

Ezi-SERVOII-EC 기초 사용법

< **LS** Mecapion 'MXP'편 >



MXP EtherCAT Master 구성

Confidential

MXP 구매시 구성품을 확인 하고, 제품을 설치한다.

** MXP Download 경로 : http://www.lsmecapion.com /contents/sub02/sub03_08.php

** Trial Version 도 지원을 함.

구성 사진	용도
	<p>설치 Program USB /1EA. (LSMecapion 로고가 인쇄된 USB입니다.)</p> <ul style="list-style-type: none"> 설치 USB Folder 구조 <div style="margin-left: 20px;">  </div> <p>** 설치시 Manual\설치 매뉴얼 파일을 참조하세요</p>
	<p>MXP 제품 Lock key USB. (제품 SN라벨이 부착되어있습니다.)</p>
	<p>RTX Lock key USB. (제품 SN라벨이 부착되어있습니다.)</p>
<p>Manual</p>	<p>설치 매뉴얼 (보고 계신 매뉴얼입니다.)</p>

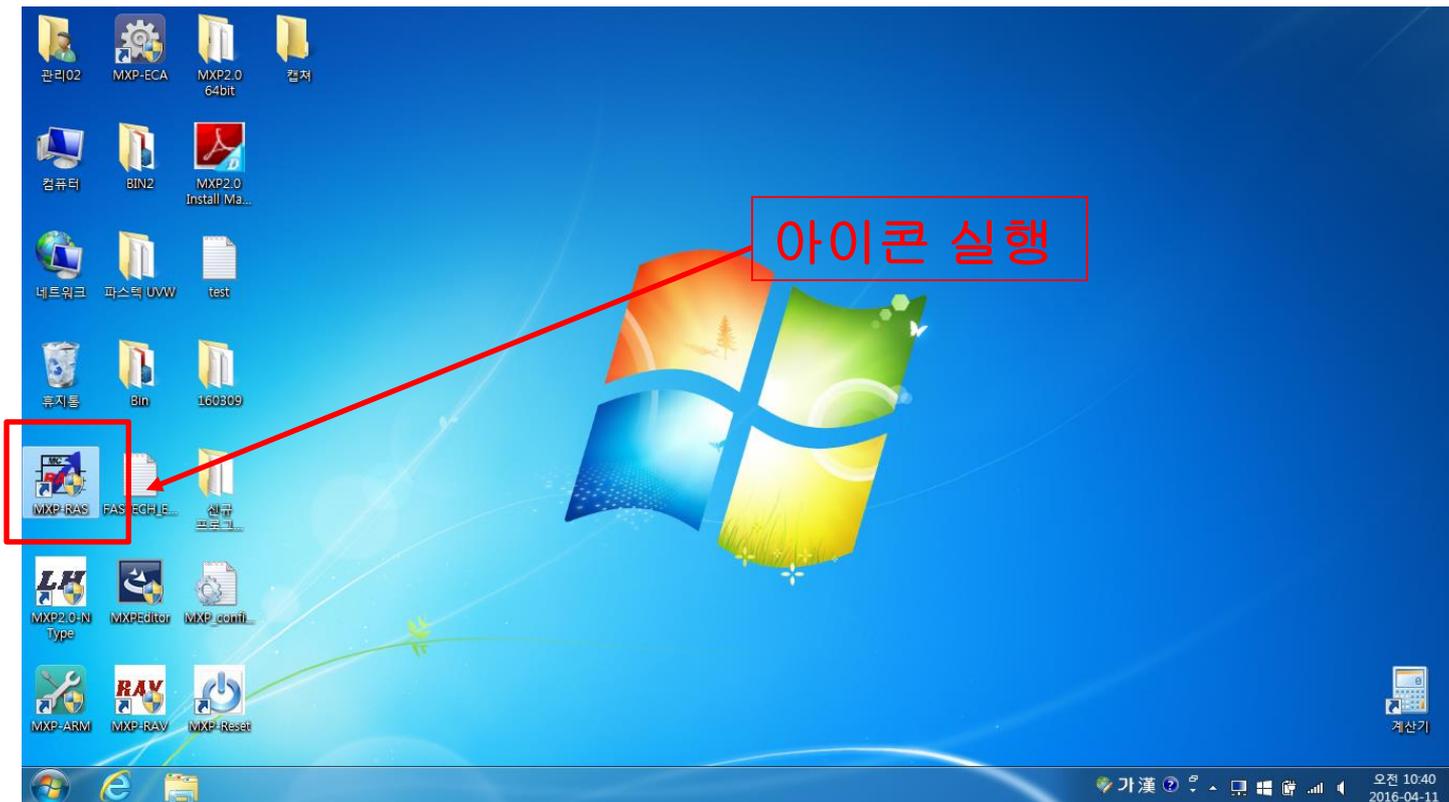
표 3- 제품구성

☐ MXP-RAS 실행 - ENI 파일제작

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☐ MXP-RAS PC 설치 후 '사용자 권한' 으로 실행한다.

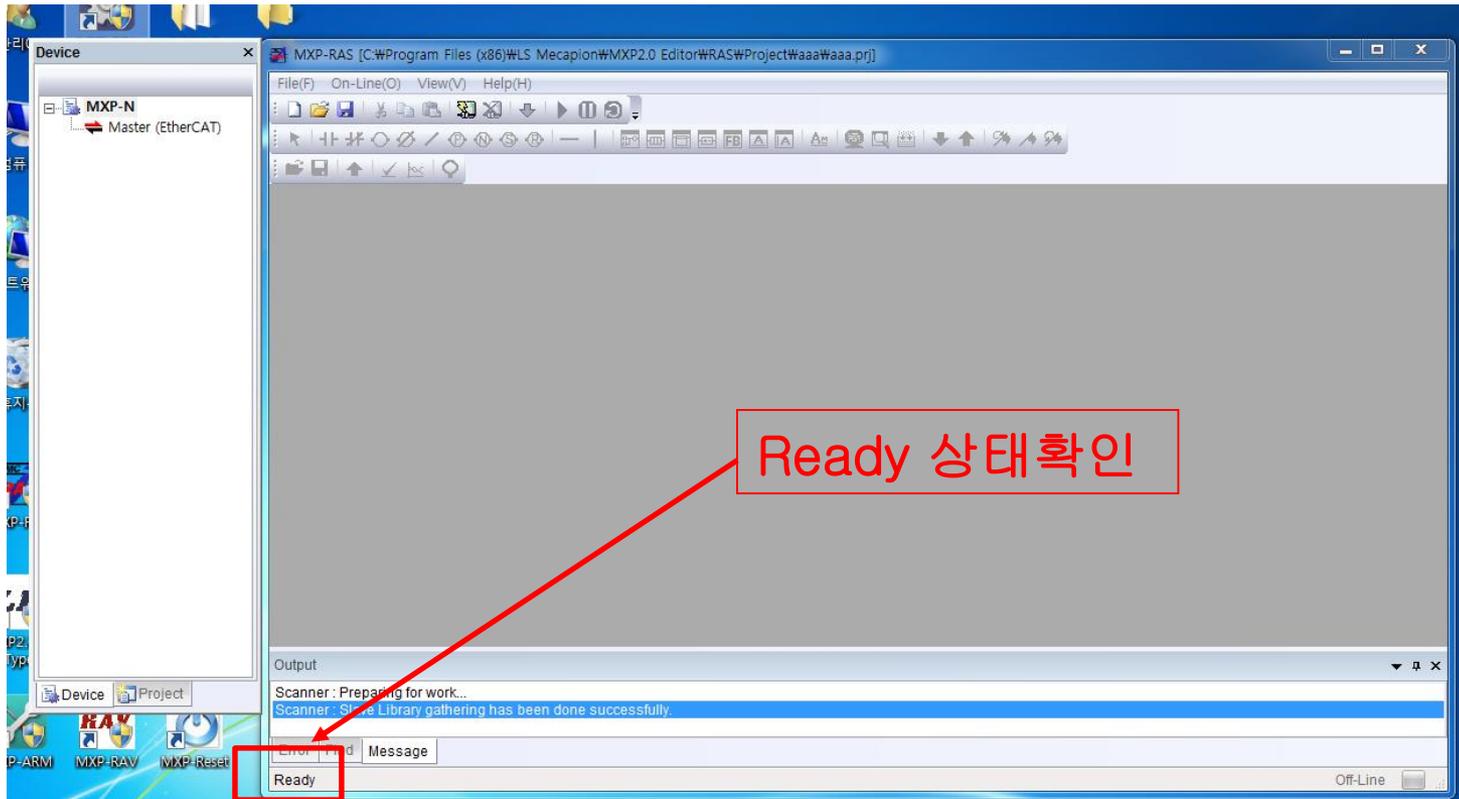
** ENI 파일 제작 (Slave 의 상태정보를 등록)



