

OSD-H-*-P Series AC Servo Drive

User Manual





Foreword

Thank you for purchasing Optimus Drive OSD-H series AC Servo drives. This manual will provide information on the OSD-H series servo products regarding product safety & specifications, installations & wiring, tuning & problem diagnostics.

Please contact us at info@optimusdrive.ru if you need further technical support.

Incorrect operation may cause unexpected accident, please read this manual carefully before using product.

- ♦ We reserve the right to modify equipment and documentation without prior notice.
- ♦ We won't undertake any responsibility with any customer's modification of product and the warranty of product will be canceled at the same time.

Safety Precautions

Please read the safety instructions carefully before using the products and pay attention to the safety signs.

Danger	Might incur death or serious injury
Caution	Might cause injury to operating personals or damage to equipment
Warning	Might cause damage to equipment
4	High voltage. Might cause electrocution to personals in contact
<u>sss</u>	Hot surface. Do not touch
	Protective Earth

Safety instructions



✓ The design of the product is not to be used in mechanical system which may incur health hazard.

✓ Users should be aware of the product safety precautions during design and installations of the equipment to prevent any unwanted accident.

Upon receiving



- \checkmark The use of damaged or faulty product(s) is prohibited.
- ✓ Please refer to item checklist. If the labels don't match, please do not install.



Transportation

- ✓ Please provide storage and transportation under protected conditions.
- \checkmark Do not stack the products too high up to prevent toppling.
- ✓ The product should be packaged properly during transportation,
- ✓ Do not hold the product by the cable, motor shaft or encoder while transporting it.
- ✓ The product should be protected from external forces and shock.

Installation

Servo drive and Motor:

- ✓ Do not install around combustibles to prevent fire hazard.
- ✓ Avoid vibration and impact.
- ✓ Do not install products that are damaged or incomplete.

Servo drive:

- ✓ Please install in electrical cabinet with sufficient protection from outside elements.
- ✓ Reserve sufficient gap as per the installation guide.
- ✓ Make sure to have good heat sinking.
- ✓ Avoid dust, corrosive gas, conductive object or fluid and combustibles.

Servo Motor:

- ✓ Make sure installation is tight to prevent it from loosening.
- ✓ Prevent fluid from leaking into motor and encoder.
- ✓ Protect motor from impact to avoid damaging encoder.
- ✓ Motor shaft should not bear the load beyond the limits as specified.

Wiring

Warning

- ✓ Participate installation personals should have sufficient training in product installation safety.
- \checkmark Please power off and wait for 10 minutes to make sure a full discharge of electricity.
- ✓ Servo drive and motor must be connected to ground.
- ✓ Connect the cables only after servo drive motor installed correctly
- ✓ Make sure the wires are properly managed and insulation layer is not torn to prevent electrocution.



- \checkmark Wiring must be correctly connected to prevent damage to product(s)
- Servo motor U, V, W terminal should be connected correctly and NOT connected directly to an AC power supply.
- ✓ Capacitor, inductor or filter shouldn't be installed between servo motor and servo drive.
- Connecting wires or any non-heat resistant components should not be put near to heat sink of the servo drive or motor.
- ✓ The flyback diode which is connected in parallel to output signal DC relay must not be connected in reverse.



Tuning and running



- ✓ Make sure the wirings of servo drive and servo motor are installed and fixed properly before powering on.
- ✓ On the first time tuning of the product, it is recommended to run unloaded until all the parameter settings are confirmed to prevent any damage to the product or machine.

Usage



- Please install an emergency stop button on machine to stop operation immediately if there is an accident.
- ✓ Please make sure machine is stopped before clearing an alarm.
- ✓ Servo drive must be matched with specified motor.
- ✓ Frequent restart of the servo system might incur damage to the product.
- ✓ Servo drive and motor will be not to touch shortly after power off. Please be careful.
- ✓ Modification(s) to servo system is prohibited.

Error Handling



- ✓ Please wait for 5 minutes after powering off for the electricity to be fully discharged before uninstalling the cables.
- ✓ Participate maintenance personals should have sufficient training in maintenance and operation of this product series.



- ✓ Please handle the error before clearing an alarm.
- ✓ Keep away from machine after a restart upon alarm. Mechanical axis might suddenly move. Such hazard should be prevented during the utilization of the product.

Model Selection



- ✓ Rated torque of the servo motor should be higher than continuous designated torque when fully loaded.
- ✓ Load inertia ratio of the motor should be lower or equals to recommended value for specified models
- ✓ Servo drive must be matched with specified motor.



Warranty Information

Available for

Optimus Drive warranty only covers Optimus Drive AC servo products that are obtained through **Optimus Drive certified sales channel**.

Warranty claim

- All Optimus Drive AC servo products (Servo drives and motors) overseas enjoy 18-month warranty period.
- Due to unforeseen circumstances in different sales regions around the globe, we recommend users to seek technical support from directed sales channel as any warranty claim or repair services may be required.
- Please be informed that any maintenance/repair work that is outside of the warranty claim conditions might incur some charges and to be confirmed before product(s) is being sent in.
- The duration required for maintenance work to be done is to be confirmed after initial check-up but we reserve the right to prolong the repair duration if needed.
- Discontinued products within warranty period will be replaced with a product of similar specifications.

Steps to warranty claim

- 1. Visit Optimus Drive global site <u>www.OptimusDrive.ru</u> to look for local certified sales channel.
- 2. Contact designated sales channel to check if any fee might incur. May include repair fee, spare part cost or shipping cost.

Circumstances where warranty claim is not available

- Damage/Loss due to occurrence of natural or man-made disaster such as fire, flood or earthquake.
- Installation or wiring error
- If there is any modification done to the product
- Warranty label on products is torn or not existing
- > Not a product bought from Optimus Drive certified global network of retailers/distributors.

Before warranty claim

- Please backup device parameters before any repair work/warranty claim. Optimus Drive and Optimus Drive certified retailers/distributors will not be held responsibilities for any data loss.
- If available, please send product back in original packaging or make sure it is well packaged to prevent any damage to the product during shipping.

Optimus Drive LLC. and its certified sales channel reserved the final right of the interpretation of the warranty information.



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Chapter 1 Introduction

1.1. Product Introduction

OSD-H Series AC Servo Product is a whole new midrange AC servo drivers and motors product range that we have proudly developed at Optimus Drive LLC. This product series provides more in demanded functionalities and control. While designing this AC servo drive series with cost concerns in mind, this product series doesn't compromise in term of performance and functions.

OSD-H-*-P Series AC Servo Drive comes with power rating from 400W up to 22000W which supports Modbus communication protocol in addition to analogue and pulse + direction input control. Using RS485 protocol, multi axis network of OSD-H series servo drive can be realized and controlled from 1 single master device.

OSD-H series AC Servo Drive is equipped with easy servo tuning (One-click Tuning/ Single Parameter Tuning), Zero Tracking Control (ZTC), vibration suppression and many more. This AC servo drive series also comes with new AC servo motors with 23-bit optical/magnetic encoder which offers better accuracy and stability.

First time user of the OSD-H series servo products can refer to this manual for more information on this product that cannot be covered in this short introduction. For further technical support, please do contact us or any local Optimus Drive certified retailers on Contact Us page.



1.2. Model number structure

1.2.1. Servo Drive

OSD-H	- 2S	2D0	Ρ
1	2	3	4

No.		Description			
1	Series No.	OSD-H AC Servo Drive Series			
2	Input Voltage	2S: 220VAC 4T:400VAC			
3	Power Rating	D40: 400 W D75: 750 W 1D0: 1000 W 1D5: 1500 W 2D0: 2 kW 3D0: 3 kW 4D4: 4,4 kW 5D5: 5,5 kW 7D5: 7,5kW			
4	Communication protocol	P: Pulse train + RS485 + Analogue, E: EtherCAT			

Driver Label



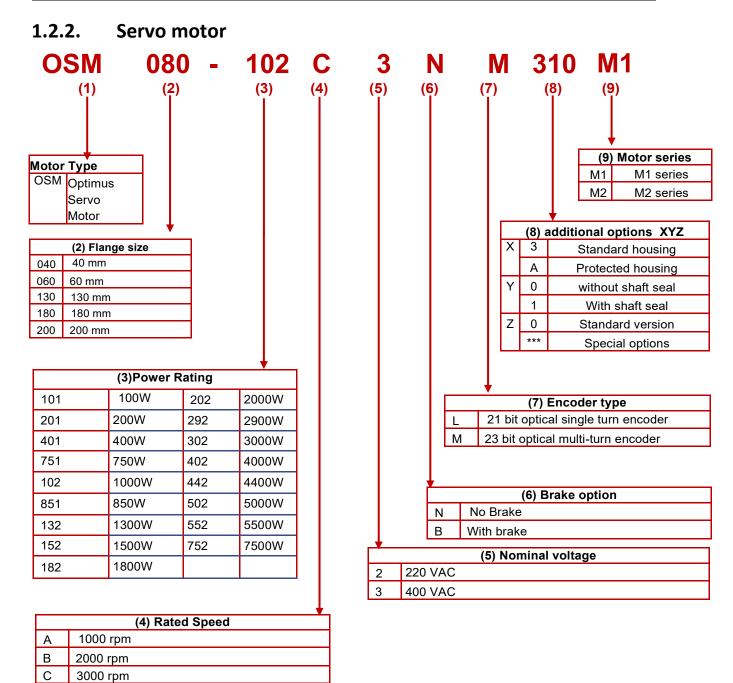


Н

Е

1500 rpm

2500 rpm





1.3. Servo Drive Technical Specifications

OSD-H 220V Models

OSD-H Series Driver	OSD-H-2SD40*	OSD-H-2SD75*	OSD-H-2S1D0*	OSD-H-2S1D5*	OSD-H-2S2D0*	
Power Rating	400W	750W	1000W	1500W	2000W	
Rated Current (Arms)	3.5	5.5	7.0	9.5	12	
Peak Current (Arms)	9.5	16.6	18.7	31.1	36	
Control circuit power supply	1-Ph AC 200V-240V, -10% - +10%, 50/60Hz					
Main power supply		I-PILAC 200	JV-240V, -10% -	+10%, 50/00HZ		
Cooling method	Air-cooled		Fan	-cooled		
Dimension H*L*W(mm)	175*156*40	175*156*50 175*		175*15	6*80	

OSD-H 400V Models

OSD-HFT series	OSD-H- 4TD75*	OSD-H- 4T1D0*		OSD-H- 4T2D0*	OSD-H- 4T3D0*	OSD-H- 4T4D4*	OSD-H- 4T5D5*	OSD-H- 4T7D5*
Rated Power(W)	750	1000	1500	2000	3000	4400	5500	7500
Rated Current (Arms)	2.7	3.5	5.4	8.4	11.9	16.5	20.8	25.7
Peak Current (Arms)	8.6	10.6	14.9	24.8	33.2	38.9	51.6	33.6
Size (mm) 55*175*		55*175*179		80*17	′5*179		89*250*230	
Main Power	Three ph	Three phase AC 380V~440V, -15%~+10%, 50/60Hz						
Control Circuit P	 Single pl 	nase AC 380'	V~440V, -15°	%~+10%, 50	/60Hz			

Port	Descriptions				
USB Type-C Tuning	Modify or read driver parameters without connecting to main power supply				
Low-speed pulse input	5V differential signal, 0-500kHz 24V single ended signal, 0-200kHz				
High-speed pulse input	5V differential signal, 0-4MHz				
nigh-speed puise input	Supports phase A/B/Z differential crossover frequency output				
Crossover Frequency Output	Supports phase Z open collector crossover frequency output				
Analog Input	2 analog inputs (AI1/AI2),-10V~+10V, Max. voltage: ±12V				
Analog Output	1 analog output(AO1), -10V~+10V				
	8 Digital Inputs (Supports common anode or cathode connection) DI1~DI8				
	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)				
Digital Input	8. Torque limit switching (TL-SEL)				
Digital input	9. Vibration suppression 1(VS-SEL1)				
	10. Vibration suppression 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.Crossover frequency input(DIV1)				
	16. Zero speed clamp(ZEROSPD)				
	17.Velocity sign(VC-SIGN)				



		18. Torque sign(TC-SIGN)		
		19. Clear Alarm (A-CLR)		
		20. Speed Regulation(SPDREG)		
		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(ORG) 5 digital outputs (double-ended) DO1~DO5		
		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)		
Digi	al Output	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)		
		Under PR mode 1. Command completed (CMD-OK)		
		2. Path completed (PR-OK)		
		3. Homing done (HOME-OK)		
Con	munication Port	RS485 communication, Modbus RTU protocol (RJ45 port)		
		Control Mode		
		1. External pulse train position control 2. JOG control		
		3. Velocity control		
	Control	4. Torque control		
		5. Hybrid control: Position-Torque/Position-Velocity/Velocity-Torque		
		• 4MHz (5V differential input)		
uo	Pulse frequency	• 500kHz (5V differential input)		
Position		200kHz (24V single-ended input)		
Po	Electronic gear ratio	(1~8388608)/(1~8388608)		
	Torque limit	Please refer to parameter settings		
		Control Features		
Driv	e Mode	IGBT SVPWM sinusoidal wave drive		
Feed	Iback Method	Encoder: RS485 Protocol		
Stan	dardized Parameters	Quick tuning of servo driver parameters can be achieved through PC tuning		
Star	uaruizeu Fardilleters	tools.		
Easy	/-to-use	One-click tuning, Single parameter tuning, Black box, Zero tracking control		
	h Filter	Mechanical resonance suppression. Supports up to 3 filters,50Hz~4000Hz		



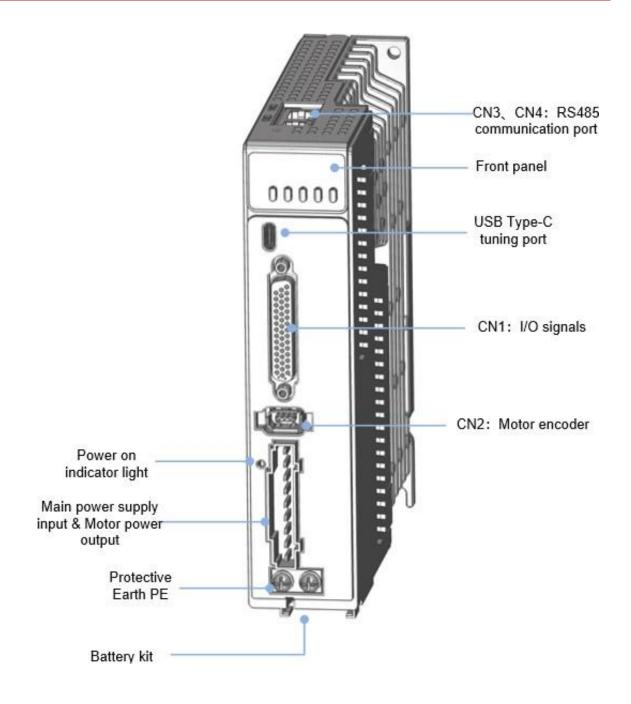
Vibration suppression	End vibration su	ppression			
DI/DO settings	Digital inputs and outputs are user-configurable				
Alarm	Overcurrent. Overvoltage. Undervoltage. Overheat. Overload. Overtravel. Single-Phasing. Regenerative resistor error. Position deviation error. Encoder feedback error. Excessive braking rate. EEPROM error				
Front Panel	5 push buttons,	8-segments display			
Software	Driver tuning through Motion Studio Ver. 2.2.x. Parameters tuning in current loop, position loop, velocity loop; Modify I/O signal and motor parameters; Variables(velocity, position deviation, etc.) monitoring using step diagrams'				
	USB Type-C	Modbus USB2.0 (No need to connect driver to power supply)			
Communication	Modbus	RS485 communication, Modbus RTU protocol (RJ45 port). Communication up to 32 axes to a host.			
Dynamic Brake	Internal dynamic brake				
Black Box	Set triggering conditions and analyze the data from black box. Used for error solving				
Suitable Load Inertia	30 times smaller	than motor inertia			
	Environme	ntal requirements			
Temperature	Storage: -20-80°C (Condensation free); Not < 72 hours if stored in over 65° C Installation: 0-55°C (Not frozen); Lower performance at over 45° C				
Humidity	Under 90%RH (Condensation free)				
Altitude	Max. altitude of 2000m; 100% performance at 1000m or below. Performance decreases by 1% with every increase of 100m from 1000m.				
Vibration	Less than 0.5G (4.9m/s2) 10-60Hz (non-continuous working)				
IP ratings	IP20				



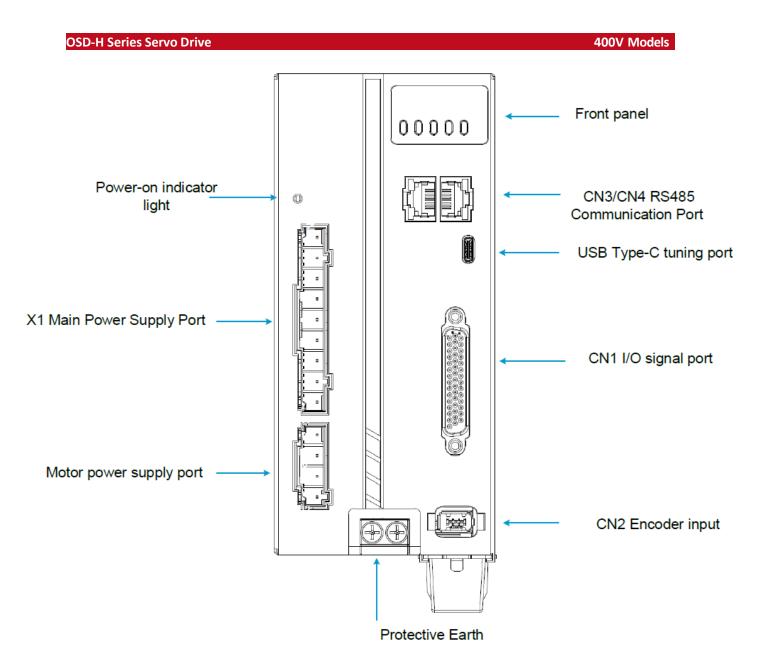
1.4. Servo Drive Ports and Connectors

OSD-H Series Servo Drive

220V Models







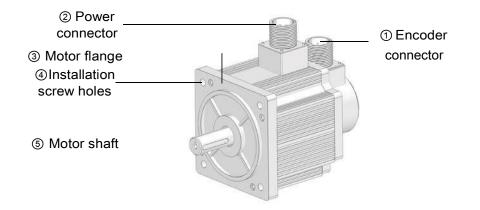


Front PanelIncluding a LED display and 5 buttons. LED display is used to display servo drive status and parameter settings. 5 buttons: M : To switch between different modes and parameters 4 : Switch between value A : Switch between sub-menus/Increase S : EnterUSB Type-C Tuning PortConnect to computer for tuning of servo drive. Parameters of the servo drive can be modified without connecting to main power supply.CN1 I/O signalProbe input signal & other I/O signals terminalsCN3/CN4 RS485 communication portConnect to master device or next/previous slave stationCN2 EncoderConnect to motor encoderCN2 EncoderConnect to motor encoderPower-on indicator lightLights up when servo drive 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.DSD-H 220V modelsConnect to regenerative resistorL1, L2Main power supply 220VACP+, NConnect to regenerative resistorP4, NWMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalDSD-H 400V modelsElife terminal. Connect to regenerative resistorL1, L2Control circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorP1, B2Nin power supply input – 3ph 400VACP4DC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)Ni and N2 are short connected. Connect NI and N2 after removing	Parts & Connectors	Description			
USB Type-C Tuning Portservo drive can be modified without connecting to main power supply.CN1 I/O signalProbe input signal & other I/O signals terminalsCN3/CN4 RS485 communication portConnect to master device or next/previous slave stationCN2 EncoderConnect to motor encoderPower-on indicator lightPlease do not louch the power terminal immediately after power off as the capacitor might require some time to discharge.OSD-H 220V modelsL1, L2L1, L2Main power supply 220VACP+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CL1C, L2CControl circuit power supply input - 1ph 400VACP+DC bus positive terminal. Connect to regenerative resistorP+DC bus positive terminal. Connect to external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	Front Panel	 display servo drive status and parameter settings. 5 buttons: M : To switch between different modes and parameters ◄ : Switch between value ▲ : Switch between sub-menus/Increase ▼ : Switch between sub-menus/Decrease 			
CN3/CN4 RS485 communication portConnect to master device or next/previous slave stationCN2 EncoderConnect to motor encoderPower-on indicator lightLights up when servo drive 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.OSD-H 220V modelsLiphts up when supply 220VACP+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	USB Type-C Tuning Port	servo drive can be modified without connecting to main power			
connect to master device or next/previous stave stationCN2 EncoderConnect to motor encoderPower-on indicator lightLights up when servo drive 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.OSD-H 220V modelsLi, L2L1, L2Main power supply 220VACP+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	CN1 I/O signal	Probe input signal & other I/O signals terminals			
Power-on indicator lightLights up when servo drive 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.OSD-H 220V modelsL1, L2Main power supply 220VACP+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CL1C, L2CControl circuit power supply input - 1ph 400VACR, S, TMain power supply input - 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.		Connect to master device or next/previous slave station			
Power-on indicator lightPlease do not touch the power terminal immediately after power off as the capacitor might require some time to discharge.OSD-H 220V modelsL1, L2Main power supply 220VACP+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CL1C, L2CControl circuit power supply input - 1ph 400VACR, S, TMain power supply input - 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	CN2 Encoder	Connect to motor encoder			
L1, L2Main power supply 220VACP+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsEL1C, L2CControl circuit power supply input - 1ph 400VACR, S, TMain power supply input - 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connect or P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	Power-on indicator light	Please do not touch the power terminal immediately after power			
P+, BrConnect to regenerative resistorP+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsElfc, L2CL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connect or D+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	OSD-H 220V models				
P+, NCommon DC bus terminals for multiple driversU, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsEL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	L1, L2	Main power supply 220VAC			
U, V, WMotor connector: Connect to U,V,W power terminals on servo motorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	P+, Br	Connect to regenerative resistor			
U, V, WmotorPEPE motor earth terminal: Connect to motor PE terminalOSD-H 400V modelsL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	P+, N	Common DC bus terminals for multiple drivers			
OSD-H 400V modelsL1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	U, V, W				
L1C, L2CControl circuit power supply input – 1ph 400VACR, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	PE	PE motor earth terminal: Connect to motor PE terminal			
R, S, TMain power supply input – 3ph 400VACP+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	OSD-H 400V models				
P+DC bus positive terminal. Connect to regenerative resistorB1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connector to a DC reactor to suppress electrical current high harmonics.	L1C, L2C	Control circuit power supply input – 1ph 400VAC			
B1, B2Please short connect B1 and B2 when using internal regenerative resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	R, S, T	Main power supply input – 3ph 400VAC			
B1, B2resistor. If external regenerative resistor is required, remove the short connector between B1 and B2, connect the external regenerative resistor to P+ and B2.NDC bus negative terminal. Do not connect.N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	P+	DC bus positive terminal. Connect to regenerative resistor			
N1, N2 (4.4/5.5/7.5kW models)N1 and N2 are short connected. Connect N1 and N2 after removing short connector to a DC reactor to suppress electrical current high harmonics.	B1, B2 resistor. If external regenerative resistor is required, reme short connector between B1 and B2, connect the external				
(4.4/5.5/7.5kW models) removing short connector to a DC reactor to suppress electrical current high harmonics.	Ν	DC bus negative terminal. Do not connect.			
Protective Earth PE Connect to PE of main power supply. For grounding		removing short connector to a DC reactor to suppress electrical			
	Protective Earth PE	Connect to PE of main power supply. For grounding			



1.5. Motor ports and connectors

Motors with aviation connectors

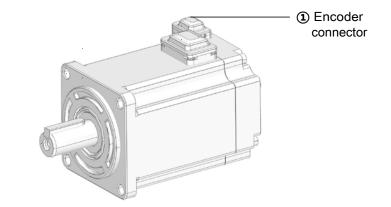


Motors with direct connectors

Power connector 2

- Motor flange 3 Installation
- screw holes

Motor shaft (5)





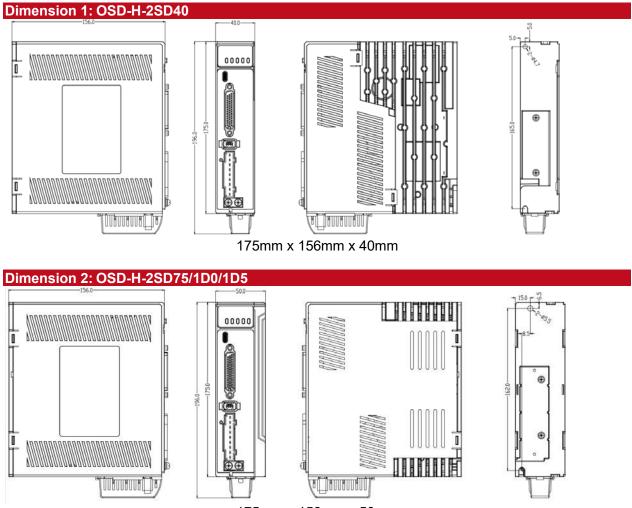
Chapter 2 Installation & Wiring

2.1 Servo Drive Installation

2.1.1 Servo drive installation environment

Temperature	Storage: -20-80°C (Condensation free); Installation: 0-55°C (Not frozen)		
Humidity	Under 90%RH (Condensation free)		
Altitude Up to 1000m above sea level			
Vibration Less than 0.5G (4.9m/s2) 10-60Hz (non-continuous work			
Atmospheric	No corrosive gas, combustibles, dirt or dust.		
IP ratings	IP20		

2.1.2 Servo drive dimension

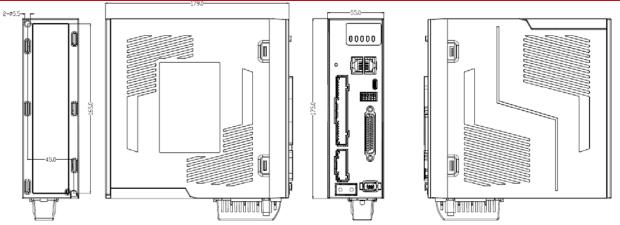


175mm x 156mm x 50mm

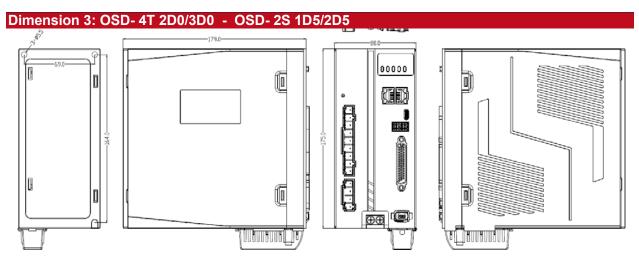


User Manual of OSD H-*-P AC Servo

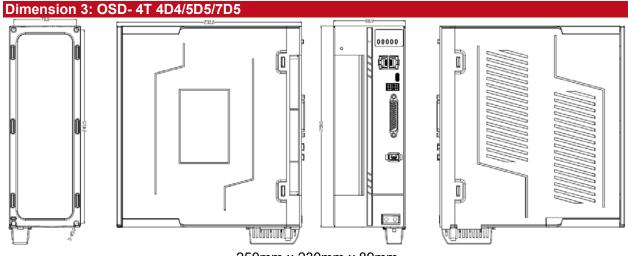
Dimension 3: OSD-H 4T D75/1D0/1D5



175mm x 179mm x 55mm



175mm x 179mm x 85mm

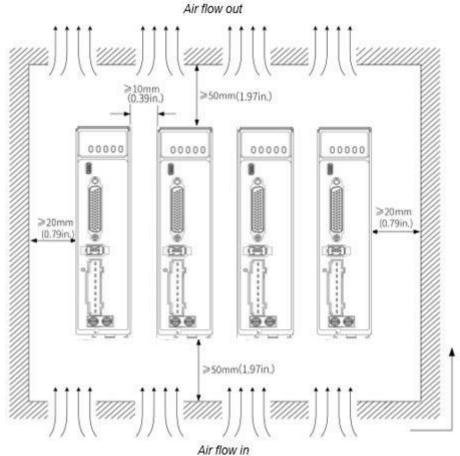


250mm x 230mm x 89mm



Space requirement for installation

In order to ensure efficient heat dissipation, please leave at least 10mm installation space in between drivers. If drivers need to be mounted compactly, please leave at 1mm of installation space. Please keep in mind that under such conditions, the drivers can only run at 75% of actual load rate.



Installation method

Please install the driver vertical to ground facing forward for better heat dissipation. Always install in rows and use heat insulation board to separate between rows. Cooling fans are recommended for drivers to achieve optimal performance.

> Grounding

 \triangleright

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

Please ensure there is no liquid around the wiring and connectors as liquid leakage may cause serious damage to the driver(s).

> RJ45 port cover

Please cover unconnected RJ45 port(s) on top of the driver to prevent dust or liquid from damaging the ports.

> Battery kit

If there is a need for battery kit, please remember to leave a room in the electrical cabinet for it.



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 motor is used in enclosed environment without heat dissipation, motor lifespan will be short.
- > Please check and clean the installation spot before installation.

2.2.2 Precautions during installation

Installation method

Install horizontal to ground

Make sure power cable and encoder cable is facing downwards to make sure fluid doesn't leak into the ports.

Install vertical to ground

Please use a motor with oil seal when paired with a reducer 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.
- > If there is an unavoidable fluid leakage near the motor, please use motor with better IP ratings.
- Make sure power cable and encoder cable is facing downwards to make sure fluid doesn't leak into the ports.
- > Avoid the usage of motor in water/oil leaking prone environment.

Cable under stress

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

Connectors

- > Please to 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.

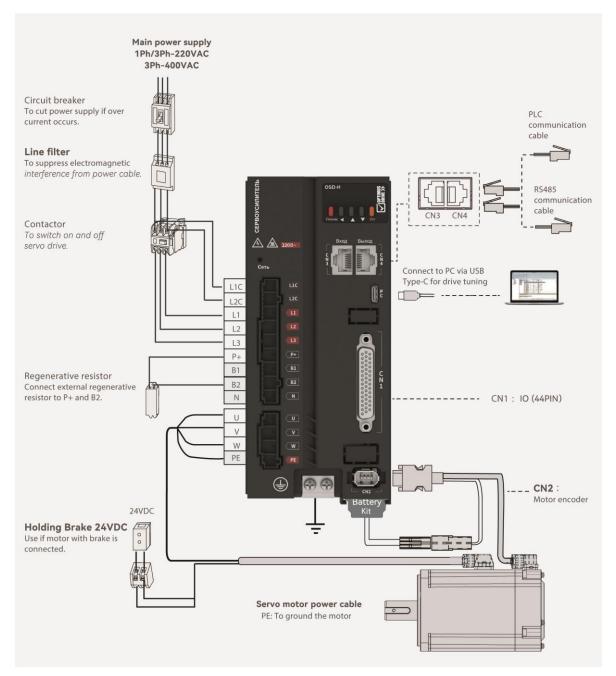
Encoder & coupling

- 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 is within the limits specified as it might affect the lifespan of the motor or cause damage to it.



2.3 OSD-H Wiring Diagram

Common connection scheme for OSD-H-P below



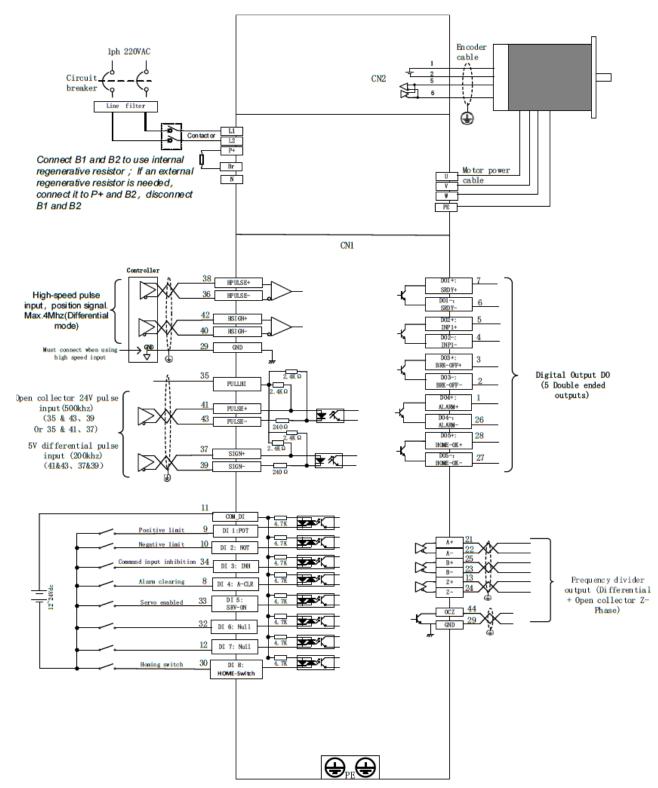
- OSD-H series servo drive supports single phase and three phase 220VAC. Only driver with power rating above 1500W supports three phase 220VAC.
- Please use a circuit breaker for the main power supply to prevent damage to the product or machine.
- Please do not use a contactor in connection to servo 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.





2.3.1 Position Control Mode Wiring Diagram

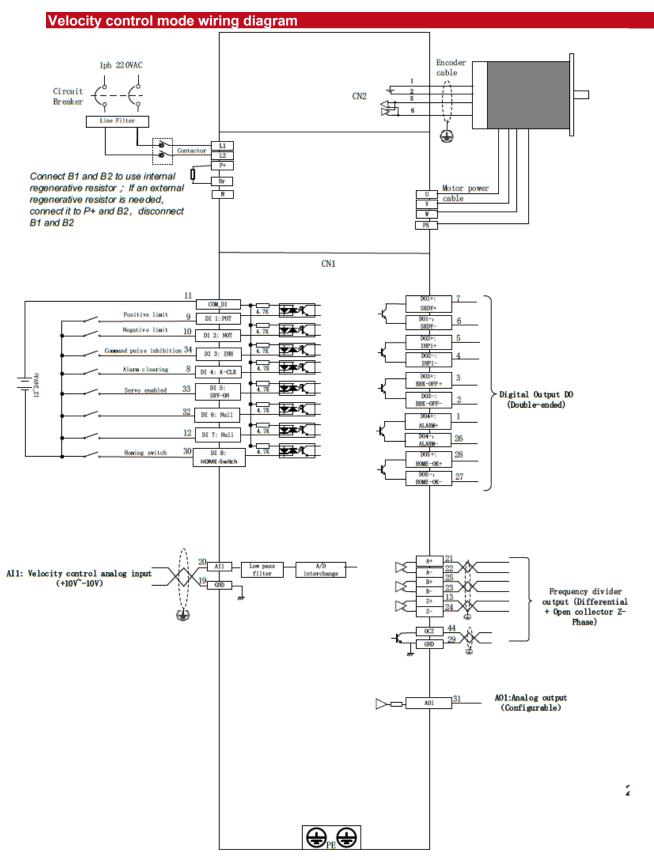
Position control mode wiring diagram



Note: Please set **Pr0.05 to 1** when using high speed pulse command (max. 4 MHz)

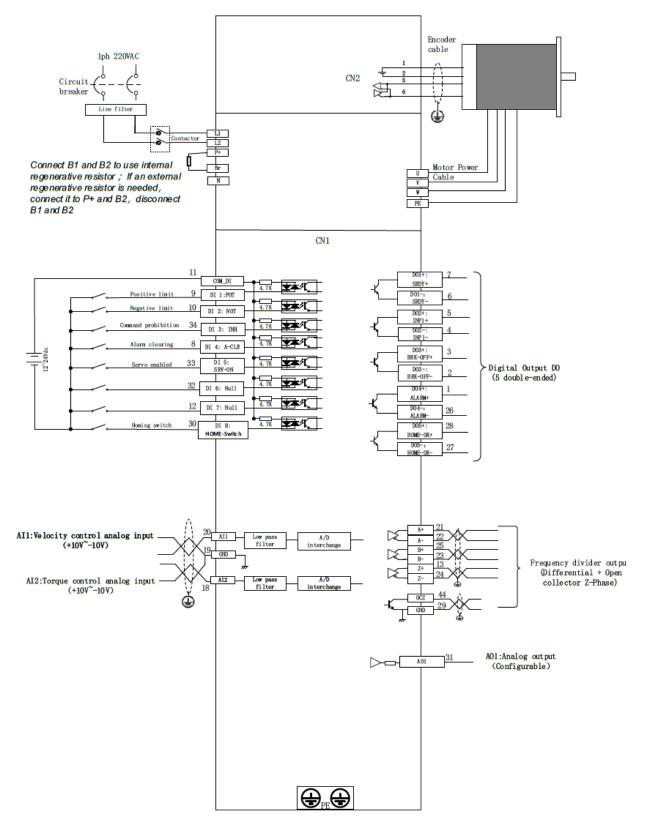


2.3.2 Velocity/Torque Control Mode Wiring Diagram



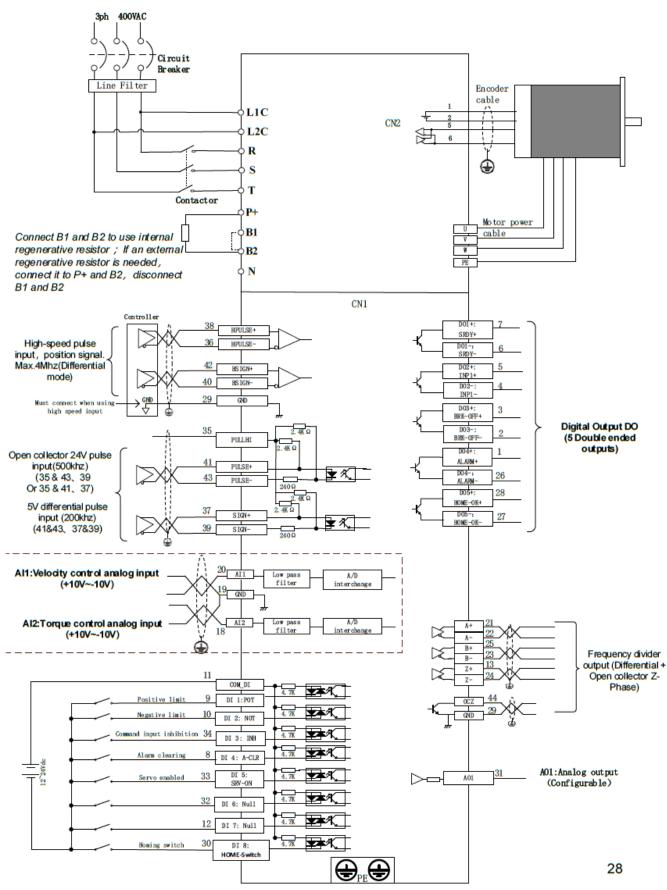


Torque control mode wiring diagram



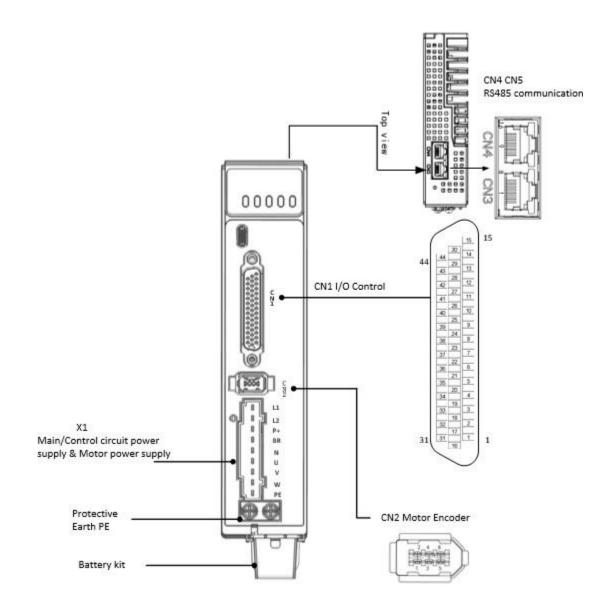


OSD-H (3ph 400VAC drives) wiring diagram





2.4 Servo Drive Ports

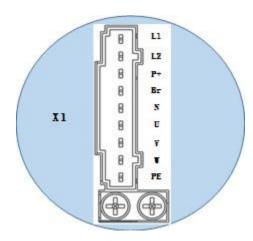


Connector	Label
CN1	I/O signal connector(DB 44PIN)
CN2	Motor encoder feedback
CN3	RS485 Communication port
CN4	RS485 Communication port
X1	Main circuit power supply/ Motor power output
PC	USB type C tuning port
PE	Protective Earth for grounding



2.5 X1 Main power supply

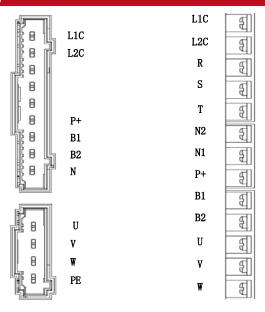
OSD-H Series - 220V Models



Port	Pin	Functions	Remarks		
X1	L1	Single phase 220VAC, +10~-	 Optional isolation transformer Do not connect to 400VAC directly to prevent damage to driver. 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	15%, 50/60Hz			
	Ρ+	 Internal DC bus positive terminal 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			
	V	Motor V terminal	Please ensure proper wire connection on motor.		
	W	Motor W terminal			
	PE	Motor Protective Earth	Please ground PE of driver and motor together		



OSD-H Series - 400V Models



Port	Pin	Functions	Remarks			
	L1C	Control circuit:	${f 1}$ Optional isolation transformer			
	L2C	Single phase 380VAC, +10~-15%, 50/60Hz	2 In case of serious interference, it is			
	R	Main Power Supply:	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.			
	S	Three phase 380VAC,				
	т	+10~-15%, 50/60Hz				
X1	P +	 ③ Internal DC bus positive terminal ④ External regenerative resistor P terminal External regenerative 	If an external regenerative resistor is required, please disconnect B1 and B2. Connect the external regenerative resistor to terminal P+ and B2.			
	B1/B2	resistor terminal				
	Ν		Please do not connect			
	N1	Internal DC bus negative terminal	N1 and N2 are connected under normal circumstances. To suppress power supply high			
	N2	5	harmonics, please disconnected N1 and N2. Connect a DC reactor between N1 and N2.			
	U	Motor U terminal				
	v	Motor V terminal	Please ensure proper wire connection on motor.			
	w	Motor W terminal				
	PE	Motor Protective Earth	Please ground PE of driver and motor together			



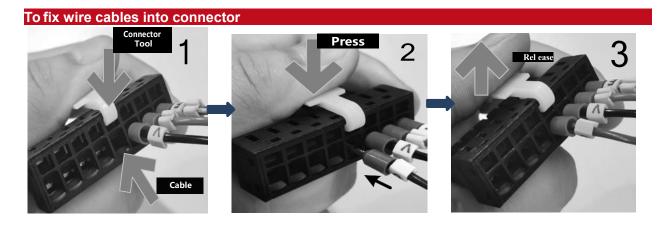
2.5.1 Main Power Supply Cable Selection

Main Power Supply Cable

• Wire diameter: Wire diameter differs according to the power rating of the servo drives. Please refer to the table below.

Driver	Wire diameter (mm ² /AWG)				
Driver	L1 L2/R S T	P+ BR	UVW	PE	
OSD-2SD40-*	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14	
OSD-2SD75-*	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14	
OSD-2S1D0-*	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14	
OSD-2S1D5-*	2.1/AWG14	2.1/AWG14	1.3/AWG16	1.3/AWG16	
OSD-4TD75-*	1.3/AWG16	2.1/AWG14	0.52/AWG14	0.52/AWG14	
OSD-4T1D0-*	1.3/AWG16	2.1/AWG14	1.3/AWG16	1.3/AWG16	
OSD-4T1D5-*	1.3/AWG16	2.1/AWG14	1.3/AWG16	1.3/AWG16	
OSD-4T2D0-*	2.1/AWG14	2.1/AWG14	1.3/AWG16	1.3/AWG16	
OSD-4T3D0-*	2.1/AWG14	2.1/AWG14	3.3/AWG12	3.3/AWG12	
OSD-4T4D4-*	2.1/AWG14	2.1/AWG14	3.3/AWG12	3.3/AWG12	
OSD-4T5D5-*	2.6/AWG13	2.6/AWG13	3.3/AWG12	3.3/AWG12	
OSD-4T7D5-*	4.2/AWG11	2.6/AWG13	3.3/AWG12	3.3/AWG12	

- **Grounding**: Grounding wire should be thicker. Ground PE terminal of servo drive and servo motor together with resistance <100 Ω.
- □ A 3-phase isolation transformer is recommended to lessen the risk of electrocution
- □ Connect a line filter to power supply to reduce electromagnetic interference.
- Please install a fuseless circuit breaker to cut off power supply in time when the driver fails.

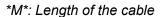


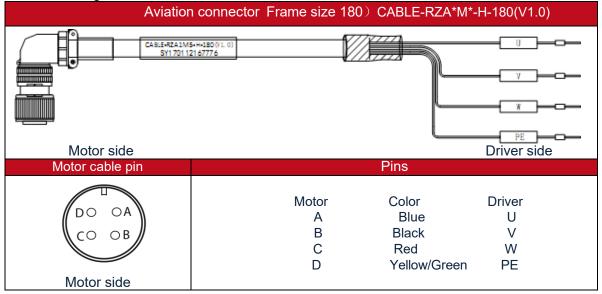


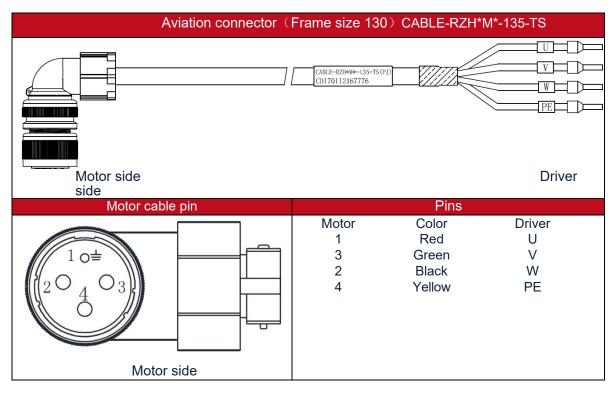
2.5.2 Motor Power Supply Cable Selection (Without Brake)

Motor winding power cable

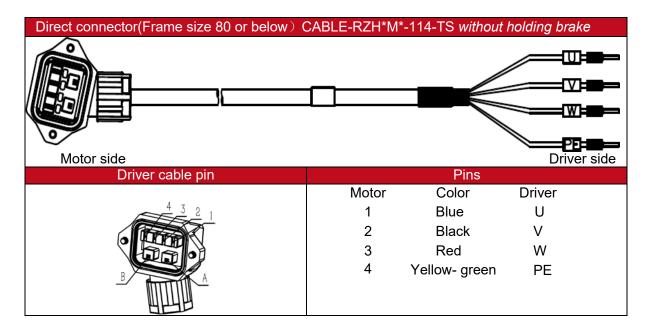
- Wire length available: 1.5m, 3m and 5m
- > Connectors type available: Aviation connectors, direct connectors (recommended)
- Please contact Optimus Drive sales team or any Optimus Drive certified local retailers for any customized needs.









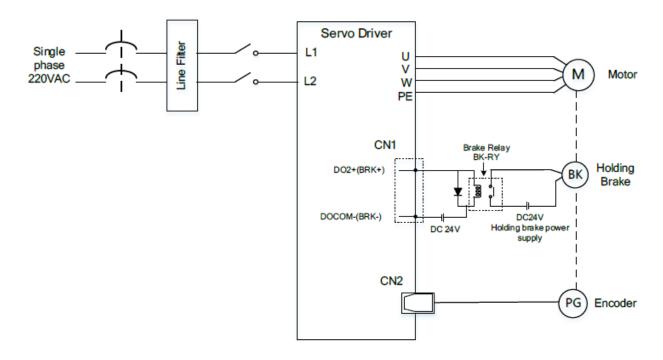






2.5.3 Holding Brake Wiring Diagram

Holding brake is activated when servo drive 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.

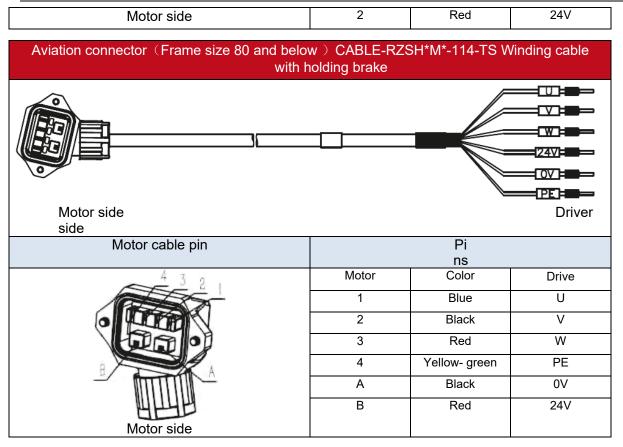


Holding brake wiring diagram

2.5.4 Motor Power Supply Cable (With Holding Brake)

Aviation connector (Frame size 130) CABLE-RZSH*M*-135-TS Winding cable with holding brake					
CABLE-RZSI###=135-TS (P) CABLE-RZSI###=135-TS (P) W CD170112167776 PE OV 24V					
Motor side side			Driver		
Motor cable pin	Pins				
	Motor	Color	Drive		
38°0,	A	Blue	U		
1008°	В	Black	V		
	С	Red	W		
	D	Yellow- green	PE		
ն անել տանն	1	Black	0V		



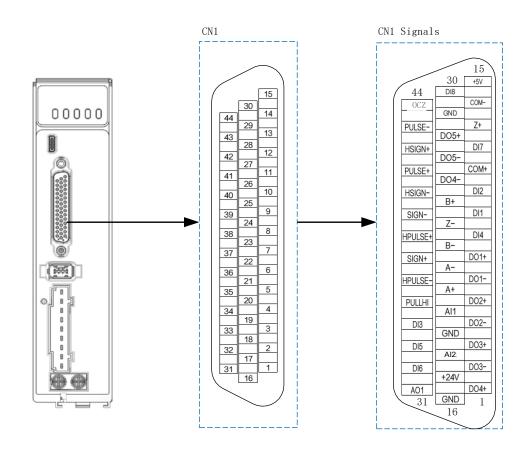


- Mechanical noise might exist when motor with holding brake is in operation but it doesn't affect the functionality of the motor.
- □ When the holding brake circuit is closed (holding brake deactivated), there might be magnetic flux leakage. Please be aware to not use magnetic sensor around motor with 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.



2.6 CN1 I/O Control Signal

OSD-H Series Servo Drive uses DB 44-Pin connector.



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

Function	Pin	Signal	Label	Description
41 POLSE+ command input • Differential (5V) 43 PULSE- Low speed pulse command input • Single ended (24V)	41	PULSE+		Low speed pulse command input mode: • Differential (5V)
	 Single ended (24V) Low speed pulse and direction command 			
	37	SIGN+	Low speed direction command input	input mode: PULSE+ & PULSE-: 5V Differential
Position	Position 39 SIGN- Low speed direction (500KHz)	(500KHz) SIGN+ & SIGN-: 5V Differential		
command	35	PULLHI	Open collector 24V common input	(500KHz) PULLHI & PULSE-: 24V Single ended (200KHz) PULLHI & SIGN-: 24V Single ended (200KHz)
	38	HPULSE+	High speed pulse command input	4MHz High speed pulse command input,



	36	HPULSE-	High speed pulse command input	5V differential input	
	42	HSIGN+	High speed direction command input	4MHz High speed direction command	
	40	HSIGN-	High speed direction command input	input ,5V differential input	
Common	17 14	+24V COM-	Internal 24V power supply	24V internal power supply, range 20V~28V. Max. output current 200mA	
	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	-	
Digital	30	DI8	HOME-Switch	Homing switch (sensor)	
inputs and	7	D01+	SRDY+		
outputs	6	D01-	SRDY-	Servo ready signal output	
	5	D02+	INP1+		
	4	D02-	INP1-	Positioning done signal output	
	3	DO2- DO3+	BRK-OFF+		
	2	DO3-	BRK-OFF-	Holding brake output	
		 DO3- DO4+	ALARM+		
	1 26	 DO4-		Alarm output	
			ALARM-	· · · · · · · · · · · · · · · · · · ·	
	28 27	DO5+ DO5-	HOME-OK+ HOME-OK-	Homing done signal output	
Analaa	27	Al1	AI1	Velocity command or limit input($0 \sim \pm 10$ V	
Analog input and	18	Al2	Al2	Torque command or limit input $(0 \sim +10 \text{ V})$	
output	31	A01	A01	Analogue output – Status monitoring	
output	19	GND	GND	Analogue ground	
	21	A+	Encoder Aphase		
	22	A-	frequency divider output	Differential output, A/B phase quadrature	
	25	B+	Encoder B phase	frequency divided pulse output signal	
			frequency divider		
_	23	B-	output		
Frequency divider	13	Z+	Encoder Z phase	Differential entruit mater 7 shace sized	
output	24	Z-	frequency divider output	Differential output, motor Z phase signal output	
	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)	
C ommon	15	+5V	Internal 5V power	5V internal power supply. Max. output	
Common	16	GND	supply	current 200mA	
	Fram		FG	Frame grounding	



2.6.1 CN1 control signal cable selection

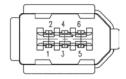
To ensure I/O signal to not be affected by electromagnetic interference, a **shielded cable** is recommended for this application.



Cables for different analogue signals should be using isolated shielded cable while cables for digital signals should be shielded twisted pair cable. Cables for CN1 connectors should be 24-28AWG in diameter.

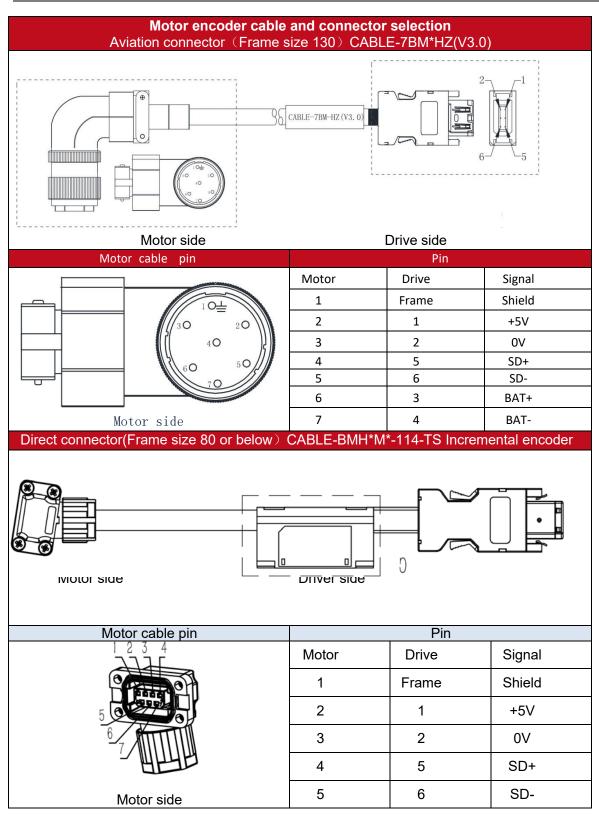
Please keep at least 30cm from main power supply/control circuit power cable (L1C/L2C/L1/L2/L3, U/V/W) to prevent electromagnetic interference of I/O signals.

2.7 CN2 Motor Encoder

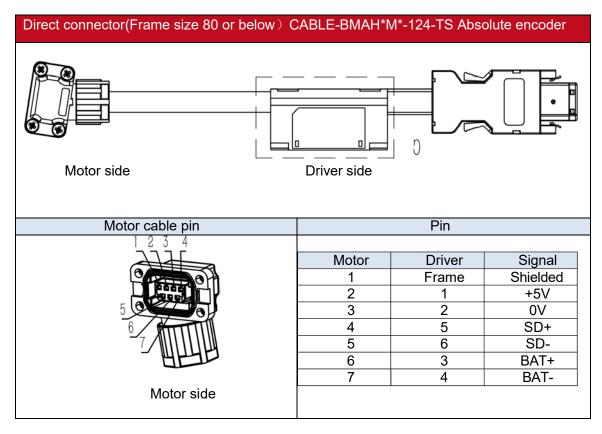


Port	Pin	Signal	Explanation
	1	VCC5V	Power supply 5V
	2	GND	Power supply ground
	3	BAT+	Battery positive terminal
CN2	4	BAT-	Battery negative terminal
	5	SD+	SSI Data+
	6	SD-	SSI Data-
	Frame	PE	Shield grounding





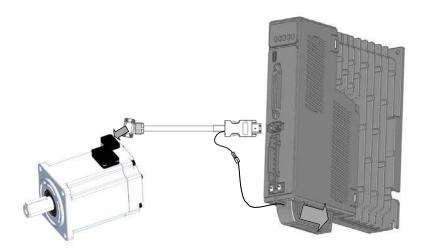




- a) Please ground cable shield foil to drive to prevent servo error alarm
- b) Please use a double winded shielded cable and make sure to be as short as possible.
- c) Please separate CN1 cable from power cables with a minimum gap of 30cm.

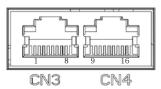
Battery kit installation

Please install the battery kit as the following diagram if our Optimus Drive direct connector motor doesn't come with an online battery kit.



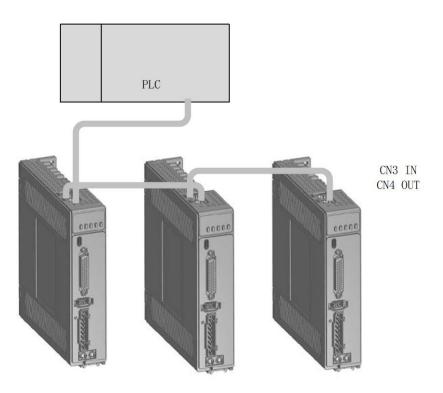


2.8 CN3/CN4 – RS485 Communication Port



Port	Pin	Signal	Description
	1, 9	RDO+	RS485 Differential signal+
	2, 10	RDO -	RS485 Differential signal-
	3, 11	GND	Ground (RS485)
	4, 12	TXD+	RS485 Differential signal+
CN3	5, 13	TXD-	RS485 Differential signal-
CN4	6	VCC5V	Reserved, 5V positive
	0	VCC3V	(50mA)
	7, 15	GND	Ground
	8, 16	1	/
	Frame	PE	Shield grounding

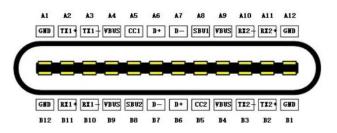
OSD-H series supports RS485 communication protocol which enables communication between single/multi axes and master device.





2.9 USB Type-C Tuning Port

OSD-H series servo drive 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 drive connecting to main power supply.



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

2.10Regenerative 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 reach the maximum capacity, a regenerative resistor is required the excessive energy to prevent over-voltage.

Selection of regenerative resistor

OSD-H series servo drives are equipped with internal regenerative resistor. If an external resistor is needed, please refer to the table below.

Model no.	Internal resistance (Ω)	Internal resistor power rating (W)	Minimum resistance (Ω)	Minimum power rating (W)
OSD-2SD40	100	50	50	50
OSD-2SD75	50	75	40	50
0SD-2S1D0	50	100	30	100
OSD-4TD75	100	100	100	100
0SD-4T 1D0	100	100	100	100
0SD-4T 1D5	100	100	100	100
OSD-4T 2D0	50	100	40	100
OSD-4T 3D0	50	100	40	100
0SD-4T 4D4	35	100	35	100
OSD-4T 5D5	35	100	25	100
OSD-4T 7D5	35	100	25	100



Calculation of regenerative resistance under normal operation

Steps:

1. Determine if driver comes with a regenerative resistor. If not, please prepare 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°C, 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(Max. required regenerative resistance) = (380² - 370²)/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 precautions before installing an external regenerative resistor.

1. Please set the correct resistance value in Pr0.16 and resistor power rating Pr0.17 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°C 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

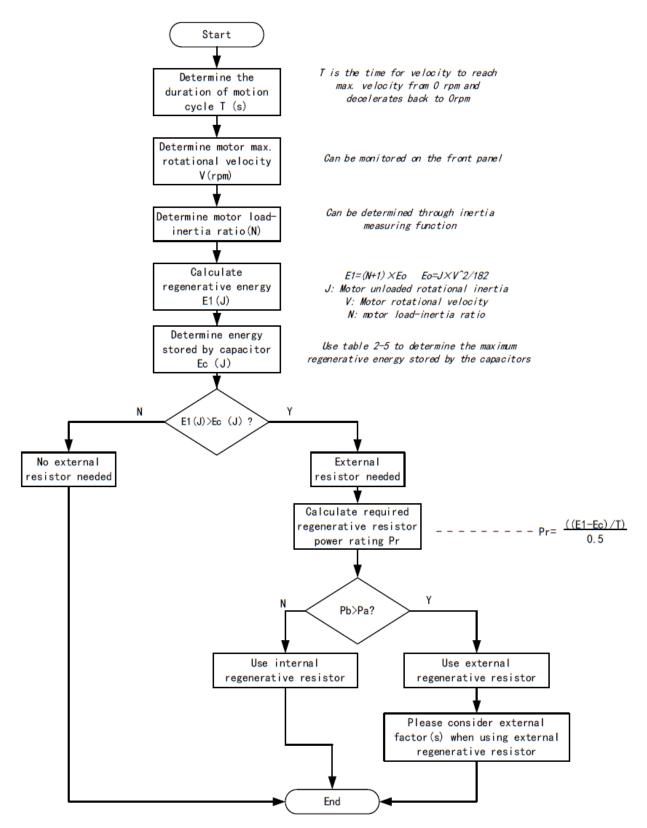
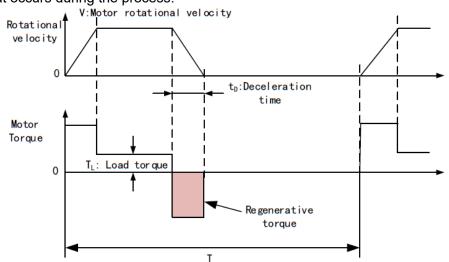




Diagram below shows the acceleration and deceleration cycle periods and the regenerative torque that occurs during the process.



Steps to calculate capacity of regenerative resistor

Steps	Calculation	Symbol	Formula
1	Servo system regenerative energy	E1	E1=(N+1)×J×V ² /182
2	Depleted energy from loss of load system during acceleration	ΕL	$E_L = (\pi/60) V \times T_L \times tD$ If loss is not determined, please assume $E_L = 0$.
3	Depleted energy due to motor coil resistance.	Ем	$E_M = (U^2/R) \times tD$ 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	Eκ	E _K =E1-(EL+EM+EC), If loss is ignored, EK=E1-EC
6	Required power rating of regenerative resistor	Pr	Pr=Eк/(0.5×T)

Internal capacitor capacity and rotor inertia

OSD-H Drivers	Servo motor	Rotor Inertia (×10 ⁻⁴ kg.m ²)	Max. regenerative energy stored in capacitor Ec(J)
400W	OSM-060401C-2NM310-M2	0.58	13.47
750W	OSM-080751C-2NM310-M2	1.66	22.85
1000W	OSM-080102C-2NM310-M2	1.79	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 drive: OSD-H- 2SD75, Servo Motor: OSM-080751C-2NM310-M2. When T = 2s, rotational velocity = 3000rpm, load inertia is 5 times of motor inertia.



OSD-H Drivers	Some motor		Max. regenerative energy stored in capacitor Ec(J)
750W	OSM-080751C-2NM310-M2	1.66	22.85

Regenerative energy produced:

$$E1 = \frac{(N+1) \times J \times V^2}{182} = \frac{(5+1) \times 1.66 \times 3000^2}{182} = 49.35$$

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,

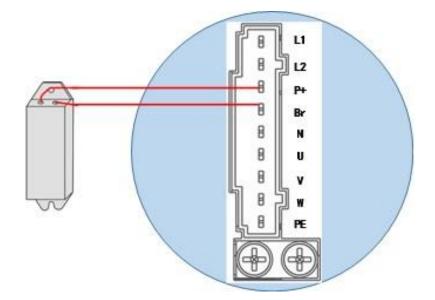
When selecting the resistance of the regenerative resistor, please be higher than the minimum value recommended in table 2-3 but lower than Rmax

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 the regenerative resistance is not as accurate as calculations done under normal operation.



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 prevent 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 Pr0.16 and Pr0.17 before using any regenerative resistor.
- > Do not set the regenerative resistor near any flammable object.



2.11I/O Signals

2.11.1 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 drive, 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 Pr0.05.

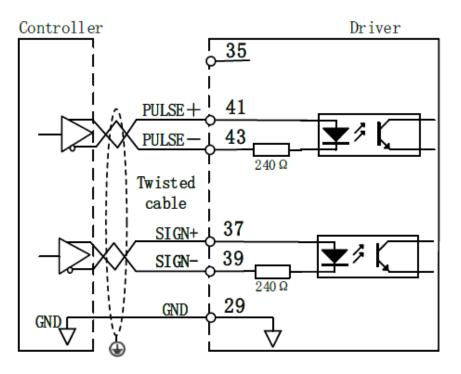
	Pulse	Max. Frequency	Min pulse width(µs)
Low	Differential	500k	1
speed	Open collector(Single ended)	200k	2.5
High speed differential		4M	0.125

- > 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.

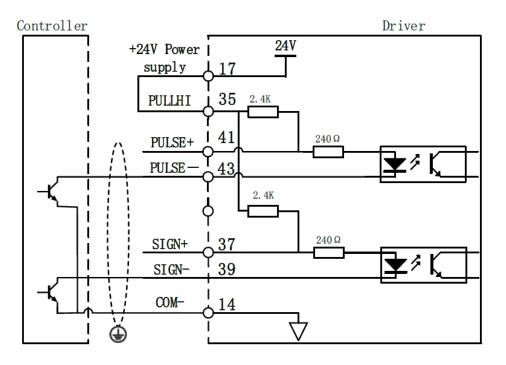




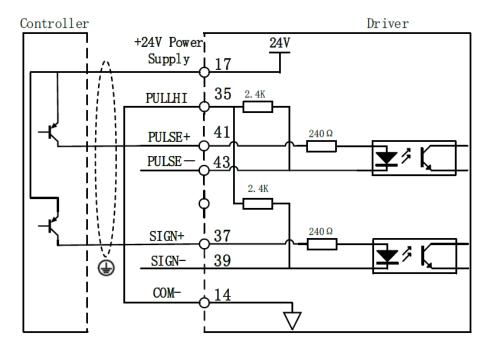
Single ended open collector drive input (Low Speed)

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:



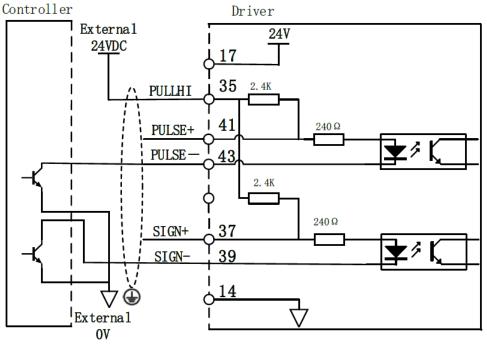
2. When pulse input comes from PNP type device:



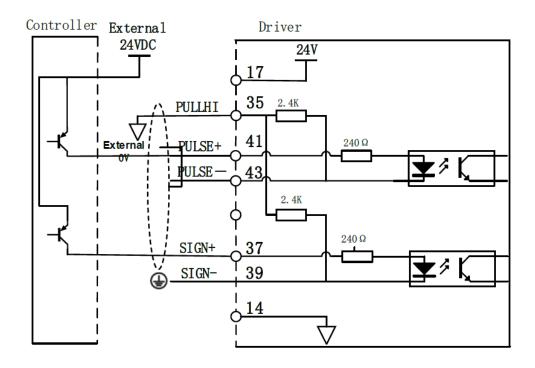


Using external power supply Method 1: Using driver internal resistor (Recommended)

3. When pulse input comes from NPN type device:



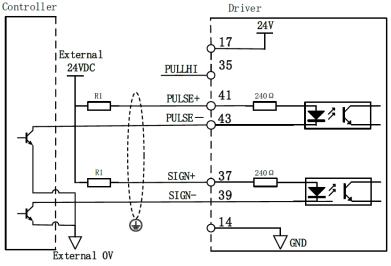
4. When pulse input comes from PNP type device:



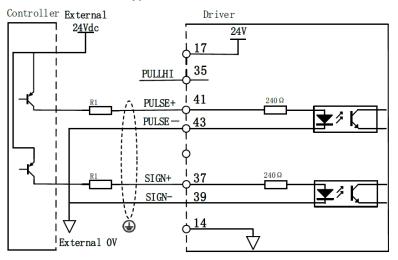


Method 2: Using external resistor

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.

	VDC-1.5V	(Voltage drop)	
Resistance of current limitir 24V, resistance of current li	ng resistor = R1 (Current 1 imiting resistor approximates 2	$\overline{\operatorname{imiting})^{+220 \Omega}}^{=10 \text{mA}}$. If VD k Ω . (Rough estimation))C =
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.

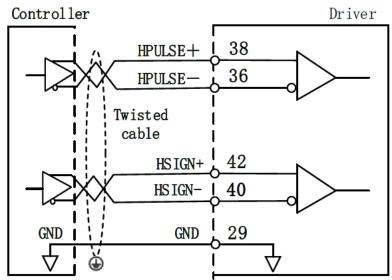
OSD-H series servo drive supports 5V differential drive and 24V single ended open collector drive, different connection pins for both methods.

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 drive.



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.



2.11.2 Analogue input/output circuit

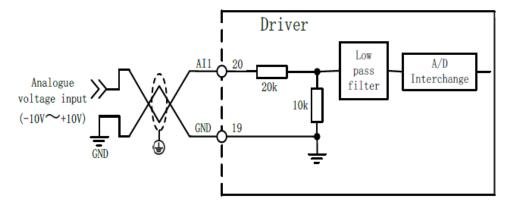
Analogue input signal

OSD-H series servo drives support 2 analogue inputs and 1 analogue output.

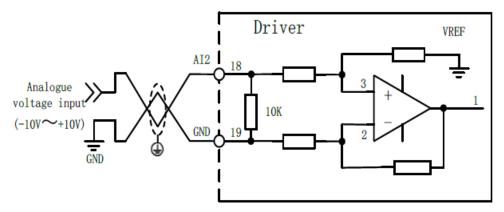
CN1 Pin	Pin Label	Description
15	AO1 Analogue output 1: Single-ended Input voltage: ±10VDC, input resistance: 20KΩ	
16	GND	Power supply ground
18	AI2	Analogue input 2: Differential Input voltage: ±10VDC, Input Resistance: 10KΩ
19	GND	Analogue I/O common ground
20	AI1	Analogue input 1: Single-ended Input voltage: ±10VDC, Input Resistance: 10KΩ
Frame	PE	Protective earth

- There are 2 analogue inputs: Al1 and Al2. Al1 uses single ended input while Al2 uses differential input
- All and Al2 are both voltage analogue inputs with resolution of 12-bit.
- All uses specific calculations to increase sampling precision.
- Both analogue inputs max. voltage input = ±12VDC

Analogue input 1 Al1 wiring diagram



Analogue input 2 AI2 wiring diagram



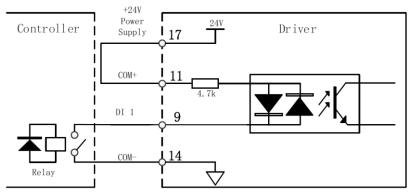




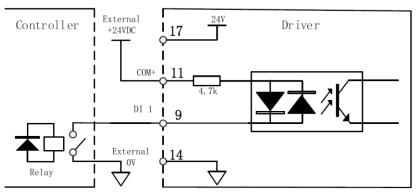
2.11.3 Digital Input Circuit

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:
- 3. Using internal 24V power supply



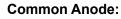
4. Using external power supply

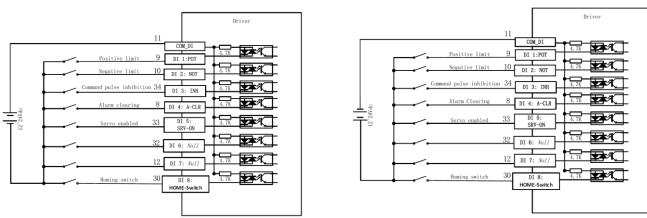


*Please connect to a flyback diode when using relay input to prevent damage to DO terminal.

OSD-H Series AC Servo Drive supports both common anode and cathode connection:

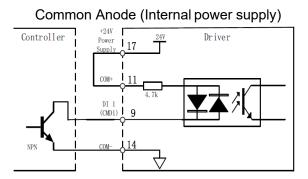
Common Cathode:



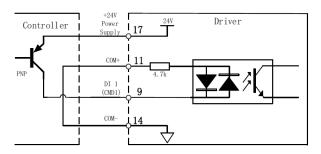




Open collector output



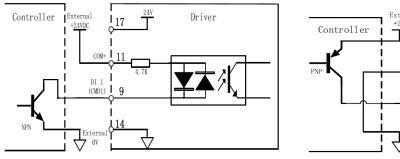
Common Cathode (Internal power supply)

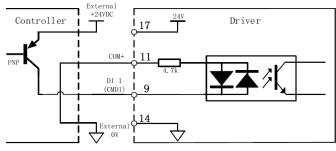


* Please prepare switching power supply with output of 12-24VDC, current≥ 100mA; ■ Using open collector output

Common Anode (External power supply)

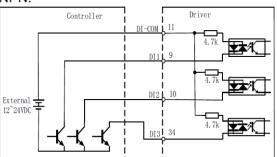
Common Cathode (External power supply)

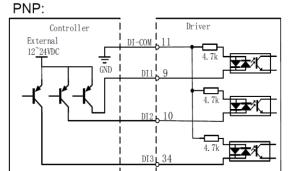




Using transistor output

NPN:





*Please do not mix NPN and PNP connections in applications DI1-DI8 Default Signal Assignment

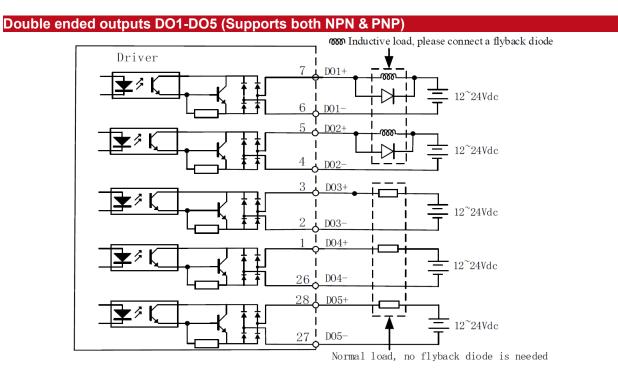
	Si	gnal	Default	Pin	Description				
		DI1	POT	9	Positive limit				
		DI2	NOT	10	Negative limit				
	Input	DI3	INH	34	Command pulse inhibition				
	ln	DI4	A-CLR	8	Alarm clearing				
	ital	DI5	SRV-ON	33	Servo enabled				
	Digital	DI6	-	32	-				
		DI7	-	12	-				
		DI8	ORG	30	Homing switch(Only in PR mode)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





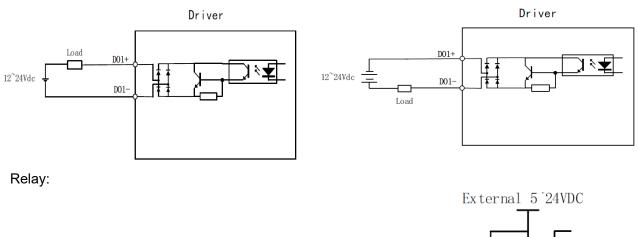
2.11.4 Digital Output Circuit

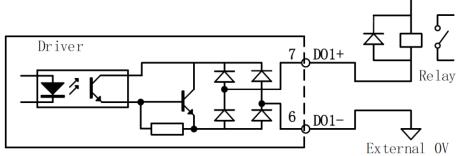
There are 5 digital outputs. DO1-DO5 are all double ended outputs. Can be connected to independent control signal power supply and reference ground is different from single ended output signals.



NPN:

PNP:

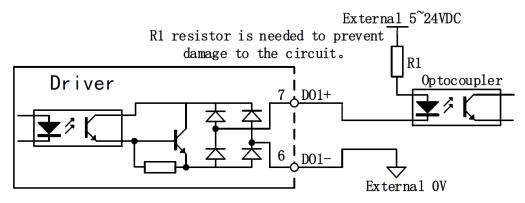




*Please connect to a flyback diode when using relay input to prevent damage to DO terminal.



Optocoupler:



*For servo drive 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.

S	Signal	Default	Pin	Description
	DO1+	SRDY+	7	Servo Ready
	DO1-	SRDY-	6	oervo ricady
t	DO2+	INP+	5	Positioning completed
Output	DO2-	INP-	4	
Out	DO3+	BRK- OFF+	3	External brake released
	DO3-	BRK-OFF-	2	
igital	DO4+	ALARM+	1	Alarm
D	DO4-	ALARM-	26	, admi
	DO5+	WARN1+	28	Warning
	DO5-	WARN1-	27	wannig

DO1-DO5 Default Signal Assignment



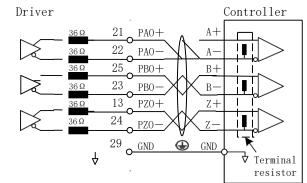
2.11.5 Encoder frequency divider output circuit

OSD-H series supports 2 kinds of frequency divider output: Differential and open collector.

