iX7NH Series AC Servo Drive
Quick Start Guide

Modbus TCP

1st Edition Rev A, February 22nd, 2024

AutomationDirect Foreword

This QuickStart Guide is designed to get an iX7NH servo system installed and running quickly. This AutomationDirect Guide is a supplement to the LS Electric iX7NH User Manual. This Guide does not replace the manufacturer's User Manual. For advanced features or options required by your application, you may still need to refer to the User Manual. Download and reference both this QuickStart Guide and the iX7NH User Manual when commissioning an iX7NH servo system.

This quickstart guide will get your iX7NH drive configured and commissioned using Drive CM. This is helpful for:

- *For further EtherCAT commissioning help, see AutomationDirect's LS Electric Interactive PLC Guide available at* https://cdn.automationdirect.com/static/helpfiles/ls_plc/Content/Home.htm
- *For further Modbus TCP commissioning, see the iX7NH Modbus TCP Communications Guide.*

A note on Part Numbers: LS Electric servo parts sold by AutomationDirect have part numbers that end with "-AD". This suffix signifies special packaging and labeling for AutomationDirect. All the LS servo products with the "-AD" function and behave exactly the same as the standard LS Electric parts. Please note that when reading the LS electric User Manual or using the Drive CM software, the "-AD" will NOT appear in any part numbers. For example, AutomationDirect part iX7NHA004U-AD is just iX7NHA004U in the LS Electric documentation.

NOTE: EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

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iX7NH Series Servo System Overview

Warnings and Cautions

⚠️	*WARNING: Install both the servo drive and the servo motor before performing any wiring.*
⚠️	*WARNING: Before wiring or inspecting, turn off the power, wait 15 minutes, make sure the charge lamp is off, and check the voltage.*
⚠️	*WARNING: Ensure this product is correctly grounded. All grounding and circuit protection methods must comply with all local standards/regulations and the national electrical standard (refer to NFPA 70: National Electrical Code, 202 Ed.)*
⚠️	*WARNING: Do not change the motor or drive wiring while power is on.*
⚠️	*WARNING: Only qualified and trained technicians may perform wiring on this product.*
⚠️	*WARNING: Do not operate the servo system with wet hands.*
⚠️	*WARNING: Do not open the servo drive cover during operation.*
⚠️	*WARNING: Do not operate the servo system with the servo drive cover removed.*
⚠️	*WARNING: Do not touch the heat sink of the servo drive when it is connected to power and operating This component gets very hot and will scald.*
⚠️	*CAUTION: The installation location must be free of vapor and corrosive or flammable gas.*
⚠️	*CAUTION: When wiring, do not connect the three-phase power supply to the motor UVW connectors. Incorrect wiring may cause damage to the servo drive.*
⚠️	*CAUTION: Do not disassemble the servo drive.*
⚠️	*CAUTION: Verify the emergency stop can be activated before the servo drive is connected to power and put into operation.*

For additional warnings and precautions, please see pages *iii* through *vii* of the iX7NH User Manual.

INSTALLATION

## AMBIENT INSTALLATION CONDITIONS

The iX7NH Servo and APM/APMC motors should be installed under the environmental conditions detailed below. Exceeding these conditions risks damage to the equipment.

	Condition	Requirement	Notes
Servo Drive	Operating Temperature	0–50℃ [32–122 °F]	Install a cooling fan on the control panel for ventilation and to maintain the temperature within the required range.
	Operating Humidity	90% relative humidity or below	Moisture developed inside the drive due to ice formation or condensation during a prolonged period of inactivity may damage the drive. If the drive has been inactive for a prolonged period remove all moisture before operating the drive.
	External Vibration	Vibration acceleration 4.9 m/s^2 (0.5 G) or lower	Excessive vibration can cause malfunctions and reduces the lifespan of the drive.
	Ambient Conditions	• Do not expose the drive to direct sunlight. • Do not expose the drive to corrosive or combustible gases. • Do not expose the drive to oil or dust. • Ensure that the drive receives sufficient ventilation even if installed in a confined place.	

	Condition	Requirement	Notes
Motor	Operating Temperature	0–40℃ [32–104 °F]	If motor temperature exceeds 40℃ [104 °F], use forced air cooling to keep the motor temperature within spec.
	Operating Humidity	80% relative humidity or below	Do not operate the motors in an environment with steam.
	External Vibration	Vibration acceleration 19.6 m/s^2 (2.0 G) or lower on X and Y axes	Excessive vibrations reduce the lifespan of the motor bearings.

INSTALLATION DIRECTION AND SPACE

Comply with the spacing standard below when installing drives with the control panel:

Single Drive   *Multiple Drives*
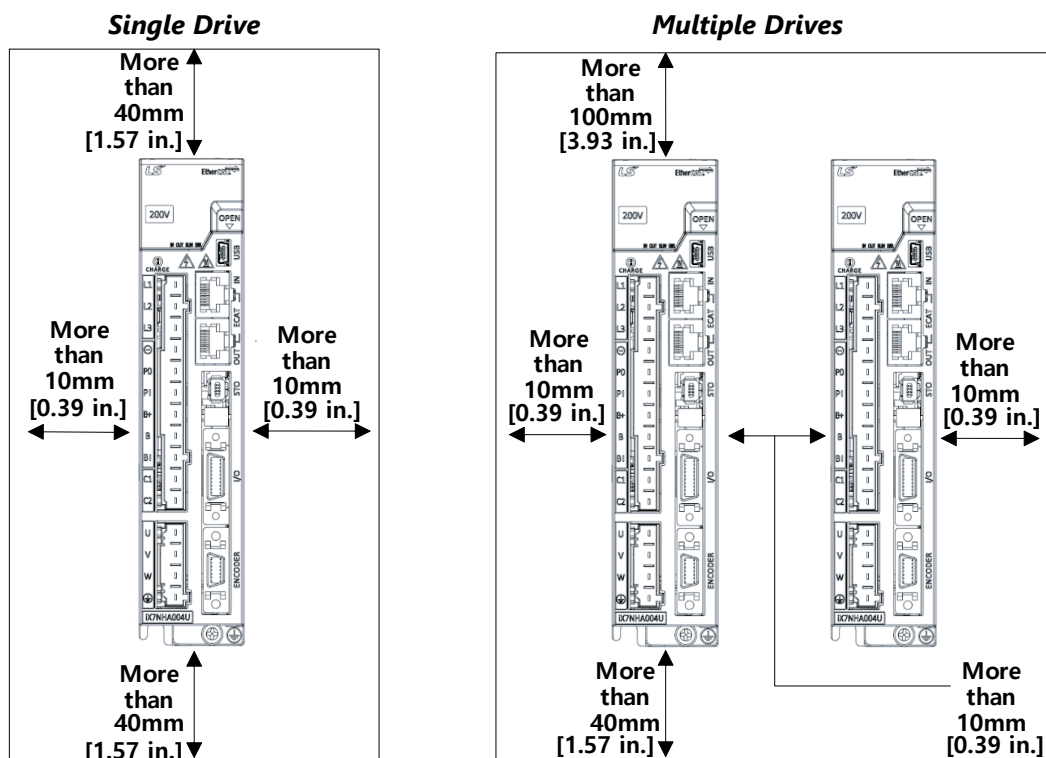
QUICK START INSTRUCTIONS

To verify your servo components and motor/drive wiring as quickly as possible, please follow the steps below. These basic instructions will quickly get the motor spinning (verifying that parts and power wiring are correct).

The rest of this quick start guide contains detailed information on how to properly set up your system and configure the drive for your specific application.

WHAT YOU'LL NEED:

- *Servo Drive*
- *Servo Motor*
- *Motor Power Cable*
- *Encoder Power Cable*
- *Brake Power Cable (for brake-equipped motors)*
- *CN6 STO cable (APCS-STOxxA-AD) or STO bypass dongle (APCS-CN6K-AD, included with drive)*
- *Drive CM software installed on a Windows PC*
- *A USB A to USB mini-B cable (such as SV2-PGM-USB15)*
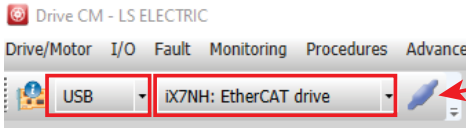
STEP 1: BEFORE POWERING ON THE DRIVE

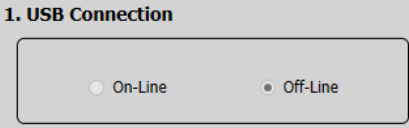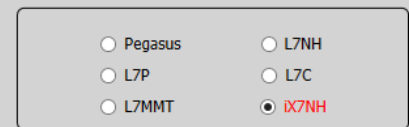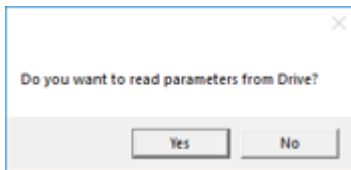|	Substep	Task
Step 1	A	Ensure Input Power wiring is connected to C1, C2, and Ground. Refer to "Main Power Connection Wiring" on page 15.
	B	Ensure 24VDC power and I/O signals are connected. At the very least, make sure the E-Stop and STO circuits are connected. Refer to "I/O Connection Wiring Diagram with Default Functions" on page 17.
	C	Ensure the Motor Encoder cable is connected. Do not simply plug the connector into the motor. Use the captive screws to ensure the connector is secure. Intermittent encoder connection can wreak havoc with the system.
	D	Ensure the Motor Brake cable is connected (if using a brake motor). If practical, wire the brake directly to 24VDC during initial system testing. This eliminates any question of brake wiring functioning properly. Brake testing can be verified after initial drive testing.
	E	Leave the motor power cable disconnected until initial drive setup and testing are complete to prevent unwanted motion. Later, the motor will be wired and tested. Do not connect a load to the motor shaft until testing is completed.

STEP 2: POWER UP THE DRIVE

	Substep	Task
Step 2	A	Turn on 24VDC power to the Drive I/O terminal and brake (if using a brake motor).
	B	Turn on power (230VAC at L1, L2, L3 (motor power), and C1, C2 (control power)).
	C	The drive LED display will show the drive's status and Warning or Alarm codes if present.

STEP 3: CONNECT THE PC TO THE DRIVE

	Substep	Task
Step 3	A	Using a standard USB A to USB mini-B cable (such as SV2-PGM-USB15, MOSAIC-CSU, etc.), connect the PC to the Drive.
	B	Start Drive CM software.
	C	Select **iX7NH EtherCAT Drive** and press the **Connect** button. The software should begin to communicate with the drive. A green flashing square should appear in the bottom left corner of the screen indicating comms traffic.
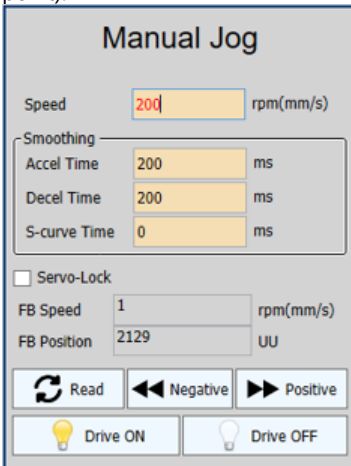
STEP 4: SETUP WIZARD

	Substep	Task
Step 4	A	In the Quick Setup window (left side of screen), click **Setup Wizard**.
	B	In the USB Connection window, choose **On-Line** and click **Yes** to read parameters from the drive. If the **On-Line** radio button is not available and grayed out, click on **Setup Wizard** again. This should restart the Setup Wizard and enable the button.
	C	Follow the steps in the Setup Wizard to define your application. 1) For initial setup and system testing, allow the Setup Wizard to choose the default selections. After completing this hardware test/verification, you can go through the rest of this guide and refer to the User Manual if you want to customize your configuration. 2) After stepping through the Setup Wizard, select **Write to Drive**. 3) After writing to the drive is complete, make sure to cycle power to the drive. A quick way to power cycle the CPU only is to click the **Software Reset** button in the upper right toolbar. Many settings in the Setup Wizard only take affect after a power cycle. **Note:** When writing to the drive and performing a software reset, always make sure the servo is not enabled.

STEP 5: CLEAR FAULTS

	Substep	Task
Step 5	A	Restart the drive and establish communications again.
	B	Go to "Fault\Servo Alarm History" and press the **Read** button. Correct any errors that are causing alarms to display on this page. Correction actions and information can be found in the User Manual or by selecting "Fault\Alarm List."
	C	After fixing any issues, click on **Reset Servo Alarm** and verify the alarms have been corrected.

