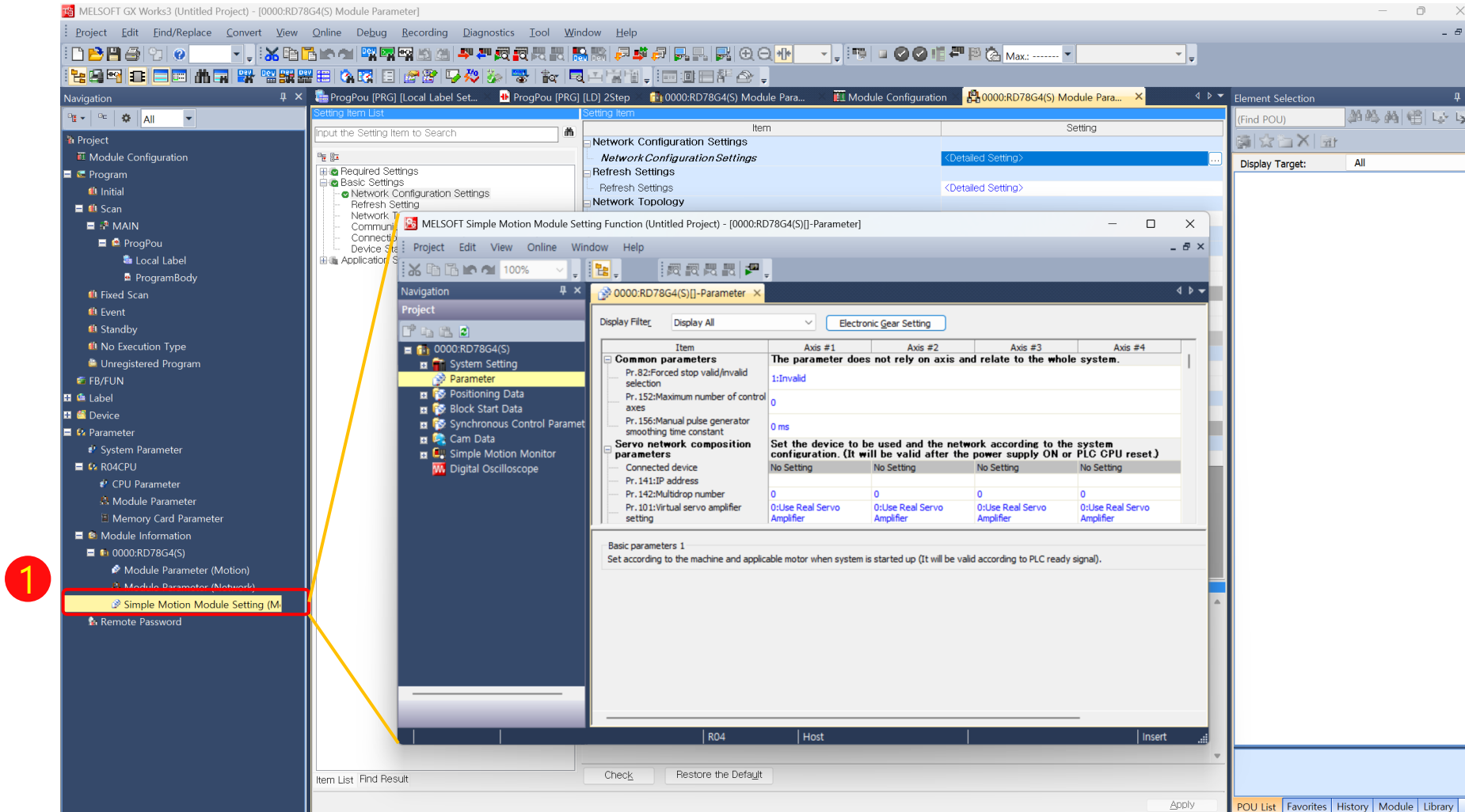
2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- Network Configuration Settings 적용



2-4. Parameter / Module Information / 1[U1]:FX5-40SSC-G(S)

- Simple Motion Module Setting 프로그램 실행하기



2-5. Simple Motion Module Setting

- Parameter / STEP network composition parameters / Pr.141:IP address 설정

The screenshot displays the MELSOFT Simple Motion Module Setting Function interface. The left sidebar shows the 'Parameter' tab selected, with a red circle '1' highlighting it. The main window shows the 'Electronic Gear Setting' tab. A red box highlights the 'Pr.141:IP address' parameter in the 'Servo network composition parameters' section. A yellow arrow points from this parameter to the 'Station Address Setting' dialog box. In the dialog box, a red box '2' highlights the 'IP Address' field, which contains the value '192.168.3.1'. A red box '3' highlights the 'OK' button at the bottom right of the dialog box. The dialog box also shows the 'Model' as 'E2-STEP-CT-ALL'.

Navigation: Project, Edit, View, Online, Window, Help

Display Filter: Display All, Electronic Gear Setting

Item: Common parameters, Servo network composition parameters, Basic parameters 1, Basic parameters 2

Axis #1, Axis #2, Axis #3, Axis #4

Pr.141:IP address

Station Address Setting

IP Address: 192.168.3.1, Model: E2-STEP-CT-ALL

OK, Cancel

2-5. Simple Motion Module Setting

- Parameter / Basic parameters 1 / Pr.7:Bias speed at start(500 pulse/s) 설정

MELSOFT Simple Motion Module Setting Function (Untitled Project) - [0000:RD78G4(S)]-Parameter

Navigation: Project, Edit, View, Online, Window, Help

Project: 0000:RD78G4(S)

