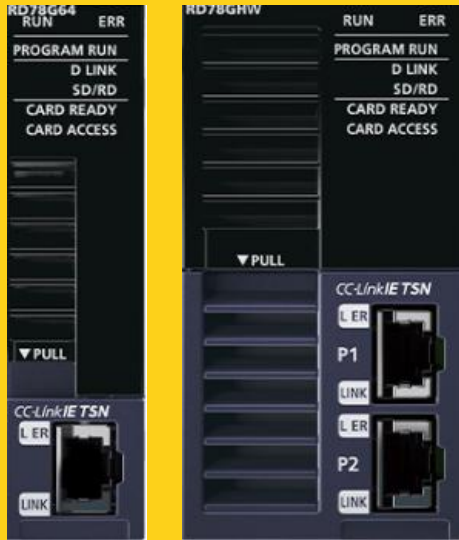




Programmable Controllers
MELSEC iQ-R
series



Ezi-ROBO® CC-Link IE TSN
Precise Actuator System **IGH**

Ezi-SERVO® CC-Link IE TSN
Closed Loop Stepping System **ALL**

접속 가이드

MELSEC iQ-R RD78G (S) and

Ezi-ROBO® CC-Link IE TSN - **Ezi-SERVO**® CC-Link IE TSN
Precise Actuator System **IGH** Closed Loop Stepping System **ALL**

미쓰비시 전기 제품

RD78G4(S) / RD78G8(S) / RD78G16(S)

파스텍 제품

Ezi-ROBO CC-Link IE TSN IGH
(Ezi-SERVO CC-Link IE TSN ALL)

시작하기 전에

- 저희 회사의 제품을 이용해 주셔서 감사합니다.
- Ezi-ROBO IGH의 제어부는 Ezi-SERVO CC-Link IE TSN ALL으로 이하 연결 가이드 설명은 Ezi-SERVO CC-Link IE TSN ALL으로 합니다.
- Ezi-SERVO CC-Link IE TSN ALL은 32비트 고성능 ARM 프로세서를 탑재한 드라이브와 다양한 모터로 구성된 스테핑모터 유닛으로, CC-Link IE TSN 네트워크에서 리모트국으로 사용됩니다.
- Ezi-SERVO 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-R RD78G(S)에 Ezi-SERVO 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-SERVO 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-SERVO ALL] Closed Loop Stepping System	
[접속가이드][CC-Link IE TSN][MELSEC iQ-R RD78G(S)][Ezi-ROBO IGH Ezi-SERVO 4X]	

- MELSEC iQ-R RD78G(S) 매뉴얼은 미쓰비시 전기 홈페이지에서 다운로드할 수 있습니다.

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

매뉴얼 명칭	매뉴얼 번호
MELSEC iQ-R Motion Unit User's Manual (Startup Edition)	IB-0300405
MELSEC iQ-R Motion Unit User's Manual (Network Edition)	IB-0300425
MELSEC iQ-R Motion Unit User's Manual (Simple Motion Mode Application Edition)	IB-0300571
MELSEC iQ-R 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-R RD78G(S)가 이에 해당합니다.
리모트국	비트 단위의 입출력 신호와 워드 단위의 입출력 데이터를 사이클릭 전송하는 국으로, 트랜지언트 전송도 가능합니다. Ezi-SERVO 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-R RD78G(S)와 Ezi-SERVO CC-Link IE TSN ALL 접속 가이드

- ◆ 마스터국: RD78G(S)4 (4축) / RD78G(S)8 (8축) / RD78G(S)16 (16축)

- 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>

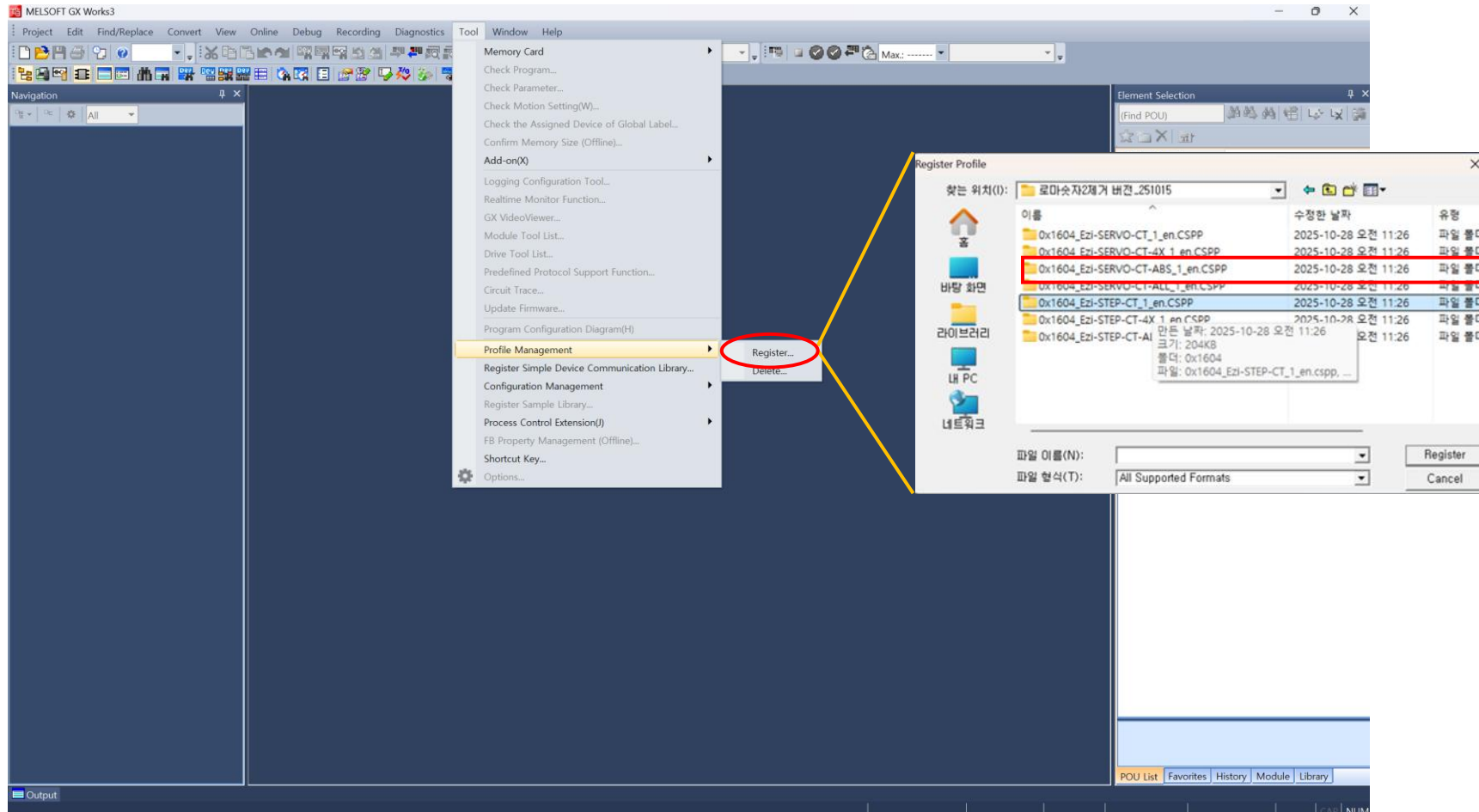
- ◆ 리모트국: Ezi-SERVO CC-Link IE TSN ALL

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

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

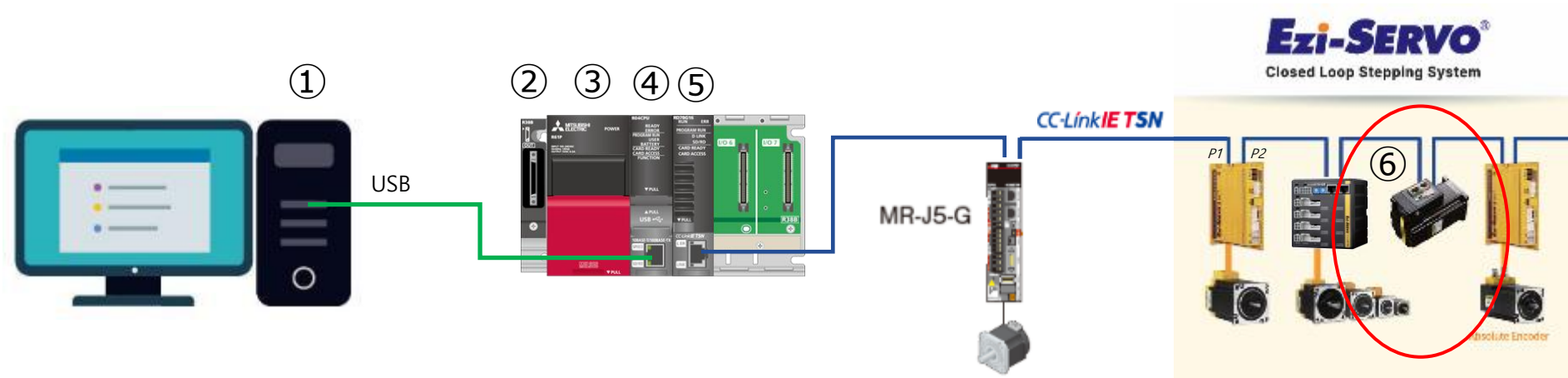
● CSP+ 등록

- [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	기본 베이스	R33B
③	전원 모듈	R61P
④	CPU 모듈	iQ-R
⑤	모션 모듈	RD78G4(S)
⑥	드라이브 + 모터	Ezi-SERVO-CT-ALL-42S-A-R
		192.168.3.253
		192.168.3.1

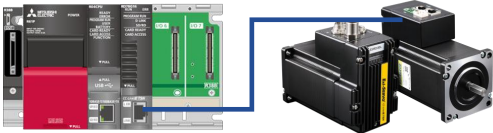
1-3. CC-Link IE TSN 구성

- Ezi-SERVO 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-SERVO, RD78GS 파라미터 설정