STEP 6: JOG THE MOTOR

<table>
<tr><td colspan="2">Substep</td><td>Task</td></tr>
<tr><td rowspan="8">Step 6</td><td>A</td><td>Remove power from the drive.</td></tr>
<tr><td>B</td><td>Ensure that there is nothing attached to the motor shaft. Initial motion testing should always be done with the motor uncoupled.</td></tr>
<tr><td>C</td><td>Connect the motor power cable and re-apply power to the drive.</td></tr>
<tr><td>D</td><td>Reconnect the software to the drive (see Step 3C).</td></tr>
<tr><td>E</td><td>Click on the Jog icon </td></tr>
<tr><td>F</td><td>Enter a nominal speed, acceleration, and deceleration (a value of 200 for each setting is a good starting point).

If a value is red, that means the value in the drive is different than the value in the software. Click in that field and press Enter to send the updated value to the drive.</td></tr>
<tr><td>G</td><td>Press Drive ON to enable the drive from the software. The drive's LED should read S-.run (servo is in run mode).
Note: The Servo On (SV_ON) digital input must phsyically be OFF for the software Drive ON/Drive OFF buttons to function properly. The drive evaluates the phsyical digital input and the software buttons as an OR function for drive enable.</td></tr>
<tr><td>H</td><td>Press Negative or Positive to jog the motor. Once the motor jogs, you have verified the power wiring, servo drive, motor, and motor cables are connected properly.</td></tr>
</table>

STEP 7: COMMUNICATION CONTROL PROTOCOL

<table>
<tr><td colspan="2">Substep</td><td>Task</td></tr>
<tr><td rowspan="3">Step 7</td><td>A</td><td>Choose either an EtherCAT® controller or Modbus TCP to control the system (only one protocol can be configured).</td></tr>
<tr><td>B</td><td>The iX7NH drive can be controlled by EtherCAT or Modbus TCP controllers. Configuration and Commissioning details can be found in "Setup Wizard" on page 31.</td></tr>
<tr><td>C</td><td>Once operating mode is set, system quick setup is complete. See the iX7NH Modbus TCP Communication Guide for further details on Modbus TCP communications.</td></tr>
</table>

NOTE: Regardless of using this drive as an EtherCAT or Modbus TCP device, care should be taken to not have duplicate MAC ID addresses on any network. See the iX7NH Modbus TCP Communication Guide for more information for the MAC ID.

FIRST TIME INSPECTION

Ensure your servo motor and drive match capacity.

iX7NH SERVO DRIVE

Part Number Explanation

The three-digit number in the middle of the drive part number determines the power of the drive. Note that the "-AD" simply represents special packaging for AutomationDirect. These are standard LS Electric parts. For example:

- iX7NH**A004**U-AD
- iX7NH**A010**U-AD

The value 004 represents a 400W drive. The value 010 represents a 1000W (or 1kW) drive.

	Drive	Input Voltage	Power Rating	Compatible Motors	
				Non-braking	**Braking**
Drive Model Explanation	iX7NHA004U-AD	115/230VAC	400W	APMC-FBL01AMK-AD APMC-FBL02AMK-AD APMC-FBL04AMK-AD	APMC-FBL01AMK2-AD APMC-FBL02AMK2-AD APMC-FBL04AMK2-AD
	iX7NHA008U-AD	230VAC	750W	APMC-FCL08AMK-AD	APMC-FCL08AMK2-AD
	iX7NHA010U-AD		1kW	APMC-FCL10AMK-AD	APMC-FCL10AMK2-AD
	iX7NHA020U-AD		2kW	APM-FE15AMK-AD APM-FE16DMK-AD APM-FE22DMK-AD	APM-FE15AMK2-AD APM-FE16DMK2-AD APM-FE22DMK2-AD
	iX7NHA035U-AD		3.5 kW	APM-FF35DMK-AD	APM-FF35DMK2-AD

* 100W to 750W 230V motors can use their recommended drives if using a single-phase supply. No derating required.
1kW 230V motors must be derated to 200% max torque if using 1kW drives with single-phase input (use the 2kW drive for no derating with single-phase supply).
1.5kW and 1.6kW 230V motors need to be derated to 200% if using the 3.5kW drive with single-phase supply.
2.2kW 230V motors need to be derated to 150% if using the 3.5kW drive with single-phase supply.
3.5kW 230V motors can only be used with the 3.5kW drive with three-phase supply.

	Location	Description
Servo Drive Components	1	Display
	2	Analog Monitor Connector
	3	Node Address Switch
	4	Node Address Switch
	5	OTG Switch
	6	USB Connector (USB, Mini B Type)
	7	Main Power Connectors (L1, L2, L3)
	8	EtherCAT Input Port (ECAT IN)
	9	EtherCAT Output Port (ECAT OUT)
	10	DC Reactor Connectors (PO, PI)[Do not connect to "-" terminal]
	11	Safety Connector (STO)
	12	Regenerative Resistor Connector (B+, B, BI)
	13	Input/Output Signal Connector (I/O)
	14	Control Power Terminals (C1, C2)
	15	Servo Motor Connection Terminal (U, V, W)
	16	Servo Motor Encoder Connector (ENCODER)
	17	Ground Terminal
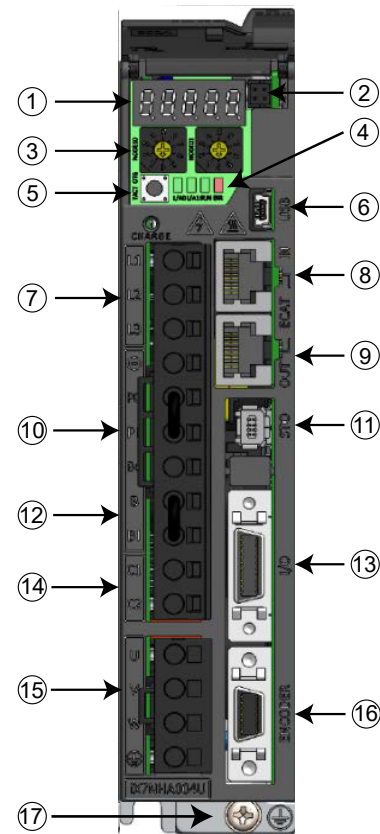
APMC AND APM SERVO MOTOR

Part Number Explanation

The motor part number is defined by several of the digits in the middle. Note that the "-AD" simply represents special packaging for AutomationDirect. These are standard LS Electric Parts.

APM(C)-F**xxyyz**MK**(2)**-AD

- *XX = the frame size:*
  - *BL = 60mm square (70mm bolt circle)*
  - *CL = 80mm square (105mm bolt circle)*
  - *E = 130mm square (145mm bolt circle)*
  - *F = 180mm square (200mm bolt circle)*
- *YY = power in hundreds of watts*
- *Z = Rated speed 3000rpm if A, 2000rpm if D*
- *(2) = If present at the end of the part number, represents a motor with built-in brake.
  No (2) = no brake.*

For example:

APM-FE16DMK2-AD

This represents a 230VAC motor, 130mm square, 1.6 kW power, 2000rpm rated speed, with brake, specially packaged for AutomationDirect.

FBL/FCL Motors (w/o brake)

FBL/FCL Braking Motors

2-Pin Brake Connection
(For FBL/FCL brake motors only)
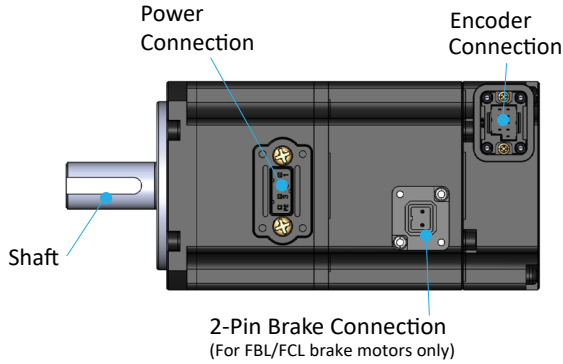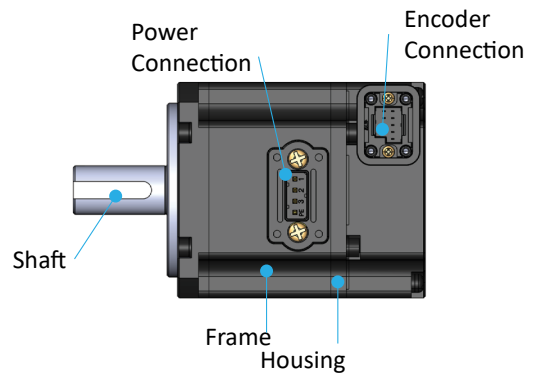
FE/FF Motors
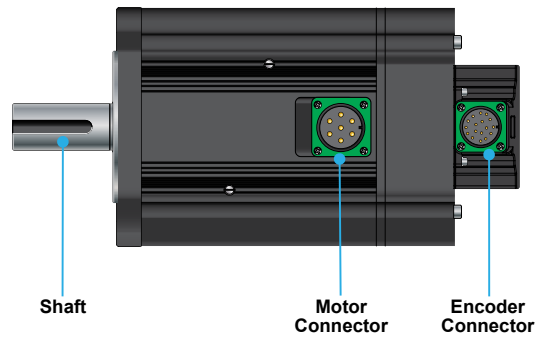
Note: FE/FF brake motors have brake wiring incorporated into the power cable (no separate brake cable).

BASIC INSPECTION

Perform periodic inspections to maintain your equipment, as well as inspections before operation of the servo and motor.

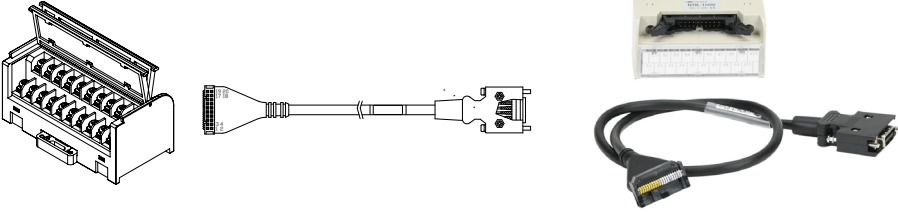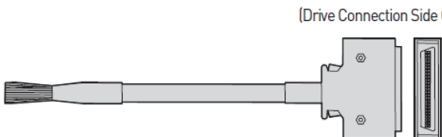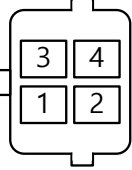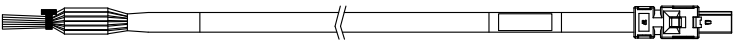| *Inspection*	*Task*
General Inspection	Periodically check to confirm the screws are securely tightened. This includes the screws in the servo drive, the connection screws between the motor shaft and the machine, and the connection screws between the terminal block and machine.
	Prevent oil, water, metallic particles, and other foreign matter from entering the control box or ventilation equipment. Protect the servo drive from any drill cuttings.
	If the control box is installed in a location where dust or harmful gas are present, ensure the dust or harmful gas cannot enter the control box.
	Make sure to wire encoders and other devices in the proper sequence to avoid sudden unintended acceleration or damage to the motor.
Inspection before operation (power OFF)	To avoid electric shock, connect the ground terminal of the servo drive to the ground terminal of the control box. If wiring must be added or modified, wait at least 10 minutes after disconnecting the servo drive from the power supply or discharge the electricity with a discharge device.
	Isolate the wires at the wiring terminal.
	Make sure the wiring is correct to avoid damage or any abnormal operation.
	Check for and remove any electrically conductive objects, including metal sheet and screws, or flammable objects inside or near the servo drive.
	Make sure the emergency stop switch is OFF.
	To ensure the electromagnetic brake works, make sure the stop and circuit breaker functions are working properly.
	Reduce the electromagnetic interference if there is electromagnetic interference with the peripheral devices.
	Make sure the external voltage level of the servo drive is correct.
Inspection before operation (power ON)	The encoder cable should be protected from excessive stress – make sure the cable is not worn or stretched.
	Contact AutomationDirect if the servo motor vibrates or makes unusual noise during operation.
	Make sure the parameter settings are correct. Different machines have different characteristics. Adjust the parameters according to the characteristics of each machine.
	Reset the parameters when the servo drive is in the Servo OFF status to avoid possible malfunction.
	If there is no contact noise or other abnormal noise when the relay is operating, contact AutomationDirect.
	Contact AutomationDirect if the power indicator or LED display does not function properly.
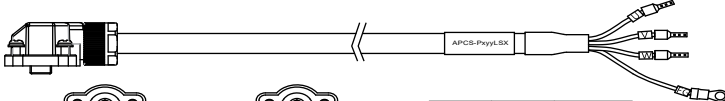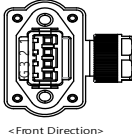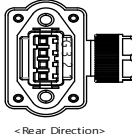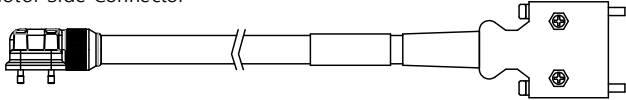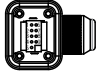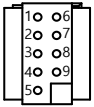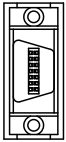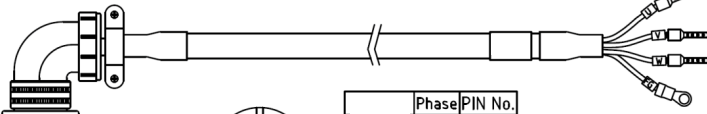
SYSTEM WIRING
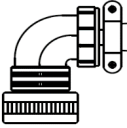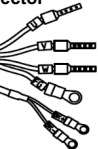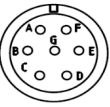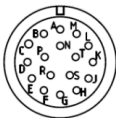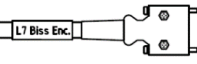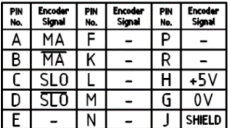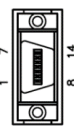
PRE-MADE MOTOR CABLES

Motor connections utilize premade cables available in normal flex or robotic flex specifications. Cables are available for any iX7NH drive and motor size 100W–3.5 kW but are model dependent (brake cables are only applicable for brake motors). They are available in lengths of 3m, 5m, 10m, and 20m (9.8 ft, 16.4 ft, 32.8 ft, and 65.6 ft).