System Setting

Parameter

Positioning Data

Block Start Data

Synchronous Control Parameter

Cam Data

Simple Motion Monitor

Digital Oscilloscope

Display Filter: Display All

Electronic Gear Setting

Item	Axis #1	Axis #2	Axis #3	Axis #4
Pr. 141:IP address	192.168.3.1			
Pr. 142:Multidrop number	0	0	0	0
Pr. 101:Virtual servo amplifier se...	0:Use Real Servo Amplifier	0:Use Real Servo Amplifier	0:Use Real Servo Amplifier	0:Use Real Servo Amplifier
Pr. 140:Driver command discard ...	1:Detection Valid	1:Detection Valid	1:Detection Valid	1:Detection Valid
Pr. 143:Driver communication set...	0:Driver Communication Invalid	0:Driver Communication Invalid	0:Driver Communication Invalid	0:Driver Communication Invalid
Basic parameters 1	Set according to the machine and applicable motor when system is started up (It will be valid according to PLC ready signal).			
Pr. 1:Unit setting	3:pulse	3:pulse	3:pulse	3:pulse
Pr. 2:Number of pulses	20000 pulse	20000 pulse	20000 pulse	20000 pulse
Pr. 3:Movement amount	20000 pulse	20000 pulse	20000 pulse	20000 pulse
Pr. 4:Unit magnification	1:x1 Times	1:x1 Times	1:x1 Times	1:x1 Times
Pr. 7: Bias speed at start	500 pulse/s	0 pulse/s	0 pulse/s	0 pulse/s
Basic parameters 2	Set according to the machine and applicable motor when system is started up.			
Pr. 8:Speed limit value	200000 pulse/s	200000 pulse/s	200000 pulse/s	200000 pulse/s
Pr. 9:Acceleration time 0	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 10:Deceleration time 0	1000 ms	1000 ms	1000 ms	1000 ms
Detailed parameters 1	Set according to the system configuration when the system is started up.(It will be valid according to PLC ready signal).			
Pr. 11:Backlash compensation a...	0 pulse	0 pulse	0 pulse	0 pulse
Pr. 12:Software stroke limituppe...	2147483647 pulse	2147483647 pulse	2147483647 pulse	2147483647 pulse
Pr. 13:Software stroke limit lowe...	-2147483648 pulse	-2147483648 pulse	-2147483648 pulse	-2147483648 pulse
Pr. 14:Software stroke limit selec...	0:Apply Software Stroke Limit on Command Position Value	0:Apply Software Stroke Limit on Command Position Value	0:Apply Software Stroke Limit on Command Position Value	0:Apply Software Stroke Limit on Command Position Value
Pr. 15:Software stroke limit valid...	0:Valid	0:Valid	0:Valid	0:Valid
Pr. 16:Command in-position width	100 pulse	100 pulse	100 pulse	100 pulse
Pr. 17:Torque limit setting value	300.0 %	300.0 %	300.0 %	300.0 %
Pr. 18:M-code ON signal output t...	0:WITH Mode	0:WITH Mode	0:WITH Mode	0:WITH Mode

Pr. 7: Bias speed at start
In "Bias speed at start", "Minimum speed at start" will be set.
Set the speed to start the motor smoothly in using stepping motor or like. (A stepping motor will not start smoothly if a low rotation speed is instructed at the beginning.)
Setting bias speed at start will be valid in the operation below.
- At positioning operation
- At HPR
- At JOG operation
Please set value less than speed limit value.

Setting Range
0 to 200000 pulse/s

Bias speed at start: 500 pulse/s

※ 모터에 장착된 인코더 규격에 따라 설정을 변경할 수 있습니다.

2-5. Simple Motion Module Setting

- Parameter / HPR parameters / Pr.46:HPR speed(500 pulse/s) 설정

MELSOFT Simple Motion Module Setting Function (Untitled Project) - [0000:RD78G4(S)]-Parameter

Navigation: Project, Edit, View, Online, Window, Help

Project: 0000:RD78G4(S)

System Setting

Parameter

Positioning Data

Block Start Data

Synchronous Control Parameter

Cam Data

Simple Motion Monitor

Digital Oscilloscope

Display Filter: Display All

Electronic Gear Setting

Item	Axis #1	Axis #2	Axis #3	Axis #4
Pr.41:Allowable circular interpol...	100 pulse	100 pulse	100 pulse	100 pulse
Pr.42:External command functio...	0:External Positioning Start	0:External Positioning Start	0:External Positioning Start	0:External Positioning Start
Pr.83:Speed control 10x multipl...	0:Invalid	0:Invalid	0:Invalid	0:Invalid
Pr.84:Restart allowable range w...	0 pulse	0 pulse	0 pulse	0 pulse
Pr.90:Operation setting for SPD...	0:Command Torque	0:Command Torque	0:Command Torque	0:Command Torque
Pr.90:Operation setting for SPD...	0:Command Speed	0:Command Speed	0:Command Speed	0:Command Speed
Pr.90:Operation setting for SPD...	0:Check the Switching Conditions on the Simple Motion Module	0:Check the Switching Conditions on the Simple Motion Module	0:Check the Switching Conditions on the Simple Motion Module	0:Check the Switching Conditions on the Simple Motion Module
Pr.127:Speed limit value input s...	0:Input Enable	0:Input Enable	0:Input Enable	0:Input Enable
Pr.95:External command signal s...	0:Not Used	0:Not Used	0:Not Used	0:Not Used
Pr.112:Servo OFF command val...	0:Servo OFF Command Invalid	0:Servo OFF Command Invalid	0:Servo OFF Command Invalid	0:Servo OFF Command Invalid
Pr.122:Manual pulse generator ...	0:Do Not Execute Speed Limit	0:Do Not Execute Speed Limit	0:Do Not Execute Speed Limit	0:Do Not Execute Speed Limit
Pr.123:Manual pulse generator ...	20000 pulse/s	20000 pulse/s	20000 pulse/s	20000 pulse/s
HPR parameters	Set the parameters required for HPR, which are not set on the driver (servo amplifier) side (Valid when the PLC ready signal is ON).			
Pr.44:HPR direction	0:Forward Direction (Address Increase Direction)	0:Forward Direction (Address Increase Direction)	0:Forward Direction (Address Increase Direction)	0:Forward Direction (Address Increase Direction)
Pr.45:HP address	0 pulse	0 pulse	0 pulse	0 pulse
Pr.46:HPR speed	500 pulse/s	1 pulse/s	1 pulse/s	1 pulse/s
Pr.51:HPR acceleration time sele...	0:1000	0:1000	0:1000	0:1000
Pr.52:HPR deceleration time sel...	0:1000	0:1000	0:1000	0:1000
Pr.55:Operation setting for inco...	0:Positioning Control is Not Executed	0:Positioning Control is Not Executed	0:Positioning Control is Not Executed	0:Positioning Control is Not Executed
External input signal assign...	Set the link device to assign external input signal.			
Forced stop signal	Set the link device to assign forced stop signal.			
Pr.900:Type	00h:Invalid	00h:Invalid	00h:Invalid	00h:Invalid
Pr.901:Start No.	H0000	H0000	H0000	H0000
Pr.902:Bit specification	H0	H0	H0	H0

Pr.46:HPR speed
Set the speed at high-speed home position return.
The speed at machine home position return depends on the servo amplifier setting.

Setting Range
1 to 200000 pulse/s

HPR speed: 500 pulse/s

※ Bias speed(Pr.7)값보다 HPR speed(Pr.46)값이 크면 (1C15H:원점복귀속도Error)가 발생합니다.

