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# Chapter 1 safety reminder

This chapter describes important matters that users must observe, including product identification, storage, transportation, installation, wiring, operation, and inspection.

### 1.1 Safety Notes

• Turn off the power for more than 5 minutes before disassembling and installing the driver, otherwise it may cause electric shock due to residual voltage.

• Do not disassemble or install the driver when the servo unit is powered on, otherwise it may cause electric shock, stop the product or burn it out.

• Please never touch the inside of the servo drive, otherwise it may cause electric shock.

• When the power is turned on and for a period of time after the power is cut off, the heat sink of the servo drive, the external braking resistor, the servo motor, etc. may be high temperature, please do not touch, otherwise it may cause burns. To prevent inadvertent contact with hands or parts (such as cables, etc.), take safety measures such as installing a cover.

• Please use the power supply specification that conforms to the product for the power supply of the servo drive, otherwise it may cause the product to burn out, electric shock or fire.

• Between the power supply and the main circuit power supply of the servo drive, be sure to connect a magnetic contactor and a non-fuse circuit breaker. Otherwise, when the servo drive fails, the large current cannot be cut off, resulting in a fire.

• The ground terminal of the servo drive must be grounded, otherwise it may cause electric shock.

• Unless you are a professional, do not set up, disassemble, or repair the product, as this may result in electric shock or injury.

• Please never modify this product, otherwise injury or mechanical damage may result.

• Do not damage or pull the cable too hard, do not subject the cable to excessive force, do not place it under heavy objects or cause it to be pinched, otherwise it will cause malfunction, damage, and electric shock.

• When the servo motor is running, please never touch its rotating parts, otherwise you may be injured.

• Do not use this product near places where it will be splashed with water, corrosive environments, flammable gas environments and combustibles, otherwise it may cause electric shock or fire.

• Please install the servo drive, servo motor and external braking resistor on incombustible materials, otherwise it may cause fire.

• In the servo driver and servo motor, do not mix flammable foreign objects such as oil and grease, and conductive foreign objects such as screws and metal pieces, otherwise it may cause a fire.

• When installing it on the supporting machine and starting to run, please put the servo motor in a state where it can be stopped at any time in advance, otherwise it may cause injury.

• In the state where the servo motor and the machine are connected, if an operation error occurs, it will not only cause mechanical damage, but may also lead to personal accidents.

• Install an external emergency stop device to ensure that the power is turned off and operation is stopped immediately when an error occurs.

• Please use a noise filter, etc. to reduce the influence of electromagnetic interference, otherwise it will cause electromagnetic interference to the electronic devices used near the servo unit.

• Servo unit and servo motor should be used in the specified combination.

### 1.2 Precautions for storage

 $\bullet$  Do not place too much of this product on top of one another, as this may cause injury or malfunction.

• Please store in the following environment:

- Places without direct sunlight;
- Places where the ambient temperature is within the range of  $-20^{\circ}$ C to  $+65^{\circ}$ C;
- The relative humidity is in the range of 0% to 95%, and there is no condensation;
- Places without water droplets, steam, dust and oily dust;
- Places without high-heating devices;
- Non-corrosive, flammable gas and liquid places;
- Places that are not easy to be splashed with water, oil, medicines, etc.;
- Places that will not be exposed to radioactive radiation;
- Strong and vibration-free place;
- A place without electromagnetic noise interference.

Storage in an environment other than the above may result in product failure or damage.

### 1.3 Precautions for transportation

• When operating the servo unit and servo motor, be careful of sharp parts such as the corners of the equipment, otherwise injury may result.

 $\bullet$  Do not place too much of this product on top of one another, as this may cause injury or malfunction.

• This is a precision device, please do not drop it or apply strong impact to it, otherwise it will cause malfunction or damage.

 $\bullet$  Do not apply shock to the connector part, otherwise it will cause poor connection or malfunction.

### 1.4 Notes on installation

•Please install the drive on a dry and sturdy platform, maintain good ventilation and heat dissipation, and maintain a good grounding during installation.

• Please install it in the prescribed direction to avoid malfunction.



 $\bullet$  When installing, please make sure to keep the specified distance between the servo drive and the inner surface of the electric cabinet and other machines, otherwise it will cause fire or failure.





• When installing, do not block the air inlet and air outlet, and do not allow foreign objects to enter the product, otherwise it may cause malfunction or fire due to the aging of the internal components.

- Do not place heavy objects on or on top of this product, as this may result in injury.
- Please install in the following environment:
  - Places without direct sunlight;
  - Locations where the ambient temperature is in the range of  $0^{\circ}$ C to  $55^{\circ}$ C;
  - •The relative humidity is in the range of 0% to 95%, and there is no condensation;
  - Places without water droplets, steam, dust and oily dust;
  - Places without high-heating devices;
  - Non-corrosive, flammable gas and liquid places;
  - Places that are not easy to be splashed with water, oil, medicines, etc.;
  - Places that will not be exposed to radioactive radiation;
  - A firm and vibration-free place;
  - A place without electromagnetic noise interference.

Installation in an environment other than the above may result in product failure or damage.

### 1.5 Wiring Precautions

• It is recommended not to use single-phase 220V main power supply, as the electrolytic capacitor may be damaged due to lack of phase.

 $\bullet$  Do not change the wiring while the power is on, otherwise electric shock or injury may result.

• Please have professional technicians perform wiring or inspection operations, otherwise it will cause electric shock or product failure.

• Please check the wiring and power supply carefully. The output circuit may be

short-circuited due to incorrect wiring or the application of different voltages. When the above fault occurs, the brake does not operate, so it may cause mechanical damage or personal injury.

 $\bullet$  Do not connect the input power cable to the U, V, W terminals of the drive, otherwise the servo drive will be damaged.

• When wiring, do not pass the power cable and the signal cable through the same pipe, and do not bundle them together. The distance between the two should be more than 30cm to avoid interference.

• The ground terminal of the driver must be connected to the ground to avoid leakage and reduce the interference to the system, and the diameter of the ground wire should be the same or larger than that of the power supply wire.

• When connecting the AC power supply and DC power supply to the servo unit, please connect to the designated terminals, otherwise it may cause malfunction or fire.

• For the wiring length, the maximum length of the command input line is 3m, and the maximum length of the encoder line is 20m.

• Please use twisted-pair shielded cables for signal cables and encoder cables, and the shielding layer is grounded at one end.

• The U, V, W terminals of the driver and the U, V, W terminals of the motor should be connected one by one according to their names. If they are connected incorrectly, the motor cannot run normally.

 $\bullet$  Products that share the DC bus should have a varistor, and the wiring should be secure.

• Please wait at least 5 minutes after the power is turned off before performing the inspection. Even if the power is turned off, high voltage may still remain inside the servo drive. Therefore, within 5 minutes after the power is turned off, do not touch the power terminals, otherwise it will cause electric shock.

• Do not turn on/off the power frequently. When it is necessary to repeatedly turn on/off the power continuously, please control it to less than once a minute. Since the power supply part of the servo driver has a capacitor, a large charging current will flow (charging time 0.2 seconds) when the power is turned ON/OFF. Therefore, if the power is turned on/off frequently, the performance of the main circuit components inside the servo drive will be degraded.

• Do not power on when the terminal block screws or cables are loose, otherwise it may cause fire.

• In the following places, please take appropriate shielding measures, otherwise it may cause damage to the machine:

- Places where there is interference due to static electricity;
- Places where strong electric or magnetic fields are generated;
- places where radiation exposure may occur;
- Places with power lines nearby.

### 1.6 runtime considerations

• During the test run, in order to prevent accidents, please run the servo motor with no load (not connected to the transmission shaft), otherwise it may cause injury.

• When it is installed on the matching machine and starts to run, please set the user parameters that match the machine in advance. If the operation is started without parameter setting, it may cause loss of control or malfunction of the machine.

• To avoid accidents, please install a limit switch or stopper at the end of the moving part of the machine, otherwise it will cause damage to the machine or injury to personnel.

• Do not make extreme changes to the parameter settings, otherwise it will cause unstable movement, mechanical damage or injury.

• When the power is turned on or the power is just cut off, the heat sink, external braking resistor, motor, etc. of the servo drive may be in a high temperature state. Please do not touch it, otherwise it may cause burns.

• When using a servo motor on a vertical axis, please install a safety device to prevent the work piece from falling in the state of alarm, over travel, etc. In addition, please set the stop setting of the servo lock when over travel occurs, otherwise the work piece may drop in the over travel state.

• Do not enter the operating range of the machine during operation, otherwise injury may result.

• Do not touch the servo motor and the moving parts of the machine during operation, otherwise injury may result.

• Install a safety system to ensure safety even in the event of a signal line disconnection or other failure. For example, when the forward over-travel switch (P-OT) and reverse over-travel switch (N-OT) signals are disconnected at the factory settings, a safety action is performed.

• When turning off the power, be sure to set the servo OFF status.

• Do not turn on/off the power frequently. After starting the actual operation, the interval between power ON/OFF should be more than 1 hour, otherwise the components inside the servo unit will be aged prematurely.

• When an alarm occurs, reset the alarm after eliminating the cause and ensuring safety, and restart the operation. Otherwise, injury may occur.

• Do not use the brake of the brake motor for normal braking, otherwise it may cause malfunction.

# 1.7 Maintenance and Inspection Precautions

 $\bullet$  Do not change the wiring while the power is on. Doing so may result in electric shock or injury.

• Please have professional technicians perform wiring or inspection operations, otherwise it will cause electric shock or product failure.

• Please wait at least 5 minutes after the power is turned off before performing the inspection. Even if the power is turned off, high voltage may still remain inside the servo drive. Therefore, within 5 minutes after the power is turned off, do not touch the power terminals, otherwise it will cause electric shock.

 $\bullet$  When replacing the servo drive, please back up the user parameters of the servo drive to be replaced before replacing, and transfer the backup to the new servo drive, and then restart the operation, otherwise the machine may be damaged.

# Chapter 2 Product Information

# 2.1 Drive form factor



E Structure Profinet Bus

# 2.1.1 Installation dimensions of E1, E2, E3, EA structure drives



E1 adaptation current (A) 3-6

E2 Adapter Current (A) 7-12



E3 adaptation current (A) 16-32





# 2.1.2 EA/-E installation dimensions

# EA installation dimension drawing comparison table

Current (A)	38-45	60	75-90
А	220	226	262
В	149	150	160
С	363	439	499
D	349	428	488
E	200	250	251
F	5.5	6.5	6.5

# -E installation dimension drawing comparison table

Current (A)	38-45	60	75-90	110-170				
А	220	226		226		305		
В	149	150		150		160		
С	363	439		439		605		
D	349	428		428		594		
Е	200	250		250		250		236
F	5.5	6.5		6.5		6.5		

# 2.2 Nameplate Description

### 2.2.1 E structure servo drive nameplate

VC series nameplate description:

# VEC-VCXXX-00323-E

VEC	Trademarks									
VC	VC-Series									
XXX	Serial 330 Profinet bus servo drive									
00323	Drive rated	Nameplate logo	Nameplate 00323 00623 00733 01243 logo							243
	current	rated	003	3.0A	00	6.0A	007	7.0A	012	12.0A
	and	current			6					
	voltage	Rated voltage	2	220V	2	220V	3	380V	4	440V
		Single/Dual	3	Three	3	Three	3	Three	3	Three
		/Three		-phas		-phas		-phas		-phas
		Phase		е		е		е		е
		Electricity								
E	structure type									

### 2.2.2 Motor nameplate

# 200FMB-LR4015E33F1-MF2\*

200	Square flange size (mm)							
F		Mark	cooling method					
	cooling method	F	air cooling					
		Default	natural cold					
	Product Series	mark						
		ME						
IVID		МВ						
			ME1					

		MD							
		МН							
	Mamont				inert	ia			
	ivioment of	L	low inertia						
L	inartia	Μ		medium inertia					
	mertia	н		high Inertia					
		Mark		Specification					
		R40		0.4KW					
P40	rated power	1R5			1.5K	W			
<b>N40</b>	lated power	003			3KV	V			
		7R5			7.5K	W			
		020			20K\	N			
		Mark		Ra	nted s	peed			
		10		1	000R	PM			
15	Pated speed	15		1	500R	PM			
15	Rated speed	20		2000RPM					
		25		2	2500R	PM			
		30		3	8000R	PM			
	Installation	Mark	Specification						
F	Instanation	Α	IMB5						
-	method	D	IMB3						
		E	IMB35						
		Mark		Sp	ecific	ation			
		23	2	220V	3	Three-phase			
						power			
33	Voltage level	33	3	380V	3	Three-phase			
						power			
		43	4	440V	3	Three-phase			
		Marila		<u> </u>		power			
		IVIARK		Sp Without k	ecific				
		F P		Puilt in hold	ing b				
	Brake	Δ		No boldin	a bra	ake has on seal			
F		~		NO HOIGHI	g bra				
		C	With holding brake and without oil seal						
	Shaft connection	Mark		sp	ecific	ation			
1		1		0	ptical	axis			
	method	Default		Keyed	threa	ded hole			
N/		Mark		Enc	oder	Signal			
IVI	Encoder type	Μ		Incremental J	ohoto	electric encoder			
		Ν		Wire-saving photoelectric encoder					

		Х	resolver encoder			
		В	23-bit multi-turn absolute value			
			photoelectric encoder			
		C1A	17-bit single-turn absolute value			
			magnetic encoder			
		C2A	17-bit multi-turn absolute value magnetic			
			encoder			
		S	24-bit multi-turn absolute value			
			photoelectric encoder			
		Mark	Specification			
	Number of	F1	1024C/T			
		F2	2500C/T			
F2	encoder lines	F5	5000C/T			
		F6	6000C/T			
		Mark				
		М				
			LA			
	Factoryland		Z			
*	Factory logo		D			
		U				
			С			
			N			

# 2.3 Drive Specifications

Project		Description			
		Single-phase/three-phase full-bridge rectification			
Voltage	control mode	SVPWM drive			
		(Input voltage range AC $220V/380V \pm 10\%$ )			
		Wire-saving photoelectric encoder;			
		17-bit single-turn Tamagawa absolute value encoder;			
Encoder	encoder feedback	23-bit single-turn Tamagawa absolute value encoder;			
Encoder		17-bit multi-turn Tamagawa absolute value encoder;			
		23-bit multi-turn Tamagawa absolute value encoder;			
		24-bit Nikon absolute value encoder;			
	voltage range	-10V to 10V			
Analog	Input impedance	10k Ω			
input	Maximum	1 51-11-			
	frequency	I.JKHZ			
DI/DO Interface Type		NPN/PNP			
Communication method		Profinet			

VECTOR

Brake har	ndling	External Brake Resistor			
fault response		deceleration stop, freewheel stop			
Protective function		Overcurrent, overvoltage, undervoltage, overload, locked rotor,			
		etc.			
auxılıary	function	Gain adjustment, alarm record, jog operation			
		internal position planning			
	<b>T</b> , ,	Plan according to target position, speed, acceleration and			
	Instruction input	deceleration time			
	method	Irapezoidal speed curve			
		Cubic velocity curve A hashts/aslating some and as de			
.,.		Absolute/felative command mode			
position	command smooth way	low pass filter/median filter			
mode	Electronic gear ratio	N/M;(M=1~214/48364/,N=1~214/48364/)			
	Torque limit	Internal torque limit			
		Analog torque limit			
	compensation	Speed feedforward/torque feedforward			
	Torque compensation	Fixed torque compensation/analog torque			
	Torque compensation	compensation/automatic torque compensation;			
	way of command input	analog input/internal speed planning			
	speed control range	1~Maximum speed			
	bandwidth	3kHz			
speed	Torque limit	Internal torque limit/analog torque limit			
control mode	Command smoothing method	Low-pass filter/median filter			
	Feedforward compensation	Torque feedforward			
		Fixed torque compensation/analog torque			
	Torque compensation	compensation/automatic torque compensation:			
	Instruction input method	Internal torque given/analog control torque			
Torque	<b>–</b>	Fixed torque compensation/analog torque			
control	Torque compensation	compensation/automatic torque compensation;			
	speed limit	Internal Speed Limit/Analog Speed Limit			
	Up to 4 digital inputs,	the function of each digital input can be assigned arbitrarily, the			
	assignable functions inc	lude:			
1 1	Enable drive, reset driv	e, torque command A/B switch, torque command reverse enable,			
	positive torque limit A	/B switch, negative torque limit A/B switch, positive speed limit			
input	A/B Switch, negative speed limit A/B switch, forward jog, reverse jog, speed command				
	reverse enable, Main sp	ed source A/B switch, speed stop enable, clear position count,			
	zero position fixed in speed mode, multi-speed speed selection 0, multi-speed speed				

	selection 1, multi-speed speed selection 2, multi-speed speed selection 3, position
	command Prohibit, position command reverse, Electronic gear ratio switch 1, position
	error reset, zero return, trigger multi-stage position, multi-stage position selection 0,
	multi-stage position selection 1, multi-stage position selection 2, multi-stage position
	selection 3, multi-stage position direction selection, return to zero origin switch input,
	Internal position planning, control mode switching switch 0, control mode switching
	switch 1,Enable interrupt fixed length input, cancel interrupt fixed length, trigger interrupt
	fixed length, first set of second set of gain switch, reset fault, forward limit switch in
	position mode, reverse limit switch in position mode, full closed loop Open and closed
	loop switching in mode, electronic gear ratio switch 2, motor overheat input, emergency
	stop input, internal trigger reset, internal trigger reset, internal counter count pulse,
	internal counter reset, speed mode UPDOWN mode UP signal, Speed mode UPDOWN
	mode DOWN signal, AI zero drift automatic correction.
	Up to 3 digital outputs, the function of each digital output can be assigned arbitrarily, the
	assignable functions include:
	Drive enabling, speed reaching, decelerating, accelerating, zero-speed, speed overrun,
	forward running, reverse running, fault output, forward speed limit in torque mode
digital	Negative speed limit in torque mode, speed limit in torque mode, positioning completion
output	output, positioning approaching output, origin return completion output, position error too
1	large output
	Interrupt fixed length completion signal output, software limit signal output, brake signal
	output, input command valid, always OFF, always ON, torque limit signal output, torque
	arrival signal, internal trigger status, internal counter count arrival, same speed
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure.FPGA and
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure.
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found Hall code value learning error over temperature of the drive no
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found, Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on mismatch of motor
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found, Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder twees when the origin is returned to zero, the origin switch INEn 34 is not
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found, Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set Repeated assignment of INFn xx, overspeed, position error is too large interrupt.
	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found, Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set, Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed length trigger signal INFn 40 is not set, no return to zero hefere absolute point.
fault	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found, Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set, Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point mation motor averland asftware limit hardware limit avera planning failure full closed
fault protecti	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, origin search error, lap overflow in
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn.44 not assigned to entity DI,Origin search error, lap overflow in absolute value mode, absolute encoder battery failure, inertia learning failure, when
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn.44 not assigned to entity DI, reverse travel switch input function bit INFn.45 is not assigned to entity DI, reverse travel switch input function bit INFn.45 is not assigned to entity DI, reverse travel switch input function bit INFn.46 is not state point provention is earch error, lap overflow in absolute value mode, absolute encoder battery failure, inertia learning failure, when learning full closed-loop parameters, the position value detected by the second encoder is the position value detected by the second encoder is the position value detected by the second encoder is position.
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn.44 not assigned to entity DI,Origin search error, lap overflow in absolute value mode, absolute encoder battery failure, inertia learning failure, when learning full closed-loop parameters, the position value detected by the second encoder is too small, bus error, motor overheating, DI function code no assignment,AI zero drift is
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn.44 not assigned to entity DI,Origin search error, lap overflow in absolute value mode, absolute encoder battery failure, inertia learning failure, when learning full closed-loop parameters, the position value detected by the second encoder is too large, zero return timeout, absolute encoder battery failure, wrong motor rotation
fault protecti on	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure,FPGA and ARM communication failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found,Hall code value learning error, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, mismatch of motor encoder types, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, interrupt fixed-length trigger signal INFn.40 is not set, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, full closed loop Position error is too large,Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn.44 not assigned to entity DI,Origin search error, lap overflow in absolute value mode, absolute encoder battery failure, inertia learning failure, when learning full closed-loop parameters, the position value detected by the second encoder is too small, bus error, motor overheating, DI function code no assignment,AI zero drift is too large, zero return timeout, absolute encoder battery failure, wrong motor rotation direction during absolute encoder self-learning, and absolute encoder battery voltage is

VC330 series servo driver instruction manual

Installati	air pressure	86~106kPa
on	ambient temperature	$0\sim40^{\circ}$ C,Derating is used when the temperature exceeds $40^{\circ}$ C,
Environ	amolent temperature	and derating by 2 % for every 1 $^{\circ}$ C increase. Up to 50 $^{\circ}$ C.
ment	environment humidity	0~90%RH (No dew condensation)
Require	IP level	IP20
ments	vibration	0~4.9m/s^2

### 2.4 Drive selection

VECTOR

The parameters of the servo factory default maximum current can be viewed through P05.10~P05.20 parameters. If P05.13 defaults to 300%, it means that the factory default maximum output current of the driver is 3 times the rated current of the driver, but it does not represent the maximum current that the servo can output. If you need to further open the current of the driver, please contact our technical personnel for inquiry.

### 2.4.1 E-structure 220V driver selection

Drive model	Output rated current A	Output maximum current A	Hardware output maximum current A
VC330-00323	3	9	9
VC330-00623	6	18	18
VC330-01223	12	36	36
VC330-01523	15	36	45
VC330-02723	27	54	67.5

### 2.4.2 E structure 380V driver selection

Drive model	Output rated current A	Output maximum current A	Hardware output maximum current A
VC330-00733	7	14	21
VC330-01233	12	24	36
VC330-01633	16	32	40
VC330-02033	20	40	50
VC330-02733	27	54	67.5
VC330-03233	32	64	80

### 2.5 Meet the standards

This product meets the following CE certification standards:

1. EN 61800-5-1:2007+A1:2017 (Part 5-1 Safety Requirements for Electricity, Heat and Energy of Speed Regulating Electric Drive System), the corresponding national standard is GB12668.501-2013;

2. EN IEC 61800-3:2018 (Part 3 Electromagnetic Compatibility Standard and Its Specific Test Methods for Speed-governing Electric Drive Systems), the corresponding national standard is GB12668.3-2012.

