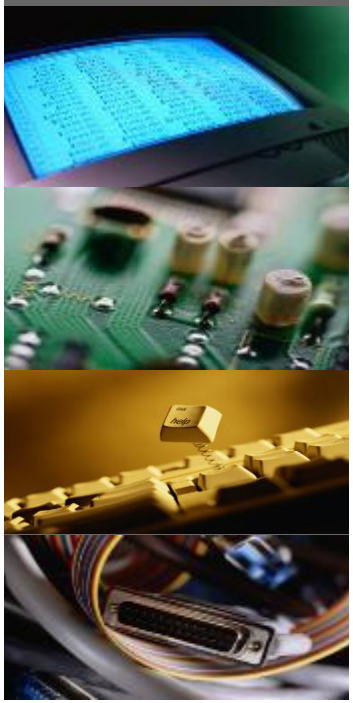


iX7M Servo Drive

23rd. June, 2025

LS Mecapion

List

1. Features and Advantages of IX7M

2. Introduction to the IX7M Drive

3. I/O Configuration Guide

4. Protection Parameter Description

5. Communication Protocol and PC Program

1. Features and Advantages of IX7M

◆ iX7M EtherCAT Servo Drive (Multi-Axis Servo Drive)

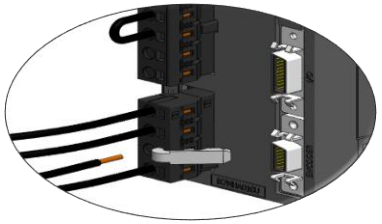
Auto tuning enhancement
- **ONE parameter tuning(Hunting)**
- **Vibration Control**
- **FRF and adopted filter**

Communication
- EtherCAT 125us
- Built-in Web Server
- Modbus TCP
- Ethernet Switch IP

Additional Function
- **Encoder pulse output**
- **Variety of USB OTG function**
  - **Drive parameter backup/restore**
    Alarm history back up

Enhanced Diagnostics
- **Predictive maintenance data**
- **Alarm trace**
  - when Alarm **trigger, recorded**
    Time/Date, Max 4 channels

Additional Function
- **Encoder pulse output**
- **Variety of USB OTG function**
  - **Drive parameter backup/restore**
    Alarm history back up



■ EtherCAT fuction

- Min. cycle time 0.125[ms] (30byte/30byte)
- FoE fucntion

■ Supports Built-in Webserver

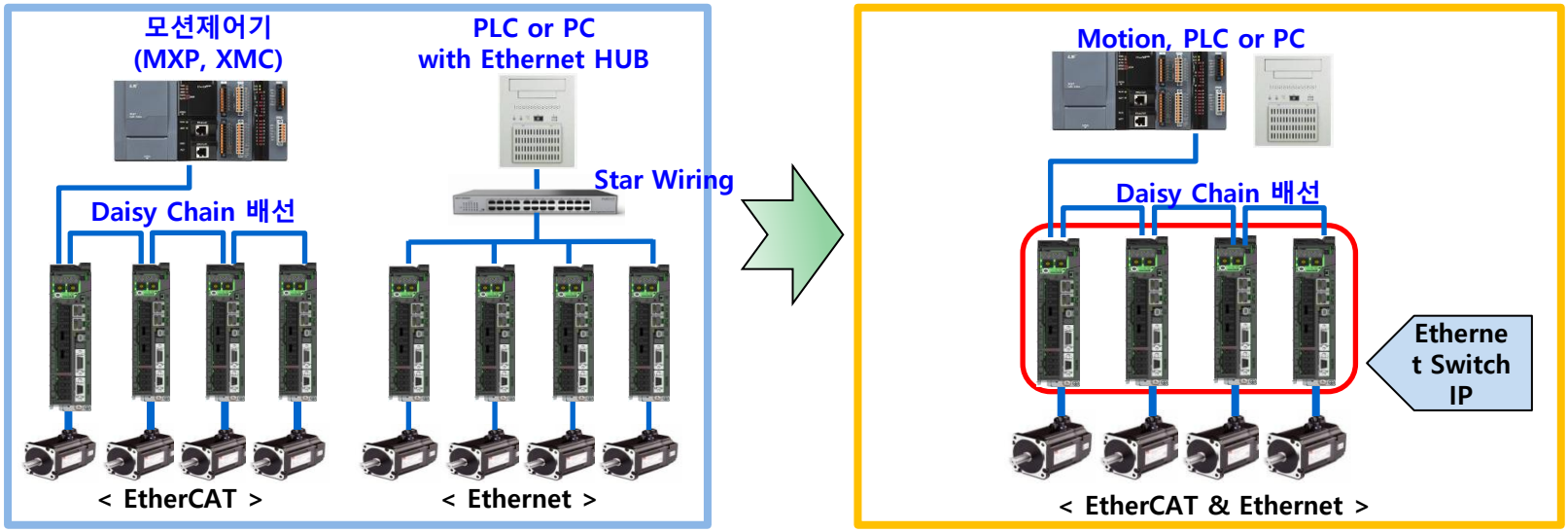
- Built-in web server enables configuration via a web browser without requiring a separate setup program (DriveCM)
- Enhanced remote commissioning capabilities using Ethernet connectivity

■ Supports Modbus TCP

- For applications that do not require high-speed real-time communication
- A separate motion library will be provided to enable simple motion control

