MiSUMi

AC Servo Driver
E-DFASxxP Series (Pulse Type)

User Manual

Ver1.0

MiSUMi

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MEGMI

Preface

Thank you for purchasing the E-DFASxxP Series AC Servo Driver!

This product series comes standard with dynamic braking, supports pulse input frequencies up to 4 MHz, and includes black box functionality. It is suitable for automated equipment in industries such as electronics manufacturing, packaging, robotics, and machine tools. With high-performance solutions, it helps upgrade equipment and improve efficiency.

This manual serves as the product manual for the E-DFASxxP series servo drivers. It provides essential knowledge and precautions for using the system, mechanical and electrical installation instructions, basic debugging and maintenance methods, function descriptions, and parameter details.
For first-time users, please read this manual carefully.
If you have any questions regarding functions or performance, please contact our technical support team for assistance.
Thank you for your use!

How to Obtain the Manual
This manual is not included with the product shipment.
To obtain the PDF electronic version, please visit the official MISUMI website:
Vietnam: *https://vn.misumi-ec.com*
Thailand: *https://th.misumi-ec.com*
Malaysia: *https://my.misumi-ec.com*
India: *https://in.misumi-ec.com*
Singapore: *https://sg.misumi-ec.com*
Indonesia: *https://id.misumi-ec.com*
and download it from the corresponding product series page.

Caution!
Improper operation may cause unexpected accidents. Please read this manual carefully before using the system.
Due to product improvements, the contents of this manual are subject to change without prior notice.
Our factory will not be responsible for any changes made by the user to the product, and the product warranty will be invalidated.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Safety precautions

In order to prevent personal injury and property damage, the following statements are made for matters that must be followed. When reading this manual, please pay special attention to the following warning signs:

⚠Warning: “Warning” Incorrect operation may cause death or serious injury.
⚠Caution: “Caution” Incorrect operation may cause injury or equipment damage.
⚠Notice: “Notice” Improper use may damage the product or equipment.

Safety Rules
⚠Warning This product is not intended for safety-critical machinery or systems. Users must implement proper safety measures to prevent accidents.
Inspection
⚠Caution Do not install if the product or accessories are damaged or rusted upon unpacking. Do not install if there is water inside, missing parts, or damaged components. Check the packing list carefully; do not install if it does not match the product.
⚠Notice Do not forcibly remove packaging or handle roughly to avoid damage to components. Do not use damaged or faulty products.
Storage and Transportation
⚠Caution Store and transport the product according to specified environmental conditions. Do not stack too high to prevent falls. Ensure proper packaging during transit. Do not drag cables, motor shafts, or encoders when handling servo motors. Avoid applying external force or impacts to servo drivers and motors.
⚠Notice Handle the product with care, lift and place gently, and watch your footing to prevent trips or drops, which may cause injury or damage. During storage or transport, avoid direct contact with terminals or driver circuits without electrostatic protection to prevent damage. Avoid storing or transporting in places exposed to water, rain, direct sunlight, strong electric or magnetic fields, or severe vibration. Do not store the product for more than 3 months; if stored longer, apply stricter protection and inspections. Do not mix-pack this product with items that could affect or damage it during transport.
Installation
⚠Warning Only trained professionals with electrical knowledge are allowed to operate. Operation by unqualified personnel is strictly prohibited

⚠Caution
Servo Driver and Servo Motor:
Do not install on or near flammable materials to prevent fire.
Avoid vibration and strictly prohibit impacts.
Do not install if the unit is damaged or has missing parts.
Discharge static electricity before operating buttons or switches on the driver, or equipment damage may occur.
Servo Driver:
Must be installed inside a control cabinet with sufficient protection rating.
Maintain adequate clearance from other devices.
Ensure proper heat dissipation. If installed in a sealed environment, use cooling devices (fans or air conditioners) to meet environmental requirements, or overheating/fire may result.
Prevent the entry of dust, corrosive gases, conductive materials, liquids, and flammable or explosive substances.
Servo Motor：
Must be mounted securely to prevent loosening due to vibration.
Prevent liquid ingress to avoid motor or encoder damage.
Do not strike the motor or shaft to avoid encoder damage.
The motor shaft must not be subjected to loads beyond its rated limits.

Wiring
⚠Caution Only qualified personnel may perform wiring or inspection. Wait at least 10 minutes after power-off before starting. Properly ground the servo driver and motor to avoid electric shock. Incorrect voltage or polarity may cause accidents or explosions. Connect wires only after installation is complete. Ensure wire insulation and avoid pinching to prevent shock. Never wire, open covers, or touch circuits with power on.
⚠Caution Wiring must be correct and secure to avoid malfunction or damage Do not reverse U/V/W motor terminals or connect to AC power Connect motor directly to the servo driver—no capacitors, inductors, or filters Prevent conductive parts or wire ends from entering the driver Keep wires and heat-sensitive parts away from heatsinks and motors Do not reverse the flyback diode on output signal relays Use cables with proper gauge and shielding; ground shield at one end Follow ESD precautions and wear an anti-static wrist strap For control circuits, use twisted shielded wire and ground the shield to the terminal

Power-On
⚠Warning Before power-on, ensure proper installation and secure wiring of control, main power, and motor output circuits. Do not touch any terminals while the product is powered on.
Debugging Operation
⚠Caution Before power-on, confirm proper installation, secure wiring, and correct power within rating. During setup, run motor unloaded first; verify settings before load testing to avoid damage.
Usage

⚠Caution An emergency stop circuit must be installed to immediately stop operation and cut power in case of an accident. Before resetting an alarm, ensure the run signal is off to prevent sudden restart. Use the servo driver only with the specified servo motor. Avoid frequently turning the servo system power on and off to prevent damage. The servo driver and motor may become hot during and shortly after operation; do not touch the heatsink or motor. Do not modify the servo system.
Troubleshooting
⚠Caution High voltage may remain in the servo driver for some time after power off; do not disconnect wires or touch terminals within 5 minutes. Only qualified personnel with proper knowledge should perform disassembly and maintenance.
⚠Caution After an alarm, troubleshoot and clear the cause, then reset the alarm before restarting. Keep away from the machine when power returns after a blackout, as it may start unexpectedly (the design should prevent hazards on restart).
System Matching
⚠Notice The servo motor's rated torque must exceed the effective continuous load torque. The load inertia to servo motor inertia ratio should be below the recommended value. The servo driver and motor must be used as a matched pair.

Other Notes **Dynamic brake**

- The dynamic brake should only be used for emergency stops during faults or sudden power loss. Do not trigger faults or power loss frequently.
- At high speeds, ensure the dynamic brake has at least a 5-minute interval between activations to prevent damage to the internal brake circuit.
- In rotating machinery, after dynamic braking stops the motor, the motor may be driven by the load on the shaft and act as a generator. Continuous external rotation for a long time can cause short-circuit current in the dynamic brake, potentially leading to smoke, fire, or motor damage.

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 customer 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 damages caused by product defects is limited to the purchase price of the damaged product. Orders will not be accepted without the customer’s 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 done by returning the product; 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 Introduction

1.1 Model Identification

1.1.1 Servo Driver

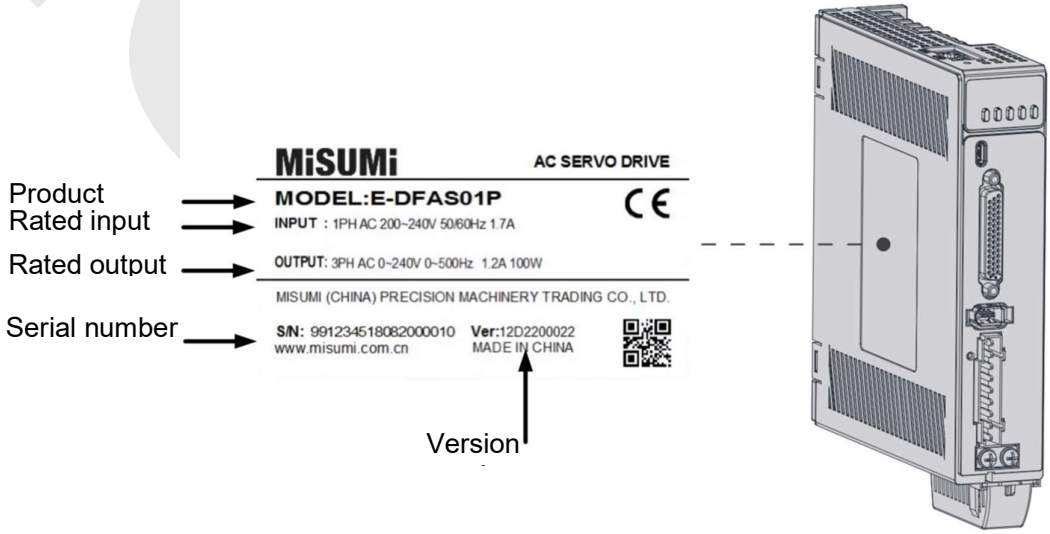
Servo Driver Model Identification Method

E-DFAS 01 P □

① ② ③ ④

① Product Series E-DFAS: Economy AC Servo Driver	② Power Rating (W) 01：100W 04：400W 08：750W 10：1000W	③ Product Type P: Pulse Train + RS485 E: EtherCAT
		④ Voltage Level (V) Blank: 220V

Driver Nameplate



1.1.2 Servo Motor

E-MAS Series Servo Motor Model Identification

E-MAS H 2 - 04 01 □ B □

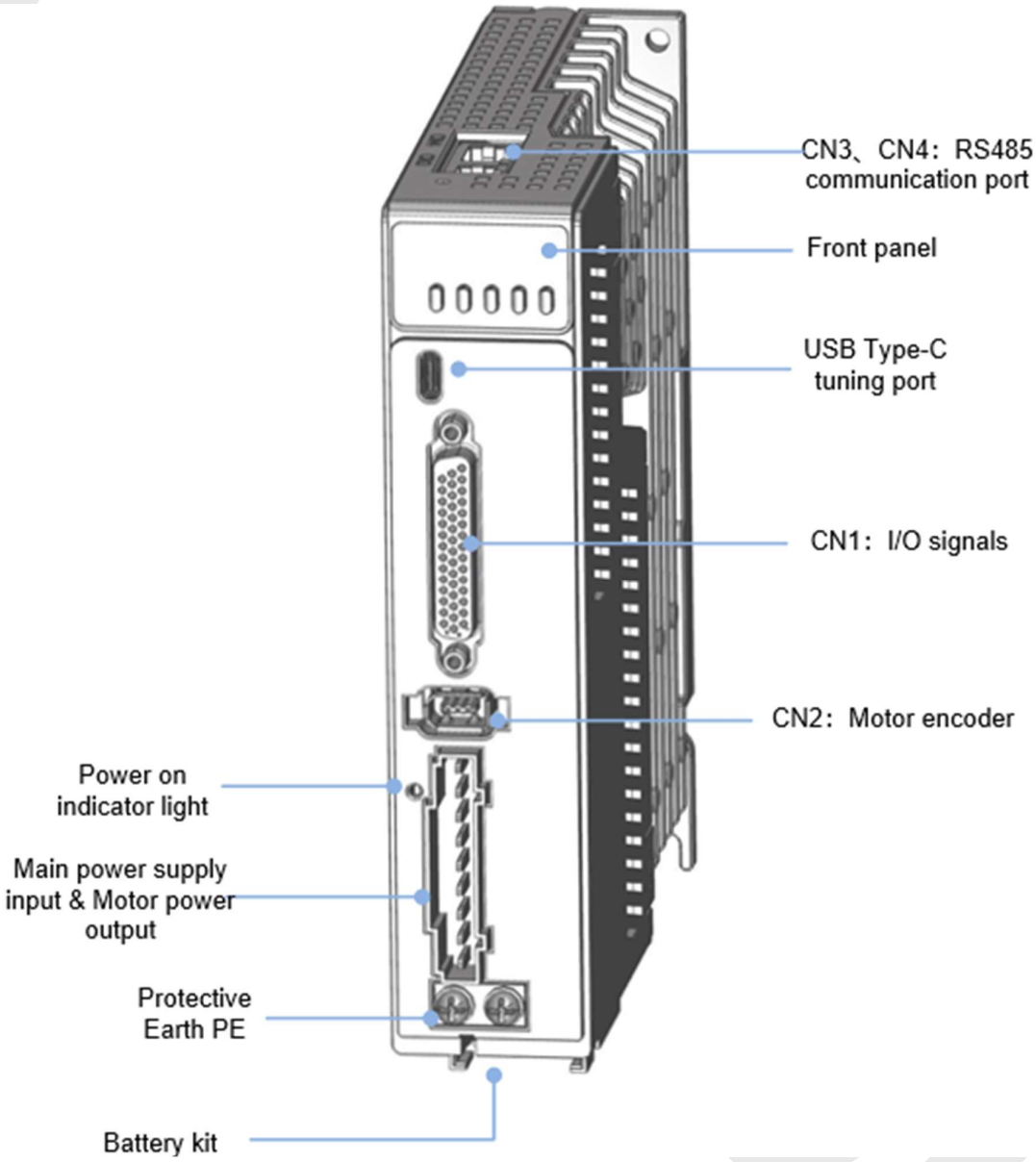
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Product Category E-MAS: MISUMI E-MAS series Servo Motor	④ Frame Size (mm) 04: 40mm 06: 60mm 08: 80mm	⑦ Brake Type Blank: No brake B: With brake
② Inertia Type S: Low Inertia H: High Inertia	⑤ Power Rating (W) 01 : 100W 02 : 200W 04 : 400W 08 : 750W 10 : 1000W	⑧ Connector Type Blank: Straight plug
③ Product Series 2: General type, 23-bit encoder	⑥ Voltage Level (V) Blank: 220V	

Servo Motor Nameplate Overview

1.2 Servo Driver Ports and Connectors

E-DFASxxP Series Servo Driver 220V Models



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*
USB Type-C Tuning 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	Probe input signal & other I/O signals terminals
CN3/CN4 RS485 communication port	Connect to master device or next/P0Evious slave station
CN2 Encoder	Connect to motor encoder
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.*
L1, L2	Main power supply 220VAC
P+, Br	Connect to regenerative resistor
P+, N	Common DC bus terminals for multiple drivers
U, V, W	Motor connector: Connect to U, V, W power terminals on servo motor
PE	PE motor earth terminal: Connect to motor PE terminal

1.3 Driver Technical Specification

1.3.1 Electrical Specification

E-DFASxxP series		E-DFAS01P	E-DFAS04P	E-DFAS08P	E-DFAS10P
Rated power (W)		100	400	750	1000
Rated Current (Arms)		1.2	3.5	5.5	7.0
Peak Current (Arms)		3.4	10.1	16.9	21.0
Control Circuit Power Supply		Single phase AC 200V~240V, -10%~+10%, 50/60Hz			
Main Power Supply		Busbar power supply, shared power input and rectification			
regenerative resistor	Resistance (Ω)	-		50	50
	Power (W)			75	75
Cooling method		Natural cooling		Fan cooling	
Dimension H*L*W (mm)		175*156*40		175*156*50	

1.3.2 General Specification

Interface Configuration		
Debug Port	TYPE-C debug port, supports USB power only for parameter modification and export	
Low-speed pulse input	5V differential signal, 0-500kHz 24V single-ended signal, 0-200kHz	
Low-speed pulse input	5V differential signal, 0~4MHz (high speed)	
Frequency division output	Supports A phase / B phase / Z phase differential division output (max output pulse frequency after frequency division is 1MHz) Supports Z phase open collector division output	
Digital Inputs	8 points (supports common cathode and common anode) DI1~DI8	
Digital Outputs	5 points (5 dual-ended outputs DO1~DO5) LDO with load capacity of 50mA, voltage range of 5V~30V	
Control Mode		
Control Mode	• External pulse position control • Speed control • Torque control • JOG control • Mixed control: position/torque, position/speed, speed/torque	
Position control	Max Input Pulse Frequency	• 4MHz (5V differential input) • 500kHz (5V differential input) • 200kHz (24V single-ended input)
	Electronic Gear Ratio (Numerator/Denominator)	1~8388608 / 1~8388608
	Rotation Limit	Set via parameter
Control Characteristics		
Control Method	IGBT SVPWM sine wave control	
Feedback Method	Bus-type encoder using RS485 protocol	
Normalized Servo Parameters	PC debugging tool supports quick servo tuning using parameters like rigidity	

Ease-of-Use Features	Auto tuning, Single-parameter tuning, Super-following function
Notch Filters	Suppress mechanical resonance, supports 3 notch filters, frequency range: 50Hz ~ 4000Hz
Oscillation Suppression	End-point vibration suppression
DI/DO Configuration	Digital input/output functions can be freely assigned
Alarm Functions	Overvoltage, Undervoltage, Overcurrent, Overload, Overheating, Overspeed, Missing main power phase, Regenerative braking fault, Excessive position deviation, Encoder feedback error, Excessive braking rate, Travel limit exceeded, EEPROM error, etc.
Operation & Display	5 buttons, 5 digits LED with decimal point
Debugging Software	Using MISUMI EDrive software to adjust current loop, position loop, and speed loop parameters, modify input/output signal logic levels, import/export motor and driver parameters via file, monitor waveform data such as speed and position error during trapezoidal test runs
Communication Functions	USB Support: Based on Modbus protocol (USB 2.0 spec), allows PC connection for parameter setting and status monitoring.
	E-DFASxxP model supports RS384 bus communication via RJ45 interface, based on Modbus protocol, up to 32 axes.
Dynamic Brake	Built-in dynamic brake
Black Box	Supports black box data capture. Records data before and after preset conditions. Compatible with MISUMI EDrive software for data reading and analysis.
Applicable Load Inertia	Recommended for loads with inertia less than 30× motor inertia
Digital Input	
Digital Input	8 points (supports both sinking and sourcing types) DI1, DI2, DI3, DI6. Configurable input signals: 1. Servo enabled (SRV-ON) 2. Positive limit switch (POT) 3. Negative limit switch (NOT) 4. Gain switching (GAIN) 5. Emergency stop (E-Stop) 6. Deviation counter clearing (CL) 7. Control mode switching (C-MODE) 8. Torque limit switching (TL-SEL) 9. Vibration supP0Ession 1(VS-SEL1) 10. Vibration supP0Ession 2(VS-SEL2) 11. Command prohibition (INH) 12. Internal command velocity 1(INTSPD1) 13. Internal command velocity 2(INTSPD2) 14. Internal command velocity 3(INTSPD3) 15. Internal command velocity 4(INTSPD4) 16.Crossover frequency input (DIV1) 17. Zero speed clamp (ZEROSPD) 18.Velocity sign (VC-SIGN) 19.Torque sign (TC-SIGN) 20. Clear Alarm （A-CLR
PR Mode Only	Configurable input signals under PR mode: 1. Path trigger (CTRG) 2. Home switch (HOME)

	3. Emergency stop trigger (STP) 4. Path 0-3 (ADD0-ADD3) 5. Positive JOG (PJOG) 6. Negative JOG(NJOG) 7. Positive limit switch (PL) 8. Negative limit switch (NL) 9. Origin point switch (ORG)
Digital Output	
Digital Output	5 points (dual-ended) Configurable input signals: 1. Alarm (ALARM) 2. Servo ready (SRDY) 3. External brake off (BRK-OFF) 4. Positioning completed (INP1) 5. Velocity at arrival (AT-SPEED) 6. Zero speed position (ZSP) 7. Velocity coincidence (V-COIN) 8. Position command (P-CMD) 9. Velocity limit (V-LIMIT) 10. Velocity command (V-CMD) 11. Servo enabled (SRV-ST) 12. Positive limit switch (POT-OUT) 13. Negative limit switch (NOT-OUT)
PR Mode Only	Configurable output signals under PR mode: 1. Command completed (CMD-OK) 2. Path completed (PR-OK) 3. Homing done (HOME-OK)
Environment	
Temperature	Operating Temperature: 0°C to 55°C (non-freezing). If temperature exceeds 45°C, apply derating[1]. Reduce by 2% for every 1°C above 45°C Storage Temperature: -40°C to 80°C (no condensation). If storage temperature exceeds 65°C, do not store for more than 72 hours!
Humidity	Under 90%RH (Condensation free)
Altitude	Maximum altitude: 2000 meters No derating required below 1000 meters Above 1000 meters, derate by 1% for every 100 meters For usage above 2000 meters, please contact the manufacturer
Vibration	Less than 0.5G (4.9m/s2) 10-60Hz (non-continuous working)
IP ratings	IP20

Note
[1] Please install the servo driver within the specified ambient temperature range. If stored inside an electrical cabinet, ensure that the internal cabinet temperature does not exceed this specified range.

Chapter 2 Installation

2.1 Servo Driver Installation

2.1.1 Installation Location

1. Install the servo driver indoors, inside a control cabinet, away from rain and direct sunlight. Do not place flammable materials nearby. The unit is not waterproof.
2. Do not use the product in environments containing corrosive gases such as Hydrogen sulfide, Sulfur dioxide, Chlorine, Ammonia, Chlorinated gases, Acids, alkalis, salts, or in areas with flammable gases or combustible materials.
3. Avoid installing in environments that are Hot, humid, dusty or contain metal dust.
4. Install in a location with minimal vibration.
5. Preferably install in a well-ventilated, dry, and dust-free area. Ensure no oil, metal dust, or water enters the product.

2.1.1 Servo driver installation environment

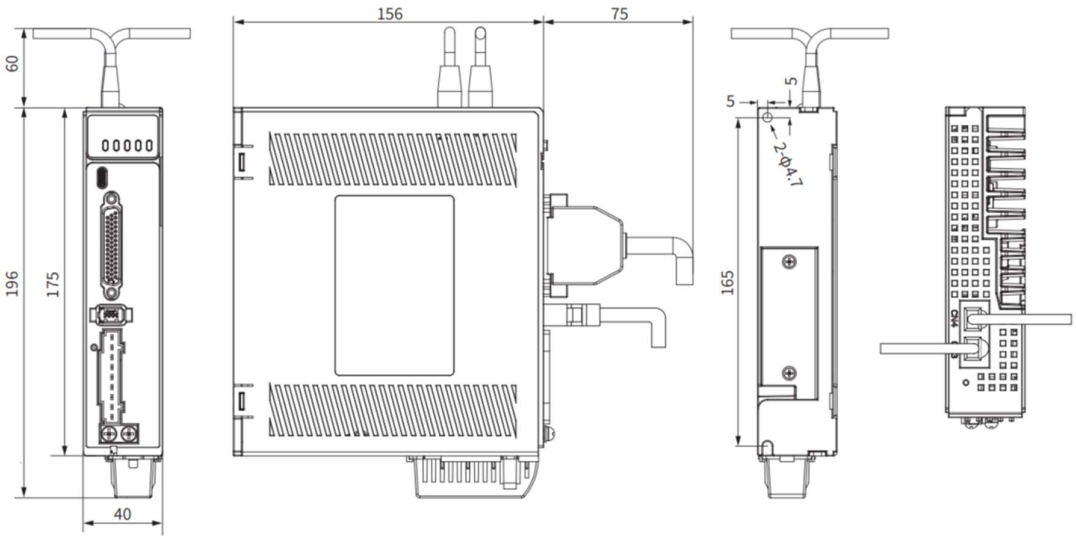
Item	E-DFASxxP series driver
Operating Temperature	0~+55℃ (no derating is required from 0℃ to +45℃, derating is required when the temperature exceeds 45℃) (Condensation is more likely to occur when the temperature drops and the humidity rises) [1]
Operating Humidity	Below 90% RH, non-condensing
Storage Temperature	-40°C to +80°C (non-freezing)
Storage Humidity	Below 90% RH, non-condensing
Atmospheric Conditions	Indoor use only (No direct sunlight) No corrosive gases, flammable gases, oil, or dust
Altitude	Maximum altitude: 2000 meters No derating required below 1000 meters Above 1000 meters, derate by 1% for every 100 meters For usage above 2000 meters, please contact the manufacturer
Vibration Resistance	Less than 0.5G (4.9m/s2) 10-60Hz (non-continuous working)
Protection Rating	IP20 (except terminals, which are IP00)

Note

[1] Please install the servo driver within the specified ambient temperature range. If stored inside an electrical cabinet, ensure that the internal cabinet temperature does not exceed this specified range.

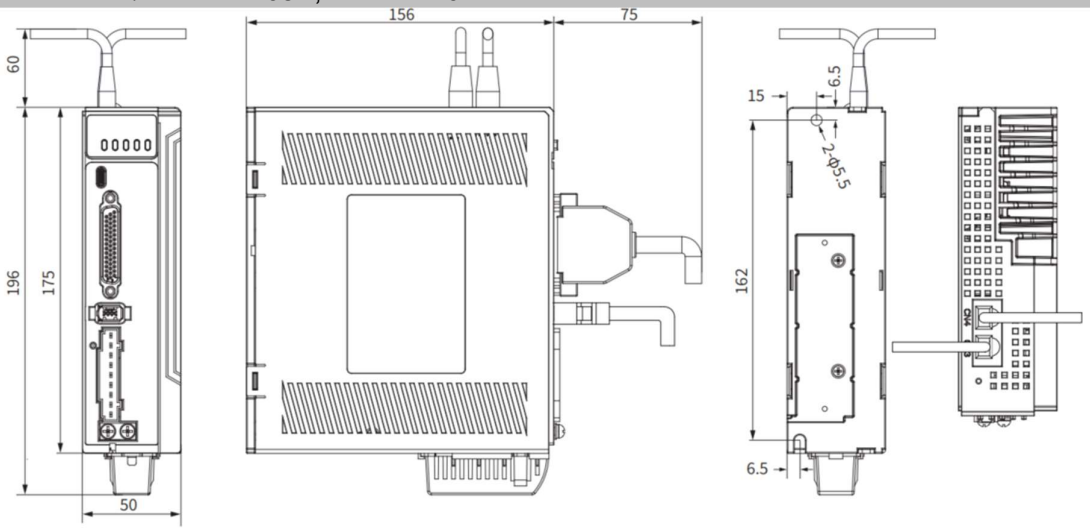
2.1.2 Servo Driver Dimension

Dimension 1： E-DFAS01P, E-DFAS04P



40mm x 175mm x 156mm

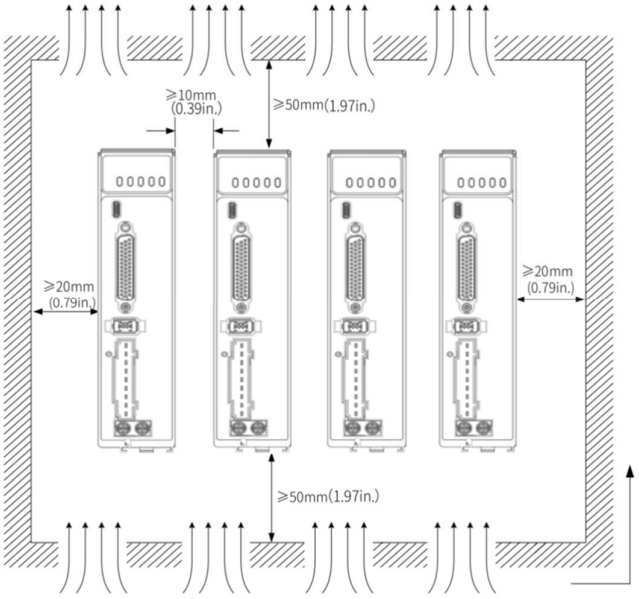
Dimension 2： E-DFAS08P, E-DFAS10P



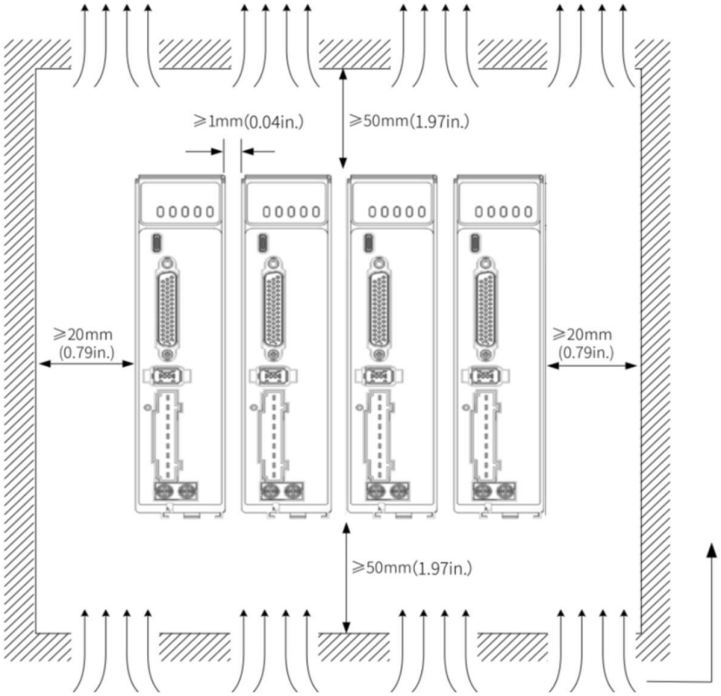
50mm x 175mm x 156mm

2.1.3 Space requirement for installation

The servo driver can be installed using either base mounting or panel mounting. The installation orientation must be vertically upward, perpendicular to the mounting surface. To ensure proper heat dissipation:
Leave at least 10 mm of clearance around the unit.
Leave at least 50 mm of clearance on both vertical sides.



For compact installations, allow at least 1 mm of spacing between each pair of drivers to account for installation tolerances. In this case, operate the drivers at no more than 75% actual load rate.



Installation Precautions

1. Installation Method

   Ensure the installation direction is perpendicular to the wall, with the product mounted vertically upward to allow heat to dissipate effectively. If multiple units are installed inside a cabinet, arrange them side by side. For vertical stacking, install a heat insulation and airflow guide plate between units.
   Use natural convection or fans to cool the servo driver.
   Fix the servo driver to the mounting surface using the mounting holes on the unit.
   During installation, the front panel of the servo driver should face the operator, and the unit should be vertically aligned with the wall.

2. Cooling

   To ensure effective cooling via fans or natural airflow, leave sufficient space around the servo driver and consider the heat dissipation of other components in the cabinet.
   Install a cooling fan above the servo driver. Maintain uniform temperature inside the cabinet to avoid localized overheating.

3. Grounding

   Be sure to ground the grounding terminal. Failure to do so may result in electric shock, interference, or malfunction.

4. Wiring Requirements

   When wiring the servo driver, route cables downward. This prevents liquids from flowing along the cables into the driver, which could cause damage or accidents.

5. Ethernet Port Dust Protection

   For CN3 and CN4 communication ports, if they are not in use, appropriate dust protection measures must be taken. Insert dust caps into the ports to prevent foreign objects (such as solids or liquids) from entering and potentially damaging the product.

6. Absolute Encoder Battery Box

   If using a battery box, reserve installation space for it inside the cabinet.

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2.2 Servo Motor Installation

2.2.1 Installation conditions

Installation conditions may affect the lifespan of a motor

- Please keep away from corrosive fluid and combustibles.
- If dusty working environment is unavoidable, please use motors with oil seal.
- Please keep away from heat source.
- If motors are used in enclosed environments without heat dissipation, motor lifespan will be short.
- Please check and clean the installation spot before installation.

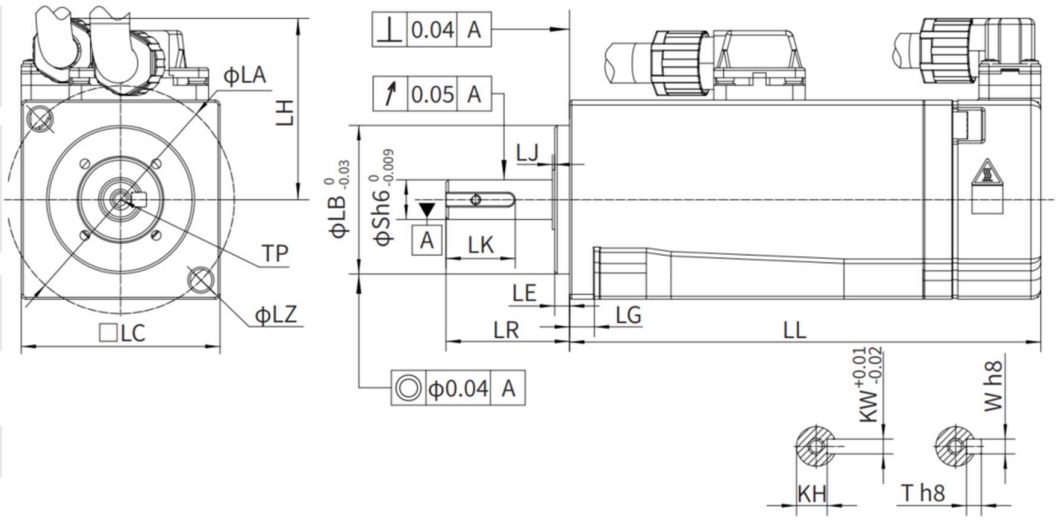
2.2.2 Installation Environment

Item	Condition
Operating Temperature	0°C to +40°C (up to +60°C with derating; non-freezing)
Operating Humidity	Below 90% RH (no condensation or icing)
Storage Temperature	-20°C to +60°C (max 85°C for up to 72 hours)
Storage Humidity	Below 90% RH (no condensation or icing)
Atmosphere	Indoor (no direct sunlight), free of corrosive or flammable gases
Altitude	Below 1000m for normal use; derating required above 1000m (up to 2000m)
Vibration Grade	Less than 5G (49 m/s²)
Shock Resistance	Less than 50G (490 m/s²)
Protection Rating	IP65 (E-MASH2 series motors up to IP67)

Note:
Operating temperature: 0 to +60 °C. Derating is required when operating above 40 °C.
When temperature decreases and humidity increases, condensation is likely to occur.
If storage temperature exceeds +60 °C, do not store continuously at this temperature for more than 72 hours.

2.2.3 Motor Dimensions

40 Motor Frame (Unit: mm)



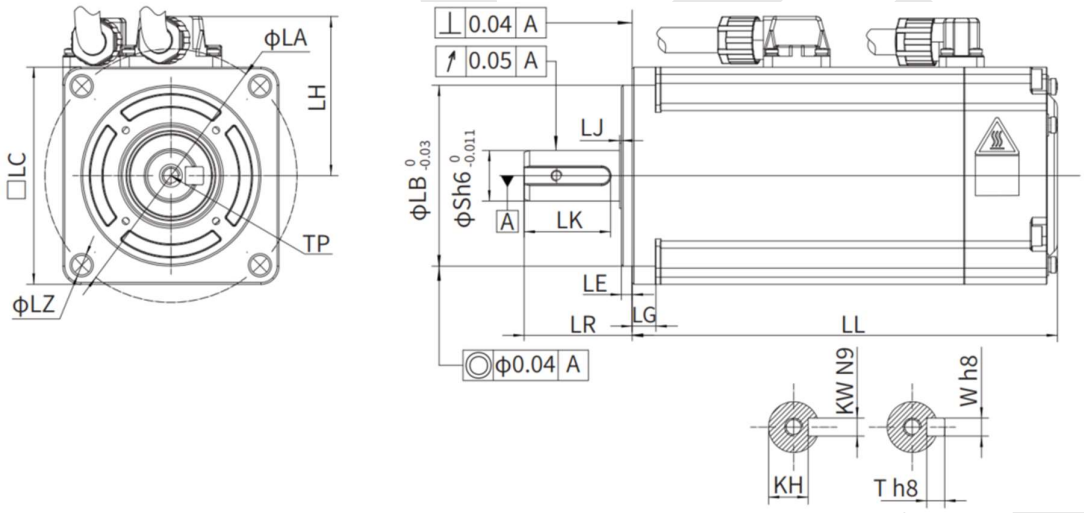
Shaft End Shaft End with Key

The above diagrams are for reference only. Please refer to the actual dimensions for installation.

Motor Model	LL	LC	LR	LA	LZ	LH	LG	LE	LJ	S	LB	TP	LK	KH	KW	W	T	Weight (kg)
E-MASH2-0401	67.7	40	25	46	4.5	38MAX	5	3	3	8	30	M3X8	14	6.2	3	3	3	0.46
E-MASH2-0401B	95	40	25	46	4.5	38MAX	5	3	3	8	30	M3X8	14	6.2	3	3	3	0.68

Note: In the motor model, “B” indicates a brake-equipped motor.

60/80 Motor Frame (Unit: mm)



Shaft End Shaft End with Key

The above diagrams are for reference only. Please refer to the actual dimensions for installation.

Motor Model	LL	LC	LR	LA	LZ	LH	LG	LE	LJ	S	LB	TP	LK	KH	KW	W	T	Weight (kg)
E-MASH2-0602	71.8	60	30	70	5.5	37.5MAX	6.6	3	3	14	50	M5X12	22.5	11	5	5	5	0.9
E-MASH2-0602B	101.1	60	30	70	5.5	37.5MAX	6.6	3	3	14	50	M5X12	22.5	11	5	5	5	1.3
E-MASH2-0604	88.8	60	30	70	5.5	37.5MAX	6.6	3	3	14	50	M5X12	22.5	11	5	5	5	1.3
E-MASH2-0604B	118.1	60	30	70	5.5	37.5MAX	6.6	3	3	14	50	M5X12	22.5	11	5	5	5	1.55
E-MASH2-0808	90.9	80	35	90	6.5	57.5MAX	8.1	3	3	19	70	M5X15	25	15.5	6	6	6	2.12
E-MASH2-0808B	121.9	80	35	90	6.5	57.5MAX	8.1	3	3	19	70	M5X15	25	15.5	6	6	6	2.7
E-MASH2-0810	103.9	80	35	90	6.5	57.5MAX	8.1	3	3	19	70	M5X15	25	15.5	6	6	6	2.7
E-MASH2-0810B	134.9	80	35	90	6.5	57.5MAX	8.1	3	3	19	70	M5X15	25	15.5	6	6	6	3.2

Note: In the motor model, “B” indicates a brake-equipped motor.

2.2.4 Installation Method and Precautions

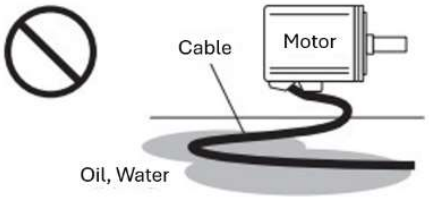
Installation Method

The motor can be installed vertically or horizontally, but the following requirements must be observed:

- Horizontal Installation
- Position the cable outlet facing downward to prevent oil or water from entering the motor.
- Vertical Installation
- When installing a motor with a reducer in the axial direction, use a motor with an oil seal to prevent reducer oil from leaking into the motor.

Oil- and waterproofing

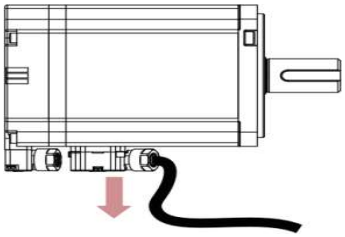
- Do not submerge motor/cable under oil/water
- Please use a motor with oil seal when paired with a reducer to prevent reducer oil from leaking into the motor.



Conditions for use of servo motors with oil seals:
— Make sure the oil level is below the lip of the oil seal during use.
— When installing the servo motor vertically upward, do not allow oil to enter the lip of the oil seal.

- When using in places with water dripping, please use it after confirming the protection level of the servo motor.
- In applications with liquid, please install the motor with the wiring port facing downward
- Do not use in an environment where oil and water often splash onto the motor body.

(As shown below), prevent liquid from flowing along the cable to the motor body.



Cable stress

Do not bend the cable, especially at each end of the connectors.
Make sure not to let the cables be too tight and under tremendous stress especially thinner cables such as signal cables

Connectors

Please remove any conductive foreign objects from the connectors before installation
The connectors are made of resin. May not withstand impact.
Please hold the driver during transportation, not the cables.
Leave enough “bend” on the connector cables to ensure less stress upon installation.

Encoder & coupling

During installation or removal of coupling, please do not hit the motor shaft with a hammer as it would cause damage to internal encoder.
Please make sure to centralize the motor shaft and coupling, it might cause damage to motor or encoder due to vibration.
Please make sure axial and radial load are within the limits specified as it might affect the lifespan of the motor or cause damage to it.

Motor brake cable connection precautions

For motors with a brake and a magnetic encoder, brake wiring must respect polarity to avoid interference that can cause alarms, accuracy loss, or vibrations. For motors with a photoelectric encoder, polarity in brake wiring doesn’t matter

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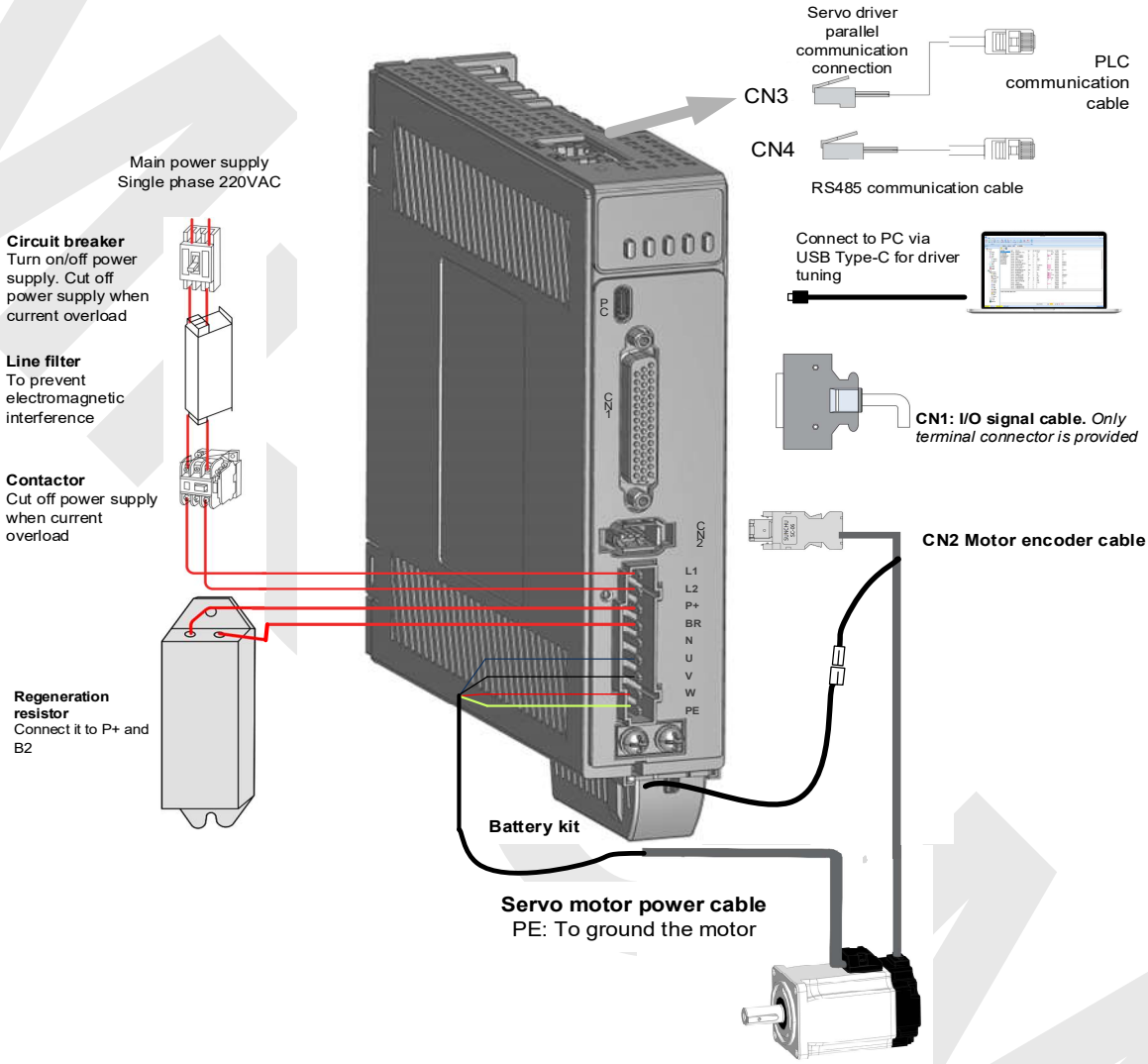
Chapter 3 Wiring

3.1 E-DFASxxP Wiring Diagram

E-DFASxxP 220VAC Wiring Diagram

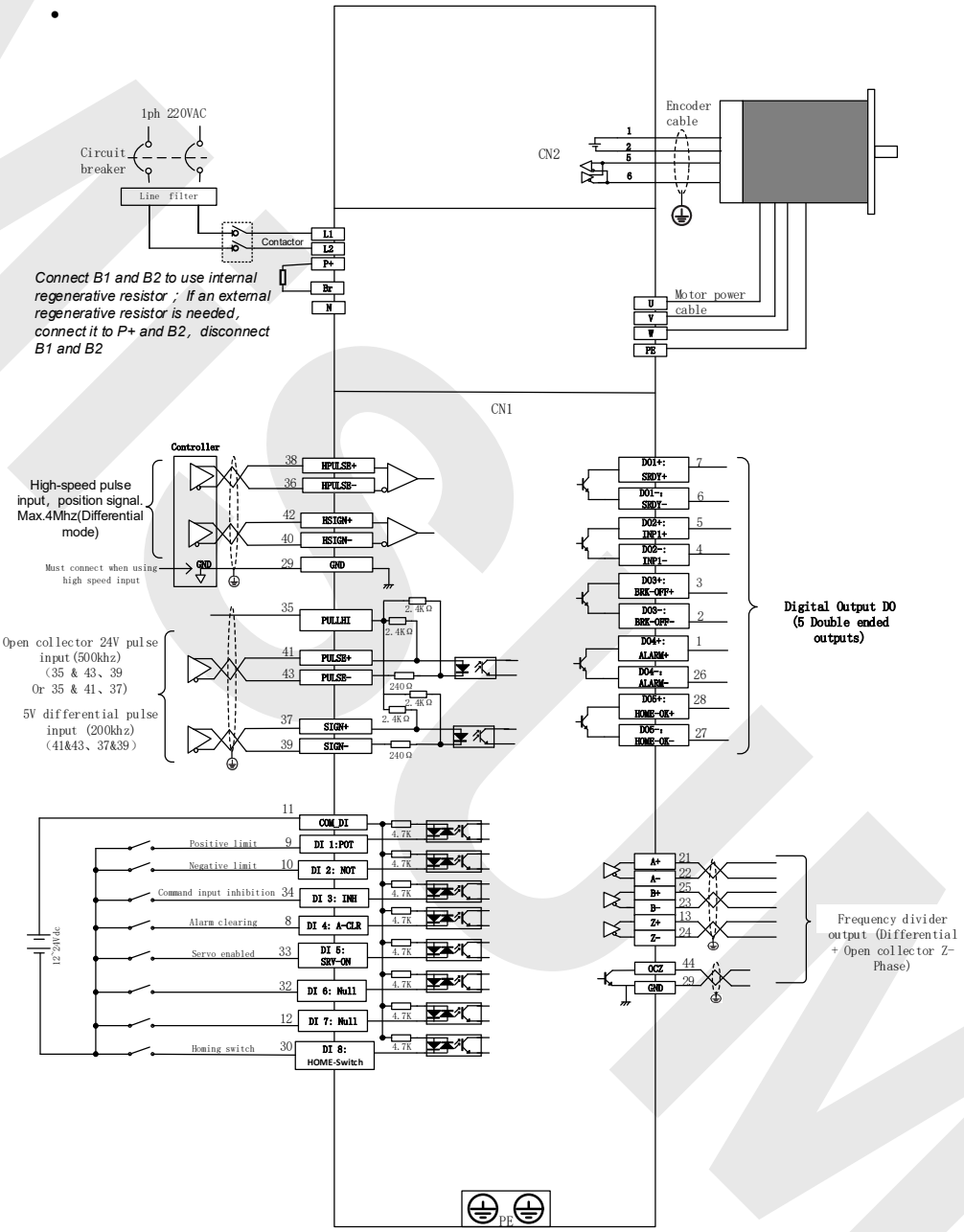


- E-DFASxxP series servo driver supports single phase 220VAC.
- Please use a circuit breaker for the main power supply to P0Event damage to the product or machine.
- Please do not use a contactor in connection to servo motor as it may not withstand a sudden surge of operating voltage.
- Please take note of the capacity when connect to a 24VDC switching power supply, especially if power supply is shared between multiple components. Insufficient supply current will cause failure in holding brake functions.