# Chapter 3 Wiring

This chapter describes the wiring method of the servo drive and the definitions of various signals.

### 3.1 Drive overview

### 3.1.1 E structure servo drive



# 3.2 Main circuit wiring

This section describes the functions of the main circuit terminals, main circuit wiring examples, and main circuit wiring precautions.

### 3.2.1 Main circuit terminal names and functions

Terminal symbol	Name	Function		
рст	Main circuit power	Three-phase 380V driver: power supply access R, S, T;		
<b>Γ</b> <sub>1</sub> <b>Σ</b> <sub>1</sub>	supply input	Three-phase 220V driver: power supply access R, S, T;		
U, V, W	Motor Terminals	One-to-one connection with motors U, V, W		
P、Rb'	Braking resistor terminal	External braking resistor		
P, N	DC bus terminal	External power saving module or shared DC bus		
Ē	Earth terminal	Connect to the ground and connect to the ground wire of the motor at the same time		

Note when sharing DC bus: 380V driver can only share DC bus with 380V driver, 220V driver can only share DC bus with 220V driver.

### 3.2.2 Typical Main Circuit Wiring Example

### (1) E structure driver is three-phase 220V



• The +24V power supply of IO needs to be provided by the user.

(2) E structure driver is three-phase 380V



• The +24V power supply of IO needs to be provided by the user.

3.2.3 Main circuit wiring precautions

(1) Do not connect the input power cable to the P, RB', N, U, V, W terminals of the drive, otherwise the servo drive will be damaged.

(2) The U, V, W terminals of the driver and the U, V, W terminals of the motor should be connected one by one according to their names, and the motor will not run normally if they are connected incorrectly.

(3) The braking resistor cannot be connected to the terminals P and N of the DC bus, otherwise it may cause a fire!

(4) The ground terminal of the driver must be connected to the ground to avoid leakage and reduce the interference to the system, and the diameter of the ground wire should be the same or larger than that of the power supply wire.

(5) When wiring, do not pass the power cable and the signal cable through the same pipe, and do not bundle them together. The distance between them should be more than 30cm to avoid interference.

(6) Use twisted-pair shielded cables for signal lines and encoder lines.

(7) For the wiring length, the maximum length of the command input line is 3m, and the maximum length of the encoder line is 20m.

(8) Even if the power is turned off, high voltage may still remain inside the servo drive. Therefore, after turning off the power, do not touch the power terminals for 5 minutes.

(9) Do not turn on the power when the terminal block screws are loose or the cables are loose, otherwise it may cause fire.

(10) Please do not turn on/off the power frequently. When you need to repeatedly turn on/off the power continuously, please control it to less than once a minute. Since there is a capacitor in the power supply part of the servo driver, when the power is turned on, a large charging current will flow (charging time 0.2 seconds). If the power is turned on/off frequently, the performance of the main circuit components inside the servo drive will be degraded and the service life will be shortened.

#### 3.3 Encoder signal wiring

3.3.1 Pin assignment of the encoder connection port (CN2)



9pin pin interface (female)

3.3.2 The pin definition of the encoder connection port (CN2)

The VC330 servo model supports incremental photoelectric encoder/wire-saving photoelectric encoder/absolute encoder. The pin definitions of the encoder connection port are shown in the table below.

	9PIN pin (female header)					
Pin No.	Signal name	Pin No.	Signal name			
1	A+ or BISS-C	2	A- or BISS-C			
	encoder CLK+		encoder CLK-			
3	B+ or BISS-C	4	B- or BISS-C			
	encoder		encoder DATA-			
	DATA+					
5	Z+or(SD)	6	Z-or(SD-)			
	absolute value		absolute value			
	encoder signal		encoder signal			
	positive		negative			
7	+5V	8	OV			
0	hald	q	(FG)Shielded			
9 hold		Case	network layer			

# 3.4 Input/Output Signal Wiring

In order to facilitate communication with the host controller, the VC330 servo driver provides 4 groups of digital input terminals and 3 groups of digital output terminals that can be arbitrarily configured. In addition, it also provides encoder differential output signals OA+, OA-, OB+, OB- and analog input signals that can be arbitrarily divided.

3.4.1 Pin assignment of input/output signal port (CN3)

The control signal input and output port CN3 of VC330 adopts 25PIN (female) interface.



25PIN pin (female header)

25Pin pin definition						
Pin No.	Define	Functional Description	Pin No.	Define	Functional Description	
11、12	+24V	External DC24V power	4	RST	Reset	
9、17	COM	supply, for DI, DO work	24	AGND	Built-in Analog Ground	
3	DO1C		25	AI1	Analog input	
2	DO2C		13	AI2	Analog input	
1	DO3C	Programmable Digital	10	SW-DI	DI's NPN/PNP jumper	
14	DO3E	Output	20	OA+	Select the encoder signal frequency	
15	DO2E		21	OA-	division output or the second	
16	DO1E		22	OB+	encoder input through parameter	
8	DI1		23	OB-	P03.78	
7	DI2		18	+5V		
6	DI3	Programmable digital	19	0V	Built-in +5V power supply	
		input		Shielded		
5	DI4		Case	network	Connect to drive ground	
				layer		

### 3.4.2 Input and output signal type selection

VC330 can select NPN/PNP type DO through wiring, without jumper, select NPN/PNP type DI through jumper.

Description of digital output circuit: DO1~DO3 are the same

Example description of DO1C/DO1E in 25Pin of VC330 bus:

When D01C and D01E work in  $\ensuremath{\mathsf{NPN}}\xspace/\ensuremath{\mathsf{PNP}}\xspace$  form

Internal expansion diagram of DO1C and DO1E



Remarks: Connect external DC24V power supply to pin 9 (COM) and pin 11 (+24V).

# 3.5 Communication signal wiring

3.5.1 Pin assignment and definition of VC330 servo E structure communication port

Location and function	Terminal shape	Description		
		Both interfaces are defined the same.		
		Pin.No	Position	Description
		1	TX+	send signal+
	OUT UT	2	TX-	send signal-
		3	RX+	receive signal+
		4	NC	dangling
CN1		5	NC	dangling
		6	RX-	receive signal-
		7	NC	dangling
		8	NC	dangling
		(1) It is necessary to connect the power ground of		
		the controll	er (PLC) and	the power ground of the
		<u>servo drive</u>		

Note: When wiring, please connect the GND terminal of the host device and the GND terminal of the servo drive together.

3.5.2 E structure monitoring port pin assignment and definition

CN5 Pin No. Define Description Pin No. Oefine Description I GND power ground NC dangling 3 TXD RS232 send 4 RXD RS232 receive	Location and function	Terminal shape	Description							
5 NC dangling	CN5		Pin No. 1 2 3 4 5	Define GND NC TXD RXD NC	Descriptionpower grounddanglingRS232 sendRS232 receivedangling					

The connection to the computer is as shown below:



#### The parameters for RS232 baud rate selection are as follows:

parameter no.	Parameter Description	Setting range	Units	Function	Setting method	Effective way	Defaults	read and write method
P08.26	RS232 monitor port baud rate 0- 9600 1- 38400 2- 115200	0~2	bps	Set the baud rate of the RS232 monitor port.	anytime	Immediately	2	RW

### 3.6 Wiring suggestions and anti-interference countermeasures

3.6.1 Wiring Recommendations

For the safety and stability of the product, please pay attention to the following matters when wiring:

1. For the cables related to the command input and encoder wiring, please select the shortest distance wiring.

2. The ground wire should be as thick as possible (above 2mm<sup>2</sup>).

•All parts of the system (servo driver, servo motor, noise filter, host controller, switching power supply, HMI, etc.) must be grounded, and must be grounded at one point.

• The recommended grounding resistance is  $100 \Omega$  or less.

•Use shielded cables for motor cables.

3.Do not bend or strain the cable.

•The core wire diameter of the signal cable is only 0.2mm or 0.3mm, please use it carefully.

To prevent radio frequency interference, please use a noise filter.

•Install a noise filter on the input side of the power cord when using it near a home or worrying about radio frequency interference.
In order to prevent malfunction caused by noise, the following processing methods can be adopted:

• Install the host device and noise filter as close to the servo driver as possible.

•Install surge suppressors on the coils of relays and AC contactors.

•When wiring, please separate the strong current line and the weak current line, and keep an interval of more than 30cm, do not put them in the same pipe or bundle them together.

•Do not share the power supply with electric welding machines, electrical discharge machining equipment, etc. Even if the power supply is not shared, install a noise filter on the input side of the wire when there is a high-frequency generator nearby.

6.Protect the power cord with a wiring circuit breaker or fuse.

•Be sure to use a circuit breaker or fuse for wiring in order to prevent cross-electric shock in the servo system.

#### 3.6.2 Anti-interference countermeasures

#### 1. Servo motor housing ground

Be sure to connect the ground terminal "" of the servo motor directly with the ground terminal "" of the servo drive. In addition, connect the ground terminal "" of the driver to the ground. Otherwise, when the servo motor is mechanically grounded, the switching disturbance current will flow from the main circuit of the drive through the parasitic capacitance of the servo motor.

2. When there is interference on the command input cable

When there is interference on the command input line, please connect the 0V line of the input line to the ground, the main circuit wiring of the motor passes through the metal conduit, and connect the conduit and the junction box to the ground.

- Please perform the above grounding treatment and ground all of them at one point.
- 3. Anti-interference wiring example



Note 1: Please use a thick wire of 3.5mm2 or more for the connection wire of the outer box used for grounding (braided copper wire is recommended).

Note 3: When using a noise filter, please observe the precautions described in the following "How to use the noise filter".

4. How to use the noise filter

In order to prevent the interference of the power line and reduce the influence of the servo drive on other equipment, please select a noise filter that can make the servo system

meet the IEC/EN 61800-3 electromagnetic compatibility standard according to the power of the servo drive, and observe the The following notes:

• Please separate the input wiring and output wiring of the noise filter, do not put them in the same bushing, and do not bundle them together.



• Please separate the ground wire of the noise filter from the output wiring, do not put them in the same casing, and do not bundle them together.



• Please connect the ground wire of the noise filter to the ground plane separately. Do not connect other ground wires.



•When the noise filter and the servo drive are installed in the same control cabinet, please connect the ground wire of the noise filter and the ground wires of other devices in the control cabinet to the grounding plate of the control cabinet, and then ground.



# Chapter 4 Panel Display and Keyboard Operation

# 4.1 Introduction to panel composition

#### 4.1.1 E Structure Servo Driver Panel



The panel contains 5 buttons and 5 digital tubes. The general functions of the 5 buttons are shown in the table below.

button name	Button function						
Mode	Mode switch, return to the previous menu						
▲ Increase	Increase the value of the blinking digit of the LED nixie tube						
▼ decrease	Decrease the value of the blinking digits of the LED nixie tube						
Disular	Move the flashing bit of the LED digital tube to the left; check the						
ement	high-order value of the data whose length is greater than 5 digits; reset the						
	fault; execute the Fn function						
SET	Read/write parameter value, enter Fn function page						

# 4.2 panel operation mode

#### 4.2.1 E Structure Servo Driver Panel

There are a total of 4 operating modes, namely status display, parameter reading and writing, variable monitoring, and function operation.

operating mode	Mode introduction
Status Display	Display the status of the drive, such as reset (panel display rst), ready (panel display rdy), running (panel display run), fault (Er.xxx), or monitor a specific variable in operation (such as speed, bus voltage, etc. Wait)
Parameter	read and write all parameters

read and	
write	
Variable	Monitor a variable or IO status of the drive
monitoring	Wonitor a variable of 10 status of the drive
Functional	Execute specific functions, such as jog test run, parameter reset to factory
operation	value, drive reset

Each mode is switched through the MODE button.



# 4.3 Pulse servo status display

In this mode, the status of the drive is displayed, and there are several statuses as follows.

Status name	atus name Status introduction				
The driver enters this state after power-on initialization or		rSt			
Reset state	re-reset and restart.				
Deedy state	The servo drive is initialized and enters the ready state	rdy			
Ready state	when there is no fault in the hardware detection.				
running state	ing state When the driver is enabled, the motor is powered on				
fault state	The drive reports a fault, and the panel displays the reported	Er.xxx			
faunt state	fault code				

In the non-fault state of state display, the panel can be set to display a specific variable through P02.05. For bus type servo status display, refer to the corresponding bus protocol chapter.

### 4.4 Parameter read and write

When entering the parameter read/write mode for the first time, Pxx.yy is displayed. Among them, xx is the parameter group, and yy is the parameter number in the group. The parameters of the driver are divided into  $0\sim13$  groups, and each group can accommodate up to 99 16-bit parameters. There are four types of parameters, namely unsigned 16-bit parameters, signed 16-bit parameters, unsigned 32-bit parameters, and signed 32-bit parameters. The range of values for the unsigned 16-bit parameter is 0 to 65535. The value range for signed 16-bit parameters is -32767 to 32767. The value range of the unsigned 32-bit parameter is 0 to 4294967295. The value range for signed 32-bit parameters is -2147483647 to 2147483647.

#### 4.4.1 Display rules for numbers of different lengths

Negative numbers less than 4 digits and positive numbers less than 5 digits can be displayed through 5 digital tubes. Such as -9999 and 12345 are displayed as follows.



Negative numbers with more than 4 digits or positive numbers with more than 5 digits are displayed on the 2nd or 3rd page. The switching between pages is realized by long pressing the " $\blacktriangleleft$ " (shift) key. The leftmost nixie tube of each page identifies the number of pages displayed at this time. The high horizontal bar is lit to represent the high page, the middle horizontal bar is lit to represent the middle page, and the low horizontal bar is lit to represent the low page.

For example, 1234567 is displayed as follows.



For example, -1234567 is displayed as follows.



1234567890 is displayed as follows.



-1234567890 is displayed as follows.



4.4.2 Parameter setting steps

For example, the process of setting P00.02 to 4000 is as follows.

① Press the MODE button to switch the mode to the parameter reading and writing mode, and the keyboard displays P00.00 at this time;

② Combined with "▲" (increase), "◄◄" (shift), "▼" (decrease) three keys to modify

the parameter number to P00.02;

③ Press the SET key, first read the value of P00.02;

④ Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\nabla$ " (decrease) three keys to set the parameter value to 4000;

⑤ Press the SET key to write the set parameter value into P00.02.

For data displayed on multiple pages, you can automatically shift to other pages by "•

• " (shift), or you can directly shift to other pages by long pressing "••" (shift).

#### 4.5 Functional operation

Currently the servo supports the following functions.

Function No.	Function					
Fn000	Reset the drive					
Fn001	Jog test run					
Fn002	Parameter reset to factory value					
Fn003	Update ARM firmware					
Fn004	Learning the parameters of asynchronous motors					
Fn005	Learn motor pole pairs and encoder parameters					
Fn006	Single parameter gain adjustment					
Fn007	Learning load inertia					
Fn008	Update the FPGA program					
Ep000	Restore all factory parameters except P00 and P01 parameter					
111009	groups					
Fn010	Backup all parameters					
Fn011	Restoring backed up parameters					
Fn012	Restart RS232 communication					
	Self-learning full-closed loop polarity and the number of pulses					
Fn013	of the second encoder corresponding to one rotation of the					
	motor					
Fn014	Clears the revolution value of the absolute encoder					
Fn016	Current loop PI parameters of self-learning synchronous motor					

4.5.1 Fn000 reset drive function

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn000;

③ Press the SET key, the drive will be reset directly.

#### Note: In any state, pressing the "▲" (increase) and "▼" (decrease) keys

#### simultaneously for 2 seconds can reset the drive.

4.5.2 Fn001 Jog test run function

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn001;

③ Press the SET key, at this time the drive is enabled and the digital tube displays the motor speed in real time.

④ Press the "▲" (increase) key to increase the Jog speed by 10rpm, press the "▼" (decrease) key to reduce the Jog speed by 10rpm, press the "◄<" (shift) key to set the Jog speed to 0; long Press the "◄<" (shift) key to change the speed increase rate to 500rpm.</li>

(5) After the Jog trial run, press the MODE button to exit the Jog mode, and the servo is disabled at this time.

#### Note: When the drive is enabled, the jog test operation function is invalid.

4.5.3 Fn002 Restore all parameters to factory defaults

All parameters are restored to factory defaults, and the drive will restore its related parameters according to the set motor model P00.06 and drive level P01.15. If Er609 is reported, it means that the drive level P01.15 is set incorrectly, and the servo does not have the drive parameters of this drive level temporarily. If Er610 is reported, it means that the motor model P00.06 is set incorrectly, and the servo does not have the motor parameters of this motor model. When Er609 or Er610 is reported, if you need to forcefully restore a group of drive parameters, you can set P10.33=32767 to shield the above errors, and then restore the factory defaults.

The operation steps are as follows:

① Confirm the motor model P00.06 and drive grade P01.15. Motor models and drive level can be found on the VECObserve Complete Matching page. As shown below.



2 Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

③ Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn002;

④ Press the SET key to display rECY;

⑤ Long press the "◄◄" (shift) key;

6 If the recovery is successful, it will display donE, and if it fails, it will display Err.
Notice:

<u>\*When the drive is enabled, the function of parameter restoring to factory default is</u> <u>invalid.</u>

<u>\*When power on, if you press the "▲", "▼", "◀◀" keys at the same time, the</u> parameters can also be restored to the factory values.

4.5.4 Fn003 Download program reset

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combined with " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) 3 buttons to set the display value of the nixie tube to Fn003;

- ③ Click SET to display UPd; (Update)
- ④ Long press the "<<" (shift) key to reset the drive;
- (5) At this point, the ARM firmware can be updated via RS232.

4.5.5 Fn004 Learn asynchronous motor encoder parameters

This function can self-learn the relevant parameters of the asynchronous motor. Including P00.05 motor pole pair number, P00.11 motor encoder resolution, P00.47 induction motor stator resistance ( $\Omega$ ), P00.48 induction motor rotor resistance ( $\Omega$ ), P00.49 induction motor total leakage inductance (mH), P00.50 induction motor magnetizing inductance (mH). During the self-learning process, the motor maintains the smooth axis, and the motor rotates to the rated speed.

The operation steps are as follows:

① Set the motor rated frequency P00.51;

② Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn004;

③ Click SET to display SEL0; (Self-Learn0)

④ Press the "< " (shift) key to start self-learning. After the self-learning is completed, it will automatically turn off the enable or report a fault.

#### Note: 1. When the driver is enabled, this function is invalid.

2. The asynchronous motor self-learning encoder can only be realized through this function, and the monitoring software learning is invalid.

3. During the learning process, the motor will run at high speed, please make sure that the motor is fixed and safe to operate.

4.5.6 Fn005 Learn related parameters of synchronous motor encoder

When using motors other than our company, it is necessary to learn the encoder parameters.

Before self-learning, set the self-learning maximum current limit P02.36 (50% of motor rated current), motor maximum speed P00.03, motor rated speed P00.02, motor Rated current P00.01, drive rated current P01.03.

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\nabla$ " (decrease) three buttons to set the display value of the digital tube to Fn005;

③ Click SET to display SEL1; (Self-Learn1)

④ Press the "<<" (shift) key to start self-learning. After the self-learning is completed, it will automatically turn off the enable or report a fault. The main learning parameters are as follows: P00.05 Motor pole pairs, P00.71 Z point offset, P00. 11 Motor encoder resolution, P00.72 Encoder AB phase sequence.

If the overcurrent Er.100 is reported during the learning process, parameters P02.36

(maximum current limit of self-learning), P07.01 (current loop proportional gain) and P07.02 (current loop integral gain) can be appropriately reduced.

#### Note: When the driver is enabled, this function is invalid.

#### 4.5.7 Fn006 Single parameter gain adjustment

Single parameter gain adjustment refers to adjusting one parameter to achieve the purpose of adjusting servo rigidity. Before single-parameter gain adjustment, the servo load inertia ratio P07.29 must be accurately obtained. For the method of obtaining the load inertia ratio, refer to Fn007.

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn006;

③ Click SET to display the value of rigidity level P07.28;

④ Press the "<<" (shift) key, the motor starts to rotate forward and reverse;

(5) By pressing " $\blacktriangle$ " or " $\blacktriangledown$ ", gradually increase or decrease the value of the rigidity level until the rigidity of the servo meets the actual application. Under normal circumstances, the rigidity level can be gradually increased until the motor has abnormal noise, and then reduce the rigidity level by 1-2.

Note: When the driver is enabled, this function is invalid.

For VC330 series servo, every time the rigidity level is adjusted, the parameters will not be automatically saved in the servo. If the adjustment is completed, the user needs to manually long press the "<<" (shift) key to save the adjusted rigidity level in the servo.

4.5.8 Fn007 Learning load inertia

The load inertia is the most important parameter of the servo system. Only when the inertia is matched can the servo perform optimally.

(1) VC330 Servo Load Inertia Learning

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn007;

③ Click SET to display SEL4; (Self-Learn 4)

(4) Press the " $\triangleleft \dashv$ " (shift) key to start self-learning. The servo drive enters the state of automatically learning the habit, and the learned inertia will be automatically displayed on the panel.

(5) Press " $\blacktriangle$ ", the motor rotates forward for 2 circles, and press " $\checkmark$ ", the motor rotates reversely for 2 circles. The load inertia value will be updated to the panel every time it rotates. Press continuously for several times until the inertia is stable, the inertia at this time is the

learned load inertia. After stabilization, long press "< " (shift) to save the learned value to the servo drive.

If the overcurrent Er.100 is reported during the learning process, P07.01 (current loop proportional gain), P07.02 (current loop integral gain), P07.03 (speed loop proportional gain), P07.04 can be appropriately reduced (speed loop integral gain).

If the load inertia is large, low frequency oscillation may occur during self-learning. At this time, it is necessary to manually increase P07.03 and decrease P07.04 before self-learning.

Notice:

#### 1. When the drive is enabled, this function is invalid.

- 2. <u>When the load inertia is large, low-frequency oscillation may occur in</u> <u>self-learning, and it is necessary to manually increase P07.03 and decrease</u> <u>P07.04, and then self-learn.</u>
- 3. <u>When the load inertia is small, reduce the inertia self-learning acceleration and deceleration time P07.33.</u>
- 4. When the machine vibrates, the position loop gain P07.05 needs to be reduced.