■ MXP-RAS 실행 - ENI 파일제작

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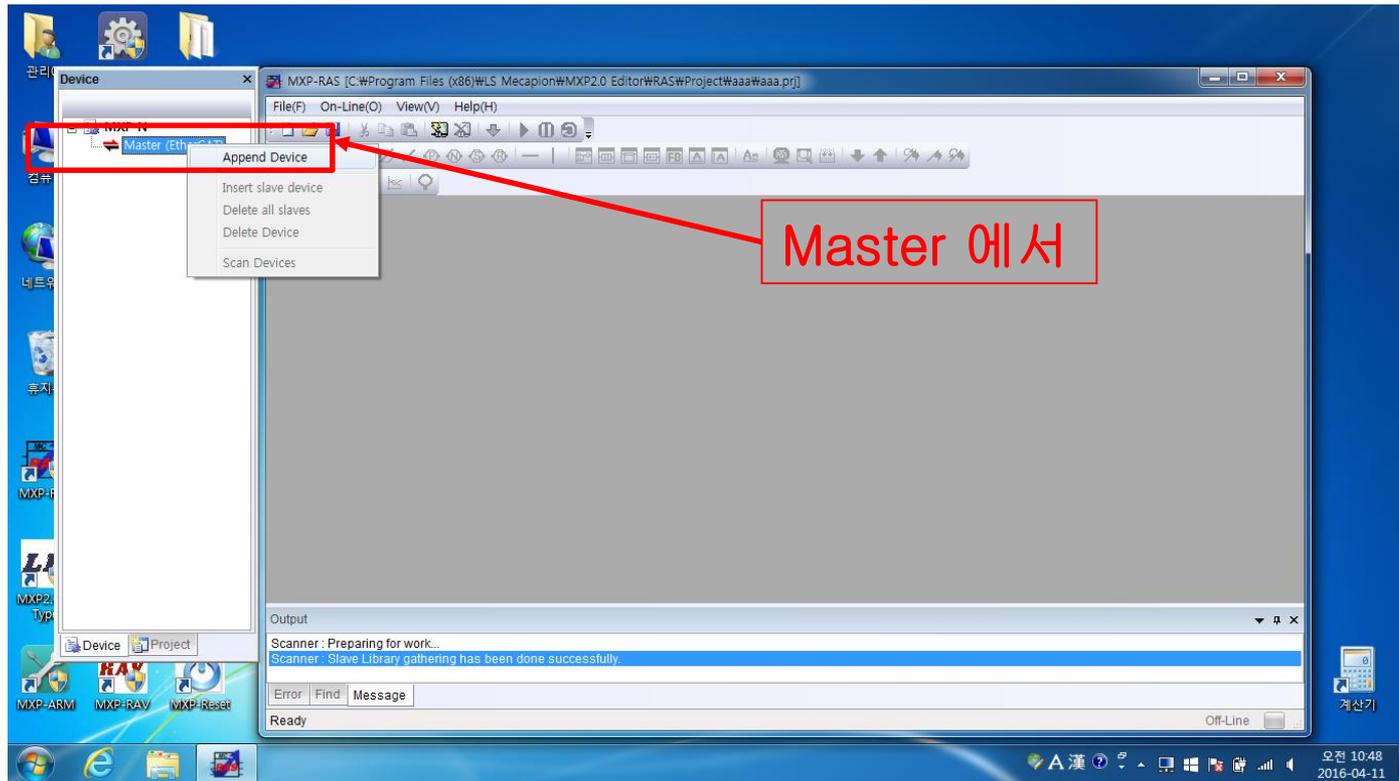
- MXP-RAS 실행 후 하기 Ready 상태 확인.
- Ready PC 환경에 따라 일부 지연이 될수 있어 반드시 Ready 확인 후 다음 순서를 진행한다.



■ MXP-RAS 실행 - ENI 파일제작

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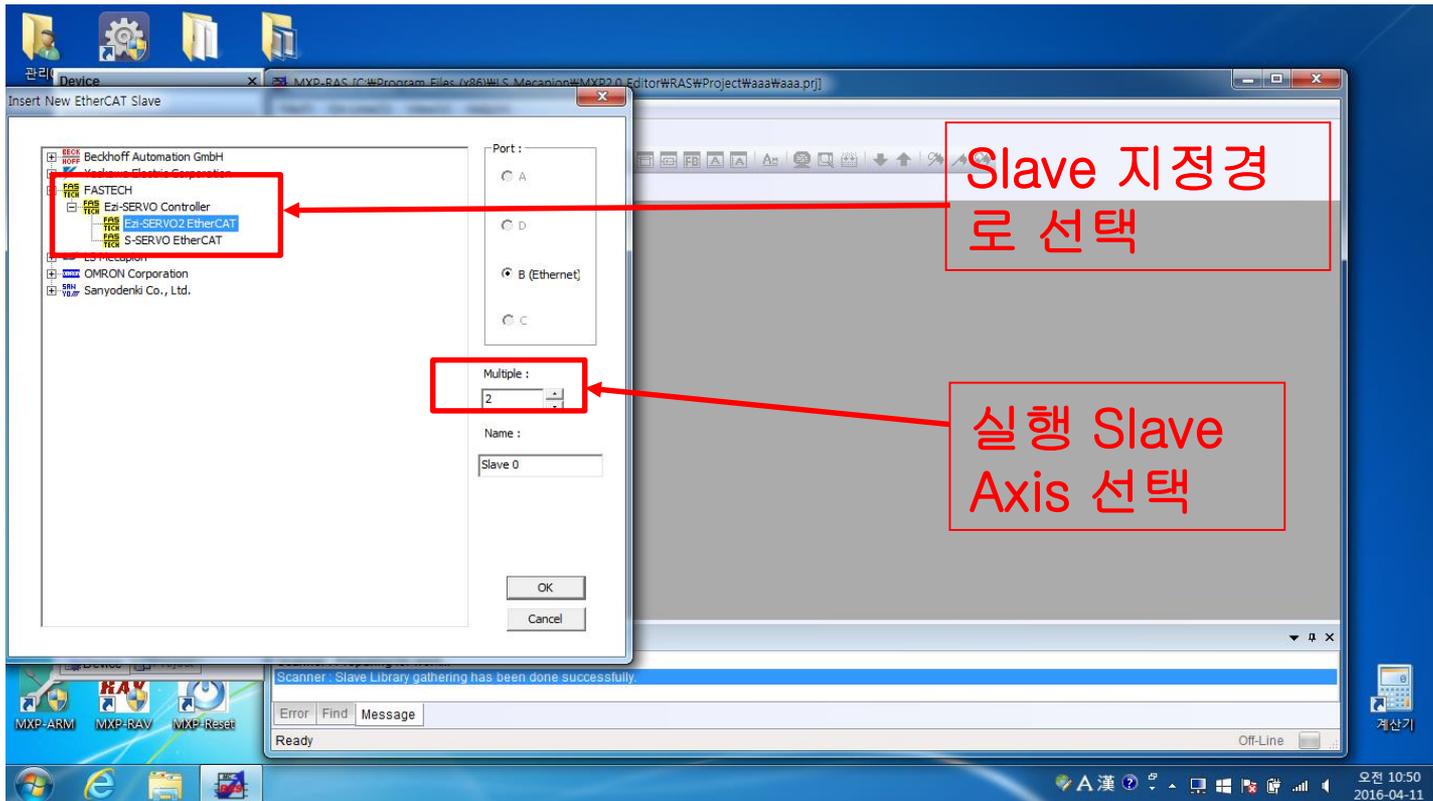
- 활성화 된 Master(EtherCAT) 에서 마우스 오른쪽 클릭.
- Append Device 선택.



■ MXP-RAS 실행 - ENI 파일제작

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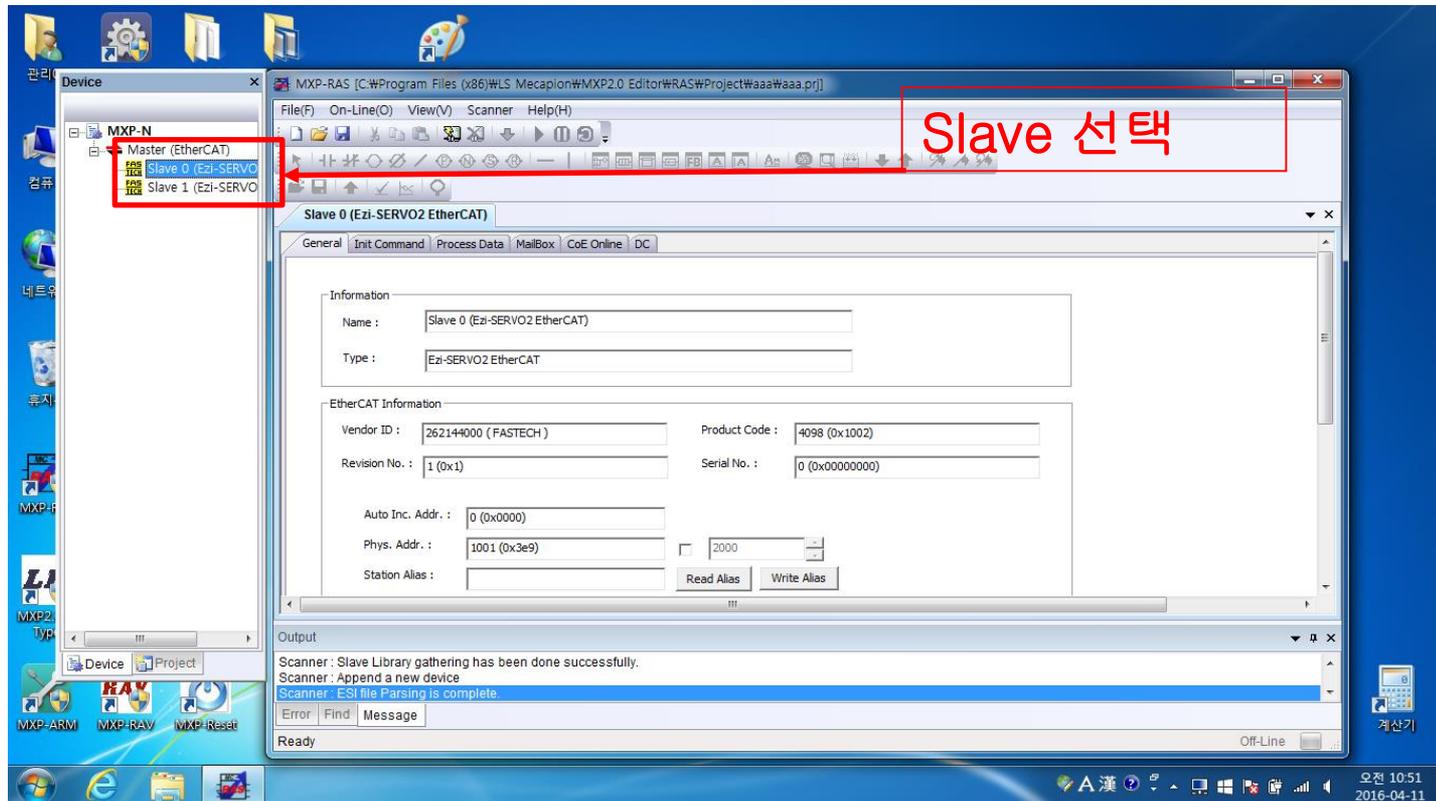
- 활성화 된 FASTECH -> Ezi-SERVO Controller -> Ezi-SERVO2 EtherCAT 와 같이 경로를 지정 후 연결된 Slave Axis 를 선택한다.