For cable model details and specifications, please see www.automationdirect.com.

For assistance in specifying a servo system, go to www.automationdirect.com/selectors for utilities that will help pick the correct motor, drive, cables, IO components, and accessories.

Cable Type	Illustration
Motor Power Cables (FBL, FCL motors)	
Motor Encoder Cable (FBL, FCL motors)	
Motor Brake Cable (FBL, FCL motors)	
Motor Power Cable (FE, FF motors)	

Motor Power Cables table:

Item	Phase	Pin No.
LEAD WIRE	U	1
	V	2
	W	3
FG	FG	4

Motor Encoder Cable — Motor Side:

Pin No.	Encoder Signal	Pin No.	Encoder Signal
1	MA	6	/MA
2	SLO	7	/SLO
3	-	8	-
4	0V	9	+5V
5	SHIELD		

Motor Encoder Cable — Drive Side:

Pin No.	Encoder Signal	Pin No.	Encoder Signal
1	-	8	-
2	-	9	-
3	MA	10	-
4	/MA	11	-
5	SLO	12	-
6	/SLO	13	-
7	0V	14	+5V
Plate	SHIELD		

Motor Brake Cable:

PIN No.	Signal
1	BK +
2	BK -

Motor Power Cable (FE, FF motors):

	Phase	PIN No.
LEAD WIRE	U	1
	V	2
	W	3
FG	FG	4

Cable Type	Illustration
Motor Power and Brake Cable (FE, FF motors)	
Motor Power and Brake Cable (FE, FF motors)	
Drive I/O Cables	 APCS-L7NCN1T-AD, APCS-L7NCN1T01-AD, APCS-L7NCN1T015-AD, APCS-L7NCN1T02-AD You can download a printable terminal label ("I/O Breakout Template") at https://www.automationdirect.com/pn/APCS-L7NCN1T-AD See terminal assignments table on the following page. *APCS-CN101A-AD, APCS-CN102A-AD, APCS-CN103A-AD*
Analog Monitoring Connector	Connect with: • L7P-CON-E (for 24-48 AWG pins) • L7P-CON-F • L7P-CON-G (for 26AWG IDC) Analog output monitor connection (viewed from front side of drive)
STO Replacement Connector	Connect with: • APCS-CN6K-AD

Terminal Assignments and Wire Colors

> **CAUTION: Terminal assignments are different for every LS drive series. Use this terminal assignment chart with iX7NH series drives ONLY. Using terminal charts from other LS series drives will result in incorrect wiring that will damage your equipment.**

Terminal	Drive I/O Pin/Wire #	iX7NH Series Description	APCS-CN10xA Flying Lead Cables		
			Wire Color	Stripe Color	Number of Stripes
A1	1	DO1	Yellow	Black	1
B1	2	DOCOM	Yellow	Red	1
A2	3	DO2	Yellow	Black	2
B2	4	DO3	Yellow	Red	2
A3	5	AGND	Yellow	Black	3
B3	6	+24V	Yellow	Red	3
A4	7	DI3	Yellow	Black	4
B4	8	DI4	Yellow	Red	4
A5	9	AO	Yellow	Black	5
B5	10	/AO	Yellow	Red	5
A6	11	DI1	White	Black	1
B6	12	DI2	White	Red	1
A7	13	DI5	White	Black	2
B7	14	DI6	White	Red	2
A8	15	A-TLMT	White	Black	3
B8	16	GND	White	Red	3
A9	17	ZO	White	Black	4
B9	18	/ZO	White	Red	4
A10	19	BO	White	Black	5
B10	20	/BO	White	Red	5

APCS-L7NCN1Txxx-AD
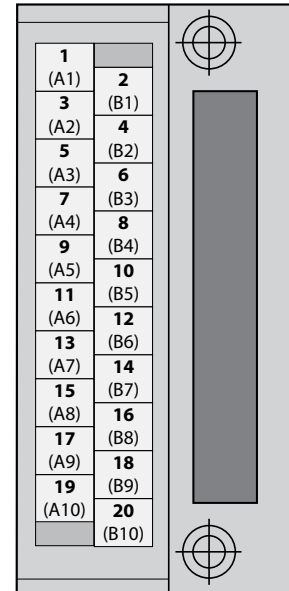
1 (A1)	2 (B1)
3 (A2)	4 (B2)
5 (A3)	6 (B3)
7 (A4)	8 (B4)
9 (A5)	10 (B5)
11 (A6)	12 (B6)
13 (A7)	14 (B7)
15 (A8)	16 (B8)
17 (A9)	18 (B9)
19 (A10)	20 (B10)

You can download a printable terminal label ("I/O Breakout Template") at https://www.automationdirect.com/pn/APCS-L7NCN1T-AD
See terminal assignments table on the following page.

Names and Functions of Analog Inputs and Outputs

Location	Name	Description	Pin #	Function Details	Terminal
Output on 4-pin Analog Monitor Connector	AMON1	Analog monitor 1	1	Analog monitor output (-10V to +10V)	3 4 / 1 2
	AMON2	Analog monitor 2	2	Analog monitor output (-10V to +10V)	
	AGND	AGND(0V)	3	Analog ground	
	AGND	AGND(0V)	4	Analog ground	
Input on I/O Connector	AGND	AGND(0V)	5	Analog ground	
	A-TLMT	Analog torque limit	15	-10V to +10V is connected between A-TLMT (pin 15) and AGND (pin 5) to limit the motor's output torque. The relationship between input voltage and torque limit varies depending on the Torque Command Scale [0x221C] value and Torque Limit Function Select (0x2110).	

GENERAL WIRING OVERVIEW

EXAMPLE SYSTEM CONFIGURATION

NOTE: 100W to 2.2 kW 230VAC systems can use a single-phase supply. Any 2 of R,S,T can be used. See "iX7NH Servo Drive" on page 8 for notes on motor sizes that need derating when using single-phase power.
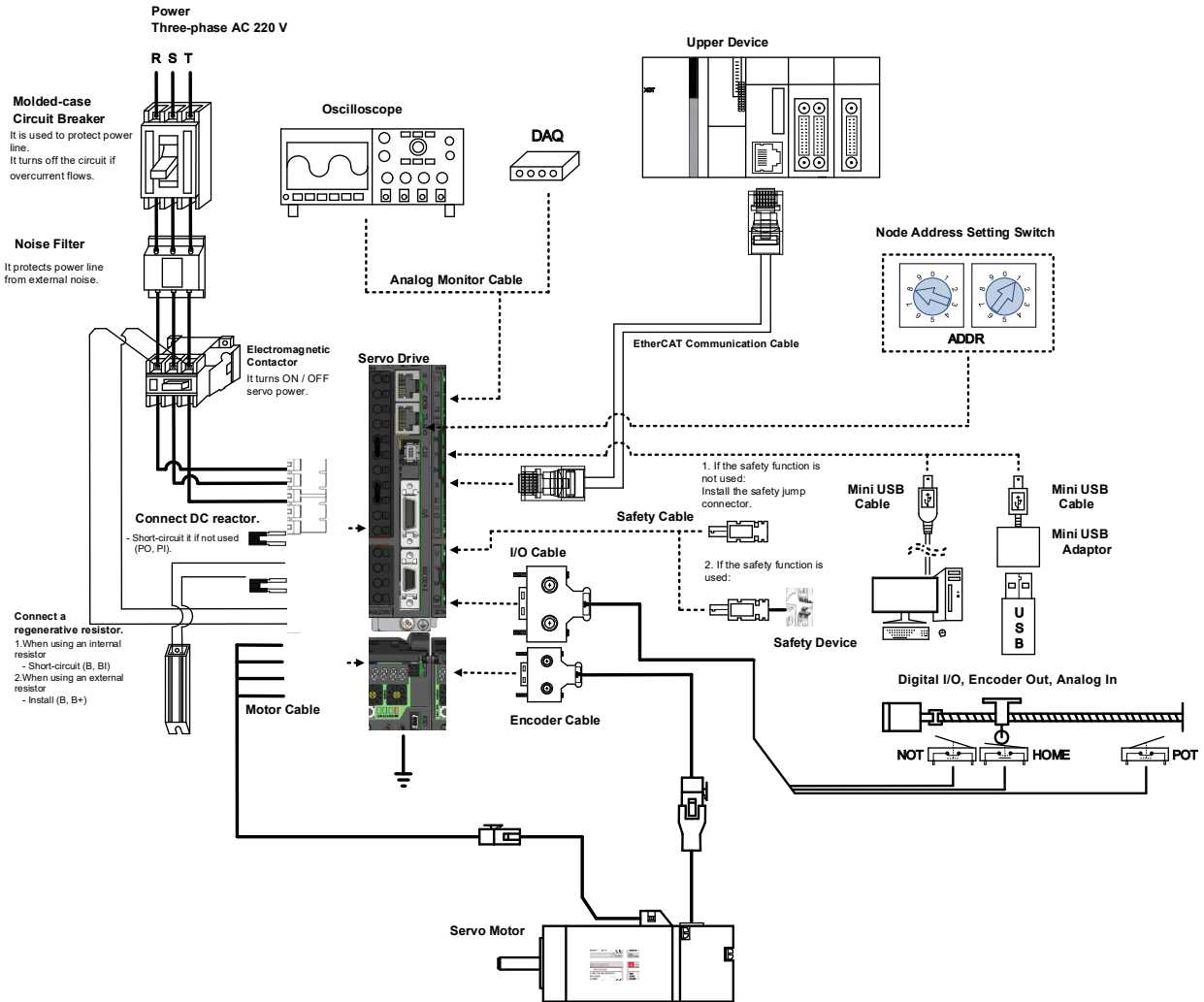
NOTE: PE between the servo motor and the servo and between the servo and the device must be connected.

MAIN POWER CONNECTION WIRING

> 📝 *NOTE: Single-phase can use any two wires of R, S, or T. Ensure C1 and C2 are powered as well.*

Drive	Specification
400W	1-phase 115V/230V, 3-phase 230V
750W–2.2 kW	1-phase (with derating) or 3-phase 230V
3.5 kW	3-phase 230V

Although designed with 3-phase AC input power in mind, some iX7NH systems are capable of supporting single-phase AC input power. With 3-phase AC supply, the iX7NH motor/drive combination supplies 300% rated maximum/intermittent motor Torque (see the Instantaneous Operation Range in the torque-speed charts above). With single-phase AC supply some ratings will have limited maximum/intermittent torque, and/or the next larger drive size will be required.