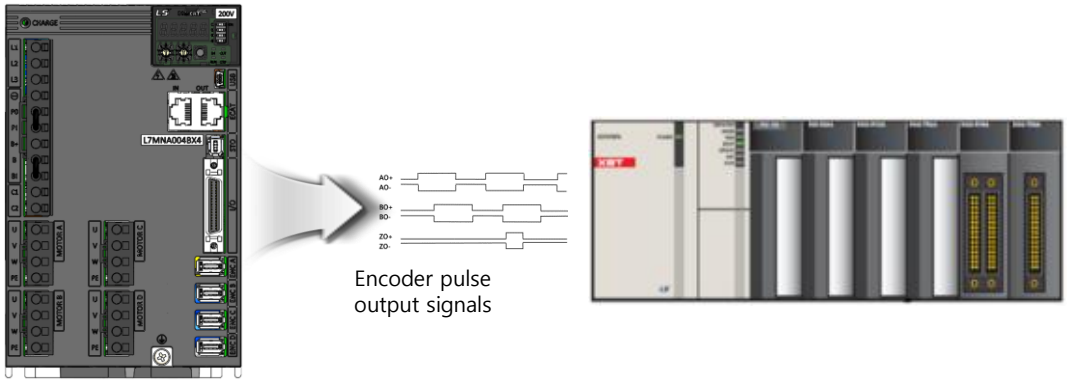
■ Applying Ethernet Switch IP

- Supports Star and Daisy Chain Wiring



LS Mecapion

Encoder Output pulse



■ Encoder Output pulse support

L7NHF	L7NH	iX7NH	IX7M
X	X	O	O

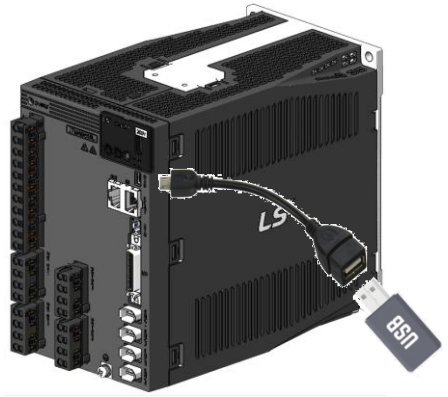
■ Encoder output pulse spec

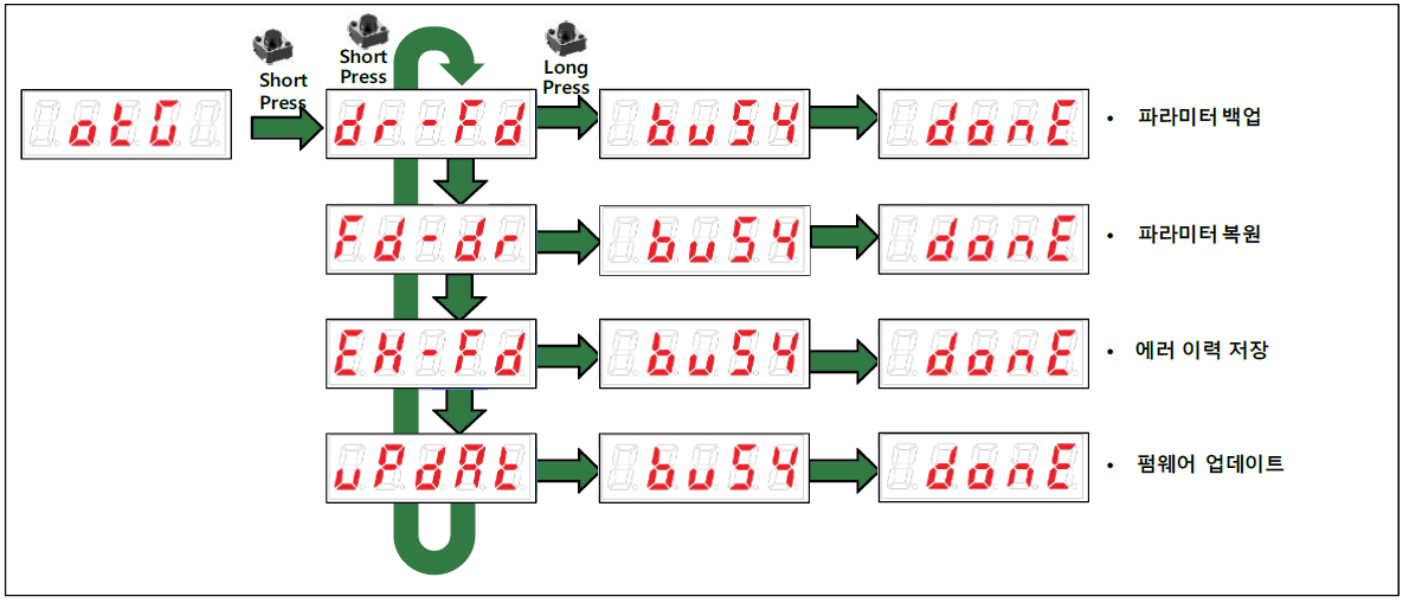
	Type	Max output frequency	Remark
iX7NH	3Ch(Diff. Line Driver) AO, /AO, BO, /BO, ZO, /ZO	6.5Mpps (Mpulses/s)	
IX7M	2Ch(Diff. Line Driver) AO, /AO, BO, /BO	6.5Mpps (Mpulses/s)	Max 2Axis. Not support 3/4Axis

◆ USB OTG fuction

- Various convenience features accessible via OTG button operation:
  - ↔ *Drive parameter backup and restore*
  - → Drive alarm history backup
  - ← Firmware update

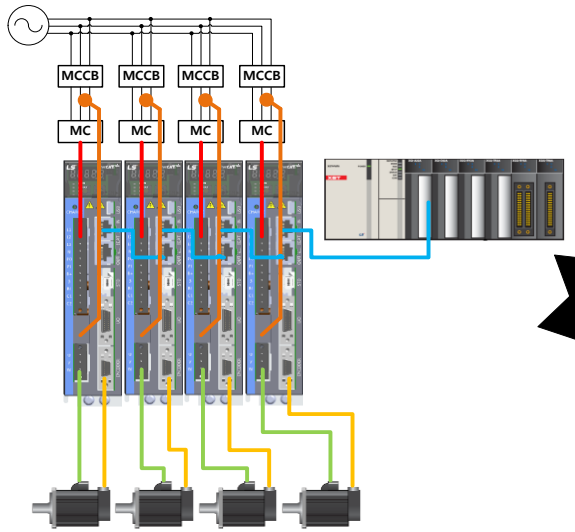
  - Parameter backup/restore and error history storage operate across all axes





iX7M – Reduce cables and wiring

L7NHA004U x 4대

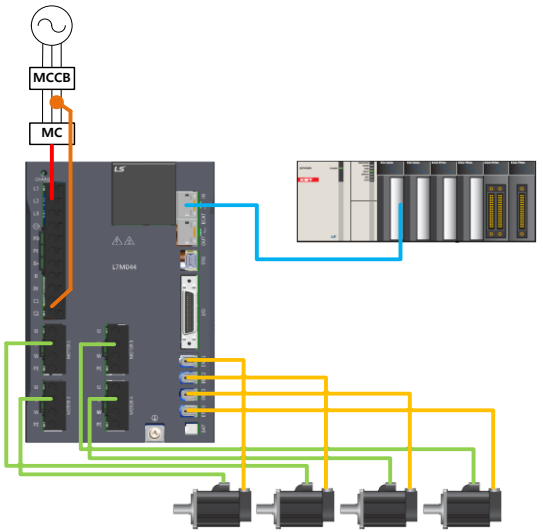


배선 개수

EtherCAT	x 4 (서보드라이브 개수)
주 전원	x 4 (서보드라이브 개수)
제어 전원	x 4 (서보드라이브 개수)
MC 접속	x 4 (서보드라이브 개수)
MC 제어	x 4 (서보드라이브 개수)
엔코더	x 4 (비교)
서보모터	x 4 (비교)
합 계	28개

배선 개수 50% 이상 감축

L7NM(4축 일체형) x 1대



배선 개수

EtherCAT	x 1
주 전원	x 1
제어 전원	x 1
MC 접속	x 1
MC 제어	x 1
엔코더	x 4
서보모터	x 4
합 계	13개

- **Peripheral devices, control signal lines, etc. 4-axis common connection**
- **Number of wires and devices big savings**

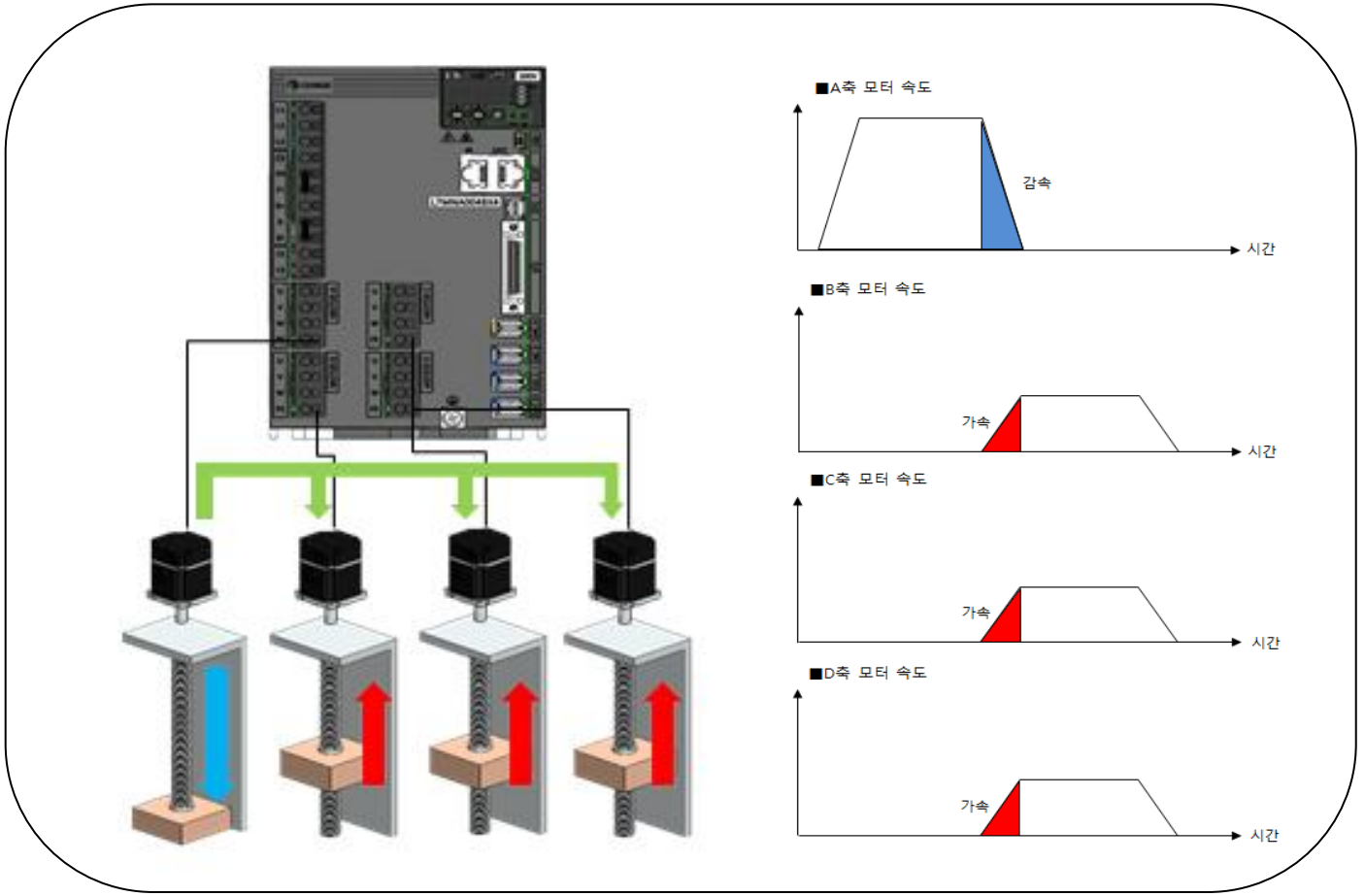
4Wiring savings of more than 50% for 4-axis type