MXP-RAS 실행 - ENI 파일제작

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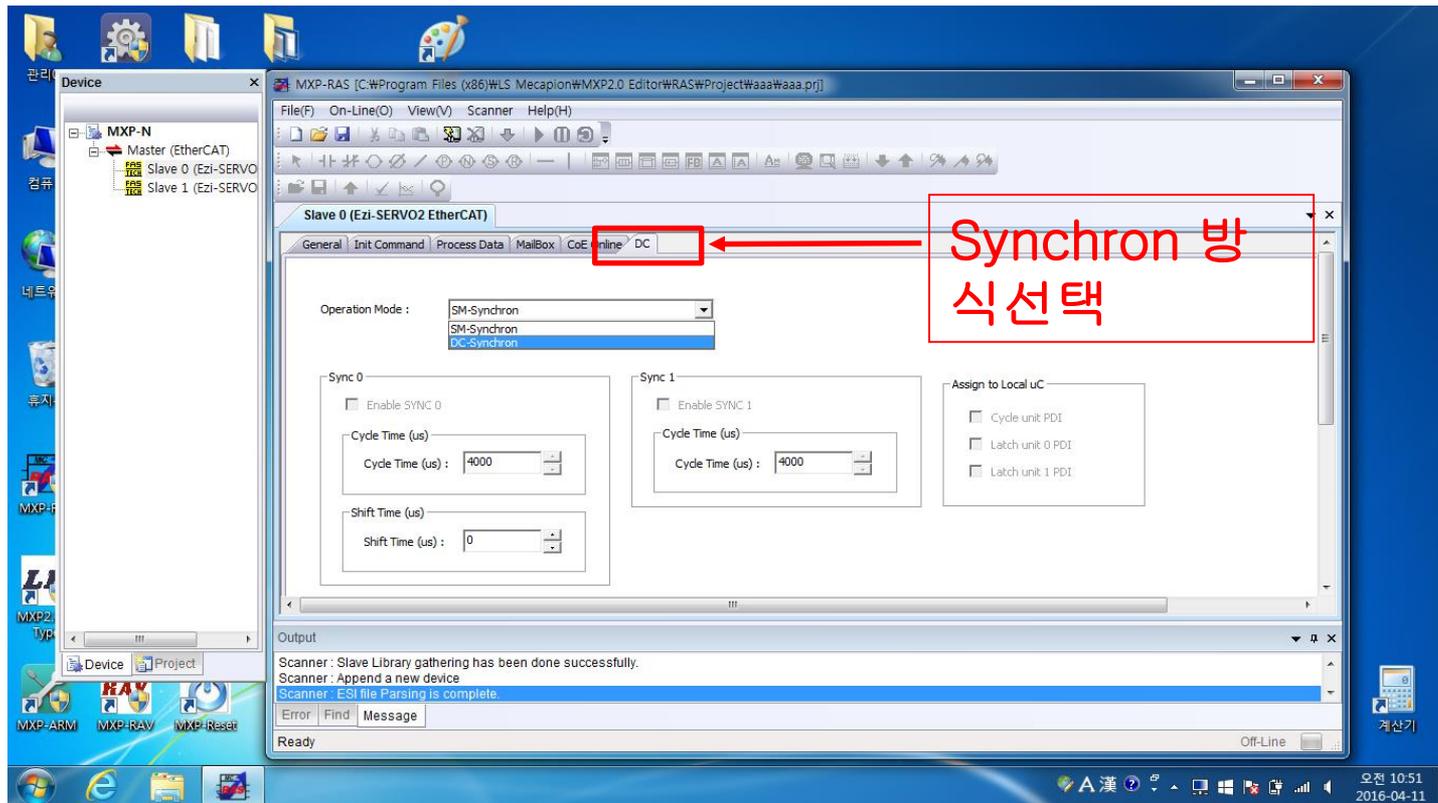
Slave 별 Mode 셋팅



MXP-RAS 실행 - ENI 파일제작

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- ❑ SM Synchron, DC Synchron 방식 중 DC Synchron 선택.
- ❑ Slave 0, 1 모든 Slave 동일 설정.



- Process Data 에서 PDO Mapping 을 위해 PDO List 에서 Input 설정 후 하단의 PDO Contents 기본 설정 값 확인.

The screenshot shows the MXP-RAS software interface. The 'Process Data' tab is selected. The 'PDO Lists' section shows a table with the following data:

Index	Size	Name	EM	Flag
0x1A00	6.0	Inputs	3	
0x1A04	6.0	Outputs	2	

The 'PDO Contents (0x1A00):' section shows a table with the following data:

Index	Size	Units	Name	Type
0x6041:: 0	2.0	0.0	Status Word	UINT
0x6064:: 0	4.0	2.0	Actual Position	DINT
		6.0		

Red boxes highlight the 'Process Data' tab, the 'PDO List' table, and the 'PDO Contents' table. A red callout box with the text 'Input 설정 ** 설정 기본값 확인가능' points to the 'Inputs' row in the PDO List table.

MXP-RAS 실행 - ENI 파일제작

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- Input PDO Mapping을 위해 하단의 PDO Contents 에서 오른쪽 마우스 클릭.
- Insert Item 클릭.

The screenshot shows the MXP-RAS software interface. On the left, a tree view shows the device hierarchy: MXP-N (Master EtherCAT) containing Slave 0 (Ezi-SERVO) and Slave 1 (Ezi-SERVO). The main area displays the PDO List and PDO Contents (0x1A00) for Slave 0. The PDO Contents table has columns for Index, Size, Offs, Name, and Type. A context menu is open over the table, with 'Insert Item' highlighted. A red arrow points from a text box 'Insert Item 클릭' to the 'Insert Item' menu item.

Index	Size	Name	SM	Flag
0x1A00	6.0	Inputs	3	
0x1600	6.0	Outputs	2	

Index	Size	Offs	Name	Type
0x6041: 0	2.0	0.0	Status Word	UINT
0x6064: 0	4.0	2.0	Actual Position	DINT
		6.0		

□ Object Dictionary 선택. (ex. Digital Input 선택)

** 주의사항 : Object Dictionary 선택시 Input, Output 이 동시에 창에 나타나며, Input 명령을 Output 명령으로 할당시 통신이 정상적으로 이루어 지지 않음.

The screenshot shows the MXP-RAS software interface. The 'Insert New Pdo Entry' dialog box is open, displaying the 'Object Dictionary' list. The 'Digital inputs' entry is selected and highlighted in blue. A red box surrounds the 'Object Dictionary' list, and a red arrow points from a callout box to the 'Digital inputs' entry. The callout box contains the text '사용에 필요한 Object Dictionary 선택'.

Index	SubIdx	Name
0x60BA	0	Touch probe 1 positive value
0x60BB	0	Touch probe 1 negative value
0x60BC	0	Touch probe 2 positive value
0x60BD	0	Touch probe 2 negative value
0x60D5	0	Touch probe 1 positive edge counter
0x60D6	0	Touch probe 1 negative edge counter
0x60D7	0	Touch probe 2 positive edge counter
0x60D8	0	Touch probe 2 negative edge counter
0x60F4	0	Following error actual value
0x60FD	0	Digital inputs
0x60FE	1	Physical outputs
0x60FE	2	Bit mask

MXP-RAS 실행 - ENI 파일제작

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□ 같은 방법으로 Input 에 필요한 PDO 를 선택한다.

