

MISUMI

**LMAC driver
E-RMA Series (Pulse Type)**

User Manual

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Version Update Record

- 1) Reproduction of part or all the contents of this book is prohibited.
- 2) The contents of this book are subject to change without prior notice.

Version	Update date	Update Content
1.0	01/2025	First release
1.1	01/2026	Revised some wrong information. Added parameter tables.

About obtaining the manual

This manual does not come with the product. If you need to obtain the electronic PDF file, you can obtain it by logging in to the official website of Misumi

- <https://sg.misumi-ec.com/>
- <https://my.misumi-ec.com/>
- <https://vn.misumi-ec.com/>
- <https://th.misumi-ec.com/>
- <https://id.misumi-ec.com/>
- <https://in.misumi-ec.com/>

Preface

Thank you for purchasing the E-RMA series LMAC driver.

This product supports the STO (Safe Torque Off) function, gantry synchronization, position comparison (flying capture), and other features. It is suitable for automation equipment in industries such as semiconductors, lithium batteries, photovoltaics, electronics manufacturing, and machine tools. With its high-performance solutions, it facilitates equipment upgrades and improves efficiency.

This manual will provide information on the E-RMA series of products regarding product safety & specifications, installations & wiring, tuning & problem diagnostics.

For first-time users, please read this manual carefully. If you have any questions about some functions and performance, please consult our technical support staff for help! Thank you!

Explanation

- Incorrect operation may cause unexpected accident, please read this manual carefully before using product.
 - We reserve the right to modify equipment and documentation without prior notice.
 - We won't undertake any responsibility with any customer's modification of product, and the warranty of product will be canceled at the same time.
-

Safety Precautions

In order to prevent personal injury and property damage, the following statements are made regarding matters that must be observed.

When reading this manual, please pay attention to the safety signs:

 **Danger:** Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

 **Warning:** Indicates a hazard with a medium risk level which, if not avoided, could result in death or serious injury.

 **Caution:** Indicates a hazard with a low risk level which, if not avoided, could result in minor or moderate injury.

Safety Rules	
 Danger	- The design of the product is not to be used in mechanical system which may incur health hazards. - Users should be aware of the product safety precautions during design and installation of the equipment to prevent any unwanted accident.
Inspection	
 Warning	- If you find that the product or accessories are damaged or rusted when unpacking, please do not install it! - If you find that the product has water inside, parts are missing or parts are damaged when unpacking, please do not install it! - Please refer to item checklist. If the labels don't match, please do not install. - The use of damaged or faulty product(s) is prohibited.
 Caution	- Do not remove the package or place it violently to prevent damage to the internal components of the driver! - The use of damaged or faulty product(s) is prohibited
Storage and Transportation	
 Warning	- Please provide storage and transportation under protected conditions. - Do not stack the products too high up to prevent toppling. - The product should be packaged properly during transportation. - The product should be protected from external forces and shock
 Caution	- When handling products, always lift and place them gently, paying close attention to objects underfoot to prevent tripping or falling, as this may result in injury or product damage. - During storage or transportation, do not directly touch terminals or the driver circuit without electrostatic discharge precautions to avoid damaging the driver. - Avoid storing or transporting the product in environments exposed to splashing water, rain, direct sunlight, strong electric fields, strong magnetic fields, or intense vibrations. - Do not store the product for more than three months. If storage exceeds this duration, ensure stricter protective measures and necessary inspections are conducted. - It is strictly prohibited to transport this product together with equipment or items that may impact or damage it.
Installation	
 Danger	Only personnel who have received training related to electrical equipment and possess electrical knowledge are allowed to operate. Operation by non-professional personnel is strictly prohibited!

 Warning • Do not install around combustibles to prevent fire hazard. • Avoid vibration and impact. • Do not install products that are damaged or incomplete. • Please ensure proper removal of static electricity before operating the buttons, switches, or other components of the driver. Otherwise, it may cause damage to the equipment! • Please install in electrical cabinet with sufficient protection from outside elements. • Reserve sufficient gap as per the installation guide. • Good heat dissipation conditions are essential. If the product is installed in an enclosed environment, use cooling devices (such as cooling fans or air conditioning units) to ensure adequate cooling and meet the installation environment requirements. Failure to do so may result in product overheating or fire! • Avoid dust, corrosive gas, conductive object or fluid and combustibles.
Wiring
 Warning • Participate installation personals should have sufficient training in product installation safety. • Please power off and wait for 10 minutes to make sure a full discharge of electricity. • Servo driver and motor must be connected to ground. • Incorrect voltage or power polarity may cause explosions or operational accidents. • Connect the cables only after servo driver motor installed correctly. • Make sure the wires are properly managed and insulation layer is not torn to prevent electrocution. • Perform wiring operations, remove the product's outer casing, or touch the circuit board only when the power is off. Otherwise, there is a risk of electric shock. • Wiring must be correctly connected to prevent damage to product(s). • Capacitor, inductor or filter shouldn't be installed between servo motor and servo driver. • Prevent conductive fasteners and wire ends from entering the driver. • Connecting wires or any non-heat resistant components should be put near to heat sink of the servo driver or motor • The flyback diode which is connected in parallel to output signal DC relay must not be connected in reverse. • The cables used during wiring must meet the corresponding requirements for wire gauge and shielding. The shielding layer of shielded cables must be reliably grounded at one end! • Follow the procedures specified in electrostatic discharge (ESD) prevention measures and wear an anti-static wrist strap during wiring and other operations to avoid damaging the equipment or internal circuits of the product. • When wiring the control circuit, use twisted-pair shielded cables, and connect the shielding layer to the grounding terminal of the product for grounding. Otherwise, the product may malfunction.
Tuning and Running
 Danger • Before powering on, please check that the product is properly installed, the wiring is secure, and the control power, main power, and motor output circuits are all correctly wired. • It is strictly prohibited to touch any terminals of the product while it is powered on.
Debugging Operation
 Warning • Make sure the wirings of servo driver and servo motor are installed and fixed properly before powering on, and within the rated input range of the driver. • On the first time tuning of the product, it is recommended to run unloaded until all the parameter settings are confirmed to prevent any damage to the product or machine.
Usage
 Warning • Please install an emergency stop button on machine to stop operation immediately if there is an accident. • Please make sure machine is stopped before clearing an alarm. • Servo driver must be matched with specified motor.

• Frequent restart of the servo system might incur damage to the product. • Servo driver and motor will be hot to touch shortly after power off. Please be careful. • Modification(s) to servo system is prohibited.
Error Handling
 Warning • Please wait for 5 minutes after powering off for the electricity to be fully discharged before uninstalling the cables. • Participate maintenance personals should have sufficient training in maintenance and operation of this product series • Please handle the error before clearing an alarm. • Keep away from machine after a restart upon alarm. Mechanical axis might suddenly move. Such hazard should be prevented during the utilization of the product.
Model Selection
 Caution • Servo driver must be matched with specified motor.

Other precautions

Dynamic brake

- 1) Dynamic braking should only be used in emergency situations such as faults or sudden power failure. Do not trigger faults or power failures frequently.
- 2) In high-speed situations, ensure there is a minimum 5-minute action interval between dynamic braking operations to prevent damage to the internal dynamic braking circuit of the driver.

Safety Signs

To ensure safe operation, always follow the safety signs on the equipment.

The safety signs are explained as follows:



Warranty Terms

For products purchased from MISUMI (the “Company”) via official product catalogs or MISUMI’s official websites (including all global/regional domains, affiliated platforms, apps, and mini-programs—collectively, the “Official Website”), the warranty is governed by the usage guidelines and warranty terms stated on the Official Website or in the catalogs (“Warranty Terms”).

These Warranty Terms do not apply to custom-made products. Placing an order or using a product implies acceptance of the Warranty Terms.

If the product includes a manufacturer’s warranty, that warranty shall take precedence over these Warranty Terms.

Warranty Scope and Period

The warranty covers defects such as damage, deformation, or faults (collectively “defects”) attributable to the Company. The customer must document and notify the Company in writing within the warranty period (defined below). If the Company confirms the defect is its responsibility, it will repair or replace the defective product partially or fully at no cost.

However, if any of the following conditions apply, or if the Company’s website or product catalog states that repair or replacement is not authorized, the warranty will not apply.

- 1) Defects from use outside general industrial applications, excluding transport vehicles, medical devices, and household electronics.
- 2) Defects from use in aerospace, nuclear, military, or weapons applications.
- 3) Defects caused by customer’s careless or incorrect handling.
- 4) Defects caused by natural disasters (e.g., earthquakes, floods, fires).
- 5) Defects from not following specifications, usage instructions, or related documents on the website or catalog.
- 6) Defects caused by customer’s modification, repair, or disassembly.
- 7) Defects caused by other equipment.
- 8) Defects from use outside purchased Misumi Subsidiary and the areas it handles.
- 9) Defects due to inexperience or use beyond intended purpose or method.
- 10) Defects caused by customers violating usage rules or contracts.
- 11) Defects discovered or occurring after resale to third parties.
- 12) Other cases where repair or replacement is not accepted as stated on the website or catalog.

The warranty period for this product is one year from the date of shipment by the Company.

Minor scratches, stains, dents, or discoloration that do not affect use are not considered defects. However, if these are deemed severe by the Company, they will be treated as defects.

Customers must verify the product name, model, quantity, and condition within one week of receipt, and check against specifications on the website or catalog. Any defects must be reported in writing to MISUMI Customer Service within this period. If no notification is received, the product is considered accepted and free of defects. Repairs or replacements after the warranty period or outside the warranty scope will be charged.

Depending on the product’s nature, production date, or specifications, repairs or replacements may not be possible

Disclaimer

Except as required by usage rules or product quality laws, the Company is not liable for any damages, losses, or costs caused by product defects, including defects in products made with it, recalls, or production stoppages.

If the customer violates usage precautions, they lose all rights to compensation from the Company.

Compensation for damage caused by product defects is limited to the purchase price of the damaged product.

Orders will not be accepted without the customers’ agreement to this limit.

If the Company is not the manufacturer as defined by product quality laws, the customer may seek liability directly from the actual manufacturer.

For damages caused by or related to the following reasons, the customer has no right to claim any compensation or reimbursement from the Company:

- 1) Damages caused by using defective products or resulting production line stoppages.
- 2) Damages caused by violating usage rules, product catalogs, or warranty terms.
- 3) Damages resulting from the customer’s intentional or negligent actions.
- 4) Damages caused by force majeure events beyond control.
- 5) Damages arising from intellectual property disputes related to product use.
- 6) Damages caused by export delays or prohibitions due to laws or regulations.
- 7) Losses resulting from defects found after the product is resold to third parties.

Precautions

Repairs or replacements must be made by returning the product, and no on-site service.

Product discontinuation may prevent replacement with the same item.

The Company may update warranty terms; continued orders mean acceptance.

Chapter 1 Overview

1.1 Upon Receiving

After receiving the products, the following checks must be performed:

- Ensure the packaging is intact, and the goods have not been damaged during transportation.
- Verify the driver nameplate to confirm that the goods received match the ordered items.
- Check the packing list to ensure all accessories are included.

 Caution

- Damaged or incomplete driver units must not be installed.
- The driver must be used with a linear motor that matches its performance.
- If you have any questions after receiving the products, please contact our company.

Parts List

Port No.	Parts Name	Quantities
X1	9 PIN Main power connector Comes with a compression stick	1
X2	4 PIN Motor power connector	1
X3	2 PIN Holding brake connector	1
CN1	SCSI 50PIN connector	1
CN2	1394 6PIN connector	1
CN7	1394 10PIN connector	1

Note:

The E-RMA series debugging software for the PC requires separate contact with MISUMI staff for provision.

1.2 Model Number Structure

Driver model number structure

E-RM ① A ② 30 ③	
① Series No.	③ Current Rating 30: 2.8A 60: 6A
② Product type A: Pulse + RS485 B: EtherCAT BUS	

1.3 Component Description

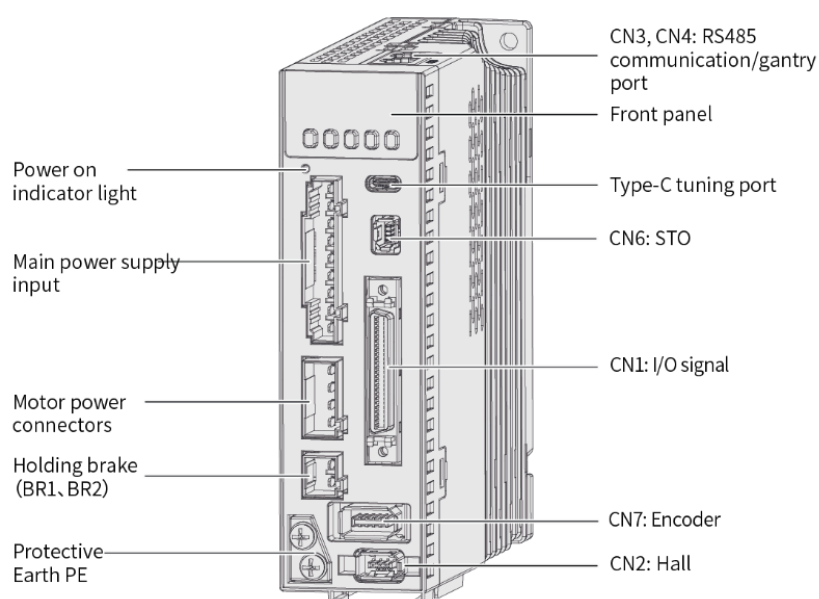


Figure 1-1 Driver Appearance and Component Diagram

Table 1-1 Driver Component Description

Parts & Connectors	Description
Front Panel	Including an LED display and 5 buttons. LED display is used to display servo driver status and parameter settings. 5 buttons : M: To switch between different modes and parameters ◀: Switch between values ▲: Switch between sub-menus/Increase ▼: Switch between sub-menus/Decrease S: Enter
Type-C Debugging Port	Connect to computer for tuning of servo driver. Parameters of the servo driver can be modified without connecting to main power supply.
CN1 I/O signal	I/O signal connection terminals (SCSI-50PIN)
CN2 Hall Port	Connect to motor Hall
CN3 CN4 RS485 Communication Port	RS485 communication interface, connected to RS485 communication command devices.
CN6 STO (Safety Torque Off)	STO connectors. Used for any application requiring STO functions.
CN7 Encoder Port	Connect to motor encoder (Now only support ABZ incremental encoder and BISS-C absolute encoder)
Holding Brake 24VDC	BR+/BR- brake terminals
Power-on indicator light	Lights up when servo driver is connected to main power supply. Please do not touch the power terminal immediately after power off as the capacitor might require some time to discharge.
Main power supply 220VAC	L1C, L2C: Control circuit power supply (Single phase 220VAC) L1, L2, L3: Main power supply 220VAC Note: E-RMA series supports 1P/3P 220VAC main power supply P+, B1, B2: Connect B1 and B2 to use internal regenerative resistor; If an external regenerative resistor is needed, connect it to P+ and B2, disconnect B1 and B2.
Motor connectors	U, V, W Motor connector: Connect to U, V, W terminals on servo motor PE motor earth terminal: Connect to motor PE terminal
Protective Earth PE	Connect to PE of main power supply. For grounding

Note:

- E-RMA series drivers are equipped with built-in regenerative brake resistors. When using an external regenerative brake resistor, short the terminals B1 and B2. If an external regenerative braking resistor is required, remove the shorting piece and connect the external resistor between P+ and B2.
- The thickness may vary depending on the current rating, but the components are consistent.

1.4 Technical Specifications

1.4.1 Electrical Parameters

Table 1-2 E-RMA30~E-RMA60 Electrical Specifications

Driver Module		E-RMA30	E-RMA60
Power Rating (W)		400	1000
Rated Current (A)		2.8	7.0
Peak Current (A)		9.3	21.0
Control circuit power supply		1-Phase AC 200V~240V, -10%~+10%, 50/60Hz	
Main power supply		1-Phase/3-Phase AC 200V~240V, -10%~+10%, 50/60Hz	
Regenerative resistor	Resistance (Ω)	100	100
	Power rating (W)	50	50
	Braking resistor function	All models in the series come with built-in regenerative braking resistors and also support the use of external braking resistors	
Cooling method		Air-cooled	Fan-cooled
Dimension H*L*W(mm)		150*150*43	150*160*55

1.4.2 General Specifications

Table 1-3 E-RMA Series driver General Specifications Table

Interface Configuration		
Configuration Port		TYPE-C configuration port, support to modify or read driver parameters without connecting to main power supply.
Low-speed pulse input		5V differential signal, 0-500kHz 24V differential signal, 0-200kHz
High-speed pulse input		5V differential signal, up to 4 MHz per channel, up to 8 MHz in quadrature mode
Crossover Frequency Output		Supports phase A/B/Z differential crossover frequency output Supports phase Z open collector crossover frequency output
Analog Input		3 analog inputs (AI1~AI3) Input range: -10V~+10V, Max. voltage: $\pm 12V$
Analog Output		2 analog outputs (AO1/AO2), Output range: -10V~+10V
Digital Input		10 Digital Inputs DI1~DI10 (Supports common anode or cathode connection)
Digital Output		6 Digital output (2 single ended, 4 double-ended)
STO		Support
Hall		Support
Brake Output		Built-in brake output function, no external relay required
Communication Interface		Support RS485 bus communication (RJ45 interface), based on Modbus communication protocol
Control Mode		
Control		External pulse train position control Velocity control Torque control/JOG control Hybrid control: Position-Torque/Position-Velocity/Velocity-Torque
Position	Pulse frequency	500kHz/4MHz (5V differential input) 200kHz (24V single-ended input)
	Electronic gear ratio	1 ~ 8388608/1 ~ 8388608
	Torque limit	Please refer to parameter setting

Control Features	
Driver Mode	IGBT SVPWM sinusoidal wave driver
Feedback Method	Encoder: RS485 Protocol
Standardized Parameters	Quick tuning of servo driver parameters through PC tuning tools.
Easy-to-use	One-click tuning, Single parameter tuning, Black box, Zero tracking control
Notch Filter	Mechanical resonance suppression. Supports up to 3 filters, 50Hz~4000Hz
Vibration suppression	End vibration suppression
DI/DO settings	Digital inputs and outputs can be set accordingly
Alarm	Overcurrent. Overvoltage. Undervoltage. Overheat. Overload. Overtravel. Single-Phasing. Regenerative resistor error. Position deviation error. Encoder feedback error. Excessive braking rate. EEPROM error
Front Panel	5 push buttons, 8-segments display, 5 warning LEDs
Software	Driver tuning through EDrive. Parameters tuning in current loop, Position loop, velocity loop. Modify I/O signal and motor parameters. Parameters can be imported and exported in file format, facilitating the matching of the driver with different motors or loads. Variables (velocity, position deviation, etc.) monitoring using step diagrams.
Communication	USB Type-C: Based on the Modbus protocol (compliant with USB 2.0 specifications), it can connect to a computer for parameter configuration and status monitoring.
	E-RMA supports RS485 bus communication (RJ45 interface), based on the Modbus protocol, with a maximum of 32 axes.
Dynamic Brake	Internal dynamic brake.
Position Comparison	42 position comparison outputs.
Black-box Function	Supports the black-box function, which can capture data before and after pre-set conditions. This data can be read using EDrive for further analysis.
Input signal	
General Mode	DI points: 10 (Supports common anode or cathode connection) Assignable output signals: • Servo enabled (SRV-ON) • Clear Alarm (A-CLR) • Gain switching (GAIN) • Deviation counter clearing (CL) • Control mode switching (C-MODE) • Torque limit switching (TL-SEL) • Vibration suppression 1 (VS-SEL1) • Vibration suppression 2 (VS-SEL2) • Command prohibition (INH) • Internal command velocity 1 (INTSPD1) • Internal command velocity 2 (INTSPD2) • Internal command velocity 3 (INTSPD3) • Frequency divider input (DIV1) • Positive limit switch (POT) • Negative limit switch (NOT) • Zero speed clamp (ZEROSPD) • Velocity sign (VC-SIGN) • Velocity sign 2 (VC-SIGN) • Torque sign (TC-SIGN) • Emergency stop (E-STOP)

PR mode	Under PR mode: • Path trigger (CTRG) • Home switch (HOME) • Emergency stop trigger (STP) • Path 0-3 (ADD0-ADD3) • Positive JOG (PJOG) • Negative JOG (NJOG) • Positive limit switch (PL) • Negative limit switch (NL) • Origin (ORG)
Output Singal	
General Mode	DO points: 6 (2 single ended, 4 double-ended) Assignable output signals: • Servo ready (SRDY) • External brake off (BRK-OFF) • Positioning completed (INP1) • Velocity at arrival (AT-SPEED) • Zero speed position (ZSP) • Alarm (ALARM) • Velocity coincidence (V-COIN) • Position command (P-CMD) • Velocity limit (V-LIMIT) • Velocity command (V-CMD) • Servo enabled (SRV-ST) • Positive limit switch (POT-OUT) • Negative limit switch (NOT-OUT)
PR mode	Assignable output signal under PR mode: • Command completed (CMD-OK) • Path completed (PR-OK) • Homing done (HOME-OK)
Environmental requirements	
Temp	Installation: 0-55°C (Not frozen). Reduce the load when operating above 45°C. For every 1°C increases, reduce the load by 2%. ^[1] Storage: -20-80°C (Condensation free). Do not store for more than 72 hours at temperatures exceeding 65°C!
Humidity	Under 90%RH (Condensation free)
Altitude	Maximum altitude: 2000m. For altitudes below 1000m, no derating is required. Above 1000m, reduce the load by 1% for every additional 100m.
Vibration	Less than 0.5G (4.9m/s ²), 10-60Hz (non-continuous working)
IP ratings	IP20

Note:

[1] Please install the driver within this ambient temperature range. When stored in an electrical cabinet, ensure that the internal temperature of the cabinet does not exceed this value.

Chapter 2 Installation

Please carefully read the "Safety Precautions" chapter and the installation instructions provided in this section.

Caution

- Please strictly follow the installation requirements outlined in this section, as failure to do so may result in product malfunctions or damage.
- Do not install or operate any equipment that is damaged or missing parts, as this may cause personal injury.
- Do not install this product in areas where water may splash or in environments prone to corrosion, as this may lead to product failure.
- Do not install this product near flammable gases or combustible materials, as it may cause fire or electric shock.
- Install this product in a cabinet that provides fire protection and electrical protection, otherwise, it may lead to a fire.
- Ensure that there is the required spacing between the driver, the control cabinet's surface, and other machines. Failure to do so may cause fire or product failure.
- Do not place heavy objects on the product, as this may cause personal injury or product damage.
- Do not apply excessive impact force to the equipment, as this may result in product damage.
- Do not block the driver's intake or exhaust vents, and do not allow foreign objects to enter the product, as this could lead to fire or product malfunction.

2.1 Installation Location

1. Please install the product in an indoor control cabinet, away from rain and direct sunlight. Do not place flammable materials around the product. This device does not have a waterproof design.
2. Do not use this product in environments containing hydrogen sulfide, sulfur dioxide, chlorine, ammonia, corrosive gases, acids, alkalis, salts, or near flammable gases and combustible materials.
3. Do not install this product in high-temperature, humid, dusty, or metal powder environments.
4. Install the product in a location with minimal vibration.
5. Install in a well-ventilated, dry, and dust-free area. Ensure that the product's interior is free from oil, metal dust, water, and other foreign substances.

2.2 Installation Environment

Installation and Storage Environment Conditions

Table 2-1 Driver Installation and Storage Environment Requirements

Item	Condition
Environment Temperature	0~+55°C - No derating is required between 0° C and +45° C. When the temperature exceeds 45° C, derating is required, with a 2% derating for every 1° C increase. - As the temperature decreases and humidity increases, condensation is likely to occur.^[1]
Environment Humidity	Under 90%RH (Condensation free)
Storage Temperature	-20-80°C (Condensation free)
Storage Humidity	Under 90%RH (Condensation free).
Atmospheric	Indoor (no exposure to sunlight) No corrosive gas, combustibles, dirt or dust.
Altitude	Maximum altitude: 2000m. For altitudes below 1000m, no derating is required. Above 1000m, reduce the load by 1% for every additional 100m
Vibration	Less than 0.5G (4.9m/s ²) 10-60Hz (non-continuous working)
IP ratings	IP20

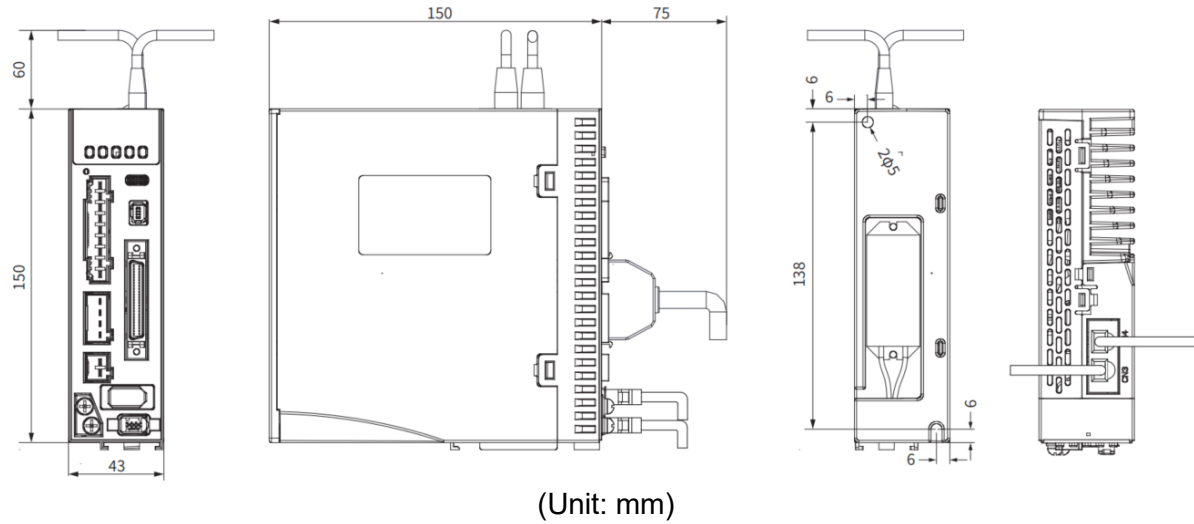
Note:

[1] Please install the driver within this temperature range. When storing it in an electrical cabinet, the temperature inside the cabinet should not exceed this temperature value.

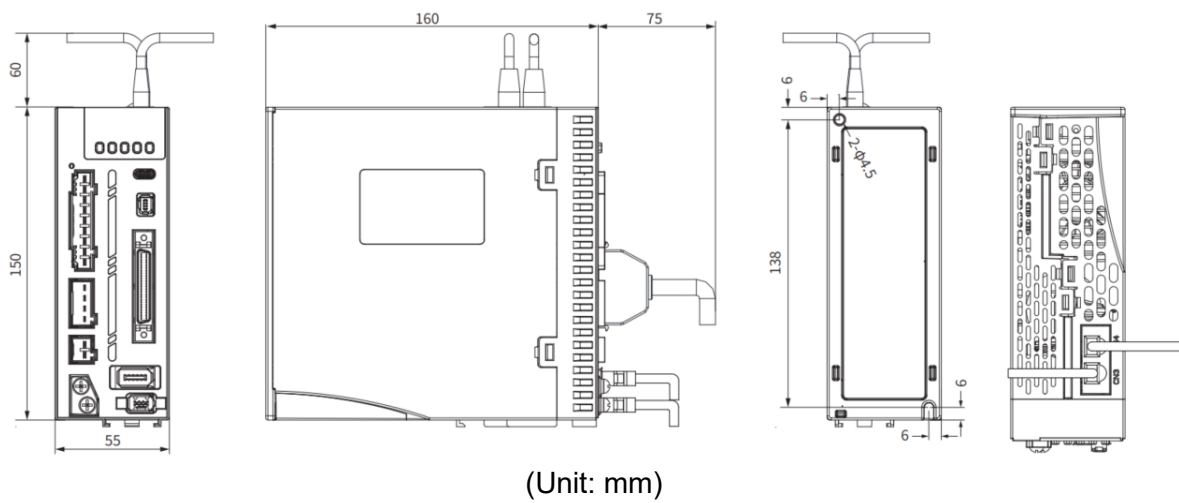
2.3 Driver Dimension

The following provides the dimensions for each model of E-RMA. Please use the site wiring as the standard for installation dimensions.

E-RMA30



E-RMA60



2.4 Installation Method Precautions

Space requirement for installation

Users can install the device using either the base mounting method or the panel mounting method, with the installation direction vertical to the mounting surface facing upwards. In order to ensure efficient heat dissipation, please leave at least 10mm of installation space between drivers. When reserving installation space, ensure a clearance of at least 50mm on each side in the longitudinal direction.

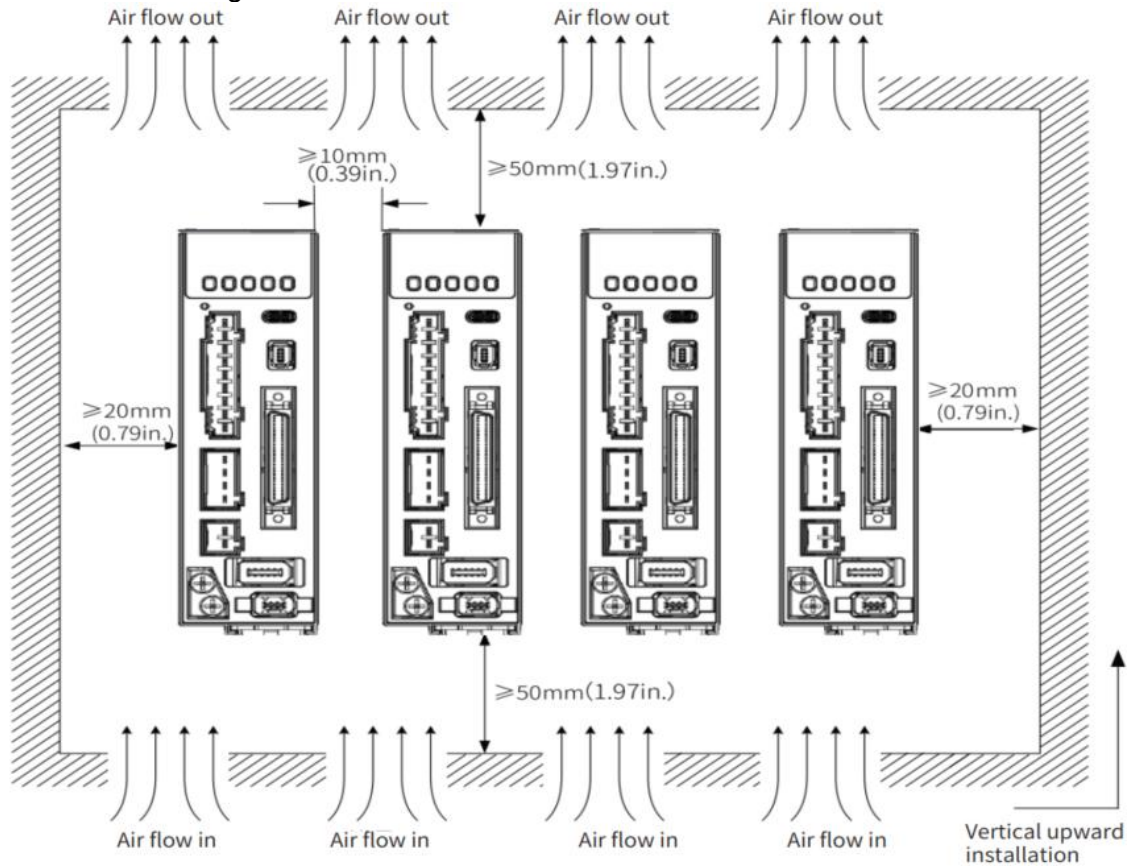


Figure 2-1 Installation Space Diagram with Reserved Clearance

When installing the drivers in a compact arrangement, please consider the installation tolerances and leave at least 1mm of space between each pair of drivers. In this case, please use the drivers at an actual load rate of 75% or below.

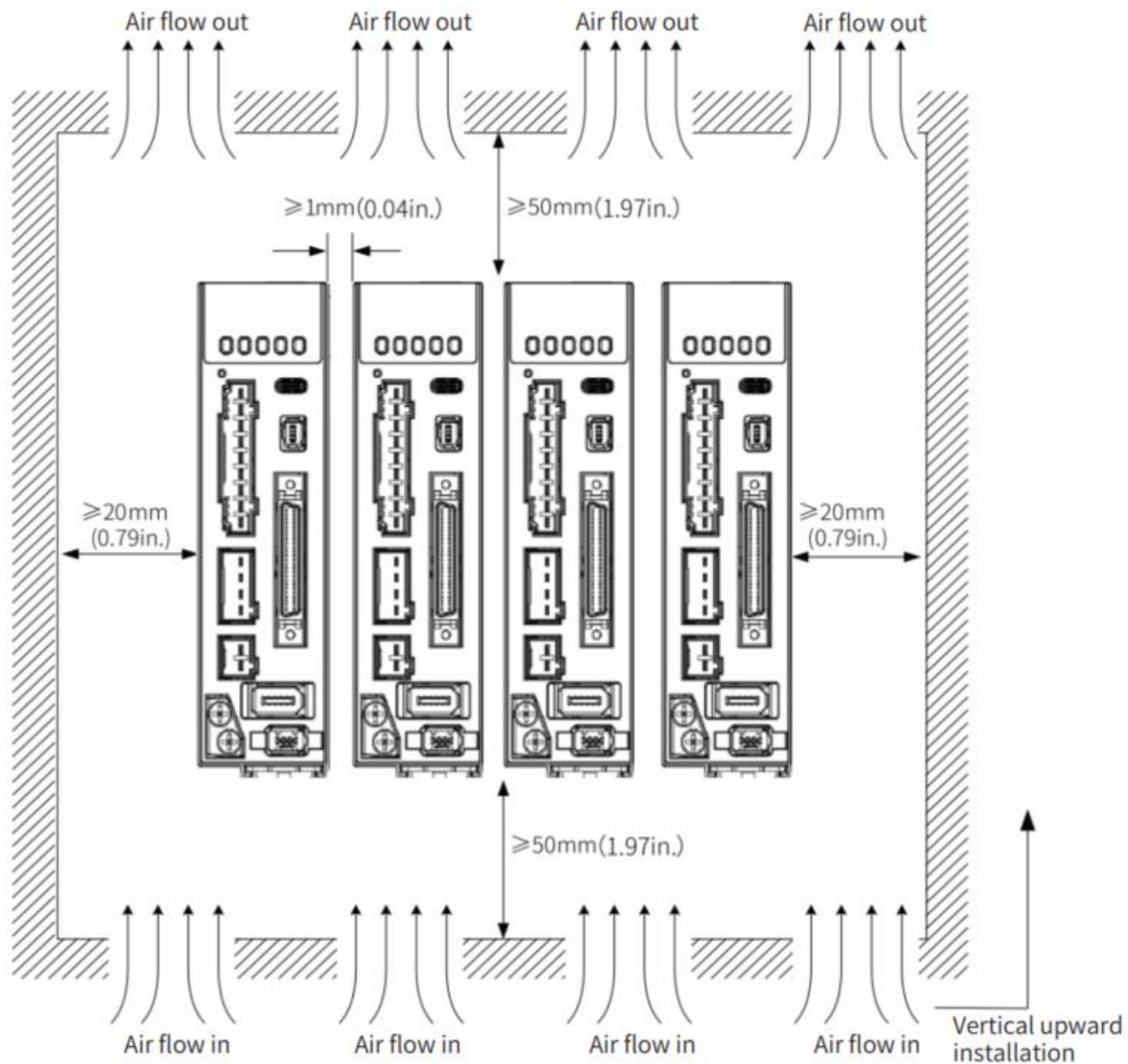


Figure 2-2 Compact Installation Space Diagram

Installation Precautions

1. Method

Please install the driver vertically to ground facing forward for better heat dissipation.

When there are multiple products in the cabinet, please install them side by side. In cases where vertical installation is required, please install insulation and diversion plates.

Use natural convection or fans to cool the drivers.

Fix the driver to the mounting surface using the mounting holes on the driver.

During installation, ensure that the front of the driver faces the operator and that the driver is installed vertically onto the wall!

2. Cooling

To ensure cooling through fans and natural convection, sufficient heat dissipation space must be left around the driver. Additionally, considering the heat dissipation of other components in the cabinet, please install a cooling fan above the driver. To prevent areas within the driver's environment from becoming too hot, it is necessary to maintain an even temperature throughout the electrical cabinet.

3. Grounding

PE terminals must be grounded to prevent electrocution hazard or electromagnetic interference.

4. Wiring

When wiring the driver, the cables connecting to the driver should be routed downwards. Please ensure there is no liquid around the wiring and connectors as liquid leakage may cause serious damage to the driver(s).

5. Port Dust Protection

When the top CN3 and CN4 communication port is not in use, appropriate dust protection measures should be taken, such as inserting a dust cover into the port, to prevent foreign objects (solids, liquids, etc.) from falling inside and causing damage to the product.

Chapter 3 Wiring

Please carefully read the safety instructions in the "Safety Precautions" chapter. Violating these safety instructions may lead to serious consequences.

Danger

- Personnel involved in wiring or inspection must have sufficient qualifications for this work.
- It is strictly forbidden to power the driver with an IT power grid. Please use TN/TT power grid supply, otherwise, it may result in electric shock.
- Be sure to connect the input power and the main circuit power of the driver (single phase L1, L2, three-phase L1, L2, L3/R, S, T) to an electromagnetic contactor, forming a structure that can cut off the power supply. This will prevent the driver from experiencing a fault and continuing to carry large currents, which could lead to a fire.
- Ensure that the input power to the driver is within the specified voltage fluctuation range, otherwise, it may lead to product failure.
- Do not connect the driver's output terminals U, V, W to a three-phase power supply, as this may cause personal injury or fire.
- Use the ALM (fault signal) to cut off the main circuit power supply. If the brake transistor fails, it could cause the brake resistor to overheat abnormally, resulting in a fire.
- Connect the driver's protective earth (PE) terminal to the control cabinet's protective earth (PE) terminal. Otherwise, it may lead to electric shock.
- Ensure the entire system is grounded. Otherwise, it may cause incorrect operation of the product.
- After disconnecting the power supply, the internal capacitors may still have residual voltage. Please wait at least 5 minutes before performing wiring or other operations, otherwise, it may result in electric shock.

Warning

When wiring the power supply and main circuit, please follow these precautions:

- It is strictly forbidden to connect the driver directly to a 380V input power supply.
- Install circuit breakers or other safety devices to prevent fires caused by potential short circuits in the external wiring.
- Wiring must be done according to the terminal voltage and polarity to prevent equipment damage or personal injury.
- The driver and linear motor must be properly grounded.
- Please use a power supply filter to reduce electromagnetic interference. Otherwise, it may interfere with electronic devices near the driver.
- The driver and linear motor must be directly connected. The use of electromagnetic contactors during wiring is strictly prohibited, as it may cause product failure.

3.1 E-RMA Wiring Diagram

E-RMA 220VAC Wiring Diagram

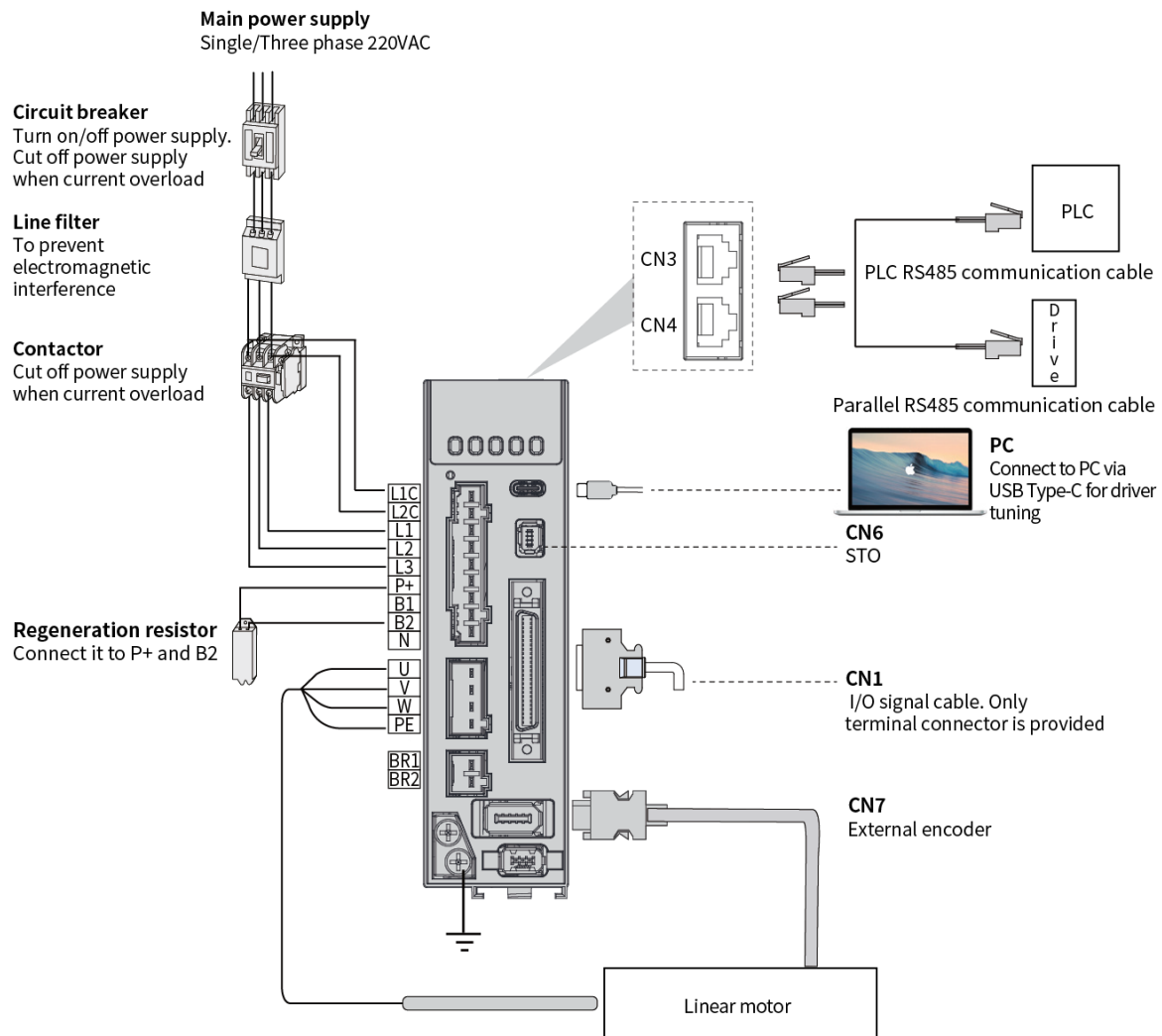


Figure 3-1 Single phase 220VAC Wiring Diagram

- E-RMA series supports single-phase/three-phase 220V power supply. For three phase 220V, it needs to be connected to L1, L2, and L3.
- The driver is directly connected to the industrial power supply without going through a transformer or other power isolation devices. To prevent cross-electric shock accidents, please use a fuse or circuit breaker on the input power supply. For a safer system, please use a leakage circuit breaker with overload and short circuit protection, or a dedicated leakage circuit breaker with ground protection.
- It is prohibited to use an electromagnetic contactor for the operation and stopping of the motor. Since the motor is a large inductive component, the instantaneous high voltage generated may damage the contactor.

3.2 Electrical Wiring Diagram

3.2.1 Position Control Mode Wiring Diagram

Position control mode + Full closed loop control wiring diagram

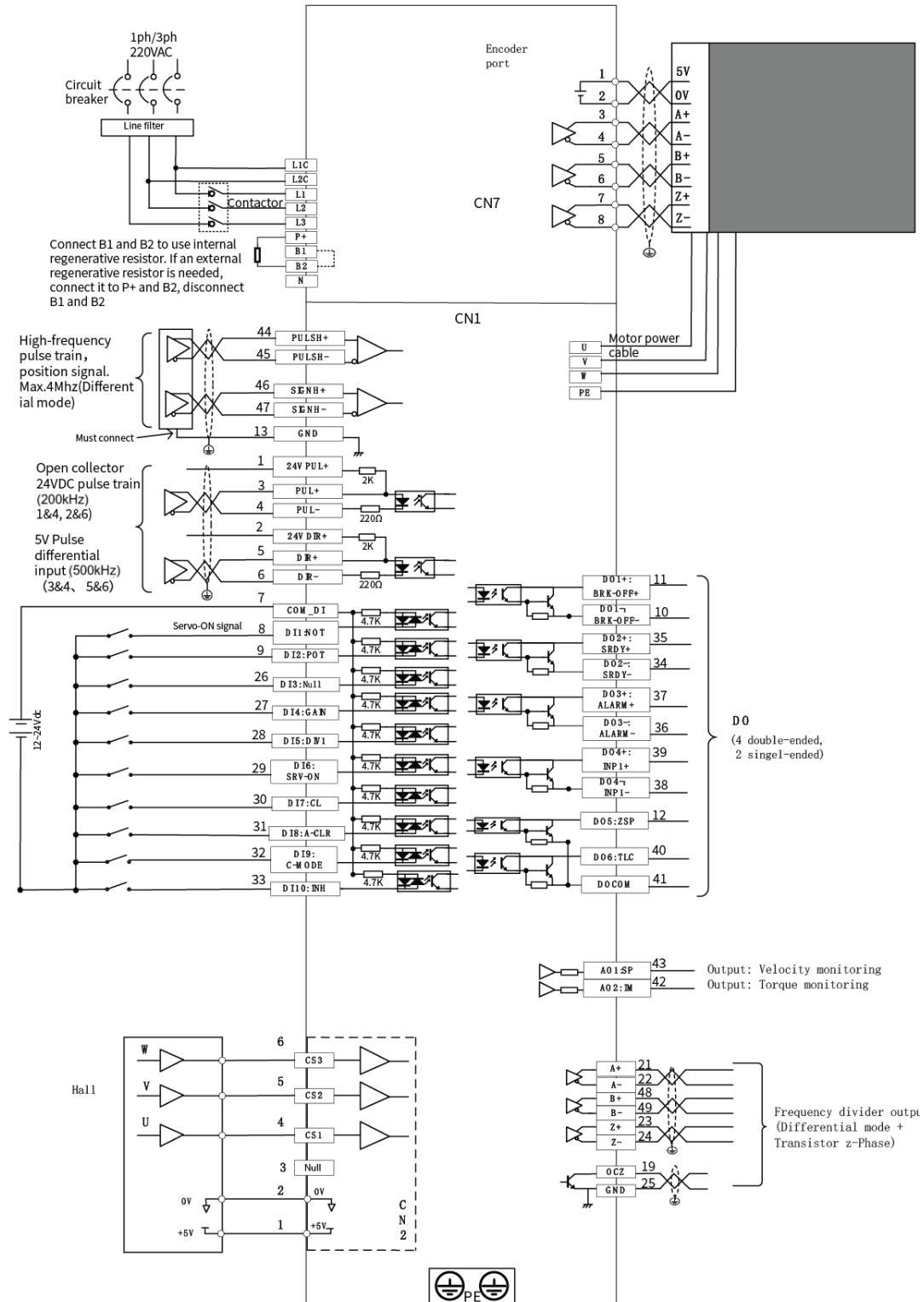


Figure 3-2 Position control mode standard wiring diagram

Note: Please set P00.05 to 1 when using 4MHz high-frequency pulse train

3.2.2 Velocity/Torque Control Mode Wiring Diagram

Velocity control mode wiring diagram

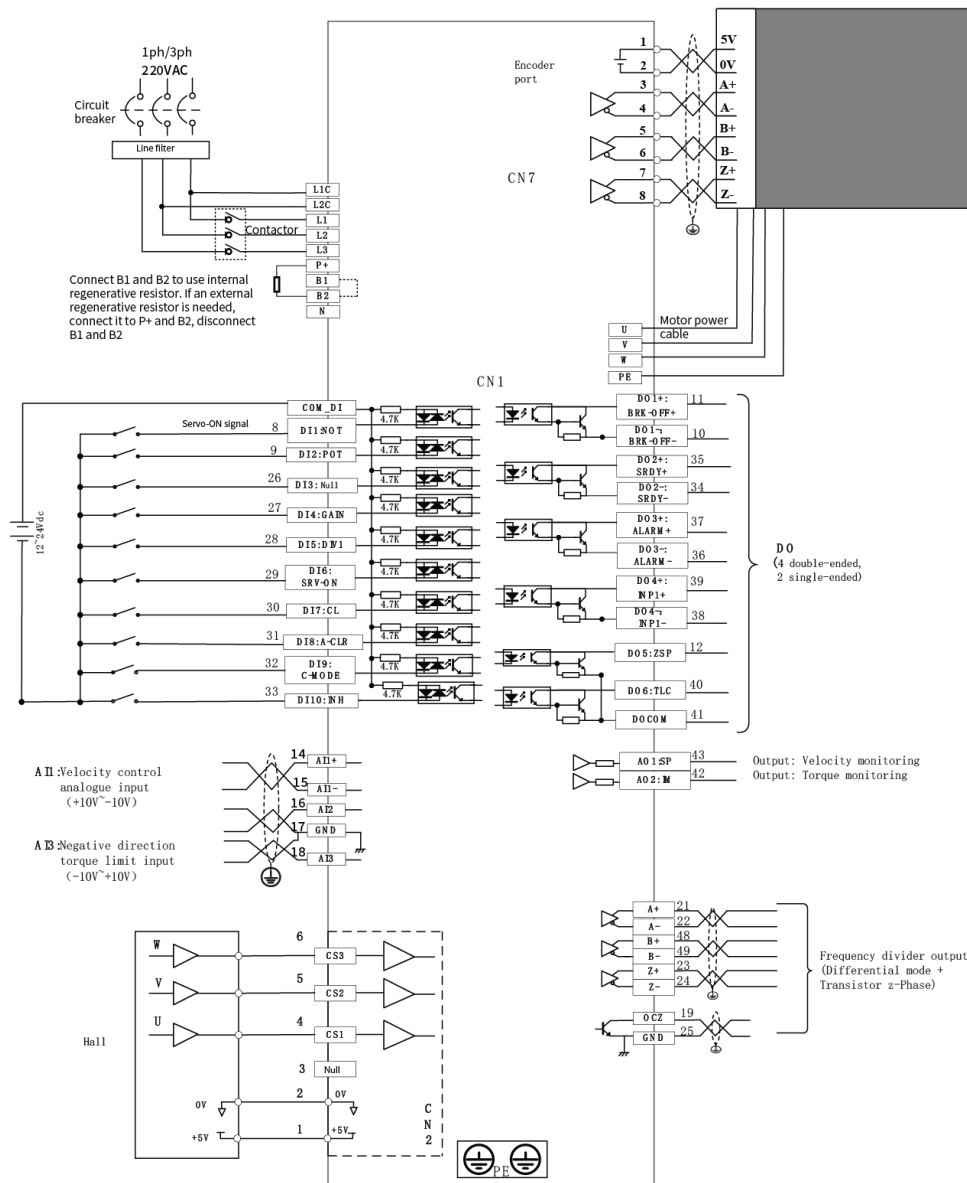


Figure 3-3 Velocity control mode standard wiring diagram

Torque control mode wiring diagram

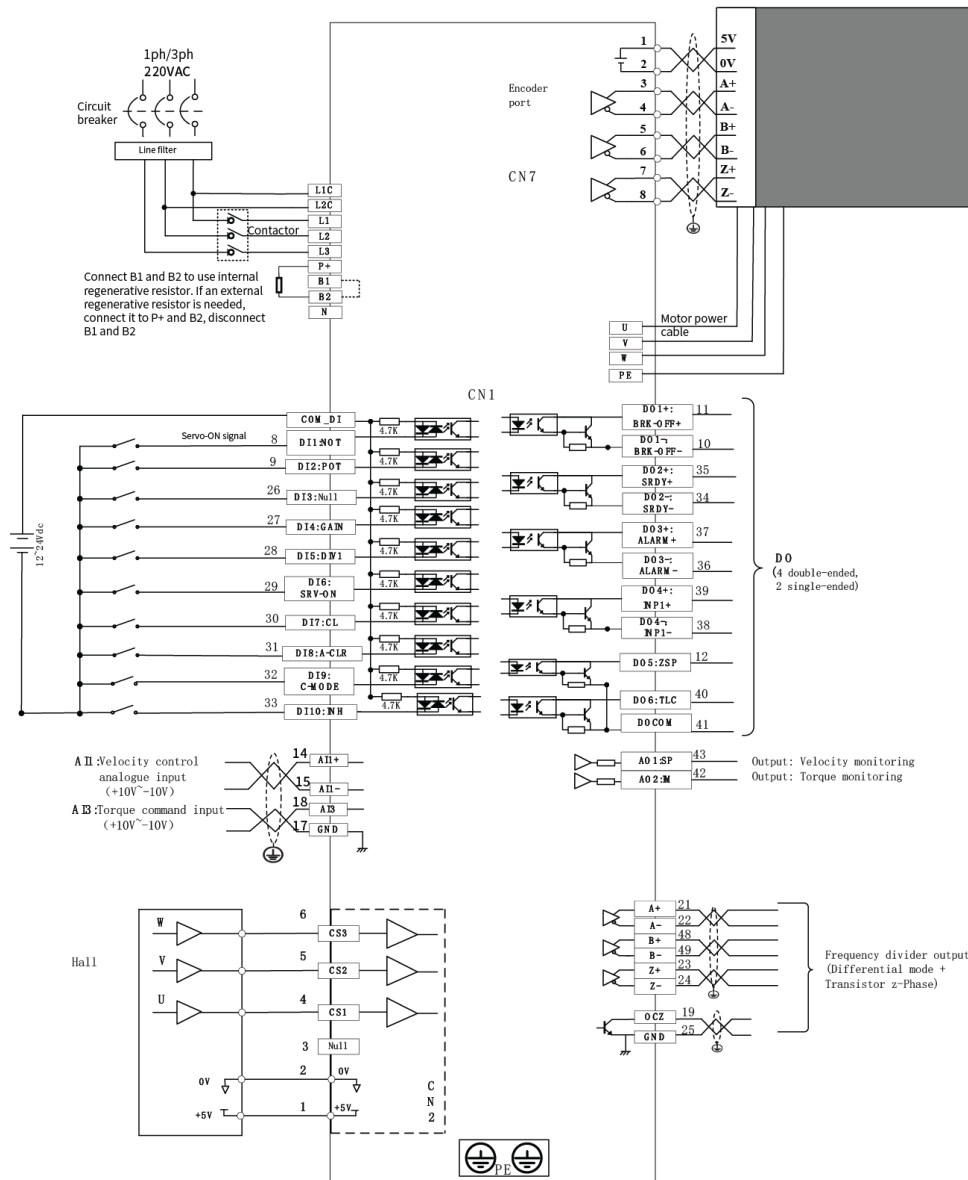


Figure 3-4 Torque control mode standard wiring diagram

3.3 Ports Assignment

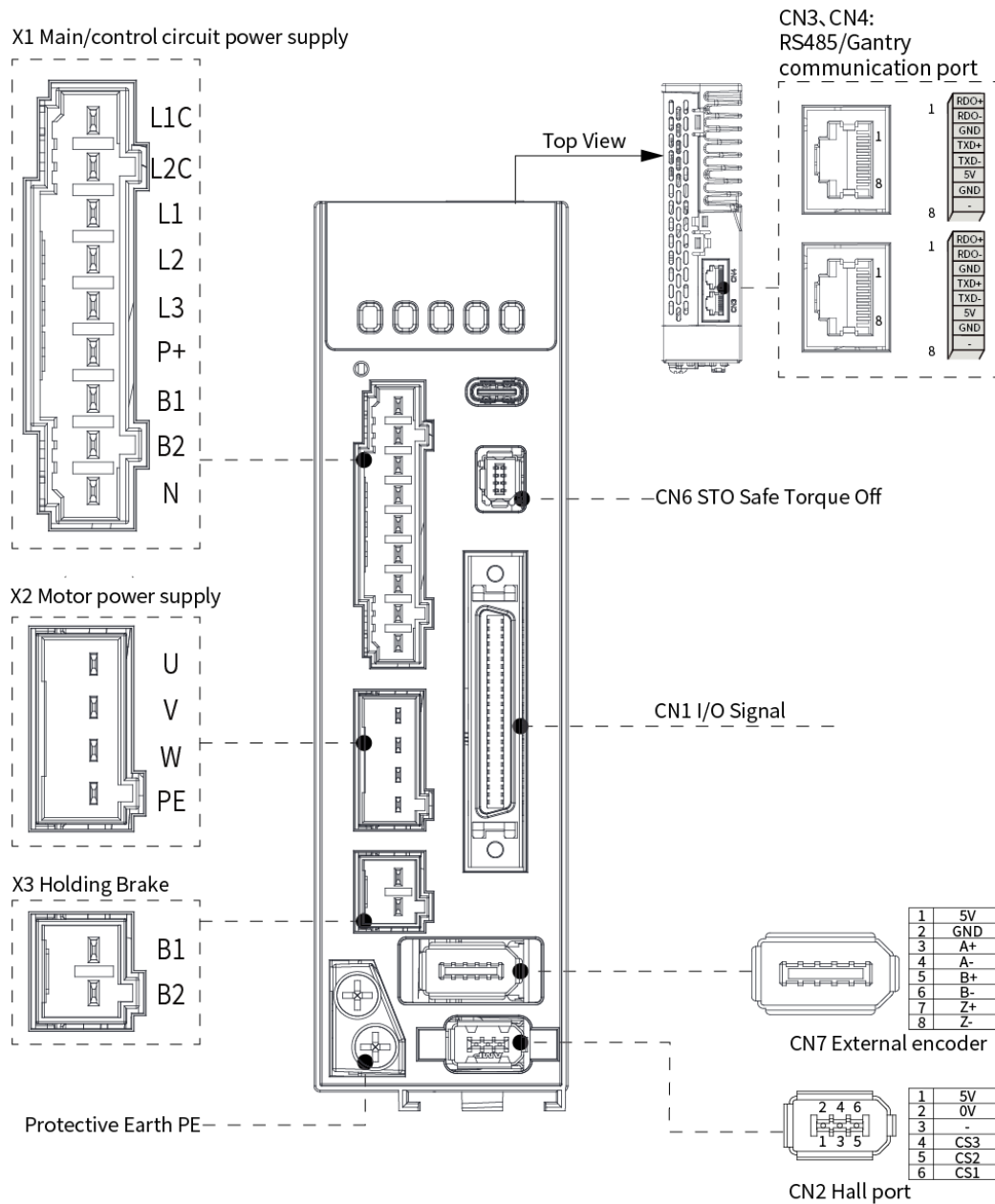


Figure 3-5 Ports pinout diagram

The pin layout shown in the above diagram represents the ports built into the driver's body!