4.5.9 Fn008 update FPGA program reset

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\triangleleft \dashv$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn008;

③ Click SET to display FUPd; (FPGA Update)

④ Long press the "<<" (shift) key to reset the drive;

(5) At this point, the FPGA firmware can be updated through the "VECTOR FPGA Firmware Update Tool".

4.5.10 Fn009 restores all factory parameters except P00 and P01 parameter groups

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn009;

- ③ Click SET to display -rECy; (-Recovery)
- ④ Long press the "< " (shift) key;
- ⑤ If the recovery is successful, it will display donE, and if it fails, it will display Err.

4.5.11 Fn010 backup all parameters

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn010;

- ③ Click SET to display bcuP; (backup Parameter)
- ④ Long press the "◄◄" (shift) key;
- ⑤ If the backup is successful, it will display donE, and if it fails, it will display Err.

# Note: The drive backup parameters are stored in another address area of the drive <u>memory.</u>

4.5.12 Fn011 restore the parameters that have been backed up

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\triangleleft \dashv$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn011;

③ Click SET to display rESto. (restore)

④ Long press the "◄◄" (shift) key;

⑤ If the restoration is successful, it will display donE, and if it fails, it will display Err.

4.5.13 Fn012 restart RS232 communication

When the servo RS232 does not communicate for a long time, it will automatically turn off. RS232 communication can be restarted via Fn012.

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn012;

- ③ Click SET to display SEnd;
- ④ Press the "<<" (shift) key;

4.5.14 In Fn013 full-closed loop mode, the polarity of self-learning feedback and the number of pulses of the second encoder corresponding to one rotation of the motor

In full-closed loop mode, it is necessary to set the full-closed loop feedback polarity P03.33 and P03.34. The appropriate value can be automatically calculated through this function operation. When performing this function operation, please ensure that the second encoder measuring wheel can be tightly and The material connection ensures that no slippage occurs between the measuring wheel and the material.

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this

time the first two digits of the digital tube display Fn;

2 Combine the " $\blacktriangle$ " (increase), " $\checkmark$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn013;

- ③ Click SET to display LFCP. (Learn Full\_Close Parameter);
- ④ Press the "<<" (shift) key; the motor will rotate forward 3 times at a speed of 10rpm.

4.5.15 Fn014 clears the absolute value encoder circle value (only for Nikon 24-bit encoder)

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn014;

- ③ Click SET to display CLrEn. (Clear Encoder);
- ④ Press the "<<" (shift) key; clear the absolute encoder turns.

4.5.16 Fn016 Self-learning synchronous motor current loop PI gain

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn016;

- ③ Click SET to display SELC.
- ④ Press the "<<" (shift) key; start learning the current loop PI gain.

#### 4.6 Variable monitoring

Press the MODE key several times to switch the mode to variable monitoring mode, and the first two digits of the digital tube display Un. Combine the " $\blacktriangle$ " (increase), " $\triangleleft \dashv$ " (shift), " $\checkmark$ " (decrease) three buttons to set the display value of the digital tube to the number that needs to be monitored (for example, Un007 is to monitor the DIDO status). Press SET to display the variables to be monitored.

At present, the drive can monitor 13 variables, and the values corresponding to the monitoring numbers are shown in the table below.

Number	corresponding value
Un000	Motor speed rpm
Un001	Bus capacitor voltage V
Un002	temperature °C
Un003	Current RMS A
Un004	Command pulse count value

Un005	Motor encoder pulse count value					
Un006	Second encoder pulse count value					
Un007	DIDO status					
Un008	Voltage value of AI1					
Un009	Voltage value of AI2					
	Output motor instantaneous					
Un011	current percentage					
	Output motor instantaneous					
Un012	power percentage					
	Percentage of output drive rated					
Un013	current					
Un014	Motor load rate					

It should be noted that, for DIDO status monitoring, the actual level of DI (high level on, low level off), the valid state of DI (valid on, invalid off), DO can be monitored simultaneously on 5 digital tubes Valid state (valid on, invalid off). The meaning of each segment in the digital tube is as follows.

#### Special attention should be paid to the VC330 servo only 4 DI, 3 DO.



As shown in the figure above, the first digital tube displays the valid states of DO1~DO6, and the state of each DO corresponds to the on-off of the corresponding segment of the digital tube, valid on, invalid off. The upper 3 segments of the last 4-digit digital tubes correspond to the actual levels of DI1~DI10 respectively, high level is on, and low level is off. The lower 3 segments of the last 4-digit digital tubes correspond to the valid states of DI1~DI10 respectively, high level is on, and low level is off. The lower 3 segments of the last 4-digit digital tubes correspond to the valid states of DI1~DI10 respectively, DIDO is on when valid, and off when invalid.

## Chapter 5 VC330 Servo Control Mode

Servo system consists of three main parts: servo driver, motor and encoder.



The servo driver is the control core of the servo system. By processing the input signal and feedback signal, the servo driver can control the precise position, speed and torque of the servo motor, that is, the position, speed, torque and mixed control mode. Among them, position control is the most important and most commonly used control mode of servo system.

Each control mode is briefly described as follows:

Position control refers to controlling the position of the motor through position commands. The target position of the motor is determined by the total number of position commands, and the rotation speed of the motor is determined by the frequency of the position command. The position command can be given by the combination of external pulse input, the total number of internal given position commands + speed limit. Through the internal encoder (the servo motor has its own encoder) or the second encoder (full closed-loop control), the servo drive can realize fast and precise control of the mechanical position and speed. Therefore, the position control mode is mainly used in occasions requiring positioning control, such as manipulators, placement machines, engraving, milling and engraving (pulse sequence commands), CNC machine tools, etc.

Speed control refers to controlling the speed of the machine through the speed command. Through digital, analog voltage or communication given speed command, the servo drive can achieve fast and precise control of the mechanical speed. Therefore, the speed control mode is mainly used to control the rotation speed. If you want to use the host computer to achieve speed control, you can input the output of the host computer as a speed command to the servo drive, such as an analog engraving and milling machine.

Torque control refers to controlling the output torque of the motor through the torque command. The torque command is given by digital, analog voltage or communication. The torque control mode is mainly used in devices that have strict requirements on the force of the material, such as some tension control occasions such as rewinding and unwinding devices. The torque given value should ensure that the force of the material is not affected by the change of the winding radius.

Hybrid control mode refers to a working mode realized by DI terminal, which can switch the control mode in real time under the servo running state.

# 5.1 Basic parameter setting

#### 5.1.1 control mode

The servo drive has 3 basic control modes, which are position mode, speed mode and torque mode. A variety of hybrid control modes can be derived from the 3 basic control modes. Which mode to use can be set by P02.01 parameter.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method
P02.01	Drive control mode.						
	Used to select the servo	0~7	-	anytime	Immediately	0	RW
	drive control mode.						
	0- position mode						
	1- speed mode						
	2- torque mode						
	3- Position/torque mode I	O switching	, switch thro	ough INFn.3	36, when the sig	gnal is valid,	it is torque
	mode						
	4- Position/speed mode IC	) switching,	switch thro	ough INFn.3	6, when the sig	gnal is valid,	it is speed
	mode						
	5- Torque/speed mode IO	switching, s	witching the	ough INFn.	36, when the si	gnal is valid,	it is torque
	mode						
	6- Position/torque/speed m	node IO swit	ching, throu	gh INFn.36,	INFn.37 switch	ing	
	7- Specialized Servo Contr	rol Mode					
		INFn.37	INFn.36	workin	g mode		
		invalid	invalid	Speed	Mode		
		invalid	valid	Torque	e Mode		
		valid	xx	positio	n mode		

The relevant input function bits are as follows.

Function bits	Bit description
INFn.36	Control mode toggle switch 0
INFn.37	Control mode toggle switch 1

#### 5.1.2 Servo start and stop

When the servo activates the internal input function bit INFn.01 of the drive through IO or communication, the servo is enabled. After OUTFn.25 is output, the command input command is valid, the position/speed/torque command is accepted, and the servo runs.

The servo will perform stop action under the following three working conditions. One is to stop activating the internal input function bit INFn.01; the second is to stop when a fault occurs; the third is to stop when the emergency stop signal INFn.58 is input. The shutdown modes of the 3 working conditions can be set separately. The shutdown mode is set by P02.13. Refer to "7.1.1 Troubleshooting" for fault shutdown mode, and emergency stop shutdown mode is set by P02.14.

The servo has 5 kinds of stopping methods to choose from. The first is free stop; the second is rapid deceleration to stop, the enable is disconnected after stopping, and the motor is powered off; the third is slow deceleration to stop, the enable is disconnected after parking, and the motor is powered off; the fourth is Quickly decelerate to stop, keep the enable after stopping, the user needs to disconnect the enable signal to disable the enable; the fifth is slow deceleration to stop, keep enable after stopping, the user needs to disconnect the enable signal to disable the enable of the enable signal to disable the

Free parking means that the drive is turned off and the motor is free to stop by friction resistance. Deceleration to stop means that the servo drive drives the motor to decelerate, and the motor remains powered on during this process. The deceleration time of rapid deceleration and stop is set by P02.16. The deceleration time of slow deceleration and stop is set by P02.17. Deceleration time refers to the time it takes to decelerate from the rated speed to zero. The actual deceleration time is determined by the speed at the time of failure and the set deceleration time.

# Actual deceleration time = set deceleration time $\times \frac{\text{The speed at which the failure occurs}}{\text{Rated speed}}$

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method	
P02.13	Select the method of	0~2	-	anytime	Immediate	0	RW	
	enabling shutdown				ly			
	Set the deceleration mode of the servo motor from rotation to stop and the motor state after stop when							
	the servo is off.							
	0- Off-enable freewheel stop							
	1- Turn off enable after fast deceleration and stop							
	2- Disable enable after slow deceleration and stop							
P02.14	Emergency stop mode	0~4	-	anytime	Immediate	0	RW	
	selection				1 y			

Related parameters are as follows.

	Set the deceleration method of the servo motor from rotation to stop and the motor state after stop when							
	the servo is in emergency stop.							
	0- Off-enable freewheel stop							
	1- Turn off enable after fast deceleration and stop							
	2- Disable enable after slow	deceleration	and stop					
	3- Quickly decelerate to stop	and keep er	nabled					
	4- Slowly decelerate to stop	and keep en	abled					
P02.16	fast stop time	0~6553	ms	anytime	Immediate	500	RW	
	Set the stop time when the	5			ly			
	servo is stopped quickly							
P02.17	Slow stop time	0~6553	ms	anytime	Immediate	1000	RW	
	Set the stop time when the	5			ly			
	servo is slow to stop							

#### 5.1.3 Servo braking method

When the motor decelerates, it will feed back energy to the bus capacitor. When the bus capacitor voltage is too large, an overvoltage fault will be reported. Therefore, a braking resistor needs to be connected to the servo to consume the excess bus voltage on the braking resistor. When the capacitor voltage is high, the dynamic braking circuit is activated. For 220V drives, when the DC bus voltage is greater than 380VDC, the dynamic braking circuit is activated; for 380V drives, when the DC bus voltage is greater than 680VDC, the dynamic braking circuit is activated. The user can select the servo braking mode through P02.20 to release the excess voltage on the bus.

Parameter No.	Parameter Description	Set range	units	Set method	Effectiv e way	Defaults	read and write method	
P02.20	Start dynamic braking	0~3	-	anytime	Immediat	2	RW	
	selection				ely			
	When the busbar voltage exce	eds the limit	it voltage, se	elect the way t	to start the dy	namic brakii	ng circuit.	
	0- Dynamic braking never starts							
	1- Dynamic braking can only be activated when decelerating							
	2- Ready to activate dynamic braking at any time							
	3- Braking is only possible when the energy is fed back							

Parameter No. Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method
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P02.21	Braking resistor value	0~3276.7	Ω	anytime	Immediately	0	RW		
P02.22	Maximum power of braking resistor	0~3276.7	Kw	anytime	Immediately	0	RW		
P02.23	Braking resistor heat dissipation coefficient	0~100	%	anytime	Immediately	50	RW		
If P02.23 is set to 100%, it means that the time required to drop from the maximum heat to 0 is 10s.									

#### 5.1.4 command reverse

The speed, torque and position commands can be reversed by setting the register P02.50. P02.50 contains 16-bit binary. When the 0th bit is valid, the position command is reversed; when the 1st bit is valid, the speed command is reversed; When 2 bits are valid, the torque command is reversed.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method
P02.50	command reverse	0~7	-	anytime	Immediately	0	RW
	When the 0th bit is valid, the						
	position instruction is						
	reversed;						
	When the 1st bit is valid, the						
	speed command reverses;						
	When the 2nd bit is valid, the						
	torque command reverses						

#### 5.2 position mode

The position mode is a control mode in which the motor position is the control target, and is often used to achieve high-precision positioning. The implementation of the location pattern is shown in the following figure.

Note: Since there is no pulse input port on the VC330Profinet bus servo hardware, the position command can only be derived from internal position planning, not from external pulses.



#### 5.2.1 Position command source and direction selection



The position command can come from the internal multi-segment position planning. There is no pulse signal input port on the VC330 hardware, so the position command cannot be derived from the external pulse command.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method			
P03.01	position command	0~6	-	anytime	Immediate	0	RW			
	source				ly					
	In position control mode,	it is used to s	elect the s	ource of pos	sition comm	and.				
	0- From external pulse command									
	1- From internal multi-segment location planning									
	2- Switch between extern	al pulse com	mand and	internal pos	sition planni	ng comma	nd through			
	INFn.35									
	3- The command pulse superimposes the second encoder pulse as the position command									
	4- Command pulse superi	imposed inter	nal positio	n planning a	as position c	ommand				
	5- Round pressure round	sleeve label								
	6- Sine wave									

#### Related input function bits.

Functio n bits	Bit description
INFn.21	Position command prohibited, when valid, the position command is prohibited from being input to the servo
INFn.22	The position command is reversed. When it is valid, the position command is reversed and then input to the servo.

#### 5.2.2 The position command is derived from the multi-segment position command plan

It is derived from the multi-segment position command, which means that the user pre-sets the mechanical position command, speed, acceleration/deceleration time, number of segments and other parameters to be run through the parameters, and then triggers the operation of the multi-segment position, and then the motor moves according to the set rules. Starting and stopping the multi-segment position is realized by operating INFn.27. When P13.92=0, the rising edge of INFn.27 starts the operation of the multi-segment position, and the falling edge of INFn.27 stops the operation of the multi-segment position; when P13.92=1, the rising edge of INFn.27 sets the operation of the multi-segment position until the execution of the multi-segment position is completed. The list of relevant parameters is as follows. It should be noted that the set position command refers to the mechanical position command.

Note: The position command of the multi-segment position will be multiplied by the electronic gear ratio, which is the position P00.13 of the motor encoder; but the speed setting of the multi-segment position is not affected by the electronic gear ratio.

Demonstern	Demonstern	S - t			S - t	T.C.		read
No	Description	set	units	Function	method	e way	Defaults	and write
140.	Description	Tange			memod	c way		method
P13.01	Multi-segment	0~2	-	When the	Disable	Immediat	0	RW
	position working			position	settings	ely		
	mode			command				
	0- Downtime after a			comes from a				
	single run			multi-segment				
	1- Cycle run			position				
	2- DI switch operation,			command, it				
	read the value of			is used to set				
	INFn.31, INFn.30,			the				
	INFn.29, INFn.28 as the			multi-segment				
	segment number to run			position				
				operation				
				mode.				
P13.02	total number of	1~16	-	Sets the total	anytime	Immediat	16	RW
	segments			number of		ely		
				segments for				
				the position				
				instruction.				
P13.03	idle waiting time	0~1	-	When using	anytime	Immediat	1	RW
	unit			the		ely		
	0- milliseconds			multi-segment				
	1-seconds			position				
				function, the				
				unit of				
				waiting time.				
P13.04	surplus processing	0~1	-	Pause occurs	anytime	Immediat	0	RW
	method			when using		ely		

	0- Re-jump to the			the				
	first segment			multi-segment				
	position command			position				
	to run			function to				
	1- Start where the			run, and when				
	previous segment left			the				
	off			multi-segment				
				position				
				function is				
				resumed, set				
				the segment				
				number of the				
				starting				
				segment.				
P13.05	Absolute or relative	0~1	-	When running	anytime	Immediat	1	RW
	position command			with		ely		
	settings			multi-segment				
	0- absolute position			position				
	command			function, set				
	1- relative position			the type of				
	command			position				
				command.				
P13.10	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	first segment	21474836		commands				
	position	47		at the first				
				segment				
				position				
P13.12	The running speed	0~32767	rpm	The running	anytime	Immediat	500	RW
	of the first segment			speed of the		ely		
	of the multi-segment			first segment				
	position command			of the multi-				
				segment				
				position				
				command				
P13.13	The acceleration	0~32767	ms	Set the time	anytime	Immediat	500	RW
	time of the first			for the first		ely		
	segment of the			segment to				
	multi-segment			accelerate				
	position command			from 0 to				
				rated speed.				
				Actual				
				acceleration				

				time=change				
				of speed				
				command/rate				
				d speed $ imes$				
				speed				
				command				
				acceleration				
				time				
P13.90	The deceleration	0~32767	me	The	anytime	Immediat	500	RW
115.70	time of the first	0-52707	1115	deceleration	unythic	elv	500	KW.
	segment of the			time for the		ery		
	segment of the			first stage				
	position command							
				decelerate				
				from the rated				
				speed to 0.				
				Actual				
				deceleration				
				time=change				
				of speed				
				command/rate				
				d speed $\times$				
				speed				
				command				
				deceleration				
				time.				
P13.14	Waiting idle time for	0~32767	ms(s)	The waiting	anytime	Immediat	1	RW
	the end of the first			time before		ely		
	segment of the			running the				
	multi-segment			next stage of				
	position command			movement				
	The unit of this			after the first				
	parameter is determined			stage of the				
	by P13.03.			multi-stage				
				position				
				command is				
				completed.				
P13 15	Number of nulse	-21474836	User	The number	anvtime	Immediat	10000	RW
113.13	commands at the	Δ17 ~··	unite	of position	unythic	elv	10000	
	second something	71/7/026	annts	commands for		Ciy		
	position	A7		the second				
	position	4/		ule second				
	1			segment.				

			1		1	1		
P13.17	The running speed	0~32767	rpm	The running	anytime	Immediat	500	RW
	of the second			speed of the		ely		
	segment of the			second				
	multi-segment			segment of				
	position command			the				
				multi-segment				
				position.				
P13.18	The acceleration	0~32767	ms	The time for	anytime	Immediat	500	RW
	time of the second			the second		ely		
	segment of the			stage position				
	multi-segment			to accelerate				
	position command			from 0 to				
				rated speed.				
P13.91	The deceleration	0~32767	ms	The	anytime	Immediat	500	RW
	time of the second			deceleration		ely		
	segment of the			time for the				
	multi-segment			second stage				
	position command			position to				
				decelerate				
				from the rated				
				speed to 0.				
P13.19	Waiting idle time for	0~32767	ms(s)	The waiting	anytime	Immediat	1	RW
	the end of the			time before		ely		
	second segment of			running the				
	the multi-segment			next stage of				
	position command			movement				
				after the				
				second stage				
				of the				
				multi-stage				
				position				
				command is				
				completed.				
P13.20	Number of pulse	-21474836	User	The number	anytime	Immediat	10000	RW
	commands at the	47 ~	units	of position		ely		
	third segment	21474836		commands for				
	position	47		the third				
				segment.				
P13.22	The running speed	0~32767	rpm	The running	anytime	Immediat	500	RW
	of the third segment			speed of the		ely		
	of the multi-segment			third segment				
	position command			of the				
				multi-segment				

-			1					
				position.				
P13.23	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the third segment of			rated speed in				
	the multi-segment			the third stage				
	position command			position; or				
				deceleration				
				time from				
				rated speed to				
				0.				
P13.24	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the third			that needs to		ely		
	segment of the			be waited				
	multi-segment			after the third				
	position command			position				
	-			command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.25	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	fourth segment	21474836		commands at				
	position	47		the fourth				
	-			segment				
				position				
P13.27	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the fourth		-	fourth		ely		
	segment of the			segment of				
	multi-segment			the				
	position command			multi-segment				
	-			position.				
P13.28	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the fourth segment			rated speed in				
	of the multi-segment			the fourth				
	position command			stage position;				
	-			or				
				deceleration				
				time from				
				rated speed to				
				0.				