The screenshot shows the MXP-RAS software interface. The main window displays the configuration for 'Slave 0 (Ezi-SERVO2 EtherCAT)'. On the left, a 'Device' tree shows the hierarchy: MXP-N > Master (EtherCAT) > Slave 0 (Ezi-SERVO). The 'PDO List' table shows the following data:

Index	Size	Name	SM	Flag
0x1A00	10.0	Inputs	3	
0x1600	6.0	Outputs	2	

Below this, the 'PDO Contents (0x1A00)' table is shown, with the 'Digital inputs' row highlighted by a red box:

Index	Size	Offs	Name	Type
0x6041::0	2.0	0.0	Status Word	UINT
0x6064::0	4.0	2.0	Actual Position	DINT
0x60FD::0	4.0	6.0	Digital inputs	LDINT
		10.0		

A red arrow points from a text box containing the Korean text '설정된 PDO 값 확인' (Check the set PDO values) to the highlighted 'Digital inputs' row in the 'PDO Contents' table.

been done successfully.

Off-Line

오전 10:54
2016-04-11

■ MXP-RAS 실행 - ENI 파일제작

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□ 같은 방법으로 Input 에 필요한 PDO 를 선택한다.

**** ex) Digital input / Position actual value / Velocity actual value 선택**

The screenshot shows the MXP-RAS software interface. The 'PDO List' table is as follows:

Index	Size	Name	SM	Flag
0x1A00	18.0	Inputs	3	
0x1600	6.0	Outputs	2	

The 'PDO Contents (0x1A00)' table is highlighted with a red box:

Index	Size	Offs	Name	Type
0x6041:: 0	2.0	0.0	Status Word	UINT
0x6064:: 0	4.0	2.0	Actual Position	DINT
0x60FD:: 0	4.0	6.0	Digital Inputs	UDINT
0x6064:: 0	4.0	10.0	Position actual value	DINT
0x606C:: 0	4.0	14.0	Velocity actual value	DINT

A red arrow points from the text box '설정된 PDO 값 확인' to the highlighted PDO Contents table.

□ Input 설정 완료 후 Output 셋팅을 위해 상단의 PDO List 클릭.

The screenshot shows the MXP-RAS software interface. The 'Slave 0 (Ezi-SERVO2 EtherCAT)' window is active. On the left, a tree view shows the device hierarchy: MXP-N, Master (EtherCAT), Slave 0 (Ezi-SERVO), and Slave 1 (Ezi-SERVO). The main area displays the 'PDO List' table, which is highlighted in blue. A red box surrounds the 'Outputs' row, and a red arrow points to it from a text box that says 'Input 완료 후 Output 설정'. Below the PDO List table is the 'PDO Contents (0x1600)' table, which shows the configuration for the selected PDO.

Index	Size	Name	SM	Flag
0x1A00	16.0	Inputs	3	
0x1600	6.0	Outputs	2	

Index	Size	Offs	Name	Type
0x6040:: 0	2.0	0.0	Control Word	UINT
0x607A:: 0	4.0	2.0	Target Position	DINT
		6.0		

■ MXP-RAS 실행 - ENI 파일제작

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- PDO Contents 에서 오른쪽 마우스 클릭.
 - 필요 Output 선택 후 List 확인
- ** 주의사항 : Input 영역의 Contents 클릭 시 통신이 안됨.**

The screenshot shows the MXP-RAS software interface for configuring Slave 0 (Ezi-SERVO2 EtherCAT). The PDO List table is visible, with the 'Outputs' entry selected. Below it, the PDO Contents (0x1600) table is highlighted with a red box. A red arrow points from the text 'Output 설정' to this table.

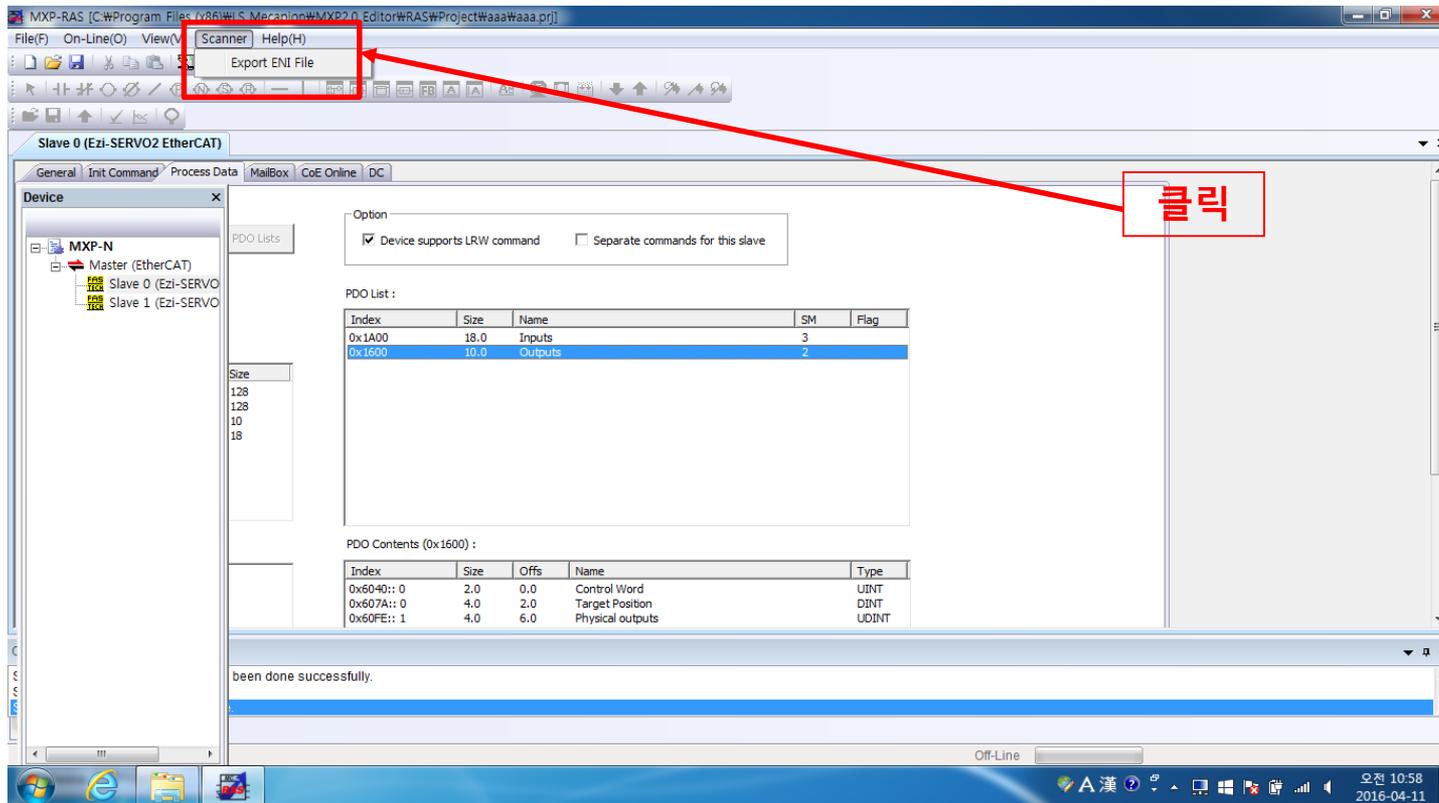
Index	Size	Name	SM	Flag
0x1A00	18.0	Inputs	3	
0x1600	10.0	Outputs	2	

Index	Size	Offs	Name	Type
0x6040:: 0	2.0	0.0	Control Word	UINT
0x607A:: 0	4.0	2.0	Target Position	DINT
0x60FE:: 1	4.0	6.0	Physical outputs	UDINT