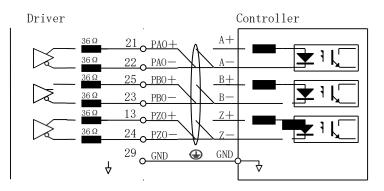
Pin	Signal	Desci	ription			
21	PAO+	Motor encoder A phase				
22	PAO-	frequency divider output	Differential,			
25	PBO+	Motor encoder B phase	High>=2.5VDC,			
23	PBO-	frequency divider output	Low<=0.5VDC,			
13	PZO+	Motor encoder Z phase	Max current output±20mA。			
24	PZO-	frequency divider output				
44	PZ-OUT	Motor encoder Z phase OC si	gnal output			
29	GND	Reference ground				
15	+5V	Internal EV newer supply Ma	v ourrent output 200m			
16	GND	Internal 5V power supply, Max current output 200mA				
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.



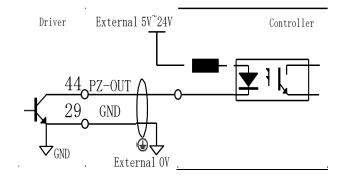
Using an optocoupler receiving circuit:



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.



2.12DI Signals Settings

CN1 PIN	Signal	Parameter	Default signal	Default status
11	DI-COM	-	Common input	
9	DI1	Pr4.00	POT	NC OFF
10	DI2	Pr4.01	NOT	NC OFF
34	DI3	Pr4.02	INH	NC OFF
8	DI4	Pr4.03	A-CLR	NC OFF
33	DI5	Pr4.04	SRV-ON	NC OFF
32	DI6	Pr4.05	-	NC OFF
12	DI7	Pr4.06	-	NC OFF
30	DI8	Pr4.07	ORG	NC OFF

NC: Signal NOT connected to DI-COM -> Invalid (OFF) Signal connected to DI-COM -> Valid (ON)

NO: Signal NOT connected to DI-COM -> Valid (ON) Signal connected to DI-COM -> Invalid (OFF)

Safety precautions

To stop motor if cable is disconnected, POT, NOT and E-STOP will be set as NO. Please make sure there is no safety issue if need to set to NC.

SRV-ON signal is recommended to set as NC. Please make sure there is no safety issue if need to set to NO.



Control DI settings

		Val	ue
Signal	Symbol	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	С	8C
Internal command velocity 1	INTSPD1	E	8E
Internal command velocity 2	INTSPD2	F	8F
Internal command velocity 3	INTSPD3	10	90
Zero speed clamp	ZEROSPD	11	91
Velocity command sign	VC-SIGN	12	92
Torque command sign	TC-SIGN	13	93
Forced alarm	E-STOP	14	94
Vibration suppression 1	VS-SEL1	0A	8A
Vibration suppression 2	VS-SEL2	0B	8B
Speed regulation valid	SPDREG	4B	CB
Speed regulation ratio 1	SPDREG1	4C	CC
Speed regulation ratio 2	SPDREG2	4D	CD
Speed regulation ratio 3	SPDREG3	4E	CE
Speed regulation ratio 4	SPDREG4	4F	CF

CN1 PIN	Input	Parameters
9	DI1	Pr4.00
10	DI2	Pr4.01
34	DI3	Pr4.02
8	DI4	Pr4.03
33	DI5	Pr4.04
32	DI6	Pr4.05
12	DI7	Pr4.06
30	DI8	Pr4.07

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 drive.

Inputs related to Pr-mode:

Signal	Symbol		Value
		NO	NC
Trigger command	CTRG	20	A0
Home	HOME	21	A1
Forced stop	STP	22	A2
Positive JOG	PJOG	23	A3
Negative JOG	NJOG	24	A4
Positive limit	PL	25	A5
Negative limit	NL	26	A6
Origin	ORG	27	A7
Path address 0	ADD0	28	A8
Path address 1	ADD1	29	A9
Path address 2	ADD2	2A	AA
Path address 3	ADD3	2B	AB

Note: CTRG, HOME are edge triggered, please make sure electronic bits last 1ms or above.



Configurable Input Signal

Label	Servo enabled			Mode	Р	S	Т
Signal	SRV-ON	Default assignment	33(DI5)	I/O circuit	2.11.3 Digital inputs		

·Servo enabled (Motor ON/OFF control signal)

Label	Positive position limit			Mode	Р	S	Т			
Signal	POT	Default assignment	9(DI1)	I/O circuit	2.11.3	Digital inputs				
	To prevent axis from travelling in positive direction Signal valid when Pr5.04 is set. If Pr5.04 is set to any value besides 1, POT signal invalid when axis moves in positive direction.									
Label	Negative p	osition limit		Mode	Р	S	Т			
Signal	NOT	Default assignment	10(DI2)	I/O circuit	2.11.3	Digital in	puts			
To prevent axis from travelling in negative direction Signal valid when Pr5.04 is set. If Pr5.04 is set to any value besides 1, NOT signal invalid when axis moves in negative direction.										

Label			Mode	Р						
Signal	CL	Default assignment		I/O circuit	2.11.3 Digital inputs					
	To clear position deviation counter									

To clear position deviation counter. Only clear once by default. Please modify on Pr5.17.

Label	Clear alarm			Mode	Р	S	Т
Signal	A-CLR	Default assignment	8(DI4)	I/O circuit	2.11.3 Digital inputs		puts

To clear alarm.

Only some of the alarms can be cleared.

Label	Command	Command pulse prohibited I			Р					
Signal	INH	Default assignment	34(DI3)	I/O circuit	2.11.3 Digital inputs					
	Signal INH Default assignment 34(Di3) I/O circuit 2.11.3 Digital inputs Ignore position command pulse Please set in Pr5.18 when needed Please set in Pr5.18 when needed When INH input is valid, position command from controller will deviate from servo drive internal command after filtering, which might cause the loss of position info before INH input. Please reset before making any further action requiring position management.									

Label	Control mode switching			Mode	Р	S	Т	
Signal	C-MODE	Default assignment		I/O circuit	2.11.3 Digital inputs			
	All control i velocity or 2 nd mode; v	01 = 3,4,5, control mode modes require this signa torque mode to prevent e when invalid, select 1 st m not enter any command	I. Please se error from o lode.	et to a same log occurring. Wher	ic when C-MOE	in positi DE is vali	on,	



Label	Command switching	frequency divider/multipl	Mode	Р			
Signal	DIV1	Default assignment		I/O circuit	2.11.3	Digital ir	nputs
	command f When DIV internal cor	1 is valid, frequency divid frequency divider/multipli 1 input is valid, position c mmand after filtering, wh se reset before making a	ier numerat command fr ich might ca	or and denomin om controller w ause the loss o	nator. /ill deviat f positior	e from s info be	servo drive fore DIV1

Label	Vibration suppression 1			Mode	Р		
Signal	VS-SEL1 Default assignment I			I/O circuit	2.11.3	Digital ir	puts
Label	Vibration s	Vibration suppression 2			Р		
Signal	VS-SEL2 Default assignment			I/O circuit	2.11.3	Digital in	puts
	To switch frequency used in vibration suppression						

Label	Label Gain switching				Р	S	Т
Signal	GAIN	Default assignment		I/O circuit	2.11.3	Digital in	iputs
	To switch b						

Label	Torque lim	it swite	ching	Mode	P	S			
Signal	TL-SEL	TL-SEL Default assignment			I/O circuit	2.11.3	Digital i	nputs	
	To switch between 1 st and 2 nd torque limit. Please refer to Pr5.21								
		Va	alue		Limit				
		[0]			1 st torque limit Pr0.13 2 nd torque limitPr5.22				
		1		2					
			TL-SEL OFF		Pr0.13				
	2 TL-SEL ON			Pr5.22					
	3~4			Reserved					
	5			Pr0.1 Pr5.2	$3 \rightarrow Positive torque 2 \rightarrow Negative torque 10 Positive 10 $	ie limit ue limit			

Label	Zero speed clamp			Mode		S	
Signal	ZEROSPD	Default assignment		I/O circuit	2.11.3	Digital in	puts
	To set veloc						
	When in use	e, please set Pr3.15 ≠ 0.					

Label	Velocity command sign			Mode		S	
Signal	VC-SIGN	C-SIGN Default assignment			2.11.3	Digital in	puts
		ocity command input in v er to Pr3.01	elocity con	trol mode.			

Label	Torque cor	nmand sign	Mode			Т	
Signal	TC-SIGN	Default assignment		I/O circuit	2.11.3	Digital in	puts
	Sign of tore	que command input in to	rque contro	l mode. Please	refer to	Pr3.18	
	Value	Di	rection setting	gs			
	[0]	Torque command input 「P 「Negative」 →Negative di					
	1	Use TC-SIGN ON/OFF sta OFF: Positive direction ON					



Label	Internal	comm	and velocity	1		N	lode		S	
Signal	INTSPE	D1 D	efault assign	ment		1/	O circuit	2.11.3	Digital inputs	
Label	Internal	comm	and velocity 2	2		N	lode		S	
Signal	INTSPE	D2 D	efault assign	ment		1/	O circuit	2.11.3	Digital inputs	
Label	Internal	comm	and velocity 3	3		N	Mode S			
Signal	INTSPE	D3 D	efault assign	ment		I/O circuit 2.11.3 Digital inputs				
	Connect		e right DI to co		ernal comr	nar	nd velocity se		0 1	
	0		Analog - Vel	ocity co	mmand (S	SPF	R)			
	[1] Internal velocity settings 1 st –					l th s	speed (Pr3.0	$04{\sim}Pr3.0$	07)	
			Internal velo	city sett	ings 1 st – 3	rd s	peed (Pr3.0	04∼P3.0	6)、Analog	
	2		velocity com	mand (SPR)					
	$\frac{3}{100000000000000000000000000000000000$									
				city sett	ings 1 st – 8	S. S	peed (Pr3.0	00~Pr3.7	11)	
			Internal .	l.	nternal		Internal cor	nmand	Velocity	
	Value		ommand velocity		ommand		velocity		comman	
			NTSPD ₀ 1)		elocity 2		(INTSPI		d	
			OFF		NTSPD2) OFF				1 st speed	
			ON		OFF				2 nd speed	
	1 -		OFF		ON		No effe	ect	3 rd speed	
			ON		ON				4 th speed	
			OFF		OFF				1 st speed	
			ON		OFF				2 nd speed	
	2		OFF		ON		No effe	ect	3 rd speed	
			ON		ON				Simulated speed	
			<u> </u>		. .			_	$1^{st} - 4^{th}$	
			Similar to	o Pr3.00	0=1		OFF	-	speed	
	3		OFF		OFF		ON		5 th speed	
			ON		OFF		ON		6 th speed	
			OFF ON		ON ON		ON ON		7 th speed	
	1 1		ON	I	UN				8 th speed	I
	Pleas	e char	ige internal co	mmano	l velocitv a	s ne	er diagram h	elow as i	unexpected a	ixis
			night occurs if							
	INTS		pen COM -:			TSPE	-			
	INTSP		pen COM -	—i	[IN]	TSPE	2 open CON			
			4th	3rd	00000	TSPE		COM - 7th_8th_ 6th_		
	Veloci		2nd			elocit mmar		rd S	1	
	comma [r/mi	anu –	101	1st		/min	125	E I I I		
	L		Pr3.00=	1/2				Pr3.00=	3	
L										



Signal input configurable only in PR mode

Label	Trigger command			Mode	PR
Signal	CTRG	Default assignment	I/O circuit	2.11.3 Digital inputs	
		address ID through ADI dge/double edge trigger		trigger PR path	motion using CTRG

Label	Path add	ress 0-3				Mode		PR
Signal	ADD0-3	Default	assignme	nt		I/O circuit	2.11.3 Dig	gital inputs
	IO combir	nation trigge	er select path	h using ADE	00~A	DD3. Trigger m	ode is set ir	n Pr8.26.
	ADD3	ADD2	ADD1	ADD0	Pat	th selection		
	OFF	OFF	OFF	OFF	Pat	th 0 (Non-action)		
	OFF	OFF	OFF	ON	Pat	:h1		
	OFF	OFF	ON	OFF	Pat	:h2		
	OFF	OFF	ON	ON	Pat	:h3		
	OFF	ON	OFF	OFF	Pat	:h4		
	OFF	ON	OFF	ON	Pat	:h5		
	OFF	ON	ON	OFF	Pat	:h6		
	OFF	ON	ON	ON	Pat	:h7		
	ON	OFF	OFF	OFF	Pat	:h8		
	ON	OFF	OFF	ON	Pat	:h9		
	ON	OFF	ON	OFF	Pat	:h10		
	ON	OFF	ON	ON	Pat	:h11		
	ON	ON	OFF	OFF	Pat	:h12		
	ON	ON	OFF	ON	Pat	:h13		
	ON	ON	ON	OFF	Pat	:h14		
	ON	ON	ON	ON	Pat	:h15		

Label	Home			Mode	PR
Signal	HOME	Default assignment		I/O circuit	2.11.3 Digital inputs
	Homing trig	ger, homing velocity and	d accelerati	on can be set i	n Pr8.15-Pr8.18

Label	Forced stop		rced stop Mode		PR				
Signal	STP Default assignment			I/O circuit	2.11.3 Digital inputs				
	Emergency stop trigger in PR motion. Deceleration can be set in Pr8.23								

Label	Positive/Nega	ative JOG	Mode	PR				
Signal	PJOG/NJOG	Default assignme	nt	I/O circuit	2.11.3 Digital inputs			
	To jog manually in PR mode							
Label	Positive/Nega	tive limit		Mode	PR			
Signal		efault assignment	I/O circuit	2.11.3 Digital inputs				
	PR mode positive/negative position limit							

Label	Origin			Mode	PR
Signal	ORG Default assignment			I/O circuit	2.11.3 Digital inputs
	Origin sign	al input			



2.13DO Signals Settings

CN1 PIN	Label	Parameter	Assigned signal		
7	DO1+	Pr4.10	Servo-Ready S-RDY		
6	DO1-	F14.10	Selvo-Ready S-RD F		
5	DO2+	Pr4,11	Positioning completed INP1		
4	DO2-	F14.11			
3	DO3+	Pr4.12	External brake released		
2	DO3-	F14.12	BRK-OFF		
1	DO4+	Pr4.13	Alarm (ALARM)		
26	DO4-	F14.10			
27	DO5+	Pr4.14	Homing done (HOME-OK)		
28	DO5-	F14.14	TIONING GONE (TIOME-OK)		

Control signal output settings

Value		Signal	Symphol
NO	NC	Signal	Symbol
00	80	Invalid	—
01	81	Alarm	ALARM
02	82	Servo-Ready	SRDY
03	83	External brake released	BRK-OFF
04	84	Positioning completed	INP
05	85	At-speed	AT-SPPED
06	86	Torque limit signal	TLC
07	87	Zero speed clamp detection	ZSP
08	88	Velocity coincidence	V-COIN
12	92	Servo Status	SRV-ST
15	95	Positive limit valid	POT-OUT
16	96	Negative limit valid	NOT-OUT
0B	8B	Position command ON/OFF	P-CMD
0F	8F	Velocity command ON/OFF	V-CMD
0D	8D	Velocity limit signal	V-LIMIT
14	94	Position comparison	CMP-OUT

CN1 PIN	Output	Parameters
7	DO1+	Pr4.10
6	DO1-	11110
5	DO2+	Pr4.11
4	DO2-	114.11
3	DO3+	Pr4.12
2	DO3-	114.12
1	DO4+	Pr4.13
26	DO4-	117.10
27	DO5+	Pr4.14
28	DO5-	117.17

Same signal can be assigned to multiple different outputs. Err212 might occur if output is allocated to signals other than listed in the table above.

Outputs related to PR-mode

Signal	Cumph of	Va	lue
Signal	Symbol	NO	NC
Command completed	CMD-OK	20	A0
Path completed	PR-OK	21	A1
Homing done	HOME-OK	22	A2



Configurable DO signals

Label	Alarm			Mode	Р	S	Т			
Signal	ALARM	Default assignment	(D04)	I/O circuit	2.11.4	2.11.4 Digital inputs				
	Signal output when driver alarm occurs									

Label	Servo Ready I			Mode	Р	S	Т
Signal	S-RDY	Default assignment	(D01)	I/O circuit	2.11.4 Digital inputs		
	Signal outp	out when servo is powere	ed on				

Label	Positioning completed			Mode	Р		
Signal	INP	Default assignment	(D02)	I/O circuit	2.11.4	2.11.4 Digital inputs	
	Signal outp	out when positioning com	pleted with	in set range			

Label	External brake released			Mode	Р	S	Т
Signal	BRK-OFF	Default assignment	(D03)	I/O circuit	2.11.4 Digital inputs		
	Signal valid	to hold braking action					

Label	Velocity read	ched	ned			S T		
Signal	AT-SPEED	Default assignment		I/O circuit	2.11.4 Digital inputs			
	Velocity read	ched signal						

Label	bel Torque limit signal			Mode	Р	S	Т
Signal	TLC	Default assignment		I/O circuit	2.11.4 Digital inputs		
Torque limiting signal							

Label	Zero speed clamp detection			Mode	Р	S	Т
Signal	ZSP	Default assignment		I/O circuit	2.11.4 Digital inputs		
	Zero speed of						

Label	Velocity coincidence			Mode		S	Т
Signal	V-COIN	Default assignment		I/O circuit	2.11.4 Digital inputs		
	Signal output when velocity coincides.						

Label	Servo Status			Mode	Р	S	Т
Signal	SRV-ST	Default assignment		I/O circuit	2.11.4 Digital inputs		
	Signal output when servo is enabled.						

Label	Positive limit valid			Mode		S	Т	
Signal	POT-OUT	Default assignment		I/O circuit	2.11.4 Digital inputs			
	Signal output when positive position limit signal valid.							



Label	Negative limit valid			Mode		S	Т	
Signal	NOT-OUT	Default assignment		I/O circuit	2.11.4 Digital inputs			
Signal output when negative position limit signal valid								

Label	Position command ON/OFF			Mode	Р		
Signal	I P-CMD Default assignment I/O circuit 2.11.4 Digital ir			Digital in	puts		
Signal valid when position command ON							

Label	Velocity command ON/OFF		Mode		S			
Signal	V-CMD	Default assignment		I/O circuit	2.11.4 Digital inputs			
	Signal valid when velocity command ON in velocity control mode							

Label	Position comparison			Mode	Р			
Signal	CMP-OUT	Default assignment		I/O circuit	2.11.4 Digital inputs			
	When position comparison condition is satisfied, output according to selected method: Flip or pulse width output.							

DO signals configurable only in PR mode

Label	Command	completed		Mode	PR		
Signal	CMD-OK	Default assignment		I/O circuit	2.11.4 Digital inputs		
PR command is delivered but axis not yet in position							

Label	Path completed		Mode	PR		
Signal	PR-OK Default assignment		I/O circuit	2.11.4 Digital inputs		
	PR comma	and delivered and axis in				

Label	5			Mode	PR		
Signal	HOME-OK Default assignment			I/O circuit	2.11.4 Digital inputs		
PR motion homing done.							



2.14Measures 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 drives 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:

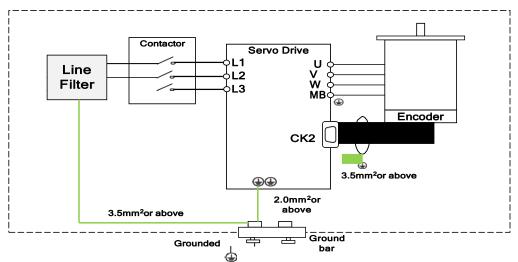
(1)Install master device and line filter close to the servo drive

②Install surge suppressor for relay and contactor

③Please 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

2.14.1 Grounding connection and other anti-interference wiring connections



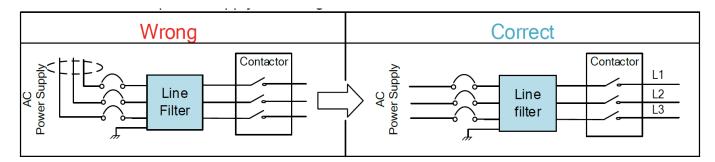
- Servo motor frame should be grounded. Please connect the PE terminal of servo motor and servo drive and ground them together to reduce interference.
- Ground both ends of the foil shield of encoder cable.



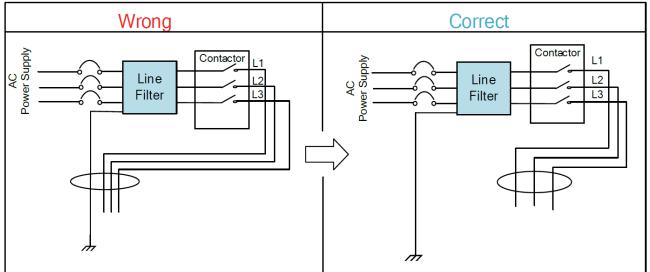
2.14.2 Using line filter

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

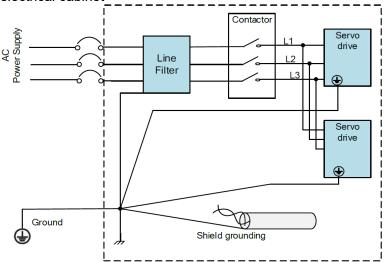
Do not band the main power supply cable together.



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



Ground wires inside an electrical cabinet





Chapter 3 Parameter

3.1 Parameters list

Classification code

Valid mode:

P: Valid in position control mode

S: Valid in velocity control mode

T: Valid in torque control mode

PR: Valid in PR control mode

Activation:

"O" - Restart driver for parameter changes to be valid

"---" - Valid immediately

" Δ " – Valid when axis stops

"●"- Valid after re-enabling

[Class 0] Basic settings

Code	Label	Default	Activ ation	Valid mode			Communication mode		
				Р	S	Т	Byte	Op.	485 Addr.
Pr0.00	Model-following bandwidth	1	Δ	0			16bit	R/W	0x0001
Pr0.01	Control Mode Settings	0	0	0	0	0	16bit	R/W	0x0003
Pr0.02	Real time Auto Gain Adjusting	0x1		0	0	0	16bit	R/W	0x0005
Pr0.03	Real time auto stiffness adjusting	11	-	0	0	0	16bit	R/W	0x0007
Pr0.04	Inertia ratio	250	_	0	0	0	16bit	R/W	0x0009
Pr0.05	Command pulse input selection	0	0	0	_	-	16bit	R/W	0x000B
Pr0.06	Command pulse polarity inversion	0	0	0	_	-	16bit	R/W	0x000D
Pr0.07	Command pulse input mode	3	0	0	_	-	16bit	R/W	0x000F
Pr0.08	1 st command pulse count per revolution	10000	ο	ο	_	_	32bit	R/W	0x0010 0x0011
Pr0.09	1 st command frequency divider/multiplier numerator	1	о	ο	_	_	32bit	R/W	0x0012 0x0013
Pr0.10	1 st command frequency divider/multiplier denominator	1	ο	ο	_	_	32bit	R/W	0x0014 0x0015
Pr0.11	Encoder output pulse count per revolution	2500	ο	ο	ο	ο	16bit	R/W	0x0017
Pr0.12	Pulse output logic inversion	0	0	0	0	0	16bit	R/W	0x0019
Pr0.13	1 st Torque Limit	350	—	0	0	0	16bit	R/W	0x001B
Pr0.14	Excessive position deviation	30	—	0	_	—	16bit	R/W	0x001D
Pr0.15	Absolute Encoder settings	0	0	0	0	0	16bit	R/W	0x001F
Pr0.16	Regenerative resistance	100	_	0	0	0	16bit	R/W	0x0021



				Va	lid m	ode	Comm	unicati	on mode
Code	Label	Default	Activ ation	Р	S	т	Byte	Op.	485 Addr.
Pr0.17	Regenerative resistor power rating	50	—	0	0	0	16bit	R/W	0x0023
Pr0.22	PR and P/S/T switching	0	_	0	0	0	16bit	R/W	0x002D
Pr0.25	Auxiliary function	0	_	0	0	0	16bit	R/W	0x0033
Pr0.26	Simulated I/O	0	—	0	0	0	16bit	R/W	0x0035
Pr0.30	Encoder feedback mode	0	—	0	0	0	16bit	R/W	0x0037
Pr0.33	Excessive hybrid deviation	16000	0	0			16bit	R/W	0x0043
Pr0.34	Clear excess hybrid control deviation	0	0	0			16bit	R/W	0x0045
Pr0.40	Mapping parameter 1	0x0	-	0	ο	ο	32bit	R/W *	0x0050 0x0051
Pr0.41	Mapping parameter 2	0x0	_	ο	ο	ο	32bit	R/W *	0x0052 0x0053
Pr0.42	Mapping parameter 3	0x0	-	ο	ο	ο	32bit	R/W *	0x0054 0x0055
Pr0.43	Mapping parameter 4	0x0	_	0	ο	ο	32bit	R/W *	0x0056 0x0057
Pr0.44	Mapping parameter 5	0x0	_	0	ο	ο	32bit	R/W *	0x0058 0x0059
Pr0.45	Mapping parameter 6	0x0	-	ο	ο	ο	32bit	R/W *	0x005A 0x005b
Pr0.46	Mapping parameter 7	0x0	_	ο	ο	ο	32bit	R/W *	0x005C 0x005d
Pr0.47	Mapping parameter 8	0x0	_	ο	ο	ο	32bit	R/W *	0x005E 0x005F
Pr0.50	Mapping parameter 1 indicator	0x0049 0049	_	ο	ο	ο	32bit	R/W	0x0064 0x0065
Pr0.51	Mapping parameter 2 indicator	0x0049 0049	_	ο	ο	ο	32bit	R/W	0x0066 0x0067
Pr0.52	Mapping parameter 3 indicator	0x0049 0049	_	ο	ο	ο	32bit	R/W	0x0068 0x0069
Pr0.53	Mapping parameter 4 indicator	0x0049 0049	_	ο	ο	ο	32bit	R/W	0x006A 0x006B
Pr0.54	Mapping parameter 5 indicator	0x0049 0049	_	0	0	ο	32bit	R/W	0x006C 0x006D



			Activ	Va	lid me	ode	Communication mode			
Code	Label	Default	Activ ation	Ρ	S	т	Byte	Op.	485 Addr.	
Pr0.55	Mapping parameter 6 indicator	0x0049 0049	Ι	0	ο	0	32bit	R/W	0x006E 0x007F	
Pr0.56	Mapping parameter 7 indicator	0x0049 0049		0	ο	0	32bit	R/W	0x0070 0x0071	
Pr0.57	Mapping parameter 8 indicator	0x0049 0049		0	ο	0	32bit	R/W	0x0072 0x0073	

[Class 1] Gain adjustment

Code	Label	Default	Acti	Valid mode			Communication mode			
oouc		Deldalt	v ation	Ρ	S	Т	Byte	Ор.	485 Addr.	
Pr1.00	1 st position loop gain	320		0	_	_	16bit	R/W	0x0101	
Pr1.01	1 st velocity loop gain	180		0	0	0	16bit	R/W	0x0103	
Pr1.02	1 st Integral Time Constant of Velocity Loop	310	Ι	0	ο	ο	16bit	R/W	0x0105	
Pr1.03	1 st velocity detection filter	15	-	0	0	0	16bit	R/W	0x0107	
Pr1.04	1 st Torque Filter Time Constant	126		0	0	0	16bit	R/W	0x0109	
Pr1.05	2 nd Position Loop Gain	380		0	—	-	16bit	R/W	0x010B	
Pr1.06	2 nd velocity loop gain	180		0	0	0	16bit	R/W	0x010D	
Pr1.07	2 nd Integral Time Constant of Velocity Loop	10000	_	ο	ο	ο	16bit	R/W	0x010F	
Pr1.08	2 nd velocity detection filter	15	_	0	0	0	16bit	R/W	0x0111	
Pr1.09	2 nd Torque Filter Time Constant	126	_	0	0	0	16bit	R/W	0x0113	
Pr1.10	Velocity feed forward gain	300		0	_	_	16bit	R/W	0x0115	
Pr1.11	Velocity feed forward filter time constant	50	Ι	0	—	_	16bit	R/W	0x0117	
Pr1.12	Torque feed forward gain	0	—	ο	ο	—	16bit	R/W	0x0119	
Pr1.13	Torque feed forward filter time constant	0	١	0	ο		16bit	R/W	0x011B	
Pr1.15	Position control gain switching mode	0		0		-	16bit	R/W	0x011F	
Pr1.17	Position control gain switching level	50		0	_	_	16bit	R/W	0x0123	
Pr1.18	Hysteresis at position control switching	33	_	ο	_	_	16bit	R/W	0x0125	
Pr1.19	Position control switching time	33	_	0	_	_	16bit	R/W	0x0127	
Pr1.35	Position command pulse filter time	8	0	0	_	_	16bit	R/W	0x0147	
Pr1.39	Special function register 2	0	_	0	0	0	16bit	R/W	0x014F	



[Class 2] Vibration Suppression

	Activ		Activ	Val	/alid mode		Communication mode		
Code	Label	Default	ation	Ρ	S	Т	Byte	Op.	485 Addr.
Pr2.00	Adaptive filtering mode settings	0	—	0	0	I	16bit	R/W	0x0201
Pr2.01	1 st notch frequency	4000	_	0	0	0	16bit	R/W	0x0203
Pr2.02	1 st notch width	4	—	0	0	0	16bit	R/W	0x0205
Pr2.03	1 st notch depth	0	_	0	0	0	16bit	R/W	0x0207
Pr2.04	2 nd notch frequency	4000	—	0	0	0	16bit	R/W	0x0209
Pr2.05	2 nd notch width	4	_	0	0	0	16bit	R/W	0x020B
Pr2.06	2 nd notch depth	0	—	0	0	0	16bit	R/W	0x020D
Pr2.07	3 rd notch frequency	4000	—	0	0	0	16bit	R/W	0x020F
Pr2.08	3 rd notch width	4	_	0	0	0	16bit	R/W	0x0211
Pr2.09	3 rd notch depth	0	—	0	0	0	16bit	R/W	0x0213
Pr2.14	1 st damping frequency	0	_	0			16bit	R/W	0x021D
Pr2.16	2 nd damping frequency	0	_	0			16bit	R/W	0x0221
Pr2.22	Position command smoothing filter	0	Δ	0	Ι	I	16bit	R/W	0x022D
Pr2.23	Position command FIR filter	0	Δ	0			16bit	R/W	0x022F
Pr2.48	Adjustment mode	0	_	0	0	0	16bit	R/W	0x0261
Pr2.50	MFC type	0	•	0		Ι	16bit	R/W	0x0265
Pr2.51	Velocity feedforward compensation coefficient	0	—	ο	—	—	16bit	R/W	0x0267
Pr2.52	Torque feedforward compensation coefficient	0	_	0	ο	_	16bit	R/W	0x0269
Pr2.53	Dynamic friction compensation coefficient	0	—	0	ο	0	16bit	R/W	0x026B
Pr2.54	Overshoot time coefficient	0	—	0	0	0	16bit	R/W	0x026D
Pr2.55	Overshoot suppression gain	0	—	0	0	0	16bit	R/W	0x026F

[Class 3] Velocity / Torque Control

			A - 41	Valid mode			Communication mode			
Code	Label	Default	Activ ation	Ρ	S	Т	Byte	Op.	485 Addr.	
Pr3.00	Velocity internal/external switching	1	I		0	I	16bit	R/W	0x0301	
Pr3.01	Velocity command rotational direction selection	0	Ι	_	0		16bit	R/W	0x0303	
Pr3.02	Velocity command input gain	500			0	0	16bit	R/W	0x0305	
Pr3.03	Velocity command input inversion	0	-		0	-	16bit	R/W	0x0307	
Pr3.04	1st speed of velocity setting	0			0	Ι	16bit	R/W	0x0309	
Pr3.05	2nd speed of velocity setting	0			0		16bit	R/W	0x030B	
Pr3.06	3rd speed of velocity setting	0			0	-	16bit	R/W	0x030D	
Pr3.07	4th speed of velocity setting	0	-		0	-	16bit	R/W	0x030F	
Pr3.08	5th speed of velocity setting	0			0	Ι	16bit	R/W	0x0311	
Pr3.09	6th speed of velocity setting	0			0	Ι	16bit	R/W	0x0313	
Pr3.10	7th speed of velocity setting	0	_		0	-	16bit	R/W	0x0315	
Pr3.11	8th speed of velocity setting	0	_	_	0	_	16bit	R/W	0x0317	
Pr3.12	Acceleration time settings	100		_	0	_	16bit	R/W	0x0319	
Pr3.13	Deceleration time settings	100	_	—	0	—	16bit	R/W	0x031B	



				Va	lid m	ode	Comm	unicati	on mode
Code	Label	Default	Activ ation	Р	S	т	Byte	Op.	485 Addr.
Pr3.14	Sigmoid acceleration/deceleration settings	0	0	-	0	_	16bit	R/W	0x031D
Pr3.15	Zero speed clamp function selection	0	_	—	0	_	16bit	R/W	0x031F
Pr3.16	Zero speed clamp level	30	_	—	0	_	16bit	R/W	0x0321
Pr3.17	Torque internal/external switching	0	_	—	—	0	16bit	R/W	0x0323
Pr3.18	Torque command direction selection	0	_	—	_	0	16bit	R/W	0x0325
Pr3.19	Torque command input gain	30	_	—	_	0	16bit	R/W	0x0327
Pr3.20	Torque command input inversion	0	_	—	—	0	16bit	R/W	0x0329
Pr3.21	Velocity limit in torque mode	0	_	—	—	0	16bit	R/W	0x032B
Pr3.22	Torque command	0	_	0	0	0	16bit	R/W	0x032D
Pr3.23	Zero speed delay time in velocity mode	0		-	0		16bit	R/W	0x032F
Pr3.24	Maximum motor rotational speed	0		0	0	0	16bit	R/W	0x0331
Pr3.29	Analog 1 clamping voltage	0		-		0	16bit	R/W	0x033B
Pr3.30	Analog 3 clamping voltage	0	_	—	_	0	16bit	R/W	0x033D
Pr3.58	Speed Regulation Ratio 1	10		0		0	16bit	R/W	0x0374 0x0375
Pr3.59	Speed Regulation Ratio 2	20		0		0	16bit	R/W	0x0376 0x0377
Pr3.60	Speed Regulation Ratio 3	40		0		0	16bit	R/W	0x0378 0x0379
Pr3.61	Speed Regulation Ratio 4	80		0		0	16bit	R/W	0x037A 0x037B

[Class 4] I/O Monitoring Settings

			A	Valid mode			Communication mode		
Code	Label	Default	Activ ation	Ρ	S	Т	Byte	Op.	485 Addr.
Pr4.00	Input selection DI1	0x1	—	0	0	0	16bit	R/W	0x0401
Pr4.01	Input selection DI2	0x2	_	0	0	0	16bit	R/W	0x0403
Pr4.02	Input selection DI3	0x8	—	0	0	0	16bit	R/W	0x0405
Pr4.03	Input selection DI4	0x4	_	0	0	0	16bit	R/W	0x0407
Pr4.04	Input selection DI5	0x3	—	0	0	0	16bit	R/W	0x0409
Pr4.05	Input selection DI6	0x0	_	0	0	0	16bit	R/W	0x040B
Pr4.06	Input selection DI7	0x0	_	0	0	0	16bit	R/W	0x040D
Pr4.07	Input selection DI8	0x27	—	0	0	0	16bit	R/W	0x040F
Pr4.10	Output selection DO1	0x2	_	0	0	0	16bit	R/W	0x0415
Pr4.11	Output selection DO2	0x4	—	0	0	0	16bit	R/W	0x0417
Pr4.12	Output selection DO3	0x3	_	0	0	0	16bit	R/W	0x0419
Pr4.13	Output selection DO4	0x1	—	0	0	0	16bit	R/W	0x041B
Pr4.14	Output selection DO5	0x22	—	0	0	0	16bit	R/W	0x041D
Pr4.22	Analog input 1(AI-1) Zero drift settings	0	—		0	0	16bit	R/W	0x042D
Pr4.23	Analog input 1(AI-1) filter	0	_		0	0	16bit	R/W	0x042F
Pr4.24	Analog input 1(AI-1) overvoltage settings	0	_	—	ο	ο	16bit	R/W	0x0431
Pr4.28	Analog input 3(AI-3) Zero drift settings	20	—	0	_	_	16bit	R/W	0x043F
Pr4.29	Analog input 3(AI-3) filter	1	_	0	_	_	16bit	R/W	0x0441
Pr4.30	Analog input 3(AI-3) overvoltage	0	_	0	_	_	16bit	R/W	0x0443



			A - 45	Val	lid me	ode	Communication mode		
Code	Label	Default	Activ ation	Ρ	S	т	Byte	Op.	485 Addr.
	settings								
Pr4.31	Positioning complete range	50	_	0	0	0	16bit	R/W	0x0445
Pr4.32	Positioning complete output setting	50	—	Ι	0		16bit	R/W	0x0447
Pr4.33	INP positioning delay time	1000	_	Ι	0	I	16bit	R/W	0x0449
Pr4.34	Zero speed	150	—	0	0	0	16bit	R/W	0x044B
Pr4.35	Velocity coincidence range	0	_	0	0	0	16bit	R/W	0x044D
Pr4.36	Arrival velocity	30	—	0	0	0	16bit	R/W	0x044F
Pr4.43	Emergency stop function	0	—	0	0	0	16bit	R/W	0x0457
Pr4.64	AO1 output	0	_	0	0	0	16bit	R/W	0x0481
Pr4.65	AO1 signal	0x4	—	0	0	0	16bit	R/W	0x0483
Pr4.66	AO1 amplification	100	_	0	0	0	16bit	R/W	0x0485
Pr4.67	AO1 communication settings	0	_	0	0	0	16bit	R/W	0x0487
Pr4.68	AO1 offset	0	_	0	0	0	16bit	R/W	0x0489

[Class 5] Extension settings

			Activ	Va	id mo	ode	Comm	unicati	on mode
Code	Label	Default	Activ ation	Ρ	S	Т	Byte	Op.	485 Addr.
Pr5.00	2nd pulse count per revolution	10000	0	ο	_	_	32bit	R/W	0x0500 0x0501
Pr5.01	2nd Command frequency divider/multiplier numerator	1	0	ο	_	-	32bit	R/W	0x0502 0x0503
Pr5.02	2nd Command frequency divider/multiplier denominator	1	0	0	_	_	32bit	R/W	0x0504 0x0505
Pr5.04	Driver prohibition input settings	0	-	0	0	0	16bit	R/W	0x0509
Pr5.06	Servo-off mode	0	-	0	0	0	16bit	R/W	0x050D
Pr5.08	DC bus voltage undervoltage	50	-	0	0	0	16bit	R/W	0x0513
Pr5.09	Main power-off detection time	0	0	0	0	0	16bit	R/W	0x0515
Pr5.10	Servo-off due to alarm mode	0	_	0	0	0	16bit	R/W	0x0517
Pr5.11	Servo braking torque setting	0	—	0	0	0	16bit	R/W	0x0519
Pr5.12	Overload level setting	0	—	0	0	0	16bit	R/W	0x051B
Pr5.15	I/O digital filter	0	0	0	0	0	16bit	R/W	0x051F
Pr5.17	Counter clearing input mode	3	—	0	-	_	16bit	R/W	0x0523
Pr5.20	Position unit settings	1	_	0	—	—	16bit	R/W	0x0529
Pr5.21	Torque limit selection	0	—	0	0	0	16bit	R/W	0x052B
Pr5.22	2nd torque limit	300	—	0	0	0	16bit	R/W	0x052D
Pr5.23	Positive torque warning threshold	0	—	0	0	0	16bit	R/W	0x052F
Pr5.24	Negative torque warning threshold	0	—	0	0	0	16bit	R/W	0x0531
Pr5.28	LED initial status	1	—	0	0	0	16bit	R/W	0x0539
Pr5.29	RS485 communication mode	0x5	—	0	0	0	16bit	R/W	0x053B
Pr5.30	RS485 communication Baud rate	4	—	0	0	0	16bit	R/W	0x053D
Pr5.31	RS485 axis address	1	—	0	0	0	16bit	R/W	0x053F
Pr5.32	Max. command pulse input frequency	0	_	0	—	—	16bit	R/W	0x0541
Pr5.35	Front panel lock setting	0	_	0	0	0	16bit	R/W	0x0547
Pr5.37	Torque saturation alarm detection time	500	—	0	0	0	16bit	R/W	0x0549



[Class 6] Other Settings

Ē				Va	lid m	ode	Communication mode			
Code	Label	Default	Activ ation	Ρ	S	т	Byte	Op.	485 Addr.	
Pr6.01	Encoder zero position compensation	0	0	0	0	0	16bit	R/W	0x0603	
Pr6.03	JOG trial run torque command	350	_	Ι	Ι	0	16bit	R/W	0x0607	
Pr6.04	JOG trial run velocity command	30	_	0	0	0	16bit	R/W	0x0609	
Pr6.05	Position 3rd gain valid time	0	_	0	—	-	16bit	R/W	0x060B	
Pr6.06	Position 3rd gain scale factor	100	_	0	—	-	16bit	R/W	0x060D	
Pr6.07	Torque command additional value	0		0	0	0	16bit	R/W	0x060F	
Pr6.08	Positive direction torque compensation value	0	-	0	0	0	16bit	R/W	0x0611	
Pr6.09	Negative direction torque compensation value	0		0	0	0	16bit	R/W	0x0613	
Pr6.11	Current response settings	100	I	0	0	0	16bit	R/W	0x0617	
Pr6.14	Max. time to stop after disabling	500	Ι	0	0	0	16bit	R/W	0x061D	
Pr6.20	Trial run distance	10	_	0	Ι	Ι	16bit	R/W	0x0629	
Pr6.21	Trial run waiting time	300	_	0	Ι	Ι	16bit	R/W	0x062B	
Pr6.22	No. of trial run cycles	5	_	0	Ι	Ι	16bit	R/W	0x062D	
Pr6.25	Trial run acceleration	200	_	0	0	Ι	16bit	R/W	0x0633	
Pr6.28	Observer gain	0		0	0	0	16bit	R/W	0x0639	
Pr6.29	Observer filter	0	-	0	0	0	16bit	R/W	0x063B	
Pr6.56	Blocked rotor alarm torque threshold	300	_	0	0	0	16bit	R/W	0x0671	
Pr6.57	Blocked rotor alarm delay time	400		0	0	0	16bit	R/W	0x0673	
Pr6.63	Absolute multiturn data upper limit	0	0	0	0	0	16bit	R/W	0x067F	

[Class B] Status Parameters

			Activ	Val	lid m	ode	Com	municati	on mode
Code	Label	Default	Activ ation	Ρ	S	т	Byte	Op.	485 Addr.
PrB.00	Software version 1 (DSP)	/	—	0	0	0	16bit	R	0x0B00
PrB.01	Software version 2 (CPLD)	/	—	0	0	0	16bit	R	0x0B01
PrB.02	Software version 3 (Others)	/	—	0	0	0	16bit	R	0x0B02
PrB.03	Current alarm	/	—	0	0	0	16bit	R	0x0B03
PrB.04	Motor not rotating cause	/	—	0	0	0	16bit	R	0x0B04
PrB.05	Driver operation status	/	—	0	0	0	16bit	R	0x0B05
PrB.06	Motor speed (Before filter)	/	—	0	0	0	16bit	R	0x0B06
PrB.07	Motor torque	/	—	0	0	0	16bit	R	0x0B07
PrB.08	Motor current	/	—	0	0	0	16bit	R	0x0B08
PrB.09	Motor speed (After filter)	/	—	0	0	0	16bit	R	0x0B09
PrB.10	DC bus voltage	/	—	0	0	0	16bit	R	0x0B0A
PrB.11	Driver temperature	/	—	0	0	0	16bit	R	0x0B0B
PrB.12	External analog 1	/	—	0	0	0	16bit	R	0x0B0C
PrB.13	External analog 2	/	-	0	0	0	16bit	R	0x0B0D
PrB.14	External analog 3	/	-	0	0	0	16bit	R	0x0B0E
PrB.15	Motor overload rate	/	—	0	0	0	16bit	R	0x0B0F
PrB.16	Vent overload rate	/	—	0	0	0	16bit	R	0x0B10
PrB.17	Physical I/O input status	/	-	0	0	0	16bit	R	0x0B11
PrB.18	Physical I/O output status	/	-	0	0	0	16bit	R	0x0B12
PrB.20	Command position (Command unit)	/	—	ο	ο	ο	32bit	R	0x0B14 0x0B15
PrB.21	Motor position (Command unit)	/	_	0	-	-	32bit	R	0x0B16 0x0B17
PrB.22	Position deviation (Command unit)	/	_	0	0	0	32bit	R	0x0B18 0x0B19
PrB.23	Command position (Encoder unit)	1	_	ο	0	0	32bit	R	0x0B1A 0x0B1B
PrB.24	Motor position (Encoder unit)	/	—	0	-	-	32bit	R	0x0B1C



		Default	Activ	Val	id mo	ode	Communication mode				
Code	Label		ation	Ρ	S	Т	Byte	Op.	485 Addr.		
									0x0B1D		
PrB.25	Position deviation (Encoder unit)	/		0	0	0	32bit	R	0x0B1E 0x0B1F		
PrB.26	Rotational encoder position feedback	/		0	-	-	32bit	R	0x0B20 0x0B21		

[Class 8] Pr-Control Parameters

			Activ	Va	lid m	ode	Comm	unicati	on mode
Code	Label	Default	ation	P R	S	т	Byte	Op.	485 Addr.
Pr8.00	PR Control	0	—	0	—	-	16bit	R/W	0x6000
Pr8.01	Path count	16	-	0	—	-	16bit	R/W	0x6001
Pr8.02	Control Operation		-	0	-		16bit	R/W	0x6002
Pr8.06	Software positive limit H	0		0			16bit	R/W	0x6006
Pr8.07	Software positive limit (L)	0	—	0	—	—	16bit	R/W	0x6007
Pr8.08	Software negative limit H	0	—	0	—	—	16bit	R/W	0x6008
Pr8.09	Software negative limit (L)	0	—	0	—	—	16bit	R/W	0x6009
Pr8.10	Homing mode	0	—	0	—	—	16bit	R/W	0x600A
Pr8.11	Zero position H	0	—	0	—	—	16bit	R/W	0x600B
Pr8.12	Zero position (L)	0	—	0	—	—	16bit	R/W	0x600C
Pr8.13	Home position off set H	0	—	0	—	—	16bit	R/W	0x600D
Pr8.14	Home position off set (L)	0		0	—	—	16bit	R/W	0x600E
Pr8.15	High homing velocity	200	—	0	—	—	16bit	R/W	0x600F
Pr8.16	Low homing velocity	50	—	0	—	—	16bit	R/W	0x6010
Pr8.17	Homing acceleration	100	—	0	—	—	16bit	R/W	0x6011
Pr8.18	Homing deceleration	100		0	—	—	16bit	R/W	0x6012
Pr8.19	Homing torque holding time	100	_	0	—	—	16bit	R/W	0x6013
Pr8.20	Homing torque	100	—	0	—	—	16bit	R/W	0x6014
Pr8.21	Homing overtravel alarm range	0	_	0	—	—	16bit	R/W	0x6015
Pr8.22	Emergency stop at limit deceleration	10	—	0	—	—	16bit	R/W	0x6016
Pr8.23	STP emergency stop deceleration	50	—	0	—	—	16bit	R/W	0x6017
Pr8.24	I/O combination trigger mode	0	—	0	—	—	16bit	R/W	0x601A
Pr8.25	I/O commbination filter	5	—	0	—	—	16bit	R/W	0x601B
Pr8.26	S-code current output value	0	—	0	—	—	16bit	R/W	0x601C
Pr8.27	PR warning	0	—	0	—	—	16bit	R/W	0x601D
Pr8.39	JOG velocity	100	—	0	—	—	16bit	R/W	0x6027
Pr8.40	JOG acceleration	100	—	0	—	—	16bit	R/W	0x6028
Pr8.41	JOG deceleration	100	—	0	—	—	16bit	R/W	0x6029
Pr8.42	Command position H	0	—	0	—	—	16bit	R/W	0x602A
Pr8.43	Command position (L)	0	—	0	—	—	16bit	R/W	0x602B
Pr8.44	Motor position H	0	—	0	-	Ι	16bit	R/W	0x602C
Pr8.45	Motor position (L)	0	—	0	-		16bit	R/W	0x602D
Pr8.46	Input I/O status	0	—	0	—	—	16bit	R/W	0x602E
Pr8.47	Output I/O status	0	—	0	—	—	16bit	R/W	0x602F
Pr8.48	Path 0 S-code	0	—	0	—	—	16bit	R/W	0x6030
Pr8.49	Path 1 S-code	0	_	0	_	—	16bit	R/W	0x6031
Pr8.50	Path 2 S-code	0	_	0	—	_	16bit	R/W	0x6032
Pr8.51	Path 3 S-code	0		0	—	—	16bit	R/W	0x6033
Pr8.52	Path 4 S-code	0	_	0	—	-	16bit	R/W	0x6034
Pr8.53	Path 5 S-code	0	—	0	—	-	16bit	R/W	0x6035
Pr8.54	Path 6 S-code	0	_	0	—	_	16bit	R/W	0x6036
Pr8.55	Path 7 S-code	0	—	0	_	-	16bit	R/W	0x6037
Pr8.56	Path 8 S-code	0	_	0	_	_	16bit	R/W	0x6038
Pr8.57	Path 9 S-code	0	—	0	-	I	16bit	R/W	0x6039
Pr8.58	Path 10 S-code	0	—	0	—	—	16bit	R/W	0x603A



	Activ		Valid mode			Comm	unicati	on mode	
Code	Label	Default	ation	P R	S	т	Byte	Op.	485 Addr.
Pr8.59	Path 11 S-code	0	_	0	-	-	16bit	R/W	0x603B
Pr8.60	Path 12 S-code	0	_	0	-	-	16bit	R/W	0x603C
Pr8.61	Path 13 S-code	0	_	0	-	-	16bit	R/W	0x603D
Pr8.62	Path 14 S-code	0	—	0	-	—	16bit	R/W	0x603E
Pr8.63	Path 15 S-code	0	-	0	-	-	16bit	R/W	0x603F

[Class 9] Pr-Control Path Parameters

			A -41-	Va	lid m	ode	Comm	unicati	on mode
Code	Label	Default	Activ ation	P R	S	т	Byte	Op.	485 Addr.
Pr9.00	PR0 mode	0	—	0	—	-	16bit	R/W	0x6200
Pr9.01	PR0 position H	0	_	0	_	-	16bit	R/W	0x6201
Pr9.02	PR0 position(L)	0	_	0	_	-	16bit	R/W	0x6202
Pr9.03	PR0 velocity	60		0	_	-	16bit	R/W	0x6203
Pr9.04	PR0 acceleration time	100	—	0	_	-	16bit	R/W	0x6204
Pr9.05	PR0 deceleration time	100	—	0	_	-	16bit	R/W	0x6205
Pr9.06	PR0 pause time	0	_	0		Ι	16bit	R/W	0x6206
Pr9.07	PR0 special parameter	0	_	0		Ι	16bit	R/W	0x6207
Pr9.08	PR1 mode	0	_	0		Ι	16bit	R/W	0x6208
Pr9.09	PR1 position H	0	_	0		Ι	16bit	R/W	0x6209
Pr9.10	PR1 position(L)	0	_	0		Ι	16bit	R/W	0x620A
Pr9.11	PR1 velocity	60	_	0		Ι	16bit	R/W	0x620B
Pr9.12	PR1 acceleration time	100	-	0	—	-	16bit	R/W	0x620C
Pr9.13	PR1 deceleration time	100	-	0	—	-	16bit	R/W	0x620D
Pr9.14	PR1 pause time	0	-	0	—	-	16bit	R/W	0x620E
Pr9.15	PR1 special parameter	0	_	0	_	-	16bit	R/W	0x620F
Pr9.16	PR2 mode	0	_	0		Ι	16bit	R/W	0x6210
Pr9.17	PR2 position H	0	_	0		Ι	16bit	R/W	0x6211
Pr9.18	PR2 position(L)	0	_	0		Ι	16bit	R/W	0x6212
Pr9.19	PR2 velocity	60		0	_	-	16bit	R/W	0x6213
Pr9.20	PR2 acceleration time	100	_	0	_	-	16bit	R/W	0x6214
Pr9.21	PR2 deceleration time	100	—	0	_	-	16bit	R/W	0x6215
Pr9.22	PR2 pause time	0	_	0	_	-	16bit	R/W	0x6216
Pr9.23	PR2 special parameter	0	—	0	_	-	16bit	R/W	0x6217
Pr9.24	PR3 mode	0	_	0		Ι	16bit	R/W	0x6218
Pr9.25	PR3 position H	0	_	0		Ι	16bit	R/W	0x6219
Pr9.26	PR3 position(L)	0	_	0		Ι	16bit	R/W	0x621A
Pr9.27	PR3 velocity	60	_	0		Ι	16bit	R/W	0x621B
Pr9.28	PR3 acceleration time	100	-	0		Ι	16bit	R/W	0x621C
Pr9.29	PR3 deceleration time	100	_	0		Ι	16bit	R/W	0x621D
Pr9.30	PR3 pause time	0	_	0		Ι	16bit	R/W	0x621E
Pr9.31	PR3 special parameter	0	_	0	_	-	16bit	R/W	0x621F
Pr9.32	PR4 mode	0		0	_	I	16bit	R/W	0x6220
Pr9.33	PR4 position H	0	—	0	-	Ι	16bit	R/W	0x6221
Pr9.34	PR4 position(L)	0	—	0	I	Ι	16bit	R/W	0x6222
Pr9.35	PR4 velocity	60		0	_	Ι	16bit	R/W	0x6223
Pr9.36	PR4 acceleration time	100	—	0	_	_	16bit	R/W	0x6224
Pr9.37	PR4 deceleration time	100		0	—	—	16bit	R/W	0x6225
Pr9.38	PR4 pause time	0	—	0	—	Ι	16bit	R/W	0x6226
Pr9.39	PR4 special parameter	0	—	0	—	—	16bit	R/W	0x6227
Pr9.40	PR5 mode	0	—	0	_	Ι	16bit	R/W	0x6228
Pr9.41	PR5 position H	0	—	0	_	_	16bit	R/W	0x6229
Pr9.42	PR5 position(L)	0		0	_	I	16bit	R/W	0x622A
Pr9.43	PR5 velocity	60	—	0	-	Ι	16bit	R/W	0x622B
Pr9.44	PR5 acceleration time	100	—	0	—	Ι	16bit	R/W	0x622C
Pr9.45	PR5 deceleration time	100	—	0	—	—	16bit	R/W	0x622D



				Va	lid m	ode	Comm	unicati	on mode
Code	Label	Default	Activ ation	P R	S	т	Byte	Op.	485 Addr.
Pr9.46	PR5 pause time	0		0			16bit	R/W	0x622E
Pr9.47	PR5 special parameter	0		Ō	_	—	16bit	R	0x622F
Pr9.48	PR6 mode	0	_	0	_	_	16bit	R/W	0x6230
Pr9.49	PR6 position H	0	_	0	—	—	16bit	R/W	0x6231
Pr9.50	PR6 position(L)	0	_	0	—	—	16bit	R/W	0x6232
Pr9.51	PR6 velocity	60		0	—	—	16bit	R/W	0x6233
Pr9.52	PR6 acceleration time	100	_	0	—	—	16bit	R/W	0x6234
Pr9.53	PR6 deceleration time	100	_	0	—	—	16bit	R/W	0x6235
Pr9.54	PR6 pause time	0	_	0	_	-	16bit	R/W	0x6236
Pr9.55	PR6 special parameter	0	—	0	_	-	16bit	R/W	0x6237
Pr9.56	PR7 mode	0	_	0	—	-	16bit	R/W	0x6238
Pr9.57	PR7 position H	0	—	0	—	-	16bit	R/W	0x6239
Pr9.58	PR7 position(L)	0	_	0	—	-	16bit	R/W	0x623A
Pr9.59	PR7 velocity	60		0	Ι	Ι	16bit	R/W	0x623B
Pr9.60	PR7 acceleration time	100		0	Ι	Ι	16bit	R/W	0x623C
Pr9.61	PR7 deceleration time	100		0	Ι	Ι	16bit	R/W	0x623D
Pr9.62	PR7 pause time	0		0	Ι	Ι	16bit	R/W	0x623E
Pr9.63	PR7 special parameter	0		0	Ι	Ι	16bit	R/W	0x623F
Pr9.64	PR8 mode	0		0	Ι	Ι	16bit	R/W	0x6240
Pr9.65	PR8 position H	0	_	0	Ι	Ι	16bit	R/W	0x6241
Pr9.66	PR8 position(L)	0		0	Ι	Ι	16bit	R/W	0x6242
Pr9.67	PR8 velocity	60		0	Ι	Ι	16bit	R/W	0x6243
Pr9.68	PR8 acceleration time	100	_	0	Ι	Ι	16bit	R/W	0x6244
Pr9.69	PR8 deceleration time	100	_	0	Ι	Ι	16bit	R/W	0x6245
Pr9.70	PR8 pause time	0	—	0	—	—	16bit	R/W	0x6246
Pr9.71	PR8 special parameter	0	—	0	—	—	16bit	R/W	0x6247
Pr9.72	PR9 mode	0	—	0	—	-	16bit	R/W	0x6248
Pr9.73	PR9 position H	0	—	0	—	-	16bit	R/W	0x6249
Pr9.74	PR9 position(L)	0	—	0	—	—	16bit	R/W	0x624A
Pr9.75	PR9 velocity	60	_	0	—	-	16bit	R/W	0x624B
Pr9.76	PR9 acceleration time	100	—	0	—	—	16bit	R/W	0x624C
Pr9.77	PR9 deceleration time	100	_	0	—	-	16bit	R/W	0x624D
Pr9.78	PR9 pause time	0	—	0	-	—	16bit	R/W	0x624E
Pr9.79	PR9 special parameter	0	—	0	-	—	16bit	R/W	0x624F
Pr9.80	PR10 mode	0	—	0	-	-	16bit	R/W	0x6250
Pr9.81	PR10 position H	0	—	0	—	—	16bit	R/W	0x6251
Pr9.82	PR10 position(L)	0	—	0	—	—	16bit	R/W	0x6252
Pr9.83	PR10 velocity	60		0	—	—	16bit	R/W	0x6253
Pr9.84	PR10 acceleration time	100		0	-	-	16bit	R/W	0x6254
Pr9.85	PR10 deceleration time	100	—	0	-	—	16bit	R/W	0x6255
Pr9.86	PR10 pause time	0	—	0	-	—	16bit	R/W	0x6256
Pr9.87	PR10 special parameter	0	—	0	—	—	16bit	R/W	0x6257
Pr9.88	PR11 mode	0	_	0	—	—	16bit	R/W	0x6258
Pr9.89	PR11 position H PR11 position(L)		_	0	_	—	16bit	R/W R/W	0x6259 0x625A
Pr9.90		0 60	—	0	-	-	16bit		
Pr9.91	PR11 velocity	100	_	0	-	_	16bit	R/W R/W	0x625B
Pr9.92	PR11 acceleration time				-	_	16bit		0x625C
Pr9.93	PR11 deceleration time	100		0	—	—	16bit	R/W R/W	0x625D
Pr9.94	PR11 pause time	0	_	0	-	_	16bit	R/W	0x625E
Pr9.95 Pr9.96	PR11 special parameter PR12 mode	0	_	0	-	_	16bit 16bit	R/W	0x625F
Pr9.96 Pr9.97	PR12 mode PR12 position H	0	_	0		-	16bit	R/W	0x6260 0x6261
Pr9.97 Pr9.98	PR12 position H PR12 position(L)	0	_	0			16bit	R/W	0x6261 0x6262
Pr9.98 Pr9.99	PR12 position(L) PR12 velocity	60	—	0	_	_	16bit	R/W	0x6262 0x6263
Pr9.99 Pr9.100	PR12 velocity PR12 acceleration time	100		0		-	16bit	R/W	0x6263 0x6264
Pr9.100 Pr9.101	PR12 acceleration time PR12 deceleration time	100		0		-	16bit	R/W	0x6264 0x6265
- 19.101		100		U			TODIL	LZ/ AA	070200



				Va	lid m	ode	Comm	unicati	on mode
Code	Label	Default	Activ ation	P R	S	т	Byte	Op.	485 Addr.
Pr9.102	PR12 pause time	0	-	0	_	-	16bit	R/W	0x6266
Pr9.103	PR12 special parameter	0	_	0	_	-	16bit	R/W	0x6267
Pr9.104	PR13 mode	0	_	0	_	-	16bit	R/W	0x6268
Pr9.105	PR13 position H	0	_	0	_	-	16bit	R/W	0x6269
Pr9.106	PR13 position(L)	0	_	0	_	-	16bit	R/W	0x626A
Pr9.107	PR13 velocity	60		0	—	—	16bit	R/W	0x626B
Pr9.108	PR13 acceleration time	100	_	0	_	-	16bit	R/W	0x626C
Pr9.109	PR13 deceleration time	100	_	0	_	-	16bit	R/W	0x626D
Pr9.110	PR13 pause time	0	_	0	_	-	16bit	R/W	0x626E
Pr9.111	PR13 special parameter	0	_	0	_	-	16bit	R/W	0x626F
Pr9.112	PR14 mode	0	_	0	_	-	16bit	R/W	0x6270
Pr9.113	PR14 position H	0		0	—	—	16bit	R/W	0x6271
Pr9.114	PR14 position(L)	0	_	0		Ι	16bit	R/W	0x6272
Pr9.115	PR14 velocity	60		0	_	-	16bit	R/W	0x6273
Pr9.116	PR14 acceleration time	100	_	0	_	-	16bit	R/W	0x6274
Pr9.117	PR14 deceleration time	100	_	0	_	-	16bit	R/W	0x6275
Pr9.118	PR14 pause time	0	_	0	_	-	16bit	R/W	0x6276
Pr9.119	PR14 special parameter	0	_	0	_	-	16bit	R/W	0x6277
Pr9.120	PR15 mode	0	_	0	_	-	16bit	R/W	0x6278
Pr9.121	PR15 position H	0	_	0	_	-	16bit	R/W	0x6279
Pr9.122	PR15 position(L)	0	I	0	_	-	16bit	R/W	0x627A
Pr9.123	PR15 velocity	60	I	0	_	-	16bit	R/W	0x627B
Pr9.124	PR15 acceleration time	100		0	—	—	16bit	R/W	0x627C
Pr9.125	PR15 deceleration time	100		0	—	—	16bit	R/W	0x627D
Pr9.126	PR15 pause time	0		0	—	—	16bit	R/W	0x627E
Pr9.127	PR15 special parameter	0	-	0	_	_	16bit	R/W	0x627F

3.2 Parameters description

3.2.1 [Class 0] Basic Settings

	Label	Model-followi	ng/Zero tracki	ng control	Valid mode(s)	Р				
Pr0.00	Range	0-2000 Unit 0.1Hz Default 1								
	Byte length	16bit	Attribute	R/W	485 address	0x000	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 D)escription								
	0 [)isable model fo	llowing/zero	tracking co	ntrol					
	1 5	Set bandwidth a	utomatically							
	2~9 F	Reserved	served							
	111~711111	Aanually set cor	anually set control bandwidth. 30~100 recommended for belt plication							



	Label		Control	Mode Settings		Valid mode(s)	Ρ	S	т		
Pr0.01	Range		0~10	Unit		Default	0				
	Byte len	igth	16bit	Attribute	R/W	485 address	0x00	003			
	Valid		After res	start							
					-						
	Value		ription								
	Value	1 st mo	ode	2 nd mode		n 3, 4, 5, 6 combir					
	[0]	Positi	on	—		mode can be cho					
	1	Veloc	ity	—		mode switching ir DE: Invalid, select			:).		
	2	Torqu	le	—		,					
	3	Positi	on	Velocity		C-MODE: Valid, select 2 st mode. Please allow some time in between mode					
	4	Positi	on	Torque		ng commands.	ii betw				
	5	Veloc	ity	Torque		se set Pr0.01 = 6 t	o swite	ch to oth	ner		
				Position Pr0.22=1	modes Pr0.22	from PR mod, the	n set 2	2 nd mod	e using		
	6	PR in comm	connear	Velocity Pr0.22=1	C-MOL	C-MODE is defaulted to Normally Open					
		contro	bl	Torque Pr0.22=2	:2						
	7~10	Rese	rved								

	Label		Real time A	Auto Gain Adju	sting	Valid mode(s)	Ρ	P S T		
Pr0.02	Range		0x0~0xFF F	Unit	—	Default	0x1			
	Byte len	gth	16bit	Attribute	R/W	485 address	0x000)5		
	Valid		Immediate	ate						
Data bits	Category	Settir	igs	Application						
	Motion	chara mode rapid	cteristics or s 1 with good positioning is e choose mo	t motion setting mode, which can be selected according to the motio stics or setting requirements. Generally, it is recommended to select th good generality when there is no special requirement, mode 2 whe ioning is needed If mode 1 and mode 2 cannot meet the requirement pose mode 0. Pr0.03 invalid. Gain value must be adjusted manually and						
0x00_	setting mode	1:Star	ndard	accordingly. Pr0.03 valid. Quick gain adjusting can be achieved by changing Pr0.03 stiffness value. Gain switching is not used in this mode, suitable for applications with requirements for stability.						
		2:Pos	itioning	Pr0.03 valid. Quick gain adjusting can be achieved by changing Pr0.03 stiffness value. This mode is suitable for						



		Used to select t mechanical stru	he load type, choose according to load-inertia ratio and cture.					
0x0 0	Load type	0: Rigid structure	This mode prioritizes system responsiveness. Use this mode when there is a relatively rigid structure with low load inertia. Typical application including directly connected high-precision gearbox, lead screw, gears, etc.					
0.00_0	setting	1:High inertia	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							
	 		in the local of the second					
	ng type combin type combinatio		cimal standard, as follows:					
0X000	type combinatio		cture + Manual					
0X000			cture +Standard					
0X002		-	ture +Positioning					
0X010			ia + Manual					
0X011			ia + Standard					
0X012		High inert	ia + Positioning					
0X020		Flexible st	ructure + Manual					
0X021		Flexible st	ructure +Standard					
0X022		Flexible st	ructure +Positioning					

	Label	Real time aut	Ρ	S	Т			
Pr0.03	Range	0~31	Unit		Default	11		
	Byte length	16bit	Attribute	R/W	485 address	0x00)07	
	Valid	Immediate						
	Lo	w ──►Me	chanical stiff	ness—	→ High			
					-			
	Lo	w>	Servo gair	1 —	→ High			
			C		e			
	81.80••••••		70.69.68	•••••		••51.5	0	
	Lo	ow →	Responsiver	ness —	→ High			
					nd mechanical stiffn nend to set to arour			



	Label	Inertia ratio			Valid mode(s)	Ρ	S	Т		
Pr0.04	Range	0~20000	Unit	%	Default	250				
	Byte length	16bit	Attribute	R/W	485 address	0x00	09			
	Valid	Immediate								
	Pr0.04=(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 greate than actual value, velocity loop gain settings will be higher and vice versa. For motor with high inertia, Pr0.04 can be left unfilled but optimal setting of Pr0.04 could improve system performance									

	Label	Command pulse input selection			Valid mode(s)	P					
Pr0.05	Range	0~1	Unit	—	Default	0					
	Byte length	16bit	Attribute	485 address	0x000B						
	Valid	After restart	•								
	Value	Descripti	on								
	[0]	Pulse inpu input)	it low speed	channel	(200/500kHz pulse						
	1	Pulse inpu	Pulse input high speed channel (4MHz pulse input)								
	Both channels	cannot be us	cannot be used at the same time.								

	Label	Command p inversion	ulse polarity	Valid mode(s)	Ρ			
Pr0.06	Range	0~1	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x000		
	Valid	After restart						
	Pr0.06 and Pr	0.07 set comm	and pulse ir	nput inve	rsion and mode cor	respond	dingly.	



	Label	Command	oulse input m	ode	Valid mode(s	s) P		
D-0.07	Range	0~3	Unit	—	Default	3		
Pr0.07	Byte length	16bit	Attribute	R/W	485 address	0x0	000F	
	Valid	After restar	t					
Command	oulse input							
Command Polarity inversion (Pr0.06)	Command pulse input mod settings (Pr0.07)	e Comm Mode	and Pulse	Posit	ive signal	Negativ	ve signal	
[0]	0 or 2			A <u>相</u> B <u>相</u>	t1			
	1	CW pu sequer + CCW p sequer	nce oulse					
	(3)	+	Pulse sequence + Directional symbol		+1 +1	t4 t5 "∟"	t6	
	0 or 2	differer 2 phas	90°phase difference 2 phase pulse (Phase A+Phase B)					
1	1		ilse nce pulse nce					
	□3	+	Pulse sequence					

Command pulse input signal max. frequency and min. duration needed

Command pulse		Max.	Min. duration needed $(\mu \square s)$						
	Command pulse input interface		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 Pr0.07=0 or 2, Pr0.08 = 10000; 1 revolution with 10000 pulses 1-phase pulse input when Pr0.07=1 or 3, Pr0.08 = 10000



	Label	1st command revolution	pulse count	per	Valid mode(s)	P S T				
Pr0.08	Range	0-67100864	Unit	PULS E	Default	10000				
	Byte length	32bit	Attribute	R/W	485 address	H: 0x0010 L: 0x0011				
	Valid	After restart								
(1) Pr0.08 va	affected if value alid when ≠ 0: M valid when = 0:	lotor revolution	= input pulse							
	Label	1st command divider/multipl	ier numerato	r	Valid mode(s)	Р				
Pr0.09	Range	1~2147483647 Unit —		—	Default	1				
F10.03	Byte length	32bit	Attrib ute	R/W	485 address	H: 0x0012 L: 0x0013				
	Valid	After restart								
	Valid when Pro	0.08 = 0, please	e refer to des	cription in	n Pr0.10.					
	Label	1st command divider/multipl		ator	Valid mode(s)	P				
D 0 40	Range	1~214748364		—	Default	1				
Pr0.10	Byte length	32bit	Attrib ute	R/W	485 address	H: 0x0014 L: 0x0015				
	Valid	After restart								
	 Settings: Driver command pulse input count : X Encoder pulse count after frequency divider/multiplier: Y Encoder pulse count per revolution: Z Motor revolution: W Calculation: X, Y Y = X * Pr0.09 / Pr0.10 Please keep the value of Pr0.09 and Pr0.10 to be smaller than 2²⁴ (16777216). Z Motor with 23-bit motor: Z = 2²³ = 8388608 Y, Z, W Y = Y / Z Performance cannot be guaranteed if frequency divider/multiplier ratio is set to extreme values. Err1b1 might occur if W < 500. 									
	Label	Encoder outpure	ut pulse cour	nt per	Valid mode(s)	P S T				
Pr0.11	Range	1~32767	Unit	P/r	Default	2500				
	Byte length	16bit	Attribute	R/W	485 address	0x0017				
	Valid	After restart		1						
			erential outp	ut signal	per revolution = 40	000 pulses				



	Label	Pulse output	t logic inversi	on	Valid mode(s)	Р	S	Т
Pr0.12	Range	0~1	Unit	—	Default	0		
F10.12	Range O Byte length O Valid O To set phase B lapulse logic and o Pulse output log Pr0.12 Phase [0]	th 16bit	Attribute	R/W	485 address	0x0019		
	Valid	After restart						
	•	se B logic and out	•			o inverse	B-Ph	nase
	pulse logi	c and change the r	elation betw	een Phase	A and Phase B			
	Pulse outp	out logic inversion						
	Pr0.12	Phase B logic	b WDD	irection	CW dire	ection		
	[0]	Net invented	A-phase		A-phase		-	
	[U]	Not inverted	B-phase		B-phase			
	[4]		A-phase		A-phase			
	[1]	Inverted	B-phase		B-phase	B-phase		

	Label	1 st torque limi	it		Valid mode(s)	Ρ	S	Т
Pr0.13	Range	0~500	~500 Unit % 6bit Attribute R/W mmediate set according to ratio percentage of	Default	350			
	Byte length	16bit Attribut Immediate		R/W	485 address	0x001		
	Valid	Immediate						
	1 st torque limit max driver out		g to ratio pe	rcentage o	f motor rated curre	ent. Do	not exce	ed
	Please refer to	Pr5.21 on how	v to set torqu	ue limit.				

	Label	Excessive po	sition deviat	ion	Valid mode(s)	Р
Pr0.14	Range	0~310	Unit	0.1rev	Default	30
	Byte length	16bit	Attribute	R/W	485 address	0x001D
	Valid	Immediate				
					cordingly. Default f ess of 3 revolution	actory setting = 30, s.



	Label	Absolute en	coder setting	js	Valid mode(s)	Р	S	Т		
Pr0.15	Range	0~15	Unit	-	Default	0				
	Byte length	16bit	Attribute	R/W	485 address	0x00	1F			
	Valid	After restart								
Value	Mode			De	scription					
【0】	Incremental	Doesn't retai	n position da	ata on po	wer off. Unlimited tr	ravel d	istance			
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 positi (Pr6.63+1). U			. Actual data feedba ce.	ack in I	betwee	n 0-		
3	Single turn absolute	Used when tr overflow will			n 1 revolution of the	e enco	der. Da	ta		
5	Multi turn	0.000	de once alar		multiturn absolute t d, if remains at 5 af					
9	absolute	absolute function absolute functin absolute function absolute function absolute func	tion. Will sw after 3s, plea	itch to m ase solve	iturn alarm and act ultiturn mode once according to Er153 ixis before using.	alarm	cleared	, if		
Others		Do not use!			Ŭ					

		Label	Regenerativ	e resistance		Valid mode(s)	Р	S	Т	
D-0	0SD-2S 0SD-2S 0SD-2S 0SD-4T 0SD-4T 0SD-4T 0SD-4T 0SD-4T	Range	25~500	Unit	Ohm	Default	100			
Pru		Byte length	16bit	Attribute	R/W	485 address	0x002	21		
		Valid	Immediate							
		Pr0.16 and	tance value of re Pr0.17set value o > actual regenera	determine ala	rm thresh	nold of Er120.) occurrence might	be dela	yed.		
		Label	Regenerative rating	e resistor po	wer	Valid mode(s)	Р	S	Т	
Pr0	.17	Range	20~5000	Unit	W	Default	50			
		Byte length	16bit	Attribute	R/W	485 address	0x0023			
		Valid	Immediate	Immediate						
		To set powe	er rating of regen	erative resiste	or. Please	e refer to table belo	W			
	Мо	del no.	Internal resi	stance (Ω)	I	nternal resistor p	ower ra	ting (W))	
	OSD-2	SD40	10	00		5	0			
	OSD-2	SD75	Ę	50		7	5			
	OSD-2	S1D0	5	50		10)0			
	OSD-4	TD75	10	00		10)0			
	OSD-4	T1D0	10	00		10)0		<u> </u>	
	OSD-4	T1D5	10	00		10)0			
	OSD-4	T2D0	Ę	50		10)0			
				50)0			
	OSD-4T4D4 35 100									
	OSD-4			35)0			
	OSD-4			35		10)0			

Pr0.16 and Pr0.17 determines the threshold value of Er120. Please set accordingly or it might trigger false alarm or damage to servo drive.

Note: If external regenerative resistor is used, please set according to its labeled power rating.