3.2 Electrical wiring diagram

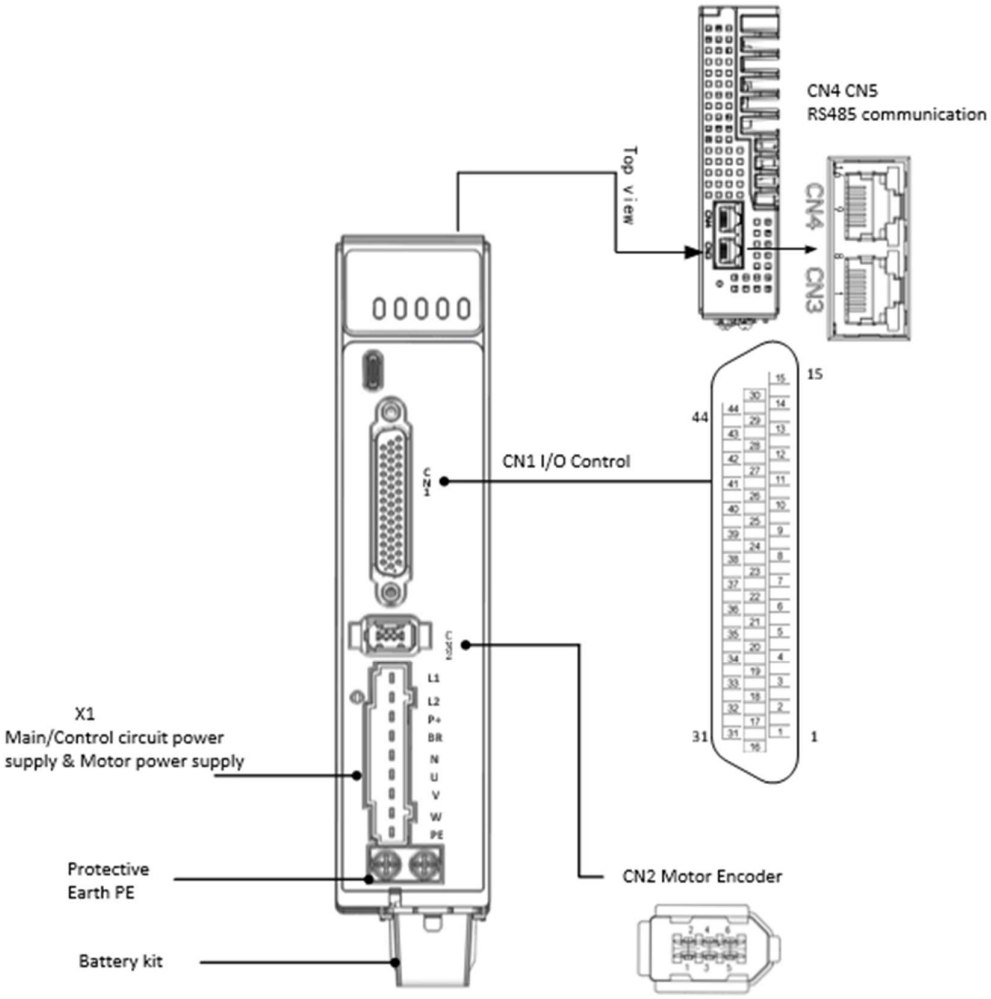
3.2.1 Position Control Mode Wiring Diagram

Position control mode wiring diagram



*Note: Please set **P00.05 to 1** when using high speed pulse command (max. 4 MHz)*

3.3 Servo Driver Ports

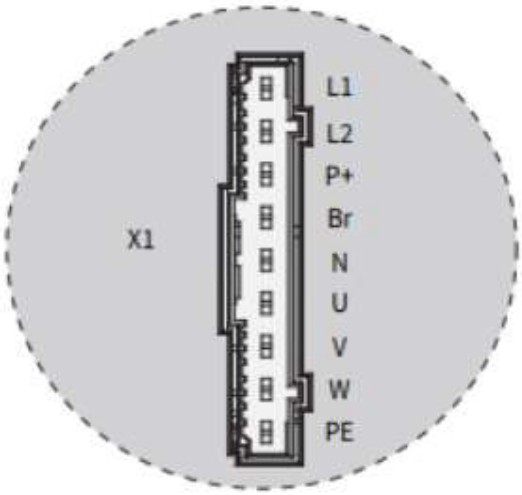


Connector	Label
CN1	I/O signal connector（DB 44PIN）
CN2	Motor encoder feedback
CN3	RS485 Communication port IN
CN4	RS485 Communication port OUT
X1	Main circuit power supply/ Motor power output
PC	USB type C tuning port
PE	Protective Earth for grounding

3.4 Main circuit connection

3.4.1 Main circuit terminal description

E-DFASxxP Series – 220V Models



Port	Pin	Functions	Remarks
X1	L1	Single phase 220VAC，+10～-15%，50/60Hz	① Optional isolation transformer ② Do not connect to 380VAC directly to P0Event damage to driver. ③ In case of serious interference, it is recommended to connect a line filter to main power supply. *It is recommended to install a fuseless circuit breaker to cut off power supply in time when the driver fails.*
	L2		
	P +	① Internal DC bus positive terminal ② External regenerative resistor P terminal	*Please refer to 2.10 Regenerative resistor selection and connections*
	Br	External regenerative resistor terminal	
	N		Please do not connect
	U	Motor U terminal	Please ensure proper wire connection on motor.
	V	Motor V terminal	
	W	Motor W terminal	
	PE	Motor Protective Earth	Please ground PE of driver and motor together

3.4.2 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 P0Event over-voltage.

Selection of regenerative resistor

In the E-DFASxxP series, models below 400W do not include built-in regenerative braking resistors. If external braking is required, customers must independently configure an external braking resistor. To connect an external resistor, wire it between terminals P+ and Br.

Model no.	Internal resistance (Ω)	Internal resistor power rating (W)	Minimum resistance (Ω)	Minimum power rating (W)
E-DFAS01P	-	-	50	50
E-DFAS04P	-	-	50	50
E-DFAS08P	50	75	30	50
E-DFAS10P	50	75	30	75

If detailed motion parameters such as acceleration/deceleration time, torque, and load inertia are not available on-site, you can skip the detailed selection steps and use the recommended method below to choose a suitable regenerative braking resistor.

Calculation of regenerative resistance under normal operation

Steps:

1. Determine if driver comes with a regenerative resistor. If not, please P0Epare a regenerative resistor with resistance value higher than might be required.
2. Monitor the load rate of the regenerative resistor using front panel (d14). Set the driver on high velocity back and forth motions with high acceleration/deceleration.
3.Please make sure to obtain the value under following conditions: Driver temperature < 60℃, d14<80(Won't trigger alarm), Regenerative resistor is not fuming, No overvoltage alarm (Err120).

Pb(Regenerative power rating) = Resistor power rating x Regenerative load rate (%)

Please choose a regenerative resistor with power rating Pr about **2-4 times the value of Pb** in considered of harsh working conditions and some 'headroom'.
If the calculated Pr value is less than internal resistor power rating, external resistor is not required.

$$R(\text{Max. required regenerative resistance}) = (380^2 - 370^2)/Pr$$

Problem diagnostics related to regenerative resistor:

- If driver temperature is high, reduce regenerative energy power rating or use an external regenerative resistor.
- If regenerative resistor is fuming, reduce regenerative energy power rating or use an external regenerative resistor with higher power rating.
- If d14 is overly large or increasing too fast, reduce regenerative energy power rating or use an external regenerative resistor with higher power rating.
- If driver overvoltage alarm (Er120) occurs, please use an external regenerative resistor with lower resistance or connect another resistor in parallel.

Please take following P0Ecautions before installing an external regenerative resistor.

1. Please set the correct resistance value in P00.16 and resistor power rating P00.17 for the external regenerative resistor.
2. Please ensure the resistance value is higher or equals to the recommended values in table 2-3. Regenerative resistors are generally connected in series but they can also be connected in parallel to lower the total resistance.
3. Please provided enough cooling for the regenerative resistor as it can reach above 100℃ under continuous working conditions.

4. The min. resistance of the regenerative resistor is dependent on the IGBT of the regenerative resistor circuit. Please refer to the table above.

Theoretical selection of regenerative resistor

Without external loading torque: the need for an external regenerative resistor can be determined as the flow chart below

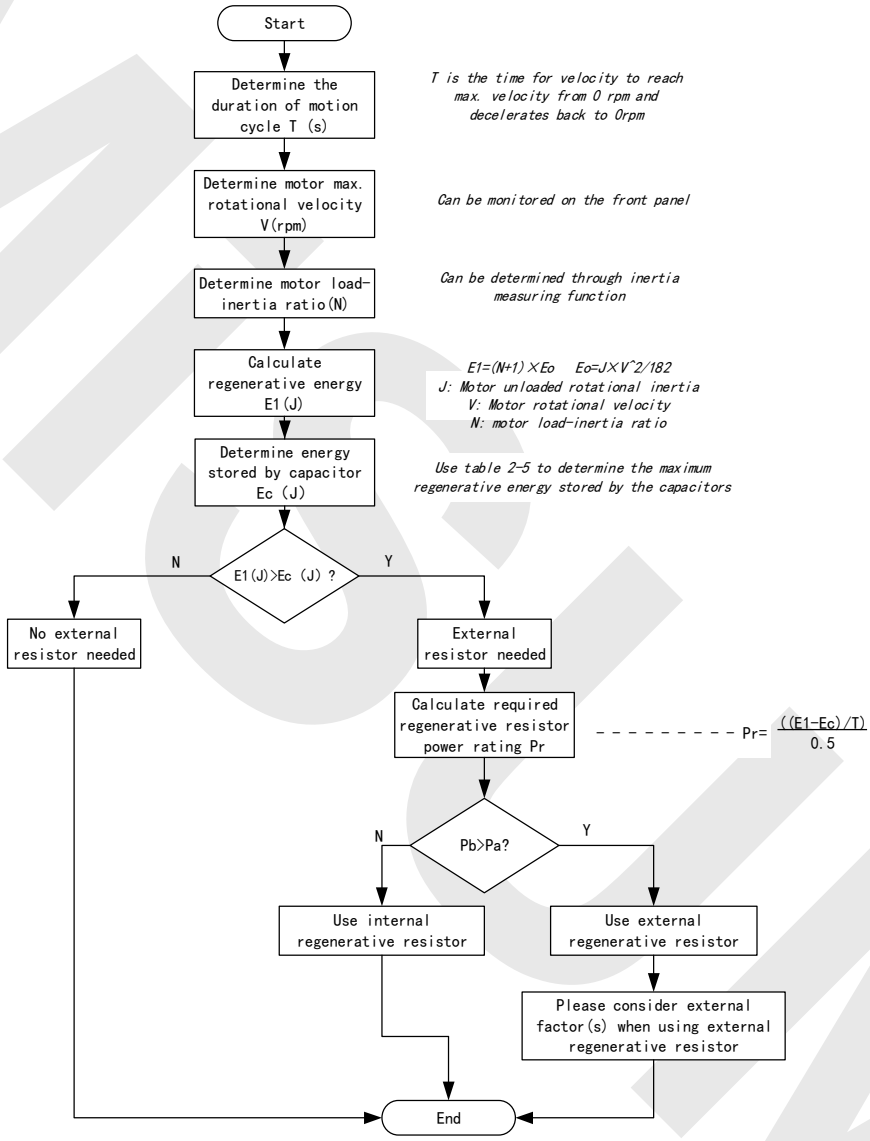
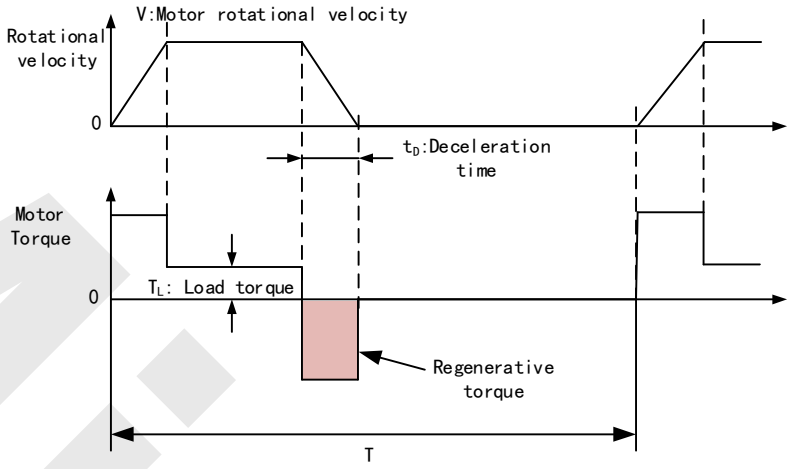


Diagram below shows the acceleration and deceleration cycle periods and the regenerative torque that occurs during the process.



Steps to calculate capacity of regenerative resistor

Steps	Calculation	Symbol	Formula
1	Servo system regenerative energy	E1	$E1=(N+1)\times J\times V^2/182$
2	Depleted energy from loss of load system during acceleration	E_L	$E_L = (\pi/60)\ V\times T_L\times tD$ *If loss is not determined, please assume $E_L = 0$.*
3	Depleted energy due to motor coil resistance.	E_M	$E_M=(U^2/R)\times tD$ R= coil resistance, U = operating voltage *If R is not determined, please assume $E_M = 0$.*
4	Energy stored by internal DC capacitors	Ec	Please refer to table 2-5
5	Depleted energy due to regenerative resistance	E_K	E_K=E1-(EL+EM+EC), If loss is ignored, EK=E1-EC
6	Required power rating of regenerative resistor	Pr	$Pr=E_K/(0.5\times T)$

Theoretical selection of regenerative resistor

Internal capacitor capacity and rotor inertia

E-DFASxxP	Servo Motor	Rotor Inertia (× 10-4kg.m^2)	Max. regenerative energy stored in capacitor Ec(J)
E-DFAS01P	E-MASH1-0401	0.048	13.46
E-DFAS04P	E-MASH1-0604	0.58	13.47
E-DFAS08P	E-MASH1-0808	1.66	22.85
E-DFAS10P	E-MASH1-0810	2.03	27.74

There are motors with low, medium and high inertia. Different motor models have different rotor inertia. Please refer to product catalogue for more information on rotor inertia.
Calculation examples:
Servo driver: E-DFASxxP750P, Servo Motor: E-MASH1-0808. When T = 2s, rotational velocity = 3000rpm, load inertia is 5 times of motor inertia.

E-DFASxxP Drivers	Servo motor	Rotor Inertia （× 10^{-4}kg.m^2）	Max. regenerative energy stored in capacitor Ec(J)
750W	E-MASH1-0808	1.66	22.85

Regenerative energy produced:

$$E1 = \frac{(N+1) \times J \times V^2}{182} = \frac{(5+1) \times 1.66 \times 3000^2}{182} = 49.3J$$

If E1<Ec, internal capacitors can't take in excessive regenerative energy, regenerative resistor is required.

Required regenerative resistor power rating Pr:

$$Pr = \frac{(E1 - Ec)}{0.5T} = \frac{49.3 - 22.85}{0.5 \times 2} = 26.45W$$

Hence, with the internal regenerative resistor Pa = 75W, Pr<Pa, no external regenerative resistor is required.

Let's assume if the load inertia is 15 times of motor inertia, Pr = 108.6W, Pr>Pa, external regenerative resistor is required. And to consider for harsh working environment,

Pr(external)=108.6/(1-40%)=181 W

When selecting the resistance of the regenerative resistor, please be higher than the minimum value recommended in table 2-3 but lower than Rmax

Rmax =(380^2-370^2)/Pr=7500/108.6=69Ω

In conclusion, a regenerative resistor with resistance 40Ω - 70Ω and power rating 110W to 180W can be chosen.

Please take note that theoretical calculations of regenerative resistance is not as accurate as calculations done under normal operation.

With external load torque:

There is an external load torque, and the servo motor does negative work. When the motor does positive work, the motor torque output direction is the same as the rotation direction. However, in some special occasions, the torque output of the motor is opposite to the direction of rotation. At this time, the motor performs negative work, and the external energy is returned to the driver through the electric energy generated by the motor.

For example, when the output force of the external load is the same as the rotation direction (for example, when the vertical installation mechanism moves downward), in order to meet the speed of the control command, the servo system must produce reverse force to offset the external force of the excessive load (its own gravity), and a large amount of energy will return to the driver. When the bus capacitor is full and cannot absorb the regenerative energy, this energy will be consumed by the guide regenerative resistor, in general, the external resistor capacity in this case will be very large.

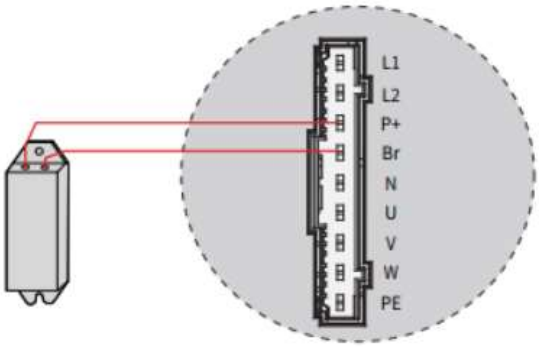
Calculation example: using 750W motor E-MASH1-0808, when the external load torque is + 70% of the rated torque (2.39Nm)

At a speed of 3000rpm, the required external regenerating resistor power is:

[(0.7*2.39)*(3000*2π)/60]/0.5=1051w

The resistance value refers to the minimum resistance value of the 750W driver regeneration resistor of 30Ω, so an external regeneration resistor of 30Ω and 1000W is selected. If the external resistor environment is harsh, derating needs to be considered.

Regenerative resistor connection



- 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 P0Event overcurrent.
- Please do not connect external regenerative resistor directly to N or it might cause fire hazard.
- Please refer to the section above to select minimum allowable resistance for the external regenerative resistor or it might damage the driver.
- Please confirm P00.16 and P00.17 before using any regenerative resistor.
- Do not set the regenerative resistor near any flammable object.

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3.4.3 Recommended Wiring Specifications for Main Circuit

Main Power Supply Cable

Driver	Wire diameter (mm^2/AWG)				
	Rated input current (A)	L1, L2, L3	P+, (B2) Br	U, V, W	PE
Single phase 220V					
E-DFAS01P	2	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14
E-DFAS04P	5	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14
E-DFAS08P	7.9	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14
E-DFAS10P	9.6	2.1/AWG14	2.1/AWG14	0.52/AWG14	0.52/AWG14

The CN1 is used for control signal wiring, CN2 is encoder feedback signal wiring.

■ Wire Gauge

Use shielded cables (preferably twisted shielded cables). CN1: ≥ 0.14 mm², CN2: ≥ 0.25 mm². The shield layer must be grounded.

■ Cable Length

Keep cables as short as possible. CN1 (Control Signals): ≤ 3 meters, CN2 (Encoder Feedback): ≤ 20 meters.

■ Routing

Route cables away from power lines to prevent signal interference.

■ Surge Protection

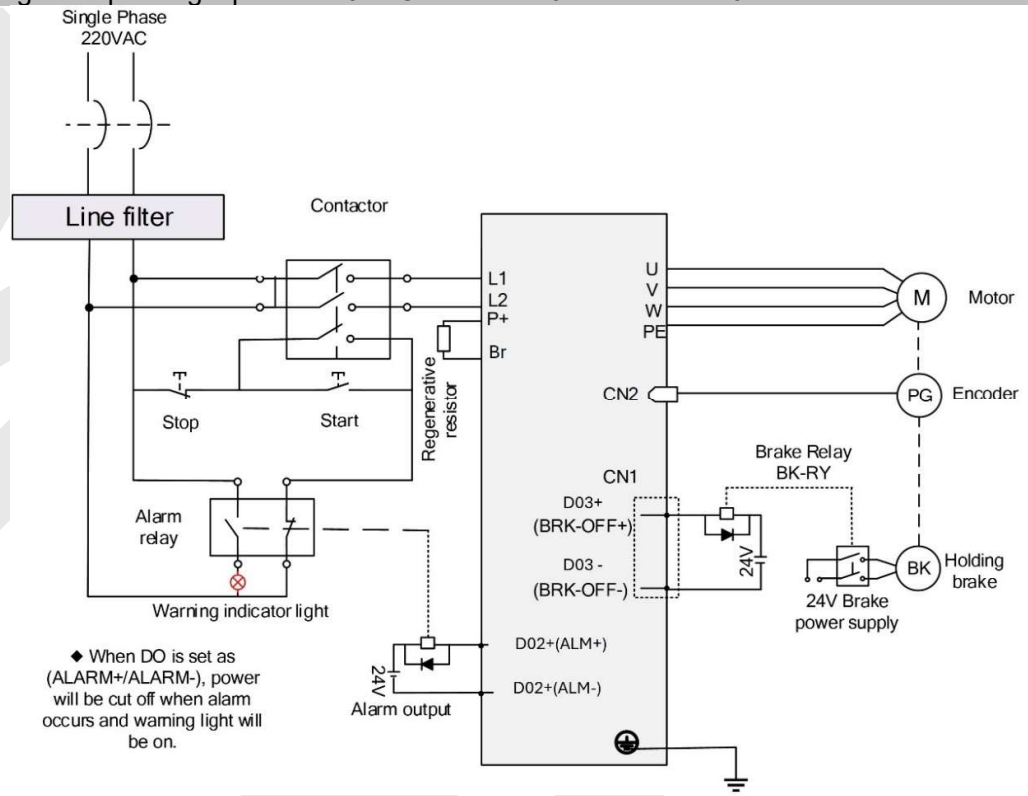
Install surge suppression components for inductive elements (e.g., coils).
For DC coils: connect a flyback diode in reverse parallel.
For AC coils: use an RC snubber circuit.

Notes

- U, V, W must be connected to the motor windings in the correct order — do not reverse the connections.
- Secure all cables and wires properly, and avoid placing them near the driver's heat sink or motor, as heat may degrade insulation performance.
- The servo driver contains large electrolytic capacitors. Even after power is turned off, high voltage remains — do not touch the driver or motor within 5 minutes after power-off.

3.4.4 Main Circuit Power Wiring Examples

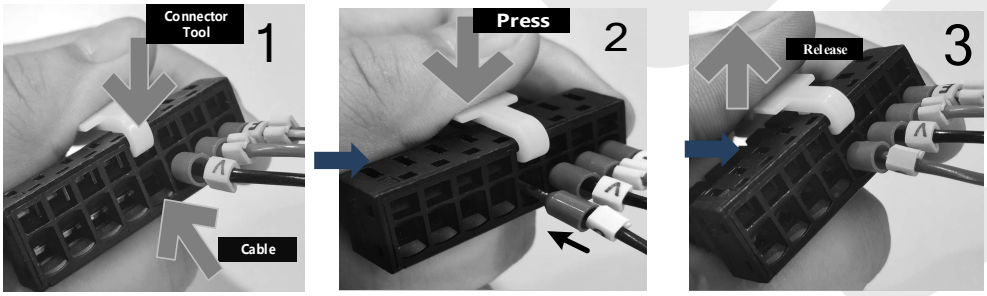
Wiring example single phase 220VAC : E-DFAS01P~E-DFAS10P



- E-DFASxxP series servo driver 220VAC models support single phase and three phase 220VAC. Only driverr with power rating above 1500W supports three phase 220VAC.

To fix wire cables into connector

An operating lever is provided on the main circuit terminal connector for wiring:



1. Select the terminal hole and insert the lever into its slot.
2. Press the lever vertically to open the spring, then insert the cable conductor fully.
3. Release the lever to lock the cable in place.

Notes:

- To remove the cable, press the lever the same way.
- Only one wire per terminal hole is allowed.
- Keep the lever properly after use for future needs.

3.5 Connecting motor power cable to servo driver

3.5.1 U/V/W/PE Motor Power Phase Connection

The power cable from the driver is labeled with U, V, W, PE. Please connect the wires accordingly to the power cable extending from the servo motor.

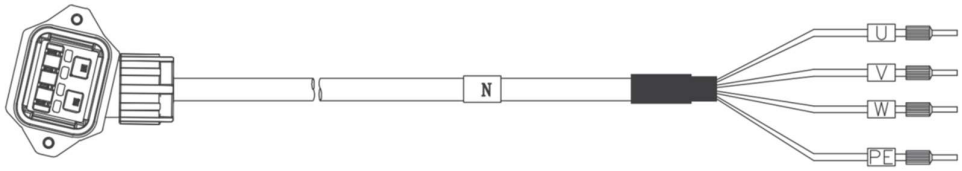
Motor power cable selection

Motor winding power cable

- Wire length available: 1.5m, 3m and 5m
- Connectors type available: Direct connectors
- Please contact Misumi sales team or any Misumi certified local retailers for any customized needs.

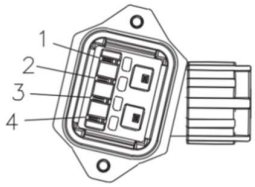
**M*: Length of the cable*

Direct connector E-CASP*M*-N without holding brake



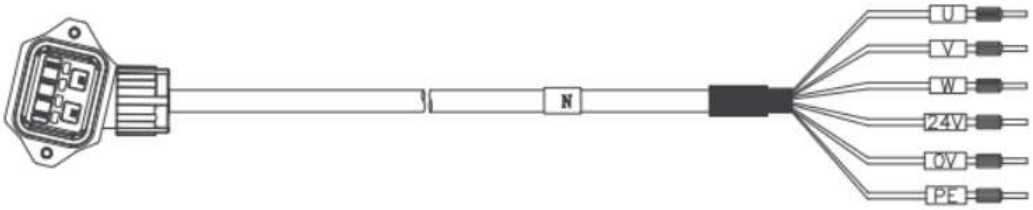
Motor side Driver side

Driver cable pin	Pins



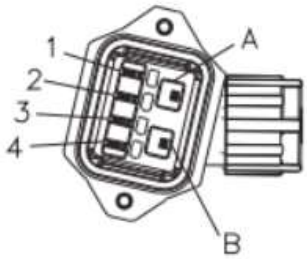
Motor	Color	Driver
1	Blue	U
2	Black	V
3	Red	W
4	Yellow-green	PE

Direct connector E-CASPB*M*-N with holding brake



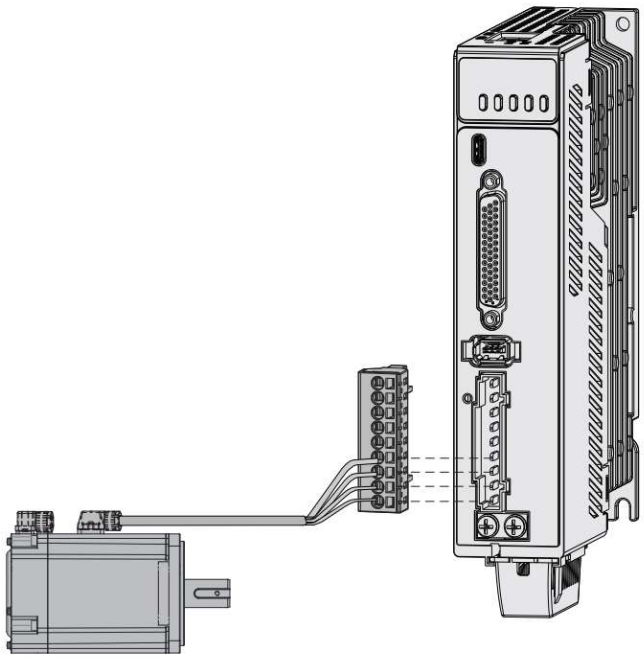
Motor side Driver side

Driver cable pin	Pins



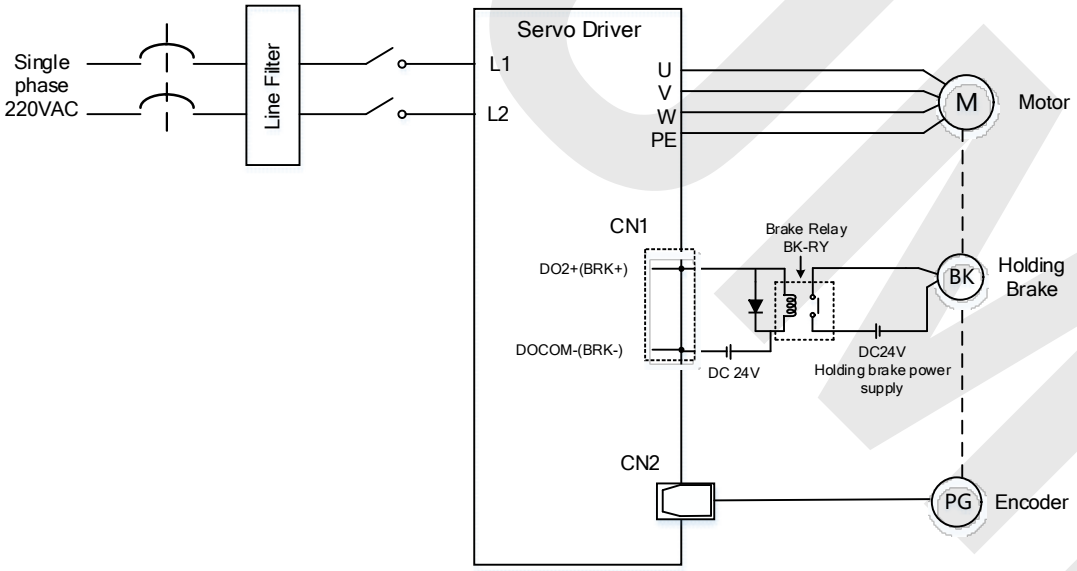
Motor	Color	Driver
1	Blue	U
2	Black	V
3	Red	W
4	Yellow-green	PE
A	Black	0V
B	Red	24V

Example of connect motor's power cable to servo driver



3.5.2 Holding brake connection

Holding brake is activated when servo driver is not powered on to prevent axis from moving due to gravitational pull or other external forces by locking the motor in place. Usually used on axis mounted vertically to the ground so that the load would not drop under gravitational force when the driver is powered off or when alarm occurs.



Holding brake wiring diagram

- Mechanical noise might exist when motor with holding brake is in operation but it doesn't affect the functionality of the motor.
- When the holding brake circuit is closed (holding brake deactivated), there might be magnetic flux leakage. Please be aware not to use magnetic sensor around motor with holding brake.
- 24V operating voltage for the holding brake has to be ensured to maintain the functionality of the holding brake. Please consider the voltage dropped over lengthy motor cables due to increase in cable resistance.
- It is recommended to have an isolated switching power supply for the holding brake to prevent malfunctioning of the holding brake in case of voltage drop.
- If the motor is using a magnetic encoder, holding brake wires need to be differentiated between positive and negative terminal to prevent interference to the magnetic encoder due to wrong polarity. It might cause alarm, loss in encoder accuracy or abnormal vibration, etc.
- Motor with optical encoder has no such problem, so holding brake circuit can be connected in anyway.

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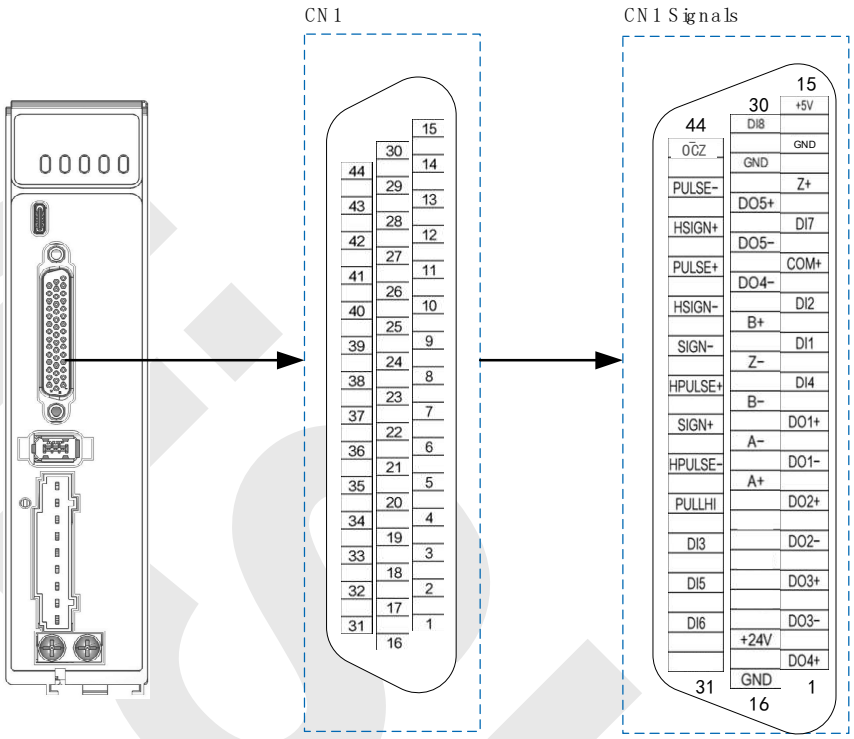
3.6 CN1 I/O Control Signal

E-DFASxxP Series Servo Driver uses DB 44-Pin connector.



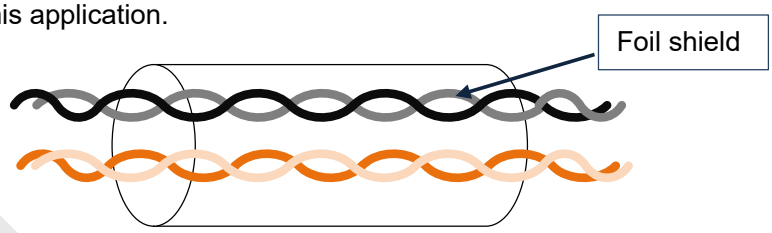
Note: It is recommended to use 24-26AWG cables for CN1

Function	Pin	Signal	Label	Description
Position command	41	PULSE+	Low speed pulse command input	Low speed pulse command input mode： ● Differential (5V) ● Single ended (24V) Low speed pulse and direction command input mode ： PULSE+ & PULSE-：5V Differential (500KHz) SIGN+ & SIGN-：5V Differential (500KHz) PULLHI & PULSE-：24V Single ended (200KHz) PULLHI & SIGN- ： 24V Single ended (200KHz)
	43	PULSE-	Low speed pulse command input	
	37	SIGN+	Low speed direction command input	
	39	SIGN-	Low speed direction command input	
	35	PULLHI	Open collector 24V common input	
	38	HPULSE+	High speed pulse command input	4MHz High speed pulse command input，5V differential input (Pins 38 and 41 are internally shorted, and pins 36 and 43 are internally shorted; high and low speed pulse inputs can be selected through P00.05 pulse input without rerouting)
	36	HPULSE-	High speed pulse command input	
	42	HSIGN+	High speed direction command input	

	40	HSIGN-	High speed direction command input	4MHz High speed direction command input， 5V differential input(Pins 42 and 37 are internally shorted, and pins 40 and 39 are internally shorted; high and low speed direction input can be selected through P00.05 pulse input without changing lines)
Common	17	+24V	Internal 24V power supply	24V internal power supply, range 20V~28V. Max. output current 200mA
	14	GND		
Digital inputs and outputs	11	COM+	Common DI	Common DI
	9	DI1	POT	Positive limit
	10	DI2	NOT	Negative limit
	34	DI3	INH	Command pulse inhibition
	8	DI4	A-CLR	Alarm clearing
	33	DI5	SRV-ON	Servo enabled
	32	DI6	*Null*	-
	12	DI7	*Null*	-
	30	DI8	HOME-Switch	Homing switch (sensor)
	7	DO1+	SRDY+	Servo ready signal output
	6	DO1-	SRDY-	
	5	DO2+	INP1+	Positioning done signal output
	4	DO2-	INP1-	
	3	DO3+	BRK-OFF+	Holding brake output
	2	DO3-	BRK-OFF-	
	1	DO4+	ALARM+	Alarm output
	26	DO4-	ALARM-	
	28	DO5+	HOME-OK+	Homing done signal output
	27	DO5-	HOME-OK-	
Frequency divider output	21	A+	Encoder A phase frequency divider output	Differential output，A/B phase quadrature frequency divided pulse output signal
	22	A-		
	25	B+	Encoder B phase frequency divider output	
	23	B-		
	13	Z+	Encoder Z phase frequency divider output	Differential output, motor Z phase signal output
	24	Z-		
	44	OCZ	Z-phase open collector output	Channel Z output (Open collector)
	29	GND	Z-phase open collector output signal ground	Channel Z output ground (Open collector)
Common	15	+5V	Internal 5V power supply	5V internal power supply. Max. output current 200mA
	16	GND		
	Fram		FG	Frame grounding

CN1 control signal cable selection

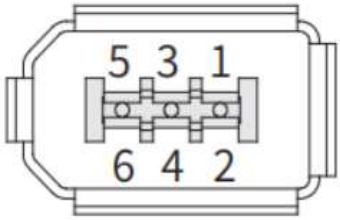
To ensure I/O signal is not affected by electromagnetic interference, a **shielded cable** is recommended for this application.



Cables for digital signals should be shielded twisted pair cable. Cables for CN1 connectors should be 24-28AWG in diameter.

- Please keep at least 30cm from main power supply/control circuit power cable (L1C/L2C/L1/L2/L3，U/V/W) to P0Event electromagnetic interference of I/O signals.

3.7 CN2 Encoder Connection Port

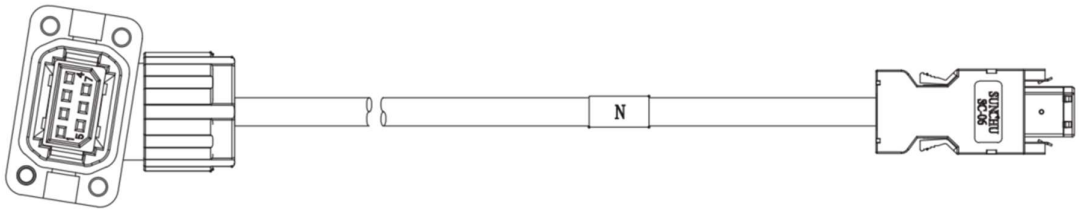


Connector	Pin	Signal	Description
CN2	1	VCC5V	Power supply 5V
	2	GND	Power supply ground
	3	BAT+	Battery positive terminal
	4	BAT-	Battery negative terminal
	5	SD+	SSI Data+
	6	SD-	SSI Data-
	Frame	PE	Shield grounding

- Please ground both driver and motor PE terminals to avoid any servo alarms.
- It is recommended to use a shielded twisted pair cable not longer than 20m.
- Please leave a space of min. 30cm between motor power cable and encoder to avoid interference.

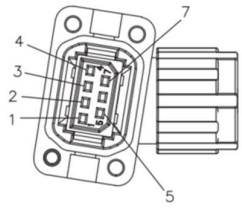
Motor encoder cable selection

Direct connector E-CAS1E*M*-N Incremental encoder



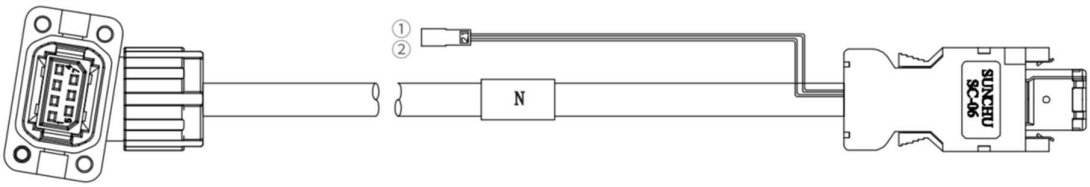
Motor side Driver side

Motor cable pin	Pin



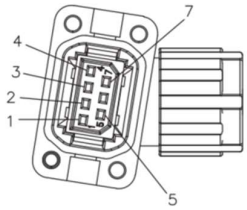
Motor	Color code	Driver
1	Frame	Shielded
2	White	1 (+5V)
3	Black	2 (0V)
4	Blue	5 (SD+)
5	Purple	6 (SD-)

Direct connector E-CAS2E*M*-N Absolute encoder



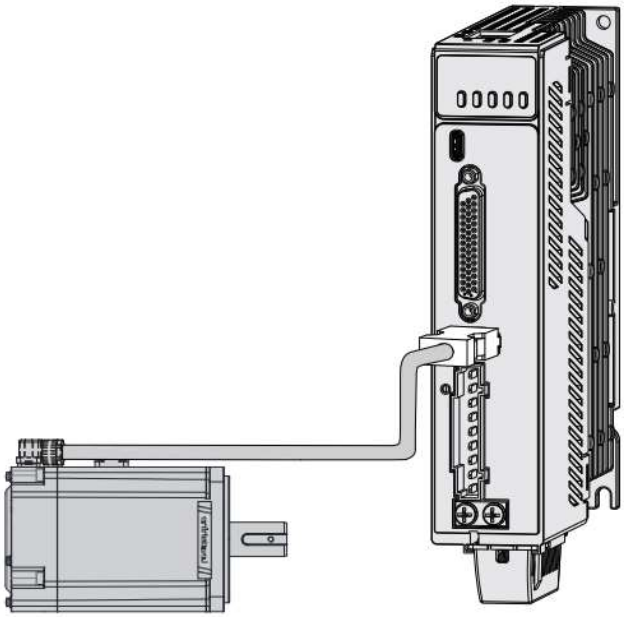
Motor side Driver side

Motor cable pin	Pin



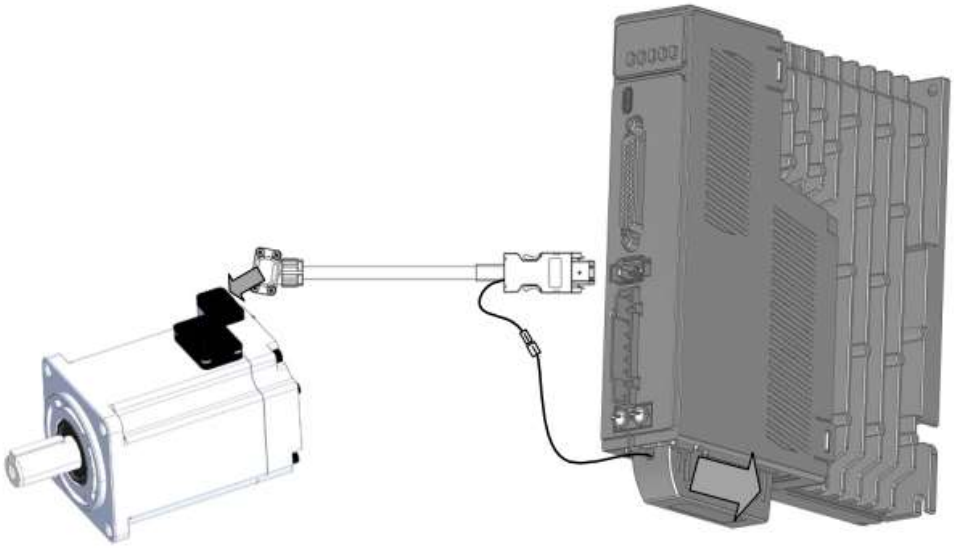
Motor	Color code	Driver
1	Frame	Shielded
2	White	1 (+5V)
3	Black	2 (0V)
4	Blue	5 (SD+)
5	Purple	6 (SD-)
6	Red	① (BAT+)
7	Black	② (BAT-)

Example of connect motor's encoder cable to servo driver



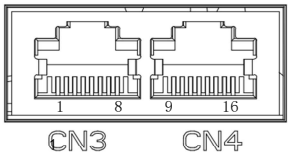
Battery box for absolute encoder

E-DFASxxP series servo drivers come with battery kit installed on the driver or on the encoder cable.



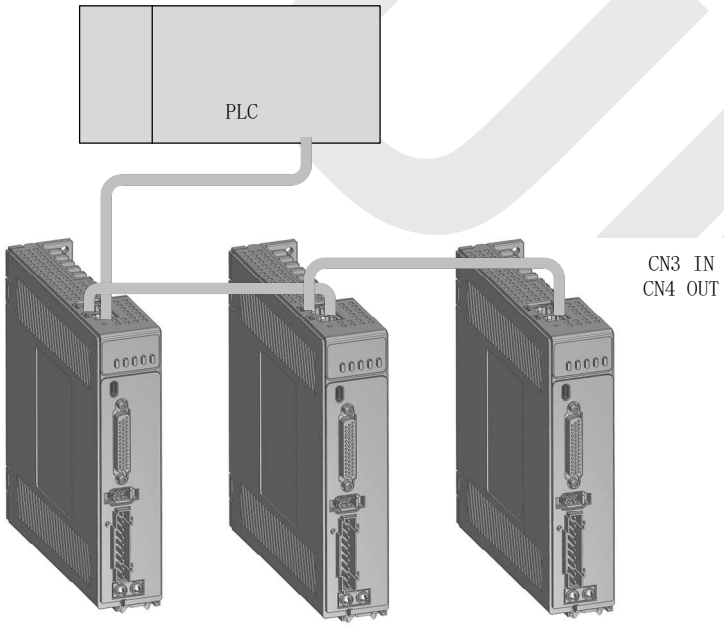
3.8 CN3/CN4 – RS485 Communication Port

The E-DFASxxP series drivers support RS485 communication.
When using multiple drivers simultaneously, RS485 interfaces are provided to connect them with the host controller and enable multi-axis communication.



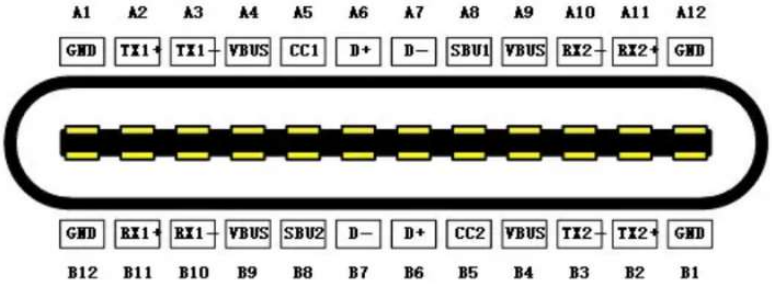
Port	Pin	Signal	Description
CN3 CN4	1，9	RDO+	RS485 Differential signal+
	2，10	RDO -	RS485 Differential signal-
	3，11	GND	Ground（RS485）
	4，12	TXD+	RS485 Differential signal+
	5，13	TXD-	RS485 Differential signal-
	6	VCC5V	Reserved，5V positive（50mA）
	7，15	GND	Ground
	8，16	/	/
	Frame	PE	Shield grounding

Note: Pins 1/2 and Pins 4/5 share the same RS485 signal line.
Example of connecting multiple drivers



3.9 USB Type-C Tuning Port

E-DFASxxP series servo driver can be connected to PC for performance tuning, data monitoring and parameters modifying using a **USB Type-C data cable**. Can be done without the servo driver connecting to main power supply.



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:

- When the main power is off, the driver can be connected to a PC via a debug cable to modify parameters using the MISUMI EDrive software.
- If connection issues occur due to strong interference, use a debug cable with a magnetic ring to improve stability.

3.10 I/O Signals

3.10.1 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 drive input and open collector input.

Pulse input frequency:

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

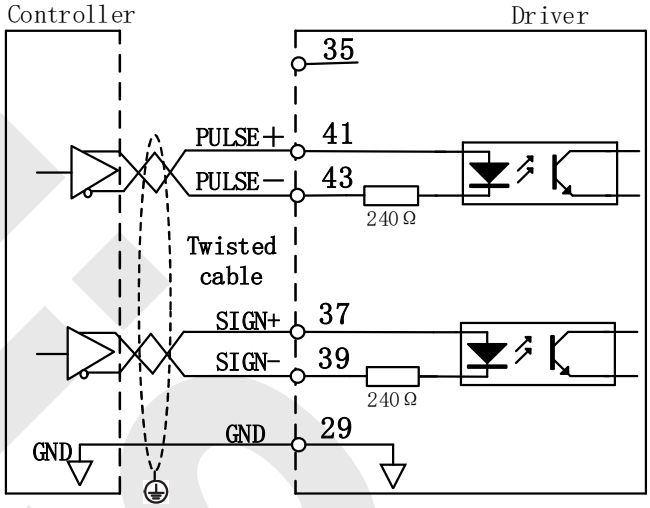
Pulse input frequency can be set in P00.05.

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

- *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 drive input (Low Speed)

5V differential drive 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 47 and 43 of CN1 are for pulse signal input; pin 37 and 39 are for direction signal input.

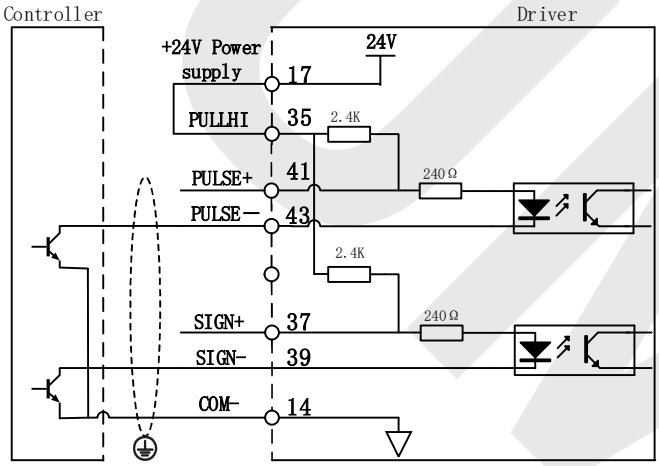


Single ended open collector drive input (Low Speed)

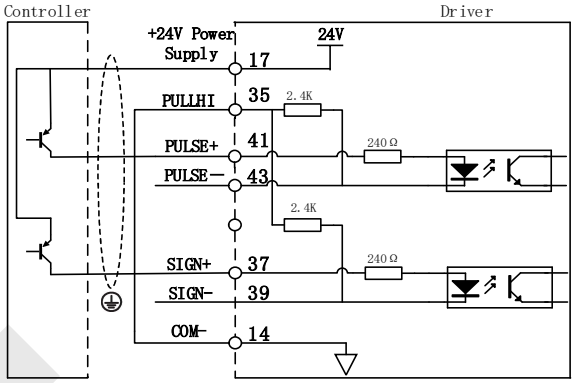
Max. tolerable command pulse input frequency under open collector = 200kHz. Input voltage of 12-24V with 50% duty ratio.