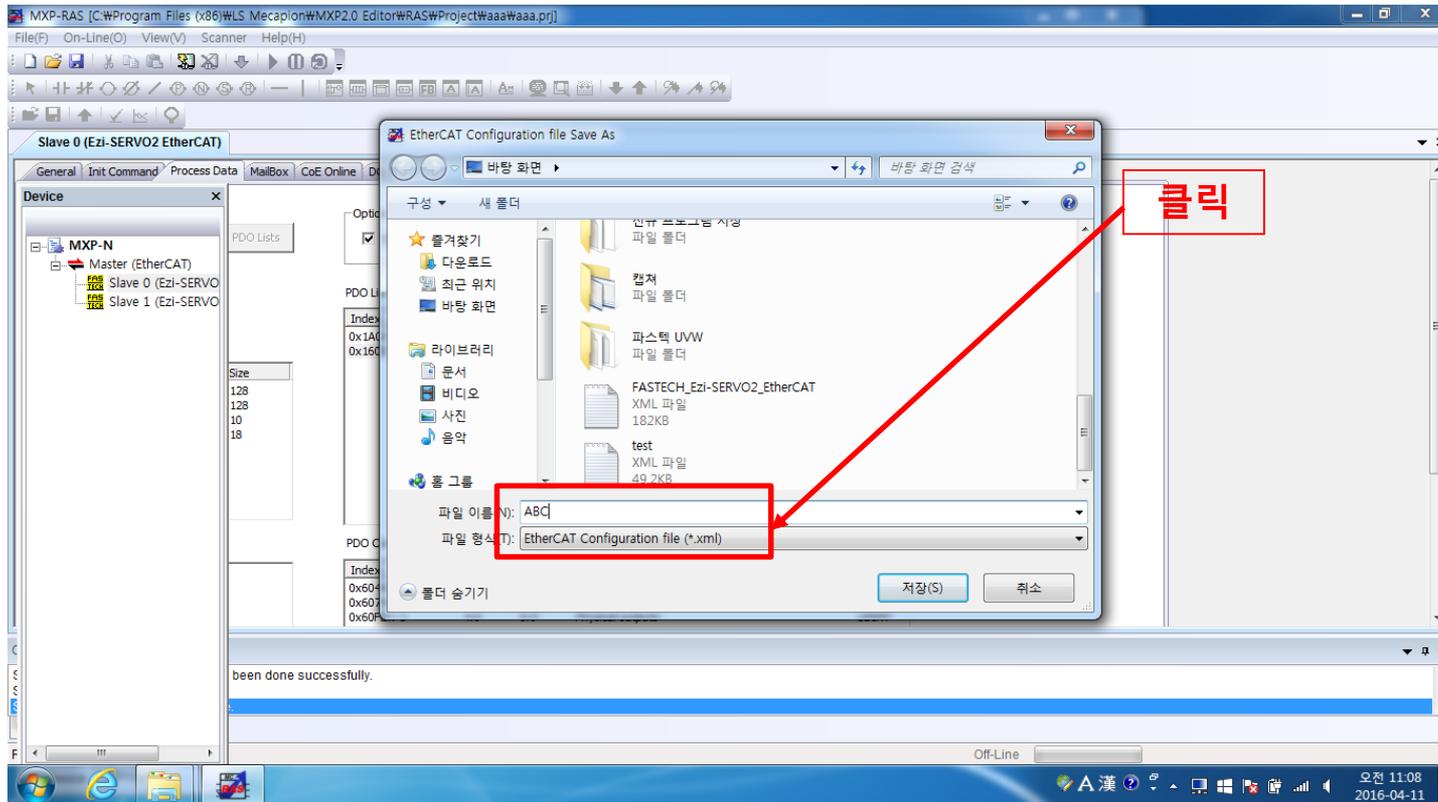
■ MXP-RAS 실행 - ENI 파일제작

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- PDO Mapping 완료 후, ENI 파일로 저장을 위해 상단의 Scanner 클릭.
- Export ENI File 클릭.



□ EtherCAT Configuration file (*.xml) 형식으로 ENI 파일저장

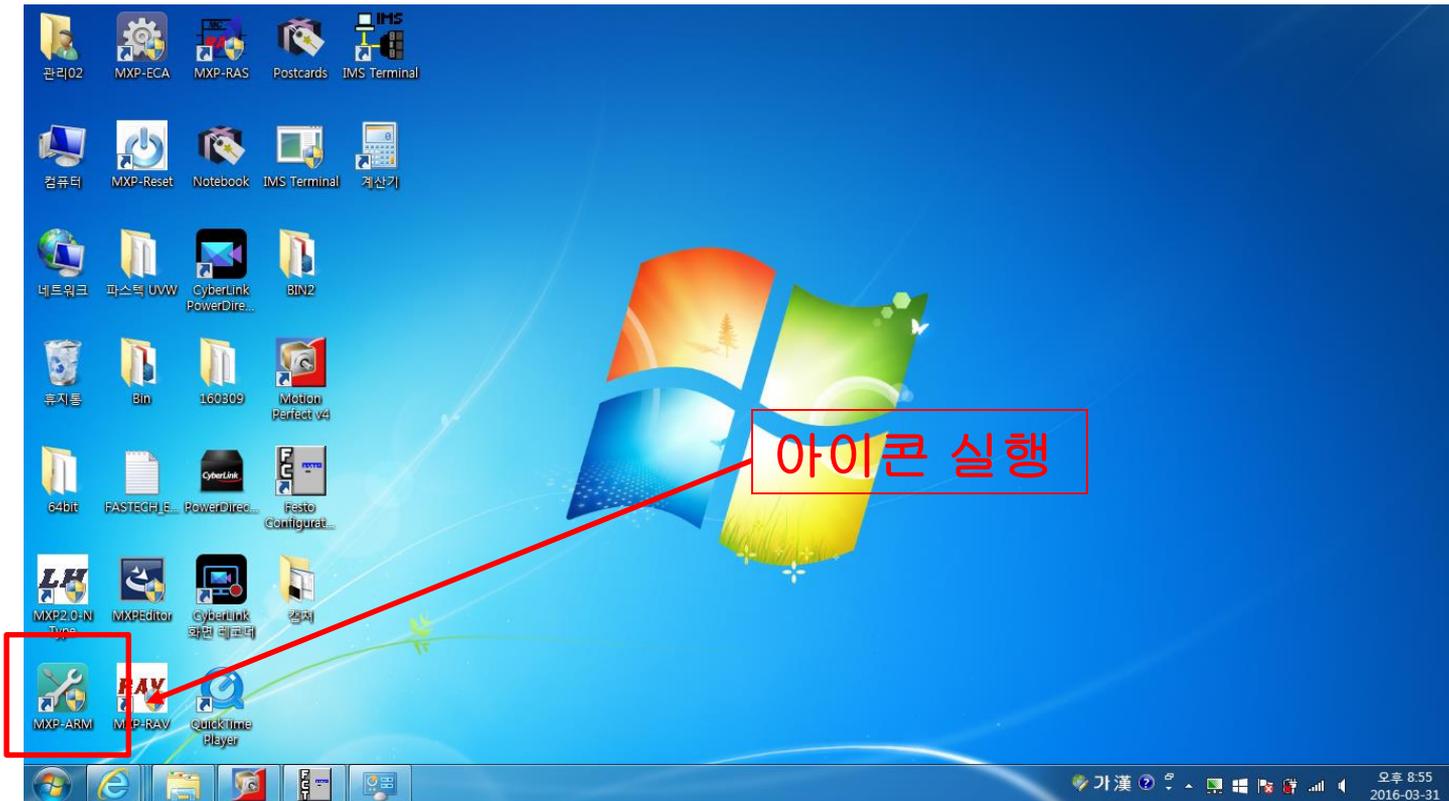


■ MXP-ARM 실행

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□ MXP-ARM 을 구매하여 PC 설치 후 '사용자 권한' 으로 실행한다.

** Trial Version 도 지원을 함.

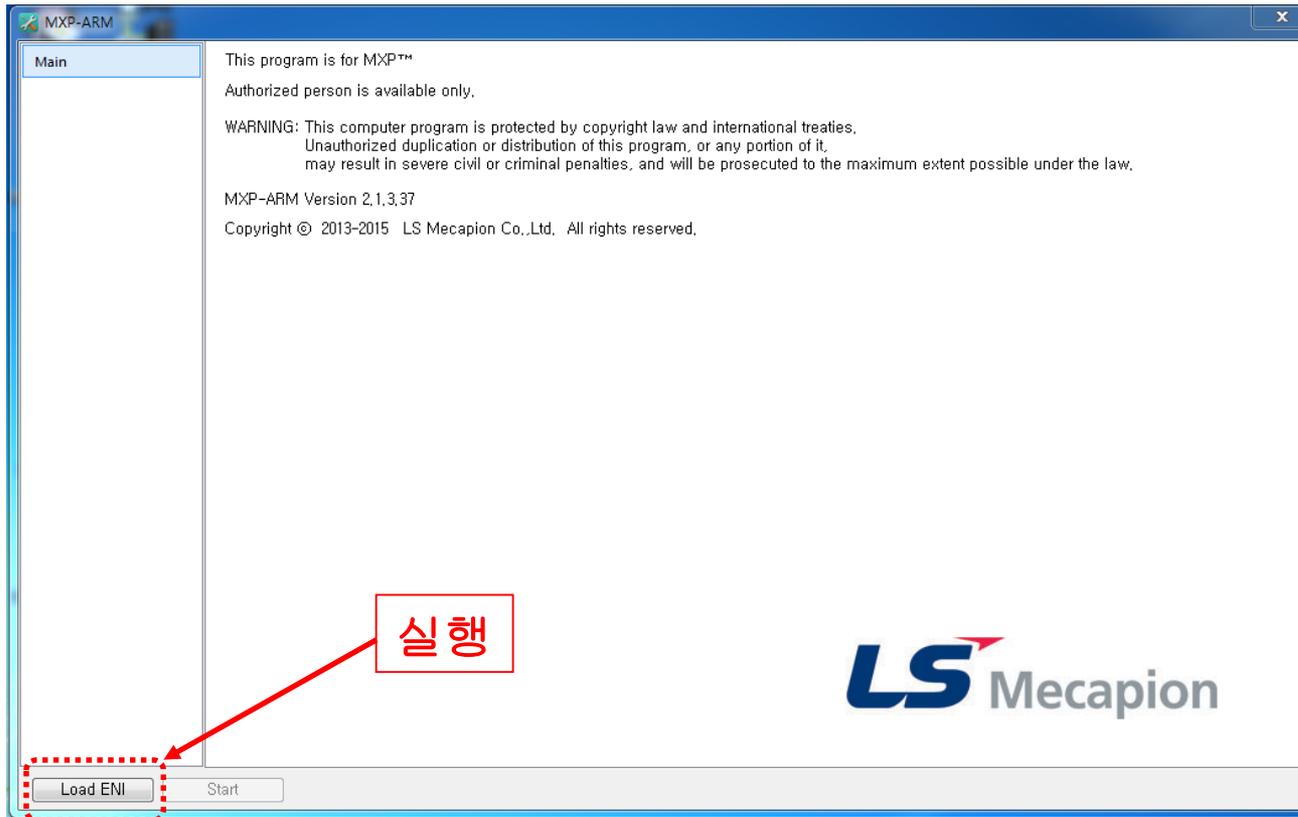


Load ENI

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하단의 'Load ENI' 실행

- ** Slave 해당 축 및 설비 App. 환경이 변경될때 마다 새로제작 필요
- ** 사전 제작된 ENI 파일을 Load 한다.