2-5. Simple Motion Module Setting

- Parameter / Basic parameters 1 / Number of pulses per rotation

The screenshot displays the MELSOFT Simple Motion Module Setting Function (Untitled Project) - [0000:RD78G8(S)]-Parameter window. The interface is divided into several sections:

- Navigation:** A tree view on the left shows the project structure, including System Setting, Parameter, Positioning Data, Block Start Data, Synchronous Control Parameter, Cam Data, Simple Motion Monitor, Module Monitor, Axis Monitor, Starting History, Position Value History, and Digital Oscilloscope.
- Parameter List:** A table of parameters is shown, with 'Pr. 2: Number of pulses per rotation' highlighted in blue. A red box and the number '1' point to this parameter.
- Electronic Gear Setting - Axis #1:** A dialog box is open, showing the 'Entry' tab. It contains fields for 'Machine Components', 'Unit Setting', 'Movement Amount per Load Rotation (dSL)', 'Reduction Ratio (NL/NM)', 'Encoder Resolution', and 'Setting Range'. A red box and the number '2' point to the 'Movement Amount per Load Rotation (dSL)' field, which is set to 10000. A red box and the number '3' point to the 'Encoder Resolution' field, which is set to 10000. A red box and the number '4' point to the 'Calculate Electronic Gear' button. A red box and the number '5' point to the 'OK' button in the 'Calculation Result' dialog box.
- Calculation Result:** A dialog box showing the results of the calculation. It includes a table of basic parameters and a text area stating: 'As a result of calculation, no error occurs in the movement amount. Applying the calculation result above, you want to perform is about 0 [pulse] the error for the movement amount 0 [pulse] Error Calculation'. The 'OK' button is circled in red.

✓ Movement Amount per Load Rotation(dSL) : 10,000 pulse
✓ Encoder Resolution : 10,000 pulse

2-5. Simple Motion Module Setting

- Parameter / HPR parameters / Pr.46:HPR speed(500 pulse/s) 설정

Pr.2: Number of pulses per rotation

Set the number of pulses required for a complete rotation of the motor shaft.

Set it taking the electronic gear of the servo amplifier into consideration.

Number of pulses per rotation (AP) = Encoder resolution x Electronic gear denominator / Electronic gear numerator

When the encoder resolution is 67108864 pulses, the electronic gear (numerator / denominator) of the servo amplifier is rewritten with 16/1 inside RD78G(S).

Therefore, set the number of pulses per rotation (AP) as 4194304 pulses in such a case.

"Electronic gear function" coordinates the output pulses calculated from the values set as the pulses per rotation and the movement amount per rotation with the actual movement amount of a machine.

Using the electronic gear setting allows users to configure the electronic gear easily.

Setting Range

1 to 200000000 pulse

Electronic Gear Setting - Axis #1

Entry

Select the machine components, and enter the machine data to automatically set the basic parameters 1 (unit setting, number of pulses per rotation, movement amount per rotation and unit magnification).

Machine Components: Others

Unit Setting: 3:pulse

Movement Amount per Load Rotation (dSL): 10000 [pulse]

Reduction Ratio (NL/NM): 1 / 1

Calculate reduction ratio by teeth or diameters

Encoder Resolution: 10000 [pulse/rev]

Setting Range: 1 to 200000000 pulse

When the encoder resolution is 67108864 pulses, the electronic gear (numerator / denominator) of the servo amplifier is rewritten with 16/1. Therefore, set the encoder resolution as 4194304 pulses.

Calculate Electronic Gear

Calculation Result

* Basic Parameters 1

Unit Setting	3:pulse
Number of Pulses per Rotation	10000 pulse
Movement Amount per Rotation	10000 pulse
Unit Magnification	1x1 Times

Movement Amount per Pulse

As a result of calculation, no error occurs in the movement amount.

Applying the calculation result above,

you want to perform is about 0 [pulse] the error for the movement amount 0 [pulse] Error Calculation

Click OK to reflect to the basic parameters 1.

OK Cancel

2-5. Simple Motion Module Setting

- Parameter / Basic parameters 2 / Speed limit value, Acceleration time 0, Deceleration time 0

MELSOFT Simple Motion Module Setting Function (Untitled Project) - [0000:RD78G8(S)]-Parameter

Navigation: Project, Edit, View, Online, Window, Help

Project: 0000:RD78G8(S) > System Setting > Parameter

Display Filter: Display All | Electronic Gear Setting

Item	Axis #1	Axis #2	Axis #3	Axis #4
Common parameters The parameter does not rely on axis and relate to the whole system.				
Pr.82: Forced stop valid/invalid selection	1: Invalid			
Pr.152: Maximum number of control axes	0			
Pr.156: Manual pulse generator smoothing time constant	0 ms			
Servo network composition parameters Set the device to be used and the network according to the system configuration. (It will be valid after the power supply ON or PLC CPU reset.)				
Connected device	Ezi-SERVO-CT	Ezi-SERVO-CT		
Pr.141: IP address	192.168.3.1	192.168.3.50		
Pr.142: Multidrop number	0	0		
Pr.101: Virtual servo amplifier setting	0: Use Real Servo Amplifier	0: Use Real Servo Amplifier		
Pr.140: Driver command discard detection setting	1: Detection Valid	1: Detection Valid		
Pr.143: Driver communication setting	0: Driver Communication Invalid	0: Driver Communication Invalid		
Basic parameters 1 Set according to the machine and applicable motor when system is started up.				
Pr.1: Unit setting	3: pulse	3: pulse		
Pr.2: Number of pulses per rotation	10000 pulse	20000 pulse		
Pr.3: Movement amount per rotation	10000 pulse	20000 pulse		
Pr.4: Unit magnification	1: 1 Times	1: 1 Times		
Pr.7: Bias speed at start	500 pulse/s	500 pulse/s		
Basic parameters 2 Set according to the machine and applicable motor when system is started up.				
Pr.8: Speed limit value	500000 pulse/s	200000 pulse/s	200000 pulse/s	200000 pulse/s
Pr.9: Acceleration time 0	200 ms	1000 ms	1000 ms	1000 ms
Pr.10: Deceleration time 0	200 ms	1000 ms	1000 ms	1000 ms
Detained parameters 1 Set according to the system configuration when the system is started up. (It will be valid according to PLC ready signal)				
Pr.11: Backlash compensation amount	0 pulse	0 pulse		
Pr.12: Software stroke limit upper limit value	2147483647 pulse	2147483647 pulse	2147483647 pulse	2147483647 pulse
Pr.13: Software stroke limit lower limit value	-2147483648 pulse	-2147483648 pulse	-2147483648 pulse	-2147483648 pulse
Pr.14: Software stroke limit selection	0: Apply Software Stroke Limit on Command Position Value	0: Apply Software Stroke Limit on Command Position Value	0: Apply Software Stroke Limit on Command Position Value	0: Apply Software Stroke Limit on Command Position Value
Pr.15: Software stroke limit valid/invalid setting	0: Valid	0: Valid		
Pr.16: Command in-position width	100 pulse	100 pulse	100 pulse	100 pulse
Pr.17: Torque limit setting value	300.0 %	300.0 %	300.0 %	300.0 %
Pr.18: M-code ON signal output timing	0: WITH Mode	0: WITH Mode		
Pr.19: Speed switching mode	0: Standard Speed Switching Mode	0: Standard Speed Switching Mode		
Pr.20: Interpolation speed designation method	0: Vector Speed	0: Vector Speed		
Pr.21: Command position value during speed control	0: Not Update of Command Position Value	0: Not Update of Command Position Value		
Pr.22: Inout signal logic selection : Lower limit	0: Neactive Logic	0: Neactive Logic		