- **Using driver internal 24V power supply**

1. When pulse input comes from NPN type device:
   -

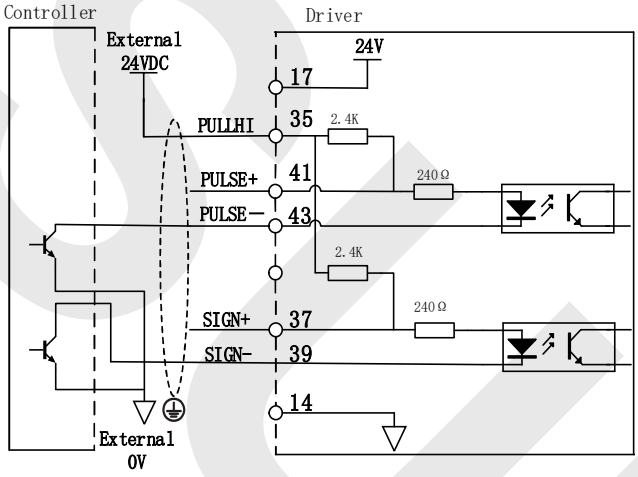


2. When pulse input comes from PNP type device:

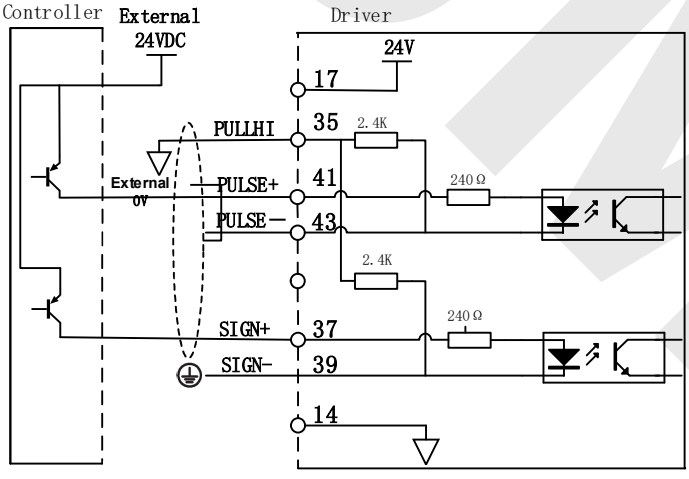


- **Using external power supply**
  - **Method 1: Using driver internal resistor (Recommended)**

3. When pulse input comes from NPN type device:

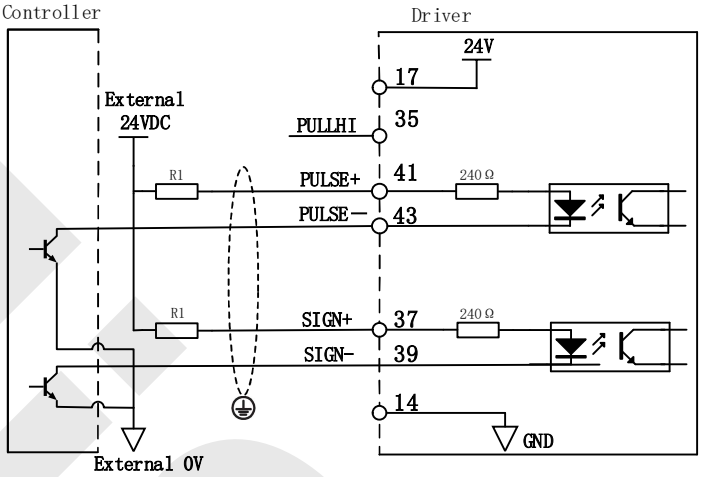


4. When pulse input comes from PNP type device:

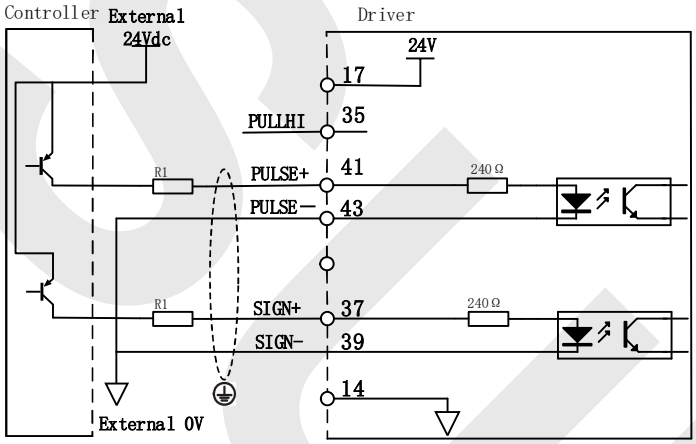


Method 2: Using external resistor

5. When pulse input comes from NPN type device:



6. When pulse input comes from PNP type device:



- Using 24V external power supply, driver internal includes current limitation equivalent to VDC value. By installing a resistor, driver's noise tolerance will be improved.

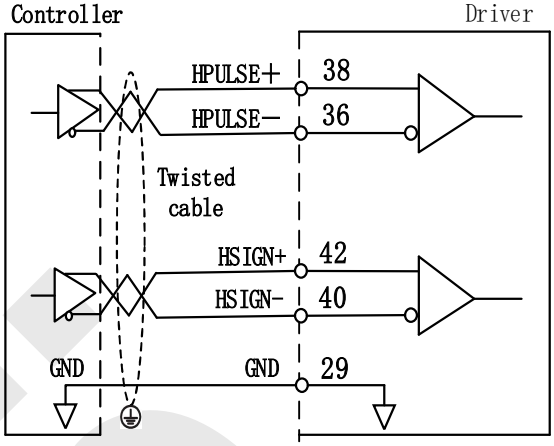
- Resistance of current limiting resistor = $\frac{\text{VDC}-1.5\text{V}(\text{Voltage drop})}{\text{R1}(\text{Current limiting})+220\,\Omega}=10\text{mA}$.
  If VDC = 24V, resistance of current limiting resistor approximates 2kΩ. (Rough estimation)

Vcc Voltage	R1 Resistance	R1 Power rating
24V	2.4kΩ	1/2 W
12V	1.5kΩ	1/2 W

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

5V differential drive input (High Speed)

5V differential drive input (Max. tolerable command pulse input frequency: 500kHz). Due to high-speed pulse input, it is highly recommended to use shielded cable and be isolated from power cable.



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

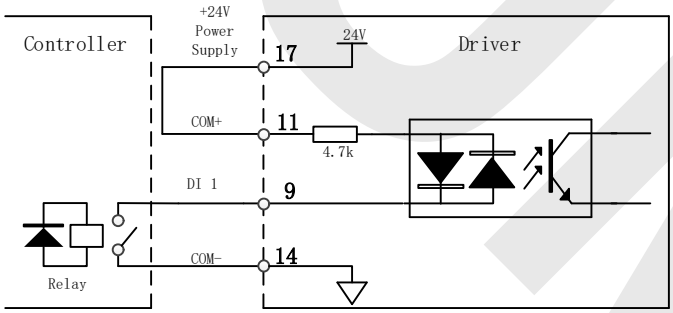
- *Pulse lost during command pulse input*
- *Inversed pulse direction during direction command*
- *Please connect 5V signal to GND on driver to lower noise interference.*

3.10.2 Digital Input Circuit

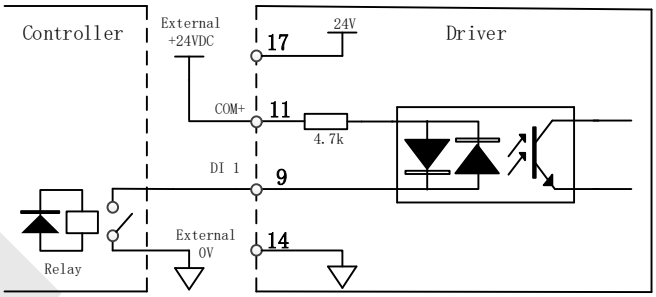
Using DI1 as an example (DI2-DI8 use the same input circuit). The internal circuit of common input is a bidirectional optocoupler which supports common anode and common cathode configurations. There are 2 types of outputs from master device: Relay output and Open Collector output as shown below.

■ Relay output:

1. Using internal 24V power supply



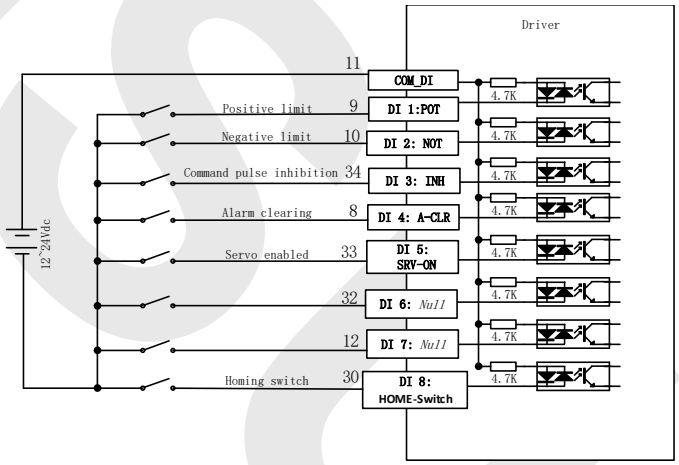
2. Using external power supply



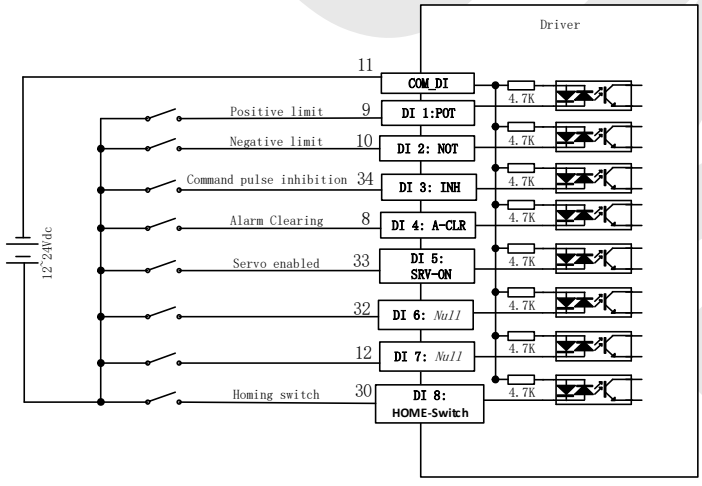
**Please connect to a flyback diode when using relay input to P0Event damage to DO terminal.*

E-DFASxxP Series AC Servo Driver supports both common anode and cathode connection:

Common Anode:

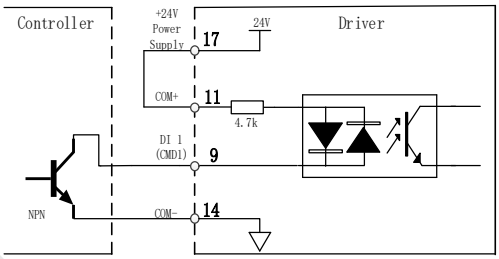


Common Cathode:

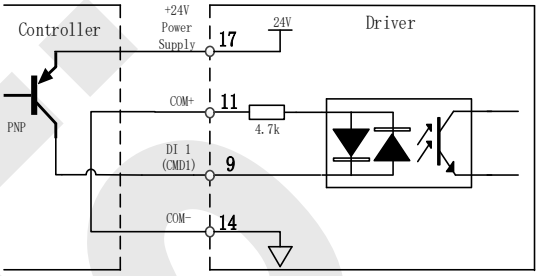


Open collector output

Common Anode (Internal power supply)



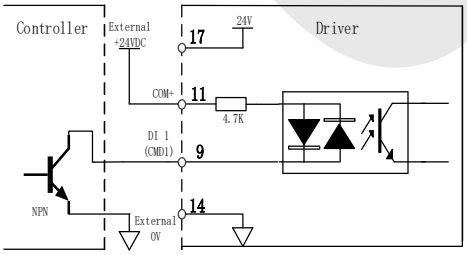
Common Cathode (Internal power supply)



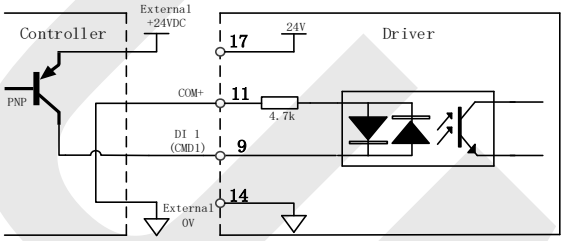
** Please P0Epare switching power supply with output of 12-24VDC, current≥ 100mA;*

■ **Using open collector output**

Common Anode (External power supply)

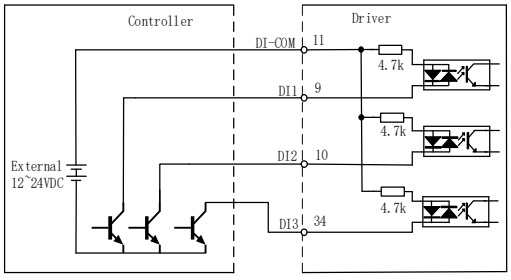


Common Cathode (External power supply)

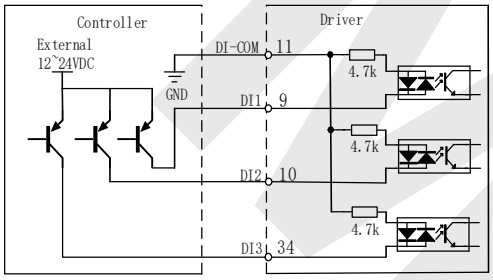


■ **Using transistor output**

NPN:



PNP:



**Please do not mix NPN and PNP connections in applications*

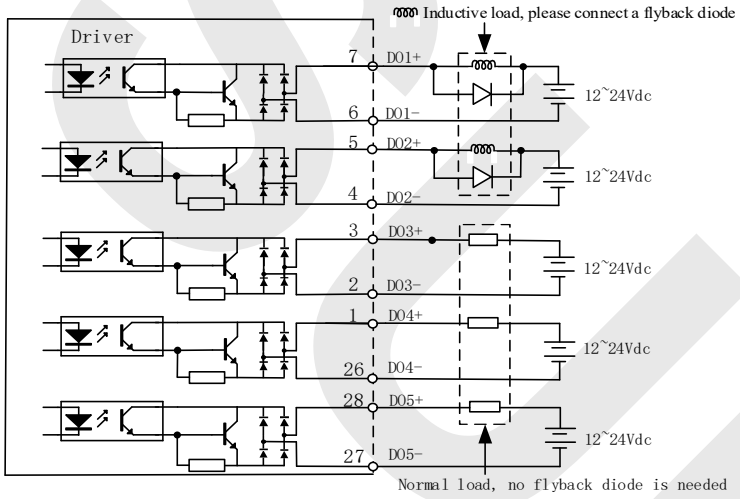
DI1-DI8 Default Signal Assignment

Signal		Default	Pin	Description
Digital Input	DI1	POT	9	Positive limit
	DI2	NOT	10	Negative limit
	DI3	INH	34	Command pulse inhibition
	DI4	A-CLR	8	Alarm clearing
	DI5	SRV-ON	33	Servo enabled
	DI6	-	32	-
	DI7	-	12	-
	DI8	ORG	30	Homing switch *(Only in PR mode)*
+24V			17	Internal 24V power supply, Voltage range+20~28V, Max current output 200mA
COM-			14	
COM+			11	Common DI

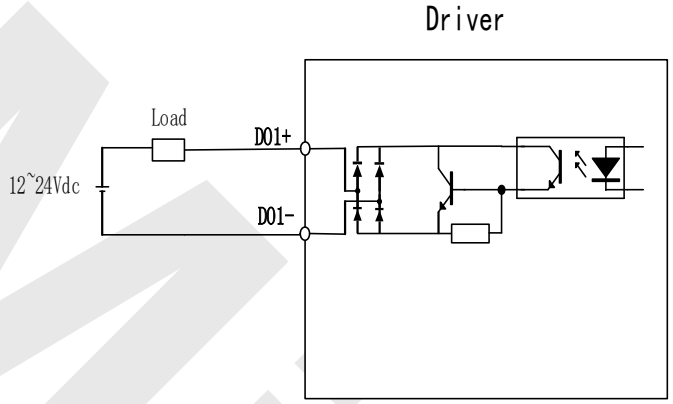
3.10.3 Digital Output Circuit

There are 5 digital outputs. DO1-DO5 are all double ended outputs. Can be connected to independent control signal power supply and reference ground is different from single ended output signals.

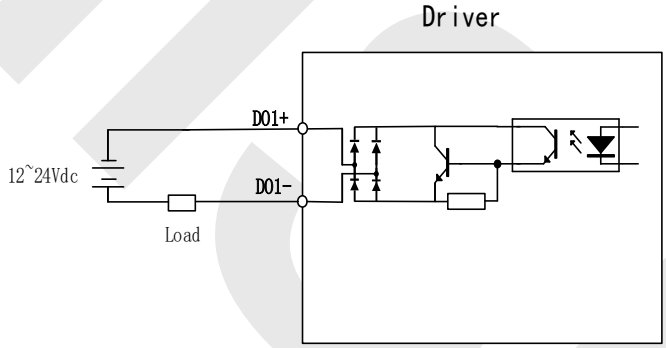
Double ended outputs DO1-DO5 (Supports both NPN & PNP)



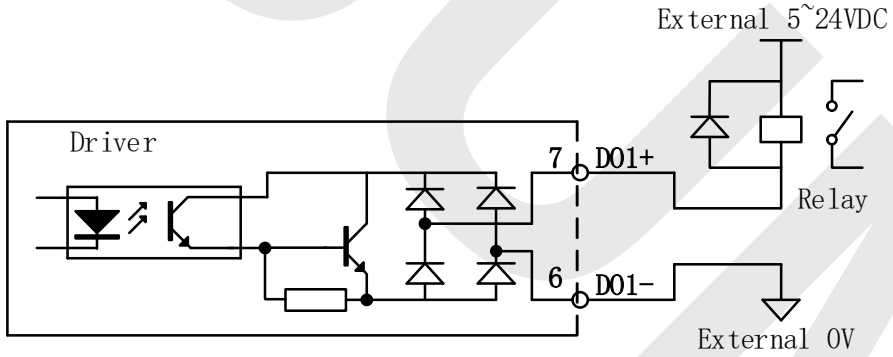
NPN:



PNP:

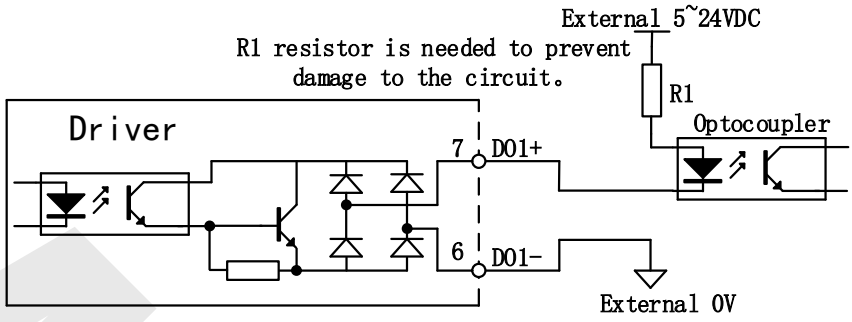


Relay:



**Please connect to a flyback diode when using relay input to P0Event damage to DO terminal.*

Optocoupler:



**For servo driver internal optocoupler output circuit: Max. Voltage: 30VDC, Max. Current:50mA*

- External power supply needs to be provided. Reversed connection of power supply might cause damage to the driver.
- When output = open collector, max current 50mA, external power supply max voltage 25V. Hence, DO loads need to satisfy these conditions. If excessive or output connected directly to power supply, it might cause damage to the driver.
- If the load is an inductive load such as a relay, please install freewheeling diodes on both ends of the load in parallel. If the diode is connected in reverse, it might cause damage to the driver.

DO1-DO5 Default Signal Assignment

Signal		Default	Pin	Description
Digital Output	DO1+	SRDY+	7	Servo Ready
	DO1-	SRDY-	6	
	DO2+	INP+	5	Positioning completed
	DO2-	INP-	4	
	DO3+	BRK- OFF+	3	External brake released
	DO3-	BRK-OFF-	2	
	DO4+	ALARM+	1	Alarm
	DO4-	ALARM-	26	
	DO5+	WARN1+	28	Warning
	DO5-	WARN1-	27	

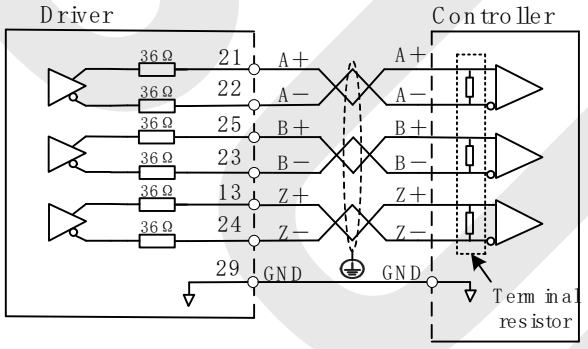
3.10.4 Encoder frequency divider output circuit

E-DFASxxP series supports 2 kinds of frequency divider output: Differential and open collector.

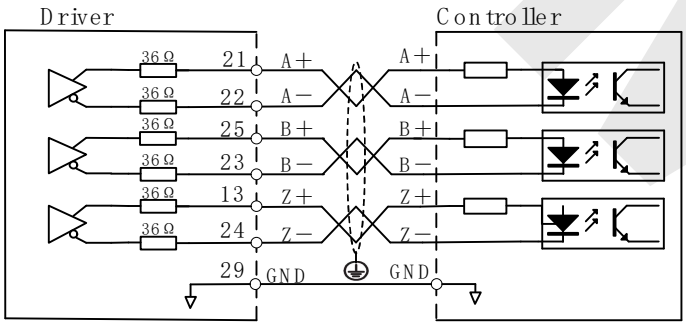
Pin	Signal	Description	
21	A+	Motor encoder A phase frequency divider output	Differential, High＞=2.5VDC，Low<=0.5VDC，Max current output±20mA。
22	A−		
25	B+	Motor encoder B phase frequency divider output	
23	B−		
13	Z+	Motor encoder Z phase frequency divider output	
24	Z−		
44	OCZ	Motor encoder Z phase OC signal output	
29	GND	Reference ground	
15	+5V	Internal 5V power supply, Max current output 200mA	
16	GND		
Frame	PE	-	

Encoder frequency divider output (Differential)

Encoder signal after frequency division will go through differential driver to deliver differential output. Feedback signal will be provided if the master device is in position control mode. Please install a differential optocoupler receiving circuit to receive the signals. A terminal resistor must be installed between differential input circuits. Resistance of the resistor as per actual use.



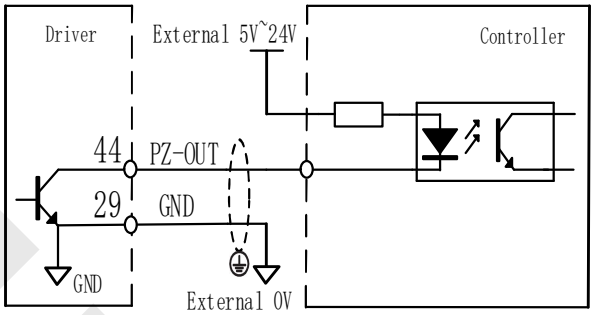
Using an optocoupler receiving circuit:



If a differential receiving circuit instead an optocoupler is used on the controller side, please connect pin 29 (GND) to GND of differential receiving circuit.

Encoder frequency divider output (Open Collector)

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



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

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3.11 Measures against electromagnetic interference

To reduce interference, please take the following measures:

- I/O signal cable > 3m; Encoder cable > 20m
- Use cable with larger diameter for grounding

① Grounding resistance > 100Ω

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.
- In order to prevent malfunctions caused by electromagnetic interference, please take following measures:

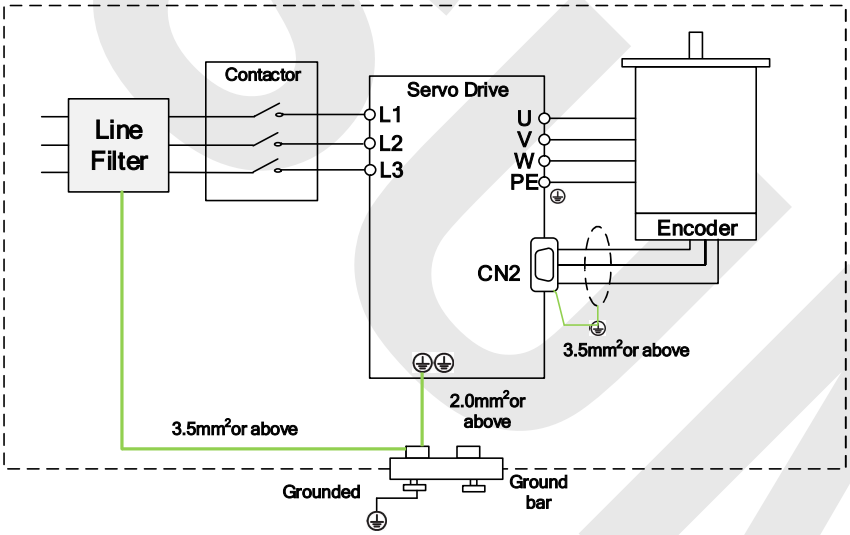
① Install master device and line filter close to the servo driver

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

3.11.1 Grounding connection and other anti-interference wiring connections

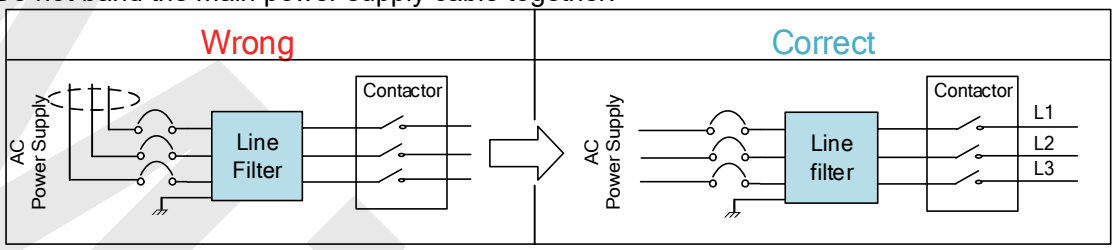


- Servo motor frame should be grounded. Please connect the PE terminal of servo motor and servo driver and ground them together to reduce interference.
- Ground both ends of the foil shield of encoder cable.

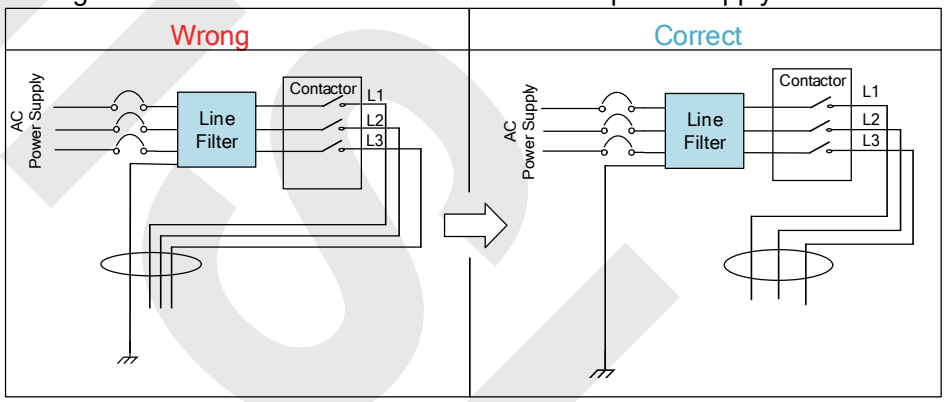
3.11.2 Using line filter

To reduce interference from main power supply cable and to prevent from affecting other sensitive components around 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.

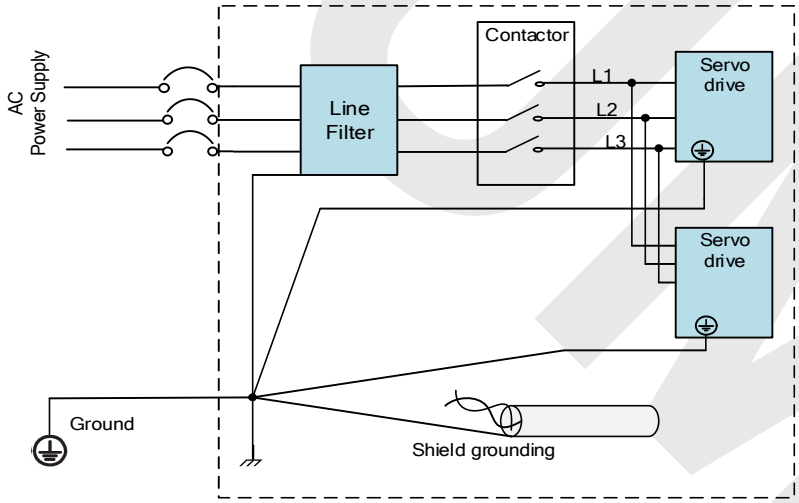
Do not band the main power supply cable together.



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



Ground wires inside an electrical cabinet

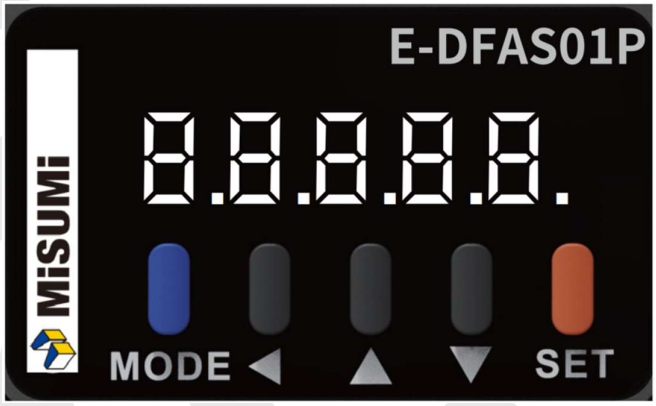


Chapter 4 Servo Driver Operation

4.1 Front Panel

4.1.1 Front Panel Structure

Servo Driver front panel consists of 5 push buttons and a 8-segments display. Can be used for displaying status, alarms, functions, parameters setting and auxiliary functions.

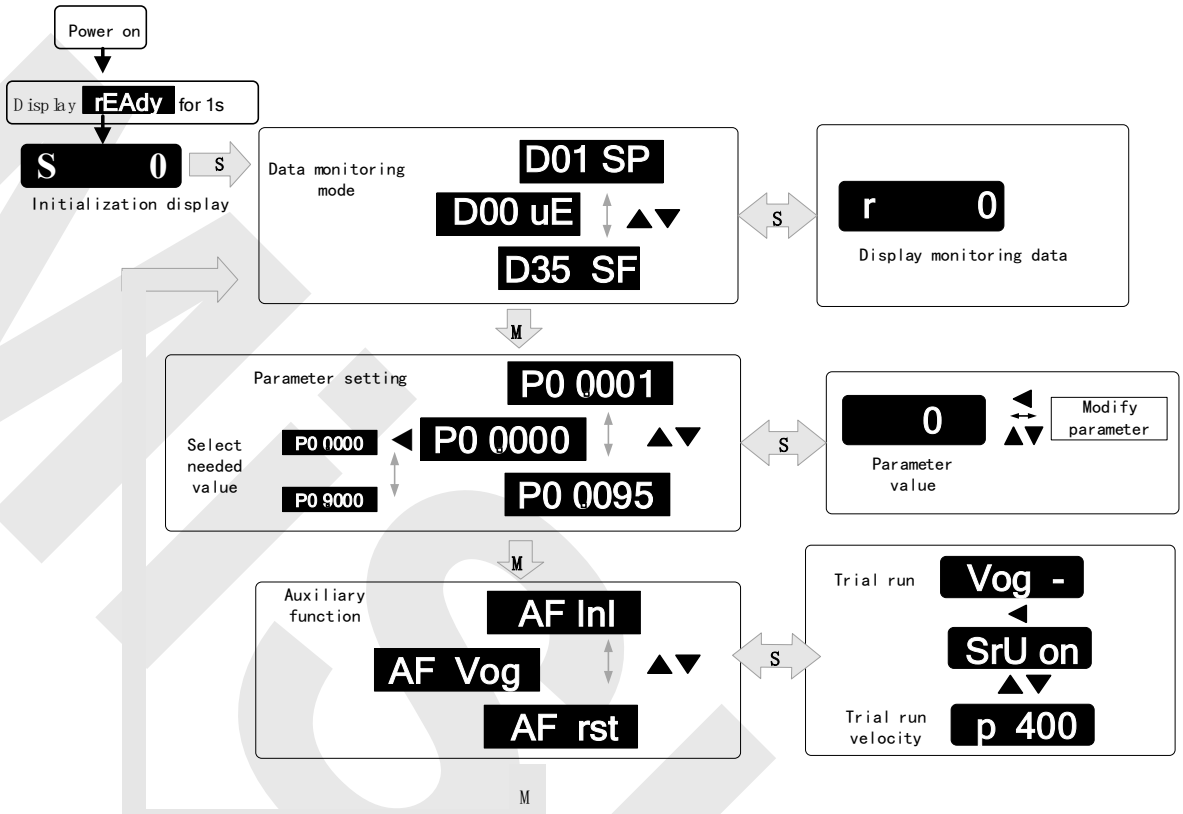


Front panel

Buttons and functions

Label	Symbol	Function
Display	/	Consists of 5 push buttons and a 8-segments display
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 Operation Flow Chart



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) P0Ess **M** key to switch between modes.

Data monitoring mode → Parameters setting mode → Auxiliary functions mode

Alarm code will be displayed regardless of any mode if alarm occurs. P0Ess **M** to switch to other modes.

(3) P0Ess ▲or▼to select the type of parameters in data monitoring mode. P0Ess **S** to confirm.

(4) P0Ess◀ to select current segment in parameters settings mode. P0Ess▲or▼to increase/decrease the value of segment. P0Ess **S** to confirm the modified value(s) and save the parameters.

4.1.3 Front Panel Locking

To P0Event any misuse of the front panel, it can be locked. Limitations when locked are as shown below.

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

To lock and unlock the front panel

	Front Panel	EDrive
Lock	①Set P05.35 = 1. ②Restart driver. ③Front panel is now locked.	
Unlock	① Please refer to auxiliary function **AF UnL** ② Front panel is now unlocked.	① Set P05.35 = 0. ② Front panel is now unlocked.

4.1.4 Data Monitoring Mode

E-DFASxxP series servo driver offers the function to monitor different types of data in data monitoring mode. After entering this mode, P0Ess **S** to monitor any data that starts with **d**. P0Ess **S** again to get back to data monitoring mode and **M** to switch to any other modes.

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**	puls e	“xxxx”
9	d09cn	Control mode	**d09Cn**	/	Position: “**Ct PoS**” Velocity: “**Ct SPd** ” Torque: “**Ct trq**”
10	d10Io	I/O signal status	**d10 Io**	/	-
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**	puls e	“ xxxx”
21	d21AE	Single turn encoder data	**d21AE**	puls e	“**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	**d23id**	/	“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**	puls e	“ xxxx”
26	d26hy	Motor mechanical angle	**d26hy**	puls e	“ 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	℃	"d xxx" – driver temperature "C xxx" – MCU temperature
34	d34	Servo status	d34	/	"xxx"
35	d35 SF	Internal usage	d35SF	/	"xxxxxx"

Description of data monitoring function

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

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.

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

1. d00uE Position command deviation

Shows high bit and low bit of position deviation

Position command deviation

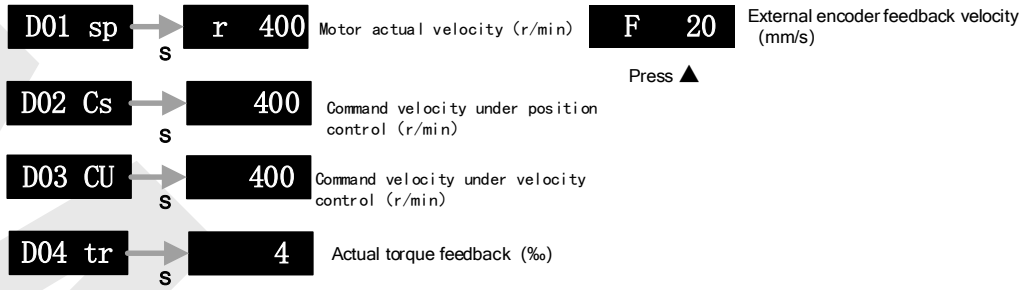
Positive: 1st and 2nd values on the left has no decimal point.
Negative: 1st and 2nd values on the left has two decimal points

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.

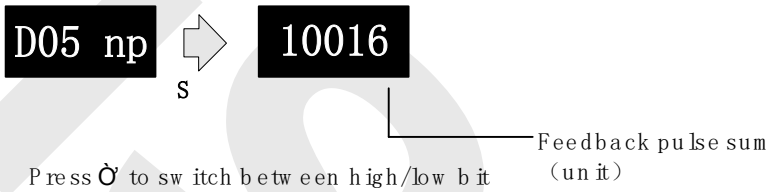
2. d01SP Motor velocity, d02CS Position control command velocity, d03CU Velocity control command velocity, d04 tr Actual torque feedback

d04 tr reflects actual current.



3. d05nP Feedback pulse sum d06CP Command pulse sum

Feedback pulse sum (Encoder feedback pulse)

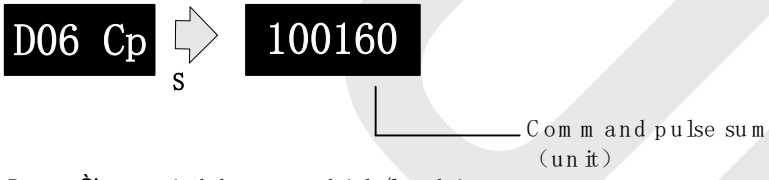


Press Ò to switch between high/low bit

Example: Feedback pulse sum =2100160

High bit Low bit

Command pulse sum (Command pulse)

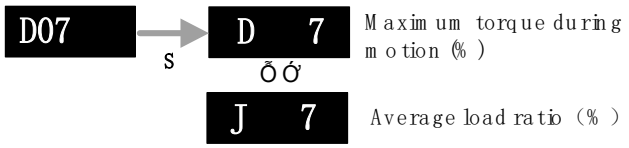


Press Ò to switch between high/low bit

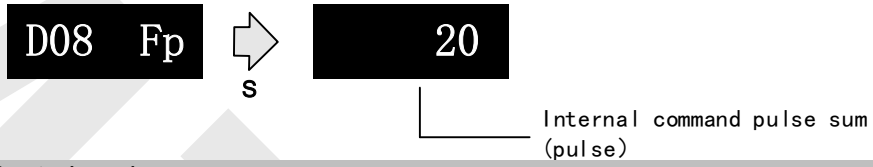
Example: Command pulse sum =210017

High bit Low bit

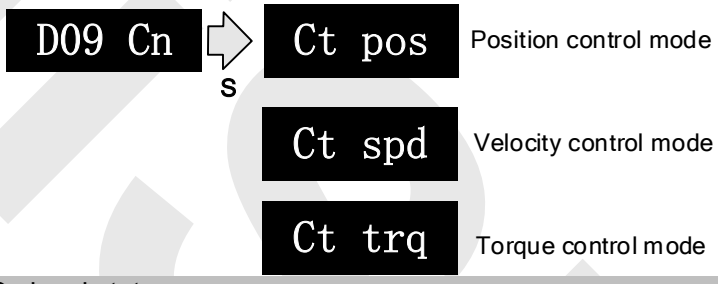
4. d07 Maximum torque during motion



5. d08FP Internal command pulse sum



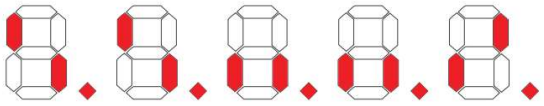
6. d09Cn Control mode



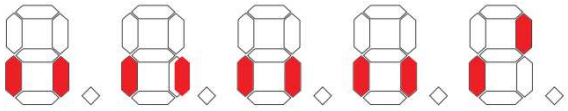
7. d10Io I/O signal status

When the top half of the digital tube is lit, the signal is valid; when the bottom half of the digital tube is lighted, the signal is not valid. Decimal points reP0Esent I/O status, input when lighted, output when not lighted.

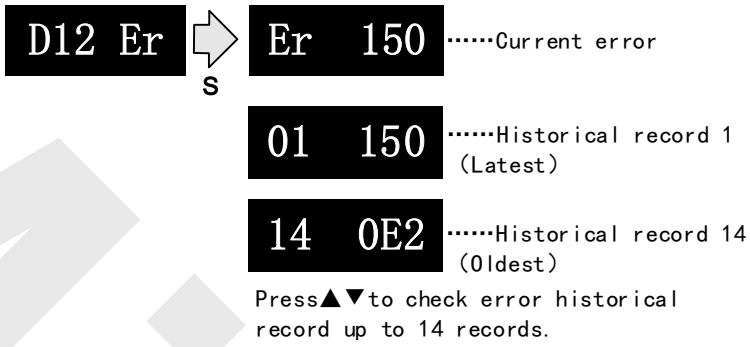
■ **Input:** From low to high bit (Right to left) DI1, DI2, ... DI10. Decimal point is lighted to reP0Esent input signals.
In the example below, DI1, DI8 and DI10 input signal is valid; DI2-DI7, DI9 input signal is invalid.



■ **Output:** From low to high bit (Right to left) DO1, DO2, … DO10. Decimal point is not lighted to reP0Esent output signals.
In the example below, DO1 output signal is valid; DO2-DO10 output signal is invalid.

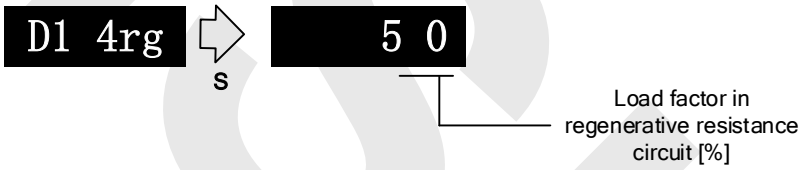


8. d12Er Alarm cause and historical record



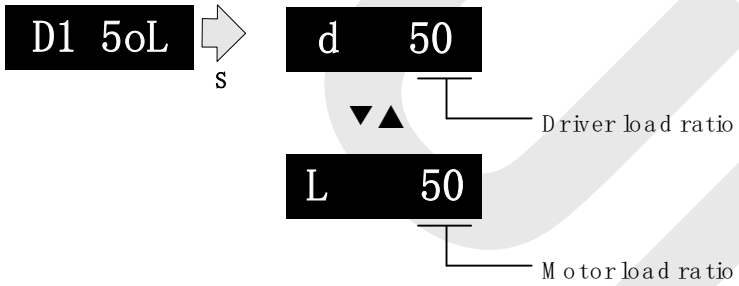
9. d14rg Regenerative load factor d15oL Overload factor

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



Overload factor（Er101 might occur, if d increases indefinitely

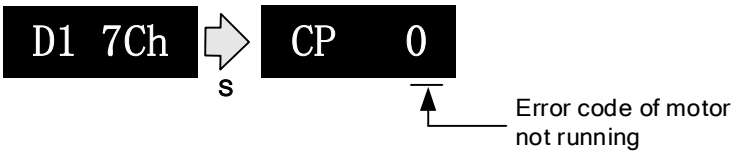
Er100 might occur, if L increases indefinitely）



10、d16Jr Inertia ratio

Use auxiliary function **AF_GL** or EDrive to measure the inertia ratio. The result will be shown on **D1 6Vr**, hold M to write the value in P00.04.

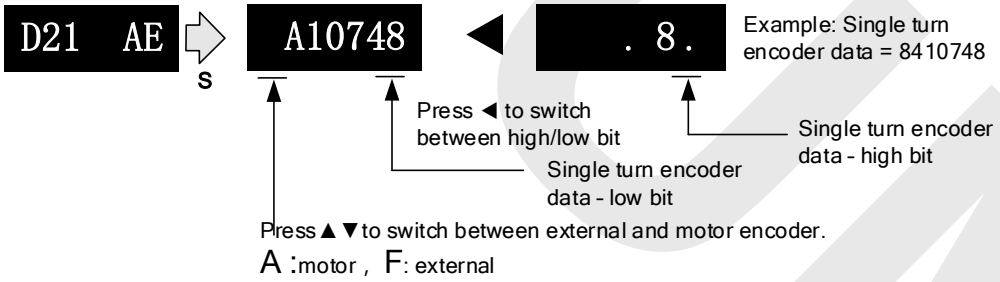
11、d17Ch Motor not running cause



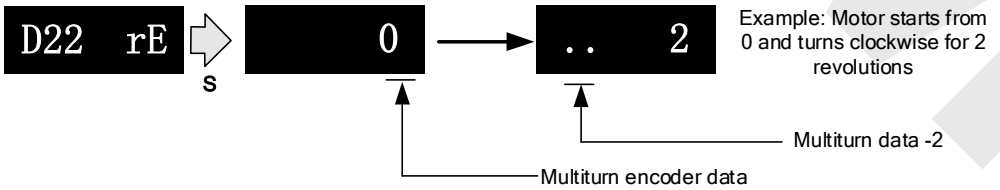
"d17Ch" Motor No Running Cause - Codes & Descriptions

Display Code	Description	Content
CP 0	Normal	
CP 1	DC bus undervoltage	Check if DC bus voltage is too low on D27
CP 2	No SRV-ON signal	Servo-ON input (SRV-ON) is not connected to COM-
CP 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
CP 4	Driver alarm	/
CP 5	Relay not clicked	Check input voltage
CP 6	Pulse input prohibited (INH)	P05.18=0
CP 7	Position command too low	No command or too low
CP 8	CL valid	P05.17=0, deviation counter connected to COM-
CP 9	Zero speed clamp valid	P03.15 = 1, Zero speed clamp input is open

12、d21AE Single turn encoder data d22rE Multiturn encoder data

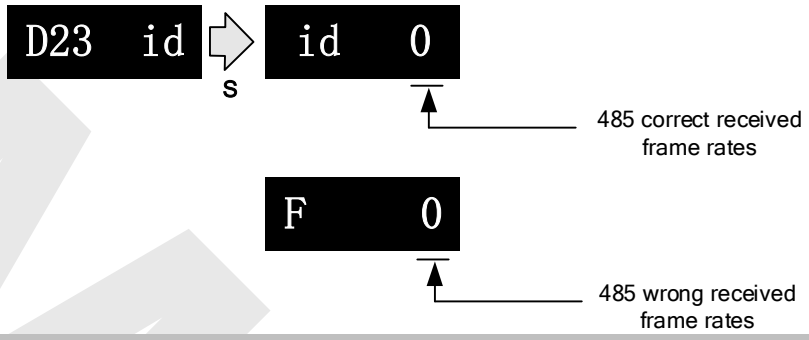


For 23-bit encoder, single turn encoder data = 0~8388607. Each value corresponds to certain position in a single revolution of the rotor, clockwise motion as negative, counter clockwise motion as positive. When counter clockwise single turn data > 8388607, multiturn data +1, clockwise single turn data < 0, multiturn data -1.

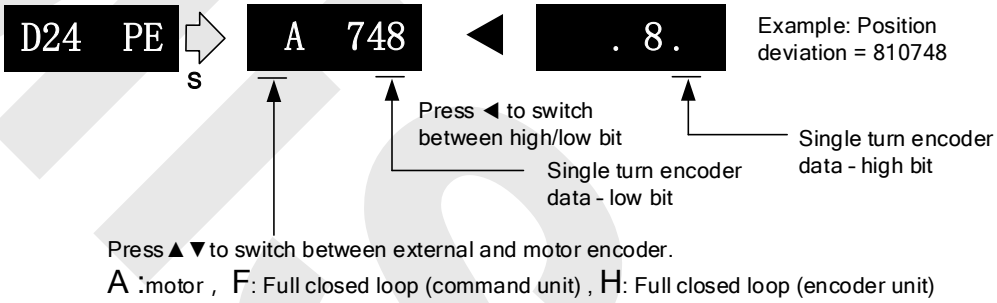


Multiturn encoder data range: -32768~+32767, As no. of revolution goes over range, 32767 will jump to -32768, -32767(counter clockwise); -32768 will jump to 32767, 32766 (clockwise)

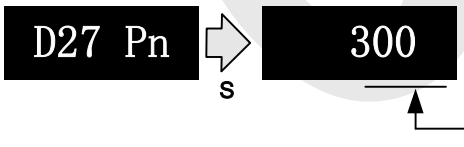
13.d23id 485 received frame



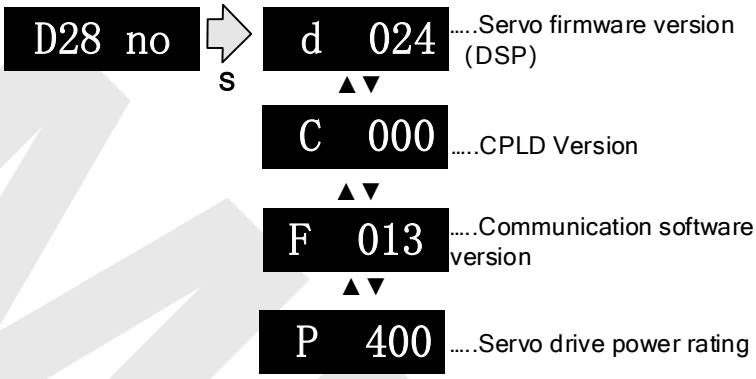
14. d24PE Position deviation



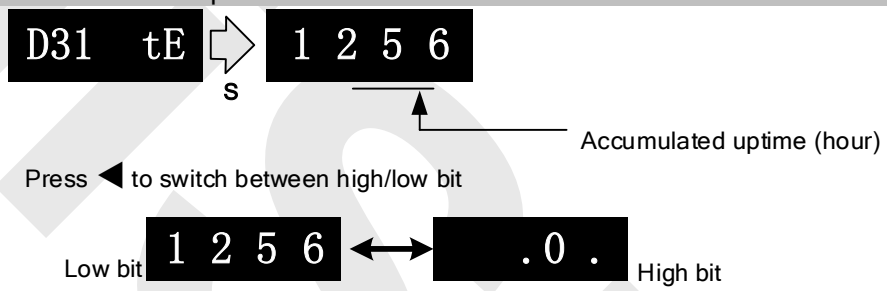
15. d27Pn DC bus voltage



16. d28no Software version



17. d31tE Accumulated operation time



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Display setting at power on

■ Default setting for initialization display settings at power on is **d34**, if any other display is required, please set on P05.28.

Please refer to P05.28 for any display content required on the front panel during initialization

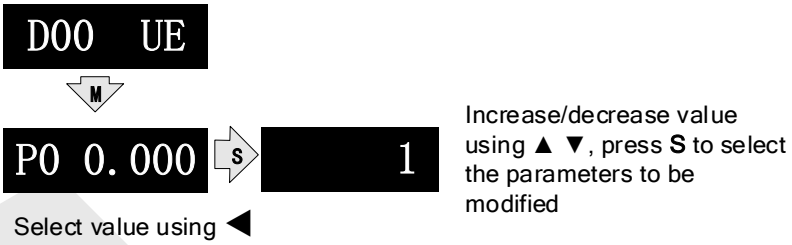
P05.28	Label	LED initial status			Valid mode(s)	P	S	T
	Range	0~35	Unit	—	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0539		
	Valid	Immediate						

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-rotation	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		
9	Control mode	23	485 receive frame		
10	I/O status	24	Encoder position deviation		
11		25	Internal usage		
12	Alarm cause & history record	26	Internal usage		
13	Warning ID	27	PN Voltage		

4.1.5 Parameters saving

Save using driver's front panel



After modifying the selected parameter to desired values, P0Ess **S** to confirm and save the changes. If the parameter is modified but user does not want to save the changes, P0Ess **M** to exit without saving. Some parameter modifications will only take effect after the driver is restarted.