Drive Derating for Single-phase Usage		
Motor	Drive to use with Single-Phase Input	Motor Torque Derating
100W/200W/400W	iX7NHA004U-AD	Single phase and three phase input both produce 300% max torque
750W	iX7NHA008U-AD	Single phase and three phase input both produce 300% max torque
1kW	iX7NHA010U-AD or iX7NHA020U-AD	2kW drive produces 300% max torque. The 1kW drive can be used, but the motor can only provide 200% max torque.
1.5 kW/1.6 kW/ 2.2 kW	iX7NHA035U-AD	3.5kW drive produces 200% max torque with 1.5 kW and 1.6 kW motors. With single phase supply, this drive only produces 150% max motor torque with a 2.2 kW motor.
3.5 kW	n/a	No single-phase capability
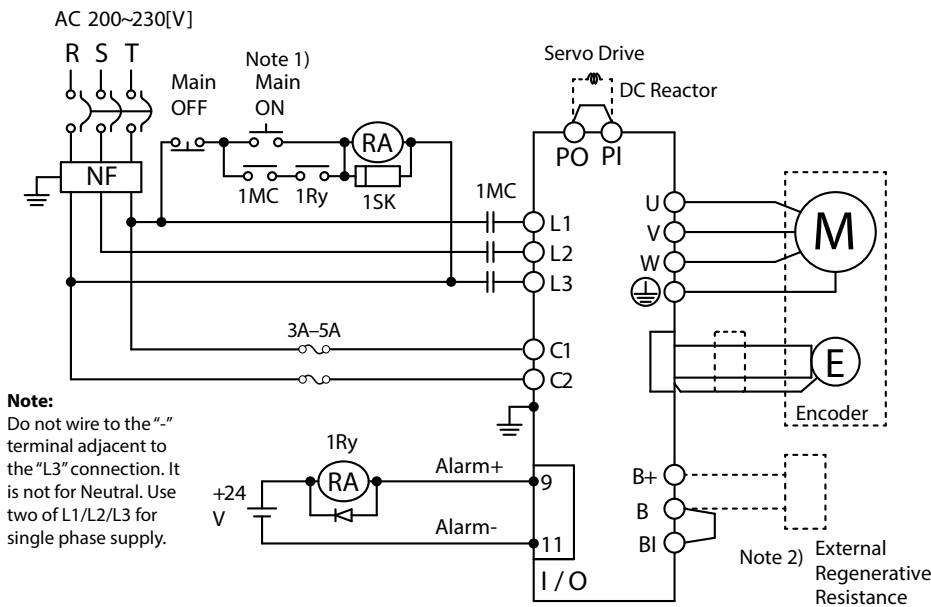
Note: Do not wire to the "-" terminal adjacent to the "L3" connection. It is not for Neutral. Use two of L1/L2/L3 for single phase supply.

> 📝 *NOTE 1: About 1-2 seconds are required from main power supply to alarm signal output. Hold the main power on for 2 seconds until the alarm circuit ("1Ry") will latch main power ON. See "STO Wiring" on page 20.*

> 📝 *NOTES 2 & 3: If an external regen resistor is required, see the available regen resistors under Motion Control category at AutomationDirect.com (APCS-140R50-AD, APCS-300R30-AD, etc.). Remove the jumper from the internal resistor between B and BI, and connect the external resistor to the B+ and B pins.*

NOTE: To connect a power or motor connector, use the provided spring cage release tool (IX7-CON-C) or flat-head screwdriver to clear the opening as shown below. Insert the core wire into the hole and pull out the spring opener or flat-head screwdriver to complete connection.
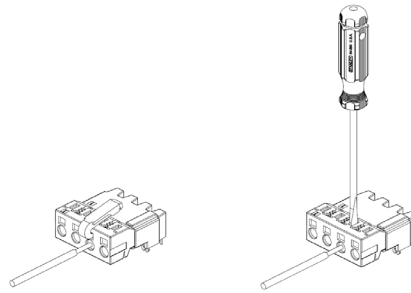
Wiring Specifications

Drive Size	400W	750W	1kW	2kW	3.5 kW
MCCB (UL489 NFB) / Fuse[2]	15A		30A		
Noise Filter (NF)	TB6-B010LBEI (10A)		TB6-B030NBDC (30A)		
DC Reactor	10A	15A	30A		
MC	11A / 240V	18A / 240V	32A / 240V		
L1, L2, L3, PO, PI, N, B+, B, BI, U, V, W [1]	16AWG (1.5 mm²)	14AWG (2.5 mm²)	12AWG (4.0 mm²)		
Pressurized Terminal	AL 1, 5-8 BK 3200043, Phoenix Contact AI 0, 75-8 GY-3200519, Phoenix Contact (8.5 ± 0.5 mm strip & twist)		UA-F4010, SEOIL (10mm strip & twist)		
Recovery Resistance	50W 100Ω	100W 40Ω	150W 13Ω		
Power Connector	iX7-CON-A iX7-CON-B iX7-CON-C		iX7-CON-D iX7-CON-E iX7-CON-F		

1 - Select and use 600V, PVC-insulated wires. To comply with UL (CSA) standards, use UL-certified wires that have a heat resistant temperature of 75°C [167°F] or above. To comply with other standards, use proper wires that meet the applicable standards. For other special specifications, use wires equivalent or superior to those specified in this section.
2 - Use Class CC or High Speed J (HL series) current limiting fuses to prevent nuisance tripping and to increase the panel SCCR rating.

Power Connector Signal Names

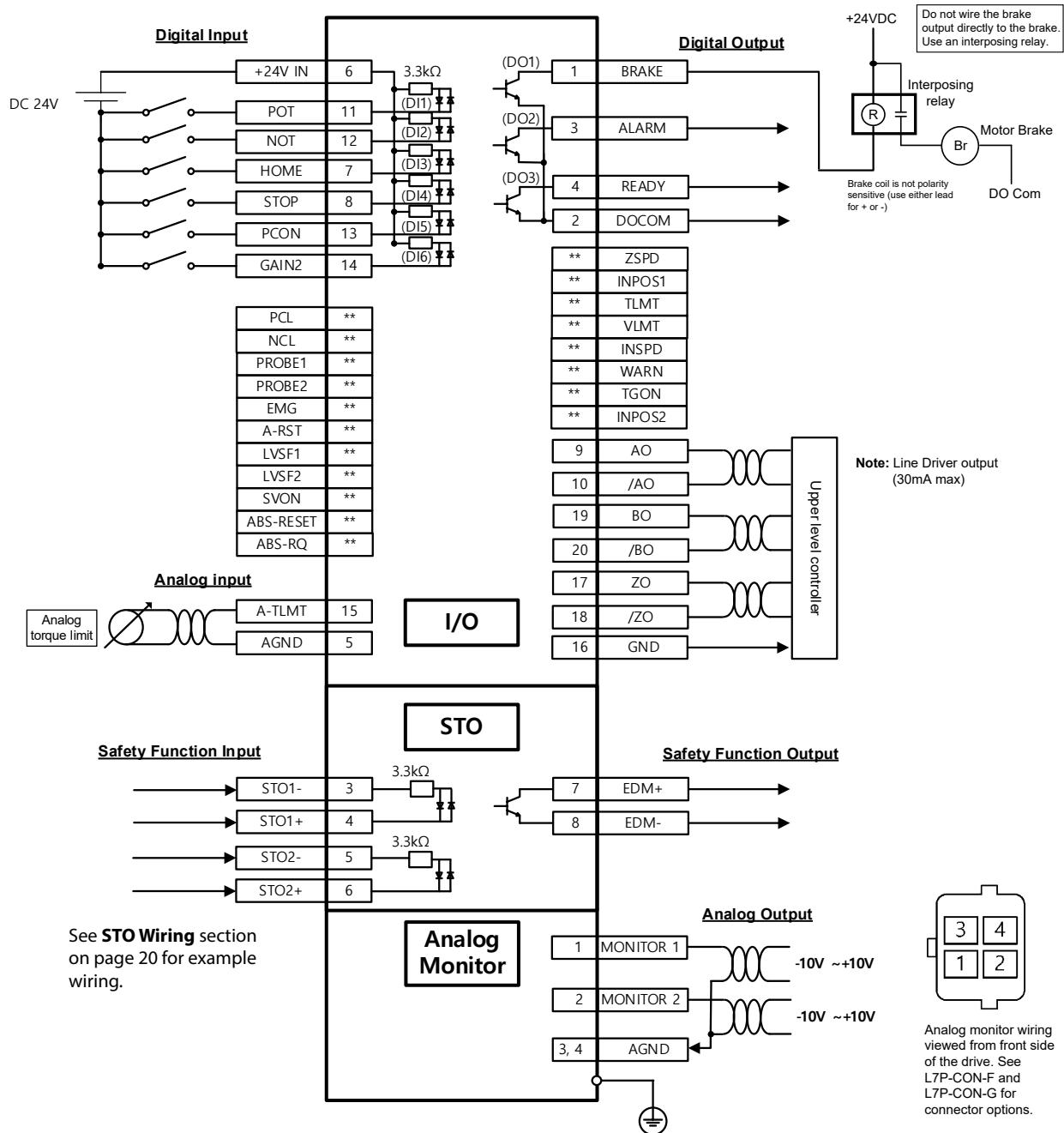| Signal Name	Description
L1	Main power connectors
L2	
L3	
–	No connection (do not connect to Neutral)
P0	DC reactor connection connector
PI	
B+	Recovery resistance connection connector
B	
BI	
C1	Control power terminal
C2	
U	Servo motor connection terminal
V	
W	

NOTE: Strip all Power Connector wiring 7-10mm. Refer to section 3.4.2 of the User Manual.

I/O Connection Wiring Diagram with Default Functions

I/O Connection wiring diagram is shown below. For a printable terminal label, go to:
https://www.automationdirect.com/pn/APCS-L7NCN1T-AD.

See "Terminal Assignments and Wire Colors" on page 13 for terminal assignments.

Digital Input

Signal	Terminal
+24V IN	6
POT	11 (DI1)
NOT	12 (DI2)
HOME	7 (DI3)
STOP	8 (DI4)
PCON	13 (DI5)
GAIN2	14 (DI6)

3.3kΩ

DC 24V

Signal	
PCL	**
NCL	**
PROBE1	**
PROBE2	**
EMG	**
A-RST	**
LVSF1	**
LVSF2	**
SVON	**
ABS-RESET	**
ABS-RQ	**

Analog input

Analog torque limit

Signal	Terminal
A-TLMT	15
AGND	5

I/O

Digital Output

Terminal	Signal
1	BRAKE (DO1)
3	ALARM (DO2)
4	READY (DO3)
2	DOCOM
**	ZSPD
**	INPOS1
**	TLMT
**	VLMT
**	INSPD
**	WARN
**	TGON
**	INPOS2
9	AO
10	/AO
19	BO
20	/BO
17	ZO
18	/ZO
16	GND

+24VDC

Do not wire the brake output directly to the brake. Use an interposing relay.

Interposing relay (R)

Motor Brake (Br)

DO Com

Brake coil is not polarity sensitive (use either lead for + or -)

Note: Line Driver output (30mA max)

Upper level controler

STO

Safety Function Input

Signal	Terminal
STO1-	3
STO1+	4
STO2-	5
STO2+	6

3.3kΩ

See **STO Wiring** section on page 20 for example wiring.

Safety Function Output

Terminal	Signal
7	EDM+
8	EDM-

Analog Monitor

Analog Output

Terminal	Signal	
1	MONITOR 1	-10V ~ +10V
2	MONITOR 2	-10V ~ +10V
3, 4	AGND	

3	4
1	2

Analog monitor wiring viewed from front side of the drive. See L7P-CON-F and L7P-CON-G for connector options.

NOTE: Input signals DI1-DI6 and output signals DO1-DO3 are factory default signals and can be reconfigured.

NOTE: APCS-L7NCN1Txxx-AD provides shielding between the servo and the terminal blocks. User provided shielding should be installed for high speed and analog signals (ground the shield on the PLC side).

DRIVE NODE ADDRESS SETTING

The iX7NH includes a Modbus TCP Server feature. For Modbus TCP communications to the drive the two rotary dials need to be addressed to node 98 or 99. Node 99 allows access to the built-in webserver in the drive. For network installations that do not allow webservers, Node 98 enables Modbus TCP communications without the built-in webserver function (firmware version 1.15 and later). See the iX7NH Modbus TCP Communication Guide for further details on Modbus TCP communication.
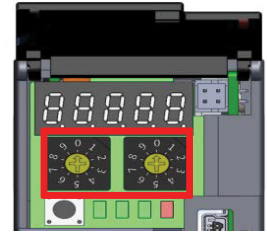
Note that the drive only reads the node switch value when power is turned on. To change the value, the power has to be turned off and back on again.

Modbus TCP communication is only available using the EtherCAT-IN port.

The iX7NH supports the following operation modes (0x6060) when connected to the Modbus-TCP server.

- *Profile Position Mode (PP): Refer to Section 5.3.2*
- *Homing Mode (HM): Refer to Section 5.6*
- *Profile Velocity Mode (PV): Refer to Section 5.4.2*
- *Profile Torque Mode (PT): Refer to Section 5.5.2*

Default IP Address : 192.168.5.5 / Port : 502

See section 13.1 in the iX7NH user manual for further details.

The iX7NH Node address must be unique on an EtherCAT network. For EtherCAT usage, set the two rotary dials to any value 0 - 97 not being used on the network.

