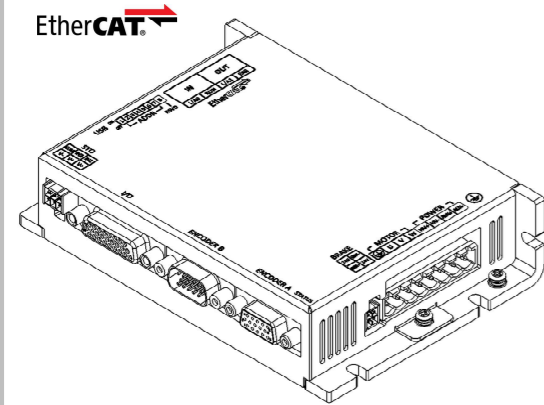


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DC Servo User Manual

PHOX Series



Safety Precautions

- Read all safety precautions before using this product.
- After reading this manual, store it in a readily accessible location for future reference.



1. Product Introduction

1.1 Product Components

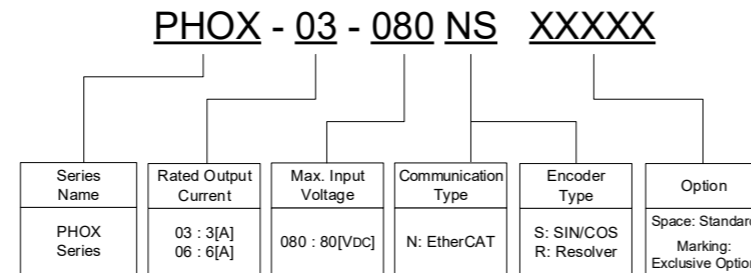
PHOX Servo Drive comprises the following components.

Make sure that all components are included in your package.

Contents	Quantity
Servo drive	1
Servo Drive power connector	1
Servo brake connector	1
Servo STO connector	1
Terminal (For brake and STO connector)	10
PE bolt (M3 x 5, mounted on the drive)	1
Servo drive user manual (this manual)	1

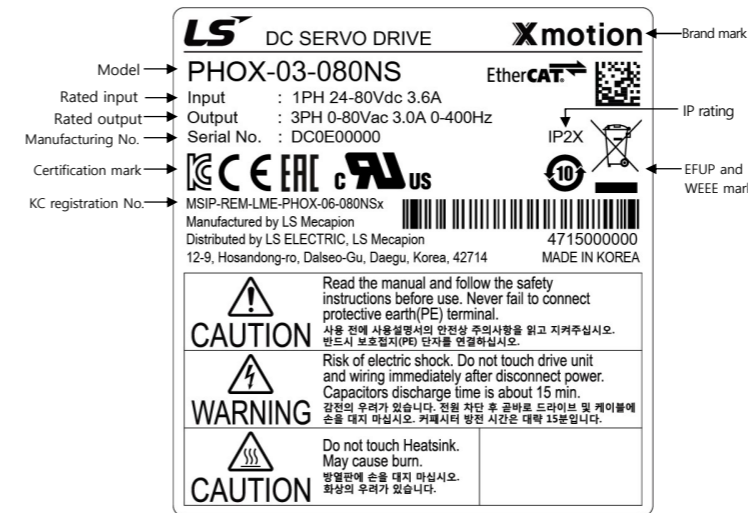
1.2 Notation Conventions

The notation of each segment of PHOX Drive is as follow.



The following is an example of a product label.

Product label is attached to the cover of the PHOX servo drive.



Certification marks for the standards for which the product has been certified by certification bodies are shown on product label. Products that do not have the marks are not certified for the standards.



2. Alarm and Warning

Refer to the user manual on the website for details about alarms and warnings.

Alarm Code	Contents
AL-10	Over current(H/W)
AL-11	Power Module over heat
AL-14	Over current(S/W)
AL-15	Abnormal current offset
AL-16	Over current limit (H/W)
AL-21	Continuous overload
AL-22	Drive temperature1
AL-24	Motor cable disconnection
AL-25	Drive temperature2
AL-27	Motor temperature
AL-30	Encoder communication error
AL-31	Encoder cable disconnection
AL-32	Encoder data error
AL-33	Motor ID setting error
AL-34	Encoder Z phase open
AL-35	Encoder low battery error
AL-36	Encoder sinewave amplitude error
AL-37	Encoder sinewave frequency error
AL-38	Encoder setting error
AL-39	Encoder over current
AL-40	Low voltage