LS Mecapion

Advantage

■ Energy-saving effect

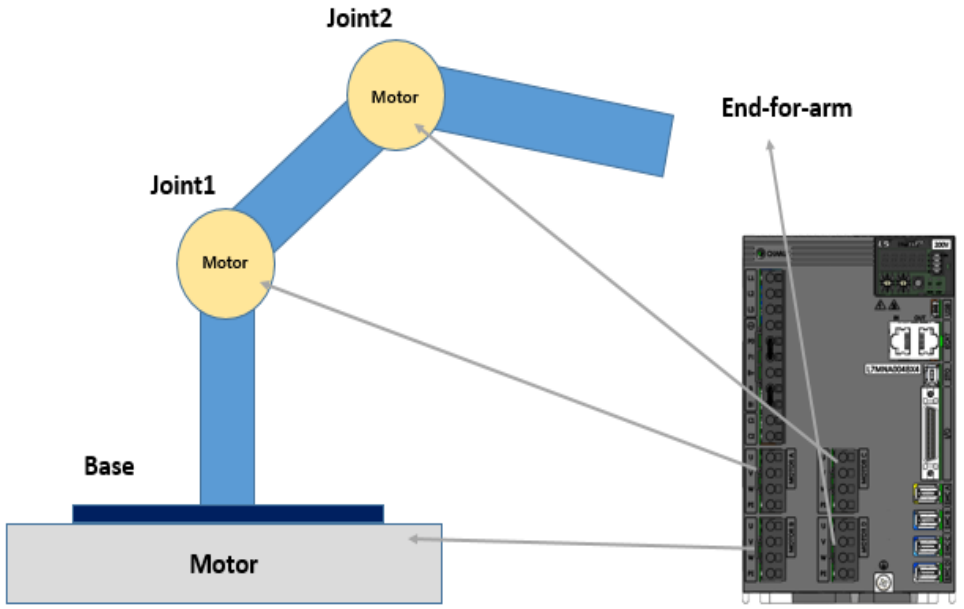
- Since the regenerative energy of one axis can be used as motor drive energy to operate another axis, it contributes to reducing the energy costs of the equipment



LS Mecapion

◆ Application

- A linear motor, primarily used in Cartesian coordinate robots, or applied to SCARA or articulated robots, allows control of up to four axes individually with a single servo drive.



[Delta Robot]

[Scara Robot]

2. Introduce of IX7M Drive

iX7M Servo Drive Model Name

1st Axis 2nd Axis 3rd Axis 4th Axis

iX7M	A	4 4 4 4	B	AA

Seires Name	Input Voltage	Capacity	Encoder	Option
iX7M : X-Motion Series Intelligent Multi Servo	A : AC 220[V]	2 : 200[W] 4 : 400[W] 8 : 750[W] A : 1[kW]	B : BiSS	Blank : Standard Product Marking : Exclusive Option

iX7M Strong point and Spec

■ Strong point

Auto tuning enhancement
- ONE **parameter tuning**(**Hunting**)
- **Vibration Control**
- FRF **and adopted filter**

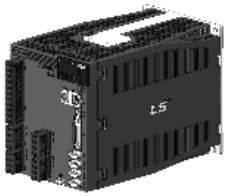
Enhanced Diagnostics
- **Predictive maintenance data**
- **Encoder temperature monitoring**
- **Alarm trace**
  - when Alarm **trigger, recorded** Time/Date, Max 4 channels

Communication
- ✓ EtherCAT 125us
- ✓ **Built in Webserver**
- ✓ Modbus TCP
- ✓ FoE
- ✓ **Motion library**

Additional Function
- **Encoder pulse output**
- **Variety of USB OTG function**
  - **Drive parameter backup/restore**
  - **Alarm history back up**

Etc
- Easy wiring with clamp-type power and motor connectors
  - Easy PE wiring by motor connector
- **State monitoring**, **Parameter edit**

■ Spec



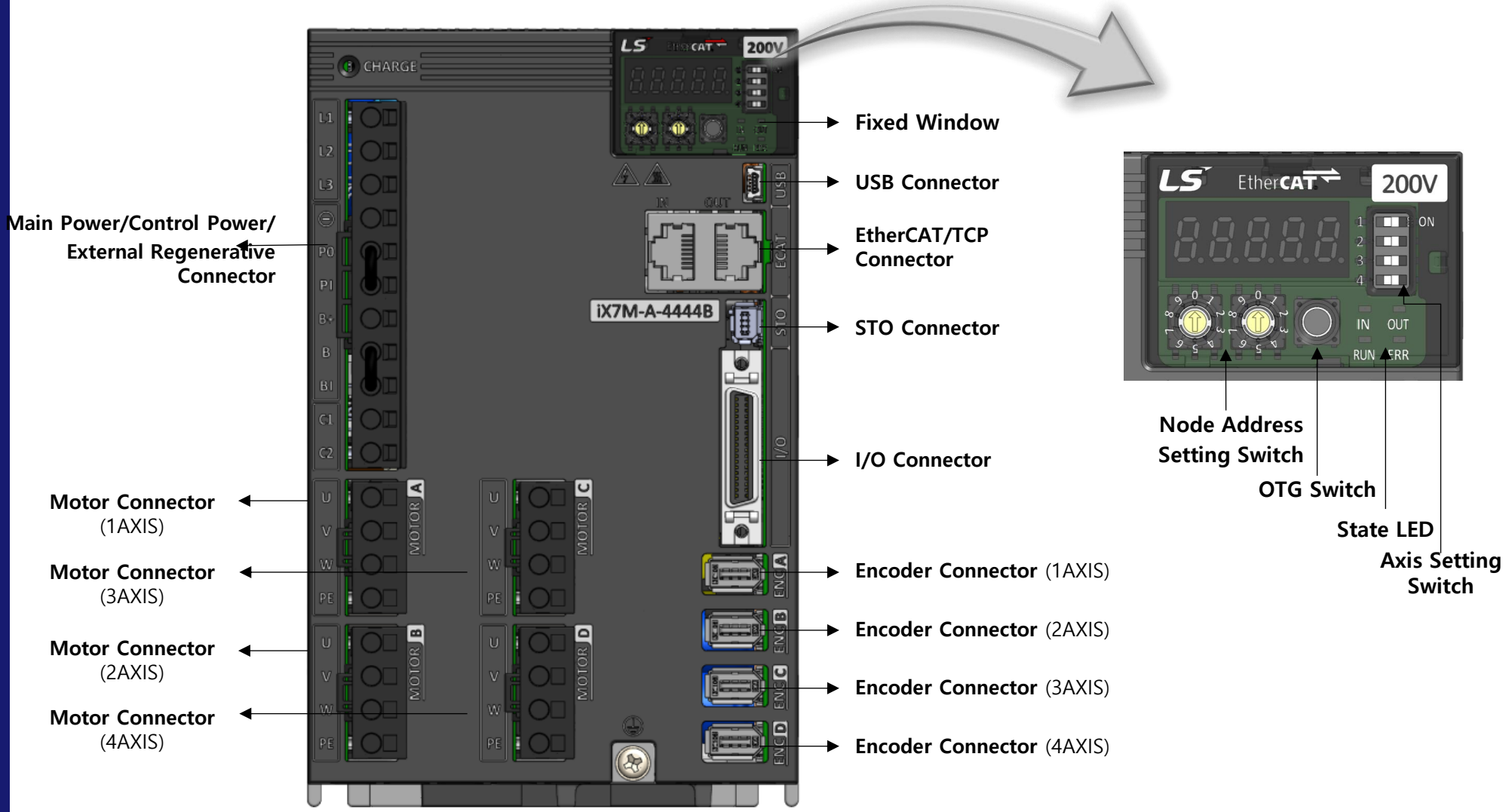
FRAME-1 [4 Axis]

FRAME-2 [3Axis/2 Axis]

FRAME-3 [2 Axis]