NOTE: The iX7NH MAC ID factory default setting is 00:00:00:00:00:00 for all drives (parameter 0x241F). Having duplicate MAC IDs will probably not impact an EtherCAT network, but care should be taken to avoid having duplicate MAC IDs on any managed network. See the iX7NH Modbus TCP Communication Guide for more information.

### I/O WIRING DETAILS DIGITAL INPUTS/OUTPUTS

Digital Inputs

1) You can set the input contact to contact A (normally open) or contact B (normally closed).
2) You can assign each input contact to one of 17 functions.
3) For more information on signal assignment and change of the input contact, refer to the User Manual, section 6.2 "Input/Output Signals Setting." The Drive CM software makes setting the I/O signals very quick and easy.
4) The rated voltage is 12VDC to 24VDC.
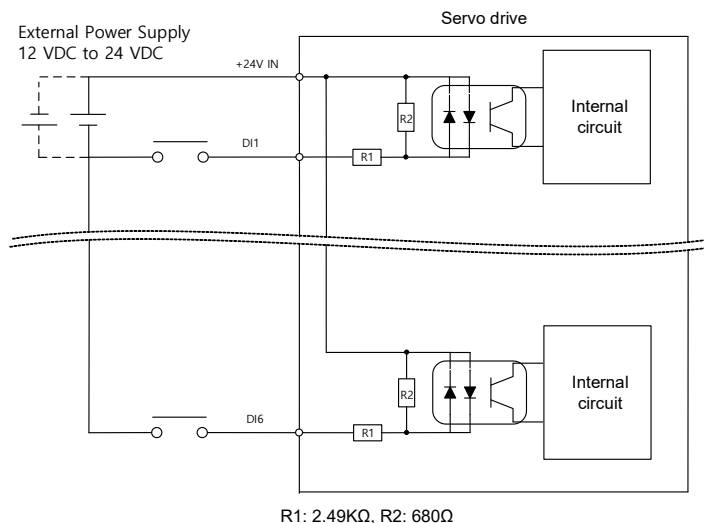
R1: 2.49KΩ, R2: 680Ω

Digital Outputs

1) You can set the output to contact A (normally open) or Contact B (normally closed).
2) You can assign each output contact to one of 11 output functions.
3) For more information on signal assignment and change of the output contact, refer to the User Manual, section 6.2 "Input/Output Signals Setting." The Drive CM software makes setting the I/O signals very quick and easy.
4) Excessive voltage or overcurrent may damage the device because it uses an internal transistor switch. Be cautious. Do not directly power large inductive loads, use an interposing relay.
5) The rated voltage and current are 24VDC ± 10% and 120mA.
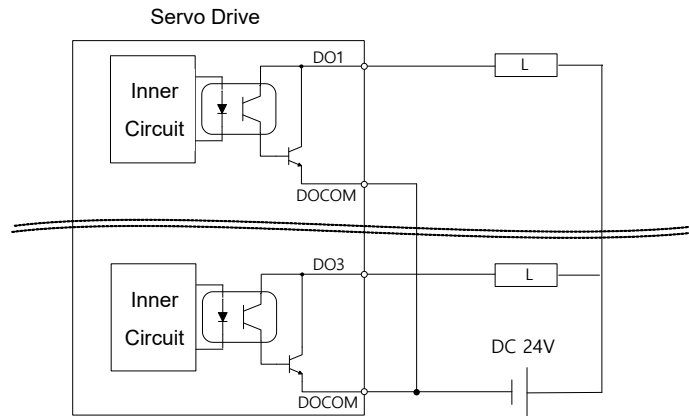
6) When using an electronic brake, refer to the wiring diagram below for configuration.
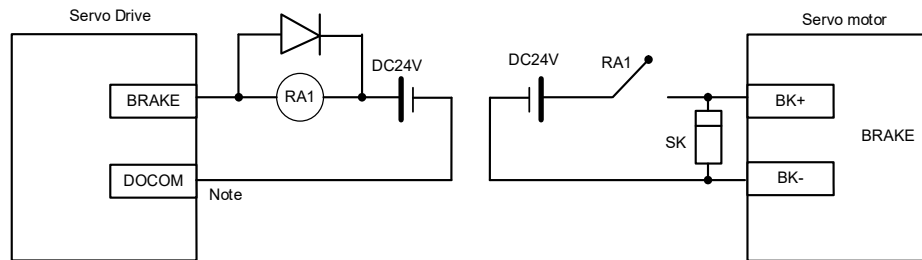
NOTE: Use separate power sources for the control and the main power of the electronic brake with voltage according to the electronic brake's specifications (refer to "Electronic Brake Specifications" table in iX7NH User Manual Section 2). For DO1-DO3 output, use a common GND24 for DOCOM.

STO WIRING

The iX7NH Safe Torque Off is designed to meet Safety Category 3, Safety integrity level 2 (SIL 2), Performance level d(PL d).
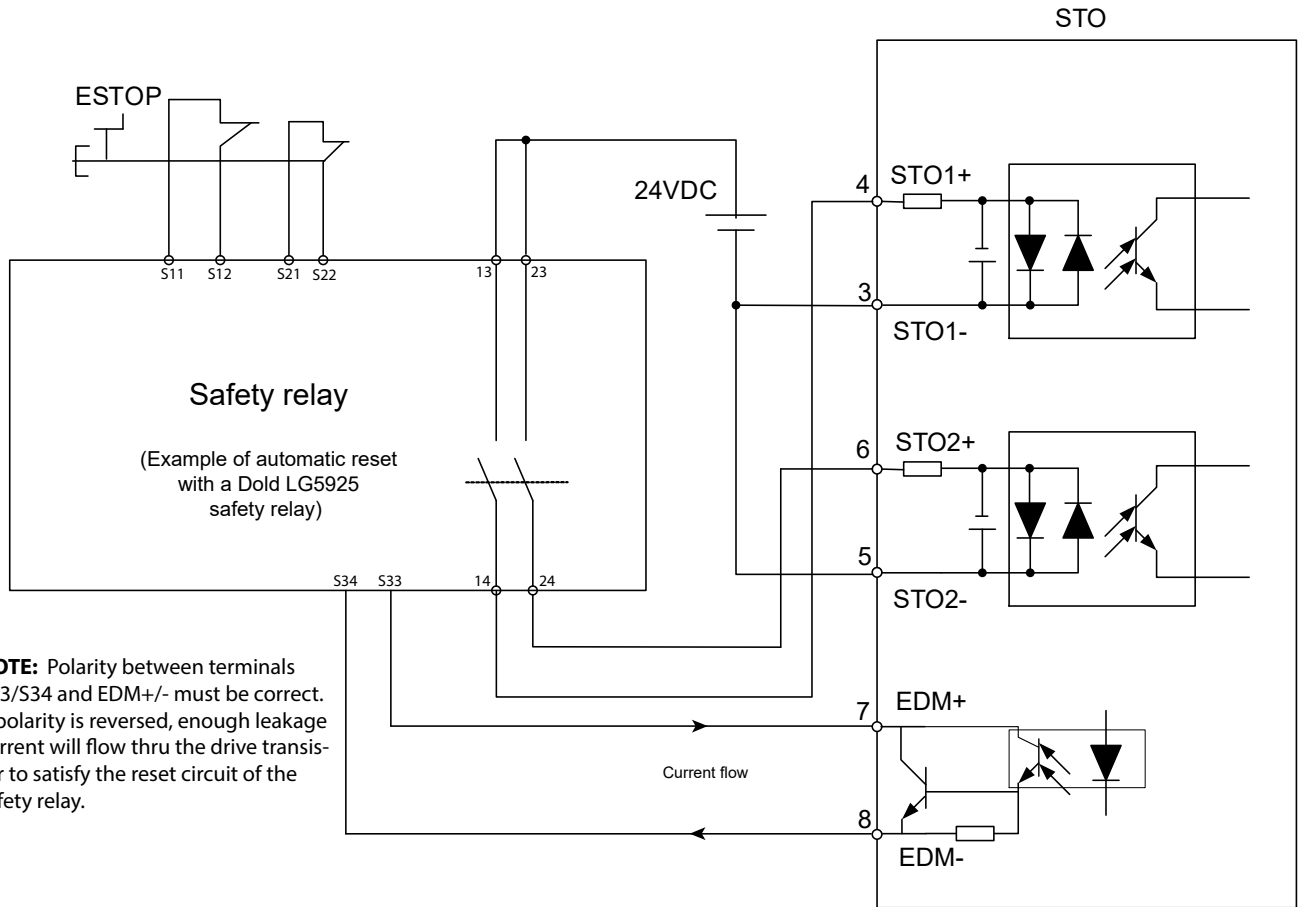
NOTE: Polarity between terminals S33/S34 and EDM+/- must be correct. If polarity is reversed, enough leakage current will flow thru the drive transistor to satisfy the reset circuit of the safety relay.

1. The STO rated voltage is 12VDC to 24VDC
2. With the contacts of STO1 and STO2 off, the motor output current is blocked.

NOTE: Each iX7NH drive ships with an STO bypass connector APCS-CN6K for commissioning and testing. AutomationDirect recommends using pre-made STO cables (APCS-STOxxA-AD) to facilitate STO wiring.

I/O WIRING AND OPTION DETAILS FOR THE ANALOG INPUT

1) For information on how to operate the analog input signal, refer to the User Manual, section 6.9 "Torque Limit Function".
2) The range of the analog input signal is -10V to 10V.
3) The impedance for the analog input signal is approximately 10KΩ.

NOTE: APCS-L7NCN1Txxx-AD provides shielding between the servo and the terminal blocks. User provided shielding should be installed for analog signals (ground the shield on the PLC side).

4) Use a PLC analog output signal configured for -10V - +10V (can use 0–10V). To use a potentiometer and a 24VDC supply, use the following wiring and dropping resistor values:
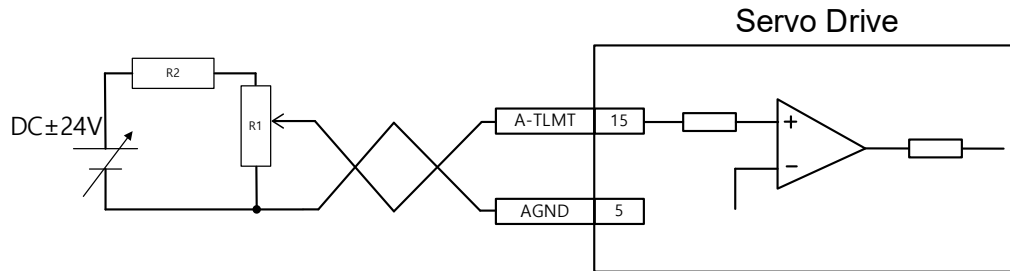
No.	R1	R2
1	5KΩ	6KΩ
2	10KΩ	12KΩ

5) Example R1 potentiometers:
   - *GSDA-5K: 5K potentiometer with 0-100% dial*
   - *ECX2300-5K: 5k potentiometer*
   - *ECX2300-10K: 10k potentiometer*

LED DISPLAY

The LED status display can contain a variety of information, including the status of the drive's operating state, digital inputs, digital outputs, alarms, and warnings. Please refer to section 4.2 of the User Manual to see details of using the display on the front of the drive to monitor drive status.

ALARMS

See section 14.2 of the User Manual for more information on Alarms.

Code	Alarm	Immediately Reset	Power Cycle or Software Reset Needed
AL-10	IPM fault (Overcurrent H/W)	✓	
AL-14	IPM fault (Overcurrent S/W)	✓	
AL-16	Current Limit exceeded (Overcurrent (H/W))	✓	
AL-11	IPM Temperature (IPM Overheat)	✓	
AL-15	Current Offset Abnormality	✓	
AL-21	Continuous Overload Abnormality	✓	
AL-22	Drive Temperature Overheat 1	✓	
AL-23	Regeneration Overload	✓	
AL-24	Motor Cable Open	✓	
AL-25	Drive Temperature Overheat 2	✓	
AL-26	Encoder Temperature (Reserved)	✓	
AL-28	DC Fan Trip	✓	
AL-29	Regeneration Resistor Fault	✓	
AL-30	Encoder Communication Error		✓
AL-31	Encoder Cable Open		✓
AL-32	Encoder Data Error		✓
AL-38	Encoder Setting Error		✓
AL-33	Motor ID Setting		✓
AL-34	Encoder Z Phase Open		✓
AL-35	Encoder Battery Low Voltage		✓
AL-3b	Encoder Position Error		✓
AL-36	Sine Wave Amplitude Encoder Error		✓
AL-37	Sine Wave Frequency Encoder Error		✓
AL-40	Main Power Input Undervoltage	✓	
AL-41	Main Power Input Overvoltage	✓	
AL-42	Main Power Input Failure	✓	
AL-43	Control Power Failure (reserved)	✓	
AL-50	Over Speed Limit	✓	
AL-51	POS Excessive Position Error	✓	
AL-53	Excessive Speed Deviation	✓	
AL-57	Excessive Pulse Output	✓	
AL-63	Parameter Checksum Error		✓
AL-71	Factory Setting Error		✓

WARNINGS

Code	Warning
W01	Main Power Phase Loss
W02	Encoder Battery Low Voltage
W04	Software Position Limit
W08	Dynamic Braking Overcurrent
W10	Operation Overload
W20	Drive-Motor Setup Abnormality
W40	Main Power Undervoltage
W80	Emergency Signal Input Abnormality

DRIVE CM SOFTWARE

AUTOMATIONDIRECT FOREWORD

The LS Electric Drive CM software does not include "Are you sure?" types of warnings. When you make a change in the SW it takes place immediately in the drive, even settings that initiate motion.