	Label	PR and P/S	/T switching		Valid m	ode(s)	Р	S	Т
Pr0.22	Range	0~2	Unit	-	Default		0		
F10.22	Byte length	16bit	Attribute	R/W	485 add	485 address		0x002D	
	Valid	Immediate							
	Pr0.01	Pr0.2	2	Control	Control mode				
		【0】		PR / Position PR / Velocity					
	6	1							
		2		PR / To	rque				
	-	•				-			

	Label	Auxiliary fur	oction		Va	alid mode(s)	P S T			
	Range	0~0xFFFF	Unit	-	D	efault	0			
Pr0.25	Byte length	16bit	Attribute	R/W	48	85 address	0x0033			
	Valid	Immediate								
	Parameter		uxiliary func	tion		1	•			
	0x1111		eset current a							
	0x1122		eset record a							
			arameter to l				485 communication,			
	0x2211		not including			please write corresponding				
	0x2212		ve PR param			parameters into Pr0.25				
			itialize param		Do not use JOG_P and JOG_					
	0x2222		iding motor p)	in PR mode				
	0x2233	All parar	neters restor	e to default						
	0x3322	Analog 2	2 self-learning	g zero point	t					
	0x3333	Analog 3	3 self-learning	g zero point	t					
	0X4001	JOG_F	JOG_P (once every 50ms)							
	0X4002	JOG_N	l (once ever	y 50ms)						
	0x4411	Encode	r auto correct							
	0x6666		Software res	et						
	Label	Simulated I/				alid mode(s)	P S T			
Pr0.26	Range	0~0xFFFF	Unit	-		efault	0			
110.20	Byte length	16bit	Attribute	R/W	48	35 address	0x0035			
	Valid	Immediate								
	Bit		Input							
	0		DI1							
	1		DI2							
	2		DI3							
	3		DI4			Only for RS48	5 communication.			
	4		DI5				is different from			
	5		DI6				hich means inversion			
	6		DI7			of current I/O				
	7		DI8							
	8		DI9							
	9		DI10							



	Label	Manning	ogramotor 1		Valid mode(s)	Р	S	Т
Pr0.40	Range	wapping	parameter 1 Unit		Default	0	3	
(Only for	Byte length	32bit	Attribute		485 address	•	0x0050	
RS485)	Valid	5201	Allibule		405 audiess			
		ļ					0x0051	
					dress quickly. Ma			
		et on Pr0.5	0 by R5485. I	Data saved i	n Pr0.40 is param	ieter de	esignated	з бу
	Pr0.50. Please refer t	o Dr0 57 for	noromotor o	ottingo				
					ined by Pr0.50 de	sianati	ed naran	neter
	Label		parameter 2		Valid mode(s)	P	S	T
Pr0.41	Range	mapping	Unit		Default	0		•
(Only for	Byte length	32bit	Attribute		485 address	H: 0x	0052	
RS485)	Valid	0_01				L: 0x		
		o Pr0.40 for	parameter d	escription ar	nd Pr0.57 for para			
					ined by Pr0.51 de			neter.
	Label		parameter 3		Valid mode(s)	P	S	Τ
Pr0.42	Range		Unit		Default	0		
(Only for	Byte length	32bit	Attribute		485 address	•	(0054	
RS485)	Valid)x0055	
		o Pr0 40 for	parameter d	escription ar	nd Pr0.57 for para			
	Note: Range,	unit and att	ribute of Pr0.		ined by Pr0.52 de	signate	ed paran	neter.
D=0.42	Label	Mapping	parameter 4		Valid mode(s)	Ρ	S	Т
Pr0.43	Range		Unit		Default	0		
(Only for RS485)	Byte length	32bit	Attribute		485 address	H:	0x0056	
10400)	Valid					L: ()x0057	
					nd Pr0.57 for para ined by Pr0.53 de			notor
	Label		arameter 5	-5 13 0010111	Valid mode(s)	P	su paran S	T
Pr0.44	Range		Unit		Default	0	Ŭ	•
(Only for	Byte length	32bit	Attribute		485 address	•	0x0058	
RS485)	Valid	02.5h	7.001150000)x0059	
		Dr0 40 for	noromotor de	operintion on	d Pr0.57 for para			
					ined by Pr0.54 de			neter.
	Label	Mapping p	arameter 6		Valid mode(s)	Р	S	Т
Pr0.45	Range		Unit		Default	0	•	
(Only for	Byte length	32bit	Attribute		485 address	H:	0x005A	
RS485)	Valid)x005B	
	Please refer to	Pr0.40 for	parameter de	escription an	d Pr0.57 for para			
	Note: Range,	unit and att	ribute of Pr0.4		ined by Pr0.55 de			neter.
Dr0.46	Label	Mapping p	arameter 7		Valid mode(s)	Р	S	Т
Pr0.46	Range		Unit		Default	0		
(Only for RS485)	Byte length	32bit	Attribute		485 address	H:	0x005C	
K3405)	Valid					L: ()x005D	
					d Pr0.57 for para			
					ined by Pr0.56 de			neter.



	Label	Mapping p	aran	neter 8		Valid mode(s)	Р	S	T
Pr0.47	Range		Uni	t		Default	0		
(Only for	Byte length	32bit	Attr	ribute		485 address	H:	0x005E	
RS485)	Valid	-						0x005F	
	Please refer	to Pr0.40 for	para	meter descr	iption a	nd Pr0.57 for para			
						nined by Pr0.57 de			
	Label	Mapping pa	rame	eter 1 indicat	or	Valid mode(s)	Р	S	Т
Pr0.50	Range	0~0xFFFFFF	F	Unit		Default	0x00	0490049	
(Only for	U	F							
RS485)	Byte length	32bit		Attribute	R/W	485 address	H:	0x0064	
	Valid	Immediate					L:	0x0065	
	Label	Mapping pa	rame	eter 2 indicat	or	Valid mode(s)	Р	S	Т
Pr0.51 (Only for	Range	0~0xFFFFFF F	FF	Unit		Default	0x00	0490049	
RS485)	Byte length	32bit		Attribute	R/W	485 address	H:	0x0066	
	Valid	Immediate					L:	0x0067	
	Label	Mapping pa	rame	eter 3 indicat	or	Valid mode(s)	Р	S	Т
Pr0.52 (Only for	Range	0~0xFFFFFF		Unit		Default	0x00	0490049	
RS485)	Byte length	32bit		Attribute	R/W	485 address	H:	0x0068	
	Valid	Immediate					L:	0x0069	
	Label	Mapping pa	rame	eter 4 indicat	or	Valid mode(s)	Р	S	Т
Pr0.53	Range	0~0xFFFFF	F	Unit		Default	0x00	0490049	
(Only for		F							
RS485)	Byte length	32bit		Attribute	R/W	485 address		0x006A	
	Valid	Immediate						x006B	
	Label	Mapping pa			or	Valid mode(s)	Ρ	S	Т
Pr0.54 (Only for	Range	0~0xFFFFFF F	F-	Unit		Default)490049	
RS485)	Byte length	32bit		Attribute	R/W	485 address)x006C	
	Valid	Immediate						x006D	
	Label	Mapping pa			or	Valid mode(s)	Ρ	S	Т
Pr0.55 (Only for	Range	0~0xFFFFFF F	F-	Unit		Default)490049	
RS485)	Byte length	32bit		Attribute	R/W	485 address		0x006E	
	Valid	Immediate						x006F	
	Label	Mapping pa			or	Valid mode(s)	Ρ	S	Т
Pr0.56 (Only for	Range	0~0xFFFFFF F	-F	Unit		Default	0x00)490049	
RS485)	Byte length	32bit		Attribute	R/W	485 address	H: 0)x0070	
	Valid	Immediate						x0071	



	Label	Mapping parame	eter 8 indica	tor	Valid	mode(s)	Р	S	Т		
Pr0.57 (Only for	Range	0~0xFFFFFFF F	Unit		Defau	-		90049			
RS485)	Byte length	32bit	Attribute	R/W 485 address		H: 0x0072					
	Valid Immediate L: 0x0073										
	High bit paran 0xABCD & 0x	et parameter to 0xABCDWXYZ igh bit parameter position(PH) and low bit parameter position(PL)settings format: xABCD & 0xWXYZ									
	4-bit value	Definition		4-bit va	alue	Definitio	n				
	CD	Parameter bias d	ΥZ		Paramet	er bias o	decimal				
	В	Parameter type hexadecimal	Х		Paramete hexadeci						
	А	Unused	W		Unused						
	Pr0.50 conten (Mapping para Pr0.40 high bi Pr0.40 low bit 1. When Pr0.5 If Pr0.50=0x00 0x0005 into P 2. When Pr0.5	ameter 1 indicator: t corresponds to P corresponds to Pr 50 PH≠PL, indicate 6200101; PH=0x06 r6.20, write 0x006 50 PH=PL, indicate 1150115; PH=0x0	Pr0.50; M r0.50 high b 0.50 low bit es that Pr0.4 620,PL=0x0 4 into Pr1.01 tes that Pr0.4	apping (it indicator indicator 0 contair 101; writ ; 40 conta	oarame or (PH) r (PL) va ns 2 16 ns 2 16 ns 2 16 ns 1 32	ter 1: Pr0.4 value; alue; -bit mappe 05 0064 int 2-bit mapp	40) d values to Pr0.4 ed value	0; write e.			
	Note: When a 32-bit address parameter is mapped, please write same address into hig and low bit as shown above.								gh		

3.2.2 [Class 1] Gain adjustments

	Label	1 st position I	oop gain		Valid mode(s)	P
D#1.00	Range	0~30000 Unit 0.1/s			Default	320
Pr1.00	Byte length	16bit Attribute R/W			485 address	0x0101
	Valid	Immediate				
	lessens the po Position loop g take in conside and overtravel	sitioning time ain value sho eration velocit p gain is base	uldn't exceed y loop gain, if ed on position	d responsiv f not it migl n loop gain	ht cause vibration	ervo driver and hanical system and , mechanical noise values accordingly.



	Label	1 st velocity le			Valid mode(s) P S 1
2-4-04	Range	1~32767	Unit	0.1Hz	Default	180
Pr1.01	Byte length	16bit	Attribute	R/W	485 address	0x0103
	Valid	Immediate				
						tio of Pr0.04 is uniform
	with actual ine					
						whole system, velocity
	high, it might c			ease nou	ce that if the ver	ocity loop gain is too
			 Time Constan	it of		. P S 1
	Label	Velocity Loo			Valid mode	(S)
Pr1.02	Range	1~10000	Unit	0.1ms	Default	310
	Byte length	16bit	Attribute	R/W	485 address	s 0x0105
	Valid	Immediate				
						ight cause vibration. If
				lelay of p	ositioning time	duration and lowered
	responsivenes Set 10000 to c					
			.02. letection filter		Valid mode	(s) P S
				r	Default	
	Range	0	Unit			
Pr1.03	Range Byte length	0∼31 16bit	Unit	— •		15 0x0107
Pr1.03	Byte length	16bit	Unit Attribute	R/W	485 address	
Pr1.03	-			R/W		
Pr1.03	Byte length Valid	16bit Immediate	Attribute		485 address	
Pr1.03	Byte length Valid This filter is a velocity feedba	16bit Immediate low pass filter ack data. The	Attribute . It blocks hig higher the se	h frequer et value, l	485 address	s 0x0107 se system instability fro es will be blocked and
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon	16bit Immediate low pass filter ack data. The nsiveness will	Attribute . It blocks hig higher the se also be lowe	h frequer et value, l	485 address	s 0x0107 se system instability fro
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to	16bit Immediate low pass filter ack data. The nsiveness will o the following	Attribute . It blocks hig higher the se also be lowe table.	h frequer et value, l red. Pr1.	485 address ncies which cau ower frequencie 03 needs to ma	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain.
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity [Attribute . It blocks hig higher the se also be lowe table. Detection	h frequer et value, l	485 address hcies which cau ower frequencie 03 needs to ma le Velocit	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to	16bit Immediate ow pass filter ack data. The nsiveness will the following Velocity f Filter Cut	Attribute . It blocks hig higher the se also be lowe table. Detection -off	h frequer et value, l red. Pr1.	485 address hcies which cau ower frequencie 03 needs to ma le Velocit	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain.
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to	16bit Immediate ow pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute . It blocks hig higher the se also be lowe table. Detection -off sy(Hz)	h frequer et value, l red. Pr1. Valu	485 address Address	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz)
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to Value	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute . It blocks hig higher the se also be lowe table. Detection -off	h frequer et value, l red. Pr1. Valu	485 address hcies which cau ower frequencie 03 needs to ma le Velocit	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute Attribute igher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100	h frequer et value, l red. Pr1. Valu	485 address hcies which cau ower frequencie 03 needs to ma le Velocity Cut-off 16 17 18	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to Value 0 1 2 3	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute Attribute Liblocks hig higher the se also be lowe table. Detection -off (HZ) 2500 2250 2100 2000	h frequer et value, l red. Pr1. Valu	485 address hcies which cau ower frequencie 03 needs to ma le Velocit Cut-off 16 17 18 19	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to Value 0 1 2 3 4	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100 2000 1800	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma Je Velocit Cut-off 16 17 18 19 20	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off (Hz) 2500 2250 2100 2000 1800 1600	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma ue Velocity Cut-off 16 17 18 19 20 21	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100 2000 1800 1600 1500	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma ue Velocit Cut-off 16 17 18 19 20 21 22	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500 450
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off 2500 2250 2100 2000 1800 1600 1500 1400	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma ue Velocity Cut-off 16 17 18 19 20 21 22 23	s 0x0107 se system instability from es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500 450 400
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7 8	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100 2000 1800 1600 1500 1400 1300	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma Image Velocity Cut-off 16 17 18 19 20 21 22 23 24	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500 450 400 350
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7 8 9	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off 2000 2250 2100 2000 1800 1600 1500 1400 1300 1200	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma Je Velocit Cut-off 16 17 18 19 20 21 22 23 24 25	s 0x0107 se system instability from es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500 450 400 350 300
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respon Please refer to Value 0 1 2 3 4 5 6 7 8 9 10	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off 2000 2250 2100 2000 1800 1600 1500 1400 1300 1200 1100	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma Je Velocit Cut-off 16 17 18 19 20 21 22 23 24 25 26	s 0x0107 se system instability from es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500 450 400 350 300 250
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7 8 9 10 11	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off 2000 2250 2250 2100 2000 1800 1600 1500 1400 1300 1200 1100 1000	h frequer et value, l red. Pr1. Valu	485 address ncies which cau ower frequencie 03 needs to ma ue Velocity Cut-off 16 17 18 19 20 21 22 23 24 25 26 27	s 0x0107 se system instability fro es will be blocked and tch velocity loop gain. y Detection Filter Frequency(Hz) 750 700 650 600 550 500 450 400 350 300 250 200
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7 8 9 10 11 12	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100 2250 2100 2000 1800 1600 1500 1400 1300 1200 1100 1000 950	h frequer et value, l red. Pr1. Valu	485 address	Ox0107 Se system instability from the set of t
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7 8 9 10 11 12 13	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequenc	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100 2000 1800 1600 1500 1400 1300 1200 1100 1000 950 900	h frequer et value, l red. Pr1. Valu	485 address accies which cau ower frequencie 03 needs to ma ue Velocit Cut-off 16 17 18 19 20 21 22 23 24 25 26 27 28 29	Ox0107 Se system instability from the set of t
Pr1.03	Byte length Valid This filter is a velocity feedba velocity respond Please refer to Value 0 1 2 3 4 5 6 7 8 9 10 11 12	16bit Immediate low pass filter ack data. The nsiveness will the following Velocity I Filter Cut Frequence	Attribute Attribute It blocks hig higher the se also be lowe table. Detection -off cy(Hz) 2500 2250 2100 2250 2100 2000 1800 1600 1500 1400 1300 1200 1100 1000 950	h frequer et value, l red. Pr1. Valu	485 address	Ox0107 Se system instability from the set of t



	Label	1 st Torque F	ilter Time Co	nstant	Valid mode(s)	Р	S	Т
Pr1.04	Range	0~2500	Unit	0.01ms	Default	126		
	Byte length	16bit	Attribute	R/W	485 address	0x0109)	
	Valid	Immediate						
	and filter out th Often used to will reduce the position loop of Recommended For example: A torque filter sh If mechanical of vibration. The machine condi loop. With higher Pr	ne high freque reduce or elin responsivene ontrol. Pr1.04 d range: 1,000 Velocity loop g ould be Pr1.0 vibration is du smaller the va itions. If the va	encies in the opinate some rest of current needs to ma 0,000/(2π×Pr gain Pr1.01= 1≤221(0.01m e to servo dr alue, the bette alue is too lar ttings and no	command. noise or vib t loop, resu atch velocit 1.04) ≥Pr1 180(0.1Hz) ns) iver, adjust er the resp ge, it migh		or operating veloci me cons eliminate so subject siveness value;	tion, but ty loop tant of the cted to	it it and

	Label	2 nd Position	Loop Gain		Valid mode(s)	Р	
Pr1.05	Range	0~30000	Unit	0.1/s	Default	380	
P11.05	Byte length	16bit	Attribute	R/W	485 address	0x010B	
	Valid	Immediate					
	Label	2 nd velocity I	oop gain		Valid mode(s)	P S	Т
Pr1.06	Range	1~32767	Unit	0.1Hz	Default	180	
F11.00	Byte length	16bit	Attribute	R/W	485 address	0x010D	
	Valid	Immediate					
	Label		Time Constai p	nt of	Valid mode(s)	P S	T
Pr1.07	Range	1~10000	Unit	0.1ms	Default	10000	
	Byte length	16bit	Attribute	R/W	485 address	0x010F	
	Valid	Immediate					
	Label	2 nd velocity of	detection filter		Valid mode(s)	P S	Т
Pr1.08	Range	0~31	Unit	—	Default	15	
F11.00	Byte length	16bit	Attribute	R/W	485 address	0x0111	
	Valid	Immediate					
	Label		ilter Time Co		Valid mode(s)	P S	Т
Pr1.09	Range	0~2500	Unit	0.01ms	Default	126	
111.05	Byte length	16bit	Attribute	R/W	485 address	0x0113	
	Valid	Immediate					
	Position loop, pairs of gain o				torque command	filter each have	2
	Label		d forward gai		Valid mode(s)	P	
Pr1.10	Range	0~1000	Unit	0.10%	Default	300	
	Byte length	16bit	Attribute	R/W	485 address	0x0115	
	Valid	Immediate					
	Used for decre cause oversho				responsiveness of too high.	f velocity loop. N	light



		Velocity fee	d forward filte	ar time		Ρ				
	Label	constant			Valid mode(s)					
Pr1.11	Range	0~6400	Unit	0.01ms	Default	50				
	Byte length	16bit	Attribute	R/W	485 address	0x0117				
	Valid	Immediate								
	Set velocity fe	ed forward lov	v pass filter t	o eliminate	high or abnormal	frequencies in				
						with low resolution c				
	high electronic									
					wered with higher	velocity feed forwar				
	gain. Please to									
	Reduce Pr1.11 value to suppress velocity overshoot during deceleration; Increase Pr1.1 value to suppress noise or vibration due to long driver control cycle or position comman									
			ibration due	to long ariv	ver control cycle c	or position command				
	uneven pulse	frequency.								
	<application></application>	>								
			improve feed	forward eff	fect by gradually i	ncrease Pr1.10. The				
			•		on deviation due t					
	feedforward ga					,				
	-			nt						
		S	et velocity[<mark>Ui</mark>	<u>s</u>] 10	0 – Velocity feed j	foward gain[%]				
	Position deviat	tion[Uint]= Pos	ition loop gai	n[Hz]	100					
	Label	Torque feed	forward gair	1	Valid mode(s)	P S				
	Range		Unit	1	Default					
Pr1.12		0~1000		0.1%		0				
	Byte length	16bit	Attribute	R/W	485 address	0x0119				
	Valid	Immediate								
						04. By increasing				
						deceleration can be				
					pezoidal speed pr	perturbation torque				
	will always exi					perturbation torque				
			forward filte			P S				
	Label	constant			Valid mode(s)					
Pr1.13	Range	0~6400	Unit	0.01ms	Default	0				
	Byte length	16bit	Attribute	R/W	485 address	0x011B				
	Valid	Immediate								
	•			•		ed forward command				
	Usually used v									
					stant is set higher	but position deviation				
	will increase a		varied points	S.						
	<application></application>		o inorcess t	statio fam.	and again and duelly	to onable terrine				
	 Set Pr1.13 feedforward 		se increase to	orque forwa	ard gain gradually	to enable torque				
			noise will red	uce but pr	sition deviation	will become larger.				
	- by increas	ыну гтт. тэ, т		uce but po		wiii beconne larger.				



	Label			ntrol gain swi	tching	Valid mode(s)	Ρ			
	Dengo		mode	Unit		Default				
Pr1.15	Range	46	0~10	Attribute	— R/W	485 address	0 0x011F			
	Byte leng	IN	16bit	Attribute	Attribute R/W 465 address 0x011F					
	Valid		Immediate							
	In position	contro	ol, set the cor	nditions for gain switching to be valid.						
	Value	Con	dition	Gain swite	hing cond	ition				
	【0】	1 st g	ain fixed	Fixed on u	sing 1 st gair	n(Pr1.00-Pr1.04)				
	1	2 nd g	ain fixed	Fixed on u	sing 2 nd gai	n (Pr1.05-Pr1.09)				
	2		n switching iput valid		ching input	(GAIN) invalid: (GAIN) valid: 2	-			
	3	High	n command torque	value la Switch t	rger than (le o 1 st gain w	vhen set torque co evel + hysteresis) /hen set torque co (level + hysteresis	[%] mmand abso			
	4-9	F	Reserved	Reserved						
	10	com	ding position mand ual velocity	Valid for position control. Switch to 2 nd gain if position command ≠ 0 Switch to 1 st gain if positional command = 0 throughout the duration of delay time and absolute value of actual velocity remains smaller than (level - hysteresis) (r/min)						
						ce to Pr1.17 Positio ntrol switching.	ncontrolgain	1		
	Label	level		itrol gain swi		Valid mode(s)	Р			
Pr1.17	Range		0~20000	Unit	Mode Jependent	Default	50	L		
	Byte len	gth	16bit	Attribute	R/W	485 address	0x0123			
	Valid		Immediate							
	<u>Unit is m</u>	ode d	value for gain ependent.	_		·				
	Switchi	ng coi	ndition	Unit						
	Positio	n		Encoder pu	lse count					
	Velocity	/		RPM						
	Torque			%						
	Please	set lev	vel ≥ hystere	esis						



	Label	Hysteresis a switching	at position co	ontrol	Valid mode(s)	Р					
Pr1.18	Range	0~20000		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 Pr1.17 using the same unit. If level< hysteresis, drive will set internally hysteresis = level.										
	Label	Position con	trol switchin	g time	Valid mode(s)	Р					
Pr1.19	Range	0~10000	Unit	0.1ms	Default	33					
	Byte length	16bit	Attribute	R/W	485 address	0x0127					
	Valid	Immediate									
	Valid Immediate During position control, if 1 st and 2 nd gain difference is too large, to ease torque changes and vibration due to rapid changes in position loop gain, set suitable Pr1.19 value For example: 1st (pr1.00) <-> 2nd (Pr1.05) 2nd (Pr1.05) 2nd (Pr1.05) Ist (Pr1.00) Position gain switching time (ms) (Pr1.19) Result of switching 1st										

	Label	Position cor	nmand pulse	filter time	Valid mode(s)	Ρ					
Pr1.35	Range	0~200	Unit	0.01us	Default	8					
	Byte length	16bit	Attribute	R/W	485 address	0x0147					
	Valid	After restart									
	To filter position setting pulse, getting rid of narrow pulse frequency with interference. Low- speed pulse input unit: 0.05us; High-speed pulse input unit: 0.01us. If set value is overly large, it will affect the receiving of high frequency command pulse and wth high delay time. Pr1.35 formula: Filter frequency = $\frac{1}{2 \times Pr1.35 \times 0.05us} \times 1000000$ Hz Example: Pr1.35=100, pulse frequency > 100KHz will be filtered;										
	Pr1.35	Fil	ter frequency	/	Pr1.35	Filter frequency					
	0		Null		100	100kHz(500KHz)					
	8	1.25	5MHz(6.25MH	z)	125	80kHz(400KHz)					
	10	1N	Hz (5MHz)		160	62.5kHz(312KHz)					
	20	50	0kHz(2.5MHz)	200	50kHz(250KHz)					
	50	20	00kHz(1MHz)								
	80	12	5kHz(625KHz	()							



3.2.3 [Class 2] Vibration suppression

	Label	Adaptive filte	ering mode s	settings	Valid mode(s)	P S		
D-2.00	Range	0~4	Unit	—	Default	0		
Pr2.00	Byte leng	jth 16bit	Attribute	R/W	485 address	0x0201		
	Valid	Immediate						
				•				
	Value			Descri	ption			
	0	Adaptive filter: inv		Parameters related to 3 rd notch filter remain unchanged				
	1	Adaptive filter: 1 for once.		 1 adaptive filter becomes valid. 3rd notch filter related parameters updated accordingly. Pr2.0 switches automatically to 0 once updated. 				
	2	Adaptive filter: 1 remains valid			filter becomes valid ameters will keep u /.			
	3-4	Reserved						
	Label	1 st notch free	quency		Valid mode(s)	P S T		

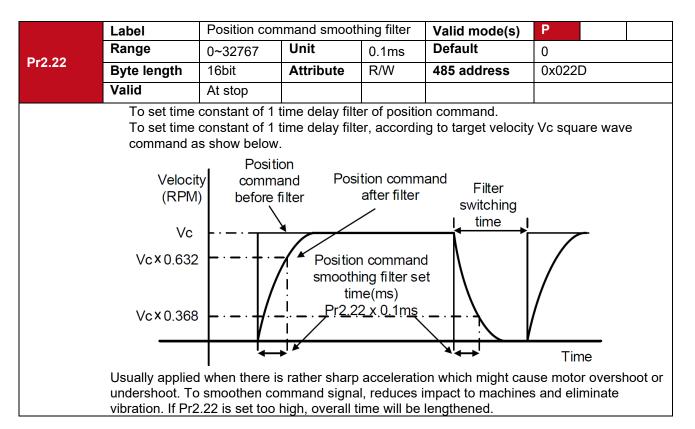
Label	1° notch freq	uency		Valid mode(s)	Р	8	
Range	50~4000	Unit	Hz	Default	4000		
Byte length	16bit	Attribute	R/W	485 address	0x0203		
Valid	Immediate						
				er.			
Set Pr2.01 to 400	00 to deactivat	e notch filter					
Label	1 st notch widt	h		Valid mode(s)	Ρ	S	Т
Range	0~20	Unit	—	Default	4		
Byte length	16bit	Attribute	R/W	485 address	0x020)5	
Valid	Immediate						
Set notch bandwid	dth for 1 st resor	hant notch fil ^s	ter.				
Under normal circ	umstances, ple	ease use fac	tory defaul	t settings. If resona	ance is	under o	control,
in combination wit	h Pr2.01 and F	Pr2.03, Pr2.0	2 can be r	educed to improve	curren	t loop	
responsiveness w	hich allows hig	her mechani	ical stiffnes	ss settings			
Label	1 st notch dep	th		Valid mode(s)	Ρ	S	Т
Range	0~99	Unit	—	Default	0		
Byte length	16bit	Attribute	R/W	485 address	0x020)7	
Valid	Immediate						
Set notch depth for	or 1 st resonant	notch filter.					
							control,
in combination with	th Pr2.01 and I	Pr2.02, Pr2.0)3 can be r	educed to improve	currer	nt loop	
responsiveness w	hich allows high	gher mechan	ical stiffne	ss settings			
	RangeByte lengthValidSet center frequeSet Pr2.01 to 400LabelRangeByte lengthValidSet notch bandwidUnder normal circcin combination witresponsiveness wLabelRangeByte lengthValidSet notch depth forUnder normal circcin combination witresponsiveness wLabelRangeByte lengthValidSet notch depth forUnder normal circoin combination wit	Range50~4000Byte length16bitValidImmediateSet center frequency of 1st torq Set Pr2.01 to 4000 to deactivatLabel1st notch widtRange0~20Byte length16bitValidImmediateSet notch bandwidth for 1st resor Under normal circumstances, ple in combination with Pr2.01 and Fresponsiveness which allows hig Label1st notch deptRange0~99Byte length16bitValidImmediateSet notch depth for 1st resonant Under normal circumstances, ple in combination with Pr2.01 and F	Range50~4000UnitByte length16bitAttributeValidImmediateSet center frequency of 1st torque command Set Pr2.01 to 4000 to deactivate notch filterLabel1st notch widthRange0~20UnitByte length16bitAttributeValidImmediateSet notch bandwidth for 1st resonant notch fil Under normal circumstances, please use facc in combination with Pr2.01 and Pr2.03, Pr2.0responsiveness which allows higher mechan Label1st notch depthRange0~99UnitByte length16bitAttributeValidImmediateSet notch depthImmediateSet notch depthImmediateCanade1st notch depthRange0~99UnitByte length16bitAttributeValidImmediateSet notch depth for 1st resonant notch filter.Under normal circumstances, please use facc in combination with Pr2.01 and Pr2.02, Pr2.0	Range50~4000UnitHzByte length16bitAttributeR/WValidImmediateAttributeR/WValidImmediateImmediateImmediateSet center frequency of 1st torque command notch filterImmediateImmediateLabel1st notch widthImmediateImmediateByte length16bitAttributeR/WValidImmediateImmediateSet notch bandwidth for 1st resonant notch filter.Under normal circumstances, please use factory defaul in combination with Pr2.01 and Pr2.03, Pr2.02 can be r responsiveness which allows higher mechanical stiffnest Label1st notch depthRange0~99Unit—Byte length16bitAttributeR/WValidImmediateSet notch depthByte length16bitAttributeR/WValidImmediateImmediateSet notch depth for 1st resonant notch filter.Under normal circumstances, please use factory defau in combination with Pr2.01 and Pr2.02, Pr2.03 can be r	Range 50~4000 Unit Hz Default Byte length 16bit Attribute R/W 485 address Valid Immediate Immediate 485 address Valid Immediate Valid Valid Valid Set center frequency of 1 st torque command notch filter. Set Pr2.01 to 4000 to deactivate notch filter Valid mode(s) Range 0~20 Unit — Default Byte length 16bit Attribute R/W 485 address Valid Immediate	Range50~4000UnitHzDefault4000Byte length16bitAttributeR/W485 address0x020ValidImmediateImmediateImmediateImmediateImmediateSet center frequency of 1st torque command notch filter. Set Pr2.01 to 4000 to deactivate notch filterValid mode(s)PRange0~20UnitDefault4Byte length16bitAttributeR/W485 address0x020ValidImmediateImmediateImmediateImmediateImmediateSet notch bandwidth for 1st resonant notch filter.Under normal circumstances, please use factory default settings. If resonance is in combination with Pr2.01 and Pr2.03, Pr2.02 can be reduced to improve current responsiveness which allows higher mechanical stiffness settingsPLabel1st notch depthValid mode(s)PRange0~99UnitDefault0Byte length16bitAttributeR/W485 address0x020Label1st notch depthValid mode(s)PRange0~99UnitOefault0Byte length16bitAttributeR/W485 address0x020ValidImmediateImmediateImmediateImmediateSet notch depth for 1st resonant notch filter.Under normal circumstances, please use factory default settings. If resonance is in combination with Pr2.01 and Pr2.02, Pr2.03 can be reduced to improve current in combination with Pr2.01 and Pr2.02, Pr2.03 can be reduced to improve current in combination with Pr2.01 and Pr2	Range 50~4000 Unit Hz Default 4000 Byte length 16bit Attribute R/W 485 address 0x0203 Valid Immediate



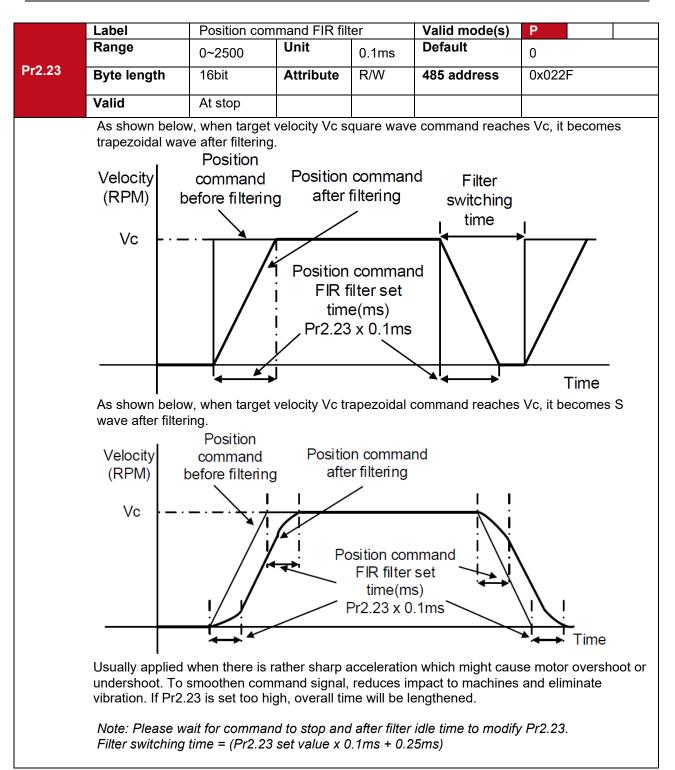
Pr2.04 Pr2.05	Label Range Byte length Valid Set center freque Set Pr2.04 to 400 Label Range		Unit Attribute le command notch filter	Hz R/W notch filte	Valid mode(s) Default 485 address	4000 0x0209
	Byte length Valid Set center freque Set Pr2.04 to 400 Label Range	16bit Immediate ncy of 2 nd torqu 0 to deactivate	Attribute le command notch filter	R/W	485 address	
Pr2.05	Valid Set center freque Set Pr2.04 to 400 Label Range	Immediate ncy of 2 nd torqu 0 to deactivate	le command notch filter			0,0203
Pr2.05	Set center freque Set Pr2.04 to 400 Label Range	ncy of 2 nd torqu 0 to deactivate	notch filter	notch filte		
Pr2.05	Set Pr2.04 to 400 Label Range	0 to deactivate	notch filter	noton nite	r	
Pr2.05	Range	2 nd notch widt				
Pr2.05	V		th		Valid mode(s)	P S T
F12.05	Durfa Lavantia	0~20	Unit		Default	4
	Byte length	16bit	Attribute	R/W	485 address	0x020B
	Valid	Immediate				
	Set notch bandwi	dth for 2 nd reso	nant notch fi	lter.		
	Under normal circ	umstances, ple	ease use fac	tory defau	It settings. If reson	ance is under control,
					educed to improve	e current loop
	responsiveness w			ical stiffne		
	Label	2 nd notch dep		ſ	Valid mode(s)	P S T
Pr2.06	Range	0~99	Unit		Default	0
112.00	Byte length	16bit	Attribute	R/W	485 address	0x020D
	Valid	Immediate				
	circumstances, pl	ie is higher, no ease use facto Pr2.04 and Pr2	tch depth be ry default se 2.05, Pr2.06	ttings. If re can be red	sonance is under luced to improve c	
	Label	3 rd notch freq			Valid mode(s)	P S T
Pr2.07	Range	50~4000	Unit	Hz	Default	4000
	Byte length	16bit	Attribute	R/W	485 address	0x020F
	Valid	Immediate				
	Set center frequer Set Pr2.07 to 400	0 to deactivate	notch filter	notch filter		
	Label	3 rd notch widt			Valid mode(s)	P S T
Pr2.08	Range	0~20	Unit	—	Default	4
F12.00	Byte length	16bit	Attribute	R/W	485 address	0x0211
	Valid	Immediate				
	circumstances, pl	e is higher, not ease use facto	tch depth be ry default se	ttings. If re	allow, phase lag re sonance is under luced to improve c	
	responsiveness w					unoncioop
	Label	3 rd notch dept			Valid mode(s)	P S T
	Range	0~99	Unit	_	Default	0
Pr2.09	Byte length	16bit	Attribute	R/W	485 address	0x0213
	Valid	Immediate				•
	Set notch depth f When Pr2.06 valu circumstances, p	or 3 rd resonant ue is higher, no lease use facto Pr2.04 and Pr2	otch depth be ory default se 2.05, Pr2.06	ettings. If re can be rec	esonance is under duced to improve o	



	Label	1 st damping f	requency		Valid mode(s)	Ρ							
D=2.4.4	Range	0/10~2000	Unit	0.1Hz	Default	0							
Pr2.14	Byte length	16bit	Attribute	R/W	485 address	0x021	D						
	Valid	Immediate											
	Set Pr2.16 to 0 to deactivate this parameter.												
					e of flexible structu								
					le with frequencies			Set					
	Pr2.15 to wobble f	requency (wob	ble frequency	/ can be de	etermined using trac	cing fund	ction of						
	Motion Studio)												
	Label	2 nd damping frequency			Valid mode(s)	Ρ							
Pr2.16	Range	0/10~2000	Unit	0.1Hz	Default	0							
P12.10	Byte length	16bit	Attribute	R/W	485 address	0x022	1						
	Valid	Immediate											
	Set Pr2.16 to 0	to deactivate the	his paramete										
					bble of flexible strue								
					bble with frequenci								
	Set Pr2.16 to w	obble frequenc	cy (wobble fre	quency ca	n be determined us	ing traci	ng funct	ion					
	Set Pr2.16 to wobble frequency (wobble frequency can be determined using tracing function of Motion Studio)												









	Label	Adjustment I	mode		Valid mode(s)	Р	S	Т				
	Range	0~1	Unit	_	Default	0						
Pr2.48	Byte length	16bit	Attribute	PR/W	485 address	0x0261						
	Valid											
	Value	Description										
	[0]	Turn off auto	Turn off automatic adjustments									
	Activate automatic adjustments, real time inertia measuring and vibratic suppression. Inertia measuring deactivated after reaching 4 times in 5 minutes, triggering conditions: changes in mechanical stiffness.											

	Label	MFC type			Valid mode(s)	Р	
	Range	0~3	Unit	—	Default	0	
Pr2.50	Byte length	16bit	Attribute	R/W	485 address	0x0265	
	Valid	Re-enable					
				I			
	Value			Descript	ion		
	【0】	Model following	ng control				
	1	Zero tracking					

2	3 inertia (future upgrade)
3	Path following (future upgrade)

Pr2.51	Label	Velocity feedfor coefficient	ward comper	Valid mode(s)	Р			
	Range	-10000~10000	Unit	_	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0267		
	Valid	Immediate						
To compensate for velocity feedforward								

Pr2.52	Label	Torque feedforw coefficient	ard compen	Valid mode(s)	Р	S		
	Range	-10000~10000	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x0269		
	Valid	Immediate						
	To compens							



	Label	Dynamic friction coefficient	n compensat	Valid mode(s)	Р	S	Т			
Pr2.53	Range	0~1000	Unit	%	Default	0				
112.00	Byte length	16bit	Attribute R/W		485 address	0x026B				
	Valid Immediate									
	To set ratio	of rated torque/r	ated rotation	nal speed,	to compensate for	[.] dynamic	frictio	n		
	during moti	on and have bett	er control ov	er acceler	ration/deceleration	1.				
	Dynamic fricti	ion coefficient								
		= Torque(Rotat	ional speed 1)	- Torque(F	Rotational speed 2)	nated notat	ional en	and		
	$= \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									
	Pr2.53 to re	duce the deviation	n to 0.	-		-				

	Label	Overshoot time	coefficient	Valid mode(s)	Р	S	T		
	Range	0~10000	Unit	%	Default	0			
Pr2.54	Byte length	16bit	Attribute	R/W	485 address	0x026D			
	Valid	Immediate							
	To set overshoot time coefficient								

	Label	Overshoot supp	pression gain	l	Valid mode(s)	Р	S	Т	
Pr2.55	Range	0~10000	Unit	%	Default	0			
	Byte length	16bit	Attribute	R/W	485 address	0x026F			
	Valid	Immediate							
Suppression improves with larger set value but might affect the performance of MFC. Please use with caution for any value above 100.									



3.2.4 [Class 3] Velocity/Torque control

	Label		Velocity inter	nal/external s	switching	Valid mode(s)	S				
	Range		0~3	Unit		Default	1				
Pr3.00	Byte le	ngth	16bit	Attribute	R/W	485 address	0x0301				
	Valid	•	Immediate								
	Connect	to the I	right DI to conti	rol internal co	ommand vo	elocity settings.					
		lue	0			y settings					
		ר	Analog - Velo	Analog - Velocity command (SPR)							
		1]	U U	Internal velocity settings 1 st – 4 th speed (Pr3.04~Pr3.07)							
		• 4	Internal velocity settings $1^{st} - 3^{rd}$ speed (Pr3.04~Pr3.07) Internal velocity settings $1^{st} - 3^{rd}$ speed (Pr3.04~P3.06), Analog								
		2									
		<u></u>	velocity command (SPR)								
		3	Internal veloc	city settings 1	st – 8 th spe	ed (Pr3.00 \sim Pr3.	11)				
	Value		nal command velocity 1 INTSPD□1)	Internal co velocit (INTSF	xy 2	Internal comman velocity 3 (INTSPD3)	d Velocity command				
			OFF	OFF	=		1 st speed				
			ON	OFF		N	2 nd speed				
	1		OFF	ON		No effect	3 rd speed				
			ON	ON			4 th speed				
		OFF OFF			-		1 st speed				
			ON	OFF	-		2 nd speed				
	2		OFF	ON		No effect	3 rd speed				
			ON	ON			Simulated speed				
			Similar to	Pr3.00=1		OFF	1 st – 4 th speed				
			OFF	OFF	-	ON	5 th speed				
	3		ON	OFF	=	ON	6 th speed				
			OFF	ON		ON	7 th speed				
			ON	ON		ON	8 th speed				
	move	ment m PD1 • PD2 • city hand •	hight occurs if 2	2 command v	elocities a	3 openCOM - 7m 855					



	Label	Velocity comma direction select		I	Val	id mode(s)	S	
Pr3.01	Range	0~1	Unit		Def	ault	0	
	Byte length	16bit	Attribute	R/W	485	address	0x0303	
	Valid	Immediate						
	To set positive	/negative direction	of velocity c	ommand			·	
	Value	Velocity settings (Analog or intern velocity)	al sign sel	Velocity comman sign selection (V □SIGN□)		Velocity co direct		
	[0]	+	N	o effect		Positi	ve	
		—	N	o effect		Negat	ive	
	1	No effect		OFF		Positi	ve	
		No effect		□ON		Negat	ive	

Label Velocity command input gain Valid mode(s) S							
Pr3.02	Range	10~2000	Unit	(r/min)/V	Default	500	
	Byte length	16bit	Attribute	R/W	485 address	0x0305	
	Valid	Immediate					
	command veloc Pr3.02 sets Factory defa Pr3.02=5000 Hence 6V in 1. [ity command inpu ault: (r/min)/V. put: 3000 r/mir Do not supply r	n nore than ±1 ue is too lar <u>Velocity</u>	d rotational	or analog velocity of cause vibration.		



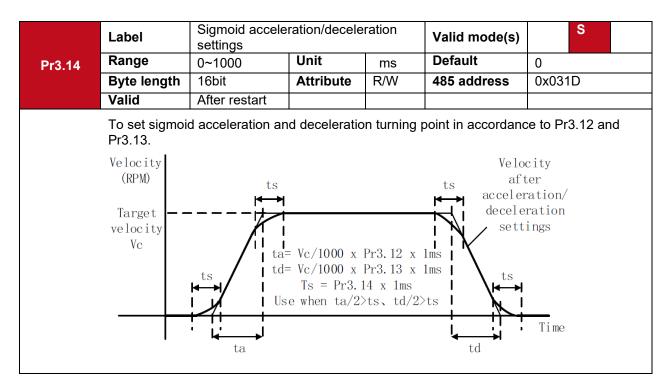
	Label	Velocity command input inversion			Valid mode(s)	S		
D#2.02	Range	0~1	Unit	_	Default	0		
Pr3.03	Byte length	16bit	Attribute	R/W	485 address	0x0307		
	Valid	Immediate						
	To set voltage polarity of analog velocity command. Only valid when Pr3.01 = 0. When Pr3.01 = 1, rotational direction is only related to VC-SIGN.							
	Value		Motor rotational direction					
	[0]	Not inversed		$ \begin{bmatrix} Positive \ voltage \end{bmatrix} \rightarrow \begin{bmatrix} Positive \ direction \end{bmatrix} \\ \begin{bmatrix} Negative \ voltage \end{bmatrix} \rightarrow \begin{bmatrix} Negative \ direction \end{bmatrix} $				
	1	Inversed		$\[\[\] Positive voltage\] \rightarrow \[\] Positive direction\]$ $\[\] Negative voltage\] \rightarrow \[\] Negative direction\]$				

Pr3.04 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x0309 Valid Immediate Valid mode(s) S Pr3.05 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030B Valid Immediate 0 Uaid 0 0 Byte length 16bit Attribute R/W 485 address 0x030B Valid Immediate 0 S S 0 Label 3rd speed of velocity setting Valid mode(s) S S Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030F Valid Immediate Valid mode(s) S S Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Valid Immediate		Label	1st speed of velocity setting			Valid mode(s)	S
Byte length 16bit Attribute R/W 485 address 0x0309 Valid Immediate Immediate Valid mode(s) S Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030B Valid Immediate Valid Immediate O 0x030B Label 3rd speed of velocity setting Valid mode(s) S Range -10000~10000 Unit r/min Default 0 Pr3.06 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030D Valid Immediate Valid Mode(s) S Range -10000~10000 Unit r/min Default 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030F Valid Immediate <	Pr3.04	Range	-10000~10000	Unit	r/min	Default	0
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 Immediate 0 0 0 Pr3.06 Range -10000~10000 Unit r/min Default 0 Pr3.06 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030D Valid Immediate 0 0 0 0 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 0 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 0 0 Pr3.08 Range -10000~10000 Unit r/min Default 0 0 0 <t< th=""><th>Byte length</th><th>16bit</th><th>Attribute</th><th>R/W</th><th>485 address</th><th>0x0309</th></t<>		Byte length	16bit	Attribute	R/W	485 address	0x0309
Pr3.05 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030B Valid Immediate Immediate Immediate Immediate Immediate Label 3rd speed of velocity setting Valid mode(s) S S Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030D Valid Immediate Immediate 0 Immediate Immediate <td< th=""><th>Valid</th><th>Immediate</th><th></th><th></th><th></th><th></th></td<>		Valid	Immediate				
Pr3.05 Byte length 16bit Attribute R/W 485 address 0x030B Valid Immediate Immediate Immediate 0 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 Byte length 16bit Attribute R/W 485 address 0x030D Pr3.06 Byte length 16bit Attribute R/W 485 address 0x030D Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Pr3.08 Range -10000~10000 Unit r/min Default 0 Pr3.08 Range -10000~10000 Unit r/min Default 0 Pr3.09 Range <th></th> <th>Label</th> <th colspan="3">2nd speed of velocity setting</th> <th>Valid mode(s)</th> <th>S</th>		Label	2nd speed of velocity setting			Valid mode(s)	S
Byte length 16bit Attribute R/W 485 address 0x030B Valid Immediate Immediate Valid mode(s) S Pr3.06 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x030D Pr3.06 Byte length 16bit Attribute R/W 485 address 0x030D Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030D Pr3.07 Range -10000~10000 Unit r/min Default 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Pr3.08 Range -10000~10000 Unit r/min Default 0 Pr3.08 Range -10000~10000 Unit r/min Default 0 Pr3.09 Range -10000~10000 Unit r/min Default 0 0	Pr3.05	Range	-10000~10000	Unit	r/min	Default	0
Pr3.06Label3rd speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x030DValidImmediateImmediateImmediateImmediateImmediatePr3.07Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x030FByte length16bitAttributeR/W485 address0x030FValidImmediateImmediateImmediateImmediateImmediatePr3.08Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x031FPr3.08Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0311ValidImmediateImmediateImmediateImmediateImmediatePr3.09Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313ValidImmediateImmediateImmediateImmediateImmediateLabel7th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefaultImmediatePr3.10Range-10000~10000Unitr/minDe		Byte length	16bit	Attribute	R/W	485 address	0x030B
Pr3.06Range Byte length-10000~10000Unit Validr/min r/minDefault 00Byte length16bitAttributeR/W485 address0x030DValidImmediateImmediateImmediateImmediateImmediateLabel4th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x030FValidImmediateImmediateImmediateImmediateImmediateLabel5th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Pr3.08Byte length16bitAttributeR/W485 address0x0311Pr3.09Eabel6th speed of velocity settingValid mode(s)SSPr3.09Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313ValidImmediateImmediateImmediateImmediateImmediateLabel6th speed of velocity settingValid mode(s)SSRange-10000~10000Unitr/minDefaultImmediateValidImmediateImmediateImmediateImmediateImmediateValidImmediateImmediateImmediateImmediateImmediateValidImmediateImmediate		Valid	Immediate				
Pr3.06 Byte length 16bit Attribute R/W 485 address 0x030D Valid Immediate Immediate Valid Immediate Valid 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 Pr3.07 Range -10000~10000 Unit r/min Default 0 Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Pr3.08 Range -10000~10000 Unit r/min Default 0 Pr3.08 Range -10000~10000 Unit r/min Default 0 Pr3.08 Byte length 16bit Attribute R/W 485 address 0x0311 Pr3.09 Range -10000~10000 Unit r/min Default 0 Pr3.09 Range -10000~10000 Unit r/min Default 0 Pr3.09 Range -10000~10000 Unit		Label	3rd speed of velocity setting				S
Byte length16bitAttributeR/W485 address0x030DValidImmediateImmediateImmediateImmediateImmediateImmediatePr3.07Range-1000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x030FValidImmediateImmediate0ImmediateImmediateImmediateValidImmediateImmediateImmediateImmediateImmediateImmediatePr3.08Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0311Pr3.09Eabel6th speed of velocity settingValid mode(s)SPr3.09Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313Pr3.09Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313ValidImmediateImmediateImmediateImmediateImmediateLabel7th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefaultPr3.10Range-10000~10000Unitr/minImmediate	Dr2 06	Range	-10000~10000	Unit	r/min	Default	0
Pr3.07Label4th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x030FValidImmediateImmediateImmediateImmediateImmediatePr3.08Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0311Byte length16bitAttributeR/W485 address0x0311ValidImmediateImmediateImmediateImmediateImmediatePr3.09Eabel6th speed of velocity settingValid mode(s)SPr3.09Range-10000~10000Unitr/minDefault0Pr3.10Range-10000~10000Unitr/minDefault0Pr3.10Range-10000~10000Unitr/minDefault0	F13.00	Byte length	16bit	Attribute	R/W	485 address	0x030D
Pr3.07Range Byte length-10000~10000Unit IIIr/minDefault0Byte length16bitAttributeR/W485 address0x030FValidImmediateImmediateImmediateImmediateImmediateLabel5th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0311ValidImmediateImmediateImmediateImmediateImmediateLabel6th speed of velocity settingValid mode(s)SSRange-10000~10000Unitr/minDefault0Pr3.09Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313Pr3.09Range-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313ValidImmediateImmediateImmediateImmediateImmediateLabel7th speed of velocity settingValid mode(s)SSRange-10000~10000Unitr/minDefaultImmediate		Valid					
Pr3.07 Byte length 16bit Attribute R/W 485 address 0x030F Valid Immediate Range -10000~10000 Unit R/W 485 address 0x030F Pr3.08 Eabel 5th speed of velocity setting Valid mode(s) S S Pr3.08 Eabel 5th speed of velocity setting Valid mode(s) S S Pr3.08 Byte length 16bit Attribute R/W 485 address 0x0311 Pr3.08 Byte length 16bit Attribute R/W 485 address 0x0311 Pr3.09 Range -10000~10000 Unit r/min Default 0 Pr3.09 Range -10000~10000 U		Label	4th speed of ve	locity setting			S
Byte length16bitAttributeR/W485 address0x030FValidImmediateImmediateImmediateImmediateImmediateImmediateLabel5th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0311ValidImmediateImmediateImmediateImmediateImmediatePr3.09Label6th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0313ValidImmediateImmediateImmediateImmediateImmediateLabel7th speed of velocity settingValid mode(s)SSPr3.10Range-10000~10000Unitr/minDefault	D+2.07	Range	-10000~10000	Unit	r/min	Default	0
Label5th speed of velocity settingValid mode(s)SRange-10000~10000Unitr/minDefault0Byte length16bitAttributeR/W485 address0x0311ValidImmediate </th <th rowspan="2">Pr3.07</th> <th>Byte length</th> <th>16bit</th> <th>Attribute</th> <th>R/W</th> <th>485 address</th> <th>0x030F</th>	Pr3.07	Byte length	16bit	Attribute	R/W	485 address	0x030F
Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x0311 Valid Immediate Valid Immediate Valid mode(s) S Pr3.09 Label 6th speed of velocity setting Valid mode(s) S Byte length 16bit Attribute R/W 485 address 0x0311 Pr3.09 Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x0313 Valid Immediate Immediate 0 0 0 Label 7th speed of velocity setting Valid mode(s) S S Range -10000~10000 Unit r/min Default 0		Valid	Immediate				
Pr3.08 Byte length 16bit Attribute R/W 485 address 0x0311 Valid Immediate Valid Immediate Valid mode(s) S Pr3.09 Range -10000~10000 Unit r/min Default 0 Pr3.09 Label 6th speed of velocity setting Valid mode(s) S Byte length 16bit Attribute R/W 485 address 0x0313 Valid Immediate Valid Immediate S S Label 7th speed of velocity setting Valid mode(s) S Range -10000~10000 Unit r/min Default	Pr3.08	Label	5th speed of velocity setting			Valid mode(s)	S
Byte length 16bit Attribute R/W 485 address 0x0311 Valid Immediate Immediate Valid mode(s) S 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 Immediate Valid mode(s) S Label 7th speed of velocity setting Valid mode(s) S Range -10000~10000 Unit r/min Default		Range	-10000~10000	Unit	r/min	Default	0
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 Valid mode(s) S S 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	0x0311
Range -10000~10000 Unit r/min Default 0 Byte length 16bit Attribute R/W 485 address 0x0313 Valid Immediate Immediate Valid mode(s) S Range -10000~10000 Unit r/min Default		Valid	Immediate				
Pr3.09 Byte length 16bit Attribute R/W 485 address 0x0313 Valid Immediate Immediate Valid mode(s) S Label 7th speed of velocity setting Valid mode(s) S Range -10000~10000 Unit r/min Default	Pr3.09	Label					S
Byte length Tobit Attribute R/W 485 address 0x0313 Valid Immediate Valid Immediate Valid mode(s) S Label 7th speed of velocity setting Valid mode(s) S Range -10000~10000 Unit r/min Default							9
Label 7th speed of velocity setting Valid mode(s) S Range -10000~10000 Unit r/min Default			16bit	Attribute	R/W	485 address	0x0313
Pr3 10Range-10000~10000Unitr/minDefault		Valid					
Pr3 10 10000 10000 0000 10000 10000	Pr3.10	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		Byte length	16bit	Attribute	R/W	485 address	0x0315
Valid Immediate		Valid	Immediate				
Label 8th speed of velocity setting Valid mode(s) S	Pr3.11	Label	8th speed of velocity setting			Valid mode(s)	S
Range -10000~10000 Unit r/min Default 0		Range	-10000~10000	Unit	r/min	Default	0
Pr3.11 Byte length 16bit Attribute R/W 485 address 0x0317		Byte length	16bit	Attribute	R/W	485 address	0x0317
Valid Immediate			Immediate				
To set internal velocity command 1 st -8 th speed							



abel	Acceleration time settings Valid mode(s) S						
ange	0~10000	Unit	ms/ (1000rpm)	Default	100		
yte length	16bit	Attribute	R/W	485 address	0x0319		
alid	Immediate						
abel	Valid mode(s)	S					
ange	0~10000	Unit	ms/ (1000rpm)	Default	100		
yte length	16bit	Attribute	R/W	485 address	0x031B		
alid	Immediate		locity comman				
If target velocity = x [rpm], max acceleration = a [unit: rpm/ms], acceleration time = t [ms] Pr3.12 = 1000/a Pr3.13 = 1000/a a = x/t For example: If motor is to achieve 1500rpm in 30s, $a=1500/30=50rpm/ms$ Pr3.12 = 1000/a = 20. Hence when Pr3.12 = 20, motor can achieve 1500rpm in 30s. Velocity Initial velocity (r/min)							
many c stable w	liffe /hile locit	sed when there is lifferent internal sp /hile motor in moti /ocity control mode	sed when there is rapid acceler lifferent internal speed segmen /hile motor in motion. /ocity control mode, 6083 and 6	sed when there is rapid acceleration or trapez lifferent internal speed segments under veloci /hile motor in motion. /ocity control mode, 6083 and 6084 is limited b	Pr3.13(ms) sed when there is rapid acceleration or trapezoidal wave velocit lifferent internal speed segments under velocity control mode w vhile motor in motion. locity control mode, 6083 and 6084 is limited by Pr3.12 and Pr3		





		Label	Zero speed selection	clamp functio	'n	Valid mode(s)	S	
Pr3.15	Pr3.15	Range	0~3	0~3 Unit _ Default 0				
		0 Invalid: zer 1 Velocity cor signal is va 2 Velocity cor	16bit	Attribute	R/W	485 address	0x031F	
		Valid	Immediate					
	Value			Zero speed	clamp fun	ction		
	0	Invalid: zero	speed clam	p deactivated				
	1	Velocity cor signal is val		ced to 0 when	the zero s	speed clamp (ZER(OSPD) input	
	0 Invalid: zero 1 Velocity cor signal is va 2 Velocity cor	nmand is for	ced to 0 when	actual ve	locity is lower thar	n Pr3.16.		
	3	Byte length Valid alue 0 Invalid: zer 1 Velocity co signal is va 2 Velocity co	nditions from	1 and 2				

Pr3.16 Range 10~2000 Unit r/min Default Byte length 16bit Attribute R/W 485 ad Valid Immediate Immediate Immediate Immediate Valid when Pr3.15 = 2/3, velocity command is forced to 0 when Pr3.16 and after static time set in Pr3.23. Immediate Immediate Label Torque internal/external switching Valid mo Range 0~3 Unit Default		Valid mode(s) S					
	Range	10~2000	Unit	r/mir	۱	Default	30	
	Byte length	16bit	Attribu	Attribute R/W		485 address	0x0321	
	Valid	Immediate						
				d is force	ed to	0 when actual v	elocity is lov	wer than
	Byte length16bitAttributeR/W485 address0x0321ValidImmediateImmediateImmediateImmediateImmediateImmediateImmediateValid when Pr3.15 = 2/3, velocity command is forced to 0 when actual velocity is lower Pr3.16 and after static time set in Pr3.23.Valid mode(s)ImmediateLabelTorque internal/external switchingValid mode(s)ImmediateImmediateImmediateByte length16bitAttributeR/W485 address0x0323ValidImmediateImmediateImmediateImmediateImmediateValueTorque command inputVelocity limit input(0)Analog input 3(AI 3)Pr3.21 set value1Analog input 3(AI 3)Analog input 1(AI 1)							Т
D-0.47	Range	0~3	Unit		D	efault	0	
Pr3.17	Byte length	16bit	Attribute	R/W	485 address		0x0323	
	Valid	Immediate						
	Label Torque internal/external switching Valid mode(s) Range 0~3 Unit Default 0 Byte length 16bit Attribute R/W 485 address 0x0323 Valid Immediate Immediate Product value Product value Value Torque command input Velocity limit input Immediate Product value Product value							
	【0】	Analog	input 3(AI 3)			Pr3.21 set v	/alue	
	Byte length Valid Value (0)	Analog	input 3(AI 3)			Analog input	1(Al 1)	
	2	Pr3.22	2 set value		Pr3.21 set value		/alue	



	Label	Torque command	d direction se	election	Valid mode(s)		Т	
Pr3.18	Range	0~1	Unit	_	Default	0	·	
F13.10	Byte length	16bit	Attribute	R/W	485 address	0x032	25	
	Valid	Immediate						
	To set torque	command positive/	negative dire	ction				
	Value		Direction s	ettings				
		TC-SIGN ON/OFF Torque command ir 「Negative」 →Neç	nput 「Positiv	ve」 →Pos				
		Use TC-SIGN ON/0 OFF: <i>Positive direc</i>						

	Label Torque command input gain Valid mode(s) Image Range 10~100 Unit 0.1V/100% Default 30 Byte length 16bit Attribute R/W 485 address 0x0327 Valid Immediate	Т
Pr3.19	Range 10~100 Unit 0.1V/100% Default 30 Byte length 16bit Attribute R/W 485 address 0x0327 Valid Immediate Immediate </th <th>30</th>	30
P13.19	Range 10~100 Unit 0.1V/100% Default 30 Byte length 16bit Attribute R/W 485 address 0x0327 Valid Immediate Immediate </th <th>0x0327</th>	0x0327
	Range 10~100 Unit 0.1V/100% Default 30 Byte length 16bit Attribute R/W 485 address 0x0327 Valid Immediate Immediate </th <th></th>	
		Positive 2 4 6 8 10 V Command input voltage

	Label	Torque commai	nd input inve	rsion	Valid mode(s)		т	
Pr3.20		0~1 Unit		Default 0				
Pr3.20	Range Byte length Valid To set voltage Only valid wh Value	16bit	Attribute	R/W	485 address	0x0329		
	Valid	Immediate						
	To set voltage p Only valid whe	oolarity of analog en Pr3.18 = 0.	torque comr	nand.		·		
	Value			Motor tor	que direction			
	[0]	Not inversed			→ \lceil Positive direc			
	1	Inversed	[Positive	voltage	\rightarrow Positive direc	ction		
			∫ Negativ	e voltage	floor ightarrow $ floor$ Negative dir	ection		



	Label	Velocity limit in to	orque mode		Valid mode(s)	Т		
D-0.04	Range	0~10000	Unit	r/min	Default	0		
Pr3.21	Byte length	16bit	Attribute R/W 485 address 0x0					
	Valid	Immediate						
	To set velocity	limit in torque cont	rol mode. O	nly valid w	hen Pr3.17 = 0 / 2)		

	Label	Torque comr	mand		Valid mode(s)		Т
D-2.00	Range	0~300	Unit	%	Default	0	
Pr3.22	Byte length	16bit	Attribute	R/W	485 address	0x032D	
	Valid	Immediate					
	To set torque li	mit in torque c	ontrol mode.	Only valid	when Pr3.17 = 2.		
	Please refer to	Pr3.17.					

Pr3.23	Label	Zero speed de mode	elay time in v	/elocity	Valid mode(s)	S
Pr3.23	Range	0~2000	Unit	ms	Default	0
	Byte length	16bit Attribute R/W			485 address	0x032F
	Valid	Immediate				
	To set the time	interval betwee	en axis reach	nes zero sp	eed level and the	moment it totally stops.
	Used when axi	s crawls under	velocity mod	e. Set 0 to	deactivate this par	rameter.

	Label	Maximum moto	or rotational s	peed	Valid mode(s)	Р	S	Т
Pr3.24	Range	0~10000	Unit	r/min	Default	0		
110.24	Byte length	16bit	Attribute	R/W	485 address	0x033	31	
	Valid	Immediate						
					han motor rated sp			
	If Pr3.24 = 0, m	aximum motor ro	otational spee	d = max. s	peed in motor para	ameter.		

	Label	Analog 1 clampi	ng voltage		Valid mode(s)	Т
Pr3.29	Range	0~20000	Unit	mv	Default	0
Pr3.29	Byte length	16bit	Attribute	R/W	485 address	0x033B
	Valid	Immediate				
	Only valid whe When Pr3.17=		o 0 if analog ²	l voltage i	s below Pr3.29 se	t value.
	Label	Analog 3 clampi	ng voltage		Valid mode(s)	Т
D-0.00	Range	0~20000	Unit	mv	Default	0
Pr3.30	Byte length	16bit	Attribute	R/W	485 address	0x033D
	Valid	Immediate				
		en Pr3.17 = 1 / 0. 1 / 0, velocity is s	et to 0 if analo	og 1 volta	ge is below Pr3.30	set value.

	Label	Speed regul	Speed regulation ratio 1 Valid mode(s) S						
Pr3.58	Range	0~150	Unit	%	Default	10			
P13.50	Byte length	16bit	Attribute	R/W	485 address	H0x0374 L0x0375			
	Valid	Immediate							
		ed of the moto 4, then motor	r will remain will rotate at	unchang maximu	im speed.	an 150% in total, speed of the motor			



Please refer to the following table as an example for users' required settings. Assuming (1) Pr3.58-Pr3.61 = default (2) Motor rated rotational speed = 2000rpm

- (3) SPDREG input signal = ON

	SPDREG1 Pr3.58	SPDREG2 Pr3.59	SPDREG3 Pr3.60	SPDRE Pr3.6		Ratio (%)	A	ctual sp (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	ON OFF			30		600		
	ON	ON	ON	OFF	70			1400)	
	Label	Speed regu	lation ratio 2		Val	id mode(s)			S	
D=2 E0	Range	0~150	Unit	%	Def	fault		20		
Pr3.59	Byte length	16bit	Attribute	R/W	485	i address		H0x0	376 L	0x0377
	Valid	Immediate								
	Same as Pr3.	58								
	Label		lation ratio 3		Val	id mode(s)			S	
Pr3.60	Range	0~150	Unit	%	Def	fault		40		
P13.00	Byte length	16bit	Attribute	R/W	485	o address		H0x0	378 L	0x0379
	Valid	Immediate								
	Same as Pr3.	58								
	Label	Speed regu	lation ratio 4		Val	id mode(s)			S	
Pr3.61	Range	0~150	Unit	%	Def	fault		80		
-13.01	Byte length	16bit	Attribute	R/W	485	address		H0x0	37A L(0x037E
	Valid	Immediate								
	Same as Pr3.	58								



3.2.5 [Class 4] I/O Monitoring Settings

	Label		election DI1			Valid mode	e(s)	Р		S	Т
	Range	0x00~(0xFF			Unit		_		fault	0x2
Pr4.00	Byte length	16bit				Attribute		R/W		85 ress	0x0401
	Valid	Immed	liate								
Please refe	er to the table	below to	set DI signals	and table	e on the	right for cor	respor	nding	pin ar	nd par	ameters
	Signal		Symbol	Va	lue						
				NO	NC		CN1			Dava	
	Invalid			0	-		PIN	In	out	Para	meters
	sitive limit swit		POT	1	81		8	D	11	Pr	4.00
	gative limit swi		NOT	2	82		9		12		4.01
5	Servo enabled		SRV-ON	3	83		26		13		4.02
	Clear alarm		A-CLR	4	-		27		14		4.03
	rol mode switc	<u> </u>	C-MODE	5	85		28		15	Pr	4.04
	Gain switching		GAIN	6	86		29		16		4.05
-	ar deviation co		CL	7	-				17		4.06
	and pulse prol		INH	8	88		31		18		4.07
	ue limit switch	<u> </u>	TL-SEL	9	89						
	nmand freque		DIV1	С	8C						
	/multiplier swi										
	command ve		INTSPD1	E	8E						
	command ve		INTSPD2	F	8F						
	command ve		INTSPD3	10	90						
	ro speed clam		ZEROSPD	11	91						
	city command	<u> </u>	VC-SIGN	12	92						
	ue command	sign	TC-SIGN	13	93						
	Forced alarm		E-STOP	14	94						
	tion suppressi		VS-SEL1	0A	8A	_					
	tion suppressi		VS-SEL2	0B	8B	_					
	ed regulation v		SPDREG	4B	CB						
	d regulation ra		SPDREG1	4C	CC	_					
	d regulation ra		SPDREG2	4D	CD	_					
	d regulation ra		SPDREG3	4E	CE	_					
Spee	d regulation ra	atio 4	SPDREG4	4F	CF						

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 drive.



	Inputs relat	ted to Pr-mode:					-
		Signal	s	ymbol		alue	
				.	NO	NC	
	Trig	ger command		RG	20	A0	
		Home	-	ME	21	A1	
	F	orced stop	S	TP	22	A2	
		Signal	Svr	nbol		alue	
	P	ositive JOG	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	OG	NO 23	NC A3	
		egative JOG			24	A4	
		Positive limit		<u>ัย</u> ข	25	A5	
		egative limit			26	A6	_
		Origin		RG	20	A0 A7	_
	Pa	th address 0		DD0	28	A7 A8	1
		th address 0		DD0 DD1	28	A0 A9	1
		th address 2		DD2	29 2A	AS	-
		th address 3		D2 DD3	2A 2B	AA	-
						nic bits last 1ms or	above
	Label	Input selection		piease I	Valid mode(s)	P S	above. T
	Range	0x0~0xFF	Unit		Default	0x1	
Pr4.01	Byte	16bit	Attribute	R/W	485 address	0x0403	
	length						
	Valid	Immediate					
	Label	Input selection			Valid mode(s)	P S	Ţ
	Range	0x0~0xFF	Unit		Default	0x0	
Pr4.02	Byte length	16bit	Attribute	R/W	485 address	0x0405	
	Valid	Immediate					
	Label	Input selection	DI4		Valid mode(s)	P S	Т
	Range	0x0~0xFF	Unit	_	Default	0x6	
Pr4.03	Byte	16bit	Attribute	R/W	485 address	0x0407	
	length						
	Valid	Immediate					
	Label	Input selection	DI5		Valid mode(s)	P S	Т
	Range	0x0~0xFF	Unit	—	Default	0xC	
Pr4.04	Byte	16bit	Attribute	R/W	485 address	0x0409	
	length Valid	Immediate					
		Input selection				P S	Т
	Label	0x0~0xFF	Unit		Valid mode(s) Default		
Pr4.05	Range Byte	16bit	Attribute	 R/W	485 address	0x3 0x040B	
	length		Aundule	1.7.4.4	+00 autiess	0.040B	
	Valid	Immediate					
	Label	Input selection	DI7		Valid mode(s)	P S	Т
	Range	0x0~0xFF	Unit	_	Default	0x7	
Pr4.06	Byte	16bit	Attribute	R/W	485 address	0x040D	
	length						
	Valid	Immediate					



	Label	Input selection	Valid mode(s)	Р	S	Т		
	Range	0x0~0xFF	Unit	—	Default		0x4	
Pr4.07	Byte length	16bit	Attribute	R/W	485 address		0x040F	
	Valid	Immediate						
	DI2~DI8al	location is the sa	er to Pr4.00.					

Output selection DO1 Valid mode(s) Label Ρ S Т Unit Default Range 0x0~0xFF 0x3 Pr4.10 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 Value Signal Symbol NO NC CN1 Output **Parameters** 00 80 Invalid PIN ALARM 01 81 Alarm DO1+ 7 02 82 Servo-Ready SRDY Pr4.10 DO1-**BRK-OFF** 6 03 83 External brake released 5 DO2+ 04 84 Positioning completed INP Pr4.11 4 DO2-05 85 At-speed AT-SPPED 3 DO3+ 06 86 Torque limit signal TLC Pr4.12 2 DO3-07 Zero speed clamp detection ZSP 87 DO4+ 1 08 88 Velocity coincidence V-COIN Pr4.13 26 DO4-12 92 Servo Status SRV-ST DO5+ 27 15 95 Positive limit valid POT-OUT Pr4.14 DO5-28 NOT-OUT 16 96 Negative limit valid 0B 8B Position command ON/OFF P-CMD 0F 8F Velocity command ON/OFF V-CMD 0D 8D Velocity limit signal V-LIMIT 94 Position comparison CMP-OUT 14

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			
Signal	Symbol	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.

D-4.44	Label	Output selection DO2			Valid mode(s)	Ρ	S	Т
Pr4.11	Range	0x0~0xFF	Unit		Default		0x2	



	Byte length	16bit	Attribute	R/W	485 address	0x0417
	Valid	Immediate				
	Label	Output selection	on DO3		Valid mode(s)	P S T
D-4.40	Range	0x0~0xFF	Unit	_	Default	0x1
Pr4.12	Byte length	16bit	Attribute	R/W	485 address	0x0419
	Valid	Immediate				
	Label	Output selection	n DO4	•	Valid mode(s)	P S T
D=4.42	Range	0x0~0xFF	Unit	_	Default	0x4
Pr4.13	Byte length	16bit	Attribute	R/W	485 address	0x041B
	Valid	Immediate				
	Label	Output selection	n DO5	•	Valid mode(s)	P S T
	Range	0x0~0xFF	Unit	_	Default	0x7
Pr4.14	Byte length	16bit	Attribute	R/W	485 address	0x041D
	Valid	Immediate				
	DO2-DO5 is a	llocated by the s	ame method	l as per DC	01. Please refer to	Pr4.10.
	Label					

	Label	Analog input 1(Al-1) Zero dri	ft settings	Valid mode(s)	S
	Range	-1860~1860	Unit	5.37mv	Default	0
Pr4.22	Byte length	16bit	Attribute	R/W	485 address	0x042D
	Valid	Immediate				
	To set zero dr	ift compensation	value on ana	log input 1	voltage for zero dr	ift correction.
	Label	Analog input 1(AI-1) filter		Valid mode(s)	S
Pr4.23	Range	0~6400	Unit	0.01ms Default		0
114.25	Byte length	16bit	Attribute	R/W	485 address	0x042F
	Valid	Immediate				
	To set a delay voltage will be		cient for AI1 in	nput voltage	e. When filter time	takes effect, input
	Label	Analog input 1(settings	Al-1) overvolt	age	Valid mode(s)	S
Pr4.24	Range	0~100	Unit	0.1V	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0431
	Valid	Immediate				
		id when set to 0. er zero drift corre		occur wher	n the input voltage	of AI1 is higher than

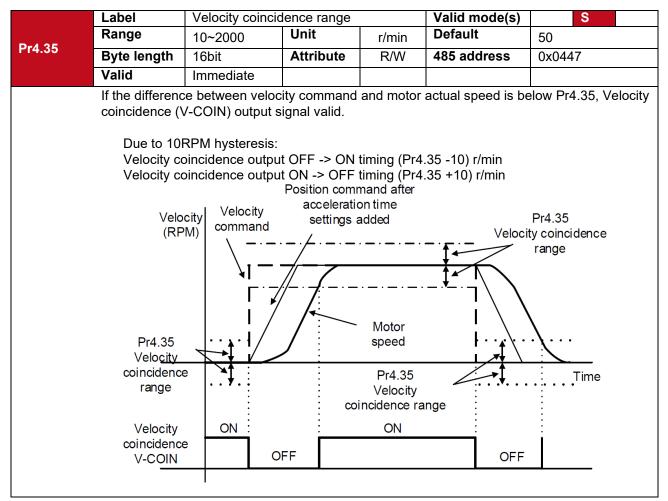
	Label	Analog input 3	(AI-3) Zero di	rift settings	Valid mode(s)		Т			
Pr4.28	Range	-1860~1860	Unit	5.37mv	Default	0				
	Byte length	16bit	Attribute	R/W	485 address	0x043	39			
	Valid	Immediate								
To set zero drift compensation value on analog input 3 voltage for zero drift correction.										
	Label	Analog input 3(AI-3) filter			Valid mode(s)		Т			
	Range	0~6400	Unit	0.01ms	Default	0				
Pr4.29	Byte length	16bit	Attribute	R/W	485 address	0x043	3B			
	Valid	Immediate								
To set a delay filter time coefficient for AI3 input voltage. When filter time takes effect, input voltage will be smoothen.										



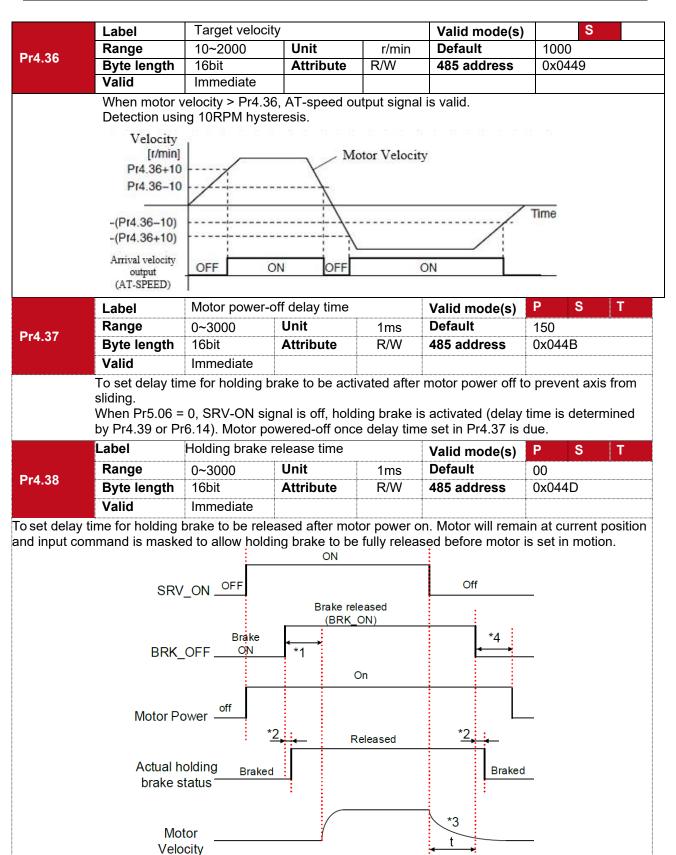
	Label	Analog input	3(AI-3) ove	rvolt	age	Valid mode(s)			Т		
		settings									
Pr4.30	Range	0~100	Unit		0.1V	Default	0				
	Byte length	16bit	Attribu	te	R/W	485 address	0x043	0x043D			
	Valid	Immediate									
					occur wher	n the input voltage	of AI3	is higher	r		
	than the voltag		rift correction complete r			Valid mode(s) P		<u> </u>		
	Range		Unit	ange	;	Default					
D=4.04	Range	0∼ 10000	Onit	Pr:	5.21 set uni	it	20				
Pr4.31	Byte length	16bit	Attribute	R/\	N	485 address	0x0	43F			
	Valid	Immediate		-				-			
	To set positio		nge of INID		sitioning co	 mpleted output sig	nal INI		.		
						range of deviatio		Toup	11		
						nmand unit (pulse)		oder uni	it		
	(pulse)										
	Label	Positioning	complete o	utpu	t setting	Valid mode(s)	Р		1		
	Range	0~4	Unit	•		Default	1		.1		
Pr4.32	Byte length	16bit	Attrib	ute	R/W	485 address	0x04	41			
	Valid	Immediate									
		ons for INP1	output signa	al to	be valid						
	Value		ng complete								
	0	Signal vali	d when the	posi	tion deviatio	on is smaller than	Pr4.31				
	1			e is	no position	command and po	sition d	eviation	is		
		smaller tha									
	2	Signal valid when there is no position command, zero-speed clamp									
		detection (ZSP) signal is ON and the positional deviation is smaller than Pr4.31									
	3		d when ther	e is	no position	command and po	sition d	eviation	is		
		smaller that OFF.	an Pr4.31. S	Signa	I ON when	within the time se	t in Pr4	.33 othe	rwise		
	4		e is no com	man	d, position	detection starts af	ter the	delay tin	ne set		
		in Pr4.33.									
				e is	no position	command and po	sitional	deviatio	n is		
	Label	smaller tha	ning delay ti	mo		Valid mode(s)	Р		1		
	Range	0~15000	Unit		1ms	Default	0		1		
Pr4.33	Byte length	16bit	Attrib	ute	R/W	485 address	0x04	43			
	Valid	Immediate	7.010		1.7.1	+00 uuur035	0,04	10			
	Valid when P		a oomelet	نم ای	anal —						
	Set value		g complete			ext position comm	and				
						set. Switch OFF		ceivina n	ext		
	1-15000	position co		., 01					-/		
	L										



	Label	Zero speed			Valid mode(s)	P S T
D=4.24	Range	1~2000	Unit	r/min	Default	50
Pr4.34	Byte length	16bit	Attribute	R/W	485 address	0x0445
	Valid	Immediate				
	To set threshold	d value for zero s	speed clamp of	detection.		
		mp detection (ZS	P) output sigi	nal valid wh	en motor speed g	joes under the value
	set in Pr4.34					
	•	e direction of ro	tation,		Speed	Positive direction
	valid for both				(RPM)	direction
		f 5RPM. Please	refer	(Pr4	.34+5) r/min 🛌 🗕 –	/
	to diagram on	the right side.				
						I
				¥-		
					(P	r4.34-5) r/min
					Nevetice	
				ł	Negative direction	
						i
			ZSF	′	ON	









	released or Bl on the holding *3: Deceleration whichever cor *4: Pr4.37 set	from the momer RK_ON signal is brake of the mo- on time is determ nes first. BRK_O time value.	given until a tor. ined by Pr6. FF given aft	ctual holdin 14 or if mo er decelera	tor speed goes be tion time.	ed. It is dependent						
	Label Holding brake activation speed Valid mode(s) P S T											
	Range	30~3000	Unit	r/min	Default	30						
Pr4.39	9 Byte length 16bit Attribute R/W 485 address 0x044F											
	Valid	Immediate										
	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 Pr4.39 and Pr6.14 is not yet reached, BRK_OFF is given. BRK_OFF signal is determined by Pr6.14 or if motor speed goes below Pr4.39, whichever comes first. Application: 1. After disabling axis, Pr6.14 has been reached but motor speed is still above Pr4.39, BRK_OFF signal given. 2. After disabling axis, Pr6.14 has not been reached but motor speed is below Pr4.39, BRK_OFF signal given. 2. After disabling axis, Pr6.14 has not been reached but motor speed is below Pr4.39, BRK_OFF signal given.											