Table 3-1 Description of each port

Connector	Description	Connector	Description
CN1	I/O signal connector (50PIN)	X1	Main/Control circuit power supply
CN2	Hall port	X2	Motor power supply
CN3	RS485 Communication port	X3	External holding brake (Optional)
CN4	RS485 Communication port	PC	USB type C port
CN6	STO Safety Torque Off port	PE	Connect to power ground terminal for grounding
CN7	External encoder feedback	-	-

3.4 Main Circuit Wiring

3.4.1 Main/Control Circuit Power Supply X1

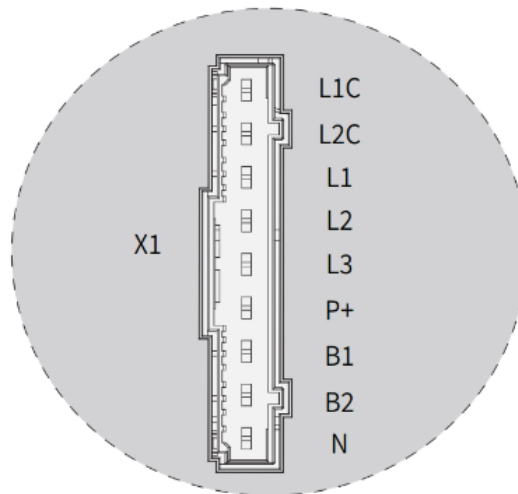


Figure 3-6 Main circuit port pinout diagram

Table 3-2 Main circuit port labels and function descriptions

Table 3-2 Main circuit port labels and function descriptions			
Pin	Label	Explanation	Remarks
L1C	Control circuit L1	Control circuit power supply. Single phase 220VAC.	• Optional isolated switching power supply. • Connecting to 380VAC will cause damage to driver. • Line filter is suggested in environment with strong interference. • Use a fuse-less circuit breaker to turn on/off power supply to driver.
L2C	Control circuit L2		
L1	Main power supply L1	Single phase 220VAC. Supports 1ph/3ph 220VAC, -10%~+10%, 50/60Hz.	
L2	Main power supply L2		
L3	Main power supply L3		
P+	DC Bus positive terminal	Internal DC bus positive terminal. External regenerative resistor P terminal.	Connect B1 and B2 to use internal regenerative resistor.
B1	Regenerative resistor terminal	Internal regenerative resistant drawing terminal	
B2	Regenerative resistor terminal	Internal IGBT transistor	If an external regenerative resistor is needed, connect it to P+ and B2, disconnect B1 and B2.
N	DC Bus negative terminal	Internal DC bus negative terminal	Please don't connect to any cable.

3.4.2 Motor Power Supply X2

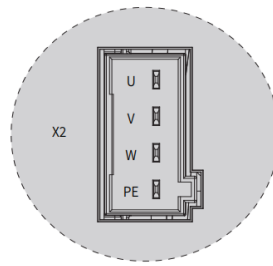


Figure 3-7 Motor power output port pinout diagram

Table 3-3 Motor power output port labels and function descriptions

Pin	Label	Explanation	Remarks
U	U terminal	To motor U terminal	- Please make sure U, V, W terminals of driver and motor are correctly connected. - Connect motor PE to driver PE and ground.
V	V terminal	To motor V terminal	
W	W terminal	To motor W terminal	
PE	PE	Motor frame	

3.4.3 Regenerative Resistor Selection and Connections

The use of regenerative resistor

When the motor opposes the direction of rotation as in deceleration or vertical axis escalation, part of the regenerative energy will be delivered back to the driver. This energy will first be stored in internal capacitors of the driver. When the energy stored in the capacitors reaches the maximum capacity, a regenerative resistor is required the excessive energy to prevent over-voltage.

Regenerative energy is related to multiple factors. Measures to reduce regenerative energy power include reducing inertia, extending deceleration time, and reducing load, etc.

Selection of regenerative resistors

E-RMA series servo drivers are equipped with internal regenerative resistor. If an external resistor is needed, please refer to the table below.

Table 3-4 Regenerative Resistor Specifications Table

Model	Internal regenerative resistor Resistance (Ω)	Internal regenerative resistor Power rating (W)	Minimum resistance allowed (Ω)	Minimum power allowed (W)
E-RMA30	100	50	50	50
E-RMA60	100	50	40	50

⚠ Caution

To connect an external braking resistor, configure the following parameters:

- Set P07.31 Discharge Mode = 0 to enable the resistor discharge function.
- Set P00.16/P00.17 to the correct regenerative resistor power and resistance values.

Regenerative resistor connection

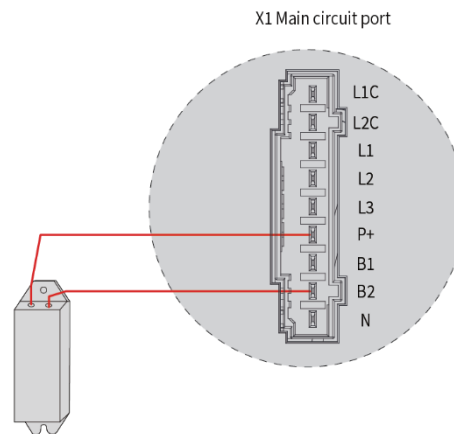


Figure 3-8 Regenerative resistor connection diagram

⚠ Caution

- If B1 and B2 are connected, internal regenerative resistor is now functional. If an external regenerative resistor is required, please disconnect B1 and B2 and connect P+ to B1 to prevent overcurrent.
- Please do not connect external regenerative resistor directly to N or it might cause fire hazard.
- Do not use a value lower than the minimum allowable resistance, as this may cause an alarm or damage the driver. Please refer to "Table3-4 Regenerative Resistor Specifications Table".
- Please confirm P00.16 and P00.17 before using any regenerative resistor.
- Do not set the regenerative resistor near any flammable object.
- Do not make any connections to N!

3.4.4 Recommended Specifications for Main Circuit Wiring

E-RMA Series driver output current specifications

Model	Rated Current (Arms)	Peak Current (Arms)
E-RMA30	2.8	9.3
E-RMA60	6.0	21.0

Main power supply cable selection

- Wire gauge

The wire gauge for connecting different power drivers varies. The recommended values are shown in the table below:

Table 3-5 Main power supply wire gauge

Model	Wire diameter (mm ² /AWG)			
	L1, L2	P+, BR	U, V, W	PE
E-RMA30	1.3/AWG16	2.1/AWG14	1.3/AWG16	2.1/AWG14
E-RMA60	1.3/AWG16	2.1/AWG14	1.3/AWG16	2.1/AWG14

⚠ Caution

- When using three-phase 220V, the wire gauge for L1/L2/L3 can be smaller than for single-phase 220V.

- Grounding wire should be thicker. Ground PE terminal of servo driver and servo motor together with resistance $<100\ \Omega$.
- A 3-phase isolation transformer is recommended to lessen the risk of electrocution.
- Connect a line filter to power supply to reduce electromagnetic interference.
- Please install a non-fusing breaker (NFB) to ensure that the external power supply is promptly cut off in the event of a driver failure.

Cable selection for I/O signal port CN1 and CN2 encoder feedback

- Wire gauge

Recommend using stranded and shielded cables. For CN1, $\geq 0.14\text{mm}^2$, CN2 $\geq 0.25\text{mm}^2$ shielding layer needs to be grounded.

- Length

Cable length should be as short as possible. No more than 3m for CN1 and 15m for CN2.

- Placement

Place the cable away from power cables.

Please install surge absorption components for the inductive elements (coils) in the relevant circuits.

Install a surge suppressor in feedback circuit flyback diode inversely connected in parallel in DC coil and capacitor connected in parallel in AC coil.

Caution

- U, V, and W must be connected to the motor windings correspondingly and must not be reversed.
- Cables and wires should be securely fixed and kept away from the driver's heat sink and the motor to prevent insulation degradation due to heat.
- The driver contains large-capacity electrolytic capacitors, which may still hold high voltage even after power is turned off. Do not touch the driver within 5 minutes after power-off.

3.4.5 Single/Three Phase Power Supply Wiring Diagram

Single Phase 220VAC

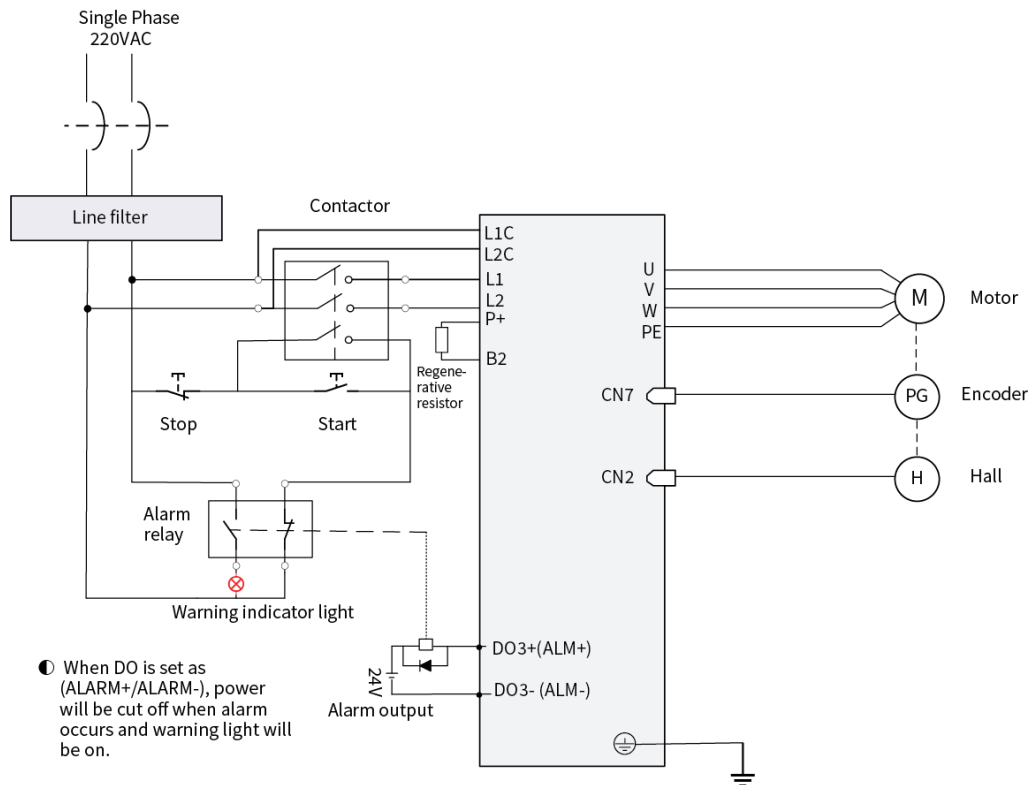


Figure 3-9 Single Phase 220VAC wiring diagram

Three Phase 220VAC

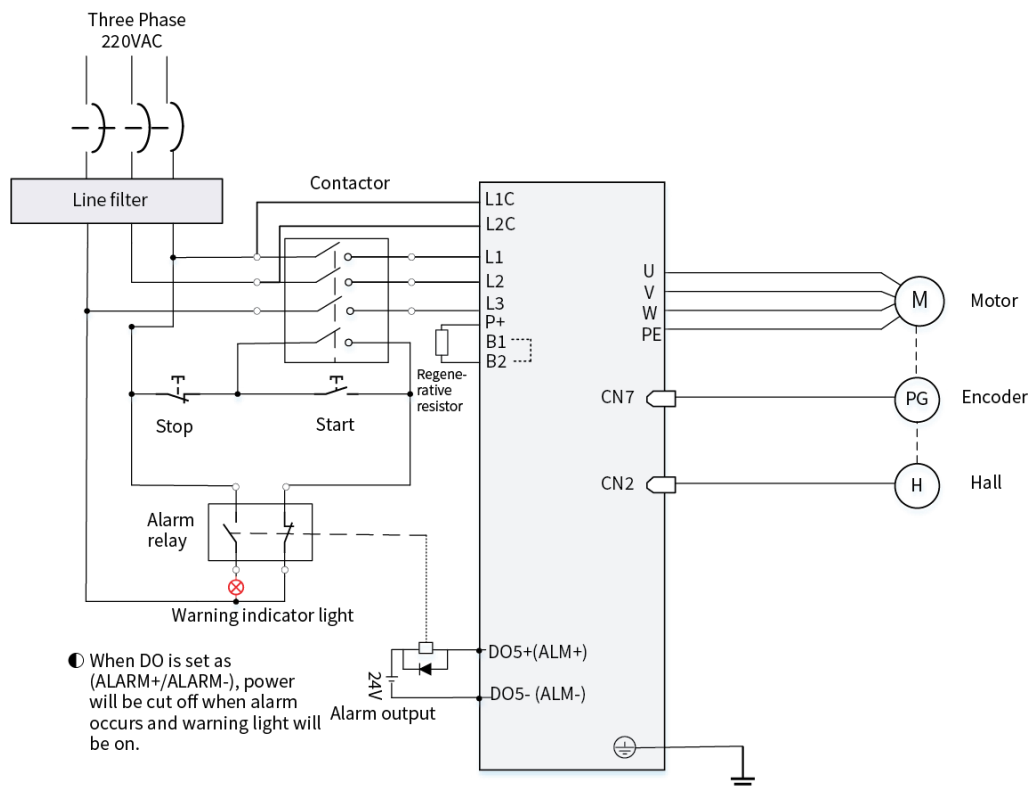


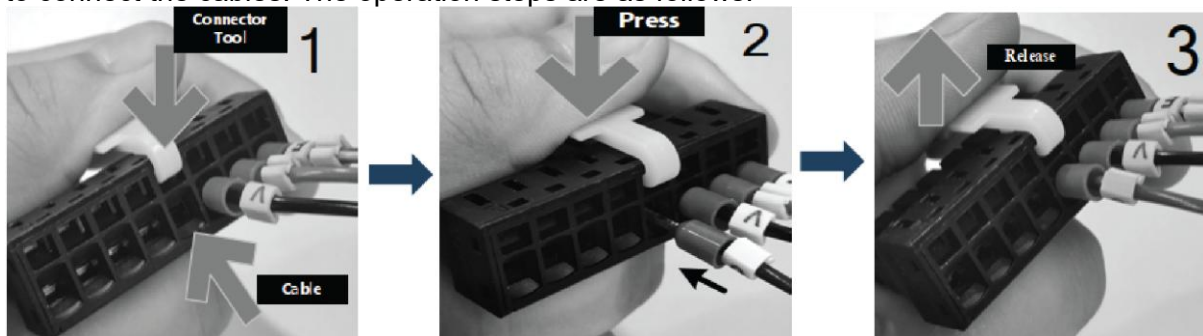
Figure 3-10 Three Phase 220VAC wiring diagram

3.4.6 Precautions for Main Circuit Wiring

- Ensure the input power supply matches the rated voltage level indicated on the nameplate. Both control power and main power must be connected as specified.
- Do not connect the input power supply wires to the U, V, W motor output terminals. Otherwise, it may damage the driver.
- Do not route power cables and signal cables through the same conduit or bundle them together. To avoid interference, maintain a distance of at least 30 cm between them.
- The power input and motor cables of the driver generate strong electromagnetic interference. To prevent electromagnetic interference caused by coupling when high interference cables run parallel to control circuits over long distances, ensure the distance between the main circuit cables and signal cables is greater than 30 cm. Common main circuit cables include control power input (L1C/L2C), main power input (L1/L2/L3), output (UVW), DC bus cables, and brake cables. Signal cables include I/O signal cables, communication cables, and encoder cables.
- Ensure good connections and grounding between cable troughs. Aluminum cable troughs can ensure equal potential across the equipment. Filters, drivers, and motors should be properly grounded to the system (machinery or device). Protective coatings should be applied at installation points to ensure sufficient contact with conductive metals.
- Reliably ground the driver to the earth.
- Do not power on the device if terminal screws or cable connections are loose, as this could cause fire hazard.
- Ensure the power supply is turned off and wait for at least 5 minutes before inspecting the driver to prevent electric shock from residual voltage.

To fix wire cables into connectors

The main circuit terminal connector is equipped with an operation lever, which can be used to connect the cables. The operation steps are as follows:



- 1) Select the terminal hole where the cable will be connected, then insert the operation lever into the corresponding operation lever slot for that terminal hole.
- 2) Press the operation lever in the direction perpendicular to the connector. At this point, the spring clamp in the terminal hole will open, allowing the conductive part of the cable to be fully inserted into the terminal hole.
- 3) Release the operation lever. The spring clamp will lock the conductive part of the cable securely in place. The operation is now complete.

⚠ Caution

- The action to remove the cable is the same as inserting it: press the operation lever to remove the cable.
- Only one wire can be inserted into each connector terminal.
- After using the operation lever, please store it properly for future use!

3.5 Connection of Driver and Linear Motor Power Cables

For motor power cables, MISUMI provides optional accessories:

- Cables are available in three selectable lengths: 1 meter, 3 meters, 5 meters, 8 meters and 10 meters.



Note:

- If other cable lengths are required, please contact our sales department in advance.
- When connecting the motor power cable to the driver, the four wires at the end of the cable are marked as follows: M1, M2, M3, and PE. These should be matched one-to-one (M1 to U, M2 to V, M3 to W) and correctly connected to the plug slots of the driver's main circuit terminals.

3.6 CN1 - Control Signal Port Connection

E-RMA series driver CN1 control signal connector use SCSI 50 PIN connector. The specific definitions are as follows:

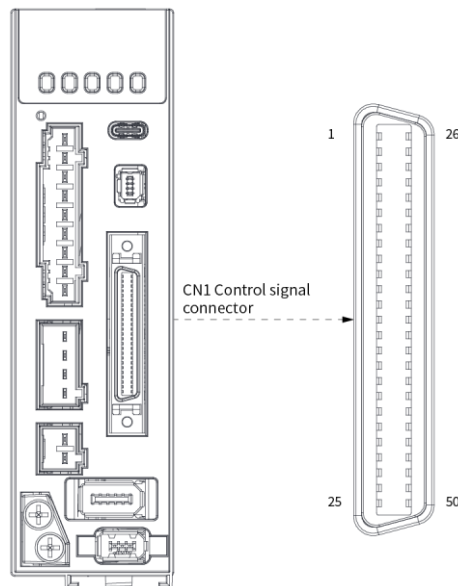
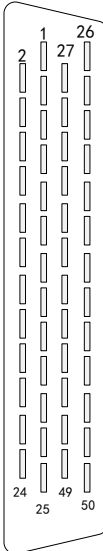


Figure 3-11 Control signal connector CN1 schematic diagram

Note

- It is recommended to use cables with a wire gauge of 24–26 AWG for connecting to CN1. The CN1 connector is an SCSI 26-pin connector.

Table 3-6 Control signal connector - CN1 pin assignment

Port	Diagram	Pin	Signal	Label	Description
CN1		1	PUL+24	Pulse train	Low-frequency pulse train direction signal
		3	PUL+	Pulse train	PUL+ & PUL-: 5V differential (500KHz)
		4	PUL-	Pulse train	DIR+ & DIR-: 5V differential (500KHz)
		2	DIR+24	Pulse direction signal	PUL+24 & PUL-: 24V single ended (200KHz)
		5	DIR+	Pulse direction signal	DIR+24 & DIR-: 24V single ended (200KHz)
		6	DIR-	Pulse direction signal	
		44	PULSH+	High-frequency pulse signal	4MHz High-frequency pulse train, 5V differential input
		45	PULSH-	High-frequency pulse signal	
		46	SIGNH+	High-frequency direction signal	4MHz High-frequency pulse train, 5V differential input
		47	SIGNH-	High-frequency direction signal	
		13	GND	GND	Ground
		7	DI-COM	Input	Common digital input
		8	DI1	NOT	Negative limit switch
		9	DI2	POT	Positive limit switch
		26	DI3	Null	-
		27	DI4	GAIN	Gain switching
		28	DI5	DIV1	Command multiplier switching
		29	DI6	SRV-ON	Servo powers on
		30	DI7	CL	Set deviation counter to zero
		31	DI8	A-CLR	Clear alarm(s)
		32	DI9	C-MODE	Control mode switching
		33	DI10	INH	Signal inhibit
		11	DO1+	BRK-OFF+	Release external brake
		10	DO1-	BRK-OFF-	
		35	DO2+	SRDY+	Servo ready
		34	DO2-	SRDY-	
		37	DO3+	ALM+	Servo driver alarm
		36	DO3-	ALM-	
		39	DO4+	INP1+	Position reached feedback signal
		38	DO4-	INP1-	
		41	DOCOM	Output	Common digital output (Max. current: 50mA, Max. voltage 30V)
		12	DO5	ZSP	Velocity zero
		40	DO6	TLC	Limited torque
		14	AI 1+	AI1	Velocity/Velocity limit (0 ~ ±10 V)
		15	AI 1-		
		16	AI 2	AI2	Torque/Torque limit in clockwise direction (0 ~ +10 V)
		17	GND	GND	Analog signal ground
		18	AI 3	AI3	Torque/Torque limit in anti-clockwise direction (-10 ~ 0 V)

	42	AO1	IM	Analog output signal monitoring 1 (Configurable)
	43	AO2	SP	Analog output signal monitoring 2 (Configurable)
	21	A+	Differential output	Phase A frequency divider output
	22	A-	Differential output	
	48	B+	Differential output	Phase B frequency divider output
	49	B-	Differential output	
	23	Z+	Differential output	Phase Z frequency divider output
	24	Z-	Differential output	
	25	GND	GND	Internal ground
	19	OCZ	Channel Z output	Channel Z output (Open collector)
	20	GND	GND	Internal ground
	50	FG	FG	Shield grounding
	Frame		FG	Frame grounding

CN1 signal cable selection

To ensure I/O signals are not affected by electromagnetic interference, a shielded twisted pair cable is recommended for this application. For different analog signals, separate shielded wires should be used. For digital signal wires, shielded twisted pair cables are recommended, with the shield effectively grounded to PE. The cables connected to CN1 should be of 24–26 AWG wire gauge, and the CN1 terminal is a 50-pin connector.

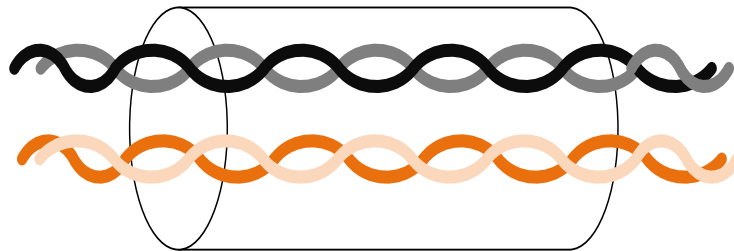


Figure 3-12 Shielded Twisted-Pair Cable Diagram

IO signal wiring

IO signals include digital input (DI), output (DO) signals, and relay output signals. When wiring control circuits, they should be kept at least 30 cm apart from main circuit wiring (L1C/L2C/L1/L2/L3, U/V/W) and other power lines, as placing them too close can cause interference with IO signals.

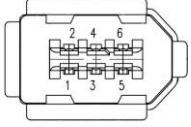
3.7 CN2 - Hall Port Connection

Note

- Hall cable is provided by MISUMI. Users need to prepare hall cables by themselves.

E-RMA series servo driver CN2 uses 1394 6PIN connector, with the following pin definitions:

Table 3-7 Hall connector - CN2 pin assignment

Port	Diagram	Pin	Signal	Description
CN2		1	5V	Power supply
		2	0V	
		3	-	Do Not Connect
		4	CS3	CS3 signal input (W)
		5	CS2	CS2 signal input (V)
		6	CS1	CS1 signal input (U)
		Frame	PE	Frame grounding

Note

- After inserting the Hall wires, bundle the cables together with the power cables to prevent the Hall connector from being damaged due to the weight of the wires.

⚠ Caution

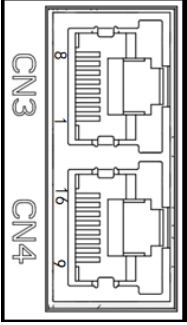
- Make sure to reliably ground the shielded layer on both the driver and motor sides to avoid false alarms in the driver!
- It is recommended to use twisted pair shielded cables for the Hall wires and avoid using excessively long cables.
- Hall wires and power cables must be routed separately to prevent interference! Maintain a spacing of at least 30cm between them!

3.8 CN3/CN4 - RS485 Communication Port

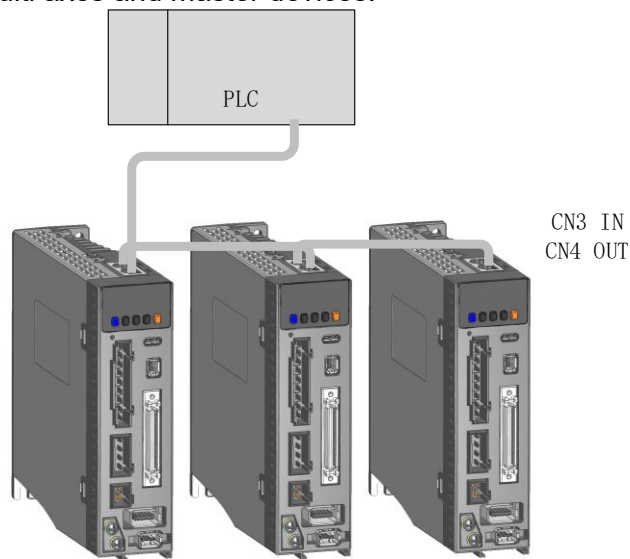
E-RMA series drivers support RS485 communication.

When using multiple units simultaneously, connect to the master controller and multiple servos via the RS485 communication interface.

Table 3-8 RS485 communication port - CN3/CN4 pin assignment

Port	Diagram	Pin	Signal	Description
CN3 CN4		1	422+	422 data positive terminal (Gantry communication)
		2	422-	422 data negative terminal (Gantry communication)
		3	-	-
		4	485+	RS485 data positive terminal
		5	485-	RS485 data negative terminal
		6	5V	Reserved, 5V power positive terminal (50mA)
		7	-	-
		8	GND	Power GND
		Frame	PE	Shielding grounded

- E-RMA series supports RS485 communication protocol which enables communication between single/multi axes and master devices.



3.9 CN6 - Safe Torque Off (STO) Port

The CN6 terminal of the E-RMA series servo driver uses the TE 2013595-1 connector, with the specific definitions as follows:

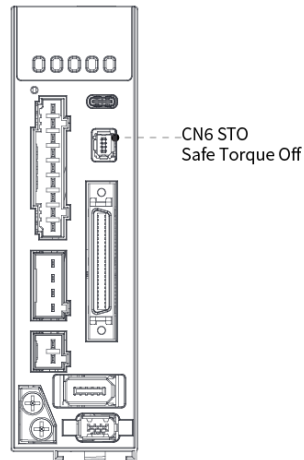


Table 3-9 STO port pin assignment

Port	Diagram	Pin	Signal	Description	Remarks
CN6		1	24V	24v power supply	Connect to SF1 and SF2 when not in use. Do not use to supply power.
		2	0V	Reference ground	
		3	SF1-	Control signal 1 negative input	When SF1 = OFF or SF2 = OFF, STO is enabled.
		4	SF1+	Control signal 1 positive input	
		5	SF2 -	Control signal 2 negative input	
		6	SF2+	Control signal 2 positive input	
		7	EDM-	External monitoring device (EDM) with differential double ended output	When SF1 = OFF and SF2 = OFF, EDM = ON
		8	EDM+		

Introduction to Safe Torque Off (STO)

Function: Cut off motor current supply physically (through mechanical means).

STO module (CN6 connector) consists of 2 input channels. It cuts off the motor current supply by blocking PWM control signal from the power module. When the motor current is cut off, the motor will still move under inertia and stop gradually.

The STO function is set up ready to be used by factory default. Please remove STO connector if it is not needed.

⚠ Caution

Once the STO (Safe Torque Off) function is activated, the driver will no longer have control over the motor. Therefore, before enabling the STO function, please assess the potential dangers that may still exist:

- After enabling the STO function, the driver cannot guarantee that the motor will not move due to external forces.
- The STO function does not cut off the power supply to the driver, so there is still a risk of electric shock. When performing maintenance on the driver, always disconnect the power supply and other devices.

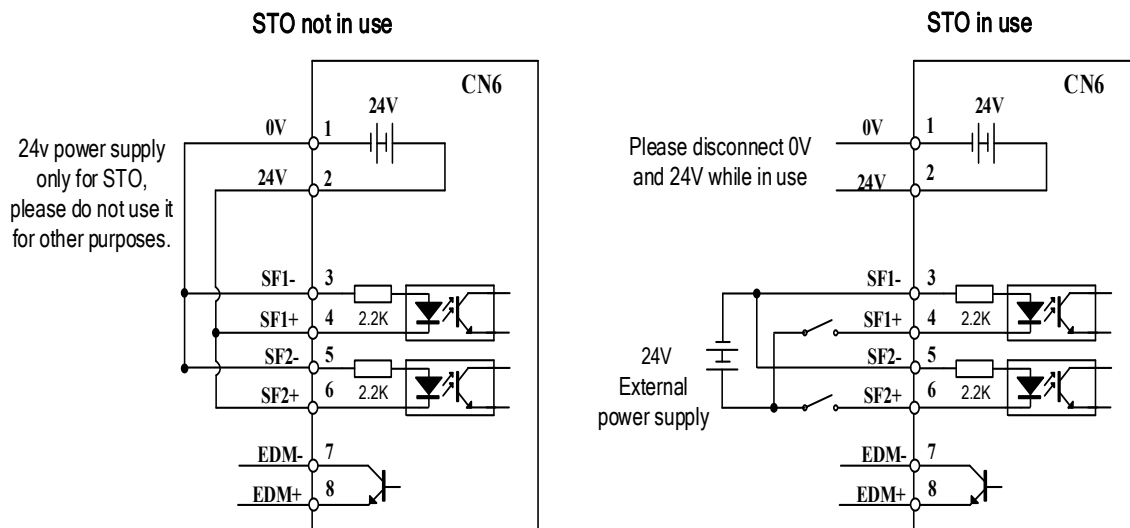
- Please use a single power source to supply the STO signal input. Otherwise, leakage current may cause the STO function to malfunction, preventing the system from entering the STO OFF state.

STO functional principle

STO module cuts off the motor current supply and stops motor gradually by blocking PWM control signal from the power module through 2 isolated circuits. When an STO error occurs, the actual status of STO can be determined by the EDM status feedback. Status Description Table as follows:

SF1 Input	SF2 Input	EDM Output	PWM Control	Alarm
ON	ON	OFF	Normal	-
ON	OFF	OFF	Blocked	Er 1c2
OFF	ON	OFF	Blocked	Er 1c1
OFF	OFF	ON	Blocked	Er 1c0

STO wiring diagram



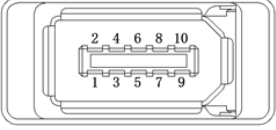
STO Alarm Reset Mechanism

STO1 Input Status	STO2 Input Status	Alarm Reset Method
OFF → ON	ON	Reset via host, upper PC, or power cycle (Er 1C1)
ON	OFF → ON	Reset via host, upper PC, or power cycle (Er 1C2)
OFF → ON	OFF → ON	Auto reset (Er 1C0)

3.10 CN7 - Encoder Port Connection

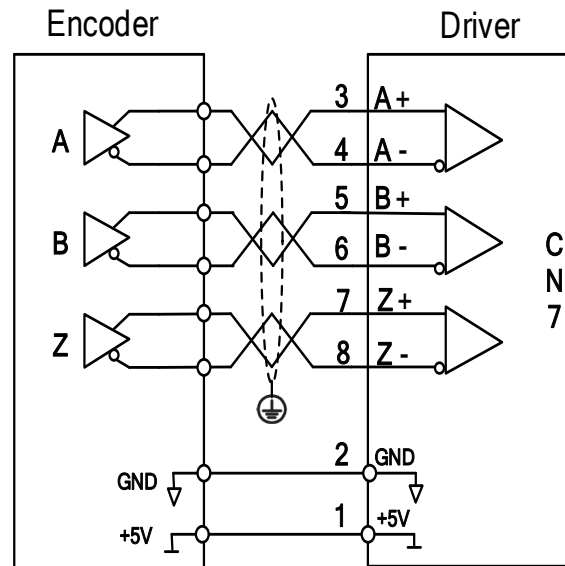
Encoder port CN7 uses 1394 10PIN connector and simultaneously supports two encoder feedback modes: incremental A, B, Z and BISS-C. Please connect according to the encoder feedback type supported by the motor.

Table 3-10 Encoder feedback signal port - CN7 pin assignment

Port	Diagram	Feedback type	Pin	Signal	Description
CN7		A, B, Z	1	5V	Power supply 5V
			2	GND	Power supply ground
			3	A+	Phase A+ pulse input
			4	A-	Phase A- pulse input
			5	B+	Phase B+ pulse input
			6	B-	Phase B- pulse input
			7	Z+	Phase Z+ pulse input
			8	Z-	Phase Z- pulse input
		Biss-C	1	5V	Power supply 5V
			2	GND	Power supply ground
			3	SLO+	Data+
			4	SLO-	Data-
			5	MA+	Clock+
			6	MA-	Clock-
		-	Frame	FG	Shield grounding

External encoder pulse input

Encoder pulse input must use twisted pair shielded cables, and the shield must be properly grounded.



Note

- Please connect the encoder reference ground terminal to driver ground terminal. Recommended to use double winding cable with shielding foil, Connect the shielding foil to CN7 connector to reduce noise interference.

3.11 USB Type-C Tuning Port

By using a universal Type-C communication cable, the computer can be connected to the driver for parameter setting, changes, and monitoring. It supports parameter modification and uploading of alarm information without affecting the main power.

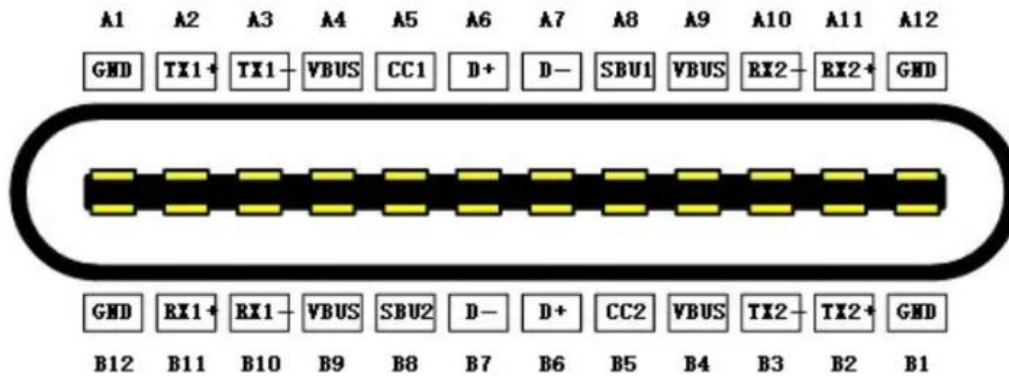


Figure 3-13 Driver TYPE-C pin assignment

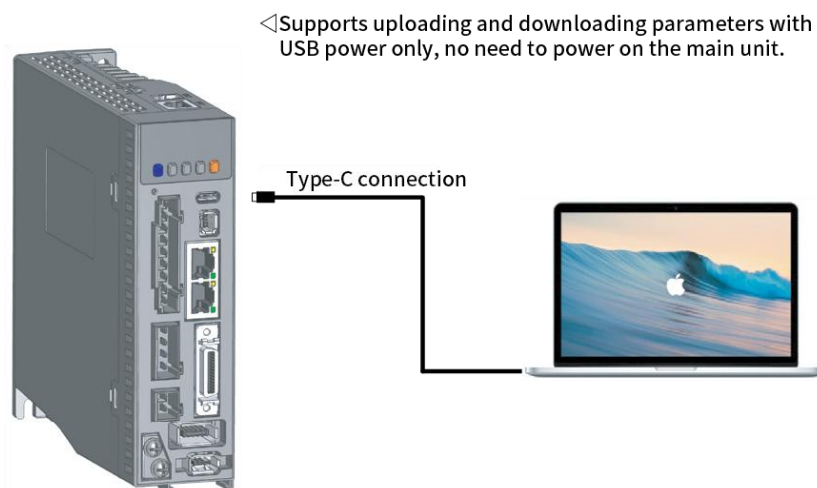
Table 3-11 TYPE-C communication port pin assignment

Port	Pin	Signal	Description
USB Type-C	A4, B4, A9, B9	VCC 5V	Power supply positive terminal 5V
	A12, B12, A1, B1	GND	Power supply negative terminal
	A6, B6	D+	USB data positive terminal
	A7, B7	D-	USB data negative terminal
	Frame	USB_GND	Ground through capacitor

Note

- Without powering on the main power, a debugging cable can be used to connect the computer to the driver, allowing the use of the debugging software EDrive to make relevant parameter settings and changes.
- When connecting to the computer for debugging, if there is significant interference, it may result in connection issues. In such cases, using a debugging cable with a magnetic ring can effectively solve the connection problem!

PC Turning Port Wiring Example



3.12 I/O Signals

3.12.1 Pulse Input Circuit

When PLC or Motion Controller command pulse output circuits can be divided into 2 categories, namely differential output or open collector. Hence, on the side of servo driver, there are 2 types of command pulse input method as well: Differential driver input and open collector input.

Pulse input frequency:

- 1) High speed pulse input (4MHz)
- 2) Low speed pulse input (200kHz/500kHz)

Pulse input frequency can be set in P00.05.

The relationship between different pulse input frequencies and pulse widths:

Pulse		Max. Frequency (Hz)	Min pulse width(μs)
Low speed	Differential	500k	1
	Open collector (Single ended)	200k	2.5
High speed differential		4M	0.125

Note

- High-/low speed pulse cannot be used at the same time.
- If output pulse width is smaller than min pulse width, error might occur at pulse receiving end.

5V differential driver input (Low Speed)

5V differential driver input (max. tolerable command input pulse frequency = 500kHz), input voltage of 3-6V with 50% duty ratio.

This input method will not be easily affected by noise with better delivery accuracy. Pin 3 and 4 of CN1 are for pulse signal input; pin 5 and pin 6 are for direction signal input.

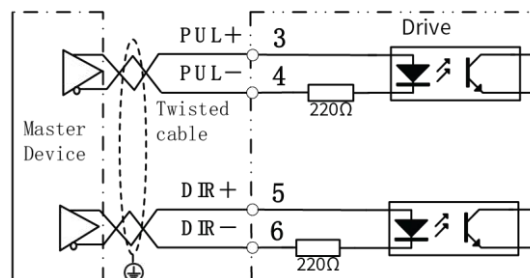


Figure 3-14 Low speed 5V differential driver mode for pulse input interface (3, 4, 5, 6)

Single ended open collector driver input (Low Speed)

Max. tolerable command pulse input frequency under open collector = 200kHz. Input voltage of 12-24V with 50% duty ratio.

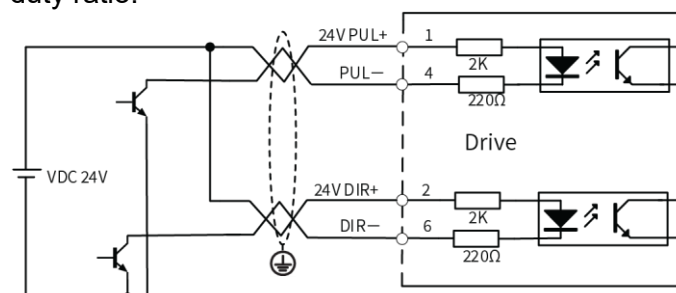


Figure 3-15 24V single-ended driver mode for pulse input interface (NPN)

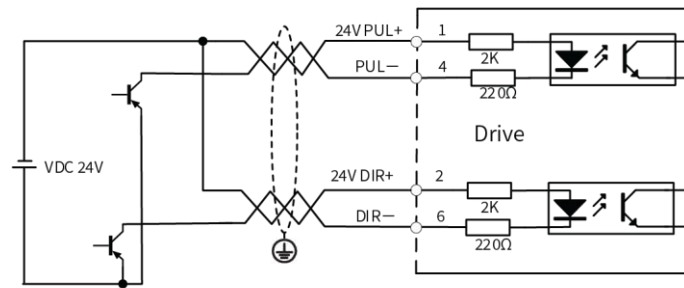


Figure 3-16 24V single-ended driver mode for pulse input interface (PNP)

Note

- 5V differential driver method is recommended for accurate delivery of pulse data.
- E-RMA driver supports 5V differential driver and 24V single ended open collector driver, different connection pins for both methods.
- External power supply needs to be provided externally when using single ended open collector driver method. Please note that reversed polarity might cause damage to the servo driver.

5V differential driver input (High Speed)

5V differential driver input (Max. tolerable command pulse input frequency: 4MHz). Due to high-speed pulse input, it is highly recommended to use shielded cable and be isolated from power cable.

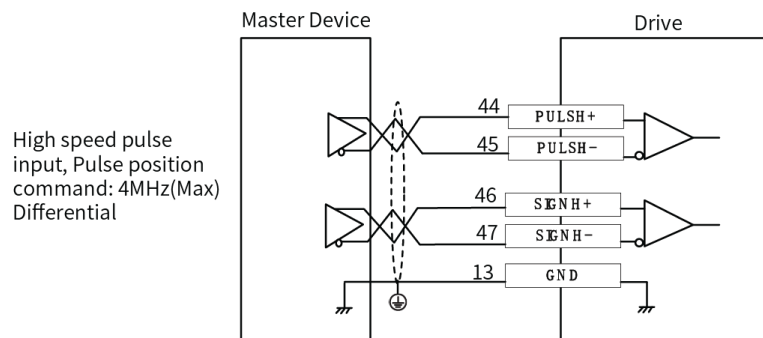


Figure 3-17 High speed 5V differential driver mode for pulse input interface (44, 45, 46, 47)

Please make sure that differential input is 5V or it might cause instability of input pulse.

- Pulse lost during command pulse input
- Inversed pulse direction during direction command
- Please connect 5V signal to GND on driver to lower noise interference.

3.12.2 Analogue Input Circuit

Analogue input signal

E-RMA series drivers support three analog input channels. AI1, AI2, and AI3 use single-ended analog input.

Table 3-12 Analog input signal pin assignment

CN1 Pin	Signal	Description
14	AI1+	Analogue input 1, differential, Input voltage: $\pm 10\text{VDC}$, input resistance: $20\text{K}\Omega$
15	AI1-	
16	AI2	Analogue input 2, single ended, Input voltage: $\pm 10\text{VDC}$, input resistance: $20\text{K}\Omega$
18	AI3	Analogue input 3, single ended, Input voltage: $\pm 10\text{VDC}$, input resistance: $20\text{K}\Omega$
17	AGND	Analogue GND

Max tolerable input voltage for each AI is $\pm 10\text{VDC}$. If variable resistor (VR) or resistor (R) is used, please refer to the following circuit diagram.

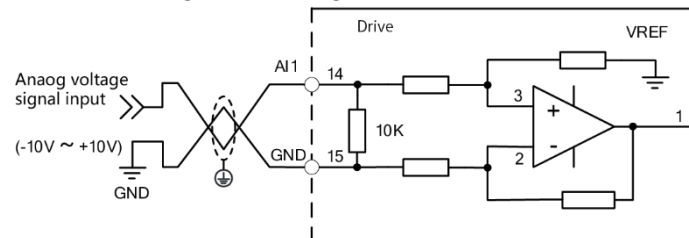


Figure 3-18 Analog AI1 input port

Analogue output signal

E-RMA series drivers support 2 analogue outputs, output voltage: $\pm 10\text{VDC}$. Corresponding signals are set in P04.65/P04.70.

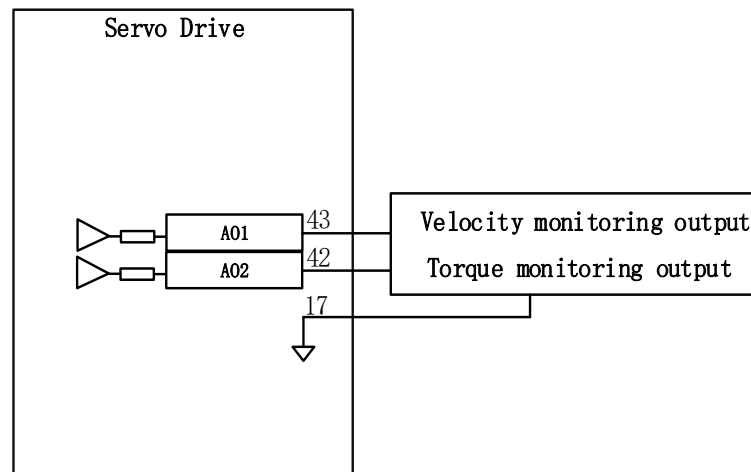


Figure 3-19 Analog AO1 output port

3.12.3 General Digital Input Circuit

Using DI1 as an example (DI2-DI10 use the same input circuit). The internal circuit of common input is a bidirectional optocoupler which supports common anode and common cathode configurations. There are 2 types of outputs from master device: Relay output and Open Collector output as shown below.

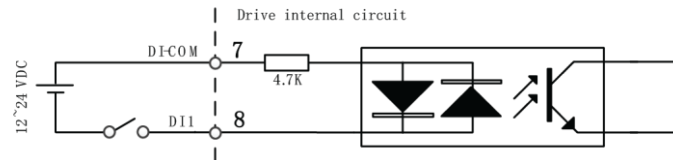
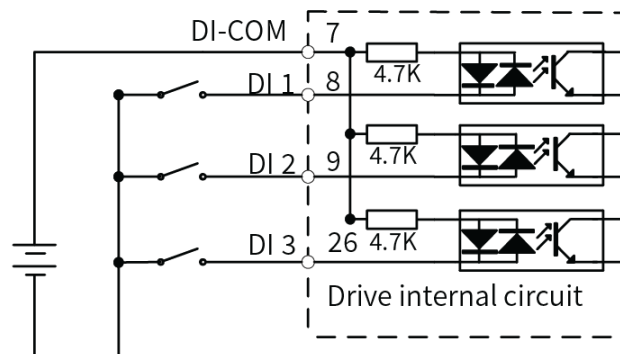


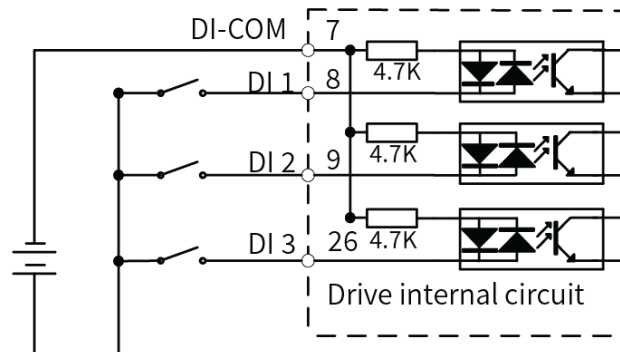
Figure 3-20 General digital IO input circuit

① Output from master device: Relay (only DI1~DI3 shown)

E-RMA supports both common anode and common cathode connection:
Common anode:

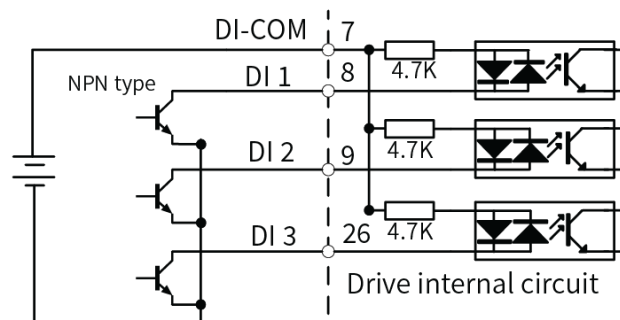


Common cathode:

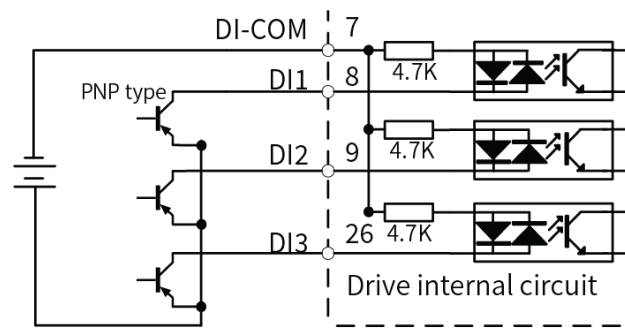


② Output from master device: Open Collector

NPN configuration:



PNP configuration:



Note

- Please prepare for switching power supply with output of 12-24VDC.
- For IO pin assignment, please refer to "3.6 CN1-Control signal port connection".

3.12.4 General Digital Output Circuit

There are total of 6 digital outputs with DO5/DO6 as single ended outputs. Both of DO5 and DO6 outputs are connected to COM of control signal source, which means both use the same control signal source. DO1-DO4 are double ended outputs. They can be connected to independent control signal source and reference ground can be different from other single ended output signals.

Double ended outputs DO1-DO4

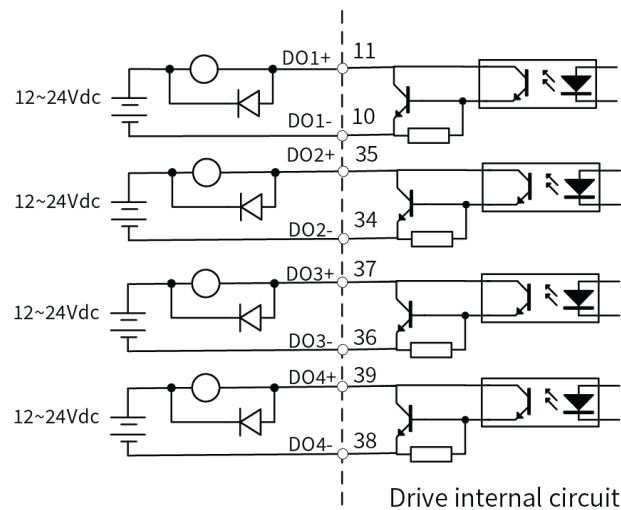


Figure 3-21 General digital IO output double end

Single ended output DO5-DO6

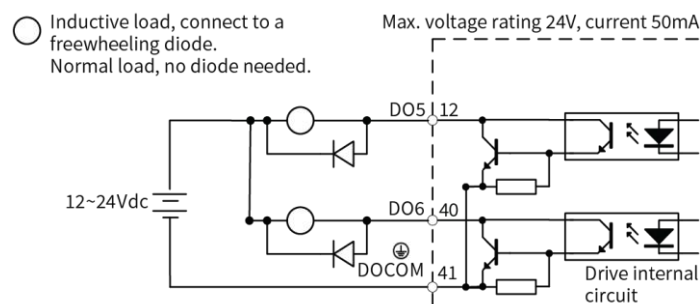


Figure 3-22 General digital IO output single end

⚠ Caution

- Power supply is provided by users. Please be aware that reversed power supply polarity might cause damage to the driver.
- When it is an open collector output, max current: 50mA, max supplying voltage: 25V. Please ensure the switching power supply fulfills the conditions.
- If the load is an inductive load such as a relay, please connect a flyback diode in parallel in reverse. The wrong installation of the flyback diode might cause damage to the driver.
- For IO pin assignment, please refer to "3.6 CN1-Control signal port connection".

3.12.5 Encoder Frequency Divider Output Circuit

E-RMA has frequency divider output in both differential mode and open collector mode.

Table 3-13 Encoder frequency divider output signal pin assignment

CN1 Pin	Label	Description	
21	A+	Motor encoder A-phase crossover frequency output	Differential, High≥2.5VDC, Low≤0.5VDC, Max current±20mA
22	A-		
48	B+	Motor encoder B-phase crossover frequency output	
49	B-		
23	Z+	Motor encoder Z-phase crossover frequency output	
24	Z-		
19	OCZ	Motor encoder Z-phase signal OC output	Only supports NPN type OC output
25	GND	Open collector signal ground	

Encoder frequency divider output (Differential)

The encoder signal output, after frequency division processing, is differential output through a differential driver. Typically, when the upper-level device forms a position control system, it provides feedback signals. On the upper-level device side, please use a differential or optocoupler receiving circuit. When using a differential receiver on the upper-level device side, make sure to install termination resistors between the differential input circuits, with the resistance value set according to the actual situation.

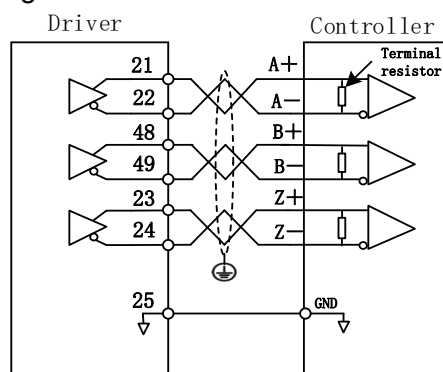


Figure 3-23 Encoder frequency divider output (differential output) circuit

⚠ Caution

- If the master device is not an optocoupler but a differential reception circuit, please be sure to short-circuit pin 25 (GND) of the driver with the differential reception GND of the master device.

Encoder frequency divider output (Open Collector)

Encoder signal after frequency division will be delivered through an open collector output.

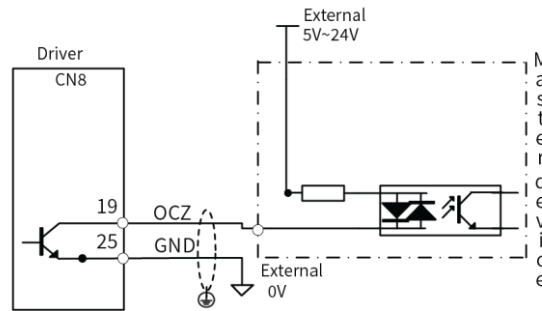


Figure 3-24 Encoder frequency divider output (Open Collector) circuit

⚠ Caution

- Please connect driver frequency divider signal GND to GND of external power supply. Use shielded twisted pair cables to lower noise interference.

3.13 Digital Input/Output Signal

3.13.1 Digital Input Signal Setting

Control input

Default status:

CN1 PIN	Signal	Parameter	Default signal	Default status
7	DI-COM	-	Common input	
8	DI1	P04.00	NOT	Normally opened OFF
9	DI2	P04.01	POT	Normally opened OFF
26	DI3	P04.02	-	Normally opened OFF
27	DI4	P04.03	GAIN	Normally opened OFF
28	DI5	P04.04	DIV1	Normally opened OFF
29	DI6	P04.05	SRV-ON	Normally opened OFF
30	DI7	P04.06	CL	Normally opened OFF
31	DI8	P04.07	A-CLR	Normally opened OFF
32	DI9	P04.08	C-MODE	Normally opened OFF
33	DI10	P04.09	INH	Normally opened OFF

Note

- Normally Opened (NO):
When the signal input is disconnected from the DI-COM loop → Function is inactive (OFF state)
When the signal input is connected to the DI-COM loop → Function is active (ON state)
- Normally Closed (NC):
When the signal input is disconnected from the DI-COM loop → Function is active (ON state)
When the signal input is connected to the DI-COM loop → Function is inactive (OFF state)

⚠ Caution

- When limit switch or emergency stop is used, POT, NOT and E-STOP signal will be normally closed (NC) by default. Please make sure there is no safety concern if these signals need to be set to normally open (NO)
- Servo driver power on signal (SRV-ON) is set as normally open (NO) as default. Please make sure there is no safety concern if this signal needs to be set to normally closed (NC).

How to set control input

Common input control signal:

CN1 PIN	Signal	Parameter	CN1 PIN	Signal	Parameter
8	DI1	P04.00	29	DI6	P04.05
9	DI2	P04.01	30	DI7	P04.06
26	DI3	P04.02	31	DI8	P04.07
27	DI4	P04.03	32	DI9	P04.08
28	DI5	P04.04	33	DI10	P04.09

This parameter is set in hexadecimal.

Please refer to the table below to configure the function number.

Signal	Symbol	Value	
		NO	NC
Invalid	—	00h	-
Positive limit switch	POT	01h	81h
Negative limit switch	NOT	02h	82h
Servo enabled	SRV-ON	03h	83h
Clear alarm	A-CLR	04h	-
Control mode switching	C-MODE	05h	85h
Gain switching	GAIN	06h	86h
Clear deviation count	CL	07h	-
Command pulse prohibited	INH	08h	88h
Torque limit switching	TL-SEL	09h	89h
Command frequency divider/multiplier switching	DIV1	0Ch	8Ch
Internal command velocity 1	INTSPD1	0Eh	8Eh
Internal command velocity 2	INTSPD2	0Fh	8Fh
Internal command velocity 3	INTSPD3	10h	90h
Zero speed clamp	ZEROSPD	11h	91h
Velocity command sign	VC-SIGN	12h	92h
Velocity command sign 2	VC-SIGN 2	4Ah	Cah
Torque command sign	TC-SIGN	13h	93h
Forced alarm	E-STOP	14h	94h
Inertia ratio switching input	J-SEL	15h	95h
Gantry disable	GTRY	17h	07h

⚠ Caution

- Do not configure values outside the table above, as this will trigger an Er211 "I/F Input Port Function Setting Error." Configuring control input lines as invalid does not affect operation.
- The same function must not be assigned to multiple pins. Otherwise, an Er210 "I/F Input Port Assignment Duplication" error will occur.
- The servo-enable signal (SRV-ON) must be assigned. If it is not assigned, the servo cannot be enabled.

Inputs related to Pr-mode:

Signal	Symbol	Value	
		NO	NC
Trigger command	CTRG	20h	A0h
Home	HOME	21h	A1h
Forced stop	STP	22h	A2h
Positive JOG	PJOG	23h	A3h
Negative JOG	NJOG	24h	A4h
Positive limit	PL	25h	A5h
Negative limit	NL	26h	A6h
Origin	ORG	27h	A7h
Path address 0	ADD0	28h	A8h
Path address 1	ADD1	29h	A9h
Path address 2	ADD2	2Ah	AAh
Path address 3	ADD3	2Bh	ABh

⚠ Caution

CTRG and HOME are edge-triggered, please make sure electronic bits last 1ms and above.

Configurable Input Signal

Label	Servo enabled			Mode	P	S	T
Signal	SRV-ON	Default assignment	29(DI6)	I/O circuit	Please refer to 3.12.3		
Servo enabled (Motor ON/OFF control signal).							