P13.29Waiting idle time for the end of the fourth segment of the multi-segment032767ms(s)The idle time that needs to be waitedanytimeImmediat1RWgeneration of the multi-segment position commandIIImmediatIRWImmediatIRWposition command multi-segment positionImmediatI
the end of the fourth segment of the multi-segment position commandthat needs to be waited after the fourth position command of the multi-segment positionely ely ely to waited after the fourth the multi-segment positionely ely ely to waited after the fourth the multi-segment position command of the multi-segment position commandely to waited after the fourth position command of the multi-segment position command endsmulti-segment position endsP13.30Number of pulse commands at the fifth segment position 47User tunits pulseNumber of pulse10000 elyRWP13.32The running speed of the fifth segment of the fifth segment of the multi-segment032767 rpmrpm speed of the fifth segment of the multi-segmentanytime elyImmediat ely500 RW
segment of the multi-segment position commandbe waited after the fourth position command of the multi-segment positionlase after the fourth position command of the multi-segment positionlase after the fourth position command of the multi-segment positionlase after the fourth position command of the multi-segment positionlase after the fourth position command of the multi-segment positionlase after the fourth position commands at the the pulseImmediat ely10000 RWP13.30Number of pulse commands at the fifth segment position-21474836 47 47User unitsNumber of pulse commands at the fifth segment positionImmediat ely10000 elyRWP13.32The running speed of the fifth segment of the multi-segment position commandO~32767 rpmrpm speed of the fifth segment of the multi-segmentImmediat ely500 elyRW
multi-segment position commandImmediat fourth position command of the multi-segment positionafter the fourth position command of the multi-segment positionImmediat fourth positionImmediat fourth positionP13.30Number of pulse fifth segment position-21474836 fourth 47 ~User unitsNumber of pulse commands at the fifth segment positionImmediat fourth ely10000 fourth fifth segmentRWP13.32The running speed of the fifth segment of the multi-segment position command0~32767 for the fifth segment of the multi-segmentanytime segment positionImmediat for the ely500RW
position commandpositionfourthpositionposition commandipositioniipositioncommand oftheiithemulti-segmentpositioniipositioncommandendsiiP13.30Number of pulse-21474836UserNumber ofanytimeImmediatfifthsegment47 ~unitspulseelyiposition47the fifthsegmentelyiposition47the fifthsegmentiiposition47the fifthsegmentiiposition47isegmentiiiposition47isegmentiiiposition6iiiiiiP13.32The running speed0-32767rpmspeed of the ifth segmentanytimeImmediat500RWof the fifth segmentiiiiiiiiiposition commandiiiiiiiiiiposition commandiiiiiiiiiiposition commandiiiiiiiiiiiposition commandiiiiiiiiiii </td
P13.30Number of pulse commands at the fifth segment position-21474836 commandsUser unitsNumber of pulse commands at the fifth segment positionImmediat edy10000 edwRWP13.32The running speed of the fifth segment of the multi-segment position command0~32767 rpmrpm speed of the fifth segment positionanytime positionImmediat edy500 RWP13.32The running speed of the fifth segment of the multi-segment position command0~32767 rpmrpm speed of the fifth segment of the multi-segmentImmediat edy500 RW
P13.30Number of pulse commands at the fifth segment position-21474836User unitsNumber of pulseanytime elyImmediat ely10000RWP13.32The running speed of the fifth segment of the multi-segment position command0~32767rpm speed of the fifth segment of the multi-segment position commandanytime elyImmediat ely500RWP13.32The running speed of the fifth segment of the multi-segment position command0~32767rpm speed of the fifth segment of the multi-segment of the multi-segment position command10000RW
P13.30Number of pulse-21474836UserNumber ofanytimeImmediat10000RWP13.30Number of pulse-21474836UserNumber ofanytimeImmediat10000RWfifthsegment47~unitspulseelyely10000RWposition21474836UserNumber ofpulseely10000RWP13.32The running speed0~32767rpmspeed of the fifth segmentanytimeImmediat500RWP13.32The running speed0~32767rpmspeed of the fifth segmentanytimeImmediat500RWof the fifth segmentImmediat0 - 32767rpmspeed of the fifth segmentelyImmediat500RWof the multi-segmentImmediatof the multi-segmentImmediatof the iffth segmentelyimmediatfunctionposition commandImmediatImmediatspeed of the multi-segmentimmediatfunctionimmediatfunctionposition commandImmediatImmediatspeedimmediatspeedimmediatfunctionimmediatspeedposition commandImmediatImmediatspeedimmediatspeedimmediatspeedimmediatspeedposition commandImmediatImmediatspeedimmediatspeedimmediatspeedimmediatspeedposition commandImmediatimmediat <td< td=""></td<>
P13.30Number of pulse commands at the fifth segment position-21474836 commandsUserNumber of pulseImmediat ely10000 elyRWP13.30Number of pulse commands at the fifth segment-21474836 21474836UserNumber of pulseanytime commands at elyImmediat ely10000RWP13.32The running speed of the fifth segment of the fifth segment of the multi-segment0~32767 rpmrpm speed of the fifth segment of the multi-segmentImmediat ely500RW
P13.30Number of pulse commands at the fifth segment position-21474836 47 ~User unitsNumber of pulseanytime elyImmediat ely10000 RWP13.30Number of pulse commands at the fifth segment position-21474836 47 ~User unitsNumber of pulseanytime elyImmediat ely10000 elyRWP13.32The running speed of the fifth segment of the fifth segment of the multi-segment position command0~32767 rpmrpm speed of the fifth segment of the multi-segmentImmediat ely500 elyRW
P13.30Number of pulse commands at the fifth segment position-21474836 47 ~UserNumber of pulseanytime anytimeImmediat ely10000RWP13.30Number of pulse commands at the fifth segment position21474836 47UserNumber of pulseanytime commands at the fifth segmentImmediat ely10000RWP13.32The running speed of the fifth segment of the multi-segment0~32767 FPMrpm speed of the fifth segment of the multi-segmentImmediat ely500RW
P13.30Number of pulse commands at the fifth segment position-21474836User unitsNumber of pulseanytime anytimeImmediat ely10000RWP13.30Number of pulse commands at the fifth segment position47 ~unitspulse commands at the fifth segment position10000RWP13.32The running speed of the fifth segment of the multi-segment position command0~32767rpm fifth segment of the multi-segmentspeed of the fifth segment of the multi-segmentanytime elyImmediat ely500RW
P13.30Number of pulse commands at the fifth segment position-21474836 47 ~User unitsNumber of pulseanytime anytimeImmediat ely10000RWfifth positionsegment 4721474836 47commands at the fifth segment position10000RWP13.32The running speed of the fifth segment of the multi-segment position command0~32767rpm speed of the of the multi-segmentanytime elyImmediat ely500RW
commands at the fifth segment47~ 21474836unitspulse commands at the fifth segmentelyline commands at commands at the fifthposition471the fifth segment111P13.32The running speed0~32767rpmspeed of the fifth segmentanytimeImmediat500RWof the fifth segment1511of the multi-segment1111position command111111111
fifth positionsegment 4721474836 47commands at the fifth segment positionlease alease aP13.32The running speed of the fifth segment of the fifth segment of the multi-segment position command0~32767rpm fifth segment of the multi-segmentanytime elyImmediat ely500RW
position47the fifth segment positionImmediat500RWP13.32The running speed0~32767rpmspeed of the fifth segment of the fifth segmentImmediat500RWof the fifth segment of the multi-segment position commandImmediatImmediat500RW
P13.32       The running speed       0~32767       rpm       speed of the segment fifth segment of the multi-segment       Immediat       500       RW         of the fifth segment of the multi-segment       Immediat       500       Immediat       500       Immediat         of the fifth segment of the multi-segment       Immediat       Immediat       500       Immediat         Immediat       Immediat       Immediat       Immediat       Immediat       Immediat         Immediat       Immediat       Immediat       Immediat       Immediat       Immediat       Immediat         Immediat
P13.32The running speed0~32767rpmspeed of the fifth segmentanytimeImmediat500RWof the fifth segmentof the multi-segmentof theImmediat500RWof the multi-segmentImmediatof theImmediatImmediatImmediatposition commandImmediatImmediatImmediatImmediatImmediat
P13.32       The running speed       0~32767       rpm       speed of the fifth segment of the fifth segment of the multi-segment position command       Immediat       500       RW
of the fifth segment     fifth segment     ely       of the multi-segment     of the     multi-segment       position command     multi-segment     description
of the multi-segment     of the       position command     multi-segment
position command multi-segment
position.
P13.33 The acceleration and 0~32767 ms Acceleration anytime Immediat 500 RW
deceleration time of time from 0 to ely
the fifth segment of rated speed in
the multi-segment the fifth stage
position command position; or
deceleration
time from
rated speed to
P13.34 Waiting idle time for 0~32767 ms(s) The idle time anytime Immediat 1 RW
the end of the fifth that needs to elv
segment of the be waited
multi-segment after the fifth
position command position
command of
the
multi-segment
position
command
ends

	P13.35	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
		commands at the	47 ~	units	pulse		ely		
		sixth segment	21474836		commands at				
		position	47		the sixth				
					segment				
					position				
	P13.37	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
		of the sixth segment		1	sixth segment		ely		
		of the multi-segment			of the				
		position command			multi-segment				
		Ĩ			position.				
	P13.38	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
		deceleration time of			time from 0 to		ely		
		the sixth segment of			rated speed in				
		the multi-segment			the sixth stage				
		position command			position; or				
					deceleration				
					time from				
					rated speed to				
					0.				
-	P13.39	Waiting idle time for	0~32767	ms(s)	The idle time	anvtime	Immediat	1	RW
		the end of the sixth		(-)	that needs to	5	elv	-	
		segment of the			be waited				
		multi-segment			after the sixth				
		nosition command			nosition				
		position command			command of				
					the				
					multi-segment				
					nosition				
					command				
					ends				
╞	P13 /0	Number of nulse	-21474836	User	Number of	anytime	Immediat	10000	RW/
	113.10	commands at the	47~	unite	nulee	unythic	elv	10000	17.44
		seventh segment	21474836	units	commands at		ery		
		nosition	Δ1 F/ <del>T</del> 030 Δ7		the seventh				
		position	Τ/		segment				
					nosition				
╞	D13 17	The minning speed	0-32767	rom	speed of the	anytima	Immodiat	500	<b>DW</b> 7
	113.42	of the seventh	0~32707	ipm	spece of the	anytime	alv	500	17.44
		segment of the			segment of		Ciy		
		segment of the			segment of				
		multi-segment			une				
		position command			multi-segment				
1					position.				

D12 42	The englantion and	0 22767		Assolution	antima	Immediat	500	DW
P15.45	The acceleration and	0~32707	ms	Acceleration	anytime	Immediat	300	ĸw
	deceleration time of			time from 0 to		ely		
	the seventh segment			rated speed in				
	of the multi-segment			the seventh				
	position command			stage position;				
				or				
				deceleration				
				time from				
				rated speed to				
				0.				
P13.44	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the			that needs to		ely		
	seventh segment of			be waited				
	the multi-segment			after the				
	position command			seventh				
	-			position				
				command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13 45	Number of pulse	-21474836	User	Number of	anvtime	Immediat	10000	RW
1 15.15	commands at the	47 ~	units	nulse		elv	10000	it
	eighth segment	21474836	units	commands at		ory		
	nosition	21171050 17		the eighth				
	position	Τ/		segment				
				nosition				
D12 47	The munning speed	0.22767	***	speed of the	anytime	Immediat	500	DW
113.47	of the eighth	0~32707	ipin	speed of the	anythic	alv	500	IX VV
	of the eight					Ciy		
	segment of the			segment of				
	multi-segment			une				
	position command			multi-segment				
<b>D</b> 1 <b>D</b> 1 O				position.				
P13.48	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the eight segment of			rated speed in				
	the multi-segment			the eight stage				
	position command			position; or				
				deceleration				
				time from				
				rated speed to				
				0.				

				Immediately				
P13.49	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the eight			that needs to		ely		
	segment of the			be waited				
	multi-segment			after the eight				
	position command			position				
				command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.50	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	ninth segment	21474836		commands at				
	position	47		the ninth				
				segment				
				position				
P13.52	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the ninth segment		-	ninth segment		ely		
	of the multi-segment			of the		-		
	position command			multi-segment				
	1			position.				
P13.53	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to	5	elv		
	the ninth segment of			rated speed in		5		
	the multi-segment			the ninth stage				
	position command			position: or				
	r			deceleration				
				time from				
				rated speed to				
				0.				
P13 54	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
1 10.01	the end of the ninth	0 52101	mb(b)	that needs to		elv	1	1000
	segment of the			be waited				
	multi-segment			after the ninth				
	nosition command			position				
	Position command			command of				
				the				
				multi-segment				
				nosition				
				command				
				ende				
				citus				

P13.55	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	tenth segment	21474836		commands at				
	position	47		the tenth				
	-			segment				
				position				
P13.57	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the tenth segment		1	tenth segment		elv		
	of the multi-segment			of the		5		
	position command			multi-segment				
	r			position.				
P13.58	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the tenth segment of			rated speed in				
	the multi-segment			the tenth stage				
	position command			position; or				
	1			deceleration				
				time from				
				rated speed to				
				0.				
P13.59	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the tenth			that needs to		ely		
	segment of the			be waited		2		
	multi-segment			after the tenth				
	position command			position				
	Position Community			command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.60	Number of nulse	-21474836	User	Number of	anytime	Immediat	10000	RW
115.00	commands at the	47~	units	nulse	anythic	elv	10000	1277
	eleventh segment	21474836		commands at		-19		
	nosition	47		the eleventh				
	Position	יד (		segment				
				nosition				
P13.62	The minning speed	0~32767	rnm	speed of the	anytime	Immediat	500	RW
115.02	of the alguest	0~52/0/	ihm	eleventh	anythine	الماس ماير	500	17.44
	segment of the			segment of		ciy		
	segment of the			segment of				
	mun-segment			une multi				
	position command			muiti-segment				
1			1	position.		1		

			1		1	1		
P13.63	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the eleventh			rated speed in				
	segment of the			the eleventh				
	multi-segment			stage position;				
	position command			or				
				deceleration				
				time from				
				rated speed to				
				0.				
P13.64	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the			that needs to		ely		
	eleventh segment of			be waited				
	the multi-segment			after the				
	position command			eleventh				
	-			position				
				command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.65	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	twelfth segment	21474836		commands at		-		
	position	47		the twelfth				
	1			segment				
				position				
P13.67	The running speed	0~32767	røm	speed of the	anytime	Immediat	500	RW
	of the twelfth		1	twelfth	5	elv		
	segment of the			segment of		5		
	multi-segment			the				
	position command			multi-segment				
	r			position.				
P13 68	The acceleration and	0~32767	ms	Acceleration	anvtime	Immediat	500	111
1 15.00	deceleration time of	0 52101	ind	time from 0 to		elv	200	LLL
	the twelfth segment			rated speed in		-5		
	of the multi-segment			the twelfth				
	position command			stage position.				
	r control commune			or				
				deceleration				
				time from				
				rated speed to				
		1	1	rated speed to	1	l		

			1					
				0.				
P13.69	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the			that needs to		ely		
	twelfth segment of			be waited				
	the multi-segment			after the				
	position command			twelfth				
	1			position				
				command of				
				the				
				multi-segment				
				nosition				
				command				
				ends				
D12 70		21474926	TT	N 1 C		T L'A	10000	DW
P13.70	Number of pulse	-214/4830	User	Number of	anytime	Immediat	10000	KW
	commands at the	4/~	units	pulse		ely		
	thirteenth segment	214/4836		commands at				
	position	47		the thirteenth				
				segment				
				position				
P13.72	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the thirteenth			thirteenth		ely		
	segment of the			segment of				
	multi-segment			the				
	position command			multi-segment				
				position.				
P13.73	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the thirteenth			rated speed in				
	segment of the			the thirteenth				
	multi-segment			stage position;				
	position command			or				
	1			deceleration				
				time from				
				rated speed to				
				0				
D13 7/	Waiting idle time for	0-32767	ma(a)	The idle time	onutime	Immediat	1	DW
113.74	the and of the	0~32707	1115(5)	that people to	anythine	alv	1	IX VV
	thirtoonth comment			ha maite 1		ciy		
	cul le			be walled				
	of the multi-segment			after the				
	position command			thirteenth				
				position				
				command of				
				the				

				multi-segment				
				position				
				command				
				ends				
P13.75	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	fourteenth segment	21474836		commands at				
	position	47		the fourteenth				
				segment				
				position				
P13.77	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the fourteenth			fourteenth		ely		
	segment of the			segment of				
	multi-segment			the				
	position command			multi-segment				
	-			position.				
P13.78	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the fourteenth			rated speed in				
	segment of the			the fourteenth				
	multi-segment			stage position;				
	position command			or				
	-			deceleration				
				time from				
				rated speed to				
				0.				
P13.79	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the			that needs to		ely		
	fourteenth segment			be waited				
	of the multi-segment			after the				
	position command			fourteenth				
				position				
				command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.80	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	fifteenth segment	21474836		commands at				
	position	47		the fifteenth				
				segment				

				position				
P13.82	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the fifteenth			fifteenth		ely		
	segment of the			segment of				
	multi-segment			the				
	position command			multi-segment				
				position.				
P13.83	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the fifteenth			rated speed in				
	segment of the			the fifteenth				
	multi-segment			stage position;				
	position command			or				
				deceleration				
				time from				
				rated speed to				
				0.				
P13.84	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the			that needs to		ely		
	fifteenth segment of			be waited				
	the multi-segment			after the				
	position command			fifteenth				
				position				
				command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.85	Number of pulse	-21474836	User	Number of	anytime	Immediat	10000	RW
	commands at the	47 ~	units	pulse		ely		
	sixteenth segment	21474836		commands at				
	position	47		the sixteenth				
				segment				
				position				
P13.87	The running speed	0~32767	rpm	speed of the	anytime	Immediat	500	RW
	of the sixteenth			sixteenth		ely		
	segment of the			segment of				
	multi-segment			the				
	position command			multi-segment				
				position.				
P13.88	The acceleration and	0~32767	ms	Acceleration	anytime	Immediat	500	RW
	deceleration time of			time from 0 to		ely		
	the sixteenth			rated speed in				
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	segment of the			the sixteenth				
	multi-segment			stage position;				
	position command			or				
				deceleration				
				time from				
				rated speed to				
				0.				
P13.89	Waiting idle time for	0~32767	ms(s)	The idle time	anytime	Immediat	1	RW
	the end of the			that needs to		ely		
	sixteenth segment of			be waited				
	the multi-segment			after the				
	position command			sixteenth				
	1			position				
				command of				
				the				
				multi-segment				
				position				
				command				
				ends				
P13.92	Multi-segment	0~3	_	0. The rising	anytime	Immediat	3	RW
115.92	nosition command	0 5		edge of INFn 27	unythic	elv	5	1
	trigger signal type			triggers the		ery		
	BITO-INEn 27 Rising			multi-segment				
	edge triggers to start			nosition and				
	running multi segment			the falling edge				
	nosition: falling edge			stops executing				
	triggers to stop rupping			the				
	multi segment position			multi cogmont				
	DIT1 INEr 27 Dising			nonition When				
	BITT-INFIL2/ KISINg			position. when				
	edge triggers set to run			the				
	multi-segment position,			multi-segment				
	falling edge does not			position comes				
	work			from DI, a				
				change in DI				
				automatically				
				triggers the				
				multi-segment				
				position.				
				1: INFn.27				
				rising edge				
				trigger, not				
				stop				

				2: When the				
				multi-segment				
				position				
				comes from				
				DI, the DI				
				change does				
				not				
				automatically				
				trigger the				
				multi-segment				
				position, and				
				the position				
				execution will				
				only be				
				triggered				
				when INFn.27				
				is				
				re-triggered.				
				3: INFn.27				
				rising edge				
				trigger, not				
				stop, when the				
				multi-segment				
				position				
				comes from				
				DI, the DI				
				change does				
				not				
				automatically				
				trigger the				
				multi-segment				
				position, only				
				when INFn.27				
				is re-triggered				
				will the				
				position				
				execution be				
				triggered.				
P13.93	Condition for	0~1	-	Set the	anytime	Immediat	0	RW
	sending the next			sending		ely		
	command			conditions of				
	0- You must wait for the			the next				
	previous position to			command				

complete the output and				
then delay the idle time				
before sending the next				
position command				
1- After the previous				
position command is				
sent, wait for the idle				
time to directly send the				
second position				
command				

The absolute position command refers to the position of the size of the position command relative to the origin, and the relative position command refers to the position of the size of the position command relative to the current position. Therefore, the origin return must be performed before the absolute position command is executed, otherwise a fault will be reported.

For example, suppose that 3 absolute position commands are executed, the size of the first position command is set to 1000, the size of the second position command is set to 2000, and the size of the third position command is set to 0. The zero return operation is performed first, and then the multi-stage position is triggered. The motor first moves forward 1000, then forward 1000, and then reversely moves 2000, and returns to the zero point.

As another example, assuming that three relative position commands are taken, the first position command is set to 1000, the second position command is set to 2000, and the third position command is set to -1000. After triggering the multi-segment position, the motor first moves forward 1000, then forwards 2000, and then reverses 1000.

If you want to use the multi-segment position command, in addition to setting P03.01 and P13.01 first, you also need to configure the DIx function control register and set it to INFn.27 (triggering the multi-segment position function number). Then control the effective level of DIx to trigger the execution of multi-segment position commands at the rising edge, and stop the execution of multi-segment position commands at the falling edge (when P13.92=0). Selecting the segment number is similar, configure the DIx function control register, set the corresponding level, and then trigger.

Function bits	Bit description							
INFn.27	Trigger multi-segment position command							
	The rising edge triggers the execution of the multi-segment position command, and the falling edge							
	stops the execution of the multi-segment position command							
	Or only the rising edge triggers the execution of multi-segment position commands, and the falling							
	edge does not act. Specific reference P13.92							
INFn.28	Multi-segment position command segment number selection 0							
INFn.29	Multi-segment position command segment number selection 1							
INFn.30	Multi-segment position command segment number selection 2							

The relevant input function bits are as follows.

INFn.31	Multi-segment position command segment number selection 3
INFn.32	Multi-segment position direction selection, when valid, the position command set for multi-segment
	position is reversed

According to the status of INFn28~31.

Multi-segment running segment number

# = INFn.31\*8 + INFn.30\*4 + INFn.29\*2 + INFn.28\*1 +1

See the table below for details.

INFn.31	INFn.30	INFn.29	INFn.28	run segment number
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
0	0	1	1	4
0	1	0	0	5
0	1	0	1	6
0	1	1	0	7
0	1	1	1	8
1	0	0	0	9
1	0	0	1	10
1	0	1	0	11
1	0	1	1	12
1	1	0	0	13
1	1	0	1	14
1	1	1	0	15
1	1	1	1	16

# 5.2.2.1 Stop after a single run

In this mode, the motor runs n positions of position commands, the idle time of each position command can be set independently, and INFn.27 starts/stops running multi-stage position mode (Note: when P13.92=0, the rising edge of INFn.27 starts multi-stage position mode Position running, the falling edge of INFn.27 stops the running of multi-segment positions; when P13.92=1, the rising edge of INFn.27 starts the running of multi-segment positions, and the falling edge does not act). Its running speed curve is as follows. The total number of segments is assumed to be 2.



#### 5.2.2.2 Cycle run

In this mode, the motor automatically jumps to the first position command after running the n-stage position command. The idle time of each position command can be set independently. INFn.27 starts/stops the multi-stage position mode (Note: when P13 When .92=0, the rising edge of INFn.27 starts the operation of the multi-segment position, and the falling edge of INFn.27 stops the operation of the multi-segment position; when P13.92=1, the rising edge of INFn.27 sets the operation of the multi-segment position, and the falling edge no action). Its running speed curve is as follows. The total number of segments is assumed to be 2.