Pr.8: Speed limit value
Set the maximum speed during positioning, HPR, and speed/torque operations.

Setting Range
1 to 1000000000 pulse/s

Speed limit value graph showing Speed vs Time. The graph shows a trapezoidal profile with acceleration time 0 and deceleration time 0. The speed limit value is indicated by a horizontal line.

- ✓ Pr8 : Speed limit value → 500,000 (Encoder 10,000 pulse의 경우)
- ✓ Pr9 : Acceleration time 0 → 200ms (Ezi-STEP는 100ms도 가능)
- ✓ Pr10: Deceleration time 0 → 200ms (Ezi-STEP는 100ms도 가능)

2-5. Simple Motion Module Setting

- Convert / Rebuild All

설정이 끝나면 윈도우 종료로 설정 값 반영됨

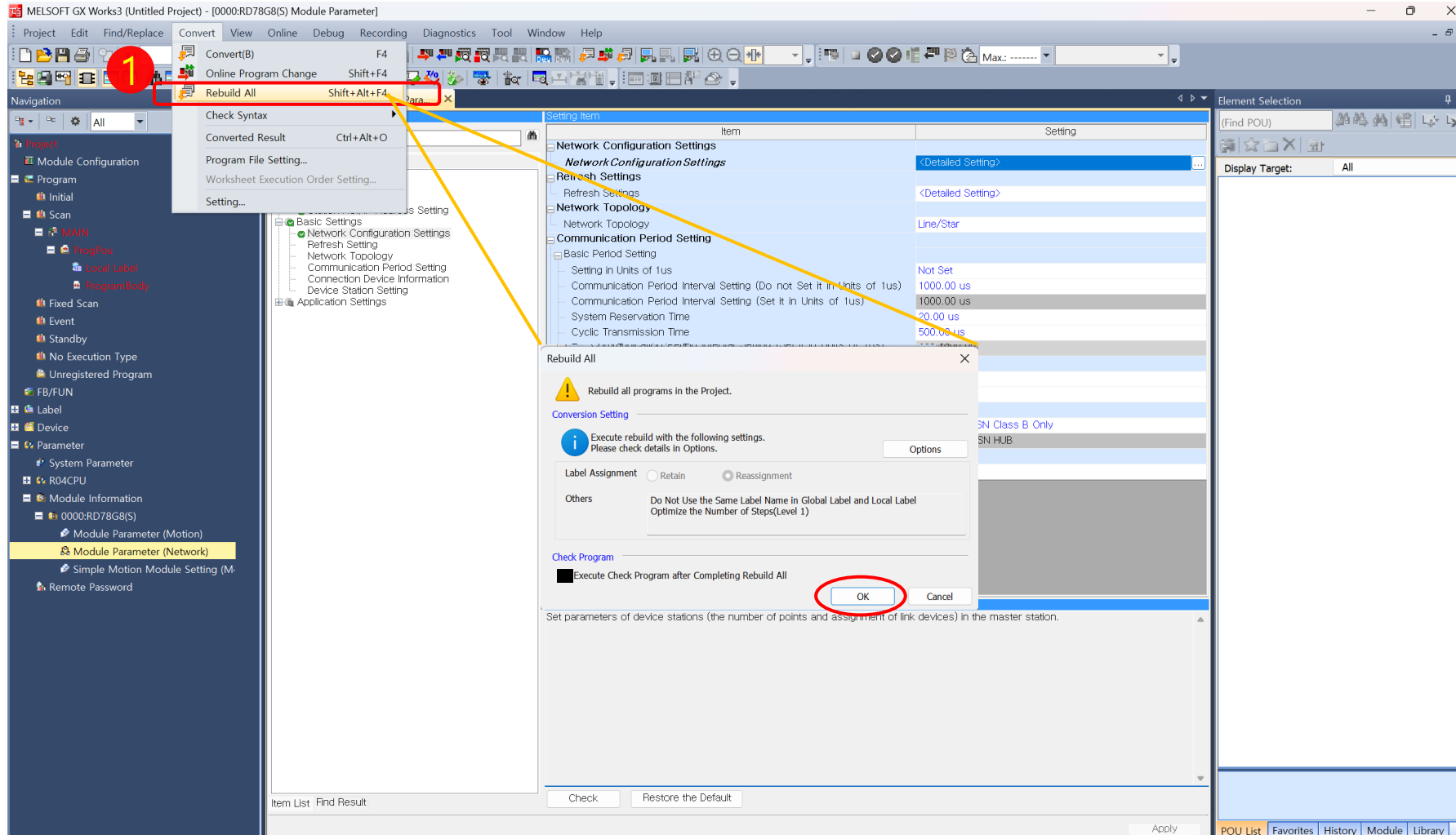
Limit Sensor를 연결하지 않은 상태에서 Ezi-STEP 동작 테스트를 하려면 Pr.116, Pr.117, Pr.118 모두 Invalid로 설정해야 함