	Label	Emergency sto	op function		Valid mode(s)	Ρ	S	Т		
	Range	0~1	Unit	—	Default	0				
Pr4.43	Byte length	h 16bit Attribute R/W 485 address					0x0457			
	Valid	Immediate								
	Value			Descri	ption.					
	[0]	Emergency sto occurs.	Emergency stop is valid, servo driver will be forced to STOP and Err570 occurs.							
	1	Emergency sto can be enable			er will not be forced is cleared.	d to STOP. Servo				



	Label	AO1 output					Valid mode(s)	P S T		
	Range	0~10		nit			Default			
Pr4.64	Byte length	16bit		tribute	R/W		485 address	0x0481		
	Valid	Immediate		lindute	1.0,00		400 address	0,0401		
	Value	Inneulate		Do	scrip	tion				
		Negative/Pos	aitiyoyy			lion				
	[0]	U								
	1	Absolute val	ue outp	out: 0~10∖	/					
	Other	Reserved								
	Label	AO1 signal					Valid mode(s)	P S T		
Pr4.65	Range	0x0~0x7FF	FFFFF		-		Default	0x4		
114.00	Byte length	16bit		Attribu		R/	485 address	0x0483		
	Valid	Immediate				W				
	Bit 0 – 15: AO		e; Bit 10	6 – 31: DO						
	Bit0~E	Bit15			Si	gna	l source			
	0>	(0	-							
	0>	<i>ر</i> 1	Moto	rotationa	Isnee) h	V/krnm)			
	0>						ity (V/krpm)			
								n)		
		(3					nd velocity (V/krpn			
	0>		Torque command (0.03V/0.01)							
	0>	(5	Position command deviation (mV/Command unit)							
	0>	(6	Position command deviation (mV/Encoder unit)							
	0>	۲ 7	Analog 1 (V/V)							
	0>	(8	Analog 2 (V/V)							
	0>	(9	Analog 3 (V/V)							
	0>	κA								
	0>		As pe	er Pr4.67						
	Bit 16 – 31: O		when A	O signal s	source					
	Bit16~	Bit31				Ch	annel			
	01	lh	Alarm	n output						
	02	2h		o ready						
	03	3h	Exter	nal brake	releas	sed				
	04	lh		oning cor						
				e refer to	Pr4.1	0 fo	r other signal chan			
	Label	AO1 amplifi	cation				Valid mode(s)	P S T		
Pr4.66	Range	-10000~100	00	Jnit	0.0	1	Default	100		
P14.00	Byte length	16bit		Attribute	R/\	N	485 address	0x0485		
	Valid	Immediate								
						out =	 amplification x the 			
	Label	AO1 commu					Valid mode(s)	P S T		
Pr4.67	Range	-10000~100		Jnit	mV		Default	0		
	Byte length	16bit	1	Attribute	R/\	N	485 address	0x0487		
	Valid	Immediate								
	Available wher									
	Label	AO1 offset					Valid mode(s)	P S T		
Pr4.68	Range	-10000~100		Jnit	mV		Default	0		
114.00	Byte length	16bit	1	Attribute	R/\	N	485 address	0x0489		
	Valid	Immediate								
	To set AO1 offs	not voluo								



3.2.6 [Class 5] Extension Settings

	Label	2 nd pulse coun	t per revoluti	on	Valid mode(s)	Ρ				
D-5 00	Range	0-67108864	Unit	PULS E	Default	10000	-			
Pr5.00	Byte length	32bit	Attribute	R/W	485 address	H: 0x05 L: 0x05				
	Valid	After restart								
	Switch between Pr0.08 and Pr5.00 with DI signal DIV1. When switch to Pr5.00: (1) Pr5.00 valid when ≠ 0:									
	Motor revolution = Input pulse count / [Pr5.00 set value]									
	(2) Pr5.00 invalid when = 0 :									
	Actual position pulse count is according to Pr5.01 and Pr5.02. Switching with DIV1 signal only valid when servo drive is re-enabled.									

	Label	2 nd Command freq divider/multiplier n			Valid mode(s)	Р	
Pr5.01	Range	1~1073741824	Unit	—	Default	1	
P15.01	Byte length	32bit	Attribute	R/	485 address	H: 0x0502	
				W		L: 0x0503	
	Valid	After restart					
	To set comma	nd pulse input freque	ency division	and i	multiplication nume	erator	
	Label	2 nd Command freq divider/multiplier d			Valid mode(s)	Р	
Dr5 02	Label Range				Valid mode(s) Default	P 1	
Pr5.02		divider/multiplier d	enominator	— R/	,	P 1 H: 0x0504	
Pr5.02	Range	divider/multiplier d 1~1073741824	enominator Unit		Default	1	
Pr5.02	Range	divider/multiplier d 1~1073741824	enominator Unit	R/	Default	1 H: 0x0504	
Pr5.02	Range Byte length Valid	divider/multiplier d 1~1073741824 32bit	enominator Unit Attribute	R/ W	Default 485 address	1 H: 0x0504 L: 0x0505	ase refer

	Label	Driver prohibition	n input settin	gs	Valid mode(s)	Ρ	S	Т
	Range	0/1/2	Unit	—	Default	0		
Pr5.04	Byte length	16bit	Attribute	R/W	485 address	0x050	09	
	Valid	Immediate						
	To set driver n	rohibition input (P	OT/NOT)					
	Value		Ι	Descriptio	n			
	0	POT → Positive	direction dri	ve prohibit	ed			
		NOT → Negative	e direction d	rive prohib	ited			
	1	POT and NOT ir	nvalid	•				
	2	Any single sided	input from F	POT or NC	T might cause Er2	60		



	Label	Servo-off mode			Valid mode(s)	Р	S	Т	
	Range	0~1	Unit		Default	0			
Pr5.06	Byte length	16bit	Attribute	R/W	485 address	0x05	0x050D		
	Valid	Immediate							
	To set servo d	river disable mod	e and status	5.	·				
	Value								
	value	Mode		S	tatus				
	0	Servo braking	D	ynamic bi	raking				
	1	Free stopping Dyna			braking				
	2	Dynamic braking	g D	namic b	raking				
	3	Servo braking	Fi	ee-run					
	4			ee-run					
	5	Dynamic braking	a Fr	ee-run					

Pr5.06 only effective for stopping under normal circumstances. For stopping on alarm occurrence but refer to Pr5.10

Range50~200UnitmsDefault50			
	50		
Pr5.09 Byte length 16bit Attribute R/W 485 address 0x051	13		
Valid Immediate			

To set delay time for detection of main power-off or low voltage supply.

	Lab	pel	Servo-off due to	o alarm m	ode		Valid mode(s)	P S T
D-5 40	Rar	nge	0~2	Unit		_	Default	0
Pr5.10	Byt	e length	16bit	Attribute	е	R/W	485 address	0x0515
	Val	id	After restart					
	Tos	set servo di	river disable mode and status if alarm is triggered.				s triggered.	
	Ala	rm type 2:						
		Value	Explanation					
		value	Mode		St	atus		
		0	Servo braking			/namic bi	U	
			Free stopping		Dynamic braking			
	2		Dynamic braking		Dynamic braking			
		3	Servo braking		Free-run			
		4	Free stopping		Free-run			
		5	Dynamic brakir	ng	Fr	ee-run		
	Ala	rm type 1:						
		Value	Explanation					
			Mode		St	atus		
		0	-					
		1	Dynamic braki	ng	Dy	/namic b	raking	
		2			_			
		3	Servo braking			ee-run		
		4	Free stopping			ee-run		
		5	Dynamic braki	ng	Fr	ee-run		



	Label	Servo braking t	orque setting		Valid mode(s)	Ρ	S	Т
D-5 44	Range	0~500	Unit	%	Default	0		
Pr5.11	Byte length	16bit	Attribute	R/W	485 address	0x05′	17	
	Valid	Immediate						
	lf Pr5.11 = 0, ι	limit for servo bra use torque limit a lat if Pr5.11 set v	is under norm		n. ency stop will take lo	onger.		

	Label	Overload level	setting		Valid mode(s)	Ρ	S	Т
Dre 40	Range	0~115	Unit	%	Default	0		
Pr5.12	Byte length	16bit	Attribute	R/W	485 address	0x05	19	
	Valid	Immediate						
		o 0, overload lev ler regular usage		verload le	vel will cause motor	to ove	erloadi	n

• Er100 occurs when driver output current higher than motor rated current (overload) Er101 occurs when driver output current lower than motor rated current

	Label	Overspeed leve	el settings		Valid mode(s)	Ρ	S	Т
Pr5.13	Range	0~10000	Unit	r/min	Default	0		
F15.15	Byte length	16bit	Attribute	R/W	485 address	0x051		
	Valid	Immediate						
	If motor speed exceeds Pr5.13, Er1A0 might occur. When Pr5.13 = 0, overspeed level = max. motor speed x 1.2							

	Label	I/O digital filter			Valid mode(s)	Ρ	S	Т
Pr5.15	Range	0~255	Unit	0.1ms	Default	0		
Pr5.15	Byte length	16bit	Attribute	R/W	485 address	0x051	١F	
	Valid	After restart						
	Digital filtaring	of I/O input Over	Iv lorgo volu	o oot will oo	una control dolou			

Digital filtering of I/O input. Overly large value set will cause control delay.

Lab	el	Counter clearing	g input mode		Valid mode(s)	Р
Ran	ige	0~4	Unit	_	Default	3
Byte length Valid		16bit	Attribute	R/W	485 address	0x0523
Vali	d	Immediate				
To s	set the clea	aring conditions for	or deviation c	ounter cle	earing input signal.	
	Value	Condition				
	0/2/4	Invalid				
	1	Always cle	ar			
	3	Clear only	once (Rising	edge trig	ger)	
	Ran Byte Vali	Valid To set the clear Value 0/2/4 1	Range 0~4 Byte length 16bit Valid Immediate To set the clearing conditions for Value Condition 0/2/4 Invalid 1 Always cleared	Range 0~4 Unit Byte length 16bit Attribute Valid Immediate To set the clearing conditions for deviation c Value Condition 0/2/4 Invalid 1 Always clear	Range 0~4 Unit Byte length 16bit Attribute R/W Valid Immediate Immediate To set the clearing conditions for deviation counter clearing Odd to the clearing Value Condition 0/2/4 Invalid 1 Always clear	Range 0~4 Unit — Default Byte length 16bit Attribute R/W 485 address Valid Immediate Immediate Immediate Immediate To set the clearing conditions for deviation counter clearing input signal. Value Condition 0/2/4 Invalid Invalid Immediate 1 Always clear Immediate Immediate



	Label		Positio	n unit sett	ings		Valid mode(s)	Ρ
	Range		0~2		Unit	_	Default	1
Pr5.20	Byte ler	ngth	16bit		Attribute	R/W	485 address	0x0529
	Valid		Immed	liate				
	Set unit	for po	sition rel	ated para	meters			•
		Valu	e	Unit				
		C)	Enco	oder unit			
		1		Com	mand unit			
		2)	0.00	01rev			
	Comma	nd uni	t: Pulse	from host	(Affected by	electroni	c gear ratio)	
					er (Related t			
	Pr5.20 d	can on	ly be mo	dified whe	en axis is dis	abled as	it will clear position	data

	Label	Torque limit sele	ction		Valid mode(s)	Р	S	Т
Pr5.21	Range	0~6	Unit	_	Default	0		
F13.21	Byte length	16bit	Attribute	R/W	485 address	0x052	2B	
	Valid	Immediate						

	Value	Limit
ľ	נכ	1 st torque limit Pr0.13
	1	2 nd torque limitPr5.22
2	TL-SEL OFF	Pr0.13
Z	TL-SEL ON	Pr5.22
3~	4	Reserved
	5	Pr0.13 →Positive torque limit Pr5.22 →Negative torque limit

	Label	2 nd torque limit			Valid mode(s)	Ρ	S	Т
	Range	0~500	Unit	%	Default	300		
Pr5.22	Byte length	16bit	Attribute	R/W	485 address	0x052	2D	
	Valid	Immediate						
					•	•		

Pr5.22 is limited by max. torque set in motor parameter.

	Label	Positive torque	warning three	shold	Valid mode(s)	Ρ	S	Т
D-5 00	RangeByte lengthValidDefault = 0, vIf actual torqueLabelRangeByte lengthValid	0~300	Unit	%	Default	0		
Pr5.23	Byte length	16bit	Attribute	R/W	485 address	0 0x052F		
	Valid	Immediate						
	Default = 0, w If actual torque	hich is 95%. Othe e higher than thre	er values only shold, TLC to	valid wher	n Pr5.21 = 5. signal will be valid			
	Label	Negative torque	e warning thre	eshold	Valid mode(s)	Ρ	S	Т
D=5.24	Range	0~300	Unit	%	Default	0		
Pr5.24	Byte length	16bit	Attribute	R/W	485 address	0x05	31	
	Valid	Immediate						
		hich is 95%. Othe e higher than thre			n Pr5.21 = 5. signal will be valid			



	Label		LED initial st		•4			d mode	(3)	P S
28	Rang		0~35		nit	_		ault		1
		length	16bit	A	ttribute	R/W	485	addres	S	0x0539
	Valid		Immediate							
	To se	et content	display on fr	ont pa	nel of the	e servo driv	ver at	servo (driver p	ower on.
			tatus	Value		Status		Value		Status
	0 Posit		Position deviation		Regene	rative load	rate	28	Soft	ware version
	1	Mot	or speed	15	Öve	erload rate		29	Inte	ernal usage
	2		on command eviation	16	Inerti	a load ratio	0	30		Encoder nmunication lure counts
	3		city control mmand	17		e(s) of nor otation)-	31	Accun	nulated uptime
	4	1	al feedback torque	18	No. of	I/O chang	es	32	Inte	ernal usage
	5	Feedbac	ck pulse sum	19	Internal usage		33	Drive	r temperature	
	6	Commar	nd pulse sum	20	Absolute	e encoder o	data	34	Se	ervo status
	7	Max	k. torque	21	Encod	er single tu data	ırn	35	Inte	ernal usage
	8		n command quency	22	Encoder	multiturn	data			
	9	Cont	rol mode	23	485 re	eceive fram	ne			
	10	I/C) status	24		der positio leviation	n			
	11	Analo	gue input	25	Inte	rnal usage	;			
	12	histo	n cause & ry record	26		rnal usage	;			
	13	Wai	ning ID	27	PI	Voltage				



	Label	RS485	comr	nunication mod	de	Valid mode(s)	P S T
	Range	0~255		Unit		Default	5
Pr5.29	Byte length	16bit		Attribute	R/W	485 address	0x053B
	Valid	After re	estart				
			255 it er restart Bit E C C E C C C E C It E S C It N 485 comm S it E 2400k 4800k 9600k 1920C e: 2400~3 485 axis ac 27 it er restart Connected d to set the S	1			
	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		
	Label	RS485	comr	nunication Bau	id rate	Valid mode(s)	P S T
	Range	0~15		Unit		Default	4
Pr5.30	Byte length	16bit		Attribute	R/W	485 address	0x053D
	Valid	-	etart		1	400 4441000	
	Vana	Alterne	,5tart				
	Value		Bau	d rata		•	Doud roto
	Value 0				Valu		Baud rate
	-						38400bps
				Jhne	5		57600bpa
	1				5		57600bps
	2		9600	Obps	5 6		57600bps 115200bps
	2 3	erance: 2	9600 1920	Obps O0bps	6	~115200bps±2	115200bps
	2 3 Baud rate tole	-	9600 1920 400~	Dbps D0bps 38400bps±0.	6	· · · · · · · · · · · · · · · · · · ·	115200bps
	2 3 Baud rate tole	RS485	9600 1920 400~	Dbps D0bps 38400bps±0. address	6	∼115200bps±2 Valid mode(s)	115200bps
Pr5.31	2 3 Baud rate tole Label Range	RS485 0~127	9600 1920 400~	Dbps D0bps 38400bps±0. address Unit	5%, 57600 	Valid mode(s) Default	115200bps % P S T 1
Pr5.31	2 3 Baud rate tole	RS485 0~127 16bit	9600 1920 400 axis	Dbps D0bps 38400bps±0. address	6	Valid mode(s)	115200bps % P S T
Pr5.31	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be	RS485 0~127 16bit After re er is con	9600 1920 400 axis axis estart necte	Dbps Dbps 38400bps±0. address Unit Attribute d to multiple at ne axis ID/addr	6 5%, 57600 — R/W kis and con ess.	Valid mode(s) Default	P S T 1 0x053F dentify the axis,
r5.31	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be	RS485 0~127 16bit After re er is con used to a max of	9600 1920 400 axis estart set th f 31 if	Dbps Dbps 38400bps±0. address Unit Attribute d to multiple at ne axis ID/addr	5%, 57600 	Valid mode(s) Default 485 address troller needs to id ween RS232 and	P S T 1 0x053F
	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range	RS485 0~127 16bit After re er is con used to a max of	9600 1920 400 axis estart sestart f 31 if omma	Dbps Dbps 38400bps±0. address Unit Attribute d to multiple at ne axis ID/addr the communic	5%, 57600	Valid mode(s) Default 485 address troller needs to id ween RS232 and	P S T 1 0x053F
	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length	RS485 0~127 16bit After re er is con e used to a max of Max. c 0~8000 16bit	9600 1920 400 axis axis estart necte set th f 31 if omma D	Dbps Dbps 38400bps±0. address Unit Attribute d to multiple at ne axis ID/addr the communicand pulse input	6 5%, 57600	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s)	P S T 1 0x053F dentify the axis, RS485
	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length Valid	RS485 0~127 16bit After re e ris con e used to a max of Max. c 0~8000 16bit Immed	9600 1920 400 axis a estart necte set th f 31 if omma 0 iate	Dbps Dbps	6 5%, 57600 5%, 57600 R/W kis and con ess. ation is bet frequency kHz R/W	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s) Default 485 address	115200bps P S T 1 0x053F omega omega dentify the axis, model 1RS485 P 4100 0x0541
	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length Valid Please set the	RS485 0~127 16bit After re e ris con a max of Max. co 0~8000 16bit Immed e max. fro	9600 1920 400 axis a estart necte set th f 31 if omma 0 iate equer	Dbps Dbps	kis and coness. ation is bett frequency kHz R/W	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s) Default	115200bps P S T 1 0x053F dentify the axis, RS485 P 4100 0x0541
	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length Valid Please set the command pulse	RS485 0~127 16bit After re e used to a max of Max. co 0~8000 16bit Immed e max. fro se input	9600 1920 400 axis axis set tr f 31 if omma o iate equer freque	Dbps Dbps Dbps 38400bps±0. address Unit Attribute d to multiple at the communica and pulse input Unit Attribute cy required for ency exceeds f	kis and coness. ation is bett frequency kHz R/W	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s) Default 485 address pulse input. Er11	115200bps P S T 1 0x053F dentify the axis, I RS485 P 4100 0x0541 30 will occur, if I
Pr5.32	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length Valid Please set the command pulse	RS485 0~127 16bit After re er is con e used to a max of Max. c 0~8000 16bit Immed e max. fr se input	9600 1920 400 axis axis set tr f 31 if omma o iate equer freque	Dbps Dbps	kis and coness. ation is bett frequency kHz R/W	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s) Default 485 address pulse input. Er11 Valid mode(s)	115200bps P S T 1 0x053F dentify the axis, 1RS485 P 4100 0x0541 30 will occur, if
Pr5.31 Pr5.32 Pr5.35	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length Valid Please set the command pulse Label Range	RS485 0~127 16bit After re er is con a max of Max. cr 0~8000 16bit Immed e max. fro se input Front p 0~1	9600 1920 400 axis axis set tr f 31 if omma o iate equer freque	Dbps Dbps	6 5%, 57600 5%, 57600 R/W kis and con ess. ation is bet frequency kHz R/W • command • r5.32. • — — — — — — — — — — — — — — — — — — —	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s) Default 485 address pulse input. Er11 Valid mode(s) Default Valid mode(s)	115200bps P S T 1 0x053F dentify the axis, dentify the axis, 1 0x053F 9 4100 0x0541 30 will occur, if 0
Pr5.32	2 3 Baud rate tole Label Range Byte length Valid When controll Pr5.31 can be Please set to Label Range Byte length Valid Please set the command pulse	RS485 0~127 16bit After re er is con e used to a max of Max. c 0~8000 16bit Immed e max. fr se input	9600 1920 400 axis a estart necte set th f 31 if omma o iate equer freque	Dbps Dbps	6 5%, 57600 5%, 57600 6 5%, 57600 kis and con ess. ation is bet frequency kHz R/W command Pr5.32.	Valid mode(s) Default 485 address troller needs to id ween RS232 and Valid mode(s) Default 485 address pulse input. Er11 Valid mode(s)	115200bps P S T 1 0x053F dentify the axis, 1RS485 P 4100 0x0541 30 will occur, if



	Label	Torque saturati	on alarm dete	ection	Valid mode(s)	P S T
		time	I			
Pr5.37	Range	0~5000	Unit	ms	Default	500
	Byte length	16bit	Attribut	e R/W	485 address	0x0549
	Valid	Immediate				
					under torque homi	
	Under homing signal will be v		que exceeds	limit and th	ne time set in Pr5.	37, TLC output
	Label	Frequency divi polarity	der output – 2	Z-signal	Valid mode(s)	P S T
Pr5.42	Range	0~7	Unit	—	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0555
	Valid	Disabled				
	Bit	Polarity		Des	scription	
		0 = Positive	Z polarity se		equency divider ou	utput and
	Bit0	1 = Negative	position cor	0	squorio, annaor oc	ip at and
		0 = Positive			comparison.	
	Bit1				phase A frequency	v divider
		1 = Negative	as position	•		,
					comparison.	
	Bit2	0 = Positive	Polarity set	ting when	phase B frequency	y divider
			as position	compariso	n output	
	Label	Frequency divi width		Z-signal	Valid mode(s)	P S T
Pr5.43	Range	0~500	Unit µs		Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x0557
	Valid	After restart				
	Value		Descr	iption		
	【0】	Z bandwidth equ	ivalent to 1 c	ycle of A/E	3	
	1~500	Delay setting on	top of A/B cy	cle width		
	When Pr5.43	= 0, width of freq	uency divider	output Z-s	signal is equivaler	nt to width of 1 cycle
	of A/B, value s	set in Pr5.43 + A	B cycle width	n = delay s	etting.	-
		—		7 :	!	
	Α					
	A				1	
		i			i	
		i		— j	i	
	В					
	D					
		Ĭ				
	Z			, ,	-i	
	۷		A/B cyc	le		
		i .				
		i ←				
		i			▶	
				DE	10	
				Pr5	. 43	



	Label	Frequency divid	der output so	urce	Valid mode(s)	Ρ	S	Т
Pr5.44	Range	0~4	Unit		Default	0		
P15.44	Byte length	16bit	bit Attribute R/W 485 address					
	Valid	After restart						
		•	•	•	•			
	Value			ription				
	【0】	Position feedbac	ck of encode	*#1(motor	encoder)			
	1	Reserved						
	2	Reserved						
	3	Pulse input com position compar						
	4	Frequency divid	er output pro	hibited				

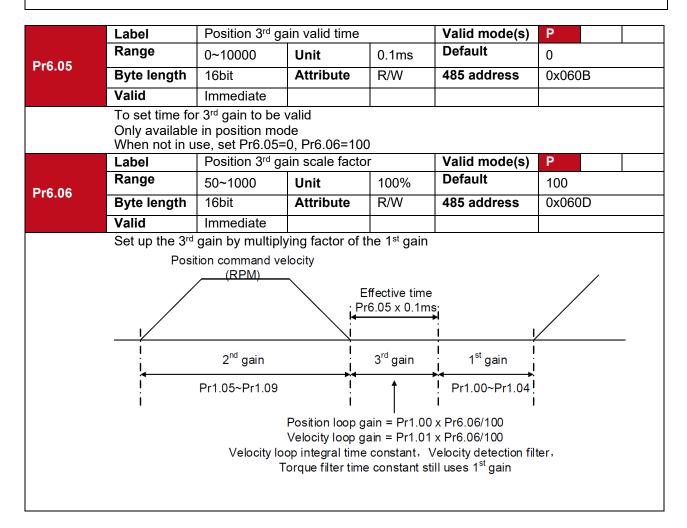
	Label	Vent overload I	evel		Valid mode(s)	Ρ	S	Т	
DrE 46	Range	0~115	Unit	%	Default	0			
Pr5.46	Byte length	16bit	Attribute	R/W	485 address	0x05			
	Valid	After restart							
	Value		Desc	ription					
	【0】	Default level: 80	%						
	1~115	Set vent overloa	Set vent overload level accordingly						



3.2.7 [Class 6] Other settings

	Label	Encoder zer	o position co	mpensation	Valid mode(s)	Р	S	Т
Pr6.01	Range	0~360	Unit	Electrical angel	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x060)3	
	Valid	Power-off						
	Zero position	compensation	for encoder	zero drift to av	void abnormality d	lue to z	ero dr	ift.

	Label	JOG trial run t	orque comma	ind	Valid mode(s)			Т
D#C 02	Range	0~350	Unit	%	Default	350		
Pr6.03	Byte length	16bit	Attribute	R/W	485 address	0x060)7	
	Valid	Immediate						
	To set torque	for JOG trial ru	n command.					
	Label	JOG trial run y	elocity comm	and	Valid mode(s)	Р	S	
	Labol		· · · · · · · · · · · · · · · · · · ·	unu	Valia moac(5)	-	Ŭ	
Dr6 04	Range	0~10000	Unit	r/min	Default	30	Ŭ	
Pr6.04			, , , , , , , , , , , , , , , , , , ,	1		-		
Pr6.04	Range	0~10000	Unit	r/min	Default	30		





Above diagram is illustrated using Pr1.15 = 7. 3^{rd} gain= 1^{st} gain * Pr6.06/100 Only effective under position control mode. 3^{rd} gain valid when Pr6.05 \neq 0. Set 3^{rd} gain value in Pr6.06. When 2^{nd} gain switches to 1^{st} gain, it will go through 3^{rd} , switching time is set in Pr1.19.

	Label	Torque comma	nd additiona	l value	Valid mode(s)	Р	S	Т
D-0.07	Range	-100~100	Unit	%	Default	0		
Pr6.07	Byte length	16bit	Attribute	R/W	485 address	0x060F		
	Valid	Immediate						
	Applicable for Application: W stop the load a	at that particular	xis, compena long vertical point with mo	sate consta axis, pick otor enable		Record	outpu	t

	Label	Positive direction v			Valid mode(s)	Ρ	S	Т				
Pr6.08	Range	-100~100	Unit	%	Default	0						
	Byte length	16bit	Attribute	R/W	485 address	0x06	0x0611					
	Valid	Immediate										
	Label	Negative direct			Valid mode(s)	Ρ	S	Т				
Pr6.09	Range	-100~100	Unit	%	Default	0						
	Byte length	16bit	Attribute	R/W	485 address	0x0613						
	Valid	Immediate										
	values can be Applications: 1. When moto Torque value	set according to r is at constant s	needs for bo peed, d04 wi on = T1;	oth rotatio	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;							

 $Pr6.08/Pr6.09 = T_f = \frac{|T1 - T2|}{2}$

Positive/Negative compensation corresponds to actual position feedback. Positive torque compensation value = $+(Pr6.08=+T_f)$ Negative torque compensation value = $-(Pr6.08=+T_f)$ Pr6.08 = x, Pr6.09=y; friction compensation value = |x-y|/2

	Label	Current response	se settings		Valid mode(s)	Ρ	S	Т
D+C 44	Range	50~100	Unit	%	Default	100		
Pr6.11	Byte length	16bit	Attribute	R/W	485 address	0x061	7	
	Valid	Immediate						
	To set driver o	urrent loop relate	ed effective v	alue ratio.				



	Label	Max. time to sto	op after disab	oling	Valid mode(s)	P S T
D-0 44	Range	0~1000	Unit	ms	Default	500
Pr6.14	Byte length	16bit	Attribute	R/W	485 address	0x061D
	Valid	Immediate				
	After disabling reached, BRK BRK_ON give whichever com Applications: 1. After disabli reached, BRK 2. After disabli is not yet reac	axis, if motor sp _ON given and h n time is determi nes first. ng axis, if motor _ON given and h ng axis, if motor hed, BRK_ON gi e will be provide	eed is still hig olding brake ned by Pr6.1 speed is still olding brake speed is alre ven and hold	higher than P activated. 4 or when r higher than activated. ady lower t ing brake a	Pr4.39 but the time motor speed goes n Pr4.39 but the tin than Pr4.39 but the	below Pr4.39, ne set in Pr6.14 is e time set in Pr6.14

	Label	Trial run distan	се		Valid mode(s)	Ρ
Pr6.20	Range	0~1200	Unit	0.1rev	Default	10
F10.20	Byte length	16bit	Attribute	R/W	485 address	0x0629
	Valid	Immediate				
	JOG (Position	control) : Distan	ce travel of e	each motio	n.	•
	Label	Trial run waiting	g time		Valid mode(s)	Р
Pr6.21	Range	0~10000	Unit	ms	Default	300
Pro.21	Byte length	16bit	Attribute	R/W	485 address	0x062B
	Valid	Immediate				
	JOG (Position	control) : Waitin	g time interva	al after eac	h motion cycle	
	Label	No. of trial run	cycles		Valid mode(s)	Р
	Range	0~10000	Unit	—	Default	5
Pr6.22	Byte length	16bit	Attribute	R/W	485 address	0x062D
	Valid	Immediate				
		control) : No. of trial run goes int		cles.		1
	Label	Trial run accele	eration		Valid mode(s)	P S
DrfC 25	Range	0~10000	Unit	ms	Default	200
Pr6.25	Byte length	16bit	Attribute	R/W	485 address	0x0633
	Valid	Immediate				
	To set the acc	eleration/deceler	ration time fo	r JOG con	nmand between 0 r	pm to 1000 rpm



	Label	Observer goin			Valid mode/a	B) P S
	Label Range	Observer gair	Unit	%	Valid mode(s	,
Pr6.28	Byte length	0~32767 16bit	Attribute	% R/W	485 address	0 0x0639
			Allribule	R/VV	405 aduress	0x0039
	Valid	Immediate				
		able gain 1:OF Manual, related		d and er	coder	
	Label	Observer filter			Valid mode(s) P S
	Range	0~32767	Unit	μs	Default	0
Pr6.29	Byte length	16bit	Attribute	R/W	485 address	0x063B
	Valid	Immediate				
		able observer fil Manual, related		ad and er	ncoder	
	Label	Blocked rotor threshold	alarm torque		Valid mode(s	e) P S
Pr6.56	Range	0~300	Unit	%	Default	300
	Byte length	16bit	Attribute	R/W	485 address	0x0671
	Valid	Immediate				
	If motor speed	us iuipini or ac		vonitueit		
	Label	Blocked rotor			Valid mode(s) P S
Dr6 57	Range	Blocked rotor 1~10000	alarm delay t Unit	ime ms	Valid mode(s Default	400
Pr6.57	Range Byte length	Blocked rotor 1~10000 16bit	alarm delay t	ime	Valid mode(s	,
Pr6.57	Range Byte length Valid	Blocked rotor 1~10000 16bit Immediate	alarm delay t Unit Attribute	ime ms R/W	Valid mode(s Default 485 address	400 0x0673
Pr6.57	RangeByte lengthValidTo set delay tset time in PréBlocked rotor400ms; speed	Blocked rotor 1~10000 16bit Immediate ime for blocked 5.57.	alarm delay t Unit Attribute rotor alarm. I red by default prpm; Torque d block	ime ms R/W Err102 w , alarm to	Valid mode(s Default 485 address on't be triggered orque threshold =	400
Pr6.57	Range Byte length Valid To set delay t set time in Pro Blocked rotor 400ms; speed	Blocked rotor 1~10000 16bit Immediate ime for blocked 5.57. alarm is activat d threshold = 10 Torque (%) Torque durin	alarm delay t Unit Attribute rotor alarm. I red by default prpm; Torque d block	ime ms R/W Err102 w , alarm to	Valid mode(s Default 485 address on't be triggered orque threshold =	400 0x0673 if time doesn't excee 300%, delay time = Diagram shows locked rotor with



	Label	Absolute multitu	urn data upp	er limit	Valid mode(s)	Ρ	S	Т
Pr6.63	Range	0~32766	Unit	rev	Default	0		
110.00	Byte length	16bit	Attribute	R/W	485 address	0x067	7F	
	Valid	After restart						
	encoder resol			•	cycles between 0 r limit.	and (Pi	6.63+1) x

3.2.8 [Class 7] Factory settings

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

	Label	Motor model		<u> </u>	Valid mode(s)		Т			
	Range	0x0~0x7FFF	Unit	_	Default	0x200				
Pr7.15	Byte length	16bit	Attribute	R/W	485 address	0x071F				
	Valid	After restart								
	Value		Ī	Description	า					
	0x100	Read from EE	PROM							
	[0x200]	Read from End	coder							
	When Pr7.15	= 0x200(2xx):								
	Parameter	Label								
	Pr7.00	Current loop g								
	Pr7.01		loop integral time							
	Pr7.05	No. of motor p								
	Pr7.06	Motor phase re								
	Pr7.07	Motor D/Q ind								
	Pr7.08	Motor back EN		t						
	Pr7.09	Motor torque o								
	Pr7.10	Motor rated ro								
	Pr7.11	Motor max. rol		d						
	Pr7.12	Motor rated cu								
	Pr7.13	Motor rotor ine								
	Pr7.14	Driver power r	ating							
	Pr7.16	Encoder								
	Pr7.17	Motor max. cu		anastian						
	Pr7.18	Encoder index	angle comp	ensation			-			
	Label	Encoder		1	Valid mode(s)	P S	T			
Pr7.16	Range	0x0~0x200	Unit	—	Default	编码器决定				
117.10	Byte length	16bit	Attribute R/W 485 address 0x0721							
	Valid	After restart								
	To select enco	To select encoder type. Typically, encoder specifications are automatically read.								
	0x0	17-bit enco	Z-bit encoder							
	0x7	23-bit enco								



3.2.9 [Class B] Status Parameters

	Label	Software vers	ion 1 (DSP)		Valid mode(s)	Р	S	Т
PrB.00	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	00	
	Show DSP so	ftware version i	are version info.					
	Label	Software vers	ion 2 (CPLD)	Valid mode(s)	Р	S	Т
PrB.01	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	01	
	Show softwar	e version info.						
	Label	Software vers	ion 3 (Others	s)	Valid mode(s)	Р	S	Т
PrB.02	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	02	
	Show softwar	e version info.						

	Label	Current alarm			Valid mode(s)	Р	S	Т
PrB.03	Range	/	Unit	1	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	03	
	Show current	alarm	•					

	· J ·	Motor not rotating cause			Valid mode(s)	Р	S	Т
PrB.04	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0		
	Show cause of	of motor not rota	ting	•				

	Label	Driver opera	tion status		Valid mode(s)	P	S	Т
PrB.05	Range	/	Unit	/	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0)5	
	Bit	Status	Description					
	0	RDY	Servo is read	dy				
	1	RUN	Servo is runi					
	2	ERR	Driver error					
	3	HOME_OK	Homing com	pleted				
	4	INP	In position					
	5	AT-SPEED	Velocity reac	hed				
	6~15		Reserved					

	Label	Motor speed (Before filter)		Valid mode(s)	Ρ	S	Т
PrB.06	Range	/	Unit	rpm	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	06	
	Motor actual s							



	Label	Motor torque			Valid mode(s)	Р	S	Т		
PrB.07	Range	/	Unit	%	Default	/				
	Byte length	16bit	Attribute	R	485 address	0x0B0)7			
	The percentage of motor actual torque and rated torque									

	Label	Motor current			Valid mode(s)	Р	S	Т
PrB.08	Range	1	Unit	0.01A	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0	28	
	Motor actual of	current						

	Label	Motor speed (A	After filter)		Valid mode(s)	Р	S	Т	
PrB.09	Range	/	Unit	rpm	Default	/			
	Byte length	16bit	Attribute	R	485 address	0x0B0	09		
	Motor speed after motor actual speed filtering								

	Label DC bus volt				Valid mode(s)	Р	S	Т
PrB.10	Range	1	Unit	V	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0	DA	
	Driver DC bus	s actual voltage						

	Label	Driver tempera	ature		Valid mode(s)	Ρ	S	Т
PrB.11	Range	1	Unit	°C	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0	ЭB	
	Actual driver t							

	Label	External analo	og 1		Valid mode(s)	Р	S	Т
PrB.12	Range	/	Unit	0.01V	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0	C	
Driver analog input 1								

	Label	External analo	og 2		Valid mode(s)	Р	S	Т
PrB.13	Range	/	Unit	0.01V	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	0D	
	Driver analog	input 2						

	Label	External analo	og 3		Valid mode(s)	Р	S	Т
PrB.14	Range	1	Unit	0.01V	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B0	0E	
	Driver analog	input 3						

	Label	Motor overload	d rate		Valid mode(s)	Р	S	Т
PrB.15	Range	1	Unit	%	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B()F	
	Motor overloa	id rate						

	Label	Vent overload	rate		Valid mode(s)	Ρ	S	Т
PrB.16	Range	/	Unit	%	Default	/		
	Byte length	16bit	Attribute	R	485 address	0x0B	10	
	Vent overload	l rate						



	Label	,		Valid mode(s)	Ρ	Т				
PrB.17	Range	/	Unit	/	Default	/				
	Byte length	16bit	Attribute	R	485 address	0x0B0)4			
	Driver physica	al I/O input bit0 o	corresponds t	o DI1, bit1 t	to DI2 and so on;					
	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									

	Label	Cause of moto	Cause of motor not rotating			Р	S	Т
PrB.18	Range	/ Unit /			Default	/		
	Byte length	16bit	16bit Attribute R			0x0B04		
	Driver physica	al I/O output bit0	corresponds	to DO1, bi	t1 to DO2 and so	on;		
	Bitn=1, DOn+	1 high level sign	nal output; Bit	n=0 indicat	es DOn+1 low lev	el signa	al outpu	ut

	Label	Command posit	tion (Comma	nd unit)	Valid mode(s)	Р
PrB.20	Range	1	Unit	Р	Default	/
	Byte length	32bit	Attribute	R	485 address	H: 0x0B14
						L: 0x0B15
	Driver receives command pulse count. Driver command unit: 10000 pulses/rev, Enco unit: 8388608 pulses/rev. If driver receives 8388608 pulses, 10000P will be shown.					

	Label	Motor position (Command u	nit)	Valid mode(s)	P		
PrB.21	Range	/	Unit	Р	Default	1		
	Byte length	32bit	Attribute	R	485 address	H: 0x0B16		
						L: 0x0B17		
	Motor position	position feedback. Driver command unit: 10000 pulses/rev, Encoder unit: 838860						
	pulses/rev. If o	driver receives 83	388608 pulse	s, 10000P	will be shown.			

	Label	Position deviation (Command unit)			Valid mode(s)	Р		
PrB.22	Range	1	Unit	Р	Default	/		
110.22	Byte length	32bit	Attribute	R	485 address	H: 0x0B18		
						L: 0x0E	319	
	Shows positio	n deviation. Plea	se refer to P	B.20.				

	Label	Command position (Encoder unit)			Valid mode(s)	Ρ		
PrB.23	Range	1	Unit	Р	Default /			
110.20	Byte length	32bit	Attribute	R	485 address	H: 0x0		
						L: 0x0	B1B	
	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.							
	unit. 0388608	puises/rev. If any	ver receives	roooo puis	es, osocous puise	es will be	e snow	п.

	Label	Motor position (Encoder unit	t)	Valid mode(s)	Р		
PrB.24	Range	1	Unit	Р	Default	1		
110.24	Byte length	32bit	Attribute	R	485 address	H: 0x0B1C		
						L: 0x0B1D		
	Driver receives motor encoder feedback pulses							

	Label	Position deviation	on (Encoder	unit)	Valid mode(s)	Р			
PrB.25	Range	/	Unit	Р	Default	1			
110.20	Byte length	32bit	Attribute	R	485 address	H: 0x0B1E			
						L: 0x0B1F			
	Shows position deviation. Please refer to PrB.23.								



	Label	Rotational enco (Command unit	•	feedback	Valid mode(s)	Р	
PrB.26	Range	/	/ Unit P			1	
	Byte length	32bit	32bit Attribute R			H: 0x0 L: 0x0	
	Motor position	n under rotary mo	de. Please r	efer to PrB.	21		

3.2.10 [Class 8] PR control parameters

	Label	PR Control			Valid mode(s)	PR			
Pr8.00	Range	0 ~ 65535	Unit	/	Default	0			
	Byte length	16bit	Attribute	R/W	485 address	0X6000			
	It is recommended to modify PR control parameters using Motion Studio.								
	Bit	3	2	1		0			
	Description	=1, absolute value memory =0, absolute value with no memory	=1, homing upon powe =0, no hom upon powe	r on lim ing =0	, software position hit valid , software position hit not valid	=0, CTRG rising edge trigger =1, double edges trigger			
	with no memory upon power on limit not valid trigger If parameter modifications are done through the front panel or parameters list, please keep i 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, 111 = 15, Pr8.00 is to be set to 15.								

	Labe	el	Path count				Valid mode(s)	PR			
Pr8.01	Rang	je	16		Unit	/	Default	16			
	Byte	length	16bit		Attribute	R	485 address	0X6001			
	16 pa	aths									
	Labe	el	Control Ope	ratio	n		Valid mode(s)	PR			
Pr8.02	Rang	ge	0x0 ~ 0xFF	FF	Unit	/	Default	0x0			
	Byte	length	16bit		Attribute	R/W	485 address	0X6002			
	pain.	Attribute	efer to the fol		cription						
						Read/W	/rite. P refers to pos	itioning motion of N			
		Write	0x01P		ath positionir	σ					
		Write	0x020	Res	•	δ					
		Write	0x021	Mai	nually set cur	rently pos	ition as 0 (Origin)				
		Write	0x040		ergency stop	, ,					
		Read	0x000P	Pos	itioning comp	leted. Rea	ady to receive new da	ita			
		Read	0x01P,								
			0x020, 0x040	Yet to respond to command							
		Read	0x10P	Patl	h motion und	ergoing					
		Read	0x200	Con	nmand comp	eted. Wai	ting for positioning				



	Label	Valid mode(s)	PR			
Pr8.06	Range	0~ 65535	Unit	Pulse	Default	0
	Byte length	16bit	16bit Attribute R/W			0X6006
	High bit of sof	tware positive lim	iit; (Only val	lid using 48	5 communication))

	Label	Software positiv	e limit (L)		Valid mode(s)	PR				
Pr8.07	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 Pr8.06 When software positive limit = 994817, 0x000F2E01(Hexadecimal) high16bit = 0x000F, hence Pr8.05 reading = 0x000F, controller = 15. R/W of high/low bit data is similar when using 485 communication.									
	Label	Software negative		0	Valid mode(s)	PR				
Pr8.08	Range	0~ 0x65535 l	Jnit	Pulse	Default	0				
	Byte length	16bit 🖌	Attribute	R/W	485 address	0X6008				
	High bit of sof	tware negative lin	nit; (Only va	lid using 4	85 communicatior	ı)				
	Label	Software negative	ve limit (L)		Valid mode(s)	PR				
Pr8.09	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 Pr8.08.									

	Label	Homing mode			Valid mode(s)	PR
Pr8.10	Range	0~ 0xFFFF	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0X600A
	To set homing using Motion \$	•	node. It is rec	commended	l to modify PR co	ntrol parameters
	Bit	8 (Z-signal 2-7 (Homing mo homing)		ing mode)	1 (Specific pos after homing)	ition 0 (Homing direction)
	Description	=1, homing with Z-signal =0, homing without Z-signal	=1 Origin homing =2 Single turn Z		=1, Yes =0, No	=1, Forward =0, Reverse
	Label	Zero position F	1		Valid mode(s)	PR
Pr8.11	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0X600B
	High bit of zer	o position; (On	ly valid using	485 commu	unication)	•



Pr8.12	Range Byte length	-2147483648~ 2147483647			Valid mode(s) Default	
	Byte length	2147483647		n	Delault	0
	Byte length		Unit	р		-
		32bit	Attribute	R/W	485 address	0X600C
	To set zero po					
1		munication, only			t.	
	R/W high 16 b	it needs to be re Home position		gh Pr8.11.	Valid mode(s)	PR
	Range	0 ~ 65535		,	Default	
	-		Unit	/ 8 R/W		0
	Byte length	16bit	Attribute		485 address	0X600D
	-			d using 48	5 communication)	
	Label	Home position	offset (L)		Valid mode(s)	PR
Pr8.14	Range	-2147483648~ 2147483647	Unit	р	Default	0
	Byte length	32bit	Attribute	R/W	485 address	0X600E
	To set home p					
		nmunication, only it needs to be re			t.	
	Label	High homing ve		<u>, , , , , , , , , , , , , , , , , , , </u>	Valid mode(s)	PR
	Range	1 ~ 6000	Unit	rpm	Default	200
	Byte length	16bit	Attribute	R/W	485 address	0X600F
		ming velocity in				0/10001
	<u> </u>	<u> </u>				DD
	Label	Low homing ve	1		Valid mode(s) Default	PR
110.10	Range	1 ~ 6000	Unit	rpm		50
	Byte length	16bit	Attribute	R/W	485 address	0X6010
		ning velocity in F				
	Label	Homing acceler	ration		Valid mode(s)	PR
Pr8.17	Range	1 ~ 32767	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0X6011
	To set homing 1000rpm	acceleration tim	e in PR mod	le, time nee	eded for 0rpm to a	ccelerate to
	Label	Homing decele	ration		Valid mode(s)	PR
	Range	-	Unit	ms/Krpm	Default	100
	Byte length		Attribute	R/W	485 address	0X6012
	To set homing 0rpm	deceleration tim	e in PR mod	le, time ne	eded for 1000rpm	to decelerate to
	Label	Homing torque	holding time	9	Valid mode(s)	PR
	Range		Unit	ms	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0X6013
	To set homing	torque holding t	ime		-	•
	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				

	Label	Homing overtra	vel alarm rar	ige	Valid mode(s)	PR
Pr8.21	Range	0 ~ 65535	Unit	0.1r	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0X6015
	To set homing	overtravel alarm	threshold.			



	Label	Emergency st	op at limit de	celeration	Valid mode(s)	PR				
Pr8.22	Range	1 ~ 32767	Unit	ms/Krpm	Default	10				
	Byte length	16bit	Attribute	R/W	485 address	0X6016				
	To set position limit emergency stop deceleration.									
	Label	STP emergen	cy stop dece	leration	Valid mode(s)	PR				
Pr8.23	Range	1 ~ 32767	Unit	ms/Krpm	Default	50				
	Byte length	16bit	Attribute	R/W	485 address	0X6017				

	Label		I/O co	mbinatio	on tr	igger mod	е	Valid mode(s)	PR		
Pr8.26	Range		0~65	535	ι	Jnit	1	Default	0		
	Byte len	gth	16bit		4	Attribute	R/W	485 address	0X601A		
	Value	Desc	ription								
	[0]		-					CTRG signal edge tr			
	1		-					1E-OK signal is valid			
	2							not required.			
	IO comb	inatio	ation trigger select path using ADD0~ADD3. Trigger mode is set in Pr8.26.								
	ADD3	AD	D2	ADD1		ADD0	Path sele	ection			
	OFF	OF	F	OFF		OFF	Path 0 (N	lon-action)			
	OFF	OF	F	OFF		ON	Path1				
	OFF	OF	F	ON		OFF	Path2				
	OFF	OF	F	ON		ON	Path3				
	OFF	ON		OFF		OFF	Path4				
	OFF	ON		OFF		ON	Path5				
	OFF	ON		ON		OFF	Path6				
	OFF	ON	N ON			ON	Path7				
	ON	OF	F	OFF		OFF	Path8				
	ON	OF	F	OFF		ON	Path9				
	ON	OF		ON		OFF	Path10				
	ON	OF		ON		ON	Path11				
	ON	ON		OFF		OFF	Path12				
	ON	ON		OFF		ON	Path13				
	ON	ON		ON		OFF	Path14				
	ON	ON		ON		ON	Path15				
	Label			mbinatio			1	Valid mode(s)	PR		
Pr8.27	Range		0~65	535	Ur		ms	Default	5		
	Byte len		16bit			tribute	R/W	485 address	0X601B		
	To set I/	O con	nbinatio	n filter ti	me.						



	Label	S-0	code curre	nt output	value		Va	alid mode(s)	Р
Pr8.28	Range		05505	11			D	efault		R
			65535	Unit		/			0	
	Byte lengt	: h 16	bit	Attribu	ite	R/W	48	35 address	0	X601C
-code(Sta -code settir	atus code)is ng.	the S-c	ode of curr	ently ope	erating	PR pos	sitionin	g data. Eve	ry PR	path has a
S-code	Sx.H			Sx.L						
Bit	15		8-14	7			0-6			
Description	n S-code vali	d when	S-code up	on S-co	ode va	lid	S-code	upon		
	completed		completio	on upo	n acti	vation	activat	tion		
	0: Invalid, r			0: Ir	nvalid					
	previous va	alue		1: V	alid					
	1: Valid									
equence di	lagram					\frown				
			$\left \right\rangle_{\text{PR1}}$	Pause		/	!			
					i	$/ PR2$ \				
			/	<u> </u>		/	¥,			
			L				l t			
		Trigg	er	i						
		_					+	-		
		S-coo			S1.H	S2. L	S2. H			
		Valid	upon enab	ling and c	comple	tion of	S1 and	S2		
				S1. L	,					
							S2. H			
		I	alid when	S1 enable		S2 comp				
-code bit	bit0/8 b	it1/9	alid when bit2/10	S1 enable	d and	S2 comp bit4/12		J	5/14	7
			-		d and 1		leted	J	-	-
		it1/9	bit2/10	bit3/1:	d and 1	bit4/12	leted	/13Bit€	-	
Dx		it1/9 D1	bit2/10	bit3/1:	d and 1	bit4/12	leted	/13Bit€	5	P
Dx	SDO SI	it1/9 D1	bit2/10 SD2	bit3/1: SD3	d and 1	bit4/12 SD4	bit5	J Bite SDS alid mode(s)	P R
	SDO SI	it1/9 D1 PR	bit2/10 SD2 warning 0~0x20F	bit3/1:	d and 1	bit4/12	leted bit5	J J13 Bitt SD5	s)	
Dx	SDO SI	it1/9 D1 PR	bit2/10 SD2 warning D~0x20F bit	bit3/1: SD3	d and 1	bit4/12 SD4	leted bit5	/13 Bit(SDS alid mode(efault	s)	R
Dx	Label Range Byte lengt	it1/9 D1 PR 0xi h 16 Warn	bit2/10 SD2 warning D~0x20F bit	bit3/11 SD3 Unit Attrib	d and 1 Dute	bit4/12 SD4	leted bit5	/13 Bit(SDS alid mode(efault	s)	R
Dx	SD0 SI Label Range Byte lengt Address	it1/9 D1 PR 0xi h 16 Warn Reset	bit2/10 SD2 warning 0~0x20F bit ing	bit3/1: SD3 Unit Attrib	d and 1 Dute natica	bit4/12 SD4 / R/W	leted bit5	/13 Bit(SDS alid mode(efault	s)	R
Dx	SDO SI Label Range Byte lengt Address 0	it1/9 D1 PR 0xt ih 16 Warn Reset Positi	bit2/10 SD2 warning 0~0x20F bit ing new comm on limit erro	bit3/1: SD3 Unit Attrib and auton or during h	d and 1 Dute matica	bit4/12 SD4 / R/W Ily	leted bit5	/13 Bit(SDS alid mode(efault	s)	R
Dx	SD0 SI Label Range Byte lengt Address 0 0x100	it1/9 D1 PR 0xi b 16 Warn Reset Positi Emera	bit2/10 SD2 warning D~0x20F bit ing new comm	bit3/1: SD3 Unit Attrib and auton or during h Homing n	d and 1 Dute matica	bit4/12 SD4 / R/W Ily	leted bit5	/13 Bit(SDS alid mode(efault	s)	R
δDx	SD0 SI Label Range Byte lengt Address 0 0x100 0x101	h 16 Varn Reset Positi Emeri Homi	bit2/10 SD2 warning 0~0x20F bit ing new comm on limit erro gency stop.	bit3/1: SD3 Unit Attrib and auton or during h Homing ne el alarm	d and 1 Dute matica nomin, ot con	bit4/12 SD4 / R/W Ily	leted bit5	/13 Bit(SDS alid mode(efault	s)	R
Dx	SDO SI Label Range Byte lengt Address 0 0x100 0x101 0x102 0x20x	it1/9 D1 PR 0xt b 16 Warn Reset Positi Emeri Homi Positi	bit2/10 SD2 warning 0~0x20F bit ing new comm on limit erro gency stop. ng overtrav on limit erro	bit3/1: SD3 Unit Attrib and auton or during h Homing no el alarm or on Path	d and 1 Dute matica nomin, ot con	bit4/12 SD4 / R/W Ily	leted bit5	J 3D Alid mode(efault 35 address	s) 0 0 0	R X601D
Dx Pr8.29	SD0 SI Label Range Byte lengt Address 0 0x100 0x101 0x102 0x20x Label	it1/9 D1 PR 0xi 0xi 16 Warn Reset Positi Emeri Homi Positi	bit2/10 SD2 warning 0~0x20F bit ing new comm on limit erro gency stop. ng overtrav on limit erro G velocity	bit3/1: SD3 Unit Attrib and auton or during h Homing no el alarm or on Path	d and 1 Dute matica nomin, ot con	bit4/12 SD4 / R/W Ily g npleted	Leted	alid mode(s) 0 0 02	R X601D
Dx	SDO SI Label Range Byte lengt Address 0 0x100 0x101 0x102 0x20x	it1/9 D1 PR 0xi 0xi 0xi 16 Varn Reset Positi Emeri Homi Positi Vositi	bit2/10 SD2 sD2 warning 0~0x20F bit ing new comm on limit erro gency stop. ng overtrav on limit erro go vertrav on limit erro go vertrav	bit3/1: SD3 Unit Attrib and auton or during h Homing no el alarm or on Path	d and 1 Dute matica nomin ot con	bit4/12 SD4 / R/W Ily	Leted bit5	J 3D Alid mode(efault 35 address	s) 0 0 0 0 0 0 0 1	R X601D

	Set JOG veloc	city in PR mode							
	Label	JOG accelera	Valid mode(s)	PR					
Pr8.40	Range	0 ~ 65535	Unit	ms/Krpm	Default	100			
	Byte length	16bit	Attribute	R	485 address	0X6028			
	Set JOG acceleration in PR mode.								



	Label	JOG deceleration			Valid mode(s)	PR
Pr8.41	Range	0 ~ 65535	Unit	ms/Krpm	Default	100
	Byte length	16bit	Attribute	R	485 address	0X6029
	Set JOG dece	leration in PR r	node.			

	Label	Command posi	tion H		Valid mode(s)	PR			
Pr8.42	Range	0 ~ 65535	Unit	/	Default				
	Byte length	16bit	Attribute	R	485 address	0X602A			
	High bit of cor	nmand position;	(Only valid u	sing 485 c	communication)				
	Label	Command position (L)			Valid mode(s)	PR			
Pr8.43	Range	-2147483648~ 2147483647	Unit	р	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 Pr8.42.								
				1 Pr8.42.	Valid mode(s)	PR			
Pr8.44		0~ 0xFFFF	Motor position H)~ 0xFFFF Unit /		Default				
F10.44	Range Byte length	16bit	Attribute	/ R	485 address	0X602C			
		nmand position;				0/0020			
	Label	Motor position	(L)		Valid mode(s)	PR			
Pr8.45	Range	-2147483648~ 2147483647	Unit	р	Default				
	Byte length	32bit	Attribute	R	485 address	0X602D			
		nmunication, only it needs to be re							

	Label	Input I/O status			Valid mode(s)	PR			
Pr8.46	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.									
	Label	Output I/O statu	JS		Valid mode(s)	PR			
Pr8.47	Label Range	Output I/O statu 0 ~ 65535	us Unit	/	Valid mode(s) Default	PR			
Pr8.47			r	/ R	、 <i>,</i>	PR 0X602F			

	Label	Path 0 S-code			Valid mode(s)	PR			
Pr8.48	Range	0 ~ 65535	Unit	1	Default	0			
	Byte length	16bit	Attribute	R	485 address	0X6030			
	Please refer to Pr8.28 for S-code setting.								

	Label	Path 1 S-code			Valid mode(s)	PR			
Pr8.49	Range	0 ~ 65535	Unit	1	Default	0			
	Byte length	16bit	Attribute	R	485 address	0X6031			
	Please refer to Pr8.28 for S-code setting.								



	Label	Path 2 S-code			Valid mode(s)	PR	
Pr8.50	Range	0 ~ 65535	Unit	1	Default	0	
	Byte length	16bit	Attribute	R	485 address	0X6032	
Please refer to Pr8.28 for S-code setting.							

	Label	Path 3 S-code			Valid mode(s)	PR		
Pr8.51	Range	0 ~ 65535	Unit	1	Default	0		
	Byte length	16bit	Attribute	R	485 address	0X6033		
Please refer to Pr8.28 for S-code setting.								

	Label	Path 4 S-code			Valid mode(s)	PR	
Pr8.52	Range	0 ~ 65535	Unit	/	Default	0	
	Byte length	16bit	Attribute	R	485 address	0X6034	
Please refer to Pr8.28 for S-code setting.							

	Label	Path 5 S-code			Valid mode(s)	PR	
Pr8.53	Range	0 ~ 65535	Unit	/	Default	0	
	Byte length	16bit	Attribute	R	485 address	0X6035	
Please refer to Pr8.28 for S-code setting.							

	Label	Path 6 S-code			Valid mode(s)	PR	
Pr8.54	Range	0 ~ 65535	Unit	1	Default	0	
	Byte length	16bit	Attribute	R	485 address	0X6036	
Please refer to Pr8.28 for S-code setting.							

	Label	Path 7 S-code			Valid mode(s)	PR	
Pr8.55	Range	0 ~ 65535	Unit	1	Default	0	
	Byte length	16bit	Attribute	R	485 address	0X6037	
	Please refer to Pr8.28 for S-code setting.						

	Label	Path 8 S-code			Valid mode(s)	PR		
Pr8.56	Range	0 ~ 65535	Unit	1	Default	0		
	Byte length	16bit	Attribute	R	485 address	0X6038		
Please refer to Pr8.28 for S-code setting.								

	Label	Path 9 S-code			Valid mode(s)	PR		
Pr8.57	Range	0 ~ 65535	Unit	1	Default	0		
	Byte length	16bit	Attribute	R	485 address	0X6039		
	Please refer to Pr8.28 for S-code setting.							

	Label	Path 10 S-code			Valid mode(s)	PR	
Pr8.58	Range	0 ~ 65535	Unit	1	Default	0	
	Byte length	16bit	Attribute	R	485 address	0X603A	
	Please refer to Pr8.28 for S-code setting.						

	Label	Path 11 S-code)		Valid mode(s)	PR		
Pr8.59	Range	0 ~ 65535	Unit	/	Default	0		
	Byte length	16bit	Attribute	R	485 address	0X603B		
	Please refer to Pr8.28 for S-code setting.							



	Label	Path 12 S-code	;		Valid mode(s)	PR
Pr8.60	Range	0 ~ 65535	Unit	/	Default	0
	Byte length	16bit	Attribute	R	485 address	0X603C
	Please refer to	Pr8.28 for S-co	de setting.			

	Label	Path 13 S-code	;		Valid mode(s)	PR
Pr8.61	Range	0 ~ 65535	Unit	1	Default	0
	Byte length	16bit	Attribute	R	485 address	0X603D
	Please refer to	Pr8.28 for S-co	de setting.			

	Label	Path 14 S-code	;		Valid mode(s)	PR
Pr8.62	Range	0 ~ 65535	Unit	1	Default	0
	Byte length	16bit	Attribute	R	485 address	0X603E
	Please refer to	Pr8.28 for S-co	de setting.			

	Label	Path 15 S-code	;		Valid mode(s)	PR
Pr8.63	Range	0 ~ 65535	Unit	1	Default	0
	Byte length	16bit	Attribute	R	485 address	0X603F
	Please refer to	Pr8.28 for S-co	de setting.			



3.2.11 [Class 9] PR control path parameters

	Label	PR0 mode	;			Valid mode	e(s)	PR	
Pr9.00	Range	0x0~0xFF	FF	Unit	/	Default	-	0	
	Byte length	16bit		Attribute	R/W	485 addres	s	0X6200	
		•			•				
Bit	14	8-13	6-7		5	4	0-3		
Definition	0: No	0-15:	0: at	osolute	0: No	0: Can be	0: n	ull	
	Jump,	Jump to	1: cc	orrespond	overlap,			ositioning	
		correspond		mand	indicates			elocity	
		path		orrespond	with SJ	Interrupt,	mot		
	1: Jump.		mot	-	1 Overlap,	indicates		loming	
	Jump to SJ				indicated	using !		mergency	
	or CJ				with CJ		stop		
								icates using	
								/H/S	
							.,.	// 0	
	1 1		1			1	l .		
	Label	PR0 positi	on H			Valid mode	e(s)	PR	
Pr9.01	Range	0~ 0xFFFF	=	Unit	Pulse	Default		0	
	Byte length	16bit		Attribute	R/W	485 addres	s	0X6201	
	High bit of Pa	ath 0 position	; (Or	nly valid usi	ng 485 com	munication)		•	
	0	·	`	5	0	,			
	Label	PR0 positi	on(L)			Valid mode	e(s)	PR	
-	Range	-21474836	48~	11	Data	Default		0	
Pr9.02	, i i i i i i i i i i i i i i i i i i i	214748364	47	Unit	Pulse			0	
	Byte length	32bit		Attribute	R/W	485 addres	S	0X6202	
	For Path 0 po	sition, using	485 o	communicat	tion, only ab	le to R/W low	16 k	bit.	
	R/W high 16	bit needs to b	be rea	alized throug	gh Pr9.02.				
	Label	PR0 veloc			Valid mode)(e)	PR		
	Label		лу			vallu moue	(3)	PR	
Pr9.03		-10000~		Unit	rpm	Default	,(3)	60 PR	
Pr9.03	Range				rpm te R/W	Default	()		
Pr9.03	Range Byte length	-10000~′ 16bit	10000	Unit Attribu			()	60	
Pr9.03	Range	-10000~ 16bit th 0 velocity.	10000	Attribu		Default 485 addres	S	60	
	Range Byte length To set PR pa Label	-10000~ 16bit th 0 velocity. PR0 accel	10000 eratio	Attribu	te R/W	Default 485 addres Valid mode	S	60 0X6203	
	Range Byte length To set PR pa Label Range	-10000~ 16bit th 0 velocity.	eratio	Attribu n time Jnit		Default 485 addres Valid mode Default	s e(s)	60 0X6203 PR	
	Range Byte length To set PR pa Label Range Byte length	-10000~ 16bit th 0 velocity. PR0 accel 1 ~ 32767 16bit	eratio	Attribu n time Jnit Attribute	te R/W ms/Krpm R/W	Default 485 addres Valid mode Default 485 addres	s e(s) s	60 0X6203 PR 100 0X6204	
	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR pa	$\begin{array}{c c} -10000 \sim \\\hline 16bit\\ th 0 velocity.\\ PR0 accele\\ 1 \sim 32767\\ 16bit\\ th 0 accelerated \\ \end{array}$	eratio	Attribu n time Jnit Attribute me, time ne	te R/W ms/Krpm R/W	Default 485 addres Valid mode Default 485 addres pm to acceler	s e(s) s ate t	60 0X6203 PR 100 0X6204	
Pr9.04	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabel	$\begin{array}{c c} -10000 \\\hline 16bit\\ th 0 velocity.\\ PR0 acceleration \\1 \sim 32767\\ 16bit\\ th 0 acceleration \\PR0 deceleration \\PR0 d$	eratio eratio	Attribu n time Jnit Attribute me, time ne n time	te R/W ms/Krpm R/W beded for 0r	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode	s e(s) s ate t	60 0X6203 PR 100 0X6204 o 1000rpm PR	
Pr9.04	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRange	$\begin{array}{c c} -10000 \sim \\\hline 16bit\\ th 0 velocity.\\ PR0 acceleration \\1 \sim 32767\\ 16bit\\ th 0 accelerate \\PR0 decelerate \\1 \sim 32767\\ \end{array}$	eratio eratio tion ti eratio	Attribu n time Jnit Attribute me, time ne on time Jnit	te R/W ms/Krpm R/W	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default	s e(s) s ate t e(s)	60 0X6203 PR 100 0X6204 o 1000rpm PR 100	
	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthRangeByte length	$\begin{array}{c c} -10000 \sim \\\hline 16bit\\ th 0 velocity.\\ PR0 acceleration \\1 \sim 32767\\ 16bit\\ th 0 accelerate\\ PR0 decelerate\\ 1 \sim 32767\\ 16bit\\ \end{array}$	eratio	Attribu	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default 485 addres	s e(s) s ate t e(s) s	60 0X6203 100 0X6204 o 1000rpm PR 100 0X6205	
Pr9.04	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR pa	$\begin{array}{c c} -10000 \\\hline 16bit \\ th 0 velocity. \\\hline PR0 accele \\1 \\ \sim 32767 \\\hline 16bit \\th 0 accelera \\\hline PR0 decel \\1 \\ \sim 32767 \\\hline 16bit \\th 0 decelera \\\hline \end{array}$	eratio eratio tion ti eratio l u ation t	Attribute In time Jnit Attribute Ime, time ne In time Jnit Attribute ime, time ne	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec	s e(s) s ate t e(s) s celera	60 0X6203 100 0X6204 o 1000rpm PR 100 0X6205	
Pr9.04 Pr9.05	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabel	$\begin{array}{c c} -10000 \\\hline 16bit \\ th 0 velocity. \\\hline PR0 accelera \\\hline 1 \sim 32767 \\\hline 16bit \\th 0 accelera \\\hline PR0 decelera \\\hline 1 \sim 32767 \\\hline 16bit \\th 0 decelera \\\hline PR0 pause \\\hline PR0 pause \\\hline \end{array}$	eratio eratio tion ti eratio l u ation t	Attribu n time Jnit Attribute me, time ne n time Jnit Attribute ime, time ne	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W eeded for 10	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec Valid mode	s e(s) s ate t e(s) s celera	60 0X6203 PR 100 0X6204 o 1000rpm PR 100 0X6205 ate to 0rpm PR	
Pr9.04 Pr9.05	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRange	$\begin{array}{c c} -10000 \\\hline & 16bit \\\hline th 0 velocity. \\\hline PR0 acceleration \\\hline 1 \sim 32767 \\\hline 16bit \\\hline th 0 acceleration \\\hline PR0 deceleration \\\hline 1 \sim 32767 \\\hline 16bit \\\hline th 0 deceleration \\\hline PR0 pause \\\hline 0 \sim 32767 \\\hline \end{array}$	eratio eratio tion ti eratio l u ation t	Attribute	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W eeded for 10 ms	Default485 addresValid modeDefault485 addrespm to accelerValid modeDefault485 addres000rpm to dedValid modeDefaultDefault	s ate to e(s) s celera e(s)	60 0X6203 PR 100 0X6204 o 1000rpm PR 100 0X6205 ate to 0rpm PR 0	
Pr9.04 Pr9.05	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthRangeByte length	$\begin{array}{c c} -10000 \sim 7 \\ \hline 16bit \\ th 0 velocity. \\ PR0 accelera \\ 1 \sim 32767 \\ \hline 16bit \\ th 0 accelera \\ PR0 decelera \\ \hline 1 \sim 32767 \\ \hline 16bit \\ th 0 decelera \\ \hline PR0 pause \\ 0 \sim 32767 \\ \hline 16bit \\ \hline 16bit \\ \hline 16bit \\ \hline 1 \sim 32767 \\ \hline 1 \rightarrow 32767 \\ \hline$	eratio	Attribute	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W eeded for 10 ms R/W	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec Valid mode Default 485 addres	s ate to e(s) s celera e(s)	60 0X6203 PR 100 0X6204 o 1000rpm PR 100 0X6205 ate to 0rpm PR	
Pr9.04 Pr9.05	RangeByte lengthTo set PR paLabelRangeByte lengthTo set pause	$\begin{array}{c c} -10000 \\\hline 16bit \\ th 0 velocity. \\\hline PR0 accelera \\\hline 1 \sim 32767 \\\hline 16bit \\th 0 accelera \\\hline PR0 decelera \\\hline 1 \sim 32767 \\\hline 16bit \\th 0 decelera \\\hline PR0 pause \\\hline 0 \sim 32767 \\\hline 16bit \\time for PR \\\hline \end{array}$	eratio eratio tion ti eratic tion t e time	Attribute In time Jnit Attribute Ime, time ne Init Attribute ime, time ne Unit Attribute O from comp	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W eeded for 10 ms R/W	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to ded Valid mode Default 485 addres xt path	s sate t e(s) s celera s s	60 0X6203 PR 100 0X6204 o 1000rpm PR 100 0X6205 ate to 0rpm PR 0 0X6206	
Pr9.04 Pr9.05 Pr9.06	RangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set PR paLabelRangeByte lengthTo set pauseByte lengthTo set pauseLabel	$\begin{array}{c c} -10000 \\\hline & 16bit \\\hline & 16bit \\\hline & 0 \ velocity. \\\hline & PR0 \ accelera \\\hline & 1 \ \sim \ 32767 \\\hline & 16bit \\\hline & th \ 0 \ accelera \\\hline & PR0 \ decelera \\\hline & 1 \ \sim \ 32767 \\\hline & 16bit \\\hline & th \ 0 \ decelera \\\hline & PR0 \ pause \\\hline & 0 \ \sim \ 32767 \\\hline & 16bit \\\hline & time \ for \ PR \\\hline & PR0 \ specie \\\hline & PR0 \ $	eratio eratio tion ti eratic tion t e time	Attribute In time Jnit Attribute me, time ne Init Attribute ime, time ne Unit Attribute I from comp rameter	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W eeded for 10 ms R/W leeded for 10 ms	Default485 addresValid modeDefault485 addrespm to accelerValid modeDefault485 addres000rpm to dedValid modeDefault485 addres000rpm to dedValid modeDefault485 addresxt pathValid modeValid mode	s sate t e(s) s celera s s	60 0X6203 PR 100 0X6204 o 1000rpm PR 100 0X6205 ate to 0rpm PR 0 0X6206	
Pr9.04 Pr9.05	RangeByte lengthTo set PR paLabelRangeByte lengthTo set pause	$\begin{array}{c c} -10000 \\\hline 16bit \\ th 0 velocity. \\\hline PR0 accelera \\\hline 1 \sim 32767 \\\hline 16bit \\th 0 accelera \\\hline PR0 decelera \\\hline 1 \sim 32767 \\\hline 16bit \\th 0 decelera \\\hline PR0 pause \\\hline 0 \sim 32767 \\\hline 16bit \\time for PR \\\hline \end{array}$	eratio eratio tion ti eratic tion t e time	Attribute In time Jnit Attribute Ime, time ne Init Attribute ime, time ne Unit Attribute O from comp	te R/W ms/Krpm R/W eeded for 0r ms/Krpm R/W eeded for 10 ms R/W	Default 485 addres Valid mode Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to ded Valid mode Default 485 addres xt path	s e(s) s ate t e(s) s celer: celer: s e(s)	60 0X6203 PR 100 0X6204 o 1000rpm PR 100 0X6205 ate to 0rpm PR 0 0X6206	

It is more convenient to set Class 9 parameters on Motion Studio



	Label	PR1 mode	9				Valid mode	e(s)	PR	
Pr9.08	Range	0x0~0xFF	FF	Unit	/		Default		0	
	Byte length	16bit		Attribute	R	/W	485 addres	s	0X6208	
		1					1		1	
Bit	14	8-13	6-7		5		4	0-3		
Definition	0: No (0-15:	0: abs	solute	0: N	lo	0: Can be 0:		ull	
	Jump, J	lump to	1: cor	respond	ove	rlap,	Interrupt 1: I		ositioning	
	indicates	correspond	comn	ommand		cates	1: Can't be	2: V	elocity	
	with END	path			with	n SJ	Interrupt,	mot	ion	
	1: Jump.		moto	r	1 O	verlap,	indicates	3: H	oming	
	Jump to SJ				indi	cated	using !	4: E	mergency	
	or CJ				with	n CJ		stop)	
								Indi	cates using	
								P/V	/H/S	
	Label	PR1 positi					Valid mode	e(s)	PR	
Pr9.09	Range	0~ 0xFFF		Unit		ulse	Default		0	
	Byte length	16bit		Attribute	R	/W	485 addres	S	0X6209	
	High bit of Pa			y valid usir	ng 4	85 com	munication)			
	Label	PR1 position(L))			Valid mode(s)		PR	
Pr9.10	Range	-21474836	-	Unit		Pulse	Default		0	
13.10		214748364	47						•	
	Byte length	32bit		Attribute R/W			485 addres		0X620A	
	For Path posi R/W high 16 t						to R/W low 1	6 bit.		
	Label	PR1 velo	city	-			Valid mode	e(s)	PR	
Pr9.11	Range	-10000~	10000			rpm	Default		60	
	Byte length	16bit		Attribut		R/W	485 addres	s	0X620B	
	To set PR pat	h 1 velocity.		1			•		•	
	Label	PR1 accel	eration	ı time			Valid mode	e(s)	PR	
Pr9.12	Range	1 ~ 32767	-	nit	ms/	/Krpm	Default		100	
	Byte length	16bit		ttribute	R/V		485 addres		0X620C	
	To set PR pat				ede	d for Or				
	Label	PR1 decel	eratior	n time			Valid mode	e(s)	PR	
Pr9.13	Range	1~32767		nit		/Krpm	Default		100	
	Byte length	16bit			R/V		485 addres		0X620D	
	To set PR pat	1		me, time ne	eede	ed for 10				
	Label	PR1 pause					Valid mode	e(s)	PR	
Pr9.14	Range	0 ~ 32767		Unit	m		Default		0	
	Byte length	16bit		Attribute		/W	485 addres	S	0X620E	
	To set pause		-		oletic	on to ne				
	Label	PR1 speci	· ·		-		Valid mode	e(s)	PR	
Pr9.15	Range	0 ~ 65535		Unit	/		Default		0	
	Byte length	16bit		Attribute	R		485 addres	S	0X620F	
	Reserved				-		1		1	