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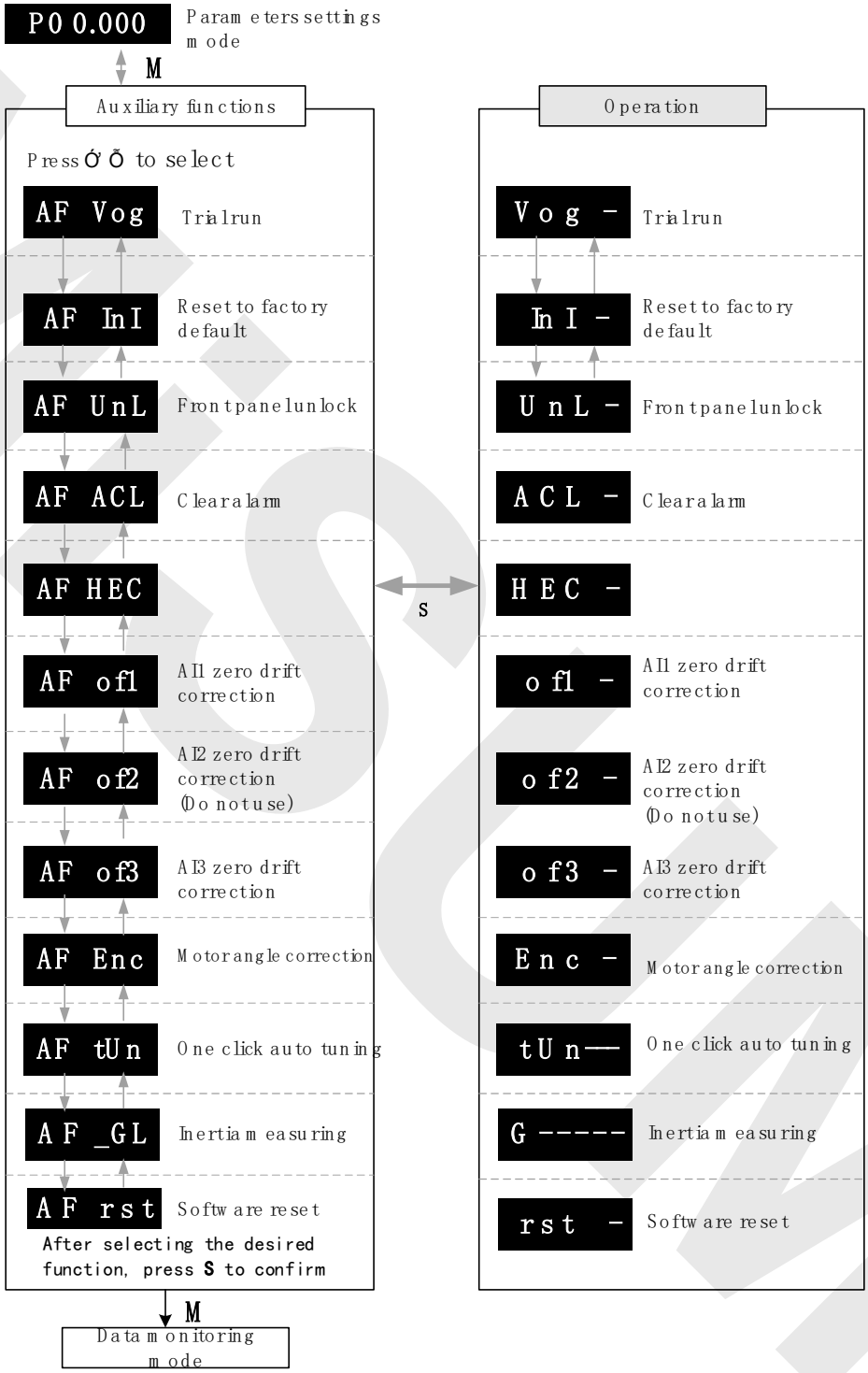
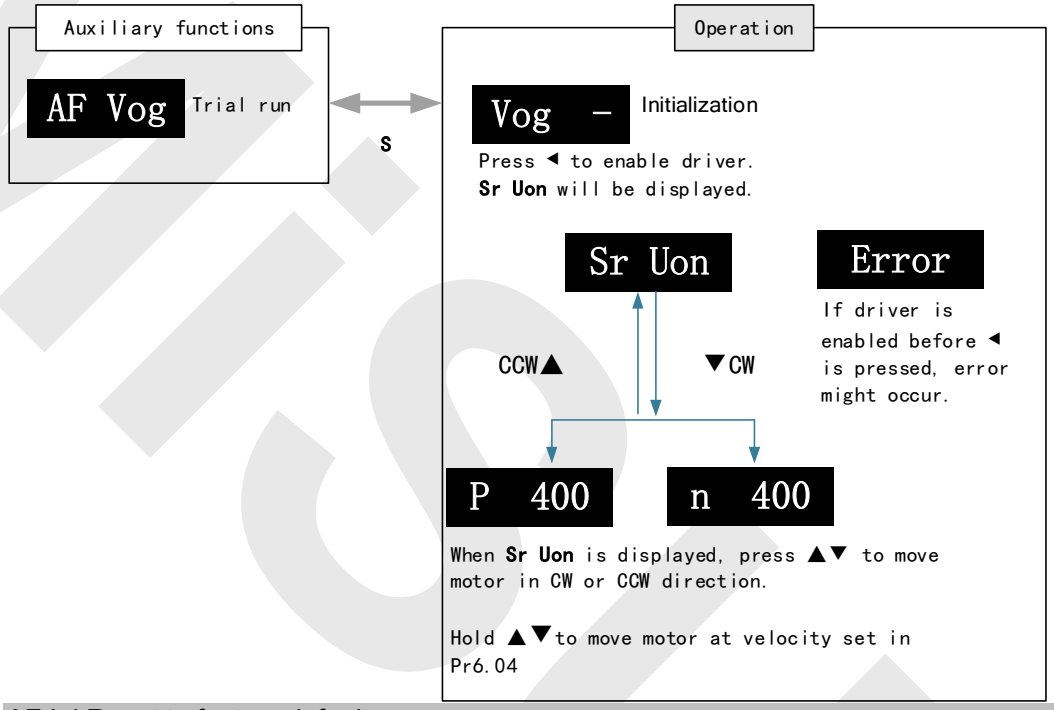
4.1.6 Auxiliary function



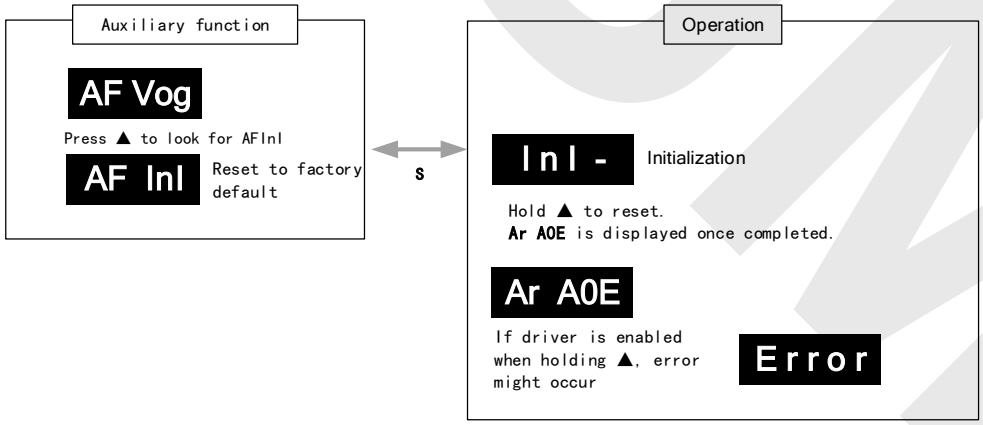
AF Vog Trial run

- Please disable servo driver before performing any trial run.
- Please don't modify gain related parameters during trial run to P0Event any occurrence of mechanical vibrations.
- Only use trial run when P00.01 set to 0, 1, 6.
- Please check P06.04 (JOG velocity) and P06.25 (JOG acceleration) before running.
- P0Ess **S** to exit trial run.

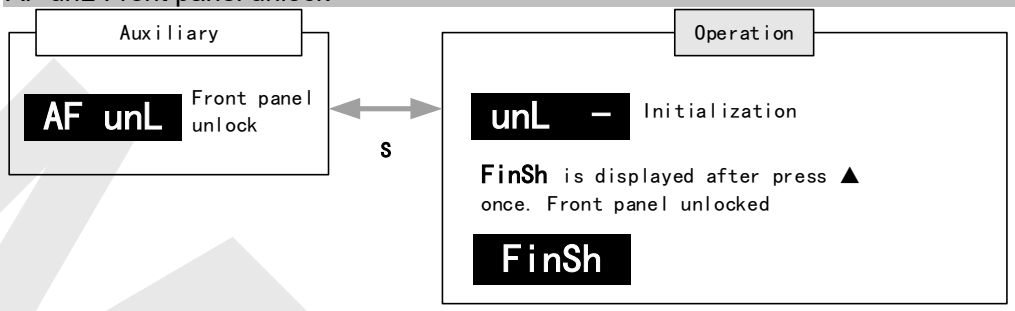


AF Inl Reset to factory default

To reset parameters settings to factory default. Can be used to reset parameters using auxiliary function on front panel or using object dictionary.

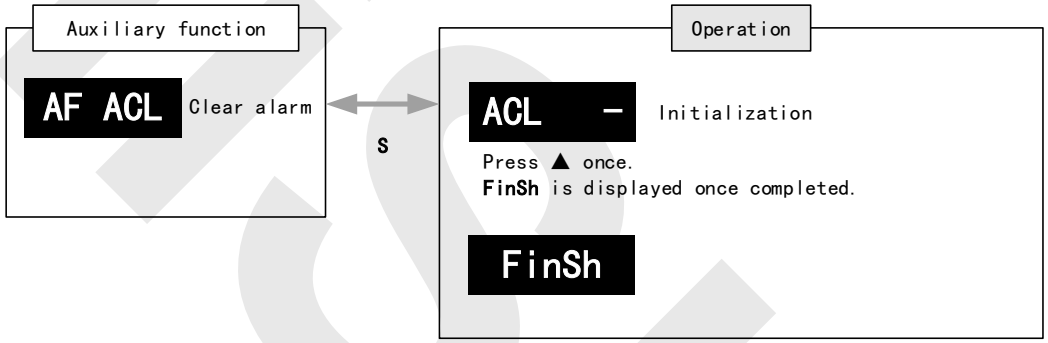


AF unL Front panel unlock



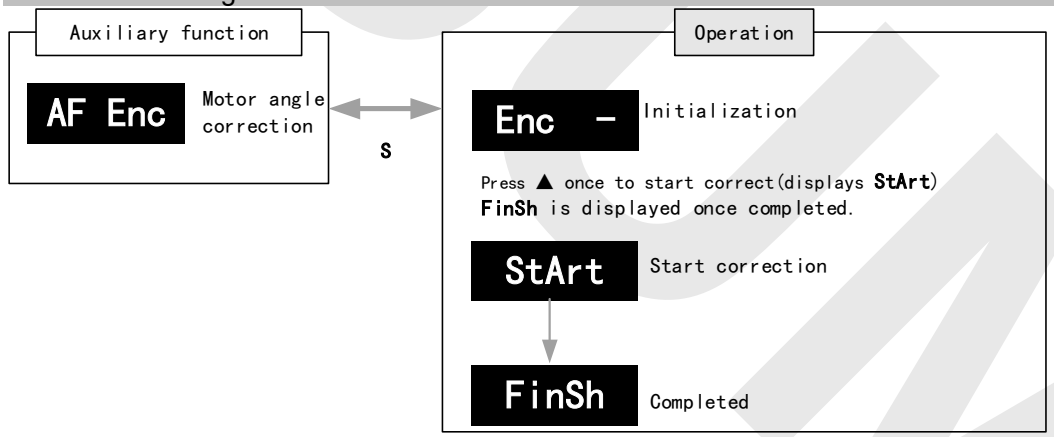
AF ACL Clear alarm

Alarm can be cleared using this auxiliary function but before that, the error needs to be solved and driver needs to be restarted.



For alarms that can be cleared using this function, please refer to table in Chapter 8.

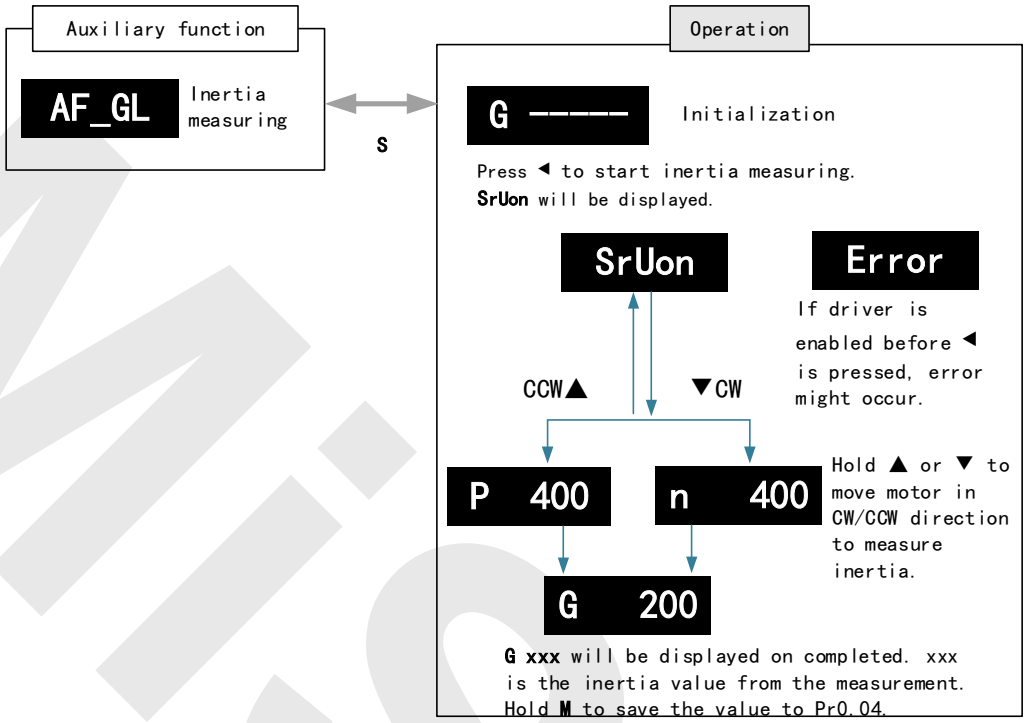
AF Enc Motor angle correction



AF_GL Inertia measuring

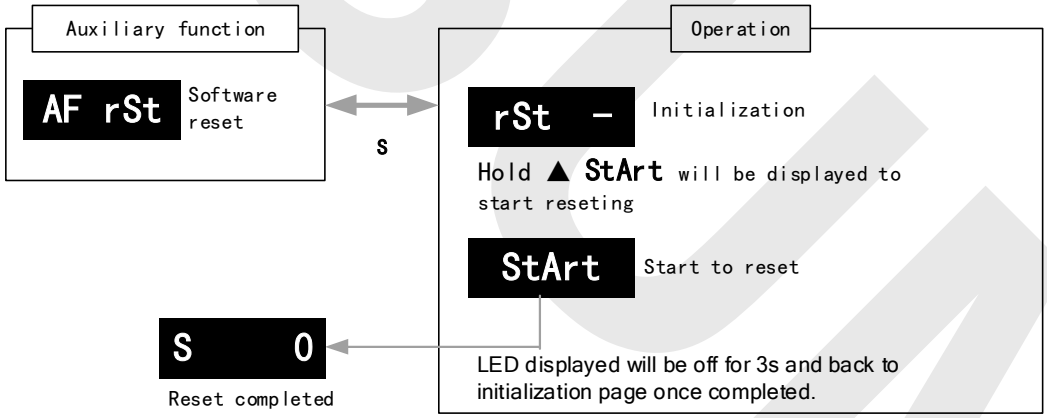
Please make sure: 1. Velocity < 300RPM, average velocity duration < 50ms
2. Acceleration/Deceleration time < 500ms

P0Ess **S** to exit and disable the driver once completed.



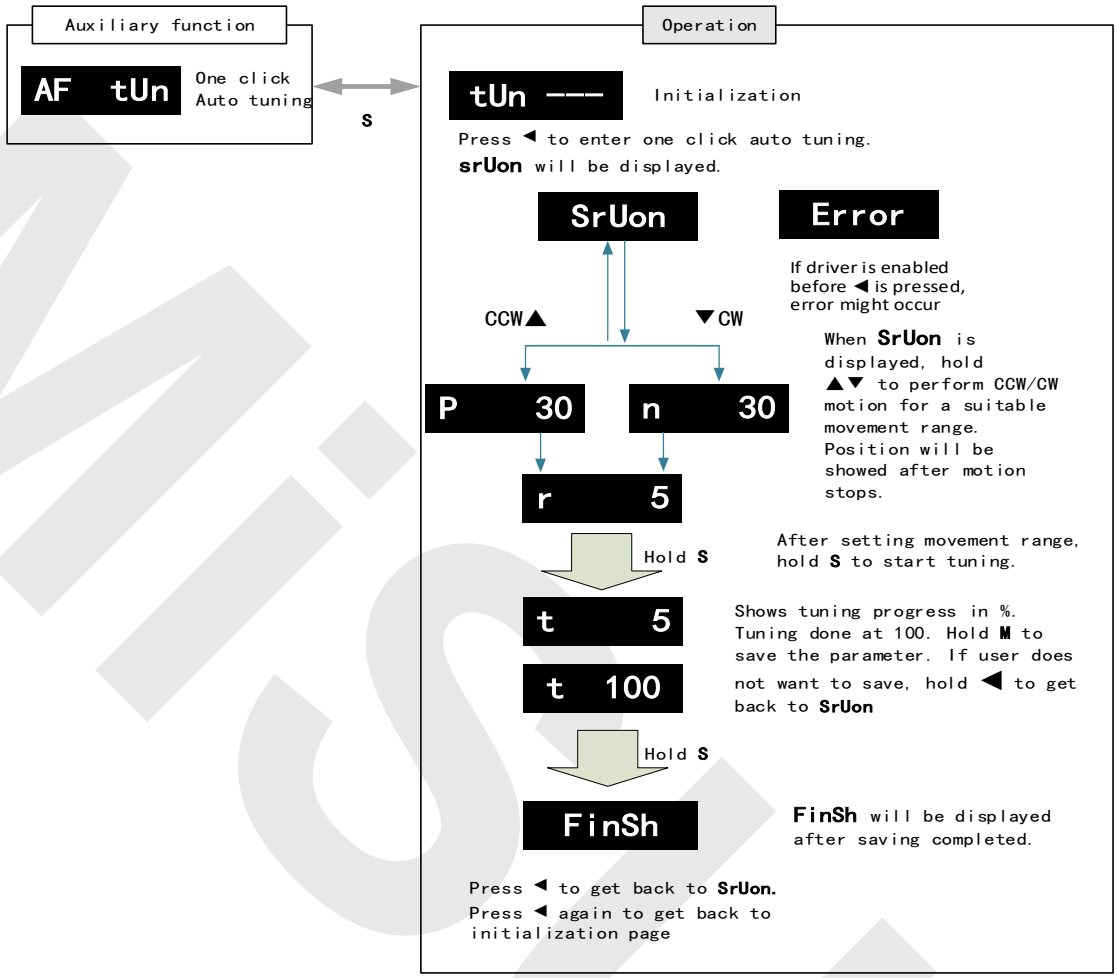
AF rSt Software reset

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 0.5 motor revolution.


Auxiliary function
AF tUn
One click
Auto tuning
S
Operation
tUn ---
Initialization
Press ◄ to enter one click auto tuning.
srUon will be displayed.
SrUon
Error
If driver is enabled before ◄ is pressed, error might occur
CCW▲
▼CW
When SrUon is displayed, hold ▲▼ to perform CCW/CW motion for a suitable movement range. Position will be showed after motion stops.
P 30
n 30
r 5
Hold S
After setting movement range, hold S to start tuning.
t 5
t 100
Shows tuning progress in %. Tuning done at 100. Hold M to save the parameter. If user does not want to save, hold ◄ to get back to SrUon
Hold S
FinSh
FinSh will be displayed after saving completed.
Press ◄ to get back to SrUon.
Press ◄ again to get back to initialization page

MISUMI

4.2 Tuning Software

Our company 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.

■ 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 replug the debugging cable to reconnect.

4.3 Get Started with Driver 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.

Connect 220V power supply into main power supply R, S, T 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 **rEAdY**, then LED initial status will be displayed. Driver is ready for operation if no alarm occurs.

4.4 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	9	/
2	P06.04	JOG trial run command velocity	User defined	r/min
3	P06.25	Trial run acc-/deceleration time	User defined	ms/1000rpm

- 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 "AF_Jog Trial Run" for detailed explanations on how to perform trial run using front panel operation

4.4.1 Front Panel Trial Run

JOG Test Run (Jogging Control) Operation Procedure
Set all parameters related to jogging control.

1) After successfully writing the parameters, power off and restart the driver.
2) Ensure the driver is in a disabled state to enter JOG control mode.
3) Enter the "AF Jog" submenu under Auxiliary Functions Mode.
4) Press the SET key once — the display should show "Jog -".
5) Press ◄ key once — if there are no issues, the display should show "SrUon". If "Error" appears, press the ▲ key again — it should then show "SrUon". If it still shows "Error",

switch to the “d17Ch” submenu under Data Monitoring Mode to check why the motor is not rotating. Troubleshoot the issue and retry.

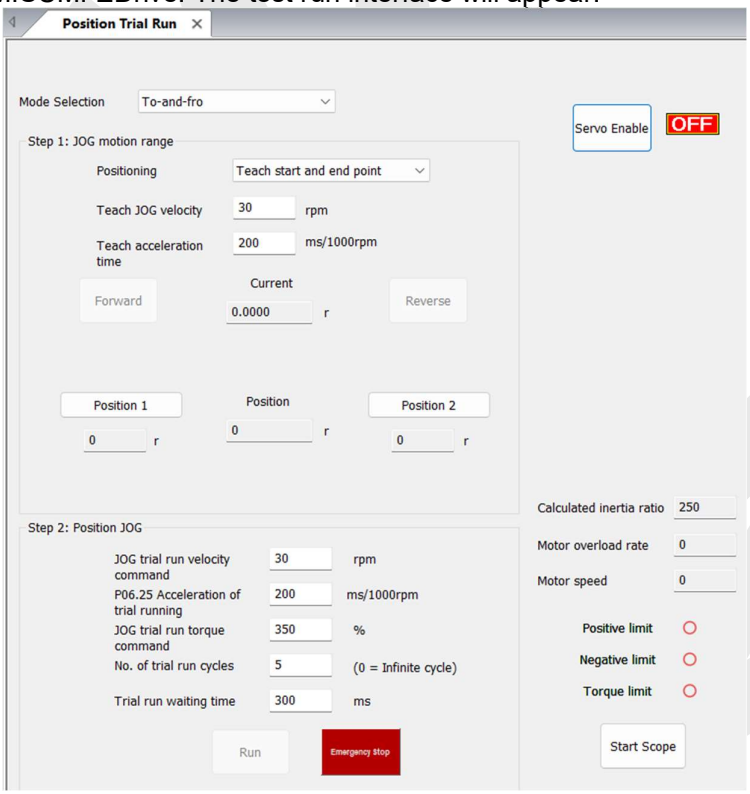
6) In Position JOG Mode, once “SrUon” is displayed, hold the ▲ key to increase motor speed up to the maximum set in P06.04, and the motor will run forward continuously. Release the ▲ key to decelerate and stop — the display should return to “SrUon”. Hold the ▼ arrow key to run the motor in reverse at increasing speed up to P06.04. Release the ▼ key to decelerate and stop — the display should return to “SrUon”. If the motor does not rotate, check the “d17Ch” submenu in Data Monitoring Mode to identify the issue and retry after resolving it.
7) During the JOG test run, press the SET key to exit JOG control mode.

4.4.2 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.

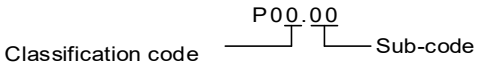


4) Set to Reciprocating Motion Mode, choose positioning start/end point operation mode. After clicking Enable, the red OFF will turn green ON. Set the teaching motion attributes — avoid high speeds to prevent collisions. Use the forward/reverse motion buttons to teach and set the desired start and end 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.

During operation, use the monitoring panel on the right to view: Estimated inertia, Motor speed, Motor load rate and Limit status indicators.

Chapter 5 Parameter

5.1 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

Initial Value:
Factory default value

◆ **Activation Method:**
"**O**" indicates the parameter takes effect after power cycle
"**—**" indicates the parameter takes effect immediately
"△" indicates the parameter takes effect after stopping
"●" indicates the parameter takes effect after re-enabling

◆ **Effective Mode:**
"**O**" in the Effective Mode column means the parameter is valid in this mode
"**—**" means the parameter is not valid in this mode

◆ **Additional Notes:**
32-bit data, with high byte first and low byte last
The attribute of mapped parameters (including R/W permissions and data length) is determined by the parameter to which the pointer refers

Note:
For software versions **105 and above**, parameter numbers **PAx** have been changed to **P0x**. To check the software version, refer to the panel "Run Data Monitor Mode" display code **d28no**.

[Class 0] Basic settings

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P00.00	Model-following bandwidth (MFC)	/	/	O	—	—	16bit	R/W	0x0001
P00.01	Control Mode Settings	/	/	O	O	O	16bit	R/W	0x0003
P00.02	Real time Auto Gain Adjusting	/	/	O	O	O	16bit	R/W	0x0005
P00.03	Real time auto stiffness adjusting	/	/	O	O	O	16bit	R/W	0x0007
P00.04	Inertia ratio	/	/	O	O	O	16bit	R/W	0x0009
P00.05	Command pulse input selection	/	/	O	—	—	16bit	R/W	0x000B
P00.06	Command pulse polarity inversion	/	/	O	—	—	16bit	R/W	0x000D
P00.07	Command pulse input mode	/	/	O	—	—	16bit	R/W	0x000F
P00.08	1st command pulse count per revolution	/	/	O	—	—	32bit	R/W	0x0010 0x0011
P00.09	1st command frequency divider/multiplier numerator	/	/	O	—	—	32bit	R/W	0x0012 0x0013

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P00.10	1st command frequency divider/multiplier denominator	/	/	O	—	—	32bit	R/W	0x0014 0x0015
P00.11	Encoder output pulse count per revolution	/	/	O	O	O	16bit	R/W	0x0017
P00.12	Pulse output logic inversion	/	/	O	O	O	16bit	R/W	0x0019
P00.13	1st Torque Limit	/	/	O	O	O	16bit	R/W	0x001B
P00.14	Excessive position deviation	/	/	O	—	—	16bit	R/W	0x001D
P00.15	Absolute Encoder settings	/	/	O	O	O	16bit	R/W	0x001F
P00.16	Regenerative resistance	/	/	O	O	O	16bit	R/W	0x0021
P00.17	Regenerative resistor power rating	/	/	O	O	O	16bit	R/W	0x0023
P00.22	PR and P/S/T switching	/	/	O	O	O	16bit	R/W	0x002D
P00.25	Auxiliary function	/	/	O	O	O	16bit	R/W	0x0033
P00.26	Simulated I/O	/	/	O	O	O	16bit	R/W	0x0035
P00.39	Pulses per revolution (PR dedicated)	/	/	-	-	-	32bit	R/W	0x004E 0x004F
P00.40	Mapping parameter 1	/	/	O	O	O	32bit	R/W *	0x0050 0x0051
P00.41	Mapping parameter 2	/	/	O	O	O	32bit	R/W *	0x0052 0x0053
P00.42	Mapping parameter 3	/	/	O	O	O	32bit	R/W *	0x0054 0x0055
P00.43	Mapping parameter 4	/	/	O	O	O	32bit	R/W *	0x0056 0x0057
P00.44	Mapping parameter 5	/	/	O	O	O	32bit	R/W *	0x0058 0x0059
P00.45	Mapping parameter 6	/	/	O	O	O	32bit	R/W *	0x005A 0x005b
P00.46	Mapping parameter 7	/	/	O	O	O	32bit	R/W *	0x005C 0x005d
P00.47	Mapping parameter 8	/	/	O	O	O	32bit	R/W *	0x005E 0x005F
P00.50	Mapping parameter 1 indicator	/	/	O	O	O	32bit	R/W	0x0064 0x0065
P00.51	Mapping parameter 2 indicator	/	/	O	O	O	32bit	R/W	0x0066 0x0067
P00.52	Mapping parameter 3 indicator	/	/	O	O	O	32bit	R/W	0x0068 0x0069
P00.53	Mapping parameter 4 indicator	/	/	O	O	O	32bit	R/W	0x006A 0x006B
P00.54	Mapping parameter 5 indicator	/	/	O	O	O	32bit	R/W	0x006C 0x006D
P00.55	Mapping parameter 6 indicator	/	/	O	O	O	32bit	R/W	0x006E 0x007F
P00.56	Mapping parameter 7 indicator	/	/	O	O	O	32bit	R/W	0x0070 0x0071

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P00.57	Mapping parameter 8 indicator	/	/	O	O	O	32bit	R/W	0x0072 0x0073

[Class 1] Gain adjustment

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P01.00	1st position loop gain	/	/	O	—	—	16bit	R/W	0x0101
P01.01	1st velocity loop gain	/	/	O	O	O	16bit	R/W	0x0103
P01.02	1st Integral Time Constant of Velocity Loop	/	/	O	O	O	16bit	R/W	0x0105
P01.03	1st velocity detection filter	/	/	O	O	O	16bit	R/W	0x0107
P01.04	1st Torque Filter Time Constant	/	/	O	O	O	16bit	R/W	0x0109
P01.05	2nd Position Loop Gain	/	/	O	—	—	16bit	R/W	0x010B
P01.06	2nd velocity loop gain	/	/	O	O	O	16bit	R/W	0x010D
P01.07	2nd Integral Time Constant of Velocity Loop	/	/	O	O	O	16bit	R/W	0x010F
P01.08	2nd velocity detection filter	/	/	O	O	O	16bit	R/W	0x0111
P01.09	2nd Torque Filter Time Constant	/	/	O	O	O	16bit	R/W	0x0113
P01.10	Velocity feed forward gain	/	/	O	—	—	16bit	R/W	0x0115
P01.11	Velocity feed forward filter time constant	/	/	O	—	—	16bit	R/W	0x0117
P01.12	Torque feed forward gain	/	/	O	O	—	16bit	R/W	0x0119
P01.13	Torque feed forward filter time constant	/	/	O	O	—	16bit	R/W	0x011B
P01.15	Position control gain switching mode	/	/	O	—	—	16bit	R/W	0x011F
P01.17	Position control gain switching level	/	/	O	—	—	16bit	R/W	0x0123
P01.18	Hysteresis at position control switching	/	/	O	—	—	16bit	R/W	0x0125
P01.19	Position control switching time	/	/	O	—	—	16bit	R/W	0x0127
P01.35	Position command pulse filter time	/	/	O	—	—	16bit	R/W	0x0147
P01.39	Special function register 1	/	/	O	O	O	16bit	R/W	0x014E 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	/	/	O	O	—	16bit	R/W	0x0201
P02.01	1st notch frequency	/	/	O	O	O	16bit	R/W	0x0203
P02.02	1st notch width	/	/	O	O	O	16bit	R/W	0x0205
P02.03	1st notch depth	/	/	O	O	O	16bit	R/W	0x0207
P02.04	2nd notch frequency	/	/	O	O	O	16bit	R/W	0x0209
P02.05	2nd notch width	/	/	O	O	O	16bit	R/W	0x020B
P02.06	2nd notch depth	/	/	O	O	O	16bit	R/W	0x020D
P02.07	3rd notch frequency	/	/	O	O	O	16bit	R/W	0x020F
P02.08	3rd notch width	/	/	O	O	O	16bit	R/W	0x0211
P02.09	3rd notch depth	/	/	O	O	O	16bit	R/W	0x0213
P02.14	1st damping frequency	/	/	O	—	—	16bit	R/W	0x021D
P02.16	2nd damping frequency	/	/	O	—	—	16bit	R/W	0x0221
P02.22	Position command smoothing filter	/	/	O	—	—	16bit	R/W	0x022D
P02.23	Position command FIR filter	/	/	O	—	—	16bit	R/W	0x022F
P02.48	Adjustment mode	/	/	O	O	O	16bit	R/W	0x0261

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P02.50	MFC type	/	/	O	—	—	16bit	R/W	0x0265
P02.51	Velocity feedforward compensation coefficient	/	/	O	—	—	16bit	R/W	0x0267
P02.52	Torque feedforward compensation coefficient	/	/	O	O	—	16bit	R/W	0x0269
P02.53	Dynamic friction compensation coefficient	/	/	O	O	O	16bit	R/W	0x026B
P02.54	Overshoot time coefficient	/	/	O	O	O	16bit	R/W	0x026D
P02.55	Overshoot supP0Ession gain	/	/	O	O	O	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	/	/	—	O	—	16bit	R/W	0x0301
P03.01	Velocity command rotational direction selection	/	/	—	O	—	16bit	R/W	0x0303
P03.02	Velocity command input gain	/	/	—	O	O	16bit	R/W	0x0305
P03.03	Velocity command input inversion	/	/	—	O	—	16bit	R/W	0x0307
P03.04	1st speed of velocity setting	/	/	—	O	—	16bit	R/W	0x0309
P03.05	2nd speed of velocity setting	/	/	—	O	—	16bit	R/W	0x030B
P03.06	3rd speed of velocity setting	/	/	—	O	—	16bit	R/W	0x030D
P03.07	4th speed of velocity setting	/	/	—	O	—	16bit	R/W	0x030F
P03.08	5th speed of velocity setting	/	/	—	O	—	16bit	R/W	0x0311
P03.09	6th speed of velocity setting	/	/	—	O	—	16bit	R/W	0x0313
P03.10	7th speed of velocity setting	/	/	—	O	—	16bit	R/W	0x0315
P03.11	8th speed of velocity setting	/	/	—	O	—	16bit	R/W	0x0317
P03.12	Acceleration time settings	/	/	—	O	—	16bit	R/W	0x0319
P03.13	Deceleration time settings	/	/	—	O	—	16bit	R/W	0x031B
P03.14	Sigmoid acceleration/deceleration settings	/	/	—	O	—	16bit	R/W	0x031D
P03.15	Zero speed clamp function selection	/	/	—	O	—	16bit	R/W	0x031F
P03.16	Zero speed clamp level	/	/	—	O	—	16bit	R/W	0x0321
P03.17	Torque internal/external switching	/	/	—	—	O	16bit	R/W	0x0323
P03.18	Torque command direction selection	/	/	—	—	O	16bit	R/W	0x0325
P03.19	Torque command input gain	/	/	—	—	O	16bit	R/W	0x0327
P03.20	Torque command input inversion	/	/	—	—	O	16bit	R/W	0x0329
P03.21	Velocity limit in torque mode	/	/	—	—	O	16bit	R/W	0x032B
P03.22	Torque command	/	/	O	O	O	16bit	R/W	0x032D
P03.23	Zero speed delay time in velocity mode	/	/	—	O	—	16bit	R/W	0x032F
P03.24	Maximum motor rotational speed	/	/	O	O	O	16bit	R/W	0x0331
P03.58	Speed Regulation Ratio 1	/	/	O		O	16bit	R/W	0x0374 0x0375
P03.59	Speed Regulation Ratio 2	/	/	O		O	16bit	R/W	0x0376 0x0377
P03.60	Speed Regulation Ratio 3	/	/	O		O	16bit	R/W	0x0378 0x0379
P03.61	Speed Regulation Ratio 4	/	/	O		O	16bit	R/W	0x037A 0x037B

[Class 4] I/O Monitoring Settings

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P04.00	Input selection DI1	/	/	O	O	O	16bit	R/W	0x0401
P04.01	Input selection DI2	/	/	O	O	O	16bit	R/W	0x0403
P04.02	Input selection DI3	/	/	O	O	O	16bit	R/W	0x0405
P04.03	Input selection DI4	/	/	O	O	O	16bit	R/W	0x0407
P04.04	Input selection DI5	/	/	O	O	O	16bit	R/W	0x0409
P04.05	Input selection DI6	/	/	O	O	O	16bit	R/W	0x040B
P04.06	Input selection DI7	/	/	O	O	O	16bit	R/W	0x040D
P04.07	Input selection DI8	/	/	O	O	O	16bit	R/W	0x040F
P04.10	Output selection DO1	/	/	O	O	O	16bit	R/W	0x0415
P04.11	Output selection DO2	/	/	O	O	O	16bit	R/W	0x0417
P04.12	Output selection DO3	/	/	O	O	O	16bit	R/W	0x0419
P04.13	Output selection DO4	/	/	O	O	O	16bit	R/W	0x041B
P04.14	Output selection DO5	/	/	O	O	O	16bit	R/W	0x041D
P04.31	Positioning complete range	/	/	O	O	O	16bit	R/W	0x043F
P04.32	Positioning complete output setting	/	/	—	O	—	16bit	R/W	0x0441
P04.33	INP positioning delay time	/	/	—	O	—	16bit	R/W	0x0443
P04.34	Zero speed	/	/	O	O	O	16bit	R/W	0x0445
P04.35	Velocity coincidence range	/	/	O	O	O	16bit	R/W	0x0447
P04.36	Arrival velocity	/	/	O	O	O	16bit	R/W	0x0449
P04.37	Motor power-off delay time	/	/	O	O	O	16bit	R/W	0x044B
P04.38	Holding braker release time	/	/	O	O	O	16bit	R/W	0x044D
P04.39	Holding brake activation speed	/	/	O	O	O	16bit	R/W	0x044F
P04.43	Emergency stop function	/	/	O	O	O	16bit	R/W	0x0457
P04.62	Position/Speed/Torque Feedback Polarity Setting	/	/	O	O	O	16bit	R/W	0x047D

[Class 5] Extension settings

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P05.00	2nd pulse count per revolution	/	/	O	—	—	32bit	R/W	0x0500 0x0501
P05.01	2nd Command frequency divider/multiplier numerator	/	/	O	—	—	32bit	R/W	0x0502 0x0503
P05.02	2nd Command frequency divider/multiplier denominator	/	/	O	—	—	32bit	R/W	0x0504 0x0505
P05.04	Driver prohibition input settings	/	/	O	O	O	16bit	R/W	0x0509
P05.06	Servo-off mode	/	/	O	O	O	16bit	R/W	0x050D
P05.08	DC bus voltage undervoltage	/	/	O	O	O	16bit	R/W	0x0513
P05.09	Main power-off detection time	/	/	O	O	O	16bit	R/W	0x0515
P05.10	Servo-off due to alarm mode	/	/	O	O	O	16bit	R/W	0x0517
P05.11	Servo braking torque setting	/	/	O	O	O	16bit	R/W	0x0519
P05.12	Overload level setting	/	/	O	O	O	16bit	R/W	0x051B
P05.15	I/O digital filter	/	/	O	O	O	16bit	R/W	0x051F
P05.17	Counter clearing input mode	/	/	O	—	—	16bit	R/W	0x0523
P05.20	Position unit settings	/	/	O	—	—	16bit	R/W	0x0529
P05.21	Torque limit selection	/	/	O	O	O	16bit	R/W	0x052B
P05.22	2nd torque limit	/	/	O	O	O	16bit	R/W	0x052D
P05.23	Positive torque warning threshold	/	/	O	O	O	16bit	R/W	0x052F
P05.24	Negative torque warning threshold	/	/	O	O	O	16bit	R/W	0x0531

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P05.28	LED initial status	/	/	O	O	O	16bit	R/W	0x0539
P05.29	RS485 communication mode	/	/	O	O	O	16bit	R/W	0x053B
P05.30	RS485 communication Baud rate	/	/	O	O	O	16bit	R/W	0x053D
P05.31	RS485 axis address	/	/	O	O	O	16bit	R/W	0x053F
P05.32	Max. command pulse input frequency	/	/	O	—	—	16bit	R/W	0x0541
P05.35	Front panel lock setting	/	/	O	O	O	16bit	R/W	0x0547
P05.37	Torque saturation alarm detection time	/	/	O	O	O	16bit	R/W	0x0549
P05.42	Frequency divider output – Z-signal polarity	/	/	O	—	—	16bit	R/W	0x0555
P05.43	Frequency divider output – Z-signal width	/	/	O	—	—	16bit	R/W	0x0557

[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	/	/	O	O	O	16bit	R/W	0x0603
P06.03	JOG trial run torque command	/	/	—	—	O	16bit	R/W	0x0607
P06.04	JOG trial run velocity command	/	/	O	O	O	16bit	R/W	0x0609
P06.05	Position 3rd gain valid time	/	/	O	—	—	16bit	R/W	0x060B
P06.06	Position 3rd gain scale factor	/	/	O	—	—	16bit	R/W	0x060D
P06.07	Torque command additional value	/	/	O	O	O	16bit	R/W	0x060F
P06.08	Positive direction torque compensation value	/	/	O	O	O	16bit	R/W	0x0611
P06.09	Negative direction torque compensation value	/	/	O	O	O	16bit	R/W	0x0613
P06.11	Current response settings	/	/	O	O	O	16bit	R/W	0x0617
P06.14	Max. time to stop after disabling	/	/	O	O	O	16bit	R/W	0x061D
P06.20	Trial run distance	/	/	O	—	—	16bit	R/W	0x0629
P06.21	Trial run waiting time	/	/	O	—	—	16bit	R/W	0x062B
P06.22	No. of trial run cycles	/	/	O	—	—	16bit	R/W	0x062D
P06.25	Trial run acceleration	/	/	O	O	—	16bit	R/W	0x0633
P06.28	Observer gain	/	/	O	O	O	16bit	R/W	0x0639
P06.29	Observer filter	/	/	O	O	O	16bit	R/W	0x063B
P06.56	Blocked rotor alarm torque threshold	/	/	O	O	O	16bit	R/W	0x0671
P06.57	Blocked rotor alarm delay time	/	/	O	O	O	16bit	R/W	0x0673
P06.63	Absolute multiturn data upper limit	/	/	O	O	O	16bit	R/W	0x067F

[Class B] Status Parameters

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P0B.00	Software version 1（DSP）	/	/	O	O	O	16bit	R	0x0B00
P0B.01	Software version 2（CPLD）	/	/	O	O	O	16bit	R	0x0B01
P0B.02	Software version 3（Others）	/	/	O	O	O	16bit	R	0x0B02
P0B.03	Current alarm	/	/	O	O	O	16bit	R	0x0B03
P0B.04	Motor not rotating cause	/	/	O	O	O	16bit	R	0x0B04
P0B.05	Driver operation status	/	/	O	O	O	16bit	R	0x0B05
P0B.06	Motor speed（Before filter）	/	/	O	O	O	16bit	R	0x0B06
P0B.07	Motor torque	/	/	O	O	O	16bit	R	0x0B07
P0B.08	Motor current	/	/	O	O	O	16bit	R	0x0B08
P0B.09	Motor speed（After filter）	/	/	O	O	O	16bit	R	0x0B09
P0B.10	DC bus voltage	/	/	O	O	O	16bit	R	0x0B0A
P0B.11	Driver temperature	/	/	O	O	O	16bit	R	0x0B0B
P0B.15	Motor overload rate	/	/	O	O	O	16bit	R	0x0B0F
P0B.16	Vent overload rate	/	/	O	O	O	16bit	R	0x0B10
P0B.17	Physical I/O input status	/	/	O	O	O	16bit	R	0x0B11
P0B.18	Physical I/O output status	/	/	O	O	O	16bit	R	0x0B12
P0B.20	Command position (Command unit)	/	/	O	O	O	32bit	R	0x0B14 0x0B15

Code	Label	Default	Activation	Valid mode			Communication mode		
				P	S	T	Byte	Op.	485 Addr.
P0B.21	Motor position (Command unit)	/	/	O	-	-	32bit	R	0x0B16 0x0B17
P0B.22	Position deviation (Command unit)	/	/	O	O	O	32bit	R	0x0B18 0x0B19
P0B.23	Command position (Encoder unit)	/	/	O	O	O	32bit	R	0x0B1A 0x0B1B
P0B.24	Motor position (Encoder unit)	/	/	O	-	-	32bit	R	0x0B1C 0x0B1D
P0B.25	Position deviation (Encoder unit)	/	/	O	O	O	32bit	R	0x0B1E 0x0B1F
P0B.26	Rotational encoder position feedback	/	/	O	-	-	32bit	R	0x0B20 0x0B21

[Class 8] PR-Control Parameters

Code	Label	Default	Activation	Valid mode			Communication mode		
				PR	S	T	Byte	Op.	485 Addr.
P08.00	PR Control	/	/	O	—	—	16bit	R/W	0x6000
P08.01	Path count	/	/	O	—	—	16bit	R/W	0x6001
P08.02	Control Operation	/	/	O	—	—	16bit	R/W	0x6002
P08.06	Software positive limit H	/	/	O			16bit	R/W	0x6006
P08.07	Software positive limit (L)	/	/	O	—	—	16bit	R/W	0x6007
P08.08	Software negative limit H	/	/	O	—	—	16bit	R/W	0x6008
P08.09	Software negative limit (L)	/	/	O	—	—	16bit	R/W	0x6009
P08.10	Homing mode	/	/	O	—	—	16bit	R/W	0x600A
P08.11	Zero position H	/	/	O	—	—	16bit	R/W	0x600B
P08.12	Zero position (L)	/	/	O	—	—	16bit	R/W	0x600C
P08.13	Home position off set H	/	/	O	—	—	16bit	R/W	0x600D
P08.14	Home position off set (L)	/	/	O	—	—	16bit	R/W	0x600E
P08.15	High homing velocity	/	/	O	—	—	16bit	R/W	0x600F
P08.16	Low homing velocity	/	/	O	—	—	16bit	R/W	0x6010
P08.17	Homing acceleration	/	/	O	—	—	16bit	R/W	0x6011
P08.18	Homing deceleration	/	/	O	—	—	16bit	R/W	0x6012
P08.19	Homing torque holding time	/	/	O	—	—	16bit	R/W	0x6013
P08.20	Homing torque	/	/	O	—	—	16bit	R/W	0x6014
P08.21	Homing overtravel alarm range	/	/	O	—	—	16bit	R/W	0x6015
P08.22	Emergency stop at limit deceleration	/	/	O	—	—	16bit	R/W	0x6016
P08.23	STP emergency stop deceleration	/	/	O	—	—	16bit	R/W	0x6017
P08.24	I/O combination trigger mode	/	/	O	—	—	16bit	R/W	0x601A
P08.25	I/O commbination filter	/	/	O	—	—	16bit	R/W	0x601B
P08.26	S-code current output value	/	/	O	—	—	16bit	R/W	0x601C
P08.27	PR warning	/	/	O	—	—	16bit	R/W	0x601D
P08.39	JOG velocity	/	/	O	—	—	16bit	R/W	0x6027
P08.40	JOG acceleration	/	/	O	—	—	16bit	R/W	0x6028
P08.41	JOG deceleration	/	/	O	—	—	16bit	R/W	0x6029
P08.42	Command position H	/	/	O	—	—	16bit	R/W	0x602A
P08.43	Command position（L）	/	/	O	—	—	16bit	R/W	0x602B
P08.44	Motor position H	/	/	O	—	—	16bit	R/W	0x602C
P08.45	Motor position（L）	/	/	O	—	—	16bit	R/W	0x602D
P08.46	Input I/O status	/	/	O	—	—	16bit	R/W	0x602E
P08.47	Output I/O status	/	/	O	—	—	16bit	R/W	0x602F
P08.48	Path 0 S-code	/	/	O	—	—	16bit	R/W	0x6030
P08.49	Path 1 S-code	/	/	O	—	—	16bit	R/W	0x6031
P08.50	Path 2 S-code	/	/	O	—	—	16bit	R/W	0x6032
P08.51	Path 3 S-code	/	/	O	—	—	16bit	R/W	0x6033
P08.52	Path 4 S-code	/	/	O	—	—	16bit	R/W	0x6034

Code	Label	Default	Activation	Valid mode			Communication mode		
				PR	S	T	Byte	Op.	485 Addr.
P08.53	Path 5 S-code	/	/	O	—	—	16bit	R/W	0x6035
P08.54	Path 6 S-code	/	/	O	—	—	16bit	R/W	0x6036
P08.55	Path 7 S-code	/	/	O	—	—	16bit	R/W	0x6037
P08.56	Path 8 S-code	/	/	O	—	—	16bit	R/W	0x6038
P08.57	Path 9 S-code	/	/	O	—	—	16bit	R/W	0x6039
P08.58	Path 10 S-code	/	/	O	—	—	16bit	R/W	0x603A
P08.59	Path 11 S-code	/	/	O	—	—	16bit	R/W	0x603B
P08.60	Path 12 S-code	/	/	O	—	—	16bit	R/W	0x603C
P08.61	Path 13 S-code	/	/	O	—	—	16bit	R/W	0x603D
P08.62	Path 14 S-code	/	/	O	—	—	16bit	R/W	0x603E
P08.63	Path 15 S-code	/	/	O	—	—	16bit	R/W	0x603F

[Class 9] Pr-Control Path Parameters

Code	Label	Default	Activation	Valid mode			Communication mode		
				PR	S	T	Byte	Op.	485 Addr.
P09.00	PR0 mode	/	/	O	—	—	16bit	R/W	0x6200
P09.01	PR0 position H	/	/	O	—	—	16bit	R/W	0x6201
P09.02	PR0 position(L)	/	/	O	—	—	16bit	R/W	0x6202
P09.03	PR0 velocity	/	/	O	—	—	16bit	R/W	0x6203
P09.04	PR0 acceleration time	/	/	O	—	—	16bit	R/W	0x6204
P09.05	PR0 deceleration time	/	/	O	—	—	16bit	R/W	0x6205
P09.06	PR0 pause time	/	/	O	—	—	16bit	R/W	0x6206
P09.07	PR0 special parameter	/	/	O	—	—	16bit	R/W	0x6207
P09.08	PR1 mode	/	/	O	—	—	16bit	R/W	0x6208
P09.09	PR1 position H	/	/	O	—	—	16bit	R/W	0x6209
P09.10	PR1 position(L)	/	/	O	—	—	16bit	R/W	0x620A
P09.11	PR1 velocity	/	/	O	—	—	16bit	R/W	0x620B
P09.12	PR1 acceleration time	/	/	O	—	—	16bit	R/W	0x620C
P09.13	PR1 deceleration time	/	/	O	—	—	16bit	R/W	0x620D
P09.14	PR1 pause time	/	/	O	—	—	16bit	R/W	0x620E
P09.15	PR1 special parameter	/	/	O	—	—	16bit	R/W	0x620F
P09.16	PR2 mode	/	/	O	—	—	16bit	R/W	0x6210
P09.17	PR2 position H	/	/	O	—	—	16bit	R/W	0x6211
P09.18	PR2 position(L)	/	/	O	—	—	16bit	R/W	0x6212
P09.19	PR2 velocity	/	/	O	—	—	16bit	R/W	0x6213
P09.20	PR2 acceleration time	/	/	O	—	—	16bit	R/W	0x6214
P09.21	PR2 deceleration time	/	/	O	—	—	16bit	R/W	0x6215
P09.22	PR2 pause time	/	/	O	—	—	16bit	R/W	0x6216
P09.23	PR2 special parameter	/	/	O	—	—	16bit	R/W	0x6217
P09.24	PR3 mode	/	/	O	—	—	16bit	R/W	0x6218
P09.25	PR3 position H	/	/	O	—	—	16bit	R/W	0x6219
P09.26	PR3 position(L)	/	/	O	—	—	16bit	R/W	0x621A
P09.27	PR3 velocity	/	/	O	—	—	16bit	R/W	0x621B
P09.28	PR3 acceleration time	/	/	O	—	—	16bit	R/W	0x621C
P09.29	PR3 deceleration time	/	/	O	—	—	16bit	R/W	0x621D
P09.30	PR3 pause time	/	/	O	—	—	16bit	R/W	0x621E
P09.31	PR3 special parameter	/	/	O	—	—	16bit	R/W	0x621F
P09.32	PR4 mode	/	/	O	—	—	16bit	R/W	0x6220
P09.33	PR4 position H	/	/	O	—	—	16bit	R/W	0x6221
P09.34	PR4 position(L)	/	/	O	—	—	16bit	R/W	0x6222
P09.35	PR4 velocity	/	/	O	—	—	16bit	R/W	0x6223
P09.36	PR4 acceleration time	/	/	O	—	—	16bit	R/W	0x6224
P09.37	PR4 deceleration time	/	/	O	—	—	16bit	R/W	0x6225
P09.38	PR4 pause time	/	/	O	—	—	16bit	R/W	0x6226

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

Code	Label	Default	Activation	Valid mode			Communication mode		
				PR	S	T	Byte	Op.	485 Addr.
P09.94	PR11 pause time	/	/	O	—	—	16bit	R/W	0x625E
P09.95	PR11 special parameter	/	/	O	—	—	16bit	R/W	0x625F
P09.96	PR12 mode	/	/	O	—	—	16bit	R/W	0x6260
P09.97	PR12 position H	/	/	O	—	—	16bit	R/W	0x6261
P09.98	PR12 position(L)	/	/	O	—	—	16bit	R/W	0x6262
P09.99	PR12 velocity	/	/	O	—	—	16bit	R/W	0x6263
P09.100	PR12 acceleration time	/	/	O	—	—	16bit	R/W	0x6264
P09.101	PR12 deceleration time	/	/	O	—	—	16bit	R/W	0x6265
P09.102	PR12 pause time	/	/	O	—	—	16bit	R/W	0x6266
P09.103	PR12 special parameter	/	/	O	—	—	16bit	R/W	0x6267
P09.104	PR13 mode	/	/	O	—	—	16bit	R/W	0x6268
P09.105	PR13 position H	/	/	O	—	—	16bit	R/W	0x6269
P09.106	PR13 position(L)	/	/	O	—	—	16bit	R/W	0x626A
P09.107	PR13 velocity	/	/	O	—	—	16bit	R/W	0x626B
P09.108	PR13 acceleration time	/	/	O	—	—	16bit	R/W	0x626C
P09.109	PR13 deceleration time	/	/	O	—	—	16bit	R/W	0x626D
P09.110	PR13 pause time	/	/	O	—	—	16bit	R/W	0x626E
P09.111	PR13 special parameter	/	/	O	—	—	16bit	R/W	0x626F
P09.112	PR14 mode	/	/	O	—	—	16bit	R/W	0x6270
P09.113	PR14 position H	/	/	O	—	—	16bit	R/W	0x6271
P09.114	PR14 position(L)	/	/	O	—	—	16bit	R/W	0x6272
P09.115	PR14 velocity	/	/	O	—	—	16bit	R/W	0x6273
P09.116	PR14 acceleration time	/	/	O	—	—	16bit	R/W	0x6274
P09.117	PR14 deceleration time	/	/	O	—	—	16bit	R/W	0x6275
P09.118	PR14 pause time	/	/	O	—	—	16bit	R/W	0x6276
P09.119	PR14 special parameter	/	/	O	—	—	16bit	R/W	0x6277
P09.120	PR15 mode	/	/	O	—	—	16bit	R/W	0x6278
P09.121	PR15 position H	/	/	O	—	—	16bit	R/W	0x6279
P09.122	PR15 position(L)	/	/	O	—	—	16bit	R/W	0x627A
P09.123	PR15 velocity	/	/	O	—	—	16bit	R/W	0x627B
P09.124	PR15 acceleration time	/	/	O	—	—	16bit	R/W	0x627C
P09.125	PR15 deceleration time	/	/	O	—	—	16bit	R/W	0x627D
P09.126	PR15 pause time	/	/	O	—	—	16bit	R/W	0x627E
P09.127	PR15 special parameter	/	/	O	—	—	16bit	R/W	0x627F

5.2 Parameters description

5.2.1 [Class 0] Basic Settings

P00.00	Label	Model-following/Zero tracking control			Valid mode(s)	P		
	Range	0-5000	Unit	0.1Hz	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0001		
	Valid	At stop						

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.
Use mainly to tune MFC or ZTC bandwidth.