Label	Positive position limit			Mode	P	S	T
Signal	POT	Default assignment	9(DI2)	I/O circuit	Please refer to 3.12.3		
To prevent axis from travelling in positive direction. Signal valid when P05.04 is set. If P05.04 is set to any value besides 1, POT signal is invalid when axis moves in positive direction.							

Label	Negative position limit			Mode	P	S	T
Signal	NOT	Default assignment	8(DI1)	I/O circuit	Please refer to 3.12.3		
To prevent axis from travelling in negative direction. Signal valid when P05.04 is set. If P05.04 is set to any value besides 1, NOT signal is invalid when axis moves in negative direction.							

Label	Clear deviation count			Mode	P		
Signal	CL	Default assignment	30(DI7)	I/O circuit	Please refer to 3.12.3		
To clear position deviation counter. Only clear once by default. Please modify on P05.17.							

Label	Clear alarm			Mode	P	S	T
Signal	A-CLR	Default assignment	31(DI8)	I/O circuit	Please refer to 3.12.3		
To clear alarm. Only some of the alarms can be cleared.							

Label	Command pulse prohibited			Mode	P		
Signal	INH	Default assignment	33(DI10)	I/O circuit	Please refer to 3.12.3		
Ignore position command pulse. Please set in P05.18 when needed. When INH input is valid, position command from controller will deviate from servo driver internal command after filtering, which might cause the loss of position info before INH input. Please reset before making any further action requiring position management.							

Label	Control mode switching			Mode	P	S	T
Signal	C-MODE	Default assignment	32(DI9)	I/O circuit	Please refer to 3.12.3		
When P00.01 = 3,4,5, control mode: hybrid mode, which consists of 2 control modes. All control modes require this signal. Please set to the same logic when in position, velocity or torque mode to prevent errors from occurring. When C-MODE is valid, select 2nd mode; when invalid, select 1st mode. Please do not enter any command 10ms before and after mode switching.							

Label	Command frequency divider/multiplier switching			Mode	P		
Signal	DIV1	Default assignment	28(DI5)	I/O circuit	Please refer to 3.12.3		
When DIV1 is valid, frequency divider/multiplier numerator and denominator switch to 2nd command frequency divider/multiplier numerator and denominator. When DIV1 input is valid, position command from controller will deviate from servo driver internal command after filtering, which might cause the loss of position info before DIV1 input. Please reset before making any further action requiring position management.							

Label	Vibration suppression 1			Mode	P		
Signal	VS-SEL1	Default assignment		I/O circuit	Please refer to 3.12.3		

Label	Vibration suppression 2			Mode	P		
Signal	VS-SEL2	Default assignment		I/O circuit	Please refer to 3.12.3		
To switch frequency used in vibration suppression							

Label	Gain switching			Mode	P	S	T
Signal	GAIN	Default assignment	27(DI4)	I/O circuit	Please refer to 3.12.3		
To switch between 1 st and 2 nd gain							

Label	Torque limit switching			Mode	P	S	
Signal	TL-SEL	Default assignment		I/O circuit	Please refer to 3.12.3		
To switch between 1 st and 2 nd torque limit. Please refer to P05.21							
Value		Limit					
[0]		1 st torque limit P00.13					
1		2 nd torque limitP05.22					
2	TL-SEL OFF	P00.13					
	TL-SEL ON	P05.22					
3~4		Reserved					
5	P00.13 →Positive torque limit						
	P05.22 →Negative torque limit						

Label	Zero speed clamp			Mode		S	
Signal	ZEROSPD	Default assignment		I/O circuit	Please refer to 3.12.3		
To set velocity command to 0 When in use, please set P03.15 ≠ 0.							

Label	Velocity command sign			Mode		S	
Signal	VC-SIGN	Default assignment		I/O circuit	Please refer to 3.12.3		
Sign of velocity command input in velocity control mode. Please refer to P03.01							

Label	Torque command sign			Mode			T
-------	---------------------	--	--	------	--	--	---

Signal	TC-SIGN	Default assignment	I/O circuit	Please refer to 3.12.3
Sign of torque command input in torque control mode. Please refer to P03.18				
	Value	Direction settings		
	【0】	Torque command input 「Positive」 →Positive direction、 「Negative」 →Negative direction		
	1	Use TC-SIGN ON/OFF status for torque direction OFF: <i>Positive direction</i> ON: <i>Negative direction</i>		

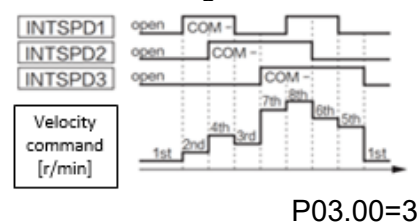
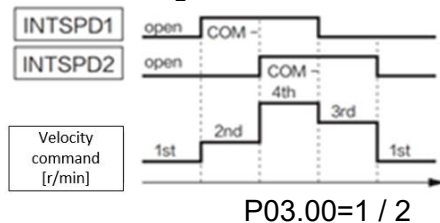
Label	Internal command velocity 1		Mode		S
Signal	INTSPD1	Default assignment		I/O circuit	Please refer to 3.12.3
Label	Internal command velocity 2		Mode		S
Signal	INTSPD2	Default assignment		I/O circuit	Please refer to 3.12.3
Label	Internal command velocity 3		Mode		S
Signal	INTSPD3	Default assignment		I/O circuit	Please refer to 3.12.3

Connect to the right DI to control internal command velocity settings.

Value	Velocity settings
0	Analog - Velocity command (SPR)
【1】	Internal velocity settings 1 st – 4 th speed (P03.04~P03.07)
2	Internal velocity settings 1 st – 3 rd speed (P03.04~P03.06) 、Analog velocity command (SPR)
3	Internal velocity settings 1 st – 8 th speed (P03.00~P03.11)

Value	Internal command velocity 1 (INTSPD 1)	Internal command velocity 2 (INTSPD2)	Internal command velocity 3 (INTSPD3)	Velocity command
1	OFF	OFF	No effect	1 st speed
	ON	OFF		2 nd speed
	OFF	ON		3 rd speed
	ON	ON		4 th speed
2	OFF	OFF	No effect	1 st speed
	ON	OFF		2 nd speed
	OFF	ON		3 rd speed
	ON	ON		Simulated speed
3	Similar to P03.00=1		OFF	1 st – 4 th speed
	OFF	OFF	ON	5 th speed
	ON	OFF	ON	6 th speed
	OFF	ON	ON	7 th speed
	ON	ON	ON	8 th speed

Please change internal command velocity as per diagram below as unexpected axis movement might occur if 2 command velocities are changed at the same time.



Label	Emergency stop			Mode	P	S	T
Signal	E-STOP	Default assignment		I/O circuit	3.12.3 Digital inputs		
When the forced alarm input is active, it can trigger an Er570 alarm and stop the machine or stop the machine without triggering an alarm.							

Signal input configurable only in PR mode

Label	Trigger command			Mode	PR
Signal	CTRG	Default assignment		I/O circuit	Please refer to 3.12.3
Select path address ID through ADD0-3, then trigger PR path motion using CTRG Set rising edge/double edge trigger in P08.00.					

Label	Path address 0-3			Mode	PR
Signal	ADD0-3	Default assignment		I/O circuit	Please refer to 3.12.3
IO combination trigger select path using ADD0~ADD3. Trigger mode is set in P08.26.					
ADD3	ADD2	ADD1	ADD0	Path selection	
OFF	OFF	OFF	OFF	Path 0 (Non-action)	
OFF	OFF	OFF	ON	Path1	
OFF	OFF	ON	OFF	Path2	
OFF	OFF	ON	ON	Path3	
OFF	ON	OFF	OFF	Path4	
OFF	ON	OFF	ON	Path5	
OFF	ON	ON	OFF	Path6	
OFF	ON	ON	ON	Path7	
ON	OFF	OFF	OFF	Path8	
ON	OFF	OFF	ON	Path9	
ON	OFF	ON	OFF	Path10	
ON	OFF	ON	ON	Path11	
ON	ON	OFF	OFF	Path12	
ON	ON	OFF	ON	Path13	
ON	ON	ON	OFF	Path14	
ON	ON	ON	ON	Path15	

Label	Home			Mode	PR
Signal	HOME	Default assignment		I/O circuit	Please refer to 3.12.3
Homing trigger, homing velocity and acceleration can be set in P08.15-P08.18					

Label	Forced stop			Mode	PR
Signal	STP	Default assignment		I/O circuit	Please refer to 3.12.3
Emergency stop trigger in PR motion. Deceleration can be set in P08.23					

Label	Positive/Negative JOG			Mode	PR
Signal	PJOG/NJOG	Default assignment		I/O circuit	Please refer to 3.12.3
To jog manually in PR mode					

Label	Positive/Negative limit			Mode	PR
Signal	PL/NL	Default assignment		I/O circuit	Please refer to 3.12.3
PR mode positive/negative position limit					

Label	Origin			Mode	PR
Signal	ORG	Default assignment		I/O circuit	Please refer to 3.12.3
Origin signal input					

3.13.2 Digital Output Signal Setting

Control output

Default status

CN1 PIN	Label	Parameter	Assigned signal
11	DO1+	P04.10	External brake released BRK-OFF
10	DO1-		
35	DO2+	P04.11	Servo-Ready S-RDY
34	DO2-		
37	DO3+	P04.12	Alarm (ALARM)
36	DO3-		
39	DO4+	P04.13	Positioning completed INP1
38	DO4-		
12	DO5	P04.14	Zero speed clamp detection ZSP
40	DO6	P04.15	Torque limit signal TLC

The functionality will vary depending on the parameter settings. Please refer to the following 'Control Output Setting Method'. Digital output functions can be assigned to multiple pins at the same time. Control output pins set to "None" will keep the output transistor in the OFF state.

Control signal output settings

CN1 PIN	Output	Parameters
11	DO1+	P04.10
10	DO1-	
35	DO2+	P04.11
34	DO2-	
37	DO3+	P04.12
36	DO3-	
39	DO4+	P04.13
38	DO4-	
12	DO5	P04.14
40	DO6	P04.15

The setting value is represented in hexadecimal. The front panel parameter modifications are also represented in hexadecimal format. Refer to the table below for function numbers.

Value		Signal	Symbol
NO	NC		
00h	80h	Invalid	—
01h	81h	Alarm	ALARM
02h	82h	Servo-Ready	SRDY
03h	83h	External brake released	BRK-OFF
04h	84h	Positioning completed	INP
05h	85h	At-speed	AT-SPPED
06h	86h	Torque limit signal	TLC
07h	87h	Zero speed clamp detection	ZSP
08h	88h	Velocity coincidence	V-COIN
12h	92h	Servo Status	SRV-ST
15h	95h	Positive limit valid	POT-OUT

16h	96h	Negative limit valid	NOT-OUT
0Bh	8Bh	Position command ON/OFF	P-CMD
0Fh	8Fh	Velocity command ON/OFF	V-CMD
0Dh	8Dh	Velocity limit signal	V-LIMIT
14h	94h	Position comparison	CMP-OUT

Outputs related to PR-mode

Signal	Symbol	Value	
		NO	NC
Command completed	CMD-OK	20h	A0h
Path completed	PR-OK	21h	A1h
Homing done	HOME-OK	22h	A2h

Note

- Same signal can be assigned to multiple different outputs.
- Control output pins set to "Invalid" will keep the output transistor in the OFF state.
- Do not assign values outside the table above.

Configurable DO signals

Label	Alarm			Mode	P	S	T
Signal	ALARM	Default assignment	(D03)	I/O circuit	Please refer to 3.12.4		
Signal output when driver alarm occurs							

Label	Servo Ready			Mode	P	S	T
Signal	S-RDY	Default assignment	(D02)	I/O circuit	Please refer to 3.12.4		
Signal output when servo is powered on							

Label	Positioning completed			Mode	P		
Signal	INP	Default assignment	(D04)	I/O circuit	Please refer to 3.12.4		
Signal output when positioning completed within set range							

Label	External brake released			Mode	P	S	T
Signal	BRK-OFF	Default assignment	(D01)	I/O circuit	Please refer to 3.12.4		
Signal valid to hold braking action							

Label	Velocity reached			Mode		S	T
Signal	AT-SPEED	Default assignment		I/O circuit	Please refer to 3.12.4		
Velocity reached signal							

Label	Torque limit signal			Mode	P	S	T
Signal	TLC	Default assignment	(D06)	I/O circuit	Please refer to 3.12.4		
Torque limiting signal							

Label	Zero speed clamp detection			Mode	P	S	T
Signal	ZSP	Default assignment	(D05)	I/O circuit	Please refer to 3.12.4		
Zero speed clamp activation signal							

Label	Velocity coincidence			Mode		S	T
Signal	V-COIN	Default assignment		I/O circuit	Please refer to 3.12.4		
Signal output when velocity coincides.							

Label	Servo Status			Mode	P	S	T
Signal	SRV-ST	Default assignment		I/O circuit	Please refer to 3.12.4		
Signal output when servo is enabled.							

Label	Positive limit valid			Mode		S	T
Signal	POT-OUT	Default assignment		I/O circuit	Please refer to 3.12.4		
Signal output when positive position limit signal valid.							

Label	Negative limit valid			Mode		S	T
Signal	NOT-OUT	Default assignment		I/O circuit	Please refer to 3.12.4		
Signal output when negative position limit signal valid							

Label	Position command ON/OFF			Mode	P		
Signal	P-CMD	Default assignment		I/O circuit	Please refer to 3.12.4		
Signal valid when position command ON							

Label	Velocity command ON/OFF			Mode		S	
Signal	V-CMD	Default assignment		I/O circuit	Please refer to 3.12.4		
Signal valid when velocity command ON in velocity control mode							

Label	Position comparison			Mode	P		
Signal	CMP-OUT	Default assignment		I/O circuit	Please refer to 3.12.4		
When position comparison condition is satisfied, output according to selected method: Flip or pulse width output.							

DO signals configurable only in PR mode

Label	Command completed			Mode	PR
Signal	CMD-OK	Default assignment		I/O circuit	Please refer to 3.12.4
PR command is delivered but axis not yet in position					

Label	Path completed			Mode	PR
Signal	PR-OK	Default assignment		I/O circuit	Please refer to 3.12.4
PR command delivered and axis in position					

Label	Homing done			Mode	PR
Signal	HOME-OK	Default assignment		I/O circuit	Please refer to 3.12.4
PR motion homing done.					

3.14 Measures Against Electromagnetic Interference

To reduce interference, please take the following measures:

- Encoder cable < 15m.
- Use cable with larger diameter for grounding
 - 1) Grounding resistance < $100\ \Omega$.
 - 2) When there are multiple drivers connected in parallel, PE terminal of the main power supply and ground terminal of servo drivers must be connected to copper ground bar in the electrical cabinet, and the copper ground bar needs to be connected to the metal frame of the cabinet.
- Please install a line filter on main power supply cable to prevent interference from radio frequency. When used in residential environments or in environments with strong power supply noise interference, please install a power filter on the input side of the power supply line.
- In order to prevent malfunctions caused by electromagnetic interference, please take following measures:
 - 1) Install master device and line filter close to the servo driver.
 - 2) Install surge suppressor for relay and contactor.
 - 3) Please separate signal/encoder cable from power cable with a space of at least 30cm.
 - 4) Install a line filter for the main power supply if a device with high frequency generation such as a welding machine exists nearby.

3.14.1 Grounding Connection and Other Anti-Interference Wiring Connections

As a key device in motion control systems, the driver has high requirements for interference resistance. Differences in peripheral wiring and grounding of the driver may cause noise to affect the normal operation of the system. Therefore, correct grounding methods and wiring handling must be implemented.

Grounding Handling

To prevent potential electromagnetic interference problems, please ground according to the following methods.

- Servo motor frame should be grounded. Please connect the PE terminal of servo motor and servo driver and ground them together to reduce interference.
- Ground both ends of the foil shield of encoder cable.

When using a power filter, comply with the precautions described in the section "Using line filter".

3.14.2 Using Line Filter

To reduce interference from main power supply cable and to prevent other sensitive components around the the servo driver, please choose a line filter based on actual supply current. Please do be aware of the following mistake when installing a line filter.

- Do not band the main power supply cable together.

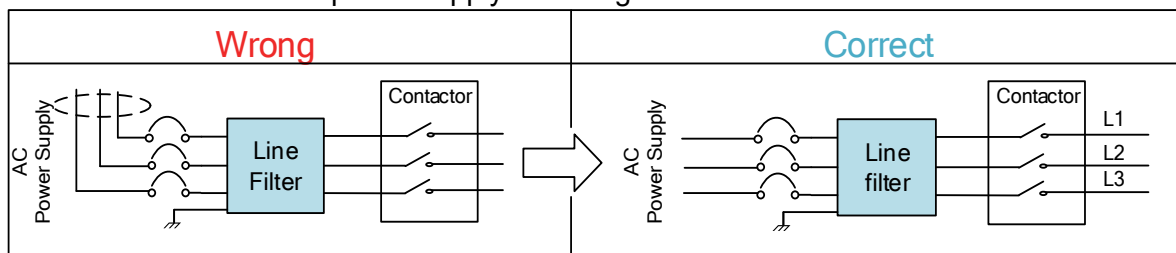


Figure 3-25 Power filter input wiring separation diagram

- Separate the ground wire from the line filter and the main power supply cable.

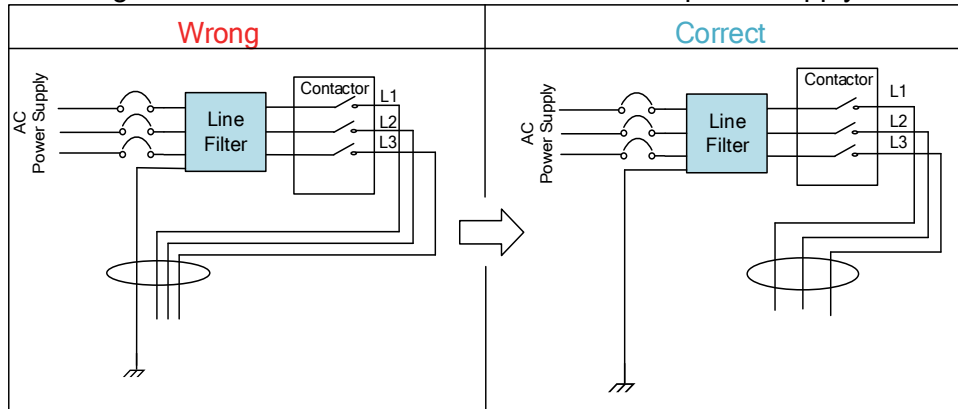


Figure 3-26 Power filter grounding and output wiring separation diagram

- Ground wires inside an electrical cabinet

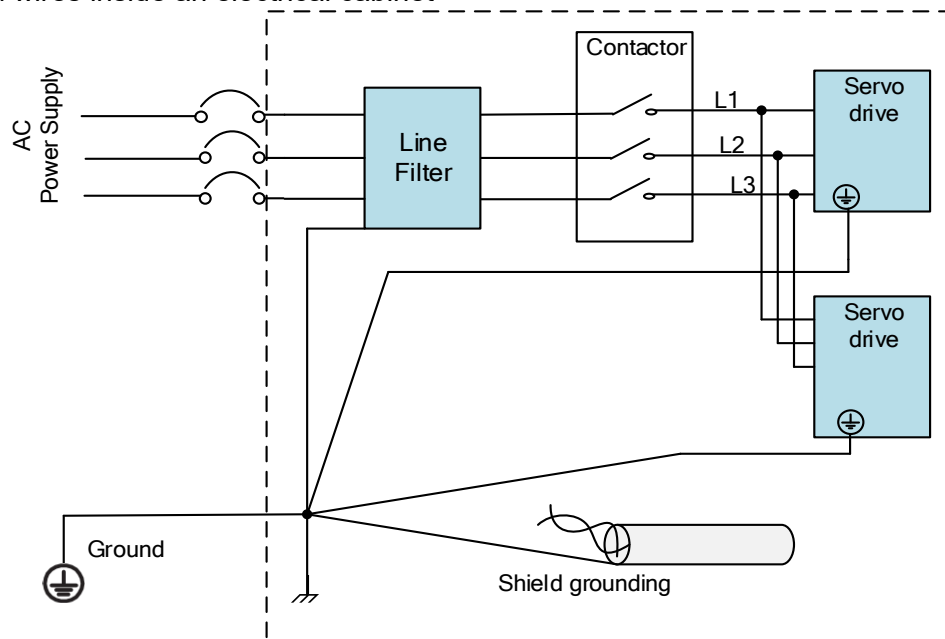


Figure 3-27 Power filter grounding handling illustration

Chapter 4 Display and Operation

4.1 Usage of the Front Panel

4.1.1 Structure of the Front Panel

Introduction to the front panel appearance and operation buttons

E-RMA driver panel consists of a 6-digit LED display and 5 buttons. It can be used for displaying status, alarms, functions, parameters setting and auxiliary functions.

Table 4-1 Buttons and functions

Label	Symbol	Function
Display	/	Consists of 5 push buttons, an 8-segments display and 5 green LED as warning indicators
Mode	M	To switch between 3 modes: 1. Data monitoring mode: To monitor changes of motion data values 2. Parameters setting mode: To set parameters 3. Auxiliary functions mode: To operate common functions, such as trial run, alarm clearing
Enter	S	To enter or confirm
Up	▲	To switch between sub-menus / Increase
Down	▼	To switch between sub-menus / Decrease
Left	◀	To switch between values

4.1.2 Panel Display and Operation

During operation, the driver panel can perform data monitoring, parameters setting, fault display, and auxiliary functions.

- Data monitoring: To monitor changes of motion data values.
- Parameters setting: To set parameters.
- Auxiliary functions: To operate common functions, such as trial run, alarm clearing.
- Fault display: Displays the faults occurring in the driver and the corresponding fault codes.
- EEPROM: Can save parameters after changing.

Panel operation process

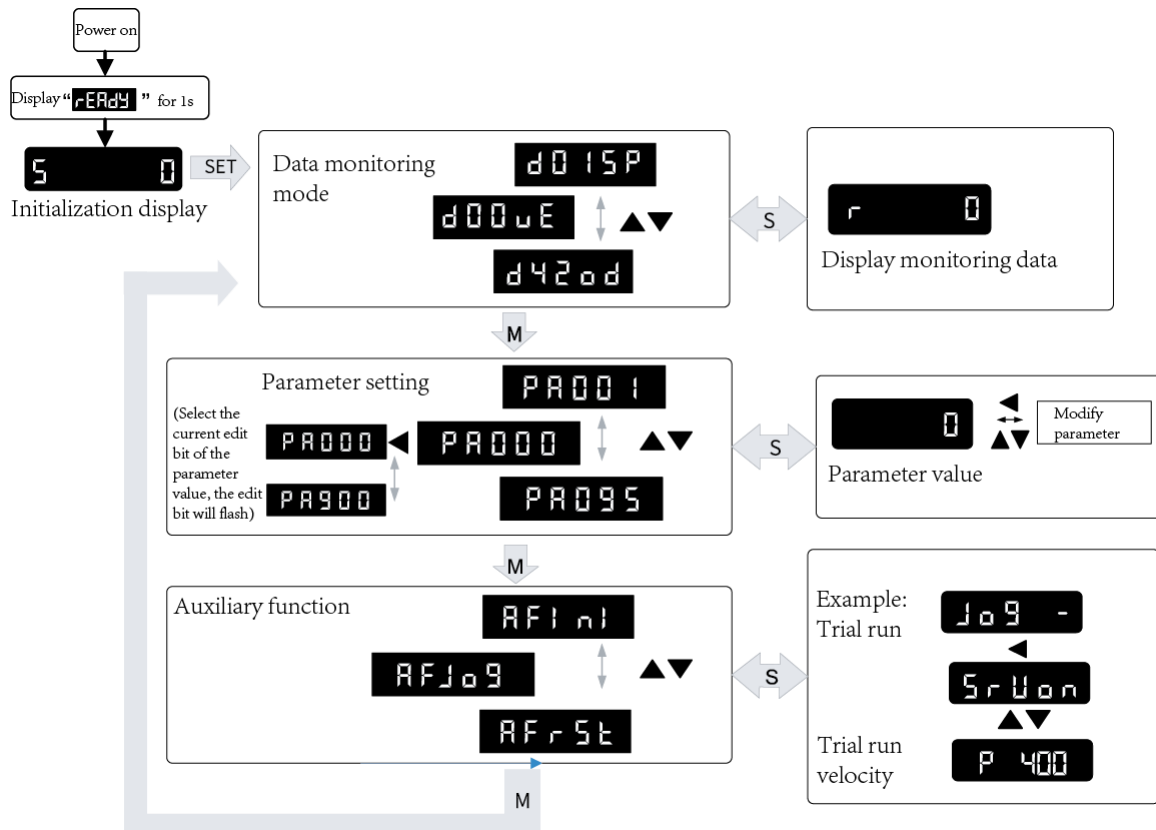


Figure 4-1 Flow diagram of panel operation

- 1) **READY** will be displayed for about 1 second after driver is powered on. Then, automatically enters data monitoring mode and displays initial data value. Otherwise, alarm code will be displayed if error occurs.
- 2) Press **M** key to switch between modes. Data monitoring mode → Parameters setting mode → Auxiliary functions mode.
- 3) Alarm code will be displayed regardless of any mode if alarm occurs. Press **M** to switch to other modes.
- 4) Press **▲** or **▼** to select the type of parameters in data monitoring mode. Press **S** to confirm.
- 5) Press **◀** to select current segment in parameters settings mode. Press **▲** or **▼** to increase/decrease the value of segment. Press **S** to confirm the modified value(s) and save the parameters.

When editing the parameter value, use the **◀** to select the current edit bit of the parameter value, and use the **▲** or **▼** to change the numerical value of the selected bit. After modifying the parameter value, press the **S** key to save the changes and return to the parameter selection interface.

4.1.3 Front Panel Locking

Summary

To prevent any misuse of the front panel, it can be locked. Limitations when locked are as shown below:

Table 4-2 Restricted operations in locked state

Mode	Limitation
Data monitoring	Not limited
Parameters setting	Parameters can only be read, not modified.
Auxiliary functions	Not limited

How to operate

- Related parameter

Parameter		Parameter Name	Function
Class	No.		
P05	35	Front panel lock	To lock or unlock front panel

- To lock and unlock the front panel

Process	Front Panel	EDrive
Lock	① Set P05.35 = 1. ② Restart driver. ③ Front panel is now locked.	
Unlock	① Please refer to auxiliary function, Front panel unlock function. ② Front panel is now unlocked.	① Set P05.35 = 0, write into EPROM. ② Front panel is now unlocked.

For the operation of unlocking the front panel in the auxiliary functions, please refer to the **AFUnL** function introduction in "4.1.6 Auxiliary function".

4.1.4 Data Monitoring Mode

E-RMA series driver offers the function to monitor different types of data in data monitoring mode. After entering this mode, press **S** to monitor any data that starts with **d**. Then can switch between different data using **▲▼** and press **S** to view the value of the selected data. Press **S** again to get back to data monitoring mode and **M** to switch to any other mode.

Data list in data monitoring mode

No.	Label	Descriptions	Display	Unit	Data Format (x = numerical value)
0	d00uE	Position command deviation	d00uE	pulse	"xxxx"
1	d01SP	Motor velocity	d01SP	r/min	"r xxxx" – Motor actual velocity "F xxxx" – External encoder feedback velocity
2	d02CS	Position control command velocity	d02CS	r/min	"xxxx"
3	d03Cu	Velocity control command velocity	d03Cu	r/min	"xxxx"
4	d04tr	Actual feedback torque	d04tr	%	"xxxx"
5	d05nP	Feedback pulse sum	d05nP	pulse	"xxxx"
6	d06cP	Command pulse sum	d06cP	pulse	"xxxx"
7	d07	Maximum torque during motion	d07	/	"d xxxx" – Max torque % "V xxxx" – Average load ratio

8	d08FP	Internal command position sum	d08FP	pulse	"xxxx"
9	d09cn	Control mode	d09Cn	/	Position: "Ct PoS" Velocity: "Ct SPd" Torque: "Ct trq"
10	d10Io	I/O signal status	d10Io	/	-
11	d11Ai	Analog input	d11Ai	V	-
12	d12Er	Alarm cause and record	d12Er	/	"Er xxx" Alarm code
13	d13rn	Warning	d13rn	/	"H xxx" Warning code
14	d14r9	Regeneration load factor	d14r9	%	"xxx"
15	d15oL	Overload factor	d15oL	%	"L xxx" – Motor overload % "d xxx" – Driver overload %
16	d16Jr	Inertia ratio	d16Jr	%	"xxx"
17	d17ch	Motor not running cause	d17Ch	/	"CP xxx" Error code
18	d18ic	No. of changes in I/O signals	d18ic	/	"xxx"
19	d19	Internal use	d19	/	"xxxx"
20	d20Ab	CSP position command sum	d20Ab	pulse	"xxxx"
21	d21AE	Single turn encoder data	d21AE	pulse	"A xxxx" – motor encoder single turn data "F xxxx" – external encoder single turn data
22	d22rE	Multiturn encoder data	d22rE	r	"xxxx"
23	d23 id	485 received frame	d23 id	/	"id xxx" "Fr xxx"
24	d24PE	Position deviation	d24PE	Unit	"A xxxx" – Position deviation "F xxxx" – Full closed loop deviation (Command unit) "H xxxx" - Full closed loop deviation (Encoder unit)
25	d25PF	Motor electrical angle	d25PF	pulse	"xxxx"
26	d26hy	Motor mechanical angle	d26hy	pulse	"xxxx"
27	d27 Pn	Voltage across PN	d27Pn	V	"xxxx"
28	d28 no	Software version	d28no	/	"d xxx" – Servo software "F xx" – Communication software "p xxx" – Servo power rating "C xx" – CPLD software
29	d29AS	Internal usage	d29AS	/	"A xxxx" "F xxxx" – external encoder serial no.
30	d30NS	No. of times of encoder communication error	d30SE	/	"A xxxx" – Motor encoder communication error count "F xxxx" – External encoder communication error count
31	d31 tE	Accumulated uptime	d31tE	/	"xxxx"
32	d32Au	Automatic motor identification	d32Au	/	"r xxx" Motor no. "E xxx" Servo no.
33	d33At	Driver temperature	d33At	°C	"d xxx" – driver temperature "C xxx" – MCU temperature
34	d34St	Servo status	d34St	/	"xxxxx"
35	d35 SF	Internal usage	d35SF	/	"xxxxxx"

43	d43	External encoder Z-Phase counter	d43	/	"xxxxxx"
44	d44	External encoder pulse count per revolution	d44	pulse	"xxxxxx"
45	d45	External encoder direction	d45	/	"xxxxxx"
46	d46	Position compared to current position	d46	/	"xxxxxx"

Description of data monitoring function

When using the front panel to monitor data, data is divided in low/high bit and positive/negative.

The display rules for the high and low bits, as well as positive and negative numbers, are as follows:

When the first and second decimal points on the far-right side are lit, it indicates high-bit data. When these two decimal points are not lit, it indicates low-bit data.



High bit: 1st and 2nd values on the right has two decimal points

Low bit: 1st and 2nd values on the right has no decimal point.

When the first and second decimal points on the far-left side are lit, it indicates a negative number. Otherwise, the number is positive.

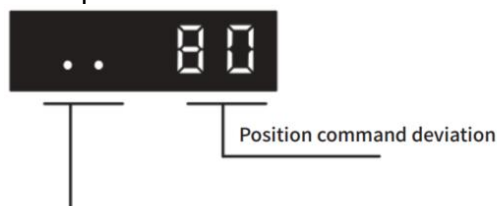


Positive: 1st and 2nd values on the left has no decimal point

Negative: 1st and 2nd values on the left has two decimal points

d00uE Position command deviation

Shows high bit and low bit of position deviation



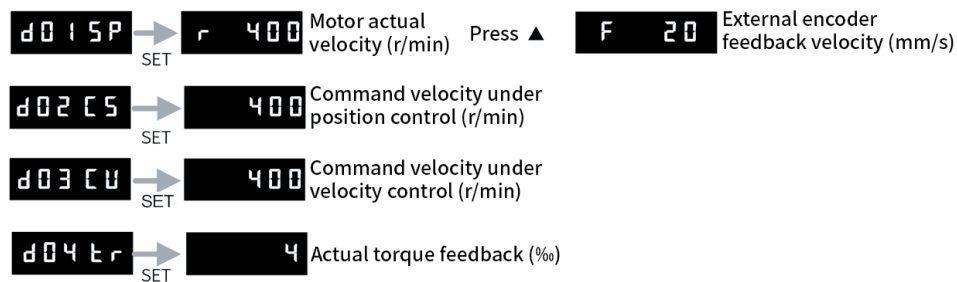
Positive: 1st and 2nd values on the left has no decimal point.
Negative: 1st and 2nd values on the left has two decimal points

Press ◀ to switch between low and high bit
Example : Position command deviation=260885



High bit: 1st and 2nd values on the right has two decimal points
Low bit: 1st and 2nd values on the right has no decimal point.

d01SP Motor velocity, d02CS Position control command velocity, d03CU Velocity control command velocity, d04 tr Actual torque feedback

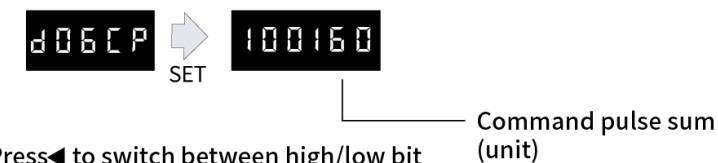


d05nP Feedback pulse sum d06CP Command pulse sum

Feedback pulse sum(Encoder feedback pulse)

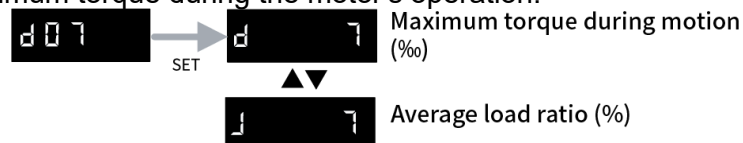


Command pulse sum (Command pulse)



d07 Maximum torque during motion

Displays the maximum torque during the motor's operation.



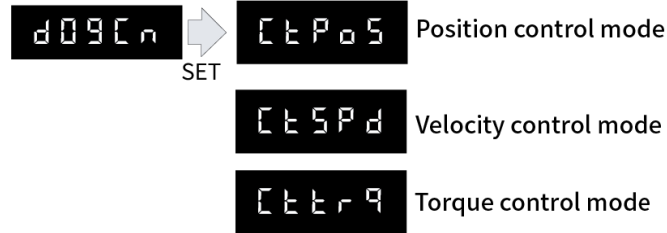
d08FP Internal command pulse sum

Displays the input pulse frequency of the command sent from the host device to the driver (pulses input in 1 second).



d09Cn Control mode

Displays the current control mode of the driver.

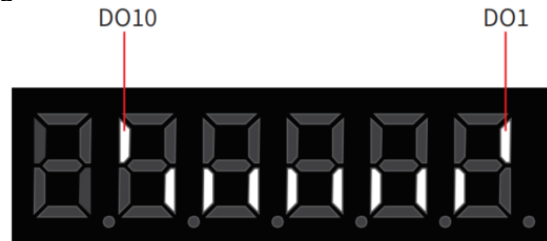
**d10Io I/O signal status**

When the top half of the digital tube is lighted, the signal is valid. When the bottom half of the digital tube is lighted, the signal is not valid. Decimal points represent I/O status, input when lighted, output when not lighted. Press ▲▼ to toggle between displaying the DI input and DO output status.

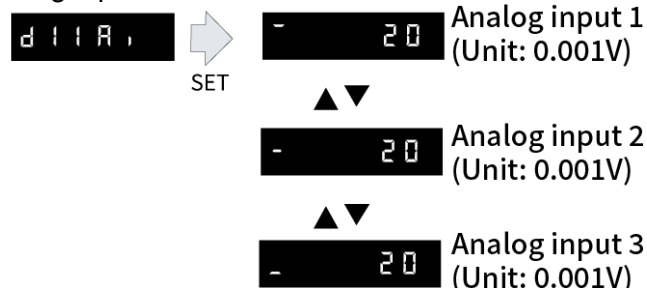
- Input: From low to high bit (Right to left) DI1, DI2.... DI10. Decimal point is lighted to represent input signals. In the example below, DI1, DI8 and DI10 input signal is valid; DI2-DI7, DI9 input signal is invalid.



- Output: From low to high bit (Right to left) DO1, DO2....DO10. Decimal points are not lighted to represent output signals. In the example below, DO1 output signal is valid; DO2-DO10 output signal is invalid.

**d11Ai Analog input**

Display the current analog input value of the driver.



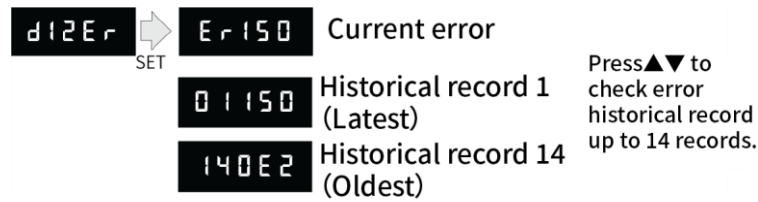
3 analog inputs can be monitored through d11. Left most bar at the top: 1st analog input; at the middle: 2nd analog input; at the bottom 3rd analog input.

The analog display unit is 0.001V, and the fifth and sixth decimal places on the right indicate the negative sign. The analog monitoring can be switched using ▲▼.

For example, the third analog input of -11.5V would be displayed as shown on the right:

-11.50

d12Er Alarm cause and historical record

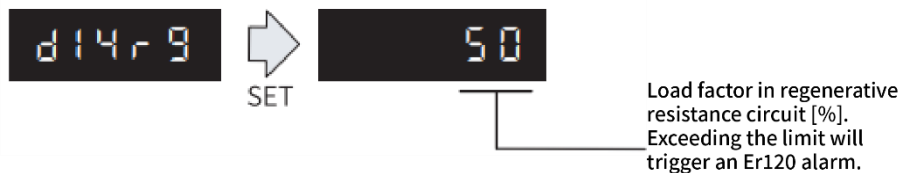


Note

- Save: Save error messages to alarm history.
- Clearable: Clearable alarm by operating the front panel and using auxiliary function **AFACL**. For other alarms, the error cause must be eliminated before reconnecting the power to clear the alarm.
- Type: The type 1 and type 2 fault stop mode can be set

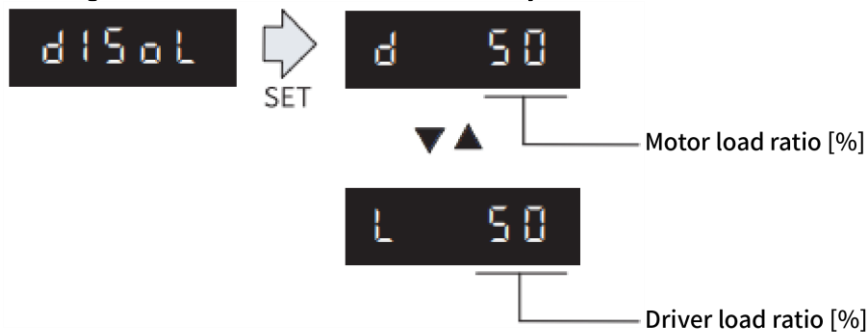
d14rg Regenerative load factor d15oL Overload factor

Regenerative load factor (Er120 might occur, if the value increases indefinitely)



Overload factor

- Er100 might occur, if d increases indefinitely
- Er101 might occur, if L increases indefinitely

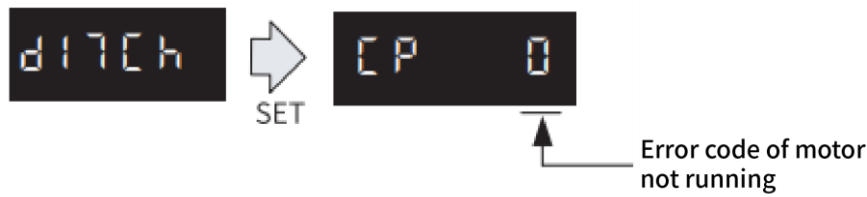


d16Vr Inertia ratio



Use auxiliary function **AF_GL** or EDrive to measure the inertia ratio. The result will be shown on **d16Jr**, hold M to write the value in P00.04.

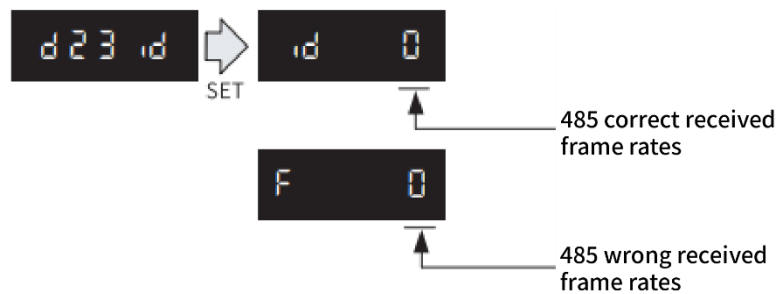
d17Ch Motor not running cause



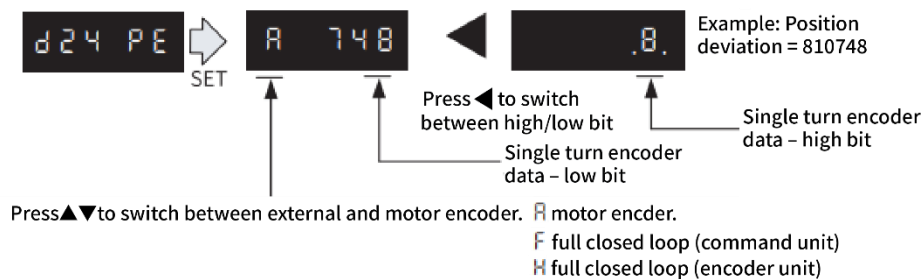
- “d17Ch” Motor No Running Cause - Codes & Descriptions

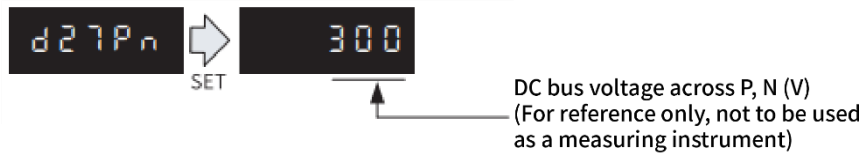
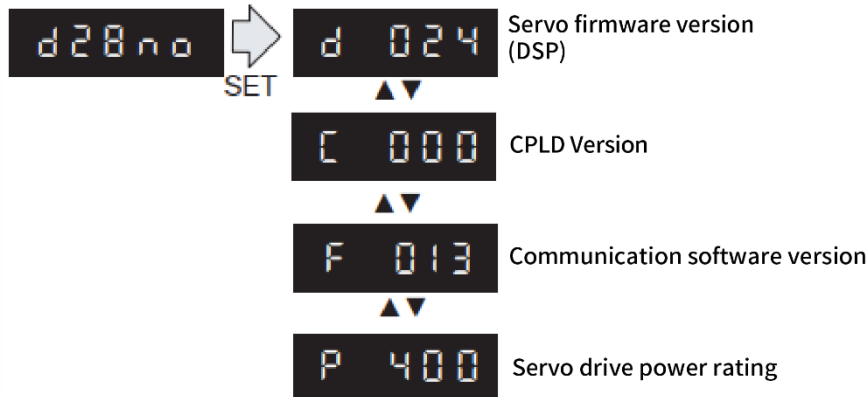
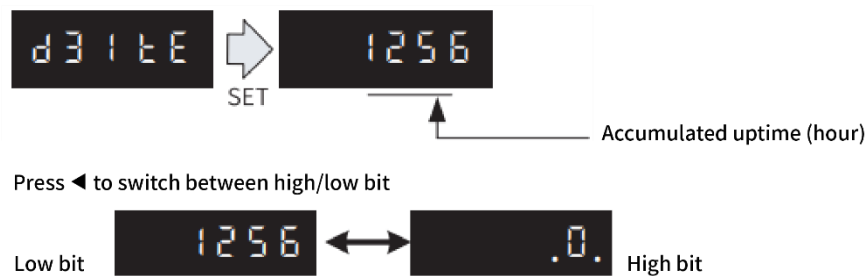
Code	Display Code	Description	Content
0	[P 0]	Normal	-
1	[P 1]	DC bus undervoltage	Check if DC bus voltage is too low on D27
2	[P 2]	No SRV-ON signal	Servo-ON input (SRV-ON) is not connected to COM-
3	[P 3]	POT/NOT input valid	P05.04 = 0, POT is in open circuit, velocity command is in positive direction NOT is in open circuit, velocity command is in negative direction
4	[P 4]	Driver alarm	-
5	[P 5]	Relay not clicked	Check input voltage
6	[P 6]	Pulse input prohibited (INH)	P05.18=0
8	[P 8]	CL valid	P05.17=0, deviation counter connected to COM-
9	[P 9]	Zero speed clamp valid	P03.15 = 1, Zero speed clamp input is open

d23id 485 received frame

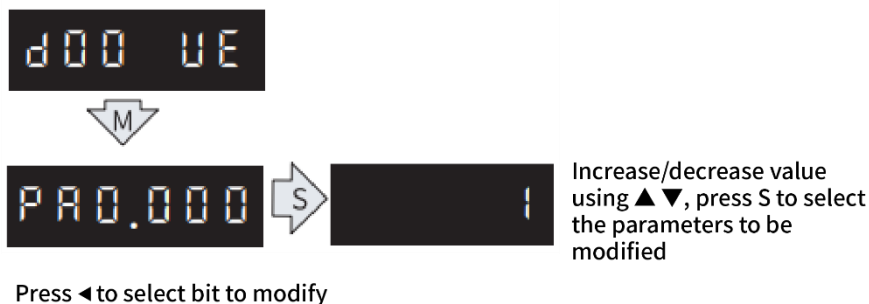


d24PE Position deviation



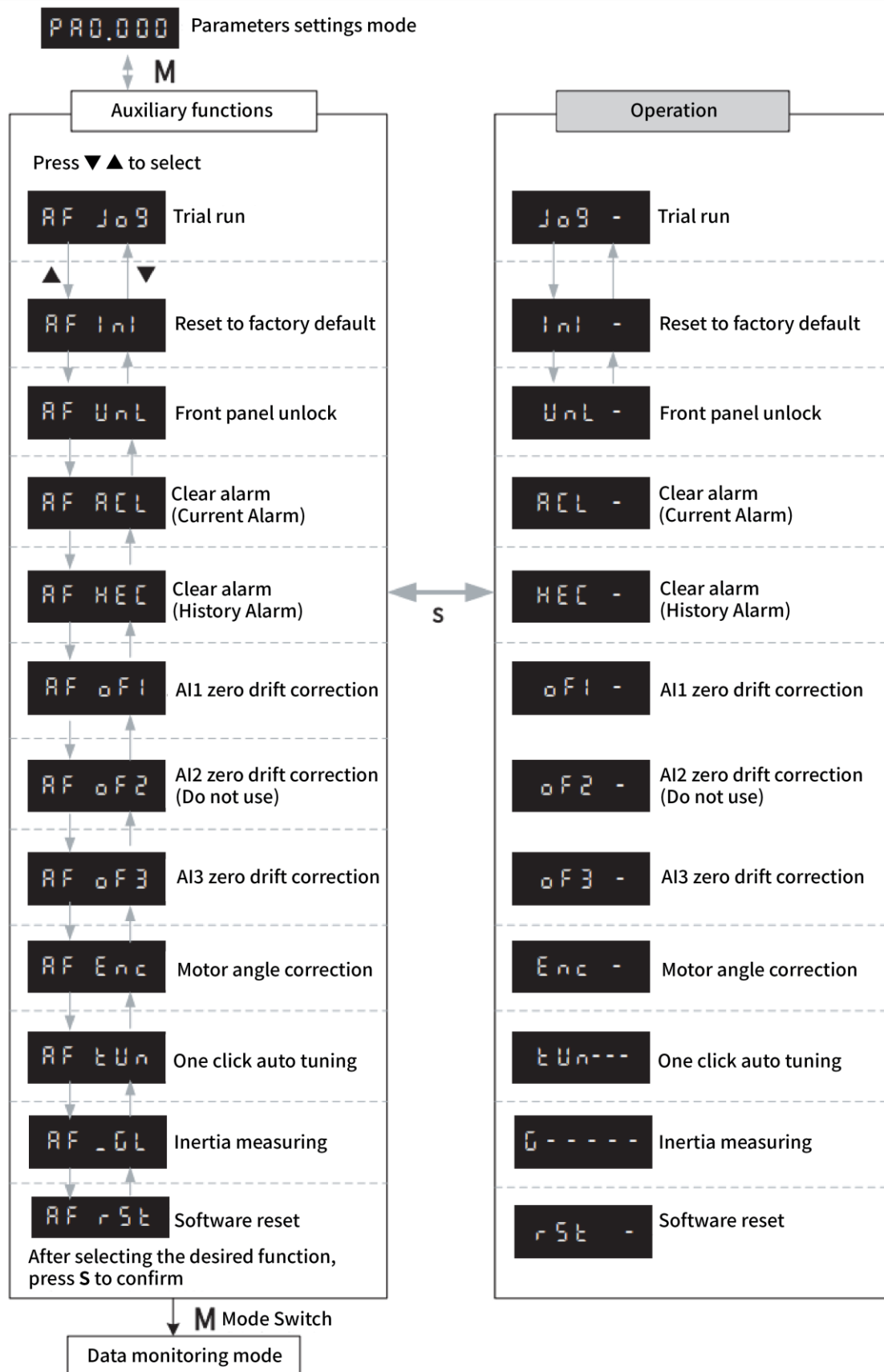
d27Pn DC bus voltage**d28no Software version****d31tE Accumulated operation time****4.1.5 Parameters Saving**

In parameter setting mode, when the panel is not locked, we can modify and save the parameters of the driver through the front panel.



If the parameter is modified but user does not want to save the changes, press **M** to exit without saving. Some parameter modifications will only take effect after the driver is restarted.

4.1.6 Auxiliary Function



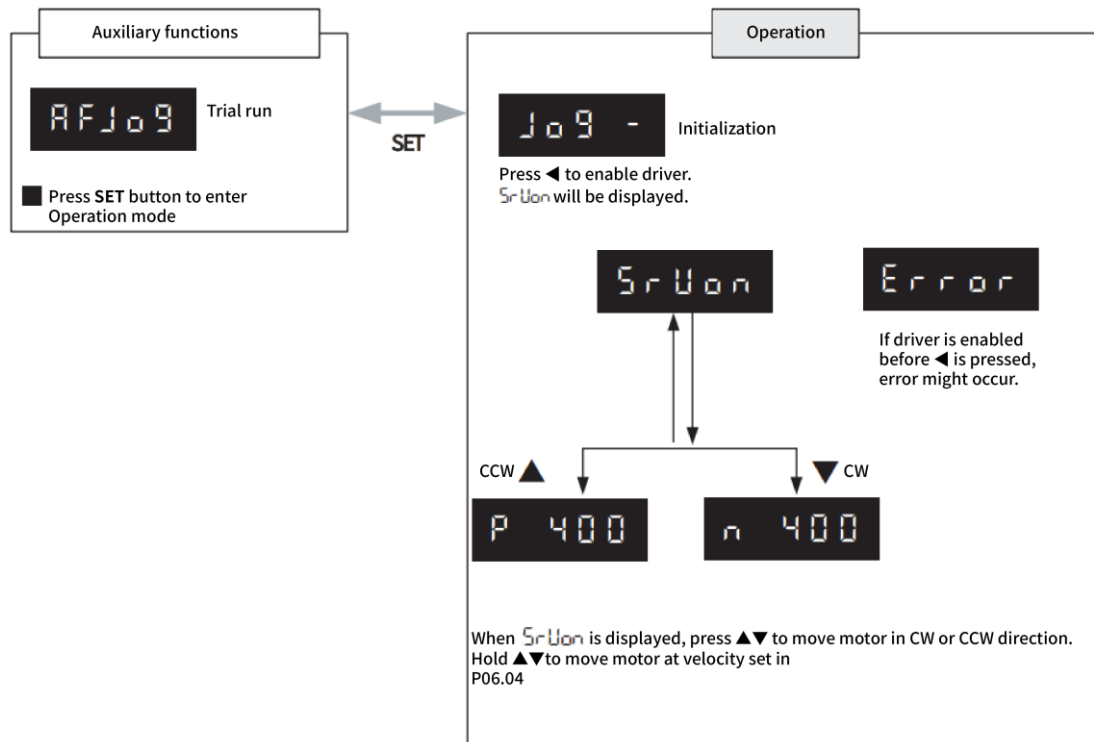
AF JOG Trial Run

It Is Possible To Perform A Trial Run Without Connecting The CN1 Control Signal Terminal To A PLC Or Other Master Control Device, In Order To Make An Initial Judgment On Whether The Driver And Motor Can Function Properly.

Requirements

- Be Sure To Remove The Motor Load And Disconnect The CN1 Connection Wiring Before Using.
- Please Initialize The User Parameters (Especially P00.04 And Gain Parameters) To Prevent Issues Like Oscillations.
- Before Performing A Trial Run, Please Check The Relevant Parameters As Follows:
 - P00.01 Control Mode: Set To 0, 1, Or 6 To Enable The Trial Run Function.
 - P06.04 JOG Speed: The Test Speed Should Not Be Set Too High To Avoid Collisions.
 - P06.25 Trial Run Acceleration: The Acceleration Should Not Be Set Too High To Avoid Collisions.

Trial Run Process

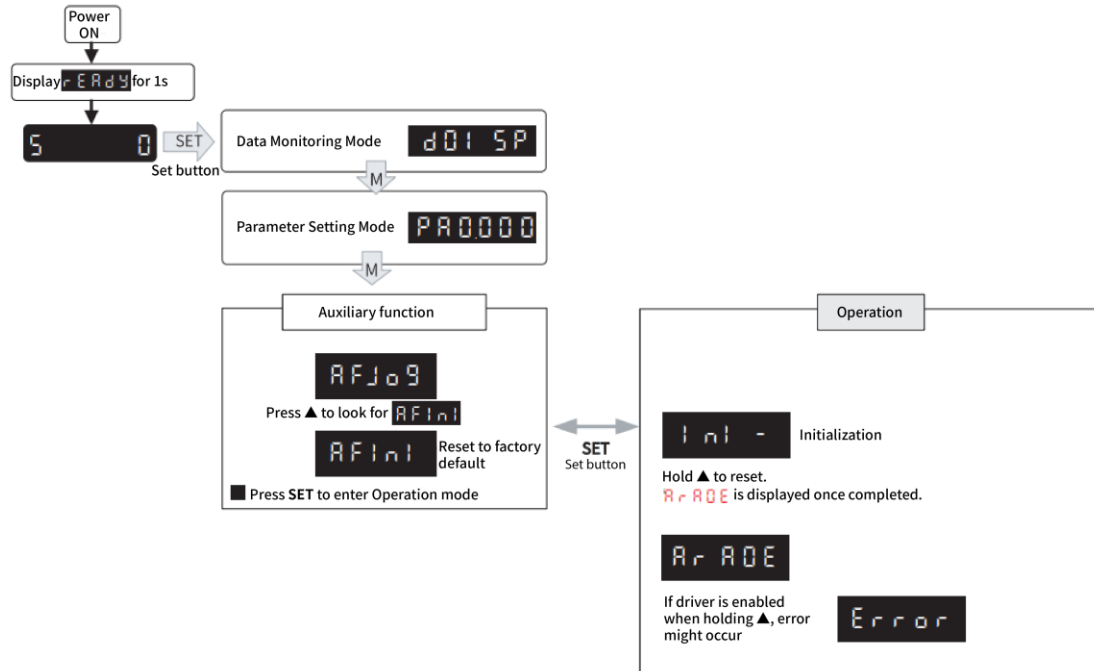


⚠ Caution

- Please Don't Modify Gain Related Parameters During Trial Run To Prevent Any Occurrence Of Mechanical Vibrations.
- After The Trial Run Is Completed, Press S To Return To The Selection State, And The Internal Servo ON For The Trial Run Will Be Servo OFF.

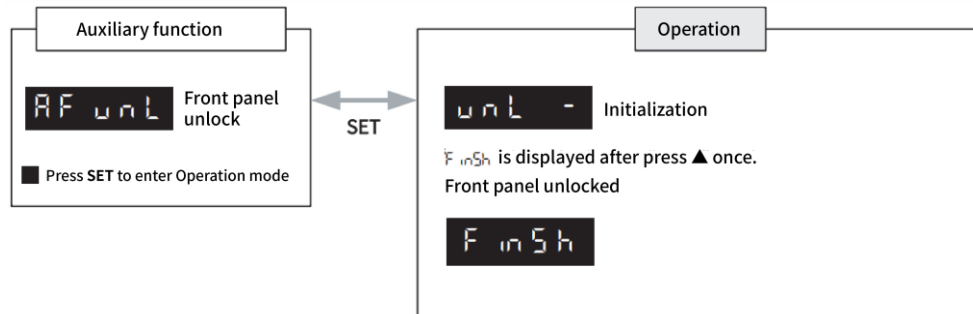
AF InI Reset To Factory Default

To Reset Parameters Settings To Factory Default.



AF ACL Clear Alarm

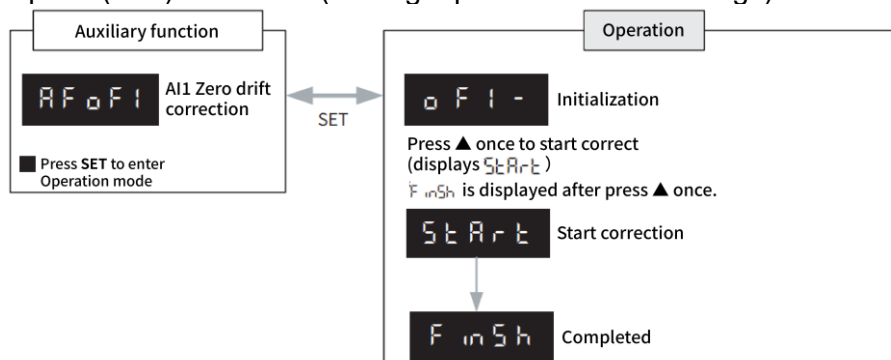
Alarm Can Be Cleared Using This Auxiliary Function **AFACL**. But Before That, The Error Needs To Be Solved, And Driver Needs To Be Restarted.