No.	항목	내용
1	Ezi-SERVO 설정 	드라이브 설정 프로그램(Ezi-CT Manager)을 이용하여 파라미터를 설정합니다. 설정 프로그램과 사용 방법은 (주)파스텍 홈페이지 에서 다운로드하시기 바랍니다. ※ 주소: https://cltsn.fastech-motions.com/download/quick
2	RD78GS 설정 	GX-Works3를 사용해 RD78GS의 프로젝트를 만든 다음, 유닛 파라미터(통신 방식, 접속 대상)와 축 파라미터(모션 제어용)를 설정합니다.
3	RD78GS + Ezi-SERVO 동작 확인 	RD78GS와 Ezi-SERVO가 올바르게 설정되어 있는지 확인하기 위한 프로그램을 작성합니다. 라벨을 조작해 모터가 정상적으로 작동하는지 확인합니다

1-4. 설정 순서

● Ezi-SERVO 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'(초기값) → '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 (RD78GS와 Ezi-SERVO)

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
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

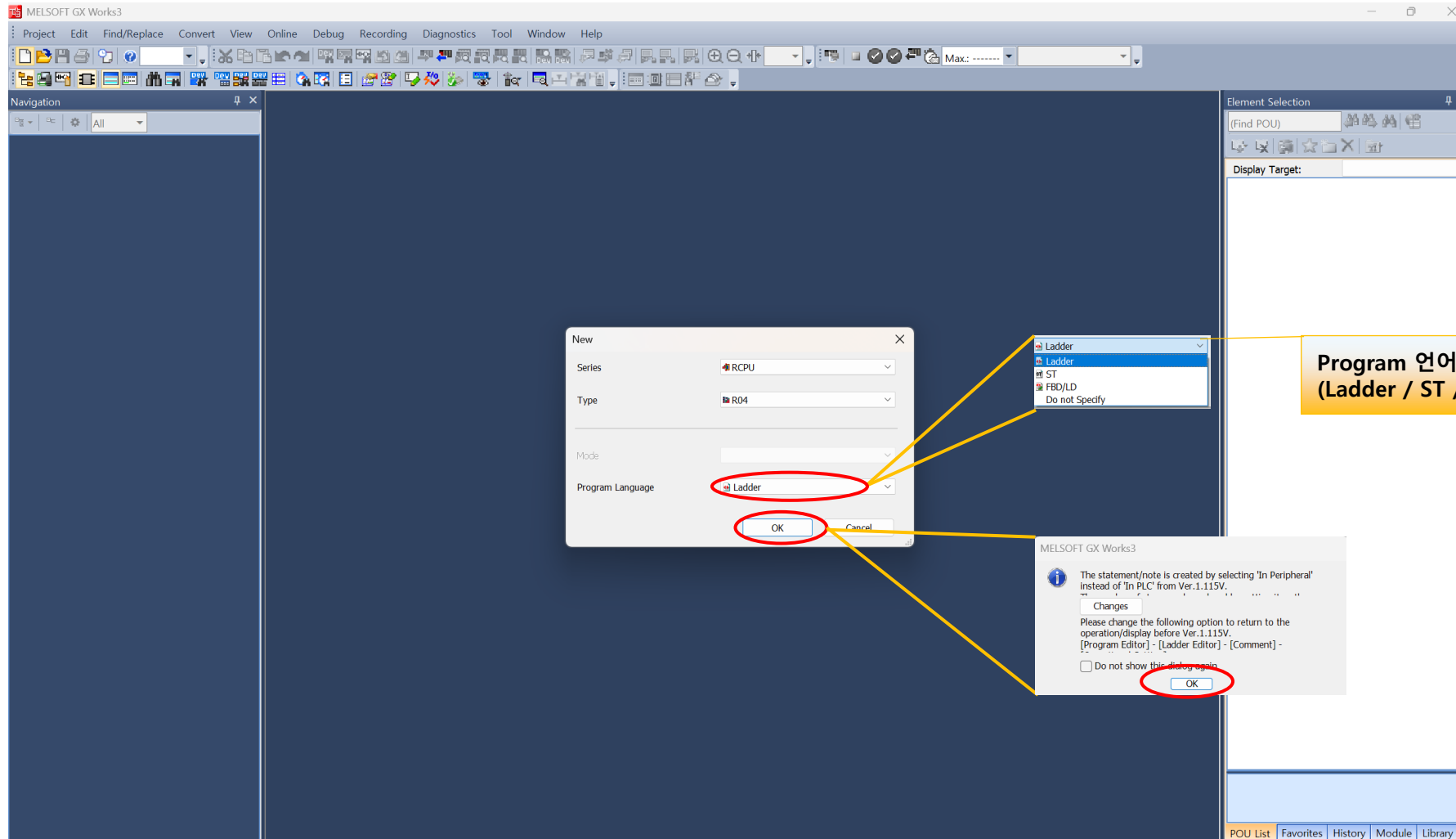
● 모션 제어 기능 제약 사항 (RD78GS와 Ezi-SERVO)

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. RD78G(S) 설정

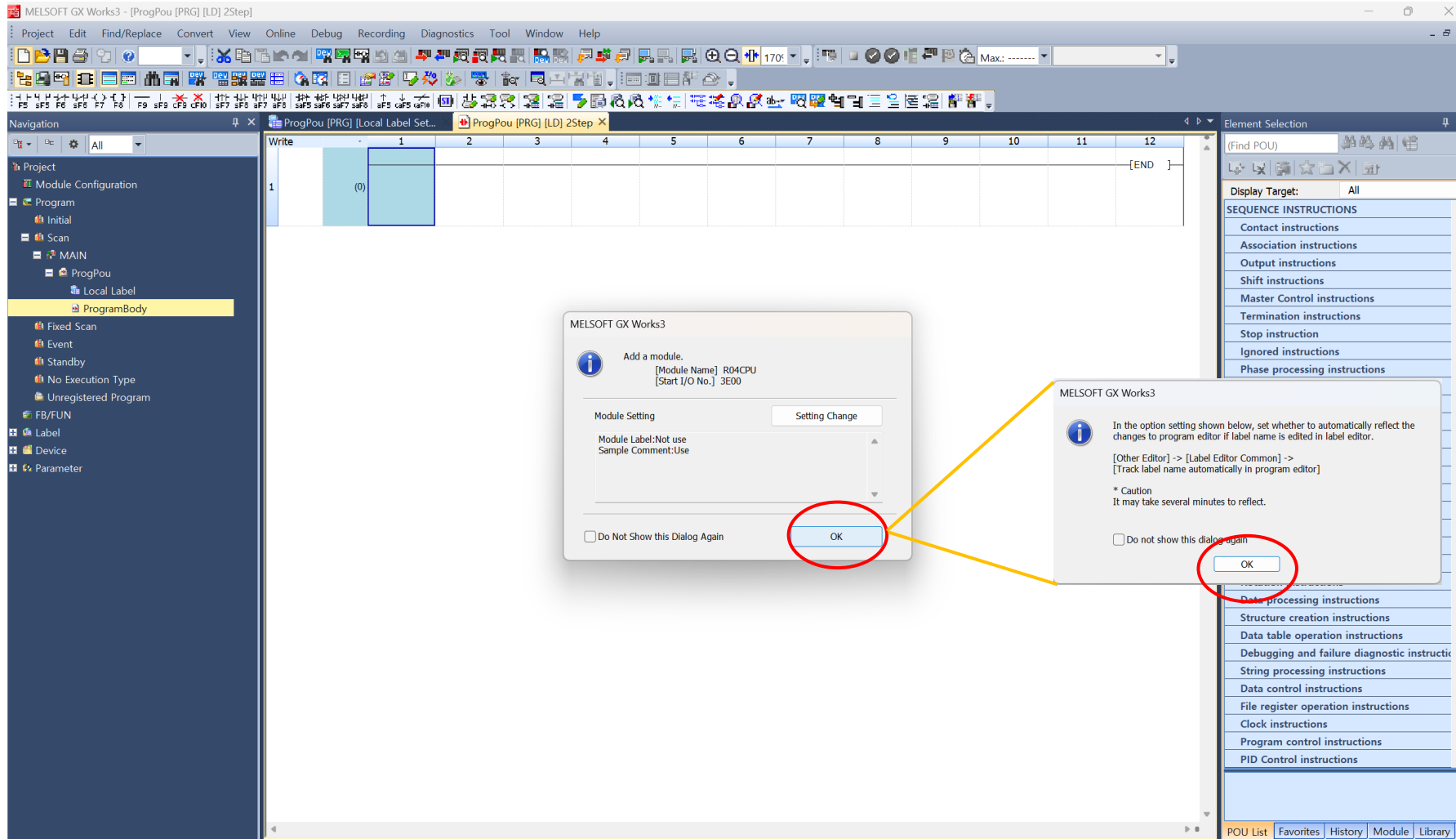
2-1. Project 생성

- 신규 Project 생성 시 iQ-R RD78G(S), 모델명, 사용 축수, Program 언어를 선택



2-2. Module 등록

- iQ-R CPU 등록



2-3. Module Configuration – H/W

- 마우스로 클릭&드래그 하여 Main Base, CPU Module, Power Supply를 구성

The screenshot shows the MELSOFT GX Works3 interface with the 'Module Configuration' window open. The interface includes a menu bar, a toolbar, a navigation pane on the left, a central rack diagram, and an 'Element Selection' pane on the right. Numbered annotations (1-5) and arrows indicate the steps for configuring the hardware:

- 1:** Points to the 'Module Configuration' tab in the navigation pane.
- 2:** Points to the '마우스 클릭 & 드래그' (Mouse Click & Drag) action in the rack diagram.
- 3:** Points to the 'CPU iQ-R 장착' (CPU iQ-R Installation) step.
- 4:** Points to the 'RD78G(S) 장착' (RD78G(S) Installation) step.
- 5:** Points to the 'Power Supply' selection in the 'Element Selection' pane.

A dialog box is visible in the bottom-left corner with the following text:

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.