Example 1:

When you go to the JOG screen and press "Enable", the drive Enables immediately.

Example 2:

When you change a Digital Input from active low to active high, the definition changes immediately by pushing the "Edge" button. In the picture to the right, Input #1 is configured for Servo On. If the input is physically low and you press the Edge button, the input's definition is changed to active low and the servo will immediately be enabled.

There is nothing wrong with this approach, but it may be more direct than most software packages that are in use today.
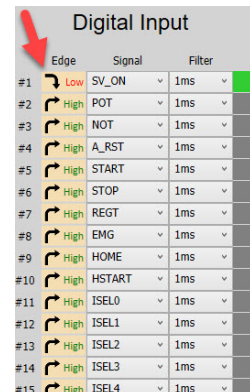
GETTING STARTED

When using Modbus TCP control, the drive will generate a built-in webserver when the Node ID DIP switches are set to 99. (Node ID = 98 disables the webserver feature.) Many configuration and commissioning features are available through the webserver. But some features, most notably the Setup Wizard, are NOT available through the webserver. For this reason, AutomationDirect recommends initial commissioning using Drive CM.

Drive CM software provides the fastest and easiest way to set up the LS Electric IX7NH drive. The following steps show how to get started with the software and a few key features.

Before starting, you will need:

- *PC with Windows 8 or later*
- *PC USB port*
- *USB Type A to USB mini-B cable (SV2-PGM-USB15 is a good choice due to the dual ferrite filters and opto-isolator included with the cable. This USB cable is helpful when dealing with PC to Drive connectivity issues due to EMI)*

Step 1

Download and install Drive CM Software from the AutomationDirect software download page at https://www.automationdirect.com/support/software-downloads?itemcode=Drive%20CM%20Configuration.

Step 2

Connect the servo drive USB port to the PC USB port using a standard USB-A to USB-mini-B cable. Some cables available from AutomationDirect include:

USB-A to USB-mini-B Cables
SV2-PGM-USB15
SV2-PGM-USB30
MOSAIC-CSU
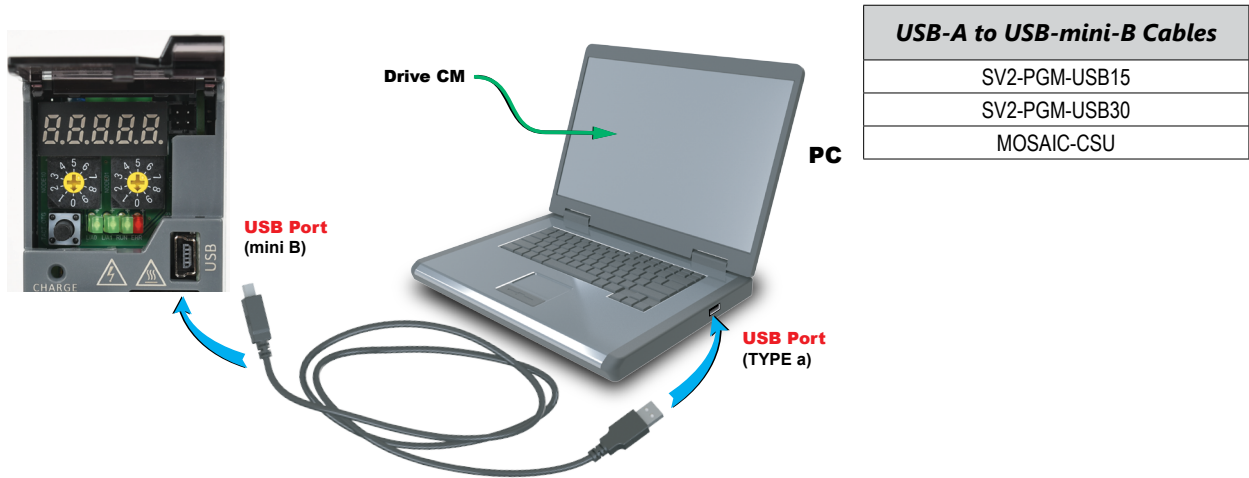
Step 3

Open Drive CM Software and Connect to the drive.

1) Select the USB connection type and iX7NH drive.
2) Then press the Cable icon to connect and establish communications with the drive.

Push to connect

After connecting, icon will change to this. Push to disconnect.
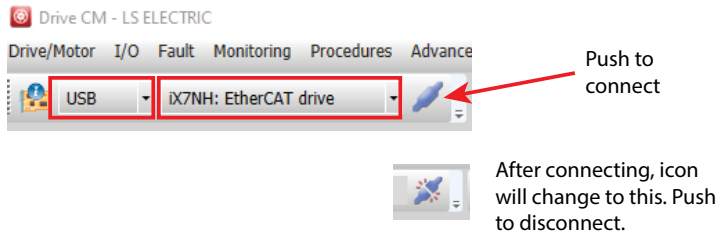
NOTE: The icon does not show the current comms state, it shows what will happen if you push the button.

The comms status is displayed at the bottom left corner of the software screen. A green blinking square indicates active communication.

USING THE DRIVE CM SOFTWARE

There are two main working areas in Drive CM. The Main Window (larger, left) is mostly used for setup and configuration. The Auxiliary Window (smaller, right) has more dynamic operations available. Both areas can be viewed simultaneously for maximum usefulness. The left area is also used to run the Setup Wizard. The Setup Wizard will walk you step-by-step through setting up the basic parameters of the system.

NOTE: If you exit the "Setup Wizard" before completing the process, you will have to restart the wizard from the beginning. The "Setup Wizard" will not update the drive's parameters or the parameters in the object dictionary until they are written to the drive.

NOTE: In the "About" drop down menu you can find the Drive CM software user manual for specifics on each function in the software.
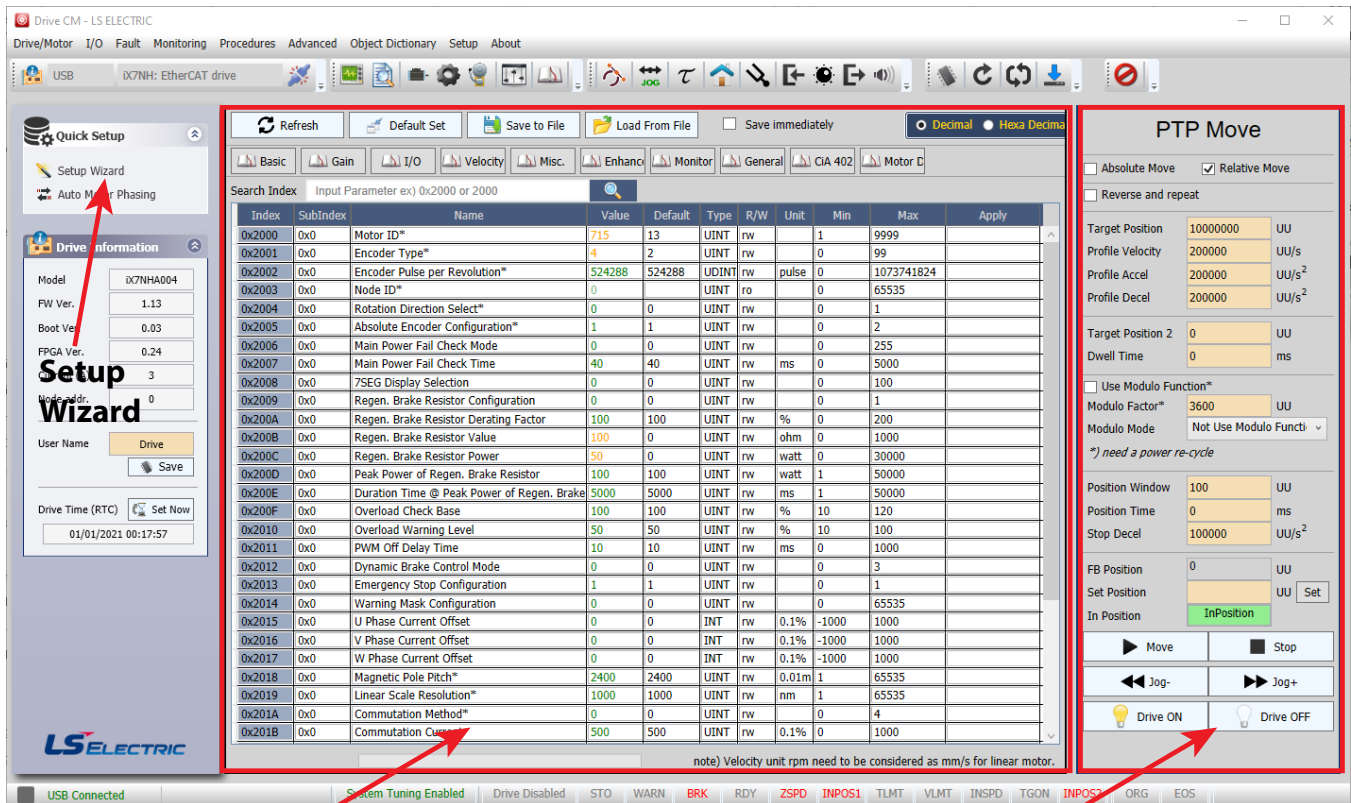
Main Window   **Auxiliary Window**

TOOLBARS

The two main toolbars at the top of the screen control what is displayed in the Main and Auxiliary windows.

Toolbar	Controls
	Main Window
	Auxiliary Window

TOOLBAR FUNCTIONS

Icon	Function	Displays In
	Trace/Trigger Monitor (Scope)	Main Window
	Cyclic Monitor (System Data View)	
	Motor Encoder Setup (no configuration needed for auto-identifiable FBL/FCL motors)	
	General Configuration Setup	
	Fault Configuration	
	Controls Loop (Manual Tuning)	
	Object Dictionary (Parameters)	
	PTP Move	
	Jog Manual	
	Torque Control	
	Homing	
	Tuning	
	Digital Input	
	Analog Input	
	Digital Output	
	Analog Monitor	
	Save to Drive Memory	n/a (Command only)
	Reset Servo Alarm	
	Software Reset for Drive CPU power cycle	
	Firmware Update	
	Emergency STOP	

*NOTE: Some configuration screens (PTP Move, Manual Jog, etc.) have software **Drive ON**/**Drive OFF** buttons to enable and disable the drive. The **Servo On** (SV_ON) digital input must physically be OFF for the software Drive ON/Drive OFF buttons to function properly. The drive evaluates the physical digital input and the software buttons as an OR function for drive enable.*

I/O Configuration

Digital Inputs

Use the following parameters to configure Digital Input functionality or use the Digital Input window in Drive CM directly to make changes. The software provides a very easy way to change the DI functions using the digital input icon (quickest and easiest method for configuration). Alternatively, you can open the parameter object dictionary using the Object Dictionary menu button or the Object Dictionary icon.

> *NOTE: When making these changes while the software is connected to the drive the change will take effect immediately, there is no "Are you sure?" warning. Example: Changing an SVON digital input from NO to NC by pressing the "Edge" button will cause the drive to change state immediately.*
>
> *This feature of immediate changes from NO <-> NC can be used for "forcing" a digital input for testing and troubleshooting your application.*

Object Dictionary Menu button

Digital Input icon

Object Dictionary icon
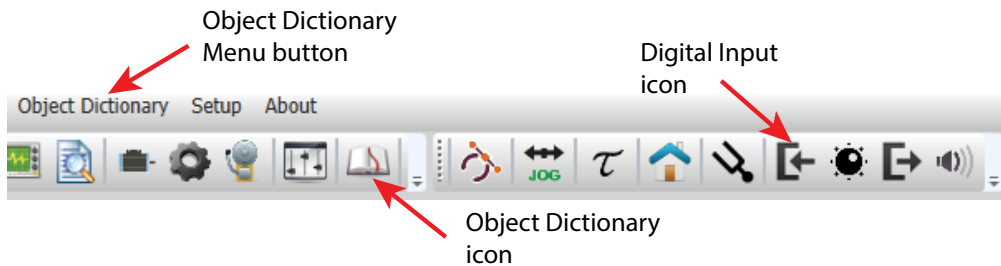
Digital Input Default Functions

These functions are located under the **I/O** tab.