Value	Description
0	Disable model following/zero tracking control
1	Set bandwidth automatically
2~9	Reserved
10~5000	Manually set control bandwidth. 30~100 recommended for belt application

P00.01	Label	Control Mode Settings			Valid mode(s)	P	S	T
	Range	0~10	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0003		
	Valid	After restart						

Value	Description	
	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	

◆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 2st 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

P00.02	Label	Real time Auto Gain Adjusting			Valid mode(s)	P	S	T
	Range	0x0~0xFFF	Unit	—	Default	0x1		
	Byte length	16bit	Attribute	R/W	485 address	0x0005		
	Valid	Immediate						

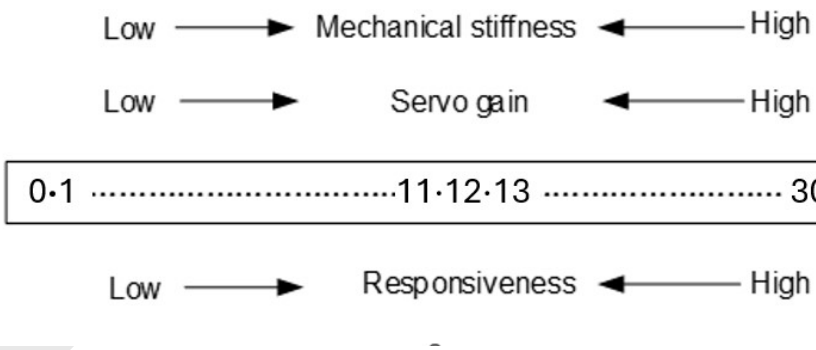
Data bits	Category	Settings	Application
0x00_	Motion setting mode	Used to set motion setting mode, which can be selected according to the motion characteristics or setting requirements. Generally, it is recommended to select mode 1 with good generality when there is no special requirement, mode 2 when 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 vertically 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-P0Ecision 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	Real time auto stiffness adjusting			Valid mode(s)	P	S	T
	Range	0~ 31	Unit	—	Default	68		
	Byte length	16bit	Attribute	R/W	485 address	0x0007		

	Valid	Immediate			



Lower values ensure better system responsiveness and mechanical stiffness but machine vibration might occur, please set accordingly. Recommend to set to around 68 with motor with high inertia.

P00.04	**Label**	Inertia ratio			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~20000	**Unit**	%	**Default**	250		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0009		
	Valid	Immediate						

P00.04=(load inertia/motor rotational inertia)×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 motors 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 selection			**Valid mode(s)**	**P**		
	Range	0~1	**Unit**	—	**Default**	0		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x000B		
	Valid	After restart						

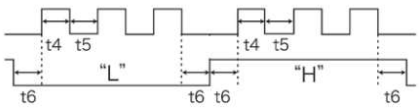
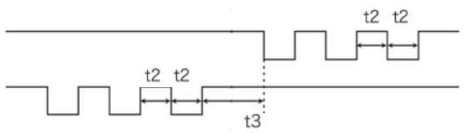
Value	**Description**
【0】	Pulse input low speed channel (200/500kHz pulse input)
1	Pulse input high speed channel (4MHz pulse input)

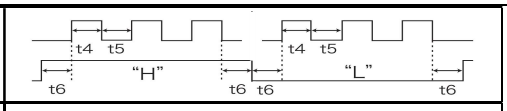
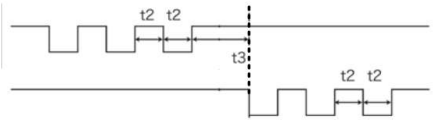
Both channels cannot be used at the same time.

P00.06	Label	Command pulse polarity inversion			Valid mode(s)	P		
	Range	0~1	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x000D		
	Valid	After restart						
	P00.06 and P00.07 set command pulse input inversion and mode correspondingly.							

P00.07	Label	Command pulse input mode			Valid mode(s)	P		
	Range	0~6	Unit	—	Default	3		
	Byte length	16bit	Attribute	R/W	485 address	0x000F		
	Valid	After restart						

Command pulse input

(P00.06) Command Polarity inversion	(P00.07) Command pulse input mode settings	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 + direction sign positive logic		
	5	Pulse sequence + direction sign negative logic		
	6	Positive direction pulse + negative direction pulse (CW CCW) negative logic		
1	0 *or* 2	90°phase difference 2 phase pulse （Phase A＋Phase B）		
	1	CW pulse sequence ＋ CCW pulse sequence		
	3	Pulse sequence + direction sign positive logic		

	5	Pulse sequence + direction sign negative logic	
	6	Positive direction pulse + negative direction pulse (CW CCW) negative logic	

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 drive	500 kHz	2	1	1	1	1	1
	Open collector	200 kHz	5	2.5	2.5	2.5	2.5	2.5
	High speed differential drive	4Mhz	0.25	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	0-8388608	Unit	PULSE	Default	10000		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0010 L: 0x0011		
	Valid	After restart						
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	1~2147483647	Unit	—	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0012 L: 0x0013		
	Valid	After restart						
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	1~2147483647	Unit	—	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0014 L: 0x0015		
	Valid	After restart						

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 2^{24} (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.

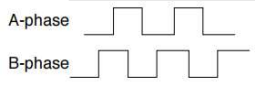
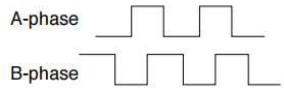
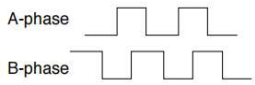
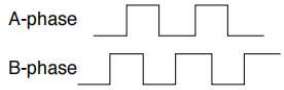
P00.11	Label	Encoder output pulse count per revolution			Valid mode(s)	P	S	T
	Range	1~32767	Unit	P/r	Default	2500		
	Byte length	16bit	Attribute	R/W	485 address	0x0017		
	Valid	After restart						

Sets the number of divided output pulses.
Set the number of output pulses of phase A and phase B of the frequency division output terminal for one rotation of the motor as position feedback in the upper device.
Motor rotation 1 turn terminal output pulse resolution = P00.11 × 4.
When setting this parameter, it must meet: motor speed (revolution/second) x P00.11 (encoder output pulse number per revolution) ≤ 1MHz. Otherwise alarm Er280

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	After 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	0~500	Unit	%	Default	350		
	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	Excessive position deviation			Valid mode(s)	P		
	Range	0~310	Unit	0.1rev	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. P00.14 If the setting is too small, the fault Er180 will easily occur (abnormal detection of excessive position deviation)							

P00.15	Label	Absolute encoder settings			Valid mode(s)	P	S	T
	Range	0~15	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x001F		
	Valid	After restart						

Value	Mode	Description
【0】	Incremental	Doesn't retain position data on power off. Unlimited travel distance.
1	Multiturn absolute linear	Retrain position data on power off. For applications with fixed travel distance and no multiturn data overflow.
2	Multiturn absolute rotary	Retrain position data on power off. Actual data feedback in between 0-(P06.63+1). Unlimited travel distance.
3	Single turn absolute	Used when travel distance is within 1 revolution of the encoder. Data overflow will trigger alarm.
5	Multi turn absolute	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	Regenerative resistance			Valid mode(s)	P	S	T
	Range	25~500	Unit	Ohm	Default	100		
	Byte length	16bit	Attribute	R/W	485 address	0x0021		
	Valid	Immediate						
	To set resistance value of regenerative resistor P00.16 and P00.17set value determine alarm threshold of Er120. If set value > actual regenerative resistance, Er120 occurrence might be delayed.							

P00.17	Label	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. Please refer to table below

Model	Internal resistance(Ω)	Internal resistor power rating(W)
E-DFAS01P	-	-
E-DFAS04P	-	-
E-DFAS08P	50	75
E-DFAS10P	50	75

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 labeled power rating.

P00.22	Label	PR and P/S/T switching			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 / Velocity
	2	PR / Torque

P00.25	Label	Auxiliary function			Valid mode(s)	P	S	T
	Range	0~0xFFFF	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0033		
	Valid	Immediate						

Parameter	Auxiliary function
0x1111	Reset current alarm
0x1122	Reset record alarm
0x2211	Save parameter to EEPROM (not including PR)
0x2212	Save PR parameters
0x2222	Initialize parameter (not including motor parameters)
0x2233	All parameters restore to default
0x4001	JOG_P（once every 50ms）
0x4002	JOG_N（once every 50ms）
0x4411	Encoder auto correction to zero
0x6666	Software reset

Only for RS485 communication, please write corresponding parameters into P00.25
Do not use JOG_P and JOG_N in PR mode

P00.26	Label	Simulated I/O			Valid mode(s)	P	S	T
	Range	0~0xFFFF	Unit	-	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0035		
	Valid	Immediate						

Bit	Input
0	DI1
1	DI2
2	DI3
3	DI4
4	DI5
5	DI6
6	DI7
7	DI8

Only for RS485 communication. Simulated I/O is different from physical I/O which means inversion of current I/O status

P00.39	Label	Number of pulses per revolution (PR only)			Valid mode(s)	P	S	T
	Range	10~390000	Unit	PULSE	Default	10000		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x004E		
	Valid					L: 0x004F		

Sets the number of command pulses per motor revolution in PR mode. This parameter is valid when P01.37 = 0x 20000[bit17 = 1], and the number of motor turns in PR mode = the number of input pulses/ [P00.39 setting value]

P00.40 (Only for RS485)	Label	Mapping parameter 1			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x0050		
	Valid					L: 0x0051		
For users 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 (Only for RS485)	Label	Mapping parameter 2			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x0052		
	Valid					L: 0x0053		
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 (Only for RS485)	Label	Mapping parameter 3			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x0054		
	Valid					L: 0x0055		
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 (Only for RS485)	Label	Mapping parameter 4			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x0056		
	Valid					L: 0x0057		
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 (Only for RS485)	Label	Mapping parameter 5			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x0058		
	Valid					L: 0x0059		
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 (Only for RS485)	Label	Mapping parameter 6			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x005A		
	Valid					L: 0x005B		
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 (Only for RS485)	Label	Mapping parameter 7			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x005C		
	Valid					L: 0x005D		
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 (Only for RS485)	Label	Mapping parameter 8			Valid mode(s)	P	S	T
	Range		Unit		Default	0		
	Byte length	32bit	Attribute		485 address	H: 0x005E		
	Valid					L: 0x005F		
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 (Only for RS485)	**Label**	Mapping parameter 1 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x0064		
	Valid	Immediate				L: 0x0065		
P00.51 (Only for RS485)	**Label**	Mapping parameter 2 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x0066		
	Valid	Immediate				L: 0x0067		
P00.52 (Only for RS485)	**Label**	Mapping parameter 3 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x0068		
	Valid	Immediate				L: 0x0069		
P00.53 (Only for RS485)	**Label**	Mapping parameter 4 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x006A		
	Valid	Immediate				L: 0x006B		
P00.54 (Only for RS485)	**Label**	Mapping parameter 5 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x006C		
	Valid	Immediate				L: 0x006D		
P00.55 (Only for RS485)	**Label**	Mapping parameter 6 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x006E		
	Valid	Immediate				L: 0x006F		
P00.56 (Only for RS485)	**Label**	Mapping parameter 7 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x0070		
	Valid	Immediate				L: 0x0071		

P00.57 (Only for RS485)	**Label**	Mapping parameter 8 indicator			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~0xFFFFFFFF	**Unit**		**Default**	0x00490049		
	Byte length	32bit	**Attribute**	R/W	**485 address**	H: 0x0072		
	Valid	Immediate				L: 0x0073		

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 P01.15;

Note: When a 32-bit address parameter is mapped, please write same address into high and low bit as shown above.

5.2.2 [Class 1] Gain adjustments

P01.00	Label	1st position loop gain			Valid mode(s)	P		
	Range	0～30000	Unit	0.1/s	Default	320		
	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≤P01.00/P01.01≤1.8							

P01.01	Label	1st velocity loop gain			Valid mode(s)	P	S	T
	Range	1～32767	Unit	0.1Hz	Default	180		
	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 note that if the velocity loop gain is too high, it might cause vibration.							
P01.02	Label	1st Integral Time Constant of Velocity Loop			Valid mode(s)	P	S	T
	Range	1～10000	Unit	0.1ms	Default	310		
	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	0～31	Unit	—	Default	15		
	Byte length	16bit	Attribute	R/W	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 Time Constant			Valid mode(s)	P	S	T
	Range	0～2500	Unit	0.01ms	Default	126		
	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/(2π×P01.04) ≥P01.01×4

For example: Velocity loop gain P01.01=180(0.1Hz) which is 18Hz. Time constant of torque filter should be P01.01≤221(0.01ms)
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 subject 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	380		
	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	180		
	Byte length	16bit	Attribute	R/W	485 address	0x010D		
	Valid	Immediate						
P01.07	Label	2nd Integral Time Constant of Velocity Loop			Valid mode(s)	P	S	T
	Range	1～10000	Unit	0.1ms	Default	10000		
	Byte length	16bit	Attribute	R/W	485 address	0x010F		
	Valid	Immediate						

P01.08	Label	2nd velocity detection filter			Valid mode(s)	P	S	T
	Range	0～31	Unit	—	Default	15		
	Byte length	16bit	Attribute	R/W	485 address	0x0111		
	Valid	Immediate						
P01.09	Label	2nd Torque Filter Time Constant			Valid mode(s)	P	S	T
	Range	0~2500	Unit	0.01ms	Default	126		
	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 feed forward gain			Valid mode(s)	P		
	Range	0~1000	Unit	0.10%	Default	300		
	Byte length	16bit	Attribute	R/W	485 address	0x0115		
	Valid	Immediate						
	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 feed forward filter time constant			Valid mode(s)	P		
	Range	0~6400	Unit	0.01ms	Default	50		
	Byte length	16bit	Attribute	R/W	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 ration to smoothen velocity feed forward. Position deviation under constant velocity can be lowered with higher velocity feed forward gain. Please refer to the equation below. Reduce P01.11 value to supP0Ess velocity overshoot during deceleration; Increase P01.11 value to supP0Ess 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 increasing P01.10. The equation below can be used to determine the position deviation due to velocity feedforward gain under constant velocity. Position deviation[Unit]= $\frac{Set\ velocity[\frac{Uint}{s}]}{Position\ loop\ gain[Hz]} x \frac{100 - Velocity\ feed\ foward\ gain[\%]}{100}$							
P01.12	Label	Torque feed forward gain			Valid mode(s)	P	S	
	Range	0~1000	Unit	0.1%	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 feed forward filter time constant			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 P0Ecision. 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 = 0.5ms, 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 gain switching mode			Valid mode(s)	P		
	Range	0～10	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)[%] Currently at the second gain, if the absolute value of the torque command is less than (level-hysteresis)[%] and the state duration reaches the delay time, return to the first gain
4-9	Reserved	Reserved
10	Pending position command +actual velocity	Valid for position control. Switch to 2nd gain if position command ≠ 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.*

P01.17	Label	Position control gain switching level			Valid mode(s)	P		
	Range	0~20000	Unit	Mode dependent	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	RPM
Torque	%

Please set level ≥ hysteresis

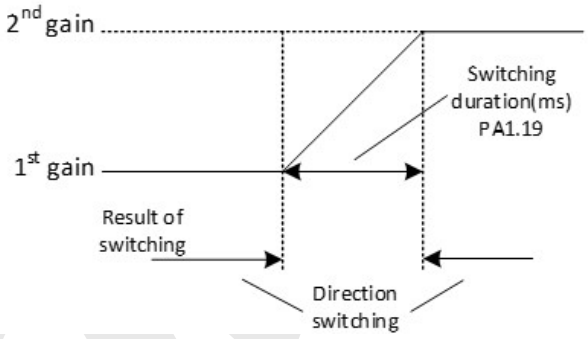
P01.18	Label	Hysteresis at position control switching			Valid mode(s)	P		
	Range	0~20000	Unit	Mode dependent	Default	33		
	Byte length	16bit	Attribute	R/W	485 address	0x0125		

	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 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)



P01.35						
	Label	Position command pulse filter time			**Valid mode(s)**	**P**
	Range	0~200	**Unit**	0.02us / 0.1us	**Default**	8
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0147
	Valid	After restart				

The position given pulse is filtered to eliminate the interfering narrow pulse. Low-speed pulse input unit is 0.1us, high-speed pulse input unit is 0.02us, high-speed pulse input coefficient is 0.6, low-speed 0.75.
If set value is overly large, it will affect the receiving of high frequency command pulse and with high delay time.
P01.35 formula：

$$\text{Filter frequency} = \frac{1}{2 \times \text{P01.35} \times 0.1\text{us}} \times 1000000\text{Hz} \times \text{coefficient}$$

Example：P00.05=1,P01.35=200, pulse frequency > 200KHz will be filtered;

P01.35	Filter frequency	P01.35	Filter frequency
0	*Null*	50	75kHz(300kHz)
3	1.25MHz(5MHz)	80	50kHz(190kHz)
6	625kHz(2.5MHz)	100	37.5kHz(150kHz)
8	470kHz(1.9MHz)	125	30kHz(120kHz)
10	375kHz(1.5MHz)	160	20kHz(100kHz)
20	200kHz(750KHz)	200	15kHz(75kHz)

P01.39	Label	Special Function Register 1			Valid mode(s)	P	S	T
	Range	0x0~0x7F FFFFFF	Unit	-	Default	0x0		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x014E L: 0x014F		
	Valid	Immediate						

BIT	value	Description
Bit 18	0x40000	When Bit18 = 0, the positioning is completed using the relative position error. When Bit18 = 1, the positioning is completed using the absolute position error.

5.2.3 [Class 2] Vibration suppression

P02.00	Label	Adaptive filtering mode settings			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. The larger the value of this parameter, the wider the notch width and the stronger the effect of suppressing mechanical vibration. However, under the premise of effectively suppressing resonance, the smaller the parameter setting, the better. Use this parameter with P02.01 and P02.03								
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						
A notch depth of the first resonance control notch filter is set. The smaller the value of this parameter, the deeper the notch depth, the stronger the suppression effect on mechanical vibration. However, under the premise of effectively								

suppressing resonance, the larger the parameter setting, the better. Use this parameter with P02.01 and P02.02

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.
The larger the value of this parameter, the wider the notch width and the stronger the effect of suppressing mechanical vibration. However, under the premise of effectively suppressing resonance, the smaller the parameter setting, the better.
Use this parameter with P02.04 and P02.06

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.
A notch depth of the first resonance control notch filter is set.
The smaller the value of this parameter, the deeper the notch depth, the stronger the suppression effect on mechanical vibration. However, under the premise of effectively suppressing resonance, the larger the parameter setting, the better. Use this parameter with P02.04 and P02.05

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						

The notch frequency width of the third resonance control notch filter is set.
The larger the value of this parameter, the wider the notch width and the stronger the effect of suppressing mechanical vibration. However, under the premise of effectively suppressing resonance, the smaller the parameter setting, the better.
Use this parameter with P02.07 and P02.09.

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						

The notch depth of the third resonance control notch filter is set.
The smaller the value of this parameter, the deeper the notch depth, the stronger the suppression effect on mechanical vibration. However, under the premise of effectively suppressing resonance, the larger the parameter setting, the better.
Use this parameter with P02.07 and P02.08.

P02.14	Label	1st damping frequency			Valid mode(s)	P		
	Range	0/10~2000	Unit	0.1Hz	Default	0		

	Byte length	16bit	**Attribute**	R/W	**485 address**	0x021D
	Valid	Immediate				

Set the first damping frequency to suppress the shaking at the end of the vibration. Please measure the vibration frequency at the end of the load and set it in 0.1[Hz].

Value	Description
0	Turn off the low frequency suppression function
10~2000	Set the damping frequency (0.1Hz in unit)

Note: Suppresses sloshing at the end of the load. It is generally used to suppress the shaking of the elastic end of the load caused by the high deceleration impact when the motor is stopped. For the frequency within 100Hz shaking suppression effect is obvious. When in use, set this parameter to the frequency of shaking

P02.16						
	Label	2nd damping frequency			**Valid mode(s)**	**P**
	Range	0/10~2000	**Unit**	0.1Hz	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0221
	Valid	Immediate				

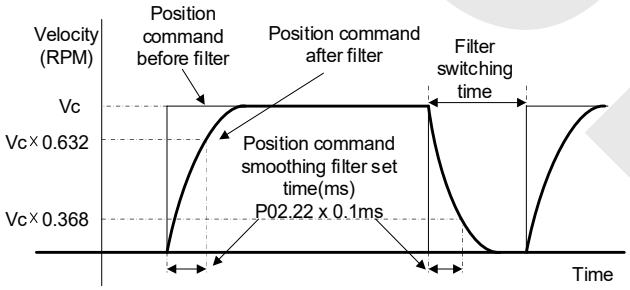
Set the second damping frequency to suppress the shaking at the end of the vibration. Please measure the vibration frequency at the end of the load and set it in 0.1[Hz].

Value	Description
0	Turn off the low frequency suppression function
10~2000	Set the damping frequency (0.1Hz in unit)

Note: Suppresses sloshing at the end of the load. It is generally used to suppress the shaking of the elastic end of the load caused by the high deceleration impact when the motor is stopped. For the frequency within 100Hz shaking suppression effect is obvious. When in use, set this parameter to the frequency of shaking

P02.22						
	Label	Position command smoothing filter			**Valid mode(s)**	**P**
	Range	0~32767	**Unit**	0.1ms	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x022D
	Valid	At stop				

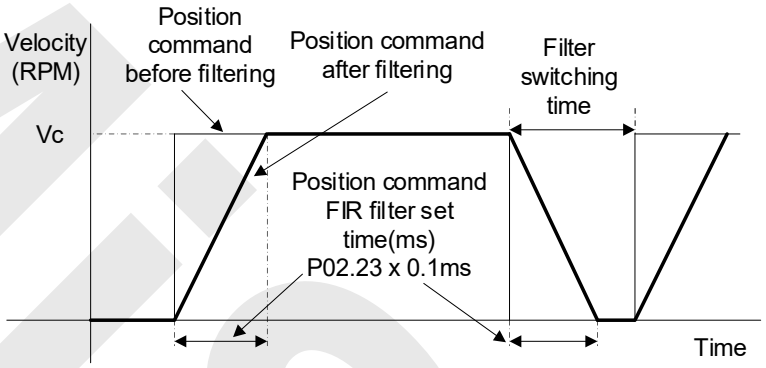
To set time constant of 1 time delay filter of position command.
To set time constant of 1 time delay filter, according to target velocity Vc square wave command as show below.



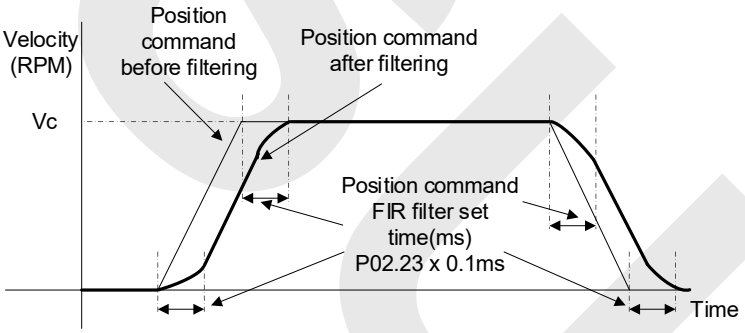
Usually applied when there is rather sharp acceleration which might cause motor overshoot or undershoot. To smoothen command signal, reduces impact to machines and eliminate vibration. If P02.22 is set too high, overall time will be lengthened.

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	At stop						

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



As shown below, when target velocity Vc trapezoidal command reaches Vc, 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 x 0.1ms + 0.25ms)

P02.48	Label	Adjustment mode			Valid mode(s)	P	S	T
	Range	0~1	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0261		
	Valid	Immediate						

Value	Description
【0】	Turn off automatic adjustments
1	Turn on the automatic adjustment function, turn on the inertia real-time identification and vibration suppression, and turn off the function after the effective number of inertia identification reaches 4 within 5min, and the rigidity change is the trigger start condition.

P02.50	Label	MFC type			Valid mode(s)	P		
	Range	0~3	Unit	—	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	-10000~10000	Unit	—	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	-10000~10000	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0269		
	Valid	Immediate						
	To compensate for torque feedforward							

P02.53	Label	Dynamic friction compensation coefficient			Valid mode(s)	P	S	T
	Range	0~1000	Unit	%	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.

$$\text{Dynamic friction coefficient} = \left| \frac{\text{Torque(Rotational speed 1)} - \text{Torque(Rotational speed 2)}}{\text{Rotational speed 1} - \text{Rotational speed 2}} * \text{rated rotational speed} \right|$$

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 coefficient			Valid mode(s)	P	S	T
	Range	0~10000	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x026D		
	Valid	Immediate						
To set overshoot time coefficient								

P02.55	Label	Overshoot supP0Ession gain			Valid mode(s)	P	S	T
	Range	0~10000	Unit	%	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x026F		
	Valid	Immediate						
SupP0Ession improves with larger set value but might affect the performance of MFC. Please use with caution for any value above 100.								

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5.2.4 [Class 3] Velocity/Torque control

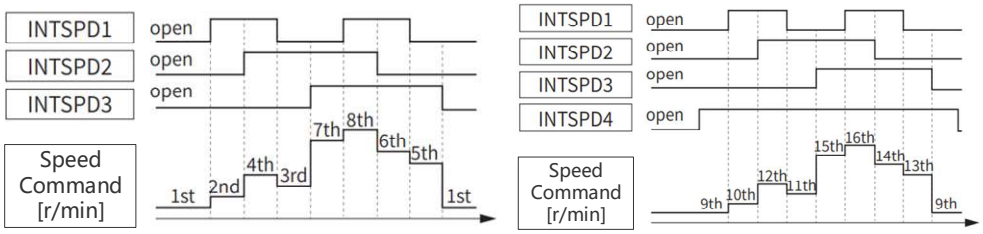
P03.00	Label	Velocity internal/external switching			Valid mode(s)	S
	Range	0~3	Unit	—	Default	1
	Byte length	16bit	Attribute	R/W	485 address	0x0301
	Valid	Immediate				

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

Value	Velocity settings
0	Reserved
【1】	Internal velocity settings 1st – 8th speed（P03.04～P03.11 ）
2	Internal velocity settings 1st – 7th speed（P03.04～P3.10）
3	Internal velocity settings 1st – 16th speed（P03.04～P03.11，P03.36～P3.43）

Value	Internal Command velocity 1（INTSPD 1）	Internal command velocity 2（INTSPD2 ）	Internal command velocity 3（INTSPD3 ）	Internal command velocity 4（INTSPD4 ）	Velocity command
1	OFF	OFF	OFF	-	1st speed
	ON	OFF	OFF	-	2nd speed
	OFF	ON	OFF	-	3rd speed
	ON	ON	OFF	-	4th speed
	OFF	OFF	ON	-	5th speed
	ON	OFF	ON	-	6th speed
	OFF	ON	ON	-	7th speed
	ON	ON	ON	-	8th speed
2	OFF	OFF	OFF	-	1st speed
	ON	OFF	OFF	-	2nd speed
	OFF	ON	OFF	-	3rd speed
	ON	ON	OFF	-	4th speed
	OFF	OFF	ON	-	5th speed
	ON	OFF	ON	-	6th speed
	OFF	ON	ON	-	7th speed
3	Similar to (P03.00=ON)			OFF	1st speed~ 8th speed
	OFF	OFF	OFF	ON	9th speed
	ON	OFF	OFF	ON	10th speed
	OFF	ON	OFF	ON	11th speed
	ON	ON	OFF	ON	12th speed
	OFF	OFF	ON	ON	13th speed
	ON	OFF	ON	ON	14th speed
	OFF	ON	ON	ON	15th speed
	ON	ON	ON	ON	16th 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



P03.00=1 / 2 P03.00=3

P03.01	Label	Velocity command rotational direction selection			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（VC-SIGN）	Velocity command sign selection（VC-SIGN 2）	Velocity command direction	note
【0】	+	No effect	No effect	Positive	Direction determined by +/-
	—	No effect	No effect	Negative	Direction determined by VC-SIGN
1	No effect	OFF	No effect	Positive	The direction is determined by +/-, VC-SIGN and VC-SIGN2; 1.when the VC-SIGN and VC-SIGN2 are valid or invalid at the same time, the motor is stationary; 2. when the VC-SIGN is valid and the VC-SIGN2 is invalid, the speed command direction is the same as the speed setting value direction; 3. when the VC-SIGN is invalid and the VC-SIGN2 is valid, the speed command direction is opposite to the speed setting value direction
	No effect	ON	No effect	Negative	
2	+	ON	OFF	Positive	
		OFF	ON	Negative	
		ON	ON	STOP	
		OFF	OFF	STOP	
	-	ON	OFF	Negative	
		OFF	ON	Positive	
		ON	ON	STOP	
		OFF	OFF	STOP	

P03.04	Label	1st speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0309
	Valid	Immediate				
P03.05	Label	2nd speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x030B
	Valid	Immediate				
P03.06	Label	3rd speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x030D
	Valid	Immediate				
P03.07	Label	4th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x030F
	Valid	Immediate				
P03.08	Label	5th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0311
	Valid	Immediate				
P03.09	Label	6th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0313
	Valid	Immediate				
P03.10	Label	7th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	
	Byte length	16bit	Attribute	R/W	485 address	0x0315
	Valid	Immediate				
P03.11	Label	8th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0317
	Valid	Immediate				
To set internal velocity command 1st -8th speed						

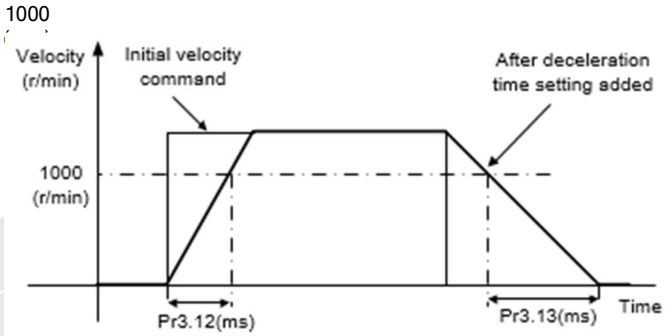
P03.12	Label	Acceleration time settings			Valid mode(s)	S
	Range	0~10000	Unit	ms/ (1000rpm)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x0319
	Valid	Immediate				
P03.13	Label	Deceleration time settings			Valid mode(s)	S
	Range	0~10000	Unit	ms/ (1000rpm)	Default	100
	Byte length	16bit	Attribute	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*
a = x/t

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

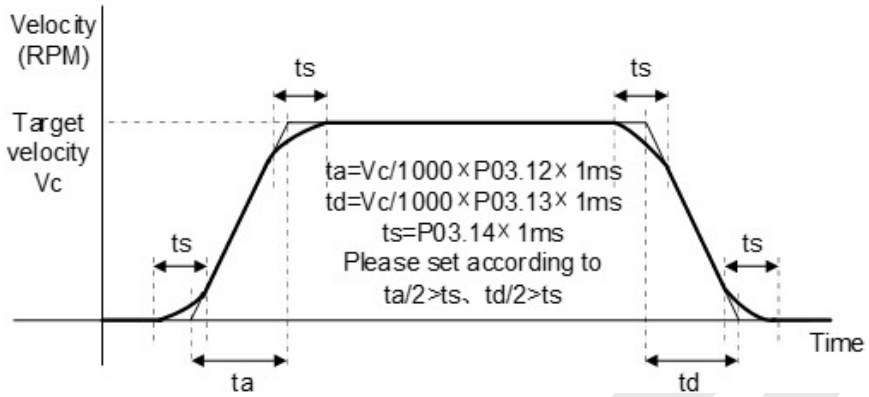
P03.12 = 1000/*a= 20.* Hence when P03.12 = 20, motor can achieve 1500rpm in 30s.



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 settings			Valid mode(s)	S
	Range	0~1000	Unit	ms	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x031D
	Valid	After restart				

Sets the S-curve ramp time for speed command input.
This is the S-curve time centered around the acceleration/deceleration transition point, based on the values set in P03.12 (Acceleration Time) and P03.13 (Deceleration Time).



Note: This parameter takes effect after power-off and restart.

P03.15	Label	Zero speed clamp function selection			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 or 2
4	When the Zero Speed Clamp (ZEROSPD) input signal is valid and when the speed command in speed control mode is less than the P03.16 Zero Speed Clamp Level setpoint, the speed command is forcibly set to 0.

P03.16	Label	Zero speed clamp level			Valid mode(s)	S
	Range	10~2000	Unit	r/min	Default	30
	Byte length	16bit	Attribute	R/W	485 address	0x0321
	Valid	Immediate				

Set the decision level of zero speed.
P03.15 is valid when 2 and 3 are set. When the speed given command in the speed control mode is less than the zero speed clamp level setting, the speed command can be forcibly set to 0.

P03.17	Label	Torque internal/external switching			Valid mode(s)	T
	Range	0~2	Unit		Default	2
	Byte length	16bit	Attribute	R/W	485 address	0x0323
	Valid	Immediate				

Value	Torque command input	Velocity limit input
【0】	Reserved	
1		
2	P03.22 set value	P03.21 set value

P03.18	Label	Torque command direction selection			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*

P03.21	Label	Velocity limit in torque mode			Valid mode(s)		T
	Range	0~10000	Unit	r/min	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x032B	
	Valid	Immediate					
	Sets the speed limit value during torque control. In torque control mode, the operating speed is limited and will not exceed the value set in parameter P03.21.						

P03.22	Label	Torque command			Valid mode(s)		T
	Range	0~300	Unit	%	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x032D	
	Valid	Immediate					
	To set torque limit in torque control mode.						

P03.23	Label	Zero speed delay time in velocity mode			Valid mode(s)		S
	Range	0~2000	Unit	ms	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x032F	
	Valid	Immediate					
	Zero-speed standstill delay time in set speed mode; that is, the time from when the speed reaches below the zero-speed clamp to when the motion stops. Prevents the position from creeping slowly when stationary in speed mode. When 0 is set, the speed mode zero speed standstill function is invalid. When 1~2000 is set, the speed reaches P03.16 zero speed clamp level below and the motor stops after the set time.						

P03.24	Label	Maximum motor rotational speed			Valid mode(s)	P	S	T
	Range	0~10000	Unit	r/min	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.							

P03.36	Label	9th speed of velocity setting			Valid mode(s)		S
	Range	-10000~10000	Unit	r/min	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x0349	
	Valid	Immediate					
	To set internal velocity command 9th speed						
P03.37	Label	10th speed of velocity setting			Valid mode(s)		S
	Range	-10000~10000	Unit	r/min	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x034B	
	Valid	Immediate					
	To set internal velocity command 10th speed						
P03.38	Label	11th speed of velocity setting			Valid mode(s)		S
	Range	-10000~10000	Unit	r/min	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x034D	
	Valid	Immediate					
	To set internal velocity command 11th speed						
P03.39	Label	12th speed of velocity setting			Valid mode(s)		S
	Range	-10000~10000	Unit	r/min	Default	0	
	Byte length	16bit	Attribute	R/W	485 address	0x034F	
	Valid	Immediate					

	To set internal velocity command 12th speed					
P03.40	Label	13th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0351
	Valid	Immediate				
	To set internal velocity command 13th speed					
P03.41	Label	14th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0353
	Valid	Immediate				
	To set internal velocity command 14th speed					
P03.42	Label	15th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0355
	Valid	Immediate				
	To set internal velocity command 15th speed					
P03.43	Label	16th speed of velocity setting			Valid mode(s)	S
	Range	-10000~10000	Unit	r/min	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0357
	Valid	Immediate				
	To set internal velocity command 16th speed					

P03.58	Label	Speed regulation ratio 1			Valid mode(s)	S
	Range	0~150	Unit	%	Default	10
	Byte length	16bit	Attribute	R/W	485 address	H: 0x0374 L: 0x0375
	Valid	Immediate				

To set speed regulation ratio for each input signal. If ratio is more than 150% in total, rotational speed of the motor will remain unchanged. If the rotational speed of the motor exceeds P03.24, then motor will rotate at maximum speed.
Speed regulation ratio = 100% if SPDREG signal is not valid.

Please refer to the following table as an example for users' required settings.
Assuming (1) P03.58-P03.61 = default
(2)Motor rated rotational speed = 2000rpm
(3) SPDREG input signal = ON

SPDREG1 P03.58	SPDREG2 P03.59	SPDREG 3 P03.60	SPDREG 4 P03.61	Ratio (%)	Actual speed (rpm)
OFF	OFF	OFF	OFF	0	0
ON	OFF	OFF	OFF	10	200
OFF	ON	OFF	OFF	20	400
OFF	OFF	ON	OFF	40	800
OFF	OFF	OFF	ON	80	1600
ON	ON	OFF	OFF	30	600
ON	ON	ON	OFF	70	1400

P03.59	Label	Speed regulation ratio 2			Valid mode(s)	S
	Range	0~150	Unit	%	Default	20
	Byte length	16bit	Attribute	R/W	485 address	H: 0x0376 L: 0x0377
	Valid	Immediate				
	Same as P03.58					
P03.60	Label	Speed regulation ratio 3			Valid mode(s)	S

	Range	0~150	**Unit**	%	**Default**	40
	Byte length	16bit	**Attribute**	R/W	**485 address**	H: 0x0378 L: 0x0379
	Valid	Immediate				
	Same as P03.58					
P03.61	**Label**	Speed regulation ratio 4			**Valid mode(s)**	**S**
	Range	0~150	**Unit**	%	**Default**	80
	Byte length	16bit	**Attribute**	R/W	**485 address**	H: 0x037A L: 0x037B
	Valid	Immediate				
	Same as P03.58					

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5.2.5 [Class 4] I/O Monitoring Settings

P04.00	**Label**	Input selection DI1	**Valid mode(s)**	**P**	**S**	**T**
	Range	0x00~0xFF	**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	
		NO	NC
Invalid	—	0	-
Positive limit switch	POT	1	81
Negative limit switch	NOT	2	82
Servo enabled	SRV-ON	3	83
Clear alarm	A-CLR	4	-
Control mode switching	C-MODE	5	85
Gain switching	GAIN	6	86
Clear deviation count	CL	7	-
Command pulse prohibited	INH	8	88
Torque limit switching	TL-SEL	9	89
Command frequency divider/multiplier switching	DIV1	C	8C
Internal command velocity 1	INTSPD1	E	8E
Internal command velocity 2	INTSPD2	F	8F
Internal command velocity 3	INTSPD3	10	90
Internal command velocity 4	INTSPD4	31	B1
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 supP0Ession 1	VS-SEL1	0A	8A
Vibration supP0Ession 2	VS-SEL2	0B	8B

CN1 PIN	Input	Parameters
9	DI1	P04.00
10	DI2	P04.01
34	DI3	P04.02
8	DI4	P04.03
33	DI5	P04.04
32	DI6	P04.05
12	DI7	P04.06
30	DI8	P04.07

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
Forced stop	STP	22	A2

The input settings related to PR mode are as follows:

Signal	Symbol	Value	
		NO	NC
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**	Input selection 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**	Input selection 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**	Input selection 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**	Input selection 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**	Input selection 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**	Input selection 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**	Input selection DI8			**Valid mode(s)**	**P**	**S**	**T**
	Range	0x0~0xFF	**Unit**	—	**Default**	0x4		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x040F		
	Valid	Immediate						
DI2~DI8allocation is the same as DI1. Please refer to P04.00.								

P04.10	**Label**	Output selection 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**	
		NO	**NC**
Invalid	—	00	80
Alarm	ALARM	01	81
Servo-Ready	SRDY	02	82
External brake released	BRK-OFF	03	83
Positioning completed	INP	04	84
At-speed	AT-SPPED	05	85
Torque limit signal	TLC	06	86
Zero speed clamp detection	ZSP	07	87
Velocity coincidence	V-COIN	08	88
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
Z phase output	—	2E	AD

CN1 PIN	**Output**	**Parameters**
7	DO1+	P04.10
6	DO1-	
5	DO2+	P04.11
4	DO2-	
3	DO3+	P04.12
2	DO3-	
1	DO4+	P04.13
26	DO4-	
28	DO5	P04.14
27	DO6	P04.15

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 completed	CMD-OK	20	A0
Path completed	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**	Output selection DO2			**Valid mode(s)**	**P S T**
	Range	0x0~0xFF	**Unit**	—	**Default**	0x4
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0417
	Valid	Immediate				
P04.12	**Label**	Output selection DO3			**Valid mode(s)**	**P S T**
	Range	0x0~0xFF	**Unit**	—	**Default**	0x3
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0419
	Valid	Immediate				
P04.13	**Label**	Output selection DO4			**Valid mode(s)**	**P S T**
	Range	0x0~0xFF	**Unit**	—	**Default**	0x81
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x041B
	Valid	Immediate				
P04.14	**Label**	Output selection DO5			**Valid mode(s)**	**P S T**
	Range	0x0~0xFF	**Unit**	—	**Default**	0x22
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x041D
	Valid	Immediate				
DO2-DO5 is allocated by the same method as per DO1. Please refer to P04.10.						

P04.31	Label	Positioning complete range			Valid mode(s)	P		
	Range	0～10000	Unit	P05.20 set unit	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.
The default unit is the command unit. Through P05.20 position setting unit can be set to command unit (Pulse), encoder unit (Pulse)

P04.32	Label	Positioning complete output setting			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 positioning delay time			Valid mode(s)	P		
	Range	0~15000	Unit	1ms	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0443		
	Valid	Immediate						

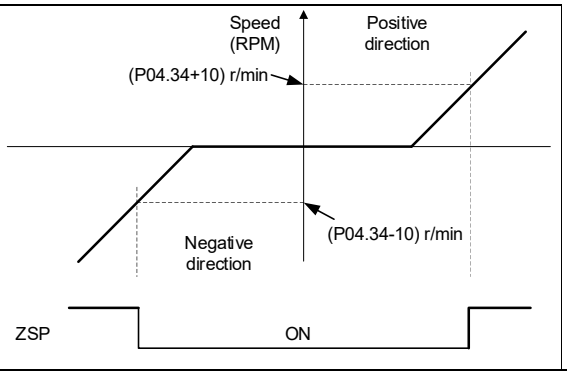
Valid when P04.32 = 3.

Set value	Positioning completed signal
0	Indefinite delay time, signal ON until next position command
1-15000	OFF within the time set; ON after time set. Switch OFF after receiving next position command.

P04.34	Label	Zero speed			Valid mode(s)	P	S	T
	Range	1~2000	Unit	r/min	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

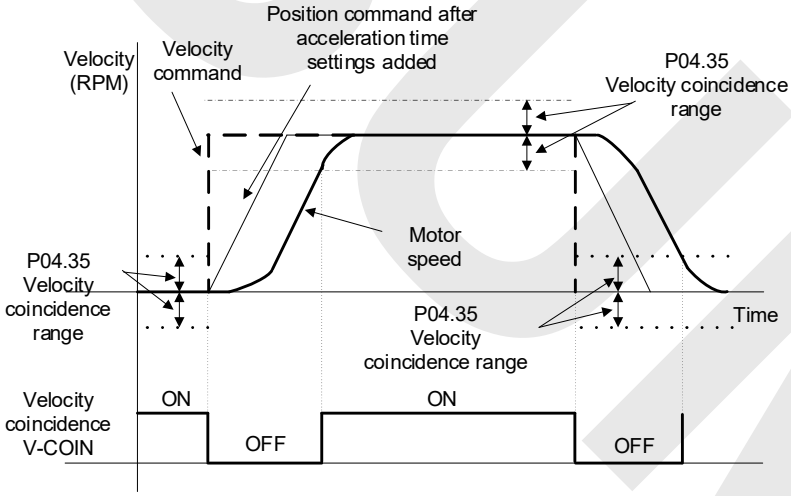
- Disregard the direction of rotation, valid for both directions.
- Hysteresis of 10RPM. Please refer to diagram on the right side.