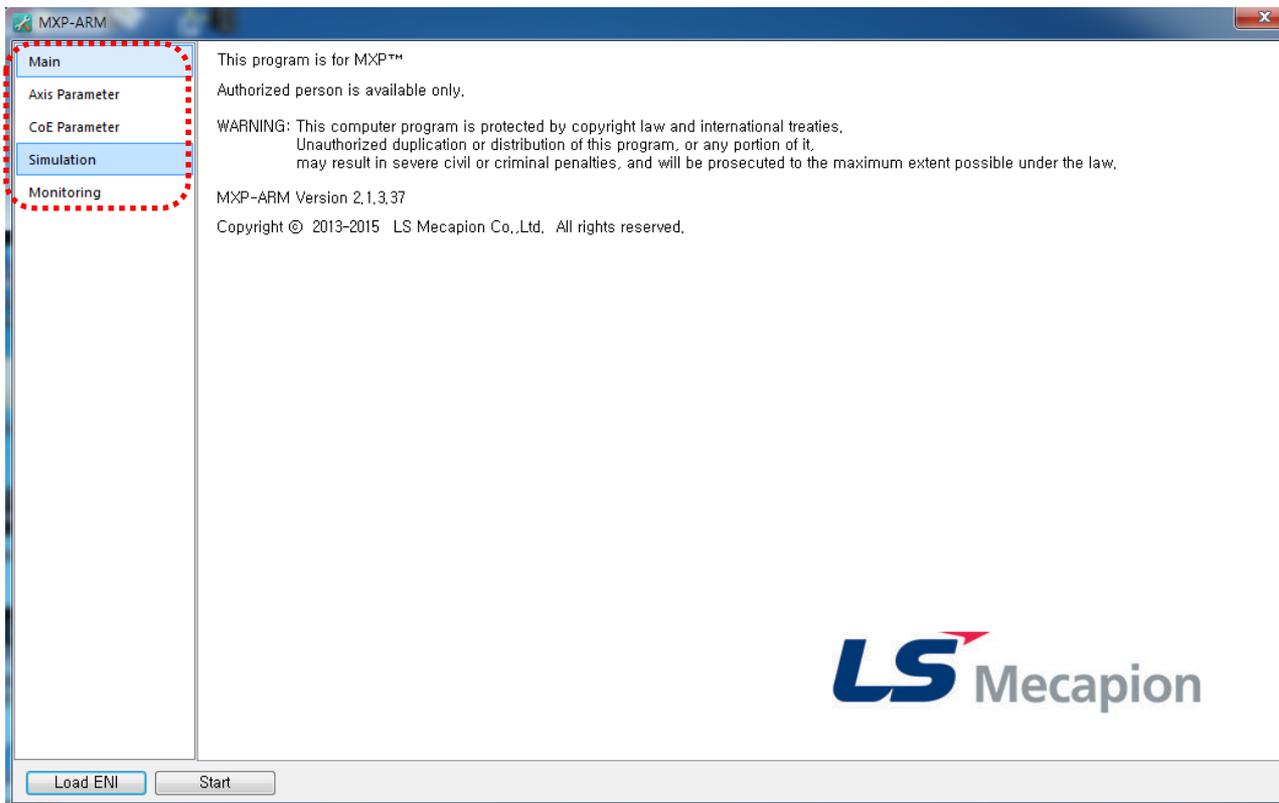


통신연결 상태 확인

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- MXP Master, Ezi-SERVOII-EC Slave 정상 연결시 좌측 상태처럼 5개의 카테고리가 생성.

** Salve 전원 인가 및 Cable 등이 정상 연결되지 않을 경우 카테고리 생성 안됨. (점검 후 재실행 필요)



1. Axis Parameter

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- ❑ Axis Parameter 실행시 Node devices 가 생성되며, Devices 연결된 Master 정보 및 검색된 Slave 확인이 가능.

** 미리 제작된 3축 UVW DEMO 의 Slave Drive 를 Scan 함.

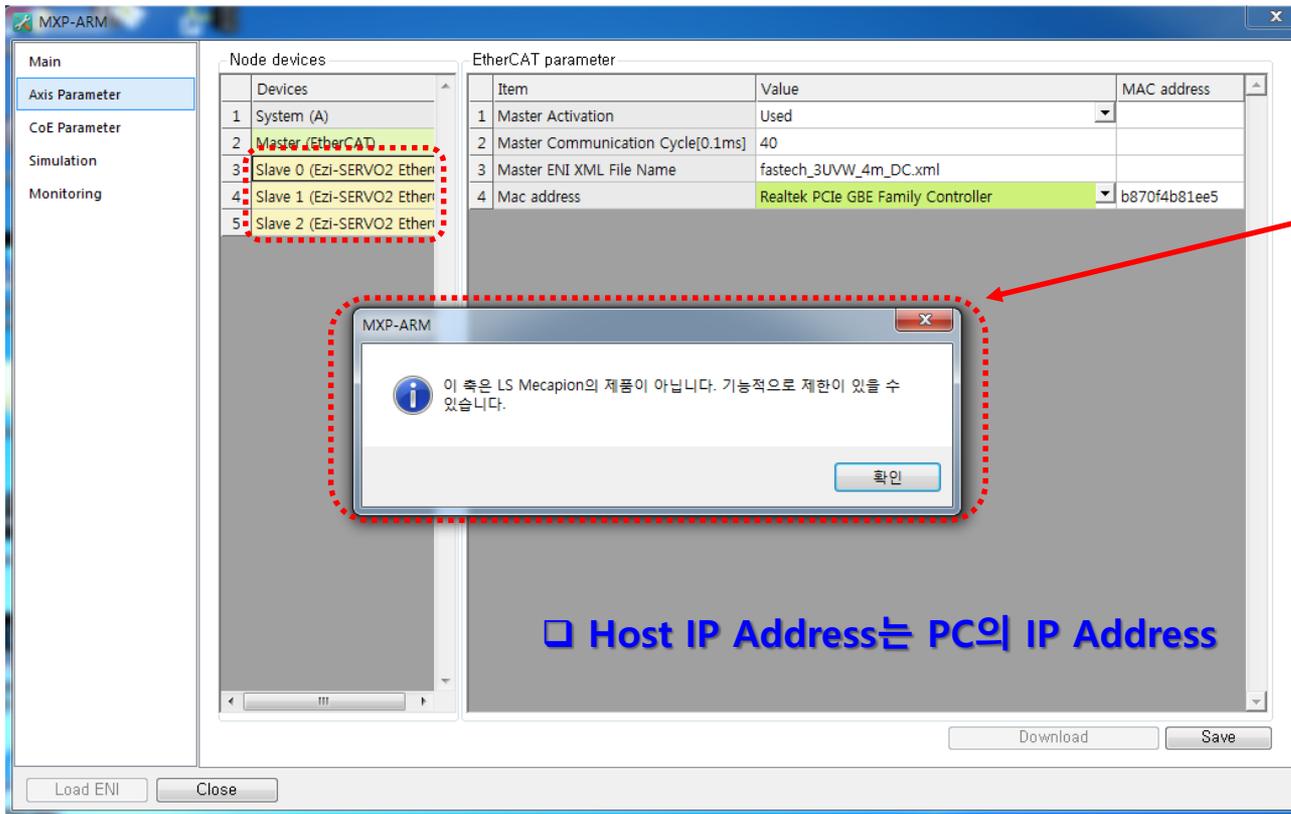
Item	Value	MAC address
1 Master Activation	Used	
2 Master Communication Cycle[0.1ms]	40	
3 Master ENI XML File Name	fastech_3UVW_4m_DC.xml	
4 Mac address	Realtek PCIe GBE Family Controller	b870f41831ee5

Mac address :
사용 PC의 Lan Card
정보 확인이 가능

1. Axis Parameter [Slave Scan]

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- Scan 된 Slave 를 실행시, 하기 그림과 같이 경고 창이 생성되며, 이는 FASTECH 의 Ezi-SERVOII-EtherCAT Slave 사용시 항상 뜨는 창으로 Test 에 있어서는 문제가 되지 않음.