AF Of1 - AF Of3 Analog Input AI1-3 Zero Drift Correction

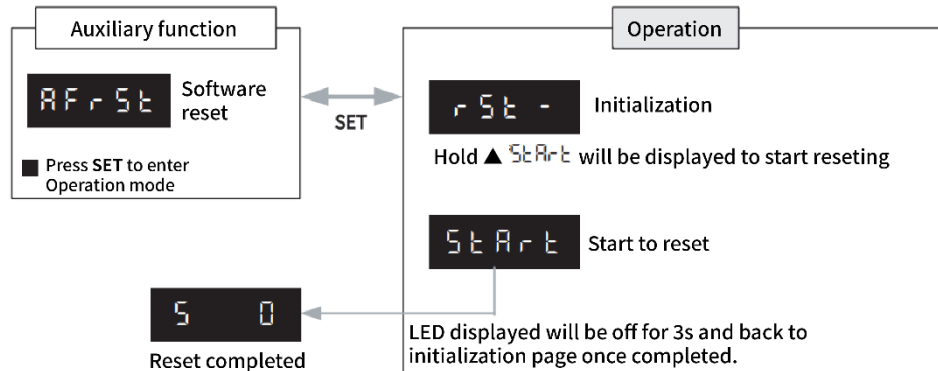
Auto Adjustment Of Analog Input Zero Drift Settings.

- Analog Input 1 (AI 1) --- P04.22 (Analog Input 1 Zero Drift Settings)
- Analog Input 2 (AI 1) --- P04.25 (Analog Input 2 Zero Drift Settings)
- Analog Input 3 (AI 3) --- P04.28 (Analog Input 3 Zero Drift Settings)



AF rSt Software reset

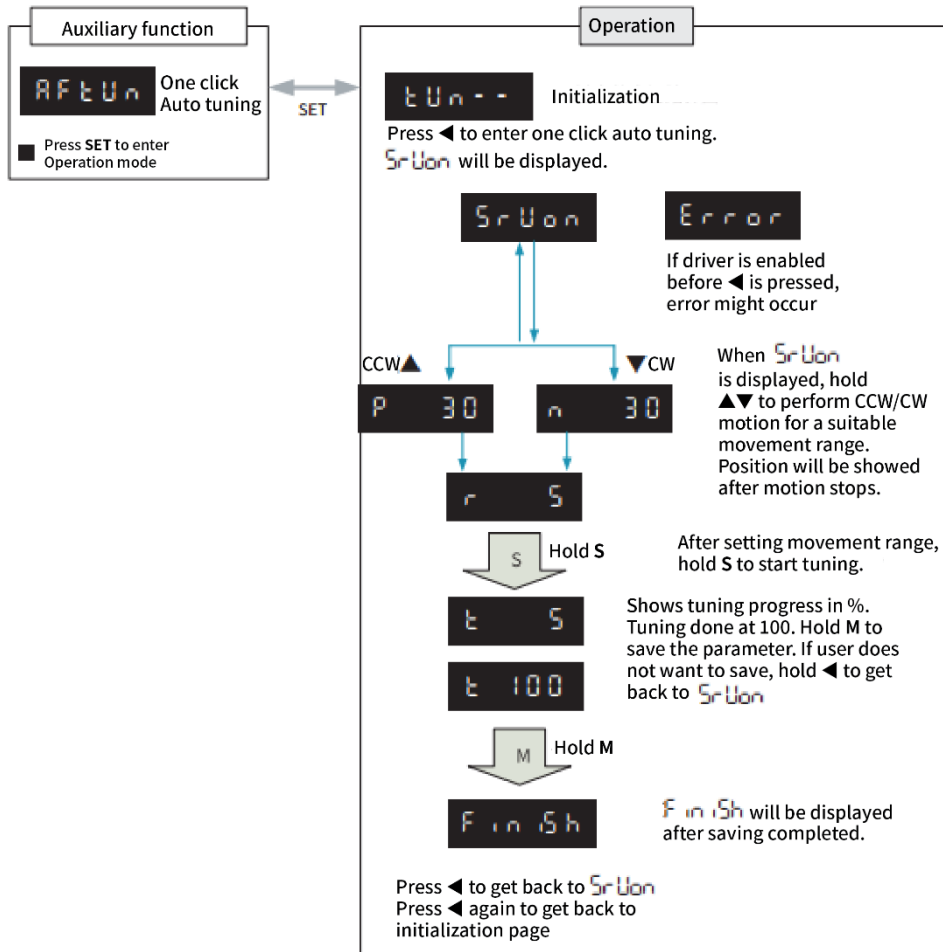
Perform a software reset on the driver.



- Software reset is used mainly on parameters modification that takes effect only after driver restart.

AF_tun One click auto tuning

One click auto tuning can be applied by operating the front panel. Set simple movement range and movement range has to be more than 20 mm!



4.1.7 Alarm

When a driver error occurs, the front panel will automatically switch to abnormal alarm display mode, showing the corresponding error code.

- If the panel does not display anything, first check whether the main power supply voltage is faulty. If the power supply is within the correct range, the issue may be with the servo driver itself. Please consult MISUMI support staff for assistance.
- For clearable alarms, you can use the alarm reset function in the auxiliary menu to clear the alarm. For non-clearable alarms, you must resolve the root cause and then power cycle the system to clear the alarm.
- The servo stop method depends on the type of fault. Faults are categorized into Type 1 and Type 2, and the corresponding stop method is configured via parameter P05.10.

4.1.8 Parameter Save Mode

The parameter save mode refers to the EEPROM write mode, where the modified data is written into the EEPROM. Parameters can be saved either through the driver's operation panel or via the object dictionary.

- Save using driver's front panel
After modifying the selected parameter to desired values, press S to confirm and save the changes.

4.1.9 Front Panel Warning Indicator

E-RMA series driver has five segments of green LED lights on the front panel, which can be used to display warnings and operational status.

- LED indicator status
 - Servo powered on but disabled: All 5 LEDs off
 - Servo powered on and enabled: All 5 LEDs lighted in cycles.
 - Warning status: All 5 LEDs lit in accordance with assigned signals. For example, if configured as a negative limit, the negative limit signal will be active, and the corresponding LED light will turn on.

Please refer to the table below.

Warning indicator	Parameter	Assignment
LED 1	P04.74	0: Null
LED 2	P04.75	1: Negative limit switch
LED 3	P04.76	2: Battery low voltage
LED 4	P04.77	3: Overload
LED 5	P04.78	4: Torque limit
		5: Positive limit switch

4.2 Get Started with Driver Operation

4.2.1 Checklist Before Operation

No.	Description
Power supply	
1	The voltage of main and control circuit power supply is within rated values.
2	Power supply polarity is rightly connected.
Wiring	
1	Power supply input is rightly connected.
2	Driver's power output UVW matches UVW terminals on the main circuit.
3	No short circuit of driver's input and output UVW terminals.
4	Signal cables are correctly and well connected.
5	Drivers and motors are connected to ground
6	All cables under stress within recommended range.
7	No foreign conductive objects inside/outside the driver.
Mechanical	
1	Driver and external holding brake are not place near combustibles.
2	Installations of driver, motor and axis is fastened.
3	Movement of motors and mechanical axes are not obstructed.

4.2.2 Power On

Connect 220V power supply into main power supply L1, L2 (and L3 for 3 phase) terminals and 220V power supply into control circuit power supply L1C, L2C. After power on, light indicator will light up and front panel will display **-EAdy**, then LED initial status will be displayed. Driver is ready for operation if no alarm occurs.

4.2.3 Trial Run

Servo driver must be disabled before performing trial run. For safety precautions, please JOG under minimal velocity.

Related Parameters:

No.	Parameters	Label	Set value	Unit
1	P00.01	Control mode settings	0, 1, 6	/
2	P06.04	JOG trial run command velocity	User defined	mm/s
3	P06.25	Trial run acc-/deceleration time	User defined	ms/(m/s)

- Please make sure the mechanical axis is within the range of motion and travelled distance should not be too long to avoid collision.
- Set optimal velocity and acceleration for trial run (not too high!)
- Do not modify any gain related parameters during motion to avoid vibration.

Please refer to "Section 4.2.5 Front Panel Trial Run" for detailed explanations on how to perform trial run using front panel operation. Or refer to EDrive user manual for details guide on how to perform trial run using EDrive.

4.2.4 Debugging Software

MISUMI provides free download and usage of the debugging software MISUMI EDrive via our website. When used with a debugging cable, one end connects to a PC and the other to the Type-C port of the servo driver, enabling communication between the PC and the servo driver.

Main Functions of MISUMI EDrive

- System Monitoring: Monitor the servo driver's operating status, alarms, and capture/save real-time operation data.
- Key modules include:
 - Oscilloscope function
 - Alarm display
 - Status monitoring (corresponds to front panel motion data monitoring)
- Oscilloscope: Supports single/multi-frame high-precision sampling, overlapping waveforms, analog and digital channels, and dual cursors for waveform analysis.
- Auto Tuning: Automatically adjusts gain parameters based on simple operating condition settings.
- Parameter Management: Read and download all parameters from P00 to P09, load previously saved parameter files, modify and write parameters to the driver, save to EEPROM, and restore factory settings.
- IO Configuration: Configure or monitor IO signals via the IO settings interface, with support for forced IO input/output.
- Trial Run (JOG): Perform simple forward/reverse motor movements. Supports position and speed test runs.
- Inertia Identification: Identify load inertia through a series of actions and write the actual inertia ratio to P00.04 via parameter management.
- Mechanical Characteristic Analysis: Analyse the system's resonance frequency and apply notch filters for improvement.
- Gain Adjustment: Adjust servo rigidity level and tuning method. In manual mode, individual parameters can be modified. In standard/real-time mode, predefined rigidity tables are used, and individual parameters cannot be changed.
- PR Motion Function: Plan up to 16 segments of single-axis motion, including homing, path movement, limit, and emergency stop functions.
- Position Comparison: Configure up to 42 position comparison points.
- Black Box: Read and analyse servo black box data using the debugging software.

Notes

- Supports USB-powered connection to the driver, allowing parameter modification via MISUMI EDrive without external power.
- Recommended to use a Windows 10 PC.
- Serial port driver vendors no longer support Windows 7, which may cause disconnection after power cycling the driver.
- If using Windows 7, you may need to re-plug the debugging cable to reconnect.

4.2.5 Trial Run Using Debugging Software

Use the MISUMI EDrive debugging software to perform test runs on the servo driver and motor.

Debugging Software Trial Run Procedure

- 1) Wiring Check:
 - Confirm correct wiring for power input and motor output.
 - Use a Type-C cable to connect the servo driver to the PC for communication.
- 2) Confirm Power Supply Voltage, ensure it is within the rated range.
- 3) After establishing communication between the PC and the driver, open the test run function in MISUMI EDrive. The test run interface will appear.

Position Trial Run

Mode Selection: To-and-fro

Servo Enable: OFF

Step 1: JOG motion range

Positioning: Teach start and end point

Teach JOG velocity: 30 rpm

Teach acceleration time: 200 ms/1000rpm

Forward: 0.0000 r Reverse

Position 1: 0 r Position: 0 r Position 2: 0 r

Step 2: Position JOG

JOG trial run velocity command: 30 rpm

P06.25 Acceleration of trial running: 200 ms/1000rpm

JOG trial run torque command: 350 %

No. of trial run cycles: 5 (0 = Infinite cycle)

Trial run waiting time: 300 ms

Run Emergency stop Start Scope

Calculated inertia ratio: 250

Motor overload rate: 0

Motor speed: 0

Positive limit: ☐

Negative limit: ☐

Torque limit: ☐

- 4) Set to Reciprocating Motion Mode, choose positioning start/end point operation mode. After clicking Enable, the red OFF will turn green ON. Set the teaching motion attributes — avoid high speeds to prevent collisions. Use the forward/reverse motion buttons to teach and set the desired start and end points.
- 5) STEP-2: Configure JOG motion attributes. Execute the set motion within the taught range. Set the number of repetitions for reciprocating motion based on the planned path.
- 6) During operation, use the monitoring panel on the right to view: Estimated inertia, Motor speed, Motor load rate and Limit status indicators.

Chapter 5 Timing Chart

5.1 Power ON Sequence Diagram

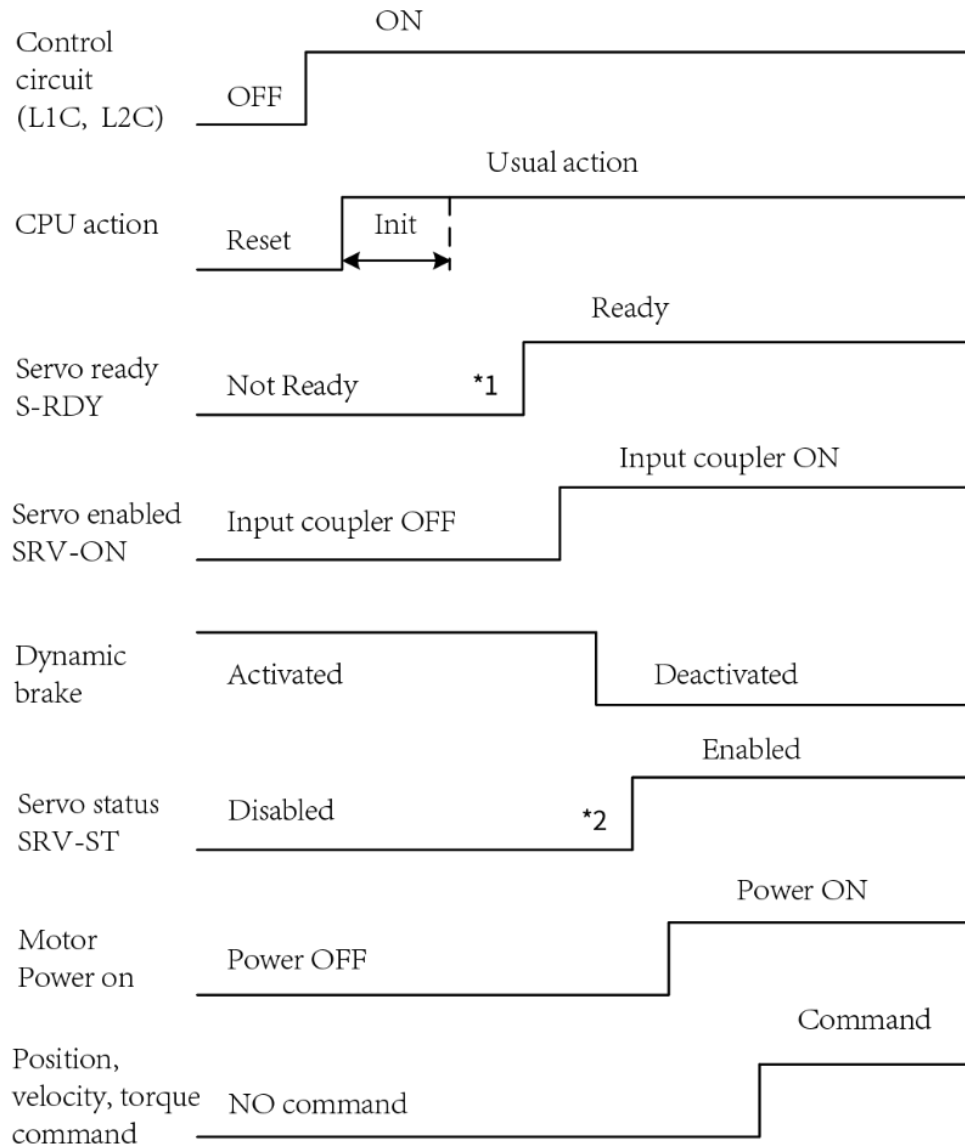


Figure 5-1 Driver Power on sequence diagram

Please input servo status, position, velocity, torque command as sequence diagram above.

⚠ Caution

*1. S-RDY signal is given after CPU initialization and main power supply powered on.

*2. SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

5.2 Servo Stop

There are 3 different methods of servo stop: Servo braking method, free stopping method, dynamic braking method. In the manual, servo braking stop during an alarm is referred to as emergency stop. For alarms where the stop is not categorized as an emergency stop, the stopping time is shorter and the impact is smaller compared to an emergency stop, but it is not the same as free stop.

Table 5-1 Servo stop method

Stopping method	Description	Details
Servo braking	Servo driver delivers braking torque in opposite direction	Quick stopping but mechanical impact might exist
Free stopping	Motor power cut off. Free to move until velocity = 0. Affected inertia, friction and other factors	Smooth deceleration, low mechanical impact but slow stopping
Dynamic braking	The linear motor operates in the U/V/W short-circuit braking state	Quick stopping but mechanical impact might exist

Table 5-2 Servo status after stopped

Stopping status	Status after stopped
Free running	Motor is powered OFF; block is free to rotate
Dynamic braking	Motor is powered OFF; block is not free to rotate

Motor stopping (Servo disabled) - Sequence Diagram

- Servo braking method. Status after stopping: Dynamic braking (P05.06=0)

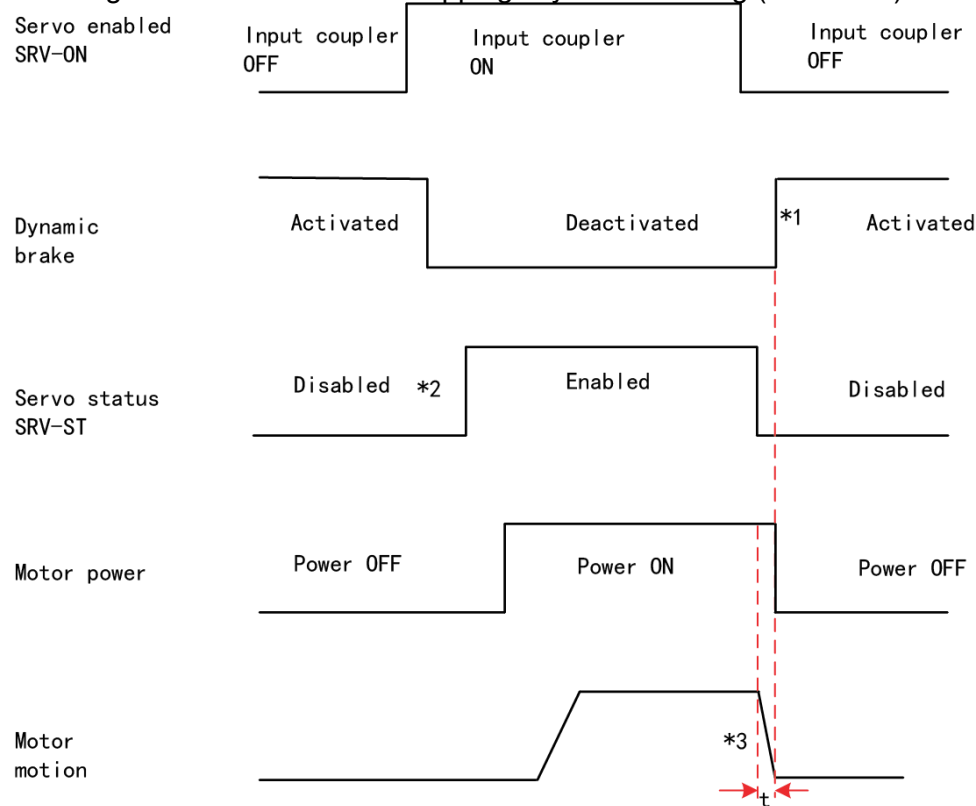


Table 5-3 Motor normal servo stop sequence 1

Note

*1: Status after stopping is as defined in P05.06.

*2: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

*3: Servo stopping method is as defined in P05.06. Braking torque in opposite direction to decelerate the motor is defined as P05.11. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39. After deceleration time t , dynamic braking will be ON.

- Free stopping method. Status after stopping: Dynamic braking (P05.06 = 1)

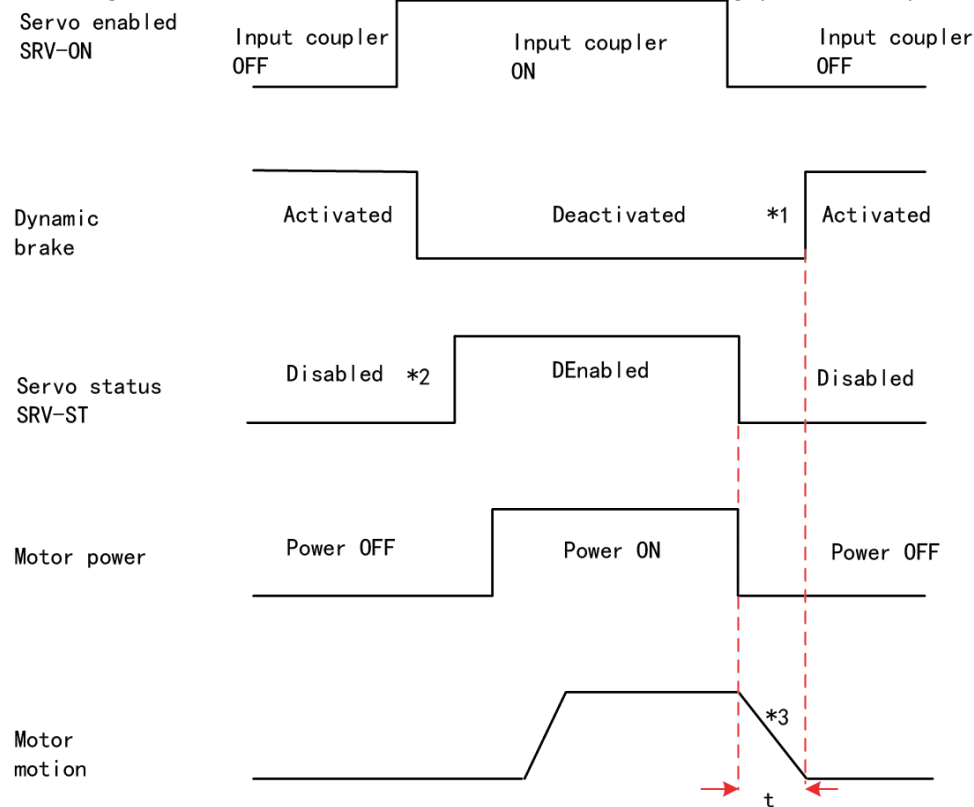


Figure 5-2 Motor normal servo stop sequence 2

Note

*1: Status after stopping is as defined in P05.06.

*2: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

*3: Servo stopping method is as defined in P05.06. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39. After time t is reached, dynamic braking is activated.

- Dynamic braking method. Status after stopping: Dynamic braking (P05.06=2)

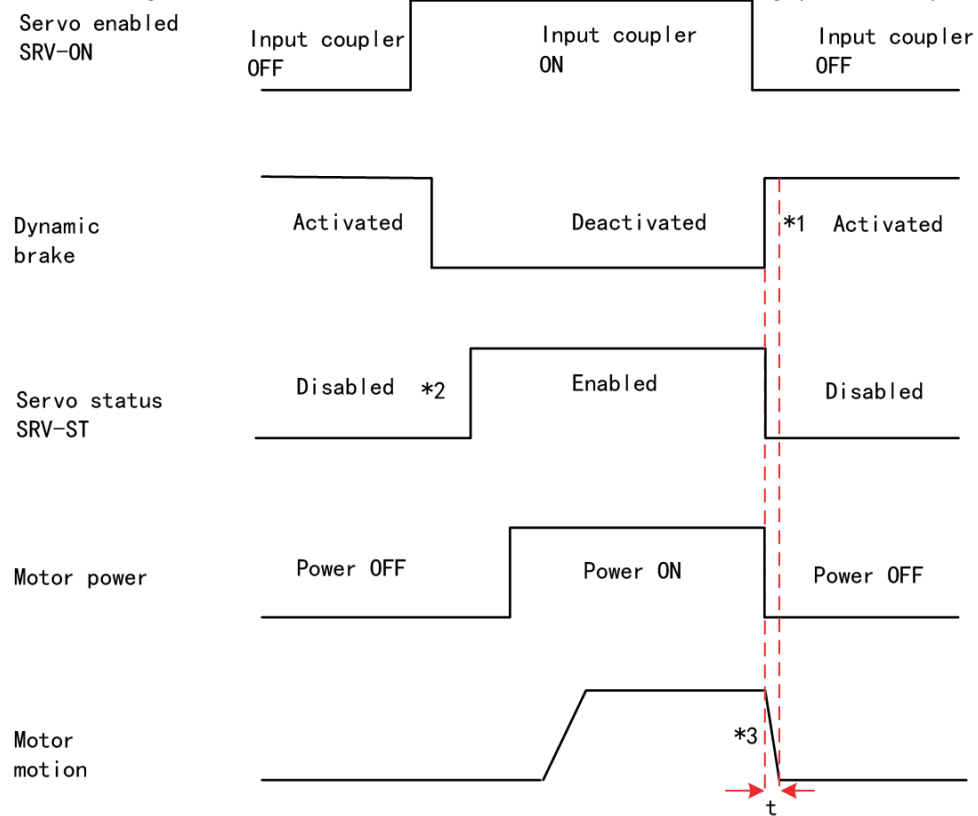


Figure 5-3 Motor normal servo stop sequence 3

Note

*1: Status after stopping is as defined in P05.06.

*2: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

*3: Servo stopping method is as defined in P05.06. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

- Servo stopping method. Status after stopping: Free running (P05.06 = 3)

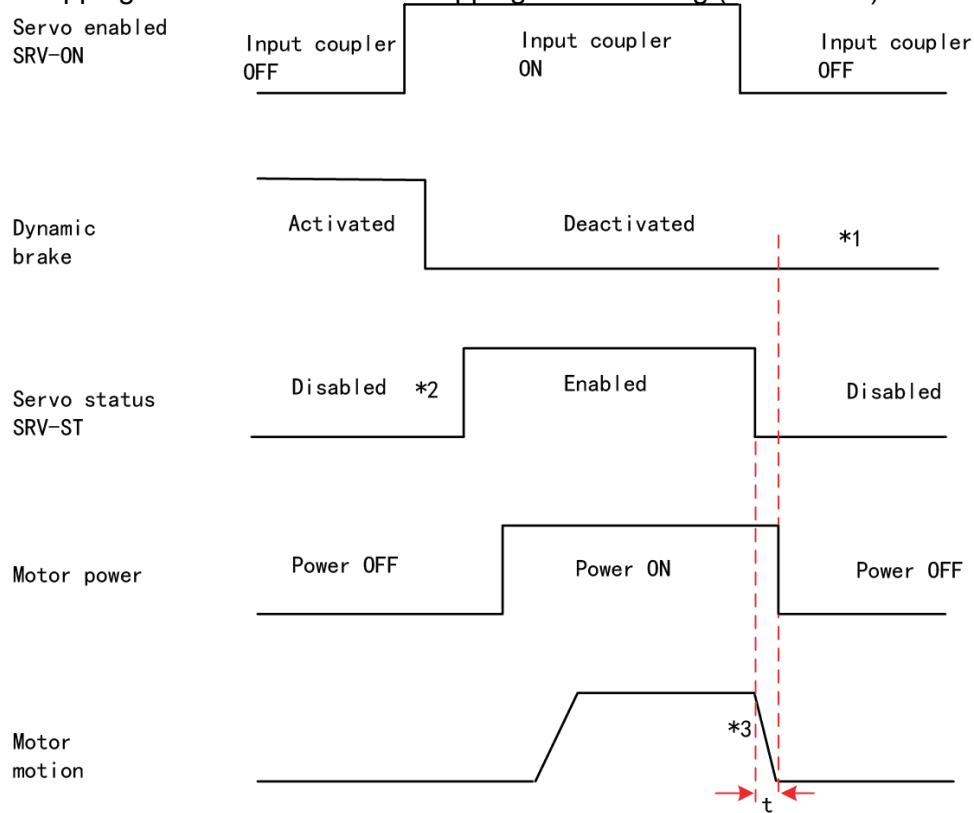


Figure 5-4 Motor normal servo stop sequence 4

Note

*1: Status after stopping is as defined in P05.06.

*2: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

*3: Servo stopping method is as defined in P05.06. Braking torque in opposite direction to decelerate the motor is as defined in P05.11. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

- Free stopping method. Status after stopping: Free running (P05.06 = 4)

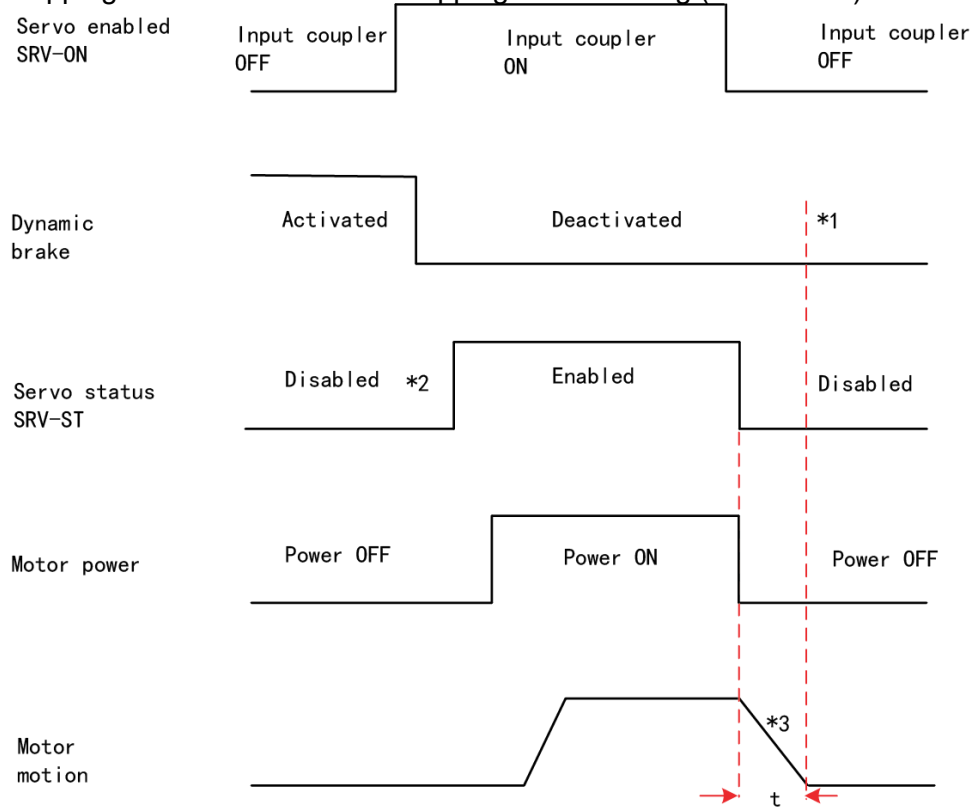


Figure 5-5 Motor normal servo stop sequence 5

Note

*1: Status after stopping is as defined in P05.06.

*2: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

*3: Servo stopping method is as defined in P05.06. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

- Dynamic braking method. Status after stopping: Free running (P05.06 = 5)

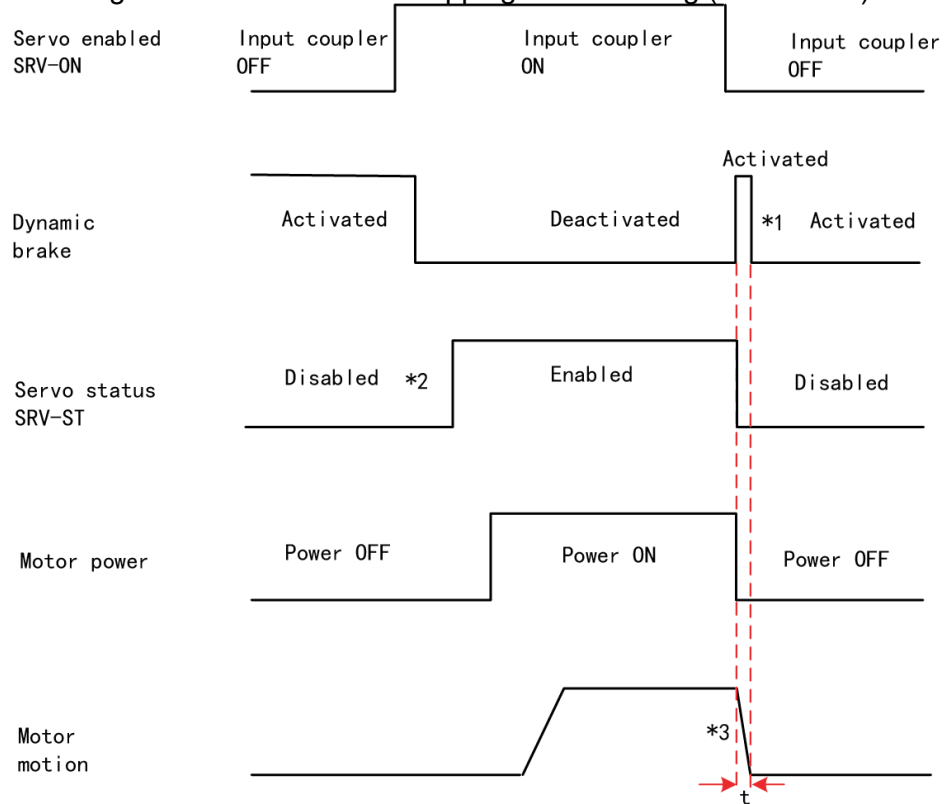


Figure 5-6 Motor normal servo stop sequence 6

Note

*1: Status after stopping is as defined in P05.06.

*2: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.

*3: Servo stopping method is as defined in P05.06. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39

Stopping when alarm occurs – Sequence Diagram

- Servo braking method. Status after stopping: Dynamic braking

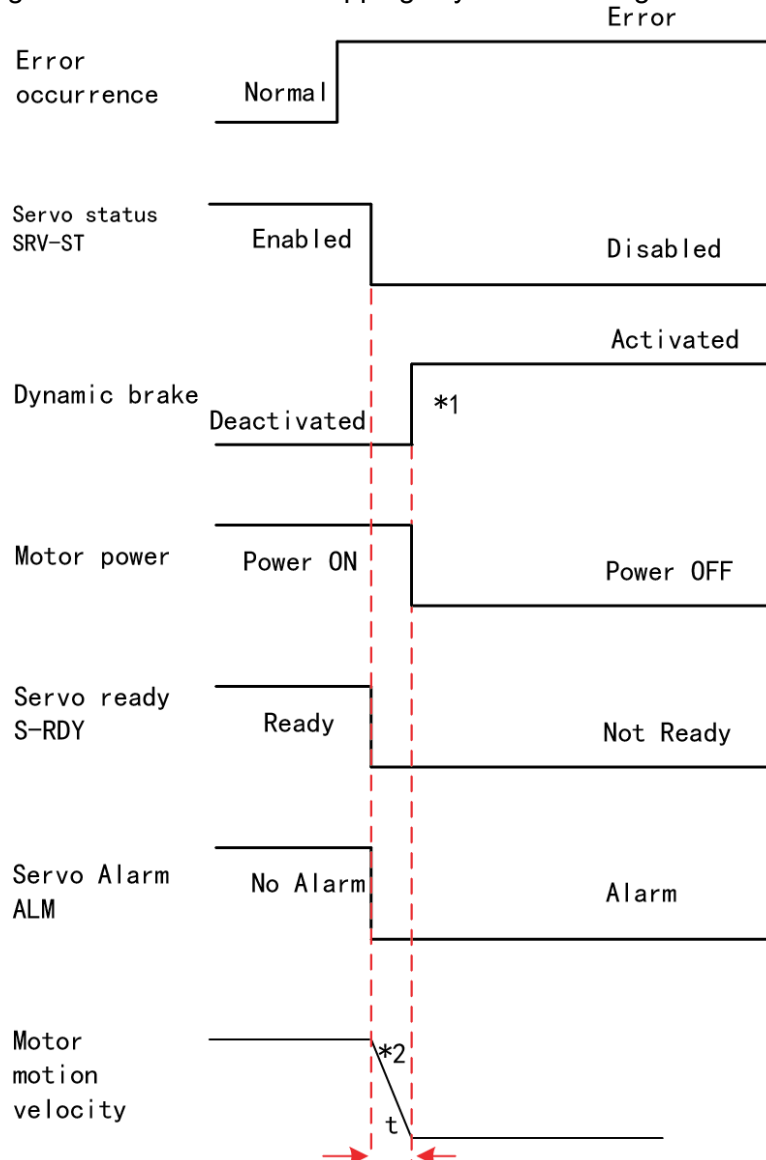


Figure 5-7 Alarm stopping sequence 1

Note

*1: Status after stopping is as defined in P05.10.

*2: Servo stopping method is as defined in P05.10. Braking torque in opposite direction to decelerate the motor is as defined in P05.11. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39. After deceleration time t , dynamic braking will be ON.

- Free stopping method. Status after stopping: Dynamic braking

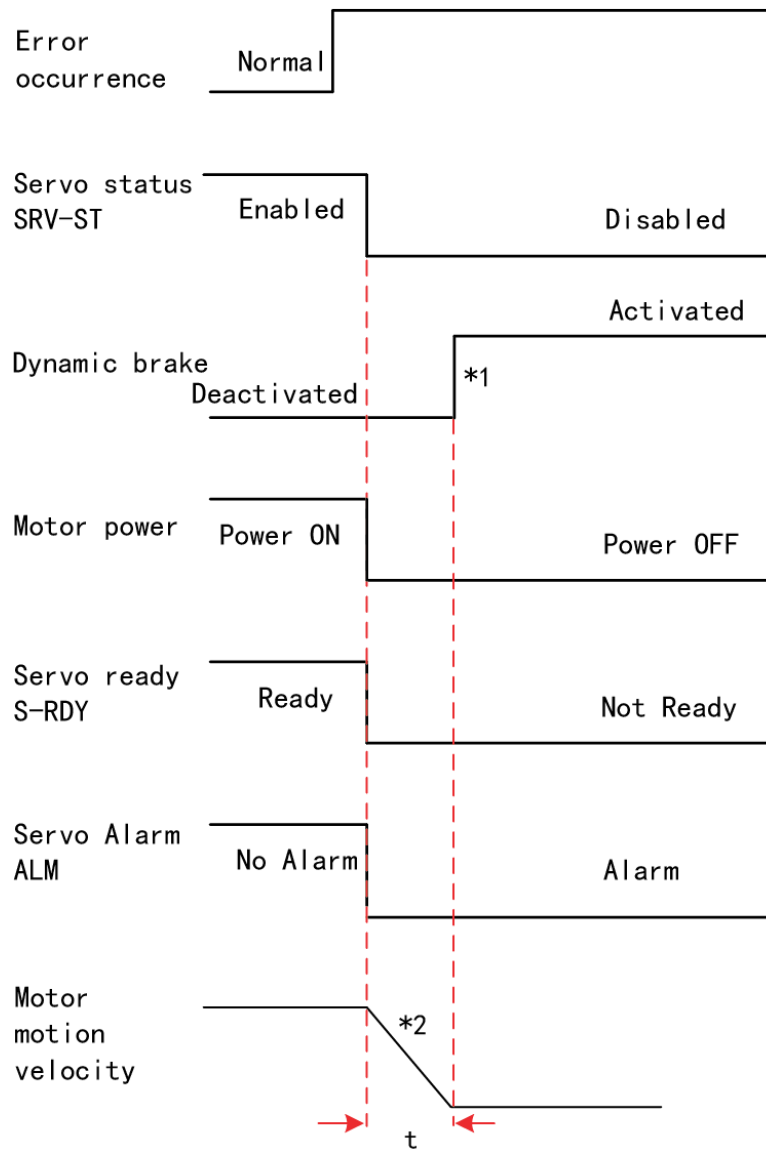


Figure 5-8 Alarm stopping sequence 2

Note

*1: Status after stopping is as defined in P05.10.

*2: Servo stopping method is as defined in P05.10. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39. After deceleration time t , dynamic braking will be ON.

- Dynamic braking method. Status after stopping: Dynamic braking Error

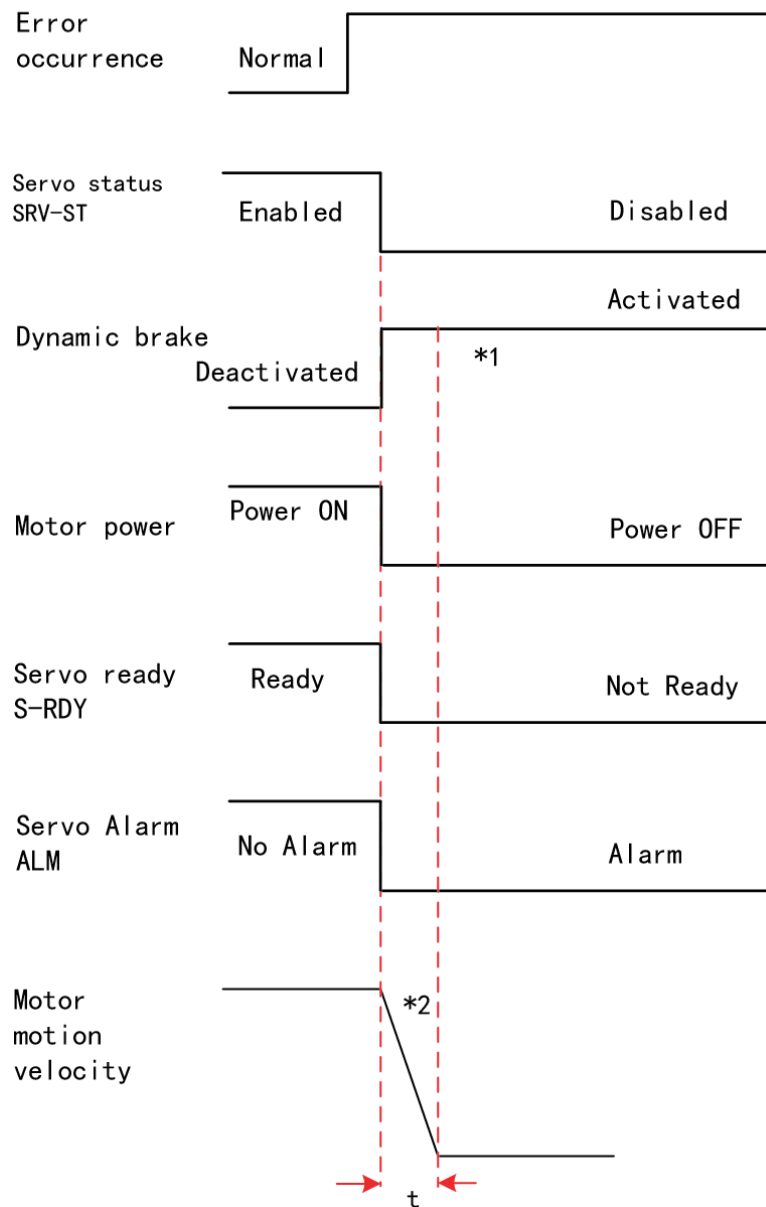


Figure 5-9 Alarm stopping sequence 3

Note

*1: Status after stopping is as defined in P05.10.

*2: Servo stopping method is as defined in P05.10. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

- Servo braking method. Status after stopping: Free running

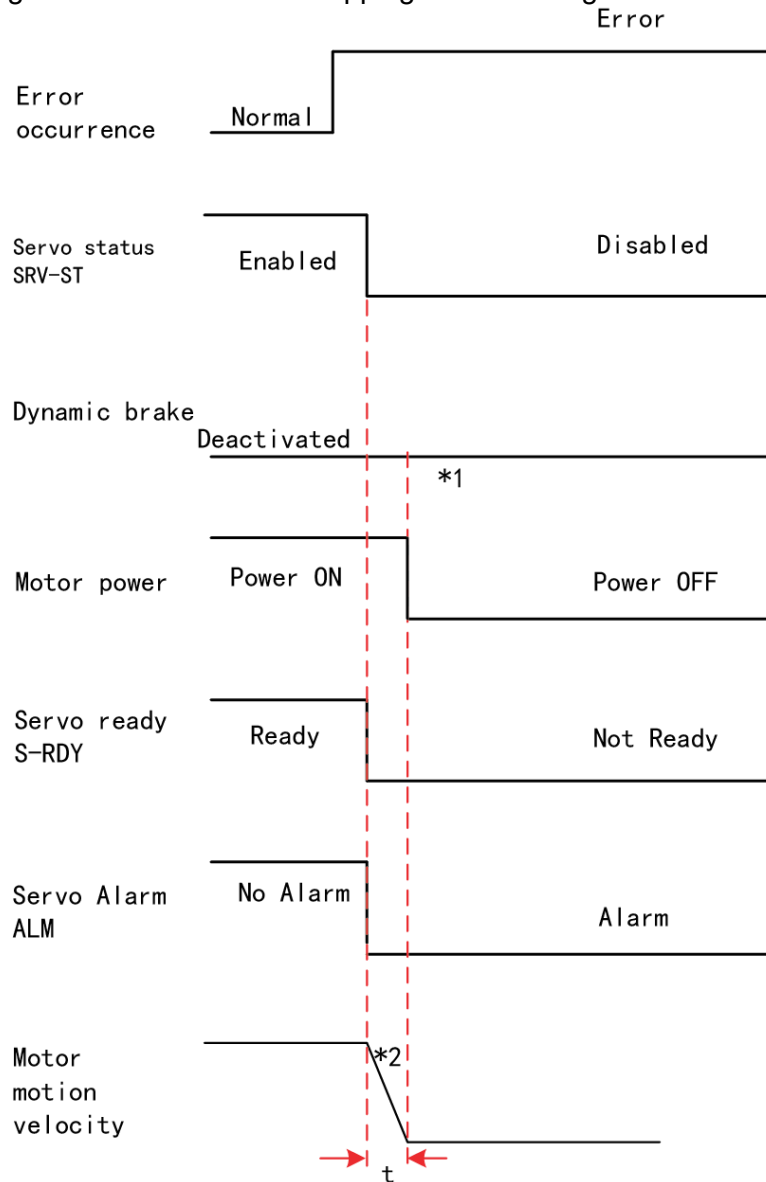


Figure 5-10 Alarm stopping sequence 4

Note

*1: Status after stopping is as defined in P05.10.

*2: Servo stopping method is as defined in P05.06. Braking torque in opposite direction to decelerate the motor is as defined in P05.11. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

- Free stopping method. Status after stopping: Free running

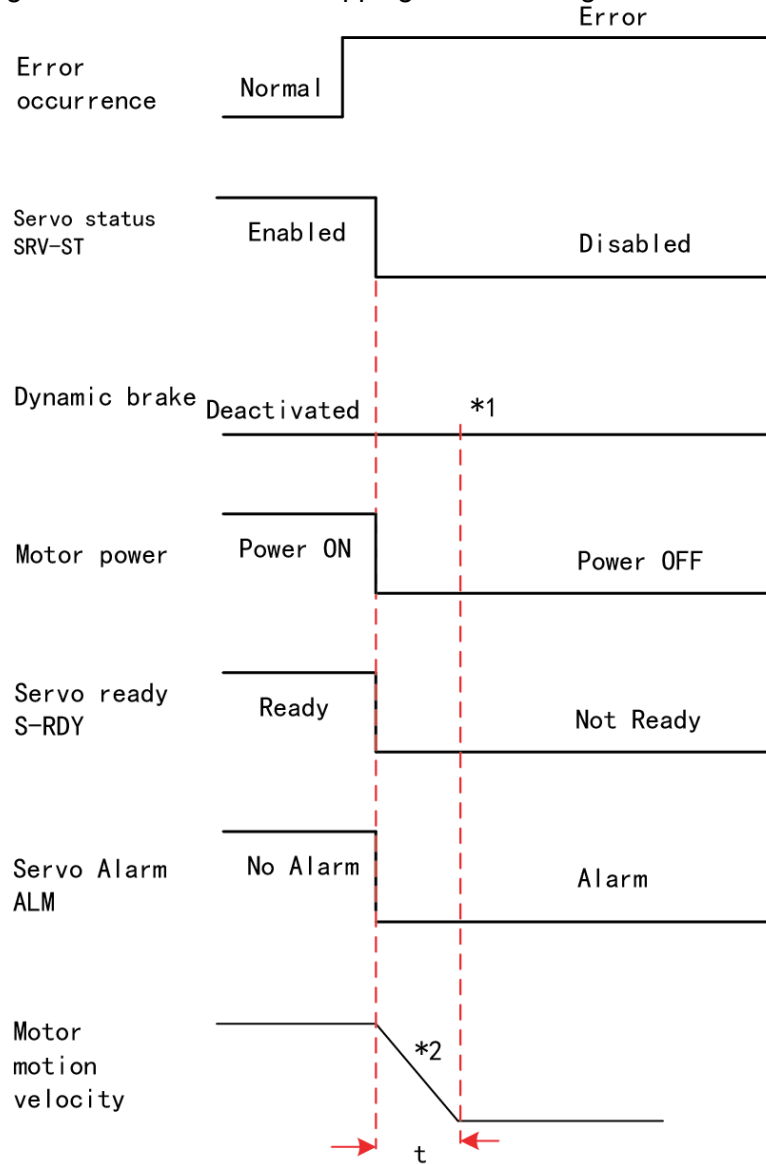


Figure 5-11 Alarm stopping sequence 5

Note

*1: Status after stopping is as defined in P05.10.

*2: Servo stopping method is as defined in P05.10. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

- Dynamic braking. Status after stopping: Free running

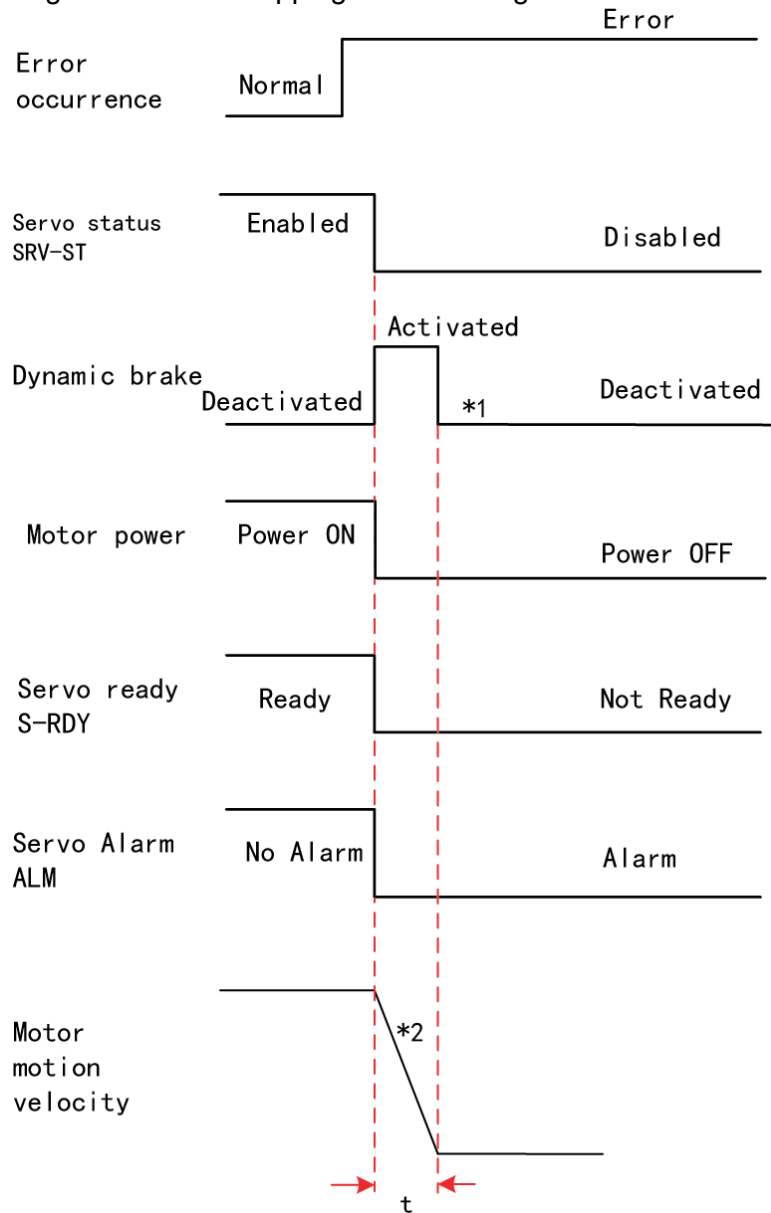


Figure 5-12 Alarm stopping sequence 6

Note

*1: Status after stopping is as defined in P05.10.

*2: Servo stopping method is as defined in P05.10. Deceleration time t is determined by whichever comes first between time set in P06.14 and time needed for motor to drop below velocity set in P04.39.

Alarm clearing - Sequence diagram

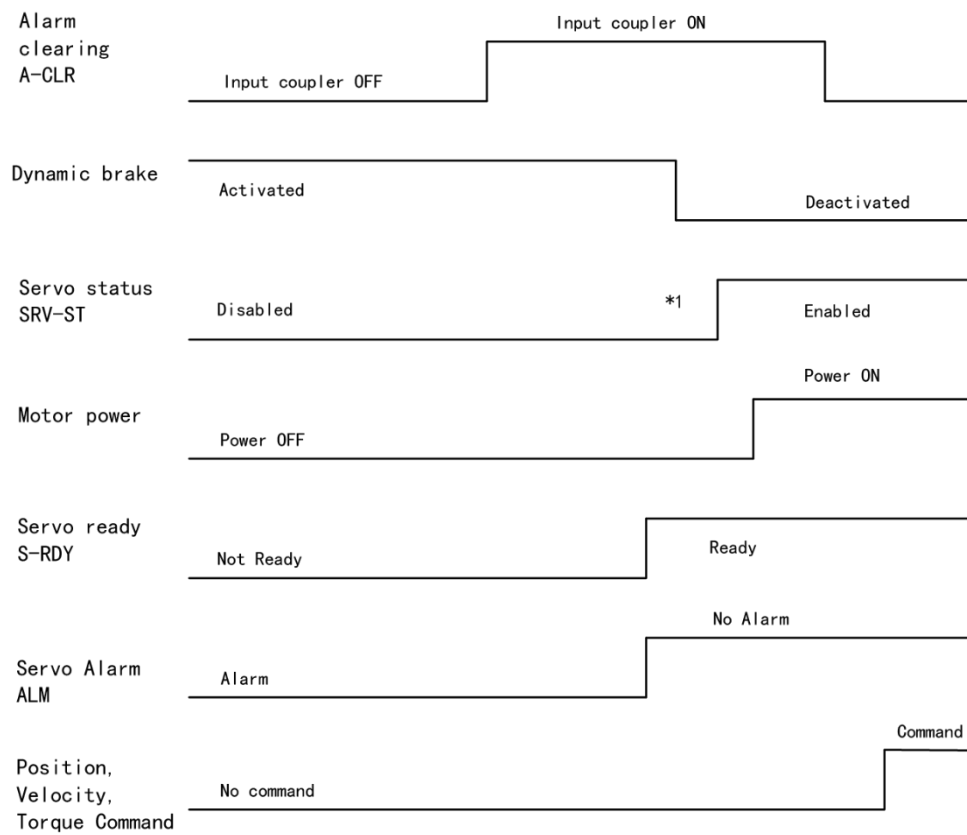


Figure 5-13 Alarm clear sequence

Note

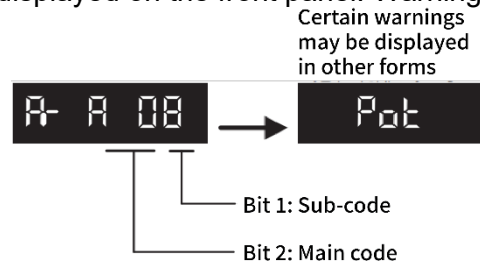
*1: SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet

Chapter 6 Warning and Alarm Handling

6.1 Warning

Servo driver warning

When warning occurs, driver will set protective function, but motor won't stop moving. Error code will be displayed on the front panel. Warning code example:



Warning Code		Content
Main	Code	
A0	1	Overload warning
	2	Regeneration energy overload warning (85% of the regeneration threshold)
	4	Change the parameter to a non-real time valid warning, alert to restart. (Under development)
	7	Low temperature warning (< 20°C)
	8	Positive limit switch valid. POT blinking on front panel
	9	Negative limit switch valid. NOT blinking on front panel
	A	Positive and negative limit switch valid. PNOT blinking on front panel
	B	Current position is beyond the positive software limit. SPOT blinking on front panel
	C	Current position is beyond software negative limit. NPOT blinking on front panel
	D	Current position is beyond software negative, positive limit. SPNOT blinking on front panel
	E	Parameters reset to factory default. Restart needed
Ar	15	Communication fault when gantry is disabled
	16	Gantry axis fault, other axis warning Ar16
	17	Gantry axis emergency stop signal active, other axis warning Ar17
	18	Gantry axis limit active, other axis warning Ar18
	19	Slave axis PWM synchronization alarm when gantry is disabled
	1A	Gantry communication error too high
	1B	Gantry-related parameter settings error (gantry alignment offset setting exceeds 1/4 pulse, spindle warning Ar1b)

Servo driver warning handling

When warning occurs, motor won't stop moving. Error code will be displayed on the front panel.

6.2 Alarm

Servo driver alarm

When alarm occurs, driver will set protective function and motor stops moving. Error code will be displayed on the front panel. Alarm history records can also be viewed in data

monitoring mode, with the alarm log sub-menu displaying d 12 Er.