Drive	Frame	Size (W*D*H)	Capacity				Spec		
			1Axis	2Axis	3Axis	4Axis	Rated Current [Arms,by Axis]	Max Current [Arms,by Axis	Overload rate [%]
4 Axis	Frame-1	110 * 198 * 174	400W	400W	400W	400W	3	10.5	350%
			200W	200W	200W	200W	1.7	5.95	350%
3 Axis	Frame-2	90 * 198 * 174	400W	400W	400W		3	10.5	350%
2 Axis			200W	200W	200W		1.7	5.95	350%
			1kW	1kW			6.75	23.62	350%
			750W	750W			5.2	18.2	350%
2 Axis	Frame-3	70 * 198 * 174	400W	400W			3	10.5	350%
			200W	200W			1.7	5.95	350%

iX7M Servo Drive Part Name



If you are using only 2 axes on a 4-axis drive, set DIP switch number 2 to ON

■ Loader state display

– Display each axis status using a sequential blinking method on the 7-segment display

Example) 4-axis model – displayed repeatedly in order from 1 to 4 axes		
Axis 1 Status Display	Axis 2 Status Display	Axis 3 Status Display
Axis 4 Status Display		

Servo alarm, warning, STO status display		
Servo alarm 21 occurrence status	Servo Warning 20 occurrence status	STO status

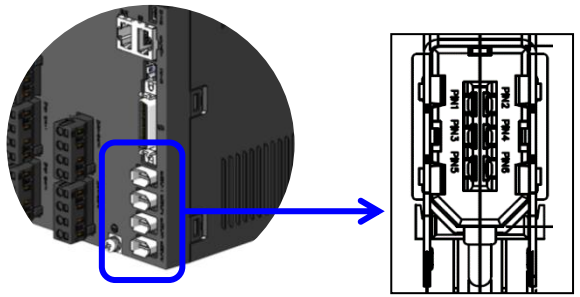
◆ iX7M EtherCAT Servo Drive Encoder Connector Spec and Pin map

Connector Spec

Type	IEEE 1394
Supplier	KEYSTONE / TE Connectivity / Molex / 3M / **Sunchu** etc
Pin	6 Pin
Encoder support	Serial only, Quadrature not support
Size and Appearance	Smaller in size compared to the MDR type. Enhanced convenience due to hook-type connection between connectors.
Pros	▪ Widely used in the market and highly competitive in price. ▪ Enhanced convenience when applying third-party servo motors. ▪ Future development convenience improvement due to connector miniaturization.
Cons	▪ Quadrature encoder not support

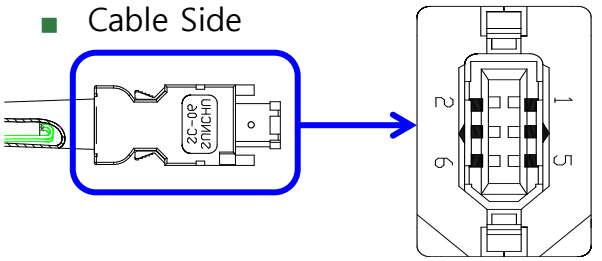
Connector pin map

■ Drive Side



Pin No.	Encoder Signal
1	+5V
2	GND
3	SLO
4	/SLO
5	MA
6	/MA

■ Cable Side

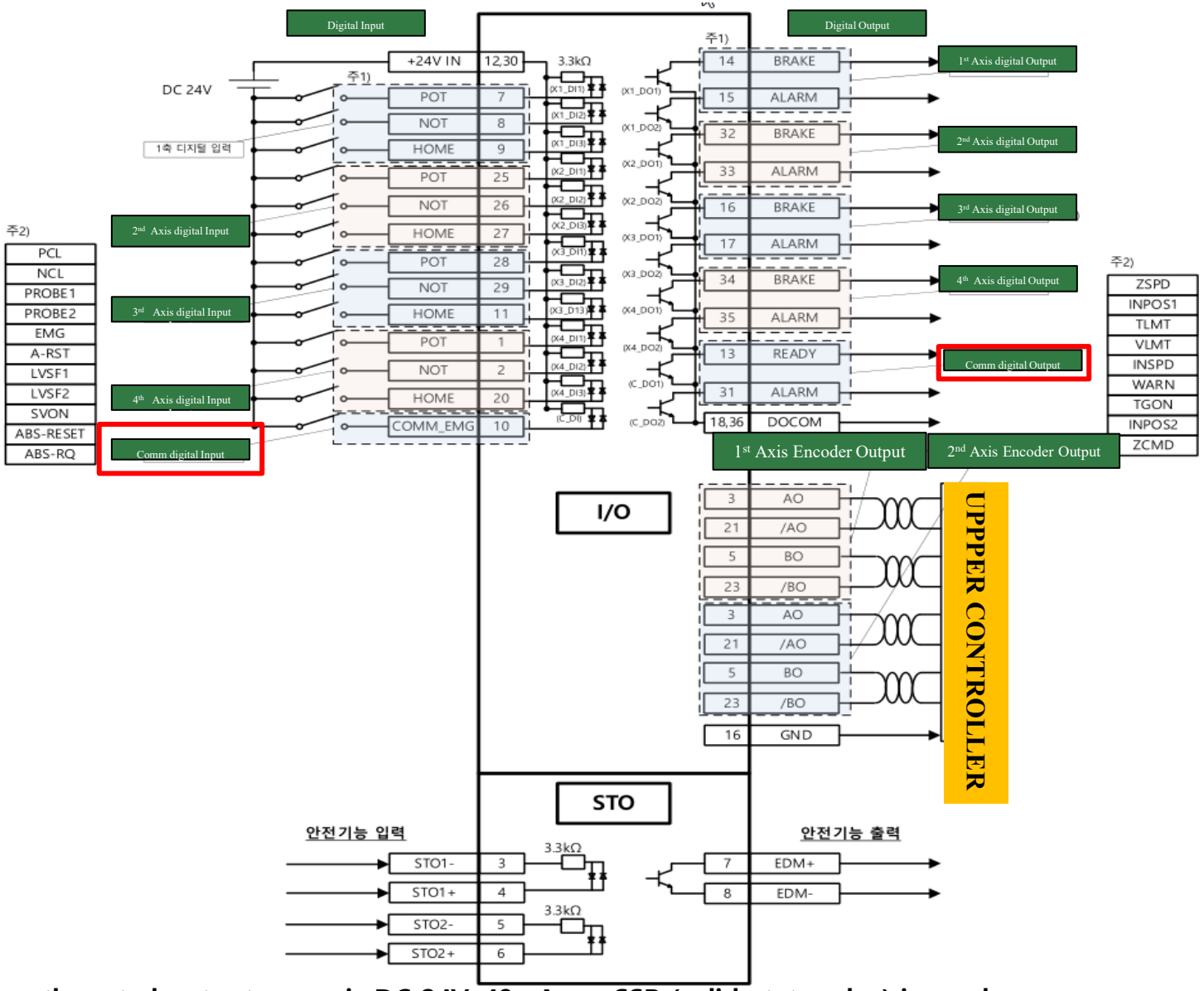


Pin No.	Encoder Signal
1	+5V
2	GND
3	SLO
4	/SLO
5	MA
6	/MA

■ The same pin map as Yaskawa, Panasonic, Delta, RSA, Omron

3. I/O Setting

iX7M Servo Drive Input/Output



-. Since the rated output usage is DC 24V, 40mA, an SSR (solid-state relay) is used.

● I/O Configuration(0x2200~)

0x2200	Digital Input Signal 1 Selection						ALL
Variable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UINT	0 to 0xFFFF	0x0001	-	RW	No	Always	Yes

Set the function, debounce filter value, and input signal level of digital input signal 1.

15Bit	14Bit	13Bit	12Bit	11Bit	10Bit	9Bit	8Bit	7Bit	6Bit	5Bit	4Bit	3Bit	2Bit	1Bit	0Bit
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Signal input level setting

Setting value	Status
0	A contact
1	B contact

Debounce filter setting

Setting value	Debounce Filter [msec]
0	1
1	1.5
2	2
3	2.5
4	3
5	3.5
6	4
7~15	No Filter

Input signal allocation

Setting value	Allocation signal
0x00	Not assigned
0x01	POT
0x02	NOT
0x03	HOME
0x04	STOP
0x05	PCON
0x06	GAIN2
0x07	PCL
0x08	NCL
0x09	PROBE1
0x0A	PROBE2
0x0B	EMG
0x0C	A_RST
0x0D	LVSF1
0x0E	LVSF2
0x0F	SV_ON
0x10	ABS_RQ
0x24	ABS_RESET

The setting method is all the same up to the setting of digital input signal 3 [0x2202]

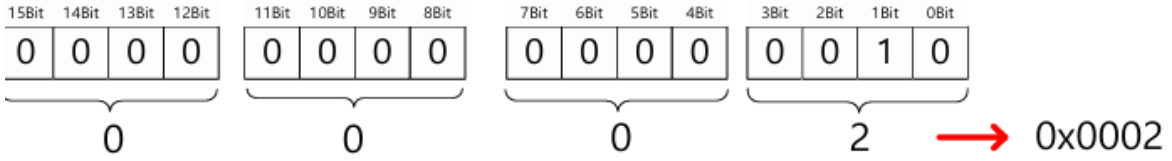
Assigns the function of digital output signal 1 and sets the output signal level.