#### 5.2.2.3 DI switch

In this mode, once the multi-segment position is triggered, the driver reads the valid status of INFn.31, INFn.30, INFn.29, and INFn.28 to select a certain position command. , and read the valid state of INFn.31, INFn.30, INFn.29, INFn.28 again to select another position command, if the valid state changes, select another position command to run. This is repeated until it is triggered to stop the operation of the multi-segment position, and then the operation is stopped.



5.2.2.4 The position command comes from the setting steps of the multi-segment position



# 5.2.3 Electronic gear ratio

The meaning of the electronic gear ratio is that the user position command unit is converted into the coefficient of the motor encoder unit. That is

User position command  $\times \frac{\text{Electronic gear ratio numerator}}{\text{Electronic gear ratio denominator}} = \text{Location of motor encoder}$ 

If the numerator of the electronic gear ratio is set to 0, then how many pulses the motor needs to make one revolution depends on the denominator.

For example, the encoder resolution of the motor is 10000, and the denominator of P03.10 electronic gear ratio 1 is set to 5000. When the motor receives 10000 pulses (the first position command of the internal position), the motor rotates twice. If the numerator of the electronic gear ratio is not 0, the motor encoder position is calculated according to the above formula.

There are two sets of electronic gear ratios to choose from in the system, and the relevant parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set metho d	Effective way	Defaults	read and write method
P03.08	Electronic gear	1~214748	-	Set the	anytime	Immediate	0	RW
	ratio 1 numerator	3647		numerator of		ly		
				the first				
				group				
				electronic				
				gear ratio for				
				the division/				
				multiplicatio				
				n frequency				
				of the				
				position				
				command.				
P03.10	Electronic gear	1~214748	-	Set the	anytime	Immediate	1000	RW
	ratio 1 denominator	3647		denominator		ly		
				of the first				
				group of				
				electronic				
				gear ratios				
				for the				
				division/				
				multiplier				

				frequency of				
				the position				
				command.				
P03.12	Electronic gear	1~214748	-	Set the	anytime	Immediate	0	RW
	ratio 2 numerator	3647		numerator of		ly		
				the first				
				group				
				electronic				
				gear ratio for				
				the division/				
				multiplicatio				
				n frequency				
				of the				
				position				
				command.				
P03.14	Electronic gear	1~214748	-	Set the	anytime	Immediate	1000	RW
	ratio 2 denominator	3647		denominator		ly		
				of the second				
				group of				
				electronic				
				gear ratios				
				for the				
				division/mult				
				iplier				
				frequency of				
				the position				
				command.				

The system defaults to electronic gear ratio 1. Multiple electronic gear ratios can also be switched through INFn.24 and INFn.56. The switching relationship is as follows.

INFn.56	INFn.24	Actual electronic gear ratio
invalid	invalid	Electronic gear ratio 1 numerator Electronic gear ratio 1 denominator
invalid	valid	Electronic gear ratio 2 numerator Electronic gear ratio 2 denominator
valid	invalid	Electronic gear ratio 1 numerator Electronic gear ratio 2 denominator
valid	valid	Electronic gear ratio 2 numerator Electronic gear ratio 1 denominator

# 5.2.4 Electronic gear ratio smooth switching function

When the electronic gear ratio changes greatly, it is easy to cause sudden changes in the motor speed. The internal electronic gear ratio can be switched smoothly through the P03.16 electronic gear ratio switching filter time constant.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P03.16	Electronic gear ratio	0~32767	ms	Set the	anytime	Immediatel	0	RW
	switching time			electronic		У		
	constant			gear ratio				
				switching				
				time to				
				make the				
				internal				
				electronic				
				gear				
				ratio				
				smoothly				
				switch				

# 5.2.5 Position command filter function

The position command filtering is to filter the position command (encoder unit) after frequency or multiplication of the electronic gear ratio.

Consider adding position command filtering in the following situations:

- The position command output by the host computer is not processed for acceleration and deceleration;
- Low frequency of pulse command;
- When the electronic gear ratio (numerator denominator) is 10 times or more.

There are two filtering methods to choose from, one is a low-pass filter and the other is a median filter.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P03.06	Position command	0~128	ms	Set the	set when	Immediate	0	RW
	given median filter			median filter	stop	ly		
	time constant			time constant				
				for the				
				position				

The relevant parameters are as follows.

				command (encoder unit).				
P03.07	Position command given low-pass filter time constant	0~32767	ms	Set the low-pass filter time constant of the position command (encoder unit).	set when stop	Immediate ly	20	RW

The larger the filter time constant is set, the more severe the position command lags and the greater the position error during operation. The waveform is as follows.



#### 5.2.6 Positioning complete/proximity function

The positioning completion function means that the absolute value of the position error P03.17 satisfies the user-set condition P03.45 and maintains the time threshold (ms) set by P03.49, and it can be considered that the positioning is completed in the position control mode. At this time, the servo drive can output a positioning completion signal, and the host computer can confirm that the positioning of the servo drive is completed when the signal is received. For the output signal of positioning completion/positioning approaching, you can directly configure the DOx function control register, and the signal is monitored through the DO terminal valid state (P06.49).

As shown in the figure below, when the positioning completion threshold is set to 10 units (10\*0.0001 cycles), and the hold time is set to 10ms, the DO outputs the positioning completion signal.



The positioning close function means that the absolute value of the position error P03.17 satisfies the condition P03.47 set by the user, and the time threshold (ms) set by P03.49 is maintained, and the positioning is considered to be close in the position control mode. At this time, the servo driver can output a positioning close signal, and the host constroller receives the signal to confirm that the servo driver is positioned close.

As shown in the figure below, the positioning close threshold is set to 200 pulses, and when the hold time is set to 10 ms, the DO output the positioning signal.



The description of Positioning proximity function

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Default s	read and write method		
	Positioning completion signal output condition	0~4	-	anytime	Immediatel y	0	RW		
	In the position control mode, w	when the servo is	s running, the a	bsolute value of	f the position e	rror P03.17	is within the		
	set value of P03.46 (positionin	g completion th	reshold), and a	fter P03.49 (pos	itioning compl	etion/proxin	nity time		
	threshold) is maintained, the se	ervo will be Out	put positioning	completion sign	nal; The output	condition c	of the		
P03.45	positioning completion signal	can be set by P0	3.45.						
	0- Output when the position en	rror is less than	the positioning	completion thre	eshold, otherwi	se clear the	output;		
	1- Output when The position error is smaller than the positioning completion threshold and the speed command in								
	position mode P03.95 is zero, otherwise the output is cleared;								
	2- Output when The position error is less than the positioning completion threshold and the filtered speed command								
	in position mode P03.96 is zero, otherwise the output is cleared;								
	3- Output when the position error is less than the positioning completion threshold and the speed command in								
	position mode P03.95 is zero. Clear output when speed command in position mode P03.95 is not zero								
	4- The sending of multi-segment position commands is completed, and the position error is less than the positioning completion threshold								
	positioning completion	0 22767	0.0001	antina	Immediatel	10	DW		
D03.46	threshold	0~32707	round	allytime	У	10	κw		
105.40	Set the positioning completion threshold (The positioning completion signal is valid only when the servo driver is in								
	position control mode and is in	the running sta	te)						
	Positioning close signal	0~3	_	anytime	Immediatel	0	RW		
	output condition	0,35	-	anytime	У	0	ιτw		
P03 47	In the position control mode, v	when the servo i	s running, the a	absolute value o	of the position of	error P03.17	is within the		
103.47	set value of P03.48 (position)	ing proximity the	hreshold), and	when P03.49 (	positioning co	mpletion/pr	oximity time		
	threshold) is maintained, the	servo can outpu	ut Positioning	proximity signa	il; the output o	conditions o	f positioning		
	proximity signal can be set three	ough P03.47.							

Related parameters are as follows.

	0- Output when the position error is less than the positioning close threshold, otherwise clear the output;									
	1- Output when The position error is smaller than the positioning close threshold and the speed command in position									
	mode P03.95 is zero, otherwise the output is cleared;									
	2- Output when The position error is less than the positioning close threshold and the filtered speed command in									
	position mode P03.96 is zero, otherwise the output is cleared;									
	3- Output when the position e	error is less that	n the positionin	ng close thresho	old and the spe	ed commar	d in position			
	mode P03.95 is zero. Clear out	put when speed	command in p	osition mode P(	3.95 is not zer	0				
	positioning close	0 22767	0.0001		Immediatel	100	RW			
	threshold	0~32/6/	round	anytime	У	100				
P03.48	Set the threshold of the absolute value of the position deviation when the servo drive outputs the positioning									
	approach signal (the positioning approach threshold generally needs to be greater than the positioning completion									
	threshold).									
	positioning completion/	0 22767			Immediatel	10	DW			
DO2 40	close time threshold	0~32707	IIIS	anythic	у	10	IX VV			
P05.49	When the position error is less than the positioning completion/proximity threshold, and the time threshold is									
	maintained, the positioning completion/proximity signal is output.									
D02 17			0.0001				DO			
P03.17	position error	-	round	-	-	-	KO			
D02.05	the speed command in						DO			
P03.95	position mode	-	rpm	-	-	-	ĸO			
	the filtered speed									
P03.96	command in position	-	rpm	-	-	-	RO			
	mode									

#### Related output function bits are as follows.

Function bits	Bit description
OUTFn.13	Positioning completion signal output, active when Positioning completion
OUTFn.14	Positioning close signal output, active when Positioning close

#### 5.2.7 Pulse frequency division output function

Servo pulse frequency division output function is divided into two types: open-collector signal output and differential signal output.

When the output signal is an open-collector signal, the servo can output the motor encoder pulse by setting P06.40, and the motor pulse can be output by dividing the frequency. At this time, the maximum frequency of the motor pulse output is 3KHz, and the output ports are DO1 and DO2. When the output signal is a differential signal, the full-closed loop function needs to be closed (set P03.31=0), and the servo can output command pulse or motor encoder pulse. The output pulse type is set by P03.78, and the output port is 20, 20 of CN3. 21, 22, 23 pins. For differential signals, only motor pulses can be divided and output.

The frequency division coefficient of the motor pulse output can be set by P03.79. The larger the frequency division factor, the lower the output pulse frequency. For example,

P03.78 is set to output motor pulse, and P03.79 is set to 2, then when the motor rotates for	2
motor pulses, the terminal outputs 1 pulse.	

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method	
P03.78	Selection of servo pulse output source	0~2	-	Set the output source of the pulse output port.	anytime	reset valid	0	RW	
	0-output motor pulse; 1-or	utput command	pulse; 2-	no output, as inpu	ıt				
P03.79	The frequency division factor of the output pulse	1~65535	-		anytime	reset valid		RW	
	If the encoder type of the motor is incremental, this value indicates the number of pulses output by the motor encoder when the pulse output terminal outputs one pulse. If the encoder type of the motor is an absolute value, the value represents the number of pulses output by the pulse output terminal when the motor rotates once, and the Z point output port outputs a Z point pulse. This value is only valid for motor pulse frequency division, but invalid for command pulse. Incremental encoder is recommended to be 1, which means that the output pulse is equal to the encoder pulse output; absolute encoder is recommended to be set to 10000, which means that the motor rotates once and the pulse output 10000.								
P03.80	Output direction of pulse frequency division	0~1	-		anytime	reset valid	0	RW	
	Set the effective level typ pulses. 0-forward output,	be of the frequent	ncy-divid 1t.	led pulse output.	Only valid f	or motor pulse	es, invalid fo	r command	
P06 40	DO1DO2 function control register	0~2	-	Set the output parameter type of DO1DO2.	anytime	Immediate ly	0	RW	
	0- DO1 and DO2 are output with the functions configured by P06.41 and P06.42 respectively 1- DO1, DO2 output A and B pulses respectively 2- DO1 outputs the Z point signal, DO2 outputs the function configured by P06.42								

## 5.2.8 Z point pulse output function

The servo can set DO1 to output the Z point pulse signal through P06.40. The Z point pulse is an open-collector signal output, and its effective level width is 5ms.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P03.81	Z pulse polarity selection	0~1	-	Set the output level	anytime	Immediate ly	0	RW
	1- reverse output			pulse output terminal Z				
				pulse is valid.				

### 5.2.9 Homing

The servo has multiple home zeroing modes. The user can choose the appropriate origin return mode according to the site conditions and process requirements. The parameters related to zero return are as follows.

Remarks: Before using the zero return function, you need to set the enable software and hardware limit P03.73 to 0 or 2. When it is set to 1, triggering the forward and reverse limit will cause the servo motor to directly enter the fault protection state and cannot continue to complete the zero return. operate.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method		
P03.51	Homing method Set the origin return mode and trigger signal source.	0~99	-	Disable to set	Immediate ly	0	RW		
P03.52	Homing acceleration and deceleration time	0~32767	ms	anytime	Immediate ly	500	RW		
	Set the time for the motor to accelerate from 0 to the rated speed when returning to the origin. Therefore, when the home is running, the actual acceleration time of the motor $t = P03.53/rated$ speed* (P03.52)								
P03.53	The first segment of zero return speed	0~32767	rpm	anytime	Immediate ly	500	RW		
	It is also called the high-speed zero return speed. When the origin is returned to zero, the motor speed when searching for the deceleration point signal is set.								
P03.54	The second segment of	0~32767	rpm	anytime	Immediate	100	RW		

	zero return speed				ly				
	Also called low-speed zero return speed, set the motor speed when searching for the origin signal when the								
	origin is returned to zero.								
P03.55	Offset after zero return (set the value of the absolute position of the motor after the zero return.)	-21474836 47~ 214748364 7	User units	anytime	Immediate ly	0	RW		
	When BIT9 of P01.46 is set to 1, the motor does not move to the offset position after finding the origin, and								
	directly sets the origin as the offset position. When the BIT9 of P01.46 is set to 0, after the origin is found,								
	the origin is zero, and the motor moves to an offset position.								
	position of the motor encoder is within the origin range, and the speed given P09.89=0		0.0001		. I				
P03.57	in the position loop mode, the time of P03.49 is maintained, and the zero return completion signal is output.)	0~32767	0.0001 Round	anytime	Immediate ly	5	RW		

The associated input function bits are as follows.

Function bits	Bit description
INFn.26	Trigger Homing
INFn.34	Zero point switch input
INFn.43	positive position limit switch
INFn.44	negative position limit switch

The associated output function bits are as follows.

Function bits	Bit description
OUTFn.15	Homing completes output. When the encoder position of the motor is within the Zero point
	range, and the speed reference in the position mode P09.89=0, the time of P03.49 is also
	maintained, and the Homing completes output signal is output.

The vec servo has a variety of homing method to choose from, including:

(1) Method 1: Depends on the negative position limit switch and Z index pulse;

(2) Method 2: Depends on the positive position limit switch and Z index pulse;

(3) Method 3-Method 6: Depends on the zero position switch and Z index pulse;

(4) Method 7-Method 10: Depends on the zero position switch, positive position limit switch and Z index pulse;

(5) Method 11 - Method 14: Depends on the zero position switch, negative position limit switch

and Z index pulse

(6) Method 17: Depends on the negative position limit switch

(7) Method 18: Depends on the positive position limit switch

(8) Method 19 - Method 22: Depends on the zero position switch

(9) Method 23 - Method 26: Depends on the zero position switch, positive position limit switch

(10) Method 27 - Method 30: Depends on the zero position switch, negative position limit switch

(11) Method 33 - Method 34: Depends on the Z pulse

(12) Method 35: Depends on the current position

#### Homing method 1: Homing on the negative limit switch and Z index pulse

Case 1: When the user triggers the execution of homing, if the negative limit switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the negative limit switch is in the high level, the moving direction changes and the starts to move at second speed; the position where the first Z index pulse is encountered when the negative

Case 2: When the user triggers the execution of homing, if the negative limit switch state is at the high level, the axis starts to move in the positive direction at the second speed, and the first Z index pulse is encountered when the negative limit switch state is at the low level. The location is the zero point position.



Homing method 1: Homing on the negative limit switch and Z index pulse

#### Homing method 2: Homing on the positive limit switch and Z index pulse

Case 1: When the user triggers the execution of homing, if the positive limit switch state is in the low level, the axis starts to move forward at the first speed, and when the positive limit switch is in the high level, the moving direction changes and moving speed changes at the second speed, the position where the first Z index pulse is encountered when the positive limit switch state is low is the zero point position.

Case 2: When the user triggers the execution of homing, if the positive limit switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the first Z index pulse is encountered when the positive limit switch state is at the low level. The location is the zero point position.



Homing method 2: Homing on the positive limit switch and Z index pulse

# Homing method $3 \sim 6$ Homing on the home switch and the Z index pulse Homing method 3

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the origin switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the position where the first Z index pulse is encountered when the home switch state is at the low level is the zero point position.

#### Homing method 4

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the second speed is reversed. The position of a Z index pulse is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. When the home switch is in the high level again, it moves in the reverse direction at the second speed, and the position where the first Z index pulse is encountered is the zero point position.



 $Homing\ method\ 3\sim 4\ Homing\ on\ the\ home\ switch\ and\ the\ Z\ index\ pulse} Homing\ method\ 5$ 

# Case 1: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts to move forward at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers to perform homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 1: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move forward in the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. When the home switch is in the high level again, it moves forward in the second speed, and the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers to perform zero return, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered is the zero point position.



Homing method 5 ~ 6 Homing on the home switch and the Z index pulse

# Homing method 7 $\sim$ 10 Homing on the home switch, positive limit switch, and Z index pulse

# Homing method 7

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high position, the axis directly starts to move in the reverse direction at the second speed. When the origin switch state is at a low level, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. The movement starts at the first speed, and when the home switch is in the high level, the movement starts at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.



Homing method 7 Homing on the home switch, positive limit switch, and Z index pulse

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the second speed starts to move. The position of the first Z index pulse is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis directly starts the reverse motion at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. When the home switch is in the high level, it still moves at the first speed. The motion direction changes when the home switch state is low, and then starts to move at the second speed. When the home switch in the high level, and the position where the first Z index pulse is encountered is the zero point position.





#### Homing method 9

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move at the first speed. When the home switch is in the high level, the motion starts at the second speed. When the switch is in the low level, the direction of motion changes and continues to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis starts to move forward at the second speed, until when the origin switch is at a low level, the movement direction changes and starts to move at the second speed, when the origin switch is at a high position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, start moving at the second speed, and the position where the first Z pulse is encountered is the home position.



Homing method 9 Homing on the home switch, positive limit switch, and Z index pulse

#### Homing method 10

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, it starts to move at the second speed. When the switch is in the low position, the position where the first Z pulse is encountered is the home position.

Case 2: When the user triggers the execution of homing, if the origin switch state is at a high position, the axis starts to move forward at the second speed. When the origin switch is at a low position, the position where the first Z pulse is encountered is the origin position .

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start moving at the first speed,

when the origin switch is at a high position, the movement direction changes again and starts moving at the second speed. When the home switch is at a low position, the position where the first Z pulse is encountered is the home position.



Homing method 10 Homing on the home switch, positive limit switch, and Z index pulse

Homing method 11  $\sim$  14 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 11

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position where the first Z pulse is encountered when the home switch state is low is the home position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high position, the axis directly starts to move forward at the second speed, and the position where the first Z pulse is encountered when the origin switch state is at a low position is the origin position.

Case3: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, start moving at the second speed, and the position where the first Z pulse is encountered when the home switch is at a low state is the home position.



Homing method 11 Homing on the home switch, the negative limit switch and the Z index pulse

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, it starts to move at the second speed. The position of the Z pulses is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis directly starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. , when the origin switch is at a high position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and It starts to move at the first speed. When the origin switch is at a high position, it still moves at the first speed. When the home switch is at a low state, the movement direction changes and starts to move at the first speed. When the first speed. When it encounters the home switch when it is in the high position, it starts to move at the second speed, and the position where it encounters the first Z pulse is the origin position.



Homing method 12 Homing on the home switch, the negative limit switch and the Z index pulse

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first stage speed. When the origin switch is in the high position, it starts to move at the second stage speed. When the switch is in the low position, the movement direction changes and starts to move at the second speed. When the second speed. When the origin switch is in the low position, the movement direction changes and starts to move at the second speed. When the origin switch is in the high position, the position where the first Z pulse is encountered is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis will directly move in the reverse direction at the second speed. When the origin switch is at a high position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, start moving at the second speed, and the position where the first Z pulse is encountered is the home position.



Homing method 13 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 14

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, it starts to move at the second speed. When the switch is in the low position, the position where the first Z pulse is encountered is the home position.

Case 2: When the user triggers the execution of homing, if the origin switch state is at a high position, the axis starts to move in the reverse direction at the second speed. When the origin switch is at a low position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start to move at the first speed, when the origin switch is at a high position, the direction of movement changes again and starts to move at the second speed, when the home switch is at a low position, the position where the first Z pulse is encountered is the origin position.



Homing method 14 Homing on the home switch, the negative limit switch and the Z index pulse

## Homing method 15 ~ Homing method 16 Reserved

• Homing method 15 and Homing method 16 are reserved as the Homing method for future development.

## Homing method 17 ~ homing method 30 does not require Z index pulse

Mode 17 to Mode 30 are similar to Mode 1 to Mode 14 mentioned above, except that the positioning of their origin return position no longer requires Z pulses, but only according to the state change of the relevant origin switch and limit switch. Mode 17 is similar to Mode 1, Mode 18 is similar to Mode 2, Mode 19 and Mode 20 are similar to Mode 3, Mode 21 and Mode 22 are similar to Mode 5, Mode 23 and Mode 24 are similar to Mode 7, Mode 25 and Mode 26 are similar to Mode 9 above. Mode 27 and Mode 28 are similar to the previous Mode 11, and Mode 29 and Mode 30 are similar to the previous Mode 13.

#### Homing method 17: Origin return depending on the reverse operation limit switch

Case 1: When the user triggers the execution of homing, if the negative position limit switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the negative limit switch is in the high level, the moving direction changes and starts to move at the second speed; the position when the negative limit switch state is in the low level is the zero point position.

Case 2: When the user triggers the execution of zero return, if the state of the reverse operation limit switch is at a high position, the axis starts to move forward at the second speed, and the position when the reverse operation limit switch state is at a low position is the origin position.