P04.35	Label	Velocity coincidence range			Valid mode(s)	S
	Range	10~2000	Unit	r/min	Default	50
	Byte length	16bit	Attribute	R/W	485 address	0x0447
	Valid	Immediate				

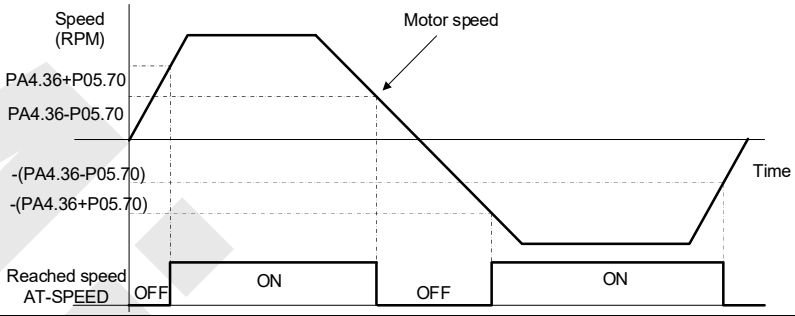
If the difference between velocity command and motor actual speed is below P04.35, Velocity coincidence (V-COIN) output signal valid.

Due to 10RPM hysteresis:
Velocity coincidence output OFF -> ON timing (P04.35 –P05.70) r/min
Velocity coincidence output ON -> OFF timing (P04.35 + P05.70) r/min



P04.36	Label	Target velocity			Valid mode(s)	S
	Range	10~2000	Unit	r/min	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.



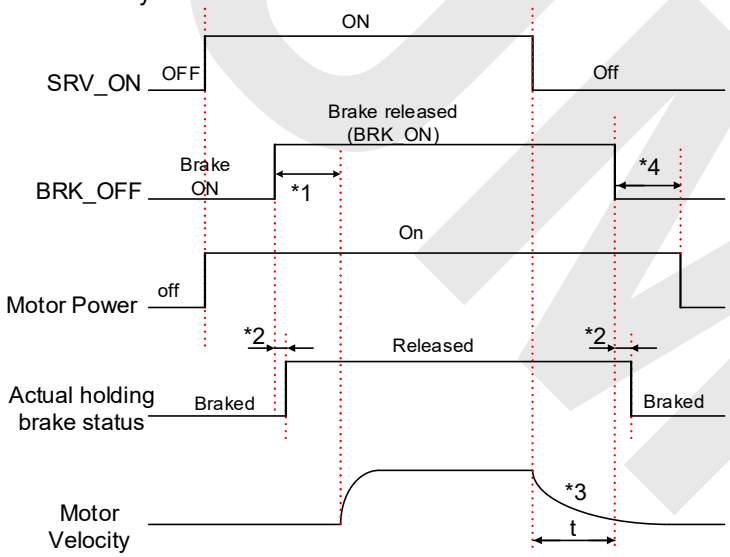
P04.37	Label	Motor power-off delay time			Valid mode(s)	P	S	T
	Range	0~3000	Unit	1ms	Default	150		
	Byte length	16bit	Attribute	R/W	485 address	0x044B		
	Valid	Immediate						

To set delay time for holding brake to be activated after motor power off to P0Event 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	Holding brake release time			Valid mode(s)	P	S	T
	Range	0~3000	Unit	1ms	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	Holding brake activation speed			Valid mode(s)	P	S	T
	Range	30~3000	Unit	r/min	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	Emergency stop function			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.

P04.62	Label	Position/Speed/Torque Feedback Polarity Setting			Valid mode(s)	P	S	T
	Range	0~1	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x047D		
	Valid	Immediate						

Set the position/speed/torque feedback polarity:
0: feedback does not reverse
1: feedback reverse

5.2.6 [Class 5] Extension Settings

P05.00	Label	2nd pulse count per revolution			Valid mode(s)	P		
	Range	0-8388608	Unit	PULSE	Default	10000		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0500 L: 0x0501		
	Valid	After restart						
	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	1~1073741824	Unit	—	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0502 L: 0x0503		
	Valid	After restart						
	To set command pulse input frequency division and multiplication numerator							

P05.02	Label	2nd Command frequency divider/multiplier denominator			Valid mode(s)	P		
	Range	1~1073741824	Unit	—	Default	1		
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0504 L: 0x0505		
	Valid	After restart						
	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	Driver prohibition input settings			Valid mode(s)	P	S	T
	Range	0/1/2	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 drive prohibited NOT → Negative direction drive prohibited
1	POT and NOT invalid
2	Any single sided input from POT or NOT might cause Er260

P05.05	Label	Limit stop deceleration			Valid mode(s)	P	S	T
	Range	1~32767	Unit	ms/krpm	Default	10		
	Byte length	16bit	Attribute	R/W	485 address	0x050B		
	Valid	Immediate						
	When bit8 of P06.10 is set to 1, the limit stop deceleration function is turned on (software limit is not supported); When the external limit is encountered (DI signal POT/NOT is valid), the system will decelerate from the current speed according to the deceleration set by P05.05 until it stops completely.							

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	Immediate				

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

P05.07								
	Label	E-STOP emergency stop deceleration			**Valid mode(s)**	**P**	**S**	**T**
	Range	1~32767	**Unit**	ms/ krpm	**Default**	50		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x050F		
	Valid	Immediate						

When bit9 of P06.10 is set to 1, the E-STOP emergency stop deceleration function will be started.
The shutdown mode is servo braking mode, and the system will decelerate from the current speed according to the deceleration set in P05.07 until it stops completely.

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	After restart						

To set servo driver disable mode and status if alarm is triggered.
Alarm type 2:

Value	Explanation	
	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	Explanation	
	Mode	*Status*
0	Dynamic braking	Dynamic braking
1		
2		
3	Dynamic braking	Free-run

	4	Free stopping	Free-run
	5	Dynamic braking	Free-run

P05.11	Label	Servo braking torque setting			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 setting			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 settings			Valid mode(s)	P	S	T
	Range	0~10000	Unit	r/min	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	After restart						

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	0~4	Unit	—	Default	3		
	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)

P05.20	Label	Position unit settings			Valid mode(s)	P		
	Range	0~2	Unit	—	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0529		
	Valid	Immediate						

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 selection			Valid mode(s)	P	S	T
	Range	0~6	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 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

P05.22	Label	2nd torque limit			Valid mode(s)	P	S	T
	Range	0~500	Unit	%	Default	300		
	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 are only valid when P05.21 = 5. If actual torque is 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 are only valid when P05.21 = 5. If actual torque is higher than threshold, TLC torque limit signal will be valid.							

P05.28	Label	LED initial status			Valid mode(s)	P	S	T
	Range	0~35	Unit	—	Default	1		
	Byte length	16bit	Attribute	R/W	485 address	0x0539		
	Valid	Immediate						

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-rotation	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		
9	Control mode	23	485 receive frame		
10	I/O status	24	Encoder position deviation		
11	-	25	Internal usage		
12	Alarm cause & history record	26	Internal usage		
13	Warning ID	27	PN Voltage		

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P05.29	Label	RS485 communication mode			Valid mode(s)	P	S	T
	Range	0~255	Unit	—	Default	5		
	Byte length	16bit	Attribute	R/W	485 address	0x053B		
	Valid	After 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	0~15	Unit	—	Default	4		
	Byte length	16bit	Attribute	R/W	485 address	0x053D		
	Valid	After restart						

Value	Baud rate
0	2400bps
1	4800bps
2	9600bps
3	19200bps

Value	Baud rate
【4】	38400bps
5	57600bps
6	115200bps

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	1		
	Byte length	16bit	Attribute	R/W	485 address	0x053F		
	Valid	After 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	4100		
	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.

P05.35	Label	Front panel lock setting			Valid mode(s)	P	S	T
	Range	0~1	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0547		
	Valid	Immediate						

Value	Description
【0】	Front panel not lock
1	Only parameter modification through front panel is locked

P05.37	Label	Torque saturation alarm detection time			Valid mode(s)	P	S	T
	Range	0~5000	Unit	ms	Default	500		
	Byte length	16bit	Attribute	R/W	485 address	0x0549		

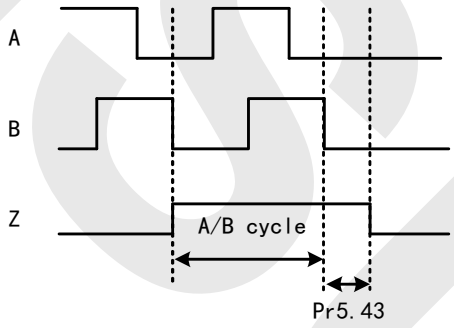
	Valid	Immediate				
To set the delay time for detection of torque over limit under torque homing mode. Under homing mode, when torque exceeds limit and the time set in P05.37, TLC output signal will be valid.						

P05.42	**Label**	Frequency divider output – Z-signal polarity			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~1	**Unit**	—	**Default**	0		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0555		
	Valid	Disabled						

Set the polarity of the frequency division output Z signal:
0: positive polarity,
1: negative polarity

P05.43	**Label**	Frequency divider output – Z-signal width			**Valid mode(s)**	**P**	**S**	**T**
	Range	2~100	**Unit**	0.1ms	**Default**	2		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0557		
	Valid	After restart						

Value	**Description**
2~100	The length of the corresponding setting value is delayed on the basis of the width of one cycle of A/B;



P05.46	**Label**	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	After restart						

Value	**Description**
【0】	Default level: 80%
1~115	Set vent overload level accordingly

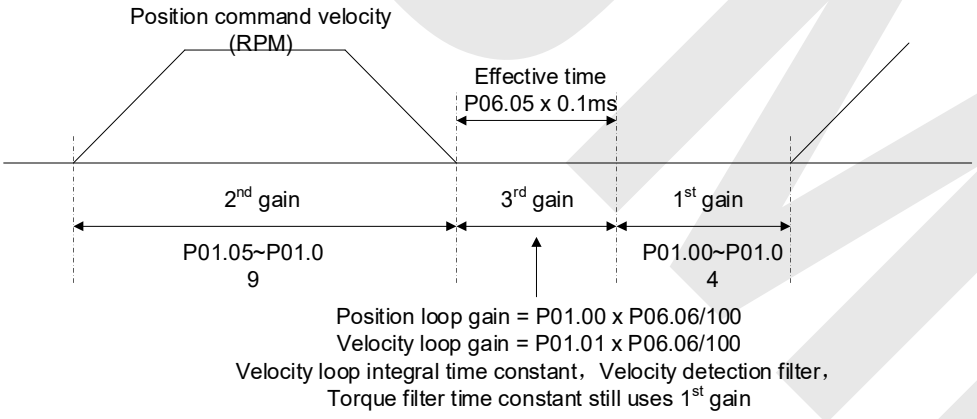
5.2.7 [Class 6] Other settings

P06.01	Label	Encoder zero position compensation			Valid mode(s)	P	S	T
	Range	0~360	Unit	Electrical angel	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0603		
	Valid	Power-off						
	Zero position compensation for encoder zero drift to avoid abnormality due to zero drift.							

P06.03	Label	JOG trial run torque command			Valid mode(s)			T
	Range	0~350	Unit	%	Default	350		
	Byte length	16bit	Attribute	R/W	485 address	0x0607		
	Valid	Immediate						
	To set torque for JOG trial run command.							
P06.04	Label	JOG trial run velocity command			Valid mode(s)	P	S	T
	Range	0~10000	Unit	r/min	Default	30		
	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	0.1ms	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	50~1000	Unit	100%	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 value			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 value			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

P06.08/P06.09 = $T_f = \frac{|T1 - T2|}{2}$

Positive/Negative compensation corresponds to actual position feedback.
Positive torque compensation value = +(P06.08=+T_f)
Negative torque compensation value = -(P06.08=+T_f)
P06.08 =x, P06.09=y; friction compensation value = |x-y|/2

P06.10	Label	Function extension setting			Valid mode(s)	P	S	T
	Range	0x0~0xFFFF	Unit	-	Default	0x0		
	Byte length	16bit	Attribute	R/W	485 address	0x0615		
	Valid	After restart						

P06.10 Use bit to set, for function extension setting: bit1/bit2 only takes effect in P00.07 = 3 mode

value	bit	function
0x0	-	Pulse input and direction input polarity does not change
0x2	Bit 1=1	Pulse Input Polarity Inverse
0x4	Bit 2=1	Direction Input Polarity Inverse
0x6	Bit 1=1, Bit 2=1	Pulse input and direction input polarity are inverted
0x1000	Bit 12=1	When turned on, when the PR mode is stopped, the driver can receive external pulse commands

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	Max. time to stop after disabling			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~1000	**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**	0.1rev	**Default**	10		
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0629		
	Valid	Immediate						
	JOG (Position control) : Distance travel of each motion.							

P06.21								
	Label	Trial run waiting time			**Valid mode(s)**	**P**		
	Range	0~10000	**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	No. of trial run cycles			**Valid mode(s)**	**P**		
	Range	0~10000	**Unit**	—	**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	**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							

P06.28								
	Label	Observer gain			**Valid mode(s)**	**P**	**S**	
	Range	0~32767	**Unit**	%	**Default**	0		
	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	Observer filter			**Valid mode(s)**	**P**	**S**	
	Range	0~32767	**Unit**	μs	**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					
P06.36	**Label**	Vibration Alarm Threshold			**Valid mode(s)**	P S T
	Range	0~1000	**Unit**	%	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0649
	Valid	Immediate				
	Set the ER190 vibration alarm out threshold.					

P06.37	**Label**	Vibration switching mode			**Valid mode(s)**	P S T
	Range	0~1000	**Unit**		**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x064B
	Valid	Immediate				

Set P00.03 Rigidity and P00.02 Auto Adjustment mode for vibration to allow automatic change:

Bit	value	function
0	0	Self-reducing rigidity and switching load mode are not allowed during vibration
	1	Allows self-reducing stiffness and switching load modes

P06.56	**Label**	Blocked rotor 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.					
P06.57	**Label**	Blocked rotor alarm delay time			**Valid mode(s)**	P S
	Range	1~10000	**Unit**	ms	**Default**	400
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0673
	Valid	Immediate				
	To set delay time for blocked rotor alarm. Err102 won't be triggered if time doesn't exceed set time in P06.57. Blocked rotor alarm is activated by default, alarm torque threshold = 300%, delay time = 400ms; speed threshold = 10rpm;					

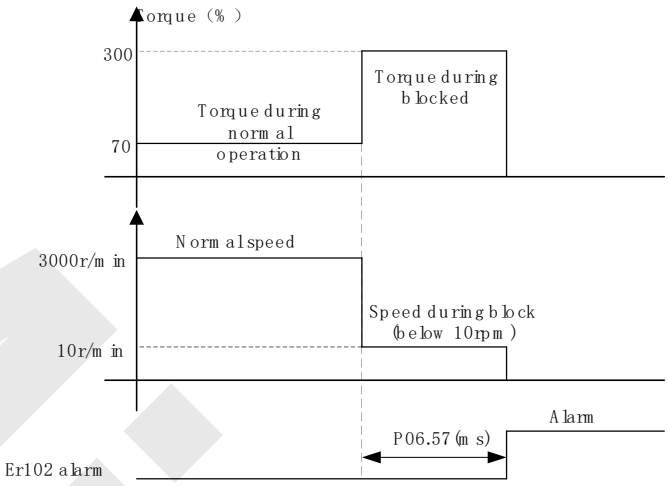


Diagram shows blocked rotor with speed under 10rpm

If the rotor is blocked but with speed over 10rpm, Er102 would not be triggered but Er100 might occur

P06.61	Label	Z signal holding time			Valid mode(s)	P	S	T
	Range	1~100	Unit	ms	Default	10		
	Byte length	16bit	Attribute	R/W	485 address	0x067B		
	Valid	Immediate						
	Sets the time for which the DO output Z signal is maintained.							

P06.63	Label	Absolute multiturn data upper limit			Valid mode(s)	P	S	T
	Range	0~32766	Unit	rev	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x067F		
	Valid	After restart						
	Sets the upper limit of multi-turn data when the absolute encoder is in rotation mode. Used in conjunction with P06.54, suitable for rotation mode when P00.15 = 2, feedback position range is 0 ~[(P06.63 1)/P06.54]x number of pulses per revolution; calculated as 1 when P06.54 = 0. Note: When P00.08 ≠ 0, the number of pulses per revolution = P00.08; When P00.08 = 0, the number of pulses per revolution = encoder resolution × electronic gear ratio)							

P06.66	Label	Initial overload rate of driver overload			Valid mode(s)	P	S	T
	Range	0~80	Unit	-	Default	50		
	Byte length	16bit	Attribute	R/W	485 address	0x0685		
	Valid	After restart						
	The overload rate is accumulated from 0% to 100 by default, and the overload rate of 380V driver is related to temperature. When the temperature exceeds 50 degrees, the overload rate increases directly from 50%.							

5.2.8 [Class 7] Factory settings

**Please take P0Ecaution when modifying Class 7 parameters. Might cause driver errors*

P07.15	Label	Motor model			Valid mode(s)	P	S	T
	Range	0x0~0x7FFF	Unit	—	Default	0x200		
	Byte length	16bit	Attribute	R/W	485 address	0x071F		
	Valid	After 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 rotational speed
P07.11	Motor max. rotational 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			**Valid mode(s)**	**P**	**S**	**T**
	Range	0x0~0x200	**Unit**	—	**Default**			
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x0721		
	Valid	After restart						

To select encoder type. Typically, encoder specifications are automatically read.

Value	Description
0x0	17-bit encoder
0x7	23-bit encoder

P07.31								
	Label	Discharge control mode setting			**Valid mode(s)**	**P**	**S**	**T**
	Range	0~1	**Unit**	—	**Default**			
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x073F		
	Valid	After restart						

Sets the discharge mode (default is **1** for drivers with 400W or lower power):

- **0**: Use regenerative resistor
- **1**: Do not use regenerative resistor (regenerative energy is absorbed by capacitors)

5.2.9 [Class B] Status Parameters

P0B.00								
	Label	Software version 1（DSP）			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	/	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B00		
	Show DSP software version info.							

P0B.01								
	Label	Software version 2（CPLD）			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	/	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B01		
	Show software version info.							

P0B.02								
	Label	Software version 3（Others）			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	/	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B02		
	Show software version info.							

P0B.03								
	Label	Current alarm			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	/	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B03		
	Show current alarm							

P0B.04	Label	Motor not rotating cause			Valid mode(s)	P	S	T
	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B04		
	Show cause of motor not rotating							

P0B.05	Label	Driver operation status			Valid mode(s)	P	S	T
	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B05		

Bit	Status	Description
0	RDY	Servo is ready
1	RUN	Servo is running
2	ERR	Driver error
3	HOME_OK	Homing completed
4	INP	In position
5	AT-SPEED	Velocity reached
6~15		Reserved

P0B.06	Label	Motor speed (Before filter)			Valid mode(s)	P	S	T
	Range	/	Unit	rpm	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B06		
	Motor actual speed							

P0B.07	Label	Motor output torque (1% unit)			Valid mode(s)	P	S	T
	Range	/	Unit	%	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B07		
	Percentage of actual torque and rated torque of motor							

P0B.08	Label	Motor current			Valid mode(s)	P	S	T
	Range	/	Unit	0.01A	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B08		
	Motor actual current							

P0B.09	Label	Motor speed (After filter)			Valid mode(s)	P	S	T
	Range	/	Unit	rpm	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B09		
	Motor speed after motor actual speed filtering							

P0B.10	Label	DC bus voltage			Valid mode(s)	P	S	T
	Range	/	Unit	V	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0A		
	Driver DC bus actual voltage							

P0B.11	Label	Driver temperature			Valid mode(s)	P	S	T
	Range	/	Unit	°C	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0B		
	Actual driver temperature							

P0B.15	Label	Motor overload rate			Valid mode(s)	P	S	T
	Range	/	Unit	%	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0F		
	Motor overload rate							

P0B.16	Label	Vent overload rate			Valid mode(s)	P	S	T
	Range	/	Unit	%	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B10		
	Vent overload rate							

P0B.17	Label	Physical I/O input status			Valid mode(s)	P	S	T
	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B04		
	Driver physical I/O input bit0 corresponds to DI1, bit1 to DI2 and so on; Bitn=1, DIn+1 high level signal input; Bitn=0, DIn+1 low level signal input							

P0B.18	Label	Cause of motor not rotating			Valid mode(s)	P	S	T
	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B04		
	Driver physical I/O output bit0 corresponds to DO1, bit1 to DO2 and so on; Bitn=1, DOn+1 high level signal output; Bitn=0 indicates DOn+1 low level signal output							

P0B.20	Label	Command position (Command unit)			Valid mode(s)	P		
	Range	/	Unit	P	Default	/		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B14 L: 0x0B15		
	Driver receives command pulse count. Driver command unit: 10000 pulses/rev, Encoder unit: 8388608 pulses/rev. If driver receives 8388608 pulses, 10000P will be shown.							

P0B.21	Label	Motor position (Command unit)			Valid mode(s)	P		
	Range	/	Unit	P	Default	/		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B16 L: 0x0B17		
	Motor position feedback. Driver command unit: 10000 pulses/rev, Encoder unit: 8388608 pulses/rev. If driver receives 8388608 pulses, 10000P will be shown.							

P0B.22	Label	Position deviation (Command unit)			Valid mode(s)	P		
	Range	/	Unit	P	Default	/		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B18 L: 0x0B19		
	Shows position deviation. Please refer to P0B.20.							

P0B.23	Label	Command position (Encoder unit)			Valid mode(s)	P		
	Range	/	Unit	P	Default	/		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B1A L: 0x0B1B		
	Driver receives command pulse count. Driver command unit: 10000 pulses/rev, Encoder unit: 8388608 pulses/rev. If driver receives 10000 pulses, 8388608 pulses will be shown.							

P0B.24	Label	Motor position (Encoder unit)			Valid mode(s)	P		
	Range	/	Unit	P	Default	/		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B1C L: 0x0B1D		
	Driver receives motor encoder feedback pulses							

P0B.25	Label	Position deviation (Encoder unit)			Valid mode(s)	P		
	Range	/	Unit	P	Default	/		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B1E L: 0x0B1F		
	Shows position deviation. Please refer to P0B.23.							

P0B.26	Label	Rotational encoder position feedback (Command unit)	Valid mode(s)	P		

	Range	/	**Unit**	P	**Default**	/		
	Byte length	32bit	**Attribute**	R	**485 address**	H: 0x0B20 L: 0x0B21		
	Motor position under rotary mode. Please refer to P0B.21							
P0B.30	**Label**	Maximum torque			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	%	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B26		
	Show maximum torque							
P0B.31	**Label**	Average load rate (1‰ units)			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	0.1%	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B27		
	Average load rate (1‰ units)							
P0B.34	**Label**	Motor speed (before filtering)			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	0.1r/min	**Default**	/		
	Byte length	32bit	**Attribute**	R	**485 address**	H: 0x0B2A L: 0x0B2B		
	Display motor speed before filtering							
P0B.35	**Label**	Motor speed (after filtering)			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	0.1r/min	**Default**	/		
	Byte length	32bit	**Attribute**	R	**485 address**	H: 0x0B2C L: 0x0B2D		
	Display motor speed after filtering							
P0B.36	**Label**	Motor output torque (1‰ unit)			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	0.1r/min	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B2E		
	Motor output torque (1‰ unit)							
P0B.37	**Label**	Motor current			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	0.001A	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B2F		
	Displays the motor current.							
P0B.38	**Label**	Inertia ratio			**Valid mode(s)**	**P**	**S**	**T**
	Range	/	**Unit**	%	**Default**	/		
	Byte length	16bit	**Attribute**	R	**485 address**	0x0B30		
	Displays the inertia ratio.							

5.2.10 [Class 8] PR control parameters

P08.00	**Label**	PR Control			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6000

It is recommended to modify PR control parameters using EDrive.

Bit	3	2	1	0
Description	=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 trigger

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	Path count			Valid mode(s)	PR
	Range	16	Unit	/	Default	16
	Byte length	16bit	Attribute	R	485 address	0x6001

16 paths

P08.02	Label	Control Operation			Valid mode(s)	PR
	Range	0x0 ~ 0xFFFF	Unit	/	Default	0x0
	Byte length	16bit	Attribute	R/W	485 address	0x6002

Attributes of P08.02 functions are divided into Read/Write. P refers to positioning motion of *N* path. Please refer to the following table.

Attribute	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
Read	0x20P	Indicates that the P-segment path is positioned.

P08.06	Label	Software positive limit H			Valid mode(s)	PR
	Range	0~ 65535	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6006

High bit of software positive limit (Only valid using 485 communication)

P08.07	Label	Software positive limit (L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6007

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.

P08.08	Label	Software negative limit H			Valid mode(s)	PR
	Range	0~ 0x65535	Unit	Pulse	Default	0

	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6008
	High bit of software negative limit (Only valid using 485 communication)					
P08.09	**Label**	Software negative limit (L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	Pulse	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x6009
	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 mode			**Valid mode(s)**	**PR**
	Range	0~ 0xFFFF	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x600A

To set homing method in PR mode. It is recommended to modify PR control parameters using EDrive.

Bit	8（Z-signal homing）	2-7（Homing mode）	1（Specific position after homing）	0（Homing direction）
Description	=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

P08.11	**Label**	Zero position H			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x600B
	High bit of zero position (Only valid using 485 communication)					

P08.12	**Label**	Zero position (L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	p	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x600C
	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.					
P08.13	**Label**	Home position offset H			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x600D
	High bit of home position offset (Only valid using 485 communication)					
P08.14	**Label**	Home position offset (L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	p	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x600E
	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 homing velocity			**Valid mode(s)**	**PR**
	Range	1 ~ 6000	**Unit**	rpm	**Default**	200
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x600F

	To set high homing velocity in PR mode.					
P08.16	**Label**	Low homing velocity			**Valid mode(s)**	**PR**
	Range	1 ~ 6000	**Unit**	rpm	**Default**	50
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6010
	To set low homing velocity in PR mode.					
P08.17	**Label**	Homing acceleration			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6011
	To set homing acceleration time in PR mode, time needed for 0rpm to accelerate to 1000rpm					
P08.18	**Label**	Homing deceleration			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6012
	To set homing deceleration time in PR mode, time needed for 1000rpm to decelerate to 0rpm					
P08.19	**Label**	Homing torque holding time			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	ms	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6013
	To set homing torque holding time					
P08.20	**Label**	Homing torque			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	%	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6014
	To set homing torque					

P08.21	**Label**	Homing overtravel alarm range			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	0.1r	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6015
	To set homing overtravel alarm threshold.					

P08.22	**Label**	Emergency stop at limit deceleration			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	10
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6016
	To set position limit emergency stop deceleration.					
P08.23	**Label**	STP emergency stop deceleration			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	50
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6017
	To set STP emergency stop deceleration.					

P08.26	**Label**	I/O combination trigger mode			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x601A

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	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	

P08.27	Label	I/O combination filter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	ms	Default	5
	Byte length	16bit	Attribute	R/W	485 address	0x601B

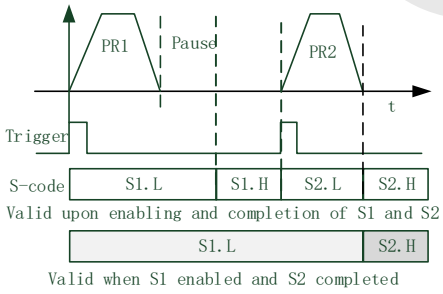
To set I/O combination filter time.

P08.28	Label	S-code current output value			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x601C

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
Description	S-code valid when completed. 0: Invalid, retain P0Evious 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	0x0~0x20F	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x601D

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**	JOG velocity			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	rpm	**Default**	100
	Byte length	16bit	**Attribute**	R	**485 address**	0x6027
	Set JOG velocity in PR mode.					
P08.40	**Label**	JOG acceleration			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R	**485 address**	0x6028
	Set JOG acceleration in PR mode.					

P08.41	**Label**	JOG deceleration			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R	**485 address**	0x6029
	Set JOG deceleration in PR mode.					

P08.42	**Label**	Command position H			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	
	Byte length	16bit	**Attribute**	R	**485 address**	0x602A
	High bit of command position (Only valid using 485 communication)					
P08.43	**Label**	Command position（L）			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	p	**Default**	
	Byte length	32bit	**Attribute**	R	**485 address**	0x602B
	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.					
P08.44	**Label**	Motor position H			**Valid mode(s)**	**PR**
	Range	0~ 0xFFFF	**Unit**	/	**Default**	
	Byte length	16bit	**Attribute**	R	**485 address**	0x602C
	High bit of command position (Only valid using 485 communication)					
P08.45	**Label**	Motor position（L）			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	p	**Default**	
	Byte length	32bit	**Attribute**	R	**485 address**	0x602D
	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 I/O status			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	
	Byte length	16bit	**Attribute**	R	**485 address**	0x602E
	Input I/O status, displays in decimal system. Convert to binary system to determine which bit is valid.					
P08.47	**Label**	Output I/O status			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	
	Byte length	16bit	**Attribute**	R	**485 address**	0x602F
	Output I/O status, displays in decimal system. Convert to binary system to determine which bit is valid.					

P08.48	Label	Path 0 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6030
	Please refer to P08.28 for S-code setting.					

P08.49	Label	Path 1 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6031
	Please refer to P08.28 for S-code setting.					

P08.50	Label	Path 2 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6032
	Please refer to P08.28 for S-code setting.					

P08.51	Label	Path 3 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6033
	Please refer to P08.28 for S-code setting.					

P08.52	Label	Path 4 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6034
	Please refer to P08.28 for S-code setting.					

P08.53	Label	Path 5 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6035
	Please refer to P08.28 for S-code setting.					

P08.54	Label	Path 6 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6036
	Please refer to P08.28 for S-code setting.					

P08.55	Label	Path 7 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6037
	Please refer to P08.28 for S-code setting.					

P08.56	Label	Path 8 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6038
	Please refer to P08.28 for S-code setting.					

P08.57	Label	Path 9 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6039
	Please refer to P08.28 for S-code setting.					

P08.58	Label	Path 10 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x603A

	Please refer to P08.28 for S-code setting.

P08.59	Label	Path 11 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x603B
	Please refer to P08.28 for S-code setting.					

P08.60	Label	Path 12 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x603C
	Please refer to P08.28 for S-code setting.					

P08.61	Label	Path 13 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x603D
	Please refer to P08.28 for S-code setting.					

P08.62	Label	Path 14 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x603E
	Please refer to P08.28 for S-code setting.					

P08.63	Label	Path 15 S-code			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x603F
	Please refer to P08.28 for S-code setting.					

5.2.11 [Class 9] PR control path parameters

It is more convenient to set Class 9 parameters on EDrive

P09.00	Label	PR0 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6200

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

P09.01	Label	PR0 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6201
	High bit of Path 0 position (Only valid using 485 communication)					

P09.02	Label	PR0 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6202

	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**	rpm	**Default**	60
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6203
	To set PR path 0 velocity.					
P09.04	**Label**	PR0 acceleration time			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6204
	To set PR path 0 acceleration time, time needed for 0rpm to accelerate to 1000rpm					
P09.05	**Label**	PR0 deceleration time			**Valid mode(s)**	**PR**
	Range	1 ~32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6205
	To set PR path 0 deceleration time, time needed for 1000rpm to decelerate to 0rpm					
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
	To set pause time for PR path 0 from completion to next path					
P09.07	**Label**	PR0 special parameter			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R	**485 address**	0x6207
	Reserved					

P09.08	**Label**	PR1 mode			**Valid mode(s)**	**PR**
	Range	0x0~0xFFFF	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6208

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

P09.09	**Label**	PR1 position H			**Valid mode(s)**	**PR**
	Range	0~ 0xFFFF	**Unit**	Pulse	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6209
	High bit of Path 1 position (Only valid using 485 communication)					
P09.10	**Label**	PR1 position(L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	Pulse	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x620A
	For Path position, using 485 communication, only able to R/W low 16 bit. R/W high 16 bit needs to be realized through P09.09.					
P09.11	**Label**	PR1 velocity			**Valid mode(s)**	**PR**
	Range	-10000～10000	**Unit**	rpm	**Default**	60
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x620B
	To set PR path 1 velocity.					
P09.12	**Label**	PR1 acceleration time			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x620C

	To set PR path 1 acceleration time, time needed for 0rpm to accelerate to 1000rpm					
P09.13	Label	PR1 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x620D
	To set PR path 1 deceleration time, time needed for 1000rpm to decelerate to 0rpm					
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
	To set pause time for PR path 2 from completion to next path					
P09.15	Label	PR1 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x620F
	Reserved					

P09.16	Label	PR2 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6210

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

P09.17	Label	PR2 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6211
	High bit of Path 2 position (Only valid using 485 communication)					
P09.18	Label	PR2 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6212
	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 P09.17.					
P09.19	Label	PR2 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6213
	To set PR path 2 velocity.					
P09.20	Label	PR2 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6214
	To set PR path 2 acceleration time, time needed for 0rpm to accelerate to 1000rpm					
P09.21	Label	PR2 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6215
	To set PR path 2 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 2 from completion to next path					

P09.23	Label	PR2 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6217
	Reserved					

P09.24	Label	PR3 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6218

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

P09.25	Label	PR3 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6219
	High bit of Path 3 position (Only valid using 485 communication)					

P09.26	Label	PR3 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x621A
	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 P09.25.					

P09.27	Label	PR3 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x621B
	To set PR path 3 velocity.					

P09.28	Label	PR3 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x621C
	To set PR path 3 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.29	Label	PR3 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x621D
	To set PR path 0 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 3 from completion to next path					

P09.31	Label	PR3 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x621F
	Reserved					

P09.32	Label	PR4 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6220

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

P09.33	Label	PR4 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6221
	High bit of Path 0 position (Only valid using 485 communication)					

P09.34	Label	PR4 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6222
	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 P09.33.					

P09.35	Label	PR4 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6223
	To set PR path 4 velocity.					

P09.36	Label	PR4 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6224
	To set PR path 4 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.37	Label	PR4deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6225
	To set PR path 4 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 4 from completion to next path					

P09.39	Label	PR4 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6227
	Reserved					

P09.40	Label	PR5 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6228

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

P09.41	**Label**	PR5 position H			**Valid mode(s)**	**PR**
	Range	0~ 0xFFFF	**Unit**	Pulse	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6229
	High bit of Path 5 position (Only valid using 485 communication)					
P09.42	**Label**	PR5 position(L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	Pulse	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x622A
	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 P09.41.					
P09.43	**Label**	PR5 velocity			**Valid mode(s)**	**PR**
	Range	-10000～10000	**Unit**	rpm	**Default**	60
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x622B
	To set PR path 5 velocity.					
P09.44	**Label**	PR5 acceleration time			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x622C
	To set PR path 5 acceleration time, time needed for 0rpm to accelerate to 1000rpm					
P09.45	**Label**	PR5 deceleration time			**Valid mode(s)**	**PR**
	Range	1 ~32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x622D
	To set PR path 5 deceleration time, time needed for 1000rpm to decelerate to 0rpm					
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
	To set pause time for PR path 5 from completion to next path					
P09.47	**Label**	PR5 special parameter			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R	**485 address**	0x622F
	Reserved					

P09.48	**Label**	PR6 mode			**Valid mode(s)**	**PR**
	Range	0x0~0xFFFF	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6230

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

P09.49	Label	PR6 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6231
	High bit of Path 6 position (Only valid using 485 communication)					

P09.50	Label	PR6 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6232
	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 P09.49.					

P09.51	Label	PR6 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6233
	To set PR path 6 velocity.					

P09.52	Label	PR6 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6234
	To set PR path 6 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.53	Label	PR6 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6235
	To set PR path 6 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 6 from completion to next path					

P09.55	Label	PR6 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6237
	Reserved					

P09.56	Label	PR7 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6238

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

P09.57	**Label**	PR7 position H			**Valid mode(s)**	**PR**
	Range	0~ 0xFFFF	**Unit**	Pulse	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6239
	High bit of Path 7 position (Only valid using 485 communication)					
P09.58	**Label**	PR7 position(L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	Pulse	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x623A
	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 P09.57.					
P09.59	**Label**	PR7 velocity			**Valid mode(s)**	**PR**
	Range	-10000～10000	**Unit**	rpm	**Default**	60
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x623B
	To set PR path 7 velocity.					
P09.60	**Label**	PR7 acceleration time			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x623C
	To set PR path 7 acceleration time, time needed for 0rpm to accelerate to 1000rpm					
P09.61	**Label**	PR7 deceleration time			**Valid mode(s)**	**PR**
	Range	1 ~32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x623D
	To set PR path 0 deceleration time, time needed for 1000rpm to decelerate to 0rpm					
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
	To set pause time for PR path 7 from completion to next path					
P09.63	**Label**	PR7 special parameter			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R	**485 address**	0x623F
	Reserved					
P09.64	**Label**	PR8 mode			**Valid mode(s)**	**PR**
	Range	0x0~0xFFFF	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6240

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

P09.65	**Label**	PR8 position H			**Valid mode(s)**	**PR**
	Range	0~ 0xFFFF	**Unit**	Pulse	**Default**	0
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6241
	High bit of Path 0 position (Only valid using 485 communication)					
P09.66	**Label**	PR8 position(L)			**Valid mode(s)**	**PR**
	Range	-2147483648~ 2147483647	**Unit**	Pulse	**Default**	0
	Byte length	32bit	**Attribute**	R/W	**485 address**	0x6242
	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 P09.65.					
P09.67	**Label**	PR8 velocity			**Valid mode(s)**	**PR**
	Range	-10000～10000	**Unit**	rpm	**Default**	60
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6243
	To set PR path 8 velocity.					
P09.68	**Label**	PR8 acceleration time			**Valid mode(s)**	**PR**
	Range	1 ~ 32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6244
	To set PR path 8 acceleration time, time needed for 0rpm to accelerate to 1000rpm					
P09.69	**Label**	PR8 deceleration time			**Valid mode(s)**	**PR**
	Range	1 ~32767	**Unit**	ms/Krpm	**Default**	100
	Byte length	16bit	**Attribute**	R/W	**485 address**	0x6245
	To set PR path 8 deceleration time, time needed for 1000rpm to decelerate to 0rpm					
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
	To set pause time for PR path 8 from completion to next path					
P09.71	**Label**	PR8 special parameter			**Valid mode(s)**	**PR**
	Range	0 ~ 65535	**Unit**	/	**Default**	0
	Byte length	16bit	**Attribute**	R	**485 address**	0x6247
	Reserved					

P09.72	Label	PR9 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6248

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

P09.73	Label	PR9 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6249
	High bit of Path 9 position (Only valid using 485 communication)					

P09.74	Label	PR9 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x624A
	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 P09.73.					

P09.75	Label	PR9 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x624B
	To set PR path 0 velocity.					

P09.76	Label	PR9 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x624C
	To set PR path 9 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.77	Label	PR9 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x624D
	To set PR path 9 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 9 from completion to next path					

P09.79	Label	special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x624F
	Reserved					

P09.80	Label	PR10 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6250

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 H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6251
	High bit of Path10 position (Only valid using 485 communication)					

P09.82	Label	PR10 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6252
	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 P09.81.					

P09.83	Label	PR10 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6253
	To set PR path 10 velocity.					

P09.84	Label	PR10 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6254
	To set PR path 10 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.85	Label	PR10 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6255
	To set PR path 10 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 10 from completion to next path					

P09.87	Label	PR10 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6257
	Reserved					

P09.88	Label	PR11 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6258

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

P09.89	Label	PR11 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6259
	High bit of Path 11 position (Only valid using 485 communication)					

P09.90	Label	PR11 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x625A
	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 P09.89.					

P09.91	Label	PR11 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x625B
	To set PR path 11 velocity.					

P09.92	Label	PR11 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x625C
	To set PR path 11 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.93	Label	PR11 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x625D
	To set PR path 11 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 11 from completion to next path					

P09.95	Label	PR11 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x625F
	Reserved					

P09.96	Label	PR12 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6260

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

P09.97	Label	PR12 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6261
	High bit of Path 12 position (Only valid using 485 communication)					

P09.98	Label	PR12 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6262
	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 P09.97.					

P09.99	Label	PR12 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6263
	To set PR path 12 velocity.					

P09.100	Label	PR12 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6264
	To set PR path 12 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.101	Label	PR12 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6265
	To set PR path 12 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 12 from completion to next path					

P09.103	Label	PR12 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6267
	Reserved					

P09.104	Label	PR13 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6268

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

P09.105	Label	PR13 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6269
	High bit of Path 13 position (Only valid using 485 communication)					

P09.106	Label	PR13 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x626A
	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 P09.105.					

P09.107	Label	PR13 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x626B
	To set PR path 13 velocity.					

P09.108	Label	PR13 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x626C
	To set PR path 13 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.109	Label	PR13 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x626D
	To set PR path 13 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 13 from completion to next path					

P09.111	Label	PR13 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x626F
	Reserved					

P09.112	Label	PR14 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6270

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

P09.113	Label	PR14 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6271
	High bit of Path 14 position (Only valid using 485 communication)					

P09.114	Label	PR14 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x6272
	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 P09.113.					

P09.115	Label	PR14 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x6273
	To set PR path 14 velocity.					

P09.116	Label	PR14 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6274
	To set PR path 14 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.117	Label	PR14 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x6275
	To set PR path 14 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

P09.118	Label	PR14 pause time			Valid mode(s)	PR
	Range	0 ~ 32767	Unit	ms	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6276
	To set pause time for PR path 14 from completion to next path					

P09.119	Label	PR14 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x6277
	Reserved					

P09.120	Label	PR15 mode			Valid mode(s)	PR
	Range	0x0~0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6278

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

P09.121	Label	PR15 position H			Valid mode(s)	PR
	Range	0~ 0xFFFF	Unit	Pulse	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x6279
	High bit of Path 15 position (Only valid using 485 communication)					

P09.122	Label	PR15 position(L)			Valid mode(s)	PR
	Range	-2147483648~ 2147483647	Unit	Pulse	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0x627A
	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 P09.121.					

P09.123	Label	PR15 velocity			Valid mode(s)	PR
	Range	-10000～10000	Unit	rpm	Default	60
	Byte length	16bit	Attribute	R/W	485 address	0x627B
	To set PR path 15 velocity.					

P09.124	Label	PR15 acceleration time			Valid mode(s)	PR
	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x627C
	To set PR path 15 acceleration time, time needed for 0rpm to accelerate to 1000rpm					

P09.125	Label	PR15 deceleration time			Valid mode(s)	PR
	Range	1 ~32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x627D
	To set PR path 15 deceleration time, time needed for 1000rpm to decelerate to 0rpm					

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
	To set pause time for PR path 15 from completion to next path					

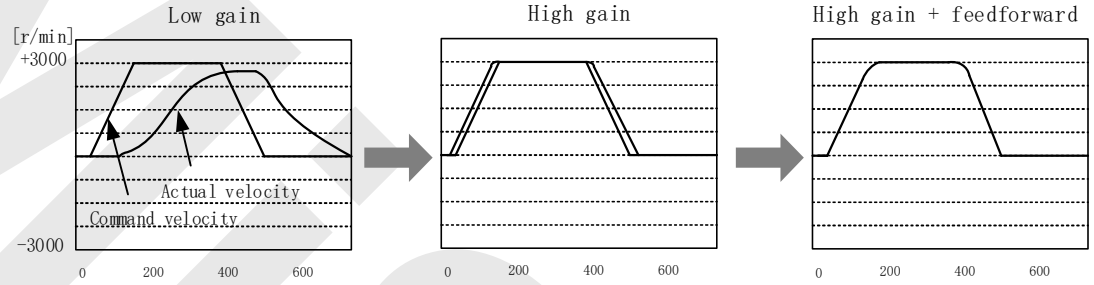
P09.127	Label	PR15 special parameter			Valid mode(s)	PR
	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0x627F
	Reserved					

Chapter 6 Application

6.1 Gain Adjustment

6.1.1 Purpose of Gain Adjustment

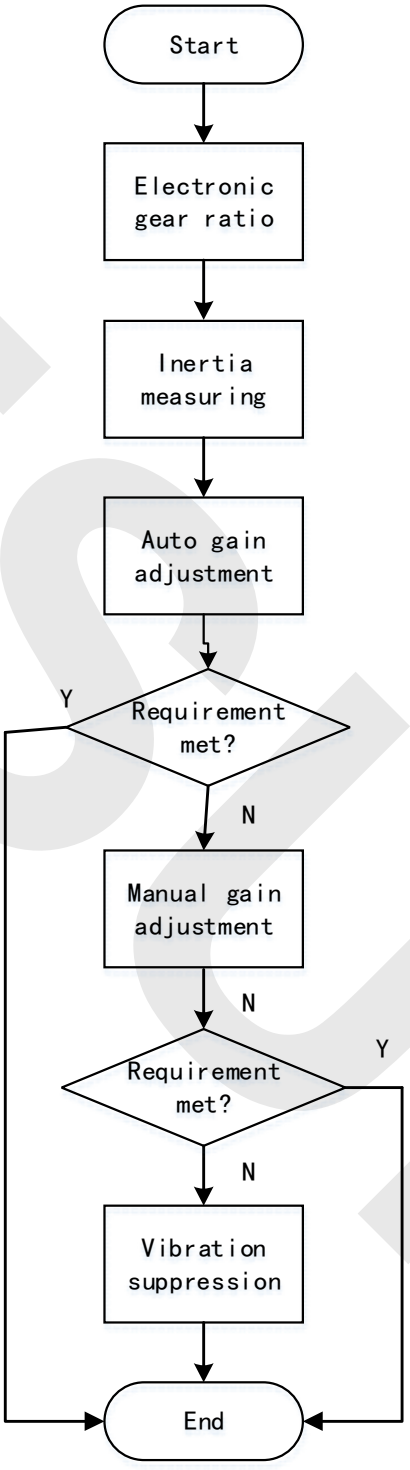
In order for servo driver to execute commands from master device without delay and to optimize machine performance, gain adjustment has to be done yet.



Position loop gain: 320 (0.1/s) **Velocity loop gain**: 180 (0.1Hz) **Velocity loop integral time constant**: 31ms	**Position loop gain**: 900 (0.1/s) **Velocity loop gain**: 500 (0.1Hz) **Velocity loop integral time constant**: 31ms	**Position loop gain**: 900 (0.1/s) **Velocity loop gain**: 500 (0.1Hz) **Velocity loop integral time constant**: 31ms

Servo driver gain adjustment is done in combination with a few other parameters (Inertia ratio, Position loop gain, Velocity loop gain and Filters settings). These parameters will have an effect on each other so it always advisable to tune each parameter according in order to achieve optimal machine performance. Please refer to the steps below

6.1.2 Gain Adjustment Procedure



Gain Adjustment Flow

Steps	Functions	Explanation
Inertia ratio identification	Online	Motor moves with command from controller, servo driver will automatically calculate load-inertia ratio
	Offline	Using servo driver inertia determining function, servo driver can automatically calculate load-inertia ratio
Auto gain adjustment	Auto gain adjustment	Real time determining of mechanical load, gain value is set accordingly. 1. One-click tuning (Can be realized using EDrive. Auto tuning of gain and inertia according to actual data) 2. Real time auto adjustment (Set by selecting mechanical stiffness level, related gain parameters will be automatically adjusted accordingly)
Manual gain adjustment	Basic gain	On top of auto gain adjustment, manually adjust related parameters so that machine can have better responsiveness and following
	Basic steps	1. Gain related parameters tuning under position mode 2. Gain related parameters tuning under velocity mode 3. Gain related parameters tuning under torque mode
	Gain switching	• Gain switching through internal data or external signal. Lower vibration at stop, shorten tuning time, improve command following.
	Model following control	• Improve responsiveness, shorten positioning time (Only available in position mode)
	Command pulse filter	Set filter for position, velocity and torque command pulse.
	Gain feedforward	Enable feedforward function to improve following behavior
	Friction compensation	Reduce the effect of mechanical friction
	3rd gain switching	Based on usual gain switching function. Can be set to switch gain at stopping and reduce positioning time.
Vibration supP0Ession	Mechanical resonance	Using notch filtering function to supP0Ess mechanical resonance.
	End vibration supP0Ession	To supP0Ess low frequency vibration of mechanical end

6.2 Inertia ratio identification function

Inertia ratio = Total mechanical load rotational inertia / Motor rotational inertia

Inertia ratio is an important parameter. Setting a suitable value can help with the P0Ecise tuning of the servo system. Inertia ratio can be set manually and also be determined automatically through servo driver

<u>To make sure accurate inertia ratio identification</u>

1. Max rotational velocity at 400rpm
2. Acceleration/deceleration time above 100ms
3. Stable load torque without large variation.
   •

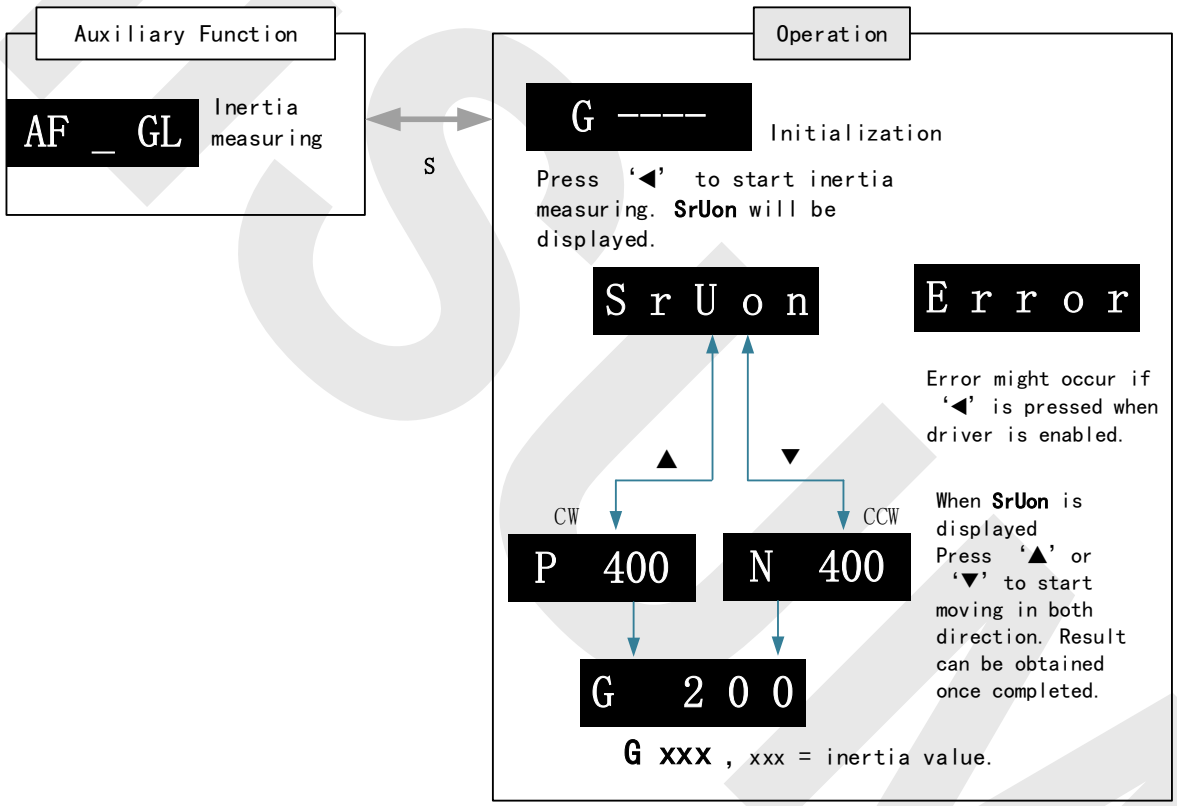
6.2.1 Online inertia determination

Enable motor using controller. Let motor run at above 400rpm, make sure there are acceleration, constant velocity and deceleration phase during the whole run. Cycle through 2-3 times to calculate load-inertia ratio. Result can be found on the front panel d16 or through EDrive system monitoring page. Enter the calculated value into P00.04 and save.