LS MECAPION Slave
가 아닌 타사제품 사용
시 뜨는 경고 창

□ Host IP Address는 PC의 IP Address

1. Axis Parameter

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- XML 파일을 정보로 Application 에 맞는 ENI 파일 사전 제작. (정보확인)
Ballscrew 등 기구정보, Motor Encoder Resolution 확인가능

**** ENI File 제작부분은 향후 업데이트 (학습중)**

MXP-ARM

Main

- Axis Parameter
- CoE Parameter
- Simulation
- Monitoring

Node devices

Type	Item	Value	Default	Unit
	General			
100	B Activation	Used	Unused	
101	W System Position Unit	mm	mm	
102	W System Velocity Unit	/s	/s	
103	W Position Precision Unit	1	1	
104	W Velocity Precision Unit	1	1	
105	L Acceleration	10000	10000	FU^2
106	L Deceleration	10000	10000	FU^2
107	L Jerk Limit	50000	50000	FU^3
108	L Servomotor Gear Ratio	1	1	
109	L Machine Gear Ratio	1	1	
110	L Travel Distance Per Machine Rotation	1	10	PU/Rev
111	L Encoder Resolution	16000	524288	
112	W Axis Control Mode	C.S.P	C.S.P	
113	B Modulo Axis Set	Unused	Unused	
114	L Modulo Position Max	1	1	PU
	Safety			
200	L Max Speed Setting	500	500	FU
201	L Rated Motor Speed Setting	3000	3000	r/min
202	B Software Limit Enable	Unused	Unused	
203	L Negative Software Limit	0	0	PU
204	L Positive Software Limit	0	0	PU
205	R Hardware Limit Enable	Used	Unused	

Download Save

Load ENI Close

2. COE Parameter

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□ FASTECH Ezi-SERVOII-EtherCAT Drive COE 정보확인

The screenshot shows the MXP-ARM software interface. On the left, the 'Main' menu has 'CoE Parameter' selected. The 'Node Axis' section lists three slave devices. The central table displays COE parameters for ENI Rev: 1, ESI Rev: 1. A red dashed box highlights the 'Value' column and the 'All Axis Dump' button. Red arrows point from the text annotations to the 'Value' column and the 'All Axis Dump' button.

Value	Index	Sub	Item	Type	
<input type="checkbox"/>	0	0X1000	00 Device type	UDINT	RO
<input type="checkbox"/>	0	0X1001	00 Error register	USINT	RO
<input type="checkbox"/>	0	0X1008	00 Device name	STRING...	RO
<input type="checkbox"/>	0	0X1009	00 Hardware version	STRING...	RO
<input type="checkbox"/>	0	0X100A	00 Software version	STRING...	RO
<input type="checkbox"/>	0	0X1010	00 Store parameters	DT1010	RO
<input type="checkbox"/>	0	0X1011	00 Restore default parameters	DT1011	RO
<input type="checkbox"/>	0	0X1018	00 Identity	DT1018	RO
<input type="checkbox"/>	0	0X10F0	00 Backup parameter handling	DT10F0	RO
<input type="checkbox"/>	0	0X10F1	00 Error Settings	DT10F1	RO
<input type="checkbox"/>	0	0X10F3	00 Diagnosis History	DT10F3	RO
<input type="checkbox"/>	0	0X1600	00 RxPDO-Map0	DT1600	RO
<input type="checkbox"/>	0	0X1601	00 RxPDO-Map1	DT1600	RO
<input type="checkbox"/>	0	0X1A00	00 TxPDO-Map0	DT1A00	RO
<input type="checkbox"/>	0	0X1A01	00 TxPDO-Map1	DT1A00	RO
<input type="checkbox"/>	0	0X1C00	00 Sync manager type	DT1C00	RO
<input type="checkbox"/>	0	0X1C12	00 RxPDO assign	DT1C12	RO
<input type="checkbox"/>	0	0X1C13	00 TxPDO assign	DT1C13	RO
<input type="checkbox"/>	0	0X1C32	00 SM output parameter	DT1C32	RO
<input type="checkbox"/>	0	0X1C33	00 SM input parameter	DT1C33	RO
<input type="checkbox"/>	0	0X2001	00 Sensor logics	USINT	RW

Value : Drive 저장정보
읽어오기 전 상태

All Axis Dump :
Drive 저장 정보를
Master PC 로 전달명령

2. COE Parameter

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□ Slave Drive 정보 활성화 및 확인

The screenshot shows the MXP-ARM software interface. On the left, there is a navigation menu with 'CoE Parameter' selected. The main window displays a table of parameters for three slave drives (Slave 0, Slave 1, Slave 2). The table has columns for 'Device', 'Value', 'Index', 'Sub', 'Item', 'Type', and 'RW'. A red dashed box highlights the 'Value' column, and a red arrow points from a text box on the right to this column.

Device	Value	Index	Sub	Item	Type	RW
1 Slave 0 (Ezi-SERVO2 EtherCAT)	0	0X2003	00	Limit stop method	USINT	RW
2 Slave 1 (Ezi-SERVO2 EtherCAT)	16000	0X2005	00	Encoder resolution	UDINT	RO
3 Slave 2 (Ezi-SERVO2 EtherCAT)	1	0X2006	00	Start speed	UINT	RW
	10	0X2007	00	Run current	USINT	RW
	0	0X2008	00	Boost current	USINT	RW
	5	0X2009	00	Stop current	USINT	RW
	126	0X200A	00	Motor number	UINT	RO
	16000	0X200C	00	Reference Resolution	UDINT	RW
	3	0X200D	00	Position control gain	USINT	RW
	0	0X200E	00	In-position mode	USINT	RW
	200	0X2010	00	Brake delay	UINT	RW
	0	0X2011	00	Digital input levels	UINT	RW
	0	0X2012	00	Digital output levels	UINT	RW
	0	0X603F	00	Error code	UINT	RO
	0	0X6040	00	Control Word	UINT	RW
	561	0X6041	00	Status Word	UINT	RO
	2	0X605A	00	Quick stop option code	INT	RW
	0	0X605B	00	Shutdown option code	INT	RW
	1	0X605C	00	Disable operation option code	INT	RW
	2	0X605D	00	Halt option code	INT	RW
	2	0X605E	00	Fault reaction option code	INT	RW

Value : Drive 저장정보
활성화 완료

3. Simulation

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□ 통신 활성화 후 동작 Test

** ALL Servo On 실행

The screenshot shows the MXP-ARM software interface. On the left, a sidebar menu has 'Simulation' highlighted with a red dashed box. The main window is titled 'Axis based on ENI' and shows three axes: 'Slave 0 (Ezi-SERVO2 EtherCAT)', 'Slave 1 (Ezi-SERVO2 EtherCAT)', and 'Slave 2 (Ezi-SERVO2 EtherCAT)'. The 'Slave 0' axis is selected, and its control panel is visible. In the 'System' section, the 'All Servo Motion' button is highlighted with a red dashed box and a red arrow. Below this, the 'Status' section shows 'On/Off' as 'Power Off', 'Vel(mm/s)' as '0.00', 'Pos(mm)' as '-0.00', 'Torque' as '0.00', 'Alarm' as '00', and 'ErrID' as '0'. The 'Motion Status' is 'Disabled'. The 'Auto Motion' section includes 'Mode' (Off), 'Vel(mm/s)' (0.00), 'Pos(mm)' (0.00), 'Common' (Acc/Dec 0.00, Jerk(0~) 0.00), 'Jog Motion' (SPD(mm/s) 0.00), and 'Motor' (Toggle - +). The 'ABS/REL Motion' section has 'Absolute' (Pos(mm) 0.00, Vel(mm/s) 0.00) and 'Relative' (Pos(mm) 0.00, Vel(mm/s) 0.00) options. The 'Motion Monitoring' section shows 'Setting' (SCALE SET), 'Focusing' (Stop, +, -), 'X-axis (s)' (MIN 0, MAX 0), 'Y-axis (Pos Unit/s)' (MIN 0, MAX 0), and 'Pos' (Green) and 'Vel' (Red) indicators. A large green grid is visible at the bottom of the interface.