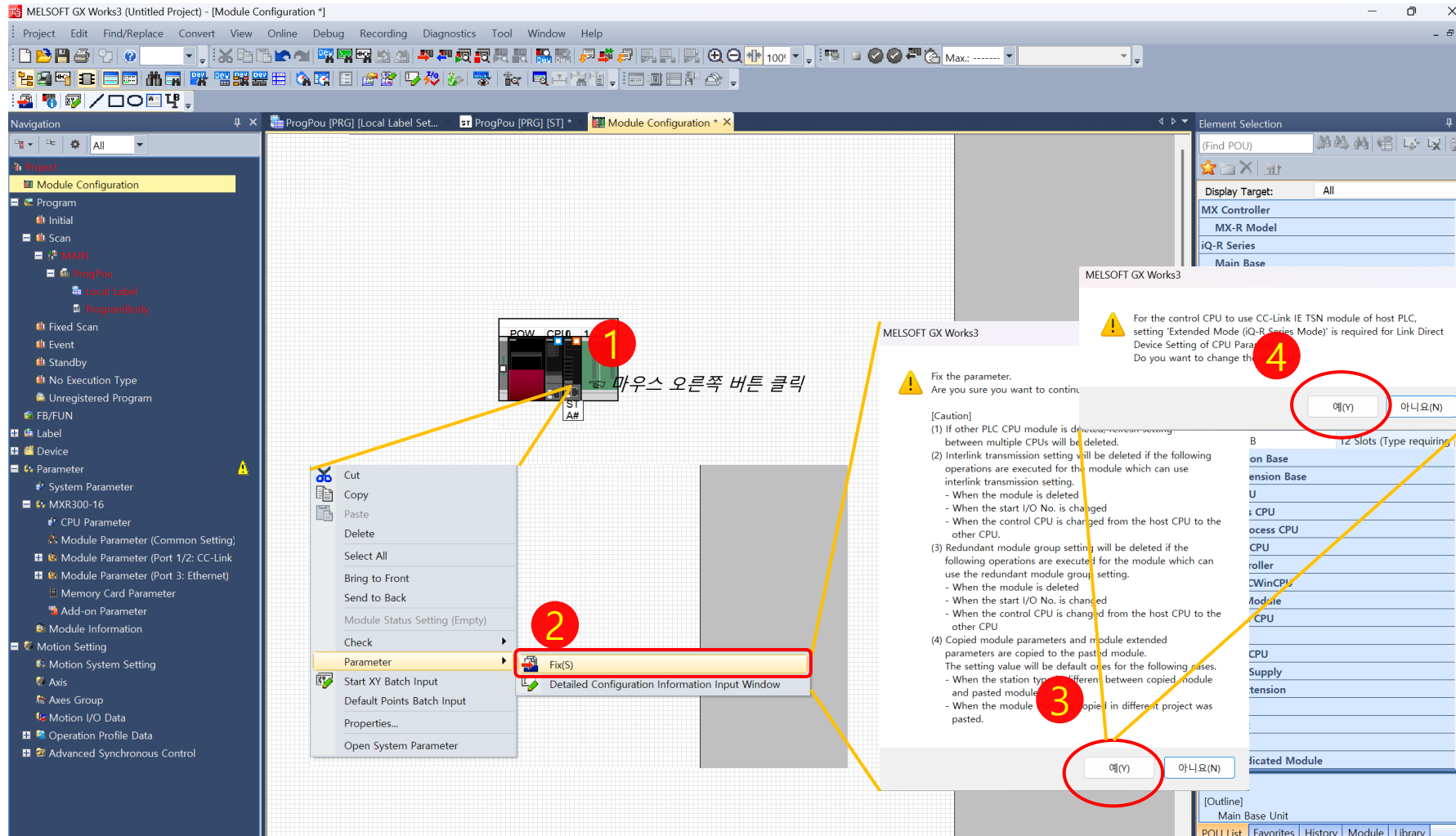
OK

The 'Element Selection' pane on the right lists various modules with their slot requirements:

Module	Slots (Type required)
Main Base	
R32SB	2 Slots (Type required)
R33B	3 Slots (Type required)
R33SB	3 Slots (Type required)
R35B	5 Slots (Type required)
SIL2 Process CPU	
Safety CPU	
C Controller	
MELSECWinCPU	
Head Module	
Motion CPU	
NCCPU	
Robot CPU	
Power Supply	
R61SP	2.5A output (Slim type)
R62P	3.5A output
R61P	6.5A output
R63P	6.5A output
NC Dedicated Module	
Sensor Control	
Analog Input	
Analog Output	
Temperature Input	
Temperature Control Module	
Motion Module	
RD78G4	4 axes CC-Link IE TSN
RD78G4(S)	4 axes CC-Link IE TSN
RD78G8	8 axes CC-Link IE TSN
RD78G8(S)	8 axes CC-Link IE TSN
Network Module	
Blank Cover	

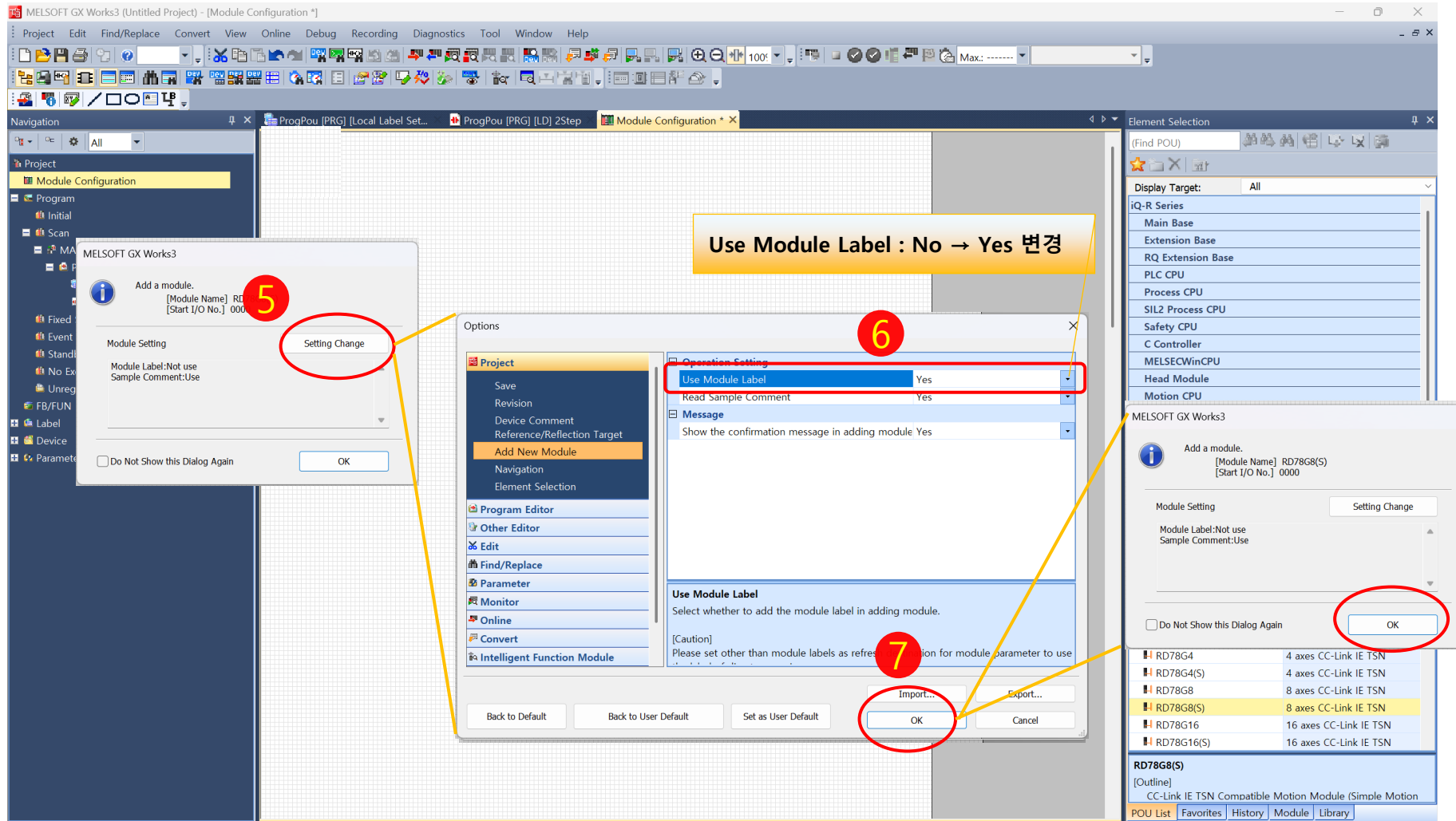
2-3. Module Configuration – H/W

- 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 / 0000:RD78G4(S)

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

MELSOFT GX Works3 (Untitled Project) - [0000:RD78G4 Module Parameter]

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

Project Structure:

- Module Configuration
- Program
 - Initial
 - Scan
 - MAIN
 - ProgPou
 - Local Label
 - ProgramBody
 - Fixed Scan
 - Event
 - Standby
 - No Execution Type
 - Unregistered Program
- FB/FUN
- Label
- Device
- Parameter
 - System Parameter
 - R04CPU
 - CPU Parameter
 - Module Parameter
 - Memory Card Parameter
 - Module Information
 - 0000:RD78G4
 - Module Parameter (Network) (1)
 - Module Extended Parameter
 - Remote Password

Setting Item List:

- Required Settings
 - Basic Settings
 - Network Configuration Settings
 - Refresh Setting
 - Network Topology
 - Communication Period Setting
 - Connection Device Information
 - Device Station Setting
 - Application Settings

Setting Item:

Item	Setting
Station Type	Master Station
Network No.	1 (Network 국번 : 1)
Station No./IP Address Setting	
Station No.	0
IP Address Setting	192.168.3.253
Subnet Mask	255.255.255.0
Default Gateway	

Explanation: Set the station type.