	Label	PR2 mod	е				Valid mode	e(s)	PR	
Pr9.16	Range	0x0~0xFF		Unit	/		Default	. ,	0	
	Byte length			Attribute	R/	W	485 addres	s	0X6210	
)	-			-			-		
Bit	14	8-13	6-7		5		4	0-3		
Definition	0: No	0-15:	0: al	bsolute	0: No	0	0: Can be	0: n	ull	
	Jump,	Jump to		orrespond	over	lap.	Interrupt	1: P	ositioning	
	indicates	correspond		mand	indic		1: Can't be		elocity	
	with END	path	2: co	orrespond	with SJ		Interrupt,	mot		
	1: Jump.			motor		verlap,	indicates	3: H	oming	
	Jump to SJ					cated			mergency	
	or CJ				with	CJ	_	stop)	
								Indi	cates using	
								P/V	/H/S	
	Label	PR2 posit			-		Valid mode	e(s)	PR	
Pr9.17	Range	0~ 0xFFF	F	Unit		ulse	Default		0	
	Byte length			Attribute	R/		485 addres	SS	0X6211	
	High bit of F	Path 2 position	n; (Or	nly valid usi	ng 48	35 comi	munication)			
	Label	PR2 posit	()				Valid mode	e(s)	PR	
19.10	Range	-21474836		Unit	F	Pulse	Default		0	
	Durte la marth	2147483647					405 a d dua a		-	
	Byte length			Attribute R/W			485 addres	S	0X6212	
			405					401	•	
		bosition, using bit needs to					le to R/W low	16 b	it.	
	R/W high 16	bit needs to	be rea							
Pr9.19	R/W high 16	bit needs to	be rea	alized throu		9.17.	Valid mode		PR	
Pr9.19	R/W high 16	bit needs to PR2 velo -10000~	be rea	D Unit	gh Pr	9.17. rpm	Valid mode Default	e(s)	PR 60	
Pr9.19	R/W high 16	5 bit needs to PR2 velo -10000~ 16bit	be rea city 10000	alized throu	gh Pr	9.17.	Valid mode	e(s)	PR	
Pr9.19	R/W high 16	bit needs to PR2 velo -10000~	be rea city 10000	D Unit	gh Pr	9.17. rpm	Valid mode Default	e(s)	PR 60	
Pr9.19	R/W high 16	5 bit needs to PR2 velo -10000~ 16bit	be rea	D Unit	gh Pr	9.17. rpm	Valid mode Default 485 addres	e(s) s	PR 60	
	R/W high 16 Label Range Byte length To set PR p	bit needs to PR2 velo -10000~ 16bit ath 2 velocity	be rea ocity 10000	D Unit	gh Pr	9.17. rpm	Valid mode Default	e(s) s	PR 60 0X6213	
	R/W high 16 Label Range Byte length To set PR p Label	PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1 ~ 32767	be rea city 10000 leratio	D Unit Attribu	gh Pr	-9.17. rpm R/W Krpm	Valid mode Default 485 addres Valid mode	e(s) ss e(s)	PR 60 0X6213 PR	
	R/W high 16 Label Range Byte length To set PR p Label Range Byte length	PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1 ~ 32767	be rea	D Unit Attribut On time Unit Attribute	gh Pr Ite ms/I R/W	9.17. rpm R/W Krpm	Valid mode Default 485 addres Valid mode Default 485 addres	e(s) ss e(s) ss	PR 60 0X6213 PR 100 0X6214	
	R/W high 16 Label Range Byte length To set PR p Label Range Byte length	PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1~32767 16bit	be rea	D Unit Attribute Unit Unit Attribute ime, time no	gh Pr Ite ms/I R/W	9.17. rpm R/W Krpm	Valid mode Default 485 addres Valid mode Default 485 addres	e(s) ss e(s) ss rate to	PR 60 0X6213 PR 100 0X6214	
Pr9.20	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p	bit needs to PR2 veloc $-10000\sim$ 16bit ath 2 velocity PR2 acce $1 \sim 32767$ 16bit ath 2 acceleration	be rea	D Unit Attribute Unit Unit Attribute ime, time no	gh Pr ite ms/l R/W eedeo	9.17. rpm R/W Krpm	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler	e(s) ss e(s) ss rate to	PR 60 0X6213 PR 100 0X6214 0X6214 0 1000rpm	
Pr9.20	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label	PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1 ~ 32767 16bit ath 2 accelers PR2 dece 1 ~32767	be rea	D Unit D Unit Attribut Unit Attribute ime, time no on time	gh Pr ite ms/l R/W eedeo	-9.17. rpm R/W Krpm / d for 0rp	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode	e(s) s e(s) ate to e(s)	PR 60 0X6213 PR 100 0X6214 0X6214 0 1000rpm PR	
Pr9.20	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length	PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1 ~ 32767 16bit ath 2 accelers PR2 dece 1 ~32767	be rea	D Unit Attribute Unit Unit Attribute ime, time ne on time Unit Attribute	gh Pr ite ms/l R/W eedeo ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm /	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode Default 485 addres	e(s) e(s) es ate to e(s) es	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215	
Pr9.20	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length	bit needs to PR2 veloc $-10000 \sim$ 16bit ath 2 velocity PR2 acce $1 \sim 32767$ 16bit ath 2 acceleration PR2 dece $1 \sim 32767$ 16bit	be real city 10000 leratio / leratio / leratic leratic / leration t	D Unit Attribute On time Unit Attribute ime, time no on time Unit Attribute time, time n	gh Pr ite ms/l R/W eedeo ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm /	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode Default 485 addres	e(s) e(s) e(s) eate to e(s) es celera	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215	
Pr9.20 Pr9.21	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p	bit needs to PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1 ~ 32767 16bit ath 2 accelera PR2 dece 1 ~32767 16bit ath 2 deceler	be real city 10000 leratio / leration leratio leration f ation t setime	D Unit Attribute On time Unit Attribute ime, time no on time Unit Attribute time, time n	gh Pr ite ms/l R/W eedeo ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm / d for 10	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode Default 485 addres 000rpm to dec	e(s) e(s) e(s) eate to e(s) es celera	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215 ate to 0rpm	
Pr9.20 Pr9.21	R/W high 16 Label Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p Label	bit needs to PR2 veloc -10000^{\sim} 16bit ath 2 velocity PR2 acce $1 \sim 32767$ 16bit ath 2 acceleration PR2 deceleration 172767 16bit ath 2 deceleration PR2 paus $0 \sim 32767$	be real city 10000 leratio / leration leratio leration f ation t setime	D Unit Attribute ime, time Unit Attribute ime, time ne on time Unit Attribute time, time ne on time	gh Pr Ite ms/l R/W eedeo ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm / d for 10 S	Valid mode Default 485 addres Default 485 addres om to acceler Valid mode Default 485 addres 000rpm to dee Valid mode	e(s) ss e(s) ss ate to e(s) ss celera e(s)	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215 ate to 0rpm PR	
Pr9.20 Pr9.21	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length Syte length	bit needs to PR2 veloc -10000^{\sim} 16bit ath 2 velocity PR2 acce $1 \sim 32767$ 16bit ath 2 acceleration PR2 deceleration 172767 16bit ath 2 deceleration PR2 paus $0 \sim 32767$	be rea	D Unit Attribute On time Unit Attribute ime, time ne On time Unit Attribute time, time n On time Unit Attribute	gh Pr ite ms/l R/W eedec ms/l R/W eedec ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm / d for 10 s W	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode Default 485 addres 00rpm to dee Valid mode Default 485 addres	e(s) ss e(s) ss ate to e(s) ss celera e(s)	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215 ate to 0rpm PR 0	
Pr9.20 Pr9.21	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length Syte length	bit needs to PR2 veloc -10000^{-1} 16bit ath 2 velocity PR2 acce $1 \sim 32767$ 16bit ath 2 acceleration PR2 deceleration 16bit ath 2 deceleration PR2 paus $0 \sim 32767$ 16bit $0 \sim 32767$ 16bit $0 \sim 32767$ 16bit $0 \sim 32767$ 16bit $0 \sim 32767$ 16bit $0 \sim 32767$ 16bit	be rea	D Unit Attribute on time Unit Attribute ime, time no on time Unit Attribute time, time n on time, time no on time Unit Attribute 2 from com	gh Pr ite ms/l R/W eedec ms/l R/W eedec ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm / d for 10 s W	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode Default 485 addres 00rpm to dee Valid mode Default 485 addres	e(s) ss e(s) ss eate to e(s) ss es ss	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215 ate to 0rpm PR 0	
Pr9.19 Pr9.20 Pr9.21 Pr9.22 Pr9.23	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set paus	bit needs to PR2 veloc -10000^{\sim} 16bit ath 2 velocity PR2 acce $1 \sim 32767$ 16bit ath 2 acceleration PR2 deceleration PR2 deceleration PR2 paus $0 \sim 32767$ 16bit ath 2 deceleration PR2 paus $0 \sim 32767$ 16bit PR2 paus	be real city 10000 leratio / leration / leration / leration / leration / leration / leration / leratio / l	alized throu Unit Attribute Unit Attribute ime, time no on time Unit Attribute time, time no Unit Attribute Unit Attribute 2 from comprameter	gh Pr ite ms/l R/W eedec ms/l R/W eedec ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm / d for 10 s W	Valid mode Default 485 addres Valid mode Default 485 addres om to acceler Valid mode Default 485 addres 000rpm to dea Valid mode Default 485 addres xt path	e(s) ss e(s) ss eate to e(s) ss es ss	PR 60 0X6213 PR 100 0X6214 0 1000rpm PR 100 0X6215 ate to 0rpm PR 0 0X6216	
Pr9.20 Pr9.21	R/W high 16 Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set PR p Label Range Byte length To set paus Label	bit needs to PR2 velo -10000~ 16bit ath 2 velocity PR2 acce 1 ~ 32767 16bit ath 2 accelera PR2 dece 1 ~32767 16bit ath 2 decelera PR2 paus 0 ~ 32767 16bit e time for PR PR2 spec 0 ~ 65535	be real city 10000 leratio / leration / leration / leration / leration / leration / leration / leratio / l	D Unit Attribute on time Unit Attribute ime, time no on time Unit Attribute time, time n on time, time no on time Unit Attribute 2 from com	gh Pr ite ms/l R/W eedec ms/l R/W eedec ms/l R/W	-9.17. rpm R/W Krpm / d for 0rp Krpm / d for 10 s W	Valid mode Default 485 addres Default 485 addres om to acceler Valid mode Default 485 addres 00rpm to dee Valid mode Default 485 addres talid mode Valid mode Valid mode	(s) (s)	PR 60 0X6213 PR 100 0X6214 01000rpm PR 100 0X6215 ate to 0rpm PR 0 0X6216	



	Label	PR3 mode	;			Valid mode	e(s)	PR	
Pr9.24	Range	0x0~0xFFI	FF	Unit	/	Default		0	
	Byte length	16bit	1	Attribute	R/W	485 addres	s	0X6218	
		4	I			1			
Bit	14	8-13	6-7		5	4	0-3		
Definition	0: No	0-15:	0: abs	solute	0: No	0: Can be	0: n	ull	
	Jump, .	Jump to	1: cor	respond	overlap,	Interrupt 1:		ositioning	
	indicates	correspond	comm	nand	indicates	1: Can't be	2: V	elocity	
	with END	path	2: cor	respond	with SJ	Interrupt,	mot	ion	
	1: Jump.		moto	r	1 Overlap,	indicates	3: H	oming	
	Jump to SJ				indicated	using !	4: E	mergency	
	or CJ				with CJ		stop		
							Indi	cates using	
							P/V	/H/S	
	Label	PR3 positi				Valid mode	e(s)	PR	
Pr9.25	Range	0~ 0xFFFF		Unit	Pulse	Default		0	
	Byte length	16bit		Attribute	R/W	485 addres	S	0X6219	
	High bit of Pa		,	y valid usir	ng 485 com	,			
Pr9.26	Label	PR3 position	()	1		Valid mode	e(s)	PR	
	Range	-214748364	-	Unit	Pulse	Default		0	
	De te les eth	214748364	17			405		0)(004.4	
	Byte length	32bit sition, using 485		Attribute	485 addres		0X621A		
	For Path 3 po R/W high 16 b								
	Label	PR3 veloc	city		Valid mode	e(s)	PR		
Pr9.27	Range	-10000~1	10000	Unit	rpm	Default		60	
	Byte length	16bit		Attribu	te R/W	485 addres	S	0X621B	
	To set PR path 3 velocity.								
						-			
	Label	PR3 accel	eration			Valid mode	e(s)	PR	
Pr9.28	Label Range	PR3 accele 1 ~ 32767	eration	nit	ms/Krpm	Default		100	
Pr9.28	Label Range Byte length	PR3 accele 1 ~ 32767 16bit	eration U At	nit ttribute	R/W	Default 485 addres	S	100 0X621C	
Pr9.28	Label Range Byte length To set PR pat	PR3 accele 1 ~ 32767 16bit h 3 accelera	eration U At tion tin	nit ttribute ne, time ne	R/W	Default 485 addres	s ate to	100 0X621C o 1000rpm	
	Label Range Byte length To set PR pat Label	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decele	eration U At tion tin eration	nit ttribute ne, time ne n time	R/W eeded for 0	Default 485 addres pm to acceler Valid mode	s ate to	100 0X621C 01000rpm PR	
	Label Range Byte length To set PR pat Label Range	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decele 1 ~32767	eration Ui At tion tin eration Ui	nit ttribute ne, time ne n time nit	R/W eeded for 0 ms/Krpm	Default 485 addres pm to acceler Valid mode Default	s ate to e(s)	100 0X621C 0 1000rpm PR 100	
	Label Range Byte length To set PR pat Label Range Byte length	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decele 1 ~32767 16bit	eration Ui At tion tin eration Ui At	nit ttribute ne, time ne n time nit ttribute	R/W eeded for 0r ms/Krpm R/W	Default 485 addres pm to acceler Valid mode Default 485 addres	s ate te e(s)	100 0X621C 0 1000rpm PR 100 0X621D	
Pr9.28 Pr9.29	Label Range Byte length To set PR pat Label Range Byte length To set PR pat	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decele 1 ~32767 16bit th 0 decelera	eration Ui At tion tin eration Ui At ation tir	nit ttribute ne, time ne n time nit ttribute	R/W eeded for 0r ms/Krpm R/W	Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec	s ate to e(s) s celera	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm	
Pr9.29	Label Range Byte length To set PR pat Label Range Byte length To set PR pat Label	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decelera 1 ~32767 16bit th 0 decelera PR3 pause	eration Ui Ation tin eration Ui Ation tir e time	nit ttribute ne, time ne time nit ttribute me, time ne	R/W eeded for 0 ms/Krpm R/W eeded for 1	Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec Valid mode	s ate to e(s) s celera	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm PR	
Pr9.29	Label Range Byte length To set PR pat Label Range Byte length To set PR pat Label Range	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decele 1 ~32767 16bit th 0 decelera PR3 pause 0 ~ 32767	eration Ui Atition tin eration Ui Ati ation tir e time	nit ttribute ne, time ne n time nit ttribute me, time ne Unit	R/W eeded for 0r ms/Krpm R/W eeded for 1 ms	Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec Valid mode Default	s ate to e(s) s celera e(s)	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm PR 0	
Pr9.29	Label Range Byte length To set PR pat Label Range Byte length To set PR pat Label Range Byte length	PR3 accele 1 ~ 32767 16bit h 3 accelera PR3 decele 1 ~32767 16bit th 0 decelera PR3 pause 0 ~ 32767 16bit	eration Ui Ation tin eration Ui Ation tir e time	nit ttribute ne, time ne n time nit ttribute me, time ne Unit Attribute	R/W eeded for 0r ms/Krpm R/W eeded for 1 ms R/W	Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec Valid mode Default 485 addres	s ate to e(s) s celera e(s)	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm PR	
	Label Range Byte length To set PR pat Label Range Byte length To set PR pat Label Range Byte length To set pause	PR3 accele 1 \sim 32767 16bit h 3 accelera PR3 decele 1 \sim 32767 16bit th 0 decelera PR3 pause 0 \sim 32767 16bit time for PR p	eration Ui Ation tin eration eration tin ation tir e time	nit ttribute ne, time nit ttribute me, time ne Unit Attribute from comp	R/W eeded for 0r ms/Krpm R/W eeded for 1 ms R/W	Default485 addrespm to accelerValid modeDefault485 addres000rpm to decValid modeDefault485 addresaddresext path	s ate to e(s) s celera e(s) s	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm PR 0 0X621E	
Pr9.29 Pr9.30	Label Range Byte length To set PR pat Label Range Byte length To set PR pat Label Range Byte length To set pause Label	PR3 acceler 1 ~ 32767 16bit h 3 accelera PR3 decelera 1 ~32767 16bit th 0 decelera PR3 pause 0 ~ 32767 16bit time for PR p	eration Ui Ation tin eration ui ation tir e time u path 3 al para	nit ttribute ne, time ne n time nit ttribute me, time ne Unit Attribute from comp meter	R/W eeded for 0r ms/Krpm R/W eeded for 1 ms R/W	Default 485 addres pm to acceler Valid mode Default 485 addres 000rpm to dec Valid mode Default 485 addres ext path Valid mode	s ate to e(s) s celera e(s) s	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm PR 0 0X621E 0X621E	
Pr9.29	Label Range Byte length To set PR pat Label Range Byte length To set PR pat Label Range Byte length To set pause	PR3 accele 1 \sim 32767 16bit h 3 accelera PR3 decele 1 \sim 32767 16bit th 0 decelera PR3 pause 0 \sim 32767 16bit time for PR p	eration Ui Ation tin eration eration Ation tir e time time path 3 al para	nit ttribute ne, time nit ttribute me, time ne Unit Attribute from comp	R/W eeded for 0r ms/Krpm R/W eeded for 1 ms R/W	Default485 addrespm to accelerValid modeDefault485 addres000rpm to decValid modeDefault485 addresaddresext path	s ate to e(s) s celera e(s) s	100 0X621C 0 1000rpm PR 100 0X621D ate to 0rpm PR 0 0X621E	



	Label	PR4 mode	9				Valid mode	e(s)	PR
Pr9.32	Range	0x0~0xFF	FF	Unit	/		Default		0
	Byte length	16bit		Attribute	F	R/W	485 addres	SS	0X6220
		1					1		
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No (0-15:	0: ab	solute	0:	No	0: Can be	0: n	ull
	Jump,	lump to	1: co	rrespond	ove	erlap,	Interrupt 1:		ositioning
		correspond		mand	indicates		1: Can't be		/elocity
		oath	2: co	correspond		h SJ	Interrupt,		tion
	1: Jump.)verlap,	indicates	3: H	loming
	Jump to SJ					licated	using !		mergency
	or CJ				wit	h CJ	-	stop	
									icates using
								P/V	/H/S
	Label	PR4 positi	on H				Valid mode	e(s)	PR
Pr9.33	Range	0~ 0xFFFF	=	Unit	F	Pulse	Default		0
	Byte length	16bit		Attribute	F	R/W	485 addres	SS	0X6221
	High bit of Pa	th 0 position	; (On	ıly valid usi	ng 4	185 com	munication)		
	Label	PR4 position(L))		Valid mode(s)		PR	
	Range	-2147483648~		Unit Pulse		Dulas	Default	. ,	0
	-	2147483647				Puise			0
	Byte length	32bit		Attribute R/W		485 addres	S	0X6222	
	For Path 4 po	pit.							
	R/W high 16 k			lized throu	gh F	Pr9.33.			
	Label	PR4 veloc	city				Valid mode(s)		PR
Pr9.35	Range	-10000~	10000	000 Unit		rpm	Default		60
	Byte length	16bit		Attribut		R/W	485 addres	S	0X6223
	To set PR pat	h 4 velocity.							
	Label	PR0 accel	eratio	n time			Valid mode	e(s)	PR
Pr9.36	Range	1 ~ 32767	-	Jnit		/Krpm	Default		100
	Byte length	16bit		Attribute	R/		485 addres		0X6224
	To set PR pat			,	eed	ed for Or			o 1000rpm
	Label	PR4decele					Valid mode	e(s)	PR
Pr9.37	Range	1~32767		Jnit		s/Krpm	Default		100
	Byte length	16bit		Attribute	R/		485 addres		0X6225
	To set PR pat	1			eed	ed for 10			
	Label	PR4 pause			-		Valid mode	e(s)	PR
Pr9.38	Range	0 ~ 32767		Unit		าร	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6226
	To set pause			•	oleti	on to ne			· · · · · · · · · · · · · · · · · · ·
	Label	PR4 speci	al para	ameter			Valid mode	e(s)	PR
Pr9.39	Range	0 ~ 65535		Unit	1		Default		0
	Byte length	16bit		Attribute	F	2	485 addres	s	0X6227
	Reserved	1					1		l



	Label	PR5 mode					Valid mode	e(s)	PR
Pr9.40	Range	0x0~0xFFF	F	Unit	1		Default	. ,	0
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6228
							1		
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No	D-15:	0: ab	solute	0:1	No	0: Can be	0: n	ull
	Jump, .	lump to	1: co	rrespond	overlap,		Interrupt	1: P	ositioning
	indicates	correspond	comr	nand	indicates		1: Can't be	2: V	elocity
		path	2: co	correspond		h SJ	Interrupt,	mot	ion
	1: Jump.		moto	notor)verlap,	indicates	3: H	oming
	Jump to SJ				ind	licated	using !	4: E	mergency
	or CJ				wit	h CJ		stop)
								Indi	cates using
								P/V	/H/S
	Label	PR5 position	on H				Valid mode	e(s)	PR
Pr9.41	Range	0~ 0xFFFF		Unit		Pulse	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6229
	High bit of Pa		(ly valid usi	ng 4	185 com	/		
Pr9.42	Label	PR5 position(L))			Valid mode(s)		PR
	Range	-214748364	-8~	Unit		Pulse	Default		0
		2147483647							•
	Byte length	32bit		Attribute R/W		485 addres	-	0X622A	
	For Path 0 po	16 b	it.						
	R/W high 16 b			lized throug	gh F	Pr9.41.	1		
	Label	PR5 veloc					Valid mode	e(s)	PR
Pr9.43	Range	-10000~1	0000			rpm	Default		60
	Byte length	16bit		Attribu	ute R/W		485 addres	S	0X622B
	To set PR pat						1		
	Label	PR5 accele					Valid mode	e(s)	PR
Pr9.44	Range	1 ~ 32767		nit	ms/Krpm		Default		100
	Byte length	16bit		ttribute	R/\		485 addres		0X622C
	To set PR pat				eede	ed for Or			
D.0.45	Label	PR5 decele				11	Valid mode	e(s)	PR
Pr9.45	Range	1~32767		nit		/Krpm	Default		100
	Byte length	16bit		ttribute	R/\		485 addres		0X622D
	To set PR pat	1			eea	ed for 10			
	Label	PR5 pause	1		-		Valid mode	e(s)	PR
Pr9.46	Range	0 ~ 32767		Unit		ns	Default		0
Pr9.46	Ryto longth	16bit		Attribute		R/W	485 addres	S	0X622E
Pr9.46	Byte length	time for PR path 5 from co							
Pr9.46	To set pause							1-1	88
	To set pause Label	PR5 specia	al para	ameter			Valid mode	e(s)	PR
Pr9.46 Pr9.47	To set pause		al para		/ R				PR 0 0X622F



	Label	PR6 mode	Э				Valid mod	e(s)	PR
Pr9.48	Range	0x0~0xFF	FF	Unit	/	1	Default		0
	Byte length	16bit		Attribute	F	R/W	485 addres	SS	0X6230
	, ,								
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No	0-15:	0: ab	solute	0:	No	0: Can be	0: n	ull
	Jump,	Jump to	1: co	rrespond	overlap,		Interrupt	1: P	ositioning
	indicates	correspond	comr	nmand		licates			elocity
	with END	path	2: co	rrespond	wi	th SJ	Interrupt,	mot	tion
	1: Jump.		moto	or	10	Overlap,	indicates	3: H	loming
	Jump to SJ				inc	licated	using !	4: E	mergency
	or CJ				wi	th CJ		stop	
								Indi	icates using
								P/V	/H/S
	Label	PR6 posit	ion L				Valid mod	o(e)	PR
Pr9.49	Range	0~ 0xFFF		Unit	1	Pulse	Default	0(3)	0
10.40	Byte length	16bit		Attribute		R/W	485 addres		0X6231
						-			0/(0201
	Label PR6 positi		; (Only valid using 485 comr			Valid mode(s)		PR	
	Range	-2147483648~		,			Default		
	italige	21474836		Unit		Pulse	Donadan		0
	Byte length	32bit		Attribute	e	R/W	485 addres	s	0X6232
	For Path 6 position, using 48			ommunica	tion	, only ab	le to R/W low	/ 16 b	bit.
	R/W high 16	bit needs to	be rea	lized throug	gh l	Pr9.49.			
	Label	PR6 velo	city				Valid mode	e(s)	PR
Pr9.51	Range	-10000 \sim	10000	0 Unit rpm			Default		60
	Byte length	16bit		Attribut		R/W	485 addres	SS	0X6233
	To set PR pa	th 6 velocity					1		•
	Label	PR6 acce	leratior	n time			Valid mode	e(s)	PR
Pr9.52	Range	1 ~ 32767	U	Init	m	s/Krpm	Default		100
	Byte length	16bit	Α	ttribute	R/	W	485 addres	SS	0X6234
	To set PR pa	th 6 accelera	ation tir	me, time ne	eed	ed for Or	pm to accele	rate t	o 1000rpm
	Label	PR6 dece	leratio	n time			Valid mode	e(s)	PR
Pr9.53	Range	1 ~32767	U	Init	m	s/Krpm	Default		100
	Byte length	16bit		ttribute	R/		485 addres		0X6235
					eec	led for 10	000rpm to de		
	Label	PR6 paus	1				Valid mode	e(s)	PR
Pr9.54	Range	0 ~ 32767		Unit		ns	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	SS	0X6236
	To set pause				olet	ion to ne			
	Label	PR6 spec	ial para	ameter			Valid mode	e(s)	PR
Pr9.55	Range	0 ~ 65535		Unit	/		Default		0
	Byte length	16bit		Attribute	F	२	485 addres	SS	0X6237
	Reserved	1					1		1



	Label	PR7 mode					Valid mode	e(s)	PR	
Pr9.56	Range	0x0~0xFFI	FF	Unit	/		Default	• •	0	
	Byte length	16bit		Attribute	R	./W	485 addres	s	s 0X6238	
) · · ·) ·				1	-				
Bit	14	8-13	6-7		5		4	0-3		
Definition	0: No (0-15:	0: at	osolute	0: N	10	0: Can be	0: n	ull	
	Jump,	lump to	1: cc	orrespond	ove	erlap,	Interrupt	1: P	ositioning	
		correspond		mand		icates	1: Can't be		elocity	
		path	2: cc	orrespond	wit		Interrupt,	mot		
	1: Jump.		mot	-	10	verlap,	indicates	3: H	oming	
	Jump to SJ			0101		icated	using !		mergency	
	or CJ				wit	h CJ	0	stop		
									cates using	
									/H/S	
								, ,		
	· · · ·									_
	Label	PR7 positi					Valid mode	e(s)	PR	
Pr9.57	Range	0~ 0xFFFF	-	Unit		ulse	Default		0	
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6239	
	High bit of Pa	th 7 position	; (Or	nly valid usi	ng 4	85 com	munication)			
	Label	PR7 position	on(L)				Valid mode	e(s)	PR	
	Range	-2147483648~					Default	(-)		
Pr9.58	. tange	214748364		Unit		Pulse	Donuali		0	
	Byte length	32bit		Attribute	e	R/W	485 addres	s	0X623A	
		sition, using	485 o	communication, only abl			le to R/W low	16 b	pit.	
	R/W high 16 t									
	Label	PR7 veloc	ity				Valid mode	e(s)	PR	
Pr9.59	Range	-10000~1	,			rpm	Default		60	
	Byte length	16bit		Attribute R/			485 addres	S	0X623B	
	To set PR pat	h 7 velocity.					•		•	
	Label	PR7 accel	eratio	n time			Valid mode	e(s)	PR	
Pr9.60	Range	1 ~ 32767		Jnit	ms	/Krpm	Default		100	
	Byte length	16bit		Attribute	R/V		485 addres		0X623C	
	To set PR pat			,	eede	ed for Or			o 1000rpm	
	Label	PR0 decel	eratio	n time			Valid mode	e(s)	PR	
Pr9.61	Range	1 ~32767		Jnit		/Krpm	Default		100	
	Byte length	16bit		Attribute	R/V		485 addres		0X623D	
	To set PR pa				eed	ed for 10				
	Label	PR7 pause	e time				Valid mode	e(s)	PR	
Pr9.62	Range	0 ~ 32767		Unit	m		Default		0	
	Byte length	16bit		Attribute		/W	485 addres	S	0X623E	
	To set pause				oletio	on to ne				
	Label	PR7 specia	al par	ameter			Valid mode	e(s)	PR	
Pr9.63	Range	0 ~ 65535		Unit	/		Default		0	
	Byte length	16bit		Attribute	R		485 addres	S	0X623F	
	Reserved	1					I		1	



	Label	PR8 mode)				Valid mode	e(s)	PR	
Pr9.64	Range	0x0~0xFF		Unit	/		Default	. ,	0	
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6240	
) ··· ·) ·	-								
Bit	14	8-13	6-7		5		4	0-3		
Definition	0: No	0-15:	0: at	osolute	0: N	٥V	0: Can be	0: n	ull	
	Jump,	Jump to	1: co	prrespond	ove	erlap,	Interrupt	1: P	ositioning	
	•	correspond		mand	ind	icates	1: Can't be		elocity	
		, path	2: co	prrespond	wit	h SJ	Interrupt,	mot		
	1: Jump.		mote	•		verlap,	indicates	3: H	loming	
	Jump to SJ					icated	using !		mergency	
	or CJ				-	h CJ		stop		
					-				cates using	
									/H/S	
								.,.	, , .	
	Label	PR8 positi 0~ 0xFFFF		11		Pulse	Valid mode Default	e(s)	PR	
Pr9.65	Range		-	Unit		viise R/W			0 0X6241	
	Byte length	16bit	(0)	Attribute		-	485 addres	55	0X6241	
	High bit of Pa	ith 0 position	; (Or	nly valid usi	ng 4	85 com	munication)			
	Label	PR8 positi	on(L)				Valid mode	e(s)	PR	
D-0.00	Range	-21474836	()			.	Default			
Pr9.66	Ŭ	214748364		Unit		Pulse			0	
	Byte length	32bit		Attribute	e	R/W	485 addres	S	0X6242	
	For Path 8 pc						le to R/W low	16 k	pit.	
	R/W high 16 l			alized throug	gh F	Pr9.65.	•			
	Label	PR8 velo					Valid mode	e(s)	PR	
Pr9.67	Range	-10000~	10000			rpm	Default		60	
	Byte length	16bit		Attribu	Ite	R/W	485 addres	S	0X6243	
	To set PR pa									
	Label	PR8 accel					Valid mode	e(s)	PR	
Pr9.68	Range	1 ~ 32767		Jnit		/Krpm	Default		100	
	Byte length	16bit		Attribute	R/\		485 addres		0X6244	
	To set PR pat	th 8 accelera	ition ti	me, time ne	eede	ed for Or	pm to acceler	ate t	o 1000rpm	
	Label	PR8 decel	eratio	on time			Valid mode	e(s)	PR	
Pr9.69	Range	1 ~32767		Jnit		/Krpm	Default		100	
	Byte length	16bit		Attribute	R/\		485 addres		0X6245	
	To set PR pa				eed	ed for 10				
	Label	PR8 pause	e time				Valid mode	e(s)	PR	
Pr9.70	Range	0 ~ 32767		Unit	n	าร	Default		0	
	Byte length	16bit		Attribute	R	./W	485 addres	S	0X6246	
	To set pause	time for PR	path 8	3 from comp	oleti	on to ne	xt path		·	
	Label	PR8 speci	al par	ameter			Valid mode	e(s)	PR	
Pr9.71	Range	0 ~ 65535	<u> </u>	Unit	/		Default		0	
	Byte length	16bit		Attribute	R	2	485 addres	S	0X6247	
	Reserved	1					L		1	



	Label	PR9 mode	;				Valid mode	e(s)	PR
Pr9.72	Range	0x0~0xFFFF Unit					Default	()	0
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6248
) · · ·) ·	-							
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No	0-15:	0: at	osolute	0: N	٥V	0: Can be	0: n	ull
	Jump,	Jump to	1: cc	prrespond	ove	erlap,	Interrupt	1: P	ositioning
		correspond		mand	ind	icates	1: Can't be		elocity
		, path	2: cc	prrespond	wit	h SJ	Interrupt,	mot	
	1: Jump.		mot			verlap,	indicates	3: H	loming
	Jump to SJ			_		icated	using !		mergency
	or CJ					h CJ		stop	
									cates using
									/H/S
								.,.	,,.
								- (-)	
D=0 72	Label	PR9 positi 0~ 0xFFFF		Unit		Pulse	Valid mode	e(s)	PR
Pr9.73	Range Byte length	16bit	-			R/W			0 0X6249
	Byte length		(0)	Attribute		-	485 addres	55	0X6249
	High bit of Pa	th 9 position	; (Or	nly valid usi	ng 4	85 com	munication)		
	Label	PR9 positi	on(L)				Valid mode	e(s)	PR
Pr9.74	Range	-21474836	48~	Unit		Pulse	Default		0
F13.74	-	214748364	47	Unit		Puise			0
	Byte length	32bit		Attribute		R/W	485 addres		0X624A
	For Path 9 pc						le to R/W low	16 b	pit.
	R/W high 16 I			alized throu	gh F	r9.73.		(-)	PR
Pr9.75	Range	PR0 veloc		Unit		rom	Valid mode Default	9(S)	60
F13.75	Byte length	16bit	10000	Attribu	ito	rpm R/W	485 addres	<u> </u>	0X624B
	To set PR pat			Attribu	ne	r///	405 auures	5	UX024D
	Label	PR9 accel		n timo			Valid mode	v(c)	PR
Pr9.76	Range	1 ~ 32767		Jnit	mo	/Krpm	Default	;(5)	100
P19.70	Byte length	16bit		Attribute	R/\		485 addres	<u> </u>	0X624C
	To set PR pat								
	Label				eeue		Valid mode		PR
D=0 77		PR9 decel						;(5)	
Pr9.77	Range Byte length	1~32767		Jnit Attribute	ms R/\	/Krpm	Default	-	100 0X624D
	Byte length To set PR pa	16bit		Attribute			485 addres		
					eeu				PR
D-0 70	Label	PR9 pause					Valid mode	;(5)	
Pr9.78	Range	0 ~ 32767		Unit		IS	Default		0
	Byte length	16bit		Attribute		2/W	485 addres	S	0X624E
	To set pause				pleti	on to ne			
	Label	PR9 speci	al par	ameter			Valid mode	e(s)	PR
Pr9.79	Range	0 ~ 65535		Unit	/		Default		0
	Byte length	16bit		Attribute	R		485 addres	s	0X624F
	Reserved								



	Label	PR10 mod	le				Valid mode	e(s)	PR	
Pr9.80	Range	0x0~0xFF	FF	Unit	/		Default	. ,	0	
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6250	
	, ,									
Bit	14	8-13	6-7		5		4	0-3		
Definition	0: No	0-15:	0: at	osolute	0: N	٧o	0: Can be	0: n	ull	
	Jump,	Jump to	1: co	prrespond	ove	erlap,	Interrupt	1: P	ositioning	
		correspond		mand	ind	icates	1: Can't be		elocity	
		, path	2: co	prrespond	wit	h SJ	Interrupt,	mot		
	1: Jump.		mote		10	verlap,	indicates	3: H	loming	
	Jump to SJ					icated	using !		mergency	
	or CJ					h CJ		stop		
									cates using	
									/H/S	
								.,.	, ,	
	Label	PR10 posi					Valid mode	e(s)	PR	
Pr9.81	Range	0~ 0xFFFF	-	Unit		Pulse	Default		0	
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6251	
	High bit of Pa	th10 position	n; (O	nly valid us	ing -	485 com	imunication)			
	Label	PR10 posi	tion(L	.)			Valid mode	e(s)	PR	
	Range	-21474836					Default	. ,		
Pr9.82		214748364		Unit		Pulse			0	
	Byte length	32bit		Attribute	Э	R/W	485 addres	S	0X6252	
	For Path 10 p	osition, using	g 485	communic	atio	n, only a	ble to R/W lov	w 16	bit.	
	R/W high 16 I									
	Label	PR10 velo	ocity				Valid mode	e(s)	PR	
Pr9.83	Range	-10000~	10000) Unit		rpm	Default		60	
	Byte length	16bit		Attribu	te	R/W	485 addres	S	0X6253	
	To set PR pa	th 10 velocity	/.			•				
	Label	PR10 acce	elerati	on time			Valid mode	e(s)	PR	
Pr9.84	Range	1 ~ 32767	l	Jnit	ms	/Krpm	Default	-	100	
	Byte length	16bit	ŀ	Attribute	R/\		485 addres	S	0X6254	
	To set PR pa	th 10 acceler	ation	time, time i	need	ded for 0	rpm to accele	erate	to 1000rpm	
	Label	PR10 dece	elerati	ion time			Valid mode	e(s)	PR	
Pr9.85	Range	1~32767		Jnit	ms	/Krpm	Default	-	100	
	Byte length	16bit	ŀ	Attribute	R/\		485 addres	S	0X6255	
	To set PR pa	th 10 decele	ration	time, time	nee	ded for 1	000rpm to de	ecele	rate to 0rpm	_
	Label	PR10 paus	se tim	e			Valid mode	e(s)	PR	
Pr9.86	Range	0~32767		Unit	m	าร	Default		0	
	Byte length	16bit		Attribute	R	./W	485 addres	S	0X6256	
	To set pause	time for PR	path 1	10 from con	nple	tion to n	ext path			
	Label	PR10 spec	cial pa	arameter			Valid mode	e(s)	PR	
Pr9.87	Range	0 ~ 65535	·	Unit	/		Default		0	
	Byte length	16bit		Attribute	R	2	485 addres	S	0X6257	
	Reserved	I					1		1	



	Label	PR11 mod	e				Valid mode	e(s)	PR
Pr9.88	Range	0x0~0xFFI		Unit	1		Default	()	0
	Byte length	16bit		Attribute	R	./W	485 addres	s	0X6258
	, ,								
Bit	14 8	8-13	6-7		5		4	0-3	
Definition	0: No (D-15:	0: ab	solute	0: N	10	0: Can be	0: n	ull
	Jump, J	lump to		rrespond	ove	erlap,	Interrupt	1: P	ositioning
		correspond	comr	-		icates	1: Can't be		elocity
		bath		rrespond		h SJ	Interrupt,	mot	
	1: Jump.		moto	-		verlap,	indicates	3: H	oming
	Jump to SJ					icated	using !		mergency
	or CJ					h CJ		stop	
					-				cates using
									/H/S
								.,.	,,.
	Label	PR11 posi					Valid mode	e(s)	PR
Pr9.89	Range	0~ 0xFFFF		Unit		Pulse	Default		•
	Byte length	16bit		Attribute		2/W	485 addres	S	0X6259
	High bit of Pa	th 11 positio	n; (O	nly valid us	sing	485 con	nmunication)		
	Label	PR11 posi	tion(L))			Valid mode	e(s)	PR
Pr9.90	Range	-214748364	48~	Unit		Pulse	Default		0
P19.90	-	214748364	17	Unit					-
	Byte length	32bit		Attribute	-	R/W	485 addres		0X625A
	For Path 11 p						ble to R/W lo	w 16	bit.
	R/W high 16 t	PR11 velo		lizea throug	gn F	19.89.	Valid mode)(e)	PR
Pr9.91	Range	-10000~1		Unit		rpm	Default	;(3)	60
10.01	Byte length	16bit	10000	Attribu	to	R/W	485 addres	6	0X625B
	To set PR pat		/	Attribu	le	11/10	+05 autres	3	070230
	Label	PR11 acce		on time			Valid mode	e(s)	PR
Pr9.92	Range	1 ~ 32767		Init	ms	/Krpm	Default	(-)	100
	Byte length	16bit		ttribute	R/V		485 addres	S	0X625C
	To set PR pat	-							
	Label	PR11 dece					Valid mode		
Pr9.93	Range	1~32767		Init	ms	/Krpm	Default	. /	100
	Byte length	16bit		ttribute	R/V		485 addres	s	0X625D
	To set PR pat								
	Label	PR11 paus					Valid mode		PR
Pr9.94	Range	0 ~ 32767		Unit	m	IS	Default	. ,	0
	Byte length	16bit		Attribute	R	/W	485 addres	s	0X625E
	To set pause		path 1						
	Label	PR11 spec	cial pa	rameter			Valid mode	e(s)	PR
Pr9.95	Range	0 ~ 65535		Unit	/		Default	-	0
	Byte length	16bit		Attribute	R		485 addres	s	0X625F
	Reserved	1							I



	Label	PR12 mod	le				Valid mode	ə(s)	PR	
Pr9.96	Range	0x0~0xFF	FF	Unit	/		Default	. ,	0	
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6260	
	, ,									
Bit	14	8-13	6-7		5		4	0-3		
Definition	0: No	0-15:	0: ab	solute	0:1	No	0: Can be	0: n	ull	
	Jump,	Jump to	1: co	rrespond	ove	erlap,	Interrupt	1: P	ositioning	
	•	correspond		mand	ind	icates	1: Can't be		elocity	
		, path	2: co	orrespond	wit	h SJ	Interrupt,	mot		
	1: Jump.		moto	-	1 C	verlap,	indicates	3: H	oming	
	Jump to SJ					icated	using !		mergency	
	or CJ					h CJ		stop		
									cates using	
									/H/S	
								.,.	, ,	
		1		-						_
	Label	PR12 posi				De la c	Valid mode	e(s)	PR	
Pr9.97	Range	0~ 0xFFFF	-	Unit		Pulse	Default		0	
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6261	
	High bit of Pa	th 12 positio	n; (C	only valid us	sing	485 con	nmunication)			
	Label	PR12 posi	tion(L)			Valid mode	e(s)	PR	
	Range	-21474836				.	Default		<u> </u>	
Pr9.98	, s	214748364		Unit		Pulse			0	
	Byte length	32bit		Attribute	Э	R/W	485 addres	S	0X6262	
	For Path 12 p						ble to R/W lov	w 16	bit.	
	R/W high 16 l			lized throug	gh F	Pr9.97.				
	Label	PR12 velo					Valid mode	e(s)	PR	
Pr9.99	Range	-10000~	10000			rpm	Default		60	
	Byte length	16bit		Attribu	Ite	R/W	485 addres	S	0X6263	
	To set PR par									
	Label	PR12 acce					Valid mode	e(s)	PR	
Pr9.100	Range	1 ~ 32767		Jnit		/Krpm	Default		100	
	Byte length	16bit		Attribute	R/\		485 addres		0X6264	
	To set PR par				nee	ded for C				
	Label	PR12 dece					Valid mode	e(s)	PR	
Pr9.101	Range	1~32767		Jnit		/Krpm	Default		100	
	Byte length	16bit		Attribute	R/\		485 addres		0X6265	
	To set PR pa				nee	ded for 1				_
	Label	PR12 paus			-		Valid mode	e(s)	PR	
Pr9.102	Range	0 ~ 32767		Unit		าร	Default		0	
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6266	
	To set pause				nple	tion to n				
	Label	PR12 spec	cial pa	arameter			Valid mode	e(s)	PR	
Pr9.103	Range	0 ~ 65535		Unit	/		Default		0	
	Byte length	16bit		Attribute	R	2	485 addres	S	0X6267	
	Reserved	I			-		I		1	



	Label	PR13 mod	le				Valid mode	ə(s)	PR
Pr9.104	Range	0x0~0xFF	FF	Unit	/		Default		0
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6268
		•							I
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No	0-15:	0: ab	osolute	0:1	No	0: Can be	0: n	ull
	Jump, .	Jump to	1: co	orrespond	ove	erlap,	Interrupt	1: P	ositioning
	indicates	correspond	com	mand	ind	licates	1: Can't be	2: V	elocity
	with END	path	2: co	orrespond	wit	:h SJ	Interrupt,	mot	tion
	1: Jump.		moto	or	1 C)verlap,	indicates	3: H	oming
	Jump to SJ				ind	licated	using !	4: E	mergency
	or CJ				wit	:h CJ	_	stop)
								Indi	cates using
									/H/S
	· ·								
	Label	PR13 posi					Valid mode	e(s)	PR
Pr9.105	Range	0~ 0xFFFF	-	Unit		Pulse	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6269
	High bit of Pa	th 13 positio	n; (C	only valid us	sing	485 con	nmunication)		
	Label	PR13 posi	tion/l	<u>۱</u>			Valid mode		PR
		-214748364		.)			Default	;(3)	FN
Pr9.106	Range	214748364		Unit		Pulse	Delault		0
	Byte length	32bit	+/	Attribute	<u> </u>	R/W	485 addres	5	0X626A
	For Path 13 p		a 185						
	R/W high 16 l							W 10	Dit.
	Label	PR13 velo			9	10.100.	Valid mode	e(s)	PR
Pr9.107	Range	-10000~		Unit		rpm	Default	(-)	60
	Byte length	16bit		Attribu	ite	R/W	485 addres	s	0X626B
	To set PR pat		1.					-	
	Label	PR13 acce		on time			Valid mode	e(s)	PR
Pr9.108	Range	1~32767	l	Jnit	ms	s/Krpm	Default	. ,	100
	Byte length	16bit	A	Attribute	R/		485 addres	S	0X626C
	To set PR pat	th 13 acceler	ation	time, time i	nee	ded for 0	rpm to accele	erate	to 1000rpm
	Label	PR13 dece	elerati	on time			Valid mode	e(s)	PR
Pr9.109	Range	1~32767	l	Jnit	ms	s/Krpm	Default		100
	Byte length	16bit	4	Attribute	R/	W	485 addres	S	0X626D
	To set PR pat				nee	ded for 1			rate to 0rpm
	Label	PR13 paus	se tim	е			Valid mode	e(s)	PR
Pr9.110	Range	0 ~ 32767		Unit	n	ns	Default		0
	Byte length	16bit		Attribute	F	R/W	485 addres	S	0X626E
	To set pause	time for PR	path 1	3 from con	nple	tion to n			
	Label	PR13 spec	cial pa	arameter			Valid mode	e(s)	PR
Pr9.111	Range	0~65535		Unit	/		Default		0
	Byte length	16bit		Attribute	F	2	485 addres	S	0X626F
	Reserved	1					1		1



	Label	PR14 mod	le				Valid mode	e(s)	PR
Pr9.112	Range	0x0~0xFF	FF	Unit	/		Default	. ,	0
	Byte length	16bit		Attribute	F	R/W	485 addres	s	0X6270
		1							1
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No (D-15:	0: ab	solute	0: N	٧o	0: Can be	0: n	ull
	Jump,	lump to	1: co	orrespond	ove	erlap,	Interrupt	1: P	ositioning
	indicates	correspond	com	mand	ind	icates	1: Can't be	2: V	elocity
		path	2: co	orrespond	wit	h SJ	Interrupt,	mot	tion
	1: Jump.		moto	-	10	verlap,	indicates	3: H	oming
	Jump to SJ				ind	icated	using !	4: E	mergency
	or CJ				wit	h CJ		stop	
								Indi	cates using
									/H/S
		1	1						
	Label	PR14 posi					Valid mode	e(s)	PR
Pr9.113	Range	0~ 0xFFFF	-	Unit		Pulse	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6271
	High bit of Pa	th 14 positio	n; (C	only valid us	sing	485 con	nmunication)		
	Label	PR14 posi	tion(L)			Valid mode	e(s)	PR
	Range	-214748364					Default	(-)	
Pr9.114	itango	214748364		Unit		Pulse	Donaut		0
	Byte length	32bit		Attribute	e	R/W	485 addres	s	0X6272
	For Path 14 p		a 485	communica	atio	n. onlv a	ble to R/W lo	w 16	bit.
	R/W high 16 I							-	
	Label	PR14 velo			•		Valid mode	e(s)	PR
Pr9.115	Range	-10000~~	10000	Unit		rpm	Default		60
	Byte length	16bit		Attribu	te	R/W	485 addres	S	0X6273
	To set PR pat	h 14 velocity	/.	•		•	•		•
	Label	PR14 acce	elerati	on time			Valid mode	e(s)	PR
Pr9.116	Range	1 ~ 32767	l	Jnit		/Krpm	Default		100
	Byte length	16bit	4	Attribute	R/\	N	485 addres	S	0X6274
	To set PR pat				need	ded for 0	rpm to accele	erate	to 1000rpm
	Label	PR14 dece	elerati	on time			Valid mode	e(s)	PR
Pr9.117	Range	1~32767		Jnit		/Krpm	Default		100
	Byte length	16bit		Attribute	R/\		485 addres		0X6275
	To set PR pat				nee	ded for 1			
	Label	PR14 paus	se tim	е			Valid mode	e(s)	PR
Pr9.118	Range	0 ~ 32767		Unit		าร	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6276
	To set pause				nple	tion to n			
	Label	PR14 spec	cial pa	arameter	_		Valid mode	e(s)	PR
Pr9.119	Range	0 ~ 65535		Unit	/		Default		0
	Byte length	16bit		Attribute	R	!	485 addres	s	0X6277
	Reserved	•			-		•		

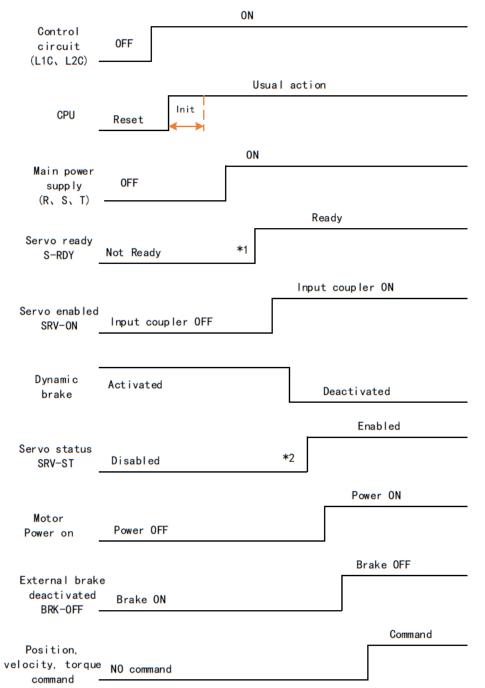


	Label	PR15 mod	le				Valid mode	e(s)	PR
Pr9.120	Range	0x0~0xFF	FF	Unit	1		Default	. ,	0
	Byte length	16bit		Attribute	F	R/W	485 addres	S	0X6278
	, ,								
Bit	14	8-13	6-7		5		4	0-3	
Definition	0: No	D-15:	0: ab	solute	0:1	No	0: Can be	0: n	ull
	Jump,	lump to	1: co	rrespond	ove	erlap,	Interrupt	1: P	ositioning
		correspond		mand	ind	icates	1: Can't be		elocity
		, path	2: co	rrespond	wit	h SJ	Interrupt,	mot	
	1: Jump.		moto		1 C	verlap,	indicates	3: H	oming
	Jump to SJ			_		icated	using !		mergency
	or CJ					h CJ		stop	
									cates using
									/H/S
								.,.,	,,.
	· · · ·	1							
2-0.4.04	Label	PR15 posi					Valid mode	e(s)	PR
Pr9.121	Range	0~ 0xFFF	-	Unit		Pulse	Default		0
	Byte length	16bit		Attribute		R/W	485 addres	S	0X6279
	High bit of Pa	th 15 positio	n; (O	only valid us	sing	485 con	nmunication)		
	Label	PR15 posi	tion(L)			Valid mode	e(s)	PR
D0 400	Range	-21474836				.	Default		
Pr9.122	Ŭ	214748364		Unit		Pulse			0
	Byte length	32bit		Attribute	Э	R/W	485 addres	S	0X627A
	For Path 15 p						ble to R/W lov	w 16	bit.
	R/W high 16 I			lized throug	gh F	Pr9.121.			
	Label	PR15 velo				-	Valid mode	e(s)	PR
Pr9.123	Range	-10000~·	10000			rpm	Default		60
	Byte length	16bit		Attribu	Ite	R/W	485 addres	S	0X627B
	To set PR pat								
	Label	PR15 acce					Valid mode	e(s)	PR
Pr9.124	Range	1 ~ 32767		Jnit		s/Krpm	Default		100
	Byte length	16bit		Attribute	R/\		485 addres		0X627C
	To set PR pat				nee	ded for 0			to 1000rpm
	Label	PR15 dece					Valid mode	e(s)	PR
Pr9.125	Range	1~32767		Jnit		s/Krpm	Default		100
	Byte length	16bit		Attribute	R/\		485 addres		0X627D
	To set PR pat				nee	ded for 1			
	Label	PR15 paus		е			Valid mode	e(s)	PR
Pr9.126	Range	0 ~ 32767		Unit	n	าร	Default		0
	Byte length	16bit		Attribute	F	R/W	485 addres	S	0X627E
	To set pause	time for PR	path 1	5 from con	nple	tion to n	ext path		•
	Label	PR15 spec					Valid mode	e(s)	PR
Pr9.127	Range	0 ~ 65535		Unit	/		Default		0
	Byte length	16bit		Attribute	R	2	485 addres	S	0X627F
	Reserved	1					1		I



Chapter 4 Servo Drive Operation

4.1 Servo enabled



Please enter servo status, position, velocity, torque command as sequence diagram above. ** 1. S-RDY signal is given after CPU initialization and main power supply powered on. 2. SRV-ST signal is received when servo driver is enabled. Command input is not allowed yet.



4.2 Servo stop

Servo stopping are of 3 different methods: Servo braking method, free stopping method, dynamic braking method.

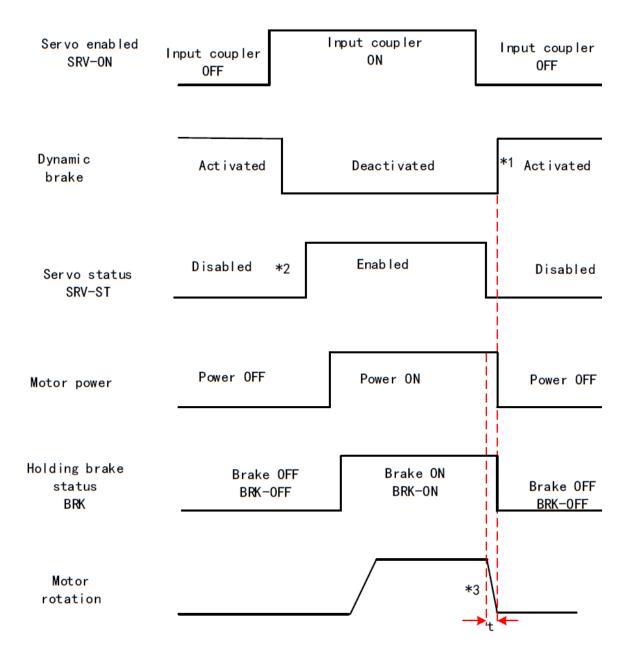
Stopping method	Description	Details
Servo braking	Servo driver delivers braking torque in opposite direction	Quick stopping but mechanical impact might exist
Free stopping	Motor power cut off. Free to move until velocity = 0. Affected inertia, friction and other factors	Smooth deceleration, low mechanical impact but slow stopping
Dynamic braking	Brake activated when in motion	Quick stopping but mechanical impact might exist

Stopping status	Status after stopped
Free running	Motor is powered off, rotor is free to rotate
Dynamic braking	Motor is powered off, rotor is not free to rotate
Holding brake stopping	Motor axis is locked, cannot rotate freely

Motor stopping (Servo disabled) - Sequence Diagram

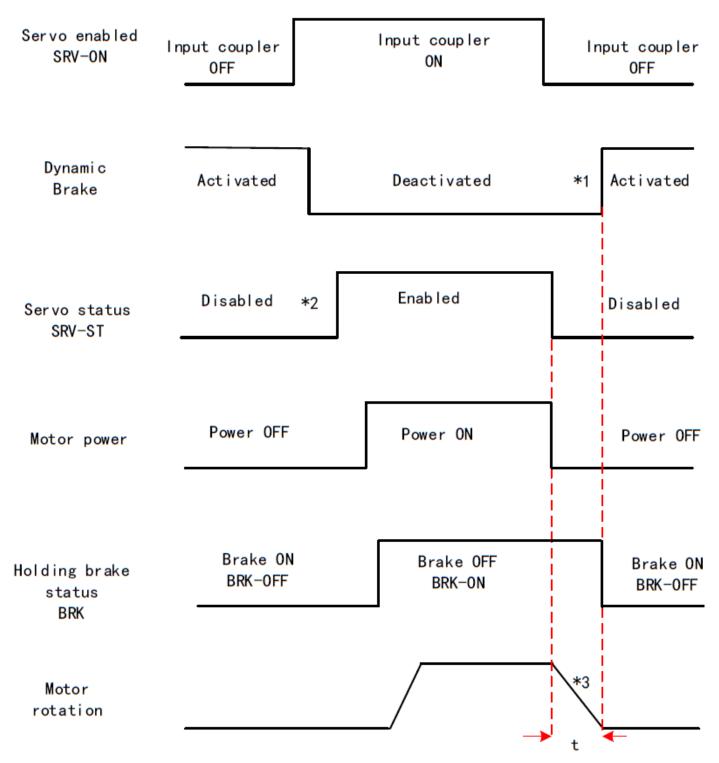
Servo braking method. Status after stopping: Dynamic braking





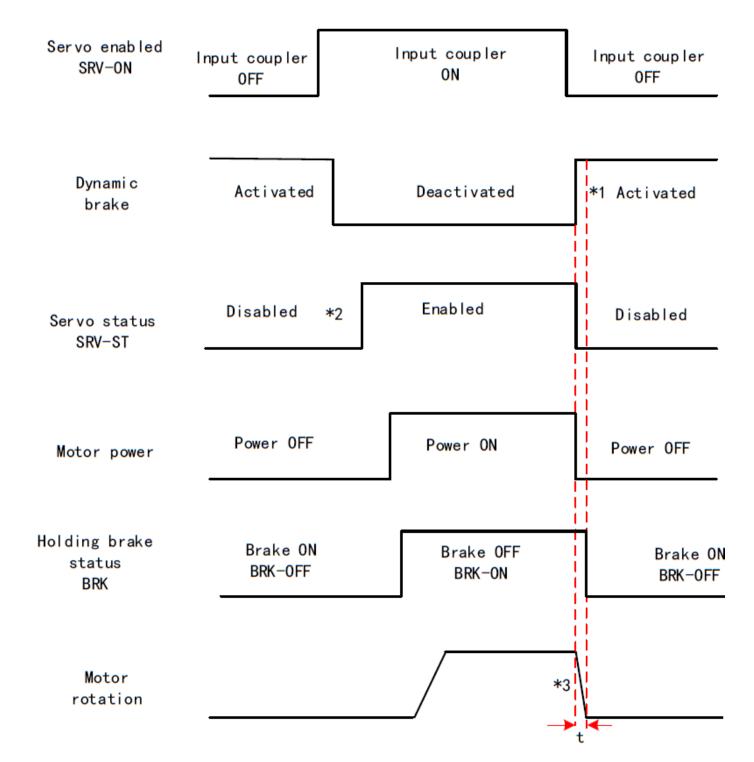


Free stopping method. Status after stopping: Dynamic braking





Dynamic braking method. Status after stopping: Dynamic braking





Servo enabled Input coupler Input coupler Input coupler ON SRV-ON 0FF 0FF Dynamic Activated Deactivated brake *1 I Enabled Disabled *2 Disabled Servo status SRV-ST Power ON Motor power Power OFF Power OFF Brake ON Brake ON Holding brake status Brake OFF BRK-OFF BRK-OFF BRK BRK-ON Motor *3 rotation ≯_ti∢

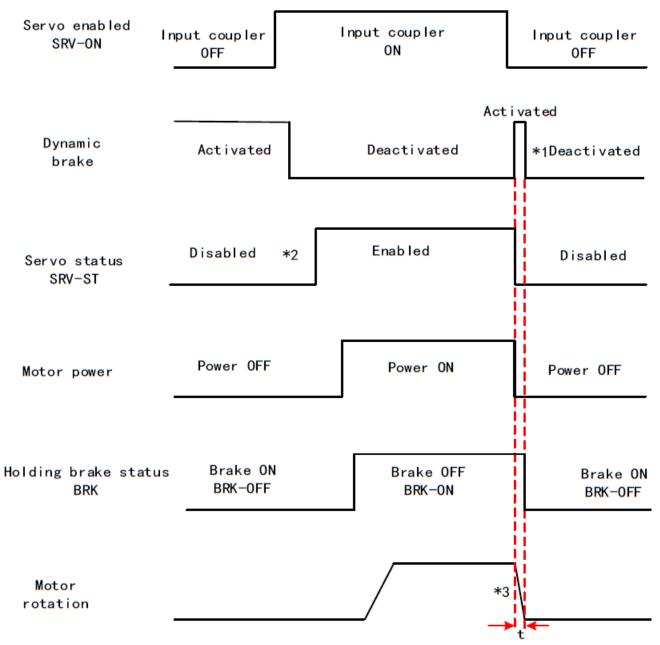
Servo stopping method. Status after stopping: Free running



Free stopping method. Status after stopping: Free running

Servo enabled SRV-ON	Input coupler OFF	Input coupler ON	Input coupler OFF
Dynamic brake	Activated	Deactivated	*1
Servo status SRV-ST	Disabled *2	Enabled	Disabled
Motor power	Power OFF	Power ON	Power OFF
Holding brake status BRK	Brake ON BRK-OFF	Brake OFF BRK-ON	Brake ON BRK-OFF
Motor rotation			*3 t





Dynamic braking method. Status after stopping: Free running

** 1. Status after stopping is as defined in Pr5.06.

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

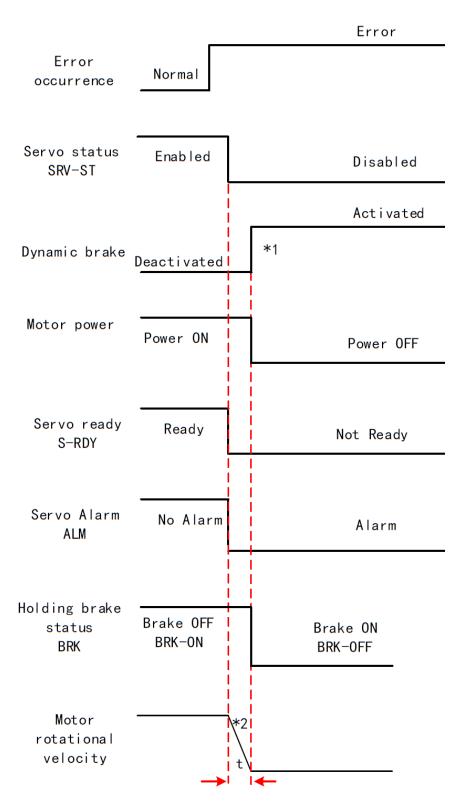
3. Servo stopping method is as defined in Pr5.06; braking torque in opposite direction to decelerate the motor is as defined in Pr5.11. Deceleration time t is determined by whichever comes first between time set in Pr6.14 and time needed for motor to drop below velocity set in Pr4.39. After deceleration time t, dynamic braking will be off and holding brake signal will be set to OFF (Holding brake is activated. Although BRK-OFF signal is valid, actual activation of holding brake is dependent on whether the motor comes with holding brake).

4. BRK-ON signal doesn't indicate the activation of holding brake but the validation of the signal. Holding brake is not applied when BRK-ON signal is valid. Same idea goes for BRK-OFF signal.



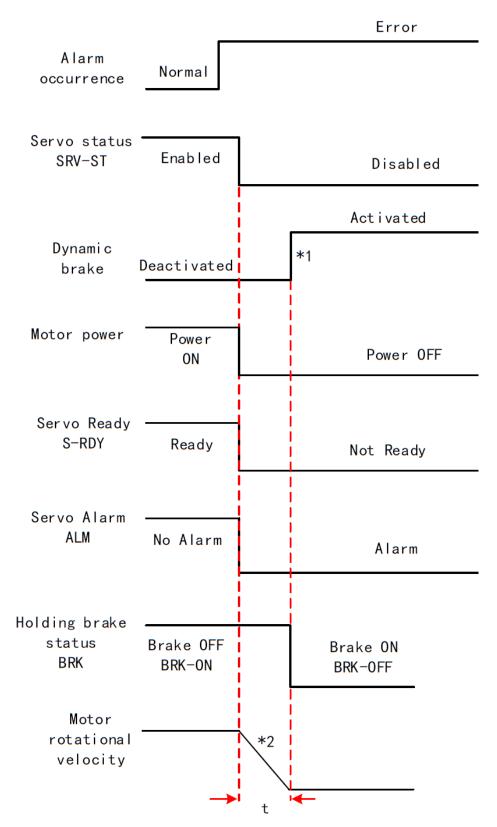
Stopping when alarm occurs – Sequence Diagram

Servo braking method. Status after stopping: Dynamic braking



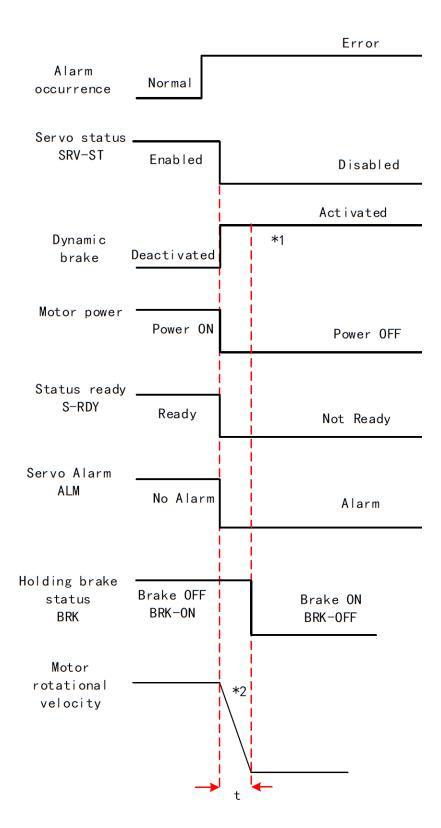


Free stopping method. Status after stopping: Dynamic braking



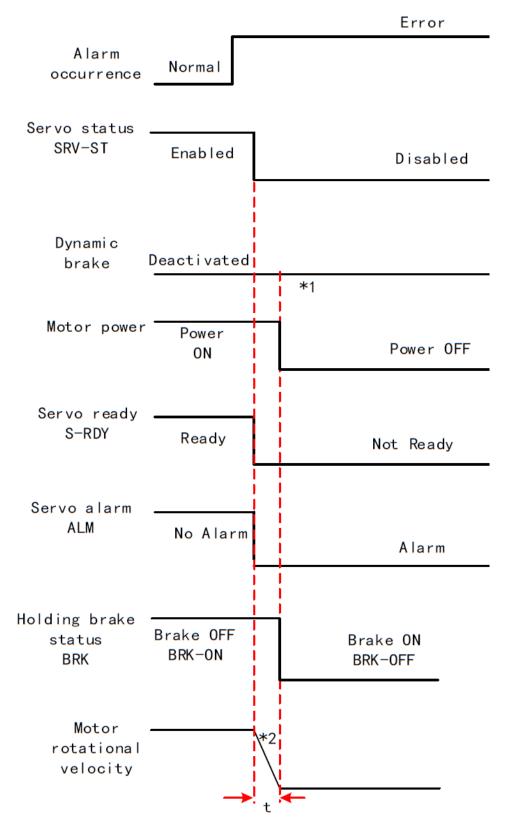


Dynamic braking method. Status after stopping: Dynamic braking

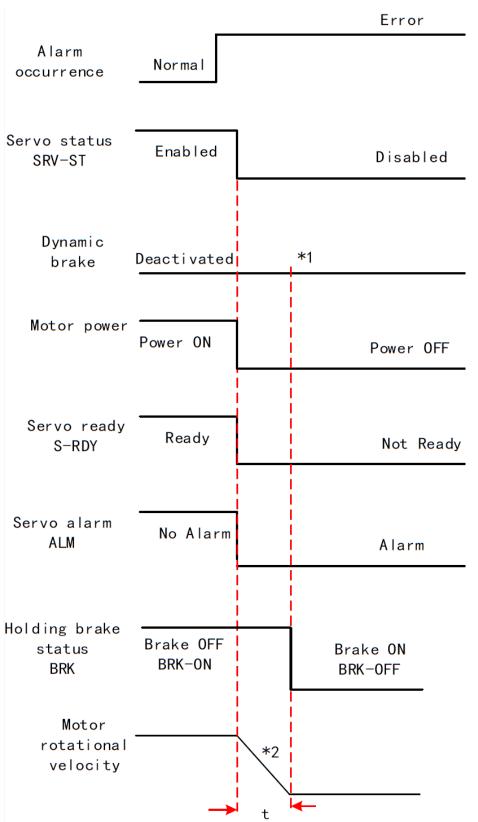




Servo braking method. Status after stopping: Free moving



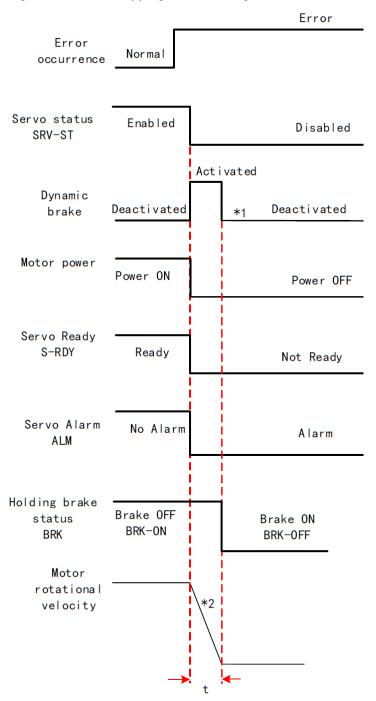




Free stopping method. Status after stopping: Free moving



Dynamic braking. Status after stopping: Free moving



** 1. Status after stopping is as defined in Pr5.10.

2. Servo stopping method is as defined in Pr5.10. Deceleration time t is determined by whichever comes first between time set in Pr6.14 and time needed for motor to drop below velocity set in Pr4.39. After deceleration time t, dynamic braking will be off and holding brake signal will be set to OFF (Holding brake is activated. Although BRK-OFF signal is valid, actual activation of holding brake is dependent on whether the motor comes with holding brake).

3. BRK-ON signal doesn't indicate the activation of holding brake but the invalidation of the signal. Holding brake is not applied when BRK-ON signal is valid. Same idea goes for BRK-OFF signal.



Alarm clearing - Sequence diagram

		Input couple	er ON			
Alarm clearing A-CLR -	Input coupler OFF					
Dynamic brake	Activated			ſ	Deactivated	
Servo status SRV-ST -	Disabled		*1		Enabled	
					Power ON	
Motor power	Power OFF					
External brake deactivation	Brake ON				Brake OFF	
BRK-OFF Servo ready S-RDY -	Not Ready			Rea	ady	
Servo			N	lo Alarm	1	
alarm ALM _	Alarm		J			
Position, Velocity, Torque Comman	nd No command					Command

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

2. BRK-OFF signal doesn't indicate the deactivation of holding brake but the invalidation of the signal. Holding brake is applied when BRK-OFF signal is invalid.



4.3 Front Panel

Servo Drive front panel consists of 5 push buttons and a 8-segments display

. Can be used for displaying of status, alarms, functions, parameters setting and auxiliary functions.



Buttons and functions

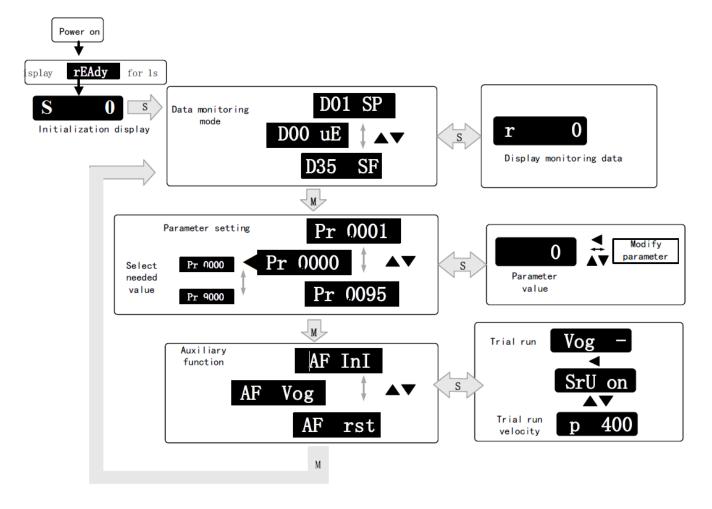
Label	Symbol	Function	
Display	/	Consists of 5 push buttons and a 8-segments display	
Mode 1. Data monitoring mode : To values 2. Parameters setting mode		 Parameters setting mode : To set parameters Auxiliary functions mode: To operate common functions, such 	
Enter	S	as trial run, alarm clearing To enter or confirm	
Up		To switch between sub-menus / Increase	
Down	▼	To switch between sub-menus / Decrease	
Left		To switch between values	

Front panel



4.4 Panel Display and Operation

4.4.1 Panel Operation



Flow diagram of panel operation

(1) **rEAdY** will be displayed for about 1 second after driver is powered on. Then, automatically enters data monitoring mode and displays initial data value. Otherwise, alarm code will be displayed if error occurs.

(2) Press M key to switch between modes.

Data monitoring mode → Parameters setting mode → Auxiliary functions mode

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

- (3) Press \blacktriangle or \triangledown to select the type of parameters in data monitoring mode. Press S to confirm.



Front Panel Locking

To prevent 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	Motion Studio
Lock	 Set Pr5.35 = 1. Restart driver. Front panel is now locked. 	
Unlock	 Please refer to auxiliary function A F U n L Front panel is now unlocked. 	 Set Pr5.35 = 0. Front panel is now unlocked.

4.4.2 Data Monitoring Mode

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

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	" <mark>r xxxx</mark> " – Motor actual 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	/	" <mark>d xxxx</mark> " – Max torque % " <mark>V xxxx</mark> "- Average load ratio

Data list in data monitoring mode



8	d08FP	Internal command position sum	d08FP	pulse	"xxxx"
9	d09cn	Control mode	d09Cn	/	Position: " <mark>Ct PoS</mark> " Velocity: " <mark>Ct SPd</mark> " Torque: " <mark>Ct trq</mark> "
10	d10Io	I/O signal status	d10 Io	/	-
11	d11Ai	Analog input	d11Ai	V	-
12	d12Er	Alarm cause and record	d12Er	/	" <mark>Er xxx</mark> " Alarm code
13	d13rn	Warning	d13rn	/	" <mark>H xxx</mark> " Warning code
14	d14r9	Regeneration load factor	d14r9	%	"XXX"
15	d15oL	Overload factor	d15oL	%	" <mark>L xxx</mark> " – Motor overload% " <mark>d xxx</mark> " – Driver overload%
16	d16Jr	Inertia ratio	d16Jr	%	"xxx"
17	d17ch	Motor not running cause	d17Ch	/	" CP xxx " Error code
18	d18ic	No. of changes in I/O signals	d18ic	/	"xxx"
19	d19	Internal use	d19	/	" xxxx"
20	d20Ab	CSP position command sum	d20Ab	pulse	" xxxx"
21	d21AE	Single turn encoder data	d21AE	pulse	" <mark>A xxxx</mark> " – motor 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	pulse	" xxxx"
26	d26hy	Motor mechanical angle	d26hy	pulse	" xxxx"
27	d27 Pn	Voltage across PN	d27Pn	V	" xxxx"
28	d28 no	Software version	d28no	/	"d xxx Servo software" "F xx Communication software" "p xxx Servo power rating" "C xx CPLD software"
29	d29AS	Internal usage	d29AS	/	
30	d30NS	No. of times of encoder communication error	d30sE	/	"A xxxxx" – Motor encoder communication error count
31	d31 tE	Accumulated uptime	d31tE	/	" XXXX"
32	d32Au	Automatic motor identification	d32Au	/	"r xxx Motor no." "E xxx Servo no."