Alarm code display:

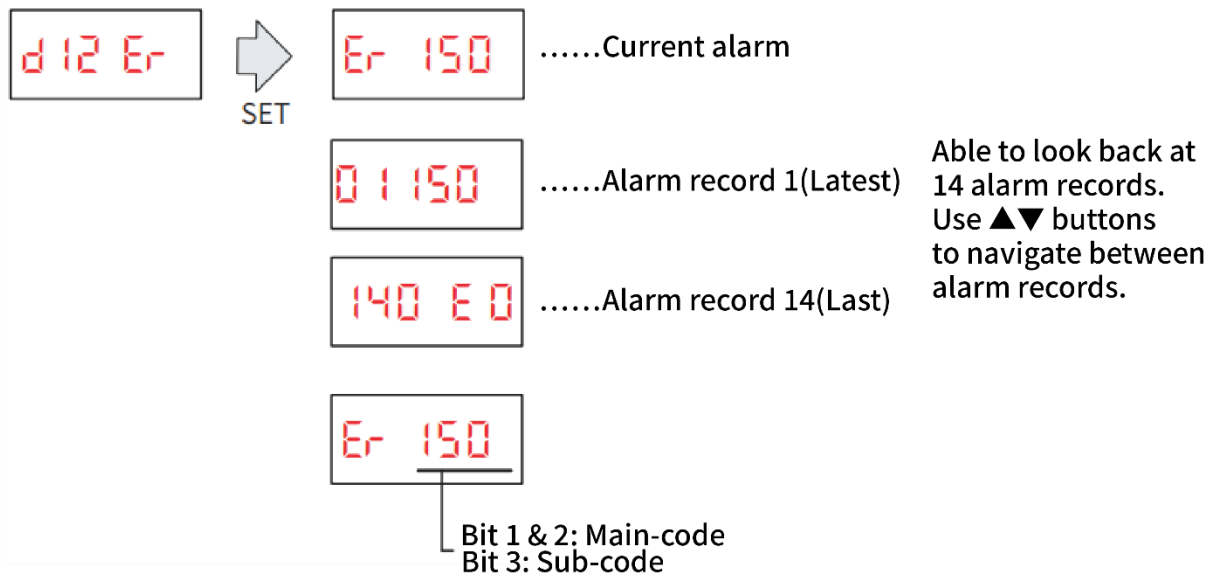


Figure 6-1 Panel Alarm display

Error code list is as below:

Save: Save error messages to alarm history.

Type: The type 1 and type 2 fault stop mode can be set via P05.10 [Sequence at alarm].

Clearable: Alarms can be cleared (reset) through DI input, the front panel, or debugging software. However, the underlying fault may still exist.

Clearable alarm by operating the front panel and using auxiliary function AFUnL.

⚠ Caution

- For non-clearable alarms (alarms that cannot be reset), troubleshooting measures must be taken. After confirming that the fault has been eliminated, power must be reapplied to clear the alarm.

Table 6-1 Error code list

Error code		Content	Attribute		
Main	Sub		Save	Type	Clearable
9	0~F	FPGA communication error	●	2	
0A	0~1	Circuit current detection error	●	2	
	2, 4	Analog input error	●	2	
	3	Motor power cable not connected	●	1	
	5	DC bus error	●	2	
	6	Temperature measuring error	●	2	
0b	0	Control circuit power supply voltage too low		2	
	1	Control circuit power supply voltage too high		2	●

0c	0	DC bus overvoltage	●	1	●
0d	0	DC bus undervoltage	●	1	●
	1	Single phasing of main power supply	●	2	
	2	No main power supply detected		2	
0E	0	Overcurrent	●	1	
	1	Intelligent Power Module (IPM) overcurrent	●	1	
	2	Power output to motor shorted to ground	●	1	
	4	Phase overcurrent	●	1	
0F	0	Driver overheated	●	2	
10	0	Motor overloaded	●	1	●
	1	Driver overloaded	●	1	●
	2	Motor rotor blocked	●	1	●
11	0	Soft start relay is not energized	●		
	1	Cooling fan damaged	●		
12	0	Regenerative resistor overvoltage	●	2	
	1	Holding brake error	●	1	
	2	Regenerative resistor value too low	●	2	
15	0	Encoder disconnected	●	1	
	1	Encoder communication error	●	1	
	2	Encoder initial position error	●	1	
	3	Multiturn encoder error	●	2	
	4	Encoder parameter settings error	●	2	
	5	Encoder data overflow	●	2	●
	6	Encoder overheated	●	2	●
	7	Encoder counter error	●	2	●
	A	Encoder wire broken (A)	●	1	
	b	Encoder wire broken (B)	●	1	
	C	Encoder wire broken (Z)	●	1	
17	0	Encoder data error	●	1	
	1	Encoder parameter initialization error	●	1	
18	0	Excessive position deviation	●	2	●
	1	Excessive velocity deviation	●	2	●
19	0	Motor vibration too strong	●	2	●
	1	Excessive hybrid position deviation	●	1	●
1A	0	Overspeed	●	2	●
	1	Velocity out of control	●	1	●
1b	0	Bus input signal dithering	●	2	●
	1	Incorrect electronic gear ratio	●	2	●
	2	Encoder single-turn data overflow	●	1	●
	3	External encoder frequency divider parameter error	●	1	●
	5	Pulse and Direction input disconnection	●	1	
1c	0	Both STO failed	●	1	
	1	1 st STO failed	●	1	
	2	2 nd STO failed	●	1	

	3	STO power supply 3.3v anomaly		2	
	4	STO power supply 5.0v anomaly		2	
	5~8	Faulty STO internal optocoupler, inverter		2	
21	0	I/O input interface assignment error	●	2	
	1	I/O input interface function assignment error	●	2	
	2	I/O output interface function assignment error	●	2	
24	0	CRC correction during EEPROM parameter saving		2	
	1	I2C communication status error		2	
	2	Error r/w alarm history record		2	
	3	Error r/w diagnostic data		2	
	4	Error r/w 402 parameters		2	
	5	Error r/w communication parameters		2	
25	0	Gantry deviation error	●	1	
	1	Gantry communication error	●	1	
	2	Gantry slave axis is not enabled	●		●
	3	Gantry synchronous torque deviation is too high	●		●
	4	Gantry synchronization mode is in non-position control mode	●		●
	5	Gantry alignment failed	●		●
26	0	Positive/Negative position limit triggered under non-homing mode	●	2	●
27	0	Analog 1 input overrun limit	●	2	●
	1	Analog 2 input overrun limit	●	2	●
	2	Analog 3 input overrun limit	●	2	●
28	0	Pulse regeneration limit protection	●	2	●
29	0	Control mode not match under full closed loop mode	●	1	
	1	Encoder mode not match under full closed loop mode	●	1	
55	0	External ABZ encoder disconnected	●	1	
	1	External ABZ encoder Phase A disconnected	●	1	
	2	External ABZ encoder Phase B disconnected	●	1	
	3	External ABZ encoder Phase Z disconnected	●	1	
57	0	Forced alarm input valid(E-stop)	●	2	●
5F	0	Motor model no. detection error		2	
	1	Driver power module detection error		2	
60	0	Main loop interrupted timeout		2	
	1	Velocity loop interrupted timeout		2	
70	0	Encryption error		2	
89	0	Homing error		2	●
92	0	External encoder parameter initialization error	●	1	

6.3 Alarm Handling

⚠ Caution

When un-clearable error occurs, please solve it accordingly. Then restart.

Error code	Main	Sub	Display: "Er 090" -- "Er 09F"
	09	0~F	Content: FPGA communication error
Cause		Diagnosis	Solution
L1, L2 terminal voltage too low		Verify L1, L2 terminal voltage.	Make sure L1, L2 terminal voltage is within recommended range.
Internal driver fault		/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 0A0" -- "Er 0A1"
	0A	0~1	Content: Circuit current detection error
Cause		Diagnosis	Solution
Motor power cable wiring error		Verify motor power cable wiring.	Make sure U, V, W terminal wired properly.
Main power supply undervoltage		Verify L1, L2, L3 terminal voltage.	Make sure L1, L2 terminal voltage is within recommended range.
Internal driver fault		/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 0A2" / "Er 0A4"
	0A	2 / 4	Content: Analog input error
Cause		Diagnosis	Solution
Analog input wiring error		Verify analog input wiring.	Make sure of analog input wiring connection.
Internal driver fault		/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 0A3"
	0A	3	Content: Motor power cable not connected
Cause		Diagnosis	Solution
Motor power cable not connected		Verify motor power cable wiring.	Measure resistance values between U, V, W terminals, make sure the values are almost equal. If not, it might be due to damaged motor or motor winding open circuit.
Motor fault		/	Replace motor.
Driver damage		Check that the above two situations do not exist, and it is normal after replacing the driver.	Replace with the new driver.
The deviation between current setting and feedback is too large		Check whether the current setting and feedback are too far apart.	Increase the parameter P07.19 weak magnetic current appropriately.

Error code	Main	Sub	Display: "Er 0A5"
	0A	5	Content: DC Bus error
Cause		Diagnosis	Solution
L1, L2 terminal voltage too low		Verify L1, L2 terminal voltage. Check if power on indicator light on servo driver is on and d27 DC bus voltage.	Make sure L1, L2 terminal voltage is within recommended range.
Internal driver fault.		/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 0A6"
	0A	6	Content: Temperature measuring error
Cause			Solution
L1, L2 terminal voltage too low			Make sure L1, L2 terminal voltage is within recommended range.
Internal driver fault			Replace with the new driver.

Error code	Main	Sub	Display: "Er 0b0"
	0b	0	Content: Control circuit power supply voltage too low
Cause			Solution
Control circuit power supply voltage too low			Increase L1C, L2C terminal voltage. Tighten L1C, L2C terminal connection.
Power supply under capacity			Increase power supply capacity for L1C and L2C terminals.
Internal driver fault			Replace with the new driver.

Error code	Main	Sub	Display: "Er 0b1"
	0b	1	Content: Control circuit power supply abnormal
Cause			Solution
The control power voltage of the driver input is unstable or too high.			Reconnect the power supply with a voltage that meets the left voltage specifications.

Error code	Main	Sub	Display: "Er 0c0"
	0c	0	Content: DC bus overvoltage
Cause			Solution
Main power supply overvoltage			Decrease main power supply voltage .
Acceleration/deceleration time too short			Increase the duration time or change to a regenerative resistor with higher resistance.
Regenerative brake parameter anomaly			Modify vent overload parameter.
Inner brake circuit damaged			Replace with the new driver.
Internal driver fault			Replace with the new driver.

Error code	Main	Sub	Display: "Er 0d0"
	0d	0	Content: DC bus undervoltage
Cause			Solution
Main power supply undervoltage			Increase main power supply voltage
Internal driver fault			Replace with the new driver.

Error code	Main	Sub	Display: "Er 0d1"
	0d	1	Content: Single phasing of main power supply
Cause			Solution
Main power supply undervoltage			Increase main power supply voltage
Internal driver fault			Replace with the new driver.

Error code	Main	Sub	Display: "Er 0d2"	
	0d	2	Content: No main power supply detected	
Cause			Diagnosis	Solution
No main power supply			Verify L1, L2, L3 terminal voltage	Check the main power supply circuit. Secure the wiring terminals. If the main power switch is off, turn it on.
Internal driver fault			/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 0E0"	
	0E	0	Content: Overcurrent	
Cause			Diagnosis	Solution
Driver power output short circuit			Verify if there is short circuit between UVW terminals, or shorted to PG.	Make sure there is no short circuit. Make sure motor is not damaged.
Motor wiring error			Verify motor wiring.	Reconnect motor wiring.
IGBT module short circuit			Disconnect motor output cable. Then, enable the servo driver to check for overcurrent.	Replace with the new driver.
Control parameter anomaly			Verify if parameter exceeds recommended range.	Set parameter within recommended range.
Control command anomaly			Verify if command motion is too acute.	Modify control command. Use filter.

Error code	Main	Sub	Display: "Er 0E1"	
	0E	1	Content: Intelligent Power Module (IPM) overcurrent	
Cause			Diagnosis	Solution
Driver power output short circuit			Verify if there is short circuit between UVW terminals, or shorted to PG.	Make sure there is no short circuit. Make sure motor is not damaged.
Motor wiring error			Verify motor wiring	Reconnect motor wiring.
IGBT module short circuit			Disconnect motor output cable. Then, enable the servo driver to check for overcurrent.	Replace with the new driver.
IGBT module undervoltage			/	Replace with the new driver.
Control parameter anomaly			Verify if parameter exceeds recommended range.	Set parameter within recommended range.
Control command anomaly			Verify if command motion is too acute.	Modify control command. Use filter.

Error code	Main	Sub	Display: "Er 0E2"	
	0E	2	Content: UVW shorted to PE	
Cause			Diagnosis	Solution
Driver U, V, W terminals shorted to ground			Disconnect motor power cable and check for short circuit between driver UVW and PE	Reconnect wiring or change UVW cable at driver side.
Motor shorted to ground			Connect motor power cable to driver power output. Verify if resistance value of UVW to PE is in the range of Megaohm (MΩ)	Replace with the new motor.

Driver failure	Disconnect the UVW cables on the driver side. After powering the driver multiple times, the fault still occurs.	Replace with the new driver.
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Error code	Main	Sub	Display: "Er 0E4"
	0E	2	Content: Phase overcurrent
Cause	Diagnosis		Solution
Driver U, V, W terminals shorted to ground	Disconnect motor power cable and check for short circuit between driver UVW and PE		Reconnect wiring or change UVW cable at driver side.
Motor shorted to ground	Connect motor power cable to driver power output. Verify if resistance value of UVW to PE is equal and if there is short circuit		Replace with the new motor.
Internal driver fault	/		Replace with the new driver.

Error code	Main	Sub	Display: "Er 0F0"
	0F	0	Content: Driver overheated
Cause	Diagnosis		Solution
Temperature of power module exceeded upper limit	Measure the temperature of driver radiator.		Improve cooling conditions. Replace driver and motor with higher power rating. Increase duration time for acceleration and deceleration. Decrease load.

Error code	Main	Sub	Display: "Er 100"
	10	0	Content: Motor overloaded
Cause	Diagnosis		Solution
Load too heavy	Verify if actual load exceeds maximum value allowed.		Decrease load. Adjust limit values.
Strong mechanical vibration	Look for mechanical vibration from machine system.		Adjust gain value of control loop. Increase duration time for acceleration and deceleration.
Motor or encoder cable wiring error	Verify motor and encoder wiring.		Reconnect wiring. Replace motor and encoder cable.

Error code	Main	Sub	Display: "Er 101"
	10	1	Content: Driver overloaded
Cause	Diagnosis		Solution
Motor power cable wiring error	UVW terminals wiring error.		Make sure motor power cable wiring connection is correct
Motor not matched	Motor current is too high.		Motor rated current is higher than driver rated current. Please change to a driver with higher rated current.

Error code	Main	Sub	Display: "Er 102"
	10	2	Content: Motor rotor blocked
Cause	Diagnosis		Solution
Motor rotor blocked	Look for mechanical blockages		Ensure the motor has not hit the hard limit. Check the mechanical structure.

Motor rotor blocking time threshold value too low	Verify value of P06.56 and P06.57.	Verify that the stall torque parameter P06.56 and stall time parameter P06.57 are set reasonably.
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Error code	Main	Sub	Display: "Er 120"
	12	0	Content: Regenerative resistor overvoltage
Cause		Diagnosis	Solution
Regenerative energy exceeded capacity of regenerative resistor		Verify if velocity is too high. Verify if load is too large.	Decrease motor rotational velocity. Decrease load inertia. Add an external regenerative resistor.
Power supply voltage too high		Check if the input voltage is too high or unstable.	Ensure the input voltage is stable and within the rated input range.
Regenerative energy discharge circuit damaged		/	Add an external regenerative resistor. Replace with the new driver.

Error code	Main	Sub	Display: “Er 121”
	12	1	Content: Holding brake error
Cause		Diagnosis	Solution
Holding brake circuit damaged		Regenerative resistor disconnected.	Replace regenerative resistor.
		Holding brake IGBT damaged.	Repair the IGBT.
External braking resistor wiring abnormal		During regenerative discharge, check if the regenerative resistor is not connected or connected to the wrong terminal.	Connect the external regenerative braking resistor correctly.

Error code	Main	Sub	Display: "Er 122"
	12	2	Content: Regenerative resistor value too low
Cause		Diagnosis	Solution
External regenerative resistor value is less than the minimum value allowed by the driver		Measure the resistance of the external regenerative resistor and confirm whether it is lower than the resistor value supported by the driver.	Replace the regenerative resistor with the right resistance value which meets the specification of the driver.

Error code	Main	Sub	Display: "Er 150"
	15	0	Content: Encoder disconnected
Cause		Diagnosis	Solution
Encoder cable disconnected		Verify encoder cable connection.	Make sure encoder cable is properly connected.
Encoder cable wiring error		Verify if the encoder wiring is correct.	Reconnect the encoder wiring.
Encoder damaged		/	Replace with the new motor.
Encoder measuring circuit damaged		/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 151"
	15	1	Content: Encoder communication error

Cause	Diagnosis	Solution
Encoder wire shielding layer is missing	Verify if encoder cable has shielding layer.	Replace with standard encoder cable.
Encoder cable wiring error	Verify if encoder wiring is correct.	Reconnect encoder wiring.
Encoder damaged	/	Replace with the new motor.

Error code	Main	Sub	Display: “Er 152”	
	15	2	Content: Encoder initial position error	
Cause		Diagnosis		Solution
Communication data abnormal		Verify if encoder power supply voltage is DC5V ±5%. Verify if encoder cable and shielded layer is not damaged. Verify if encoder cable is close to high powered power supply cable.		Make sure encoder power supply voltage is stable. Make sure encoder cable is not damaged. Make sure encoder cable shielded layer is grounded to frame. Make sure encoder cable is away from high powered power supply cable.
Encoder damaged		/		Replace with the new motor.
Encoder measuring circuit damaged		/		Replace with the new driver.

Error code	Main	Sub	Display: “Er 153”	
	15	3	Content: Multiturn encoder error	
Cause		Diagnosis		Solution
Initial use		Is it the first time the multiturn function is enabled without performing origin calibration?		Execute origin positioning and multiturn position resetting to calibrate the origin of the coordinate system. Reset the multi-turn alarm and set P00.15 to 9 for multi-turn reset and alarm clearing.
Multi-turn absolute encoder low voltage or excessive disconnection		Check if the battery voltage in the battery pack is below 2.5V or if the multi-turn data is missing or changes unexpectedly.		Replace the battery. After replacing, perform a multi-turn reset, clear the multi-turn alarm, and restart the driver. Reset the multi-turn alarm.
Encoder without multiturn absolute function used		Verify whether the encoder supports the multi-turn absolute function.		Replace it with a motor that uses a multi-turn absolute encoder or set P00.15 = 0 to disable the multi-turn absolute function.
Multi-turn data error or loss		If none of the above causes are found, confirm whether the alarm occurred during operation.		Ensure the encoder cables are routed separately from the power cables. Check the cable connections for security. Confirm whether there is multi-turn overflow on-site.

Error code	Main	Sub	Display: "Er 154"	
	15	4	Content: Encoder parameter settings error	
Cause		Diagnosis		Solution
Absolute encoder mode is incorrectly set.		Verify if encoder has multi-turn absolute value function.		Modify absolute encoder mode settings

	Main	Sub	Display: "Er 155"
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Error	15	5	Content: Encoder data overflow
Cause		Diagnosis	Solution
Encoder data overflow		Verify if encoder is not damaged.	Initialize multiturn data.

Error code	Main	Sub	Display: "Er 156"
	15	6	Content: Encoder overheated
Cause		Diagnosis	Solution
The encoder temperature is too high		Verify if motor temperature is too high.	Reduce encoder temperature.

Error code	Main	Sub	Display: "Er 157"
	15	7	Content: Multiturn data overflow
Cause		Diagnosis	Solution
Encoder data overflow		Verify if encoder is not damaged.	Initialize multiturn data.

Error code	Main	Sub	Display: "Er 15A"
	15	A	Content: Encoder wire broken (A)
Cause		Diagnosis	Solution
External encoder A phase wire break		Check external encoder wiring.	Ensure that the encoder A phase wiring is correct and there is no disconnect nor short circuit.

Error code	Main	Sub	Display: "Er 15b"
	15	b	Content: Encoder wire broken (B)
Cause		Diagnosis	Solution
External encoder B phase wire break		Check external encoder wiring.	Ensure that the encoder B phase wiring is correct and there is no disconnect nor short circuit.

Error code	Main	Sub	Display: "Er 15c"
	15	7	Content: Encoder wire broken (Z)
Cause		Diagnosis	Solution
External encoder Z phase wire break		Check external encoder wiring.	Ensure that the encoder C phase wiring is correct and there is no disconnect nor short circuit.

Error code	Main	Sub	Display: "Er 170"
	17	0	Content: Encoder data error
Cause		Diagnosis	Solution
Communication data abnormal		Verify if encoder power supply voltage is DC5V $\pm 5\%$. Verify if encoder cable and shielded layer is not damaged. Verify if encoder cable is close to high powered power supply cable.	Make sure encoder power supply voltage is stable. Make sure encoder cable is not damaged. Make sure encoder cable shielded layer is grounded to frame. Make sure encoder cable is away from high powered power supply cable.
Encoder damaged		/	Replace with the new motor.
Encoder measuring circuit damaged		/	Replace with the new driver.

Error code	Main	Sub	Display: "Er 171"	
	17	1	Content: Encoder parameter initialization error	
Cause		Diagnosis		Solution
Driver and motor not matched		Verify driver and motor models.		Replace with matching driver and motor.
Error while getting parameters from encoder		Verify if encoder cable is standard. Verify if encoder has no peeled insulator, broken connection or improper contact.		Use standard encoder cable, verify the connection of both sides of driver and motor, change encoder cable if necessary.

Error code	Main	Sub	Display: "Er 180"	
	18	0	Content: Excessive position deviation	
Cause		Diagnosis		Solution
Improper position deviation settings		Verify if value of P00.14 is too low.		Increase value of P00.14.
Position gain setting too low		Verify if values of P01.00 and P01.05 are too low.		Increase values of P01.00 and P01.05.
Torque limit too low		Verify if values of P00.13 and P05.22 are too low.		Increase values of P00.13 and P05.22.
Excessive external load		Verify if acceleration and deceleration duration time is too low. 2. Verify if rotational velocity is too high. Verify if load is too large.		Increase duration time for acceleration and deceleration. Decrease rotational velocity. Decrease load.

Error code	Main	Sub	Display: "Er 181"	
	18	1	Content: Excessive velocity deviation	
Cause		Diagnosis		Solution
Deviation between set velocity and actual velocity is too great		Verify if value of P06.02 is too low.		Increase value of P06.02. Set P06.02 to 0, position error detection off.
Acceleration and deceleration duration time for set velocity is too low		Verify if value of P03.12 and P03.13 are too low.		Increase value of P03.12, P03.13. Adjust velocity gain to reduce velocity error.

Error code	Main	Sub	Display: "Er 190"	
	19	0	Content: Vibration too strong	
Cause		Diagnosis		Solution
Resonance		Mechanical stiffness is too high, resonance occurs.		Reduce mechanical stiffness or use filter.
Current loop gain too high		Verify current loop gain value.		Reduce current loop gain.
Current vibration threshold too low		Use debugging software to check if the current feedback amplitude fluctuation exceeds 5%.		If the current level of vibration is acceptable, increase P06.36 to widen the torque detection vibration threshold.

Error code	Main	Sub	Display: "Er 191"	
	19	1	Content: Excessive hybrid position deviation	

Cause	Diagnosis	Solution
Driver UVW terminal output single phasing or wiring error	Verify if UVW terminal wiring connection is correct, and wire is connected properly.	Make sure UVW terminals are correctly connected to UVW of motor. Change motor power cable.
Motor rotor blocked	Use the debugging software's status monitoring or the panel's monitoring feature to check whether the position feedback matches the position command.	Check the machinery
Driver stiffness too low	Verify if position loop and velocity loop gain is too low.	Increase position loop and velocity loop gain
P00.33 setting is too low	Verify if P00.33 is set too low.	Increase P00.33 set value accordingly but please be aware that doing so might cause the position deviation to be higher.

Error code	Main	Sub	Display: "Er 1A0"
	1A	0	Content: Overspeed
Cause	Diagnosis		Solution
Motor velocity exceeded first speed limit.	Verify if velocity command is too high. Verify if simulated velocity command voltage is too high. Verify if parameter value of P03.21 is too low. Verify if input frequency and division frequency coefficient of pulse train is proper. Verify if encoder is wired correctly.		Adjust velocity input command. Increase P03.21 value. Adjust pulse train input frequency and division frequency coefficient. Verify encoder wiring.
Internal driver fault	/		Replace with the new driver.

Error code	Main	Sub	Display: "Er 1A1"
	1A	1	Content: Velocity out of control
Cause	Diagnosis		Solution
Out of control	Check if UVW phases are connected incorrectly.		/
Encoder fault	Monitor the increase in D30 counts.		Apply anti-interference measures. Replace with the new motor.
Special applications	Motor's actual movement direction is opposite to the output direction.		Evaluate the specificity of the application. Change P01.37 from 0 to 4 to suppress ER1A1 alarm.

Error code	Main	Sub	Display: "Er 1b0"
	1b	0	Content: Input pulse format is incorrect or frequency exceeds the limit
Cause	Diagnosis		Solution
Input pulse frequency too high	The input pulse frequency is too high (threshold parameter p05.32)		Input pulse frequency too high. Reduce the number of pulses per magnetic pitch or decrease the input pulse frequency. Ensure the command pulse frequency is lower than the value set in parameter p05.32.

Pulse signal interference	Check for interference and whether the pulse input lines are twisted shielded cables with proper grounding.	EMC improvement measures are needed. Use twisted shielded cables for pulse input lines and ensure the shield is effectively grounded.
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Error code	Main	Sub	Display: "Er 1b1"
	1b	1	Content: Incorrect electronic gear ratio
Cause			Diagnosis
Values out of range			Solution
			Numerator or denominator is zero/Set values out of range.
			Reduce number of pulses per revolution.

Error code	Main	Sub	Display: "Er 1b2"
	1b	2	Content: Encoder single-turn data overflow
Cause			Diagnosis
In single-turn absolute mode, the motor runs beyond one magnetic pitch			Solution
			Check if the motor travel has reached one full turn.
			Inspect instruction pulse count per magnetic pitch and electronic gear ratio settings and ensure these settings are reasonable to prevent command travel from exceeding one magnetic pitch of the motor.

Error code	Main	Sub	Display: "Er 1b3"
	1b	3	Content: External encoder frequency divider parameter error
Cause			Diagnosis
External encoder frequency divider parameter values out of range			Solution
			P00.35/P00.36 external encoder division ratio exceeds the range 1/40 ~ 125200.
			Modify the values of P00.35 and P00.36 to ensure they fall within the allowable range of 1/40 to 125200.

Error code	Main	Sub	Display: "Er 1b5"
	1b	5	Content: Pulse and Direction input disconnected
Cause			Diagnosis
Pulse and Direction input disconnected			Solution
			Check if high-speed differential pulse and direction signal lines are connected to the upper-level device.
			Confirm if it is high-speed pulse wiring. If using low-speed pulse control, the pulse signal pin connections need to be changed.

Error code	Main	Sub	Display: "Er 1c0"
	1c	0	Content: Both STO failed
Cause			Diagnosis
Both STO input signals valid			Solution
			Verify if STO power supply is normal.
			Verify 24V STO power supply and power cable connection.
			Disconnect switch connected to STO.
			Close the switch.

Error code	Main	Sub	Display: "Er 1c1"
	1c	1	Content: 1st STO failed
Cause			Diagnosis
1st STO input signal valid			Solution
			Verify if STO power supply is normal.
			Verify 24V STO power supply and power cable connection.

	Disconnect switch connected to STO.	Close the switch.
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Error code	Main	Sub	Display: "Er 1c2"	
	1c	2	Content: 2 nd STO failed	
Cause			Diagnosis	Solution
2 nd STO input signal valid			Verify if STO power supply is normal	Verify 24V STO power supply and power cable connection
			Disconnect switch connected to STO	Close the switch.

Error code	Main	Sub	Display: "Er 1c3"	
	1c	3	Content: STO power supply 3.3v anomaly	
Cause			Diagnosis	Solution
STO power supply internal 3.3v anomaly			Contact the manufacturer.	Contact the manufacturer.

Error code	Main	Sub	Display: "Er 1c4"	
	1c	4	Content: STO power supply 5.0v anomaly	
Cause		Diagnosis		Solution
STO power supply internal 5.0v anomaly		Contact the manufacturer.		Contact the manufacturer.

Error code	Main	Sub	Display: "Er 1c5"	
	1c	5	Content: Faulty STO internal optocoupler	
Cause		Diagnosis		Solution
Faulty STO internal optocoupler		Contact the manufacturer.		Contact the manufacturer.

Error code	Main	Sub	Display: “Er 1c6”	
	1c	6	Content: STO Inverter 1 fault	
Cause			Diagnosis	Solution
STO Inverter 1 fault			Contact the manufacturer.	Contact the manufacturer.

Error code	Main	Sub	Display: "Er 1c7"	
	1c	7	Content: STO Inverter 2 fault	
Cause			Diagnosis	Solution
STO Inverter 2 fault			Contact the manufacturer.	Contact the manufacturer.

Error code	Main	Sub	Display: "Er 1c8"	
	1c	8	Content: STO Inverter 3 fault	
Cause			Diagnosis	Solution
STO Inverter 3 fault			Contact the manufacturer.	Contact the manufacturer.

Error code	Main	Sub	Display: "Er 210"	
	21	0	Content:	I/O input interface assignment error
Cause			Diagnosis	Solution
Input signal assigned with two or more functions			Verify values of P04.00-P04.09.	Set proper values for P04.00-P04.09.

Error code	Main	Sub	Display: "Er 211"	
	21	1	Content: I/O input interface function assignment error	
Cause			Diagnosis	Solution
Input signal assignment error			Verify values of P04.00-P04.09.	Set proper values for P04.00-P04.09.

Error code	Main	Sub	Display: "Er 212"	
	21	2	Content: I/O output interface function assignment error	
Cause			Diagnosis	Solution
Input signal assignment error			Verify values of P04.10-P04.15.	Set proper values for P04.10-P04.15.

Error code	Main	Sub	Display: “Er 240”	
	24	0	Content: CRC correction error during EEPROM parameter saving	
Cause			Diagnosis	Solution
L1, L2 terminal voltage too low			Verify if L1, L2 terminal voltage too low.	Make sure L1, L2 terminal voltage is within recommended range.
Parameter saving anomaly			Save parameter again and restart.	Save parameter again.

Error code	Main	Sub	Display: "Er 250"	
	25	0	Content: Gantry communication error	
Cause			Diagnosis	Solution
Excessive Gantry drivers deviation			Verify if both drivers share the same set of parameters.	Unify the parameters of both drivers.
			Verify if control cables of the drivers are properly connected.	Connect control cable properly.
			Verify if gantry communication cable is connected properly.	Connect communication cable properly.

Error code	Main	Sub	Display: "Er 251"	
	25	1	Content: Gantry communication error	
Cause			Diagnosis	Solution
Gantry communication data error			Verify if gantry communication cable is connected properly.	Connect communication cable properly.

Error code	Main	Sub	Display: "Er 252"	
	25	2	Content: Gantry communication error	
Cause			Diagnosis	Solution
After the main axis has been servo on for 2 seconds, the slave axis is still not servo on			Check if the slave axis is connected to the debugging line.	Disconnect the slave axis debugging line.

Error code	Main	Sub	Display: "Er 253"	
	25	3	Content: Gantry communication error	
Cause			Diagnosis	Solution

Under servo on conditions, if the gantry synchronization torque deviation exceeds the gantry torque deviation threshold for more than 5ms, an alarm will occur	Check if the gantry torque deviation threshold parameter is set correctly.	Ensure that the gantry torque deviation threshold setting parameter is appropriate.
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Error code	Main	Sub	Display: "Er 254"
	25	4	Content: Gantry communication error
Cause			Solution
Gantry synchronization is not in position mode, alarm 254			Adjust the parameters.

Error code	Main	Sub	Display: "Er 255"
	25	5	Content: Gantry communication error
Cause			Solution
After receiving the command, if the gantry alignment is not completed properly after 200ms, an alarm occurs			Servo on, follow the gantry alignment enable sequence. Set reasonable parameters to ensure the spindle movement distance and gantry alignment offset error are within the positioning end range.

Error code	Main	Sub	Display: "Er 260"
	26	0	Content: Positive/Negative position limit triggered under non-homing mode
Cause			Solution
Positive/negative position limit triggered			Check wiring and parameter setting.

Error code	Main	Sub	Display: "Er 270" -- "Er 272"
	27	0~2	Error description: Analog input 1-3 out of range
Cause			Solution
Analog value out of range			Adjust analog input voltage

Error code	Main	Sub	Display: "Er 280"
	28	0	Error description: Pulse regeneration limit protection
Cause			Solution
Frequency divider output frequency exceeds 1MHz			Reduce the number of frequency divided pulse output or reduce rotational speed.

Error code	Main	Sub	Display: "Er 290"
	29	0	Error description: Control mode does not match in full closed loop mode
Cause			Solution

Control mode is not position mode when full closed loop mode is on	Verify if P00.01 is set to 0	Make sure P00.01 is set to 0 – Position mode
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Error code	Main	Sub	Display: "Er 291"
	29	1	Error description: Encoder mode does not match in full closed loop mode
Cause			Solution
Encoder mode does not match in full closed loop mode			For external ABZ encoder, please set P00.31 = 0.
Cause			Diagnosis
Encoder mode does not match in full closed loop mode			Only ABZ encoder is supported for the moment being

Error code	Main	Sub	Display: "Er 550" -- "Er 553"	
	55	0~3	Error description: Encoder mode does not match in full closed loop mode	
Cause			Diagnosis	Solution
Er550: External ABZ encoder disconnected			Verify if encoder cable is connected properly	Make sure encoder cable connection is tight. Change encoder cable. External encoder cable needs to be shielded.
Er551: External encoder Phase A disconnected				
Er552: External encoder Phase B disconnected				
Er553: External encoder Phase Z disconnected				

Error code	Main	Sub	Display: "Er 570"
	57	0	Error description: Forced alarm input valid
Cause			Solution
E-STOP forced alarm input signal occurred			Verify if the input wiring connection is correct.
Cause			Diagnosis
E-STOP forced alarm input signal occurred			Verify forced alarm input signal.

Error code	Main	Sub	Display: "Er 5F0"
	5F	0	Content: Motor model no. detection error
Cause			Solution
Motor model No. is wrong			Confirm the correct motor parameters.
Cause			Diagnosis
Motor model No. is wrong			Check if the motor model code P07.15 is correct.

Error code	Main	Sub	Display: "Er 5F1"
	5F	1	Error description: Driver power module detection error
Cause			Solution
Driver power rating not within range.			Contact the manufacturer.
Cause			Diagnosis
Driver power rating not within range.			Power cycle the driver.

Error code	Main	Sub	Display: "Er 600"
	60	0	Error description: Main loop interrupted timeout
Cause			Solution
The motor control loop calculation time overflow			Replace encoder cable if necessary.
Cause			Diagnosis
The motor control loop calculation time overflow			Verify if encoder connection is and that the encoder cable is not too long (more than 20 meters)
			Power cycle the driver.

Error code	Main	Sub	Display: "Er 601"	
	60	1	Error description: Velocity loop interrupted timeout	
Cause			Diagnosis	Solution
Motor control loop calculation time overflow			Verify if encoder connection is and that the encoder cable is not too long (more than 20 meters)	Replace encoder cable if necessary.
			Restart driver	Replace the driver with a new one

Error code	Main	Sub	Display: "Er 700"	
	70	0	Error description: Encryption error	
Cause			Diagnosis	Solution
Encryption error during initialization upon power-on.			Restart driver	Please contact our technical support

Error code	Main	Sub	Display: "Er 890"	
	89	0	Error description: Homing error	
Cause			Diagnosis	Solution
Excess homing velocity. Homing mode is different from the given signal. Sensor signal edge inconsistent			Verify if homing velocity is too high. Verify if homing mode is set correctly. Verify if sensor signal edge is consistent.	Set an optimal homing velocity Make sure sensor signal edge is consistent.
Inconsistent origin status			Homing acceleration/ deceleration is set too low. Electronic gear ratio is low which causes acceleration/deceleration to be too low.	If electronic gear ratio cannot be changed, please set a suitable 609A. Increase electronic gear ratio

Error code	Main	Sub	Display: "Er 920"	
	92	0	Error description: External encoder parameter initialization error	
Cause			Diagnosis	Solution
Encoder parameter P00.37 setting error			Verify if P00.37 set value is out of range	Modify P00.37 set value, please use default value and see if the error persists.

6.4 Alarm Clearing

Clearable alarms

Method 1:

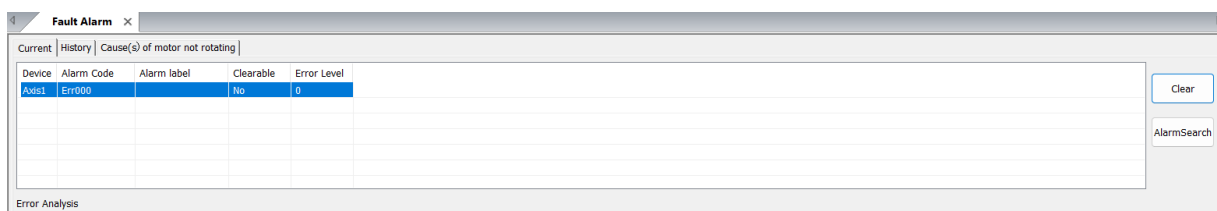
After confirming the issue, press M to select auxiliary function, Press 'S' to enter into "AF_ACL". Press and hold to clear the alarm.

Method 2:

Set IO input function as Alarm clear input "(A-CLR)", refer to switch input interface connection to clear the alarm.

Method 3:

After confirming the issue, can directly clear the alarm by using the 'Clear Alarm' button in the alarm information of the debugging software.



Non-clearable alarms

The driver needs to be powered off. After eliminating the cause of the fault, restart the system. If the alarm cannot be cleared after power cycling, please contact MISUMI staff.

Chapter 7 Peripheral Devices

7.1 Peripheral Device Overview Table

Component Type	Component Name	Installation Location	Compatible Models	Function Description
Peripheral Electronic Components	Fuse & Circuit Breaker	Driver input side	All models	Required for compliance with EN 61800-5-1 and UL61800-5-1 standards. Must be installed on the input side to prevent accidents caused by internal circuit short circuits.
	AC Input Reactor	Driver input side		Reduces high-frequency harmonics and improves power factor.
	EMC Filter	Driver input side		Reduces conducted and radiated interference from the driver.
	Magnetic Ring / Clamp	Driver output side		Reduces external interference and bearing current.
		Signal Cable		Enhances signal anti-interference performance.

7.2 Fuse, Contactor and Circuit Breaker

7.2.1 Fuse

To prevent accidents due to short circuits, fuses must be installed on the input side.

Table 7-1 Recommended Fuse selection table

Servo driver Model	Rated Input Current	Recommended Fuse		
		Manufacturer	Rated Current (A)	Model
Single phase 220V				
E-RMA30	4.0	Bussmann	20	FWP-20B
E-RMA60	8.4		40	FWP-40C
Three phase 220V				
E-RMA30	2.5	Bussmann	15	FWP-15B
E-RMA60	4.6		35	FWP-35C

7.2.2 Electromagnetic Contactor

Table 7-2 Recommended Electromagnetic contactor selection table

Servo driver Model	Rated Input Current	Recommended Contactor		
		Manufacturer	Rated Current (A)	Model
Single phase 220V				
E-RMA30	4.0	Schneider	9	LC1 D09
E-RMA60	8.4		12	LC1 D12
Three phase 220V				
E-RMA30	2.5	Schneider	9	LC1 D09
E-RMA60	4.6		9	LC1 D09

7.2.3 Circuit Breaker

Table 7-3 Recommended Circuit breaker selection table

Servo driver Model	Rated Input Current	Recommended Breaker		
		Manufacturer	Rated Current (A)	Model
Single phase 220V				
E-RMA30	4.0	Schneider	6	OSMC32N2C6
E-RMA60	8.4		16	OSMC32N2C16
Three phase 220V				
E-RMA30	2.5	Schneider	4	OSMC32N2C4
E-RMA60	4.6		16	OSMC32N2C16

If the equipment requires the use of a Residual Current Device (RCD), please follow the selection criteria below:

- The driver equipment may generate DC leakage current in the protective conductor, so be sure to use a Type B RCD.
- The driver generates a certain amount of high-frequency leakage current during operation. To avoid false triggering of the RCD, select an RCD with a tripping current of no less than 100mA for each driver.
- When multiple drivers share a single RCD in parallel, choose an RCD with a tripping current of no less than 300mA.

7.3 AC Input Reactor

AC input reactors are primarily used to reduce harmonics in the input current and are configured as optional components. When the application environment has higher harmonic requirements, an external reactor can be used. Recommended manufacturers and models for input reactors are shown in the table below:

Table 7-4 Recommended AC input reactor selection table (Three phase 220V)

Driver Model	Rated Input Current (A)	Inductance (mH)
E-RMA30	2.5	5
E-RMA60	4.6	5

7.4 EMC Filter

To ensure that this product meets the radiation and conducted emission requirements of the EN IEC 61800-3 standard, external EMC filters listed in the table below need to be connected. The EMC filters available for this product are the Schaffner FN2090 and FN3258 series. Please select according to the rated input current of this product, as shown in the table below:

Table 7-5 Standard EMC filter model and exterior

Filter Model		Appearance
SCHAFFNER	FN2090 Series	
	FN3258 Series	

Table 7-6 Recommended EMC filter selection table (SCHAFFNER)

Servo driver Model	Rated Input Current (A)	Recommended Filter
Single phase 220V		
E-RMA30	4.0	FN 2090-4-06
E-RMA60	8.4	FN 2090-10-06
Three phase 220V		
E-RMA30	2.5	FN 3287-10-44-C28-R65
E-RMA60	4.6	FN 3287-10-44-C28-R65

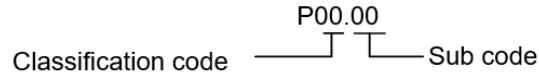
7.5 Magnetic Rings and Clamps

Magnetic rings are suitable for the input or output side of the driver. During installation, place them as close to the driver as possible. Installing magnetic rings on the input side can suppress noise in the driver's power input system. Installing magnetic rings on the output side primarily reduces external interference from the driver and decreases bearing currents. For issues such as leakage current or interference in signal lines in certain applications, magnetic rings or magnetic clamps can be used for suppression.

- Amorphous Magnetic Rings: These have very high magnetic permeability below 1MHz, making them highly effective at reducing driver interference, but they are relatively costly.
- Ferrite Magnetic Clamps: These perform better in frequency bands above 1MHz and are effective at suppressing interference in low-power drivers and various signal lines. They are low-cost and aesthetically pleasing to install.

Chapter 8 Parameter

8.1 Parameters list



Valid mode:

P: Valid in position control mode

S: Valid in velocity control mode

T: Valid in torque control mode

PR: Valid in PR control mode

Activation:

“O” – Restart driver for parameter changes to be valid

“—” – Valid immediately

“Δ” – Valid when axis stops

“●” – Valid after re-enabling

[Class 0] Basic settings

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P00.00	Model-following bandwidth	1	Δ	O	—	—	16bit	R/W	0x0001
P00.01	Control Mode Settings	0	O	O	O	O	16bit	R/W	0x0003
P00.02	Real time Auto Gain Adjusting	0x1	—	O	O	O	16bit	R/W	0x0005
P00.03	Real time auto stiffness adjusting	11	—	O	O	O	16bit	R/W	0x0007
P00.04	Inertia ratio	250	—	O	O	O	16bit	R/W	0x0009
P00.05	Command pulse input selection	0	O	O	—	—	16bit	R/W	0x000B
P00.06	Command pulse polarity inversion	0	O	O	—	—	16bit	R/W	0x000D
P00.07	Command pulse input mode	3	O	O	—	—	16bit	R/W	0x000F
P00.08	1 st command pulse count per revolution	10000	O	O	—	—	32bit	R/W	0x0010 0x0011
P00.09	1 st command frequency divider/multiplier numerator	1	O	O	—	—	32bit	R/W	0x0012 0x0013
P00.10	1 st command frequency divider/multiplier denominator	1	O	O	—	—	32bit	R/W	0x0014 0x0015
P00.11	Encoder output pulse count per revolution	2500	O	O	O	O	16bit	R/W	0x0017
P00.12	Pulse output logic inversion	0	O	O	O	O	16bit	R/W	0x0019
P00.13	1 st Torque Limit	350	—	O	O	O	16bit	R/W	0x001B
P00.14	Excessive position deviation	30	—	O	—	—	16bit	R/W	0x001D
P00.15	Absolute Encoder settings	0	O	O	O	O	16bit	R/W	0x001F
P00.16	Regenerative resistance	100	—	O	O	O	16bit	R/W	0x0021
P00.17	Regenerative resistor power rating	50	—	O	O	O	16bit	R/W	0x0023
P00.22	PR and P/S/T switching	0	—	O	O	O	16bit	R/W	0x002D
P00.25	Auxiliary function	0	—	O	O	O	16bit	R/W	0x0033
P00.26	Simulated I/O	0	—	O	O	O	16bit	R/W	0x0035
P00.30	Encoder feedback mode	0	—	O	O	O	16bit	R/W	0x0037

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P00.31	External encoder type	0	0	0	0	0	16bit	R/W	0x0039
P00.32	External encoder direction	0	0	0	0	0	16bit	R/W	0x003B
P00.33	Excessive hybrid deviation	16000	0	0			16bit	R/W	0x0043
P00.34	Clear excess hybrid control deviation	0	0	0			16bit	R/W	0x0045
P00.35	External encoder frequency divider numerator	0	0	0	0	0	16bit	R/W	0x0047
P00.36	External encoder frequency divider denominator	10000	0	0	0	0	16bit	R/W	0x0049
P00.37	External encoder feedback pulse count per revolution	0	0	0	0	0	16bit	R/W	0x004B
P00.38	Z-signal pulse input source	0	—	0	0	0	16bit	R/W	0x004D
P00.40	Mapping parameter 1	0x0	—	0	0	0	32bit	R/W *	0x0050 0x0051
P00.41	Mapping parameter 2	0x0	—	0	0	0	32bit	R/W *	0x0052 0x0053
P00.42	Mapping parameter 3	0x0	—	0	0	0	32bit	R/W *	0x0054 0x0055
P00.43	Mapping parameter 4	0x0	—	0	0	0	32bit	R/W *	0x0056 0x0057
P00.44	Mapping parameter 5	0x0	—	0	0	0	32bit	R/W *	0x0058 0x0059
P00.45	Mapping parameter 6	0x0	—	0	0	0	32bit	R/W *	0x005A 0x005b
P00.46	Mapping parameter 7	0x0	—	0	0	0	32bit	R/W *	0x005C 0x005d
P00.47	Mapping parameter 8	0x0	—	0	0	0	32bit	R/W *	0x005E 0x005F
P00.50	Mapping parameter 1 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x0064 0x0065
P00.51	Mapping parameter 2 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x0066 0x0067
P00.52	Mapping parameter 3 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x0068 0x0069
P00.53	Mapping parameter 4 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x006A 0x006B
P00.54	Mapping parameter 5 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x006C 0x006D
P00.55	Mapping parameter 6 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x006E 0x007F
P00.56	Mapping parameter 7 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x0070 0x0071
P00.57	Mapping parameter 8 indicator	0x0049 0049	—	0	0	0	32bit	R/W	0x0072 0x0073

[Class 1] Gain adjustment

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P01.00	1 st position loop gain	320	—	0	—	—	16bit	R/W	0x0101
P01.01	1 st velocity loop gain	180	—	0	0	0	16bit	R/W	0x0103
P01.02	1 st Integral Time Constant of Velocity Loop	310	—	0	0	0	16bit	R/W	0x0105
P01.03	1 st velocity detection filter	15	—	0	0	0	16bit	R/W	0x0107
P01.04	1 st Torque Filter Time Constant	126	—	0	0	0	16bit	R/W	0x0109
P01.05	2 nd Position Loop Gain	380	—	0	—	—	16bit	R/W	0x010B
P01.06	2 nd velocity loop gain	180	—	0	0	0	16bit	R/W	0x010D
P01.07	2 nd Integral Time Constant of Velocity Loop	10000	—	0	0	0	16bit	R/W	0x010F
P01.08	2 nd velocity detection filter	15	—	0	0	0	16bit	R/W	0x0111
P01.09	2 nd Torque Filter Time Constant	126	—	0	0	0	16bit	R/W	0x0113
P01.10	Velocity feed forward gain	300	—	0	—	—	16bit	R/W	0x0115
P01.11	Velocity feed forward filter time constant	50	—	0	—	—	16bit	R/W	0x0117
P01.12	Torque feed forward gain	0	—	0	0	—	16bit	R/W	0x0119
P01.13	Torque feed forward filter time constant	0	—	0	0	—	16bit	R/W	0x011B
P01.15	Position control gain switching mode	0	—	0	—	—	16bit	R/W	0x011F
P01.17	Position control gain switching level	50	—	0	—	—	16bit	R/W	0x0123
P01.18	Hysteresis at position control switching	33	—	0	—	—	16bit	R/W	0x0125
P01.19	Position control switching time	33	—	0	—	—	16bit	R/W	0x0127
P01.35	Position command pulse filter time	8	0	0	—	—	16bit	R/W	0x0147
P01.36	External ABZ encoder filter time	3	0	0	—	—	16bit	R/W	0x0149
P01.39	Special function register 2	0	—	0	0	0	16bit	R/W	0x014F

[Class 2] Vibration Suppression

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P02.00	Adaptive filtering mode settings	0	—	0	0	—	16bit	R/W	0x0201
P02.01	1 st notch frequency	4000	—	0	0	0	16bit	R/W	0x0203
P02.02	1 st notch width	4	—	0	0	0	16bit	R/W	0x0205
P02.03	1 st notch depth	0	—	0	0	0	16bit	R/W	0x0207
P02.04	2 nd notch frequency	4000	—	0	0	0	16bit	R/W	0x0209
P02.05	2 nd notch width	4	—	0	0	0	16bit	R/W	0x020B
P02.06	2 nd notch depth	0	—	0	0	0	16bit	R/W	0x020D
P02.07	3 rd notch frequency	4000	—	0	0	0	16bit	R/W	0x020F
P02.08	3 rd notch width	4	—	0	0	0	16bit	R/W	0x0211
P02.09	3 rd notch depth	0	—	0	0	0	16bit	R/W	0x0213
P02.14	1 st damping frequency	0	—	0	—	—	16bit	R/W	0x021D
P02.16	2 nd damping frequency	0	—	0	—	—	16bit	R/W	0x0221
P02.22	Position command smoothing filter	0	Δ	0	—	—	16bit	R/W	0x022D
P02.23	Position command FIR filter	0	Δ	0	—	—	16bit	R/W	0x022F
P02.48	Adjustment mode	0	—	0	0	0	16bit	R/W	0x0261
P02.50	MFC type	0	●	0	—	—	16bit	R/W	0x0265
P02.51	Velocity feedforward compensation coefficient	0	—	0	—	—	16bit	R/W	0x0267
P02.52	Torque feedforward compensation coefficient	0	—	0	0	—	16bit	R/W	0x0269
P02.53	Dynamic friction compensation coefficient	0	—	0	0	0	16bit	R/W	0x026B
P02.54	Overshoot time coefficient	0	—	0	0	0	16bit	R/W	0x026D
P02.55	Overshoot suppression gain	0	—	0	0	0	16bit	R/W	0x026F

[Class 3] Velocity / Torque Control

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P03.00	Velocity internal/external switching	1	—	—	0	—	16bit	R/W	0x0301
P03.01	Velocity command rotational direction selection	0	—	—	0	—	16bit	R/W	0x0303
P03.02	Velocity command input gain	500	—	—	0	0	16bit	R/W	0x0305
P03.03	Velocity command input inversion	0	—	—	0	—	16bit	R/W	0x0307
P03.04	1st speed of velocity setting	0	—	—	0	—	16bit	R/W	0x0309
P03.05	2nd speed of velocity setting	0	—	—	0	—	16bit	R/W	0x030B
P03.06	3rd speed of velocity setting	0	—	—	0	—	16bit	R/W	0x030D
P03.07	4th speed of velocity setting	0	—	—	0	—	16bit	R/W	0x030F
P03.08	5th speed of velocity setting	0	—	—	0	—	16bit	R/W	0x0311
P03.09	6th speed of velocity setting	0	—	—	0	—	16bit	R/W	0x0313
P03.10	7th speed of velocity setting	0	—	—	0	—	16bit	R/W	0x0315
P03.11	8th speed of velocity setting	0	—	—	0	—	16bit	R/W	0x0317
P03.12	Acceleration time settings	100	—	—	0	—	16bit	R/W	0x0319
P03.13	Deceleration time settings	100	—	—	0	—	16bit	R/W	0x031B
P03.14	Sigmoid acceleration/deceleration settings	0	0	—	0	—	16bit	R/W	0x031D
P03.15	Zero speed clamp function selection	0	—	—	0	—	16bit	R/W	0x031F
P03.16	Zero speed clamp level	30	—	—	0	—	16bit	R/W	0x0321
P03.17	Torque internal/external switching	0	—	—	—	0	16bit	R/W	0x0323
P03.18	Torque command direction selection	0	—	—	—	0	16bit	R/W	0x0325
P03.19	Torque command input gain	30	—	—	—	0	16bit	R/W	0x0327
P03.20	Torque command input inversion	0	—	—	—	0	16bit	R/W	0x0329
P03.21	Velocity limit in torque mode	0	—	—	—	0	16bit	R/W	0x032B
P03.22	Torque command	0	—	0	0	0	16bit	R/W	0x032D

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P03.23	Zero speed delay time in velocity mode	0	—	—	O	—	16bit	R/W	0x032F
P03.24	Maximum motor rotational speed	0	—	O	O	O	16bit	R/W	0x0331
P03.29	Analog 1 clamping voltage	0	—	—	—	O	16bit	R/W	0x033B
P03.30	Analog 3 clamping voltage	0	—	—	—	O	16bit	R/W	0x033D

[Class 4] I/O Monitoring Settings

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P04.00	Input selection DI1	0x3	—	O	O	O	16bit	R/W	0x0401
P04.01	Input selection DI2	0x1	—	O	O	O	16bit	R/W	0x0403
P04.02	Input selection DI3	0x2	—	O	O	O	16bit	R/W	0x0405
P04.03	Input selection DI4	0x6	—	O	O	O	16bit	R/W	0x0407
P04.04	Input selection DI5	0xC	—	O	O	O	16bit	R/W	0x0409
P04.05	Input selection DI6	0x7	—	O	O	O	16bit	R/W	0x040B
P04.06	Input selection DI7	0x4	—	O	O	O	16bit	R/W	0x040D
P04.07	Input selection DI8	0x5	—	O	O	O	16bit	R/W	0x040F
P04.08	Input selection DI9	0x8	—	O	O	O	16bit	R/W	0x0411
P04.09	Input selection DI10	0x0	—	O	O	O	16bit	R/W	0x0413
P04.10	Output selection DO1	0x3	—	O	O	O	16bit	R/W	0x0415
P04.11	Output selection DO2	0x2	—	O	O	O	16bit	R/W	0x0417
P04.12	Output selection DO3	0x1	—	O	O	O	16bit	R/W	0x0419
P04.13	Output selection DO4	0x4	—	O	O	O	16bit	R/W	0x041B
P04.14	Output selection DO5	0x7	—	O	O	O	16bit	R/W	0x041D
P04.15	Output selection DO6	0x6	—	O	O	O	16bit	R/W	0x041F
P04.22	Analog input 1(AI-1) Zero drift settings	0	—	—	O	O	16bit	R/W	0x042D
P04.23	Analog input 1(AI-1) filter	0	—	—	O	O	16bit	R/W	0x042F
P04.24	Analog input 1(AI-1) overvoltage settings	0	—	—	O	O	16bit	R/W	0x0431
P04.25	Analog input 2(AI-2) Zero drift settings	0	—	—	O	O	16bit	R/W	0x0439
P04.26	Analog input 2(AI-2) filter	0	—	—	O	O	16bit	R/W	0x043B
P04.27	Analog input 2(AI-2) overvoltage settings	0	—	—	—	O	16bit	R/W	0x043D
P04.28	Analog input 3(AI-3) Zero drift settings	20	—	O	—	—	16bit	R/W	0x043F
P04.29	Analog input 3(AI-3) filter	1	—	O	—	—	16bit	R/W	0x0441
P04.30	Analog input 3(AI-3) overvoltage settings	0	—	O	—	—	16bit	R/W	0x0443
P04.31	Positioning complete range	50	—	O	O	O	16bit	R/W	0x0445
P04.32	Positioning complete output setting	50	—	—	O	—	16bit	R/W	0x0447
P04.33	INP positioning delay time	1000	—	—	O	—	16bit	R/W	0x0449
P04.34	Zero speed	150	—	O	O	O	16bit	R/W	0x044B
P04.35	Velocity coincidence range	0	—	O	O	O	16bit	R/W	0x044D
P04.36	Arrival velocity	30	—	O	O	O	16bit	R/W	0x044F
P04.37	Motor Power-off Delay Time	150	—	O	O	O	16bit	R/W	0x044B
P04.43	Emergency stop function	0	—	O	O	O	16bit	R/W	0x0457
P04.64	AO1 output	0	—	O	O	O	16bit	R/W	0x0481
P04.65	AO1 signal	0x4	—	O	O	O	16bit	R/W	0x0483
P04.66	AO1 amplification	100	—	O	O	O	16bit	R/W	0x0485
P04.67	AO1 communication settings	0	—	O	O	O	16bit	R/W	0x0487
P04.68	AO1 offset	0	—	O	O	O	16bit	R/W	0x0489
P04.69	AO2 output	0	—	O	O	O	16bit	R/W	0x048B
P04.70	AO2 signal	0x1	—	O	O	O	16bit	R/W	0x048D
P04.71	AO2 amplification	100	—	O	O	O	16bit	R/W	0x048F
P04.72	AO2 communication settings	0	—	O	O	O	16bit	R/W	0x0491
P04.73	AO2 offset	0	—	O	O	O	16bit	R/W	0x0493
P04.74	Warning indicator light 1 signal	1	—	O	O	O	16bit	R/W	0x0495
P04.75	Warning indicator light 2 signal	2	—	O	O	O	16bit	R/W	0x0497
P04.76	Warning indicator light 3 signal	3	—	O	O	O	16bit	R/W	0x0499
P04.77	Warning indicator light 4 signal	4	—	O	O	O	16bit	R/W	0x049B
P04.78	Warning indicator light 5 signal	5	—	O	O	O	16bit	R/W	0x049D