Item	Axis #1	Axis #2	Axis #3	Axis #4
Pr. 13:Software stroke limit lower limit value	-2147483648 pulse	-2147483648 pulse	-2147483648 pulse	-2147483648 pulse
Pr. 14:Software stroke limit selection	0:Apply Software Stroke Limit on Command Position Value	0:Apply Software Stroke Limit on Command Position Value	0:Apply Software Stroke Limit on Command Position Value	0:Apply Software Stroke Limit on Command Position Value
Pr. 15:Software stroke limit valid/invalid setting	0:Valid	0:Valid	0:Valid	0:Valid
Pr. 16:Command in-position width	100 pulse	100 pulse	100 pulse	100 pulse
Pr. 17:Torque limit setting value	300.0 %	300.0 %	300.0 %	300.0 %
Pr. 18:M-code ON signal output timing	0:WITH Mode	0:WITH Mode	0:WITH Mode	0:WITH Mode
Pr. 19:Speed switching mode	0:Standard Speed Switching Mode	0:Standard Speed Switching Mode	0:Standard Speed Switching Mode	0:Standard Speed Switching Mode
Pr. 20:Interpolation speed designation method	0:Vector Speed	0:Vector Speed	0:Vector Speed	0:Vector Speed
Pr. 21:Command position value during speed control	0:Not Update of Command Position Value	0:Not Update of Command Position Value	0:Not Update of Command Position Value	0:Not Update of Command Position Value
Pr. 22:Input signal logic selection : Lower limit	0:Negative Logic	0:Negative Logic	0:Negative Logic	0:Negative Logic
Pr. 22:Input signal logic selection : Upper limit	0:Negative Logic	0:Negative Logic	0:Negative Logic	0:Negative Logic
Pr. 22:Input signal logic selection : Stop signal	0:Negative Logic	0:Negative Logic	0:Negative Logic	0:Negative Logic
Pr. 22:Input signal logic selection : External command/switching signal	0:Negative Logic	0:Negative Logic	0:Negative Logic	0:Negative Logic
Pr. 22:Input signal logic selection : Proximity dog signal	0:Negative Logic	0:Negative Logic	0:Negative Logic	0:Negative Logic
Pr. 81:Speed-position function selection	0:Speed-position Switching Control (PMC Mode)	0:Speed-position Switching Control (PMC Mode)	0:Speed-position Switching Control (PMC Mode)	0:Speed-position Switching Control (PMC Mode)
Pr. 116:FLS signal selection : Input type	15:Invalid	15:Invalid	1:Servo Amplifier	1:Servo Amplifier
Pr. 117:RLS signal selection : Input type	15:Invalid	15:Invalid	1:Servo Amplifier	1:Servo Amplifier
Pr. 118:DOG signal selection : Input type	15:Invalid	15:Invalid	1:Servo Amplifier	1:Servo Amplifier
Pr. 119:STOP signal selection : Input type	2:Buffer Memory	2:Buffer Memory	2:Buffer Memory	2:Buffer Memory
Detailed parameters 2	Set according to the system configuration when the system is started up(Set as required).	Set according to the system configuration when the system is started up(Set as required).	Set according to the system configuration when the system is started up(Set as required).	Set according to the system configuration when the system is started up(Set as required).
Pr. 25:Acceleration time 1	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 26:Acceleration time 2	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 27:Acceleration time 3	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 28:Deceleration time 1	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 29:Deceleration time 2	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 30:Deceleration time 3	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 31:JOG speed limit value	20000 pulse/s	20000 pulse/s	20000 pulse/s	20000 pulse/s
Pr. 32:JOG operation acceleration time selection	0:200	0:200	0:1000	0:1000
Pr. 33:JOG operation deceleration time selection	0:200	0:200	0:1000	0:1000
Pr. 34:Acceleration/deceleration process selection	0:Trapezoidal Acceleration/Deceleration Process	0:Trapezoidal Acceleration/Deceleration Process	0:Trapezoidal Acceleration/Deceleration Process	0:Trapezoidal Acceleration/Deceleration Process
Pr. 35:S-curve ratio	100 %	100 %	100 %	100 %
Pr. 36:Rapid stop deceleration time	1000 ms	1000 ms	1000 ms	1000 ms
Pr. 37:Stop group 1 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
Pr. 38:Stop group 2 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop
Pr. 39:Stop group 3 rapid stop selection	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop	0:Normal Deceleration Stop

Basic parameters 1
Set according to the machine and applicable motor when system is started up (It will be valid according to PLC ready signal).

2-6. Convert

- Convert / Rebuild All



2-7. Write to PLC

● Online Data Operation

The screenshot shows the MELSOFT GX Works3 interface. The 'Online' menu is open, and the 'Write to PLC...' option is selected. The 'Online Data Operation' dialog box is displayed, showing the 'Module Name/Data Name' list. The 'Common Device Co...' option is highlighted. The 'Execute' button is circled. A yellow callout box contains the text: 'Common Device Co... 체크 시 전송 불가 Error가 발생할 수 있으니 체크하지 않고 전송합니다.'

Common Device Co... 체크 시 전송 불가 Error가 발생할 수 있으니 체크하지 않고 전송합니다.

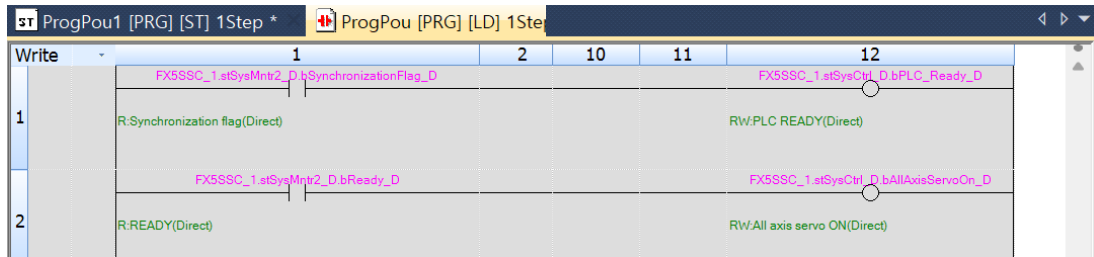
3. 동작 확인

3.1 프로그램 작성

● PLC Motion Module : Ready / Servo On

Label(변수) 방식

[Ladder Program]



- ① 시퀀스 레디 신호 (FX5SSC_1.stSysCtrl_D.bPLC_Ready_D) : ON 되면
- ② 동기용 플래그 (FX5SSC_1.stSysMntr2_D.bSynchronizationFlag_D) : ON 요구
- ③ 준비완료신호 (FX5SSC_1.stSysMntr2_D.bReady_D) : ON 되면
- ④ 전축 Servo (FX5SSC_1.stSysCtrl_D.bAllAxisServoOn_D) : ON 요구

Label(변수) 방식

[ST Program]

```
1 IF SM400 & FX5SSC_1.stSysMntr2_D.bSynchronizationFlag_D THEN
2   FX5SSC_1.stSysCtrl_D.bPLC_Ready_D := TRUE;
3 END_IF;
4
5 IF FX5SSC_1.stSysMntr2_D.bReady_D THEN
6   FX5SSC_1.stSysCtrl_D.bAllAxisServoOn_D := TRUE;
7 END_IF;
8
```