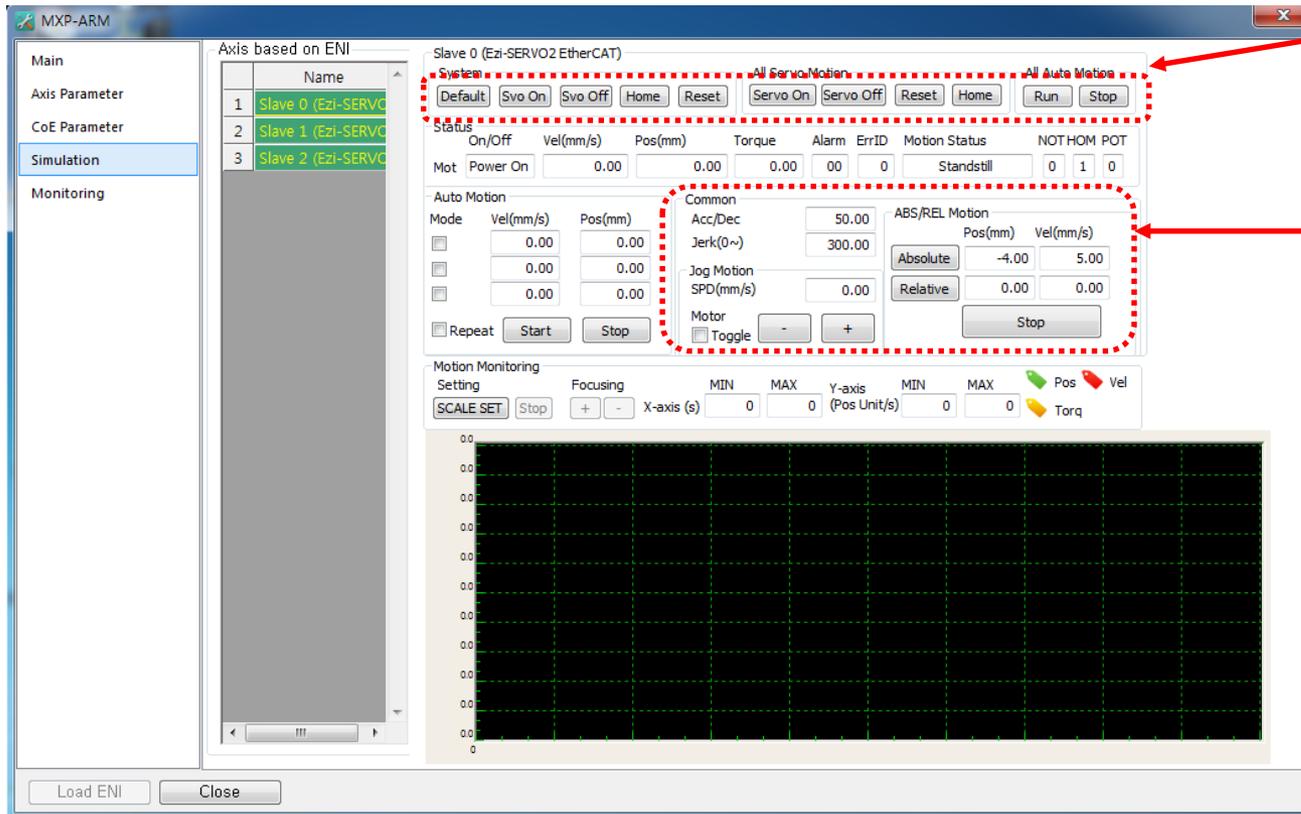
Ezi-SERVOII-EtherCAT
Slave ALL SERVO ON

3. Simulation [명령활성화]

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□ SERVO ON 및 초기 원점복귀 (Home 명령 클릭)

** ENI 파일 제작시 저장된 Screw 정보에 따라 Velocity 입력
동작실습 : Common 단축 이송정보 입력



명령활성화
초기 원점복귀 실행
Home 클릭

Common :
Acc/Dec 입력 50%
Jerk 값 입력 300
Vel 값 입력 5 (2.5회전)
(Screw 2mm)
Absolute 이동

3. Simulation [명령활성화]

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□ Scale Setting 을 통한 Motion Monitoring 가능

** PDO Mapping 에 따른 Position 및 Velocity 그래프 확인 가능

The screenshot displays the MXP-ARM software interface. The 'Motion Monitoring' section is active, showing a 'SCALE SET' button highlighted with a red dashed box. Below this, a graph plots Position (mm) and Velocity (mm/s) over time (0 to 150 seconds). The Position graph shows a step function, and the Velocity graph shows a corresponding trapezoidal profile. Red arrows point from the text 'Scale SET 가능' and 'Position / Velocity 그래프 곡선 확인가능' to the 'SCALE SET' button and the graph respectively.

Scale SET 가능

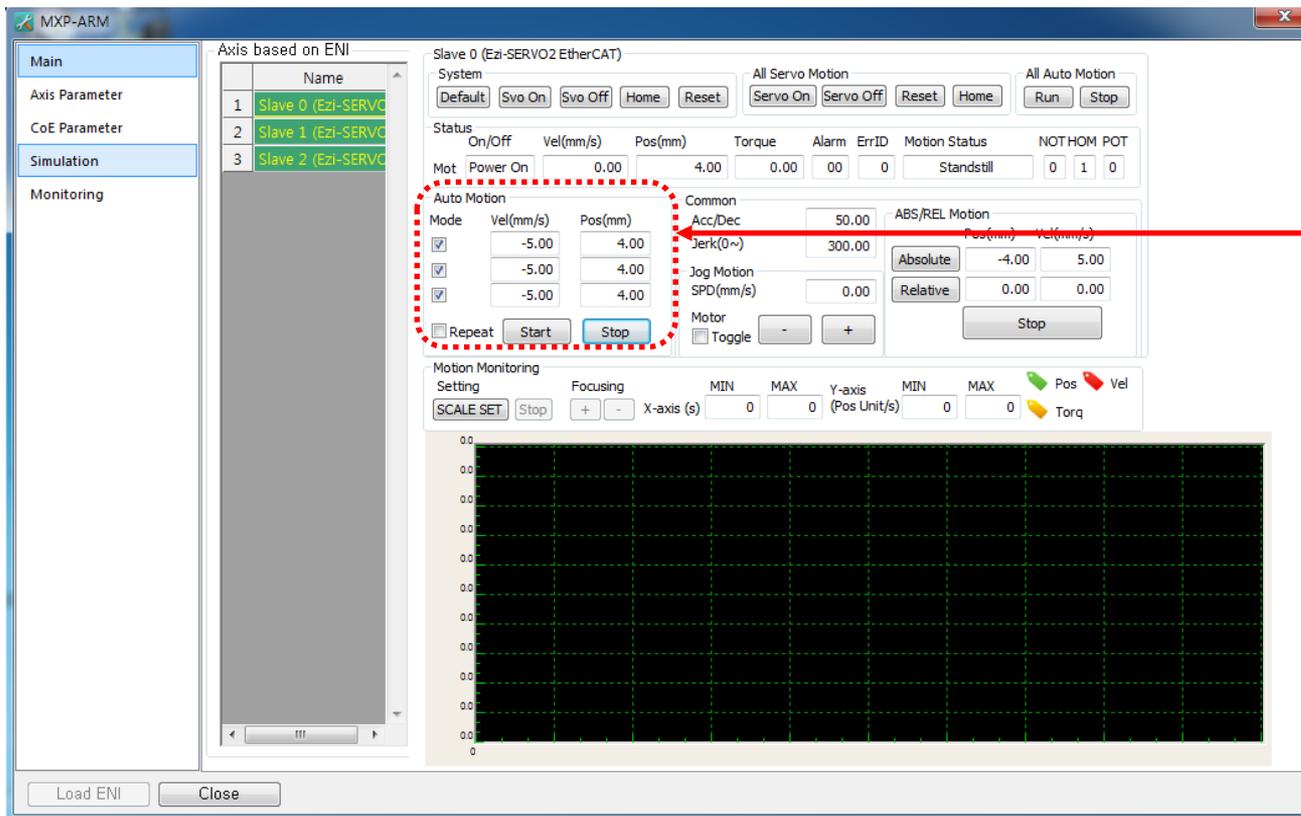
Position / Velocity
그래프 곡선 확인가능

3. Simulation [다축이송]

Confidential

□ 다축 CSP 운전 (각 Mode 체크 후 Vel, Pos 값 입력)

** Auto Motion 를 통한 Repeat Test 가능



Auto Motion :
다축 Repeat 실행
(CSP 설정)

4. Monitoring

Confidential

□ Monitoring 을 통한 Alarm History 확인 가능

** Alarm 발생시 자동저장 기능

The screenshot displays the MXP-ARM software interface. On the left, a navigation menu includes 'Main', 'Axis Parameter', 'CoE Parameter', 'Simulation', and 'Monitoring', with 'Monitoring' highlighted. The main area is divided into three sections: 'Status', 'EtherCAT Status', and 'Alarm History'. The 'Status' table shows various parameters like Heartbeat, Creation, Setting time, Current time, Minimum time, Maximum time, Current operation time, and Max operation time across different modules (Main, Motion, Scheduler, Modbus, EtherCAT / IO). The 'EtherCAT Status' table shows the state of the system and three slave units (Slave 0, 1, 2) across four ports (Port 3, 2, 1, 0). The 'Alarm History' table shows a list of alarm events with their descriptions and error codes.

Item	Main	Motion	Scheduler	Modbus	EtherCAT / IO
1 Heartbeat	2874	2871	2871	2874	2870
2 Creation	Created	Created	Created	Created	Created
3 Setting time [ms]	-	4.000000	1.000000	-	4.000000 / 4.000000
4 Current time [ms]	-	3.957561	1.006251	-	4.069963 / 4.054813
5 Minimum time [ms]	-	2.035470	0.002444	-	0.807835 / 2.905371
6 Maximum time [ms]	-	6.001339	1.489583	-	8.129664 / 5.016592
7 Current operation time [ms]	-	0.006353	0.002000	-	0.001466 / 0.140259
8 Max operation time [ms]	-	0.122440	0.224000	-	0.122000 / 2.003126

Devices	State	Port 3	Port 2	Port 1	Port 0
1 System	Run	4468 / 2180	Chk HB = 3769	DC+ = 5	DC- = 11
2 Master (EtherCAT)	OP	DCF = 0	DC Pos = 0.000000	DC itv = 0.000000	Verbose = 0
3 Slave 0 (Ezi-SERVO2 EtherCAT)	OP	No link, Close	No link, Close	Link, Open	Link, Open
4 Slave 1 (Ezi-SERVO2 EtherCAT)	OP	No link, Close	No link, Close	Link, Open	Link, Open
5 Slave 2 (Ezi-SERVO2 EtherCAT)	OP	No link, Close	No link, Close	No link, Close	Link, Open

Item	Description	Error Code
13 Alarm History [13:20]	-	0
14 Alarm History [14:20]	-	0
15 Alarm History [15:20]	-	0

실시간 Motion 및 EtherCAT I/O 정보 변화 확인가능

우리는 40년 Stepping Motor의 역사를 바꾸는 주인공입니다!!



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