[Class 5] Extension settings

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P05.00	2nd pulse count per revolution	10000	0	0	—	—	32bit	R/W	0x0500 0x0501
P05.01	2nd Command frequency divider/multiplier numerator	1	0	0	—	—	32bit	R/W	0x0502 0x0503
P05.02	2nd Command frequency divider/multiplier denominator	1	0	0	—	—	32bit	R/W	0x0504 0x0505
P05.04	Driver prohibition input settings	0	—	0	0	0	16bit	R/W	0x0509
P05.06	Servo-off mode	0	—	0	0	0	16bit	R/W	0x050D
P05.09	Main power-off detection time	50	—	0	0	0	16bit	R/W	0x0513
P05.10	Servo-off due to alarm mode	0	0	0	0	0	16bit	R/W	0x0515
P05.11	Servo braking torque setting	0	—	0	0	0	16bit	R/W	0x0517
P05.12	Overload level setting	0	—	0	0	0	16bit	R/W	0x0519
P05.13	Overspeed level settings	0	—	0	0	0	16bit	R/W	0x051B
P05.15	I/O digital filter	0	0	0	0	0	16bit	R/W	0x051F
P05.17	Counter clearing input mode	3	—	0	—	—	16bit	R/W	0x0523
P05.20	Position unit settings	1	—	0	—	—	16bit	R/W	0x0529
P05.21	Torque limit selection	0	—	0	0	0	16bit	R/W	0x052B
P05.22	2nd torque limit	300	—	0	0	0	16bit	R/W	0x052D
P05.23	Positive torque warning threshold	0	—	0	0	0	16bit	R/W	0x052F
P05.24	Negative torque warning threshold	0	—	0	0	0	16bit	R/W	0x0531
P05.28	LED initial status	1	—	0	0	0	16bit	R/W	0x0539
P05.29	RS485 communication mode	0x5	—	0	0	0	16bit	R/W	0x053B
P05.30	RS485 communication Baud rate	4	—	0	0	0	16bit	R/W	0x053D
P05.31	RS485 axis address	1	—	0	0	0	16bit	R/W	0x053F
P05.32	Max. command pulse input frequency	0	—	0	—	—	16bit	R/W	0x0541
P05.35	Front panel lock setting	0	—	0	0	0	16bit	R/W	0x0547
P05.37	Torque saturation alarm detection time	500	—	0	0	0	16bit	R/W	0x0549
P05.42	Frequency divider output – Z-signal polarity	0	0	0	0	0	16bit	R/W	0x0555
P05.43	Frequency divider output – Z-signal width	0	0	0	0	0	16bit	R/W	0x0557
P05.44	Frequency divider output source	0	0	0	0	0	16bit	R/W	0x0559
P05.46	External encoder overspeed feedback threshold	0	0	0	0	0	16bit	R/W	0x055D

[Class 6] Other Settings

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P06.01	Encoder zero position compensation	0	0	0	0	0	16bit	R/W	0x0603
P06.03	JOG trial run torque command	350	—	—	—	0	16bit	R/W	0x0607
P06.04	JOG trial run velocity command	30	—	0	0	0	16bit	R/W	0x0609
P06.05	Position 3rd gain valid time	0	—	0	—	—	16bit	R/W	0x060B
P06.06	Position 3rd gain scale factor	100	—	0	—	—	16bit	R/W	0x060D
P06.07	Torque command additional value	0	—	0	0	0	16bit	R/W	0x060F
P06.08	Positive direction torque compensation value	0	—	0	0	0	16bit	R/W	0x0611
P06.09	Negative direction torque compensation value	0	—	0	0	0	16bit	R/W	0x0613
P06.11	Current response settings	100	—	0	0	0	16bit	R/W	0x0617
P06.14	Max. time to stop after disabling	500	—	0	0	0	16bit	R/W	0x061D
P06.20	Trial run distance	10	—	0	—	—	16bit	R/W	0x0629
P06.21	Trial run waiting time	300	—	0	—	—	16bit	R/W	0x062B
P06.22	No. of trial run cycles	5	—	0	—	—	16bit	R/W	0x062D
P06.25	Trial run acceleration	200	—	0	0	—	16bit	R/W	0x0633
P06.28	Observer gain	0	—	0	0	0	16bit	R/W	0x0639
P06.29	Observer filter	0	—	0	0	0	16bit	R/W	0x063B
P06.56	Blocked rotor alarm torque threshold	300	—	0	0	0	16bit	R/W	0x0671
P06.57	Blocked rotor alarm delay time	400	—	0	0	0	16bit	R/W	0x0673
P06.63	Absolute multiturn data upper limit	0	0	0	0	0	16bit	R/W	0x067F

[Class 8] PR Control Parameters

Code	Label	Default	Activation	Valid mode			Communication mode		
				PR	S	T	Byte	Op.	485 Addr.
P08.00	PR Control	0	—	0	—	—	16bit	R/W	0x6000
P08.01	Path count	16	—	0	—	—	16bit	R/W	0x6001
P08.02	Control Operation	—	—	0	—	—	16bit	R/W	0x6002
P08.06	Software positive limit H	0	—	0	—	—	16bit	R/W	0x6006
P08.07	Software positive limit (L)	0	—	0	—	—	16bit	R/W	0x6007
P08.08	Software negative limit H	0	—	0	—	—	16bit	R/W	0x6008
P08.09	Software negative limit (L)	0	—	0	—	—	16bit	R/W	0x6009
P08.10	Homing mode	0	—	0	—	—	16bit	R/W	0x600A
P08.11	Zero position H	0	—	0	—	—	16bit	R/W	0x600B
P08.12	Zero position (L)	0	—	0	—	—	16bit	R/W	0x600C
P08.13	Home position off set H	0	—	0	—	—	16bit	R/W	0x600D
P08.14	Home position off set (L)	0	—	0	—	—	16bit	R/W	0x600E
P08.15	High homing velocity	200	—	0	—	—	16bit	R/W	0x600F
P08.16	Low homing velocity	50	—	0	—	—	16bit	R/W	0x6010
P08.17	Homing acceleration	100	—	0	—	—	16bit	R/W	0x6011
P08.18	Homing deceleration	100	—	0	—	—	16bit	R/W	0x6012
P08.19	Homing torque holding time	100	—	0	—	—	16bit	R/W	0x6013
P08.20	Homing torque	100	—	0	—	—	16bit	R/W	0x6014
P08.21	Homing overtravel alarm range	0	—	0	—	—	16bit	R/W	0x6015
P08.22	Emergency stop at limit deceleration	10	—	0	—	—	16bit	R/W	0x6016
P08.23	STP emergency stop deceleration	50	—	0	—	—	16bit	R/W	0x6017
P08.26	I/O combination trigger mode	0	—	0	—	—	16bit	R/W	0x601A
P08.27	I/O combination filter	5	—	0	—	—	16bit	R/W	0x601B
P08.28	S-code current output value	0	—	0	—	—	16bit	R/W	0x601C
P08.29	PR warning	0	—	0	—	—	16bit	R/W	0x601D
P08.39	JOG velocity	100	—	0	—	—	16bit	R/W	0x6027
P08.40	JOG acceleration	100	—	0	—	—	16bit	R/W	0x6028
P08.41	JOG deceleration	100	—	0	—	—	16bit	R/W	0x6029
P08.42	Command position H	0	—	0	—	—	16bit	R/W	0x602A
P08.43	Command position (L)	0	—	0	—	—	16bit	R/W	0x602B
P08.44	Motor position H	0	—	0	—	—	16bit	R/W	0x602C
P08.45	Motor position (L)	0	—	0	—	—	16bit	R/W	0x602D
P08.46	Input I/O status	0	—	0	—	—	16bit	R/W	0x602E

Code	Label	Default	Activation	Valid mode			Communication mode		
				PR	S	T	Byte	Op.	485 Addr.
P08.47	Output I/O status	0	—	O	—	—	16bit	R/W	0x602F
P08.48	Path 0 S-code	0	—	O	—	—	16bit	R/W	0x6030
P08.49	Path 1 S-code	0	—	O	—	—	16bit	R/W	0x6031
P08.50	Path 2 S-code	0	—	O	—	—	16bit	R/W	0x6032
P08.51	Path 3 S-code	0	—	O	—	—	16bit	R/W	0x6033
P08.52	Path 4 S-code	0	—	O	—	—	16bit	R/W	0x6034
P08.53	Path 5 S-code	0	—	O	—	—	16bit	R/W	0x6035
P08.54	Path 6 S-code	0	—	O	—	—	16bit	R/W	0x6036
P08.55	Path 7 S-code	0	—	O	—	—	16bit	R/W	0x6037
P08.56	Path 8 S-code	0	—	O	—	—	16bit	R/W	0x6038
P08.57	Path 9 S-code	0	—	O	—	—	16bit	R/W	0x6039
P08.58	Path 10 S-code	0	—	O	—	—	16bit	R/W	0x603A
P08.59	Path 11 S-code	0	—	O	—	—	16bit	R/W	0x603B
P08.60	Path 12 S-code	0	—	O	—	—	16bit	R/W	0x603C
P08.61	Path 13 S-code	0	—	O	—	—	16bit	R/W	0x603D
P08.62	Path 14 S-code	0	—	O	—	—	16bit	R/W	0x603E
P08.63	Path 15 S-code	0	—	O	—	—	16bit	R/W	0x603F

[Class 9] PR Control Path Parameters

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	R	T	Byte	Op.	485 Addr.
P09.00	P00 mode	0	—	O	—	—	16bit	R/W	0x6200
P09.01	P00 position H	0	—	O	—	—	16bit	R/W	0x6201
P09.02	P00 position(L)	0	—	O	—	—	16bit	R/W	0x6202
P09.03	P00 velocity	60	—	O	—	—	16bit	R/W	0x6203
P09.04	P00 acceleration time	100	—	O	—	—	16bit	R/W	0x6204
P09.05	P00 deceleration time	100	—	O	—	—	16bit	R/W	0x6205
P09.06	P00 pause time	0	—	O	—	—	16bit	R/W	0x6206
P09.07	P00 special parameter	0	—	O	—	—	16bit	R/W	0x6207
P09.08	PR1 mode	0	—	O	—	—	16bit	R/W	0x6208
P09.09	PR1 position H	0	—	O	—	—	16bit	R/W	0x6209
P09.10	PR1 position(L)	0	—	O	—	—	16bit	R/W	0x620A
P09.11	PR1 velocity	60	—	O	—	—	16bit	R/W	0x620B
P09.12	PR1 acceleration time	100	—	O	—	—	16bit	R/W	0x620C
P09.13	PR1 deceleration time	100	—	O	—	—	16bit	R/W	0x620D
P09.14	PR1 pause time	0	—	O	—	—	16bit	R/W	0x620E
P09.15	PR1 special parameter	0	—	O	—	—	16bit	R/W	0x620F
P09.16	PR2 mode	0	—	O	—	—	16bit	R/W	0x6210
P09.17	PR2 position H	0	—	O	—	—	16bit	R/W	0x6211
P09.18	PR2 position(L)	0	—	O	—	—	16bit	R/W	0x6212
P09.19	PR2 velocity	60	—	O	—	—	16bit	R/W	0x6213
P09.20	PR2 acceleration time	100	—	O	—	—	16bit	R/W	0x6214
P09.21	PR2 deceleration time	100	—	O	—	—	16bit	R/W	0x6215
P09.22	PR2 pause time	0	—	O	—	—	16bit	R/W	0x6216
P09.23	PR2 special parameter	0	—	O	—	—	16bit	R/W	0x6217
P09.24	PR3 mode	0	—	O	—	—	16bit	R/W	0x6218
P09.25	PR3 position H	0	—	O	—	—	16bit	R/W	0x6219
P09.26	PR3 position(L)	0	—	O	—	—	16bit	R/W	0x621A
P09.27	PR3 velocity	60	—	O	—	—	16bit	R/W	0x621B
P09.28	PR3 acceleration time	100	—	O	—	—	16bit	R/W	0x621C
P09.29	PR3 deceleration time	100	—	O	—	—	16bit	R/W	0x621D
P09.30	PR3 pause time	0	—	O	—	—	16bit	R/W	0x621E
P09.31	PR3 special parameter	0	—	O	—	—	16bit	R/W	0x621F
P09.32	PR4 mode	0	—	O	—	—	16bit	R/W	0x6220
P09.33	PR4 position H	0	—	O	—	—	16bit	R/W	0x6221
P09.34	PR4 position(L)	0	—	O	—	—	16bit	R/W	0x6222
P09.35	PR4 velocity	60	—	O	—	—	16bit	R/W	0x6223
P09.36	PR4 acceleration time	100	—	O	—	—	16bit	R/W	0x6224
P09.37	PR4 deceleration time	100	—	O	—	—	16bit	R/W	0x6225

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P R	S	T	Byte	Op.	485 Addr.
P09.38	PR4 pause time	0	—	0	—	—	16bit	R/W	0x6226
P09.39	PR4 special parameter	0	—	0	—	—	16bit	R/W	0x6227
P09.40	PR5 mode	0	—	0	—	—	16bit	R/W	0x6228
P09.41	PR5 position H	0	—	0	—	—	16bit	R/W	0x6229
P09.42	PR5 position(L)	0	—	0	—	—	16bit	R/W	0x622A
P09.43	PR5 velocity	60	—	0	—	—	16bit	R/W	0x622B
P09.44	PR5 acceleration time	100	—	0	—	—	16bit	R/W	0x622C
P09.45	PR5 deceleration time	100	—	0	—	—	16bit	R/W	0x622D
P09.46	PR5 pause time	0	—	0	—	—	16bit	R/W	0x622E
P09.47	PR5 special parameter	0	—	0	—	—	16bit	R	0x622F
P09.48	PR6 mode	0	—	0	—	—	16bit	R/W	0x6230
P09.49	PR6 position H	0	—	0	—	—	16bit	R/W	0x6231
P09.50	PR6 position(L)	0	—	0	—	—	16bit	R/W	0x6232
P09.51	PR6 velocity	60	—	0	—	—	16bit	R/W	0x6233
P09.52	PR6 acceleration time	100	—	0	—	—	16bit	R/W	0x6234
P09.53	PR6 deceleration time	100	—	0	—	—	16bit	R/W	0x6235
P09.54	PR6 pause time	0	—	0	—	—	16bit	R/W	0x6236
P09.55	PR6 special parameter	0	—	0	—	—	16bit	R/W	0x6237
P09.56	PR7 mode	0	—	0	—	—	16bit	R/W	0x6238
P09.57	PR7 position H	0	—	0	—	—	16bit	R/W	0x6239
P09.58	PR7 position(L)	0	—	0	—	—	16bit	R/W	0x623A
P09.59	PR7 velocity	60	—	0	—	—	16bit	R/W	0x623B
P09.60	PR7 acceleration time	100	—	0	—	—	16bit	R/W	0x623C
P09.61	PR7 deceleration time	100	—	0	—	—	16bit	R/W	0x623D
P09.62	PR7 pause time	0	—	0	—	—	16bit	R/W	0x623E
P09.63	PR7 special parameter	0	—	0	—	—	16bit	R/W	0x623F
P09.64	PR8 mode	0	—	0	—	—	16bit	R/W	0x6240
P09.65	PR8 position H	0	—	0	—	—	16bit	R/W	0x6241
P09.66	PR8 position(L)	0	—	0	—	—	16bit	R/W	0x6242
P09.67	PR8 velocity	60	—	0	—	—	16bit	R/W	0x6243
P09.68	PR8 acceleration time	100	—	0	—	—	16bit	R/W	0x6244
P09.69	PR8 deceleration time	100	—	0	—	—	16bit	R/W	0x6245
P09.70	PR8 pause time	0	—	0	—	—	16bit	R/W	0x6246
P09.71	PR8 special parameter	0	—	0	—	—	16bit	R/W	0x6247
P09.72	PR9 mode	0	—	0	—	—	16bit	R/W	0x6248
P09.73	PR9 position H	0	—	0	—	—	16bit	R/W	0x6249
P09.74	PR9 position(L)	0	—	0	—	—	16bit	R/W	0x624A
P09.75	PR9 velocity	60	—	0	—	—	16bit	R/W	0x624B
P09.76	PR9 acceleration time	100	—	0	—	—	16bit	R/W	0x624C
P09.77	PR9 deceleration time	100	—	0	—	—	16bit	R/W	0x624D
P09.78	PR9 pause time	0	—	0	—	—	16bit	R/W	0x624E
P09.79	PR9 special parameter	0	—	0	—	—	16bit	R/W	0x624F
P09.80	PR10 mode	0	—	0	—	—	16bit	R/W	0x6250
P09.81	PR10 position H	0	—	0	—	—	16bit	R/W	0x6251
P09.82	PR10 position(L)	0	—	0	—	—	16bit	R/W	0x6252
P09.83	PR10 velocity	60	—	0	—	—	16bit	R/W	0x6253
P09.84	PR10 acceleration time	100	—	0	—	—	16bit	R/W	0x6254
P09.85	PR10 deceleration time	100	—	0	—	—	16bit	R/W	0x6255
P09.86	PR10 pause time	0	—	0	—	—	16bit	R/W	0x6256
P09.87	PR10 special parameter	0	—	0	—	—	16bit	R/W	0x6257
P09.88	PR11 mode	0	—	0	—	—	16bit	R/W	0x6258
P09.89	PR11 position H	0	—	0	—	—	16bit	R/W	0x6259
P09.90	PR11 position(L)	0	—	0	—	—	16bit	R/W	0x625A
P09.91	PR11 velocity	60	—	0	—	—	16bit	R/W	0x625B
P09.92	PR11 acceleration time	100	—	0	—	—	16bit	R/W	0x625C
P09.93	PR11 deceleration time	100	—	0	—	—	16bit	R/W	0x625D
P09.94	PR11 pause time	0	—	0	—	—	16bit	R/W	0x625E
P09.95	PR11 special parameter	0	—	0	—	—	16bit	R/W	0x625F
P09.96	PR12 mode	0	—	0	—	—	16bit	R/W	0x6260
P09.97	PR12 position H	0	—	0	—	—	16bit	R/W	0x6261
P09.98	PR12 position(L)	0	—	0	—	—	16bit	R/W	0x6262

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P R	S	T	Byte	Op.	485 Addr.
P09.99	PR12 velocity	60		O	—	—	16bit	R/W	0x6263
P09.100	PR12 acceleration time	100	—	O	—	—	16bit	R/W	0x6264
P09.101	PR12 deceleration time	100	—	O	—	—	16bit	R/W	0x6265
P09.102	PR12 pause time	0	—	O	—	—	16bit	R/W	0x6266
P09.103	PR12 special parameter	0	—	O	—	—	16bit	R/W	0x6267
P09.104	PR13 mode	0	—	O	—	—	16bit	R/W	0x6268
P09.105	PR13 position H	0	—	O	—	—	16bit	R/W	0x6269
P09.106	PR13 position(L)	0	—	O	—	—	16bit	R/W	0x626A
P09.107	PR13 velocity	60	—	O	—	—	16bit	R/W	0x626B
P09.108	PR13 acceleration time	100	—	O	—	—	16bit	R/W	0x626C
P09.109	PR13 deceleration time	100	—	O	—	—	16bit	R/W	0x626D
P09.110	PR13 pause time	0	—	O	—	—	16bit	R/W	0x626E
P09.111	PR13 special parameter	0	—	O	—	—	16bit	R/W	0x626F
P09.112	PR14 mode	0	—	O	—	—	16bit	R/W	0x6270
P09.113	PR14 position H	0	—	O	—	—	16bit	R/W	0x6271
P09.114	PR14 position(L)	0	—	O	—	—	16bit	R/W	0x6272
P09.115	PR14 velocity	60	—	O	—	—	16bit	R/W	0x6273
P09.116	PR14 acceleration time	100	—	O	—	—	16bit	R/W	0x6274
P09.117	PR14 deceleration time	100	—	O	—	—	16bit	R/W	0x6275
P09.118	PR14 pause time	0	—	O	—	—	16bit	R/W	0x6276
P09.119	PR14 special parameter	0	—	O	—	—	16bit	R/W	0x6277
P09.120	PR15 mode	0	—	O	—	—	16bit	R/W	0x6278
P09.121	PR15 position H	0	—	O	—	—	16bit	R/W	0x6279
P09.122	PR15 position(L)	0	—	O	—	—	16bit	R/W	0x627A
P09.123	PR15 velocity	60	—	O	—	—	16bit	R/W	0x627B
P09.124	PR15 acceleration time	100	—	O	—	—	16bit	R/W	0x627C
P09.125	PR15 deceleration time	100	—	O	—	—	16bit	R/W	0x627D
P09.126	PR15 pause time	0	—	O	—	—	16bit	R/W	0x627E
P09.127	PR15 special parameter	0	—	O	—	—	16bit	R/W	0x627F

[Class C] Position Comparison

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P0C.00	Enable Position Comparison	0	—	O	O	O	16bit	R/W	0x2C01
P0C.01	Position Comparison Mode	0	—	O	O	O	16bit	R/W	0x2C03
P0C.02	Position Comparison Pulse Output Bandwidth	0	—	O	O	O	16bit	R/W	0x2C05
P0C.03	Position Comparison Output Delay	0	—	O	O	O	16bit	R/W	0x2C07
P0C.04	Position Comparison Starting Point	1	—	O	O	O	16bit	R/W	0x2C09
P0C.05	Position Comparison End Point	2	—	O	O	O	16bit	R/W	0x2C0B
P0C.06	No. of cycle for N-cycle Comparison	1	—	O	O	O	16bit	R/W	0x2C0D
P0C.07	Position Comparison - Set Current Position as Origin	1	—	O	O	O	16bit	R/W	0x2C0F
P0C.08	Position Comparison - Offset to Origin	1	—	O	O	O	16bit	R/W	0x2C11
P0C.20~61	Position Comparison 1~42 Target Value	0	—	O	O	O	16bit	R/W	0x2C28~ 0x2C7B
P0C.70	Position Comparison 1 & 2 Attribute Value	0	—	O	O	O	16bit	R/W	H:0x2C8C L:0x2C8D

[Class D] Gantry Settings

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P0D.00	Gantry Configuration	0	0	0	—	—	16bit	R/W	0x2D01
P0D.01	Gantry Slave Axis Command Mode	0	—	0	—	—	16bit	R/W	0x2D03
P0D.02	Gantry Tuning Gain 1	100	—	0	—	—	16bit	R/W	0x2D05
P0D.03	Gantry Position Synchronization Deviation Threshold	10000	—	0	—	—	16bit	R/W	0x2D07
P0D.04	Gantry Torque Deviation Threshold	500	—	0	—	—	16bit	R/W	0x2D09
P0D.05	Gantry Tuning Gain 2	0	—	0	—	—	16bit	R/W	0x2D0B
P0D.06	Position Gain	0	—	0	—	—	16bit	R/W	0x2D0D
P0D.07	Velocity Gain	0	—	0	—	—	16bit	R/W	0x2D0F
P0D.08	Velocity Integral	0	—	0	—	—	16bit	R/W	0x2D11
P0D.09	Torque Balance Controller Enables Torque Threshold	0	—	0	—	—	16bit	R/W	0x2D13
P0D.10	Homing Method	0	—	0	—	—	16bit	R/W	0x2D15
P0D.11	Alignment Mode	0	—	0	—	—	32bit	R/W	0x2D16~0x2D17

8.2 Parameters Description

8.2.1 [Class 0] Basic Setting

P00.00	Label	Model Following Control			Valid mode(s)	P		
	Range	0~5000	Unit	0.1Hz	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0001		
	Valid	Immediate						
Model-following bandwidth, also known as model-following control (MFC), is used to control the position loop to improve the responsiveness to commands, speed up positioning time and reduce following error. The effect is obvious especially in low and medium mechanical stiffness.								
Value		Description						
0		Disable model following/zero tracking control						
1		Set bandwidth automatically						
2~9		Reserved						
10~2000		Manually set control bandwidth. 30~100 recommended for belt application						

P00.01	Label	Control Mode			Valid mode(s)	P	S	T
	Range	0~6	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0003		
	Valid	Restart						
Value	Description		◆When 3, 4, 5, 6 combination hybrid mode, 1st and 2nd mode can be chosen accordingly with control mode switching input (C-MODE). C-MODE: Invalid, select 1st mode. C-MODE: Valid, select 2nd mode. Please allow some time in between mode switching commands. ◆Please set P00.01 = 6 to switch to other modes from PR mod, then set 2nd mode using P00.22. C-MODE is defaulted to Normally Open					
	1st mode	2nd mode						
0	Position	-						
1	Velocity	-						
2	Torque	-						
3	Position	Velocity						
4	Position	Torque						
5	Velocity	Torque						
6	PR internal command control	Position P00.22=0						
		Velocity P00.22=1						
		Torque P00.22=2						
7~10	Reserved							

P00.02	Label	Auto Gain Tuning Mode			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF	Unit	-	Default	0x1		
	Byte length	16bit	Attribute	R/W	485 address	0x0005		
	Valid	Immediate						
Data bits	Category	Settings	Application					

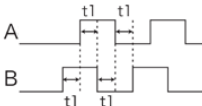
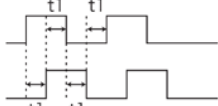
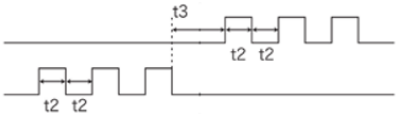
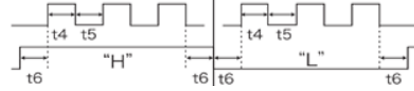
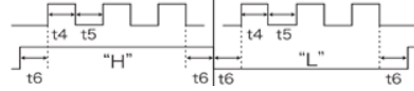
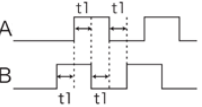
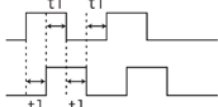
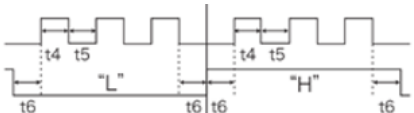
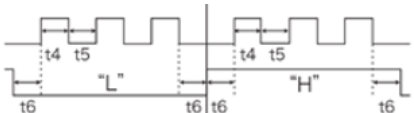
0x00_	Motion setting mode	Used to set motion setting mode, which can be selected according to the motion characteristics or setting requirements. Generally, it is recommended to select mode 1 with good generality when there is no special requirement, mode 2 when rapid positioning is needed If mode 1 and mode 2 cannot meet the requirements, please choose mode 0.	
		0: Manual	P00.03 invalid. Gain value must be adjusted manually and accordingly.
		1: Standard	P00.03 valid. Quick gain adjusting can be achieved by changing P00.03 stiffness value. Gain switching is not used in this mode, suitable for applications with requirements for stability.
		2: Positioning	P00.03 valid. Quick gain adjusting can be achieved by changing P00.03 stiffness value. This mode is suitable for applications requiring quick positioning. Not recommended for load mounted vertical to ground, or please compensate for the load using P06.07
0x0_0	Load type setting	Used to select the load type, choose according to load-inertia ratio and mechanical structure.	
		0: Rigid structure	This mode prioritizes system responsiveness. Use this mode when there is a relatively rigid structure with low load inertia. Typical application including directly connected high-precision gearbox, lead screw, gears, etc.
		1: High inertia	For applications with higher load inertia (10 times or above), gain settings take into account both machine stability and responsiveness. Not recommended to set stiffness above 15 for high load inertia.
		2: Flexible structure	This mode prioritizes system stability. Use this mode when there is low rigidity structure with high load inertia. Typical applications included belts and chains.
0x_00	reserved		
The setting type combination is a hexadecimal standard, as follows:			
Setting type combination		Application type	
0X000		Rigid structure + Manual	
0X001		Rigid structure +Standard	
0X002		Rigid structure +Positioning	
0X010		High inertia + Manual	
0X011		High inertia + Standard	
0X012		High inertia + Positioning	
0X020		Flexible structure + Manual	
0X021		Flexible structure +Standard	
0X022		Flexible structure +Positioning	

P00.03	Label	Stiffness Level			Valid mode(s)	P	S	T
	Range	0~31	Unit	-	Default	13		
	Byte length	16bit	Attribute	R/W	485 address	0x0007		
	Valid	Immediate						
Low -> Mechanical stiffness -> High Low -> Servo gain -> High 0·1.....11·12·13.....30·31 Low -> Responsiveness -> High								
Lower values ensure better system responsiveness and mechanical stiffness but machine vibration might occur, please set accordingly. Recommend to set to around 15 with motor with high inertia.								

P00.04	Label	Inertia Ratio			Valid mode(s)	P	S	T
	Range	0~200000	Unit	%	Default	250		
	Byte length	16bit	Attribute	R/W	485 address	0x0009		
	Valid	Immediate						
$P00.04 = (\text{load inertia} / \text{motor rotational inertia}) \times 100\%$								
Set inertia ratio according to actual load inertia. When both are uniform, actual motor velocity loop responsiveness and gain settings will be consistent. If inertia ratio is greater than actual value, velocity loop gain settings will be higher and vice versa. For motor with high inertia, P00.04 can be left unfilled but optimal setting of P00.04 could improve system performance.								

P00.05	Label	Command Pulse Input			Valid mode(s)	P		
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x000B		
	Valid	Restart						
Value		Description						
0		Pulse input low speed channel (200/500kHz pulse input)						
1		Pulse input high speed channel (4MHz pulse input)						
Both channels cannot be used at the same time.								

P00.06	Label	Command Pulse Polarity			Valid mode(s)	P		
	Range	0~7	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x000D		
	Valid	Restart						
P00.06: Sets the polarity of the command pulse input. It only changes the motor rotation direction; it does not invert the sign of the command. When velocity or torque mode is inverted, parameters P03.03 and P03.20 are disabled.								
Value	Position Mode		Velocity Mode		Torque Mode			
0	Not Inverted		Not Inverted		Not Inverted			
1	Inverted		Not Inverted		Not Inverted			
2	Not Inverted		Inverted		Not Inverted			
3	Inverted		Inverted		Not Inverted			
4	Not Inverted		Not Inverted		Inverted			
5	Inverted		Not Inverted		Inverted			
6	Not Inverted		Inverted		Inverted			

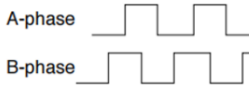
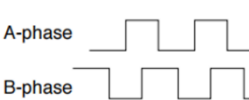
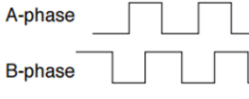
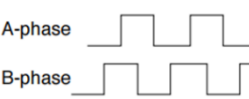
P00.07	Label	Command Pulse Mode			Valid mode(s)	P		
	Range	0~3	Unit	-	Default	3		
	Byte length	16bit	Attribute	R/W	485 address	0x000F		
	Valid	Restart						
Command pulse input								
P00.06	P00.07	Command Pulse Mode	Positive signal			Negative signal		
0	0 or 2	90°phase difference 2 phase pulse (Phase A+ Phase B)						
	1	CW pulse sequence + CCW pulse sequence						
	3	Pulse sequence + Directional symbol						
1	0 or 2	90°phase difference 2 phase pulse (Phase A+ Phase B)						
	1	CW pulse sequence + CCW pulse sequence						
	3	Pulse sequence + Directional symbol						
Command pulse input signal max. frequency and min. duration needed								
Command pulse input interface		Max. Frequency	Min. duration needed (μs)					
			t1	t2	t3	t4	t5	t6
Pulse sequence interface	Differential driver	500 kHz	1	1	1	1	1	1
	Open collector	200 kHz	2.5	2.5	2.5	2.5	2.5	2.5
	High speed differential driver	4 MHz	0.125	0.125	0.125	0.125	0.125	0.125
Please set >0.1μs for the duration between rising and falling edge of command pulse input signal. 1 revolution with 2500 pulses 2-phase pulse input when P00.07=0 or 2, P00.08 = 10000 1 revolution with 10000 pulses 1-phase pulse input when P00.07=1 or 3, P00.08 = 10000								

P00.08	Label	1st Command Pulse Count per Revolution			Valid mode(s)	P	S	T
	Range	0~2 ²⁶	Unit	PULSE	Default	10000		
	Byte length	32bit	Attribute	R/W	485 address	H : 0x0010 L : 0x0011		
	Valid	Immediate						
Control will be affected if value set is too low. Err1b1 might occur if value < 500. (1) P00.08 valid when ≠ 0: Motor revolution = input pulse count / [P00.08 value] (2) P00.08 invalid when = 0: P00.09 and P00.10 valid.								

P00.09	Label	1st Command Frequency Divider/Multiplier Numerator			Valid mode(s)	P		
	Range	1~2 ³¹ -1	Unit	-	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0012 L: 0x0013		
	Valid	Immediate						
Valid when P00.08 = 0, please refer to description in P00.10.								

P00.10	Label	1st Command Frequency Divider/Multiplier Denominator			Valid mode(s)	P		
	Range	1~2 ³¹ -1	Unit	-	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0014 L: 0x0015		
	Valid	Immediate						
1. Settings: (1) Driver command pulse input count: X (2) Encoder pulse count after frequency divider/multiplier: Y (3) Encoder pulse count per revolution: Z (4) Motor revolution: W 2. Calculation: (1) X, Y: $Y = X * P00.09 / P00.10$ Please keep the value of P00.09 and P00.10 to be smaller than 224 (16777216). (2) Z: Motor with 23-bit motor: $Z = 2^{23} = 8388608$ (3) Y, Z, W: $W = Y / Z$ Performance cannot be guaranteed if frequency divider/multiplier ratio is set to extreme values. Err1b1 might occur if $W < 500$.								

P00.11	Label	Encoder Pulse Count per Revolution			Valid mode(s)	P	S	T
	Range	0~2 ²¹	Unit	P/r	Default	2500		
	Byte length	16bit	Attribute	R/W	485 address	0x0017		
	Valid	Restart						
If P00.11 = 1000, encoder differential output signal per revolution = 4000 pulses								

P00.12	Label	Pulse Output Logic Inversion			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0019		
	Valid	Restart						
To set phase B logic and output source from encoder pulse output. To inverse B-Phase pulse logic and change the relation between Phase A and Phase B								
Pulse output logic inversion								
P00.12	Phase B logic	CCW direction		CW direction				
0	Not inverted							
1	Inverted							

P00.13	Label	1st Torque Limit			Valid mode(s)	P	S	T
	Range	0~750	Unit	%	Default	500		
	Byte length	16bit	Attribute	R/W	485 address	0x001B		
	Valid	Immediate						
1st torque limit is set according to ratio percentage of motor rated current. Do not exceed max driver output current. Please refer to P05.21 on how to set torque limit.								

P00.14	Label	Position Deviation Threshold			Valid mode(s)	P	S	T
	Range	0~310	Unit	0.1 pitch	Default	30		
	Byte length	16bit	Attribute	R/W	485 address	0x001D		
	Valid	Immediate						
Please set threshold value for position deviation accordingly. Default factory setting = 30, Er180 will be triggered if positive deviation is in excess of 3 revolutions.								

P00.15	Label	Absolute Encoder			Valid mode(s)	P	S	T
	Range	0~15	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x001F		
	Valid	Restart						
Value	Description							
0	Doesn't retain position data on power off. Unlimited travel distance.							
1	Retrain position data on power off. For applications with fixed travel distance and no multiturn data overflow.							
2	Retrain position data on power off. Actual data feedback in between 0-(P06.63+1). Unlimited travel distance.							
3	Used when travel distance is within 1 revolution of the encoder. Data overflow will trigger alarm.							
5	Clear multiturn alarm and activate multiturn absolute function. Will switch to multiturn mode once alarm cleared, if remains at 5 after 3s, please solve according to Er153.							

9	Clear multiturn position, reset multiturn alarm and activate multiturn absolute function. Will switch to multiturn mode once alarm cleared, if remains at 9 after 3s, please solve according to Er153. Please disable axis before setting to 9 and home the axis before using.
Others	Do not use!

P00.16	Label	Eternal Regenerative Resistance			Valid mode(s)	P	S	T
	Range	25~500	Unit	Ω	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0021		
	Valid	Immediate						
To set resistance value of regenerative resistor P00.16 and P00.17 set value determine alarm threshold of Er120. If set value > actual regenerative resistance, Er120 occurrence might be delayed.								

P00.17	Label	Eternal Regenerative Resistor Power Rating			Valid mode(s)	P	S	T
	Range	20~5000	Unit	W	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0023		
	Valid	Immediate						
To set power rating of regenerative resistor. P00.16 and P00.17 determines the threshold value of Er120. Please set accordingly or it might trigger false alarm or damage to servo driver. Note: If external regenerative resistor is used, please set according to its labelled power rating.								

P00.19	Label	Friction Compensation			Valid mode(s)	P	S	T
	Range	0-1000	Unit	-	Default	0		
	Byte length	0	Attribute	R/W	485 address	0		
	Valid	Immediate						

P00.22	Label	Switch Between PR and P/V/T Mode			Valid mode(s)	P	S	T
	Range	0~2	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x002D		
	Valid	Immediate						
When P00.01 = 6(PR Mode), 2nd mode can be set on P00.22								
P00.01		P00.22		Control mode				
6	0		PR/Position					
	1		PR/Velocit					
	2		PR/Torque					

P00.38	Label	Z-signal Pulse Input Source			Valid mode(s)	P	S	T
	Range	0x0~0x3	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x004D		
	Valid	Immediate						
Value	Bit 1 (Probe Z-signal)			Bit 0 (Homing Z-Signal)				
0	Motor Z-signal			Motor Z-signal				
1	Motor Z-signal			External encoder Z-signal				

2	External encoder Z-signal	Motor Z-signal		
3	External encoder Z-signal	External encoder Z-signal		

P00.40	Label	Mapping Parameter 1			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0050 L: 0x0051		
	Valid	Immediate						
For user to set parameters unrelated by RS485 address quickly. Mapping parameter ID to be written is set on P00.50 by RS485. Data saved in P00.40 is parameter designated by P00.50. Please refer to P00.57 for parameter settings. Note: Range, unit and attribute of P00.40 is determined by P00.50 designated parameter.								

P00.41	Label	Mapping Parameter 2			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0052 L: 0x0053		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.41 is determined by P00.51 designated parameter.								

P00.42	Label	Mapping Parameter 3			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0054 L: 0x0055		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.42 is determined by P00.52 designated parameter.								

P00.43	Label	Mapping Parameter 4			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0056 L: 0x0057		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.43 is determined by P00.53 designated parameter.								

P00.44	Label	Mapping Parameter 5			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0058 L: 0x0059		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.44 is determined by P00.54 designated parameter.								

P00.45	Label	Mapping Parameter 6			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x005A L: 0x005B		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.45 is determined by P00.55 designated parameter.								

P00.46	Label	Mapping Parameter 7			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x005C L: 0x005D		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.46 is determined by P00.56 designated parameter.								

P00.47	Label	Mapping Parameter 8			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x005E L: 0x005F		
	Valid	Immediate						
Please refer to P00.40 for parameter description and P00.57 for parameter settings. Note: Range, unit and attribute of P00.47 is determined by P00.57 designated parameter.								

P00.50	Label	Mapping Parameter 1 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0064 L: 0x0065		
	Valid	Immediate						

P00.51	Label	Mapping Parameter 2 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0066 L: 0x0067		
	Valid	Immediate						

P00.52	Label	Mapping Parameter 3 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0068 L: 0x0069		
	Valid	Immediate						

P00.53	Label	Mapping Parameter 4 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x006A L: 0x006B		
	Valid	Immediate						

P00.54	Label	Mapping Parameter 5 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x2		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x006C L: 0x006D		
	Valid	Immediate						

P00.55	Label	Mapping Parameter 6 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x3		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x006EL: 0x006F		
	Valid	Immediate						

P00.56	Label	Mapping Parameter 7 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x4		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0070 L: 0x0071		
	Valid	Immediate						

P00.57	Label	Mapping Parameter 8 Indicator			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF F	Unit	-	Default	0x5		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0072 L: 0x0073		
	Valid	Immediate						
Set parameter to 0xABCDWXYZ High bit parameter position (PH) and low bit parameter position(PL)settings format: 0xABCD & 0xWXYZ								
4-bit value		Definition		4-bit value		Definition		
CD		Parameter bias decimal		YZ		Parameter bias decimal		
B		Parameter type hexadecimal		X		Parameter type hexadecimal		
A		Unused		W		Unused		
Description of corresponding parameter using Mapping Parameter 1 as example. Mapping content is 32-bit wide, able to map 2 16-bit or 1 32-bit parameters. P00.50 content as below: (Mapping parameter 1 indicator : P00.50 ; Mapping parameter 1: P00.40) P00.40 high bit corresponds to P00.50 high bit indicator (PH) value; P00.40 low bit corresponds to P00.50 low bit indicator (PL) value; 1. When P00.50 PH≠PL, indicates that P00.40 contains 2 16-bit mapped values. If P00.50=0x06200101; PH=0x0620, PL=0x0101; write 0x0005 0064 into P00.40; write 0x0005 into P06.20, write 0x0064 into P01.01; 2. When P00.50 PH=PL, indicates that P00.40 contains 1 32-bit mapped value. If P00.50=0x01150115; PH=0x0115,PL=0x0115; write 0x00000001into P00.40; write 0x00000001 into Pr1.15; Note: When a 32-bit address parameter is mapped, please write same address into high and low bit as shown above.								

P00.58	Label	STO Version			Valid mode(s)	P		
	Range	0~31767	Unit	-	Default	0		
	Byte length		Attribute	R	485 address	-		
	Valid	Immediate						

P00.59	Label	STO Actual Time Stamp			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~ 2 ³¹ -1	Unit	-	Default			
	Byte length		Attribute	R	485 address			
	Valid	Immediate						

P00.64	Label	STO Dual Input Delay Detection Buffer Time			Valid mode(s)	P	S	T
	Range	0x800000 00~0x7FFF FFFF	Unit	-	Default	200		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P00.65	Label	STO Buffer Diagnosis and Filter Time			Valid mode(s)	P		
	Range	1~10	Unit	ms	Default	2		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P00.66	Label	STO Power Supply & Optocoupler Diagnosis & Filter Time			Valid mode(s)	P		
	Range	1~2	Unit	ms	Default	1		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

8.2.2 [Class 1] Gain Adjustment

P01.00	Label	1st Position Loop Gain			Valid mode(s)	P		
	Range	0~30000	Unit	0.1/s	Default	480		
	Byte length	16bit	Attribute	R/W	485 address	0x0101		
	Valid	Immediate						

Higher position loop gain value improves the responsiveness of the servo driver and lessens the positioning time.

Position loop gain value shouldn't exceed responsiveness of the mechanical system and take in consideration velocity loop gain, if not it might cause vibration, mechanical noise and overtravel. As velocity loop gain is based on position loop gain, please set both values accordingly.

Recommended range: $1.2 \leq P01.00/P01.01 \leq 1.8$

P01.01	Label	1st Velocity Loop Gain			Valid mode(s)	P	S	T
	Range	1~32767	Unit	0.1Hz	Default	270		
	Byte length	16bit	Attribute	R/W	485 address	0x0103		
	Valid	Immediate						

To determine the responsiveness of the velocity loop. If inertia ratio of P00.04 is uniform with actual inertia ratio, velocity loop responsiveness = P01.01.

To increase position loop gain and improve responsiveness of the whole system, velocity loop gain must be set at higher value. Please notice that if the velocity loop gain is too high, it might cause vibration.

P01.02	Label	1st Velocity Loop Integral Time Constant			Valid mode(s)	P	S	T
	Range	1~10000	Unit	0.1ms	Default	210		
	Byte length	16bit	Attribute	R/W	485 address	0x0105		
	Valid	Immediate						

The lower the set value, the closer the lag error at stop to 0 but might cause vibration. If the value set is overly large, overshoot, delay of positioning time duration and lowered responsiveness might occur.

Set 10000 to deactivate P01.02.

P01.03	Label	1st Velocity Detection Filter			Valid mode(s)	P	S	T
	Range	0~10000	Unit	-	Default	15		
	Byte length	16bit	Attribute	16bit	485 address	0x0107		
	Valid	Immediate						

This filter is a low pass filter. It blocks high frequencies which cause system instability from velocity feedback data. The higher the set value, lower frequencies will be blocked and velocity responsiveness will also be lowered. P01.03 needs to match velocity loop gain.

Please refer to the following table.

Value	Velocity Detection Filter Cut-off Frequency (Hz)	Value	Velocity Detection Filter Cut-off Frequency (Hz)
0	2500	16	750
1	2250	17	700

2	2100	18	650
3	2000	19	600
4	1800	20	550
5	1600	21	500
6	1500	22	450
7	1400	23	400
8	1300	24	350
9	1200	25	300
10	1100	26	250
11	1000	27	200
12	950	28	175
13	900	29	150
14	850	30	125
15	800	31	100

P01.04	Label	1st Torque Filter			Valid mode(s)	P	S	T
	Range	0~2500	Unit	0.01ms	Default	84		
	Byte length	16bit	Attribute	R/W	485 address	0x0109		
	Valid	Immediate						

To set torque command low-pass filter, add a filter delay time constant to torque command and filter out the high frequencies in the command.

Often used to reduce or eliminate some noise or vibration during motor operation, but it will reduce the responsiveness of current loop, resulting in undermining velocity loop and position loop control. P01.04 needs to match velocity loop gain.

Recommended range: $1,000,000/(2\pi \times P01.04) \geq P01.01 \times 4$

For example: Velocity loop gain $P01.01=180(0.1\text{Hz})$ which is 18Hz. Time constant of torque filter should be $P01.01 \leq 221(0.01\text{ms})$

If mechanical vibration is due to servo driver, adjusting P01.04 might eliminate the vibration. The smaller the value, the better the responsiveness but also subjected to machine conditions. If the value is too large, it might lower the responsiveness of current loop.

With higher P01.01 value settings and no resonance, reduce P01.04 value;

With lower P01.01 value settings, increase P01.04 value to lower motor noise.

P01.05	Label	2nd Position Loop Gain			Valid mode(s)	P		
	Range	0~30000	Unit	0.1/s	Default	570		
	Byte length	16bit	Attribute	R/W	485 address	0x010B		
	Valid	Immediate						

P01.06	Label	2nd Velocity Loop Gain			Valid mode(s)	P	S	T
	Range	1~32767	Unit	0.1Hz	Default	270		
	Byte length	16bit	Attribute	R/W	485 address	0x010D		
	Valid	Immediate						

P01.07	Label	2nd Velocity Loop Integral Time Constant			Valid mode(s)	P	S	T
	Range	1~10000	Unit	0.1ms	Default	10000		
	Byte length	16bit	Attribute	16bit	485 address	0x010F		
	Valid	Immediate						

P01.08	Label	2nd Velocity Detection Filter			Valid mode(s)	P	S	T
	Range	0~10000	Unit	-	Default	15		
	Byte length	16bit	Attribute	R/W	485 address	0x0111		
	Valid	Immediate						

P01.09	Label	2nd Torque Filter			Valid mode(s)	P	S	T
	Range	0~2500	Unit	0.01ms	Default	84		
	Byte length	16bit	Attribute	R/W	485 address	0x0113		
	Valid	Immediate						

Position loop, velocity loop, velocity detection filter, torque command filter each have 2 pairs of gain or time constant (1st and 2nd).

P01.10	Label	Velocity Feedforward Gain			Valid mode(s)	P		
	Range	0~1000	Unit	0.10%	Default	300		
	Byte length	16bit	Attribute	R/W	485 address	0x0115		
	Valid	Immediate						

The velocity command, which is derived by differentiating the position command, is multiplied by the ratio set in this parameter. The result bypasses the position controller and is directly added to the velocity command input.

Used for decreasing following error caused by low responsiveness of velocity loop. Might cause overshoot or increase in noise if set value is too high.

P01.11	Label	Velocity Feedforward Filter			Valid mode(s)	P		
	Range	0~6400	Unit	0.01ms	Default	50		
	Byte length	16bit	Attribute	16bit	485 address	0x0117		
	Valid	Immediate						

Set velocity feed forward low pass filter to eliminate high or abnormal frequencies in velocity feed forward command. Often used when position command with low resolution or high electronic gear ratio to smoothen velocity feed forward.

Position deviation under constant velocity can be lowered with higher velocity feed forward gain. Please to refer to the equation below.

Reduce P01.11 value to suppress velocity overshoot during deceleration; Increase P01.11 value to suppress noise or vibration due to long driver control cycle or position command uneven pulse frequency.

<Application>

Set P01.11 = 50 (0.5ms), improve feedforward effect by gradually increase P01.10. The equation below can be used to determine the position deviation due to velocity feedforward gain under constant velocity.

$$\text{Position deviation [Unit]} = \frac{\text{Set velocity}[\frac{\text{Unit}}{\text{s}}]}{\text{Position loop gain [Hz]}} \times \frac{100 - \text{Velocity feed forward gain [\%]}}{100}$$

P01.12	Label	Torque Feedforward Gain			Valid mode(s)	P	S	
	Range	0~1000	Unit	0.1Hz	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0119		
	Valid	Immediate						
Before using torque feed forward, please set correct inertia ratio P00.04. By increasing torque feed forward gain, position deviation on constant acceleration/deceleration can be reduced to close to 0. Under ideal condition and trapezoidal speed profile, position deviation of the whole motion can be reduced to close to 0. In reality, perturbation torque will always exist, hence position deviation can never be 0.								

P01.13	Label	Torque Feedforward Filter			Valid mode(s)	P	S	
	Range	0~6400	Unit	0.01ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x011B		
	Valid	Immediate						
Low pass filter to eliminate abnormal or high frequencies in torque feed forward command. Usually used when encoder has lower resolution or precision. Noise reduces if torque feed forward filter time constant is set higher but position deviation will increase at acceleration varied points.								
<Application> Set P01.13 = 50ms, please increase torque forward gain gradually to enable torque feedforward. By increasing P01.13, noise will reduce but position deviation will become larger.								

P01.15	Label	Position Control Parameter Switching Mode			Valid mode(s)	P		
	Range	0~12	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x011F		
	Valid	Immediate						
In position control, set the conditions for gain switching to be valid.								
Value	Condition		Gain switching condition					
0	1st gain fixed		Fixed on using 1st gain(P01.00-P01.04)					
1	2nd gain fixed		Fixed on using 2nd gain (P01.05-P01.09)					
2	Gain switching input valid		Gain switching input (GAIN) invalid: 1st gain. ·Gain switching input (GAIN) valid: 2nd gain. *Default: 1st gain					

3	High command torque	Switch to 2nd gain when set torque command absolute value larger than (level + hysteresis)[%] Switch to 1st gain when set torque command absolute value smaller than (level + hysteresis)[%]
4~9	Reserved	Reserved
10	Pending position command + actual velocity	Valid for position control. Switch to 2nd gain if position command $\neq 0$ Switch to 1st gain if positional command = 0 throughout the duration of delay time and absolute value of actual velocity remains smaller than (level - hysteresis) (r/min)
** Above 'level' and 'hysteresis' are in correspondence to P01.17 Position control gain switching level and P01.18 Hysteresis at position control switching.		

P01.16	Label	Position Control Parameter Switching Delay			Valid mode(s)	P		
	Range	0~10000	Unit	0.1ms	Default	0		
	Byte length	16bit	Attribute	16bit	485 address	0x0121		
	Valid	Immediate						

P01.17	Label	Position Control Parameter Switching Level			Valid mode(s)	P		
	Range	0~20000	Unit	mode	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0123		
	Valid	Immediate						

Set threshold value for gain switching to occur.
Unit is mode dependent.

Switching condition	Unit	
Position	Encoder pulse count	
Velocity	pulse/s	
Torque	%	
Please set level $\geq$ hysteresis		

P01.18	Label	Position Control Parameter Switching Hysteresis			Valid mode(s)	P		
	Range	0~20000	Unit	mode	Default	33		
	Byte length	16bit	Attribute	R/W	485 address	0x0125		
	Valid	Immediate						

To eliminate the instability of gain switching. Used in combination with P01.17 using the same unit.
If level < hysteresis, driver will set internally hysteresis = level.

P01.19	Label	Position Control Parameter Switching Time			Valid mode(s)	P		
	Range	0~10000	Unit	0.1ms	Default	33		
	Byte length	16bit	Attribute	R/W	485 address	0x0127		
	Valid	Immediate						
During position control, if 1st and 2nd gain difference is too large, to ease torque changes and vibration due to rapid changes in position loop gain, set suitable P01.19 value. For example: 1st (P01.00) <-> 2nd (P01.05)								

P01.23	Label	Speed Regulator-kr			Valid mode(s)	P	S	
	Range	0~100	Unit	%	Default	100		
	Byte length	-	Attribute	-	485 address	-		
	Valid	Immediate						

P01.34	Label	Velocity Feedback Filter Level			Valid mode(s)	P	S	
	Range	1~8	Unit	-	Default	1		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P01.35	Label	Position Command Pulse Filtering Time			Valid mode(s)	P		
	Range	0~200	Unit	20ns	Default	8		
	Byte length	16bit	Attribute	R/W	485 address	0x0147		
	Valid	Immediate						

To filter position setting pulse, getting rid of narrow pulse frequency with interference. Low speed pulse input unit: 0.05us; High-speed pulse input unit: 0.01us.
 If set value is overly large, it will affect the receiving of high frequency command pulse and with high delay time.

$$Filter\ frequency = \frac{1}{2 \times P01.35 \times 0.05us} \times 1000000Hz$$

P01.35 formula:

Example : P01.35=100, pulse frequency > 100KHz will be filtered.

P01.35	Filter frequency	P01.35	Filter frequency	
0	Null	100	100kHz (500KHz)	
8	1.25MHz (6.25MHz)	125	80kHz (400KHz)	
10	1MHz (5MHz)	160	62.5kHz (312KHz)	
20	500kHz (2.5MHz)	200	50kHz (250KHz)	
50	200kHz (1MHz)			
80	125kHz (625KHz)			

P01.36	Label	Encoder Feedback Pulse Digital Filter			Valid mode(s)	P		
	Range	0~300	Unit	-	Default	5		
	Byte length	16bit	Attribute	R/W	485 address	0x0149		
	Valid	Immediate						
To set filter time for external ABZ encoder								

P01.37	Label	Special Function Register			Valid mode(s)	P		
	Range	0x0~0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	16bit	485 address	0x014B		
	Valid	Immediate						

P01.38	Label	Special Function Register 1			Valid mode(s)	P	S	T
	Range	0x0~0xFFFFFFFF	Unit	-	Default	0x1008		
	Byte length	16bit	Attribute	R/W	485 address	0x014D		
	Valid	Immediate						

P01.39	Label	Special Function Register 2				Valid mode(s)	P	S	T
	Range	0x0~0xFFFFFFFF	Unit	-	Default	0x40000			
	Byte length	16bit	Attribute	R/W		485 address	0x014F		
	Valid	Immediate							
	Value	Description							
0	Reserved								
1	=1, activate full closed loop during trial run								
2	=1, hybrid position deviation clearing								

P01.45	Label	Reserved			Valid mode(s)	P		
	Range	0~200	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P01.64	Label	2nd Segment Q-axis Current Filter Time constant			Valid mode(s)	P		
	Range	0~2500	Unit	0.01ms	Default	0		
	Byte length	-	Attribute	-	485 address	-		
	Valid	Immediate						

P01.65	Label	3rd Segment D-axis Current Filter Time constant			Valid mode(s)	P		
	Range	0~2485	Unit	0.01ms	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P01.66	Label	Torque Filter Type			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

8.2.3 [Class 2] Vibration Suppression

P02.00	Label	Adaptive Filter Mode Setting			Valid mode(s)	P	S	
	Range	0~4	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0201		
	Valid	Immediate						
Value	Description							
0	Adaptive filter: invalid		Parameters related to 3rd notch filter remain unchanged					
1	Adaptive filter: 1 filter valid for once		1 adaptive filter becomes valid. 3rd notch filter related parameters updated accordingly. P02.00 switches automatically to 0 once updated.					
2	Adaptive filter: 1 filter remains valid		1 adaptive filter becomes valid. 3rd notch filter related parameters will keep updating accordingly.					
3~4	Reserved		-					

P02.01	Label	1st Notch Frequency			Valid mode(s)	P	S	T
	Range	50~4000	Unit	Hz	Default	4000		
	Byte length	16bit	Attribute	R/W	485 address	0x0203		
	Valid	Immediate						
Set center frequency of 1st torque command notch filter. Set P02.01 to 4000 to deactivate notch filter								

P02.02	Label	1st Notch Width			Valid mode(s)	P	S	T
	Range	0~20	Unit	-	Default	4		
	Byte length	16bit	Attribute	R/W	485 address	0x0205		
	Valid	Immediate						
Set notch bandwidth for 1st resonant notch filter. Under normal circumstances, please use factory default settings. If resonance is under control, in combination with P02.01 and P02.03, P02.02 can be reduced to improve current loop responsiveness which allows higher mechanical stiffness settings								

P02.03	Label	1st Notch Depth			Valid mode(s)	P	S	T
	Range	0~99	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0207		
	Valid	Immediate						
Set notch depth for 1st resonant notch filter. Under normal circumstances, please use factory default settings. If resonance is under control, in combination with P02.01 and P02.02, P02.03 can be reduced to improve current loop responsiveness which allows higher mechanical stiffness settings								

P02.04	Label	2nd Notch Frequency			Valid mode(s)	P	S	T
	Range	50~4000	Unit	Hz	Default	4000		
	Byte length	16bit	Attribute	R/W	485 address	0x0209		
	Valid	Immediate						
Set center frequency of 2nd torque command notch filter. Set P02.04 to 4000 to deactivate notch filter.								

P02.05	Label	2nd Notch Width			Valid mode(s)	P	S	T
	Range	0~20	Unit	-	Default	4		
	Byte length	16bit	Attribute	R/W	485 address	0x020B		
	Valid	Immediate						
Set notch bandwidth for 2nd resonant notch filter. Under normal circumstances, please use factory default settings. If resonance is under control, in combination with P02.04 and P02.06, P02.05 can be reduced to improve current loop responsiveness which allows higher mechanical stiffness settings.								

P02.06	Label	2nd Notch Depth			Valid mode(s)	P	S	T
	Range	0~99	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x020D		
	Valid	Immediate						
Set notch depth for 1st resonant notch filter. When P02.06 value is higher, notch depth becomes shallow, phase lag reduces. Under normal circumstances, please use factory default settings. If resonance is under control, in combination with P02.04 and P02.05, P02.06 can be reduced to improve current loop responsiveness which allows higher mechanical stiffness settings.								

P02.07	Label	3rd Notch Frequency			Valid mode(s)	P	S	T
	Range	50~4000	Unit	Hz	Default	4000		
	Byte length	16bit	Attribute	R/W	485 address	0x020F		
	Valid	Immediate						
Set center frequency of 3rd torque command notch filter. Set P02.07 to 4000 to deactivate notch filter.								

P02.08	Label	3rd Notch Width			Valid mode(s)	P	S	T
	Range	0~20	Unit	-	Default	4		
	Byte length	16bit	Attribute	R/W	485 address	0x0211		
	Valid	Immediate						
Set notch depth for 3rd resonant notch filter. When P02.06 value is higher, notch depth becomes shallow, phase lag reduces. Under normal circumstances, please use factory default settings. If resonance is under control, in combination with P02.04 and P02.05, P02.06 can be reduced to improve current loop responsiveness which allows higher mechanical stiffness settings.								