3.1 프로그램 작성

- Jog 설정 : 속도, 한계 속도, 가속시간, 감속시간

MELSOFT GX Works3 C:\Work\카넥션가이드\FX5.gx3 - [ProgPou [PRG] [LD] 43Step]

Project Edit Find/Replace Convert View Online Debug Recording Diagnostics Tool Window Help

Navigation

Project

- Module Configuration
- Program
- Initial
- Scan
- MAIN
- ProgPou
- Local Label
- ProgramBody
- Fixed Scan
- Event
- Standby
- No Execution Type
- Unregistered Program
- FB/FUN
- Label
- Device
- Parameter

Write

Line	Step	Instruction	Value	Target
1	(0)	R/W PLC READY(Direct)		FX5S5C_1 a8yMtr2_D bPLC_Ready_D
2	(0)	R READY(Direct)		FX5S5C_1 a8yMtr2_D bReady_D
3	(12)	bSetJogParam		FX5S5C_1 a8yMtr2_D bJOG_Speed_D
4		DMOV	K5000	FX5S5C_1 a8yMtr2_D bJOG_SpeedLimit_D
5		DMOV	K200	FX5S5C_1 a8yMtr2_D bJOG_AccelerationTime_D
6		DMOV	K200	FX5S5C_1 a8yMtr2_D bJOG_DecelerationTime_D
7	(42)	END		

Element Selection

(Find POU)

All

Module Label

Module FB

- FX5-40SSC-G(S)
- M+FX5S5C_SetPositioningData_ Positioning data set
- M+FX5S5C_StartPositioning_01A Positioning start FB
- M+FX5S5C_JOG_01A JOG/inching operation
- M+FX5S5C_MPG_01A Manual pulse generator
- M+FX5S5C_ChangeSpeed_01A Speed change FB
- M+FX5S5C_ChangeAccDecTime_ Acc./dec. time SV c
- M+FX5S5C_ChangePosition_01A Target position change
- M+FX5S5C_Restart_01A Restart FB
- M+FX5S5C_OperateError_01A Error operation FB
- M+FX5S5C_InitializeParameter_0 Parameter initialization
- M+FX5S5C_WriteFlash_00A Flash ROM writing
- M+FX5S5C_ChangeTorqueControl Torque control mode
- M+FX5S5C_ChangeSpeedControl Speed control mode
- M+FX5S5C_ChangePositionControl Position control mode
- M+FX5S5C_ChangeContinuousTorque Continuous torque
- M+FX5S5C_Sync_01A Starting/ending synchronization
- M+FX5S5C_ChangeSyncEncoder Sync encoder position
- M+FX5S5C_DisableSyncEncoder Sync encoder count
- M+FX5S5C_EnableSyncEncoder_ Sync encoder count
- M+FX5S5C_ResetSyncEncoderError Sync encoder error
- M+FX5S5C_ConnectSyncEncoder Sync encoder connection
- M+FX5S5C_MoveCamReference Cam reference position
- M+FX5S5C_ChangeCamPosition Cam position per cycle
- M+FX5S5C_ChangeMainShaftGear MG Position per cycle
- M+FX5S5C_ChangeAuxiliaryShaft Gear position per cycle
- M+FX5S5C_MoveCamPositionPer Cam position per cycle
- M+FX5S5C_MakeRotaryCutterCam Cam for rotary cutter
- M+FX5S5C_CalcCamCommandPer Cam command position
- M+FX5S5C_CalcCamPositionPer Cam position per cycle

M+FX5S5C_JOG_01A

[Japanese]

JOG運転 / インチング運転を行います。

POU List Favorites History Module Library

3.1 프로그램 작성

- Jog 동작 프로그램 : Module FB (MFX5SSC_JOG_01A1 클릭&드래그)

The screenshot displays the MELSOFT GX Works3 software interface. The main workspace shows a ladder logic program with a network containing a function block call. A dialog box titled "FB Instance Name" is open, showing the instance name "MFX5SSC_JOG_01A1" entered in the "Local Label (ProgPou)" field. A red box highlights this field, and a red circle with the number "1" points to it. A yellow callout box with a checkmark and the text "✓ JOG 동작 FB 생성 : OK" is positioned below the dialog box. On the right side, the "Element Selection" pane is visible, showing a list of function blocks. The "MFX5SSC_JOG_01A1" block is highlighted with a red box. The bottom of the screen shows the "POU List" tab with the details for "MFX5SSC_JOG_01A1", including its name in Japanese and a description: "JOG運転 / インチング運転を行います。"

FB Instance Name

Local Label (ProgPou)

MFX5SSC_JOG_01A1

OK

Exit

Register a FB instance at the last row.

✓ JOG 동작 FB 생성 : OK

1

MFX5SSC_JOG_01A1

JOG/Inching operation

MFX5SSC_JOG_01A1

JOG運転 / インチング運転を行います。

POU List Favorites History Module Library

3.1 프로그램 작성

● Jog 동작 프로그램 : Module FB 설정 / 동작 / 결과

✓ JOG 동작 실행 지령

✓ Jog Forward 지령

✓ Jog Reverse 지령

✓ Jog 속도 지령

✓ Jog 결과 출력

MELSOFT GX Works3 C:\Work\커넥션가이드\FX5.gx3 - [ProgPou [PRG] [LD] 298Step]

Navigation: Project, Module Configuration, Program, Initial, Scan, MAIN, ProgPou, Local Label, ProgramBody, Fixed Scan, Event, Standby, FB/FUN, M_FBLIB, M+FX5SSC_JOG_01A JOG/inching op, Label, Device, Parameter

Write: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

10: DMOV K50000 FX5SSC_1.stsAxFm_D[D] udJogSpeedLimit_D R/WJOG speed limit value(Direct)

11: DMOV K200 FX5SSC_1.stsAxFm_D[D] udAccelerationTime0_R/WAcceleration time 0(Direct)

12: DMOV K200 FX5SSC_1.stsAxFm_D[D] udDecelerationTime0_R/WDeceleration time 0(Direct)

7: (42) bJogOperationCmd

8: bJogOperationCmd

9: [FX5SSC_1] DUT_L.stM. o_bOK B. Module label. Normal completion

10: [K1] U/W_L.udJog. o_bErr B. Target axis. Error completion

11: bJogForwardReq

12: bJogReverseReq

13: [K5000] UD:L.udJog. Cd 17: JOG speed

14: [K1] U/W_L.udInch. Cd 16: Inching movement amount

15: (297)