Homing method 17: Homing on the negative limit switch

Homing method 18:Homing on the positive limit switch

Case 1: When the user triggers the execution of homing, if the positive position limit switch state is in the low level, the axis starts to move forward at the first speed, and when the positive position limit switch is in the high level, the moving direction changes and starts to move at second speed, and the position at the time when the positive limit switch state is at the low level is the zero point position.

Case 2: When the user triggers the execution of the zero return, if the forward running limit switch state is at a high position, the axis will directly start reverse

movement at the second speed, and the position when the forward running limit switch state is at a low position is the origin position.



Homing method 18: Homing on the positive limit switch

# Homing method 19~ Homing method 20 Depends on the origin return of the origin switch

# Homing method 19

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the origin switch is in the low position is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis starts to move in the reverse direction at the second speed, and the position when the origin switch is in the low position is the origin position.



Homing method 19 Homing on the home switch

# Homing method 20

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move forward at the first speed, and the position when the origin switch is in the high position is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis starts to move in the reverse direction at the second speed. When the origin switch is at a low level, the movement direction

changes and starts at the first speed. , the position when the origin switch is in high position is the origin position.



Homing method 20 Homing on the home switch

# Homing method 21

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the origin switch is in the low position is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis directly starts to move forward at the second speed, and the position when the origin switch is in the low position is the origin position.



Homing method 21 Homing on the home switch

# Homing method 22

Case 1: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis directly starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts at the first speed. , the position when the origin switch is in high position is the origin position.

Case 2: When the user triggers the execution of homing, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed, and the position when the origin switch is in the high position is the origin position.



Homing method 22 Homing on the home switch

Homing method 23 ~ 26 Origin return depending on origin switch, forward run limit

# Homing method 23

Situation 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the home switch state is low is the home position.

Scenario 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis starts to move in the reverse direction at the second speed, and the position when the origin switch state is in the low position is the origin position.

Scenario 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start the movement at the first speed, when the origin switch is in the high position, start the movement at the second speed, and the position when the origin switch is in the low position is the origin switch is in the low position.



Homing method 23 Homing on the home switch, positive limit switch

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move forward at the first speed, and the position when the origin switch is in the high position is the origin position.

Case 2: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis directly starts to move in reverse at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. The position when the home switch is in the high position is the home position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and It starts to move at the first speed. When the origin switch is at a high position, it still moves at the first speed. When the home switch is at a low state, the movement direction changes and starts to move at the second speed. When it encounters the home switch The position at the high position is the origin position.



Homing method 24 Homing on the home switch, positive limit switch

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, it starts to move at the second speed. When the switch is at the low position, the movement direction changes and starts to move at the second speed. When the home switch is at the high position, the position is the home position.

Case 2: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. The position when the origin switch is at a high position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start the movement at the first speed, and the position when the origin switch is at a high position is the origin position.



Homing method 25 Homing on the home switch, positive limit switch

# Homing method 26

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, it starts to move at the second speed. The position when the switch is in the low position is the origin position.

Case 2: When the user triggers the execution of zero return, if the state of the origin switch is in the high position, the axis starts to move forward at the second speed, and the position when the origin switch is in the low position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, the movement direction changes again and starts moving at the second speed, and the position when the home switch is at a low position.



Homing method 26 Homing on the home switch, positive limit switch

Homing method 27 ~ 30 Origin return depending on origin switch, reverse run limit

# Homing method 27

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the home switch state is low is the home position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis starts to move forward at the second speed, and the position when the origin switch state is in the low position is the origin position.

Case 3: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start to move at the first speed, when the origin switch is at a high position, start to move at the second speed, and the position when the home switch is at a low position is the home position.



Homing method 27 Homing on the home switch, the negative limit switch

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed, and the position when the origin switch is in the high position is the origin position.

Case 2: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis directly starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. , the position when the origin switch is in high position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and It starts to move at the first speed. When the origin switch is at a high position, it still moves at the first speed. When the home switch is at a low state, the movement direction changes and starts to move at the second speed. When it encounters the home switch The position at the high position is the origin position.



Homing method 28 Homing on the home switch, the negative limit switch

# Homing method 29

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first stage speed. When the origin switch is in the high position, it starts to move at the second stage speed. When the switch is at the low position, the movement direction changes and starts to move at the second speed. When the home switch is at the high position, the position is the home position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis will directly move in the reverse direction at the second speed. The position when the origin switch is at a high position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start the movement at the first speed, and the position when the origin switch is at a high position is the origin position.



Homing method 29 Homing on the home switch, the negative limit switch

#### Homing method 30

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, it starts to move at the second speed. The position when the home switch is in the low position is the home position.

Case 2: When the user triggers the execution of homing, if the state of the origin switch is in the high position, the axis starts to move in the reverse direction at the second speed. When the origin switch is in the low position, the position is the origin position.

Scenario 3: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, the movement direction changes again and starts moving at the second speed, and the position when the home switch is at a low position is the home position.



Homing method 30 Homing on the home switch, the negative limit switch

Homing method 31 and 32 are reserved.

Homing method 31~32 are reserved as homing modes for later development.

Homing method 33~34 Depends on Z pulse

# Homing method 33

In mode 33, when the user triggers the execution of homing, the axis starts to move in the reverse direction at the second speed, and the position where the first Z pulse is encountered is the origin position.

# Homing method 34

In mode 34, when the user triggers the execution of homing, the axis starts to move forward at the second speed, and the position where the first Z pulse is encountered is the origin position.



Homing method 33 ~ 34 Homing on the Z index pulse

# Homing method 35: depends on current location

In mode 35, when the user triggers the home return, the axis does not move, and the current position of the axis is considered to be the home position.

# 5.2.10 4th power position curve function

Generally speaking, a trapezoidal velocity curve is used for position planning inside the servo. The trapezoidal speed curve has a certain impact on the machine. In order to reduce the impact of the trapezoidal speed curve on the machine, the 4th power position curve function can be enabled. After enabling, the position curve is planned with a 4th power curve, which can greatly reduce the impact on the mechanical system.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P03.82	Enable 4th power	0~1	-	Set the	Stop to	Immediate	1	RW
	curve planning			method of	setting	ly		
	0- Use a trapezoidal			position				
	velocity profile			curve				
1- Using a 4th power		planning. It						
----------------------	--	--------------	--	--				
curve		can only be						
		modified if						
		the servo is						
		not enabled.						

## 5.2.11 Full closed loop function

In actual field applications, such as steel plate feeding, due to the sliding between the steel plate and the motor, the displacement of the motor and the displacement of the actual material are inconsistent. Therefore, an external second encoder is required to measure the displacement of the actual material. Servo The driver controls the motor speed according to the given position command and the position signal fed back by the second encoder. That is, closed-loop control is performed on the position of the second encoder, so that the given position command is consistent with the position fed back by the second encoder.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P03.31	Enable full closed	0~1	-	Set whether	Stop to	Immediatel	0	RW
	loop			to enable the	setting	У		
	0- Disable fully closed			full closed				
	loop			loop				
	1- Enable full-closed							
	loop (P03.78 setting is							
	invalid, servo pulse port							
	(CN3's 20, 21, 22,							
	23pins) is used as the							
	second encoder							
	input)							
P03.32	Full closed loop	0~2	-	When full	anytime	Immediatel	0	RW
	mode			closed loop		У		
	0- semi-closed loop;			is enabled,				
	using electronic gear			set full				
	ratio I			closed loop				
	1- Iuli closed loop;			mode.				
	ratio 1							
	2- Switch full-closed							
	and semi-closed							
	according to IO; IO is							

	invalid, servo runs in							
	semi-closed loop,							
	adopts electronic gear							
	ratio 1; IO is valid,							
	servo runs in full closed							
	loop, adopts electronic							
	gear ratio 2							
	Full closed loop							
	feedback polarity							
P03.33	Full closed loop	0~1	-	When the	anytime	Immediatel	0	RW
	feedback polarity			full-closed		у		
	0- The values of the			loop function				
	motor encoder counter			is set, the				
	and the second encoder			internal and				
	counter are incremented			external				
	or decremented			encoders				
	simultaneously			feedback the				
	1- The value of the			pulse				
	motor encoder counter			counting				
	and the second encoder			direction				
	counter are			during the				
	incremented, one			motor				
	decremented			rotation.				
P03.34	The number of	0~214748	-	Set the	anytime	Immediatel	10000	RW
	pulses of the second	3647		number of		у		
	encoder			feedback				
	corresponding to			pulses of the				
	one revolution of the			second				
	motor			encoder				
				when the				
				servo motor				
				rotates one				
				revolution.				
P03.36	Full closed loop	0~214748	0.000	Set the	anytime	Immediatel	10000	RW
	position error	3647	1	threshold		у		
	excessive		round	value of the				
	threshold, unit is			absolute				
	0.0001 round			value of the				
				position				
				deviation				
				when the				
				full-closed				
				loop position				

		deviation is		
		too large		
		fault.		

P03.38	Fully closed loop	-	0.000	The fully	-	-	-	RO
	position error,		1	closed loop				
	0.0001 round		round	position				
				error refers				
				to (the count				
				value of the				
				motor				
				encoder - the				
				count value				
				of the second				
				encoder				
				reduced to				
				the motor				
				encoder),				
				and the				
				position				
				error				
				represents				
				the relative				
				sliding				
				displacement				
				between the				
				material and				
				the motor.				
P03.40	Full closed loop	0~32767	-	This value is	anytime	Immediatel	0	RW
	position error			valid when		У		
	clearing cycles			in full closed				
				loop state.				
				When set to				
				0, the				
				full-closed				
				loop position				
				error will not				
				be cleared.				
				When set to				
				n, when the				
				motor rotates				

				every n				
				cycles, if the				
				full-closed				
				loop position				
				error is less				
				than P03.36,				
				the				
				full-closed				
				loop position				
				error will be				
				cleared.				
P03.41	Motor encoder rate	-	clk/5	Count and	-	-	-	RO
	in full closed loop		ms	display the				
	mode			speed of the				
				motor				
				encoder				
				under full				
				closed-loop				
				control. The				
				number of				
				pulses per				
				5ms.				
P03.42	Second encoder rate	-	clk/5	Statistics and	-	-	-	RO
	in full closed loop		ms	display of				
	mode			the second				
				encoder rate				
				under full				
				closed-loop				
				control. The				
				number of				
				pulses per				
				5ms.				
P00.32	Second encoder	0~32767	ms	Set the	anytime	Immediatel	5	RW
	software filter time			second		у		
	constant			encoder				
				software				
				filter time				
				constant.				

# Fn013 Self-learning feedback polarity and the number of second encoder pulses in one revolution of the motor in Fn013 full-closed loop mode

In full-closed loop mode, it is necessary to set the full-closed loop feedback polarity P03.33 and P03.34. The appropriate value can be automatically calculated through this

function operation. When performing this function operation, please ensure that the second encoder measuring wheel can be tightly and The material connection ensures that no slippage occurs between the measuring wheel and the material.

The operation steps are as follows:

① Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

② Combine the " $\blacktriangle$ " (increase), " $\blacktriangleleft$ " (shift), " $\blacktriangledown$ " (decrease) three buttons to set the display value of the digital tube to Fn013;

- ③ Click SET to display LFCP. (Learn Full\_Close Parameter);
- ④ Press the "<<" (shift) key; the motor will rotate forward 3 times at a speed of 10rpm.

The relevant input function bits are as follows.

Function bits	Bit description
INFn.45	Switch between fully closed loop and semi closed loop
	When invalid, the servo is in semi-closed loop mode, using electronic gear ratio 1; when valid,
	servo is in full-closed loop mode, using electronic gear ratio 2

## 5.2.12 Torque limit function

Position mode torque limit and torque mode torque limit are the same. Refer to (5.4.2 Torque Limit).

## 5.2.13 Travel limit function

In the position mode, the servo has the software limit function. When the software limit is enabled, it detects that the position value of the encoder is less than the lower limit value of the software limit (P03.74) and the motor moves in the negative direction, and a software limit fault is reported. (Er207). It is detected that the position value of the encoder is greater than the upper limit value of the software limit (P03.76), and the motor moves in the positive direction, and a software limit fault (Er207) is reported.

In position mode, the servo also has hardware limit function. When the hardware limit is enabled, by setting INFn.43 and INFn.44 to a DIx, when the DIx is valid, and the speed is greater than/less than zero (refer to the description of the bits INFn.43 and INFn.44 below), the hardware will be reported to the hardware. Limit fault Er208.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P03.73	Enable hardware	0~2	-	Set whether	anytime	Immediate	0	RW
	and software limits			to use the		ly		
	0- Disable hardware and			hardware				
	software limits			and software				

	1- Directly enable			limit				
	software and hardware			function, and				
	limit after power-on			the way to				
	2- Enable software and			enable the				
	hardware limit after			software and				
	returning to zero			hardware				
				limit.				
P03.74	Software limit lower	-214748364	User	Set the lower	anytime	Immediate	-100000	RW
	limit value	7 ~	units	limit value		ly	00	
		2147483647		of the				
				software				
				limit				
P03.76	Software limit upper	-214748364	User	Set the upper	anytime	Immediate	1000000	RW
	limit value	7 ~	units	limit value		ly	0	
		2147483647		of software				
				limit				

Function bits	Bit description
INFn.43	Forward hardware limit switch in position mode, when the speed is greater than zero and
	INFn.43 is valid, the hardware limit fault will be reported
INFn.44	Reverse hardware limit switch in position mode, when the speed is less than zero and INFn.44
	is valid, a hardware limit fault is reported



#### 5.2.14 Internal implementation block diagram of position mode

# 5.3 speed mode

The speed mode is a control mode with the motor speed as the control target, which is often used for the main shaft dragging. The implementation of the speed mode is shown in the figure below.



## 5.3.1 Speed command source

The servo has two speeds to choose from, namely the main speed A and the auxiliary speed B. These two speeds can be superimposed on each other or can be switched to each other. Both the main speed A and the auxiliary speed B have multiple speed sources. As shown below

(Note: Since AI3 is not supported on VC330 general-purpose servo hardware, the speed cannot be sourced from AI3, and the same is true for others)



Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P04.01	Speed command source 0- main speed A 1- auxiliary speed B 2- INFn.12 switch A/B 3- A+B 4- P08.17 5- mulit speed 6-UP/DOWN speed mode 7- sin wave	0~7	-	Select the source of the speed command.	anytime	Immediatel y	0	RW
P04.02	main speed A source 0- from P04.03 1- from AI1 2- from AI2 3-from AI3 (The hardware does not support) 4- from pulse frequency (The hardware does not support)	0~4	-	Set the speed command source of the main speed command A source.	anytime	Immediatel y	0	RW
P04.03	Set value of main speed A	-32767~32 767	rpm	When the main speed A source selects the digital given source, set the speed command value through P04.03.	anytime	Immediatel y	500	RW
P04.04	auxiliary speed B source 0- from P04.05 1- from AI1	0~4	-	Set the speed command source of auxiliary	anytime	Immediatel y	0	RW

	2- from AI2			speed				
	3- from AI3			command B.				
	(The hardware does							
	not support)							
	4-from pulse							
	frequency							
	(The hardware does							
	not support)							
P04.05	Auxiliary speed B	-32767~32	rpm	When the	anytime	Immediatel	500	RW
	set value	767		source of		У		
				auxiliary				
				speed B				
				selects the				
				digital given				
				source, set				
				the speed				
				command				
				value				
				through				
				P04.05.				
P08.17	Speed	-32767~32	rpm	In the speed	anytime	Immediatel	0	RW
	communication	767		control		У		
	given			mode, when				
				the speed				
				command				
				source is				
				communicati				
				on given, set				
				the speed				
				command				
				value.				

Function bits	Bit description
INFn.12	Switch the main speed A and the auxiliary speed B, and use the auxiliary speed B when it is
	active.

When the speed command comes from AIx, please refer to "6.3.1 Analog Input AI" for details.

## 5.3.2 Multi-stage speed mode

Servo supports multi-segment velocity mode. There are 3 modes of multi-stage speed,

namely single-run stop, cyclic operation, and IO switching operation.

Single-run stop means that after the motor is enabled, the first stage of speed will be run, and after the operation is completed, the next stage of speed will be run until the running stage number is equal to the total number of stages, and then the machine will stop.

For example, the total number of segments is set to 2, and the single-run stop mode is used. After the motor is enabled, the motor will first run the first stage of speed, and then run the second stage of speed after running, and stop after running.

Cyclic operation is to run the first stage of speed again when a single operation is about to stop, so that the cycle does not stop.

For example, the total number of segments is set to 3, and the cycle operation mode is used. After the motor is enabled, the motor first runs the first stage of speed, then the second stage of speed, then the third stage of speed, and then the first stage of speed, and so on.

IO switching operation means that after the motor is enabled, the driver reads the value of IO to get the segment number, and then runs the speed of the segment. After the IO changes, the driver re-reads the value of IO, gets the segment number again, and then runs the segment speed.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write metho d
P11.01	Multi-speed mode	0~2	-	In speed	Stop to	Immediately	0	RW
	0- single-run stop			control,	setting			
	1-cycle run			when the				
	2- IO switch run			speed				
				command				
				source is				
				multi-speed,				
				set the				
				multi-speed				
				command				
				operation				
				mode.				
P11.02	The total number of	1~16	-	Set the total	anytime	Immediately	16	RW
	segments of the			number of				
	speed			segments of				
				the speed				
				command.				
				Different				
				speeds and				
				running				
				times can be				

				set for				
				different				
				segments,				
				and there are				
				4 sets of				
				acceleration				
				times for				
				selection.				
P11.03	Running time unit	0~1	-	Multi-speed	anytime	Immediately	1	RW
	0- ms			running time				
	1- s			unit				
				selection.				
P11.04	Acceleration time 1	0~32767	ms	For each	anytime	Immediately	500	RW
				multi-speed				
				command, 4				
				sets of				
				acceleration				
				and				
				deceleration				
				time are				
				provided for				
				selection.				
	Deceleration time 1							
P11.05		0~32767	ms	-	anytime	Immediately	500	RW
P11.06	Acceleration time 2	0~32767	ms	_	anytime	Immediately	500	RW
		0 52707	1115		unythic	minediatery	500	
P11.07	Deceleration time 2	0~32767	ms	-	anytime	Immediately	500	RW
P11.08	Acceleration time 3	0~32767	ms	-	anytime	Immediately	500	RW
P11.09	Deceleration time 3	0~32767	ms	-	anytime	Immediately	500	RW
P11.10	Acceleration time 4	0~32767	ms	-	anytime	Immediately	500	RW
P11.11	Deceleration time 4	0~32767	ms	-	anytime	Immediately	500	RW
P11.12	1st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				speed				
				command of				
				the 1th stage.				
P11.13	1st speed command	0~32767	ms(s)	The running	anytime	Immediately	10	RW
	run time This			time set by				
	parameter unit is set			the speed				

	1 011 02			1.6				
	by P11.03.			command of				
D11.14	TT1 1.1 1	0.4		the 1th stage.		T 11.1	0	DUV
P11.14	The Ith speed	0~4	-	Acceleration/	anytime	Immediately	0	RW
	acceleration and			deceleration				
	deceleration time			time selected				
	selection 0-Use			by the 1th				
	acceleration/deceler			speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.15	2st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767	1	value of the	5			
				1th speed				
				command.				
P11.16	2st speed command	0~32767	ms(s)	_	anvtime	Immediately	10	RW
111110	run time	0 52707	(-)				10	1000
P11 17	The 2th speed	0~4	_	Select the	anvtime	Immediately	0	RW
1 1111 /	acceleration and	0.1		acceleration/	ungenne		Ŭ	
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			2th speed				
	ation time			command				
	P04 17 P04 18			command				
	1 Using							
	1- Using							
	deceleration time 1							
	2 Using							
	2- Using							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							

	4- Using							
	acceleration/							
	deceleration time 4							
P11.18	3st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				3th speed				
				command.				
P11.19	3st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.20	The 3th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			3th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11 21	Ast stage speed	-32767~32	rnm	Set the speed	anytime	Immediately	0	RW
1 11.21	command size	-52707-52	ipin	value of the	unythic	minediatery	U	IX W
	command size	707		Ath speed				
				command				
D11 22	Ast speed command	0.22767	ms(s)	command.	onvtime	Immediately	10	DW
F11.22	4st speed command	0~32707	1115(5)	-	anythine	mineulatery	10	κ.w
D11 22	The 4th speed	0.4		Salaat tha	onutimo	Immodiately	0	DW
P11.25		0~4	-	select the	anytime	minediatery	0	κ.w
	acceleration and							
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			4th speed				
	ation time			command				
	P04.17 P04.18							
	I-Using							
	acceleration/							

			-				-	
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.24	5st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				5th segment				
				speed				
				command.				
P11.25	5st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.26	The 5th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			5th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.27	6st stage speed	-32767~32	rpm	Set the speed	anvtime	Immediately	0	RW
	command size	767	1	value of the	5			
				6th speed				
				command.				
P11.28	6st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time						-	
P11.29	The 6th speed	0~4	-	Select the	anytime	Immediately	0	RW

	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			6th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.30	7st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767	-	value of the				
				7th speed				
				command.				
P11.31	7st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.32	The 7th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			7th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
	acceleration/							
	deceleration time 4							

-		1			1			
P11.33	8st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				8th speed				
				command.				
P11.34	8st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.35	The 8th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			8th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11 36	9st stage speed	-32767~32	rnm	Set the speed	anvtime	Immediately	0	RW
111.50	command size	767	ipin	value of the	ungunie	miniculatory	Ū	i
	commune size	101		9th speed				
				command				
D11 37	Ost speed command	0-32767	ms(s)	commune.	anytime	Immediately	10	DW/
F11.57	st speed command	0~32707	1115(5)	-	anytime	mineuratery	10	Γw
D11 29	The Oth groad	0.4		Salaat tha	antina	Immediately	0	DW
F11.56		0~4	-	Select the	anytime	Immediately	0	K VV
				time of the				
	selection 0-0se							
	acceleration/deceler			9th speed				
	ation time			command				
	P04.1 / P04.18							
	I- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							

	1				1	1		
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.39	10st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				10th speed				
				command.				
P11.40	10st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.41	The 10th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			10th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.42	11st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767	1	value of the				
				11th speed				
				command.				
P11.43	11st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.44	The 11th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			11th speed				
1		1	1	11 Speed				

				•				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.45	12st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767	-	value of the				
				12th speed				
				command.				
P11.46	12st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.47	The 12th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			12th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time							
P11.48	13st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				13th speed				
				command.				