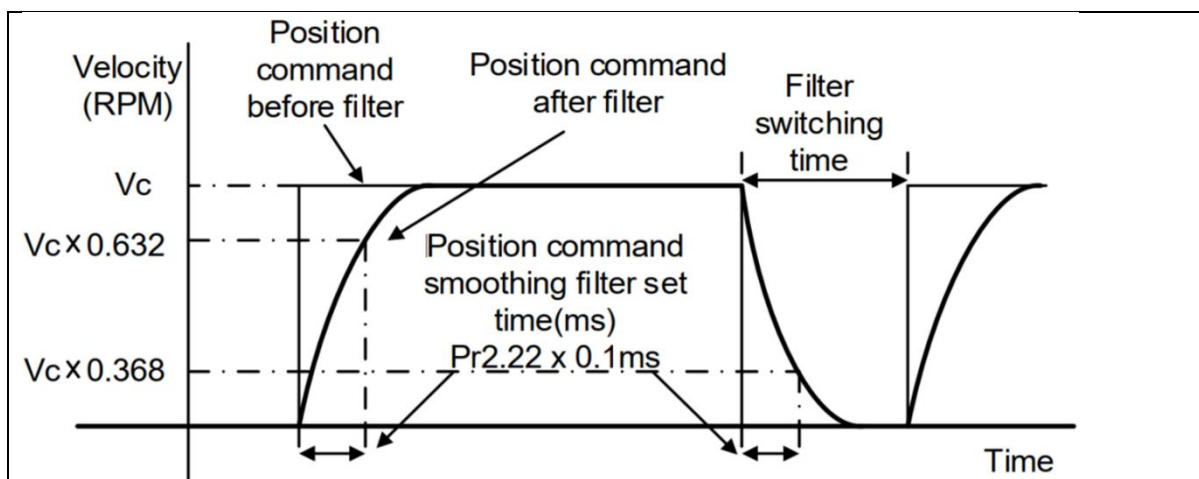
P02.09	Label	3rd Notch Depth			Valid mode(s)	P	S	T
	Range	0~99	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0213		
	Valid	Immediate						
Set notch depth for 3rd resonant notch filter. When P02.06 value is higher, notch depth becomes shallow, phase lag reduces. Under normal circumstances, please use factory default settings. If resonance is under control, in combination with P02.04 and P02.05, P02.06 can be reduced to improve current loop responsiveness which allows higher mechanical stiffness settings.								

P02.14	Label	1st Damping Frequency			Valid mode(s)	P		
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	Range	0~2000	Unit	0.1Hz	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x021D		
	Valid	Immediate						
This parameter sets the 1st damping frequency to suppress end-point oscillations of the load. After measuring the vibration frequency at the load's end, set this parameter in 0.1 Hz increments.								
Value	Description							
0	Disables the low-frequency suppression function							
10~200 0	Sets the damping frequency (in 0.1 Hz units)							
Note: This function is used to suppress oscillations at the load's end, typically caused by high deceleration impacts when the motor stops. It is especially effective for suppressing vibrations below 100 Hz. To use it, set the parameter to match the measured vibration frequency. (The vibration frequency can be identified using the waveform analysis feature in the servo tuning software.)								

P02.16	Label	2nd Damping Frequency			Valid mode(s)	P		
	Range	0~2000	Unit	0.1Hz	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0221		
	Valid	Immediate						
This parameter sets the 2nd damping frequency to suppress end-point oscillations of the load. After measuring the vibration frequency at the load's end, set this parameter in 0.1 Hz increments.								
Value	Description							
0	Disables the low-frequency suppression function							
10~200 0	Sets the damping frequency (in 0.1 Hz units)							
Note: This function is used to suppress oscillations at the load's end, typically caused by high deceleration impacts when the motor stops. It is especially effective for suppressing vibrations below 100 Hz. To use it, set the parameter to match the measured vibration frequency. (The vibration frequency can be identified using the waveform analysis feature in the servo tuning software.)								

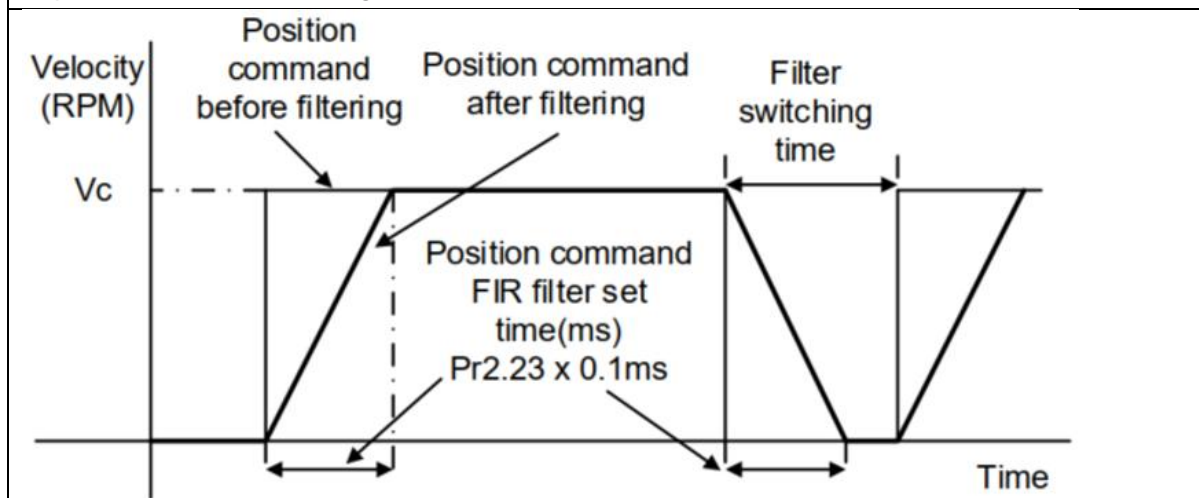
P02.22	Label	Position Command Smoothing Filter			Valid mode(s)	P		
	Range	0~3000	Unit	0.1ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x022D		
	Valid	Halt						
To set time constant of 1 time delay filter of position command. To set time constant of 1 time delay filter, according to target velocity Vc square wave command as show below.								



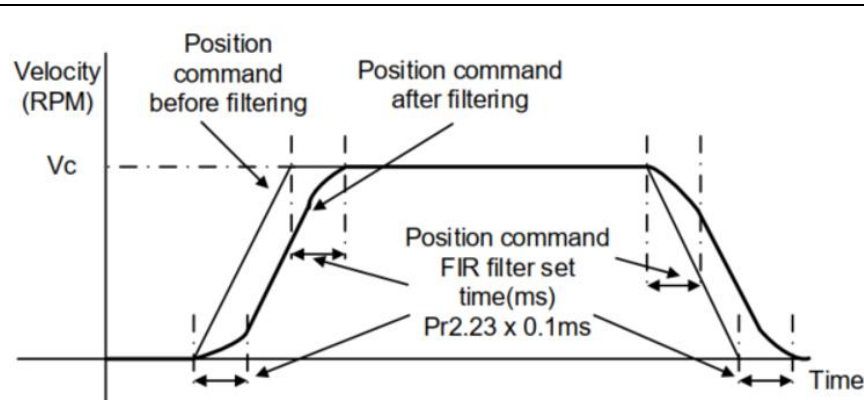
Usually applied when there is rather sharp acceleration which might cause motor overshoot or undershoot. To smoothen command signal, reduces impact to machines and eliminate vibration. If P02.22 is set too high, overall time will be lengthened.

P02.23	Label	Position Command FIR Filter			Valid mode(s)	P		
	Range	0~2500	Unit	0.1ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x022F		
	Valid	Halt						

As shown below, when target velocity V_c square wave command reaches V_c , it becomes trapezoidal wave after filtering.



As shown below, when target velocity V_c trapezoidal command reaches V_c , it becomes S wave after filtering.



Usually applied when there is rather sharp acceleration which might cause motor overshoot or undershoot. To smoothen command signal, reduces impact to machines and eliminate vibration. If P02.23 is set too high, overall time will be lengthened.

Note: Please wait for command to stop and after filter idle time to modify P02.23.

Filter switching time = (P02.23 set value $\times$ 0.1ms + 0.25ms)

P02.31	Label	5th Resonant Frequency			Valid mode(s)	P		
	Range	50~4000	Unit	0.1/s	Default	4000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.32	Label	5th Resonant Q Value			Valid mode(s)	P		
	Range	0~10000	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.33	Label	5th Anti-resonant Frequency			Valid mode(s)	P		
	Range	50~4000	Unit	0.1/s	Default	4000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.34	Label	5th Anti-resonant Q Value			Valid mode(s)	P		
	Range	0~9900	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.35	Label	6th Resonant Frequency			Valid mode(s)	P		
	Range	50~4000	Unit	0.1/s	Default	4000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.36	Label	6th Resonant Q Value			Valid mode(s)	P		
	Range	0~10000	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.37	Label	6th Anti-resonant Frequency			Valid mode(s)	P		
	Range	50~4000	Unit	0.1/s	Default	4000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.38	Label	6th Anti-resonant Q Value			Valid mode(s)	P		
	Range	0~9900	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.48	Label	Tuning Mode			Valid mode(s)	P	S	T
	Range	0~1	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0261		
	Valid	Immediate						
Value	Description							
0	Turn off automatic adjustments							
1	Activate automatic adjustments, real time inertia measuring and vibration suppression. Inertia measuring deactivated after reaching 4 times in 5 minutes, triggering conditions: changes in mechanical stiffness.							

P02.50	Label	MFC Type			Valid mode(s)	P		
	Range	0~3	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0265		
	Valid	Re-enable						
Value	Description							
0	Model following control							
1	Zero tracking control							
2	3 inertia (future upgrade)							
3	Path following (future upgrade)							

P02.51	Label	Velocity Feedforward Compensation Coefficient			Valid mode(s)	P		
	Range	-1000~10000	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0267		
	Valid	Immediate						
To compensate for velocity feedforward								

P02.52	Label	Torque Feedforward Compensation Coefficient			Valid mode(s)	P	S	
	Range	-1000~10000	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0269		
	Valid	Immediate						
To compensate for torque feedforward								

P02.53	Label	Friction Compensation Coefficient			Valid mode(s)	P	S	T
	Range	0~1000	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x026B		
	Valid	Immediate						

To set ratio of rated torque/rated rotational speed, to compensate for dynamic friction during motion and have better control over acceleration/deceleration.

$$\text{Dynamic friction coefficient} = \left| \frac{\text{Torque (Speed 1)} - \text{Torque (Speed 2)}}{\text{Speed 1} - \text{Speed 2}} \times \text{Rated speed} \right|$$

When there is an excess position deviation during acceleration/deceleration, please adjust P02.53 to reduce the deviation to 0.

P02.54	Label	Overshoot Time Constant			Valid mode(s)	P	S	T
	Range	0~10000	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x026D		
	Valid	Immediate						

To set overshoot time coefficient

P02.55	Label	Overshoot Suppression Constant			Valid mode(s)	P	S	T
	Range	0~1000	Unit	0.1/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x026F		
	Valid	Immediate						

Suppression improves with larger set value but might affect the performance of MFC. Please use with caution for any value above 100.

P02.56	Label	One-Click Tuning			Valid mode(s)	P		
	Range	0x0~0xFFFF	Unit	0.1/s	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.57	Label	One-Click Tuning Control			Valid mode(s)	P		
	Range	0x0~0xFFFF	Unit	0.1/s	Default	0x0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P02.58	Label	One-Click Tuning Progress			Valid mode(s)	P		
	Range	0~100	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P02.59	Label	One-Click Tuning Error Code			Valid mode(s)	P		
	Range	0x0~0xFFFF	Unit	0.1/s	Default	0x0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P02.60	Label	One-Click Tuning Velocity Limit			Valid mode(s)	P		
	Range	10~6000	Unit	0.1/s	Default	1500		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.64	Label	Reserved			Valid mode(s)	P		
	Range	0~30000	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P02.65	Label	Reserved			Valid mode(s)	P		
	Range	0~10000	Unit	0.1/s	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

8.2.4 [Class 3] Velocity/Torque Control

P03.00	Label	Internal/External Velocity Control			Valid mode(s)		S	
	Range	0~5	Unit	-	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0301		
	Valid	Immediate						
Connect to the right DI to control internal command velocity settings.								
Value	Velocity settings							
0	Analog - Velocity command (SPR)							
1	Internal velocity settings 1st – 4th speed (P03.04 ~ P03.07)							
2	Internal velocity settings 1st – 3rd speed (P03.04 ~ P3.06), Analog velocity command (SPR)							
3	Internal velocity settings 1st – 8th speed (P03.00 ~ P03.11)							
Value	Internal command velocity 1 (INTSPD 1)	Internal command velocity 2 (INTSPD 2)			Internal command velocity 3 (INTSPD 3)	Velocity command		
1	OFF	OFF			No Effect	1st speed		
	ON	OFF				2nd speed		
	OFF	ON				3rd speed		
	ON	ON				4th speed		
2	OFF	OFF			No Effect	1st speed		
	ON	OFF				2nd speed		
	OFF	ON				3rd speed		
	ON	ON				Simulated speed		
3	Similar to P03.00=1				OFF	1st ~ 4th speed		
	OFF	OFF			ON	5th speed		
	ON	OFF			ON	6th speed		
	OFF	ON			ON	7th speed		
	ON	ON			ON	8th speed		
Please change internal command velocity as per diagram below as unexpected axis movement might occurs if 2 command velocities are changed at the same time.								
INTSPD1 INTSPD2 Velocity command [r/min]					INTSPD1 INTSPD2 INTSPD3 Velocity command [r/min]			
P03.00=1 / 2					P03.00=3			

P03.01	Label	Velocity Command Direction			Valid mode(s)		S	
	Range	0~2	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0303		
	Valid	Immediate						
To set positive/negative direction of velocity command								

Value	Velocity settings (Analog or internal velocity)	Velocity command sign selection (VCSIGN)	Velocity command direction
0	+	No effect	Positive
	-	No effect	Negative
1	No effect	OFF	Positive
	No effect	ON	Negative

P03.02	Label	Velocity Command Input Gain			Valid mode(s)		S	
	Range	10~2000	Unit	mm/s/V	Default	500		
	Byte length	16bit	Attribute	R/W	485 address	0x0305		
	Valid	Immediate						

To set gain changes from voltage added onto analog velocity command (SPR) to motor command velocity

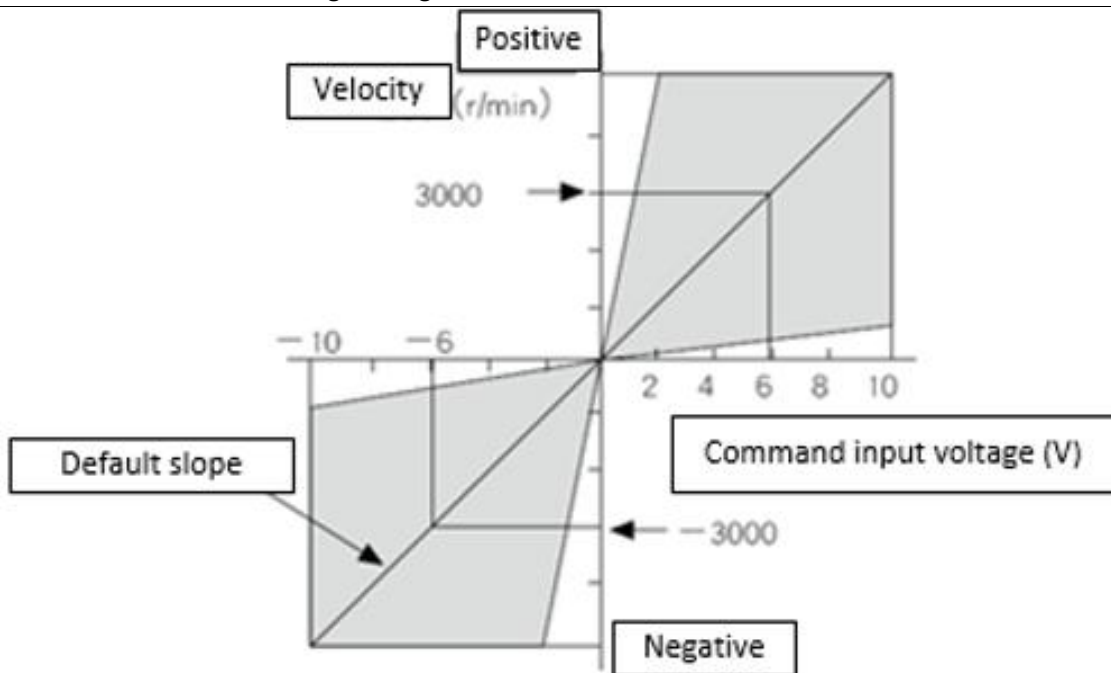
P03.02 sets command input voltage and rotational speed slope.

Factory default:

$P03.02 = 500(\text{r/min})/\text{V}$.

Hence 6V input: 3000 r/min

1. Do not supply more than $\pm 10\text{V}$ power for analog velocity command (SPR).
2. If P03.02 set value is too large, it might cause vibration.



P03.03	Label	Velocity Command Input Conversion			Valid mode(s)		S	
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0307		
	Valid	Immediate						

To set voltage polarity of analog velocity command.

Only valid when P03.01 = 0. When P03.01 = 1, rotational direction is only related to VC-SIGN.

Value	Motor motion direction
-------	------------------------

0	Not inversed	「 Positive voltage 」 → 「 Positive direction 」 「 Negative voltage 」 → 「 Negative direction 」
1	Inversed	「 Positive voltage 」 → 「 Positive direction 」 「 Negative voltage 」 → 「 Negative direction 」
If there is an external position sensor with different polarity from P03.03, motor might undergo abnormal motion.		

P03.04	Label	1st Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0309		
	Valid	Immediate						

P03.05	Label	2nd Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x030B		
	Valid	Immediate						

P03.06	Label	3rd Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x030D		
	Valid	Immediate						

P03.07	Label	4th Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x030F		
	Valid	Immediate						

P03.08	Label	5th Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0311		
	Valid	Immediate						

P03.09	Label	6th Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0313		
	Valid	Immediate						

P03.10	Label	7th Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0315		
	Valid	Immediate						

P03.11	Label	8th Segment Velocity			Valid mode(s)		S	
	Range	-10000 ~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0317		
	Valid	Immediate						

To set internal velocity command 1st ~ 8th speed

P03.12	Label	Acceleration Time			Valid mode(s)		S	
	Range	0~10000	Unit	ms/1m/s	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0319		
	Valid	Immediate						

P03.13	Label	Deceleration Time			Valid mode(s)		S	
	Range	0~10000	Unit	ms/1m/s	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x031B		
	Valid	Immediate						

Set max acceleration/deceleration for velocity command.

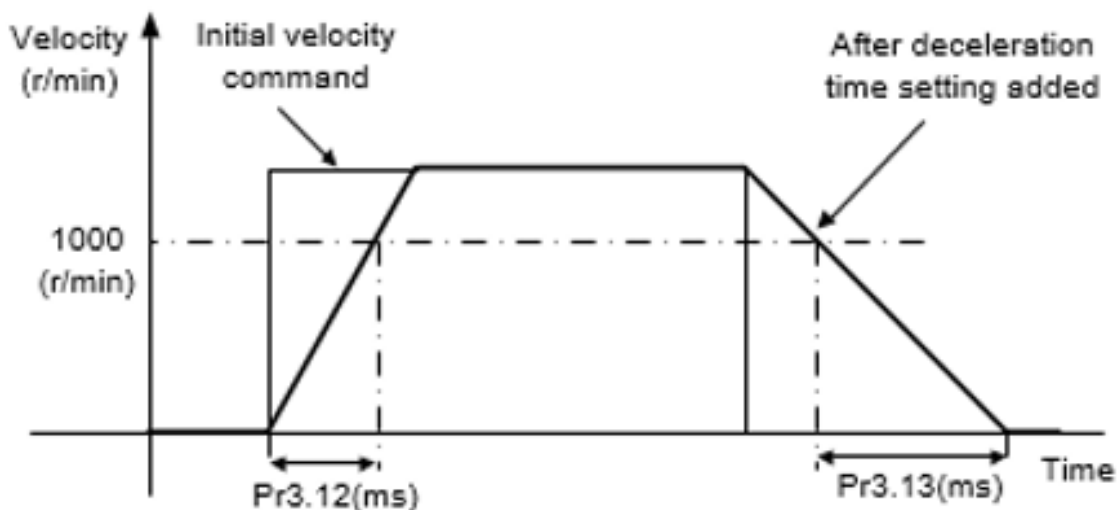
If target velocity = x [rpm], max acceleration = a [unit: rpm/ms], acceleration time = t [ms]

$P03.12 = 1000/a$

$P03.13 = 1000/a$

For example: If motor is to achieve 1500rpm in 30s, $a = 1500/30 = 50$ rpm/ms

$P03.12 = 1000/a = 20$. Hence when $P03.12 = 20$, motor can achieve 1500rpm in 30s.

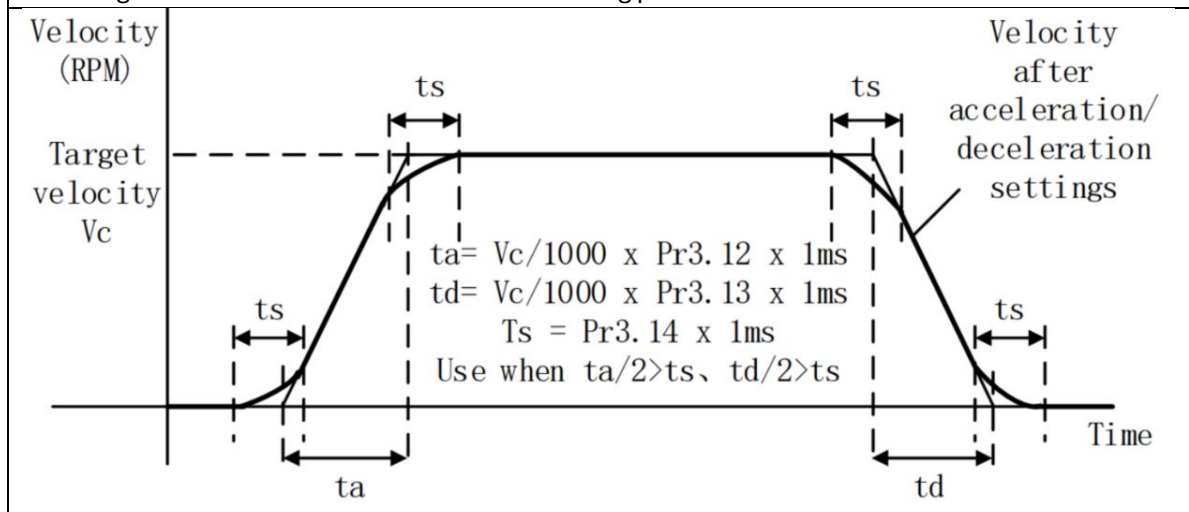


Usually used when there is rapid acceleration or trapezoidal wave velocity command due to many different internal speed segments under velocity control mode which causes instable while motor in motion.

Under velocity control mode, 6083 and 6084 is limited by P03.12 and P03.13 correspondingly.

P03.14	Label	Sigmoid Acceleration/Deceleration			Valid mode(s)		S	
	Range	0~1000	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x031D		
	Valid	Re-enable						

To set sigmoid acceleration and deceleration turning point in accordance to P03.12 and P03.13.



P03.15	Label	Zero Speed Clamp Function			Valid mode(s)		S	
	Range	0~4	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x031F		
	Valid	Immediate						
Value	Zero speed clamp function							
0	Invalid: zero speed clamp deactivated							
1	Velocity command is forced to 0 when the zero speed clamp (ZEROSPD) input signal is valid.							
2	Velocity command is forced to 0 when actual velocity is lower than P03.16.							
3	Includes conditions from 1 and 2							

P03.16	Label	Zero Speed Clamp Level			Valid mode(s)		S	
	Range	0~2000	Unit	mm/s	Default	30		
	Byte length	16bit	Attribute	R/W	485 address	0x0321		
	Valid	Immediate						
Valid when P03.15 = 2/3, velocity command is forced to 0 when actual velocity is lower than P03.16 and after static time set in P03.23.								

P03.17	Label	Internal/External Torque Control			Valid mode(s)			T
	Range	0~4	Unit	-	Default	2		
	Byte length	16bit	Attribute	R/W	485 address	0x0323		
	Valid	Immediate						
Value	Torque command input				Velocity limit input			
0	Analog input 3(AI 3)				P03.21 set value			
1	Analog input 3(AI 3)				Analog input 1(AI 1)			
2	P03.22 set value				P03.21 set value			

P03.18	Label	Torque Command Direction			Valid mode(s)			T
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0325		
	Valid	Immediate						
To set torque command positive/negative direction								
Value	Direction settings							
0	TC-SIGN ON/OFF has no effect on torque direction Torque command input 「Positive」 → Positive direction, 「Negative」 → Negative direction							
1	Use TC-SIGN ON/OFF status for torque direction OFF: Positive direction ON: Negative direction							

P03.19	Label	Torque Command Input Gain			Valid mode(s)			T
	Range	10~100	Unit	-	Default	30		
	Byte length	16bit	Attribute	R/W	485 address	0x0327		
	Valid	Immediate						
To set gain changes from voltage added onto analog torque command (TRQR) to torque command (%)								
Unit: (0.1V/100%) Set input voltage required for rated output torque. Default = 30, which is 3V/100%								

P03.20	Label	Torque Setting Input Reversal			Valid mode(s)			T
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0329		
	Valid	Immediate						
To set voltage polarity of analog torque command. Only valid when P03.18 = 0.								
Value	Motor torque direction							
0	Not inversed	「Positive voltage」 → 「Positive direction」 「Negative voltage」 → 「Negative direction」						
1	Inversed	「Positive voltage」 → 「Positive direction」 「Negative voltage」 → 「Negative direction」						

P03.21	Label	Velocity Limit in Torque Mode			Valid mode(s)			T
	Range	0~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x032B		
	Valid	Immediate						
To set velocity limit in torque control mode. Only valid when P03.17 = 0 / 2.								

P03.22	Label	Torque Command			Valid mode(s)			T
	Range	-500~500	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x032D		
	Valid	Immediate						
To set torque limit in torque control mode. Only valid when P03.17 = 2. Please refer to P03.17.								

P03.23	Label	Zero Speed Static Delay in Velocity Mode			Valid mode(s)			T
	Range	0~2000	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x032F		
	Valid	Immediate						
To set the time interval between axis reaches zero speed level and the moment it totally stops. Used when axis crawls under velocity mode. Set 0 to deactivate this parameter.								

P03.24	Label	Motor Max. Velocity			Valid mode(s)	P	S	T
	Range	0~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0331		
	Valid	Immediate						
To set maximum motor rotational speed but not higher than motor rated speed If P03.24 = 0, maximum motor rotational speed = max. speed in motor parameter.								

P03.29	Label	Analog 1 Zero Drift Clamp Position			Valid mode(s)			T
	Range	0~20000	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x033B		
	Valid	Immediate						
Only valid when P03.17 = 1. When P03.17=1, velocity is set to 0 if analog 1 voltage is below P03.29 set value.								

P03.30	Label	Analog 3 Zero Drift Clamp Position			Valid mode(s)			T
	Range	0~20000	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x033D		
	Valid	Immediate						
Only valid when P03.17 = 1 / 0. When P03.17=1 / 0, velocity is set to 0 if analog 1 voltage is below P03.30 set value.								

P03.31	Label	Torque Command Analog Input Source Selection			Valid mode(s)			T
	Range	0~3	Unit	-	Default	2		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P03.48	Label	Main Velocity Command Source			Valid mode(s)		S	
	Range	0~4	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P03.58	Label	Velocity Program Multiplication 1			Valid mode(s)		S	
	Range	0~150	Unit	-	Default	10		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P03.59	Label	Velocity Program Multiplication 2			Valid mode(s)		S	
	Range	0~150	Unit	-	Default	20		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P03.60	Label	Velocity Program Multiplication 3			Valid mode(s)		S	
	Range	0~150	Unit	-	Default	40		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P03.61	Label	Velocity Program Multiplication 4			Valid mode(s)		S	
	Range	0~150	Unit	-	Default	80		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

8.2.5 [Class 4] I/O Monitoring Settings

P04.00	Label	DI1			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x2		
	Byte length	16bit	Attribute	R/W	485 address	0x0401		
	Valid	Immediate						
Please refer to the table below to set DI signals and table on the right for corresponding pin and parameters								
Signal	Symbol	Value			CN1 PIN	Input	Parameters	
		NO	NC					
Invalid	-	00	-		8	DI1	P04.00	
Positive limit switch	POT	01	81		9	DI2	P04.01	
Negative limit switch	NOT	02	82		26	DI3	P04.02	
Servo enabled	SRV-ON	03	83		27	DI4	P04.03	
Clear alarm	A-CLR	04	-		28	DI5	P04.04	
Control mode switching	C-MODE	05	85		29	DI6	P04.05	
Gain switching	GAIN	06	86		30	DI7	P04.06	
Clear deviation count	CL	07	-		31	DI8	P04.07	
Command pulse prohibited	INH	08	88		32	DI9	P04.08	
Torque limit switching	TL-SEL	09	89		33	DI10	P04.09	
Command frequency divider/multiplier switching	DIV1	0C	8C					
Internal command velocity 1	INTSPD1	0E	8E					
Internal command velocity 2	INTSPD2	0F	8F					
Internal command velocity 3	INTSPD3	10	90					
Zero speed clamp	ZEROSPD	11	91					
Velocity command sign	VC-SIGN	12	92					
Torque command sign	TC-SIGN	13	93					
Forced alarm	E-STOP	14	94					
Vibration suppression 1	VS-SEL1	0A	8A					

Vibration suppression 2	VS-SEL2	0B	8B		
Please don't set anything other than listed in table above. Normally open (NO) : Valid when input = ON Normally close (NC): Valid when input = OFF Er210 might occur if same function is allocated to different channels at the same time. Servo enabled （SRV-ON） has to be allocated to enabled servo driver.					
Inputs related to Pr-mode:					
Signal	Symbol	Value			
		NO	NC		
Trigger command	CTRG	20	A0		
Home	HOME	21	A1		
Force stop	STP	22	A2		
Positive JOG	PJOG	23	A3		
Negative JOG	NJOG	24	A4		
Positive limit	PL	25	A5		
Negative limit	NL	26	A6		
Origin	ORG	27	A7		
Path address 0	ADD0	28	A8		
Path address 1	ADD1	29	A9		
Path address 2	ADD2	2A	AA		
Path address 3	ADD3	2B	AB		
Note: CTRG, HOME are edge triggered, please make sure electronic bits last 1ms or above.					

P04.01	Label	DI2			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x1		
	Byte length	16bit	Attribute	R/W	485 address	0x0403		
	Valid	Immediate						

P04.02	Label	DI3			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x0405		
	Valid	Immediate						

P04.03	Label	DI4			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x6		
	Byte length	16bit	Attribute	R/W	485 address	0x0407		
	Valid	Immediate						

P04.04	Label	DI5			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0xC		
	Byte length	16bit	Attribute	R/W	485 address	0x0409		
	Valid	Immediate						

P04.05	Label	DI6			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x3		
	Byte length	16bit	Attribute	R/W	485 address	0x040B		
	Valid	Immediate						

P04.06	Label	DI7			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x7		
	Byte length	16bit	Attribute	R/W	485 address	0x040D		
	Valid	Immediate						

P04.07	Label	DI8			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x4		
	Byte length	16bit	Attribute	R/W	485 address	0x040F		
	Valid	Immediate						

P04.08	Label	DI9			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x5		
	Byte length	16bit	Attribute	R/W	485 address	0x0411		
	Valid	Immediate						

P04.09	Label	DI10			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x8		
	Byte length	16bit	Attribute	R/W	485 address	0x0413		
	Valid	Immediate						

DI2~DI10 allocation is the same as DI1. Please refer to P04.00.

P04.10	Label	DO1			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x3		
	Byte length	16bit	Attribute	R/W	485 address	0x0415		
	Valid	Immediate						

Please allocate DO as per table below. ALARM logic is the opposite of others

Signal	Symbol	Value			CN1 PIN	Output	Parameters
		NO	NC				
Invalid	-	00	80		11	DO1+	P04.10
Alarm	ALARM	01	81		10	DO1-	
Servo-Ready	SRDY	02	82		35	DO2+	P04.11
External brake released	BRK-OFF	03	83		34	DO2-	
Positioning completed	INP	04	84		37	DO3+	P04.12
At-speed	AT-SPEED	05	85		36	DO3-	
Torque limit signal	TLC	06	86		39	DO4+	P04.13
					38	DO4-	

Zero speed clamp detection	ZSP	07	87		12	DO5 +	P04.14
Velocity coincidence	V-COIN	08	88		40	DO6-	P04.15
Servo Status	SRV-ST	12	92				
Positive limit valid	POT-OUT	15	95				
Negative limit valid	NOT-OUT	16	96				
Position command ON/OFF	P-CMD	0B	8B				
Velocity command ON/OFF	V-CMD	0F	8F				
Velocity limit signal	V-LIMIT	0D	8D				
Position comparison	CMP-OUT	14	94				
Same signal can be assigned to multiple different outputs. Normally open(NO) : Active low Normally close(NC) : Active high Err212 might occur if output is allocated to signals other than listed in the table above.							
Outputs related to PR-mode							
Signal	Symbol	Value					
		NO	NC				
Command complete	CMD-OK	20	A0				
Path complete	PR-OK	21	A1				
Homing done	HOME-OK	22	A2				
Note: CMD-OK indicates PR command is sent by axis might not yet be in position. PR-OK indicates axis is in place.							

P04.11	Label	DO2			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x2		
	Byte length	16bit	Attribute	R/W	485 address	0x0417		
	Valid	Immediate						

P04.12	Label	DO3			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x81		
	Byte length	16bit	Attribute	R/W	485 address	0x0419		
	Valid	Immediate						

P04.13	Label	DO4			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x4		
	Byte length	16bit	Attribute	R/W	485 address	0x041B		
	Valid	Immediate						

P04.14	Label	DO5			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x7		
	Byte length	16bit	Attribute	R/W	485 address	0x041D		
	Valid	Immediate						

P04.15	Label	DO6			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x6		
	Byte length	16bit	Attribute	R/W	485 address	0x041F		
	Valid	Immediate						
DO2-DO6 is allocated by the same method as per DO1. Please refer to P04.10.								

P04.23	Label	Analog Input 1 (AI-1) Filter			Valid mode(s)		S	
	Range	0~6400	Unit	0.01ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x042F		
	Valid	Immediate						
To set a delay filter time coefficient for AI1 input voltage. When filter time takes effect, input voltage will be smoothen.								

P04.24	Label	Analog Input 1 (AI-1) Overvoltage			Valid mode(s)		S	
	Range	0~100	Unit	0.1V	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0431		
	Valid	Immediate						
P04.24 is invalid when set to 0. Er270 might occur when the input voltage of AI1 is higher than the voltage after zero drift correction.								

P04.26	Label	Analog Input 2 (AI-2) Filter			Valid mode(s)			
	Range	0~6400	Unit	0.01ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0435		
	Valid	Immediate						

P04.27	Label	Analog Input 2 (AI-2) Overvoltage			Valid mode(s)			
	Range	0~100	Unit	0.1V	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0437		
	Valid	Immediate						

P04.29	Label	Analog Input 3 (AI-3) Filter			Valid mode(s)			T
	Range	0~6400	Unit	0.01ms	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x043B		
	Valid	Immediate						
To set a delay filter time coefficient for AI3 input voltage. When filter time takes effect, input voltage will be smoothen.								

P04.30	Label	Analog Input 3 (AI-3) Overvoltage			Valid mode(s)			T
	Range	0~100	Unit	0.1V	Default	120		
	Byte length	16bit	Attribute	R/W	485 address	0x043D		
	Valid	Immediate						
P04.30 is invalid when set to 0. Er270 might occur when the input voltage of AI3 is higher than the voltage after zero drift correction.								

P04.31	Label	In Position Tolerance			Valid mode(s)	P		
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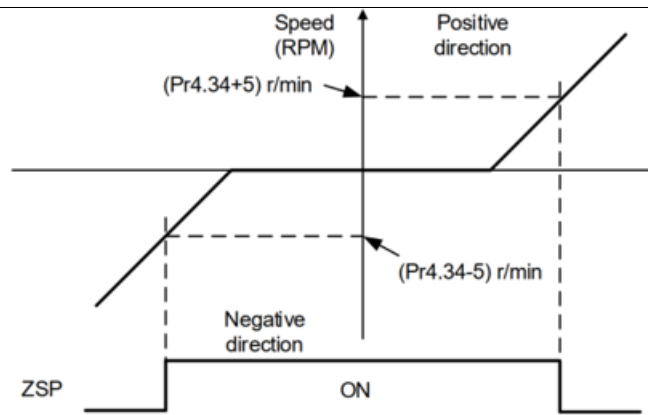
	Range	0~2 ²³	Unit	Pulse	Default	20	
	Byte length	16bit	Attribute	R/W	485 address	0x043F	
	Valid	Immediate					
To set position deviation range of INP1 positioning completed output signal. INP1 output signal will be valid once position is complete within the range of deviation set. Default unit: 0.00001rev. Can be set on P05.21 as command unit (pulse) or encoder unit (pulse)							

P04.32	Label	In position Output			Valid mode(s)	P		
	Range	0~4	Unit	-	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0441		
	Valid	Immediate						
To set conditions for INP1 output signal to be valid								
Value	Positioning completed signal							
0	Signal valid when the position deviation is smaller than P04.31							
1	Signal valid when there is no position command and position deviation is smaller than P04.31							
2	Signal valid when there is no position command, zero-speed clamp detection (ZSP) signal is ON and the positional deviation is smaller than P04.31							
3	Signal valid when there is no position command and position deviation is smaller than P04.31. Signal ON when within the time set in P04.33 otherwise OFF.							
4	When there is no command, position detection starts after the delay time set in P04.33. Signal valid when there is no position command and positional deviation is smaller than P04.31.							

P04.33	Label	INP Holding Time			Valid mode(s)	P		
	Range	0~15000	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0443		
	Valid	Immediate						
Valid when P04.32 = 3.								
Set value	Positioning completed signal							
0	Indefinite delay time, signal ON until next position command							
1~1500 0	OFF within the time set; ON after time set. Switch OFF after receiving next position command.							

P04.34	Label	Zero Speed Settings			Valid mode(s)	P	S	T
	Range	0~2000	Unit	mm/s	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0445		
	Valid	Immediate						
To set threshold value for zero speed clamp detection. Zero speed clamp detection (ZSP) output signal valid when motor speed goes under the value set in P04.34								

Disregard the direction of rotation, valid for both directions.
Hysteresis of 5RPM. Please refer H219to diagram on the right side.



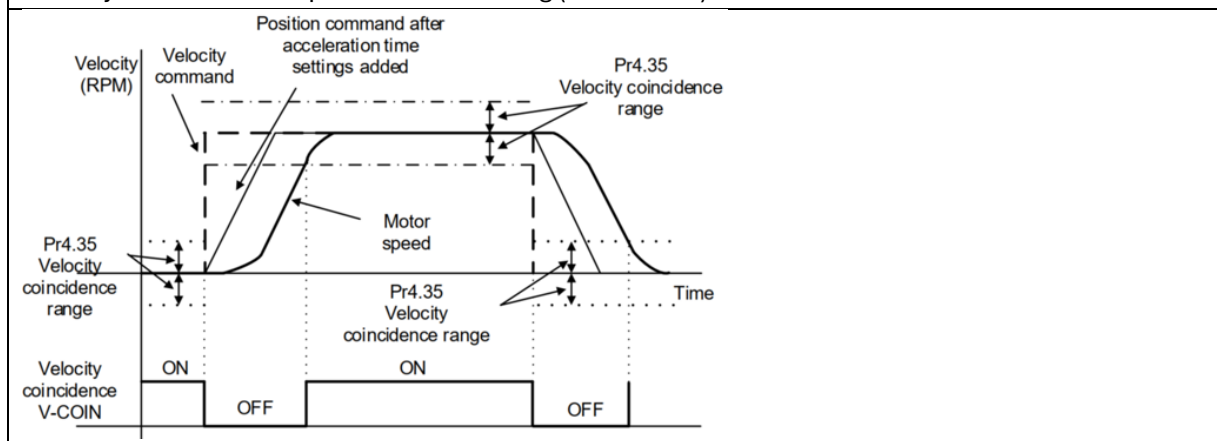
P04.35	Label	Speed Coincidence Range			Valid mode(s)		S	
	Range	0~2000	Unit	mm/s	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0447		
	Valid	Immediate						

If the difference between velocity command and motor actual speed is below P04.35, Velocity coincidence (V-COIN) output signal valid.

Due to 10RPM hysteresis:

Velocity coincidence output OFF -> ON timing (P04.35 -10) r/min

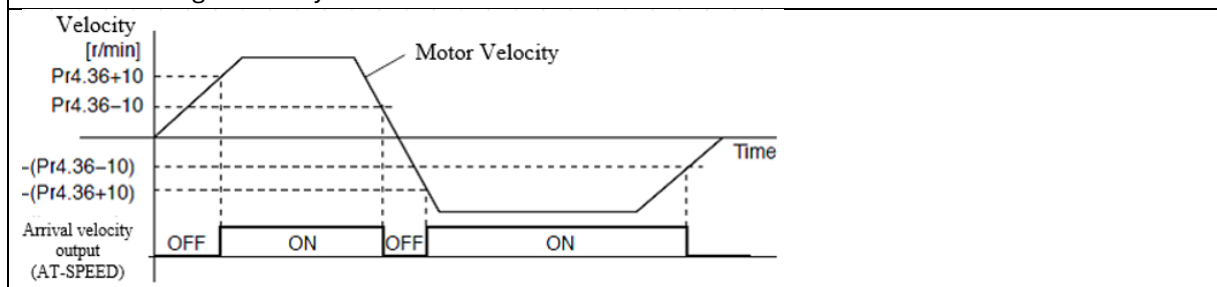
Velocity coincidence output ON -> OFF timing (P04.35 +10) r/min



P04.36	Label	AT-SPEED Settings			Valid mode(s)		S	
	Range	0~2000	Unit	mm/s	Default	1000		
	Byte length	16bit	Attribute	R/W	485 address	0x0449		
	Valid	Immediate						

When motor velocity > P04.36, AT-speed output signal is valid.

Detection using 10RPM hysteresis.



P04.37	Label	Brake OFF Delay Time			Valid mode(s)	P	S	T
	Range	0~3000	Unit	ms	Default	150		
	Byte length	16bit	Attribute	R/W	485 address	0x044B		
	Valid	Immediate						

To set delay time for holding brake to be activated after motor power off to prevent axis from sliding. When P05.06 = 0, SRV-ON signal is off, holding brake is activated (delay time is determined by P04.39 or P06.14). Motor powered-off once delay time set in P04.37 is due.

P04.38	Label	Brake ON Delay Time			Valid mode(s)	P	S	T
	Range	0~3000	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x044D		
	Valid	Immediate						

To set delay time for holding brake to be released after motor power on. Motor will remain at current position and input command is masked to allow holding brake to be fully released before motor is set in motion.

*1: Delay time set in P04.38
 *2: Delay time from the moment BRK_OFF signal is given until actual holding brake is released or BRK_ON signal is given until actual holding brake is activated. It is dependent on the holding brake of the motor.
 *3: Deceleration time is determined by P06.14 or if motor speed goes below P04.39, whichever comes first. BRK_OFF given after deceleration time.
 *4: P04.37 set time value.

Delay time from the moment SRV_ON is given until BRK_OFF switch to BRK_ON, is less than 500ms.

P04.39	Label	Brake OFF Speed			Valid mode(s)	P	S	T
	Range	0~3000	Unit	mm/s	Default	30		
	Byte length	16bit	Attribute	R/W	485 address	0x044F		
	Valid	Immediate						

To set the activation speed for which holding brake will be activated. When SRV-OFF signal is given, motor decelerates, after it reaches below P04.39 and P06.14 is not yet reached, BRK_OFF is given. BRK_OFF signal is determined by P06.14 or if motor speed goes below P04.39, whichever comes first.

Application:

1. After disabling axis, P06.14 has been reached but motor speed is still above P04.39, BRK_OFF signal given.
2. After disabling axis, P06.14 has not been reached but motor speed is below P04.39, BRK_OFF signal given.

Deceleration max duration: 2s. Servo disabled after 2s.

P04.43	Label	E-Stop Settings			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0457		
	Valid	Immediate						
Value	Description							
0	Emergency stop is valid, servo driver will be forced to STOP and Err570 occurs.							
1	Emergency stop is invalid, servo driver will not be forced to STOP. Servo can be enabled once E-STOP signal is cleared.							

P04.48	Label	Torque Compensation Delay			Valid mode(s)	P	S	T
	Range	0~3000	Unit	ms	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.62	Label	Position/Velocity/Torque Feedback Polarity			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.64	Label	AO1 Output			Valid mode(s)	P	S	T
	Range	0~10	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0481		
	Valid	Immediate						
Value	Description							
0								
1								
Other								
	Negative/Positive value: -10~10V							
	Absolute value output: 0~10V							
	Reserved							

P04.65	Label	AO1 Signal			Valid mode(s)	P	S	T
	Range	0x0~0xFFFFFFFF	Unit	-	Default	0x4		
	Byte length	16bit	Attribute	R/W	485 address	0x0483		
	Valid	Immediate						
Bit 0 – 15: AO signal source; Bit 16 – 31: DO extension channel								
Bit0~Bit15		Signal source						
0x0		-						
0x1		Motor rotational speed (V/m/s)						
0x2		Position command velocity (V/m/s)						

0x3	Internal position command velocity (V/m/s)
0x4	Torque command (0.03V/0.01)
0x5	Position command deviation (mV/Command unit)
0x6	Position command deviation (mV/Encoder unit)
0x7	Analog 1 (V/V)
0x8	Analog 2 (V/V)
0x9	Analog 3 (V/V)
0xA	Extension DO (0V/5V)
0xB	As per P04.67
Bit 16 – 31: Only available when AO signal source = 0xA	
Bit16~Bit31	Channel
01h	Alarm output
02h	Servo ready
01h	External brake released
02h	Positioning completed
...	Please refer to P04.10 for other signal channels

P04.66	Label	AO1 Amplification			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	0.01	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0485		
	Valid	Immediate						
To set the amplification of AO1, actual voltage output = amplification x theoretical voltage								

P04.67	Label	AO1 Communication Settings			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	mV	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0487		
	Valid	Immediate						
Available when AO1 = 0xB								

P04.68	Label	AO1 Offset			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	mV	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0489		
	Valid	Immediate						
To set AO1 offset value.								

P04.69	Label	AO2 Output			Valid mode(s)	P	S	T
	Range	0~10	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x048B		
	Valid	Immediate						
Value	Description							
0	Negative/Positive value: -10~10V							
1	Absolute value output: 0~10V							
Other	Reserved							

P04.70	Label	AO2 Signal			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x1		
	Byte length	16bit	Attribute	R/W	485 address	0x048D		
	Valid	Immediate						
Bit 0 – 15: AO signal source; Bit 16 – 31: DO extension channel								
Bit0~Bit15		Signal source						
0x0		-						
0x1		Motor rotational speed (V/m/s)						
0x2		Position command velocity (V/m/s)						
0x3		Internal position command velocity (V/m/s)						
0x4		Torque command (0.03V/0.01)						
0x5		Position command deviation (mV/Command unit)						
0x6		Position command deviation (mV/Encoder unit)						
0x7		Analog 1 (V/V)						
0x8		Analog 2 (V/V)						
0x9		Analog 3 (V/V)						
0xA		Extension DO (0V/5V)						
0xB		As per P04.72						
Bit 16 – 31: Only available when AO signal source = 0xA								
Bit16~Bit31		Channel						
01h		Alarm output						
02h		Servo ready						
01h		External brake released						
02h		Positioning completed						
...		Please refer to P04.10 for other signal channels						

P04.71	Label	AO2 Amplification			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	0.01	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x048F		
	Valid	Immediate						
To set the amplification of AO2, actual voltage output = amplification x theoretical voltage.								

P04.72	Label	AO2 Communication Settings			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	mV	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0491		
	Valid	Immediate						
Available when AO2= 0xB								

P04.73	Label	AO2 Offset			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	mV	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0493		

	Valid	Immediate					
To set AO2 offset value.							

P04.74	Label	Warning Indicator Light 1			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0495		
	Valid	Immediate						

To select warning signal for warning indicator light 1

Value	Signal							
0	None							
1	Negative limit							
2	Battery low voltage							
3	Overload							
4	Torque limit							
5	Positive limit							
Other	Reserved							

During normal operation, warning indicator light will be lighted in a cycle.

P04.75	Label	Warning Indicator Light 2			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	2		
	Byte length	16bit	Attribute	R/W	485 address	0x0497		
	Valid	Immediate						

To select warning signal for warning indicator light 2, as per table in P04.74

P04.76	Label	Warning Indicator Light 3			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	3		
	Byte length	16bit	Attribute	R/W	485 address	0x0499		
	Valid	Immediate						

To select warning signal for warning indicator light 3, as per table in P04.74

P04.77	Label	Warning Indicator Light 4			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	4		
	Byte length	16bit	Attribute	R/W	485 address	0x049B		
	Valid	Immediate						

To select warning signal for warning indicator light 4, as per table in P04.74

P04.78	Label	Warning Indicator Light 5			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	5		
	Byte length	16bit	Attribute	R/W	485 address	0x049D		
	Valid	Immediate						

To select warning signal for warning indicator light 5, as per table in P04.74

P04.79	Label	Virtual DI Virtual DO			Valid mode(s)	P	S	T
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	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.80	Label	VDI-01 & VDI-02 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.81	Label	VDI-03 & VDI-04 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.82	Label	VDI-05 & VDI-06 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.83	Label	VDI-07 & VDI-08 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.84	Label	VDI-09 & VDI-10 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.85	Label	VDI-11 & VDI-12 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.86	Label	VDI-13 & VDI-14 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
P04.87	Label	VDI-15 & VDI-16 Input			Valid mode(s)	P	S	T

	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.88	Label	VDO-01 & VDO-02 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.89	Label	VDO-03 & VDO-04 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.90	Label	VDO-05 & VDO-06 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.91	Label	VDO-07 & VDO-08 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.92	Label	VDO-09 & VDO-10 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.93	Label	VDO-11 & VDO-12 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P04.94	Label	VDO-13 & VDO-14 Input			Valid mode(s)	P	S	T
	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
P04.95	Label	VDO-15 & VDO-16 Input			Valid mode(s)	P	S	T

	Range	0x0~ 0xFFFFFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

8.2.6 [Class 5] Extension Settings

P05.00	Label	2nd Command Pulse Count per Revolution			Valid mode(s)	P		
	Range	0~2 ²⁶	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0500 L: 0x0501		
	Valid	Re-enable						
Switch between P00.08 and P05.00 with DI signal DIV1. When switch to P05.00: (1) P05.00 valid when ≠ 0: Motor revolution = Input pulse count / [P05.00 set value] (2) P05.00 invalid when = 0: Actual position pulse count is according to P05.01 and P05.02. Switching with DIV1 signal only valid when servo driver is re-enabled.								

P05.01	Label	2nd Command Frequency Divider/Multiplier Numerator			Valid mode(s)	P		
	Range	0~2 ³⁰	Unit	-	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0502 L: 0x0503		
	Valid	Immediate						
To set command pulse input frequency division and multiplication numerator								

P05.02	Label	2nd Command Frequency Divider/Multiplier Denominator			Valid mode(s)	P		
	Range	0~2 ³⁰	Unit	-	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0504 L: 0x0505		
	Valid	Immediate						
To set command pulse input frequency division and multiplication denominator. Please refer to P00.09 and P00.10. Switch using DIV1 signal.								

P05.04	Label	Position Limit Settings			Valid mode(s)	P	S	T
	Range	0~2	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0509		
	Valid	Immediate						
To set driver prohibition input (POT/NOT)								
Value	Description							
0	POT -> Positive direction driver prohibited NOT -> Negative direction driver prohibited							
1	POT and NOT invalid							
2	Any single sided input from POT or NOT might cause Er260							

P05.06	Label	Servo OFF Mode			Valid mode(s)	P	S	T
	Range	0~5	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x050D		
	Valid	Restart						
To set servo driver disable mode and status.								
Value	Description							
	Mode	Status						
0	Servo braking		Dynamic braking					
1	Free stopping		Dynamic braking					
2	Dynamic braking		Dynamic braking					
3	Servo braking		Free-run					
4	Free stopping		Free-run					
5	Dynamic braking		Free-run					
Servo braking: Stop servo axis quickly using braking torque P05.06 only effective for stopping under normal circumstances. For stopping on alarm occurrence but refer to P05.10								

P05.09	Label	Main Power-OFF Detection Time			Valid mode(s)	P	S	T
	Range	50~200	Unit	ms	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0513		
	Valid	Immediate						
To set delay time for detection of main power-off or low voltage supply.								

P05.10	Label	Servo Off due to Alarm Mode			Valid mode(s)	P	S	T
	Range	0~5	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0515		
	Valid	Restart						
To set servo driver disable mode and status if alarm is triggered.								
Alarm type 2:								
Value	Description							
	Mode	Status						
0	Servo braking		Dynamic braking					
1	Free stopping		Dynamic braking					
2	Dynamic braking		Dynamic braking					
3	Servo braking		Free-run					
4	Free stopping		Free-run					
5	Dynamic braking		Free-run					
Alarm type 1:								
Value	Description							
	Mode	Status						
0	Dynamic braking	Dynamic braking						
1								
2								
3	Servo braking		Free-run					
4	Free stopping		Free-run					
5	Dynamic braking		Free-run					

P05.11	Label	Servo Braking Torque			Valid mode(s)	P	S	T
	Range	0~500	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0517		
	Valid	Immediate						
To set torque limit for servo braking mode. If P05.11 = 0, use torque limit as under normal situation. Please note that if P05.11 set value is too low, emergency stop will take longer.								

P05.12	Label	Overload Level			Valid mode(s)	P	S	T
	Range	0~115	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0519		
	Valid	Immediate						
When set to 0, overload level = 100%. Set to 0 under regular usage. Lowering overload level will cause motor to overload in shorter time. Er100 occurs when driver output current higher than motor rated current (overload) Er101 occurs when driver output current lower than motor rated current								

P05.13	Label	Overspeed Level			Valid mode(s)	P	S	T
	Range	0~10000	Unit	mm/s	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x051B		
	Valid	Immediate						
If motor speed exceeds P05.13, Er1A0 might occur. When P05.13 = 0, overspeed level = max. motor speed x 1.2								

P05.15	Label	I/O Digital Filter			Valid mode(s)	P	S	T
	Range	0~255	Unit	0.1ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x051F		
	Valid	Immediate						
Digital filtering of I/O input. Overly large value set will cause control delay.								

P05.17	Label	Counter Clearing Input Mode			Valid mode(s)	P		
	Range	0x0~0xFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x0523		
	Valid	Immediate						
To set the clearing conditions for deviation counter clearing input signal.								
Value	Condition							
0/2/4	Invalid							
1	Always clear							
3	Clear only once (Rising edge trigger)							

P05.18	Label	Torque Limit Analog A Source Selection			Valid mode(s)	P	S	T
	Range	0~3	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P05.19	Label	Torque Limit Analog B Source Selection			Valid mode(s)	P	S	T
	Range	0~3	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P05.20	Label	Position Unit Settings			Valid mode(s)	P		
	Range	0~2	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0529		
	Valid	Re-enable						

Set unit for position related parameters

Value	Unit	
0	Encoder unit	
1	Command unit	
2	0.0001rev	

Command unit: Pulse from host (Affected by electronic gear ratio)

Encoder unit: Pulse from encoder (Related to encoder resolution)

P05.20 can only be modified when axis is disabled as it will clear position data

P05.21	Label	Torque Limit Settings			Valid mode(s)	P	S	T
	Range	0~15	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x052B		
	Valid	Immediate						

Value		Limit	
0		1st torque limit P00.13	
1		2nd torque limit P05.22	
2	TL-SEL OFF	P00.13	
	TL-SEL ON	P05.22	
3~4		Reserved	
5		P00.13 → Positive torque limit P05.22 → Negative torque limit	

P05.22	Label	2nd Torque Limit			Valid mode(s)	P	S	T
	Range	0~500	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x052D		
	Valid	Immediate						

P05.22 is limited by max. torque set in motor parameter.

P05.23	Label	Positive Torque Warning Threshold			Valid mode(s)	P	S	T
	Range	0~300	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x052F		
	Valid	Immediate						

Default = 0, which is 95%. Other values only valid when P05.21 = 5.

If actual torque higher than threshold, TLC torque limit signal will be valid.

P05.24	Label	Negative Torque Warning Threshold			Valid mode(s)	P	S	T
	Range	0~300	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0531		
	Valid	Immediate						
Default = 0, which is 95%. Other values only valid when P05.21 = 5. If actual torque higher than threshold, TLC torque limit signal will be valid.								

P05.25	Label	Analog 1 Torque Limit Gain			Valid mode(s)			T
	Range	0~100	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	0x0533		
	Valid	Immediate						

P05.26	Label	Analog 2 Torque Limit Gain			Valid mode(s)			T
	Range	0~100	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	0x0535		
	Valid	Immediate						

P05.27	Label	Analog 3 Torque Limit Gain			Valid mode(s)			T
	Range	0~100	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	0x0537		
	Valid	Immediate						

P05.28	Label	LED Initial Status			Valid mode(s)	P	S	T
	Range	0~50	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0539		
	Valid	Restart						

To set content display on front panel of the servo driver at servo driver power on.