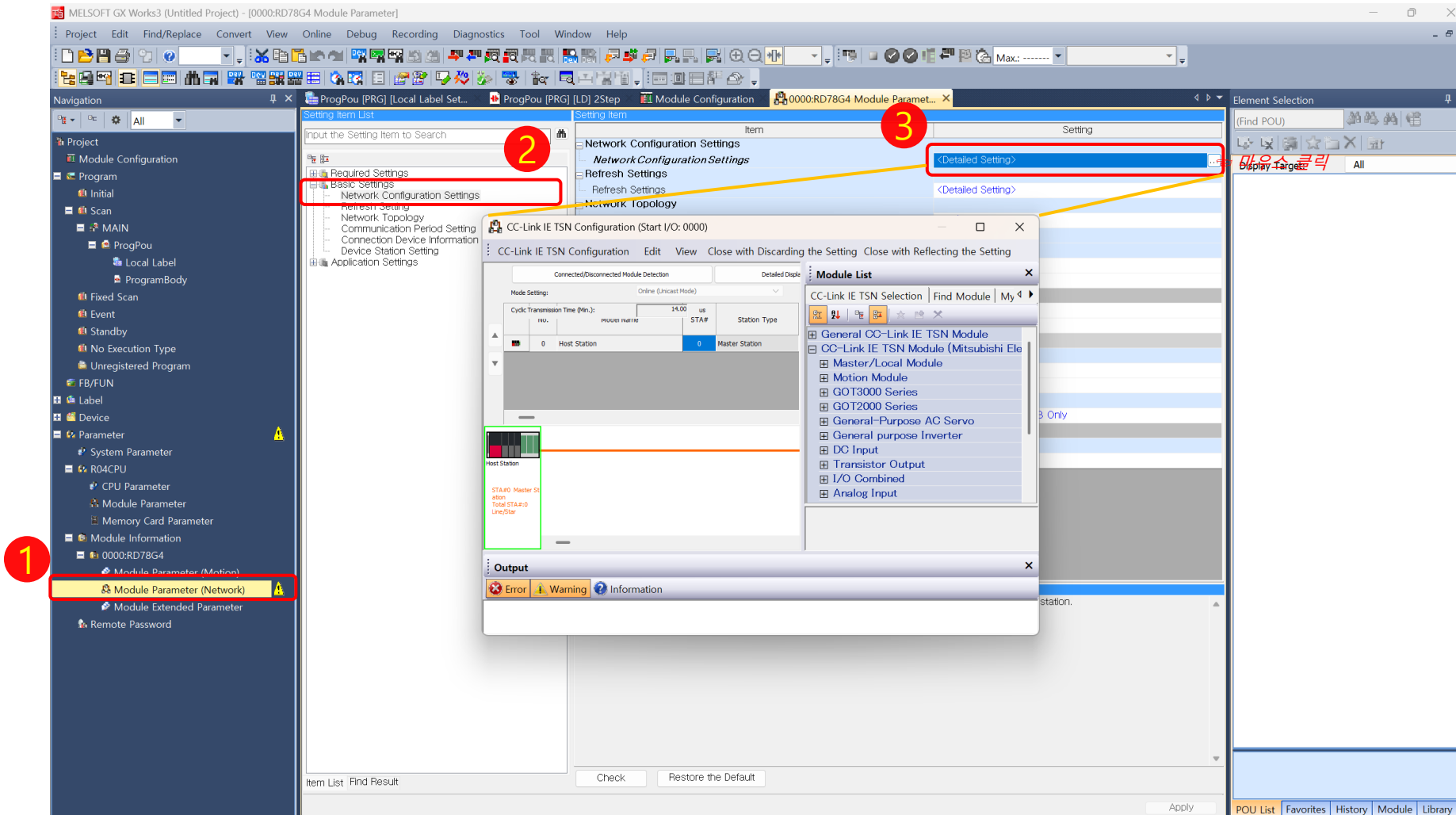
Buttons: Check, Restore the Default, Apply (3)

Bottom Bar: POU List, Favorites, History, Module, Library

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

2-4. Parameter / Module Information / 0000:RD78G4(S)

● Network Configuration Settings



2-4. Parameter / Module Information / 0000:RD78G4(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: Connected/Disconnected Module Detection Detailed Display

Online (Unicast Mode) Assignment Method:

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

2

[Ezi-SERVO 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)

[참고] Ezi-SERVO 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 / 0000:RD78G4(S)

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

The screenshot displays the 'CC-Link IE TSN Configuration' software interface. The main window shows a table of stations with columns for Station Type, Station, Points, and various settings. A red box labeled '1' highlights the 'Motion Control Station - Check (마우스 클릭)' button. Another red box labeled '2' highlights the 'Synchronous 선택' (Synchronous Selection) dropdown menu. The 'Module List' panel on the right shows the 'CC-Link IE TSN Module' selected, with a list of modules including 'General CC-Link IE TSN 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. L', 'BLDC Servo Drive', 'Closed-loop Step Drive', 'Ezi-SERVO-CT', 'Ezi-SERVO-CT-4X', 'Ezi-SERVO-CT-ABS', 'Ezi-SERVO-CT-ALL', 'Open-loop Step Drive', and 'Speed Control'. The 'Ezi-SERVO-CT-ALL' module is highlighted. The 'Station Type' dropdown is set to 'Remote Station'. The 'Station' dropdown is set to 'Ezi-SERVO-CT-ALL'. The 'Points' column shows '16' for the 'Ezi-SERVO-CT-ALL' station. The 'Synchronous' dropdown is set to 'Synchronous'. The 'Module List' panel also shows the 'Ezi-SERVO-CT-ALL' module selected under the 'Closed-loop Step Drive' category. The 'Station Type' dropdown is set to 'Remote Station'. The 'Station' dropdown is set to 'Ezi-SERVO-CT-ALL'. The 'Points' column shows '16' for the 'Ezi-SERVO-CT-ALL' station. The 'Synchronous' dropdown is set to 'Synchronous'. The 'Module List' panel also shows the 'Ezi-SERVO-CT-ALL' module selected under the 'Closed-loop Step Drive' category.

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:

Cyclic Transmission Time (Min.):	17.00 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	0	Master Station								192.168.3.253	255.255.255.0			
1	Ezi-SERVO-CT-ALL	1	Remote Station					16	16	<Detail Setting>	192.168.3.1	255.255.255.0		No Setting	Asynchronous

1 Motion Control Station - Check (마우스 클릭)

2 Synchronous 선택

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 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. L

BLDC Servo Drive

Closed-loop Step Drive

Ezi-SERVO-CT Closed-Loop

Ezi-SERVO-CT-4X Closed-Loop

Ezi-SERVO-CT-ABS Closed-Loop

Ezi-SERVO-CT-ALL Closed-Loop

Open-loop Step Drive

Speed Control

[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 / 0000:RD78G4(S)

- PDO Mapping Setting은 아래와 같이 자동으로 할당되어 설정됩니다.

■ TPDO

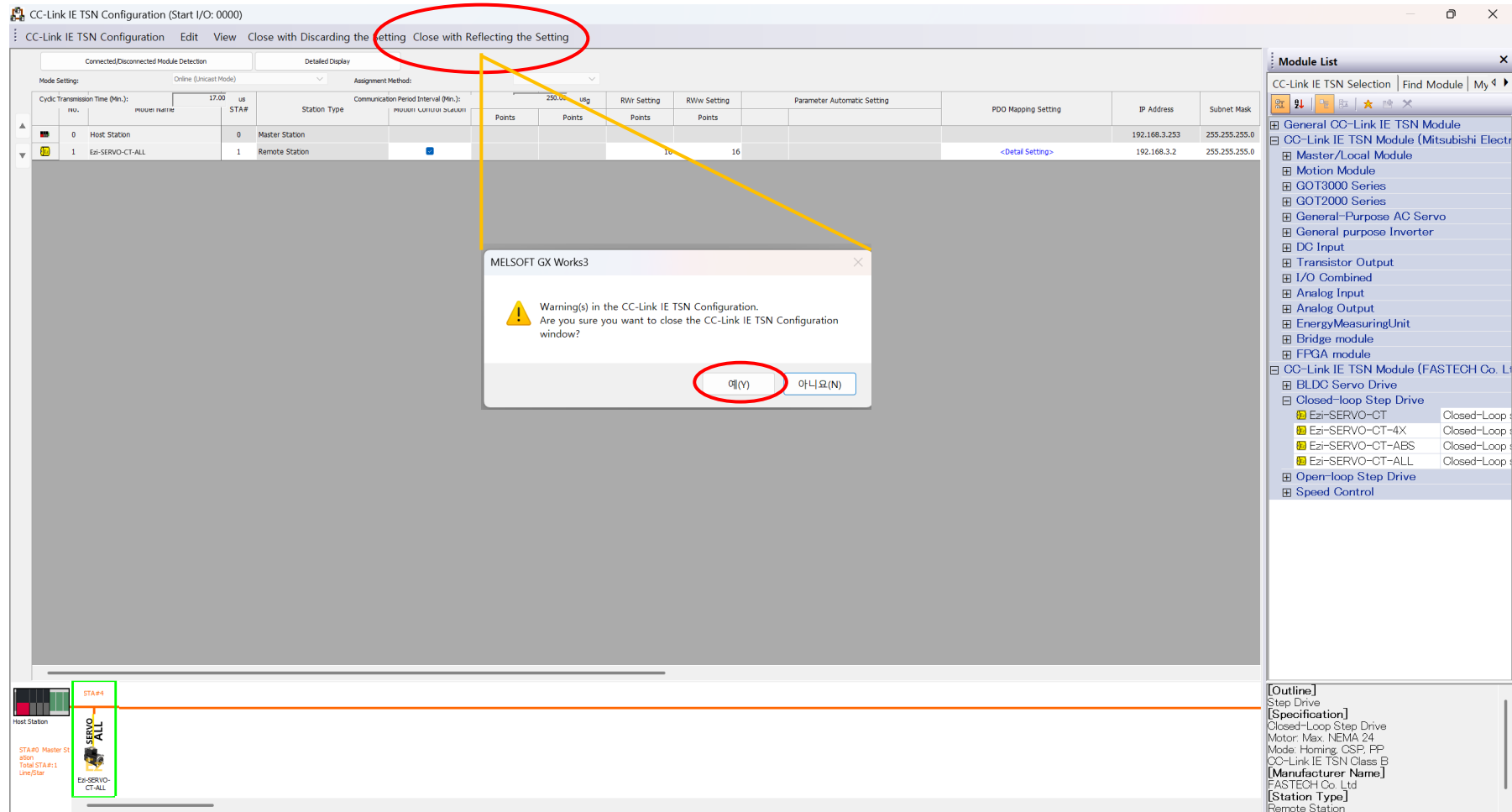
Index	Sub index	Data Type	내 용
1D02	01	U16	Watchdog counter UL 1
6061	00	I8	Modes of operation display
0000	00	U8	GAP
6064	00	I32	Position actual value
60F4	00	I32	Following error actual value
6041	00	U16	Stausword
2B12	00	U16	Status DO 1
603F	00	U16	Error code
60FD	00	U32	Digital inputs
0000	00	U32	GAP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