33	d33At	Driver temperature	d33At	°C	" <mark>d xxxx</mark> " – driver temperature " <mark>C xxx</mark> " – MCU temperature
34	d34	Servo status	d34	/	"xxx"
35	d35 SF	Internal usage	d35SF	/	"xxxxx"
Descrin	tion of data	a monitoring function			

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





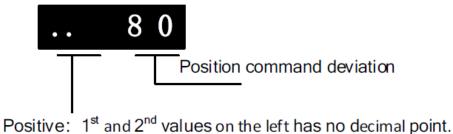




High bit: 1st and 2nd values on the right has two decimal points Low bit: 1st and 2nd values on the right has no decimal point. Positive: 1st and 2nd values on the left has no decimal point. Negative: 1st and 2nd values on the left has two decimal points

1. d00uE Position command deviation

Shows high bit and low bit of position deviation



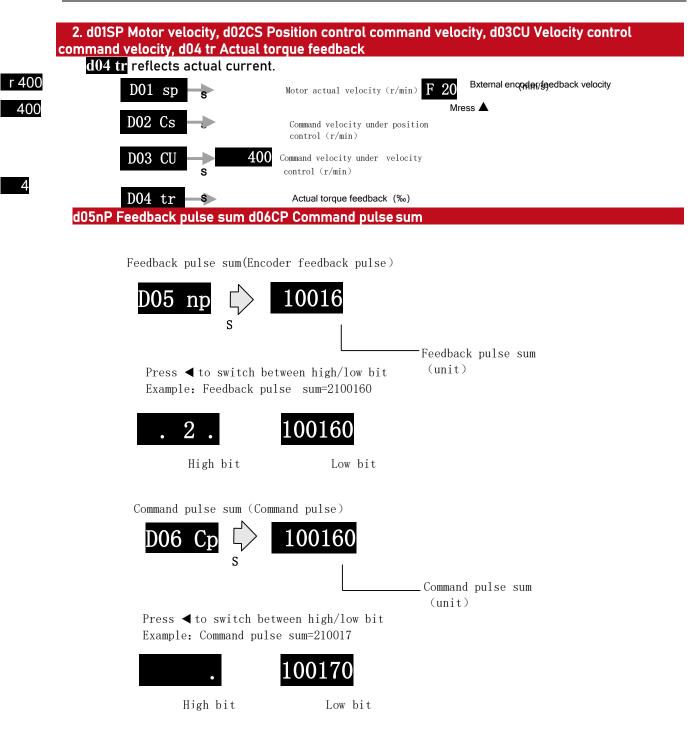
Negative: 1st and 2nd values on the left has no decimal point. Negative: 1st and 2nd values on the left has two decimal points

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

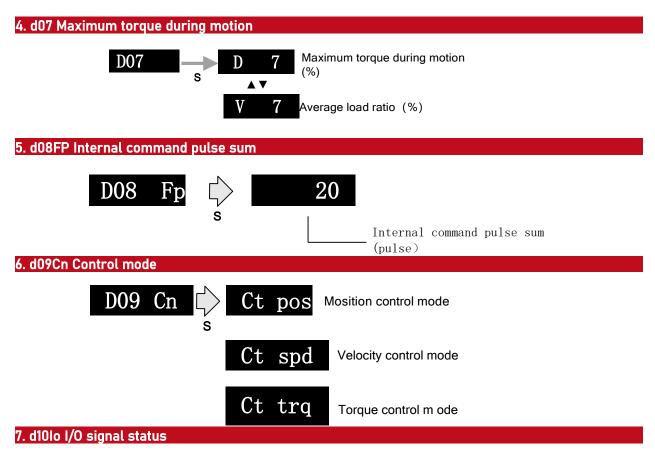


High bit: 1st and 2nd values on the right has two decimal points Low bit: 1st and 2nd values on the right has no decimal point.





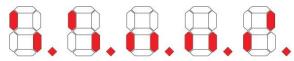




When the top half of the digital tube is lighted, the signal is valid; when the bottom half of the digital tube is lighted, the signal is not valid. Decimal points represent I/O status, input when lighted, output when not lighted.

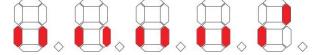
Input: From low to high bit(Right to left) DI1,DI2....DI10. Decimal point is lighted to represent input signals.

In the example below, DI1, DI8 and DI10 input signal is valid; DI2-DI7, DI9 input signal is invalid.



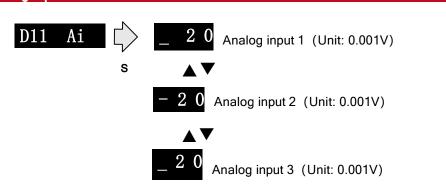
Output: From low to high bit(Right to left) D01,D02....D010. Decimal point is not lighted to represent output signals.

In the example below, DO1 output signal is valid; DO2-DO10 output signal is invalid.

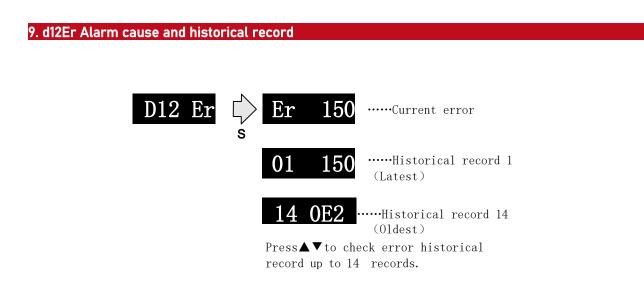




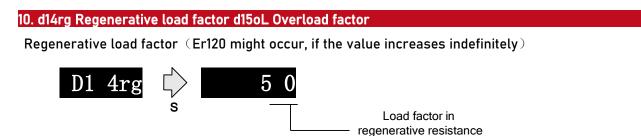
8. d11Ai Analog input



3 analog inputs can be monitored through d11. Left most bar at the top: 1st analog input; at the middle: 2nd analog input; at the bottom 3rd analog input. Points on 4th and 5th value means negative value.



Please refer to the alarm list table in chapter 9 for alarms that can be recorded.

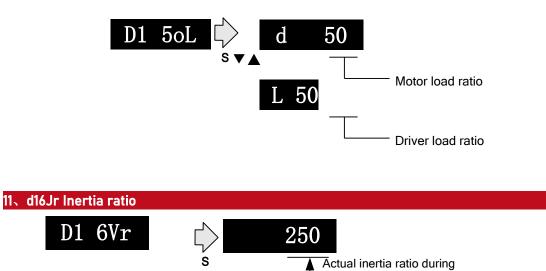


Overload factor (Er100 might occur, if d increases indefinitely

Er101 might occur, if L increases indefinitely)

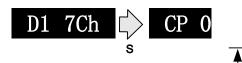
circuit [%]





Use auxiliary function AF_GL or Motion studio to measure the inertia ratio. The result will be shown on D1 6Vr, hold M to write the value in Pr0.04.

12、 d17Ch Motor not running cause



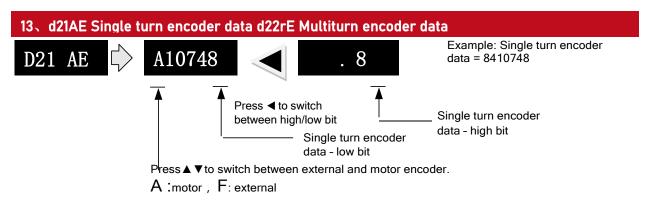
Brror code of motor not running

motion [%]

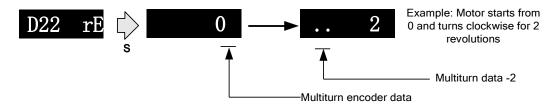
"d17Ch" Motor No Running Cause - Codes & Descriptions

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	Pr5.04 = 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)	Pr5.18=0
CP 7	Position command too low	No command or too low
CP 8	CL valid	Pr5.17=0, deviation counter connected to COM-
CP 9	Zero speed clamp valid	Pr3.15 = 1, Zero speed clamp input is open

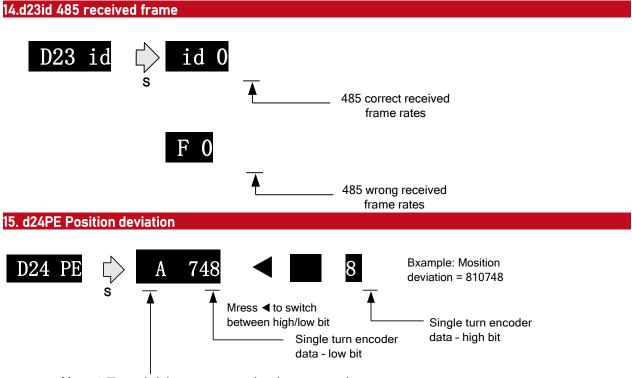




For 23-bit encoder, single turn encoder data = 0~8388607.Each value corresponds to certain position in a single revolution of the rotor, clockwise motion as negative, counter clockwise motion as positive. When counter clockwise single turn data > 8388607, multiturn data +1, clockwise single turn data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

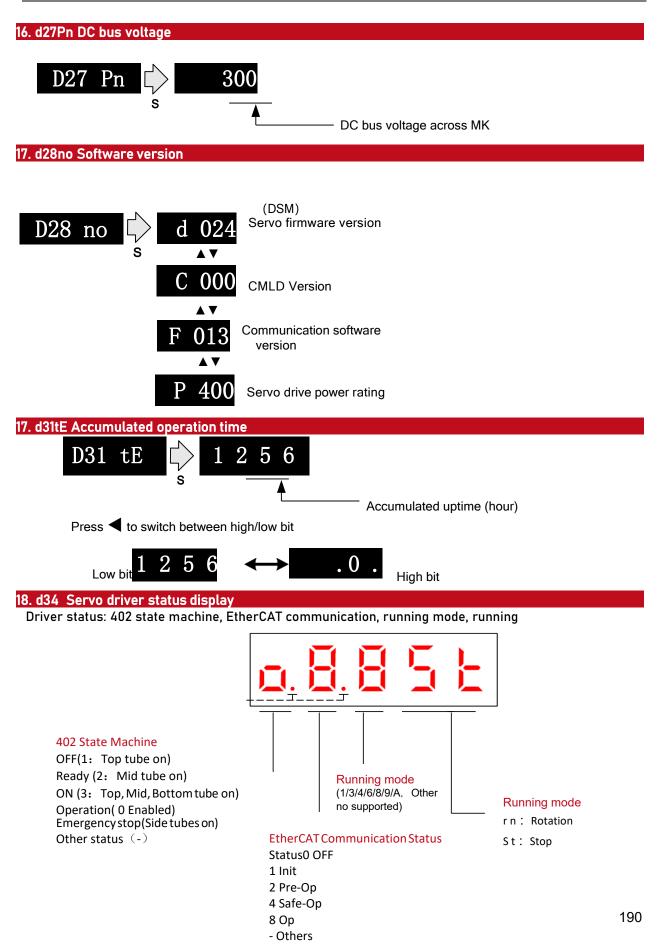


Multiturn encoder data range:-32768~+32767, As no. of revolution goes over range,32767 will jump to -32768、 -32767(counter clockwise); -32768 will jump to 32767、 32766 (clockwise)



Mress \blacktriangle \forall to switch between external and motor encoder. A :motor , F: Full closed loop (command unit), H: Full closed loop (encoder unit)







Display setting at power on

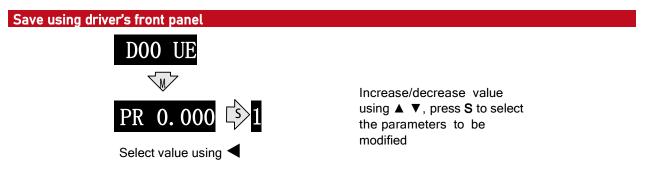
Default setting for initialization display settings at power on is d34, if any other display is required, please set on Pr5.28.

Please refer to Pr5.28 for any display content required on the front panel during initialization

	Label		LED initial s	tatus			Val	id mod	le(s)	P S
"E 20	Rang	e	0~35	l	Jnit		Def	ault		1
r5.28	Byte	length	16bit	A	Attribute	R/W	485	addre	SS	0x0539
	Valid		Immediate							
	To set conten		nt display on t	front	panel of t	he servo (drive	⁻ at ser	vo driv	er power on.
	Value	S	tatus	Value	e	Status		Value		Status
	0	Positi	on deviation	14	Regene rate	erative load	d	28	Software version	
	1	Mot	or speed	15	Ove	rload rate		29	Inte	rnal usage
	2	Position command deviation Velocity control command		16	Inerti	a load rati	0	30	con	Encoder nmunication ure counts
	3			17		e(s) of nor otation	า-	31	Accumulated uptime	
	4	Actual feedback torque		18	No. of	No. of I/O changes		32	Internal usage	
	5	Feedba	ck pulse sum	19	Inte	ernal usage		33	Driver temperature	
	6	Commai	nd pulse sum	20	Absolute	encoder	data	34	Servo status	
	7		k. torque	21	Encode	er single tu data	Jrn	35	Internal usage	
	8		n command quency	22	Encoder	multiturn	data			
	9	Con	trol mode	23	485 re	ceive fran	ne			
	10	I/C) status	24		der positic eviation	on			
	11	Analo	ogue input	25	Inte	rnal usage	e			
	12		n cause & ry record	26	Inte	rnal usage	e			
	13	Wa	rning ID	27	PN	PN Voltage				



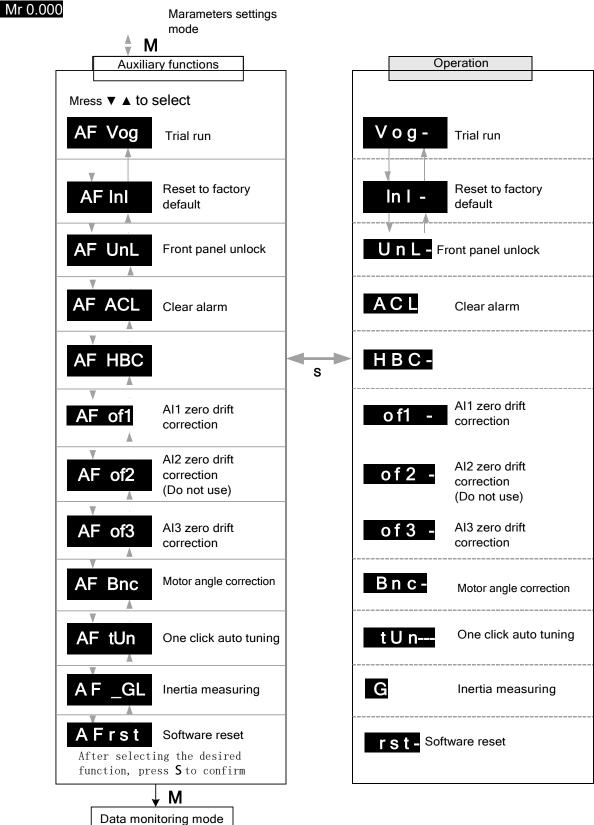
4.5 Parameters saving



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



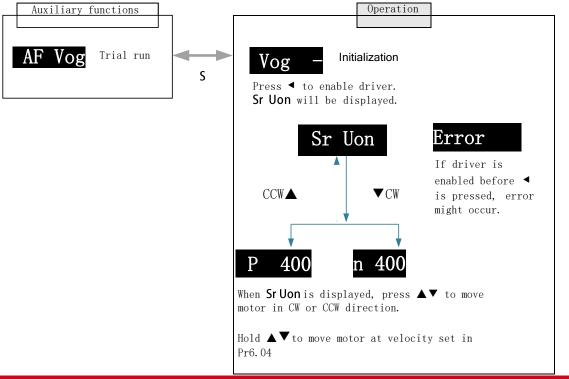
4.6 Auxiliary function





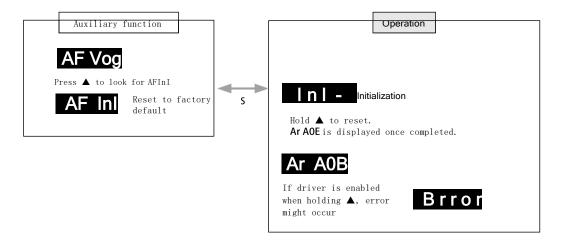
AF Vog Trial run

- > Please disable servo driver before performing any trial run.
- Please don't modify gain related parameters during trial run to prevent any occurrence of mechanical vibrations.
- > Only use trial run when Pr0.01 set to 0, 1, 6.
- > Please check Pr6.04 (JOG velocity) and Pr6.25 (JOG acceleration) before running.
- > Press S to exit trial run.

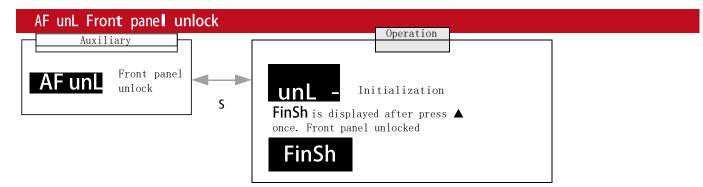


AF Inl Reset to factory default

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

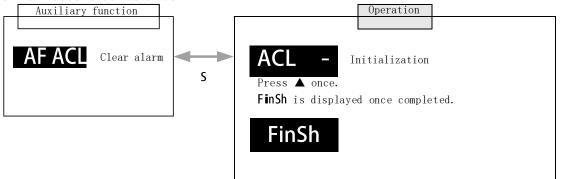




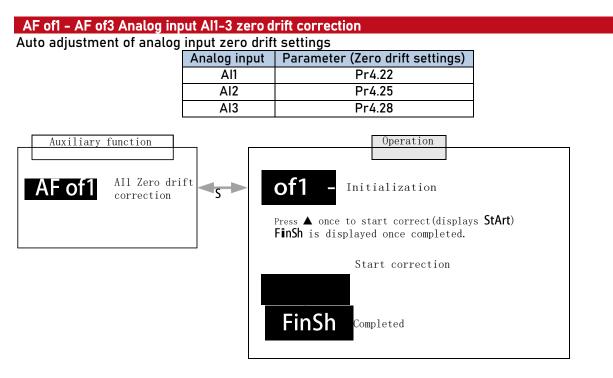


AF ACL Clear alarm

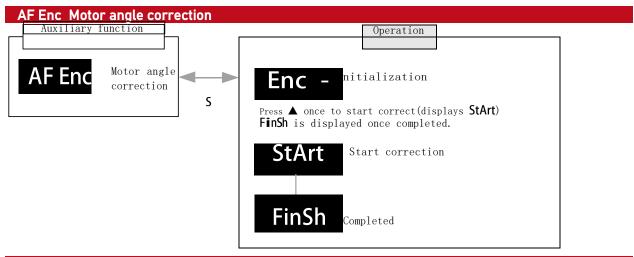
Alarm can be cleared using this auxiliary function but before that, the error needs to be solved and driver needs to be restarted.



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



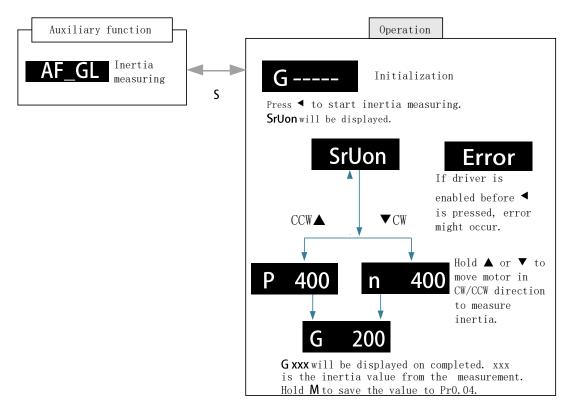




AF_GL Inertia measuring

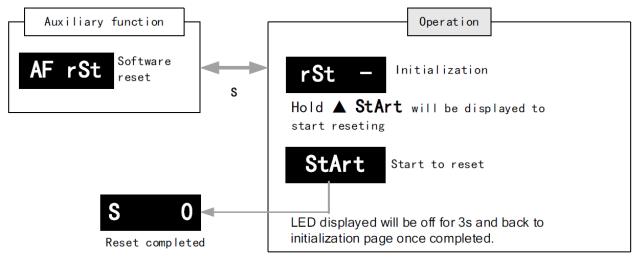
Please make sure: 1. Velocity < 300RPM, average velocity duration < 50ms 2. Acceleration/Deceleration time < 500ms

Press S to exit and disable the driver once completed.



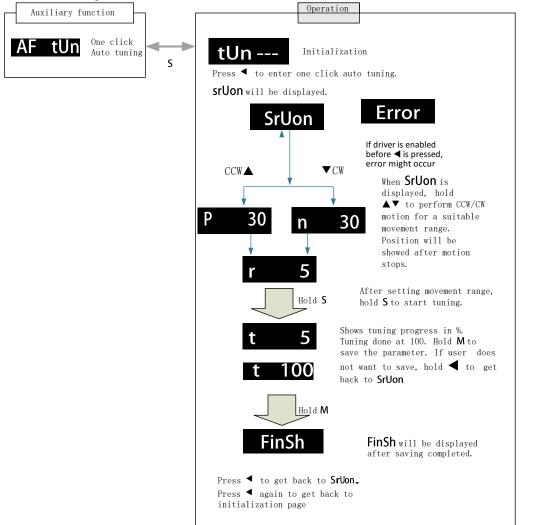


Software reset is used mainly on parameters modification that takes effect only after driver restart.



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.





4.7 Get Started with Driver Operation

4.7.1 Checklist before operation

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

4.7.2 Power On

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.

4.7.3 Trial Run

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

No.	Parameters	Label	Set value	Unit
1	Pr0.01	Control mode settings	0、1、6	/
2	Pr6.04	JOG trial run command velocity	User defined	r/min
3	Pr6.25	Trial run acc-/deceleration time	User defined	ms/1000rpm

Related Parameters

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

Please refer to "Section 4.6 AF_Vog Trial Run" for detailed explanations on how to perform trial run using front panel operation



Chapter 5 Control Mode

Control modes for OSD-HP series AC servo drives can be divided into 3 categories: Position control mode, Velocity control mode and Torque control mode. RS models also come with a hybrid control mode which is a combination of any 2 modes which are above.

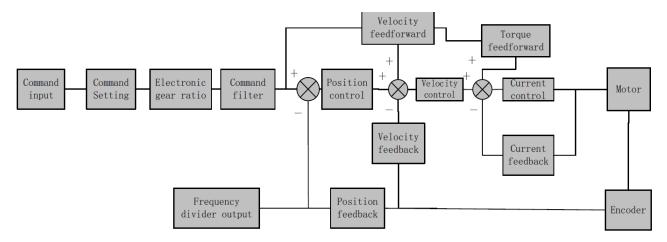
- Position control mode determines position through pulse count. External input pulse frequency determines rotational speed, mainly through motion controller, control card (5V pulse), PLC (24V pulse). Due to the ability of position control mode to control velocity and position tightly, it is usually use in positioning devices. It is the most widely used control mode for servo drives.
- Velocity control mode controls rotational speed through digital I/O or communication command settings. Mainly use in application where speed stability is required.
- Torque control mode is used in applications where forced applied on production material is restricted, mainly winding or scrolling devices. For example, coil winding machines or optical fiber cable production. Torque settings change according to the coil winding diameter as to maintain stable force output throughout the process.

	Label		Control N	Node Settings		Valid mode(s)	Р	S	т	
Pr0.01 * Range			0~10	Unit	—	Default	0			
	Byte length		16bit	Attribute	R/W	485 address	0x0003			
	Valid		After restart							
			Deseri		1					
	Value st 1 m									
			node	2 nd mode		n 3, 4, 5, 6 combi			node,	
	$\begin{bmatrix} 0 \end{bmatrix}$	Po	sition			nd 2 nd mode can l				
	2 To 3 Po		elocity	_		rdingly with contr t (C-MODE).	ol mod	e switch	ing	
			orque	—						
			sition	Velocity	C-MODE: Invalid, select 1 st mode.					
	4	Po	sition	Torque		C-MODE: Valid, select 2 st mode. Please allow some time in between moc switching commands.				
	5	Ve	elocity	Torque						
				Position Pr0.22=1	 Please set Pr0.01 = 6 to switch to other modes from PR mod, then set 2nd mode 					
	PR interr 6 comman control			Velocity Pr0.22=1	using Pr0.22.			,		
			ntrol	Torque Pr0.22=2	C-MOL	DE is defaulted to	Norma	ally Opei	n	
	7~10	Re	served							



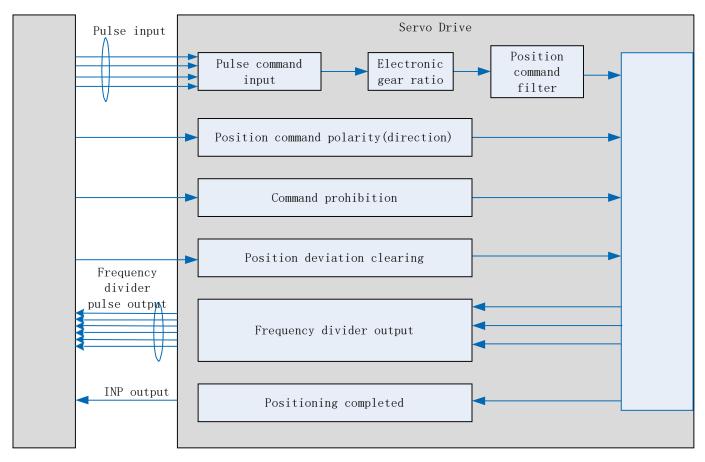
5.1 Position control

Position control determines rotational speed by frequency of external input pulse and angle of rotation through pulse count using 5V pulse from motion controller, control card or 24V pulse for PLC. Applies where precise positioning is required.



Set Pr0.01 = 0 to activate position control mode.

Please set related servo parameters according with the following diagram.





5.1.1 Pulse input and direction settings

Position command (pulse) input method:

- 1. A and B phase pulse
- 2. Positive/Negative direction pulse
- 3. Pulse count + symbol

Set pulse mode, rotational direction and max. pulse input frequency according to actual need

CN1 Pin	Label	Definition	Description						
1	PUL+24								
3	PUL+	Pulse command input	Low speed pulse direction command input:						
4	PUL-		PUL+ / PUL-: 5V differential input (500KHz)						
2	DIR+24		DIR+ / DIR-: 5V differential input (500KHz)						
5	DIR+	Direction command input	PUL+24 / PUL-: 24V single ended input (200KHz)						
6	DIR-		DIR+24 / DIR-: 24Vsingle ended input (200KHz)						
44	PULSH+	High speed pulse	4MHz high speed pulse command input :						
45	PULSH-	command input	5V differential input						
46	SIGNH+	High speed direction	4MHz high speed direction command input :						
47	SIGNH-	command input	5V differential input						

	Label	Command pulse input selection			Valid mode(s)	Р
Pr0.05	Range	0~1	Unit	—	Default	0
	Byte length	16bit	16bit Attribute R/W		485 address	0x000B
	Valid	After restart				
	Value		D	escriptio	on	
	[0]	Pulse inpu input)	it low speed	channel	(200/500kHz pulse	9
	1	Pulse inpu	ut high speed	d channe	el (4MHz pulse inpu	t)
	Both channels	cannot be us	ed at the sar	ne time.		
	Label	Command p inversion	ulse polarity		Valid mode(s)	Р
Pr0.06	Range	0~1	Unit	_	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0x000D
	Valid	After restart	•			
	rrespondingly.					



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				_	1	nual of O		1 / 10 00	10	
	Label		pulse input m	ode		d mode(s)				
Pr0.07	Range	0~3	Unit	_	Defa		3			
	Byte length	16bit	Attribute	R/W	485	address	0x	000F		
0	Valid	After resta	rt							
Command p	-									
Command Polarity inversion (Pr0.06)	Command pulse input mode settings (Pr0.07)	Comma Mode	Command Pulse Mode			Positive signal Negativ				
[0]	0 or 2	phase pu	90°phase difference 2 phase pulse (Phase A+ Phase B)							
	1	CW puls sequenc CCW pu sequence	e + Jlse		t2 t2		2 t2			
	【3】 Pulse sequence + Directional symbol			t2 t2 t4 t5 t6 H" $t6$ t6						
1	0 or 2	phase p	90°phase Difference 2 phase pulse Phase A + Phase B) CW pulse sequence + CCW pulse sequence		$A = \begin{bmatrix} t \\ A \\ \hline \\ B \\ \hline \\ t \\ t \end{bmatrix} \begin{bmatrix} t \\ \hline \\ \\ \hline \\ \\ t \end{bmatrix} \begin{bmatrix} t \\ \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$					
	1	sequence CCW pu								
	□3		equence + nal symbol							
Command p	oulse input sig	nal max. fr	equency and	min. du	ration	needed				
Command	l pulse input ii	nterface	Max. Frequenc y	Min. dı t1	t2	t3	(µ⊔s) t4	t5	t6	
Dule -	Differer	itial drive	500 kHz	2	1	1	1	1	1	
Pulse	Open c	ollector	200 kHz	5	2.5	2.5	2.5	2.5	2.5	
sequence interface	High sp differen	eed tial drive	4Mhz	0.25	0.125		0.125		0.125	
Please set >0.1µs for the duration between rising and 1 revolution with 2500 pulses 2-phase pulse input whe 1 revolution with 10000 pulses 1-phase pulse input wh					7=0 or 07=1 o	2, Pr0.08 r 3, Pr0.08	= 10000 3 = 1000);)0	al.	
	Label		mand pulse inp		-	Valid mo	de(s)	Р		
Pr5.32	Range	0~8000	Unit	kH		Default		4100		
113.32	Byte length	16bit	Attribute	e R/V	V	485 addr	ess	0x0541		
	Valid	Immediate								
Please set the max. frequency required for command pulse input. Er1B0 will occur, if command pulse input frequency exceeds Pr5.32.									, if	



5.1.2 Electronic Gear Ratio

To realize correspondent motor rotational angle to arbitrarily set input command input by multiplying pulse command input from controller and coefficient of frequency divider/multiplier. Motor might not reach target velocity due to insufficient pulse output from controller. This function can be used to solve this issue by increasing pulse command frequency.

- 1. When Pr0.08 = 0, Pr0.09 and Pr0.10 will be valid. Other than that, Pr0.08 set value will be valid.
- 2. OSD-H series supports 2 independent sets of electronic gear ratio. The 2 sets can be switch by delivering a command frequency divider/multiplier input DIV1. Both sets of electronic gear ratio is set up using Pr0.08, Pr0.09 and Pr0.10; Pr5.00, Pr5.01 and Pr5.02.

		1st command				Р	S	Т		
	Label	revolution	puloo oouni	P 01	Valid mode(s)					
	Range	0-67100864	Unit	PULSE	Default	10000				
Pr0.08	Byte length	32bit	Attribute	R/W	485 address	H: 0x0010				
		0_01				L: 0x00				
	Valid	After restart								
	Control will affe	ted if value set	is too low F	rr1b1 mi	ght occur if value	< 500				
	(1) Pr0.08 valid	when \neq 0: Moto	or revolution	= input pi	ulse count / [Pr0.0	8 value]				
	(2) Pr0.08 invali				•					
		4.4	6							
	Label	1st command		-	Valid mode(s)	Р				
	Range	divider/multipl 1~214748364		Default	1		L			
Pr0.09	Byte length	32bit	Attrib	R/W	485 address	H: 0x00	10			
	Byte length	3201	ute		405 audiess	L: 0x00				
	Valid	After restart	ato							
	Valid when Pr0.		refer to desc	ription in	Pr0 10					
		1st command		Р						
	Label	divider/multiplier denominator			Valid mode(s)					
	Range	1~214748364			Default	1				
Pr0.10	Byte length	32bit	Attrib	R/W	485 address	H: 0x00	14			
			ute			L: 0x0015				
	Valid	After restart								
	1. Settings:									
		mand pulse inpu								
		lse count after f		vider/mult	iplier: Y					
		lse count per re	volution: Z							
	(4)Motor revolu									
	2. Calculation:									
	(1) X, Y									
	-	.09 / Pr0.10			randler then 0.24 (4)	C77704C)				
		le value of Pro.	09 and Pr0. I	U to be s	maller than 2 ²⁴ (1)	0///210)	•			
	(2) Z	0 h it we at a w	7-023-000							
		23-bit motor: 2	$2 = 2^{23} = 8388$	8008						
	(3) Y, Z, W									
	W = Y / Z	onnot ho avera	ntood if from	uonov div	idor/multiplior roti	a ia aat ta	ovtror	m 0		
		annot be guara might occur if \		uency div	vider/multiplier rati		extrer	ne		
	values. EITIDT	might occur if t	vv > 500.							



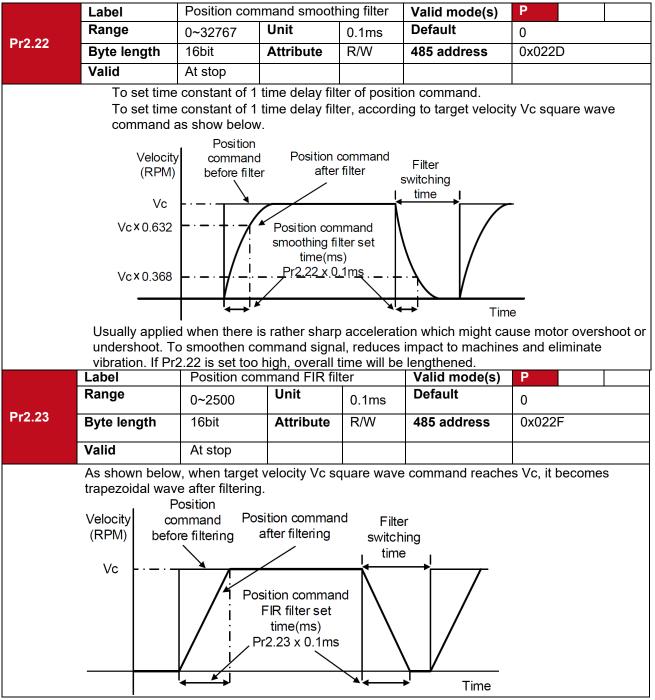
5.1.3 Position command filter

Position command filter is to filter position command after electronic gear ratio frequency dividing/multiplying. Including position command smoothing filter and position command FIR filter.

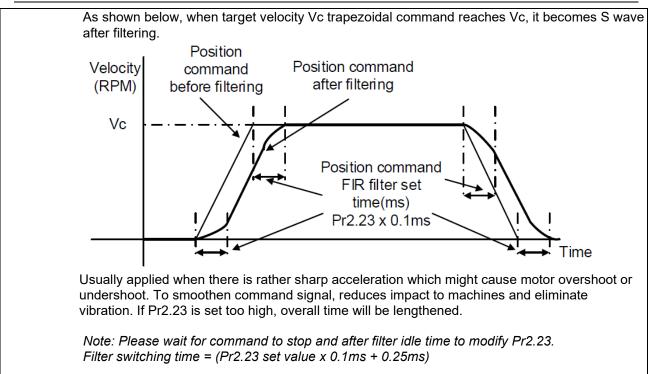
Position command filter should be added for the following cases:

- 1. Position command pulse from controller has not yet to undergo acceleration/deceleration (with steep acceleration/deceleration).
- 2. Low command pulse frequency
- 3. Electronic gear ratio = 10 times or above

Position command filter can smoothen position command and motor rotation will be more stable





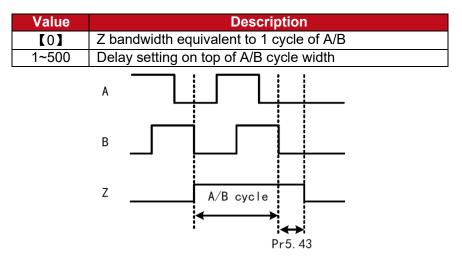


5.1.4 Frequency divider output

Frequency divider output indicates position command pulse or encoder feedback position pulse which is A and B phase pulse output.

**Encoder Z-signal width \geq 62.5ms, or equivalent to an A/B signal cycle. If frequency divider output Z-signal width has to be widen, set through Pr5.43.

*When Pr5.43 = 0, frequency divider Z-signal width is similar to width of single A/B cycle. If $Pr5.43 = 1 \sim 500$, set delay based on A/B cycle width.





Related parameters

	Label	Encoder ou revolution	tput pulse cou	int per	Valid mode(s)	Р	S	Т
Pr0.11	Range	1~32767	Unit	P/r	Default	2500		
	Byte leng	th 16bit	Attribute	R/W	485 address	0x0017		
	Valid	After restar	t					
	If Pr0.11 =	= 1000, encoder o	lifferential outp	out signal p	er revolution = 40	000 pul:	ses	
	Label	Pulse outpu	ut logic inversi	on	Valid mode(s)	Ρ	S	Т
D=0.40	Range	0~1	Unit		Default	0		
Pr0.12	Byte leng	th 16bit	Attribute	R/W	485 address	0x0019		
	Valid		ter restart					
	pulse logic		B logic and output source from encoder pulse output. I change the relation between Phase A and Phase B logic inversion					hase
	Pr0.12	Phase B logic	CCW direc	tion	CW direction			
	[0]	Notingented	A-phase		A-phase			
	[0]	Not inverted	B-phase					
	[4]		A-phase					
	[1]	Inverted	B-phase		B-phase			

	Label	Frequency div polarity	ider output – Z-	signal	Valid mode(s)	Р	S	Т
Pr5.42	Range	0~7	Unit	—	Default	0		
	Byte length	16bit	Attribute	R/W	485 address	0x05	555	
	Valid	Disabled						
	Bit	Polarity		De	scription			
	Bit0	0 = Positive	Z polarity settir	ng of frequ	uency divider output	and		
	DILU	1 = Negative	position compa	arison				
		0 = Positive	Only valid in p	osition co	mparison.			
	Bit1	1 = Negative	Polarity setting position compa		ase A frequency div put	ider as		
	Bit2	0 = Positive	Only valid in po Polarity setting position compa	when ph	ase B frequency div	ider as		

	Label	Frequency divid	der output so	ource	Valid mode(s)	Ρ	S	Т
D+E 44	Range	0~4	Unit	—	Default	0		
Pr5.44	Byte length	16bit	Attribute	R/W	485 address	0x05	59	
	Valid	After restart						
			•					
	Value		Desc	ription				
	【0】	Position feedbac	ck of encode	r #1(moto	r encoder)			
	1	Reserved						
	2	Reserved						
	3	Pulse input com	mand positio	n synchro	onous output;			
			laam mat avai	مائ ملماما	te un e el e			



5.1.5 Positioning completed INP signal output

INP signal output will be valid when position deviation is within the range when positioning is completed. Set unit in Pr5.20.

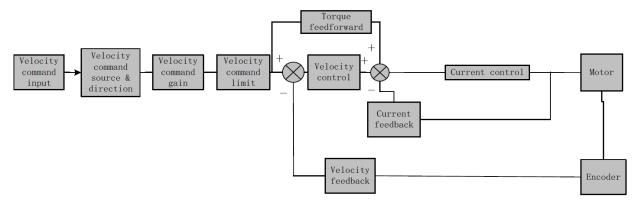
oompiotoe	Label	Positioning co	mplete ra	nge		Valid mode(s)	Ρ
Pr4.31	Range	0~ U 10000	nit	Pr5.21	set unit	Default	20
14.01	Byte length	16bit A	ttribute	R/W		485 address	0x043F
	Valid	Immediate					
	signal will be v	valid once positi	on is com	blete wit	hin the r	pleted output sign ange of deviation nand unit (pulse)	n set.
	Label	Positioning co	mplete ou	tput sett	ing	Valid mode(s)	Ρ
	Range	0~4	Unit		_	Default	1
Pr4.32	Byte length	16bit	Attribu	te R/	W	485 address	0x0441
	Valid	Immediate					
	To set condition	ons for INP1 out	put signal	to be va	alid		
	Value	Positioning					
	0					i is smaller than F	
	1	Signal valid w smaller than		is no po	osition c	ommand and pos	sition deviation is
	2					ommand, zero-sp ositional deviatior	
	3					ommand and pos vithin the time set	sition deviation is in Pr4.33 otherwis
	4	· †					
	4	in Pr4.33.	/hen there				er the delay time se sitional deviation is
	4 Label	in Pr4.33. Signal valid w	/hen there Pr4.31.	is no po			-
		in Pr4.33. Signal valid w smaller than l	/hen there Pr4.31.	is no po	osition c	ommand and pos	sitional deviation is
Pr4.33	Label Range Byte length	in Pr4.33. Signal valid w smaller than I INP positioning 0~15000 16bit	/hen there Pr4.31. g delay tim	is no po ne 1m:	osition c	ommand and pos	sitional deviation is
Pr4.33	Label Range Byte length Valid	in Pr4.33. Signal valid w smaller than INP positioning 0~15000 16bit Immediate	/hen there Pr4.31. g delay tim Unit	is no po ne 1m:	osition c	ommand and pos Valid mode(s) Default	sitional deviation is
Pr4.33	Label Range Byte length	in Pr4.33. Signal valid w smaller than I INP positioning 0~15000 16bit Immediate 4.32 = 3.	/hen there Pr4.31. g delay tim Unit Attribut	is no po ne 1ms te R/	s W	ommand and pos Valid mode(s) Default	sitional deviation is
Pr4.33	Label Range Byte length Valid Valid when Pr Set value	in Pr4.33. Signal valid w smaller than I INP positioning 0~15000 16bit Immediate 4.32 = 3. Positioning c	vhen there Pr4.31. g delay tim Unit Attribut	is no po ne 1ms te R/ L signal	s W	ommand and pos Valid mode(s) Default 485 address	sitional deviation is 0 0x0443
Pr4.33	Label Range Byte length Valid Valid when Pr	in Pr4.33. Signal valid w smaller than I INP positioning 0~15000 16bit Immediate 4.32 = 3. Positioning c Indefinite dela	vhen there Pr4.31. g delay tim Unit Attribut	is no po ne te R/ I signal gnal ON	S W until ne	ommand and pos Valid mode(s) Default 485 address	sitional deviation is 0 0x0443



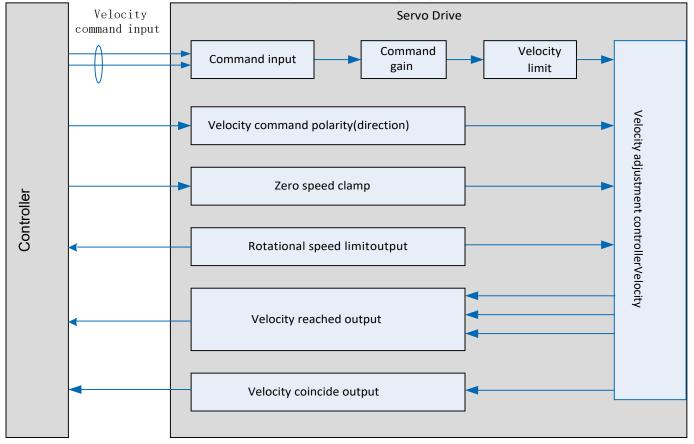
5.2 Velocity control mode

Velocity mode precisely controls motor rotational speed/direction using analog velocity command or internal related parameters. There are 4 types of velocity control modes for OSD-HP series AC Servo Drives: Analog control, internal velocity 4 speeds, internal velocity 8 speeds and analog + internal velocity control.

Set Pr0.01 = 1 to activate velocity control mode.



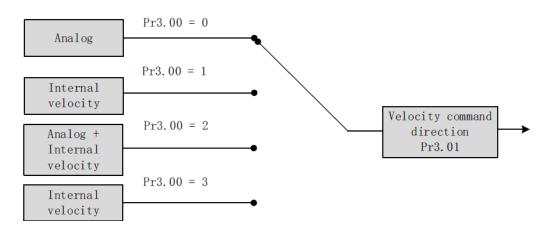
Please set related servo parameters according with the following diagram.





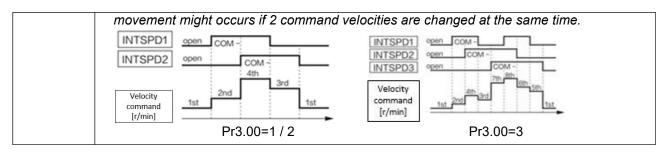
5.2.1 Velocity command input control

Set velocity control mode in Pr3.00



	Labe		Velocity inte	rnal/external s	switching	Valid mode(s)	S
	Rang	е	0~3	Unit	_	Default	1
Pr3.00	Byte	length	16bit	Attribute	R/W	485 address	0x0301
	Valid		Immediate				
	Conne	ct to the r	ight DI to con	trol internal co	ommand	velocity settings.	
	Value				Velocity	y settings	
	0	Analog -	Velocity com	mand (SPR)			
	[1]	Ŭ	,		beed (Pr	3.04~Pr3.07)	
	2	Internal v		, i		r3.04~P3.06)、An	alog velocity
	3			ity settings 1s	t – 8th sp		11)
	Value	Interna	l command	Internal com		Internal command	Velocity command
			locity 1 SPD□1)	velocity (INTSPD		velocity 3 (INTSPD3)	
			OFF	OFF			1 st speed
	1		ON	OFF		No effect	2 nd speed
			OFF	ON		NO Ellect	3 rd speed
			ON	ON			4 th speed
			OFF	OFF			1 st speed
			ON	OFF			2 nd speed
	2		OFF	ON		No effect	3 rd speed
			ON	ON			Simulated speed
			Similar to	Pr3.00=1		OFF	$1^{st} - 4^{th}$ speed
			OFF	OFF		ON	5 th speed
	3		ON	OFF		ON	6 th speed
			OFF	ON		ON	7 th speed
			ON	ON		ON	8 th speed





Velocity command direction settings

Switch velocity command direction using I/O. Assign VC-SIGN to corresponding DI terminal, velocity command direction will be in accordance to DI signal.

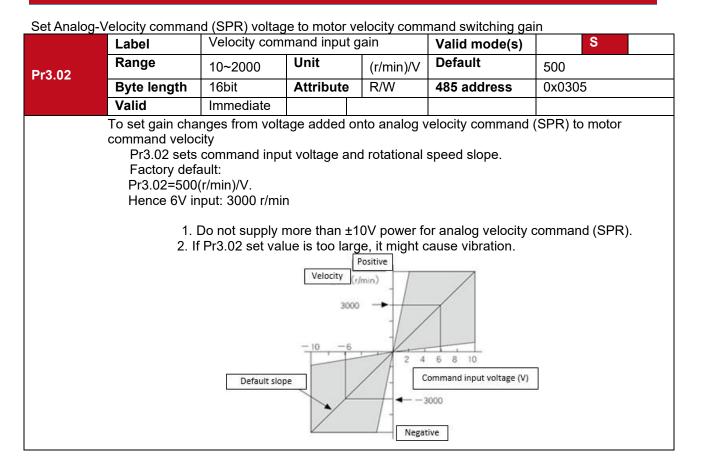
	Label	Velocity comma direction select		I	Val	id mode(s)		S
Pr3.01	Range	0~1	Unit	_	Def	ault	0	
	Byte length	16bit	Attribute	R/W	485	address	0x0303	
	Valid	Immediate						
	To set positiv	e/negative direction	of velocity c	ommand		-		
	Value	Velocity settings (Analog or intern velocity)	al sign sel	y comma ection (\ IGN□)		Velocity co directi		
	【0】	+	No	o effect		Positi	ve	
		_	No	o effect		Negat	ive	
	1	No effect		OFF		Positi		
		No effect	1	⊐ON		Negat	ive	

Velocity command input inversion

Set Analog-∖	elocity comman	d (SPR) voltag	ge polarity			
	Label	Velocity com	mand input ir	version	Valid mode(s)	S
Pr3.03	Range	0~1	Unit	_	Default	0
F13.03	Byte length	16bit	Attribute	R/W	485 address	0x0307
	Valid	Immediate				
	To set voltage p	plarity of analo	g velocity co	mmand.		
	Only valid when	Pr3.01 = 0. W	hen Pr3.01 =	1, rotation	al direction is only	related to VC-SIGN.
	Value			Motor rotat	tional direction	
	【0】	Not	∏ Positiv	re voltage∫	\rightarrow \lceil Positive direction	ction
		inversed	∫ Negati	ve voltage	ightarrow $ ightarrow$ Negative dir	rection
	1	Inversed	d 「Positiv	re voltage∫	\rightarrow Positive direct	ction
			∫ Negati	ve voltage	floor ightarrow $ floor$ Negative dir	rection



Velocity command input gain

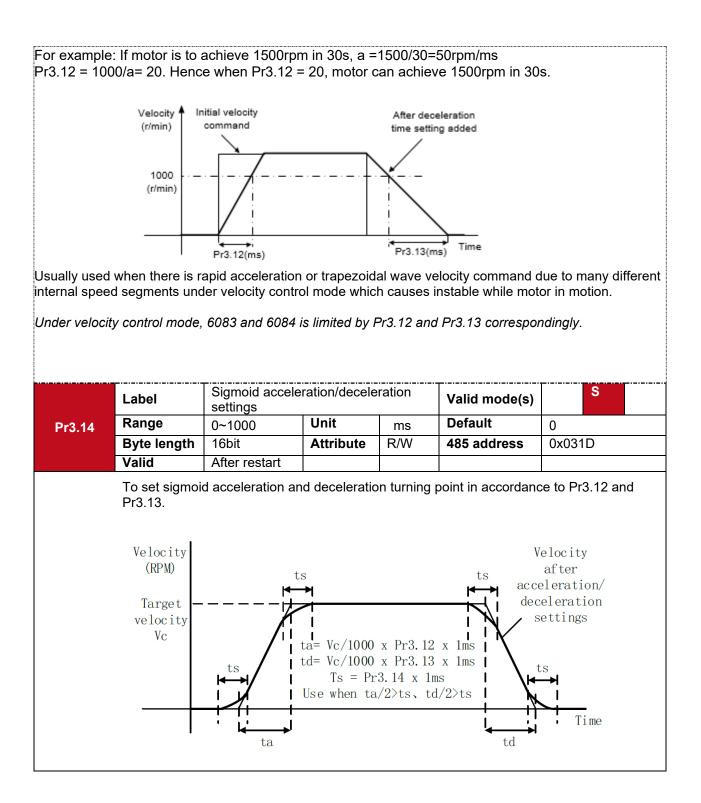


5.2.2 Velocity command acceleration/deceleration

Acceleration/Deceleration is added onto velocity command input to control velocity. This function is valid when entering step-like velocity command or internal velocity settings is used to realize motor soft start. Use Sigmoid acceleration/deceleration to reduce vibration and impact due to changes in velocity.

	Label	Acceleration	time settings		Valid mode(s)	S
Pr3.12	Range	0~10000	Unit	ms/ (1000rpm)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x0319
	Valid	Immediate				
	Label	Deceleration	time settings		Valid mode(s)	S
Pr3.13	Range	0~10000	Unit	ms/ (1000rpm)	Default	100
	Byte length	16bit	Attribute	R/W	485 address	0x031B
	Valid	Immediate				
		D/a		,	d. pm/ms], accelerati	on time = <i>t</i> [ms]

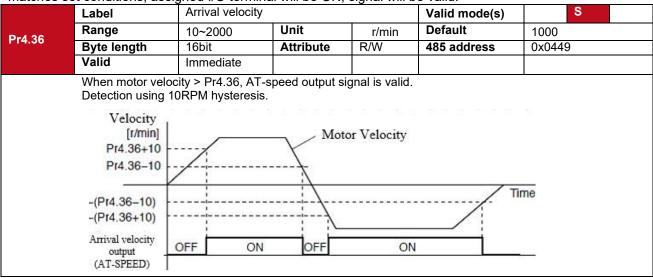






5.2.3 Velocity reached signal AT-SPEED output

Velocity reached signal AT-SPEED output will be valid when motor velocity reached set speed in Pr4.36. This output function can be assigned through I/O configurations, please refer to Pr4.10. When velocity matches set conditions, assigned I/O terminal will be ON, signal will be valid.



5.2.4 Velocity coincidence V-COIN signal output

V-COIN signal output will be valid when velocity command (before acceleration/deceleration) coincides with motor velocity. Velocity is considered to be coincided if the difference between velocity command before acceleration/deceleration from servo drive and motor velocity is within the value set in Pr4.35. This output function can be assigned through I/O configurations, please refer to Pr4.10. When velocity matches set conditions, assigned I/O terminal will be ON, signal will be valid.

In Position signal in PV mode is in synchronization with V-COIN signal.

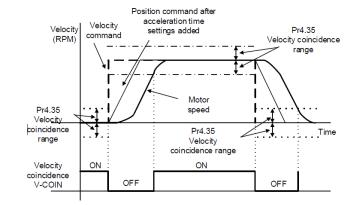
	Label	Velocity coincide	nce range		Valid mode(s)	S
D-4.25	Range	10~2000	Unit	r/min	Default	50
Pr4.35	Byte length	16bit	Attribute	R/W	485 address	0x0447
	Valid	Immediate				

If the difference between velocity command and motor actual speed is below Pr4.35, Velocity coincidence (V-COIN) output signal valid.

Due to 10RPM hysteresis:

Velocity coincidence output OFF -> ON timing (Pr4.35 -10) r/min Velocity coincidence output

ON -> OFF timing (Pr4.35 +10) r/min





5.2.5 Zero Speed Clamp

Forced set velocity command to 0 using zero speed clamp to avoid servo axis from crawling at low velocity.

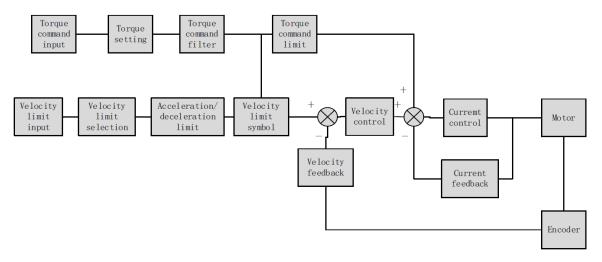
	Label	Zero speed	clamp function se	election	Valid mode(s)	S
Pr3.15	Range	0~3	Unit	_	Default	0
115.15	Byte leng	jth 16bit	Attribute	R/W	485 address	0x031F
	Valid	Immediate				
		-				
	Value		Zero	o speed cla	amp function	
	0	Invalid: zero spee	d clamp deactivat	ed		
	1	Velocity command valid.	l is forced to 0 wl	nen the ze	ro speed clamp (ZEF	ROSPD) input signal is
	2	Velocity command	l is forced to 0 wl	nen actual	velocity is lower that	an Pr3.16.
	3	Includes condition	is from 1 and 2			
	Label	Zero speed	clamp level		Valid mode(s)	S
D-0.40	Range	10~2000	Unit	r/min	Default	30
Pr3.16	Byte leng	3th 16bit	Attribute	R/W	485 address	0x0321
	Valid	Immediate				
						is lower than Pr3.16 a

This input function can be assigned through I/O configurations, please refer to Pr4.00.

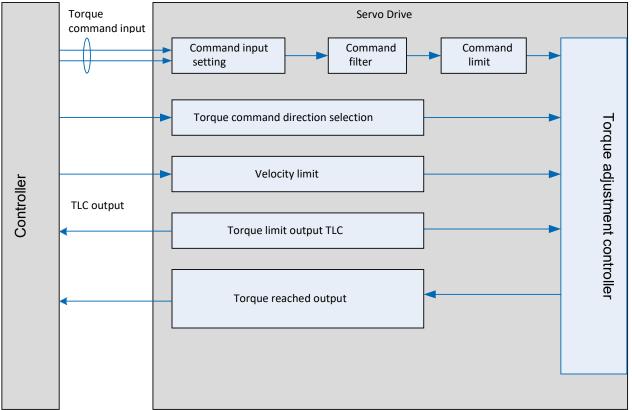


5.3 Torque control

Torque control mode is to the size of motor asserted torque through external analogue input or directly from set value internally. This control mode is applicable where torque is the main control and limiting factor.



Using Motion Studio or front panel on servo drive, set Pr0.01 = 2 to activate torque control mode. Please set related servo parameters according with the following diagram.

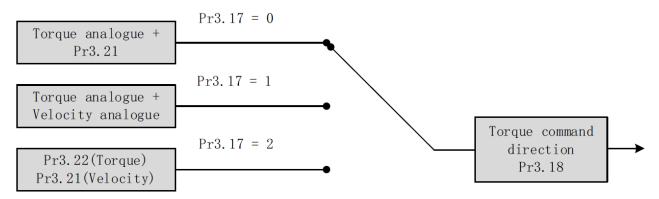




5.3.1 Torque command input control

Torque control mode settings

Torque control mode includes 3 control modes as shown below. Set torque control mode in Pr3.17.



	Label	Torque intern	al/external sw	itching	Valid mode(s)	
D 0 47	Range	0~3	Unit		Default	0
Pr3.17	Byte length	16bit	Attribute	R/W	485 address	0x0323
	Valid	Immediate				
				•		
	Value	Torque	command inj	out	Velocity lir	nit input
	【0】	Analo	og input 3(Al 3))	Pr3.21 se	t value
	1	Analo	og input 3(Al 3))	Analog inpu	ut 1(AI 1)
	2	Pr3	.22 set value		Pr3.21 se	t value

Torque command direction settings

To switch velocity command direction through DI. Assign TC-SIGN signal to corresponding DI terminal and determine velocity command direction through digital input signal.

	Label	Torque commai	nd direction selec	tion	Valid mode(s)		Т
Pr3.18	Range	0~1	Unit	_	Default	0	
F13.10	Byte length	16bit	Attribute	R/W	485 address	0x0325	
	Valid	Immediate					
	To set torque Value	command positive/n	egative direction				
	[0]	TC-SIGN ON/OFF Torque command 「Negative」 →Ne	input「Positive」				
	4	Use TC-SIGN ON	OFF status for to	orque direc	tion		



Torque command input inversion

	Label	Torque command	input inversi	on	Valid mode(s)		
D0.00	Range	0~1	Unit	_	Default	0	
Pr3.20	Byte length	16bit	Attribute	R/W	485 address	0x0329	
	Valid	Immediate					
	Only valid whe	olarity of analog toro n Pr3 _. 18 = 0.	que commano	J.			
			que command		que direction		
	Only valid whe		∫Positive	Motor tor voltage」 -	que direction → [Positive direction → [Negative direction		
	Only valid whe	en Pr3.18 = 0.	∫Positive ∫Negative	Motor tor voltage」 – e voltage」		on∫	

Torque command input gain

To set voltage added on to switching gain of motor torque command from analog torque command(TRQR)

	Label	Torque comma	and input gain	Valid mode(s)		Т
Pr3.19	Range	10~100	Unit	0.1V/100%	Default	30
F13.13	Byte length	16bit	Attribute	R/W	485 address	0x0327
	Valid	Immediate				
	·Unit: (0.1V/1 ·Set input volta torque.		rated output		Torque 300[%]	Positive
					-10 V 8 -6 -4 -2 100 100 -10 V 8 -6 -4 -2 100 -20 Negative	

5.3.2 Torque velocity limit

To set velocity limit in torque mode for safety reasons.

	Label	Velocity limit in	torque mode		Valid mode(s)		Т			
D 0 01	Range	0~10000	Unit	r/min	Default	0				
Pr3.21	Byte length	16bit	Attribute	R/W	485 address	0x032	В			
	Valid	Immediate								
To set velocity limit in torque control mode. Only valid when Pr3.17 = 0 / 2.										
	Label	Torque command			Valid mode(s)		Т			
D 0 00	Range	0~300	Unit	%	Default	0				
Pr3.22	Byte length	16bit	Attribute	R/W	485 address	0x032D	1			
	Valid	Immediate								
	To set torque limit in torque control mode. Only valid when Pr3.17 = 2. Please refer to Pr3.17.									



5.3.3 Torque limit (TL-SEL)

This input function can be assigned through I/O configurations, please refer to Pr4.00. To set torque limiting method.

	Label	Torque limit select	tion		Valid mode(s)	Р	S	Т
D-5 04	Range	0~6	Unit	—	Default	0		
Pr5.21	Byte length	16bit	Attribute	R/W	485 address	0x052B		
	Valid	Immediate						
		Value			Limit			
	ľ	0]		1 st toro	que limit Pr0.13			
		1		2 nd tor				
	2	TL-SEL OFF		Pr0.13				
		TL-SEL ON						
	3~	-4		Reserved				
		5			Pr0.13 \rightarrow Positive torque limit Pr5.22 \rightarrow Negative torque limit			
	Label	2 nd torque limit			Valid mode(s)	Р	S	Т
	Range	0~500	Unit	%	Default	300		
Pr5.22	Byte length	16bit	Attribute	R/W	485 address	0x052D		
	Valid	Immediate						
	Pr5.22 is limite	d by max. torque set	in motor para	ameter.	•			
						D	•	-

	Label	1 st torque limit			Valid mode(s)	Р	S	т
Pr0.13	Range	0~500	Unit	%	Default	350		
	Byte length	16bit	Attribute	R/W	485 address	0x001B		
	Valid	Immediate						
	1 st torque limit is output current.	set according to	ratio percenta	age of moto	r rated current. Do no	t exceed	max driv	rer
	Please refer to Pr5.21 on how to set torque limit.							



5.4 Hybrid Control Mode

Hybrid control mode is for servo drive to be able to switch between different modes during operation. Hybrid control mode consists of the 3 listed below:

- Position-velocity mode
- Position-torque mode
- Velocity-torque mode

Set Pr0.01 to select the hybrid control mode needed through Motion Studio or servo drive front panel.

	Label	C	Control Mode Settings		Valid mode(s)		Р	S T		
Pr0.01	Range	0	~10	Unit	—	Default	0			
P10.01	Byte lene		6bit	Attribute	R/W	485 address	0x0003	3		
	Valid	A	fter resta	rt						
	Value		Descrip	otion						
	value	1 st m	ode	2 nd mode			vination hybrid mode, 1 st and usen accordingly with control			
	[0]	Posit	ion			switching input (C		giy with contro	control	
	2 To 3 Po 4 Po		city			C-MODE: Invalid, select 1 st mode. C-MODE: Valid, select 2 st mode.				
			ue							
			ion	Velocity	 Please allow some time in between mode switching commands. Please set Pr0.01 = 6 to switch to other modes from PR mod, then set 2nd mode using Pr0.22. 					
			ion	Torque						
			city	Torque						
				Position Pr0.22=1	C-MODE is defaulted to Normally Open					
	6	PR inter		Velocity Pr0.22=1						
			Jona Of	Torque Pr0.22=2						
	7~10	Resei	rved							

When Pr0.01 = 3/4/5, please set assign C-MODE mode switching signal to one of the DI terminal and make sure the logic is valid.

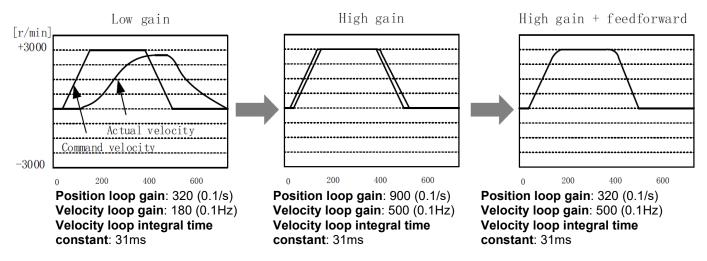
Signal	Set value	Label	Description					
			Pr0.01	C-MODE	Control mode			
				Invalid	Position mode			
	0x5	Control mode	3 -	Valid	Velocity mode			
C-MODE				Invalid	Position mode			
		switching	4	Valid	Torque mode			
			_	Invalid	Velocity mode			
			5 -	Valid	Torque mode			



Chapter 6 Application Case

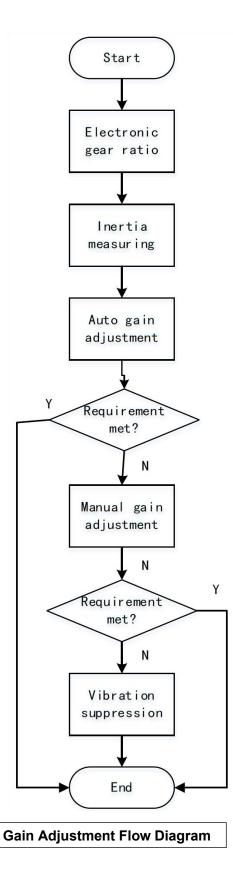
6.1 Gain Adjustment

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.



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







Steps	Functions	Explanation		
Inertia ratio	Online	Motor moves with command from controller, servo driver will automatically calculate load-inertia ratio		
identification	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 Motion Studio. 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) 		
	Basic gain	On top of auto gain adjustment, manually adjust related parameters so that machine can have better responsiveness and following		
	Basic steps	 Gain related parameters tuning under position mode Gain related parameters tuning under velocity mode Gain related parameters tuning under torque mode 		
Manual gain	Gain switching	Gain switching through internal data or external signal. Lower vibration at stop, shorten tuning time, improve command following.		
adjustment	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		
	3 rd gain switching	Base on usual gain switching function. Can be set to switch gain at stopping and reduce positioning time.		
Vibration	Mechanical	Using notch filtering function to suppress mechanical		
suppression	resonance End vibration suppression	resonance. To suppress 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 precise tuning of the servo system. Inertia ratio can be set manually and also be determined automatically through servo driver

- To make sure accurate inertia ratio identification 6.2.1 Max rotational velocity at 400rpm 6.2.2 Acceleration/deceleration time above 100ms
- 6.2.3 Stable load torque without large variation.



Online inertia determination

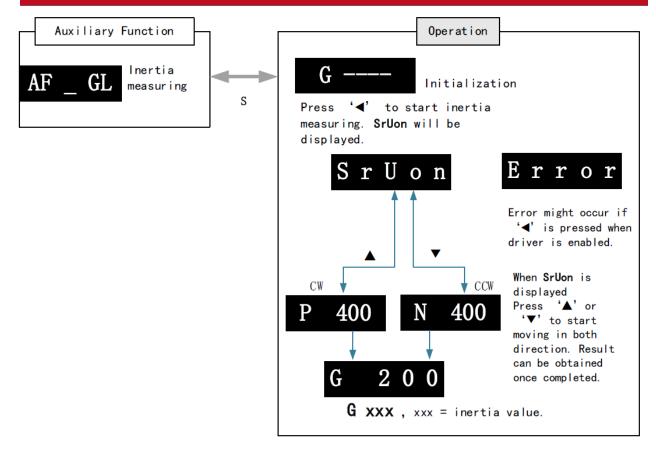
Enable motor using controller. Let motor run at above 400rpm, make sure there are acceleration, constant velocity and deceleration phase during the whole run. Cycle through 2-3 times to calculate load-inertia ratio. Result can be found on the front panel d16 or through Motion Studio system monitoring page. Enter the calculated value into Pr0.04 and save.

Offline inertia determination

Can be achieved through driver front panel or on Motion Studio Please make sure: 1. Servo driver is disabled.

2. Axis is within safe and allowed range and limit switch is not triggered to prevent axis from over travelling.

Auxiliary function to determine inertia on front panel



Steps:

1. Set the trial run velocity **Pr6.04**. 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、 Press S once to enter. "G---" will be displayed on the front panel.
- 4、Press donce to display "StUon"
- 5. Press \blacktriangle or \triangledown once to start to calculate the inertia.

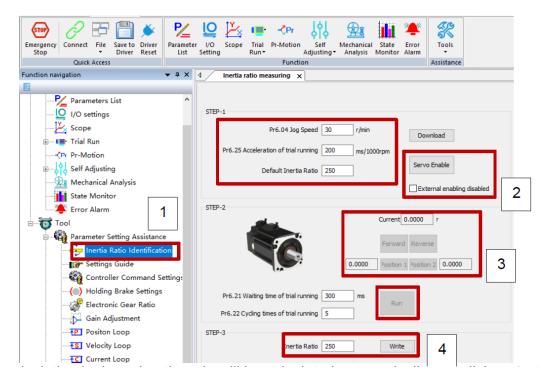
6、After the calculation is done, G **xxx** will be displayed and **xxx** is the value of inertia calculated.

7、Write the corresponding value into Pr0.04. Please refer to for parameter saving on servo driver.



Inertia measuring using Motion Studio

- 1. Start Motion Studio and maneuver to inertia ratio identification page under performance tuning. Set trial run velocity Pr6.04 and acc-/deceleration time Pr6.25, click on 'Upload' to upload parameters to servo driver.
- 2. Tick "Prohibit external enabling" and click on "servo on".
- 3. Click and hold "CCW" to start the motor. Current position will show motor cycles of revolution. Click on POS 1 to save current position as starting point. Click and hold "CW" to start the motor again. Click on POS 2 to save current position as ending point.
- 4. Set the waiting time between each cycle in Pr6.21 and no. of cycles in Pr6.22. Click on 'Run' and motor will run according to the parameters set.



5. After the calculation is done, inertia ratio will be calculated automatically and click on 'write' to enter the calculated value into Pr0.04.



6. Click on "Parameter List" to enter parameters management to check or modify Pr0.04. Then, click on "Save" to save parameters to driver.

rameter I/O Scope Trial List Setting Run	Pr-Motion Functio	Self Mechanical State Error Adjusting → Analysis Monitor Alarm n							
Parameter List 🗙									
Image: Weight of the second	Save	Compare Restore							
II Parameters	Number	Label	AxisA	Min	Max	Defa	Unit	Enable Mode	Remarks
r0.Basic Settings	PA0.00	Model-following bandwi	1	0	5000	1	0.1Hz	Immediately	Null
r1.Gain Adjustment r2.Vibration Suppres	PA0.02	Real time Auto Gain Adj	0x1	0x0	0xFFF	0x1		Immediately	Null
r3.Velocity/Torque C	PA0.03	Real time auto stiffness	70	50	81	70		Immediately	Null
r4.I/O Monitoring Se	PA0.04	Inertia ratio	250	0	20000	250	%	Immediately	Null
r5.Extended Settings	PA0.06	Command polarity inver	0	0	1	0		Poweroff Res	Null
r6.Special Settings	PA0.07	Probe signal polarity set	3	0	3	3		Poweroff Res	Null
r7.Factory Settings	PA0.08	Command pulse counts	0	0	67108	0		Poweroff Res	Null
	PA0.09	1st command frequency	1	1	21474	1		Poweroff Res	Null
	PA0.10	Command frequency m	1	1	21474	1		Poweroff Res	Null
	PA0.11	Encoder pulse output pe	2500	1	32767	2500	P/rev	Poweroff Res	Null
	PA0.12	Pulse output logic invers	0	0	1	0		Poweroff Res	Null
	PA0.13	1st Torque Limit	350	0	500	350	%	Immediately	Null
	PA0.14	Excessive Position Devia	30	0	310	30	0.1rev	Immediately	Encoder unit
	PA0.15	Absolute Encoder settings	0	0	32767	0		Poweroff Res	Null
	PA0.16	Regenerative resistance	100	25	500	100	Ohm	Immediately	Null
	PA0.17	Regenerative resistor po	50	20	5000	50	W	Immediately	Null
	PA0.19	Friction compensation s	0	0	1000	0		Immediately	Null

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.

	Label	Inertia ratio			Valid mode(s)	Р	S	Т
Pr0.04	Range	0~20000	Unit	%	Default	250		
	Byte length	16bit	Attribute	R/W	485 address	0x00	09	
	Valid	Immediate						
	Pr0.04=(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, Pr0.04 can be left unfilled but optimal setting of Pr0.04 could improve system performance							is sa.



Common issues

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

6.3 Easy 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 suppression to fulfill responsiveness and stability needs. At same time, more advanced functions can be applied, for example: Command pulse filter, low frequency vibration suppression, 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 or EtherCAT 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. 		



6.3.2 One-click Tuning

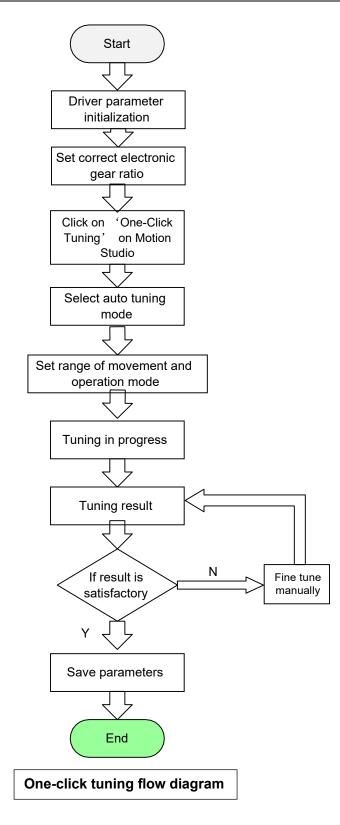
This function is able to automatically tune the most optimal gain parameters for the specific applications after the axis is in operation and learning. Corresponding paths and responsiveness level need to be set before using this function. Please refer to the flow chart below. Parameter will be saved 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 or EtherCAT mode (Not applicable in other modes)			
Others	 Make sure servo drive 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 load is 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 		







6.4 Auto gain adjustment

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 Pr0.02 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 20 times of rotor inertia.
	 Changes in load inertia
Load	 Very low mechanical stiffness
LUau	 If gear backlash is a non-linear property
	- Velocity less than 100r/min or continuously in low velocity mode
	 Acc-/deceleration to 2000r/min within 1s.
Motion	- Acc-/deceleration torque lower than eccentric load, frictional torque.
	\cdot Velocity < 100r/min, acc-/deceleration to 2000r/min within 1s but not longer than 50ms

To enable automatic gain adjustment:

6.4.1 Disable the servo driver.

2. Set Pr0.02 = 0x01/0x11 or 0x02/0x12. Then, set Pr0.03

3. Servo enabled. Run motion as normal to start measuring load properties. Related parameters will be automatically set.

4. Increase motor responsiveness by increasing Pr0.03. Please check if there is any vibration before setting Pr0.03 to max. value.

5. Save the parameters.

Please take note:

- Please stop the motor before modifying any parameter. Pr0.02 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 Pr0.03, mechanical noise or vibration might occur for the first run, it is normal. If it persists, please set Pr0.03 to lower value.



Parameters that change in accordance to real time gain adjustment

There are 2 types of auto gain adjustment methods:

• **Standard mode** (Pr0.02 = 0x 1): Basic mode, prioritizing on stability, gain switching is disabled. Actual gain auto adjustment as accordance to Pr0.03.

Gain related parameters that change as shown below.

Parameter	Label	Remarks
Pr1.00	1 st position loop gain	
Pr1.01	1 st velocity loop gain	When stiffness setting is valid
Pr1.02	1 st velocity integral time constant	When stiffness setting is valid, parameters will be updated to match stiffness value
Pr1.03	1 st velocity detection filter	
Pr1.04	1 st torque filter	

Gain related that doesn't change

Parameter	Label	Reference value	Remarks
Pr1.10	Velocity feedforward gain constant	300 (0.1%)	Doesn't change according to changes in stiffness

 Positioning mode (Pr0.02=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	Pr1.00	1 st position loop gain	
2	Pr1.01	1 st velocity loop gain	
3	Pr1.02	1 st velocity integral time	
		constant	
4	Pr1.03	1 st velocity detection filter	
5	Pr1.04	1 st torque filter	When stiffness setting is valid,
6	Pr1.05	2 nd position loop gain	parameters will be updated to
7	Pr1.06	2 nd velocity loop gain	match stiffness value
8	Pr1.07	2 nd velocity integral time	
		constant	
9	Pr1.08	2 nd velocity detection	
		filter	
10	Pr1.09	2 nd torque filter	

If auto gain adjustment is valid, the parameters listed above can't be manually modified. Only when Pr0.02 = 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			
Pr1.10	Velocity feedforward gain constant	1000ms			
Pr1.11	Velocity feedforward filter time constant	30%			
Pr1.12	Torque feedforward gain	0.50ms			
Pr1.13	Torque feedforward filter time constant	0			
Pr1.15	Position control gain switching mode	0			
Pr1.17	Position control switching level	10			
Pr1.18	Position control switching hysteresis	50			
Pr1.19	Position gain switching time	33			

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 precision 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.

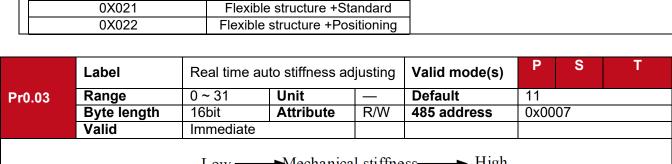
Structures with high inertia can have better performance if inertia ratio is set accurately.

	Label Pr0.02 Range		Real time	Auto Gain Adj	usting	Valid mode(s)	Ρ	S	т
Pr0.02			0x0~0xF FF	Unit	—	Default	0x1		
	Byte len	gth	16bit	Attribute	R/W	485 address	0x000)5	
	Valid		Immediate	:					
Data bits	Category	ategory Se				Application			
0x00_	Motion setting mode	motio to sel mode the re 0:I	n characteri ect mode 1 2 when rap	stics or setting with good gen id positioning please choos Pr0.03 invalic accordingly. Pr0.03 valid. changing Pr0 in this mode, stability. Pr0.03 valid. changing Pr0	g required erality w is neede se mode I. Gain va Quick ga .03 stiffn suitable Quick ga .03 stiffn	can be selected a ments. Generally, hen there is no spe d If mode 1 and m 0. alue must be adjus in adjusting can be ess value. Gain sw for applications wir in adjusting can be ess value. This mo quick positioning.	it is rec ecial re ode 2 d sted ma e achie vitching th requ e achie ode is s	ommeno quireme cannot n nually a ved by i is not u irements ved by uitable f	ded ent, neet and used s for
			_	for load mour for the load u		cal to ground, or p 07	lease c	ompens	ate



0X020

		Used to select the mechanical strue	ne load type, choose according to load-inertia ratio and cture.			
0x0_0	Load type	0: Rigid structure	This mode prioritizes system responsiveness. Use this mode when there is a relatively rigid structure with low load inertia. Typical application including directly connected high-precision gearbox, lead screw, gears, etc.			
	setting	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	2: Flexible This mode prioritizes system stability. Use this mode whe			
	0x_00 reserved					
0x_00	reserved					
 The setti	ng type combi		ecimal standard, as follows:			
 The setti	ng type combi ig type combi	nation Ap	oplication type			
 The setti	ng type combi i <mark>g type combi</mark> 0X000	nation Ar Rigid s	pplication type structure + Manual			
 The setti	ng type combi ig type combi	nation Ap Rigid s Rigid st	oplication type tructure + Manual tructure +Standard			
 The setti	ng type combi i <mark>g type combi</mark> 0X000 0X001	nation Ap Rigid s Rigid st Rigid str	oplication type structure + Manual			
 The setti	ng type combi i <mark>g type combin</mark> 0X000 0X001 0X002	nation Ap Rigid s Rigid str Rigid str High	bplication type tructure + Manual tructure +Standard ructure +Positioning			

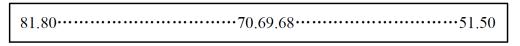


Flexible structure + Manual

Low → Mechanical stiffness → High

→ Servo gain

Low —



 $L_{OW} \longrightarrow Responsiveness \longrightarrow High$ Lower values ensure better system responsiveness and mechanical stiffness but machine vibration might occur, please set accordingly. Recommend to set to around 15 with motor with high inertia.