END

Element Selection: (Find POU)

Display Target: All

Module Label

Module FB

FX5-40SSC-G(S)

- M+FX5SSC_SetPositioningData_ Positioning data set
- M+FX5SSC_StartPositioning_01A Positioning start FB
- M+FX5SSC_JOG_01A JOG/inching operation FB
- M+FX5SSC_MPG_01A Manual pulse generator
- M+FX5SSC_ChangeSpeed_01A Speed change FB
- M+FX5SSC_ChangeAccDecTime_ Acc./dec. time SV change
- M+FX5SSC_ChangePosition_01A Target position change
- M+FX5SSC_Restart_01A Restart FB
- M+FX5SSC_OperateError_01A Error operation FB
- M+FX5SSC_InitializeParameter_0 Parameter Initialization
- M+FX5SSC_WriteFlash_00A Flash ROM writing
- M+FX5SSC_ChangeTorqueControl_ Torque control mode
- M+FX5SSC_ChangeSpeedControl_ Speed control mode
- M+FX5SSC_ChangePositionControl_ Position control mode
- M+FX5SSC_ChangeContinuousTorque_ Continuous torque control
- M+FX5SSC_Sync_01A Starting/ending sync
- M+FX5SSC_ChangeSyncEncoder_ Sync encoder position
- M+FX5SSC_DisableSyncEncoder_ Sync encoder count
- M+FX5SSC_EnableSyncEncoder_ Sync encoder count
- M+FX5SSC_ResetSyncEncoder_ Sync encoder error
- M+FX5SSC_ConnectSyncEncoder_ Sync encoder connection
- M+FX5SSC_MoveCamReference_ Cam reference position
- M+FX5SSC_ChangeCamPosition_ Cam position per cycle
- M+FX5SSC_ChangeMainShaftGear_ MG Position per cycle
- M+FX5SSC_ChangeAuxiliaryShaftGear_ AG position per cycle
- M+FX5SSC_MoveCamPositionPerCycle_ Cam position per cycle
- M+FX5SSC_MakeRotaryCutterCam_ Cam for rotary cutter
- M+FX5SSC_CalcCamCommandPerCycle_ Cam command position
- M+FX5SSC_CalcCamPositionPerCycle_ Cam position per cycle

M+FX5SSC_JOG_01A

[Japanese]
JOG運転 / インチング運転を行います。

POU List | Favorites | History | Module | Library

3.2 Axis 모니터링

- FX5-40SSC-G(S) PROGRAM RUN : D LINK 녹색 LED 점등
- Axis Monitor

FX5-40SSC-G

READY ●

D LINK ●

SD/RD ●

1 [U1]:FX5-40SSC-G(S) – Axis Monitor

2

3

Axis Monitor

Module Information List

PLC ready(Y0)

READY(X0)

Synchronization flag(X1)

All axes servo ON(Y1)

Md.108:Servo status 1 : READY ON

Md.108:Servo status 1 : Servo ON

Md.50:Forced stop input(U0WG4231)

BUSY

Md.31:Status : Error detection

Md.31:Status : Axis warning detection

Md.1:In test mode flag(U0WG4000)

Md.133:Operation cycle over flag(U0WG4239)

Md.64:Network error No.(U0WG31504)

Md.132:Operation cycle setting(U0WG4238)

Md.134:Operation time(U0WG4008)

Md.135:Maximum operation time(U0WG4009)

Md.19:Number of write accesses to flash ROM(U0WG...

Md.52:Communication between amplifiers axes searc...

Md.131:Digital OSC. running flag(U0WG4011)

Communication between set amplifier...

Stopped

[동작 확인 : ON 시 녹색]

- ✓ Synchronization flag(X1) : CPU - Motion Module 간 연결 가능 상태
- ✓ PLC Ready(Y0) : Motion Module 활성화 지시
- ✓ READY(X0) : Motion Module 제어 가능 상태
- ✓ All axes servo ON(Y1) : 모든축 Servo ON 지시

3.3 Axis 동작 확인

- Jog 동작 – 설정 및 이동 (Jog 동작 가능 확인 : FX5SSC_1.stnAxMntr_D[0].uServoStatus1_D.1 → TRUE)

Program 방식(Ladder, Label)



✓ bSetJogSpeed,
bSetJogSpeedLimit,
bSetJogAccel,
bSetJogDesel
ON/OFF로 값 설정

✓ Jog 동작 확인
bJogMoveCW : ON → CW회전, OFF → 정지
bJogMoveCCW : ON → CWW회전, OFF → 정지

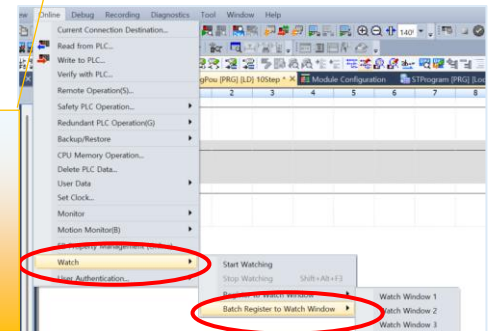
Watch 방식

Watch 1[Watching]		
ON OFF ON/OFF toggle Update Clear All		
Name	Current Value	English
FX5SSC_1.stSysCtrl_D.bPLC_Ready_D	TRUE	RW:PLC READY(Direct)
FX5SSC_1.stSysCtrl_D.bAllAxisServoOn_D	TRUE	RW:All axis servo ON(Direct)
FX5SSC_1.stnAxCtrl1_D[0].udJOG_Speed_D	5,000	RW:JOG speed(Direct)
FX5SSC_1.stnAxPrm_D[0].udJogSpeedLimit_D	50,000	RW:JOG speed limit value(Di...
FX5SSC_1.stnAxPrm_D[0].udAccelerationTime0_D	200	RW:Acceleration time 0(Direct)
FX5SSC_1.stnAxPrm_D[0].udDecelerationTime0_D	200	RW:Deceleration time 0(Direct)
FX5SSC_1.stnAxCtrl2_D[0].uStartForwardJOG_D	0	RW:Forward run JOG start(D...
FX5SSC_1.stnAxCtrl2_D[0].uStartReverseJOG_D	0	RW:Reverse run JOG start(Di...