■ RPDO

Index	Sub index	Data Type	내 용
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

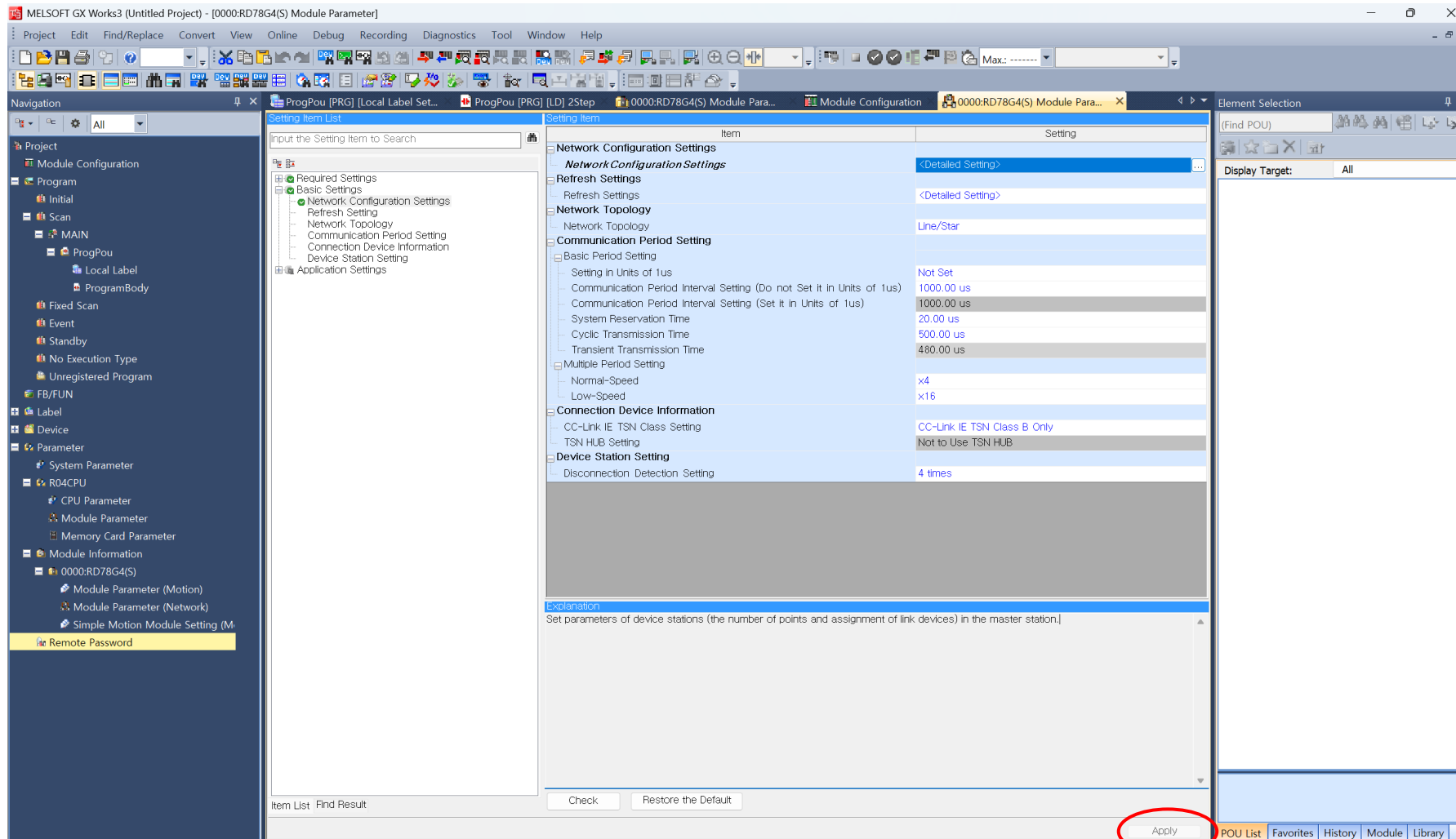
2-4. Parameter / Module Information / 0000:RD78G4(S)

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



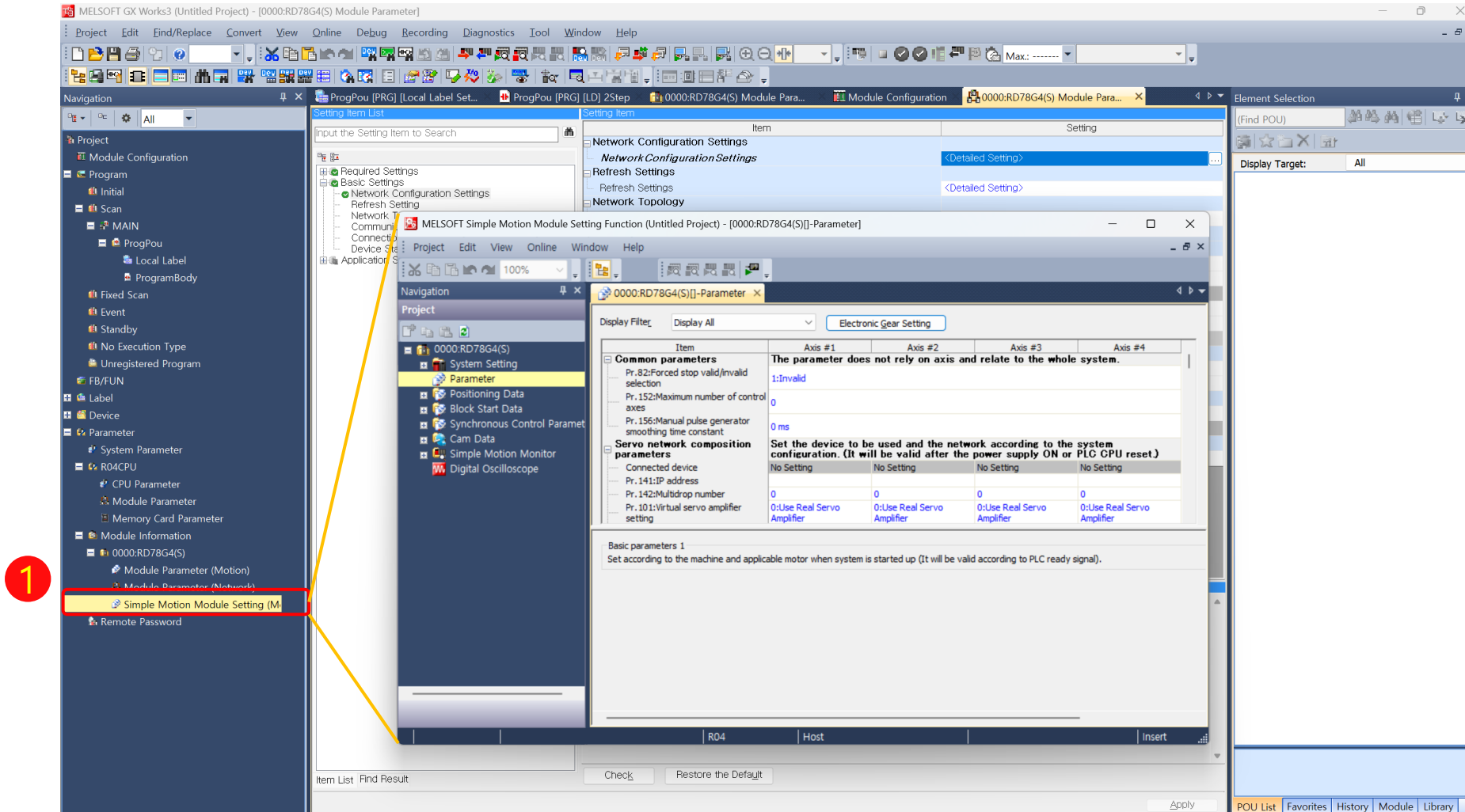
2-4. Parameter / Module Information / 0000:RD78G4(S)