→ High



Gain parameters settings table

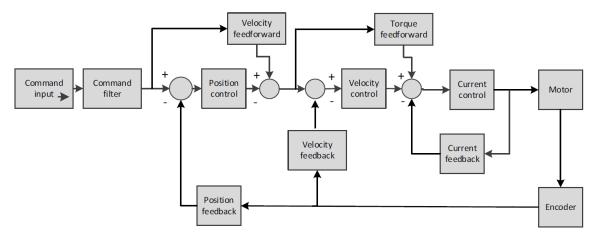
		1	st gain		2 nd gain			
SS	Pr1.00	Pr1.01	Pr1.02	Pr1.04	Pr1.05	Pr1.06	Pr1.07	Pr1.09
Stiffness	Position loop gain (0.1/s)	Velocity loop gain (Hz)	Velocity loop integral time constant (0.1ms)	Torque filter (0.01ms)	Position loop gain (0.1/s)	Velocity loop gain (Hz)	Velocity loop integral time constant (0.1ms)	Torque filter (0.01ms)
81	20	15	3700	1500	25	15	10000	1500
80	25	20	2800	1100	30	20	10000	1100
79	30	25	2200	900	40	25	10000	900
78	40	30	1900	800	45	30	10000	800
77	45	35	1600	600	55	35	10000	600
76	55	45	1200	500	70	45	10000	500
75	75	60	900	400	95	60	10000	400
74	95	75	700	300	120	75	10000	300
73	115	90	600	300	140	90	10000	300
72	140	110	500	200	175	110	10000	200
71	175	140	400	200	220	140	10000	200
70	320	180	310	126	380	180	10000	126
69	390	220	250	103	460	220	10000	103
68	480	270	210	84	570	270	10000	84
67	630	350	160	65	730	350	10000	65
66	720	400	140	57	840	400	10000	57
65	900	500	120	45	1050	500	10000	45
64	1080	600	110	38	1260	600	10000	38
63	1350	750	90	30	1570	750	10000	30
62	1620	900	80	25	1880	900	10000	25
61	2060	1150	70	20	2410	1150	10000	20
60	2510	1400	60	16	2930	1400	10000	16
59	3050	1700	50	13	3560	1700	10000	13
58	3770	2100	40	11	4400	2100	10000	11
57	4490	2500	40	9	5240	2500	10000	9
56	5000	2800	35	8	5900	2800	10000	8
55	5600	3100	30	7	6500	3100	10000	7
54	6100	3400	30	7	7100	3400	10000	7
53	6600	3700	25	6	7700	3700	10000	6
52	7200	4000	25	6	8400	4000	10000	6
51	8100	4500	20	5	9400	4500	10000	5
50	9000	5000	20	5	10500	5000	10000	5



6.5 Manual gain adjustment

Due to limitation of load conditions, automatic gain adjustment might not achieve expected performance. Control can be improved through manual gain adjustment

The servo system is made up of 3 control loops. From outer to inner: position loop, velocity loop, current loop as shown in the diagram below.



Inner control loop demands higher responsiveness. In order to avoid system instability, please tune in accordance to this principle. Current loop gain usually satisfies the responsiveness demand without tuning. When gain adjustment is done under position control mode, in order to keep the system stabile, position and velocity loop gain have to be increased at the same time to make sure the responsiveness of the position loop is lower than velocity loop.

Step	Parameter	Label	Tuning method
1	Pr1.01	Velocit y loop gain	Determine if velocity loop is able to follow the changes in velocity command at highest frequency. If Pr0.04 is set correctly, velocity loop highest following frequency = Pr1.01 Increase Pr1.01 Increase Pr1.01 Increase Pr1.01 Increase Pr1.01 provided there is no noise or vibration to reduce positioning time, better velocity stability and following. Reduce Pr1.01 if there is mechanical noise. Set up vibration suppression if there is mechanical vibration.

Steps to tuning (Position and velocity control)



Step	Parameter	Label	Tuning method
2	Pr1.02	Velocity loop integral time constant	To eliminate velocity loop deviation Reduce Pr1. 02 Velocity Command velocity Velocity loop integral time constant (ms) = 4000 / (2* π *Velocity loop gain(Hz)) Reduce Pr1.02 to reduce positioning time. Mechanical vibration might occur if set value is too low; Velocity loop deviation can't be zeroed if set value is too high. Reduce Pr1.02 to increase systemic stiffness, reduce deviation, provided that there is no resonance or noise in the system. If load- inertia ratio is high or resonance exists in mechanical system, increase Pr1.02.
3	Pr1.00	Position loop gain	Determine if position loop is able to follow the changes in position command at highest frequency. Position loop highest following frequency = Pr1.00 Increase Pr1.00 — — Position Command Actual Position Increase Pr1.01 — Position Actual Position Increase Pr1.00 to reduce position following deviation, reduce positioning time provided that there is no resonance or noise in the system. If Pr1.00 is set too high, it might cause trembling in the mechanical system or positioning overshoot
4	Pr1.04	1 st torque filter time const ant	Eliminate high frequency noise, suppress mechanical resonance. Actual velocity Velocity command ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓



- If vibration occurs with increasing Pr1.01, please modify Pr1.04 to suppress vibration.
- If the parameters are set too high, it might cause current loop response to reduce.
- To suppress vibration at stop, increase Pr1.01 and decrease Pr1.04.
- Decrease Pr1.04 if motor vibrates too much at rest.
- Pr1.04 cannot be set to overly high value as it might cause control system instability because the torque loop response is much higher than velocity loop.

For servo gain, if any one of the parameters is changed, please modify other gain related parameters accordingly. Make sure to the change at around 5% and follow the rules as below.

- 1) Increase responsiveness
 - a) Reduce torque command filter time
 - b) Increase velocity loop gain
 - c) Decrease velocity loop integral time
 - d) Increase position loop gain
- 2) Decrease responsiveness, prevent vibration and over shoot
 - a) Reduce position loop gain
 - b) Increase velocity loop integral time
 - c) Reduce velocity loop gain
 - d) Increase torque filter time

6.5.1 Parameters adjustment under different control modes

Under different control mode, parameters adjustment has to be adjusted in this order: "Inertia measuring" -> "Auto gain adjustment"->" Manual gain adjustments"

Position control mode				
Set load-inertia ratio Pr0.04 after inertia determination.				
No.	Parameter	Label		
1	Pr1.00	1 st position loop gain		
2	Pr1.01	1 st velocity loop gain		
3	Pr1.02	1 st velocity integral time constant		
4	Pr1.03	1 st velocity detection filter		
5	Pr1.04	1 st torque filter time constant		
6	Pr1.05	2 nd position loop gain		
7	Pr1.06	2 nd velocity loop gain		
8	Pr1.07	2 nd velocity integral time constant		
9	Pr1.08	2 nd velocity detection filter		
10	Pr1.09	2 nd torque filter time constant		
11	Pr1.10	Velocity feedforward gain constant		
12	Pr1.11	Velocity feedforward filter time constant		
13	Pr1.12	Torque feedforward gain		
14	Pr1.13	Torque feedforward filter time constant		
15	Pr1.15	Position control gain switching mode		
16	Pr1.17	Position control switching level		
17	Pr1.18	Position control switching hysteresis		
18	Pr1.19	Position gain switching time		

1st and 2nd gain initial values are obtained by automatic gain adjustment

No.	Parameter	Label
1	Pr1.00	1 st position loop gain



2	Pr1.01	1 st velocity loop gain
3	Pr1.02	1 st velocity integral time constant
4	Pr1.03	1 st velocity detection filter
5	Pr1.04	1 st torque filter time constant
6	Pr1.05	2 nd position loop gain
7	Pr1.06	2 nd velocity loop gain
8	Pr1.07	2 nd velocity integral time constant
9	Pr1.08	2 nd velocity detection filter
10	Pr1.09	2 nd torque filter time constant

Manually adjusted gain parameters

No.	Parameter	Label
1	Pr1.00	1 st position loop gain
2	Pr1.01	1 st velocity loop gain
3	Pr1.02	1 st velocity integral time constant
4	Pr1.04	1 st torque filter time constant
5	Pr1.10	Velocity feedforward gain constant
6	Pr1.11	Velocity feedforward filter time constant

Velocity control mode

Velocity control mode parameters adjustment is pretty similar to position control mode. Except for position loop gain Pr1.00 and Pr1.05, velocity feedforward gain (Pr1.10)

Torque control mode

Parameters adjustment for torque control mode has to be differentiate into 2 conditions:

- 1. When actual velocity reaches velocity limit, adjustment will be as per velocity control mode. Motor will switch from torque control to velocity limit as velocity control.
- 2. When actual velocity doesn't reach velocity limit yet, Except for position loop gain, velocity loop gain and feedforward gain, parameter adjustments as per velocity control mode.

If there is no velocity limit and control is through torque command, please deactivate torque and notch filter, set velocity limit to max. value and increase velocity loop gain to as high as possible.



6.5.2 Gain switching

Gain switching function can be triggered internally in servo driver. Only valid under position or velocity control mode. Following effects can be realized by gain switching:

- 1. Switch to lower gain when motor stops to suppress vibration
- 2. Switch to higher gain when motor is moving at a low velocity to shorten positioning time
- 3. Switch to higher gain when motor is moving at a high velocity to improve command following behavior.

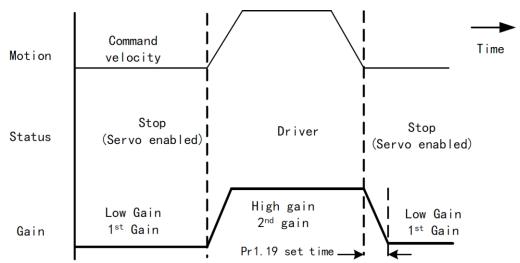
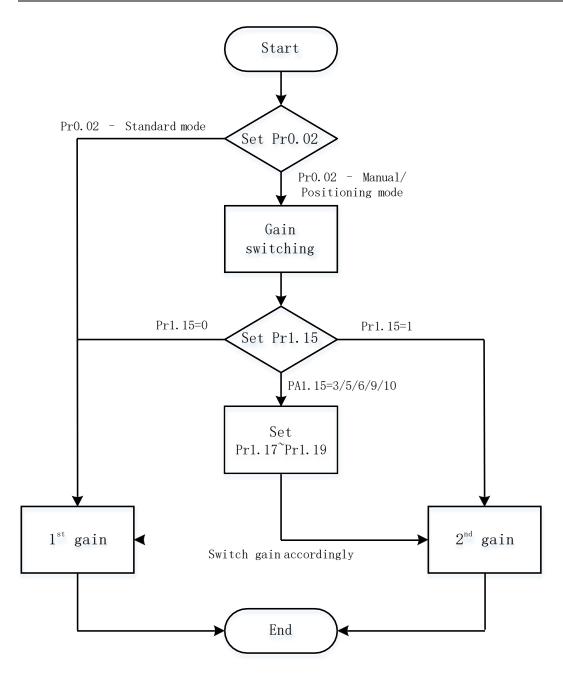


Diagram below shows gain switching when motor stops.

1st gain (Pr1.00-Pr1.04) and 2nd gain (Pr1.05-Pr1.09) switching can be realized through manual and positioning mode. Switching condition is set through Pr1.15. Gain switching is invalid under standard mode.





Related parameters on gain switching

No.	Parameter	Label	Remarks
1	Pr1.15	Position control gain switching mode	In position control, set Pr1.15=3、5、6、9、10. In velocity control, set Pr1.15=3、5、9
2	Pr1.17	Position control level switching	Please set Pr1.17≥Pr1.18
3	Pr1.18	Position control hysteresis switching	If Pr1.17 <pr1.18, driver="" pr1.17<br="" set="" will="">=Pr1.18</pr1.18,>
4	Pr1.19	Position gain time switching	As shown below



	Label Position control gain switching mode Valid mode(s) P								
	Label		roi gain		ing mode	Default	ae(s)	P	
Pr1.15	Range	0~10							
	Byte lengtl Valid	h 16bit Immediate	Attri	bute	R/W	485 addr	ess	0x011F	
					in ovitabio	a ta ba vali	al		
		control, set the c				-	a		
	Value	Condition	Gair	n swite	hing cond	ition			
	【0】	1 st gain fixed	Fixe	d on u	sing 1 st gair	n(Pr1.00-Pr	1.04)		
	1	2 nd gain fixed		Fixed on using 2 nd gain (Pr1.05-Pr1.09)					
	2	Gain switching input valid	· Ga *Def	 Gain switching input (GAIN) invalid: 1st gain. Gain switching input (GAIN) valid: 2nd gain. *Default: 1st gain 					
	3	High command torque	value Switcl value ⊦	larger h to 1 st	than (level gain when r than (leve Accelera	+ hysteresi set torque el + hystere ntion Consta speed	s)[%] comma sis)[%] ant		
	1.0	Deserved	Dee	anvad	1st '2nd	1st		'2nd' 1st	
	4-9	Reserved		erved	ocition	ntral Cust	ch 1.	2nd main in	(nooition
	10	Pending positior command +actual velocity	comm throu	nand ≠ ghout l velo	€ 0 Switch the duratio city remain	to 1 st gain n of delay	if pos time a than	2 nd gain i sitional com and absolute (level - h	mand = 0 e value of
		evel'and'hystere level and Pr1.18					Positio		in
	Label	Position co	ntrol ani	n ewite	hing lavel	Valid mo	do(e)	Р	
Dr1 47	Range	0~20000	Unit		Mode Jependent	Default	46(3)	50	
Pr1.17	Byte leng	16 bit	Attri	bute	R/W	485 addr	ess	0x0123	
	Valid	Immediate							
		hold value for ga	in switc	hing to	occur.				
	Cu	vitching conditio	n		Unit		1		
		sition		Enec		ount	-		
					der pulse c	ount	-		
		locity		RPM ⊮			-		
		rque		%			J		
		ode dependent.	-						
	Please se	et level ≥hyste	presis						





	Label	Hysteresis at p switching	osition contr	rol	Valid mode(s)	Р						
Pr1.18	Range	0~20000	•	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 Pr1.17 using the same unit. If level< hysteresis, drive will set internally hysteresis = level.											
	Label	Position contro	I switching t	ime	Valid mode(s)	Р						
	Range	0~10000	Unit	0.1ms	Default	33						
Pr1.19	Byte length	16bit	Attribute	R/W	485 address	0x0127						
	Valid	Immediate										
	and vibratio		hanges in po	sition loop	is too large, to ea gain, set suitable		S					
2nd (Pr1.05) 1st (Pr1.00) Position gain switching time (ms) (Pr1.19)												
	Resu swite	1et		2nd	1st							

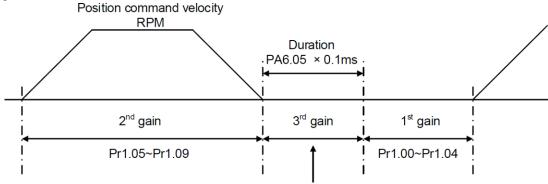


6.5.3 3rd gain switching

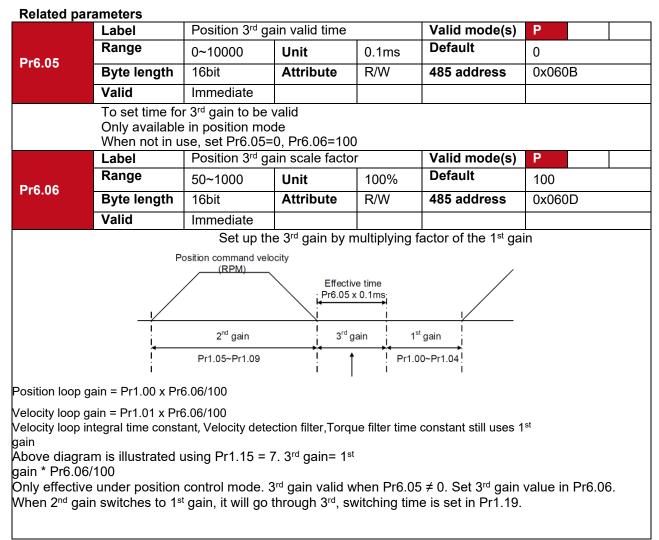
Besides switching between 1st and 2nd gain, a 3rd gain switching is added to set gain at the moment of stopping to reduce positioning time.

Only available under position mode and Pr6.05 \neq 0, set Pr6.06 for 3rd gain value. When 2nd gain switches to 1st gain, it has to go through 3rd gain, switching time is set in Pr1.19.

Diagram below shows when Pr1.15 = 7.



Position loop gain = Pr1.00 × Pr6.06/100 Velocity loop gain = Pr1.01 × Pr6.06/100 Velocity loop integral time constant, velocity detection filter, torque filter time constant will still be applied in 1st gain

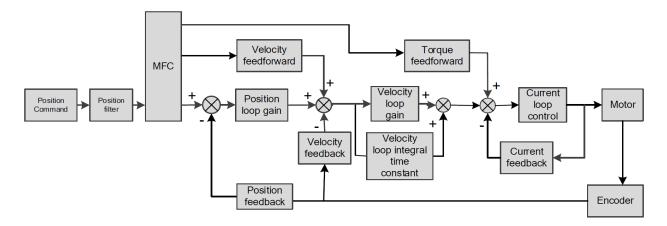




6.6 Model following control

Model following control is a type of closed loop control system. First, an ideal model is constructed and acts as a reference for actual model in a closed loop control. Model following control can be treated as a control mode with 2 flexibilities: Model reference can be used to improve command responsiveness and closed loop control used to increase responsiveness of the system towards interference. They don't affect each other.

Model following control can be used in position loop control to increase responsiveness to commands, reduce positioning time and following error. This function is only available in position control mode.



To adjust model following control

 Automatic adjustment Set model following bandwidth Pr0.00 = 1 for automatic adjustment. Now, Pr0.00 = Pr1.01, model following bandwidth is adjusted automatically according to different velocity loop gain.

- 3. Manual adjustment
 - Please used manual adjustment if
 - Automatic adjustment is not satisfactory.
 - Responsiveness needs further improvement in comparison with automatic adjustment.
 - There is a need to set servo gain or model following control parameters manually.

Steps	to manually adjust
Step	Content
1	Set up vibration suppression.
2	Set up the right inertia ratio.
3	Manually adjust gain.
4	Increase Pr0.00 provided that there is no overshoot and vibration. Usually $Pr0.00 \ge Pr1.01$ is recommended.



Improved following

Model following bandwidth determines the responsiveness of the servo system. Increase the value set will increase responsiveness and reduce positioning time. Overshoot can be prevented if it is set at a lower value but responsiveness will be lowered. Model following bandwidth shouldn't be too large for mechanical structure with lower stiffness, excessive position deviation alarm might occur under high velocity.

6.7 Zero tracking control

Zero tracking control (ZTC) is able to realize a zero position deviation during acceleration/deceleration. This function increase multi axis precision and master-slave following.

Recommended application:

1. Multi axis

Improper following during circular arc motion



2. Master-slave following

Used when driving axis sends frequency divider signal to lead following axis to improve the following control.

- > ZTC only available under position control mode.
- > ZTC can only be enabled when Pr0.00 is valid.
- Model following control (MFC) and Zero Tracking Control (ZTC) cannot be used together at the same time.

Zero tracking control can achieve better performance with the following limiting factors.

	Limiting factors
Electronic	Electronic gear ratio should be lower to prevent current noise.
gear ratio	
Mechanical	Better structural rigidity to prevent vibration.
structure	
Motion	 Command acceleration should be continuously low to prevent deviation change during drastic changes in acceleration. Callback or over travel might exist in positioning; sigmoid signal command might improve the problem.



Related parameters

Parameter	Label	Description
Pr2.50	Model following	0: Model following control - Default
	control	1: Zero tracking control
Pr2.53	Dynamic friction	Range: 0-1000, unit: 0.1%
	compensation	Unit: Changes in torque with the effect of friction on
	coefficient	rotational speed.
		Only valid when MFC is activated
Pr0.00	Model following	If Pr0.00 = 0, MFC and ZTC is deactivated.
	bandwidth	When Pr2.50 = 1 (Zero tracking control), higher
		bandwidth will improve following performance but noise
Ost the faller		will be higher.
	wing parameters to defau	
Pr2.51	Velocity feedforward	Default value = 0 for zero tracking control.
	compensation	
	coefficient	
Pr2.52	Torque feedforward	
	compensation	
	coefficient	
Pr2.54	Overtravel time	
	constant	
Pr2.55	Overtravel	
	suppression gain	

6.8 Feedforward gain

In position control, velocity feedforward is calculated by comparing the velocity control command calculated internally and velocity command calculated from position feedback. Comparing to control only using feedbacks, this will reduce position deviation and increase responsiveness. Besides, by comparing the torque needed during motion from velocity control command in comparison with velocity feedback, torque feedback can be calculated to improve system responsiveness.

6.8.1 Velocity feedforward

Velocity feedforward can be used in position control mode. When the function is enabled, it can increase velocity responsiveness, reduce position deviation during constant velocity.

Pr1.10	Label	Velocity fee	d forward ga	ain	Valid mode(s)	P
	Range	0~1000	Unit	0.10%	Default	300
	Byte length	16bit	Attribute	R/W	485 address	0x0115
	Valid	Immediat				
		е				
					w responsivenes value is too high	s of velocity loop.
	Label	Velocity fee constant	d forward fill	ter time	Valid mode(s)	Р
Pr1.11	Range	0~6400	Unit	0.01ms	Default	50
PITEI	Byte length	16bit	Attribute	R/W	485 address	0x0117
	Valid	Immediat				
		е				



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 to refer to the equation below.

Reduce Pr1.11 value to suppress velocity overshoot during deceleration; Increase Pr1.11 value to suppress noise or vibration due to long driver control cycle or position command uneven pulse frequency.

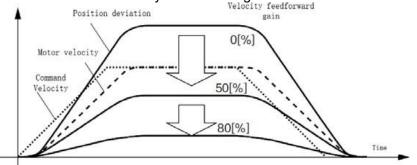
<Application>

Set Pr1.11 = 50 (0.5ms), improve feedforward effect by gradually increase Pr1.10. The equation below can be used to determine the position deviation due to velocity feedforward gain under constant velocity.

	Set velocity[<u>Uint</u>]	100 – Velocity feed foward gain[%]
Position deviation[Uint]=	Position loop gain[Hz]	100

Velocity feedforward application

Set Pr1.11 to around 50 (0.5ms), then tune Pr1.10 from 0 to bigger values until the velocity feedforward achieves better performance. Under constant velocity, the position deviation in a motion will decrease as the velocity feedforward gain increase.



Steps to tuning:

- 1. Increase Pr1.10 to increase responsiveness but velocity overshoot might occur during acc-/deceleration.
- 2. By reducing Pr1.11, velocity feedforward would be more effective and vice versa. Pr1.10 and Pr1.11 need to be tuned to a balance.
- 3. If mechanical noise exists under normal working conditions, please increase Pr1.11 or use position command filter (1 time delay/ FIR smoothing filter)



6.8.2 Torque feedforward

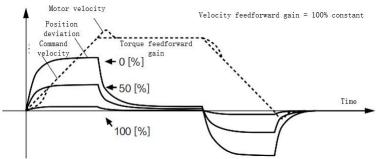
Position control mode: Torque feedforward can increase the responsiveness of torque command, decrease position deviation during constant acc-/deceleration.

Velocity control mode: Torque feedforward can increase the responsiveness of torque command, decrease velocity deviation during constant velocity.

	Label	Torque feed	l forward ga	in	Valid mode(s)	Ρ	S						
Pr1.12	Range	0~1000	Unit	0.1%	Default	0							
	Byte length	16bit	Attribute	R/W	485 address	0x01′	19						
	Valid	Immediat											
		е											
	Before using torque feed forward, please set correct inertia ratio Pr0.04. 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.												
	Label	Torque feed forward filter time constant			Valid mode(s)	Ρ	S						
Pr1.13	Range	0~6400	Unit	0.01ms	Default	0							
F11.13	Byte length	16bit	Attribute	R/W	485 address	0x01′	1B						
	Valid	Immediat e											
 Low pass filter to eliminate abnormal or high frequencies in torque feed forward command. Usually used when encoder has lower resolution or precision. Noise reduces if torque feed forward filter time constant is set higher but position deviation will increase at acceleration varied points. Set Pr1.13 = 50ms, please increase torque forward gain gradually to enable torque feedforward. By increasing Pr1.13, noise will reduce but position deviation will become larger. 													

Torque feedforward application

Set Pr1.13 to around 50 (0.5ms), then tune Pr1.10 from 0 to bigger values until torque feedforward achieves better performance. Under constant acc-/deceleration, the position deviation in a motion will decrease as the velocity feedforward gain increase.



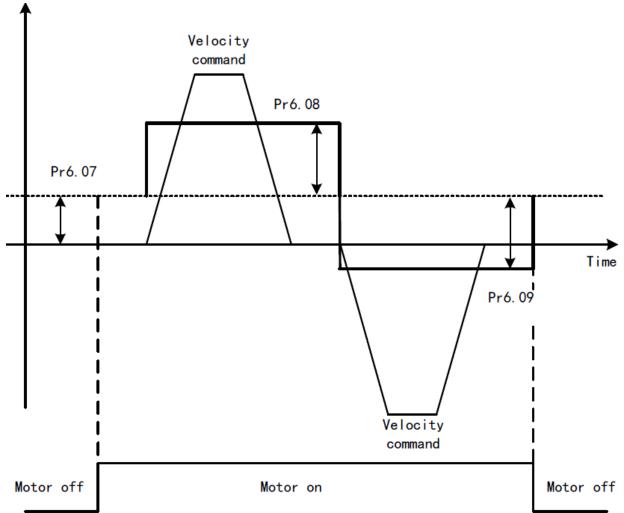
Steps to tuning:

- 3. Increase Pr1.12 to increase responsiveness but velocity overshoot might occur during acc-/deceleration.
- 4. By reducing Pr1.13, torque feedforward would be more effective and vice versa. Pr1.12 and Pr1.13 need to be tuned to a balance and reduce noise.



6.9 Friction compensation function

This function is to compensation for changes in load to reduce the effect of friction in motion. The compensation value is directional.



Vertically loaded axis: A constant eccentric load torque is applied on the motor. By adjusting Pr6.07, positioning deviation due to different motional direction can be reduced.

Belt-driven axis: Due to large radial load with dynamic frictional torque. Positioning time delay and deviation can be reduced by adjusting Pr6.08 and Pr6.09.

	Label	Torque command additional value			Valid mode(s)	Ρ	S	Т	
D#6.07	Range	-100~100	Unit	%	Default	0			
Pr6.07	Byte length	16bit	Attribute	R/W	485 address	0x06	0x060F		
	Valid	Immediate							
	Applicable for Application: V and stop the	load at that parti value from d04,	axis, compe along vertic cular point v	ensate con al axis, pio vith motor		otating	g. Reco	ord	



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				-	-					
	Label	Positive direct compensation	Valid mode(s)	Р	S	Т				
Pr6.08	Range	-100~100	Unit	%	Default	0				
F10.00	Byte length	16bit	Attribute	R/W	485 address	0x06	511			
	Valid	Immediate								
	Label	Negative direct compensation			Valid mode(s)	Ρ	S	Т		
Pr6.09	Range	-100~100	Unit	%	Default	0				
Pro.09	Byte length	16bit	Attribute	R/W	485 address	0x06	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									
	$Pr6.08/Pr6.09 = T_{f} \frac{ T1 - T2 }{2}$									
	Positive/Negative compensation corresponds to actual position feedback. Positive torque compensation value = +(Pr6.08=+ T_f) Negative torque compensation value = -(Pr6.08=+ T_f) Pr6.08 =x, Pr6.09=y; friction compensation value = x-y /2									

6.10 Safety Functions

6.10.1 Max. motor rotational speed limitation

Motor rotational speed limits can be set on Pr3.24. If command speed is 1500r/min, but Pr3.24 is set to 1000r/min, motor rotational speed will only go up to 1000r/min.

Motor overspeed threshold value can be set in Pr5.13, if the rotational speed is exceeded during operation, Er1A0 might occur.

Pr3.24	Label	Maximum mot	or rotational	Valid mode(s)	Ρ	S	Т			
	Range	0~10000	Unit	r/min	Default	0				
F13.24	Byte length	16bit	Attribute	R/W	485 address	0x033	31			
	Valid	Immediate								
To set maximum motor rotational speed but not higher than motor rated speed If Pr3.24 = 0, maximum motor rotational speed = max. speed in motor parameter.										

	Label	Overspeed lev	el settings		Valid mode(s)	Ρ	S	Т	
Pr5.13	Range	0~10000	Unit	r/min	Default	0			
	Byte length	16bit	Attribute	R/W	485 address	0x051B			
	Valid	Immediate							
If motor speed exceeds Pr5.13, Er1A0 might occur. When Pr5.13 = 0, overspeed level = max. motor speed x 1.2									



6.10.2 Max. duration for motor to stop after disabling

Set max time duration for motor to stop after disabling. If the time taken for motor to stop exceeds the duration set in Pr6.14 and motor speed is still higher than Pr4.39, holding brake will be activated. If motor doesn't have holding brake, dynamic braking will be activated to force stop the motor.

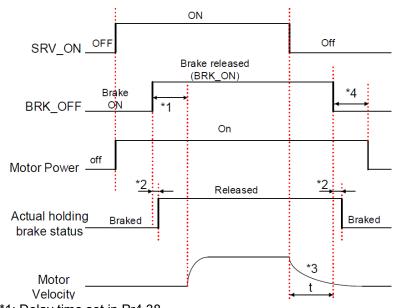
	Label	Max. time to s	top after disa	abling	Valid mode(s)	Ρ	S	Т	
Pr6.14	Range	0~1000	Unit	ms	Default	500			
	Byte length	16bit	Attribute	R/W	485 address	0x061D			
	Valid	Immediate							
	 To set the max. time allowed for the axis to stop on emergency stop or normal axis disabling. After disabling axis, if motor speed is still higher than Pr4.39 but the time set in Pr6.14 is reached, BRK_ON given and holding brake activated. BRK_ON given time is determined by Pr6.14 or when motor speed goes below Pr4.39, whichever comes first. Applications: After disabling axis, if motor speed is still higher than Pr4.39 but the time set in Pr6.14 is reached, BRK_ON given and holding brake activated. Applications: After disabling axis, if motor speed is still higher than Pr4.39 but the time set in Pr6.14 is reached, BRK_ON given and holding brake activated. After disabling axis, if motor speed is already lower than Pr4.39 but the time set in Pr6.14 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. 								

6.10.3 External brake deactivation output signal BRK-OFF

Please refer to Pr4.11 to set up the I/O output function parameters. When enabled and timing conditions are fulfilled, the set I/O output will deliver ON signal.

	Label	Motor power-o	ff delay time		Valid mode(s)	P S T					
Pr4.37	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 prevent axis from sliding. When Pr5.06 = 0, SRV-ON signal is off, holding brake is activated (delay time is determined by Pr4.39 or Pr6.14). Motor powered-off once delay time set in Pr4.37 is due.										
	Label	Holding brake release time			Valid mode(s)	P S T					
D=4.00	Range	0~3000	Unit	1ms	Default	0					
Pr4.38	Byte length	16bit	Attribute	R/W	485 address	0x044D					
	Valid	Immediate									
	will remain		on and input o	command is	fter motor power of masked to allow on.						





*1: Delay time set in Pr4.38

*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 Pr6.14 or if motor speed goes below Pr4.39, whichever comes first. BRK_OFF given after deceleration time.

*4: Pr4.37 set time value.

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

	Label	Holding brake	e activation spe	eed	Valid mode(s)) P S		
Pr4.39	Range	30~3000	Unit	r/min	Default	31 0x044F		
	Byte length	16bit	Attribute	R/W	485 address			
	Valid	Immediate						
	is not yet reach BRK_OFF sign	ned, BRK_OFF	is given.		fter it reaches belov speed goes below P			
	comes first.							

Application:

1. After disabling axis, Pr6.14 has been reached but motor speed is still above Pr4.39, BRK OFF signal given.

2. After disabling axis, Pr6.14 has not been reached but motor speed is below Pr4.39, BRK_OFF signal given.

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



6.10.4 Servo stopping mode

	Label	Servo-off mode			Val	id mode(s)	P S T			
	Range	0~1	Unit		Def	ault	0			
Pr5.06	Byte length	16bit	Attribute	R/W	485	address	0x050D			
	Valid	Immediate								
	To set servo	driver disable mod	le and status	j.						
	Value		Description							
			ode			Status				
	0	÷				c braking				
	1	Dynamic braking [c braking				
	2					c braking				
	3	Servo braking			Free-ru					
	4	Free stopping			Free-ru					
	5	Dynamic brakin	g		Free-ru	IN				
	Pr5.06 only e occurrence b	r: Stop servo axis quickly using braking t ffective for stopping under normal circun ut refer to Pr5.10				ces. For stop				
	Label	Servo-off due to		-	Valid mode(s)		P S T			
Pr5.10	Range	÷ =	Unit	—		ault	0			
F13.10	Byte length	_	Attribute	R/W	485	address	0x0515			
	Valid	After restart								
	To set servo o Alarm type 2:		river disable mode and status if alarm is triggered.							
		Explanation								
	Value	Mode				Status				
	0	Servo braking				Dynamic braking				
	1	Free stopping				Dynamic braking				
	2	Dynamic braking				Dynamic braking Free-run				
	3		Servo braking							
	4	Free stopping				Free-run				
	5	Dynamic braking	g			Free-run				
	Alarm type 1:	Explanation								
	Value	Explanation Mode			Status					
	0	Mode				Status				
	1	 Dynamic braking	a			Dynamic bra	kina			
	2		3			E ynanno bra				
	3	Servo braking				Free-run				
	4	Free stopping				Free-run				
	5	Dynamic braking	g			Free-run				



6.10.5 Emergency stop function

Emergency stop is used when an alarm occurs or a servo prohibition signal is received when servo driver is enabled.

	Label	Emergency stop	function		Valid mode(s)	Ρ	S	Τ			
	Range	0~1	Unit		Default	0					
Pr4.43	Byte length	16bit	Attribute	R/W	485 address	0x04	0x0457				
	Valid	Immediate									
	Value		Description.								
	[0] Emergency stop is valid, servo driver will be forced to STC occurs.							0			
	1	Emergency stop is invalid, servo driver will not be forced to STOP. Se can be enabled once E-STOP signal is cleared.									
	Label	Driver prohibitio	n input settir	ngs	Valid mode(s)	Ρ	S	T			
	Range	0/1/2	Unit	—	Default	0					
Pr5.04	Byte length	16bit	Attribute	R/W	485 address	0x0509					
	Byte length	TODIL	/ tellibato	1.4.4.4							
	Valid	Immediate									
	Valid										
	Valid	Immediate	POT/NOT)	Descriptic							
	Valid To set driver p	Immediate prohibition input (F POT → Positive	POT/NOT)	Descriptic	on ted						
	Valid To set driver p Value	Immediate prohibition input (F	POT/NOT) e direction drive di	Descriptic	on ted						

Method 2: Using 605Ah object dictionary through master device to activate this function.

Pr5.11	Label	Servo braking torque setting			Valid mode(s)	Ρ	S	Т	
	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 Pr5.11 = 0, use torque limit as under normal situation. Please note that if Pr5.11 set value is too low, emergency stop will take longer.									



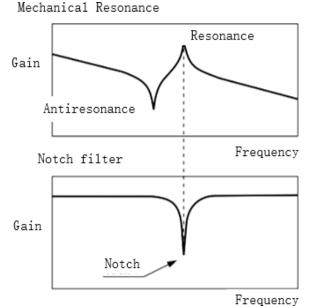
6.11 Vibration Suppression

6.11.1 Mechanical resonance suppression

Mechanical system has certain resonance frequencies. When servo gain is increased, resonance might occur at around mechanical resonant frequencies, preventing gain value from increasing. In such situation, notch filter can be used to suppress resonance to set higher gains or lower vibration. To suppress mechanical resonance:

- Torque command filter time constant Set filter time constant to reduce gain at around resonant frequencies Torque command filter blocked frequencies (Hz) fc=1/[2π×Pr1.04(0.01ms)×0.00001)]
- 2. Notch filter

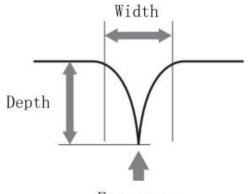
Notch filter suppress mechanical resonance by reducing gain at certain frequencies. When notch filter is correctly set, resonance can be suppressed and servo gain can be increased.



Notch filter bandwidth

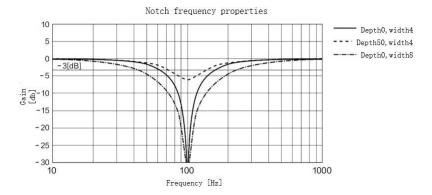
Center frequency of the notch filter, frequency bandwidth with reduction of -3dB. Notch filter depth

Notch filter depth
 The ratio between input and output of center frequency.
 When depth = 0, center frequency output is totally off and when depth = 100,
 Hence when notch filter depth is set at lower value, the depth is higher and better at suppressing mechanical resonance but it might cause system instability.



Frequency





If the analytic result from mechanical properties analysis tool doesn't show any obvious peak but vibration did occur, it might not be due to mechanical resonance, it may be that servo gain has reached its limit. This kind of vibration can't be suppressed by using notch filter, only by reducing gain and torque command filter time.

To use notch filter

Automatic notch filter

- 1. Set Pr2.00 = 1 for auto notch filter adjustment
- 2. If Pr0.03 stiffness increases, 3rd group of notch filter (Pr2.07/Pr2.08/Pr2.09) updates automatically when driver is enabled. Pr2.00 = 0, auto adjustments stop.

If resonance is suppressed, it means self-adjusting notch filter is working. If resonance occurs when mechanical stiffness increases, please use manual notch filter, set filter frequency to actual resonant frequency.

Manual notch filter

There are 2 ways to use manual notch filter.

1. After enabling self-adjusting notch filter, set the values from 3^{rd} group of filters to 1^{st} group of notch filter (Pr2.01/Pr2.02/Pr2.03), see if resonance is suppressed. If there is other resonance, set Pr2.00 = 1, then set the values from 3^{rd} group of filters to 2^{nd} group of notch filter (Pr2.04/Pr2.05/Pr2.06)

2. Get resonant frequency, notch filter bandwidth and depth and set it into the corresponding parameters through Motion Studio.



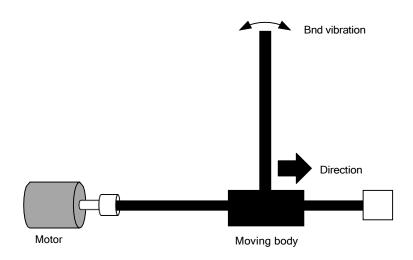
L

	Label		Adaptive filter	ring mode	settings	Valid mode(s)	P S
	Range		0~4	Unit		Default	0
Pr2.00	Byte leng	jth	16bit	Attribut	e R/W	485 address	0x0201
	Valid		Immediate				
	Value		1	1	Descri	ption	1
	0	Ada	aptive filter: inv	alid		related to 3 rd noto	ch filter remain
		Δd	aptive filter: 1 fi	lter valid	v	filter becomes valio	d 3 rd notch filter
	1		once.		related para	ameters updated a	ccordingly. Pr2.00
		۸d	aptive filter: 1 fi	ltor		itomatically to 0 or filter becomes valio	•
	2		nains valid	liter	•	ameters will keep u	
	3-4	Res	served		-	•	
	Label	1.0.	1 st notch freq	LIENCV		Valid mode(s)	P S T
	Range		50~4000	Unit	11-	Default	
Pr2.01		_	50~4000 16bit		Hz e R/W	485 address	4000 0x0203
	Byte length Valid	1	Immediate	Attribut		405 address	0x0203
		roqui	ency of 1 st torg		nd notch filt		
			00 to deactivat			51.	
	Label	10 40	1 st notch widt			Valid mode(s)	P S T
	Range		0~20	Unit		Default	4
Pr2.02	Byte length	n	16bit	Attribut	e R/W	485 address	0x0205
	Valid		Immediate				
	Under norma		dth for 1 st resor			It acttings If room	anco is under contre
	in combinatio						
		on wit	th Pr2.01 and F	Pr2.03, Pr	2.02 can be r	reduced to improve	
		on wit		Pr2.03, Pr her mech	2.02 can be r	reduced to improve	
	responsivene Label Range	on wit ess w	th Pr2.01 and F hich allows hig	Pr2.03, Pr her mech	2.02 can be r	reduced to improve ss settings	e current loop
Pr2.03	responsivene	on wit ess w	th Pr2.01 and F hich allows hig 1 st notch dep	Pr2.03, Pr: her mech th	2.02 can be r anical stiffne	reduced to improve ss settings Valid mode(s)	e current loop P S T
Pr2.03	responsivene Label Range	on wit ess w	th Pr2.01 and F hich allows hig 1 st notch dep 0~99	Pr2.03, Pr her mech th Unit	2.02 can be r anical stiffne	reduced to improve ss settings Valid mode(s) Default	e current loop P S T 0
Pr2.03	LabelRangeByte lengthValidSet notch de	on witess w	th Pr2.01 and F hich allows hig 1 st notch dep 0~99 16bit Immediate or 1 st resonant	Pr2.03, Pr her mech th Unit Attribut notch filte	2.02 can be r anical stiffne —— e R/W	reduced to improve ss settings Valid mode(s) Default 485 address	e current loop P S T 0 0 0x0207
Pr2.03	LabelLabelRangeByte lengthValidSet notch deUnder norma	on with ess w n pth for al circ	th Pr2.01 and F hich allows hig 1 st notch dep 0~99 16bit Immediate or 1 st resonant cumstances, pl	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use	2.02 can be r anical stiffne ——— e R/W 	reduced to improve ss settings Valid mode(s) Default 485 address	e current loop P S T 0 0 0x0207 0
Pr2.03	LabelRangeByte lengthValidSet notch deUnder normain combination	n witess w pth for al circo	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve	e current loop P S T 0 0 0x0207 0
Pr2.03	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsivente	n witess w pth for al circo	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I which allows hig	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr gher mech	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings	e current loop P S T 0 0 0x0207 ance is under control e current loop
Pr2.03	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsiventLabel	n witess w pth for al circo	th Pr2.01 and F which allows hig 1 st notch dep 0~99 16bit Immediate or 1 st resonant cumstances, plut th Pr2.01 and I which allows hig 2 nd notch freq	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr pher mech uency	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be anical stiffne	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s)	e current loop P S T 0 0 0x0207 nance is under contrate current loop P S 1
	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsivendoLabelRange	n witess w n pth fo al circ on wi ess v	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I which allows hig 2 nd notch freq 50~4000	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr gher mech uency Unit	2.02 can be r anical stiffne — e R/W r. factory defau 2.03 can be anical stiffne Hz	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default	e current loop P S T 0 0 0x0207 anace is under contrate current loop P S 1 4000
	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsivendoLabelRangeByte length	n witess w n pth fo al circ on wi ess v	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, plat th Pr2.01 and I which allows hig 2 nd notch freq 50~4000 16bit	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr pher mech uency	2.02 can be r anical stiffne — e R/W r. factory defau 2.03 can be anical stiffne Hz	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s)	e current loop P S T 0 0 0x0207 nance is under contrate current loop P S 1
	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsivendoLabelRangeByte lengthValid	n with ess w n pth for al circ on wi ess w	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I hich allows hig 2 nd notch freq 50~4000 16bit Immediate	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr gher mech uency Unit Attribut	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be anical stiffne Hz e R/W	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address	e current loop P S T 0 0 0x0207 anace is under contrate current loop P S 1 4000
	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsiventLabelRangeByte lengthValidSet center free	n witess w n pth for al circon wi ess w n eque	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, plat th Pr2.01 and I which allows hig 2 nd notch freq 50~4000 16bit	Pr2.03, Pr2.03, Pr2.03, Pr2.03, Pr2.04, Pr2.04, Pr2.04, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.04, Pr2.04	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be anical stiffne Hz e R/W nd notch filte	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address	e current loop P S T 0 0 0x0207 anace is under contrate current loop P S 1 4000
	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsiventLabelRangeByte lengthValidSet center free	n witess w n pth for al circon wi ess w n eque	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I vhich allows hig 2 nd notch freq 50~4000 16bit Immediate ncy of 2 nd torqu	Pr2.03, Pr2.03, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.04, Pr2.04	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be anical stiffne Hz e R/W nd notch filte	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address	e current loop P S T 0 0 0x0207 anace is under contrate current loop P S 1 4000
Pr2.04	responsiveneLabelRangeByte lengthValidSet notch deUnder normain combinationresponsiveneLabelRangeByte lengthValidSet center freeSet Pr2.04 to	n witess w n pth for al circon wi ess w n eque	th Pr2.01 and F which allows hig 1 st notch dep 0~99 16bit Immediate or 1 st resonant cumstances, plut th Pr2.01 and I which allows hig 2 nd notch freq 50~4000 16bit Immediate ncy of 2 nd torqu 0 to deactivate	Pr2.03, Pr2.03, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.04, Pr2.04	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be anical stiffne Hz e R/W nd notch filte	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address	e current loop P S T 0 0x0207
Pr2.04	LabelRangeByte lengthValidSet notch deUnder normain combinationresponsivendeLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabel	n with ess w pth for al circ on wi ess v n equer o 400	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I hich allows hig 2 nd notch freq 50~4000 16bit Immediate ncy of 2 nd torqu 0 to deactivate 2 nd notch widt	Pr2.03, Pr2.04, Pr2.04, Pr2.05, Pr2.05	2.02 can be r anical stiffne 	Valid mode(s) Valid mode(s) Default 485 address Valid mode(s) Valid mode(s) Valid mode(s) Valid mode(s) Valid mode(s)	e current loop P S T 0 0x0207 0 0x0207 0 0x0207 0 0x0207 0 0x0207 0 0x0207 0 0x0209 0 0x0209 0 0x0209
⁹ r2.04	responsivenerLabelRangeByte lengthValidSet notch deUnder normain combinationresponsivenerLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabelRange	n with ess w pth for al circ on wi ess v n equer o 400	th Pr2.01 and F hich allows hig 1 st notch dep 0~99 16bit Immediate or 1 st resonant cumstances, pl th Pr2.01 and I vhich allows hig 2 nd notch freq 50~4000 16bit Immediate ncy of 2 nd torqu 0 to deactivate 2 nd notch widt 0~20	Pr2.03, Pr2 her mech th Unit Attribut notch filte ease use Pr2.02, Pr pher mech uency Unit Attribut ue comma notch filte th Unit	2.02 can be r anical stiffne 	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address r. Valid mode(s) Default	e current loop P S T 0 0x0207 0 0x0209 0 0x0209 0 1 4 1
Pr2.03 Pr2.04 Pr2.05	responsiveneLabelRangeByte lengthValidSet notch deUnder normain combinationresponsiveneLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabelRangeByte lengthValid	n with ess w n pth fo al circ on wi ess w n equel o 400	th Pr2.01 and F which allows hig 1 st notch dep 0~99 16bit Immediate or 1 st resonant cumstances, play th Pr2.01 and I which allows hig 2 nd notch free 50~4000 16bit Immediate ncy of 2 nd torqu 0 to deactivate 2 nd notch widt 0~20 16bit	Pr2.03, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.04, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.02, Pr2.04, Pr2.04	2.02 can be r anical stiffne e R/W c. factory defau 2.03 can be hanical stiffne Hz e R/W nd notch filte er e R/W	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address r. Valid mode(s) Default	e current loop P S T 0 0x0207 0 0x0209 0 0x0209 0 1 4 1
Pr2.04	responsivenerLabelRangeByte lengthValidSet notch deUnder normain combinationresponsivenerLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabelRangeByte lengthValidSet notch baUnder norma	n witess w pth for al circon witess w n equelo a 400 n ndwidal circo	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, plut th Pr2.01 and I which allows hig 2 nd notch freq 50~4000 16bit Immediate ncy of 2 nd torqu 0 to deactivate 2 nd notch widt 0~20 16bit Immediate dth for 2 nd reso cumstances, plat	Pr2.03, Pr2.04, Pr2.04	2.02 can be r anical stiffne e R/W r. factory defau 2.03 can be anical stiffne Hz e R/W nd notch filte er e R/W	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address or. Valid mode(s) Default 485 address It settings. If reson	e current loop P S T 0 0x0207 ance is under control current loop P S T 4000 0x0209 P S T 4 0x0208 ance is under control T ance is under control T
Pr2.04	responsivenerLabelRangeByte lengthValidSet notch deUnder normain combinationresponsivenerLabelRangeByte lengthValidSet center freeSet Pr2.04 toLabelRangeByte lengthValidSet notch baUnder normain combinationin combination	n with ess w pth for al circo on with ess v n equel o 400 n ndwid al circo on with	th Pr2.01 and F hich allows hig 0~99 16bit Immediate or 1 st resonant cumstances, plut th Pr2.01 and I which allows hig 2 nd notch freq 50~4000 16bit Immediate ncy of 2 nd torqu 0 to deactivate 2 nd notch widt 0~20 16bit Immediate dth for 2 nd reso cumstances, plat	Pr2.03, Pr2.04, Pr2.04	2.02 can be r anical stiffne e R/W factory defau 2.03 can be anical stiffne Hz e R/W nd notch filte and notch filte er e R/W and notch filte and notch filte and notch filte and notch filte and notch filte	reduced to improve ss settings Valid mode(s) Default 485 address It settings. If resor reduced to improve ss settings Valid mode(s) Default 485 address rr. Valid mode(s) Default 485 address It settings. If reson reduced to improve	e current loop P S T 0 0x0207 ance is under control current loop P S T 4000 0x0209 P S T 4 0x0208 ance is under control T ance is under control T



	Label	2 nd notch dep		Γ	Valid mode(s)	P S T
Pr2.06	Range	0~99	Unit		Default	0
112.00	Byte length	16bit	Attribute	R/W	485 address	0x020D
	Valid	Immediate				
	Set notch depth f					
						educes. Under normal
	circumstances, p					
	combination with Pr2.04 and Pr2.05, Pr2.06 can be reduced to improve current loop					
	responsiveness v			ical stiffne		
	Label	3 rd notch freq			Valid mode(s)	P S T
Pr2.07	Range	50~4000	Unit	Hz	Default	4000
	Byte length	16bit	Attribute	R/W	485 address	0x020F
	Valid	Immediate				
	Set center freque			notch filter	ſ.	
	Set Pr2.07 to 400	0 to deactivate	notch filter			
	Label	3 rd notch widt	h		Valid mode(s)	P S T
Pr2.08	Range	0~20	Unit	—	Default	4
P12.00	Byte length	16bit	Attribute	R/W	485 address	0x0211
	Valid	Immediate				
	Set notch depth f					
						educes. Under normal
					sonance is under	
					uced to improve o	current loop
	responsiveness v			lical stiffne		
	Label	3 rd notch dept			Valid mode(s)	P S T
Pr2.09	Range	0~99	Unit		Default	5
	Byte length Valid	16bit	Attribute	R/W	485 address	0x0213
			natah filt			
	Set notch depth t			anoman ah		educes. Under normal
					esonance is under	
					luced to improve of	
	responsiveness					
	responsiveness (gner mechal		ss settings.	

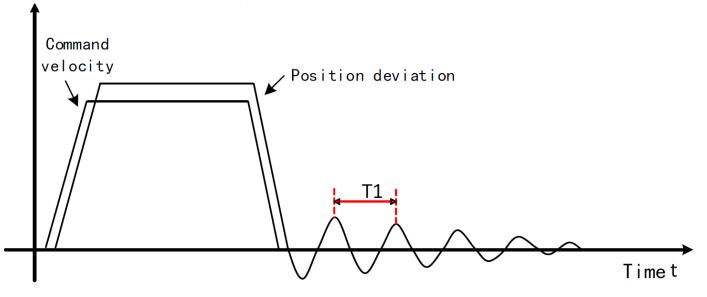
6.11.2 End vibration suppression



If the mechanical has an end that is long and heavy, it might cause end vibration at emergency stop and affect the positioning. Usually happens on long armed axis with loose end. The frequency is usually within 100Hz which is lower than mechanical resonant frequencies. It is called low-frequency resonance which can be prevented by applying low frequency suppression function.

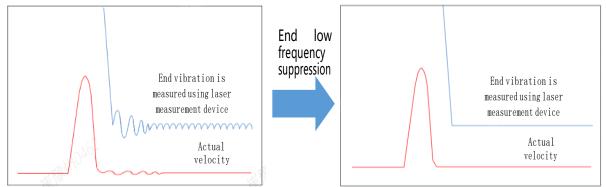
To apply low frequency suppression

- 1. Trace current/ position deviation waveform when motion stops.
- 2. Measure the vibration cycle T1 of current waveform.
- 3. Convert T1 into low frequency resonance by F1 = 1/T1
- 4. Write F1 into Pr2.14
- 5. If some other low frequency resonance occurs, please repeat step 1-3 and write F2 into Pr2.16.





The result of suppressing low frequency resonance



6.11.3 Mechanical properties analysis

To determine mechanical and set up notch filter parameters to suppress vibration caused by resonance.



To avoid strong vibration, please first set lower excitation amplitude. However, if the set value is too low, data waveform will include some degree of distortion.

If vibration occurs during tests which can't be reduce through lowering electrical current excitation, it might be due to excessive gain. Please lower velocity gain and set notch filter as accordance from the mechanical properties analysis. Or might be due to inertia settings (Pr0.04) is too large, please use optimal inertia ratio value.



6.12 Black box

Black box is a function which allows users to set conditions or data to be captured whenever error occurs. The data will be recorded by black box at the moment of error occurrence and automatically saved. Thus, through Motion Studio, user can analyze cause of the problem with the aid of black box data. Black box is deactivated by default. It is user configurable to choose whether to overwrite current data or when to overwrite the data in black box.

Setting Up Black Box

Click on "Black Box" under "Tool" to enter Black box setup. There 3 methods to trigger black box function: 1. Random error, 2. Specific error, 3. Conditions triggering. Choose trigger method as accordance to needs. Please pay attention to Data Overlay Mode and choose the option needed before start.

4	Black box x	ack box Clear black box		Enable Blad	(Box
	Black box data	n data Save data	Load data	Trigger mode Data overlay i	1: Trigger upon error
	Summary Black box version	Value		Sampling perio	d (ms) 0.125 ~
	Record time	5659 s		Trigger positio	n (%) 50
	Sample channel	22			
	Sample point	372			
	Record fault code	ErrE0			
	Select axis	Axis A			
	Trigger Mode	1: Trigger upon			
	Data overlay mode	3: Overlay on s			
	Sampling period	0.125 ms			
	Trigger position	50%			
Trigger mode	1: Trigger up	on error 🗸 🗸	Data overla	y mode	3: Overlay on servo enabled 🛛 🗸
		on error on specific error on conditions			0: No overlay 1: Automatic overlay 2: Overlay on power-on
	er migder op				3: Overlay on servo enabled



Read bla	Clear black box	Enable Black Box	
lack box data			
			2: Trigger upon specific error
Ope	n data Save data Load dat		3: Overlay on servo enabled
Summary	Value		
		Sampling period (ms)	0.125 ~
Black box version	100		50
Record time	5659 s	Trigger position (%)	50
Sample channel	22	Specify a fault code	Err000 : No alarm
Sample point	372	opeany a route code	Errooo : No alarm Errooo : No alarm
Record fault code Select axis	ErrEO		Err000 : No alarm Err090 : FPGA communication er
	Axis A		Err091 : FPGA communication er
Trigger Mode	1: Trigger upon		Err092 : FPGA communication er
	3: Overlay on s		Err093 : FPGA communication er Err094 : FPGA communication er
Sampling period			Err095 : FPGA communication er
Trigger position			Err096 : FPGA communication er
Specify a fault c	Err0		Err097 : FPGA communication er Err098 : FPGA communication er
		Set	Err098 : FPGA communication er Err099 : FPGA communication er
			Err09A : FPGA communication er
			Err09B : FPGA communication er
			Err09C : FPGA communication er Err09D : FPGA communication er
			Err09E : FPGA communication er
			Err09F : FPGA communication er
			Err0A0 : Phase A circuit current Err0A1 : Phase B circuit current
			Errual: Phase B circuit current Errual: Analog input wiring cor
			Err0A3 : Motor power cable not
			Err0A4 : Analog input wiring cor
			Err0A5 : DC bus wiring connection Err0A6 : Temperature detection
			ErroB0 : Control circuit power su
			Err0B1 : Control power supply v
			Err0B5 : Holding brake power su
			Err0C0 : DC bus overvoltage Err0C1 : Venting set value less t
			Err0D0 : DC bus undervoltage

Trigger mode 2: Trigger black box whenever a chosen specific error occurs.

Trigger mode 3: Conditions for black box functions to be triggered can set. Set the source, level and edge of the trigger as shown below.

Read bla	ck box Clear black	xoo	Enable Black Box		
lack box data			Trigger mode	3: Trigger upon conditions	
Oper	n data Save data	Load data			
			Data overlay mode	3: Overlay on servo enabled	~
Summary	Value		Sampling period (ms)	0.125 ~	
Black box version	100				
Record time	5659 s		Trigger position (%)	50	
Sample channel	22				
Sample point	372				
Record fault code	ErrE0		Trigger condition		
Select axis	Axis A		mgger condition		
Trigger Mode	1: Trigger upon		The trigger	1:Velocity feedback V	
Data overlay mode	3: Overlay on s			1:Velocity feedback	
Sampling period	0.125 ms		Trigger level	2:Velocity setting	
Trigger position	50%		Trigger edge	3:Velocity command 4:Internal velocity command	
Specify a fault c	Err0		ggcr cuge	5:Current setting	

Data overlay mode: To select how and when black box data is overlaid. 0: Do not overlay data (Black box will only preserve the data of the first trigger). 1: Always overlay (Black box data will be overlaid every time). 2: Overlay upon powered on (Data overlaid occurs when servo drive is powered on) 3: Overlay when enabled (Data overlaid occurs when servo drive is enabled).



Sampling period (ms): The lower the set value, the more precise the samples are but sampling time will be shorter.

Trigger position (%): Set the position of trigger within the sampling period. Click on "Set" to save the settings to driver.

	d Black box x			
	Read bla	ck box	Enable Black Box	
Data recorded in Black Box can be read and	Black box data	n data Save data Load data	Trigger mode	1: Trigger upon error V
cleared. The data can also			Data overlay mode	3: Overlay on servo enabled \lor
be saved and read by	Summary Black box version	Value 100	Sampling period (ms)	0.125 ~
anyone from this function	Record time	5659 s	Trigger position (%)	50
interface for further	Sample channel			
Interface for further	Sample point	372		
analysis.	Record fault code	ErrE0		
anaryolo.	Select axis	Axis A		
	Trigger Mode	1: Trigger upon		
	Data overlay mode	3: Overlay on s		
	Sampling period	0.125 ms		
	Trigger position	50%		
	Specify a fault c	Err0		
			Set	Refresh



6.13 Multiturn absolute encoder

Multiturn absolute encoder records the position and the revolution counts of the motor. When driver is powered-off, multiturn absolute encoder will backed up the data using battery and after powering on, the data will be used to calculated absolute mechanical position and there is no need for a mechanical homing process. Use widely in robotic arms and CNC machines.

If it is the first time using the encoder, please home the mechanical axis and initialize the absolute position of the encoder to zero. Set up a homing point and only home when there is an alarm. Please stop the axis before reading any position data to prevent inaccuracy.

	Label	Absolute encoder settings			Valid mode(s)	Р	S	Т	
Pr0.15	Range	$_{0\sim15}$ Unit _ Default 0							
	Byte length	16bit	Attribute	R/W	485 address	0x00	1F		
	Valid	After restart							
【0】	Incremental	Doesn't retai	n position da	ata on pow	ver off. Unlimited t	ravel d	stance		
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- (Pr6.63+1). Unlimited travel distance.					י 0- ו		
3	Single turn absolute	Used when tr overflow will			1 revolution of the	e enco	der. Dat	ta	
5	Multi turn	multiturn mo	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	absolute	Clear multiturn position, reset multiturn alarm and activate multiturn absolute function. Will switch to multiturn mode once alarm cleared, remains at 9 after 3s, please solve according to Er153. Please disab before setting to 9 and home the axis before using.						, if	
Others		Do not use!							

6.13.1 Parameters setting

6.13.2 Read absolute position

1、Steps:

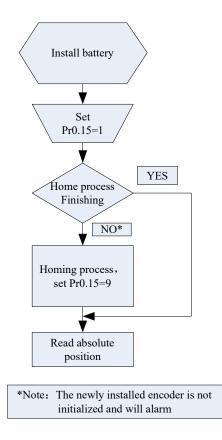
1) First, select a motor with multiturn absolute encoder, install battery and confirm whether the driver version supports the specific motor;

2) Set Pr0.15 = 1. If it is the first time of installation, Err153 will occur because battery is newly installed and position data is invalid. Please home the axis and initialize the absolute position of the encoder to zero.

3) When absolute homing point is set and there is no fault with the battery, the alarm will be cleared

4) Finally, the user can read the absolute position. Position won't be lost even if the driver is powered off.

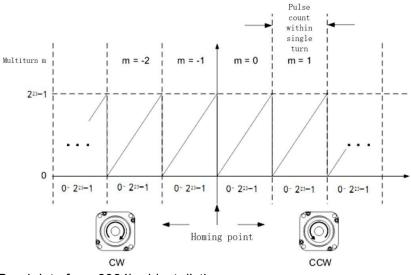




2、Read absolute position

When the rotor turns in clockwise direction, the revolution count will be negative; turns in counter clockwise direction, the count will be positive. No. of revolutions will be from -32767 to +32767. If the count number reaches +32767 in counter clockwise direction, the count will revert back to -32768, -32767 and vice versa for clockwise direction.

As for position data, it depends on the precision of the encoder. For 17 bit = 0-131071, 23 bit = 0-8388607



Read data from 6064h object dictionary

Please read data only when the motor is fully stopped or it might cause calculation errors. Please repeat this step for at least twice to make sure the result is uniform.



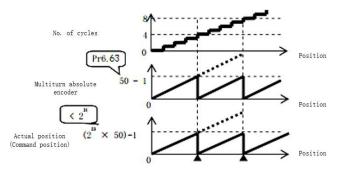
Multiturn linear mode(Pr0.15 = 1)

Multiturn absolute with memory of position at power off. Use this mode when travel distance is constant, encoder multiturn data would not overflow.

In this mode, encoder data ranges from -32768~32767. If the value either of the limits, Er157 might occur. Set 9 in Pr0.15 to clear multiturn data and home the axis.

Multiturn rotational mode

For absolute encoder, multiturn rotational mode (Pr0.15 = 2, Pr6.63 set to multiturn upper limit) is added on top of incremental mode and multiturn linear mode. Actual feedback multiturn data is always between 0 - [Pr6.63 + 1], regardless of the direction of rotation. There is no limit to no. of rotation and no data overflow.



Single turn absolute mode

Use this mode when the travel distance of the axis is within a single turn of the rotor.

1. Target position input range - EtherCAT

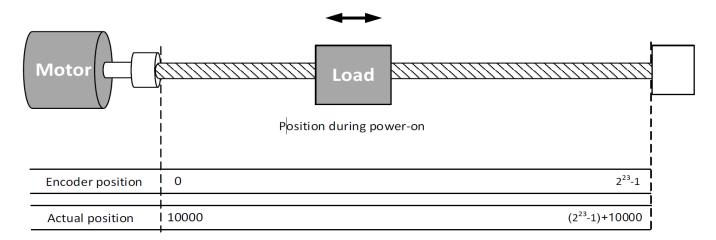
When using 23-bit absolute encoder, under single turn absolute mode, electronic gear ratio =1:1

Homing point offset 607Ch = 0, target position range = $0 - [2^{23}-1]$ Axis is homed, target position range = $607Ch - [2^{23}-1+607Ch]$

When electronic gear ratio = 1:1, 607Ch = 0: Motor Motor Position during power-on Encoder position 0 $2^{23}-1$ Actual position 0 $2^{23}-1$

When electronic gear ratio = 1:1, 607Ch = 10000:





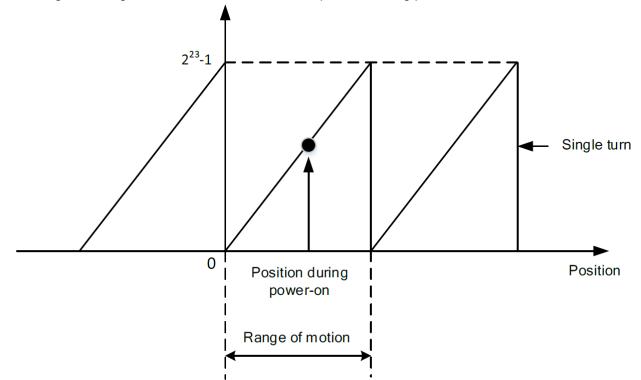
3、Clear multiturn position

Before clearing multiturn position, axis needs to be homed. After clearing multiturn position, revolution count = 0 but absolute position remains unchanged and Err153 alarm will be cleared. Please make sure the homing point is within the range of 1 revolution of the rotor. Installation and setup of the homing point can be set with the use of auxiliary function D21 on the front panel. By setting Pr0.15 to 9, multiturn position will be cleared.

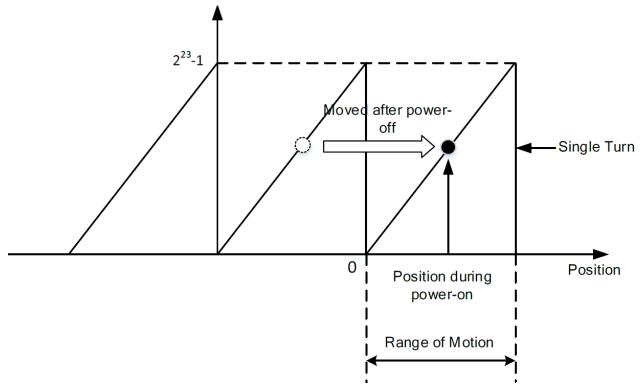
Please take notice of motor position during power on. Range of motion of a motor depends on the position of the motor during power on (23-bit absolute encoder as example).



If the motor position is as shown below during power on. The range of motion of the motor is within the range of a single turn of the motor from motor position during power on.



If power is turned off at position as shown below and power on when motor reaches the position below. Motor range of motion changes as shown below.





6.13.3 Absolute Encoder Related Alarm

The alarm can determine if absolute value encoder is valid. If battery power is low, not a motor with absolute encoder, encoder error etc. occurs, user can find out about the error from alarm output or on the front panel. Controller will stop any operation until alarm is cleared.

Alarm output:

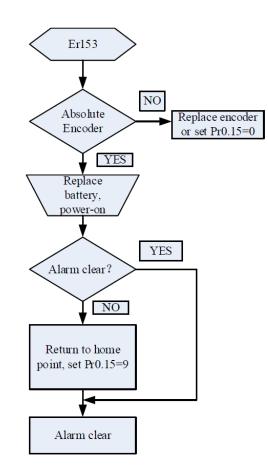
Err153 will be shown on front panel or by I/O ALM signal and from controller. Err153 might occur,

(1) If absolute encoder is used for the first time and due to installation of new batteries Axis needs to be homed and multiturn data needs to be cleared.

(2) If battery voltage is lower than 3.2v. Replace battery and restart the motor.

(3) If battery voltage is lower than 2.5v or battery power was cut off. Replacing the battery won't clear the alarm. Axis needs to be homed and multiturn data needs to be cleared.

4、Alarm processing flow chart



Battery kit

In multiturn absolute mode, Er153 might occur upon first time installation. Pr0.15 needs to be set to 0 to reset error and clear multiturn data.

When battery supply voltage < 3.0V, ArA03 might occur. Change battery as per steps below:

- 1. Power on driver (Make sure axis is disabled)
- 2. Change battery
- 3. Servo drive will reset warning automatically.



6.14 Motor Speed Regulation

This is a motor speed regulator to control motor rotational speed using I/O input signals. For example, if the input voltage = $-10 \sim 10$ VDC and rotational speed of the motor corresponds to -2000 to 2000rpm. When SPDREG = ON, motor speed regulation can be controlled using SPDREG 1 – 4. If the speed regulation ratio is set to be 20%, then $-10 \sim 10$ VDC input voltage will correspond to -400 to 400rpm (-2000*20%~2000*20%rpm). Please be minded that this is only applicable under velocity control mode.

6.14.1 Set up motor speed regulation

1. Assign I/O signals using Motion Studio 2 or using the front panel. Using Motion Studio 2: Under "Function" -> "I/O Settings"

Pin	Function	Polarity	Status	Forced state
- 🖮 AxisA				
Pr4.00 Input selection DI1	[3]Servo ON Input(SRV-ON)	0:Normally Open	OFF	0:Not forced
Pr4.01 Input selection DI2	[4B]Speed regulation valid(SPDREG)	0:Normally Open	OOFF	0:Not forced
Pr4.02 Input selection DI3	[4C]Speed regulation ratio 1(SPDREG1)	0:Normally Open	O OFF	0:Not forced
Pr4.03 Input selection DI4	[4D]Speed regulation ratio 2(SPDREG2)	0:Normally Open	OFF	0:Not forced
Pr4.04 Input selection DI5	[4E]Speed regulation ratio 3(SPDREG3)	0:Normally Open	OFF	0:Not forced
Pr4.05 Input selection DI6	[4F]Speed regulation ratio 4(SPDREG4)	0:Normally Open	OFF	0:Not forced
Pr4.06 Input selection DI7	[0]Input Invalid[NULL]	0:Normally Open	O OFF	0:Not forced
Pr4.07 Input selection DI8	[0]Input Invalid[NULL]	0:Normally Open	O OFF	0:Not forced

Using front panel: Please refer to Chapter 4 section 4.5 for detailed instructions on how to assign I/O signals using the front panel.

Assign SPDREG to enable motor speed regulator and SPDREG1-4 to control motor rotational speed as per desired from 0%-150%. Please make sure that the control wirings are wired to the right pins on CN1.

2. Make sure the control mode used for the servo drive is velocity control mode (Pr0.01=1/3/5/6). Set up Pr3.58-Pr3.61 as per required.

Keep in mind that max ratio in total should not exceed 150%, if total exceeds 150%, motor rotational speed will remain unchanged. Motor rotational speed will be running at max. speed set in Pr3.24 if exceeds max speed.

	Label	Control N	lode Settings	Valid mode(s) P S				т	
Pr0.01	Range	0~10	Unit	—	Default	Default 0			
	Byte length	n 16bit	Attribute	R/W 485 address 0x0003			0x0003		
	Valid	After rest	art						
	Descr	ription		▲ \//ha	a 2 4 5 6 combin	otion h	ubrid mo	do 1 st and	
Value	1 st mode	2 nd mo	ode		n 3, 4, 5, 6 combin 1ode can be chose				
[0]	Position	—			e switching input (0				
1	Velocity	—		Invalid, select 1 st mode.					
2	Torque	—		C-MODE: Valid, select 2 st mode.					
3	Position	Veloc	ity	Plea	se allow some time	e in bet	ween mo	ode switching	
4	Position	Torq	le		nands.				
5	Velocity	Torq	le		se set Pr0.01 =				
6	PR internal	Position Pr	0.22=1	modes from PR mod, then set 2 nd mod					
	command	Velocity Pr	0.22=1	C-MODE is defaulted to Normally Open					
	control	Torque Pr	0.22=2					Jormally Open	
7~10	Reserved								

Related parameters



	Label	Speed regu	lation ratio 1		Val	id mode(s)		S
	Range	0~150	Unit	%		ault	10	
Pr3.58	Byte length	16bit	Attribute	R/W		address	-	374 L0x0375
	Valid	Immediate						
	To set speed rotational spe motor exceed Speed regula	ed of the mot s Pr3.24, the	or will remai n motor will	in uncha rotate a	anged t max	. If the rotation imum speed	onal spe	
			1 = default rotational sp	beed = 2			red settii	ngs.
	SPDREG1	SPDREG2	SPDREG3	SPDR		Ratio (%)	Actual sp	eed
	Pr3.58	Pr3.59	Pr3.60	Pr3.			(rpm)	
	OFF	OFF	OFF	OF		0	0	
	ON	OFF	OFF	OF		10	200	
	OFF	ON	OFF	OF		20	400	
	OFF OFF	OFF	ON OFF	OF		40	800	—
	OFF	OFF ON	OFF	ON OF		80 30	1600 600	
	ON		OFF	OF		70	1400	—
		Speed regu				id mode(s)	1400	S
	Range	0~150	Unit	%		ault	20	U
Pr3.59	Byte length	16bit	Attribute	R/W		address		376 L0x0377
	Valid	Immediate						
	Same as Pr3.			1	1		<u> </u>	
	Label	Speed regu	lation ratio 3	3	Val	id mode(s)		S
	Range	0~150	Unit	%		ault	40	
Pr3.60	Byte length	16bit	Attribute	R/W	485	address	H0x03	378 L0x0379
	Valid	Immediate						
	Same as Pr3.	58			-			
	Label	Speed regu	lation ratio 4	ŀ	Val	id mode(s)		S
0r2 64	Range		Unit	%		ault	80	
Pr3.61	Byte length	16bit	Attribute	R/W	485	address	H0x03	37A L0x037E
	Valid	Immediate						
	Same as Pr3.	58						
	Label	Maximum	motor rotation	onal spe	ed	Valid mo	de(s)	P S 1
Pr3.24	Range	0~10000	Unit	r/	min	Default		0
13.24	Byte length		Attrib	ute	R/W	485 addı	ress	0x0331
	Valid	Immediate	e					
		um motor rota maximum mo						
	Label	Input selec				Valid mode		P S



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Pr4.00	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	V	alue	
	Symbol	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	С	8C	
Internal command velocity 1	INTSPD1	E	8E	
Internal command velocity 2	INTSPD2	F	8F	
Internal command velocity 3	INTSPD3	10	90	
Zero speed clamp	ZEROSPD	11	91	
Velocity command sign	VC-SIGN	12	92	
Torque command sign	TC-SIGN	13	93	
Forced alarm	E-STOP	14	94	
Vibration suppression 1	VS-SEL1	0A	8A	
Vibration suppression 2	VS-SEL2	0B	8B	
Speed regulation valid	SPDREG	4B	СВ	
Speed regulation ratio 1	SPDREG1	4C	CC	
Speed regulation ratio 2	SPDREG2	4D	CD	
Speed regulation ratio 3	SPDREG3	4E	CE	
Speed regulation ratio 4	SPDREG4	4F	CF	

CN1 PIN	Input	Parameters
8	DI1	Pr4.00
9	DI2	Pr4.01
26	DI3	Pr4.02
27	DI4	Pr4.03
28	DI5	Pr4.04
29	DI6	Pr4.05
30	DI7	Pr4.06
31	DI8	Pr4.07

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 enable (SRV-ON) has to be allocated to enabled servo drive. Inputs related to Pr-mode:



Circul	Overshall	V	/alue
Signal	Symbol	NO	NC
Trigger command	CTRG	20	A0
Home	HOME	21	A1
Forced stop	STP	22	A2
Positive JOG	PJOG	23	A3
Negative JOG	NJOG	24	A4
Positive limit	PL	25	A5
Negative limit	NL	26	A6
Origin	ORG	27	A7
Path address 0	ADD0	28	A8
Path address 1	ADD1	29	A9
Path address 2	ADD2	2A	AA
Path address 3	ADD3	2B	AB

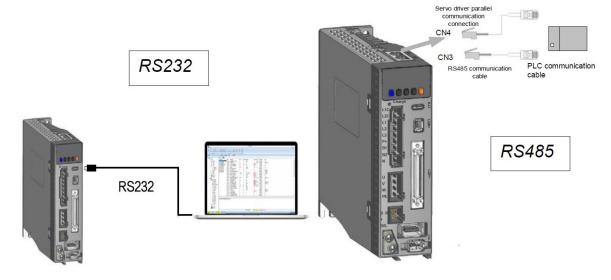
Note: CTRG, HOME are edge triggered, please make sure electronic bits last 1ms or above.