6.2.2 Offline inertia determination

Can be achieved through driver front panel or on EDrive
Please make sure: 1. Servo driver is disabled.
2. Axis is within safe and allowed range and limit switch is not triggered to P0Event axis from over travelling.

Auxiliary function to determine inertia on front panel



Steps:

1、Set the trial run velocity **P06.04**. Value set shouldn't be too large, please keep it at around **400 r/min**.

2、Enter **AF_GL** for auxiliary function – Inertia ratio determination into front panel

3、P0Ess S once to enter. "**G---**" will be displayed on the front panel.

4、P0Ess ◀ once to display "**StUon**"

5、P0Ess ▲ or ▼ once to start to calculate the inertia.

6、After the calculation is done, G **xxx** will be displayed and **xxx** is the value of inertia calculated.

7、Write the corresponding value into P00.04. Please refer to parameter saving on servo driver.

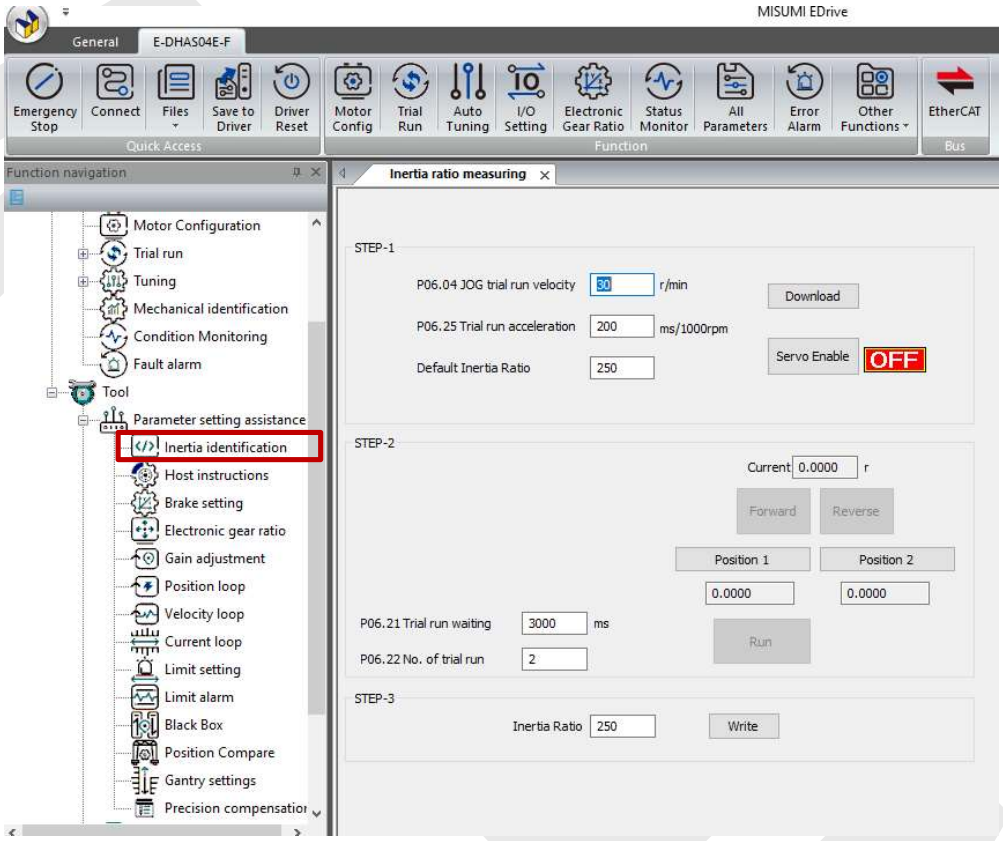
Inertia measuring using EDrive

1) Open the inertia identification page, set jog speed (P06.04) and acceleration time (P06.25), then click **Download**.

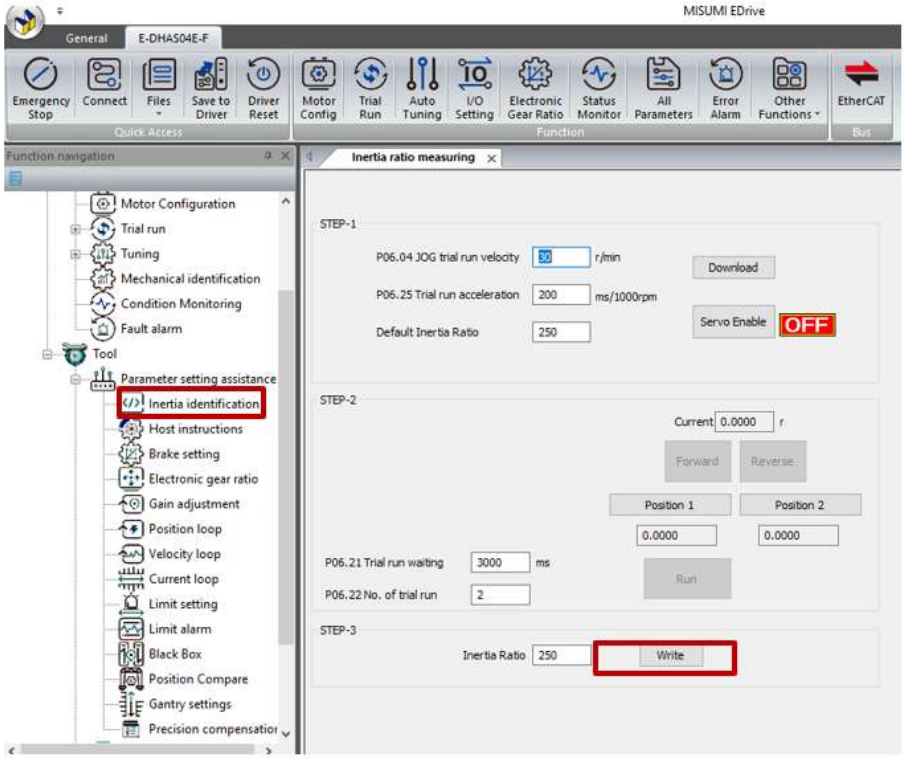
2) Enable "Disable external enable", click **Servo Enable** to turn ON.

3) Use **Forward** and **Reverse** to move motor; click **Position 1** and **Position 2** to record two positions.

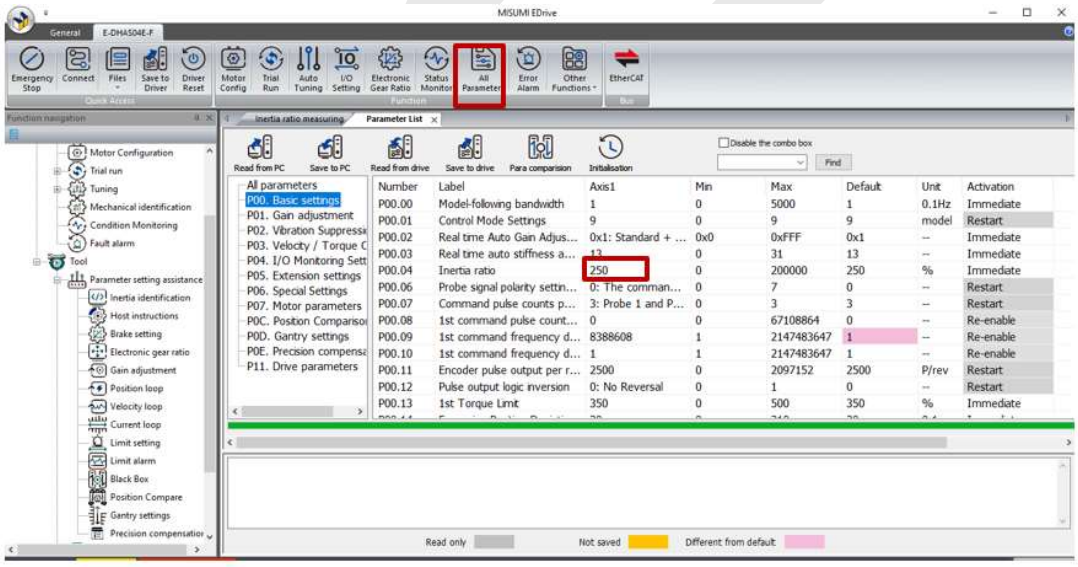
4) Set wait time (P06.21) and cycle count (P06.22), then click **Run** to execute movement.



5) After completion, the system auto-calculates inertia ratio. Click **Write** to store.



6) Open **Parameter Management**, confirm value saved to P00.04, then click **Save to Drive**



Please take note:

1. Trial run velocity and distance should be optimal to prevent any axis from bumping into objects.

2. It is recommended to move only in 1 direction for vertically mounted axis. Take precaution before moving the axis.
3. For applications with higher frictional drag, please set a minimal travel distance.

P00.04	Label	Inertia ratio			Valid mode(s)	P	S	T
	Range	0~20000	Unit	%	Default	250		
	Byte length	16bit	Attribute	R/W	485 address	0x0009		
	Valid	Immediate						

P00.04=(load inertia/motor rotational inertia)×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

Common issues

Error	Cause	Solution
Inertia measuring failure	Loose load connection	Check for mechanical failure
	Measuring distance is too short	Increase measuring distance
	Belt load	Please P0E-set an inertia ratio when using a belt to P0Event jolt due to low inertia.

6.3 Auto Gain Tuning (Auto-Tuning)

6.3.1 Single parameter tuning

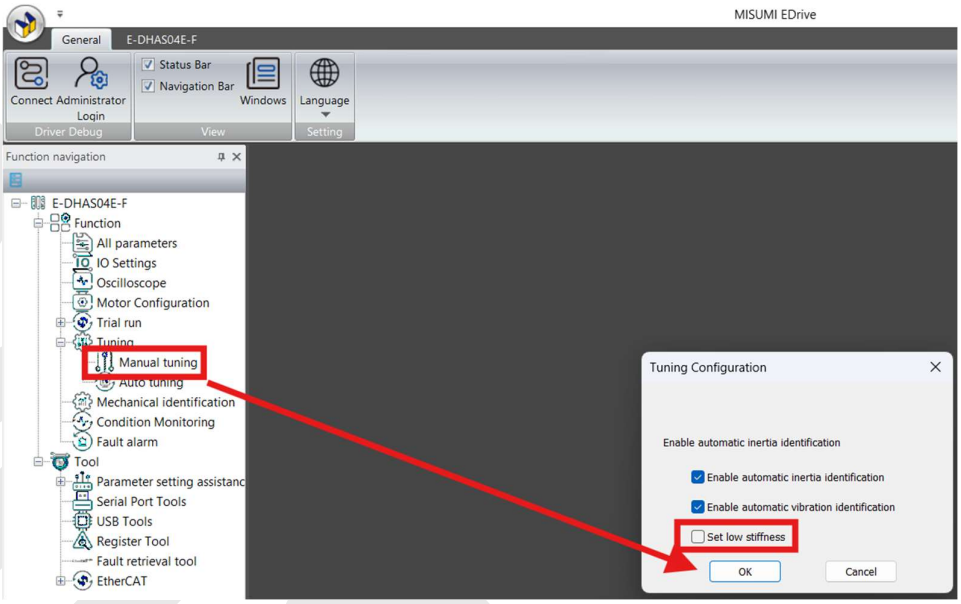
Set a mechanical stiffness level and the driver will automatically tune the parameters accordingly, including inertia measuring and vibration supP0Ession to fulfill responsiveness and stability needs. At same time, more advanced functions can be applied, for example: Command pulse filter, low frequency vibration supP0Ession, etc.
Recommended for applications where inertia changes is minute. Single parameter tuning is more complicated to set up compared to one-click tuning. Use single parameter tuning when one-click tuning doesn't fulfill the needs.

	Recommended application scenarios
Control mode	Suitable in position mode (Not applicable in other modes)
Others	➢ Servo ON (SRV-ON) status ➢ Set suitable position/torque limit so that motor can run normally ➢ Use trial run or any external controller to make sure no clash of axes

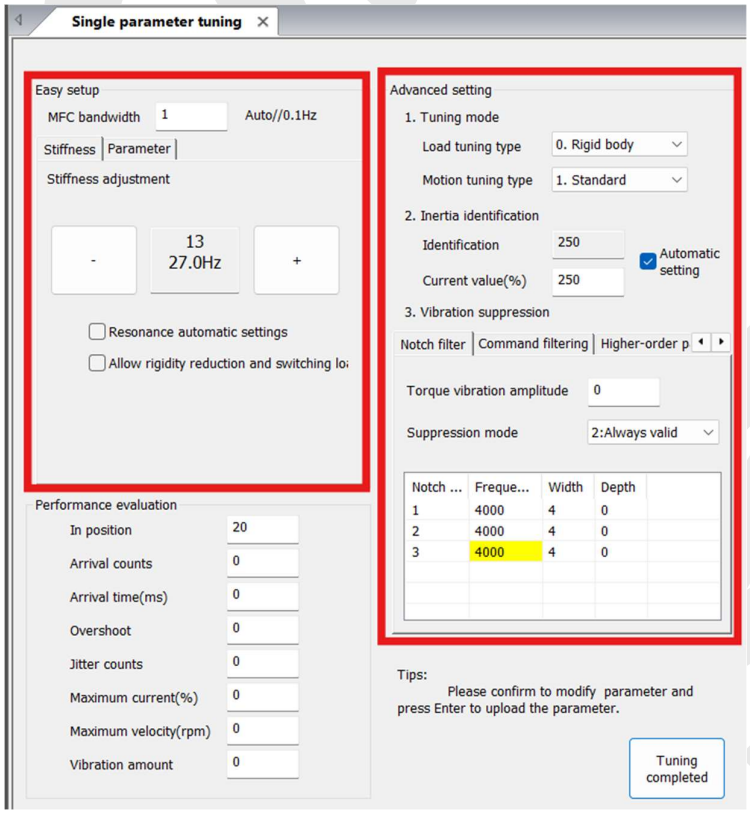
	Factors affecting single parameter tuning
Load inertia	➢ External load smaller or 30 times larger than rotor inertia ➢ Inertia measuring might fail upon changes in load inertia ➢ Load torque changes drastically
Load	➢ Mechanical stiffness is too low ➢ Existence of gear backlash or any other non-linear factors ➢ Complicated mechanical load structure
Motion	➢ Low speed, no more than 300[r/min]. ➢ Acceleration/deceleration time too long, more than = 600ms ➢ Speed > 300r/min, acceleration/deceleration time < 600ms but travelling time duration < 50ms.

Operation Steps

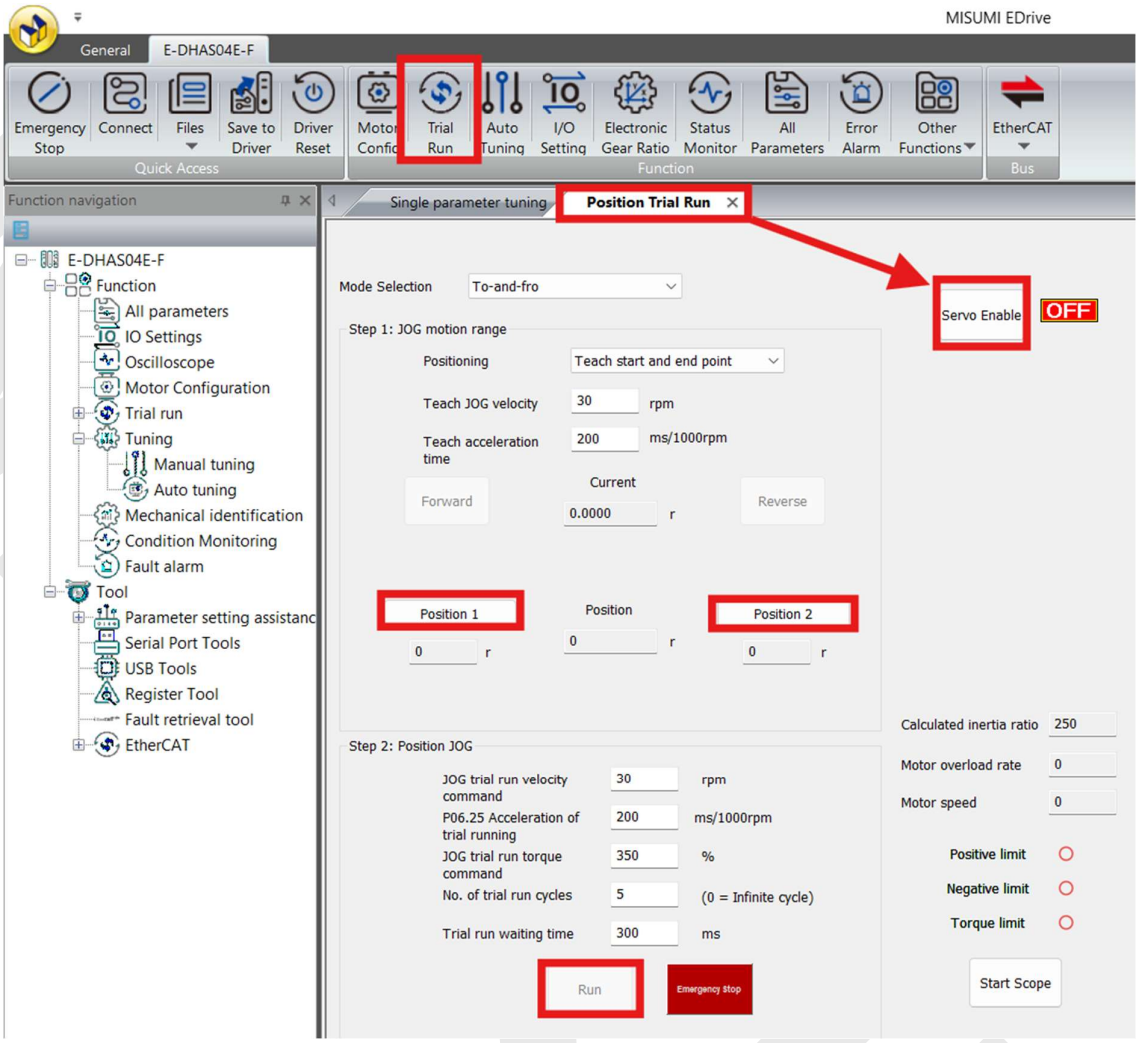
1. Open the wizard. Select the Manual Tuning function. The interface will appear as shown, with Inertia Auto Identification and Vibration Auto Identification enabled by default.
If rigidity parameter P00.03 is greater than 11, and low rigidity is selected, the initial rigidity will be set to 11 upon entering manual tuning.



2. Manual tuning interface. In Simple Settings, set MFC Bandwidth to 1 for automatic model-following bandwidth adjustment. You can also manually set other values.
If no advanced parameters need adjustment, you can use the Trial Run function or send commands from the host to rotate the motor.



3. Manual tuning requires motor movement. Use the Trial Run function to configure motion path, speed, and acceleration.

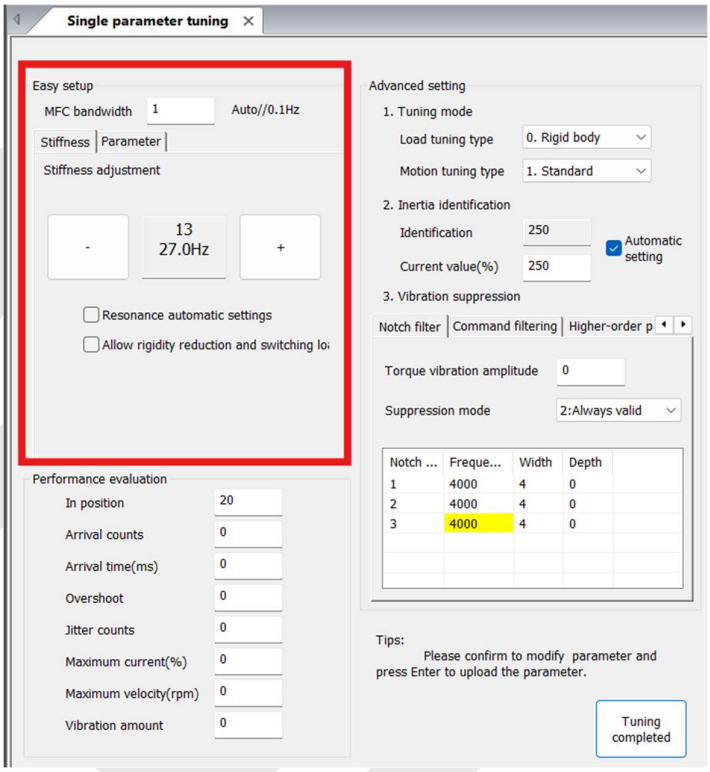


For E-DHASxxP, there are three methods to teach the motion range:

1) Teach Start and End Point: After enabling the servo, use forward/reverse buttons to adjust position. Click “Position 1/2” to complete setup.
2) Input Start and End Point: Directly input positions in the fields. The motor will move to the start point and then perform reciprocating motion.
3) Input distance: Input the travel distance in the position difference field. The motor will perform reciprocating motion from the current position.

Note: Teaching speed should not be too fast to avoid collisions!
After setting the motion range, configure JOG motion properties:
Jog trial run velocity command: >300 rpm during manual tuning.
Acceleration of trial running: <600 ms/1000rpm during manual tuning.
No. of trial run cycles: Set an appropriate number of runs to assist manual tuning.

4. Automatic parameter setting.
Manual Tuning includes Easy Setup and Advanced Setting:
1) Easy Setup: Adjust rigidity simply to achieve auto-tuning. Inertia identification is enabled by default and will auto-set the inertia ratio.



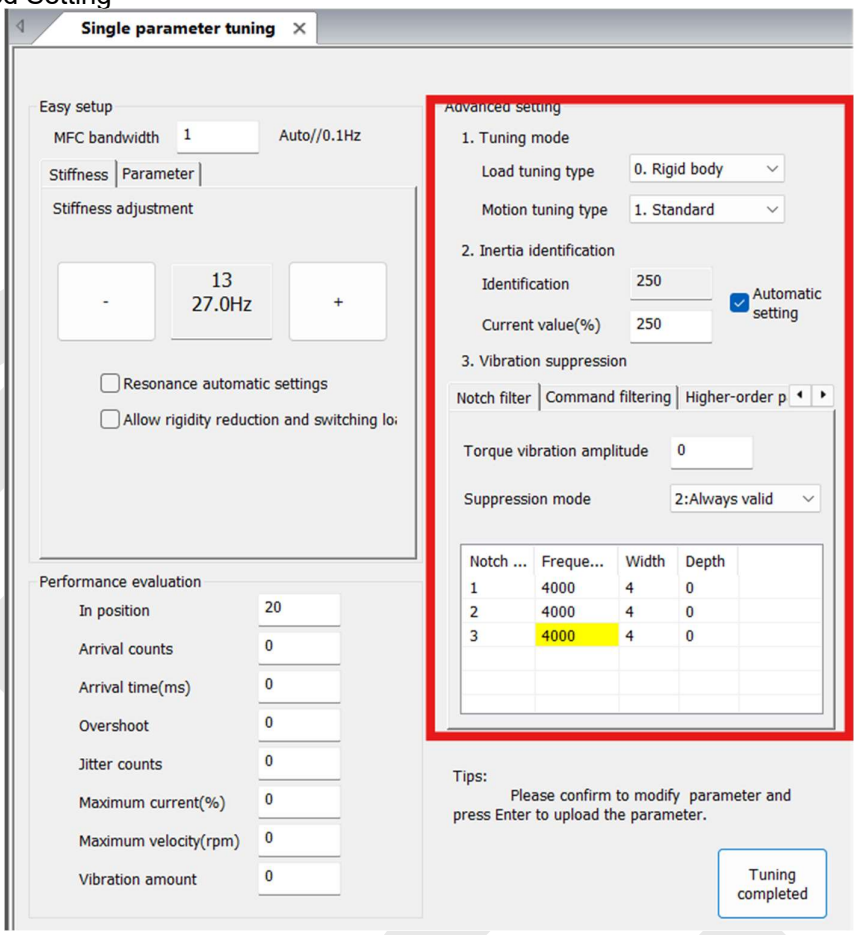
Easy Setup content:
MFC BandwidtH: Sets the model following bandwidth. MFC, also known as model following control, is used in position loop control to improve command response, accelerate positioning time, and reduce tracking error.

MFC Function	Description
0	Disable MFC
1	Auto-adjust MFC bandwidth
2 ~ 9	Invalid
10 ~ 2000	Manual setting (recommended 30–100 for belt applications)

Stiffness Adjustment:
Range: 0–31. Press '+' to increase stiffness, press '-' to decrease stiffness.
Higher values increase speed response but may cause vibration.
Set based on mechanical structure strength. If vibration count exceeds 10, reduce rigidity by 2 levels to prevent loosening of fasteners.
For belts or long rods prone to deformation, reduce rigidity and apply vibration suppression.

Resonance Automatic Settings:
If checked: cyclic vibration detection under current rigidity; resets to default if no vibration is detected.

2) Advanced Setting



<1> Tuning mode

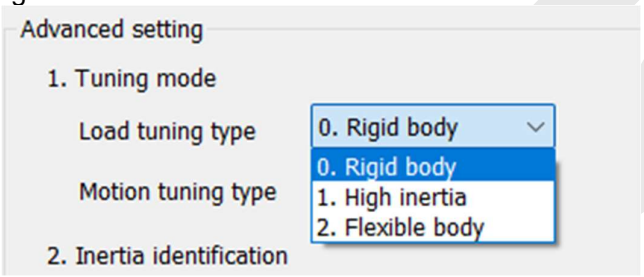
Load Tuning Type: The default is Rigid body, Standard. If vibration occurs during operation, it will automatically change to adapt to different transmission methods.

0: Rigid body (e.g., ball screw)

1: High inertia (load inertia >30–40× motor inertia)

2: Flexible body (e.g., belt drive)

Set the correct load setting type according to the actual situation and then perform debugging and setting for better results!



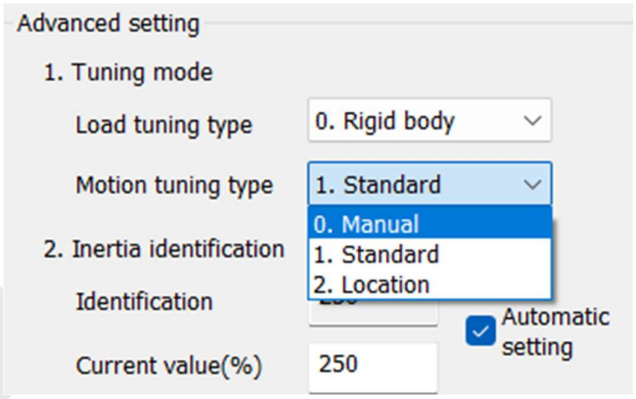
Motion Tuning Type:

0: Manual (disables real-time auto adjustment)

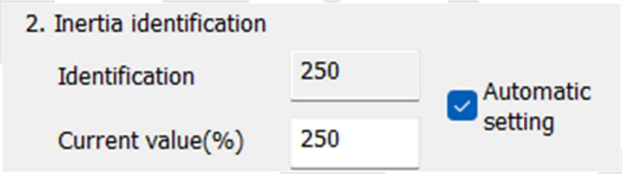
1: Standard (stable mode, no gain switching)

2: Location (for variable loads, e.g., horizontal axis)

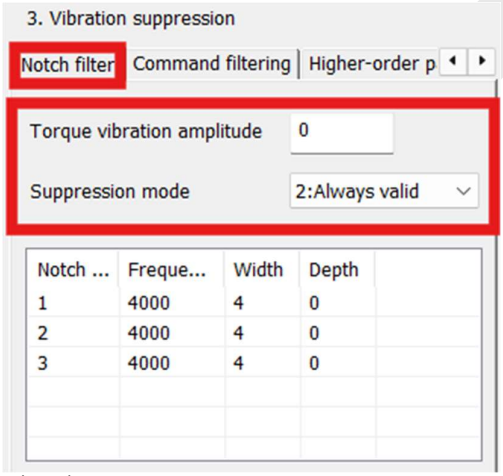
The main difference between standard and positioning is that there is no gain switching in standard mode.



<2> Inertia identification:
Enabled by default.
Identified %: flashes yellow when successful
Current Value %: syncs with identified value if auto-set is checked; otherwise, manual input is allowed
If 'Automatic setting' is unchecked, the identification value will not be synchronized. You can manually set the current inertia ratio and press Enter to submit.
When 'Automatic setting' is checked, P00.04 is filled in based on the actual inertia identification value.
Unchecking 'Automatic setting' allows you to manually enter the inertia ratio based on the current value and press Enter to submit.



<3> Vibration suppression:
Notch Filter:
Torque Vibration Amplitude, 0 = sensitive, 100% = no detection. Adjust the value based on on-site judgment to determine whether it is vibration.
Suppression Mode, range from 0 to 2:
0: Close
1: Valid once
2: Always valid

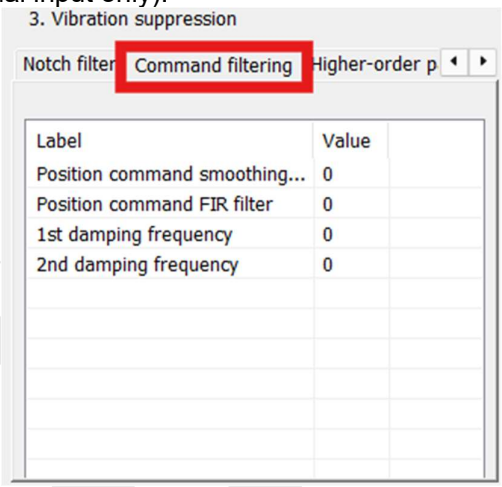


- Notch Filters: 1st, 2nd, 3rd

- Frequency: 50–2000
- Width: 0–20
- Depth: 0–99

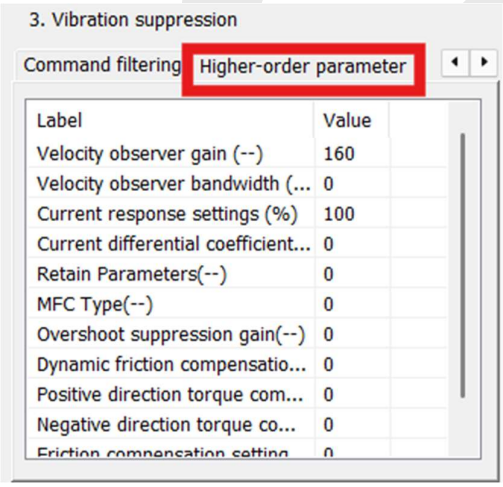
Frequency changes flash yellow.

Command Filtering (manual input only):



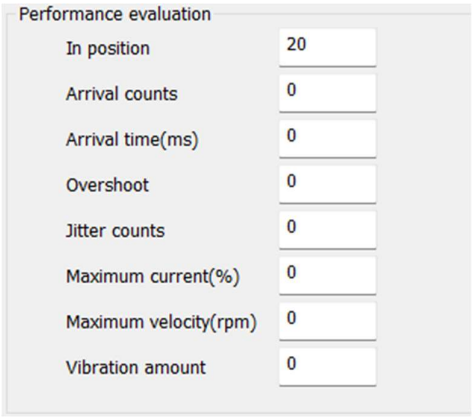
Position Command Smoothing Filter: 0–32767 (unit: 0.1 ms). Setting this parameter too high may prolong the setting time.
Position Command FIR Filter: 0–10000 (unit: 0.1 ms). Setting this parameter too high may prolong the setting time.
1st Damping Frequency: 10–2000 (unit: 0.1 Hz). Set the damping frequency to suppress end vibration.
2nd Damping Frequency: 10–2000 (unit: 0.1 Hz). Set the damping frequency to suppress end vibration.

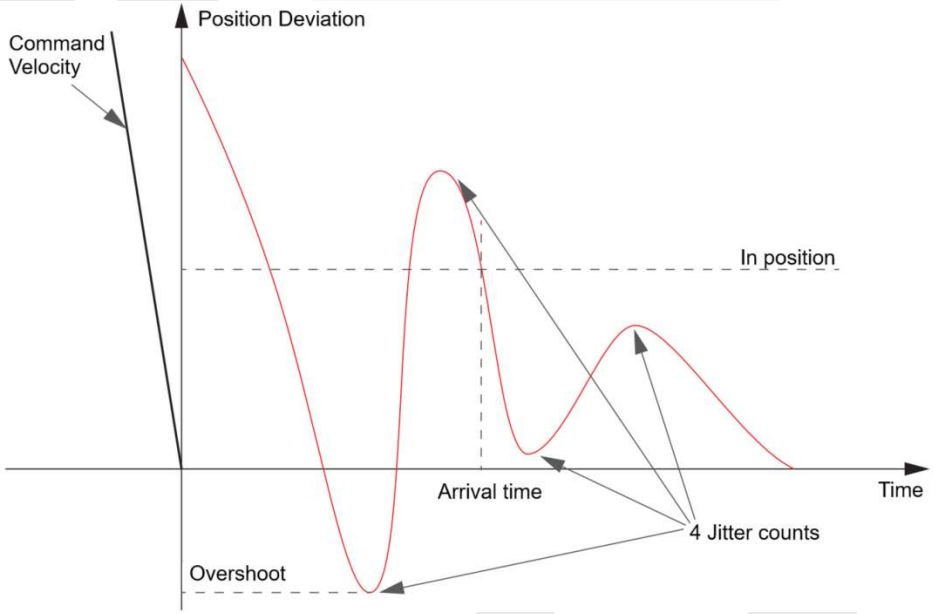
High-Order Parameter:



Velocity Observer Gain: The default stable gain, set to 1 to disable the observer.
Velocity Observer Bandwidth: The default is stable filtering, set to 1 to turns off the observer.
Current Response Settings: Ratio of effective values of driver current loop related parameters, range 50~100, unit %

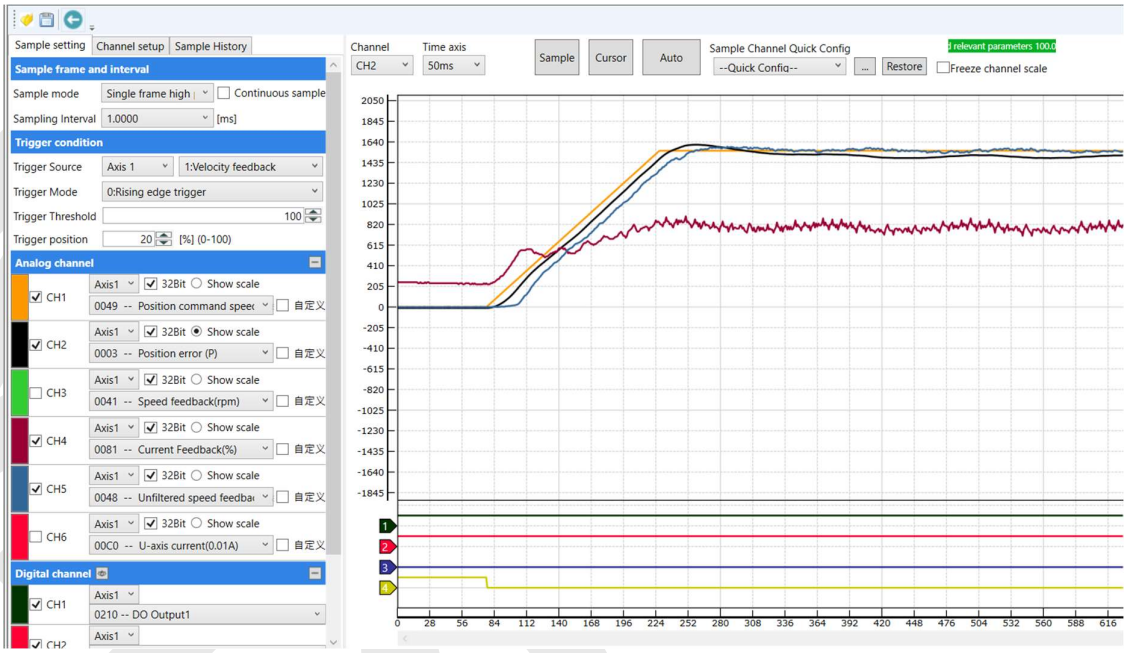
5. Performance Evaluation
Check overshoot and jitter count:



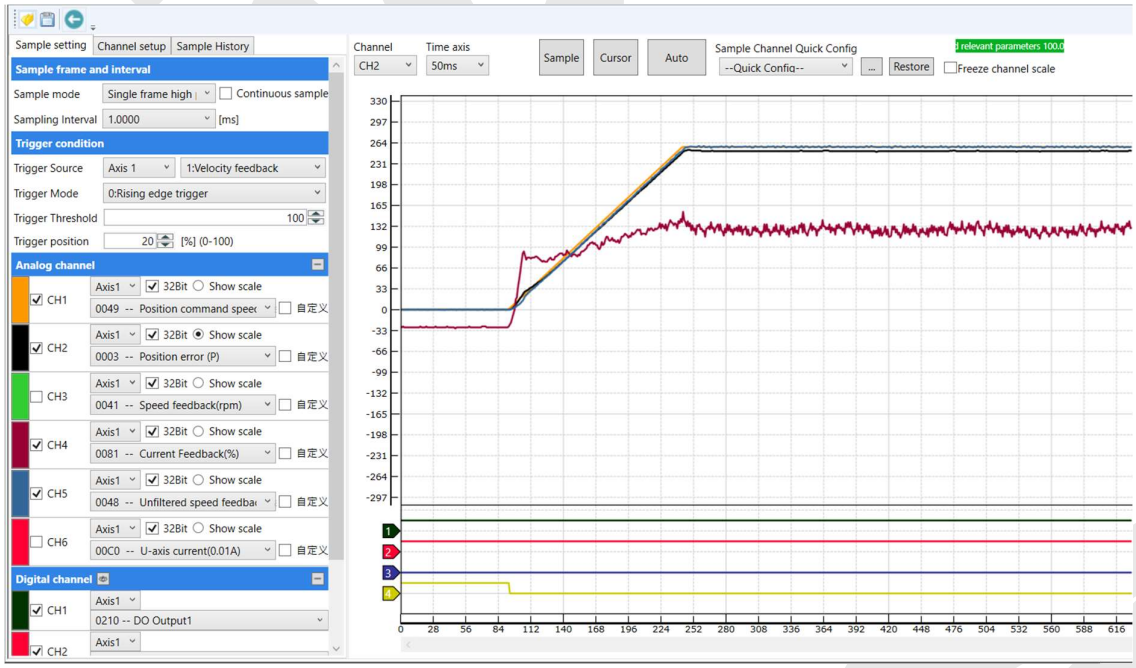


In position: allowable deviation between target and actual speed.
Aval counts: number of times target is reached.
Overshoot: overshoot between the target value and the actual measured value. <10% is displayed in white, 10% ~ 100% is displayed in yellow, >100% is displayed in red.
Jitter counts: the number of vibrations detected. If the number of vibrations = 1, the color turns yellow; if the number of vibrations > 1, the color turns red. The default color is white.
Maximum current: percentage of maximum current.
Increase stiffness and gain, use simple or advanced settings, and observe waveform to achieve optimal results.

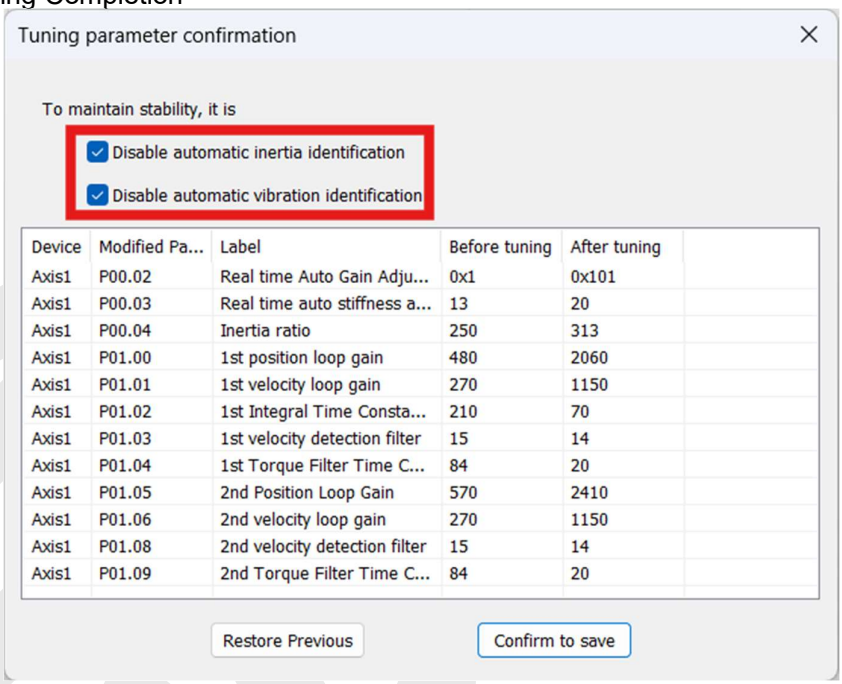
Stiffness = 11:



Stiffness = 20:



6. After Tuning Completion



Device	Modified Pa...	Label	Before tuning	After tuning
Axis1	P00.02	Real time Auto Gain Adju...	0x1	0x101
Axis1	P00.03	Real time auto stiffness a...	13	20
Axis1	P00.04	Inertia ratio	250	313
Axis1	P01.00	1st position loop gain	480	2060
Axis1	P01.01	1st velocity loop gain	270	1150
Axis1	P01.02	1st Integral Time Consta...	210	70
Axis1	P01.03	1st velocity detection filter	15	14
Axis1	P01.04	1st Torque Filter Time C...	84	20
Axis1	P01.05	2nd Position Loop Gain	570	2410
Axis1	P01.06	2nd velocity loop gain	270	1150
Axis1	P01.08	2nd velocity detection filter	15	14
Axis1	P01.09	2nd Torque Filter Time C...	84	20

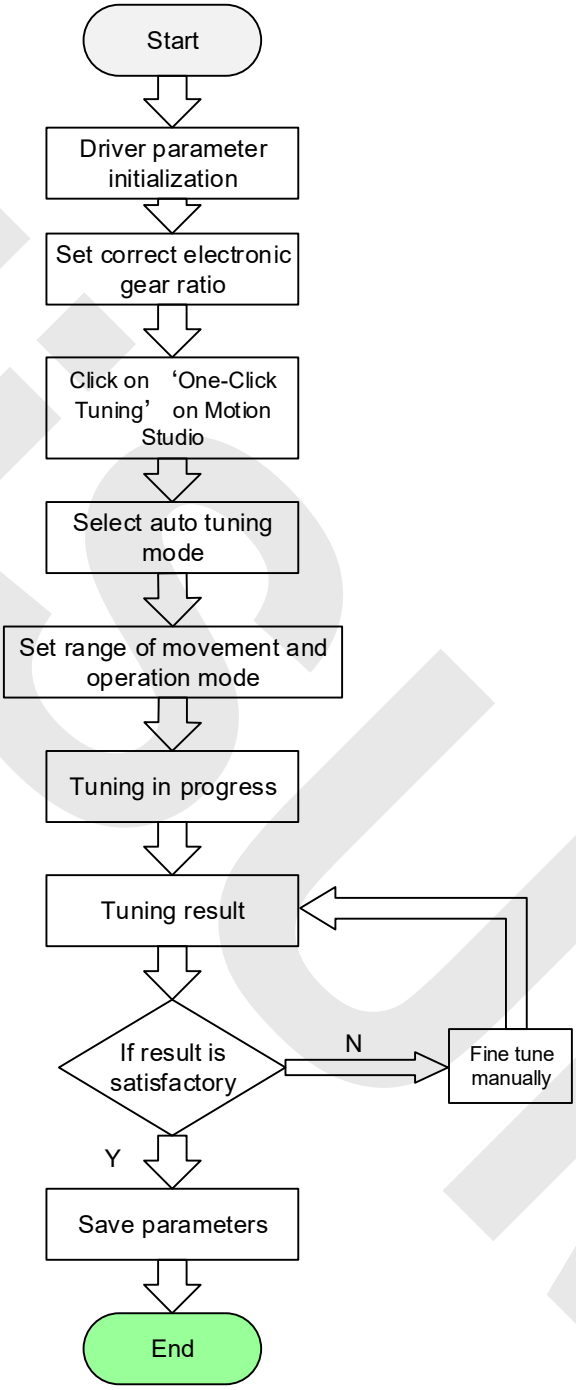
Disable automatic inertia identification: After automatic parameter tuning, turn off automatic inertia identification.
Disable automatic vibration identification: After automatic parameter tuning, turn off automatic vibration identification.
Restore Previous: Do not save the parameters after automatic tuning
Confirm to save: Save the parameters after automatic tuning

6.3.2 One-click Tuning

This function is able to automatically tune the most optimal gain parameters for the specific applications after the axis is in operation and learning. Corresponding paths and responsiveness level need to be set before using this function. Please refer to the flow chart below. Parameter will be saved to parameters file and can be used on similar axes.
Recommended for applications where inertia changes is minute.