- Network Configuration Settings 적용



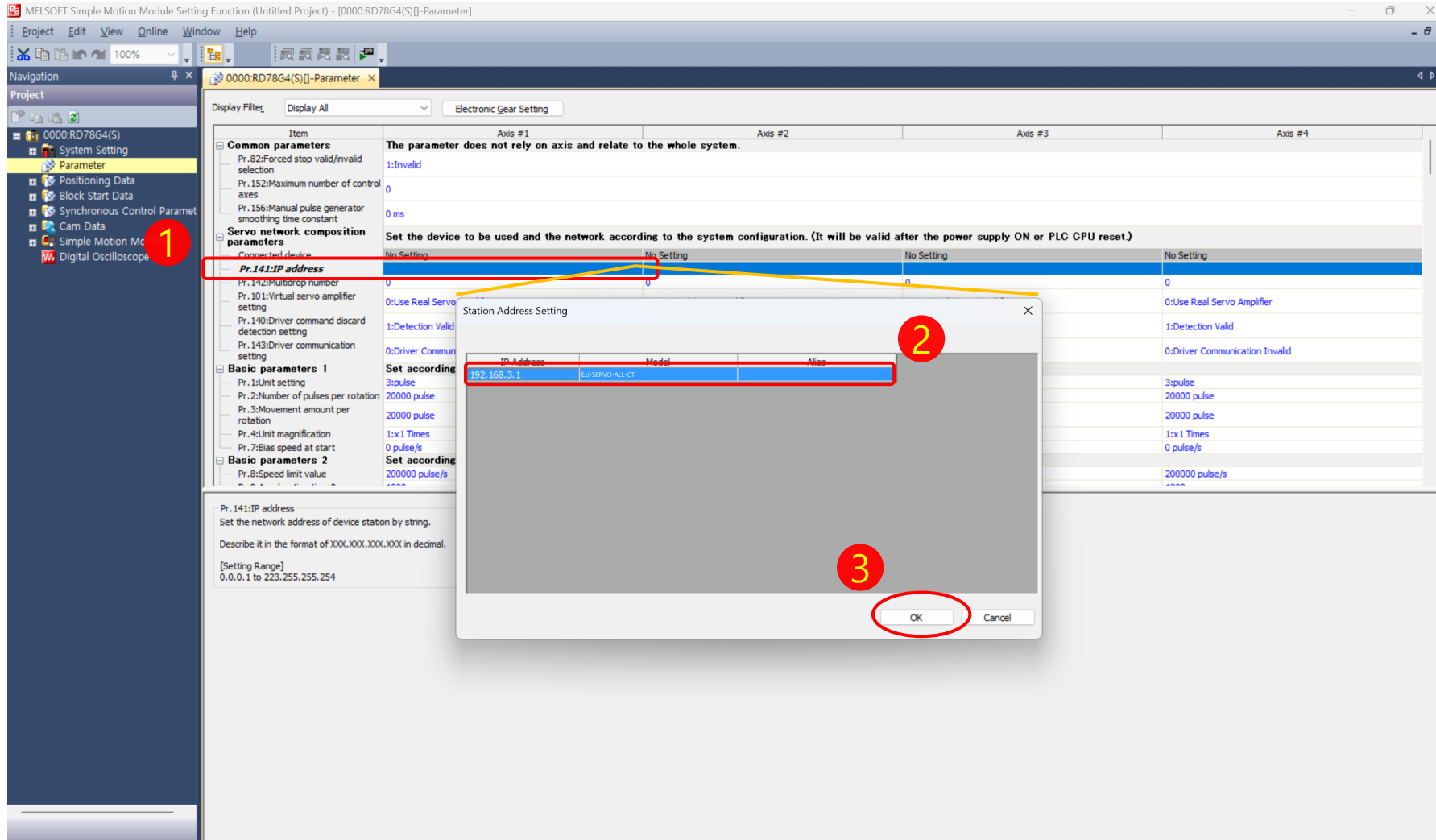
2-4. Parameter / Module Information / 0000:RD78G4(S)

- Simple Motion Module Setting 프로그램 실행하기



2-5. Simple Motion Module Setting

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



2-5. Simple Motion Module Setting

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

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

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

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: 500pulse/s
※ 모터에 장착된 인코더 규격에 따라 설정을 변경할 수 있습니다.

2-5. Simple Motion Module Setting

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

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

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

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			
Pr.901:Start No.	H0000			
Pr.902:Bit specification	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: 500pulse/s

※ Bias speed(Pr.7)값보다 HPR speed(Pr.46)값이 크면 (1C15H:원점복귀 속도 Error)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 left sidebar shows the project tree with 'Parameter' selected. The main window is divided into two panes: 'Common parameters' and 'Electronic Gear Setting - Axis #1'.

Common parameters:

- Pr. 1: Unit setting: 3:pulse
- Pr. 2: Number of pulses per rotation: 10000 pulse (highlighted with a red box and a red circle with the number 1)
- Pr. 3: Movement amount per rotation: 10000 pulse
- Pr. 4: Unit magnification: 1x1 Times
- Pr. 7: Bias speed at start: 500 pulse/s
- Pr. 8: Speed limit value: 200000 pulse/s
- Pr. 9: Acceleration time: 1000 ms
- Pr. 10: Deceleration time: 1000 ms
- Pr. 11: Backlash compensation amount: 0 pulse
- Pr. 12: Software stroke limit upper limit value: 2147483647 pulse
- Pr. 13: Software stroke limit lower limit value: -2147483648 pulse
- Pr. 14: Software stroke limit selection: 0:Apply Software Stroke Limit on Command Position Value
- Pr. 15: Software stroke limit valid/invalid setting: 0:Valid
- Pr. 16: Command in-position width: 100 pulse
- Pr. 17: Torque limit setting value: 300.0 %
- Pr. 18: M-code ON signal output timing: 0:WITH Mode
- Pr. 19: Speed switching mode: 0:Standard Speed Switching Mode
- Pr. 20: Interpolation speed designation method: 0:Vector Speed
- Pr. 21: Command position value during speed control: 0:Not Update of Command Position Value
- Pr. 22: Inout signal logic selection: 0:Negative Logic

Electronic Gear Setting - Axis #1:

The 'Entry' tab is selected. It shows the 'Machine Components' dropdown set to 'Others'. The 'Unit Setting' is '3:pulse'. The 'Movement Amount per Load Rotation (dSL)' is '10000 [pulse]' (highlighted with a red circle with the number 2). The 'Encoder Resolution' is '10000 [pulse]' (highlighted with a red circle with the number 3). The 'Reduction Ratio (NL/NM)' is '1 / 1'. The 'Calculate Electronic Gear' button is highlighted with a red circle with the number 4.

Calculation Result:

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

The 'Movement Amount per Pulse' is calculated as 1.0000 pulse. The 'Error Calculation' section shows '0 [pulse]' for the error for the movement amount and '0 [pulse]' for the error for the movement amount you want to perform is about. The 'OK' button is highlighted with a red circle with the number 5.

Annotations:

- 1: Pr. 2: Number of pulses per rotation
- 2: Movement Amount per Load Rotation(dSL) : 10,000pulse
- 3: Encoder Resolution : 10,000pulse
- 4: Calculate Electronic Gear
- 5: OK button

2-5. Simple Motion Module Setting

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

HPR speed: 500pulse/s

※ Bias speed(Pr.7)값보다 HPR speed(Pr.46)값이
큰면 (1C15H:원점복귀 속도 Error)가 발생합니다.

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 2000000000 pulse

* 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
0 [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) | 0000:RD78G8(S)-Parameter | 0000:RD78G8(S)-Axis #1 Posit...

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	20000 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	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	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: Inout signal logic selection : Lower limit	0: Neactive Logic	0: Neactive Logic	0: Neactive Logic	0: Neactive Logic

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

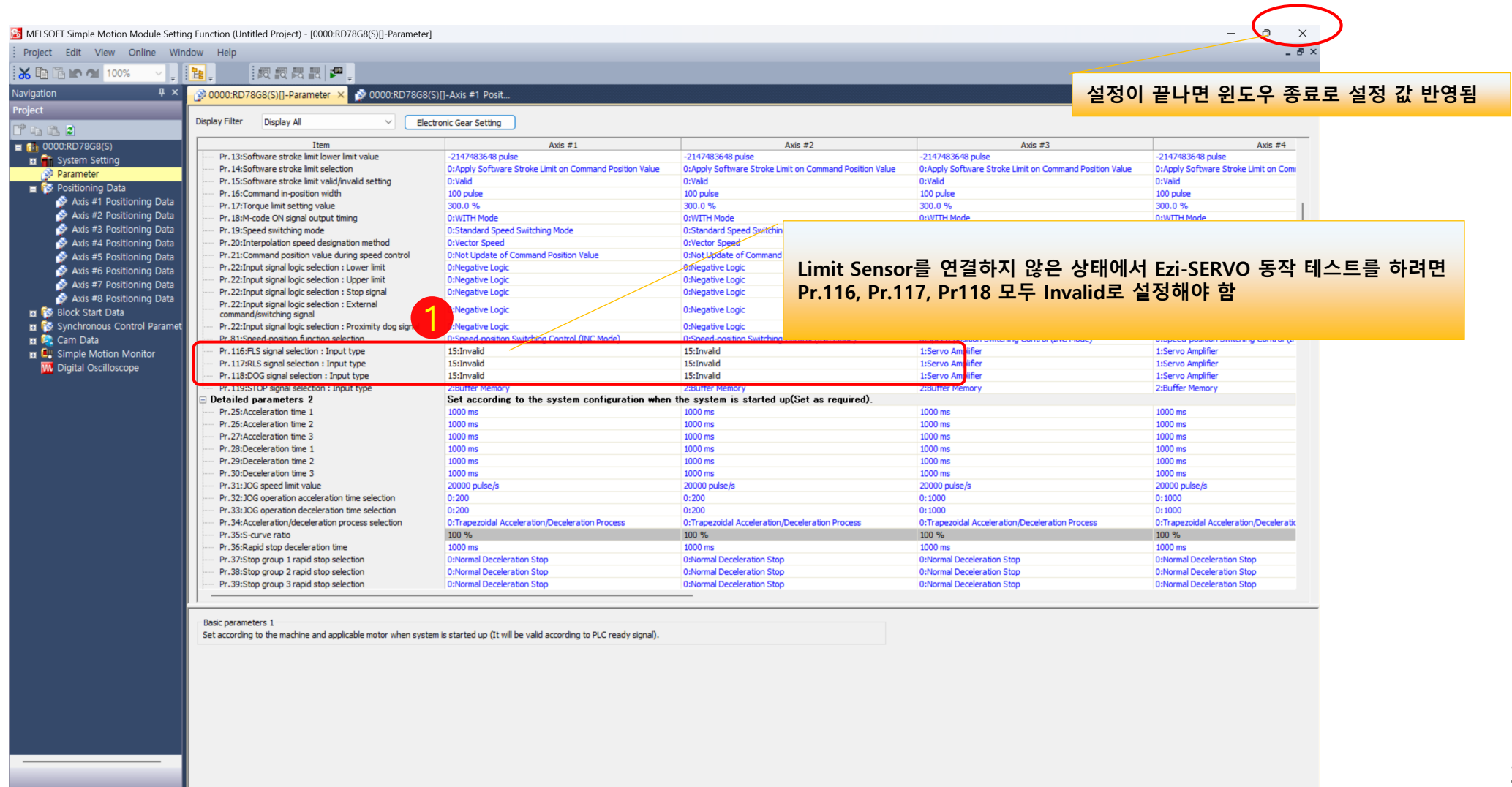
Setting Range
1 to 1000000000 pulse/s

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 10,000pulse의 경우)
- ✓ Pr9 : Acceleration time 0 → 200ms (Ezi-SERVO는 100ms도 가능)
- ✓ Pr10: Deceleration time 0 → 200ms (Ezi-SERVO는 100ms도 가능)