Chapter 7 Modbus communication

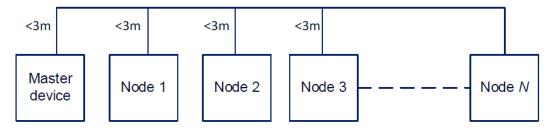
There are 2 types of Modbus communication on OSD-HP series servo drives: RS485 and RS232. RS232 is used for point-to-point communication connecting the driver to PC through a USB type-C cable for tuning using Motion Studio. RS485 can be set to communicate with multiple slave devices as a single master. Network control of the drivers can be achieved through CN3/CN4 ports.

7.1 RS232 and RS485 Connection Diagram.



RS485 network of multiple servo drives

If there is a need to connect multiple OSD-H-*-P series servo drives together, it is recommended to connect the drivers in series and no longer than 3 meters of LAN cable between each nodes (drivers) as shown below.



- > Keep the connection cable between each node as short as possible. Not longer than 3m.
- > Install a terminal resistor each end. Recommended resistance: 120 Ohm.
- > Please use shielded twisted pair connection cables.
- > Connect to reference ground of the driver.
- > Connect shielded foil of the cables to Protective Earth PE terminal.
- > Please separate them from power cable or any cable with strong interference.



7.2 RS485 communication port

Port	Diagram	Pin	Signal	Description		
		1, 9	RDO+	RS485 Differential signal+		
		2, 10	RDO -	RS485 Differential signal-		
		3, 11	GND	Ground (RS485)		
	·····]=]=0	4, 12	TXD+	RS485 Differential signal+		
CN3		5, 13	TXD-	RS485 Differential signal-		
CN4				6	VCC5V	Reserved, 5V positive
		0	VCC5V	(50mA)		
		7, 15	GND	Ground		
		8, 16	1	/		
		Frame	PE	Shield grounding		

Parameters related to RS485 communication

	Label	RS485	comm	unication mod	е	Valid mode(s)	Ρ	S	Т
Pr5.29	Range	0~255		Unit	_	Default	5		
P15.29	Byte length	16bit		Attribute	R/W	485 address	0x05	3B	
	Valid	After restart							
				•		•			
	Value	Bit		Checksum	Stop				
	0	8	I	Even	2				
	1	8	(Ddd	2				
	2	8	I	Even	1				
	3	8	(Ddd	1				
	4	8	1	Null	1				
	【5】	8	1	Null	2				
						1			
	Label	RS485	comm	unication Bau	d rate	Valid mode(s)		S	Т
Pr5.30	Range	0~15		Unit	—	Default	4		
P15.30	Byte length	16bit		Attribute	R/W	485 address	0x05	3D	
	Valid	After re	estart						
				•		·			
	Value		Bauc	l rate	Value)	Baud r	ate	
	0		2400	bps	【4】		38400b	ps	
	1		4800	bps	5		57600b	•	
	2		9600	bps	6		115200)bps	
	3		1920	0bps					
	Baud rate tole	Baud rate tolerance: 2400 \sim 38400bps±0.5%, 57600 \sim 115200bps±2%							
	Label	RS485	axis a	ddress		Valid mode(s)	Ρ	S	Т
Pr5.31	Range	0~127		Unit	_	Default	1		
	Byte length	16bit		Attribute	R/W	485 address	0x05	3F	
	Valid	After re							
	Pr5.31 can be	used to	is connected to multiple axis and controller needs to identify the axis, used to set the axis ID/address. max of 31 if the communication is between RS232 and RS485				,		



7.3 Modbus Protocol

OSD-HP series servo drives contain 16-bit and 32-bit parameters. The parameters supports read and write functions in the Modbus-RTU protocol with function codes as listed in the table below.

Operation	Function code
Read 16/32 bit parameters	0x03
Write 16 bit parameters	0x06
Write 32 bit parameters	0x10

Parameters class 0 - 7 are 32 bits data but mostly only applicable up to 16 bit. To make it convenient for users to read the data, any byte length written in the parameters list only shows that the data is using 16 bit lower level data but it is actually a 32 bit data.

Using Pr0.00 as an example, the 485 address shows 0x0001. It is actually high 0x0000 and low 0x0001 data.

	Label	Model-followi	Model-following/Zero tracking control			Р	
Pr0.00	Range	0-2000	Unit	0.1Hz	Default	1	
	Byte length	16bit	Attribute	R/W	485 address	0x0001	
	Valid	At stop					

7.3.1 Read Data 0x03

Send Receive

Read Data function code 0x03 can be used to read 1 - 100 16-bit data. For example, from servo drive to slave as 1 and reading 2 data. (H: High 8-bit, L: Low 8-bit)

No.	Request	Request frame data (Master->Slave)			Reply frai	me data(Slave->	Master)
1	ID	Slave	0x01		ID	Slave	0x01
2	FC	Function code	0x03		FC	Function code	0x03
3		Ctarting address	Н		NUM	Data count	0x00(H)
4	ADDR	Starting address	L			(byte)	0x04(L)
5	NILIM	Data count	0x00(H)		DATA1	Deta 1	Н
6	NUM	(word)	0x02(L)		DATAT	DATA1 Data 1	L
7	CRC	Checksum	L		DATA2	Data 2	Н
8	CRC	Checksum	Н		DATAZ	Dala Z	L
9					CRC	Checksum	L
10					CKC	Checksum	Н

Request frame and reply frame should have the same set of data as shown below.

01 06 00 01	00 01 19 CA
01 06 00 01	00 01 19 CA

Send Frame: Request Frame. Master device writes a 1-Word (16 bit) data (0x0001) into slave servo drive with ID no. 1 (Address 0x0001).

Receive Frame: Reply frame. Master device writes value in slave servo drive with ID no.1 successfully and gets the same frame data back.



7.3.2 Write multiple data 0x10

S Re

Function code 0x10 is to write multiple 16-bit data into servo drive. For example, from servo drive to slave as 1 and reading 2 data. (H: High 8-bit, L: Low 8-bit).

No.	Request	frame data (Maste	er->Slave)	R
1	ID	Slave	0x01	
2	FC	Function code	0x03	
3	ADDR	Starting address	Н	А
4	ADDR	Starting address	L	~
5	NUM1	Data count	0x00(H)	
6		(word)	0x02(L)	ľ
7	NUM2	Data count	0x04	
1	NUNZ	(Byte)	(2*NUM1)	
8	DATA1	Data 1	Н	
9	DATAT	Dala I	L	
10	DATA2	Data 2	Н	
11	DATAZ	Data Z	Ĺ	
12	CRC	Checksum	Ĺ	
13		CHECKSUIII	H	

Reply fra	me data (Slave->	Master)
ID	Slave	0x01
FC	Function code	0x03
ADDR	Address	Н
ADDK	Address	L
NUM	Data count	H
	(word)	L
CRC	Checksum	L
CRC	Checksum	Н

Servo parameters are 32-bit with high 16-bit at the front and low 16-bit at the back. 2 continuous communication addresses will be distributed starting with even number (High 16-bit uses even number address, low 16-bit uses odd number address. Word byte frame word is also with high 8-bit at the front and low 8-bit at the back.

32-bit data written from starting address 0x0000 (Servo driver with axis address 01):

Send	01 10 00 00 00 02 04 00 00 00 00 F3 AF
ceive	01 10 00 00 00 02 41 C8

Send Frame: Request Frame. Master device writes a 2 Word (16 bit), 4 bytes data (0x0000 0000) into slave servo drive with ID no. 1 (Address 0x0000). 11-byte CRC value is 0xAFF3 before frame sending. **Receive Frame:** Reply frame. Master device writes a 2 Word value into slave servo drive with ID no. 1 (Address 0x0000). 6-byte CRC value is 0xC841 before frame sending.

7.3.3 Reply error

When driver receives request frame data format with error, driver will feedback error reply data frame to master device.

No.	Error reply frame data (Slave->Master)			
1	ID	Slave ID	0~31	
2	FC	Function code	(0x03/0x06/0x10)+0x80	
3	Error code	Address	0x01/0x02/0x03	
4	CRC	Checksum	L	
5	CRC	Checksum	Н	

Error code table:

Error code	Description
0x01	Function code error
0x02	Address error
0x03	Data error, i.e. written data over limit
0x08	CRC checksum error

Communication data:

Receive frame: Slave servo drive's reply frame. Request frame data CRC from master device, servo drive will not respond to current request.

[Send]01 11 00 04 00 02 04 01 00 00 00 F3 A0 [Receive]01 91 01 4C 56

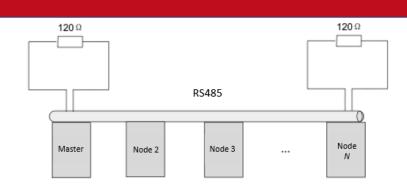
Receive frame: Slave servo drive's reply frame. Request frame data function from master device error or slave station does not support this function, unable to respond to current request.

[Send]01 11 00 04 00 02 04 01 00 00 00 A2 65 [Receive]01 91 01 8C 50



7.4 Frequently occurred issues and solutions with RS485 communication.

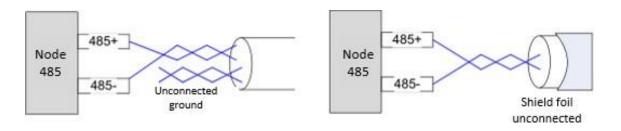
Terminal resistor



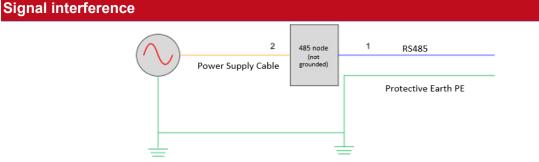
Terminal resistor is to be connected at the start and end of the device network. Recommended resistance of the terminal resistor: 120 Ohm. Measure the resistance within the network using a multimeter and refer to the table below.

Measured resistance (Ohm) Normal: 60 Ohm	Description
0	Short circuit
Much lower than 60	Might be other resistor within the network; incorrect terminal resistor is used
Much higher than 60	Might be due to damaged/faulty node communication port

Incorrect wiring connection

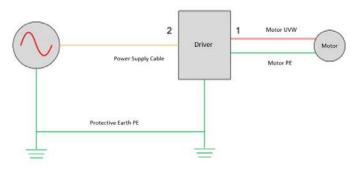


Please make sure RS485 communication connection is normal using a multimeter. Then, make sure the reference ground is corrected connected. If there is not no reference ground, please leave it unconnected. Same goes for cable shield foil.



External interference: Magnetic ring can be intertwined within cable 1 and 2 to prevent external interference.





Driver interference: If interference occurs within the driver, please intertwine magnetic rings on cable 1 and 2. Please loop UVW cables around the magnetic ring for at least 3 rounds. Do not loop PE wire into the magnetic ring.

Step-by-step problem solving

1: Verify if communication parameters setting are correct (ID not repeated, uniform Baud rate and data format);

- 2: If terminal resistor used is correct;
- 3: If wiring connection is correct;
- 4: Verify grounding and PE connection;
- 5: Communication cables should be separated from power cables.

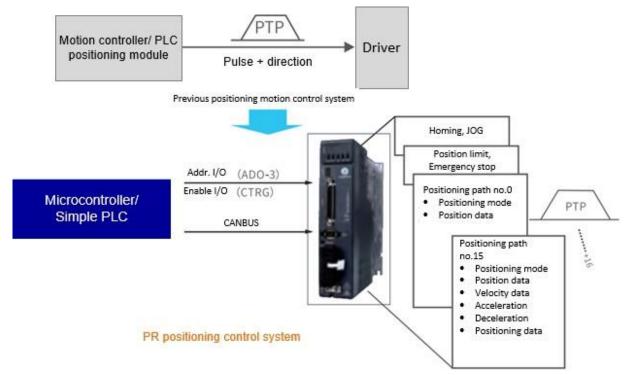
Servo drives are devices of good anti-interference. However, during installation, interference still might occur due to wiring and grounding issues. Please refer to the table below if such problems persist.

Steps	Solutions			
1	Use shielded wire cable for I/O signals, connect shield foil to PE.			
2	Connect motor PE to PE terminals on drivers, connect driver PE to PE			
	terminals of electrical network.			
3	Ground master device and servo drives together.			
4	Loop UVW motor power cable around magnetic ring for 2-3 times.			
5	Loop signal cable around magnetic ring for 1-2 times.			
6	Use shielded cable for power cables. Connect shield foil to ground.			
7	Connect a capacitance filter onto DI input. Max capacitance: 0.1 μ F			
	$COM+ \underbrace{0.01 \mu F \frac{1}{T}}_{DI} Driver$			



Chapter 8 PR Functions

PR function is a control module in servo drive that controls single axis motion using PRocedure program. Main single axis motion control functions included homing, path, position limit and emergency stop. Using PR functions can save the resources on the main controller.



Please set Pr0.01 = 6 when using PR functions. All position unit: 10000 Pulse/r



8.1 PR functions introduction

Function	Description
Homing	 Driver seeks origin signal through homing to determine zero point of the mechanical motion coordination system 1. Homing mode configurable. Can be chosen between position limit signal homing, origin signal homing and manually set home; 2. Homing direction configurable; 3. Specific position can be set after homing completed; 4. Homing velocity, acceleration and deceleration configurable. 5. High homing velocity to locate origin and low homing velocity to look for Z-signal
JOG	 Forward/Reverse JOG through I/O control. Used for tuning. 1. JOG direction: forward JOG, reverse JOG 2. JOG velocity and acceleration configurable
Position limit	 Prevent mechanical damage by limiting the range of motion 1. Positive/Negative position limit input through I/O 2. Software position limit 3. Position limit deceleration configurable
Emergency stop	Emergency stop input signal through I/O. To stop any operating motion
Path motion	 Select path ID through IO (ADD0-3), then trigger path motion through enable IO (CTRG); or directly through I/O combination mode; path motion can be controlled directly through 485 communication as well Path motion includes positioning, velocity and homing modes. I/O trigger includes rising edge, double edges trigger Supports continuous positioning; Max. 16 paths; Configurable position, velocity and acceleration/deceleration; Pause time/ timer configurable
485 communication	PR parameter R/W through 485 communication. Control PR functions such as homing, JOG, path motion, emergency stop, etc.



8.2 Control parameters

All PR motion related parameters including trigger, status output, limits, emergency stop, JOG, homing, etc.

Param eter	Label	Description	485 Addr.
Pr8.00	PR Control	PR control functions Bit 0: =0, CTRG rising edge trigger =1, double edges trigger; Bit 1: =1, software position limit valid, =0, software position limit not valid; Bit 2: =1, homing upon power on , =0, no homing upon power on Bit 3: =1, absolute value memory, =0, absolute value with no memory,	0X6000
Pr8.01	Path count	16 paths	0X6001
Pr8.02	Control Operation		0X6002
Pr8.06	Software positive limit H	High 16-bit of software positive limit	0X6006
Pr8.07	Software positive limit L	Software positive limit (Only able to read low 16-bit using 485 communication)	0X6007
Pr8.08	Software negative limit H	High 16-bit of software negative limit	0X6008
Pr8.09	Software negative limit L	Software negative limit (Only able to read low 16-bit using 485 communication)	0X6009
Pr8.10	Homing mode	Homing method in PR mode Bit 0: Homing direction =0: Reverse; =1: Forward Bit 1: Specific position after homing =0: No; =1: Yes Bit2~7: Homing mode =0: Position limit homing =1: Origin homing =2: Single turn Z homing =3: Torque homing =8: Immediate homing Bit 8: =1: Homing with Z-signal = 0: Homing without Z-signal Single turn Z homing is homing method within 1 revolution, has nothing to do with Bit 8 Z-signal.	0X600A
Pr8.11	Zero position H	High 16-bit of zero position	0X600B
Pr8.12	Zero position L	Zero position (Only able to read low 16-bit using 485 communication)	0X600C
Pr8.13	Home position offset H	High 16-bit of home position offset	0X600D
Pr8.14	Home position offset L	Home position offset (Only able to read low 16-bit using 485 communication)	0X600E
Pr8.15	High homing velocity	Set high homing velocity	0X600F



Pr8.16	Low homing velocity	Set low homing velocity	0X6010
Pr8.17	Homing acceleration	Set homing acceleration	0X6011
Pr8.18	Homing deceleration	Set homing deceleration	0X6012
Pr8.19	Homing torque holding time	Set homing torque holding time	0X6013
Pr8.20	Homing torque	Set homing torque value	0X6014
Pr8.21	Homing overtravel alarm range	Set homing overtravel alarm threshold, set to 0 to deactivate the alarm	0X6015
Pr8.22	Emergency stop at limit deceleration	Set position limit emergency stop deceleration	0X6016
Pr8.23	STP emergency stop deceleration	Set STP emergency stop deceleration	0X6017
Pr8.26	I/O combination trigger mode	 Disable I/O combination trigger mode. Uses I/O CTRG signal edge trigger. Enable I/O combination trigger. Valid when HOME-OK signal is valid. Enable I/O combination trigger. HOME-OK signal not required. 	0X601A
Pr8.27	I/O combination filter	Set I/O combination filter time	0X601B
Pr8.28	S-code current output value	Display S-code output	0X601C
Pr8.29	PR warning	 =0: Reset new command automatically; =0x100: Position limit error during homing =0x101: Emergency stop. Homing not completed; =0x20x: Position limit error on Path N 	0X601D
Pr8.39	JOG velocity	Set JOG velocity	0X6027
Pr8.40	JOG acceleration	Set JOG acceleration	0X6028
Pr8.41	JOG deceleration	Set JOG deceleration	0X6029
Pr8.42	Command position H	High 16- bit of command position	0X602A
Pr8.43	Command position L	Command position (Only able to read low 16-bit using 485 communication)	0X602B
Pr8.44	Motor position H	High 16- bit of motor position	0X602C
Pr8.45	Motor position L	Motor position (Only able to read low 16-bit using 485 communication)	0X602D
Pr8.46	Input	Input status	0X602E
Pr8.47	Output	Output status	0X602F
Pr8.48 -	S-code setting	Path <i>N</i> S-code output settings	0x6030 ~
Pr8.63		· • •	0x603F

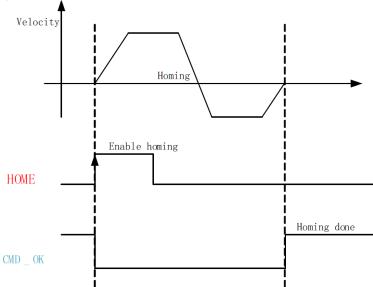


8.3 PR Motion

8.3.1 Homing

Homing is divided into 5 methods according to home signal: Single turn Z-phase homing, position limit homing, origin homing, torque homing, manually set home. Position limit homing, origin homing and torque homing can be with or without Z-signal. Homing can be triggered upon power on or using I/O after servo enabled.

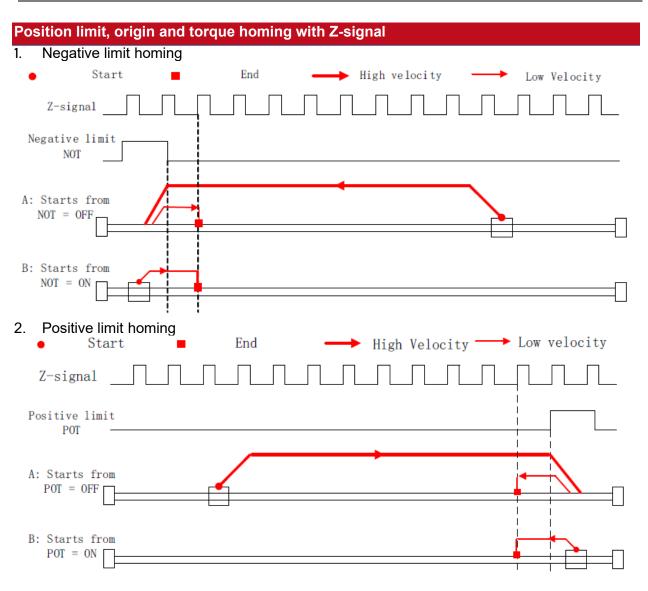
Homing sequence diagram



- 1. **HOME**: Homing trigger signal. When HOME is valid, homing will be done according to set homing method.
- 2. **CMD_OK**: Command completed signal. Invalid when command is being carried out, valid when command is done.
- 3. Please refer to Pr8.10 to set homing methods and other homing mode related settings. It is recommended to use Motion Studio to modify the control parameters in PR mode.

	Label	Homing mode			Valid mode(s)	PR
Pr8.10	Range	0~ 0xFFFF	Jnit	/	Default	0
	Byte length	16bit	Attribute	R/W	485 address	0X600A
	To set homing using Motion \$	g method in PR m Studio.	ode. It is rec	commended	I to modify PR cor	ntrol parameters
	Bit	8(Z-signal homing)	2-7(Hon mode)	ning	1 (Specific position after homing)	0(Homin g direction)
	Description	=1, homing with Z-signal =0, homing without Z-signal	=1 Origin =2 Single I homing	homing turn Z e homing	=1, Yes =0, No	=1, Forward =0, Reverse

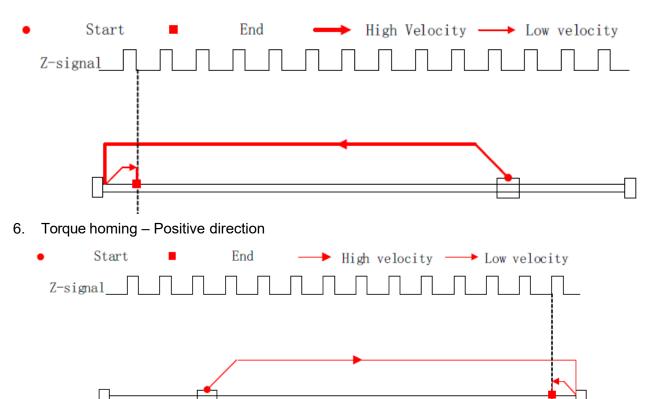






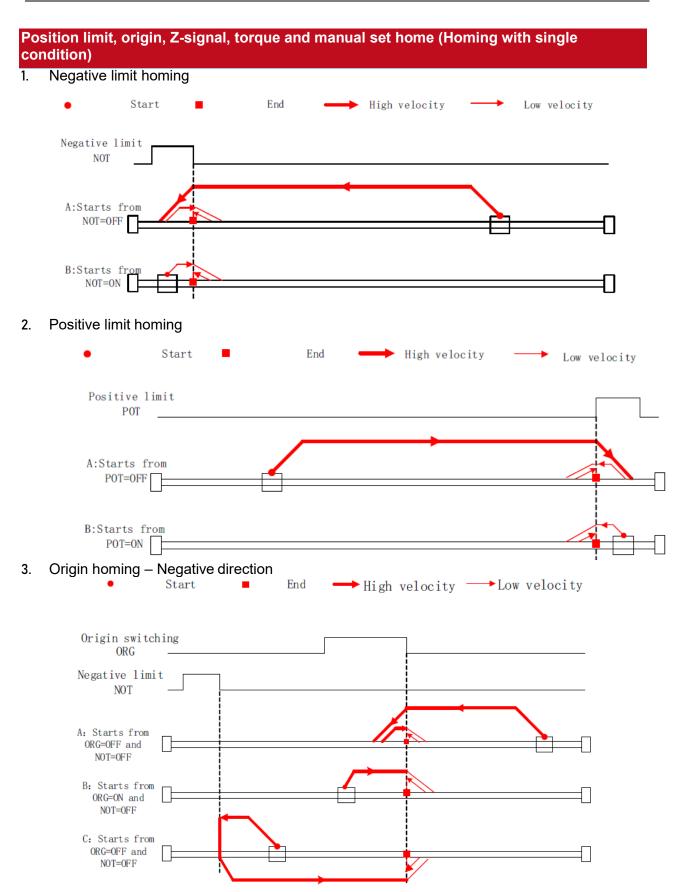
• Start End → High velocity → Low velocity Z-signal Origin switching ORG Negative limit NOT A: Starts from ORG=OFF and NOT=OFF B: Starts from ORG=ON and NOT=OFF C: Starts from ORG=OFF and NOT=OFF 4. Origin homing – Positive direction → High velocity →Low velocity Start ٠ End Z-signal___ 11 Origin switching ORG Positive limit POT A:Starts from ORG=OFF and POT=0FF B:Starts from ORG=ON and POT=OFF C:Starts from ORG=OFF and POT=OFF





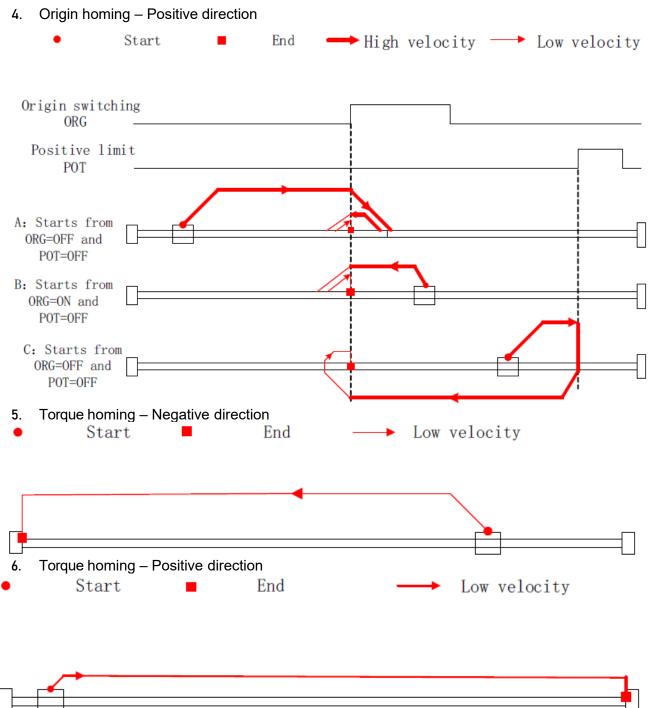
5. Torque homing – Negative direction







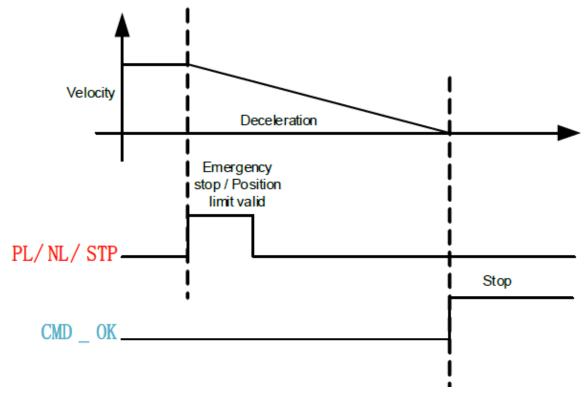






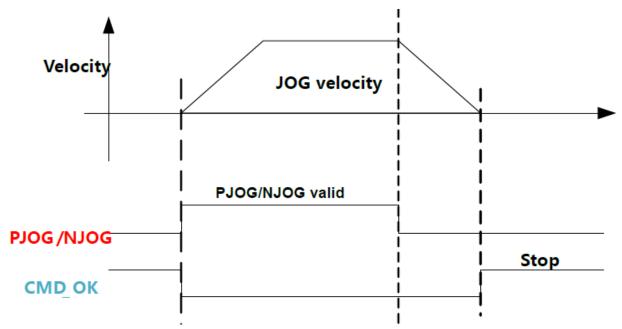
8.3.2 Position limit and emergency stop

For safety concerns, PR mode is designed to trigger emergency stop when position limit or emergency stop signal is valid. Please refer to the sequence diagram below.



8.3.3 JOG

JOG is used to make tuning more convenient. Please refer to the sequence diagram below for motion profile during JOG





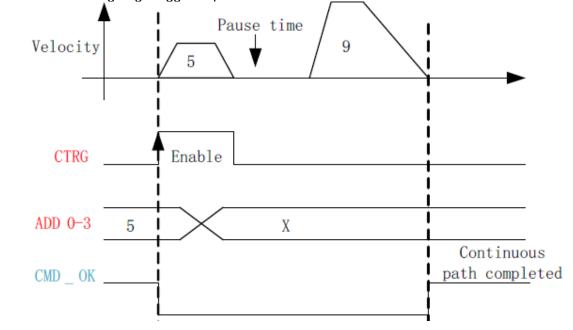
Path motion: Segmented, continuous, interrupted. Path positioning: Position, velocity, homing. PR path is to a total of 16 paths. Every path can be set with motion type, positioning mode, velocity, acceleration, deceleration and pause time independently.

Parameter	Label	Description	485 addr.
Pr9.00	PR mode	Attribute of PR path is determined by its mode. Bit 0-3: type : 0: null 1: Positioning 2: Velocity 3: Homing 4: Emergency stop Indicates using P/V/H/S Bit 4: 0: Can be Interrupted 1: Can't be Interrupted, indicates using ! Bit 5: OVLP: 0: No overlap, indicates with SJ 1: Overlap, indicated with CJ Bit 6-7: 0: absolute 1: relative command 2: relative motor Corresponding to ABS/INC/REL Bit8-13: 0-15: Jump to corresponding path Indicates using SJ0x or CJ0x Bit 14: JUMP: 0: No Jump, indicates with END 1: Jump. Jump to SJ or CJ	0X6200
Pr9.01	PR position H	High 16-bit of PR path position	0X6201
Pr9.02	PR position L	PR position (Only able to read low 16-bit using 485 communication)	0X6202
Pr9.03	Velocity	Velocity, rpm	0X6203
Pr9.04	Acceleration time	Unit ms/1000rpm	0X6204
Pr9.05	Deceleration time	Unit ms/1000rpm	0X6205
Pr9.06	Pause time	Pause time after command completed	0X6206
Pr9.07	Special parameter	Mapped to Pr8.02	0X6207
Pr9.08 ~ Pr9.127		8 parameters for each path. Please refer to Class 9 parameter in Chapter 3	



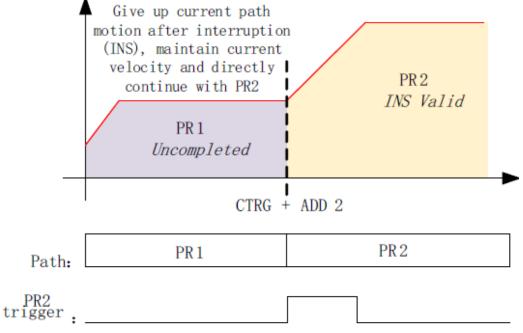
Segmented trigger

CTRG rising edge/double edges trigger (Pr8.00) a segmented motion. Please refer to the sequence diagram below with rising edge trigger of path 5.



Multi-path interrupted motion

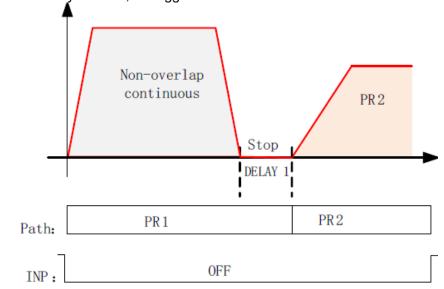
In multi-path motion, path motion that is triggered later will interrupt path motion that has already started. Please refer to the sequence diagram below





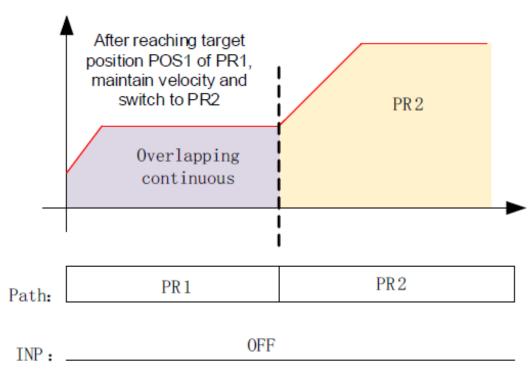
Non-overlap continuous motion

Path motion continues by another, no trigger needed for the next one to start.



Overlapping continuous motion

Path motion starts immediate after the previous path motion is completed without deceleration or trigger in between.





8.4 PR Control

8.4.1 PR module in Optimus tuning software

Using Pr-Motion function in Optimus tuning software, PR parameters can be set including trigger settings, software position limit, JOG, homing, emergency stop, etc. Manual triggering of homing, path motion or emergency stop can also be triggered on this interface.

Co	ntrol Pa	arameters Path Paramet	ers Manual	Parame	ter List Online	Path Loop				
		ol Config			H	loming Config		(0-0-10)		(D-0 10 D-0 14)
	CTR	.G(Pr8.0)				Homing Direction	on(Pr8.10)	(Pr8.10)		(Pr8.13-Pr8.14)
		Rising edge trigger	Homing	after pow	er on	Homing Direction (Negative)	Homing(Pulse	cified location after)	0
			Absolute	e data me	mory	O Homing Direction (Positive)	Z-signal Homi	ng	
	C	Rising/falling edge trigger	Trigger		÷	loming Method	(Pr8.10) 0: Limit Switch Hon	nina 🗸	Homing high	(Pr8.15) 200
		Software Limit Position(F	Pr8.0,Pr8.6-P	r8.		loming	(Pr8.11-Pr8.12)		Hamina law	(Pr8.16)
	5.0	tware Positive Limit Positio	(Dulco)	0		Position(Pulse)	0		Homing low	
	501	tware Positive Limit Positio	n(Puise)			In min m	(Pr8.17)			(Pr8.18)
	Soft	tware Negative Limit Posit	ion(Pluse)	0		loming acceleration(ms/Krpi	100		Homing deceleration(ms/Krp	m) 100
					E	-stop Config(Pr8.22	2-Pr8.23)			
						Deceleration of E-s while position limit active(ms/Krom)	stop 10		Deceleration of E-stop(ms/Krpm)	50
		PR control re				an be set o	n this page	9.		
	ath			ositi	Velocity(Acceleratio	Deceleratio	Pause Ti	S-C	
0		0000H:_,END	0		60	100	100	0	0x00	
1		0000H:_,END	0		60	100	100	0	0x00	
2		0000H:_,END	0		60	100	100	0	0x00	
3		0000H:_,END	0		60	100	100	0	0x00	
4		0000H:_,END	0		60	100	100	0	0x00	
5		0000H:_,END	0		60	100	100	0	0x00	
6		0000H:_,END	0		60	100	100	0	0x00	
7		0000H:_,END	0		60	100	100	0	0x00	
8		0000H:_,END	0		60	100	100	0	0x00	
9		0000H:_,END	0		60	100	100	0	0x00	
1		0000H:_,END	0		60 60	100	100	0	0x00	
1			0		60 60	100	100	0	0x00	
		0000H:_,END						-		
1	_	0000H:_,END	0		60	100	100	0	0x00	
1		0000H:_,END	0		60	100	100	0	0x00	
1	-	0000H:_,END	0		60	100	100	0	0x00	
1	5	0000H:_,END	0		60	100	100	0	0x00	
			Symbol descrip positioning mod		Interrupt function (_: interrupt) (!: No Interrupt)	+ (P: Po (V: Ve (HOME:	ition type sition mode) + locity mode) Homing mode) ative reference)	Absolute (ABS: absolu (INC: Relativ (REL: Relativ (CAP: Relativ	te command) + e command) (to the motor)	Jump Function (SJ: Positioning jump) (CJ: Continuous jump) (END: Stop)

All class 9 parameters for 0-15 paths can be found here once connected to a servo drive that supports PR mode.



Control Parameters | Path Parameters | Manual Parameter List | Online Path Loop |

		Parameters Man	ual Parameter L	ist Online Path Loop					
Notion Oper Position(P)	Pr9.02	_	Pr9.03 60 Acce	leration(ms/Krpm)		ration(ms/Krpm) Pr9.00	Pr9.05 100 Start	Pause Time(ms)	Pr9.06
loming				Posido	Post 1				
	Pr8.46			Pr8.43					
Input	0x0000		Command	0	Refresh		Homing	Emergenc	v Stop
	Pr8.47			Pr8.45		Μ	lanual Homing	chiergenc	y Stop
Output	0x0000	Motor	Position (Pulse)	0	Auto Refresh				
Frigger Pr-M	1ode								
0		1	2	3	4	5	6	7	
8		9	10	11	12	13	14	15	

Manual control of servo drive in PR mode can be done in this page.

Address	Number	Label	Value	Min	Max	Default	Unit	Remarks
40960	PA8.00	Pr control setting	0x0	0x0	0xFFFF	0x0		Set in the Control Parameter Window
40962	PA8.01	Pr motion path number	16	16	16	16		None
40964	PA8.02	Control register	0x0	0x0	OxFFFF	0x0		None
40974	PA8.07	Positive software limit L	0	-214	21474	0	pluse	None
40978	PA8.09	Negative software limit L	0	-214	21474	0	pluse	None
40980	PA8.10	Homing Method	0x0	0x0	OxFFFF	0x0	**	Set in the Control Parameter Window
40984	PA8.12	Homing position L	0	-214	21474	0	pluse	None
40988	PA8.14	Homing stop position L	0	-214	21474	0	pluse	None
40990	PA8.15	Homing high speed	200	1	6000	200	rpm	None
40992	PA8.16	Homing low speed	50	1	6000	50	rpm	None
40994	PA8.17	Homing acceleration	100	1	32767	100	ms/Krpm	None
40996	PA8.18	Homing deceleration	100	1	32767	100	ms/Krpm	None
40998	PA8.19	Holding time of homing	100	0	65535	100	ms	None
41000	PA8.20	Torque value of homing	100	0	65535	100	%	None
41002	PA8.21	Overpass distance settin	0	0	65535	0	0.1r	None
41004	PA8.22	Deceleration of E-stop w	10	1	32767	10	ms/Krpm	None
41006	PA8.23	Deceleration of E-stop	50	1	32767	50	ms/Krpm	None
41010	PA8.25	Absolute encoder positi	0	-214	21474	0		None
41012	PA8.26	IO combined trigger mo	0	0	65535	0		None
41014	PA8.27	IO combined filtering	5	0	65535	5	ms	None
41016	PA8.28	Output value of S code	0x0	0x0	0xFFFF	0x0		None
41018	PA8.29	PR alarm	0x0	0x8	0x7FFF	0x0		None

All PR mode and control parameters can be found on this list for convenience of tuning

Loop triggering	Pr8.43					
Command position (P)	0	Current path		Outer loop 1 count	Run	
	Pr8.45					Emergency stop
Motor position (P)	0	Current loop count			Suspend	
Motor position (P)	0	Current loop count			Suspend	
	0		Interval(ms)	Jump interval(ms)	Suspend	
position (P)	0	count	Interval(ms) 100	Jump interval(ms)	Suspend	
position (P) Path	0	count			Suspend	

To run PR mode in a loop

8.4.2 Physical I/O

Path motion, feedback status, etc can be triggered through I/O in PR mode. Please refer to the table below for I/O assignments in PR mode.

Inpu	it			Out	out		
Label	Signal			Label	Signal	Va	lue
		NO	NC			NO	NC
Command trigger	CTRG	20h	A0h	Command completed	CMD_OK	20h	A0h
Homing	HOME	21h	A1h	Path completed	PR_OK	21h	A1h
Forced emergency stop	STP	22h	A2h	Homing completed	HOME_OK	22h	A2h
Positive JOG	PJOG	23h	A3h	S-code 0	SD0	23h	A3h
Negative JOG	NJOG	24h	A4h	S-code 1	SD1	24h	A4h

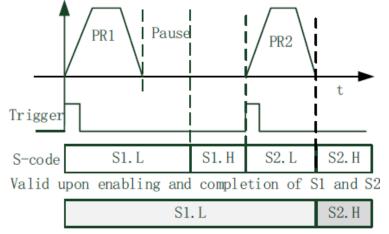


Positive position limit	PL	25h	A5h	S-code 2	SD2	25h	A5h
Negative position limit	NL	26h	A6h	S-code 3	SD3	26h	A6h
Origin	ORG	27h	A7h	S-code 4	SD4	27h	A7h
Path address 0	ADD0	28h	A8h	S-code 5	SD5	28h	A8h
Path address 1	ADD1	29h	A9h	S-code 6	SD6	29h	A9h
Path address 2	ADD2	2ah	Aah	PR warning	PRWAR	2Ah	AAh
Path address 3	ADD3	2bh	Abh				
Torque switching	TC-SEL	09h	89h				

S-code

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.	S-code upon	S-code valid	S-code upon
	0: Invalid, retain previous value	completion	upon activation	activation
	1: Valid		0: Invalid	
			1: Valid	



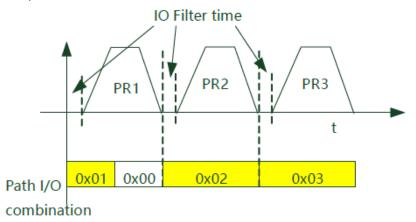
Valid when S1 enabled and S2 completed

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



I/O trigger

Path motion trigger: Edge trigger/combination trigger(Pr8.26). Edge trigger is triggering path combination motion using I/O. I/O combination trigger uses electrical level as trigger rather than signal edge. No valid motion for path 0 and I/O combination triggers motion once after I/O filter when converted to non-zero paths.



**Path combination 0 is invalid because I/O combination x>0->x can be triggered for multiple times when using incremental position.

*In I/O combination trigger mode 2, path motion will be triggered upon servo drive power on if I/O combination not set to 0. Please be careful.

	Label		I/O co	mbination	trigger mod	е	Valid mode(s)	PR		
Pr8.26	Range		0~65	535	Unit	1	Default	0		
	Byte ler	ngth	16bit		Attribute	R/W	485 address	0X601A		
	Value	Desc	ription							
	[0]	Disa	ble I/O c	ombinatio	n trigger mod	e. Uses I/O	CTRG signal edge tr	igger.		
	1	Enab	ole I/O co	ombinatior	n trigger. Valio	when HO	ME-OK signal is valid			
	2	Enab	ole I/O co	e I/O combination trigger. HOME-OK signal not required.						
	IO comb	inatio	n trigge	r select pa	ath using AD	D0~ADD3	3. Trigger mode is a	set in Pr8.26.		
	ADD3	AD	D2	ADD1	ADD0	Path sel	ection			
	OFF	OF	F	OFF	OFF	Path 0 (Non-action)			
	OFF	OF	F	OFF	ON	Path1				
	OFF	OF	F	ON	OFF	Path2				
	OFF	OF	F	ON	ON	Path3				
	OFF	ON		OFF	OFF	Path4				
	OFF	ON		OFF	ON	Path5				
	OFF	ON		ON	OFF	Path6				
	OFF	ON		ON	ON	Path7				
	ON	OF		OFF	OFF	Path8				
	ON	OF		OFF	ON	Path9				
	ON	OF	-	ON	OFF	Path10				
	ON	OF	F	ON	ON	Path11				
	ON	ON		OFF	OFF	Path12				
	ON	ON		OFF	ON	Path13				
	ON	ON	-	ON	OFF	Path14				
	ON	ON	l	ON	ON	Path15				



8.4.3 485 communication

485 communication can be used to achieve the same functions as with I/O, modifying PR related parameters and trigger path motions. Through this communication protocol, controlling of multiple axes can be realized, saving wiring works with flexibility in the system. 485 communication includes 2 kinds of mode: Fixed trigger and immediate trigger.

Parameter	Label						Description		
Pr5.29	Communication	485 cor	nmur	nicatio	n mod	e d	ata		
	mode	Valu	ie	В	it		Checksum	Stop	
		0		8		Εv	en	2	
		1		8		00	ld	2	
		2		8		Even		1	
		3		8		00	bl	1	
		4		8		Νι	ıll	1	
		【5】		8		Νı	ıll	2	
Pr5.30	Baud rate	To set o	comn	nunica	tion sp	bee	d of RS485 o	communicat	ion
		Value	Bau	d rate	Value	9	Baud rate		
		0	2400		【4】		38400bps		
		1	4800	<u> </u>	5		57600bps	_	
		2	9600		6		115200bps		
		3		00bps					
Pr5.31	ID				address				
Pr8.02	PR trigger	Attribute		lex	Description				
		Write	-	01P	<u> </u>		ositioning		
		Write		020	Rese	-			
		Write	-	021			/ set currently p	position as 0 (0	Drigin)
		Write		040		-	cy stop		
		Read	-	000P	Posit	ioni	ng completed.	Ready to recei	ve new data
		Read		01P,					
			-	020,	Yet t	o re	spond to comm	nand	
				040					
		Read		10P			tion undergoing	0	
		Read	0x	200	Com	mar	d completed. V	Naiting for pos	sitioning

485 communication parameters

PR mode communication address:

Class 8 parameters: 0x6000+(Param-ID-800). For example Pr8.06: 0x6000+(806-800)=0x6006 Class 9 parameters: 0x6200+(Param-ID-900). For example Pr9.06: 0x6200+(906-900)=0x6206



8.4.4 Path trigger

Fixed trigger

Fixed triggering method is to set all 16 paths homing and other settings, then through Pr8.02 (trigger register to replace CTRG and HOME) to enable path. Recommended for simple applications with fixed motions.

Steps:

- 1. Set homing and path attributes using Motion Studio. Power on driver for parameters to be valid.
- 2. Write corresponding command into 0x6002(Pr8.02) to realize required motions.

Attribute	Index	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,	Yet to respond to command
	0x040	
Read	0x10P	Path motion undergoing
Read	0x200	Command completed. Waiting for positioning

Immediate trigger

Immediate trigger is more flexible while fixed triggering is restricted by 16 paths position. Path motion is triggered immediately once path is written. Motions such as position, velocity or homing are realized through data frame.

This triggering method uses PR0 with 8 datum from which Pr9.07 mapped into Pr8.02. When 0x10 is written into Pr8.02, it will trigger PR0 motion immediately.

Steps:

- 1. Set homing and path attributes using Motion Studio. (Homing parameters must be set) Power on driver for parameters to be valid.
- 2. Control specific path using Pr8.02.
- 3. Realize path motion by writing into Pr9.00 Pr9.07 with Pr9.07 = 0x10

No.	Data	Description	Value
1	ID	Slave ID	1~127
2	FC	Function code	0x10
3	ADDR	Address	0x62
4	ADDR	Address	0x00
5~6	NUM1	Data count (Word)	0x0008
7	NUM2	Data count (BytE)	0x10
8-9	Pr9.00	Mode	XXXX
10-11	Pr9.01	Position high bit	XXXX
12-13	Pr9.02	Position low bit	XXXX

Master device request frame byte data



14-15	Pr9.03	Velocity	XXXX
16-17	Pr9.04	Acceleration	XXXX
18-19	Pr9.05	Deceleration	XXXX
20-21	Pr9.06	Delay time	XXXX
22-23	Pr9.07	Trigger control	0x0010
24	CRC	Checksum Lo	
25		Checksum Hi	

Slave response frame byte data

No.	Data	Description	Value
1	ID	Slave ID	1~127
2	FC	Function code	0x10
3	ADDR	Address	0x62
4	ADDR	Address	0x00
5	NUM	Data count (Word)	0x08
6	CRC	Checksum Lo	0xXX
7		Checksum Hi	0xXX

8.5 PR motion

8.5.1 Trigger using physical I/O

1. Set up servo drive parameter such as Pr0.01 = 6. Required PR I/Os are set in Pr4.00-Pr4.15 2. Set up PR control parameters such as trigger, homing, emergency stop, velocity, etc as shown below

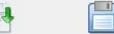
3. Set PR path parameter such as motion type, S-code, etc as shown below. The interface is divided into 3 parts:

7	7				ţĊ;	Function	n butto	ns
ntrol Paran	neters Path Parameters	Manual Parameter List	Online Path Loop	ave parameter (3)	- detory react			
ath	Positioning Mode	Positi	Velocity(Acceleratio	Deceleratio	Pause Ti	S-C	
)	0000H:_,END	0	60	100	100	0	0x00	Path parameters
	0000H:_,END	0	60	100	100	0	0x00	Path parameters
2	0000H:_,END	0	60	100	100	0	0x00	settings
8	0000H:_,END	0	60	100	100	0	0x00	-
ł	0000H:_,END	0	60	100	100	0	0x00	
5	0000H:_,END	0	60	100	100	0	0x00	
j	0000H:_,END	0	60	100	100	0	0x00	
,	0000H:_,END	0	60	100	100	0	0x00	
}	0000H:_,END	0	60	100	100	0	0x00	
)	0000H:_,END	0	60	100	100	0	0x00	
.0	0000H:_,END	0	60	100	100	0	0x00	
.1	0000H:_,END	0	60	100	100	0	0x00	
.2	0000H:_,END	0	60	100	100	0	0x00	
.3	0000H:_,END	0	60	100	100	0	0x00	
.4	0000H:_,END	0	60	100	100	0	0x00	
.5	0000H:_,END	0	60	100	100	0	0x00	 Positioning Mode settings gu
		Symbol description of positioning mode:	Interrupt function (_: interrupt) (!: No Interrupt)	+ (P: Po (V: Ve (HOME:	ition type sition mode) . locity mode) Homing mode) ative reference)	Absolute + (ABS: absolut (INC: Relativ (REL: Relative (CAP: Relativ	te command) (e command) (e to the motor)	Jump Function + (S1: Positioning Jump) (C1: Continuous Jump) (END: Stop)



Function buttons: Upload, download parameters to/from drives, save parameter, backup and reset to factory default.







Parameters: Set PR path related parameters here

Descriptions: Short explanation on each PR path motion types

Remember to upload parameters to drive and save to drive after parameters setup.

4. Set up homing, trigger, I/O in PR mode as shown below:

**Please select required path when using edge trigger. Make sure the corresponding path is chosen in I/O path selection

*Please set up I/O combination filter time when using I/O combination trigger. Make sure I/O signal filter time covers the change in signal level.

	kecipe save Parameter uploading	-	ad Save parameter(s) Factory re	set		
Motion Operation Pr9.02 Position(P) 0	Pr9.03	eleration(ms/Krpm)	Pr9.04 100 Decelera	ation(ms/Krpm) Pr9.00	Pr9.05 100 Start	Pause Time(ms)	Pr9.06
Homing Pr8.46 Input 0x0000 Pr8.47 Output 0x0000	Command Motor Position (Pulse)	Pr8.43 0 Pr8.45 0	Refresh	Ma	Homing Inual Homing	Emerge	ncy Stop
Trigger Pr-Mode	9 10	3	4	5	6	7	

This page is divided into 3 parts:

Motion Operation: To set up parameters for Path 0. Click on "Start" and parameters will be automatically uploaded to driver

Homing: I/O and position display; Homing and emergency stop button

Trigger Pr-Mode: To trigger operation of any of the 16 PR paths.



8.5.2 Control using 485 communication

485 communication data frame format

Byte(x)	0	1	2	3	4	5	6	7
Definition	ID	Function	Addr.	Addr.	Data	Data	CRC	CRC
		code	High	Low	High	Low	checksum	checksum
			8-bit	8-bit	8-bit	8-bit	Low 8-bit	High 8-bit

Please refer to Modbus communication in Chapter 7 to use Word function code writing. The request and respond frame data format is similar.

1. Set PR0 to travel to absolute position = 200000 (10000 pulse/rev)

No.	485 communication data frame	Description
1	01 06 62 00 00 01 57 B2	Set PR0 mode as absolute position
2	01 06 62 01 00 03 87 B3	Set PR0 position high bit
3	01 06 62 02 0D 40 32 D2	Set PR0 position low bit
4	01 06 62 03 02 58 66 E8	Set PR0 velocity
5	01 06 62 04 00 32 56 66	Set PR0 acceleration
6	01 06 62 05 00 32 07 A6	Set PR0 deceleration
7	01 06 60 02 00 10 37 C6	Trigger PR0 motion
8	01 06 60 02 00 40 37 FA	Send Emergency stop datagram when required

2. Set PR0 to travel relative distance = 10000 (10000 pulse/rev)

No.	485 communication data frame	Description
1	01 06 62 00 00 41 56 42	Set PR0 mode as relative position
2	01 06 62 01 00 00 C7 B2	Set PR0 position high bit
3	01 06 62 02 27 10 2D 8E	Set PR0 position low bit
4	01 06 62 03 02 58 66 E8	Set PR0 velocity
5	01 06 62 04 00 32 56 66	Set PR0 acceleration
6	01 06 62 05 00 32 07 A6	Set PR0 deceleration
7	01 06 60 02 00 10 37 C6	Trigger PR0 motion
8	01 06 60 02 00 40 37 FA	Send Emergency stop datagram when required

3. Set PR0 as velocity mode with velocity = 600rpm

No.	485 communication data frame	Description
1	01 06 62 00 00 02 17 B3	Set PR0 as velocity mode
2	01 06 62 03 02 58 66 E8	Set PR0 velocity
3	01 06 62 04 00 32 56 66	Set PR0 acceleration
4	01 06 62 05 00 32 07 A6	Set PR0 deceleration
5	01 06 60 02 00 10 37 C6	Trigger PR0 motion
6	01 06 60 02 00 40 37 FA	Send Emergency stop datagram when required



4. Set PR1 to travel to absolute position = 200000 (10000 pulse/rev)

No.	485 communication data frame	Description
1	01 06 62 08 00 01 D6 70	Set PR1 mode
2	01 06 62 09 FF FC 07 C1	Set PR1 position high bit
3	01 06 62 0A F2 C0 F3 40	Set PR1 position low bit
4	01 06 62 0B 02 58 E7 2A	Set PR1 velocity
5	01 06 62 0C 00 32 D7 A4	Set PR1 acceleration
6	01 06 62 0D 00 32 86 64	Set PR1 deceleration
7	01 06 60 02 00 11 F6 06	Trigger PR1 motion
8	01 06 60 02 00 40 37 FA	Send Emergency stop datagram when required

5. Set PR1 as velocity mode with velocity = 300rpm

-				
No.	485 communication data frame	Description		
1	01 06 62 08 00 02 96 71	Set PR1 as velocity mode		
2	01 06 62 0B 01 2C E7 FD	Set PR1 velocity		
3	01 06 60 02 00 11 F6 06	Set PR1 acceleration		
4	01 06 62 0C 00 32 D7 A4	Set PR1 deceleration		
5	01 06 62 0D 00 32 86 64	Trigger PR1 motion		
6	01 06 60 02 00 40 37 FA	Send Emergency stop datagram when required		

6. Homing

-		
No.	485 communication data frame	Description
1	01 06 60 0A 00 00 B7 C8	Set homing method
2	01 06 60 0F 00 64 A6 22	Set high homing velocity
3	01 06 60 10 00 1E 16 07	Set low homing velocity
4	01 06 60 02 00 20 37 D2	Trigger homing
5	01 06 60 02 00 40 37 FA	Send Emergency stop datagram when required

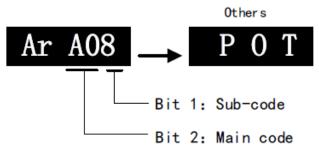


Chapter 9 Warning and Alarm

9.1 Servo drive 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		
	1	Overload warning	
	2	Regeneration energy overload warning(85% of the regeneration threshold)	
	3	Absolute encoder battery voltage low (<3.1V) . Valid when Pr0.15 is set to 1.	
	4	Change the parameter to a non-real time valid warning	
	7	Low temperature warning (< 20°C)	
	8	Positive limit switch valid. POT blinking on front panel	
A0	9	Negative limit switch valid. NOT blinking on front panel	
	А	Positive and negative limit switch valid. PNOT blinking on front panel	
	В	Current position is beyond software positive limit. SPOT blinking on front panel	
	С	Current position is beyond software negative limit. NPOT blinking on front panel	
	D	Current position is beyond software negative, positive limit. SPNOT blinking on	
	ט	front panel	
	E	Parameters reset to factory default. Restart needed	



9.2 Servo drive 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".

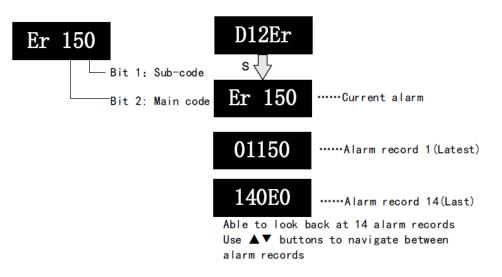


Table 9.1 Error Code List

Erro	or code	Content	Attribute			
Main	Sub	Content	Save	Туре	Clearable	
09	0~F	FPGA communication error	٠	2		
	0~1	Circuit current detection error	٠	2		
	2,4	Analog input error	•	2		
0A	3	Motor power cable not connected	•	1		
	5	DC bus error	٠	2		
	6	Temperature measuring error	•	2		
0	0	Control circuit power supply voltage too low		2		
0b	1	Control circuit power supply voltage too high		2	•	
0c	0	DC bus overvoltage	•	1	•	
	0	DC bus undervoltage	٠	1	•	
0d	1	Single phasing of main power supply	٠	2		
	2	No main power supply detected		2		
	0	Overcurrent	٠	1		
0E	1	Intelligent Power Module (IPM) overcurrent	٠	1		
UE	2	Power output to motor shorted to ground	٠	1		
	4	Phase overcurrent	٠	1		
0F	0	Driver overheated	•	2		
	0	Motor overloaded	٠	1	•	
10	1	Driver overloaded	•	1	•	
	2	Motor rotor blocked	٠	1	•	
	0	Regenerative resistor overvoltage	٠	2		
12	1	Holding brake error	٠	1		
	2	Regenerative resistor value too low	•	2		

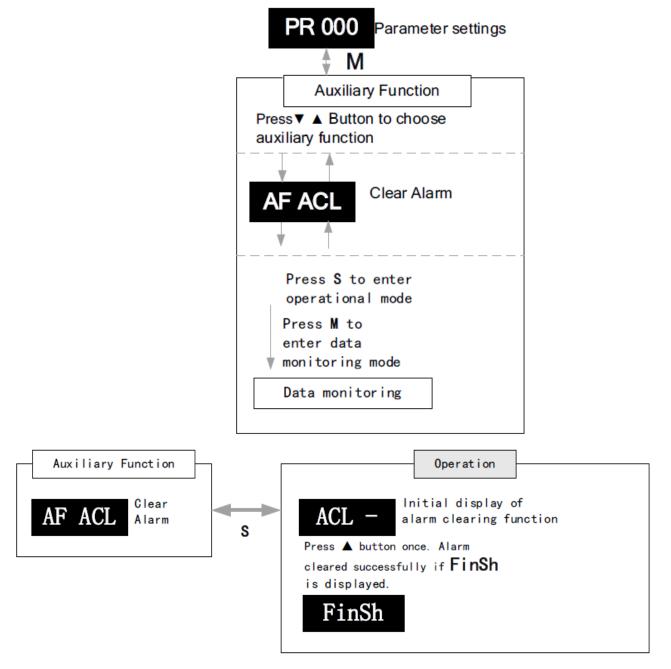


	0	Encoder disconnected	•	1	
	1	Encoder communication error	•	1	
	2	Encoder initial position error	•	1	
-	3	Multiturn encoder error	•	2	
15	4	Encoder parameter settings error	•	2	
	5	Encoder data overflow	•	2	
	5 6		•	2	•
	6 7	Encoder overheated	•	2	•
		Encoder counter error	•		٠
17	0	Encoder data error	•	1	
	1	Encoder parameter initialization error	•	1	
18	0	Excessive position deviation	•	2	٠
-	1	Excessive velocity deviation	•	2	•
19	0	Motor vibration too strong	•	2	•
	1	Excessive hybrid position deviation	•	1	•
1A	0	Overspeed	٠	2	٠
173	1	Velocity out of control	٠	1	٠
	0	Bus input signal dithering	•	2	•
	1	Incorrect electronic gear ratio	•	2	•
1b	4	Excessive synchronous position command	٠	2	٠
	0	I/O input interface assignment error	•	2	
21	1	I/O input interface function assignment error	٠	2	
21	2	I/O output interface function assignment error	•	2	
	0	CRC correction during EEPROM parameter saving		2	
	1	I2C communication status error		2	
24	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	
05	0	Gantry deviation error	•	1	
25	1	Gantry communication error	•	1	
26	0	Positive/Negative position limit triggered under non-homing mode	•	2	•
	0	Analog 1 input overrun limit	•	2	•
27	1	Analog 2 input overrun limit	•	2	•
_,	2	Analog 3 input overrun limit	•	2	•
	0	Control mode not match under full closed loop mode	•	1	
29	1	Encoder mode not match under full closed loop mode	•	1	
57	0	Forced alarm input valid(E-stop)	•	2	•
	0	Motor model no. detection error		2	
5F	1	Driver power module detection error		2	
	0	Main loop interrupted timeout		2	
60	1	Velocity loop interrupted timeout		2	
70	0	Encryption error		2	
89	0	Homing error		2	•
09	U			∠	•



Save: Save error messages to alarm history.

Type: The type 1 and type 2 fault stop mode can be set via Pr5.10 [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.







9.3 Alarm Handling

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

Error	Main	Sub	Display: " <mark>Er 090</mark> "" <mark>Er 09F</mark> "		
code	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	Main	Sub	Display: " <mark>Er 0A0</mark> "" <mark>Er 0A1</mark> "		
code	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	Main	Sub	Display: " <mark>Er 0A2</mark> " / " <mark>Er 0A4</mark> "	
code	0A	2/4	Content: Analog input error	
Cause			Diagnosis	Solution
Analog input wiring error			Verify analog input wiring	Make sure of analog input wiring connection

Error	Main	Sub	Display: " <mark>Er 0A3</mark> "			
code 0A 3 Content: Motor power cable not connected			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	Main	Sub	Display: " <mark>Er 0A5</mark> "	
code	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 drive is on and d27 DC bus voltage.	Make sure L1, L2 terminal voltage is within recommended range



Error	Main	Sub	Display: "Er 0A6" Content: Temperature measuring error	
code	0A	6		
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	Main	Sub	Display: " <u>Er 0b0</u> " Content: Control circuit power supply voltage too low	
code	0b	0		
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		der	/	Increase power supply capacity for L1C, L2C terminals

Error	Main	Sub	Display: " <mark>Er 0b1</mark> "		
code	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	Main	Sub	Display: " <mark>Er 0c0</mark> "			
code	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 Pr7.32/Pr7.33	Modify vent overload parameter		
Inner br	ake circ	uit damaged	/	Replace driver		

Error	Main	Sub	Display: "Er 0d0"		
code	0d	0d 0 Content: DC bus undervoltage			
Cause			Diagnosis	Solution	
Main po undervo	wer supp Itage	ly	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	Main	Sub	Display: " <mark>Er 0d1</mark> "		
code	0d	1	Content: Single phasing of main power supply		
Cause	Cause		Diagnosis	Solution	
Main power supply undervoltage		ly	Verify L1,L2,L3 terminal voltage	Increase main power supply voltage	
Main power supply wiring error		ly	Loose connection of L1, L2, L3 Secure connections		

Error	Main	Sub	Display: " <mark>Er 0d2</mark> "	
code 0d 2 Content: No main power supply detected		etected		
Cause			Diagnosis	Solution
No main power supply			Verify L1,L2,L3 terminal voltage	 Increase main power supply voltage Secure connections

Error	Main	Sub	Display: " <mark>Er 0E0</mark> "		
code	0E	0	Content: Overcurrent		
Cause			Diagnosis	Solution	
	Driver power output short circuit		Verify if there is short circuit between UVW terminals, or shorted to PG.	 Make sure there is no circuit. Make sure motor is not damaged 	
Motor w	viring erro	r	Verify motor wiring	Reconnect motor wiring	
IGBT m circuit	IGBT module short circuit		Disconnect motor output cable. Then, enable servo driver to check for overcurrent	Replace driver	
Control parameter anomaly		er	Verify if parameter exceeds recommended range Set parameter within recommended range.		
Control anomal	commano ⁄	b	Verify if command motion is too acute	Modify control command; use filter	

Error Main Sub		Sub	Display: " <mark>Er 0E1</mark> "		
code	0E	1	Content: Intelligent Power Module	e (IPM) overcurrent	
Cause			Diagnosis	Solution	
Driver power output short circuit		out	Verify if there is short circuit between UVW terminals, or shorted to PG.	 Make sure there is no circuit. Make sure motor is not damaged 	
Motor w	iring erro	r	Verify motor wiring	Reconnect motor wiring	
IGBT m	IGBT module short circuit		Disconnect motor output cable. Then, enable servo driver to check for overcurrent	Replace driver	
-	IGBT module undervoltage		1	Replace driver	
Control parameter anomaly		er	Verify if parameter exceeds recommended range	Set parameter within recommended range.	
Control anomaly	commano /	t	Verify if command motion is too acute	Modify control command; use filter	



Error Main Sub Display: "Er 0E2"					
code	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	 Reconnect wiring. 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	Main	Sub	Display: " <mark>Er 0E4</mark> "	
code	0E	2	Content: Phase overcurrent	
Cause			Diagnosis	Solution
	Driver U, V, W terminals shorted to ground		Disconnect motor power cable and check for short circuit between driver UVW and PE	 Reconnect wiring. 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	Main	Sub	Display: " <mark>Er 0F0</mark> "	
code	0F	0	Content: Driver overheated	
Cause	Cause		Diagnosis	Solution
Temperature of power module exceeded upper limit			Measure the temperature of driver radiator.	 Improve cooling condition. Please check installation guide; Replace driver and motor with higher power rating; Increase duration time for acceleration and deceleration; Decrease load

Error	Main	Sub	Display: " <mark>Er 100</mark> "		
code	10	0	Content: Motor overloaded		
Cause		Diagno	osis	Solution	
Load too I			f actual load exceeds um value allowed	1. Decrease load 2. Adjust limit values	
Strong mechanical vibration		Look for mechanical vibration from machine system		 Adjust gain value of control loop Increase duration time for acceleration and deceleration 	
Motor or encoder cable wiring error		Verify motor and encoder wiring		 Reconnect wiring Replace motor and encoder cable 	
Holding bi engaged	rake	Verify I	holding brake terminal voltage	Cut off holding brake	



Error	Main	Sub	Display: " <mark>Er 101</mark> "	
code	10	1	Content: Driver overloaded	
Cause Diagnosis		osis	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	Main	Sub	Display: " <mark>Er 102</mark> "		
code	10	2	Content: Motor rotor blocked		
Cause		Diagno	osis	Solution	
Motor rotor blocked		Look for mechanical blockages		Check the machinery	
Motor rotor blocking time threshold value too low		Verify	value of Pr6.57	Adjust value of Pr6.57	

Error	Main	Sub	Display: " <mark>Er 120</mark> "	
code	12	0	Content: Regenerative resi	istor overvoltage
Cause			Diagnosis	Solution
exceeded of re resistor	5		 Verify if velocity is too high Verify if load is too large 	 Decrease motor rotational velocity; Decrease load inertia; Add an external regenerative resistor;
Power suţ too high	Power supply voltage too high		 Verify if power supply voltage is within the rated range. Interval regenerative resistor value is too low 	 Decrease power supply voltage Increase regeneration resistance value(add external regenerative resistor)
Unstable power supply voltage		upply	Verify if power supply voltage is stable	Add a surge suppressor to main power supply.
Regenera discharge damaged		rgy	1	 Add an external regenerative resistor; Replace driver

Error	Main	Sub	Display: " <mark>Er 121</mark> "			
code	12	1	Content: Holding brake error			
Cause	Cause		Diagnosis Solution			
Holding brake circuit			Regenerative resistor disconnected	Replace regenerative resistor		
damaged	5		Holding brake IGBT damaged	Replace driver		



Error	Main	Sub	Display: " <mark>Er 122</mark> "		
code 12 2		2	Content: Regenerative resistor value too low		
Cause	Cause		Diagnosis Solution		
External regenerative resistor value is less than the minimum value allowed by the drive		ess value	1	Replace the regenerative resistor with the right resistance value which meets the specification of the driver	

Error	Main	Sub	Display: " <mark>Er 150</mark> "					
code	15	0	Content: Encoder disconnected					
Cause			Diagnosis	Solution				
Encoder of disconneo			Verify encoder cable connection	Make sure encoder cable properly connected				
Encoder c	able wir	ing error	Verify if encoder wiring is correct	Reconnect encoder wiring				
Encoder c	lamageo	ł	/	Replace motor				
Encoder n damaged	neasurir	ng circuit	/ Replace driver					

Error Main Sub		Sub	Display: " <mark>Er 151</mark> "	
code 15 1 Content: Encoder communication error				
Cause			Diagnosis	Solution
Encoder v layer is mi		lding	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	Main	Su	b	Display: " <u>Er 152</u> "		
code	15	2	2	Content: Encoder initial position error		
Cause			Dia	agnosis	Solution	
Communication data abnormal			vol 2. lay 3.	Verify if encoder power supply tage is DC5V ± 5% ; Verify if encoder cable and shielded er is not damaged; Verify if encoder cable is close to h-powered power supply cable	 Make sure encoder power supply voltage is stable Make sure encoder cable is not damaged. Make sure encoder cable shielded layer is grounded to frame Make sure encoder cable is away from high-powered power supply cable 	
Encoder damaged		d	1		Replace motor	
	Encoder measuring circuit damaged			1	Replace driver	



Error	Main	Sub	Display: "Er 153"	
code	15	3	Content: Multiturn enco	der error
Cause			Diagnosis	Solution
Initial use			Origin calibration not performed	Perform origin positioning and multiturn position initialization, calibrate the origin of coordinate system.
multitur	Encoder without multiturn absolute function used		Verify if encoder has multiturn absolute function	 Replace the motor with a multiturn absolute encoder. Set Pr0.15 = 0 to deactivate multiturn absolute function.
Low battery power		er	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	Main	Sub	Display: " <mark>Er 154</mark> "			
code	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	Main	Sub	Display: " <mark>Er 155</mark> "		
code	15	5	Content: Encoder data overflow		
Cause			Diagnosis	Solution	
Encode	r data ove	erflow	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	Main	Sub	Display: " <mark>Er 156</mark> "	
code	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	Main	Sub	Display: " <mark>Er 157</mark> "		
code	15	7	Content: Encoder counter error		
Cause			Diagnosis	Solution	
Encode	r data ove	erflow	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	Main	Sub	b Display: " <mark>Er 170</mark> "			
code	17	()	Content: Encoder data error		
Cause			Diagr	nosis	Solution	
Communication data abnormal			Diagnosis1. 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		 Make sure encoder power supply voltage is stable Make sure encoder cable is not damaged. Make sure encoder cable shielded layer is grounded to frame Make sure encoder cable is away from high-powered power supply cable 	
Encoder	Encoder damaged		1		Replace motor	
	Encoder measuring ircuit damaged			1	Replace driver	

Error			ub	Display: " <mark>Er 171</mark> "	
code	17	1		Content: Encoder parameter ini	tialization error
Cause	Cause D		Diag	nosis Solution	
	Driver and motor not matched		Verify driver and motor models.		Replace with matching driver and motor
Error while getting parameters from encoder		J	2. Ve insula	rify if encoder cable is standard. rify if encoder has no peeled ator, broken connection or oper contact.	Use standard encoder cable, verify the connection of both sides of driver and motor, change encoder cable if necessary

Error	Main	Sub	Display: " <mark>Er 180</mark> "	
code	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 ga	in settir	ng too	Verify if values of Pr1.00 & Pr1.05 are too low	Increase values of Pr1.00 & Pr1.05
Torque limit too low			Verify if values of Pr0.13 & Pr5.22 are too low	Increase values of Pr0.13 & Pr5.22
Excessive external load			 Verify if acceleration and deceleration duration time is too low. Verify if rotational velocity is too high Verify if load is too large 	 Increase duration time for acceleration and deceleration Decrease rotational velocity Decrease load



Error	Main	Sub	D	Display: " <mark>Er 181</mark> "		
code 18 1 Content: Excessive velocity deviation			iation			
Cause				Diagnosis	Solution	
	Deviation between set velocity and actual velocity is too great			Verify if value of Pr6.02 is too low	 Increase value of Pr6.02; Set Pr6.02 to 0, position error detection off. 	
Acceleration and deceleration duration time for set velocity is too low			or	Verify if value of Pr3.12 and Pr3.13 are too low	 Increase value of Pr3.12, Pr3.13; Adjust velocity gain to reduce velocity lag error 	

Error	Main	Sub	Display: " <mark>Er 190</mark> "	
code	19	0	Content: Vibration too strong	
Cause	Cause		Diagnosis	Solution
Resonance			Mechanical stiffness is too high, resonance occurs	Reduce mechanical stiffness or use filter
Current loop gain too large		n too	Verify current loop gain value Reduce current loop gain	

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

Error	Mai n	Sub Display: "Er 1A0"			
code 1A 0 Content: Overspeed		Content: Overspeed			
Cause Diagnosis			Solution		
Motor velo exceeded speed lim (Pr3.21)	ocity d first 1. Verify if velocity command is too high; 2. Verify if simulated velocity command voltage is too high; 3. Verify if parameter value of Pr3 21 is too low;			 Adjust velocity input command; 2. Increase Pr3.21 value; Adjust pulse train input frequency and division frequency coefficient; Verify encoder wiring; 	



Error	Main	Sub	Display: " <mark>Er 1A1</mark> "		
code	1A	1	Content: Velocity out of control		
Cause	Cause Diagnosis		Solution		
Motor velo out of con Excessive velocity er	trol,		encoder phase sequence; Verify if UVW s connected to the right terminal	Reconnect UVW if wrongly connected. If still remains unsolved, please contact technical support.	

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

Error	Main	Sub	Display: "Er 1b1" Content: Incorrect electronic gear ratio		
code	1b	1			
Cause	Cause		Diagnosis	Solution	
Values out of range		ge	Numerator or denominator is zero/Set values out of range	Reduce number of pulses per revolution	

Error	Main	Sub	Display: "Er 1b4" Content: Excessive synchronous position mode command		
code	1b	4			
Cause	Cause		Diagnosis	Solution	
Values out of range		ge	Numerator or denominator is zero/Set values out of range		

Error	Main	Sub	Display: " <mark>Er 210</mark> "			
code	21	0	Content: I/O input interface assignment error			
Cause			Diagnosis	Solution		
Input signal assigned with two or more functions.			Verify values of Pr4.00-Pr4.09, Pr4.44-4.47	Set proper values for Pr4.00- Pr4.09, Pr4.44-4.47		



Error	Main	Sub	Display: " <mark>Er 211</mark> "			
code	21	1	Content: I/O input interface function assignment error			
Cause	Cause		Diagnosis	Solution		
Input signal assignment error		ignment	Verify values of Pr4.00-Pr4.09, Pr4.44-4.47	Set proper values for Pr4.00- Pr4.09, Pr4.44-4.47		

Error	Main	Sub	Display: "Er 212" Content: I/O output interface function assignment error		
code	21	2			
Cause	Cause		Diagnosis	Solution	
	Input signal assigned with two or more functions.		Verify values of Pr4.10-Pr4.15	Set proper values for Pr4.10- Pr4.15	
Input signal not assigned			Verify values of Pr4.10-Pr4.15	Set proper values for Pr4.10- Pr4.15	

Error	Main	Sub	Display: " <mark>Er 240</mark> "	
code 24 0 Co		0	Content: CRC correction error during EEPROM parameter saving	
Cause			Diagnosis	Solution
L1, L2 terminal voltage too low		ltage	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	Main	Sub	Display: " <mark>Er 260</mark> "	
code	26	0	Content: Positive/Negative position limit triggered under non-homin	
Cause			Diagnosis	Solution
Positive/negative position limit triggered			Verify position limit signal	/

Error	Main	Sub	Display: " <mark>Er 270</mark> " " <mark>Er 272</mark> "	
code 27 0~2		0~2	Error description: Analog input 1-3 out of range	
Cause			Diagnosis	Solution
Analog value out of range			Verify if analog input value is out of range	Adjust analog input voltage

Error	Main	Sub	Display: " <mark>Er 280</mark> "		
code	e 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	Main	Sub	Display: " <mark>Er 570</mark> "	
code	57	0	Error description: Forced alarn	n input valid
Cause			Diagnosis	Solution
Forced alarm input signal occurred		ut	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		Sub	Display: "Er 5F0"	
		on error		
Cause			Diagnosis	Solution
Automatically detected motor doesn't match set motor			1	Please contact our technical support

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

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

Error Main Sub		Sub	Display: " <mark>Er 601</mark> "		
code	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 too not long (more than 20 meters)	Replace encoder cable if necessary	
			Restart driver	Replace the drive with a new one	

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



Error	Main	Sub	Display: "Er 890"	
code	89	0	Error description: Homing error	
Cause			Diagnosis	Solution
1. Excess velocity 2. Homin different f signal 3. Sensol inconsiste	g mode from giv r signal	is en	 Verify if homing velocity is too high Verify if homing mode is set correctly Verify if sensor signal edge is consistent 	 Set an optimal homing velocity Make sure sensor signal edge is consistent.
Inconsistent origin status			 Homing acceleration/ deceleration is set too low Electronic gear ratio is low which causes acceleration/ deceleration to be too low 	 If electronic gear ratio cannot be changed, please set a suitable 609A. Increase electronic gear ratio



9.4 Alarm clearing

For alarm can be cleared. There are 3 method.

Method 1 :

1. By setting bit 7 of 6040h to 1, switches state machine from fault to initialization completion , No fault(Switch on disabled).

Method 2 :

Use auxiliary function "AF_ACL"

1、Press M to select auxiliary function , Press SET to enter into "<mark>AF_ACL</mark>" , Press and hold to clear the alarm

Method 3 :

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