Alarm Code	Contents
AL-41	Over voltage
AL-50	Over speed limit
AL-51	Position following error
AL-53	Excessive speed error
AL-54	Position following error of external encoder
AL-63	Parameter error
AL-71	Factory setting error
AL-73	EEPROM error
AL-80	Load encoder communication error
AL-81	Load encoder cable disconnection
AL-82	Load encoder data error
AL-88	Load encoder setting error

Warning Code	Contents
W02	Encoder low battery
W04	S/W position limit
W10	Overload warning
W20	Setup warning
W40	Low voltage warning
W80	Emergency signal

3. Safety Precautions

Safety Precautions

- Safety precautions are categorized as either 「Danger」 or 「Caution」, depending on seriousness.

- Danger** Failure to comply with these guidelines may cause serious injury or death.
- Caution** Failure to comply with these guidelines may cause slight injury or property damage.

※ Certain cases classified as Caution may also cause serious consequences depending on the situation. Therefore, a close attention should be given to this category.

Electric Safety Precautions

- Before wiring or inspection tasks, turn off the power. Wait 15 minutes and then check the voltage with a voltage tester. Enough voltage may remain in the capacitor after the power is off to cause an electric shock.
- Be sure to protective earth (PE) both the servo drive and the servo motor.
- Only specially trained technicians may perform wiring on this product.
- Install both the servo drive and servo motor before performing any wiring.
- Do not operate the device with wet hands.
- Do not open the servo drive cover during operation.
- Do not operate the device with the servo drive cover removed.
- Even if the power is off, do not remove the servo drive cover.

Fire Safety Precautions

- Install the servo drive, the servo motor, and the regenerative resistor on non-combustible materials.
- Disconnect the input power if the servo drive malfunctions.
- Servo motor over temperature sensing is not provided by the servo drive. Please use a thermal sensor, etc. for thermal protection of the servo motor.
- To prevent a fire, use a molded-case circuit breaker or fuse for input power supply.

Repair and Inspection Precautions

- Before performing servicing tasks, turn off the power. Wait 15 minutes and then check the voltage with a voltage tester.
- Only authorized personnel may repair and inspect the device or replace parts.
- Do not modify this device in any way.

Installation Precautions

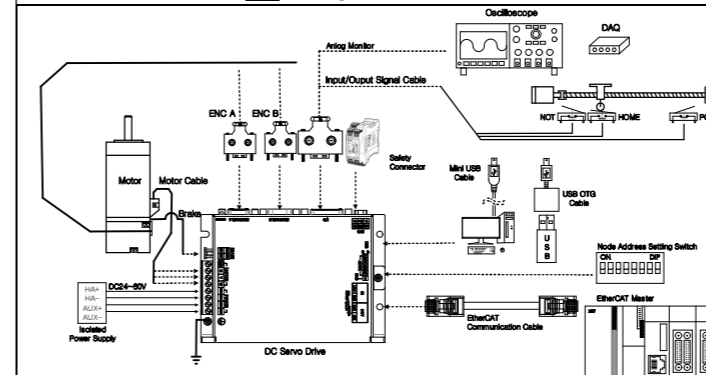
- Install the product in the correct orientation.
- Do not stack more weight than permitted on top of the product.
- Do not drop the product or expose it to hard impact.
- Install this product in a location that is free from water, corrosive gas, combustible gas or flammable materials.
- Install this product in a location capable of supporting the weight of this product.
- Do not stand on the product or place heavy objects on top of it
- The servo drive must be installed in the metal cabinet.
- Always maintain the specified spacing between the servo drive, the cabinet and other devices.
- Ensure that there are no conductive or flammable debris inside the servo drive or the servo motor.
- Firmly attach the servo motor to the machine.
- Install the servo motor with a correctly oriented decelerator.
- Do not touch the rotating unit of the servo motor during operation.
- Do not apply excessive force when connecting the couplings to the servo motor shaft.
- Do not place loads on the servo motor shaft that exceed the specified amount.
- Store and operate servo drive under the following environmental conditions.

Item	Environment conditions
Surrounding Air temperature	0 ~ 50 [°C]
Storage Temperature	-20 ~ 65 [°C]
Surrounding Air Humidity	Below 90[%] RH (no condensation)
Storage Humidity	
Altitude	Max. 1000[m] above sea level
Spacing	When installing 1 unit: More than 40[mm] at the top and bottom of the control panel, More than 10[mm] on the left and right sides of the control panel. When installing 2 or more units: More than 100[mm] at the top of the control panel, More than 40[mm] at the bottom of the control panel, More than 30[mm] on the left and right sides of the control panel, More than 2[mm] between units.
Pollution degree	2
Overvoltage category	II
Degree of Protection	IP2X
Others	Ensure the installation location is free from dust, iron, corrosive gas or combustible gas. Ensure the installation location is free from vibrations or hard impact.