2-5. Simple Motion Module Setting

- Convert / Rebuild All



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

Project Edit View Online Window Help

Navigation 100%

Project

- 0000:RD78G8(S)
- System Setting
- Parameter
- Positioning Data
 - Axis #1 Positioning Data
 - Axis #2 Positioning Data
 - Axis #3 Positioning Data
 - Axis #4 Positioning Data
 - Axis #5 Positioning Data
 - Axis #6 Positioning Data
 - Axis #7 Positioning Data
 - Axis #8 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. 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).			
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

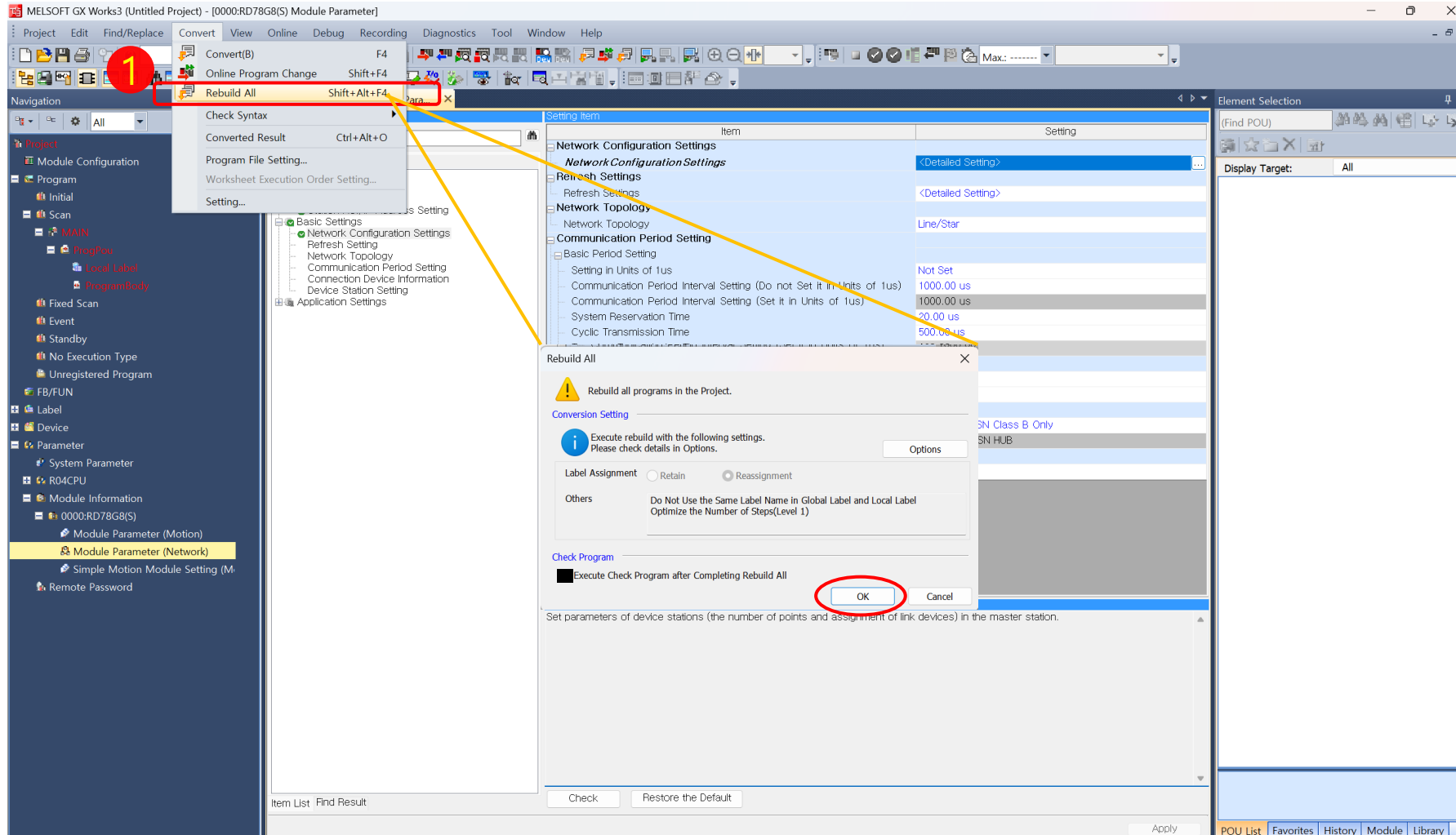
Set according to the machine and applicable motor when system is started up (It will be valid according to PLC ready signal).

설정이 끝나면 윈도우 종료로 설정 값 반영됨

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

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 a list of memory areas. The 'Common Device Co...' option is highlighted. The 'Execute' button is circled.

Online Data Operation

Display Setting Related Functions

Parameter + Progr Select All Legend

Open/Close All/ Deselect All CPU Built-in Memory SD Memory Card Intelligent Function

Module Name/Data Name	Detail	Title
MAIN		20
Device Memory		
MAIN		20
File Register		
MAIN		20
Common Device Co...		20
COMMENT		20

Display Memory Capacity

Memory Capacity Size Calculation

Legend

- Used
- Increased
- Decreased
- Free: 5% or Less

Program Memory Free 157/160KB

Data Memory Free 1852/2049KB

Device/Label Memory (File Storage Area) Free 192/256KB

SD Memory Card Free 0/0KB

Execute Close

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

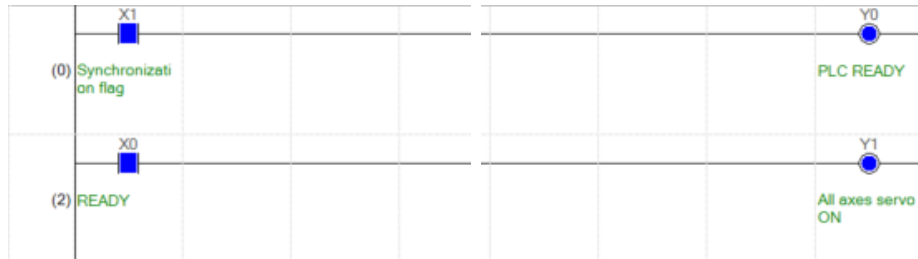
3. 동작 확인

3-1. 프로그램 작성

● PLC Motion Module : Ready / STEP On

Memory Map 방식

[Ladder Program]



Simple Motion은 2가지 Program을 지원

No	항목	신호 전달	Memory Map	Label
1	RD78GS 동기화 On	RD78GS → iQ-R CPU	X1	RD78GS_1.bSynchronizationFlag_D
2	RD78GS ON 지시	iQ-R CPU → RD78GS	Y0	RD78GS_1.bPLC_Ready_D
3	RD78GS Ready	RD78GS → iQ-R CPU	X0	RD78GS_1.bReady_D
4	All Axis STEP On	iQ-R CPU → RD78GS	Y1	RD78GS_1.bAllAxisStepOn_D

Label(변수) 방식

[Ladder Program]



[ST Program]

```

1 IF SM400 & RD78GS_1.bSynchronizationFlag_D THEN
2     RD78GS_1.bPLC_Ready_D := TRUE;
3 END_IF;
4
5 IF RD78GS_1.bReady_D THEN
6     RD78GS_1.bAllAxisServoOn_D := TRUE;
7 END_IF;
8

```

3-1. 프로그램 작성

- Jog 설정 : 속도, 한계 속도, 가속시간, 감속시간

The screenshot displays the MELSOFT GX Works3 interface for editing a ladder logic program. The main workspace shows a ladder logic diagram with the following steps:

- Step 1: Initial condition (R) RW-PLC READY(Direct) is active.
- Step 2: Initial condition (R) RW-READY(Direct) is active.
- Step 3: Set parameter (bSetParam) is executed.
- Step 4: DMOV instruction sets K5000 to RD78GS_1 aSvCrt1_D0[0] udJOG_Speed_D (RW-JOG speed(Direct)).
- Step 5: DMOV instruction sets K50000 to RD78GS_1 aSvCrt2_D0[0] udJOG_SpeedLimit_D (RW-JOG speed limit value(Direct)).
- Step 6: DMOV instruction sets K200 to RD78GS_1 aSvCrt3_D0[0] udAccelerationTime0_D (RW Acceleration time 0(Direct)).
- Step 7: DMOV instruction sets K200 to RD78GS_1 aSvCrt4_D0[0] udDecelerationTime0_D (RW Deceleration time 0(Direct)).
- Step 12: End of program.

The right-hand pane shows the 'Element Selection' window with a list of module functions. The selected function is 'M+RD78GS_JOG_01A', which is described as 'JOG/inching operation'. The bottom status bar indicates the current function is 'M+RD78GS_JOG_01A' and provides a Japanese description: 'JOG運転 / インチング運転を行います。' (Perform JOG operation / Inching operation).

3-1. 프로그램 작성

- Jog 동작 프로그램 : Module FB (MRD78GS_JOG_01A1 클릭&드래그)

The screenshot displays the MELSOFT GX Works3 interface for creating a program. The main workspace shows a ladder logic diagram with steps 1 through 7. Step 1 is labeled 'Write' and contains a network with a reset coil (R) for 'RD78GS_1 #bSynMtr2_D.bPLC_Ready_D'. Step 2 contains a reset coil (R) for 'RD78GS_1 #bSynMtr2_D.bReady_D'. Step 3 contains a set coil (S) for 'bSetJogParam'. Step 4 contains a set coil (S) for 'RD78GS_1 #bSynMtr2_D.bJOG_Speed_D'. Step 5 contains a set coil (S) for 'RD78GS_1 #bSynMtr2_D.bJOG_AccDecTime_D'. Step 6 contains a set coil (S) for 'RD78GS_1 #bSynMtr2_D.bJOG_DecelerationTime_D'. Step 7 contains a set coil (S) for 'RD78GS_1 #bSynMtr2_D.bJOG_AccDecTime_D'. A red box highlights the 'FB Instance Name' dialog box, which shows 'RD78GS_1 JOG_01A1' as the selected instance name. 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' panel is open, showing a list of module functions. A red circle with the number '1' highlights the 'M+ RD78GS_JOG_01A1 JOG/inching operat' function. The bottom of the panel shows the selected function's details, including its name 'M+RD78GS_JOG_01A1' and a description in Japanese: 'JOG運転 / インチング運転を行います。' (Perform JOG operation / Inching operation).