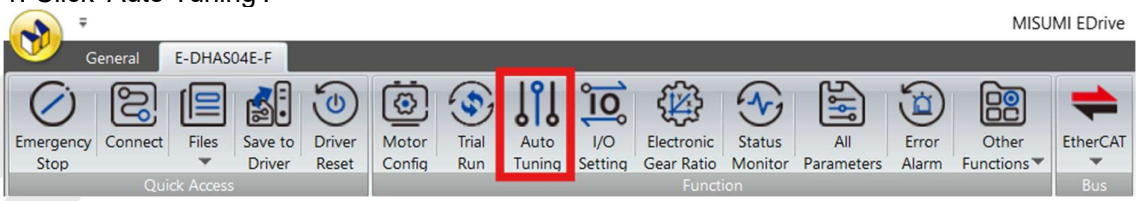
	Recommended application scenarios
Control mode	Suitable in position mode (Not applicable in other modes)
Others	➢ Make sure servo driver can't be enabled externally or any external command that can rotate the motor. Set range of movement, velocity and acceleration/deceleration time for one-click tuning. ➢ Prohibit external command. Make sure there is no obstacle within the range of movement of the axis and motor can rotate freely.
	Factors affecting one-click tuning
Load inertia	➢ External load smaller or 30 times larger than rotor inertia ➢ Drastic changes in load inertia during motion. *Under heavy load (more than 30 times inertia), please make sure of safety*
Load	➢ Mechanical loads are loosely connected. ➢ Existence of gear backlash or any other non-linear factors ➢ Complicated mechanical load structure
Motion	➢ Range of movement is too short or too long which cost the time to be overdue. ➢ Not smaller than 0.5R

One-click tuning flow diagram

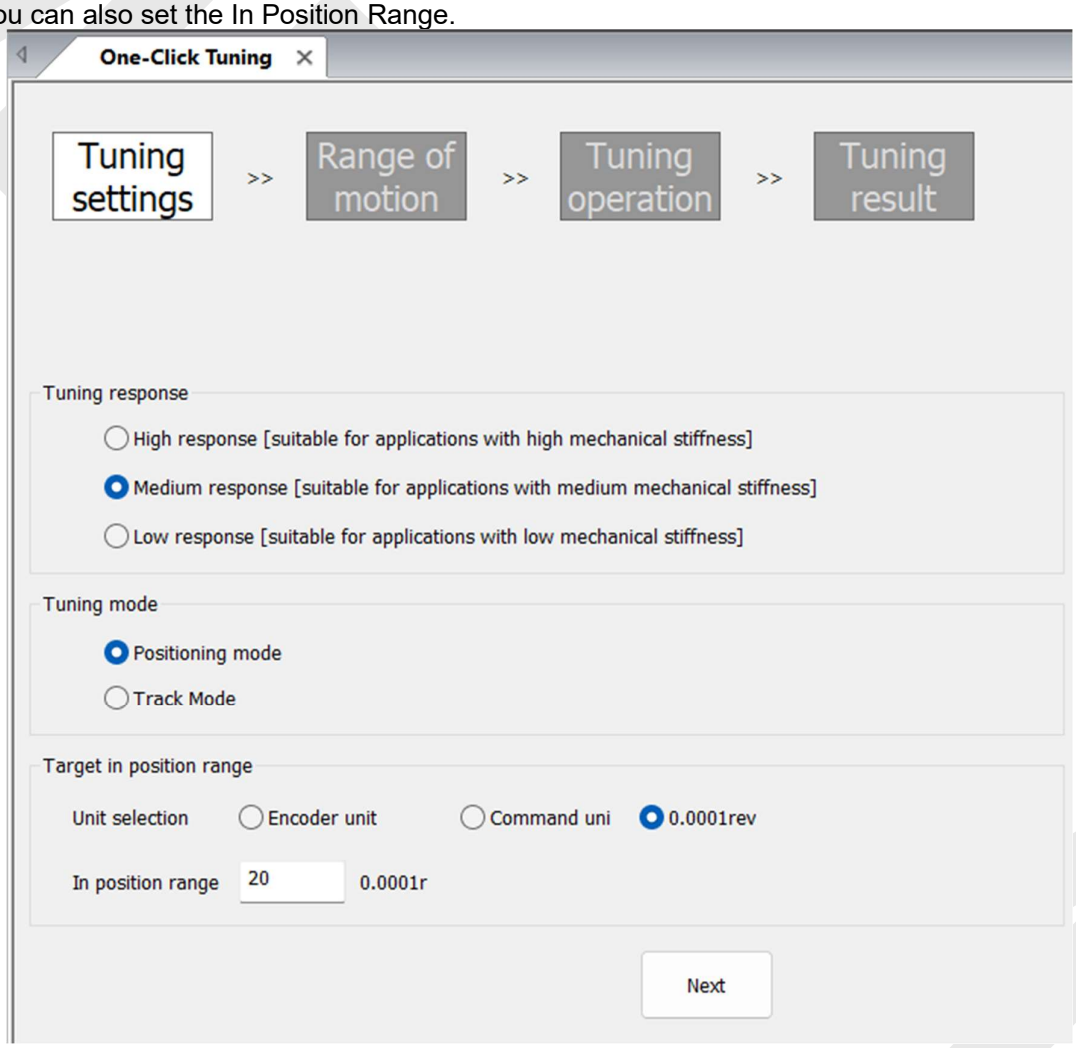


Operation Steps

1. Click ‘Auto Tuning’.



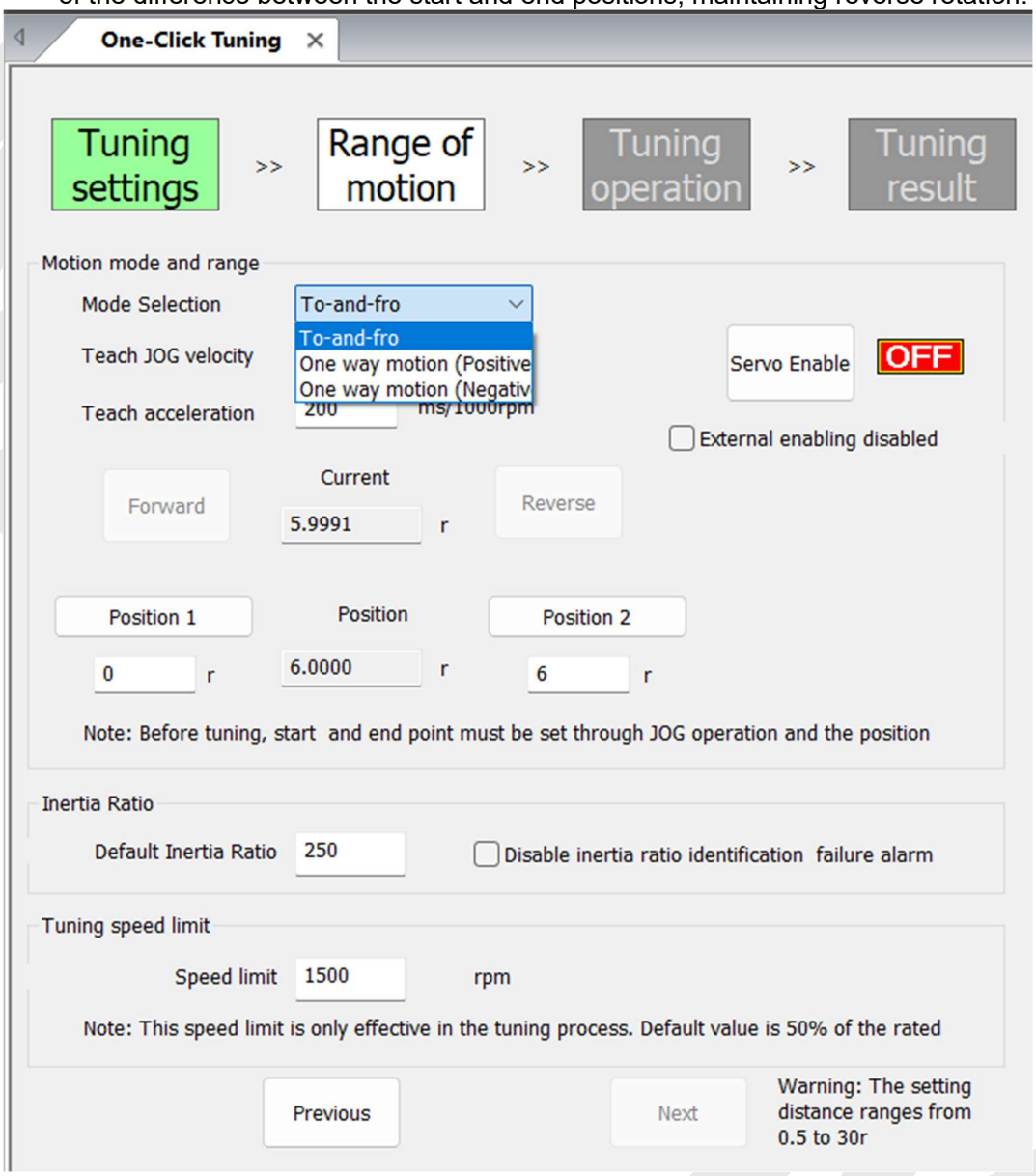
2. The first interface is for Tuning settings, which is mainly used to set the execution criteria for the auto-tuning process.
Tuning response: There are three types. Choose based on the actual mechanical conditions.
Tuning Mode: Two options are available — Positioning Mode and Track Mode.
You can also set the In Position Range.



3. Clicking ‘Next’ go to the Range of motion interface, and define the motion range for auto-tuning.
1) There are three mode selections. Choose based on the allowable movement direction of the actual machine.

- To and fro: The motor moves back and forth between the start and end positions.
- One way motion (Positive): The motor moves a distance equal to the absolute value of the difference between the start and end positions, maintaining forward rotation.

- One way motion (Negative): The motor moves a distance equal to the absolute value of the difference between the start and end positions, maintaining reverse rotation.



2) There are two methods to set the start and end positions:

- After Servo Enable, use the forward/reverse buttons to adjust the position. Click the "Position 1/2" button to complete the setup.

Note:

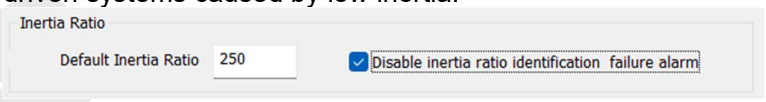
- *During motion range setting, jog speed should be between 0–200 rpm. Acceleration time should not be too short to avoid collisions. After setting speed properties, disable external enable signals. Before enabling the servo, ensure no commands are being sent to avoid unintended movement. Then click servo enable.*

- Directly input the start and end positions. After entering the values, press Enter to apply the changes. (In reciprocating motion, the motor will first move to the set start position before beginning the reciprocating motion. When manually entering positions, ensure there is no risk of collision.)

Note:

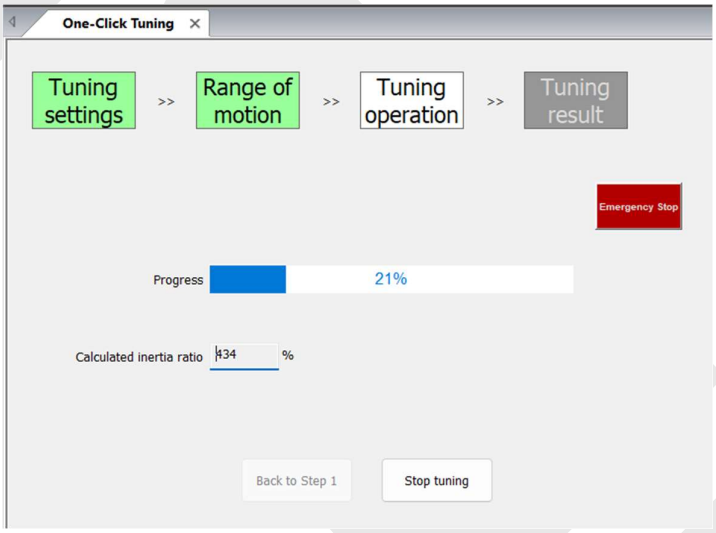
- *The difference between start and end positions must be greater than 0.5 revolutions. The closer the start/end points match the actual application stroke, the better the tuning adaptability. However, tuning time may increase accordingly.*

3) Inertia Ratio:
Can choose to ignore inertia identification failures to prevent tuning failure due to unsuccessful identification.
The inertia ratio can be manually entered or preset to a suitable value. This helps avoid shaking in belt-driven systems caused by low inertia.

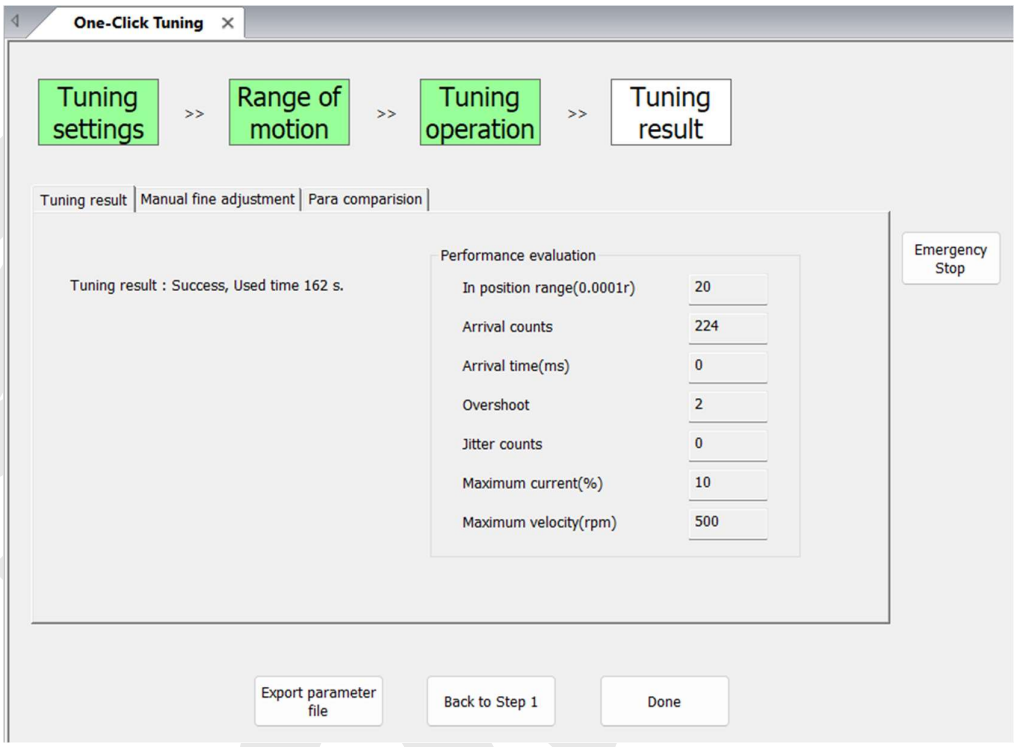


4) Tuning Speed Limit:
The speed during tuning must be no less than 400 rpm.

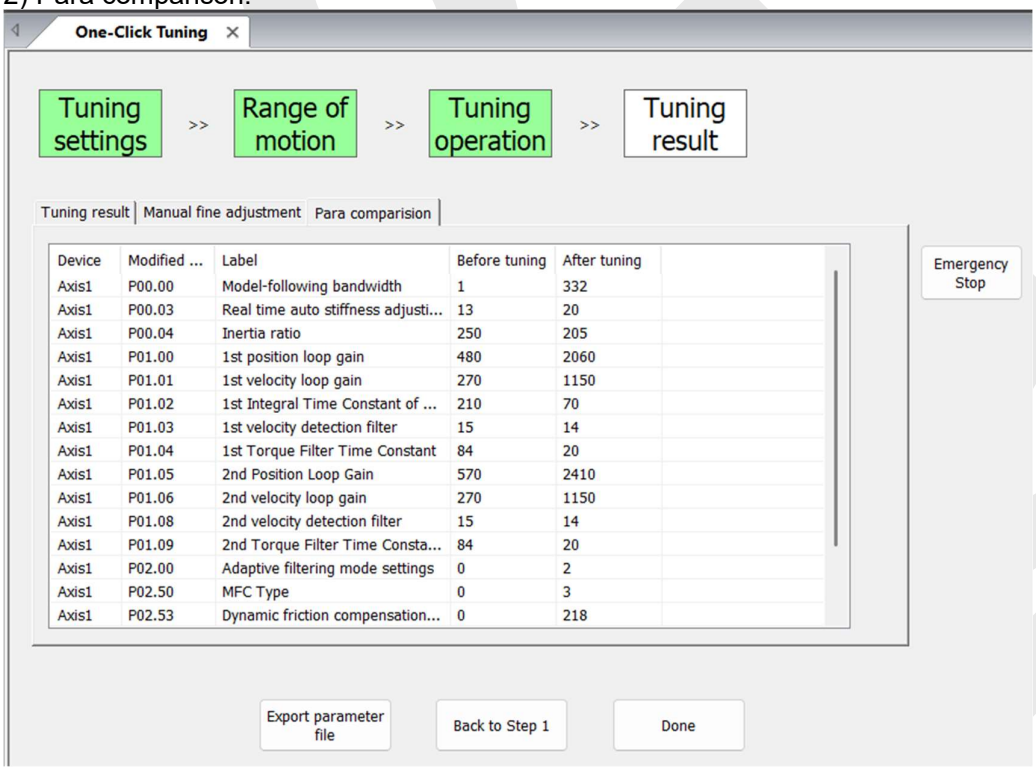
4. Click 'Next' and confirm that the motion is safe to enter the Tuning Operation interface. The tuning process will begin, with progress display and an emergency stop button available during the operation.



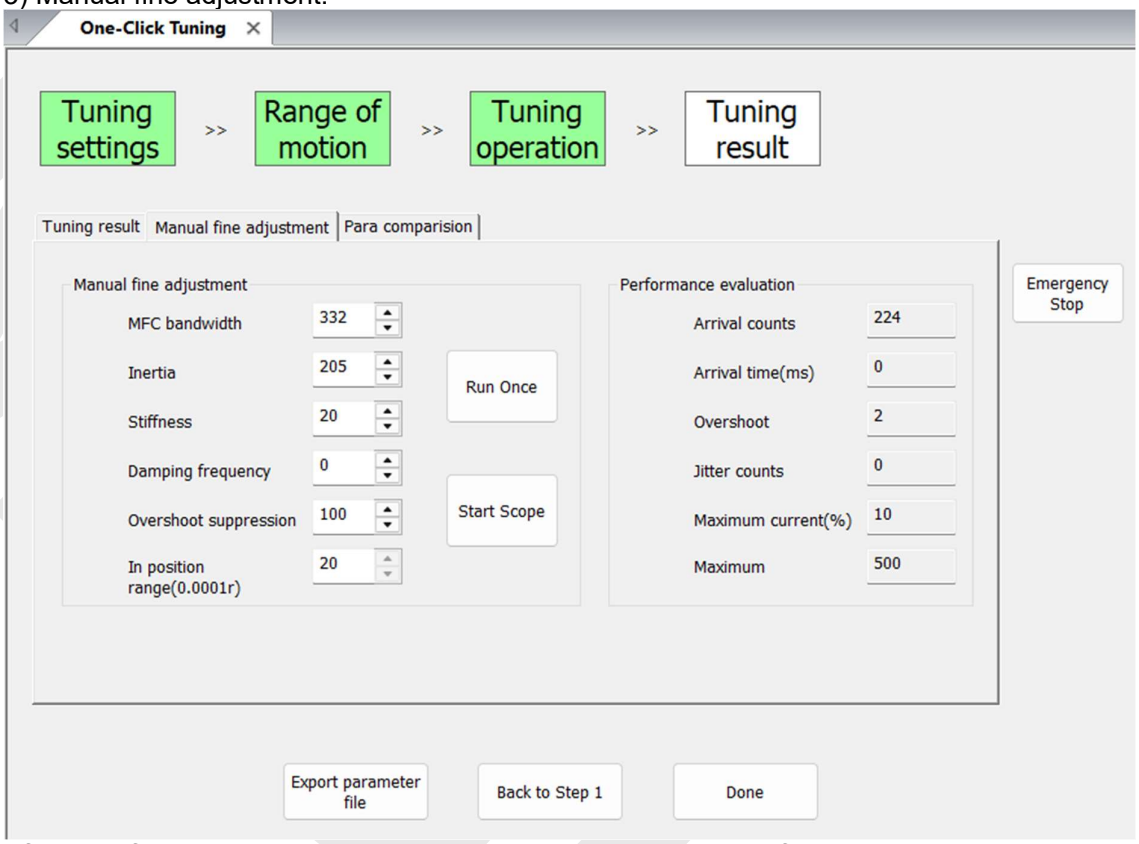
5. After tuning is complete, the system will transition to the Tuning Results interface, shows the tuning results and parameters comparison before and after tuning.
1) Tuning result:



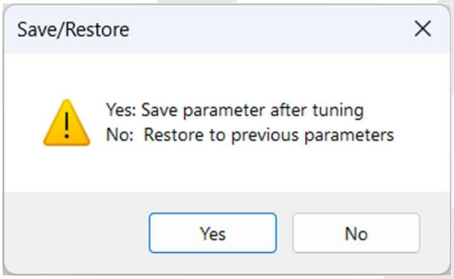
2) Para comparison:



If fine-tun is needed, can enter Manual fine adjustment to modify the gain.
3) Manual fine adjustment:



After modifying parameters, run the motor again to evaluate performance or use the oscilloscope to check if the results meet actual requirements.
If satisfied with the tuning results, click 'Done', and a prompt will appear asking whether to save the parameters.



Click 'Yes' to save the tuned parameters. Click 'No' to revert to the parameters before tuning.
Note:

- *Regardless of whether you click Yes or No, clicking 'Done' will exit the One-Key Auto Tuning Interface.*

Precautions

- Vertical Axis Applications: Ensure anti-drop measures are in place before executing any actions.
- Belt Applications: Pre-setting a moderate inertia ratio can prevent shaking caused by low inertia at the start of auto-tuning.
- Ball Screw Applications: If tuning takes too long, consider shortening the stroke.

Common Tuning Failures		
Issue	**Cause**	**Solution**
Inertia Identification Failure	Lose mechanical connections	Inspect and fix mechanical issues
	Stroke too short, inertia identification fails	Increase stroke appropriately
	Belt-driven load	Pre-set a suitable inertia ratio to avoid low inertia causes shaking and identification failure

If the tuning results are not satisfactory, you can switch to Single parameter tuning for more advanced adjustments to achieve optimal gain settings.

6.4 Auto gain adjustment

6.4.1 Overview

This function will measure real time mechanical properties and set gain values in accordance to mechanical stiffness. Can be used in any control mode

Conditions to implement	
Control mode	Please refer to P00.02 for detailed explanations. Auto gain adjustment is different for each control mode.
Other	・Servo driver needs to be enabled ・Set up input signals such as deviation counter clearing and command input; Torque limit and other motion control parameters to enable motor to move normally without obstacles.

Under certain conditions, external factors might affect automatic gain adjustment functions. If the conditions as listed exist or unfavorable, please disable the automatic gain adjustment function.

Affecting conditions	
Load inertia	・If inertia is less than 3 times or over 30 times of rotor inertia. ・Changes in load inertia
Load	・Very low mechanical stiffness ・If gear backlash is a non-linear property
Motion	・Velocity less than 100r/min or continuously in low velocity mode ・Acc-/deceleration to 2000r/min within 1s. 。 ・Acc-/deceleration torque lower than eccentric load, frictional torque. ・Velocity < 100r/min, acc-/deceleration to 2000r/min within 1s but not longer than 50ms

6.4.2 Operation Method

To enable automatic gain adjustment:

1) Disable the servo driver.
2) Set P00.02 = 0x01/0x11 or 0x02/0x12. Then, set P00.03
3) Servo enabled. Run motion as normal to start measuring load properties. Related parameters will be automatically set.
4) Increase motor responsiveness by increasing P00.03. Please check if there is any vibration before setting P00.03 to max. value.
5) Save the parameters.

Please take note:
- Please stop the motor before modifying any parameter. P00.02 only takes effect after saving modified parameter values into EEPROM and restarting the driver.
- After enabling the servo driver for the first time or when increasing P00.03, mechanical noise or vibration might occur for the first run, it is normal. If it persists, please set P00.03 to lower value.

Parameters that change in accordance to real time gain adjustment

There are 2 types of auto gain adjustment methods:

- Standard mode (P00.02 = 0x__1): Basic mode, prioritizing on stability, gain switching is disabled. Actual gain auto adjustment as accordance to P00.03.

Gain related parameters that change as shown below.

Parameter	Label	Remarks
P01.00	1st position loop gain	When stiffness setting is valid, parameters will be updated to match stiffness value
P01.01	1st velocity loop gain	
P01.02	1st velocity integral time constant	
P01.03	1st velocity detection filter	
P01.04	1st torque filter	

Gain related that doesn't change

Parameter	Label	Reference value	Remarks
P01.10	Velocity feedforward gain constant	300（0.1%）	Doesn't change according to changes in stiffness
P01.11	velocity feed-forward filter time constant	0.50ms	
P01.12	torque feed-forward gain	0	
P01.13	torque feed-forward filter time constant	0	

Positioning mode (P00.02=0x2): Prioritizing positioning. Usually applies on horizontal axis without variable load, ball screws with lower friction, gain switching enabled. Stiffness level of 2nd position loop gain is 1 level higher than 1st position.

No.	Parameters	Label	Remarks
1	P01.00	1st position loop gain	When stiffness setting is valid, parameters will be updated to match stiffness value
2	P01.01	1st velocity loop gain	
3	P01.02	1st velocity integral time constant	
4	P01.03	1st velocity detection filter	
5	P01.04	1st torque filter	
6	P01.05	2nd position loop gain	
7	P01.06	2nd velocity loop gain	
8	P01.07	2nd velocity integral time constant	
9	P01.08	2nd velocity detection filter	
10	P01.09	2nd torque filter	

If auto gain adjustment is valid, the parameters listed above can't be manually modified. Only when P00.02 = 0x00 or 0x10, can the gain related parameters be modified manually.

Gain related parameters that don't change with the real time gain adjustment

Parameter	Label	Reference value
P01.07	Second velocity loop integral constant	1000ms
P01.10	Velocity feedforward gain constant	30%
P01.11	Velocity feedforward filter time constant	0.50ms
P01.12	Torque feedforward gain	0
P01.13	Torque feedforward filter time constant	0
P01.15	Position control gain switching mode	10
P01.17	Position control switching level	50
P01.18	Position control switching hysteresis	33
P01.19	Position gain switching time	33ms

Standard mode + large inertia free adjustment (P00.02 = 0x 11)

The standard mode large inertia free adjustment mode in real-time automatic gain adjustment is to add the function of large inertia free adjustment on the basis of the original standard mode. Before setting the rigidity, there is no need to set the inertia ratio. According to P00.03 "Machine Rigidity Setting", update the following basic gain setting parameters.

Parameter	Label	Remarks
P01.00	1st position loop gain	When stiffness setting is valid, parameters will be updated to match stiffness value
P01.01	1st velocity loop gain	
P01.02	1st velocity integral time constant	
P01.03	1st velocity detection filter	
P01.04	1st torque filter	

Gain related that doesn't change

Parameter	Label	Reference value	Remarks
P01.10	Velocity feedforward gain constant	300（0.1%）	Doesn't change according to changes in stiffness
P01.11	velocity feed-forward filter time constant	0.50ms	
P01.12	torque feed-forward gain	0	
P01.13	torque feed-forward filter time constant	0	

Positioning mode large inertia free adjustment (P00.02 = 0x12)

The standard mode large inertia free adjustment mode in real-time automatic gain adjustment is to add the function of large inertia free adjustment on the basis of the original standard mode, which can be more than 30 times the inertia and the inertia ratio parameter free adjustment. Before setting the rigidity, it is not necessary to set the inertia ratio. Update the following basic gain setting parameters according to P00.03 "machine rigidity setting.

No.	Parameters	Label	Remarks
1	P01.00	1st position loop gain	When stiffness setting is valid, parameters will be updated to match stiffness value
2	P01.01	1st velocity loop gain	
3	P01.02	1st velocity integral time constant	
4	P01.03	1st velocity detection filter	
5	P01.04	1st torque filter	
6	P01.05	2nd position loop gain	
7	P01.06	2nd velocity loop gain	
8	P01.07	2nd velocity integral time constant	
9	P01.08	2nd velocity detection filter	
10	P01.09	2nd torque filter	

Gain related parameters that don't change with the real time gain adjustment

Parameter	Label	Reference value
P01.07	Second velocity loop integral constant	1000ms
P01.10	Velocity feedforward gain constant	30%
P01.11	Velocity feedforward filter time constant	0.50ms
P01.12	Torque feedforward gain	0
P01.13	Torque feedforward filter time constant	0
P01.15	Position control gain switching mode	10
P01.17	Position control switching level	50
P01.18	Position control switching hysteresis	33
P01.19	Position gain switching time	33ms

Types of mechanical load

Please select mechanical load according to load-inertia ratio and mechanical structures:

Load types	Description
0x00_: Rigid structure	When load is **rigid** with relatively **low inertia**. Gain adjustments prioritize **system responsiveness**. Structures including high P0Ecision reducer, lead screws, mechanical gears, etc.
0x01_: High inertia	**High load inertia** (10 times or above). Gain adjustments prioritize **operation stability and responsiveness**. Recommended mechanical stiffness level **not more than 15**.
0x02_: Flexible structure	When load is **flexible** with relatively **high inertia**. Gain adjustments prioritize **operation stability**. Structures including long transportation belt or chain.

Structures with high inertia can have better performance if inertia ratio is set accurately.

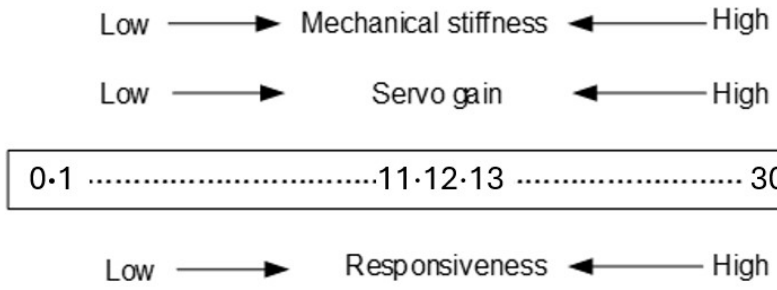
P00.02	Label	Real time Auto Gain Adjusting			Valid mode(s)	P	S	T
	Range	0x0~0xFF	Unit	—	Default	0x1		
	Byte length	16bit	Attribute	R/W	485 address	0x0005		
	Valid	Immediate						

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
x0_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-P0Ecision 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	Real time auto stiffness adjusting			Valid mode(s)	P	S	T
	Range	0 ~ 31	Unit	—	Default	11		
	Byte length	16bit	Attribute	R/W	485 address	0x0007		
	Valid	Immediate						



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.

Gain parameters settings table

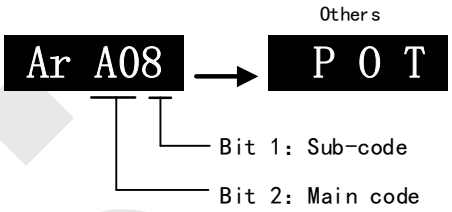
Stiffness	1st gain				2nd gain			
	P01.00	P01.01	P01.02	P01.04	P01.05	P01.06	P01.07	P01.09
	Position loop gain (0.1/s)	Velocity loop gain (Hz)	Velocity loop integral time constant （0.1ms）	Torque filter (0.01ms)	Position loop gain (0.1/s)	Velocity loop gain (Hz)	Velocity loop integral time constant （0.1ms）	Torque filter (0.01ms)
0	20	15	3700	1500	25	15	10000	1500
1	25	20	2800	1100	30	20	10000	1100
2	30	25	2200	900	40	25	10000	900
3	40	30	1900	800	45	30	10000	800
4	45	35	1600	600	55	35	10000	600
5	55	45	1200	500	70	45	10000	500
6	75	60	900	400	95	60	10000	400
7	95	75	700	300	120	75	10000	300
8	115	90	600	300	140	90	10000	300
9	140	110	500	200	175	110	10000	200
10	175	140	400	200	220	140	10000	200
11	320	180	310	126	380	180	10000	126
12	390	220	250	103	460	220	10000	103
13	480	270	210	84	570	270	10000	84
14	630	350	160	65	730	350	10000	65
15	720	400	140	57	840	400	10000	57
16	900	500	120	45	1050	500	10000	45
17	1080	600	110	38	1260	600	10000	38
18	1350	750	90	30	1570	750	10000	30
19	1620	900	80	25	1880	900	10000	25
20	2060	1150	70	20	2410	1150	10000	20
21	2510	1400	60	16	2930	1400	10000	16
22	3050	1700	50	13	3560	1700	10000	13
23	3770	2100	40	11	4400	2100	10000	11
24	4490	2500	40	9	5240	2500	10000	9
25	5000	2800	35	8	5900	2800	10000	8
26	5600	3100	30	7	6500	3100	10000	7
27	6100	3400	30	7	7100	3400	10000	7
28	6600	3700	25	6	7700	3700	10000	6
29	7200	4000	25	6	8400	4000	10000	6
30	8100	4500	20	5	9400	4500	10000	5
31	9000	5000	20	5	10500	5000	10000	5

Chapter 7 Warning and Alarm

7.1 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.

Example of warning code:



Warning Code		Content
Main	Code	
A0	1	Overload warning
	2	Regeneration energy overload warning(**85% of the regeneration threshold**)
	3	Absolute encoder **battery voltage low (<3.1V)**. Valid when P00.15 is set to 1.
	4	Change the parameter to a non-real time valid warning
	7	Low temperature warning **(< 20℃)**
	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 software positive 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

Servo Driver Warning Handling
When a warning occurs, the driver will not stop the motor, and the front panel will automatically display the corresponding warning code.
For example, when warning *ArA03* is triggered, replacing the battery during power-on to ensure the absolute encoder battery voltage exceeds 3.0V will clear the warning.
Appropriate handling methods can be taken based on the specific warning content.

7.2 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 record can also be viewed in data monitoring mode, with the alarm log sub-menu displaying "d12Er".

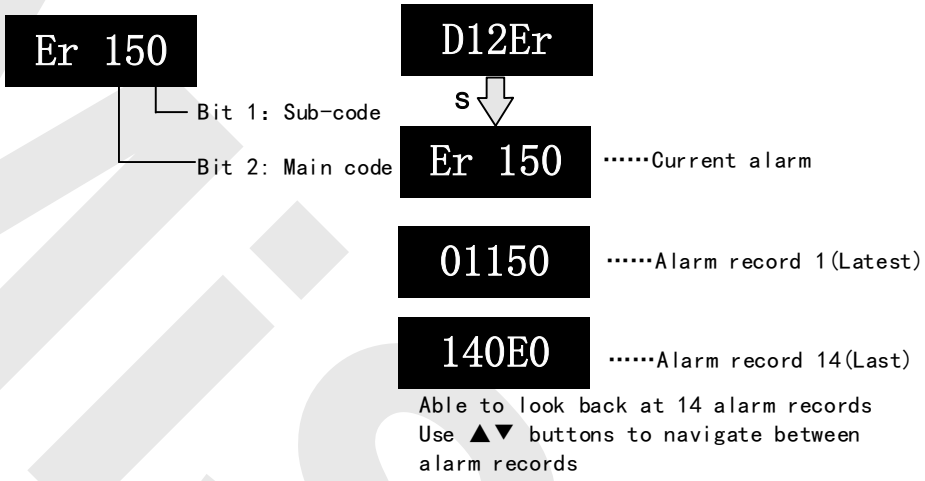


Table 9.1 Error Code List

Error code		Content	Attribute		
Main	Sub		Save	Type	Clearable
09	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	●
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	●
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	●
	3	External encoder frequency divider parameter error	●	1	
	4	Excessive synchronous position command	●	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	
26	0	Positive/Negative position limit triggered under non-homing mode	●	2	●
29	0	Control mode not match under full closed loop mode	●	1	
	1	Encoder mode not match under full closed loop mode	●	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	●

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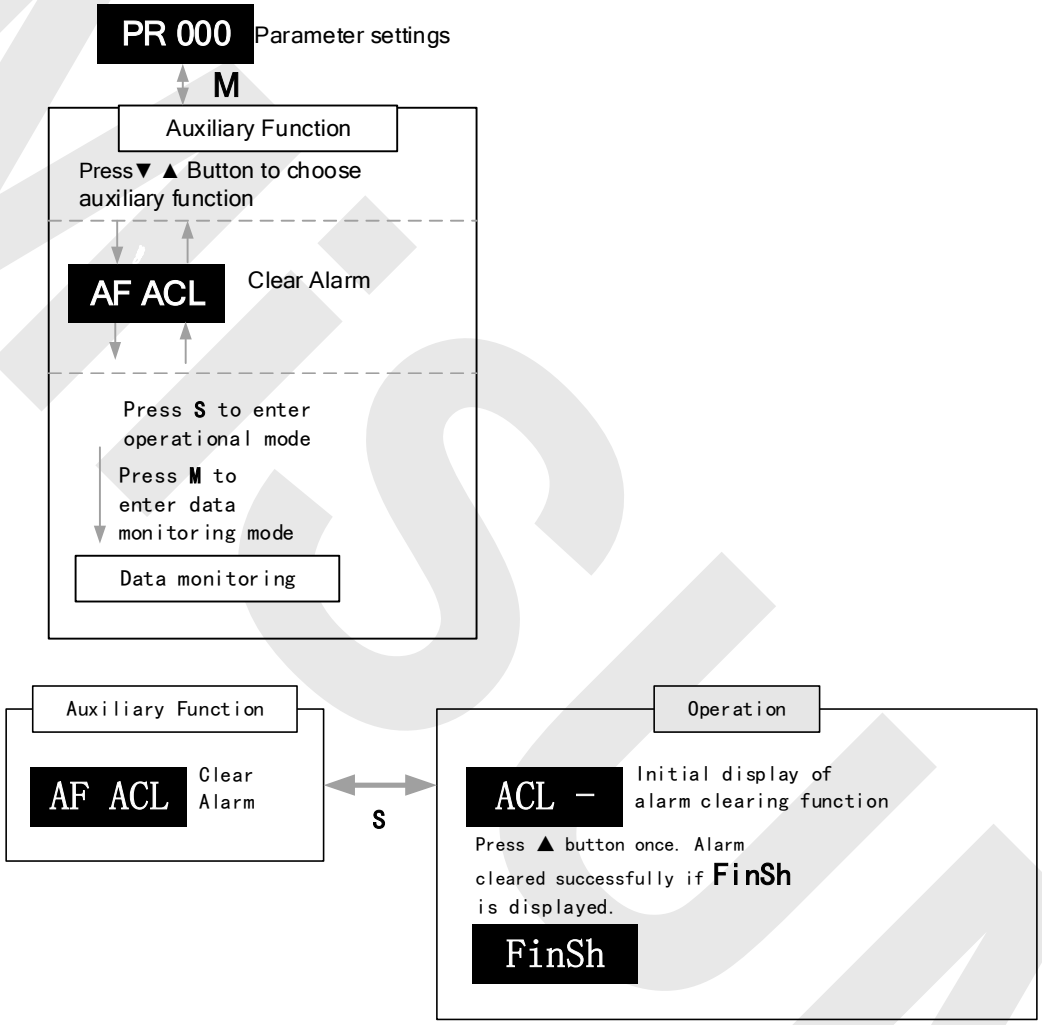
Save: Save error messages to alarm history.
Type: The type 1 and type 2 fault stop mode can be set via P05.10 [Sequence at alarm].
Clearable: Clearable alarm by operating the front panel and use auxiliary function **AFACL** as below. Besides clearable alarms, please first solve the error and restart the servo driver to clear alarm.



7.3 Alarm Handling

***When error occurs, please solve accordingly. Then, restart. If the solutions described don't work, please consider replacing the driver.*

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

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	Increase main power supply voltage

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, might be due to damaged motor or motor winding open circuit.
Motor fault			/	Replace motor

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

Error code	Main	Sub	**Display:** "Er 0A6"	
	0A	6	**Content:** Temperature measuring 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

Error code	Main	Sub	Display: "Er 0b0"	
	0b	0	**Content:** Control circuit power supply voltage too low	
Cause			Diagnosis	Solution
Control circuit power supply voltage too low			Verify L1C, L2C terminal voltage; check if wiring connection is tight	Increase L1C, L2C terminal voltage; Tighten L1C, L2C terminal connection
Power supply under capacity			/	Increase power supply capacity for L1C, L2C terminals

Error code	Main	Sub	Display: "Er 0b1"	
	0b	1	**Content:** Control circuit power supply abnormal	
Cause			Diagnosis	Solution
USB power supply too low			Verify if USB cable is properly connected and not damaged.	Replace USB Type-C cable

Error code	Main	Sub	Display: "Er 0c0"	
	0c	0	**Content:** DC bus overvoltage	
Cause			Diagnosis	Solution
Main power supply overvoltage			Verify L1, L2, L3 terminal voltage	Decrease main power supply voltage
Acceleration/deceleration time too short			Verify if the time is actually too short	Increase the duration time or change to a regenerative resistor with higher resistance.
Regenerative brake parameter anomaly			Verify P07.32/P07.33	Modify vent overload parameter
Inner brake circuit damaged			/	Replace driver

Error code	Main	Sub	Display: "Er 0d0"	
	0d	0	**Content**: DC bus undervoltage	
Cause			Diagnosis	Solution
Main power supply undervoltage			Verify L1, L2, L3 terminal voltage	Increase main power supply voltage
L1C, L2C connected when USB cable is connected			Control circuit power on before driver initialization. Alarm might occur.	Please disconnect the USB cable before powering on control circuit.

Error code	Main	Sub	Display: "Er 0d1"	
	0d	1	**Content**: Single phasing of main power supply	
Cause			Diagnosis	Solution
Main power supply undervoltage			Verify L1, L2, L3 terminal voltage	Increase main power supply voltage
Main power supply wiring error			Loose connection of L1, L2, L3	Secure connections

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	1. Increase main power supply voltage 2. Secure connections

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.	1. Make sure there is no circuit. 2. 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 servo driver to check for overcurrent	Replace 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.	1. Make sure there is no circuit. 2. 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 servo driver to check for overcurrent	Replace driver
IGBT module undervoltage			/	Replace 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**: Power output to motor shorted to ground	
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	1. Reconnect wiring. 2. Change motor power cable.
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 motor

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	1. Reconnect wiring. 2. Change motor power cable.
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 motor

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.	1. Improve cooling condition. Please check installation guide; 2. Replace driver and motor with higher power rating; 3. Increase duration time for acceleration and deceleration; 4. 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	1. Decrease load 2. Adjust limit values
Strong mechanical vibration	Look for mechanical vibration from machine system	1. Adjust gain value of control loop 2. Increase duration time for acceleration and deceleration
Motor or encoder cable wiring error	Verify motor and encoder wiring	1. Reconnect wiring 2. Replace motor and encoder cable
Holding brake engaged	Verify holding brake terminal voltage	Cut off holding brake

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	Check the machinery
Motor rotor blocking time threshold value too low	Verify value of P06.57	Adjust value of P06.57

Error code	Main	Sub	**Display:** "Er 120"	
	12	0	**Content:** Regenerative resistor overvoltage	
Cause			Diagnosis	Solution
Regenerative energy exceeded capacity of regenerative resistor			1. Verify if velocity is too high 2. Verify if load is too large	1. Decrease motor rotational velocity; 2. Decrease load inertia; 3. Add an external regenerative resistor;
Power supply voltage too high			1. Verify if power supply voltage is within the rated range. 2. Interval regenerative resistor value is too low	1. Decrease power supply voltage 2. Increase regeneration resistance value(add external regenerative resistor)
Unstable power supply voltage			Verify if power supply voltage is stable	Add a surge supP0Essor to main power supply.
Regenerative energy discharge circuit damaged			/	1. Add an external regenerative resistor; 2. Replace 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	Replace driver

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			/	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 properly connected
Encoder cable wiring error			Verify if encoder wiring is correct	Reconnect encoder wiring
Encoder damaged			/	Replace motor
Encoder measuring circuit damaged			/	Replace 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 motor

Error code	Main	Sub	Display: "Er 152"	
	15	2	**Content:** Encoder initial position error	
Cause			Diagnosis	Solution
Communication data abnormal			1. Verify if encoder power supply voltage is DC5V ± 5%; 2. Verify if encoder cable and shielded layer is not damaged; 3. Verify if encoder cable is close to high-powered power supply cable	1. Make sure encoder power supply voltage is stable 2. Make sure encoder cable is not damaged. 3. Make sure encoder cable shielded layer is grounded to frame 4. Make sure encoder cable is away from high-powered power supply cable
Encoder damaged			/	Replace motor
Encoder measuring circuit damaged			/	Replace driver

Error code	Main	Sub	Display: "Er 153"	
	15	3	**Content:** Multiturn encoder error	
Cause			Diagnosis	Solution
Initial use			Origin calibration not performed	Perform origin positioning and multiturn position initialization, calibrate the origin of coordinate system.
Encoder without multiturn absolute function used			Verify if encoder has multiturn absolute function	1. Replace the motor with a multiturn absolute encoder. 2. Set P00.15 = 0 to deactivate multiturn absolute function.
Low battery power			Replace battery and restart driver to clear alarm	Replace battery

Battery has no power or has been dismantled	Alarm not cleared after replacing battery and restart	Absolute position lost. Return to origin and perform multiturn initialization, calibrate the origin of coordinate system

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

Error code	Main	Sub	**Display:** "Er 155"
	15	5	**Content:** Encoder data overflow
Cause		Diagnosis	Solution
Encoder data overflow		Verify if encoder is not damaged	Initialize multiturn data
Absolute value applications, motor rotates in one direction		Verify if encoder is not damaged	Adjust absolute value application mode, set to turntable mode

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:** Encoder counter error
Cause		Diagnosis	Solution
Encoder data overflow		Verify if encoder is not damaged	Initialize multiturn data
Absolute value applications, motor rotates in one direction		Verify if encoder is not damaged	Adjust absolute value application mode, set to turntable mode

Error code	Main	Sub	**Display:** "Er 170"
	17	0	**Content:** Encoder data error
Cause		Diagnosis	Solution
Communication data abnormal		1. Verify if encoder power supply voltage is DC5V ± 5%; 2. Verify if encoder cable and shielded layer is not damaged; 3. Verify if encoder cable is close to high-powered power supply cable	1. Make sure encoder power supply voltage is stable 2. Make sure encoder cable is not damaged. 3. Make sure encoder cable shielded layer is grounded to frame 4. Make sure encoder cable is away from high-powered power supply cable
Encoder damaged		/	Replace motor

Encoder measuring circuit damaged	/	Replace 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	1. Verify if encoder cable is standard. 2. 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 Pr_014 is too low	Increase value of Pr_014
Position gain setting too low	Verify if values of P01.00 & P01.05 are too low	Increase values of P01.00 & P01.05
Torque limit too low	Verify if values of P00.13 & P05.22 are too low	Increase values of P00.13 & P05.22
Excessive external load	1. Verify if acceleration and deceleration duration time is too low. 2. Verify if rotational velocity is too high 3. Verify if load is too large	1. Increase duration time for acceleration and deceleration 2. Decrease rotational velocity 3. 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	1. Increase value of P06.02; 2. 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	1. Increase value of P03.12, P03.13; 2. Adjust velocity gain to reduce velocity lag 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 large	Verify current loop gain value	Reduce current loop gain

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 right	Make sure UVW terminals are correctly connected to UVW of motor; change motor power cable.
Motor rotor blocked	Look for mechanical blockages	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
Full closed loop position deviation (**Deviation between external encoder feedback position and motor feedback position**) exceeds P00.33	Verify if P00.33 is set too low	Increase P00.33 set value accordingly but please 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 (P03.21)		1. Verify if velocity command is too high; 2. Verify if simulated velocity command voltage is too high; 3. Verify if parameter value of P03.21 is too low; 4. Verify if input frequency and division frequency coefficient of pulse train is proper; 5. Verify if encoder is wired correctly	1. Adjust velocity input command; 2. Increase P03.21 value; 3. Adjust pulse train input frequency and division frequency coefficient; 4. Verify encoder wiring;

Error code	Main	Sub	**Display:** "Er 1A1"
	1A	1	**Content:** Velocity out of control
Cause		Diagnosis	Solution
Motor velocity out of control, Excessive velocity error		Verify encoder phase sequence; Verify if UVW cable is connected to the right terminal	Reconnect UVW if wrongly connected. If still remains unsolved, please contact technical support.

Error code	Main	Sub	**Display:** "Er 1b0"
	1b	0	**Content:** Bus input signal dithering
Cause		Diagnosis	Solution
Controller synchronization dithering		/	Increase alarm threshold value

Error code	Main	Sub	Display: "Er 1b1"
	1b	1	**Content:** Incorrect electronic gear ratio

Cause	Diagnosis	Solution
Values out of range	Numerator or denominator is zero/Set values out of range	Reduce number of pulses per revolution

Error code	Main	Sub	Display: "Er 1b3"
	1b	3	**Content:** External encoder frequency divider parameter error

Cause	Diagnosis	Solution
Values out of range	Numerator or denominator is zero/Set values out of range	Reduce number of pulses per revolution

Error code	Main	Sub	Display: "Er 1b4"
	1b	4	**Content:** Excessive synchronous position mode command

Cause	Diagnosis	Solution
Values out of range	Numerator or denominator is zero/Set values out of range	Reduce number of pulses per revolution

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, P04.44-4.47	Set proper values for P04.00-P04.09, P04.44-4.47

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, P04.44-4.47	Set proper values for P04.00-P04.09, P04.44-4.47

Error code	Main	Sub	Display: "Er 212"
	21	2	**Content:** I/O output interface function assignment error

Cause	Diagnosis	Solution
Input signal assigned with two or more functions.	Verify values of P04.10-P04.15	Set proper values for P04.10-P04.15
Input signal not assigned	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 260"
	26	0	**Content:** Positive/Negative position limit triggered under non-homing mode

Cause	Diagnosis	Solution
Positive/negative position limit triggered	Verify position limit signal	/

Error code	Main	Sub	Display: "Er 280"
	28	0	**Error description:** Output pulse frequency too high

Cause	Diagnosis	Solution
Frequency divided pulse output exceeds 1MHz	Verify if motor rotational speed and the number of frequency divided pulse output are too high	Reduce the number of frequency divided pulse output or reduce rotational speed

Error code	Main	Sub	Display: " Er 570"
	57	0	**Error description:** Forced alarm input valid

Cause	Diagnosis	Solution
Forced alarm input signal occurred	Verify forced alarm input signal	Verify if the input wiring connection is correct

Error code	Main	Sub	Display: "Er 5F0"
	5F	0	**Content:** Motor model no. detection error

Cause	Diagnosis	Solution
Automatically detected motor doesn't match set motor	/	Please contact our technical support

Error code	Main	Sub	Display: "Er 5F1"	
	5F	1	**Error description:** Driver power module detection error	
Cause			Diagnosis	Solution
Driver power rating not within range.			Restart driver	Please contact our technical support

Error code	Main	Sub	Display: "Er 5F3"	
	5F	3	**Error description:** The driver model matches the motor model abnormally	
Cause			Diagnosis	Solution
Driver model does not match motor model			Restart driver	Please contact our technical support

Error code	Main	Sub	Display: "Er 5F6"	
	5F	6	**Error description:** Driver power selection fault	
Cause			Diagnosis	Solution
Driver power identified at power-up initialization is not in range			Please confirm whether the driver and the motor are the matching relationship recommend by the manufacturer. If the matching relationship is correct, power off and restart to observe whether the fault is still reported.	If the model does not match, replace the motor or driver that can match each other;

Error code	Main	Sub	Display: "Er 600"	
	60	0	**Error description:** Main loop interrupted timeout	
Cause			Diagnosis	Solution
The motor control loop calculation time overflow			Check for interference from devices releasing electromagnetic field	Ground driver and motor to reduce interference
			Restart driver	Replace 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 drive with a new one

	Main	Sub	Display: "Er 700"

Error code	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
1. Excess homing velocity 2. Homing mode is different from given signal 3. Sensor signal edge inconsistent			1. Verify if homing velocity is too high 2. Verify if homing mode is set correctly 3. Verify if sensor signal edge is consistent	1. Set an optimal homing velocity 2. Make sure sensor signal edge is consistent.
Inconsistent origin status			1. Homing acceleration/ deceleration is set too low 2. Electronic gear ratio is low which causes acceleration/ deceleration to be too low	1. If electronic gear ratio cannot be changed, please set a suitable 609A. 2. Increase electronic gear ratio

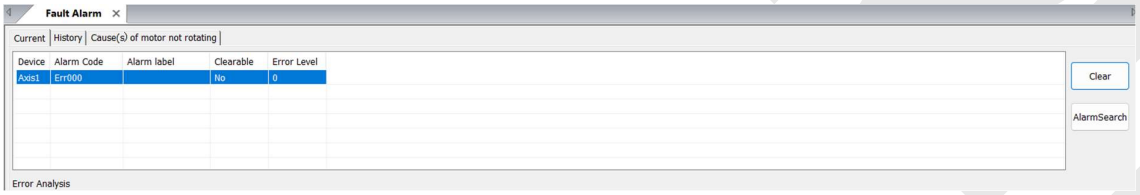
7.4 Alarm Reset

Clearable Alarms

Method 1:
After resolving the cause of the alarm, press "SET" under the "AF_ACL" menu on the front panel.
Then press the Up Arrow to clear the current alarm.

Method 2:
Refer to "3.11.1 DI Input Signal and Configuration Method".
Assign an IO input parameter to the "Alarm Clear (A-CLR)" function.
Use the appropriate signal level at the IO input terminal to clear the alarm.

Method 3:
After confirming the issue is resolved, use the debugging software.
Click the "Clear Alarm" button in the alarm information section to clear the alarm.



Unclearable Alarms

For alarms that cannot be cleared, you must power off the driver, resolve the fault, and then restart.
If the alarm still cannot be cleared after restarting, please contact MISUMI support.