Input	Parameter Object	Default Function
DI1	0x2200	POT (0x01)
DI2	0x2201	NOT (0x02)
DI3	0x2202	HOME (0x03)
DI4	0x2203	STOP (0x04)
DI5	0x2204	PCON (0x05)
DI6	0x2205	GAIN2 (0x06)

Digital Input

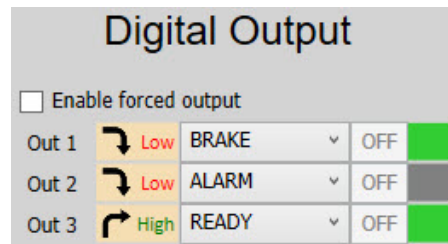|	Edge	Signal
#1	High	POT
#2	High	NOT
#3	High	HOME
#4	High	STOP
#5	High	PCON
#6	High	GAIN2
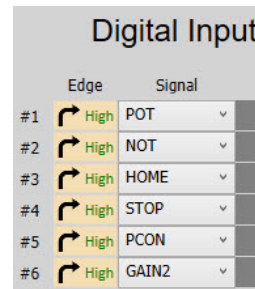
Note: 'cyc' = CPU cycle time (~125µs)

DIGITAL INPUT CODES

See section 3.5.1 and 6.2.1 in the User Manual for more information about DI codes. Drive CM is the easiest way to edit the DI codes - including changing the NO and NC settings. Either enter values directly into Parameters 0x2200–0x2205 (Object Dictionary's I/O tab) or use the pulldown lists after selecting the Digital Input icon.

Parameter Setting NC	Parameter Setting NO	Code	Function
0x8000	0x0000	Not assigned	Input not used
0x8001	0x0001	POT	Prohibit forward rotation (CCW limit)
0x8002	0x0002	NOT	Prohibit reverse rotation (CW limit)
0x8003	0x0003	HOME	Origin sensor
0x8004	0x0004	STOP	Stop servo
0x8005	0x0005	PCON	Operate P control
0x8006	0x0006	GAIN2	Switch between Gain1 and Gain2
0x8007	0x0007	P_CL	Forward torque limit
0x8008	0x0008	N_CL	Reverse torque limit
0x8009	0x8009	PROBE1	Probe signal stores position value (1)
0x800A	0x000A	PROBE2	Probe signal stores position value (2)
0x800B	0x000B	EMG	Emergency stop
0x800C	0x000C	A_RST	Reset alarm
0x800D	0x000D	LVSF1	Vibration control filter 1
0x800E	0x000E	LVSF2	Vibration control filter 2
0x800F	0x000F	SV_ON	Servo ON
0x8010	0x0010	ABS_RQ	Request absolute position data
0x8024	0x0024	ABS_Reset	Absolute Value Reset
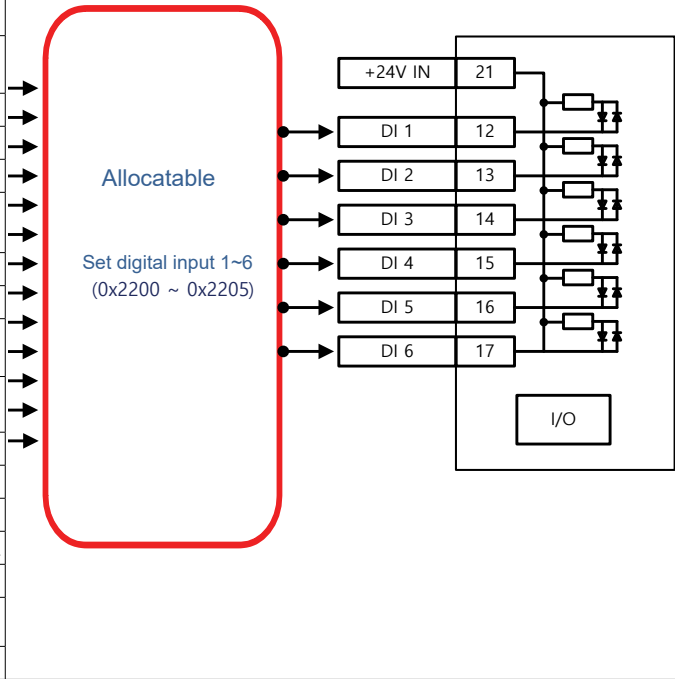
DIGITAL OUTPUTS

Use the following parameters to configure Digital Output functionality or use the Digital Output window in Drive CM directly to make changes. All three digital outputs are configurable.

The software provides a very easy way to change the DO functions using the digital output icon (the quickest and easiest method of configuration). Here you can also force the outputs individually by checking the "Enable forced output" check box. Alternatively, you can open the parameter object dictionary using the Object Dictionary menu button or the Object Dictionary icon.

> NOTE: When making these changes while the software is connected to the drive the change will take effect immediately, there is no "Are you sure?" warning. Example: Changing the BRAKE output from active low to active high (see the red "Low" and green "High" text in the in the Digital Output image below) will immediately change the physical state of the output.

Object Dictionary Menu button

Digital Output icon

Object Dictionary icon
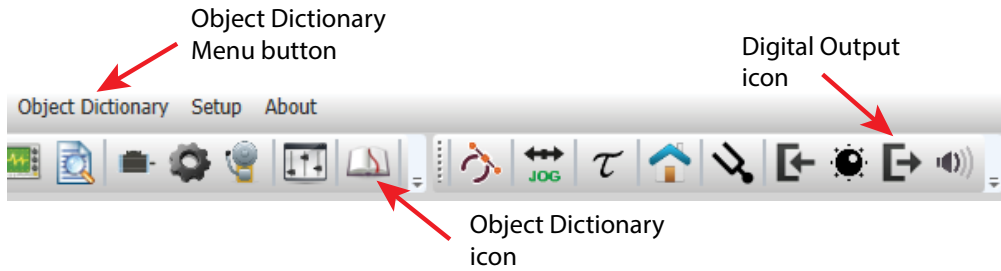
DIGITAL OUTPUT FUNCTIONS

Input	Parameter Object	Default Function
DO1	0x2210	BRAKE (0x01)
DO2	0x2211	ALARM (0x02)
DO3	0x2212	READY (0x03)

Digital Output

☐ Enable forced output

Out 1	Low	BRAKE ˅	OFF	🟩
Out 2	Low	ALARM ˅	OFF	⬜
Out 3	High	READY ˅	OFF	🟩

DIGITAL OUTPUT CODES

See section 3.5.1 and 6.2.2 in the user manual for more information about DO codes. Drive CM is the easiest way to edit the DO Codes, including changing the NO and NC settings. Either enter values directly into Parameters 0x2210–0x2212 (Object Dictionary's I/O tab) or use the pulldown lists after selecting the Digital Output icon.

Parameter Setting		Code	Function
NC	**NO**		
0x8000	0x00	Not assigned	Input not used
0x8001	0x01	BRAKE	Brake- (ON when SVON is off)
0x8002	0x02	ALARM	Servo alarm
0x8003	0x03	RDY	Servo ready
0x8004	0x04	ZSPD	Zero speed reached
0x8005	0x05	INPOS1	Complete position reach 1
0x8006	0x06	TLMT	Limit Torque is enabled
0x8007	0x07	VLMT	Speed Limit is enabled
0x8008	0x08	INSPD	Velocity is reached
0x800b	0x09	WARN	Servo warning
0x800C	0x0A	TGON	Output rotation detection
0x800F	0x0B	INPOS2	Complete position reach 2

I/O

Digital Output

Allocatable

Set digital output 1-3 (0x2210-02212)

10	DO1
9	DO2
12	DO3
11	GND24

I/O CONNECTION - ANALOG TORQUE INPUT

The IX7NH drive has an analog -10V -> +10V analog torque signal. This signal is used for an analog torque limit only, it is not an analog torque control input. Using an FA-DCDC-1 DC-to-DC converter and the ECX2300-10K potentiometer from AutomationDirect is a good option for providing a +10 to -10 volt supply and control signal.
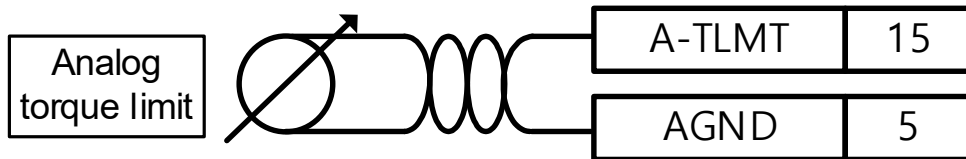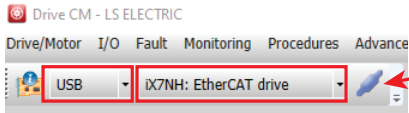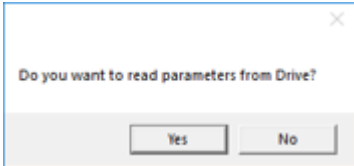
Analog torque limit		A-TLMT	15
		AGND	5

SETUP WIZARD

Below is a simple walk through of minimal settings to establish EtherCAT control. Other object configuration settings may be required for your specific needs. See the User Manual for details.

STEP 1: DRIVE SELECTION

	Substep	Task
Setup Step 1	A	Using a standard USB A to USB mini-B cable (such as SV2-PGM-USB15, MOSAIC-CSU, etc.), connect the PC to the Drive.
	B	Start Drive CM software.
	C	Select **IX7NH: EtherCAT Drive** and press the **Connect** button. The software should begin to communicate with the drive. A green flashing square should appear in the bottom right corner of the screen indicating comms traffic. Push to connect After connecting, icon will change to this. Push to disconnect.
	D	Click on **Setup Wizard**.
	E	In the USB Connection window, choose **On-Line** and click **Yes** to read parameters from the drive. **1. USB Connection** — On-Line / Off-Line **2. Drive Selection** — Pegasus, L7P, L7MMT, L7NH, L7C, iX7NH Do you want to read parameters from Drive? Yes / No If the **On-Line** radio button is not available and greyed out, click on **Setup Wizard** again. This should restart the Setup Wizard and enable the button. Click **On-Line** and **Yes** to read drive parameters.
	F	Click **Next**.
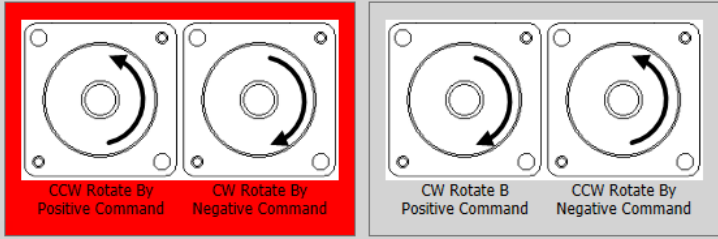
STEP 2: MOTOR/ENCODER SETTING

	Substep	Task
Setup Step 2	A	Select **Auto Setting** for motor selection. **1. Motor Selection** Auto Setting / Manual Setting
	B	Click **Next**.