✓ JOG 동작 FB 생성 : OK

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

Module FB

- M+ RD78GS_SetPositioningData (Positioning data set
- M+ RD78GS_StartPositioning_01A Positioning start FB
- M+ RD78GS_JOG_01A JOG/inching operat**
- M+ RD78GS_MPG_01A Manual pulse gener
- M+ RD78GS_ChangeSpeed_01A Speed change FB
- M+ RD78GS_ChangeAccDecTime Acc./dec. time SV c
- M+ RD78GS_ChangePosition_01A Target position cha
- M+ RD78GS_Restart_01A Restart FB
- M+ RD78GS_OperateError_01A Error operation FB
- M+ RD78GS_InitializeParameter_0 Parameter Initializati
- M+ RD78GS_WriteFlash_00A Flash ROM writing f
- M+ RD78GS_ChangeTorqueContr Torque control moc
- M+ RD78GS_ChangeSpeedContrc Speed control mod
- M+ RD78GS_ChangePositionCont Position control mo
- M+ RD78GS_ChangeContinuousTr Continuous torque)
- M+ RD78GS_Sync_01A Starting/ending syn
- M+ RD78GS_ChangeSyncEncoder Sync encoder posit
- M+ RD78GS_DisableSyncEncoder Sync encoder coun
- M+ RD78GS_EnableSyncEncoder_ Sync encoder coun
- M+ RD78GS_ResetSyncEncoderEr Sync encoder error
- M+ RD78GS_ConnectSyncEncode Sync encoder Conn
- M+ RD78GS_MoveCamReference Cam reference posi
- M+ RD78GS_ChangeCamPositionl Cam position per c
- M+ RD78GS_ChangeMainShaftGe MG Positon per cyc
- M+ RD78GS_ChangeAuxiliaryShaf AG position per cyc
- M+ RD78GS_MoveCamPositionPe Cam position per c
- M+ RD78GS_MakeRotaryCutterCa Cam for rotary cuttr
- M+ RD78GS_CalcCamCommandP Cam command pos
- M+ RD78GS_CalcCamPositionPerf Cam position per c

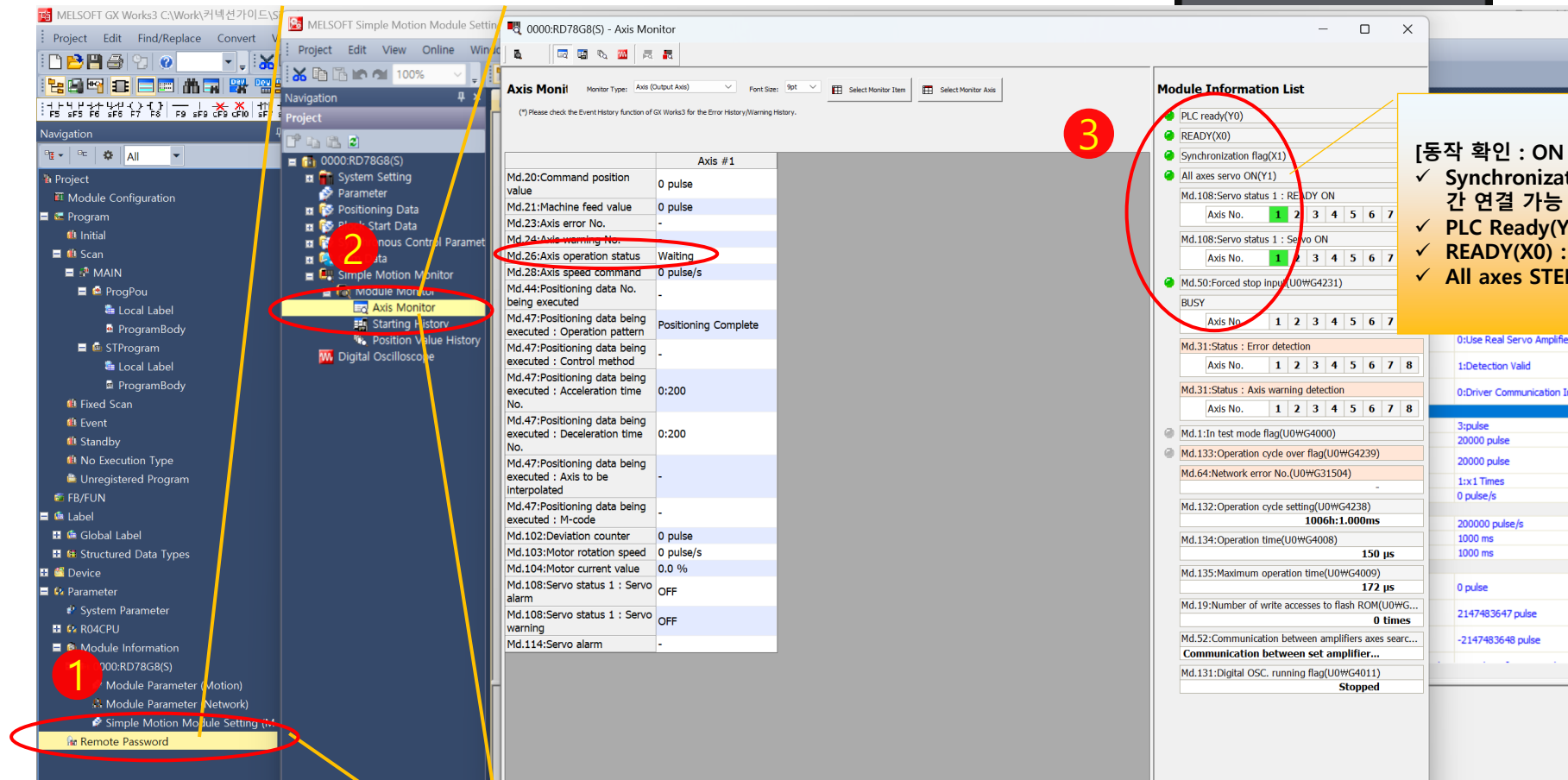
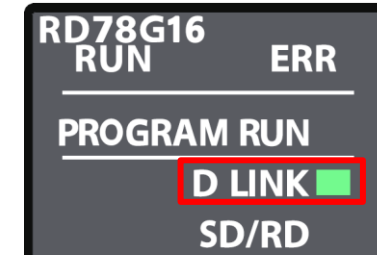
M+RD78GS_JOG_01A

[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

- RD78GS PROGRAM RUN : D LINK 녹색 LED 점등
- Axis Monitor



[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 STEP ON(Y1) : 모든 축 STEP ON 지시

3-3. Axis 동작 확인

● Jog 동작 – 설정 및 이동

Program 방식(Ladder, Label)

bSetJogSpeed

bSetJogSpeedLimit

bSetJogAccel

bSetJogDecel

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

Instruction	Address	Comment
DMOV	K5000	RD78GS_1.stnAxCtrl1_D[0].udJOG_Speed_D RW:JOG speed(Direct)
DMOV	K50000	RD78GS_1.stnAxPrm_D[0].udJogSpeedLimit_D RW:JOG speed limit value(Direct)
DMOV	K200	RD78GS_1.stnAxPrm_D[0].udAccelerationTime0_D RW:Acceleration time 0(Direct)
DMOV	K200	RD78GS_1.stnAxPrm_D[0].udDecelerationTime0_D RW:Deceleration time 0(Direct)
MOV	K1	RD78GS_1.stnAxCtrl2_D[0].uStartForwardJOG_D RW:Forward run JOG start(Direct)
MOV	K0	RD78GS_1.stnAxCtrl2_D[0].uStartForwardJOG_D RW:Forward run JOG start(Direct)
MOV	K1	RD78GS_1.stnAxCtrl2_D[0].uStartReverseJOG_D RW:Reverse run JOG start(Direct)
MOV	K0	RD78GS_1.stnAxCtrl2_D[0].uStartReverseJOG_D RW:Reverse run JOG start(Direct)

bJogMoveCW

bJogMoveCCW

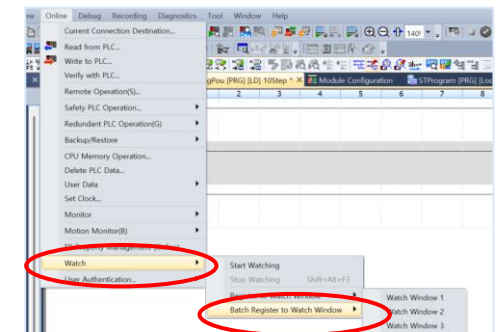
✓ Jog 동작 확인
bJogMoveCW : ON → CW회전, OFF → 정지
bJogMoveCCW : ON → CCW회전, OFF → 정지

Watch 방식

Watch 1[Watching]		
ON OFF ON/OFF toggle Update Clear All		
Name	Current Value	English
RD78GS_1.bPLC_Ready_D	TRUE	RW:PLC READY(Direct)
RD78GS_1.bAllAxisServoOn_D	TRUE	RW:All axis servo ON(Direct)
RD78GS_1.stnAxCtrl1_D[0].udJOG_Speed_D	5,000	RW:JOG speed(Direct)
RD78GS_1.stnAxPrm_D[0].udJogSpeedLimit_D	50,000	RW:JOG speed limit value(Di...
RD78GS_1.stnAxPrm_D[0].udAccelerationTime0_D	200	RW:Acceleration time 0(Direct)
RD78GS_1.stnAxPrm_D[0].udDecelerationTime0_D	200	RW:Deceleration time 0(Direct)
RD78GS_1.stnAxCtrl2_D[0].uStartForwardJOG_D	0	RW:Forward run JOG start(D...
RD78GS_1.stnAxCtrl2_D[0].uStartReverseJOG_D	0	RW:Reverse run JOG start(Di...

[동작 확인]

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



3-3. Axis 동작 확인

● Jog 동작 : 정지 → 이동

0000:RD78G8(S) - Axis Monitor

Axis Monil 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...
- 0 times
- Md.52:Communication between amplifiers axes se...
- Communication between set amplif...
- Md.131:Digital OSC. running flag(U0#G4011)
- Stopped

JOG
동작

0000:RD78G8(S) - Axis Monitor

Axis Monil 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)
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- 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...
- 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



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