Setting value	Status
0	A contact
1	B contact

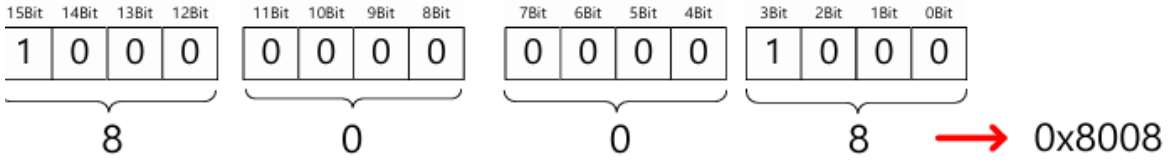
Setting value	Allocation signal
0x00	Unassigned
0x01	BRAKE
0x02	ALARM
0x03	READY
0x04	ZSPD
0x05	INPOS1
0x06	TLMT
0x07	VLMT
0x08	INSPD
0x09	WARN
0x0A	TGON
0x0B	INPOS2
0x0C	ZCMD

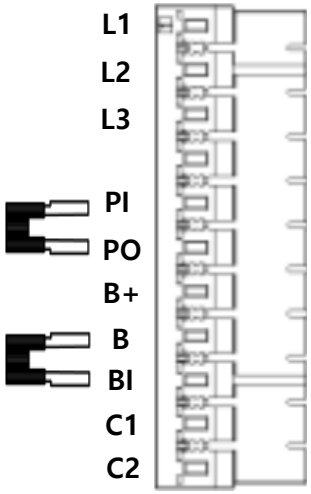
The method is the same until digital output signal 2 [0x2210] is set..

ex) In case of setting the ALARM to contact A

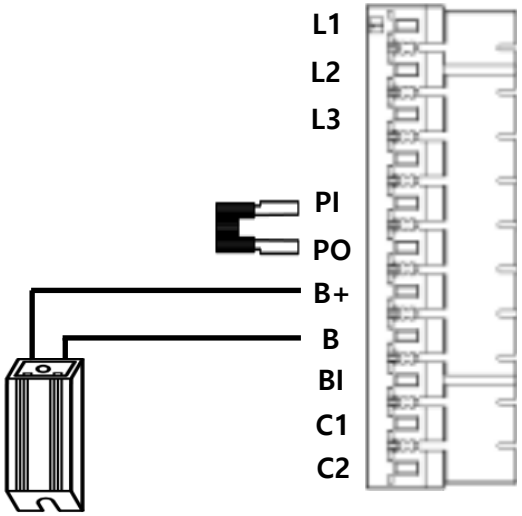


ex) In case of setting the INSPD to contact B





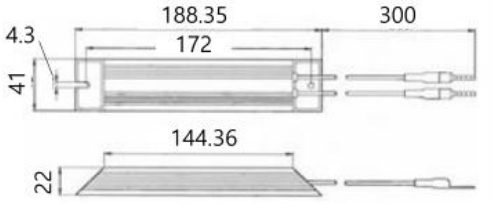
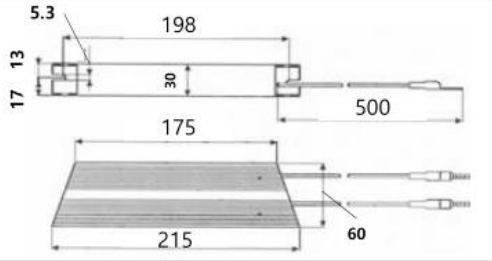
- Using Internal Regenerative Resistor -



- Using External Regenerative Resistor -

- Setting Parameter for External Regenerative Resistor

1. 0x2009 : Regen. Brake Resistor Configuration
2. 0x200B : Regen. Brake Resistor Value
3. 0x200C : Regen. Brake Resistor Power
4. 0x200D : Peak Power of Regen. Brake Resistor

구분	품 명	형명	적용 드라이브	사 양
저항	제동 저항	APCS-140R50 (50Ω/140W)	iX7MA22XXB iX7MA44XXB iX7MA222XB iX7MA2222B	
저항		APCS-300R30 (30Ω/300W)	iX7MA444XB iX7MA4444B iX7MA88XXB iX7MAAAXXB	

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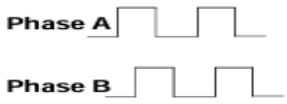
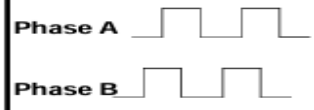
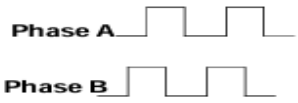
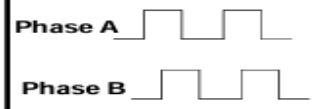
0x2422	Encoder Output Pulse						ALL
Variable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UDINT	0 to 4294967295	10000	pulse	RW	No	Power recycling	Yes

Set the number of pulses to be output per 1 motor rotation when outputting an encoder signal from the drive to the outside

Dividing output supports up to 6.5 [Mpps] based on 4 multiplication. When setting, please consider the motor driving speed.

0x2423	Encoder Output Logic						ALL
Variable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UINT	0 to 1	0	-	RW	No	Power recycling	Yes

Set A-phase lead or B-phase lead for encoder signal output when driving the motor in forward rotation.

Setting value	Forward	Reverse
0		
1		

4. Trouble Shooting

Error Name	Cause	Check Items	What to check
Fan trip A-28	Fan trip error	Disconnect, wiring is incorrect and check Short.	Connect a DC cooling fan to the drive. If the alarm continues to occur after turning the power back on, there may be a problem with the DC cooling fan. Replace the DC cooling fan.
Regeneration brake fault A-29 .	Regeneration Resistor error	Check disconnect and short.	Connect the regenerative resistor to the drive. If the alarm continues to occur after turning the power back on, there may be a problem with the regenerative resistor. Replace the regenerative resistor.
Drive temperature 3 A-2a	Ambient temperature	Check whether surrounding temperature is over 50[℃]	Lower the surrounding temperature of drive
	Drive error	Check if displayed value 3 [0x261E] of drive temperature is much different with surrounding temperature when it is normal condition.	Replace the drive
Regeneration Overcurrent A-2b	Regeneration Resistor error	Check disconnect and short.	If the alarm continues to occur after turning the power back on, there may be a problem with the regenerative resistor. Replace the regenerative resistor.

Encoder position error A-3b	Bad connection of battery, No connected.	Check the status of battery	After confirming that the battery is connected correctly, execute the GB preset procedure command.
	When battery voltage is low.	Check if the battery voltage is over 3.3 [V].	After replacing the battery, execute the GB preset procedure command.
Encoder Overcurrent error A-3e	Encoder cable error	Check encoder cable contact and wiring status.	Replace Encoder cable
	Encoder error		Replace the Motor.

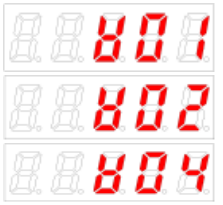
Position tracking A-55	Parameter setting error	Check the zero speed position tracking error level [0x2416] setting value	Please set the zero speed position tracking error level setting value high.
Excessive position command A-56	Motor cable error	Disconnect, wiring is incorrect and check Short.	Replace motor cable
	Encoder cable error.	Disconnect, wiring is incorrect and check Short.	Replace Encoder cable
	Parameter setting error	Motor ID[0x2000], Encoder type[0x2001], Encoder resolution [0x2002] value is same with motor label..	Modify the parameter as same as motor label information.
		Check setting value [0x6091]	Set Electronic gear ratio it on the main base where .
	Machine part has problem	Checking it was forced by drive part	Check machine part
	Encoder error	-	If alarm continue after servo on again, Replace drive. Because drive may have problem.
	Drive error	-	If the alarm continues to occur after turning the power back on, there may be a problem with the drive. Replace the drive.
Excessive pulse output speed A-57	Parameter setting error	Check setting value of Encoder dividing output [0x2422].	Please set the encoder dividing output low considering the motor driving speed.
		Check setting value [0x6091]	Set Electronic gear ratio low.