Value	Status	Value	Status	Value	Status
0	Position deviation	14	Regenerative load rate	28	Software version
1	Motor speed	15	Overload rate	29	Internal usage
2	Position command deviation	16	Inertia load ratio	30	Encoder communication failure counts
3	Velocity control command	17	Cause(s) of non-motion	31	Accumulated uptime
4	Actual feedback torque	18	No. of I/O changes	32	Internal usage
5	Feedback pulse sum	19	Internal usage	33	Driver temperature
6	Command pulse sum	20	Absolute encoder data	34	Servo status

7	Max. torque	21	Encoder single turn data	35	Internal usage
8	Position command frequency	22	Encoder multiturn data	43	External encoder Z-phase count
9	Control mode	23	485 receive frame	44	External encoder feedback pulse per revolution
10	I/O status	24	Encoder position deviation	45	External encoder direction
11	Analogue input	25	Internal usage	46	Current position comparison point
12	Alarm cause & history record	26	Internal usage		
13	Warning ID	27	PN Voltage		

P05.29	Label	RS485 Communication Mode			Valid mode(s)	P	S	T
	Range	0-31	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x053B		
	Valid	Restart						
Value		Bit	Checksum			Stop		
0		8	Even			2		
1		8	Odd			2		
2		8	Even			1		
3		8	Odd			1		
4		8	Null			1		
5		8	Null			2		

P05.30	Label	RS485 Communication Baud Rate			Valid mode(s)	P	S	T
	Range	0-13	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x053D		
	Valid	Restart						
Value	Baud rate			Value	Baud rate			
0	2400bps			4	38400bps			
1	4800bps			5	57600bps			
2	9600bps			6	115200bps			
3	19200bps							
Baud rate tolerance: 2400~38400bps±0.5%, 57600~115200bps±2%								

P05.31	Label	Rs485 Axis Address			Valid mode(s)	P	S	T
	Range	0-127	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x053F		
	Valid	Restart						
When controller is connected to multiple axis and controller needs to identify the axis, P05.31 can be used to set the axis ID/address. Please set to a max of 31 if the communication is between RS232 and RS485								

P05.32	Label	Max Command Pulse Input Frequency			Valid mode(s)	P		
	Range	0~8000	Unit	kHz	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0541		
	Valid	Immediate						
Please set the max. frequency required for command pulse input. Er1B0 will occur, if command pulse input frequency exceeds P05.32.								

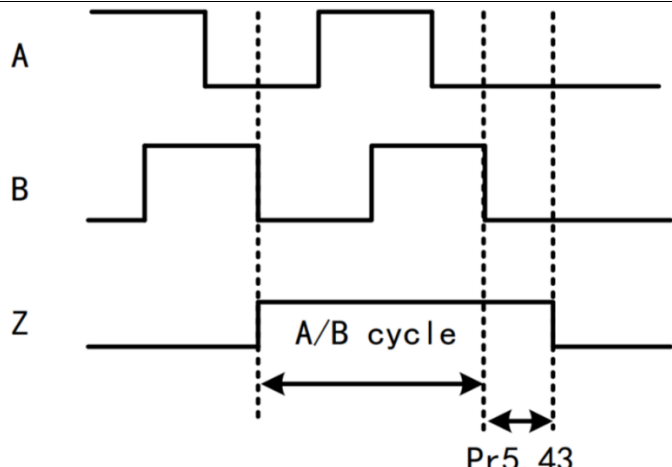
P05.37	Label	Torque Limit Alarm Delay Time			Valid mode(s)	P	S	T
	Range	0~5000	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0549		
	Valid	Immediate						
To set the delay time for detection of torque over limit under torque homing mode. Under homing mode, when torque exceeds limit and the time set in P05.37, TLC output signal will be valid.								

P05.39	Label	3rd Torque Limit			Valid mode(s)	P	S	T
	Range	0~500	Unit	%	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P05.40	Label	D41 Data Monitor			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P05.42	Label	Frequency Divider Output Z-Signal Polarity			Valid mode(s)	P	S	T
	Range	0x0~0x7	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x0555		
	Valid	Restart						
Bit	Polarity	Description						
Bit0	0 = Positive	Z polarity setting of frequency divider output and position comparison						
	1 = Negative							
Bit1	0 = Positive	Only valid in position comparison. Polarity setting when phase A frequency divider as position comparison output						
	1 = Negative							

Bit2	0 = Positive	Only valid in position comparison. Polarity setting when phase B frequency divider as position comparison output
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P05.43	Label	Frequency Divider Output Z-Signal Bandwidth			Valid mode(s)	P	S	T
	Range	0~500	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0557		
	Valid	Restart						
Value	Description							
0	Z bandwidth equivalent to 1 cycle of A/B							
1~500	Delay setting on top of A/B cycle width							
When P05.43 = 0, width of frequency divider output Z-signal is equivalent to width of 1 cycle of A/B, value set in P05.43 + A/B cycle width = delay setting.								
								

P05.44	Label	Frequency Divider Output Source			Valid mode(s)	P	S	T
	Range	0~4	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0559		
	Valid	Restart						
Value	Description							
0	Position feedback of encoder #1(motor encoder)							
1	Position feedback of encoder #2(external encoder)							
2	Reserved							
3	Pulse input command position synchronous output; position comparison not available in this mode							
4	Frequency divider output prohibited							

P05.45	Label	External Encoder Feedback Velocity Threshold			Valid mode(s)	P	S	T
	Range	0~10000	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	0x055B		
	Valid	Immediate						

P05.46	Label	Regenerative Vent Overload Level			Valid mode(s)	P	S	T
	Range	0~115	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x055D		
	Valid	Immediate						
Value	Description							
0	Default level: 80%							
1~115	Set vent overload level accordingly							

P05.58	Label	Frequency Divider Output Delay Compensation			Valid mode(s)	P	S	T
	Range	-10000 ~10000	Unit	0.1us	Default	-10000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P05.70	Label	Reached Velocity Hysteresis Bandwidth			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
Value	Description							
0	Disable							
1	Enable (Rising edge)							

8.2.7 [Class 6] Special Settings

P06.01	Label	Encoder Zero Position Compensation			Valid mode(s)	P	S	T
	Range	0~360	Unit	Electrical angle	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0603		
	Valid	Restart						

Zero position compensation for encoder zero drift to avoid abnormality due to zero drift.

P06.03	Label	JOG Torque			Valid mode(s)			T
	Range	0~750	Unit	%	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0607		
	Valid	Immediate						

To set torque for JOG trial run command.

P06.04	Label	JOG Speed			Valid mode(s)	P	S	T
	Range	0~10000	Unit	mm/s	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0609		
	Valid	Immediate						

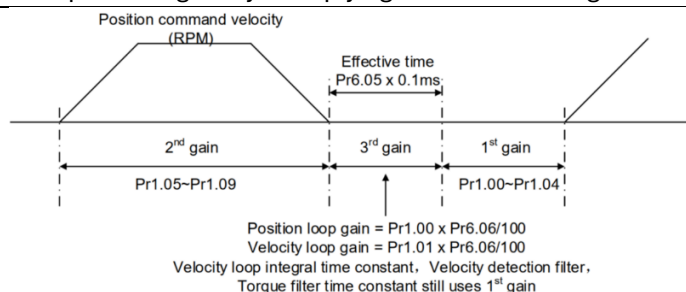
To set velocity for JOG trial run command.

P06.05	Label	Position 3rd Gain Valid Time			Valid mode(s)	P		
	Range	0~10000	Unit	0.1pitch	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x060B		
	Valid	Immediate						

To set time for 3rd gain to be valid.
Only available in position mode.
When not in use, set P06.05=0, P06.06=100.

P06.06	Label	Position 3rd Gain Scale Factor			Valid mode(s)	P		
	Range	1~1000	Unit	%	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x060D		
	Valid	Immediate						

Set up the 3rd gain by multiplying factor of the 1st gain



Above diagram is illustrated using P01.15 = 7.

3rd gain = 1st gain * P06.06/100

Only effective under position control mode. 3rd gain valid when P06.05 ≠ 0. Set 3rd gain value in P06.06. When 2nd gain switches to 1st gain, it will go through 3rd, switching time is set in P01.19.

P06.07	Label	Torque Command Additional Value			Valid mode(s)	P	S	T
	Range	-100~100	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x060F		
	Valid	Immediate						
To set torque forward feed additional value of vertical axis. Applicable for loaded vertical axis, compensate constant torque. Application: When load move along vertical axis, pick any point from the whole motion and stop the load at that particular point with motor enabled but not rotating. Record output torque value from d04, use that value as torque command additional value (compensation value)								

P06.08	Label	Positive Direction Torque Compensation			Valid mode(s)	P	S	T
	Range	-100~100	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0611		
	Valid	Immediate						

P06.09	Label	Negative Direction Torque Compensation			Valid mode(s)	P	S	T
	Range	-100~100	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0613		
	Valid	Immediate						
To reduce the effect of mechanical friction in the movement(s) of the axis. Compensation values can be set according to needs for both rotational directions. Applications: 1. When motor is at constant speed, d04 will deliver torque values. Torque value in positive direction = T1; Torque value in negative direction = T2 $\frac{P06.08}{P06.09} = T_f = \frac{ T1 - T2 }{2}$								

Positive/Negative compensation corresponds to actual position feedback.
 Positive torque compensation value = +(P06.08=+Tf)
 Negative torque compensation value = -(P06.08=+Tf)
 P06.08 =x, P06.09=y; friction compensation value = |x-y|/2

P06.10	Label	Function Expansion			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	0x0615		
	Valid	Immediate						

P06.11	Label	Current Response Settings			Valid mode(s)	P	S	T
	Range	50~100	Unit	%	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0617		
	Valid	Immediate						
To set driver current loop related effective value ratio.								

P06.14	Label	Stop Time upon Alarm			Valid mode(s)	P	S	T
	Range	0~3000	Unit	ms	Default	500		
	Byte length	16bit	Attribute	R/W	485 address	0x061D		
	Valid	Immediate						
To set the max. time allowed for the axis to stop on emergency stop or normal axis disabling. After disabling axis, if motor speed is still higher than P04.39 but the time set in P06.14 is reached, BRK_ON given and holding brake activated. BRK_ON given time is determined by P06.14 or when motor speed goes below P04.39, whichever comes first.								
Applications: 1. After disabling axis, if motor speed is still higher than P04.39 but the time set in P06.14 is reached, BRK_ON given and holding brake activated. 2. After disabling axis, if motor speed is already lower than P04.39 but the time set in P06.14 is not yet reached, BRK_ON given and holding brake activated.								
Dynamic brake will be provide the braking function if the function is activated for motors without holding brake.								

P06.20	Label	Trial Run Distance			Valid mode(s)	P		
	Range	0~1200	Unit	0.1r	Default	10		
	Byte length	16bit	Attribute	R/W	485 address	0x0629		
	Valid	Immediate						
JOG (Position control) : Distance travel of each motion.								

P06.21	Label	Interval Time			Valid mode(s)	P		
	Range	0~30000	Unit	ms	Default	300		
	Byte length	16bit	Attribute	R/W	485 address	0x062B		
	Valid	Immediate						
JOG (Position control) : Waiting time interval after each motion cycle.								

P06.22	Label	Trial Run Cycle			Valid mode(s)	P		
	Range	0~32767	Unit	Second-rate	Default	5		
	Byte length	16bit	Attribute	R/W	485 address	0x062D		
	Valid	Immediate						
JOG (Position control) : No. of cycles When P06.22, trial run goes into endless cycles.								

P06.25	Label	Trial Run Acceleration			Valid mode(s)	P	S	
	Range	0~10000	Unit	ms/(m/s)	Default	200		
	Byte length	16bit	Attribute	R/W	485 address	0x0633		
	Valid	Immediate						
To set the acceleration/deceleration time for JOG command between 0 rpm to 1000 rpm								

P06.27	Label	Current Loop Tuning			Valid mode(s)	P	S	
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	0x0637		
	Valid	Immediate						

P06.28	Label	Velocity Observer Gain			Valid mode(s)	P	S	
	Range	0~32767	Unit	-	Default	160		
	Byte length	16bit	Attribute	R/W	485 address	0x0639		
	Valid	Immediate						

0 : Default stable gain 1 : OFF

x : (unit : %) Manual, related to motor, load and encoder

P06.29	Label	Velocity Observer Bandwidth			Valid mode(s)	P	S	
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x063B		
	Valid	Immediate						

0 : Default stable observer filter 1 : OFF

x : (unit : μs) Manual, related to motor, load and encoder

P06.34	Label	Fram Error Window Time			Valid mode(s)	P	S	
	Range	0~32767	Unit	-	Default	100		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.35	Label	Fram Error Window			Valid mode(s)	P	S	
	Range	0~32767	Unit	-	Default	50		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.54	Label	Absolute Rotary Denominator			Valid mode(s)	P	S	
	Range	0~32767	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P06.56	Label	Rotor Blocked Alarm Torque Threshold			Valid mode(s)	P	S	
	Range	0~300	Unit	%	Default	300		
	Byte length	16bit	Attribute	R/W	485 address	0x0671		
	Valid	Immediate						

To set the torque threshold of blocked rotor to trigger alarm. (Alarm triggered if torque output% larger than threshold value & under 10rpm)

If P06.56 = 0, blocked rotor alarm deactivated.

If motor speed is 10rpm or above, Er102 won't be triggered.

P06.59	Label	In Position Threshold - Origin Mode			Valid mode(s)	P		
	Range	0~100	Unit	-	Default	8		
	Byte length	-	Attribute	R/W	485 address	0x0677		
	Valid	Immediate						

P06.61	Label	Z-signal Holding Time			Valid mode(s)	P		
	Range	1~1000	Unit	ms	Default	10		
	Byte length	-	Attribute	R/W	485 address	0x067B		
	Valid	Immediate						

P06.63	Label	Absolute Multiturn Data Limit			Valid mode(s)	P	S	T
	Range	0~32767	Unit	pitch	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x067F		
	Valid	Restart						
Use P00.15 = 2 in rotational mode, Feedback position cycles between 0 and (P06.63+1) x encoder resolution. Absolute multiturn data will be set to 0 if reaches upper limit.								

P06.80	Label	Clash Detection Mode			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P06.81	Label	Clash Detection Positive Current Threshold			Valid mode(s)	P	S	T
	Range	0~750	Unit	%	Default	100		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.82	Label	Clash Detection Negative Current Threshold			Valid mode(s)	P	S	T
	Range	0~750	Unit	%	Default	100		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.83	Label	Clash Detection Velocity Threshold			Valid mode(s)	P	S	T
	Range	0~10000	Unit	rpm	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.84	Label	Holding Current After Clash (Positive)			Valid mode(s)	P	S	T
	Range	0~750	Unit	%	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.85	Label	Holding Current After Clash (Negative)			Valid mode(s)	P	S	T
	Range	0~750	Unit	%	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.86	Label	Clash Detection Start Position (Positive)			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹	Unit	Command unit	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P06.87	Label	Clash Detection Start Position (Negative)			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹	Unit	Command unit	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P06.88	Label	Clash Detection Positive Current Filter Factor			Valid mode(s)	P	S	T
	Range	0~1000	Unit	Command unit	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.89	Label	Clash Detection Negative Current Filter Factor			Valid mode(s)	P	S	T
	Range	0~1000	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.90	Label	Clash Detection Time			Valid mode(s)	P	S	T
	Range	0~10000	Unit	0.1ms	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.92	Label	Clash BLF Delay Time			Valid mode(s)	P	S	T
	Range	0~10000	Unit	0.01ms	Default	200		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.93	Label	Clash BLF Threshold			Valid mode(s)	P	S	T
	Range	0~5000	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.94	Label	Clash BLF Center Frequency			Valid mode(s)	P	S	T
	Range	100 ~400000	Unit	-	Default	10000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P06.95	Label	Clash BLF Q-Value			Valid mode(s)	P	S	T
	Range	1~5000	Unit	-	Default	1000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

8.2.8 [Class 7] Motor Parameters

P07.00	Label	Current Loop Gain			Valid mode(s)	P	S	T
	Range	100~5000	Unit	Hz	Default	1000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.01	Label	Current Loop Integral Time			Valid mode(s)	P	S	T
	Range	1~10000	Unit	0.1ms	Default	500		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.02	Label	Rotor Initial Angle Compensation			Valid mode(s)	P	S	T
	Range	-360~360	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P07.03	Label	Current Differential Coefficient			Valid mode(s)	P	S	T
	Range	0~30000	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.04	Label	Reserved			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.15	Label	Motor Model			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF	Unit	-	Default	0x140		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

Value	Description
0x100	Read from EEPROM
0x200	Read from Encoder
When P07.15 = 0x200(2xx):	
Parameter	Label
P07.00	Current loop gain
P07.01	Current loop integral time
P07.05	No. of motor pole pairs
P07.06	Motor phase resistance
P07.07	Motor D/Q induction
P07.08	Motor back EMF coefficient
P07.09	Motor torque coefficient
P07.10	Motor rated motion speed
P07.11	Motor max. motion speed
P07.12	Motor rated current

P07.13	Motor rotor inertia
P07.14	Driver power rating
P07.16	Encoder
P07.17	Motor max. current
P07.18	Encoder index angle compensation

P07.16	Label	Encoder Model			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFFF	Unit	-	Default	0x7F		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						
To select encoder type. Typically, encoder specifications are automatically read.								
Value	Description							
0x0	17-bit encoder							
0x7	23-bit encoder							

P07.23	Label	Encoder Lines			Valid mode(s)	P	S	T
	Range	0~2 ²⁴	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.54	Label	Grating Ruler Resolution			Valid mode(s)	P	S	T
	Range	0~100000 0	Unit	nm	Default	100		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						
To select external grating ruler precision.								

P07.55	Label	Distance between Magnetic Poles			Valid mode(s)	P	S	T
	Range	0~32767	Unit	0.01mm	Default	1200		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P07.57	Label	Motor Overheat Threshold			Valid mode(s)	P	S	T
	Range	0~150	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.60	Label	Encoder Communication Protocol			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P07.77	Label	BISS-C Encoder Single Turn Data			Valid mode(s)	P	S	T
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	Range	0~32	Unit	-	Default	32		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P07.78	Label	BISS-C Encoder Multi Turn Data			Valid mode(s)	P	S	T
	Range	0~16	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P07.79	Label	BISS-C Baud Rate			Valid mode(s)	P	S	T
	Range	0~100	Unit	0.1MHz	Default	25		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P07.80	Label	BISS-C Encoder Pin Configuration			Valid mode(s)	P	S	T
	Range	0x0~0x7FF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

P07.83	Label	Motor Zero Pt Single Turn Position			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	Encoder unit	Default	0		
	Byte length	-	Attribute	R/W	487 address	-		
	Valid	Restart						

8.2.9 [Class 8] Pr-Control Parameters

P08.00	Label	PR Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6000		
	Valid	Immediate						
It is recommended to modify PR control parameters using EDrive.								
Bit	3		2		1	0		
Descrip- tion	=1, absolute value memory =0, absolute value with no memory		=1, homing upon power on =0, no homing upon power on		=1, software position limit valid =0, software position limit not valid	=0, CTRG rising edge trigger =1, double edges trig		
If parameter modifications are done through the front panel or parameters list, please keep in mind that PR control parameters byte are decimal system. For example: If Bit 3, 2, 1, 0 are to be set to 1 (1111). Conversion using decimal system, 1111 = 15, P08.00 is to be set to 15.								

P08.01	Label	No. of Path			Valid mode(s)	PR		
	Range	16~16	Unit	-	Default	16		
	Byte length	16bit	Attribute	R/W	485 address	0x6001		
	Valid	Immediate						
16 paths								

P08.02	Label	Control register			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6002		
	Valid	Immediate						
Attributes of P08.02 functions are divided into Read/Write. P refers to positioning motion of N path. Please refer to the following table.								
Attributes	Address		Description					
Write	0x01P		N path positioning					
Write	0x020		Reset					
Write	0x021		Manually set currently position as 0 (Origin)					
Write	0x040		Emergency stop					
Read	0x000P		Positioning completed. Ready to receive new data					
Read	0x01P, 0x020, 0x040		Yet to respond to command					
Read	0x10P		Path motion undergoing					
Read	0x200		Command completed. Waiting for positioning					

P08.07	Label	Positive software limit H			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6007		
	Valid	Immediate						

To set software positive limit position (32 bit base).
 Using 485 communication, only able to R/W low 16 bit.
 R/W high 16 bit needs to be realized through P08.06.
 When software positive limit = 994817, 0x000F2E01(Hexadecimal): high16bit = 0x000F, hence P08.05 reading = 0x000F, controller = 15.
 R/W of high/low bit data is similar when using 485 communication.

P08.09	Label	Negative software limit H			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6009		
	Valid	Immediate						

To set software positive limit position.
 Using 485 communication, only able to R/W low 16 bit.
 R/W high 16 bit needs to be realized through P08.08.

P08.10	Label	Homing			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x600A		
	Valid	Immediate						

To set homing method in PR mode. It is recommended to modify PR control parameters using Motion Studio.

Bit	8 (Z-signal homing)	2~7 (Homing mode)	1 (Specific position after homing)	0 (homing direction)
Descrip- tion	=1, homing with Z-signal =0, homing without Z-signal	=0 Limit homing =1 Origin homing =2 Single turn Z homing =3 Torque homing =8 Immediate homing	=1, Yes =0, No	=1, Forward =0, Reverse

P08.12	Label	Home Pos			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x600C		
	Valid	Immediate						

To set zero position.
 Using 485 communication, only able to R/W low 16 bit.
 R/W high 16 bit needs to be realized through P08.11.

P08.14	Label	Home Stop Pos			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x600E		
	Valid	Immediate						
To set home position offset. Using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P08.13.								

P08.15	Label	High Velocity			Valid mode(s)	PR		
	Range	1~600	Unit	mm/s	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x600F		
	Valid	Immediate						
To set high homing velocity in PR mode.								

P08.16	Label	Low Velocity			Valid mode(s)	PR		
	Range	1~600	Unit	mm/s	Default	10		
	Byte length	16bit	Attribute	R/W	485 address	0x6010		
	Valid	Immediate						
To set low homing velocity in PR mode.								

P08.17	Label	Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6011		
	Valid	Immediate						
To set homing acceleration time in PR mode, time needed for 0mm/s to accelerate to 1000mm/s								

P08.18	Label	Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6012		
	Valid	Immediate						
To set homing deceleration time in PR mode, time needed for 1000mm/s to decelerate to 0mm/s								

P08.19	Label	Torque Homing Time			Valid mode(s)	PR		
	Range	0~65536	Unit	ms	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6013		
	Valid	Immediate						
To set homing torque holding time								

P08.20	Label	Torque Homing Value			Valid mode(s)	PR		
	Range	0~65536	Unit	%	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6014		
	Valid	Immediate						
To set homing torque								

P08.21	Label	Homing overstep			Valid mode(s)	PR		
	Range	0~65536	Unit	0.1r	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6015		
	Valid	Immediate						
To set homing overtravel alarm threshold.								

P08.22	Label	Emergency Stop Deceleration upon Limit			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	10		
	Byte length	16bit	Attribute	R/W	485 address	0x6016		
	Valid	Immediate						
To set position limit emergency stop deceleration.								

P08.23	Label	STOP deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x6017		
	Valid	Immediate						
To set STP emergency stop deceleration.								

P08.26	Label	IO Trigger Mode			Valid mode(s)	PR		
	Range	0~65536	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x601A		
	Valid	Immediate						
Value	Description							
0	Disable I/O combination trigger mode. Uses I/O CTRG signal edge trigger.							
1	Enable I/O combination trigger. Valid when HOME-OK signal is valid.							
2	Enable I/O combination trigger. HOME-OK signal not required.							
IO combination trigger select path using ADD0~ADD3. Trigger mode is set in P08.26.								
ADD3	ADD2	ADD1	ADD0	Path Selection				
OFF	OFF	OFF	OFF	Path 0 (Non-action)				
OFF	OFF	OFF	ON	Path 1				
OFF	OFF	ON	OFF	Path 2				
OFF	OFF	ON	ON	Path 3				
OFF	ON	OFF	OFF	Path 4				
OFF	ON	OFF	ON	Path 5				
OFF	ON	ON	OFF	Path 6				
OFF	ON	ON	ON	Path 7				
ON	OFF	OFF	OFF	Path 8				
ON	OFF	OFF	ON	Path 9				
ON	OFF	ON	OFF	Path 10				
ON	OFF	ON	ON	Path 11				
ON	ON	OFF	OFF	Path 12				
ON	ON	OFF	ON	Path 13				
ON	ON	ON	OFF	Path 14				

ON	ON	ON	ON	Path 15	
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P08.27	Label	IO Filter			Valid mode(s)	PR		
	Range	0~10000	Unit	ms	Default	5		
	Byte length	16bit	Attribute	R/W	485 address	0x601B		
	Valid	Immediate						

To set I/O combination filter time.

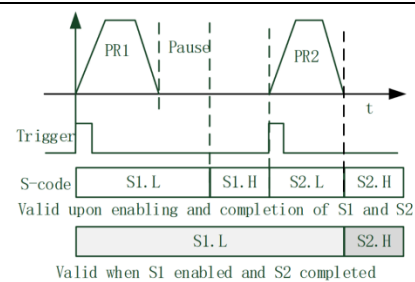
P08.28	Label	S-code actual output value			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x601C		
	Valid	Immediate						

S-code (Status code) is the S-code of currently operating PR positioning data.

Every PR path has a S-code setting.

S-code	Sx.H			Sx.L	
Bit	15	8~14	7	0~6	
Descrip- tion	S-code valid when completed. 0: Invalid, retain previous value 1: Valid	S-code upon completion	S-code valid upon activation 0: Invalid 1: Valid	S-code upon activation	

Sequence diagram



S-code bit	bit0/8	bit1/9	bit2/10	bit3/11	bit4/12	bit5/13	bit6/14	
SDx	SD0	SD1	SD2	SD3	SD4	SD5	SD6	

P08.29	Label	PR Warning			Valid mode(s)	PR		
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x601D		
	Valid	Immediate						

Address	Warning
0	Reset new command automatically
0x100	Position limit error during homing
0x101	Emergency stop. Homing not completed
0x102	Homing overtravel alarm
0x20x	Position limit error on Path N

P08.39	Label	JOG1 velocity			Valid mode(s)	PR		
	Range	0~65536	Unit	mm/s	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6027		
	Valid	Immediate						
Set JOG velocity in PR mode.								

P08.40	Label	JOG acceleration			Valid mode(s)	PR		
	Range	0~65536	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6028		
	Valid	Immediate						
Set JOG acceleration in PR mode.								

P08.41	Label	JOG deceleration			Valid mode(s)	PR		
	Range	0~65536	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6029		
	Valid	Immediate						
Set JOG deceleration in PR mode.								

P08.43	Label	Command Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x602B		
	Valid	Immediate						
To set PR-motion command position. Using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P08.42.								

P08.45	Label	Motor Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x602D		
	Valid	Immediate						
Using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P08.44.								

P08.46	Label	Input			Valid mode(s)	PR		
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x602E		
	Valid	Immediate						
Input I/O status, displays in decimal system. Convert to binary system to determine which bit is valid.								

P08.47	Label	Output			Valid mode(s)	PR		
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x602F		

	Valid	Immediate						
Output I/O status, displays in decimal system. Convert to binary system to determine which bit is valid.								

P08.48	Label	S-code for path 0			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6030		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.49	Label	S-code for path 1			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6031		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.50	Label	S-code for path 2			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6032		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.51	Label	S-code for path 3			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6033		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.52	Label	S-code for path 4			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6034		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.53	Label	S-code for path 5			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6035		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.54	Label	S-code for path 6			Valid mode(s)	PR		
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	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6036		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.55	Label	S-code for path 7			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6037		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.56	Label	S-code for path 8			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6038		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.57	Label	S-code for path 9			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6039		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.58	Label	S-code for path 10			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x603A		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.59	Label	S-code for path 11			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x603B		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.60	Label	S-code for path 12			Valid mode(s)	PR		
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x603C		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.61	Label	S-code for path 13			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x603D		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.62	Label	S-code for path 14			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x603E		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

P08.63	Label	S-code for path 15			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x603F		
	Valid	Immediate						
Please refer to P08.28 for S-code setting.								

8.2.10 [Class 9] Pr-Control Path Parameters

P09.00	Label	PR0 Mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	-	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6200
	Valid	Immediate				
Bit	14	8~13	6~7	5	4	0~3
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S

P09.02	Label	PR0 Position			Valid mode(s)	PR
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6202
	Valid	Immediate				
For Path 0 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.						

P09.03	Label	PR0 Velocity			Valid mode(s)	PR
	Range	-10000~10000	Unit	mm/s	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6203
	Valid	Immediate				
To set PR path 0 velocity.						

P09.04	Label	PR0 Acceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6204
	Valid	Immediate				
To set PR path 0 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.						

P09.05	Label	PR0 Deceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6205
	Valid	Immediate				
To set PR path 0 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.						

P09.06	Label	PR0 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6206		
	Valid	Immediate						
To set pause time for PR path 0 from completion to next path.								

P09.07	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6207		
	Valid	Immediate						
Reserved.								

P09.08	Label	PR1 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6208		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.10	Label	PR1 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x620A		
	Valid	Immediate						
For path 1 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.11	Label	PR1 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x620B		
	Valid	Immediate						
To set PR path 1 velocity.								

P09.12	Label	PR1 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x620C		
	Valid	Immediate						
To set PR path 1 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.13	Label	PR1 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x620D		
	Valid	Immediate						
To set PR path 1 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.14	Label	PR1 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x620E		
	Valid	Immediate						
To set pause time for PR path 1 from completion to next path.								

P09.15	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x620F		
	Valid	Immediate						
Reserved.								

P09.16	Label	PR2 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6210		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.18	Label	PR2 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6212		
	Valid	Immediate						
For path 2 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.19	Label	PR2 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x6213		
	Valid	Immediate						
To set PR path 2 velocity.								

P09.20	Label	PR2 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6214		
	Valid	Immediate						
To set PR path 2 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.21	Label	PR2 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6215		
	Valid	Immediate						
To set PR path 2 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.22	Label	PR2 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6216		
	Valid	Immediate						
To set pause time for PR path 2 from completion to next path.								

P09.23	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6217		
	Valid	Immediate						
Reserved.								

P09.24	Label	PR3 Mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	-	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6218
	Valid	Immediate				
Bit	14	8~13	6~7	5	4	0~3
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S

P09.26	Label	PR3 Position			Valid mode(s)	PR
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x621A
	Valid	Immediate				
For path 3 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.						

P09.27	Label	PR3 Velocity			Valid mode(s)	PR
	Range	-10000~10000	Unit	mm/s	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x621B
	Valid	Immediate				
To set PR path 3 velocity.						

P09.28	Label	PR3 Acceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x621C
	Valid	Immediate				
To set PR path 3 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.						

P09.29	Label	PR3 Deceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x621D
	Valid	Immediate				
To set PR path 3 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.						

P09.30	Label	PR3 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x621E		
	Valid	Immediate						
To set pause time for PR path 3 from completion to next path.								

P09.31	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x621F		
	Valid	Immediate						
Reserved.								

P09.32	Label	PR4 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6220		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.34	Label	PR4 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6222		
	Valid	Immediate						
For path 4 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.35	Label	PR4 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x6223		
	Valid	Immediate						
To set PR path 4 velocity.								

P09.36	Label	PR4 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6224		
	Valid	Immediate						
To set PR path 4 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.37	Label	PR4 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6225		
	Valid	Immediate						
To set PR path 4 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.38	Label	PR4 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6226		
	Valid	Immediate						
To set pause time for PR path 4 from completion to next path.								

P09.39	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6227		
	Valid	Immediate						
Reserved.								

P09.40	Label	PR5 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6228		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.42	Label	PR5 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x622A		
	Valid	Immediate						
For path 5 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.43	Label	PR5 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x622B		
	Valid	Immediate						
To set PR path 5 velocity.								

P09.44	Label	PR5 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x622C		
	Valid	Immediate						
To set PR path 5 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.45	Label	PR5 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x622D		
	Valid	Immediate						
To set PR path 5 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.46	Label	PR5 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x622E		
	Valid	Immediate						
To set pause time for PR path 5 from completion to next path.								

P09.47	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x622F		
	Valid	Immediate						
Reserved.								

P09.48	Label	PR6 Mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	-	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6230
	Valid	Immediate				
Bit	14	8~13	6~7	5	4	0~3
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S

P09.50	Label	PR6 Position			Valid mode(s)	PR
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6232
	Valid	Immediate				
For path 6 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.						

P09.51	Label	PR6 Velocity			Valid mode(s)	PR
	Range	-10000~10000	Unit	mm/s	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6233
	Valid	Immediate				
To set PR path 6 velocity.						

P09.52	Label	PR6 Acceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6234
	Valid	Immediate				
To set PR path 6 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.						

P09.53	Label	PR6 Deceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6235
	Valid	Immediate				
To set PR path 6 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.						

P09.54	Label	PR6 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6236		
	Valid	Immediate						
To set pause time for PR path 6 from completion to next path.								

P09.55	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6237		
	Valid	Immediate						
Reserved.								

P09.56	Label	PR7 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6238		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.58	Label	PR7 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x623A		
	Valid	Immediate						
For path 7 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.59	Label	PR7 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x623B		
	Valid	Immediate						
To set PR path 7 velocity.								

P09.60	Label	PR7 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x623C		
	Valid	Immediate						
To set PR path 7 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.61	Label	PR7 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x623D		
	Valid	Immediate						
To set PR path 7 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.62	Label	PR7 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x623E		
	Valid	Immediate						
To set pause time for PR path 7 from completion to next path.								

P09.63	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x623F		
	Valid	Immediate						
Reserved.								

P09.64	Label	PR8 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6240		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.66	Label	PR8 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6242		
	Valid	Immediate						
For path 8 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.67	Label	PR8 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x6243		
	Valid	Immediate						
To set PR path 8 velocity.								

P09.68	Label	PR8 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6244		
	Valid	Immediate						
To set PR path 8 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.69	Label	PR8 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6245		
	Valid	Immediate						
To set PR path 8 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.70	Label	PR8 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6246		
	Valid	Immediate						
To set pause time for PR path 8 from completion to next path.								

P09.71	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6247		
	Valid	Immediate						
Reserved.								

P09.72	Label	PR9 Mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	-	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6248
	Valid	Immediate				
Bit	14	8~13	6~7	5	4	0~3
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S

P09.74	Label	PR9 Position			Valid mode(s)	PR
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x624A
	Valid	Immediate				
For path 9 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.						

P09.75	Label	PR9 Velocity			Valid mode(s)	PR
	Range	-10000~10000	Unit	mm/s	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x624B
	Valid	Immediate				
To set PR path 9 velocity.						

P09.76	Label	PR9 Acceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x624C
	Valid	Immediate				
To set PR path 9 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.						

P09.77	Label	PR9 Deceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x624D
	Valid	Immediate				
To set PR path 9 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.						

P09.78	Label	PR9 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x624E		
	Valid	Immediate						
To set pause time for PR path 9 from completion to next path.								

P09.79	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x624F		
	Valid	Immediate						
Reserved.								

P09.80	Label	PR10 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6250		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.81	Label	PR10 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6252		
	Valid	Immediate						
For path 10 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.83	Label	PR10 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x6253		
	Valid	Immediate						
To set PR path 10 velocity.								

P09.84	Label	PR10 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6254		
	Valid	Immediate						
To set PR path 10 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.85	Label	PR10 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6255		
	Valid	Immediate						
To set PR path 10 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.86	Label	PR10 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6256		
	Valid	Immediate						
To set pause time for PR path 10 from completion to next path.								

P09.87	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6257		
	Valid	Immediate						
Reserved.								

P09.88	Label	PR11 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6258		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.90	Label	PR11 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x625A		
	Valid	Immediate						
For path 11 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.91	Label	PR11 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x625B		
	Valid	Immediate						
To set PR path 11 velocity.								

P09.92	Label	PR11 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x625C		
	Valid	Immediate						
To set PR path 11 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.93	Label	PR11 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x625D		
	Valid	Immediate						
To set PR path 11 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.94	Label	PR11 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x625E		
	Valid	Immediate						
To set pause time for PR path 11 from completion to next path.								

P09.95	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x625F		
	Valid	Immediate						
Reserved.								

P09.96	Label	PR12 Mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	-	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6260
	Valid	Immediate				
Bit	14	8~13	6~7	5	4	0~3
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S

P09.98	Label	PR12 Position			Valid mode(s)	PR
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6262
	Valid	Immediate				
For path 12 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.						

P09.99	Label	PR12 Velocity			Valid mode(s)	PR
	Range	-10000~10000	Unit	mm/s	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6263
	Valid	Immediate				
To set PR path 12 velocity.						

P09.100	Label	PR12 Acceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6264
	Valid	Immediate				
To set PR path 12 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.						

P09.101	Label	PR12 Deceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6265
	Valid	Immediate				
To set PR path 12 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.						

P09.102	Label	PR12 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6266		
	Valid	Immediate						
To set pause time for PR path 12 from completion to next path.								

P09.103	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6267		
	Valid	Immediate						
Reserved.								

P09.104	Label	PR13 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6268		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.106	Label	PR13 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x626A		
	Valid	Immediate						
For path 13 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.107	Label	PR13 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x626B		
	Valid	Immediate						
To set PR path 13 velocity.								

P09.108	Label	PR13 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x626C		
	Valid	Immediate						
To set PR path 13 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.109	Label	PR13 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x626D		
	Valid	Immediate						
To set PR path 13 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.110	Label	PR13 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x626E		
	Valid	Immediate						
To set pause time for PR path 13 from completion to next path.								

P09.111	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x626F		
	Valid	Immediate						
Reserved.								

P09.112	Label	PR14 Mode			Valid mode(s)	PR		
	Range	0x0~ 0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x6270		
	Valid	Immediate						
Bit	14	8~13	6~7	5	4	0~3		
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S		

P09.114	Label	PR14 Position			Valid mode(s)	PR		
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6272		
	Valid	Immediate						
For path 14 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.								

P09.115	Label	PR14 Velocity			Valid mode(s)	PR		
	Range	-10000 ~10000	Unit	mm/s	Default	60		
	Byte length	16bit	Attribute	R/W	485 address	0x6273		
	Valid	Immediate						
To set PR path 14 velocity.								

P09.116	Label	PR14 Acceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6274		
	Valid	Immediate						
To set PR path 14 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.								

P09.117	Label	PR14 Deceleration			Valid mode(s)	PR		
	Range	1~32767	Unit	ms/(m/s)	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x6275		
	Valid	Immediate						
To set PR path 14 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.								

P09.118	Label	PR14 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6276		
	Valid	Immediate						
To set pause time for PR path 14 from completion to next path.								

P09.119	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x6277		
	Valid	Immediate						
Reserved.								

P09.120	Label	PR15 Mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	-	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6278
	Valid	Immediate				
Bit	14	8~13	6~7	5	4	0~3
Definition	0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0-15: Jump to correspond path	0: absolute 1: correspond command 2: correspond motor	0: No overlap, indicates with SJ 1: Overlap, indicated with CJ	0: Can be Interrupt 1: Can't be Interrupt, indicates using!	0: null 1: Positioning 2: Velocity motion 3: Homing 4: Emergency stop Indicates using P/V/H/S

P09.122	Label	PR15 Position			Valid mode(s)	PR
	Range	-2 ³¹ ~2 ³¹ -1	Unit	pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x627A
	Valid	Immediate				
For path 15 position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.02.						

P09.123	Label	PR15 Velocity			Valid mode(s)	PR
	Range	-10000~10000	Unit	mm/s	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x627B
	Valid	Immediate				
To set PR path 15 velocity.						

P09.124	Label	PR15 Acceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x627C
	Valid	Immediate				
To set PR path 15 acceleration time, time needed for 0mm/s to accelerate to 100mm/s.						

P09.125	Label	PR15 Deceleration			Valid mode(s)	PR
	Range	1~32767	Unit	ms/(m/s)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x627D
	Valid	Immediate				
To set PR path 15 deceleration time, time needed for 1000mm/s to decelerate to 0mm/s.						

P09.126	Label	PR15 Pause time			Valid mode(s)	PR		
	Range	0~32767	Unit	ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x627E		
	Valid	Immediate						
To set pause time for PR path 15 from completion to next path.								

P09.127	Label	Reserved			Valid mode(s)	PR		
	Range	-32768 ~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x627F		
	Valid	Immediate						
Reserved.								

8.2.11 [Class C] Position Comparison

P0C.00	Label	Enable Position Comparison			Valid mode(s)	P	S	T
	Range	0~3	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0C01		
	Valid	Immediate						
Value	Description							
0	Disable							
1	Enable (Rising edge valid)							

P0C.01	Label	Position Comparison Mode			Valid mode(s)	P	S	T
	Range	0~255	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0C03		
	Valid	Re-enable						
Value	Description							
0	Absolute mode							
1	Relevant mode							

P0C.02	Label	Position Comparison Pulse Output Bandwidth			Valid mode(s)	P		
	Range	0~4095	Unit	0.1ms	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0C05		
	Valid	Immediate						
Set the pulse width of the signal output when the position comparison point is reached, in milliseconds (ms).								

P0C.03	Label	Position Comparison Output Delay			Valid mode(s)	P		
	Range	-10000 ~10000	Unit	0.1us	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0C07		
	Valid	Restart						
Set the delay compensation for position comparison output. This compensates for delays caused by the DO/division output circuit.								

P0C.04	Label	Position Comparison Starting Point			Valid mode(s)	P		
	Range	1~42	Unit	-	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0C09		
	Valid	Immediate						
Set the starting point for position comparison.								

P0C.05	Label	Position Comparison End Point			Valid mode(s)	P		
	Range	1~42	Unit	-	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0C0B		
	Valid	Immediate						
Set the ending point for position comparison.								

P0C.06	Label	No. of cycle for N-cycle Comparison			Valid mode(s)	P		
	Range	0~60000	Unit	-	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0C0D		
	Valid	Immediate						
Set the number of cycles for position comparison in constant cycle mode.								

P0C.07	Label	Position Comparison - Set Current Position as Origin			Valid mode(s)	P		
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0C0F		
	Valid	Immediate						
Set the zero point for position comparison. When the rising edge is enabled, the current position can be set as the zero point.								
Value	Description							
0	Disable							
1	Enable (Rising edge valid)							

P0C.08	Label	Position Comparison - Offset to Origin			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0C11		
	Valid	Immediate						
Set the position offset after setting the current position as the zero point for position comparison.								

P0C.09	Label	Position Comparison Actual Status			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0C.10	Label	Position Comparison Actual Position			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0C.11	Label	Position Comparison Actual Comparison Points			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0C.12	Label	Position Comparison Output			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0C.13	Label	Position Comparison Cycle			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0C.20	Label	Position Comparison 1 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

Set the target values for position comparison points 1 to 42. When the position reaches a comparison point, the output is determined based on the attribute values of comparison points 1 to 42.

P0C.21	Label	Position Comparison 2 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.22	Label	Position Comparison 3 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.23	Label	Position Comparison 4 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.24	Label	Position Comparison 5 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.25	Label	Position Comparison 6 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.26	Label	Position Comparison 7 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.27	Label	Position Comparison 8 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.28	Label	Position Comparison 9 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.29	Label	Position Comparison 10 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.30	Label	Position Comparison 11 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.31	Label	Position Comparison 12 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.32	Label	Position Comparison 13 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.33	Label	Position Comparison 14 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.34	Label	Position Comparison 15 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.35	Label	Position Comparison 16 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.36	Label	Position Comparison 17 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.37	Label	Position Comparison 18 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.38	Label	Position Comparison 19 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.39	Label	Position Comparison 20 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.40	Label	Position Comparison 21 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.41	Label	Position Comparison 22 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.42	Label	Position Comparison 23 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.43	Label	Position Comparison 24 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.44	Label	Position Comparison 25 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.45	Label	Position Comparison 26 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.46	Label	Position Comparison 27 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.47	Label	Position Comparison 28 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.48	Label	Position Comparison 29 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.49	Label	Position Comparison 30 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.50	Label	Position Comparison 31 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.51	Label	Position Comparison 32 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.52	Label	Position Comparison 33 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.53	Label	Position Comparison 34 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.54	Label	Position Comparison 35 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.55	Label	Position Comparison 36 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.56	Label	Position Comparison 37 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.57	Label	Position Comparison 38 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.58	Label	Position Comparison 39 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.59	Label	Position Comparison 40 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.60	Label	Position Comparison 41 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.61	Label	Position Comparison 42 Target Value			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.70	Label	Position Comparison 1 & 2 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	-		
	Valid	Immediate						

Set the attribute values for position comparison points 1 and 2 (bit 0–15 for point 1 attributes):

bit	Position Comparison Point 1 Attributes
0	= 0 No forward crossing comparison; = 1 Forward crossing comparison
1	= 0 No reverse crossing comparison; = 1 Reverse crossing comparison
2~5	Reserved
6	Output mode setting: = 0 Pulse mode; = 1 Toggle mode
7	DO1 output
8	DO2 output
9	DO3 output
10~12	Reserved
13	Divided A-phase output
14	Divided B-phase output
15	Divided Z-phase output
Bit 16–31 for Position Comparison Point 2 Attributes:	
bit	Position Comparison Point 2 Attributes
16	= 0 No forward crossing comparison; = 1 Forward crossing comparison
17	= 0 No reverse crossing comparison; = 1 Reverse crossing comparison
18~21	Reserved

22	Output mode setting: = 0 Pulse mode; = 1 Toggle mode
23	DO1 output
24	DO2 output
25	DO3 output
26~28	Reserved
29	Divided A-phase output
30	Divided B-phase output
31	Divided Z-phase output

P0C.71	Label	Position Comparison 3 & 4 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.72	Label	Position Comparison 5 & 6 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.73	Label	Position Comparison 7 & 8 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.74	Label	Position Comparison 9 & 10 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.75	Label	Position Comparison 11 & 12 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.76	Label	Position Comparison 13 & 14 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.77	Label	Position Comparison 15 & 16 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.78	Label	Position Comparison 17 & 18 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.79	Label	Position Comparison 19 & 20 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.80	Label	Position Comparison 21 & 22 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.81	Label	Position Comparison 23 & 24 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.82	Label	Position Comparison 25 & 26 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.83	Label	Position Comparison 27 & 28 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.84	Label	Position Comparison 29 & 30 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.85	Label	Position Comparison 31 & 32 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.86	Label	Position Comparison 33 & 34 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.87	Label	Position Comparison 35 & 36 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.88	Label	Position Comparison 37 & 38 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.89	Label	Position Comparison 39 & 40 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0C.90	Label	Position Comparison 41 & 42 Attribute Value			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF FFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

8.2.12 [Class D] Gantry Settings

P0D.00	Label	Gantry Configuration			Valid mode(s)	P	S	T
	Range	0~15	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0D01		
	Valid	Restart						
Bit 0: Gantry function switch — 0: Off, 1: On Bit 1: Master/Slave axis switch — 0: Slave axis, 1: Master axis Bit 2: PWM synchronization switch — 0: Sync off, 1: Sync on (Master axis should have sync off; slave axis should have sync on) Bit 3: Slave axis partial parameter sync control bit 0: Synchronized 1: Not synchronized Note: Setting value 3: Gantry master axis is active Setting value 5: Gantry slave axis is active								

P0D.01	Label	Gantry Slave Axis Command Mode			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0D03		
	Valid	Re-enable						
0: Torque (force) command synchronization 1: Position command synchronization								

P0D.02	Label	Gantry Tuning Gain 1			Valid mode(s)	P	S	T
	Range	1~300	Unit	-	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0D05		
	Valid	Re-enable						
Gantry Synchronization Feedback Compensation Gain. Only effective in position command synchronization mode 0: Gain is 0 — equivalent to center position feedback; minimal torque deviation, maximum position deviation 100: Default value — 100% gain; balances torque and position deviation 1~100: For rigid gantry systems — lower values reduce torque deviation during motion 100~300: For flexible gantry systems — higher values reduce position deviation during motion								

P0D.03	Label	Gantry Position Synchronization Deviation Threshold			Valid mode(s)	P	S	T
	Range	0~2^26	Unit	-	Default	10000		
	Byte length	32bit	Attribute	R/W	485 address	0x0D07		
	Valid	Immediate						
0: Suppress position synchronization deviation alarm								

P0D.04	Label	Gantry Torque Deviation Threshold			Valid mode(s)	P	S	T
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	Range	0~7500	Unit	-	Default	500
	Byte length	16bit	Attribute	R/W	485 address	0x0D09
	Valid	Immediate				
0: Suppress torque synchronization deviation alarm						

P0D.05	Label	Gantry Tuning Gain 2			Valid mode(s)	P	S	T
	Range	0~1000	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0D0B		
	Valid	Immediate						
Co-motion Controller Parameters. Only effective in position command synchronization mode. 0: Disable torque deviation suppression 1~1000: Higher values improve suppression of torque deviation, but reduce the maximum gain of the speed loop Typically enabled in rigid gantry systems. If high speed loop gain is required, avoid setting this value too high. Can be used in conjunction with P06.73 to suppress torque deviation								

P0D.06	Label	Position Gain			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0D0D		
	Valid	Immediate						

P0D.07	Label	Velocity Gain			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0D0F		
	Valid	Immediate						

P0D.08	Label	Velocity Integral			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0D11		
	Valid	Immediate						

P0D.10	Label	Homing Mode			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	0x0D15		
	Valid	Immediate						

P0D.11	Label	Alignment Mode			Valid mode(s)	P	S	T
	Range	0~4	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	H: 0x0D16 L: 0x0D17		
	Valid	Immediate						
Offset value must be less than 1/4 of a rotation. If greater than 1/4, alarm A1B will be triggered. IO-triggered operation: Slave axis remains stationary, master axis moves the offset distance. Currently only effective in torque command synchronization mode.								

P0D.12	Label	Gantry Origin Offset			Valid mode(s)	P	S	T
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	Range	-2^{31} $\sim 2^{31}-1$	Unit	-	Default	0		
	Byte length	32bit	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0D.13	Label	Alignment Speed			Valid mode(s)	P	S	T
	Range	0~100	Unit	-	Default	10		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0D.15	Label	Offset Measurement			Valid mode(s)	P	S	T
	Range	0~3	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0D.16	Label	Alignment Measurement Command			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0D.17	Label	Offset Measurement Value			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0D.21	Label	Gntry Command Type			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

8.2.13 [Class E] Precision Compensation

P0E.00	Label	Precision Compensation			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.01	Label	Precision Compensation Unit			Valid mode(s)	P	S	T
	Range	0~2	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.02	Label	Precision Compensation Total			Valid mode(s)	P	S	T
	Range	2~2048	Unit	-	Default	2		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.03	Label	Precision Compensation Start Point			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.04	Label	Precision Compensation Data Interval			Valid mode(s)	P	S	T
	Range	0~200000000	Unit	-	Default	100000		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.05	Label	Precision Compensation Phase Sequence and Command Direction			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.06	Label	Precision Compensation Enable Source			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0E.07	Label	Position Feedback			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

P0E.08	Label	Reserved			Valid mode(s)	P	S	T
	Range	0~2047	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.09	Label	Reserved			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.10	Label	Reserved			Valid mode(s)	P	S	T
	Range	0~2047	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.11	Label	Reserved			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P0E.12	Label	Reserved			Valid mode(s)	P	S	T
	Range	0x0~0xFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.20	Label	Position Mode			Valid mode(s)	P	S	T
	Range	0~3	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.21	Label	First Target			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.22	Label	Last Target			Valid mode(s)	P	S	T
	Range	-2 ³¹ ~2 ³¹ -1	Unit	-	Default	100000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.23	Label	Gap			Valid mode(s)	P	S	T
	Range	1~200000000	Unit	-	Default	100000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.24	Label	Target Laps			Valid mode(s)	P	S	T
	Range	2~32767	Unit	-	Default	2		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.25	Label	Laps			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	1		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.26	Label	Overstep			Valid mode(s)	P	S	T
	Range	0~1000000	Unit	-	Default	20000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.27	Label	Interval Time			Valid mode(s)	P	S	T
	Range	0~100000	Unit	-	Default	5000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.28	Label	Velocity			Valid mode(s)	P	S	T
	Range	0~500000000	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.29	Label	Acceleration			Valid mode(s)	P	S	T
	Range	1~100000000	Unit	-	Default	500000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.30	Label	Deceleration			Valid mode(s)	P	S	T
	Range	1~100000000	Unit	-	Default	500000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.31	Label	Homing Mode			Valid mode(s)	P	S	T
	Range	-6~37	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.32	Label	Homing High Velocity			Valid mode(s)	P	S	T
	Range	0~500000000	Unit	-	Default	5000000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.33	Label	Homing Low Velocity			Valid mode(s)	P	S	T
	Range	0~500000000	Unit	-	Default	1000000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.34	Label	Homing Precision Compensation Velocity			Valid mode(s)	P	S	T
	Range	0~500000000	Unit	-	Default	500000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.35	Label	Homing Acceleration			Valid mode(s)	P	S	T
	Range	1~100000000	Unit	-	Default	500000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.36	Label	Homing Deceleration			Valid mode(s)	P	S	T
	Range	1~100000000	Unit	-	Default	500000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.37	Label	Homing Torque Reached Target Value			Valid mode(s)	P	S	T
	Range	0~1500	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.38	Label	Homing Torque Reached Target Value			Valid mode(s)	P	S	T
	Range	0~1000	Unit	-	Default	50		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.39	Label	Homing Torque Holding Time			Valid mode(s)	P	S	T
	Range	0~1000	Unit	-	Default	100		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

P0E.40	Label	Homing In Position Tolerance			Valid mode(s)	P	S	T
	Range	0~10000	Unit	-	Default	500		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Re-enable						

8.2.14 [Class 10] Direct Driver Parameters

P10.00	Label	Magnetic Poles Detection			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

Bit Settings for Magnetic Pole Detection Method (bit 0–bit 3):

- 0: Magnetic pole position estimation method 1 (micro-movement phase finding)
- 1: Magnetic pole position estimation method 2 (binary micro-movement phase finding)
- 2: Magnetic pole position estimation method 3 (PI micro-movement phase finding)
- 3: Magnetic pole position estimation method 3 (pre-positioning phase finding)
- 4: Magnetic pole position estimation method 3 (Hall sensor phase finding)
- 5: Magnetic pole position recovery method (reserved)

Magnetic Pole Estimation Timing Selection (bit 4–bit 5):

- 0: Automatic phase finding on first enable after power-up
- 1: Automatic phase finding immediately after power-up
- 2: Automatic phase finding before each enable
- 3: Manual phase finding

P10.01	Label	Magnetic Poles Position Determining Time Limit			Valid mode(s)	P	S	T
	Range	0~20000	Unit	-	Default	10000		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

Total phase finding time display: If the phase finding time exceeds this value, the driver will report an error.

P10.02	Label	Magnetic Poles Position Determining Command Torque			Valid mode(s)	P	S	T
	Range	0~150	Unit	-	Default	100		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

Default is rated current; maximum can be set to 1.5 times the rated current. It is recommended to keep the default.

P10.03	Label	Magnetic Poles Position Determining Static Pulse Width			Valid mode(s)	P	S	T
	Range	0~2 ²³	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						

Rotor movement threshold during phase finding: The larger the value, the more rotor displacement is required during phase finding. Default corresponds to the pulse count for 5° of electrical angle.

P10.04	Label	Magnetic Poles Position Determining Motor Stop Pulse Count			Valid mode(s)	P	S	T
	Range	0~2 ²³	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
Rotor stationary pulse threshold during phase finding: The larger the value, the easier it is to determine that the motor is stationary.								

P10.05	Label	Magnetic Poles Position Determining Motor Stop Time			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	200		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
Stationary determination: If rotor displacement is less than the threshold set in P10.04 for the duration set in P10.05, the motor is considered stationary.								

P10.06	Label	Magnetic Poles Position Determining Torque Filter Time			Valid mode(s)	P	S	T
	Range	0~2500	Unit	-	Default	800		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
Torque ramp-up rate during phase finding.								

P10.07	Label	Magnetic Poles Position Determining Gain			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	180		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
Speed loop gain: Corresponds to rigidity level “11” during phase finding.								

P10.08	Label	Magnetic Poles Position Determining Integral Time Constant			Valid mode(s)	P	S	T
	Range	0~10000	Unit	-	Default	310		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Immediate						
Phase finding integration time constant setting.								

P10.38	Label	Encoder connection to Modbus Port			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	485 address	-		
	Valid	Restart						

8.2.15 [Class 11] Driver Parameters

P11.00	Label	MCU 1 Version			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P11.01	Label	MCU 2 Version			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P11.02	Label	FPGA Version			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	-	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P11.06	Label	Driver Voltage Level			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	V	Default	0		
	Byte length	-	Attribute	R	485 address	-		
	Valid	Immediate						

P11.07	Label	Driver Rated Power			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	W	Default	0		
	Byte length	-	Attribute	R	486 address	-		
	Valid	Immediate						

P11.08	Label	Driver Rated Current			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	0.01 A	Default	0		
	Byte length	-	Attribute	R	486 address	-		
	Valid	Immediate						

P11.09	Label	Driver Max. Current			Valid mode(s)	P	S	T
	Range	-2^{31} $\sim 2^{31}-1$	Unit	0.01 A	Default	0		
	Byte length	-	Attribute	R	486 address	-		
	Valid	Immediate						

P11.12	Label	Death Zone Compensation Factor 1			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	486 address	-		
	Valid	Immediate						

P11.13	Label	Death Zone Compensation Factor 2			Valid mode(s)	P	S	T
	Range	0~32767	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	486 address	-		
	Valid	Immediate						

P11.16	Label	Analog 1 Zero Drift			Valid mode(s)	P	S	T
	Range	-32768 ~32767	Unit	mV	Default	0		
	Byte length	-	Attribute	R/W	486 address	-		
	Valid	Immediate						

Set the zero drift compensation value for analog input 1 voltage — this is the zero drift calibration function.

P11.17	Label	Analog 2 Zero Drift			Valid mode(s)	P	S	T
	Range	-32768 ~32767	Unit	mV	Default	0		
	Byte length	-	Attribute	R/W	486 address	-		
	Valid	Immediate						

Set the zero drift compensation value for analog input 2 voltage — this is the zero drift calibration function.

P11.18	Label	Analog 3 Zero Drift			Valid mode(s)	P	S	T
	Range	-32768 ~32767	Unit	mV	Default	0		
	Byte length	-	Attribute	R/W	486 address	-		
	Valid	Immediate						

Set the zero drift compensation value for analog input 3 voltage — this is the zero drift calibration function.

P11.31	Label	Regenerative Vent Control Mode			Valid mode(s)	P	S	T
	Range	0~1	Unit	-	Default	0		
	Byte length	-	Attribute	R/W	487 address	-		
	Valid	Restart						

Discharge Mode Setting

For motors 400W and below, regenerative resistors are not included by default

Power	Default value	Description
100/400	1	Regenerative energy is absorbed only by the internal bus capacitors of the driver.
750 and above	0	Regenerative energy can also be discharged through an external regenerative resistor if available.