• The standards related to servo drive are as follows.

Global standards	CE	LVD : EN 61800-5-1:2007(2nd Edition) EMC : EN 61800-3:2004/A1:2012
	UL	UL 61800-5-1, CSA C22.2 No. 274-13 [E479434]
Korea standards	KC	Class A Equipment (Industrial Broadcasting & Communication Equipment) This equipment has been conformity assessed for use in business environments. In a residential environment this equipment may cause radio interference.

Wiring Precautions



- Always use DC 24~80[Vdc] power input for the servo drive.
- The Input power for the servo drive shall be supplied from an isolating type power supply.
- Configure the system so the main power (HV+, HV-) and auxiliary power (AUX+, AUX-) are supplied separately. Auxiliary power (AUX+, AUX-) is designed to display the drive status when the main power (HV+, HV-) is disconnected.
- Always connect the servo drive to a protective earth (PE) terminal.
- Branch circuit protection shall be provided per the NEC (National Electrical Code).
- Be sure to use a molded-case circuit breaker when you perform wiring for the servo drive.
- When you perform wiring for the servo drive, be sure to install a noise filter on the main power to satisfy EMI specifications.
- Do not connect commercial power directly to the servo motor.
- Do not connect commercial power directly to the U, V, W output terminals of the servo drive.
- Connect the U, V, W output terminals of the servo drive directly to the U, V, W input terminals of the servo motor, but do not install magnetic contactors between the wires.
- For connection, use copper wires.
- Always use pressurized terminals with insulation tubes when connecting the servo drive power terminal.
- When wiring, be sure to separate the U, V, and W cables for the servo motor power and encoder cable.
- Use our own designated cables. To use other cables, check the rated current of the servo motor, and consider operating environment to select appropriate cables.
- Be sure to use twisted-pair shield wires for encoder and I/O signal cables.
- Always use the robot cable if the servo motor moves.
- Before wiring the power lines, turn off the input power of the servo drive, and then wait until the capacitor is completely discharged.

Initial Setup Precautions

- Check the input voltage (DC 24~80[V]) and power unit wiring before supplying power to the device.
- The servo must be in the Off mode when you turn on the power.
- Be sure to check the motor ID, encoder type, and encoder pulse before supplying power.
- First set the third party parameter [0x2800-], encoder type [0x2001] and encoder resolution [0x2002] motor encoder configuration [0x202A] after turning on the power.
- After you complete the above settings, set the drive mode for the servo drive that is connected to the upper level controller in [0x6060].
- Refer to manual to perform I/O wiring for the servo drive according to each drive mode.
- You can check the on/off status of each I/O contact point from the digital input of [0x60FD].

Usage Precautions

- Install an emergency cut-off switch, which immediately stops operation in an emergency.
- Reset the alarm when the servo is off. Be warned that the system restarts immediately if the alarm is reset while the servo is on.
- Use a noise filter or DC reactor to minimize electromagnetic interference. This prevents nearby electrical devices from malfunctioning due to electromagnetic interference.
- This servo drive has solid-state servo motor overload protection. (Overload protection will be activated when it exceeds 100% of the drive rated current or more than the motor rated current.)
- Do not incinerate the servo drive. Harmful gas may be released if the servo drive is burned.
- Only use approved servo drive and servo motor combinations.
- The electric brake on the servo motor stops operation. Do not use it for ordinary braking.
- For the wiring diagram of the electric brake type motor, refer to the guidebook on the homepage.
- Brake failure may occur if the electric brake is degraded or the mechanical structure is improper (for example, if the ball screw and servo motor are combined via the timing belt). Install an emergency stop device to ensure mechanical safety.

Malfunction Precautions

- Install a servo motor with an electric brake or separate the brake system for use during emergencies or device malfunctions.
- If an alarm occurs, solve the underlying cause of the problem. After ensuring safe operation, deactivate the alarm and resume operation.
- Do not approach the machine until the problem is solved.



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※ Detailed user manuals and software can be downloaded from the website.

※ Specifications in this manuals are subject to change without notice due to continuous product development and improvement.

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