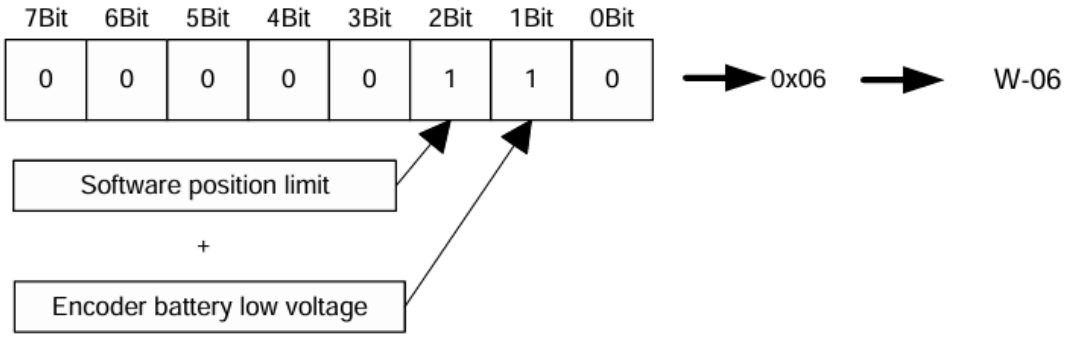
Factory setting A-71	Drive capacity automatic recognition error	Check if drive capacity [0x4000] is recognized normally.	If the alarm continues to occur after turning the power back on, there may be a problem with the drive. Replace the drive.
Invalid H/W A-73	Drive error	Check if the axes of Main PCB and Power PCB are the same. Check Main to Power cable.	Please configure the Main and Power PCBs with the same number of axes. Replace Main to Power cable. If the alarm continues to occur after turning the power back on, there may be a problem with the drive. Replace the drive.
FPGA Config. (FPGA Config error) A-74	FPGA Configuration error	Check the F_DONE LED on the bottom of the main PCB.	Pleased proceed with the FPGA download If the alarm continues to occur after turning the power back on, there may be a problem with the drive. Replace the drive.
USB Overcurrent. (USB over current) A-76	USB cable error OTG cable error	Check USB cable status and connection status.	If the alarm continues to occur after turning the power back on, there may be a problem with the drive. Replace the drive.

■ Servo Warning

If the drive detects an error classified as a servo warning, it will trigger a warning. In this case, the drive w maintain normal operation condition. After the cause of the warning is eliminated, the warning will be automatically cleared. In case of a warning, take an appropriate action. You can specify if each warning is checked with warning mask configuration (0x2014).

Bit	Warning code	Warning name
0	W01	Main power source loss
1	W02	Low voltage of encoder battery
2	W04	Software Position Limit
3	-	-
4	W10	Operation overload
5	W20	Abnormal combination of Drive and Motor, abnormal I/O setting
6	W40	Low Voltage
7	W80	Emergency signal input





5. Communication Protocol, PC Program

Cofig of iX7M Servo Drive Modbus TCP

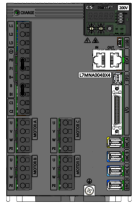
PC

HMI

PLC

192.168.5.1
255.255.255.0

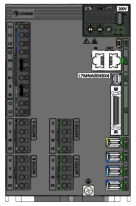
1 : 1 Comm



iX7M

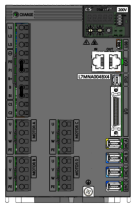
Port(0x241A) : 502
IP(0x241B) : 192.168.5.2
Sub(0x241C) : 255.255.255.0

* 1 : N Comm



iX7M

Port(0x241A) : 502
IP(0x241B) : 192.168.5.2
Sub(0x241C) : 255.255.255.0
*MAC(0x241E) : 0x000080E1

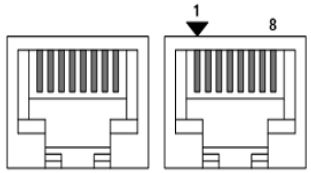


iX7M

Port(0x241A) : 502
IP(0x241B) : 192.168.5.3
Sub(0x241C) : 255.255.255.0
*MAC(0x241E) : 0x000080E2

* When connecting two or more axes, different MAC addresses must be assigned

■ Connector pin connection for communication.



Pin arrangement seen from the front of the drive

Pin arrangement seen from the connector

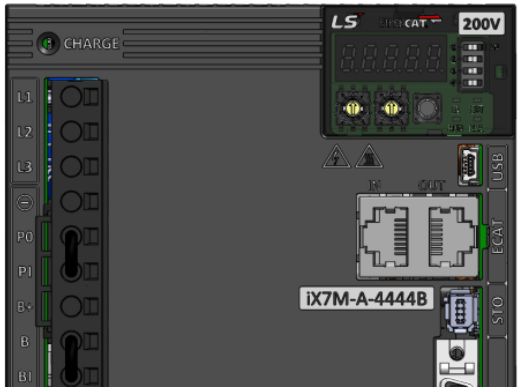
We recommend STP cables and connectors to improve the stability of our products.

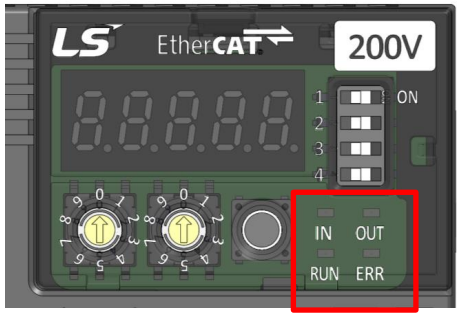
Pin No.	Pin function	Pin No.	Pin function
1	Transmit data (TXD)+	5	-
2	Transmit data (TXD) -	6	Receive data (RXD)-
3	Receive data (RXD)+	7	-
4	-	8	-

Note1) Connect TXD+ and TXD-, RXD+ and RXD- as a twisted pair.

Note2) TXD and RXD in the table above are defined based on the servo drive side.

- State LED





The IN LED indicates the connection status of the Ethernet communication port, while the OUT LED displays the data transmission and reception status. The meanings of each LED indication are detailed in the table below

LED	LED status	Description
Link (IN)	OFF	The communication cable is not connected.
	ON	The communication cable is connected.
Activity (OUT)	OFF	Data is not being sent or received.
	ON	Communication is activated and data is being sent or received.

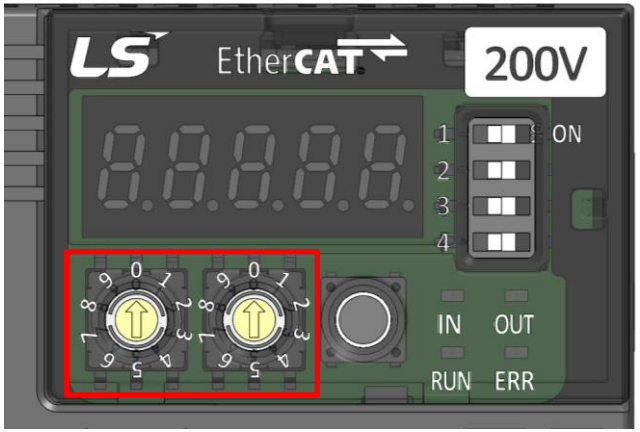
LS Mecapion

0x241B	IP Address						ALL
ariable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UDINT	0 to 0xFFFFFFFF	0x0505A8C0	-	RW	-	-	Yes

Bit	31 ~ 24	23 ~ 16	15 ~ 8	7 ~ 0
DATA	05	05	A8	C0
Setting value(hex)	0x0505A8C0			
Setting value(IP Address)	192.168.5.5			

5	5	A8	C0

C0	A8	5	5
192.168.5.5			



*** Node ID 99 set**

0x241C	Ethernet Subnet Mask						ALL
Variable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UDINT	0 to 0xFFFFFFFF	0x00FFFFFF	-	RW	No	Always	Yes

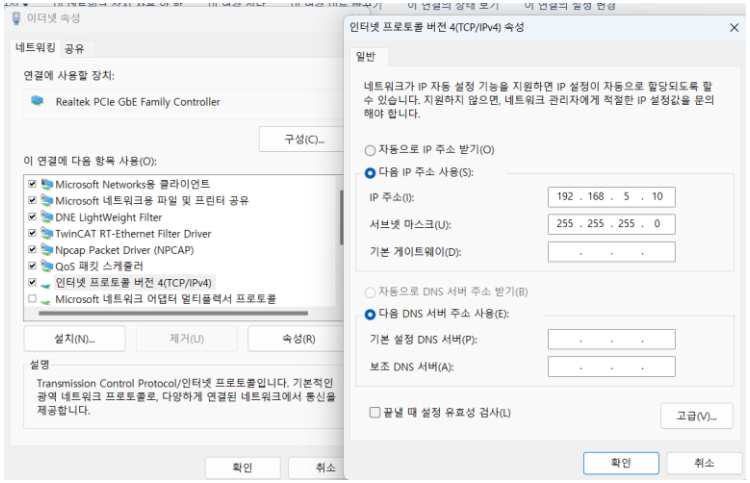
Bit	31 ~ 24	23 ~ 16	15 ~ 8	7 ~ 0
DATA	00	FF	FF	FF
Setting value(HEX)	0x00FFFFFF			
Setting value(address)	255.255.255.0			