- ✓ Jog 동작을 위한 라벨 등록

[동작 확인]

- ✓ Jog Speed/SpeedLimit/Accel/Decel에는 위와 같은 값으로 키인
- ✓ Jog 동작 확인
...uStartForwardJOG_D : 1 → CW회전, 0 → 정지
...uStartReverseJOG_D : 1 → CWW회전, 0 → 정지



3.3 Axis 동작 확인

● Jog 동작 : 정지 → 이동

1[U1]:FX5-40SSC-G(S) - Axis Monitor

Axis Moni Monitor Type: Axis (Output Axis) Font Size: 9pt Select Monitor Item Select Monitor Axis

(*) Please check the Event History function of GX Works3 for the Error History/Warning History.

	Axis #1
Md.20:Command position value	256494 pulse
Md.21:Machine feed value	256494 pulse
Md.23:Axis error No.	-
Md.24:Axis warning No.	-
Md.26:Axis operation status	Waiting
Md.28:Axis speed command	0 pulse/s
Md.44:Positioning data No. being executed	-
Md.47:Positioning data being executed : Operation pattern	Positioning Complete
Md.47:Positioning data being executed : Control method	-
Md.47:Positioning data being executed : Acceleration time No.	0:200
Md.47:Positioning data being executed : Deceleration time No.	0:200
Md.47:Positioning data being executed : Axis to be interpolated	-
Md.47:Positioning data being executed : M-code	-
Md.102:Deviation counter	0 pulse
Md.103:Motor rotation speed	0 pulse/s
Md.104:Motor current value	0.0 %
Md.108:Servo status 1 : Servo alarm	OFF
Md.108:Servo status 1 : Servo warning	OFF
Md.114:Servo alarm	-

Module Information List

- PLC ready(Y0)
- READY(X0)
- Synchronization flag(X1)
- All axes servo ON(Y1)
- Md.108:Servo status 1 : READY ON
- Axis No. 1 2 3 4 5 6 7 8
- Md.108:Servo status 1 : Servo ON
- Axis No. 1 2 3 4 5 6 7 8
- Md.50:Forced stop input(U0#G4231)
- Axis No. 1 2 3 4 5 6 7 8
- Md.31:Status : Error detection
- Axis No. 1 2 3 4 5 6 7 8
- Md.31:Status : Axis warning detection
- Axis No. 1 2 3 4 5 6 7 8
- Md.1:In test mode flag(U0#G4000)
- Md.133:Operation cycle over flag(U0#G4239)
- Md.64:Network error No.(U0#G31504)
- Md.132:Operation cycle setting(U0#G4238)
- 1006h:1.000ms
- Md.134:Operation time(U0#G4008)
- 149 μs
- Md.135:Maximum operation time(U0#G4009)
- 171 μs
- Md.19:Number of write accesses to flash ROM(U0#G4010)
- 0 times
- Md.52:Communication between amplifiers axes se...
- Communication between set amplif...
- Md.131:Digital OSC. running flag(U0#G4011)
- Stopped

JOG
동작

1[U1]:FX5-40SSC-G(S) - Axis Monitor

Axis Moni Monitor Type: Axis (Output Axis) Font Size: 9pt Select Monitor Item Select Monitor Axis

(*) Please check the Event History function of GX Works3 for the Error History/Warning History.

	Axis #1
Md.20:Command position value	277881 pulse
Md.21:Machine feed value	277881 pulse
Md.23:Axis error No.	-
Md.24:Axis warning No.	-
Md.26:Axis operation status	JOG Operation
Md.28:Axis speed command	5000 pulse/s
Md.44:Positioning data No. being executed	-
Md.47:Positioning data being executed : Operation pattern	Positioning Complete
Md.47:Positioning data being executed : Control method	-
Md.47:Positioning data being executed : Acceleration time No.	0:200
Md.47:Positioning data being executed : Deceleration time No.	0:200
Md.47:Positioning data being executed : Axis to be interpolated	-
Md.47:Positioning data being executed : M-code	-
Md.102:Deviation counter	17 pulse
Md.103:Motor rotation speed	4600 pulse/s
Md.104:Motor current value	0.0 %
Md.108:Servo status 1 : Servo alarm	OFF
Md.108:Servo status 1 : Servo warning	OFF
Md.114:Servo alarm	-

Module Information List

- PLC ready(Y0)
- READY(X0)
- Synchronization flag(X1)
- All axes servo ON(Y1)
- Md.108:Servo status 1 : READY ON
- Axis No. 1 2 3 4 5 6 7 8
- Md.108:Servo status 1 : Servo ON
- Axis No. 1 2 3 4 5 6 7 8
- Md.50:Forced stop input(U0#G4231)
- Axis No. 1 2 3 4 5 6 7 8
- Md.31:Status : Error detection
- Axis No. 1 2 3 4 5 6 7 8
- Md.31:Status : Axis warning detection
- Axis No. 1 2 3 4 5 6 7 8
- Md.1:In test mode flag(U0#G4000)
- Md.133:Operation cycle over flag(U0#G4239)
- Md.64:Network error No.(U0#G31504)
- Md.132:Operation cycle setting(U0#G4238)
- 1006h:1.000ms
- Md.134:Operation time(U0#G4008)
- 150 μs
- Md.135:Maximum operation time(U0#G4009)
- 171 μs
- Md.19:Number of write accesses to flash ROM(U0#G4010)
- 0 times
- Md.52:Communication between amplifiers axes se...
- Communication between set amplif...
- Md.131:Digital OSC. running flag(U0#G4011)
- Stopped

부 록

[부록1] 원점복귀 방법

원점복귀 방법은 Homing method(6098h)에 설정한 값에 따라 다음과 같이 분류됩니다.

설정값	내용
1	Homing on negative limit switch and index pulse
2	Homing on positive limit switch and index pulse
7	Homing on home switch (positive direction, negative edge) and index pulse
10	Homing on home switch (positive direction, positive edge) and index pulse
11	Homing on home switch (negative direction, positive edge) and index pulse
14	Homing on home switch (negative direction, negative edge) and index pulse
17	Homing on negative limit switch
18	Homing on positive limit switch
24	Homing on home switch (positive direction, negative edge)
25	Homing on home switch (positive direction, positive edge)
28	Homing on home switch (negative direction, positive edge)
29	Homing on home switch (negative direction, negative edge)
33	Homing index pulse (negative direction)
34	Homing index pulse (positive direction)
35	Set the current position origin
37	Set the current position origin and reset current position
-3	Homing on negative mechanical limit
-4	Homing on positive mechanical limit
-5	Homing on negative mechanical limit and index pulse
-6	Homing on positive mechanical limit and index pulse



Fast Accurate Smooth Motion

스마트 팩토리 구축 가속화를 위한

CC-Link *IE* TSN

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