> NOTE: Control Mode Selection not available since the iX7NH can only be controlled via EtherCAT or Modbus TCP controllers.
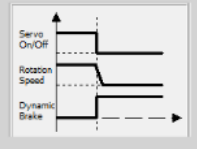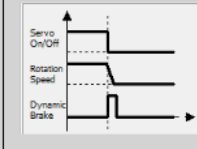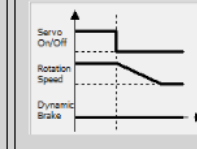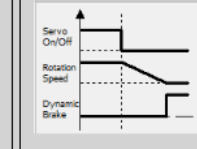
STEP 3: MOTOR ROTATION DIRECTION

	Substep	Task
Setup Step 3	A	Click **Next** to set the **Rotation Direction**. This sets which motor direction is considered positive or negative. If this isn't known, it can be set later in 0x2004 (in the Object Dictionary \ Basic tab). **1. Rotation Direction Select** CCW Rotate By Positive Command CW Rotate By Negative Command CW Rotate B Positive Command CCW Rotate By Negative Command
	B	Click **Next**.
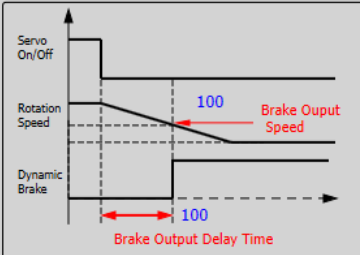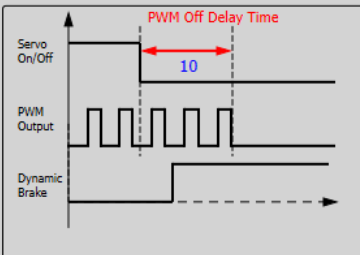
STEP 4: SET ELECTRONIC GEAR RATIO

Substep		Task
Setup Step 4	A	On the Electronic Gear Ratio screen, enter the resolution of the motor's encoder (19-bit=524288 ppr) (Object 6091:1). Also enter the number of pulses (User Units) you want to equal one shaft rotation (Object 6091:2). **1. Electronic Gear Ratio** Electronic Gear Ratio = (Motor Resolution 524288) / (Shaft Resolution 360)
	B	If no gear ratios are changed (all numerators and denominators have default values=1), then a position command of 524288 user units (UU) will result in one motor shaft revolution for an APM(C)-Fxxxx**AMK-AD** motor. This is because the AMK motors that are sold by Automation Direct have 19 bit serial encoders (19 bits=524288 pulses/rev). To convert this into an easier number to use for positioning adjust the Electronic Gear ratios in step C.
	C	If desired, set the Electronic Gear ratio so that one motor revolution = 360 user units (360 user units/rev will be used later in the Index example). To do this, set the Electronic Gear numerator to the 19-bit encoder value (encoder pulses per motor rev) and set the denominator to your desired User Units/rev. • Set Motor Resolution 0x6091:01 = 524288 (encoder pulses per motor rev) • Set Shaft Revolution 0x6091:01 = 360 (user units per motor rev) Now all Index positions, speeds, accelerations, and decelerations will be referenced in degrees. $$\text{Actual Move Distance} = 720 \text{ user units} \times \frac{524288 \text{ encoder pulses}}{\text{motor rev}} \times \frac{1 \text{ motor rev}}{360 \text{ user units}} = 2 \times 524288 \text{ encoder pulses (which is 2 motor revs)}$$ **NOTE:** You will probably want more resolution than 360 user units per motor rev. The basic rule of thumb is: • Set Motor Resolution = 524288 • Set Shaft Revolution = your desired pulses per motor rev.
	D	[This step is performed on the same screen with Electronic Gear Ratio] Configure the Encoder Output signal if desired. If the definition isn't known, the Encoder Output can be configured later with Encoder Output Pulse (0x2422) and Encoder Output Logic (0x2423). **2. Encoder Output Setup** Encoder Output Pulse: 10000 Pulse / Resolution Encoder Output Logic: Phase A lead
	E	Click **Next**.

STEP 5: SET EMERGENCY STOP AND DYNAMIC BRAKE CONTROL

Substep	Task
Setup Step 5	
A	For initial setup and testing, choose the defaults for these settings on the **Emergency Stop Configuration** and **Dynamic Brake Control Mode** screen. More information can be found in the User Manual under Dynamic Brake Control Mode (0x2012) and Emergency Stop Configuration (0x2013).
B	Click **Next**.

STEP 6: SET BRAKE SIGNAL SETTING

Substep	Task
Setup Step 6	
A	For initial setup and testing, choose the defaults for these settings on the **Brake Signal Setting** screen. More information can be found in the User Manual under Brake Output Speed (0x2407), Brake Output Delay Time (0x2408), and PWM Brake Delay Off Time (0x2011).
B	Click **Next**.
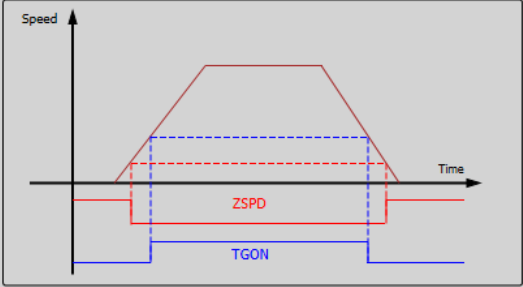
STEP 7: SET THE TORQUE LIMIT FUNCTION

	Substep	Task
Setup Step 7	A	Set the **Torque Limit Function**. **1. Torque Limit Function** ○ Internal Torque Limit 1 (0)　○ External Torque Limit (2)　○ Analog Torque Limit (4) ○ Internal Torque Limit 2 (1)　○ Internal and External Torque Limit (3) **Positive Torque Limit Value** 500　0.1% Torque Input → → → Torque Ref. **Negative Torque Limit Value** 500　0.1%　　**Maximum Torque** 3000　0.1% Select a method for limiting the torque (0x2110) applied to the load while the motor is trying to attain commanded speed and final position. For initial testing and setup, a value less than max torque is recommended. The above example sets the torque limits to 50% of system **rated** torque. Rated torque is the motor's nameplate torque. These values can be increased after initial commissioning by adjusting 0x60E0 and 0x60E1 in the **Object Dictionary \ CIA 402** tab. Default values are 3000 (300%). See section 6.9 of the iX7NH user manual for more details.
	B	Click **Next**.

Option	Description
Internal Torque Limit 1 (0)	• Uses the value of 0x60E0 as the Fwd direction torque limit • Uses the value of 0x60E1 as the Rev direction torque limit
Internal Torque Limit 2 (1)	Uses a constant 300% of rated motor torque as the Fwd and Rev torque limits
External Torque Limit (2)	• Uses the value of 0x2111 as the Fwd direction torque limit • Uses the value of 0x2112 as the Rev direction torque limit
Internal and External Torque Limit (3)	• Uses the value of 0x60E0 when Digital Input P_CL is on and the value of 0x2111 when Digital Input P_CL is off for the Fwd direction torque limit • Uses the value of 0x60E1 when Digital Input N_CL is on and the value of 0x2112 when Digital Input N_CL is off for the Rev direction torque limit
Analog Torque Limit (4)	Uses the analog value that is supplied to pin 15 of CN1 (A-TLMT)

STEP 8: SET SIGNALS RELATED TO POSITION CONTROL

	Substep	Task
Setup Step 8	A	Configure the "In Position" signals on the **Signals Related to Position Control** screen if you will use Digital Outputs INPOS1 and INPOS2. **1. Signals Related to Position Control** INPOS1 Ouput Range — 100 — UU INPOS1 Ouput Time — 0 — ms INPOS2 Ouput Range — 100 — UU
	B	Click **Next**.
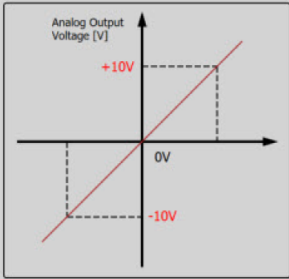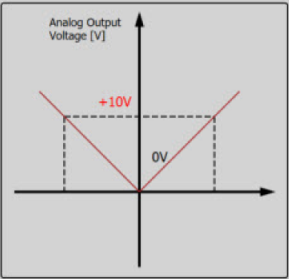
STEP 9: SET SIGNALS RELATED TO SPEED CONTROL

	Substep	Task
Setup Step 9	A	On the **Signals Related to Speed Control** screen, configure the speed output ranges that will trigger the digital outputs ZSPD, TGON, and INSPD. For initial testing and setup, these can be left as default. For more information, see section 6.4.3 Velocity Control Signals in the User Manual. To adjust these values later, see ZSPD (0x2404), TGON (0x2405), and INSPD (0x2406) in the Object Dictionary \Misc. tab. **1. Signals Related to Speed Control** ZSPD Ouput Range — 10 — rpm or mm/s TGON Ouput Range — 100 — rpm or mm/s INSPD Ouput Range — 100 — rpm or mm/s
	B	Click **Next**.
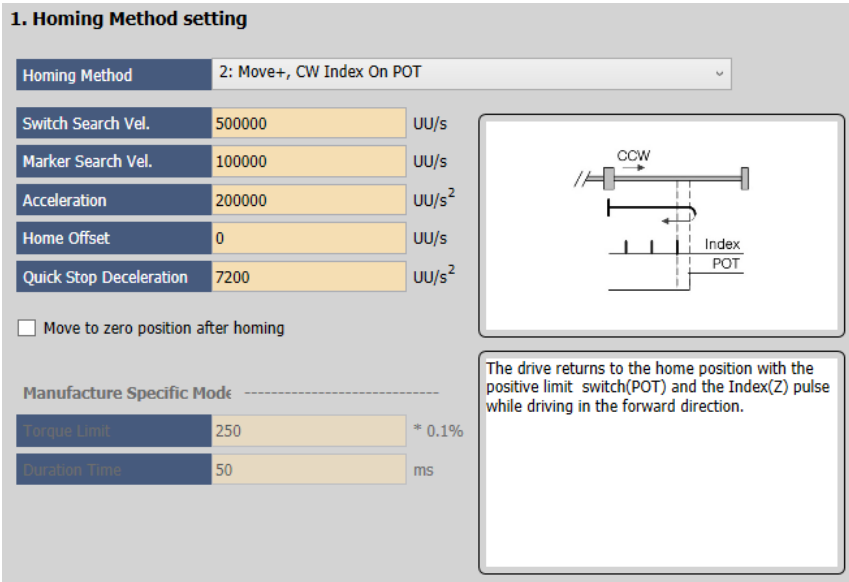
STEP 10: SET THE I/O SIGNAL SETTING

	Substep	Task
Setup Step 10	A	Configure Inputs 1 through 6 as needed for your application. Defaults are shown below. **1. Digital Input** Input 1 — High — POT Input 2 — High — NOT Input 3 — High — HOME Input 4 — High — STOP Input 5 — High — PCON Input 6 — High — GAIN2
	B	Click **Next** to Go to **Digital Output** in the Setup Wizard.
	C	Configure Outputs 1 through 3 as needed for your application. Defaults are shown below. **2. Digital Output** Output 1 — Low — BRAKE Output 2 — Low — ALARM Output 3 — High — READY
	D	Click **Next**.
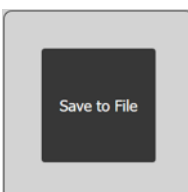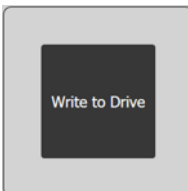
STEP 11: SET THE ANALOG MONITOR MODE

	Substep	Task
Setup Step 11	A	Objects 0x2220–0x2226 are used to configure Ch1 and Ch2 of the analog output monitoring terminals. There are 24 different drive status variables you can monitor using the analog output pins. See section 10.2 in the User Manual for more details on each object. Decide below whether to have the voltage output -10V to +10V or have both positive and negative variable information represented in an absolute (positive only) voltage output. **1. Analog Monitor Mode** ⦿ Signal Value ◯ Absolute Value
	B	Choose what variable (source) you want to monitor. The offset is just the shift, positive (up) or negative (down), from 0 units desired. Next set the scale. This is how many units of the selected variable is represented per 1 volt out of Ch1 or Ch2. Example below would represent 500rpms of the motor for every 1 volt. **Note:** There is no dead-band parameter for the analog output channels. Analog Monitor Channel 1 Source: Velocity Feedback[rpm, mm/s] Offset: 0 — Unit of CH1 Scale: 500 — Unit of CH1 / Volt Analog Monitor Channel 2 Source: Velocity Command[rpm, mm/s] Offset: 0 — Unit of CH2 Scale: 500 — Unit of CH2 / Volt
	C	Click **Next**.

STEP 12: SET HOMING METHOD SETTING

	Substep	Task
Setup Step 12	A	On the **Homing Method Setting** screen, select the Homing method appropriate for your application. For initial setup and testing, choose the defaults for these settings. Refer to section 5.6 Homing in the User Manual for more details. **1. Homing Method setting** Homing Method: 2: Move+, CW Index On POT Switch Search Vel. 500000 UU/s Marker Search Vel. 100000 UU/s Acceleration 200000 UU/s^2 Home Offset 0 UU/s Quick Stop Deceleration 7200 UU/s^2 ☐ Move to zero position after homing Manufacture Specific Mode -------------------------- Torque Limit 250 * 0.1% Duration Time 50 ms *Diagram showing CCW direction, Index, POT* The drive returns to the home position with the positive limit switch(POT) and the Index(Z) pulse while driving in the forward direction.
	B	Click **Next**.

STEP 13: SAVE YOUR CONFIGURATION

	Substep	Task
Setup Step 13	A	Select **Save to File** to save the configuration file to your PC. [Save to File button]
	B	Select **Write to Drive** to download the configuration to the drive. The drive **MUST NOT** be enabled during download. The software will not acknowledge that certain parameters were not changed, so ensure that the drive is not enabled before pressing **Write to Drive**. This **Write to Drive** button also saves the settings to memory. [Write to Drive button]
	C	After download is complete either power cycle the drive (ensuring the LED display turns off) or click on the **Software Reset** icon in the upper toolbar. [Toolbar icons]