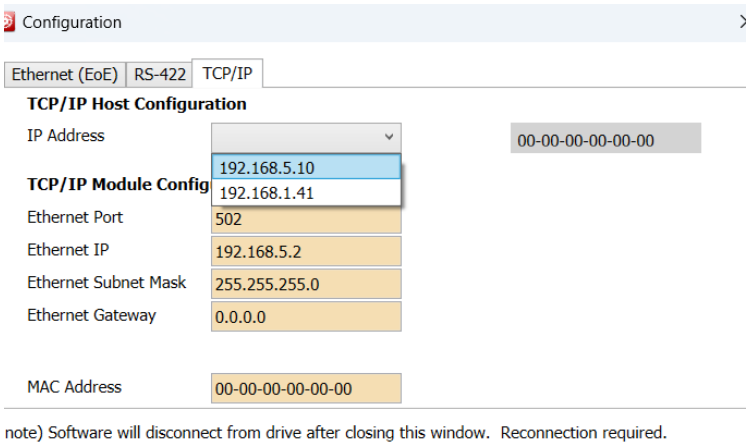
0x241A	Ethernet TCP Port						ALL
Variable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UINT	0 to 0xFFFF	502	-	RW	No	Always	Yes

0x241E	MAC Address - Vendor						ALL
Variable type	Setting range	Initial value	Unit	Accessibility	PDO allocation	Change attribute	Save
UDINT	0 to 0xFFFFFFFF	0x000080E1	-	RW	No	Power recycling	Yes

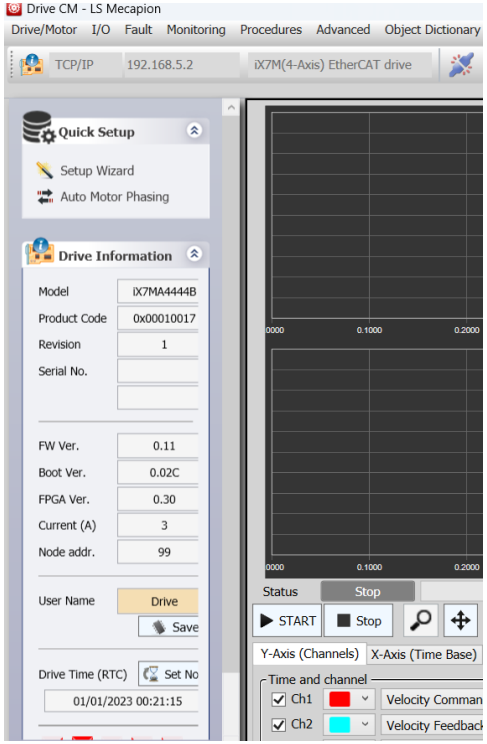
Set the vendor of the Ethernet MAC address.

Ethernet MAC address vendor settings are set as follows. If the MAC address is '00 – 80 – E1 – 12 – 34 – 56', the Vendor setting for the MAC address is set to 0x000080E1. The highest 1 byte is reserved and the lower 3 bytes are referred to.





note) Software will disconnect from drive after closing this window. Reconnection required.



◆ Read Current Speed(0x2600)

- Request

	Transaction ID		Protocol ID		Length		Unit ID	Function code	Data			
									Starting Address		Quantity(Num) of Registers	
바이트	0	1	2	3	4	5	6	7	8	9	10	11
내용	0x00	0x01	0x00	0x00	0x00	0x06	0x01	0x03	0x26	0x00	0x00	0x01

- Request OK

	Transaction ID		Protocol ID		Length		Unit ID	Function code	Data		
									Byte Count	Register Value	
바이트	0	1	2	3	4	5	6	7	8	9	10
내용	0x00	0x01	0x00	0x00	0x00	0x05	0x01	0x03	0x02	0x00	0x00

- 현재속도의 값이 0(or 0x0000)입니다.

- Request not OK

	Transaction ID		Protocol ID		Length		Unit ID	Error Code	Exception Code
바이트	0	1	2	3	4	5	6	7	8
내용	0x00	0x01	0x00	0x00	0x00	0x04	0x01	0x83	0x01~0x04

◆ Write Inertia(0x2100)

- Request

	Transaction ID		Protocol ID		Length		Unit ID	Function code	Data			
									Register Address		Register Value	
바이트	0	1	2	3	4	5	6	7	8	9	10	11
내용	0x00	0x01	0x00	0x00	0x00	0x06	0x01	0x06	0x21	0x00	0x00	0xC8

- Request OK

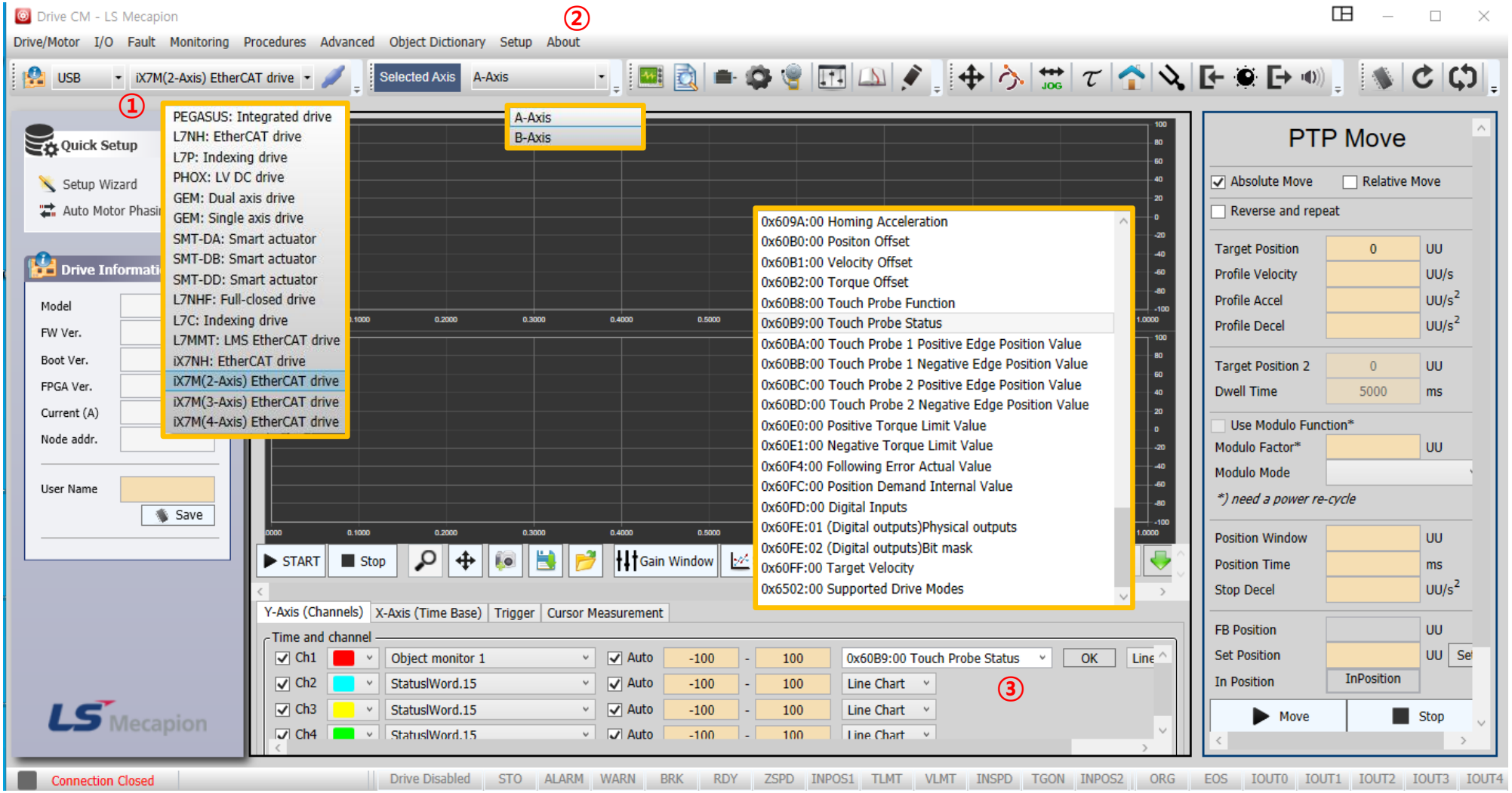
	Transaction ID		Protocol ID		Length		Unit ID	Function code	Data			
									Register Address		Register Value	
바이트	0	1	2	3	4	5	6	7	8	9	10	11
내용	0x00	0x01	0x00	0x00	0x00	0x06	0x01	0x06	0x21	0x00	0x00	0xC8

- 관성비(Address: 0x2100)의 값을 200(or 0x00C8)으로 변경합니다.

- Request not OK

	Transaction ID		Protocol ID		Length		Unit ID	Error Code	Exception Code
바이트	0	1	2	3	4	5	6	7	8
내용	0x00	0x01	0x00	0x00	0x00	0x03	0x01	0x86	0x01~0x04

Multi-axis connection in DriveCM

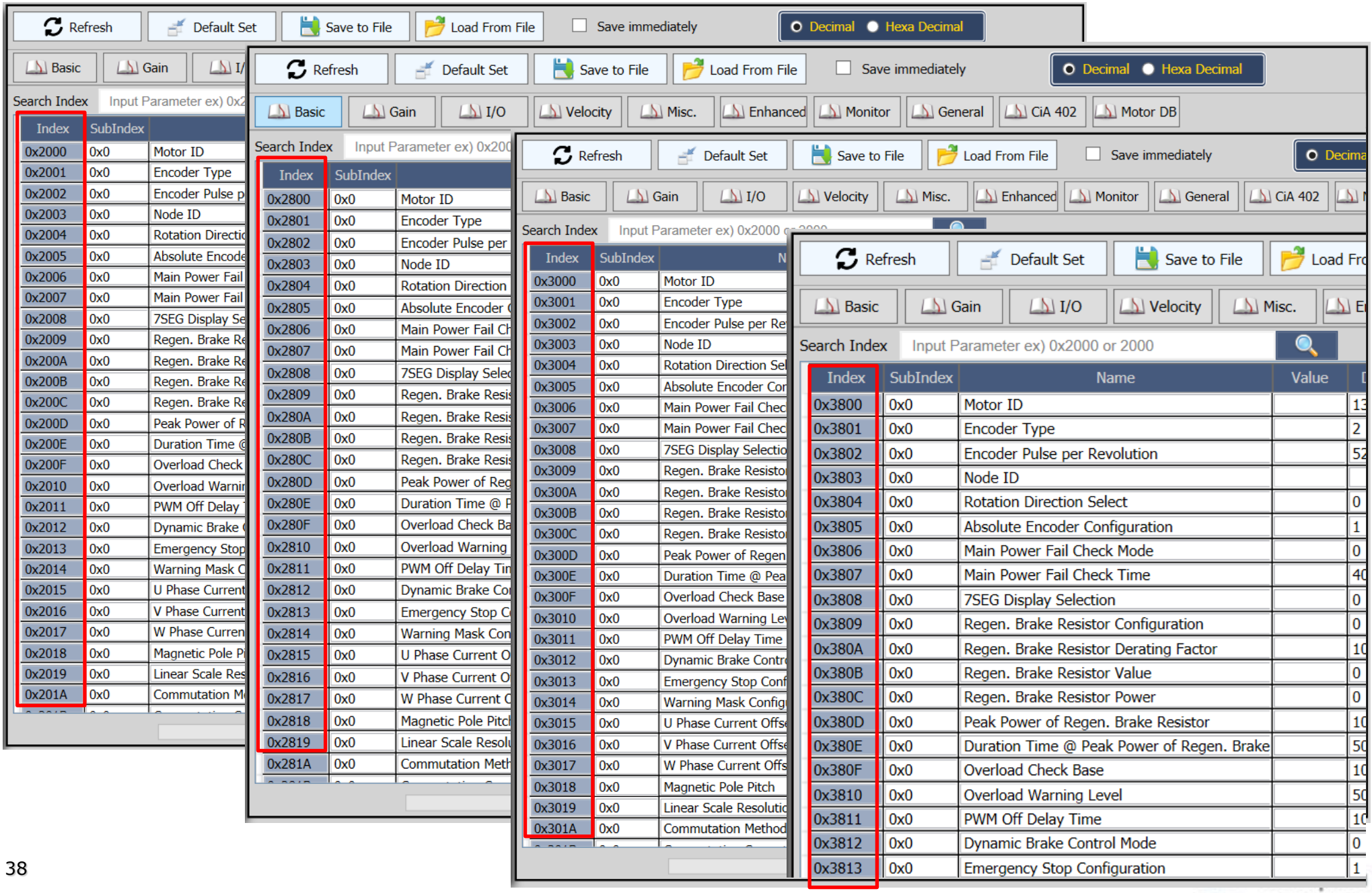


① **iX7M Model Selection by Number of Axes**

② **Axis selection for parameter editing, monitoring, and procedure commands (jog operation, PTP operation, etc.**

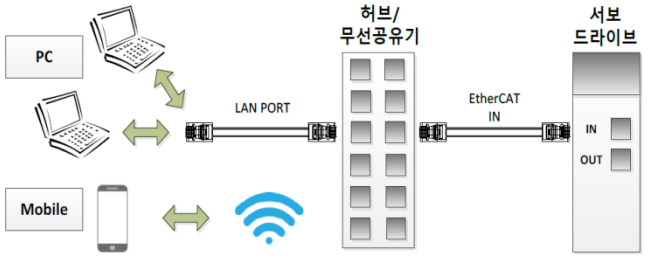
③ **Selecting A-axis data monitoring while in B-axis monitoring mode**

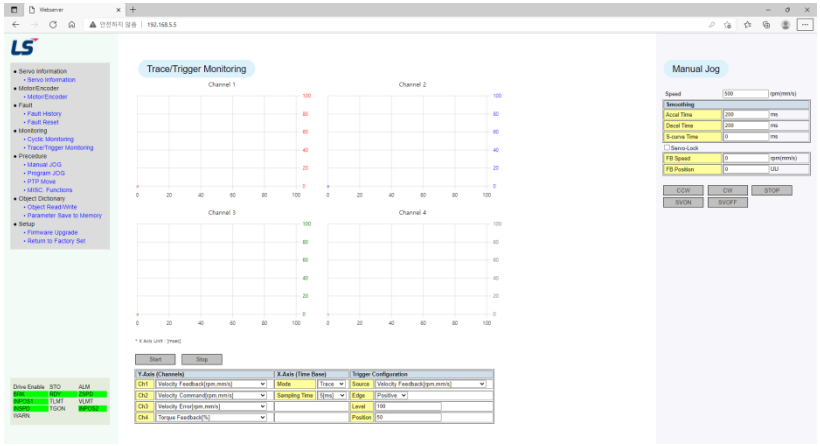
Display of 4-axis parameters in DriveCM

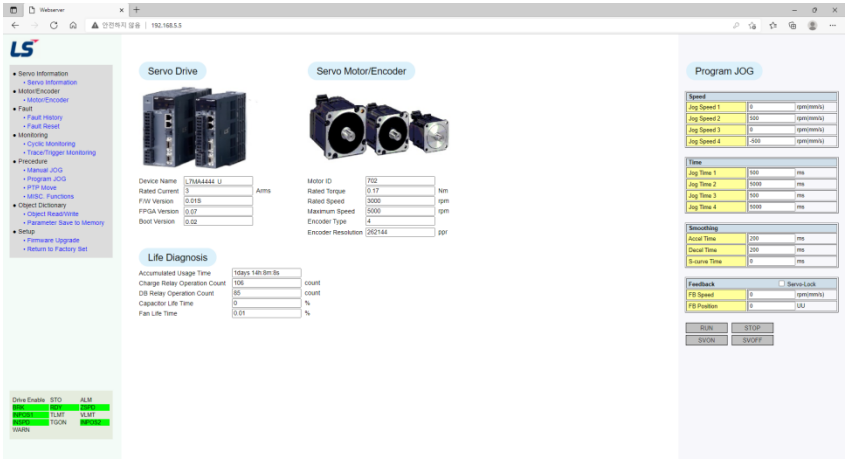


◆ Built-in Webserver

- Built-in web server allows configuration through a web browser without the need for separate setup software (DriveCM)
- Enhanced remote commissioning capabilities using Ethernet connectivity







<웹서버 화면 구성 예>