P11.49	13st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.50	The 13th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			13th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.51	14st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767	-	value of the				
				14th speed				
				command.				
P11.52	14st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.53	The 14th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			14th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
		1	1	1	1	1	1	1

	4- Using							
	acceleration/							
	deceleration time 4							
P11.54	15st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767		value of the				
				15th speed				
				command.				
P11.55	15st speed command	0~32767	ms(s)	-	anytime	Immediately	10	RW
	run time							
P11.56	The 15th speed	0~4	-	Select the	anytime	Immediately	0	RW
	acceleration and			acceleration/				
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			15th speed				
	ation time			command				
	P04.17 P04.18							
	1- Using							
	acceleration/							
	deceleration time 1							
	2- Using							
	acceleration/							
	deceleration time 2							
	3- Using							
	acceleration/deceler							
	ation time 3							
	4- Using							
	acceleration/							
	deceleration time 4							
P11.57	16st stage speed	-32767~32	rpm	Set the speed	anytime	Immediately	0	RW
	command size	767	1	value of the	5	5	-	
				16th speed				
				command.				
P11.58	16st speed command	0~32767	ms(s)	_	anvtime	Immediately	10	RW
111100	run time	0 52707	(-)				10	
P11 59	The 16th speed	0~4	_	Select the	anvtime	Immediately	0	RW
11107	acceleration and	0.1		acceleration/			Ŭ	
	deceleration time			deceleration				
	selection 0-Use			time of the				
	acceleration/deceler			16th speed				
	ation time			command				
	P04 17 P04 18			Communu				
	1_ Using							
	acceleration/							
	acceleration/		1		1			1

dec	eleration time 1				
2-1	Using				
acc	eleration/				
dec	eleration time 2				
3-1	Using				
acc	eleration/deceler				
atio	on time 3				
4-1	Using				
acc	eleration/				
dec	eleration time 4				

Function bits	Bit description
INFn.17	Select 0 for the speed segment number of multi-step speed
INFn.18	Select 1 for the speed segment number of multi-step speed
INFn.19	Select 2 for the speed segment number of multi-step speed
INFn.20	Select 3 for the speed segment number of multi-step speed

According to the status of  $INFn17\sim20$ , multi-speed speed segment number = INFn.20\*8 + INFn.19\*4 + INFn.18\*2 + INFn.17\*1 +1. See the table below for details.

INFn.20	INFn.19	INFn.18	INFn.17	Multi-speed running segment						
				number						
0	0	0	0	1						
0	0	0	1	2						
0	0	1	0	3						
	i									
1	1	1	1	16						

## 5.3.3 UP/DOWN speed mode

When the UP/DOWN speed mode is selected, the speed is controlled by the input detail bits INFn.63 (UP) and INFn.64 (DOWN). When it is detected that INFn.63 is active, the speed raises; when it is detected that INFn.64 is active, the speed decreases; when both signals are deactive, the speed remains unchanged. The timing diagram is shown below.



Function bits	Bit description
INFn.63	UP signal
INFn.64	DOWN signal

## 5.3.4 Ramp control and speed command filtering

All speed sources have ramp control to prevent the impact of a given speed on the machine. The ramp control is achieved by setting the acceleration/deceleration time of the speed. The speed command after the ramp processing is then subjected to low-pass filtering to make the speed command smoother. For example, when the set speed is the rated speed, the actual running speed is processed as shown below.



It should be noted that the actual acceleration/deceleration time is related to the change of the given speed. The set acceleration/deceleration time refers to the acceleration time required to accelerate from 0 to the rated speed.

Actual acceleration and deceleration time

= Set acceleration and deceleration time  $\times \frac{\text{Variation of the input speed command}}{\text{Rated speed}}$ 

The advantage of filtering is to make the speed output smoother, but the disadvantage is that the speed command will lag. The larger the set filter time constant, the smoother the speed output and the longer the lag time.

								read
Parameter	Parameter	Set	unita	Function	Set	Effective	Defaulta	and
No.	Description	range	units	Function	method	way	Defaults	write
								method
P04.20	Time const for speed	0~32767	ms	Set the	anytime	Immediate	20	RW
	command filter			acceleration/		ly		
				deceleration				
				ramp time				
				constant for				
				the speed				
				command.				
P04.17	Acceleration time	0~65535	ms	The time for	anytime	Immediate	500	RW
				the speed		ly		
				command to				
				accelerate				
				from 0 to the				
				rated speed.				
				The				
				calculation				
				formula of				
				the actual				
				acceleration				
				time is as				
				follows:				
				Actual				
				acceleration				
				time t				
				1=change of				
				speed				
				command/rat				
				ed speed $ imes$				
				speed				
				command				
				acceleration				
				time				

P04.18	Deceleration time	0~65535	ms	The time for	anytime	Immediate	500	RW
				the speed		ly		
				command to				
				decelerate				
				from the				
				rated speed				
				to 0. Actual				
				deceleration				
				time t2=				
				Change				
				of speed				
				command/rat				
				ed speed $\times$				
				speed				
				command				
				deceleration				
				time				

### 5.3.5 speed limit

Speed limiting includes forward limiting and reverse limiting, each of which has a primary limiting A source and an auxiliary limiting B source. That is, the main positive limiter A, the auxiliary positive limiter B, the main negative limiter A, and the auxiliary negative limiter B.

# (Note: Since AI3 is not supported on the VC330Profinet bus servo hardware, the forward speed limit cannot be sourced from AI3)

5.3.5.1 Positive speed limiting

The source of the forward speed limit is shown below. There are two types of positive speed limiting, one is the main positive speed limiter A, and the other is the auxiliary positive speed limiter B. Both speed limits have different speed limit sources.



### 5.3.5.2 Negative speed limiter

The source of the reverse speed limit is shown below. There are two types of reverse speed limiting, one is the main negative speed limiter A, and the other is the auxiliary reverse

## speed limiter B. Both speed limits have different speed limit sources.



#### The speed limit related parameters are as follows.

Parameter	Parameter	Set	units	Function	Set	Effective	Defaults	read and
INO.	Description	Tange			memou	way		method
P04.06	source of positive speed limiting 0-main positive speed limiter A 1-auxiliary reverse speed limiter B 2- A/B switch 3-both A and B are limiter	0~3	-	Set the source of the forward speed command limit.	anytime	Immediate ly	0	RW
P04.07	Source of main positive speed limiter A 0- from P04.08 1- fromAI1 2- fromAI2 3- fromAI3 (The hardware does not support)	0~3	-	Select the source of the positive speed limit A.	anytime	Immediate ly	0	RW
P04.08	Set value of positive speed limit A	0~32767	rpm	When the forward speed limit A selects the digital given source, set the required speed limit value through P04.08.	anytime	Immediate ly	3000	RW

				1	1	1	1	1
P04.09	Source of auxiliary	0~3	-	Select the	anytime	Immediate	0	RW
	reverse speed limiter			source of the		ly		
	В			positive				
	0- FromP04.10			speed limiter				
	1- FromAI1			В.				
	2- FromAI2							
	3- FromAI3							
	(The hardware does							
	not support)							
P04.10	Set value of positive	0~32767	rpm	When the	anytime	Immediate	3000	RW
	speed limiter B		-	positive		ly		
	1			speed limit B		-		
				selects the				
				digital given				
				source, set				
				the required				
				speed limit				
				value				
				through				
				DO4 10				
D04.11	<u> </u>	0.2		P04.10.		T L'A	0	DW
P04.11	source of negative	0~3	-	Set the	anytime	Immediate	0	KW
	speed limiting			source of the		Iy		
	0-main negative			reverse				
	speed limiter A			speed				
	1- auxiliary negative			command				
	speed limiter B			limiter.				
	2- A/B switch							
	3- both A and B are							
	limiter							
P04.12	Source of main	0~3	-	Select the	anytime	Immediate	0	RW
	negative speed			source of the		ly		
	limiter			reverse				
	А,			speed limiter				
	0- FromP04.13			А.				
	1- FromAI1							
	2- FromAI2							
	3- FromAI3							
	(The hardware does							
	not support)							
P04.13	Digital value of	0~32767	rpm	When the	anytime	Immediate	3000	RW
	main negative speed			reverse		ly		
	limiter A			speed limit A				
				selects the				

				digital given				
				source, set				
				the required				
				speed limit				
				value				
				through				
				P04.13				
P04.14	Source of auxiliary	0~3	-	Selects the	anytime	Immediate	0	RW
	negative speed			source of		ly		
	limiter B			reverse				
	0- FromP04.15			speed limiter				
	1- FromAI1			В.				
	2- FromAI2							
	3- FromAI3							
	(The hardware does							
	not support)							
P04.15	Digital value of	0~32767	rpm	When the	anytime	Immediate	3000	RW
	auxiliary negative			reverse		ly		
	speed limiter B			speed limit B				
				selects the				
				digital given				
				source, set				
				the required				
				speed limit				
				value				
				through				
				P0415.				

Function bits	Bit description
INFn.07	Switch the positive speed limit source A/B, when valid, use positive limit B
INFn.08	Switch the negative speed limit source A/B, when valid, use negative limit B

## 5.3.6 Torque limit

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P05.10	Torque limit method0-Forwardandreverselimitarefrompositive limiting1-Forwardandreverselimitseparately	0~1	-	Set the torque limit method.	anytime	Immediate ly	0	RW
P05.11	Positivetorquelimiting source0- Forward Limit A1- Forward limiter B2- A/B switching3- A and B aresimultaneously limit	0~3	_	Sets the source of the positive torque limit.	anytime	Immediate ly	0	RW
P05.12	Source of forward torque limit A 0- from P05.13 1- from AI1 2- from AI2 3- from AI3 (The hardware does not support)	0~3	-	Set the source of the positive torque limit A.	anytime	Immediate ly	0	RW
P05.13	Set value of forward torque limiter A	0~300.0	%	When P05.12 selects the digital given source, set the required torque percentage through P05.13.	anytime	Immediate ly	150.0	RW
P05.14	Forward Torque	0~3	-	Set the	anytime	Immediate	0	RW

## Please refer to "5.4.2 Torque Limit" in torque mode. Both are shared.

	0- from P05.15			positive				
	1- from AI1			torque limit				
	2- from AI2			В.				
	3- from AI3							
	(The hardware does							
	not support)							
P05.15	Set value of forward	0~300.0	%	When	anytime	Immediate	150.0	RW
	torque limiter			P05.14		ly		
	В			selects the				
				digital given				
				source, set				
				the required				
				torque				
				percentage				
				through				
				P05.15.				
P05.16	Reverse torque	0~3	-	Sets the	anytime	Immediate	0	RW
	limiting source			source of the		ly		
	0- Reverse Limit A			reverse				
	1- Reverse limit B			torque limit.				
	2- A/B switching							
	3-A and B are							
	simultaneously							
	limit							
P05.17	Source of reverse	0~3	-	Set the	anytime	Immediate	0	RW
	torque limit A			source of the		ly		
	0- from P05.18			reverse				
	1- from AI1			torque limit				
	2- from AI2			А.				
	3- from AI3							
	(The hardware does							
	not support)							
P05.18	Set value of reverse	0~300.0	%	When	anytime	Immediate	150.0	RW
	torque limiter			P05.17		ly		
	Α			selects the				
				digital given				
				source, set				
				the required				
				torque				
				percentage				
				through				
				P05.18.				
P05.19	Reverse Torque	0~3	-	Set the	anytime	Immediate	0	RW

	Limit B Source 0-			source of		ly		
	from P05.20			reverse				
	1- from AI1			torque limit				
	2- from AI2			В.				
	3- from AI3							
	(The hardware does							
	not support)							
P05.20	Set value of reverse	0~300.0	%	When	anytime	Immediate	150.0	RW
	torque limiter			P05.19		ly		
	В			selects the				
				digital given				
				source, set				
				the required				
				torque				
				percentage				
				through				
				P05.20.				

## 5.3.7 Zero position fixation function

The zero-position fixing function means that in the speed control mode, when the zero-position fixing DI signal INFn.16 is valid, and the speed command amplitude is less than or equal to the set value of P04.26, the servo motor enters the zero-position locking state. At this time, a position loop is built inside the servo drive, and the speed command is invalid; the servo motor is fixed within  $\pm 1$  pulse of the effective position of the zero-position fixation. Even if it rotates due to external force, it will return to the zero-position fixation. If the amplitude of the speed command is greater than P04.26, the servo motor exits the zero-position lock state, and the servo motor continues to run according to the current input speed command.

If the zero-position fixed DI signal INFn.16 is invalid, the zero-position fixation function is invalid.



Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P04.26	Zero-position fixed speed threshold	0~32767	rpm	In the speed control mode, when the zero-position fixed DI signal is valid, when the amplitude of the speed command is less than or equal to the value set by P04.26, the servo motor enters the zero-position	anytime	Immediate	5	RW
				locking state.				

Related input function bits.

Function bits	Bit description
INFn.16	Zero position fixed function enable

5.3.8 Other functions

## 5.3.8.1 Speed JOG

In the speed mode, there are two kinds of forward jog and reverse jog, which are controlled by INFn.09 and INFn.10 respectively. When INFn.09 or INFn.10 is valid, the speed output will superimpose a jog speed P04.16 on the basis of the current speed command. As shown below.



5.3.8.2 Speed command reverse

When INFn.11 is valid, the speed command will be reversed on the original basis.

5.3.8.3 Speed pause

When INFn.13 is valid, the speed command is set to zero directly.

5.3.8.4 Speed related signal output

When the difference between the actual output speed P04.21 and the speed given command is less than the speed consistency threshold P04.24, the speed consistency signal OUTFn.32 is valid. When the absolute value of the actual output speed P04.21 is greater than the speed reaching threshold P04.23, the speed reaching signal OUTFn.02 is valid.

The signal output is shown in the figure below.



When the amplitude of the actual output speed P04.21 is less than the zero-speed threshold P04.25, the zero-speed signal OUTFn.05 is valid. When the amplitude of acceleration is greater than the acceleration threshold P04.27, the acceleration OUTFn.04 is valid. When the amplitude of the deceleration is greater than the acceleration and deceleration threshold P04.27, the deceleration OUTFn.03 is valid. The signal output is shown in the figure below.



When the actual output speed P04.21 is greater than the zero speed threshold, the forward rotation signal OUTFn.07 is valid; when the actual output speed P04.21 is less than the negative zero speed threshold, the reverse rotation signal OUTFn.08 is valid. The signal output is shown in the figure below.



## 5.3.8.5 Speed feedback filtering and display filtering

Perform low-pass filtering on the speed feedback value by setting the software filtering time constant P00.10. You can also set the speed display filter time constant P04.22 to filter the speed display value.

5.3.8.6 Related parameters

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P04.16	JOG speed	0~32767	rpm	When using	anytime	Immediate	20	RW
				the DI jog		ly		
				function, set				
				the jog				
				running				
				speed				
				command				
				value. Note:				
				This value				
				will be				
				modified				
				during				

				1	1			
				keyboard				
				jog test				
				operation,				
				but will not				
				be saved.				
P04.17	acceleration time	0~65535	ms	The time for	anytime	Immediate	500	RW
				the speed		ly		
				command to				
				accelerate				
				from 0 to				
				the rated				
				speed. The				
				calculation				
				formula of				
				the actual				
				acceleration				
				time is as				
				follows:				
				Actual				
				acceleration				
				time t				
				1=change of				
				speed				
				command/ra				
				ted speed $\times$				
				speed				
				command				
				acceleration				
				time				
P04 18	deceleration time	0~65535	ms	The time for	anytime	Immediate	500	RW
104.10		0-05555	1115	the speed	anytime	ly	500	1
				command to		Ty		
				decelerate				
				from the				
				roted speed				
				to 0. Actual				
				deceleration				
				ume t				
				∠=cnange of				
				speed				
				command/ra				
				ted speed $ imes$				
				speed				
				command				
--------	----------------------	---------	-----	----------------	---------	-----------	------	----
				deceleration				
				time				
P04.20	Speed command	0~32767	ms	Set the	anytime	Immediate	20	RW
	first-order			speed		ly		
	filtering time			command				
	constant			filter time				
				constant.				
P04.21	Filtered speed value	-	rpm	Displays the	-	-	-	RO
				velocity				
				value after				
				velocity				
				filtering.				
P04.22	Speed display filter	0~32767	ms	Set the filter	anytime	Immediate	300	RW
	time			time for		ly		
				speed				
				display.				
P04.23	Speed arrival	0~32767	rpm	When the	anytime	Immediate	1000	RW
	threshold			absolute		ly		
				value of the				
				actual speed				
				of the servo				
				motor after				
				filtering				
				exceeds				
				P04.23, it is				
				considered				
				that the				
				actual speed				
				of the servo				
				motor				
				reaches the				
				expected				
				value, and				
				the servo				
				drive can				
				output the				
				speed				
				reaching				
				signal at this				
				time.				
P04.24	Speed consistent	0~32767	rpm	In the speed	anytime	Immediate	10	RW
	threshold			control		ly		

				mode, when				
				the absolute				
				value of the				
				deviation				
				between the				
				actual speed				
				P04.21 of				
				the filtered				
				servo motor				
				and the				
				speed				
				command is				
				less than				
				P04.24, it is				
				considered				
				that the				
				actual speed				
				of the motor				
				reaches the				
				set value of				
				the speed				
				command				
				and the				
				drive can				
				speed				
				consistent				
				signal at this				
				signal at time				
D04 25	Zana anaad threachald	0 22767		When the	onutimo	Immodiate	5	DW
P04.23	Zero speed ulleshold	0~32707	rpm	when the	anytime	1	5	κ.vv
				uslue of the		Iy		
				value of the				
				of the servo				
				motor after				
				filtering is				
				less than				
				P04.25, it is				
				considered				
				that the				
				actual speed				
				of the servo				
				motor is				

				close to				
				static, and				
				the servo				
				drive can				
				output a				
				zero-speed				
				signal at this				
				time.				
P04.27	Lifting speed	0~32767	rpm/s	In the speed	anytime	Immediate	375	RW
	threshold			control		ly		
				mode, when				
				the absolute				
				value of the				
				motor				
				acceleration				
				is greater				
				than a				
				certain				
				threshold				
				P04.27, the				
				motor is				
				considered				
				to be in the				
				speed-up/do				
				wn-speed				
				state.				
P00.10	Motor encoder	0~32767	ms	Set the time	anytime	reset	5	RW
	software filter time			for software		takes		
				filtering.		effect		

# Related input function bits.

Function bits	Bit description
INFn.09	Forward speed jog
INFn.10	Reverse speed jog
INFn.11	Speed reverse
INFn.12	Main speed A/B switching
INFn.13	Speed pause

# Related output function bits.

Function bits	Bit description
OUTFn.02	Speed arrives
OUTFn.03	Speed down
OUTFn.04	Speed up
OUTFn.05	Zero speed
OUTFn.06	Speed overrun
OUTFn.07	Forward rotate
OUTFn.08	Reverse rotate
OUTFn.32	Consistent speed



### 5.3.9 Internal operation block diagram of speed mode

### 5.3.10 Typical wiring diagram of speed mode



# 5.3.10.1 NPN jumper for DI/DO



1. - Indicates twisted pair shielded wire



#### 5.3.10.2 PNP jumper for DI/DO



1. \_\_\_\_\_ Indicates twisted pair shielded wire

# 5.3.11 VC330 servo uses analog quantity to control the speed

# (1) Analog signal wiring

The analog signal can be input from AI1 (pin 25) or AI2 (pin 13). Taking AI1 as an example, the analog signal line is connected to AI1 (pin 25) of CN3, and the analog ground is connected to AGND (pin 24).

# (2) Correspondence between analog voltage and actual speed command

Under the default parameters, -10V corresponds to the negative rated speed of the motor and 10V corresponds to the positive rated speed of the motor. Taking the AI1 input command voltage as an example, if you need to change the correspondence, you can modify the AI1 offset (P06.64) and AI1 magnification (P06.66). If the dead band is set to zero, the corresponding relationship between the input voltage and the speed command is:

actual speed command = rate speed × (AI1 magnification P06.66)%×

# (All input voltage P06.61) - (All Zero drift P06.68) - (All offset P06.64)

# 10000

For example:

- > By default, AI1 magnification=100.0%, AI1 zero drift=0 mV; AI1 offset=0 mV; Then when  $\pm 10000$ mV is input, the actual output speed is =  $\pm$  rated speed;
- > If AI1 magnification=200.0%; AI1 zero drift=0mV; AI1 offset=0mV; Then when  $\pm$  5000mV is input, the actual output speed is =  $\pm$  rated speed;
- > If AI1 magnification=200.0%; AI1 zero drift=0 mV; AI1 offset=5000mV; When inputting 0-10000mV, the actual output speed is =  $\pm$  rated speed;

# (3) Parameter setting step

a. Input the speed command with AI1, input  $\pm 10V$  corresponding to  $\pm$  rated speed as an example:



b. Take AI1 input speed command, input  $\pm 5V$  corresponding to  $\pm$  rated speed as an example:



#### (4) Enable the motor

By default, P06.01=1, the enable signal is input from DI1. If P06.21 is set to 1, then the servo can be enabled without receiving any signal when it is powered on.

#### (5) Zero drift correction

When the analog input is 0mV, set P06.79=4 once to trigger zero drift correction once. Zero drift can also be corrected via DI. Refer to the VC Servo User Manual for details.

# 5.4 Torque mode

Torque mode is a control mode in which the output torque of the motor is the control target, such as tension control. The implementation of torque mode is shown in the figure below.



#### 5.4.1 Torque command source

There are two kinds of torque commands for the servo to choose from, namely, the main torque command A and the auxiliary torque command B. These two torques can be superimposed or switched with each other. Both main torque A and auxiliary torque B have multiple torque sources. As shown in the picture below.



Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method
P05.01	Torque command source 0- main torque command	0~5	-	anytime	Immediate ly	0	RW
	A				5		
	1- auxiliary torque						
	command B						
	2- INFn.03 switching						
	A/B						
	5- А+в 4- from P08 16						
P05.02	Source of main torque	0~3	_	anytime	Immediate	0	RW
	command A			2	ly		
	0- from P05.03						
	1- from AI1						
	2- from AI2						
	3- from AI3						
	(The hardware does not						
	support)						
P05.03	Digital value of main	-300.0~30	%	anytime	Immediate	0.0	RW
	torque command A(When	0.0			ly		
	the main torque A selects						
	the digital given source,						
	set the required torque						
	percentage through						
	P05.03.)						

P05.04	Source of auxiliary	0~3	-	anytime	Immediate	0	RW
	torque command B				lv		
	0- from P05 05				5		
	1- from ΔI1						
	$\frac{1}{2} \text{ from AI2}$						
	2- 110111 A12						
	3- from AI3						
	(The hardware does not						
	support)						
P05.05	Digital value of auxiliary	-300.0~30	%	anytime	Immediate	0.0	RW
	torque command B(When	0.0			ly		
	the auxiliary torque B						
	selects the digital given						
	source, set the required						
	torque percentage						
	through P05 $05$ )						
P08 16	Torque communication	-3276 7~3	0/0	anytime	Immediate	0.0	RW
100.10	given (In the torque	276.7	70	unythine	ly	0.0	i cvv
	given in the torque	270.7			Ty		
	control mode, when the						
	torque command source						
	is communication given,						
	set the torque percentage						
	with an accuracy of						
	0.1%.)						

Related input function bits.

Function bits	Bit description
INFn.03	Switch the main torque command A and the auxiliary torque command B, and use the auxiliary
	torque command B when valid

When the torque command comes from AIx, please refer to "6.3.1 Analog Input AI" for details.

5.4.2 Torque limiting

5.4.2 Torque limiting

Torque limiting is achieved by limiting the output current of the driver to limit the output torque of the motor. The larger the torque limit value is, the larger the motor output torque is,

and the easier the driver is to over-current. There are two kinds of limiting methods for torque limiting. One is that the forward and reverse limiters are from the positive limiter value; the other is the positive and negative limiting separately. Which one depends on P05.10. Both the positive limiting and the reverse limiting have a primary limiter A source and an auxiliary limiter B source, respectively a primary forward torque limiter A, an auxiliary forward torque limiter B, and a primary reverse torque limiter A, auxiliary reverse torque limiter B.

In addition to the above torque limiter, in order to protect the motor, the torque output is limited according to the three values of the rated motor current P00.01, the rated current of the driver P01.03, and the current peak current percentage P00.24.

(Note: Since AI3 is not supported on VC330Profinet bus servo hardware, the torque limit cannot be sourced from AI3)

the value of this limit is calculate as follows:

Motor torque limiter =

 $\frac{\text{Motor rated current P00.01}}{\text{Drive rated current P01.03}} \times \text{Motor peak current percentage P00.24}$ 

5.4.2.1 Positive torque limiting

The source of the positive torque limit is shown below. There are two types of positive torque limiting, one is the main positive torque limiter A, and the other is the auxiliary positive limiter B. Both torque limits have different sources of torque.



#### 5.4.2.2 Negative torque limiting

The source of the negative torque limit is shown below. There are two types of negative torque limiting, one is the main negative torque limiter A, and the other is the auxiliary negative torque limiter B. Both torque limiters have different sources.



#### Related parameters are as follows

Parameter	Parameter	Set	units	Function	Set	Effective	Defaults	read

No.	Description	range			method	way		and write
								method
P05.10	Torque limit method0-Forward andreverse limit arefrompositive limiting1-Forward andreverselimitseparately	0~1	-	Select the torque limit method.	anytime	Immediatel y	0	RW
P05.11	Positivetorquelimiting source0- Forward Limit A1- Forward limiter B2- A/B switching3- A and B aresimultaneously limit	0~3	-	Select the forward torque limit source.	anytime	Immediatel y	0	RW
P05.12	Source of forward torque limit A 0- from P05.13 1- from AI1 2- from AI2 3- from AI3 (The hardware does not support)	0~3	_	Set the torque command source of main torque command A.	anytime	Immediatel y	0	RW
P05.13	Set value of forward torque limiter A	0~300.0	%	When the forward torque limit A selects the digital given source, set the required torque percentage through P05.13.	anytime	Immediatel y	150.0	RW
P05.14	Forward Torque Limit B Source 0- from P05.15 1- from AI1 2- from AI2 3- from AI3	0~3	_	Set the torque command source of auxiliary torque	anytime	Immediatel y	0	RW

	(The hardware does			command B.				
	not support)							
P05.15	Set value of forward	0~300.0	%	When the	anytime	Immediatel	150.0	RW
	torque limiter			forward		у		
	В			torque				
				limiter B				
				selects the				
				digital given				
				source, set				
				the required				
				torque				
				percentage				
				through				
				P05.15.				
P05.16	Reverse torque	0~3	-	Select the	anytime	Immediatel	0	RW
	limiting source			source of the		У		
	0- Reverse Limit A			reverse				
	1- Reverse limit B			torque				
	2- A/B switching			limiter.				
	3- A and B are							
	simultaneously							
	limit							
P05.17	Source of reverse	0~3	-	Set the	anytime	Immediatel	0	RW
	torque limit A			torque		У		
	0- from P05.18			command				
	1- from AI1			source of the				
	2- from AI2			reverse				
	3- from AI3			torque				
	(The hardware does			limiter A.				
	not support)							
P05.18	Set value of reverse	0~300.0	%	When the	anytime	Immediatel	150.0	RW
	torque limiter			reverse		У		
	А			torque limit				
				A selects the				
				digital given				
				source, set				
				the required				
				torque				
				percentage				
				through				
				P05.18.				
P05.19	Reverse Torque	0~3	-	Set the	anytime	Immediatel	0	RW
	Limit B Source			torque		у		

	0.0 00000							
	0- from P05.20			command				
	1- from AI1			source of the				
	2- from AI2			reverse				
	3- from AI3			torque				
	(The hardware does			command B.				
	not support)							
P05.20	Set value of reverse	0~300.0	%	When the	anytime	Immediatel	150.0	RW
	torque limiter			reverse		У		
	В			torque				
				limiter B				
				selects the				
				digital given				
				source, set				
				the required				
				torque				
				percentage				
				through				
				P05.20.				

# Related input function bits.

Function bits	Bit description
INFn.05	Forward torque limit source A/B switching, positive limit B is used when valid
INFn.06	Reverse torque limit source A/B switch, when valid, use reverse limit B

# 5.4.3 speed limit

When there is no load, given a large torque, the motor speed will increase all the time, so it is necessary to limit the speed. The source of speed limit is the same as the speed limit in speed mode. The relevant parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P04.06	source of positive speed limiting 0- main positive speed limiter A 1- auxiliary reverse speed limiter B 2- A/B switch 3-both A and B are limiter	0~3	-	Set the source of forward speed command limiter.	anytime	Immediatel y	0	RW
P04.07	Source of main positive speed limiter A 0- from P04.08 1- fromAI1 2- fromAI2 3- fromAI3 (The hardware does not support)	0~3	-	Select the source of the positive speed limiter A.	anytime	Immediatel y	0	RW
P04.08	Digital value of positive speed limiter A	0~32767	rpm	When the forward speed limit A selects the digital given	anytime	Immediatel y	3000	RW

				source, set				
				the required				
				speed limit				
				value				
				through				
				P04.08.				
P04.09	Source of auxiliary	0~3	-	Select the	anytime	Immediatel	0	RW
	reverse speed limiter			source of		у		
	B0- fromP04.10			positive				
	1- fromAI1			speed limiter				
	2- fromAI2			В.				
	3- fromAI3							
	(The hardware does							
	not support)							
P04.10	Digital value of	0~32767	rpm	When	anytime	Immediatel	3000	RW
	positive speed		-	forward		у		
	limiter B			speed limit B				
				selects				
				digital given				
				source, set				
				the required				
				speed limit				
				value				
				through				
				P04.10.				
P04.11	source of negative	0~3	-	Set the	anytime	Immediatel	0	RW
	speed limiting			source of the		у		
	0- main negative			reverse				
	speed limiter A			speed				
	1- auxiliary negative			command				
	speed limiter B			limiter.				
	2- A/B switch							
	3- both A and B are							
	limiter							
P04.12	Source of main	0~3	-	Select the	anytime	Immediatel	0	RW
	negative speed			source of the	2	y		
	limiter A			reverse		2		
	0- fromP04.13			speed limiter				
	1- fromAI1			A.				
	2- fromAI2							
	3- fromAI3							
	(The hardware does							
	not support)							

P04.13	Digital value of	0~32767	rpm	When the	anytime	Immediatel	3000	RW
	main negative speed			reverse		У		
	limiter A			speed limit A				
				selects the				
				digital given				
				source, set				
				the required				
				speed limit				
				value				
				through				
				P04.13.				
P04.14	Source of auxiliary	0~3	-	Selects the	anytime	Immediatel	0	RW
	negative speed			source of		У		
	limiter B			reverse				
	0- fromP04.15			speed limiter				
	1- fromAI1			В.				
	2- fromAI2							
	3- fromAI3							
	(The hardware does							
	not support)							
P04.15	Digital value of	0~32767	rpm	When the	anytime	Immediatel	3000	RW
	auxiliary negative			reverse		у		
	speed limiter B			speed limit B				
				selects the				
				digital given				
				source, set				
				the required				
				speed limit				
				value				
				through				
				P0415.				
P05.25	Time threshold for	0~32767	0.25	When the	anytime	Immediatel	10	RW
	switching torque		ms	amplitude of		у		
	mode to velocity			the speed				
	mode			exceeds the				
				speed limit				
				value plus				
				the speed				
				limit speed				
				threshold				
				(P05.26),				
				and the				
				continuous				

				torque mode				
				is switched				
				to the speed				
				mode time				
				threshold				
				(P05.25), a				
				speed loop is				
				constructed				
				to make the				
				speed				
				converge to				
				the limit				
				Inside.				
P05.26	Speed threshold for	0~32767	rpm	When the	anytime	Immediatel	30	RW
	speed torque mode		-	amplitude of		У		
	switching			the speed				
				exceeds the				
				speed limit				
				value plus				
				the speed				
				limit speed				
				threshold				
				(P05.26),				
				and the				
				continuous				
				torque mode				
				is switched				
				to the speed				
				mode time				
				threshold				
				(P05.25), a				
				speed loop is				
				constructed				
				to make the				
				speed				
				converge to				
				the limit				
				Inside.				
P05.27	Time threshold for	0~32767	0.25	When the	anytime	Immediatel	200	RW
	speed mode to		ms	servo runs in		У		
	torque mode switch			the torque				
	-			mode, but				
				due to the				

				speed limit,				
				after the				
				speed loop is				
				constructed,				
				the time				
				threshold for				
				switching				
				from the				
				speed mode				
				to the torque				
				mode is				
				determined				
				by P05.27				
P05.28	Speed limit	0~32767	ms	When the	anytime	Immediatel	500	RW
	low-pass filter time			speed limit is		у		
	parameter (unit: ms)			changed,				
				low-pass				
				filtering is				
				performed				
				on the speed				
				limit value,				
				and the filter				
				time is				
				determined				
				by P05.28.				
				The larger				
				the filter				
				time, the				
				slower the				
				speed limit				
				value				
				changes.				

# 5.4.4 Torque reaches output

The torque arrival function is used to judge whether the actual torque reaches the set interval. When the actual torque reaches the torque threshold, the drive can output the corresponding DO signal (OUTFn.29: torque reached



Actual torque: A; Base value for torque arrival P05.31: B; Valid value for torque arrival P05.32: C; Invalid value for torque arrival P05.33: D;

where C and D are the biases based on B.

Therefore, when the torque arrival DO signal (OUTFn.29) changes from invalid to valid, the actual torque must satisfy:)

 $|A| \ge B+C$ 

Otherwise, the torque arrival DO signal remains inactive.

Conversely, when the torque arrival DO signal changes from valid to invalid, the actual torque must meet:

$$|A| < B+D$$

Otherwise, the torque arrival DO signal remains valid.

Parameter No.	Pa De	arameter escription	1	Set range	units	Function	Set method	Effective way	Defa ults	read and write method
P05.31	Base	value	for	0~300.0	%	Set the	anytime	Immediate	50.0	RW
	torque	arrival				torque		ly		
						arrival				
						command				
						reference				
						value				
						(100%				
						corresponds				
						to one time				

Related parameters are as follows.

				of rated				
				torque)				
P05.32	Valid value for	0~300.0	%	The set	anytime	Immediate	10.0	RW
	torque arrival			torque		ly		
				reaches the				
				effective				
				offset				
				threshold				
				(100%				
				corresponds				
				to 1 time				
				rated torque)				
P05.33	Invalid value for	0~300.0	%	(The set	anytime	Immediate	0.0	RW
	torque arrival			torque		ly		
				reaches the				
				invalid offset				
				threshold				
				(100%				
				corresponds				
				to one time				
				rated				
				torque))				

#### Related output function bits

Function bits	Bit description
OUTFn.29	Torque arrives; when it is valid, the absolute value of torque reaches the set value; when it is
	invalid, the absolute value of torque is less than the set value.

Note: When the torque arrival signal is valid or invalid, the actual torque setting value requirements are different, please refer to the above of this section for details.

# 5.4.5 Small torque jitter suppression

When the given torque is small, the motor will vibrate due to the uneven distribution of the magnetic poles of the motor. It can be set to make the motor output a certain reverse torque to overcome the motor jitter, so that the motor speed output is uniform. Related parameters are as follows:

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P05.35	Maximum output	0~10.0	%	Limit the	anytime	Immediate	0	RW
	limit of torque that			output of the		ly		
	suppresses jitter			anti-shake				
				torque				
P05.36	Percentage of gain	0~300.0	%	The speed of	anytime	Immediate	100.0	RW
	that suppresses jitter			restraining		ly		
				the jitter				
P05.37	time constant for	0-32767	ms	Jitter whose	anytime	Immediate	500	RW
	detect Jitter speed			period is less		ly		
				than this				
				time will be				
				suppressed				
P05.38	detected Jitter speed	-	ms	Displays the	anytime	Immediate	-	RO
				detected				
				shaking				
				speed				
P05.39	Torque output that	-	ms	Displays the	anytime	Immediate	-	RO
	suppresses jitter			output		ly		
				reverse				
				torque that				
				suppresses				
				chattering				

# 5.4.6 Internal block diagram of torque mode



#### 5.4.7 Typical wiring diagram of torque mode



### 5.4.7.1 NPN jumper for DI/DO

MCCB: air switch 1MC: AC contactor

1. Indicates twisted pair shielded wire.





MCCB: air switch 1MC: AC contactor

1. Indicates twisted pair shielded wire.

# Chapter 6 Inputs and Outputs Function

# 6.1 Entity DI/DO function

The servo has 4 physical DIs, which are DI1~DI10. Each entity DI can be assigned an input function bit INFn.xx. The effective level of each entity DI can be set separately (P06.21-P06.24). Each entity DI can be forced to enter a specific level via P06.14, or a DI input can be forced via the Modbus bit.

The internal logic of servo DI is shown in the figure below.



(Remarks: SW-DI: CN3 pin 10 is short-circuited with +24V for NPN mode; short-circuited with COM is PNP mode.)

The servo has three physical DOs, DO1~DO3. Each DO can be assigned an output function bit OUTFn.xx. The effective level of each entity DO can be set individually, or a DO bit can be output through the forced register of P06.50.



(VC330 servo DO can select NPN or PNP by wiring, for example, if the relay is connected to both ends of 1, it is NPN, and if it is connected to both ends of 2, it is PNP.)

Among them, DI1<sup>DI2</sup> is hardware low-speed DI, DI3 and DI4 are hardware high-speed DI, as detailed below:

Hardware low-speed DI description(DI1~D2)										
DI function valid logical state	remark									
Low level	High More than 3ms									
	Low Effective									
High level	High									
	Low More than 3ms									
Rising edge	Effective High									
	LowMore than 3ms									
Falling edge	High More than 3ms									
	Low Effective									
Rising and falling edges	High Effective Effective									
	LowMore than 3ms									
Hard	ware high-speed DI description (DI3, DI4)									
DI 功能有效逻辑状态	remark									
Low level	High More than 0.25ms									
	Low Effective									
High level	Low Effective High									
High level	Low Effective High Low More than 0.25ms									
High level	Low Effective High Low More than 0.25ms Effective High									
High level Rising edge	Low Effective High Low More than 0.25ms Effective High Low More than 0.25ms									
High level Rising edge Falling edge	Low Effective High Low More than 0.25ms Effective High Low More than 0.25ms High More than 0.25ms									
High level Rising edge Falling edge	Low Effective High Low More than 0.25ms Effective High Low More than 0.25ms High More than 0.25ms High Low Effective									
High level Rising edge Falling edge Rising and falling edges	Low Effective High Low More than 0.25ms Effective High Low More than 0.25ms High Low Effective High Low Effective High Low Effective High Low Effective									

DO1 and DO2 are set to output the A, B, Z signals of the motor encoder through P06.40. Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P06.01	DI1 function control register	0~99	-	Set the DI function correspondin g to the hardware DI1 terminal. For specific functions,	anytime	Immediatel y	1	RW
				see the DI function table.				
P06.02	DI2 function control register	0~99	-	-	anytime	Immediatel y	42	RW
P06.03	DI3 function control register	0~99	-	-	anytime	Immediatel y	0	RW
P06.04	DI4 function control register	0~99	-	-	anytime	Immediatel y	0	RW
P06.13	DI terminal valid state			Displayed in decimal format, after conversion to binary format, it contains 0-9 digits, the low-order to high-order indicates the status of digital output terminals DI1~DI10, 0=OFF, 1=ON, the 0th bit corresponds to DI1,,	anytime			RO

				the first Bit 9				
				corresponds				
				to DI10. See				
				"4.6 Variable				
				Monitoring"				
				for details of				
				parameter				
				valid state				
				display.				
P06.14	DI forced input	0~1023	-	When the DI	anytime	Immediatel	0	RW
				forced input		у		
				is valid, set				
				the level				
				logic of the				
				DI function				
				through this				
				parameter.				
				Input in				
				decimal				
				(BCD)				
				format and				
				convert it				
				into hinary				
				(Binary) to				
				be the				
				correspondin				
				o DIx input				
				signal For				
				example.				
				P06 14=42(B				
				CD = 000010				
				1010(Binary				
				) it means				
				DI2 DI4 and				
				Dio terminale and				
				ON				
D06.15	DI tominal			UN.				DO
P00.15	level	-	-	Displayed in	anytime	-	-	KU
	level			decimal				
				format and				
				converted to				
				binary				
				format, it				

				contains 0-9				
				digits, and				
				the				
				low-order to				
				high-order				
				indicates the				
				status of				
				digital output				
				terminals				
				DI1~DI10.				
				See "4.6				
				Variable				
				Monitoring"				
				for details of				
				parameter				
				valid state				
				display.				
P06.16	High-speed DI filter	1~32767	us	When the	anytime	Immediatel	10	RW
	configuration			high-speed		у		
	U			pulse input		-		
				terminal is in				
				the peak				
				interference,				
				you can filter				
				out the peak				
				interference				
				by setting				
				P06.16.				
				INFn.34 and				
				INFn.40 are				
				high-speed				
				DI signals,				
				and their				
				filtering time				
				is				
				determined				
				bv P06.16;				
				other input				
				signals are				
				low-speed				
				DI signals.				
				and their				
				filtering time				
1	1	1	i i	0	1	1	1	1

				is				
				determined				
				by P06.17.				
P06.17	Low-speed DI filter	1~32767	us	When there	anytime	Immediatel	1000	RW
	configuration			is spike		У		
				interference				
				at the				
				low-speed				
				pulse input				
				terminal, the				
				spike				
				interference				
				can be				
				suppressed				
				by setting				
				P06.17 to				
				prevent the				
				interference				
				signal from				
				entering the				
				servo drive.				
P06.21	DI1 active level	0~1	-	Set the level	anytime	Immediatel	0	RW
	0-active low			logic of the		y		
	1-active high			hardware		-		
	6			DI1 terminal				
				when the DI				
				function				
				selected by				
				DI1 is valid				
P06 22	DI2 active level	0~1	_	-	anytime	Immediatel	0	RW
1 00.22	0-active low	0.1			unythine	W	U	IX W
	1-active high					y		
D06 22	DI2 active level	0.1			onutime	Immediatel	0	DW
P00.25	O octivo low	0~1	-	-	anythine	mineulater	0	κ.w
	1 active low					У		
D0( 24	1-active nign	0 1				T 1 . 1	0	DW
P06.24	DI4 active level	0~1	-	-	anytime	Immediatel	0	KW
	U-active low					У		
	1-active high	0.5				<b>.</b>		
P06.40	DO1 and DO2	0~2	-	Set the	anytime	Immediatel	0	RW
	function			output		У		
	configuration			function of				
	registers			output				
	0- DO1, DO2			terminals				

	function output			DO1 and				
	configured with			DO2.				
	P06.41P06.42							
	Respectively							
	1- DO1, DO2 output							
	A, B pulse							
	respectively							
	2- DO1 outputs Z							
	point signal. DO2							
	functions output							
	with P06.42							
	configuration							
P06 41	DO1 function	0~99	-	Set the DO	anvtime	Immediatel	9	RW
100.11	control register	0		function		v	,	it
	control register			correspondin		y		
				g to the				
				hardware				
				terminal For				
				specific				
				functions				
				nlassa rafar				
				to the DO				
				for the DO				
				Tunction				
<b>D</b> O( 42		0.00		table.		T 1 / 1	12	DIV
P06.42	DO2 function	0~99	-	-	anytime	Immediatel	13	RW
<b>D</b> 0 ( 40	control register	0.00				У		DUV
P06.43	DO3 function	0~99	-	-	anytime	Immediatel	0	RW
	control register					У		
P06.49	DO terminal valid	-	-	Displayed in	anytime	-	-	RO
	state			decimal				
				format, after				
				conversion				
				to binary				
				format, it				
				contains 0-5				
				digits, the				
				low digits to				
				high digits				
				indicate the				
				status of				
				digital output				

				terminals				
				DO1~DO6				
				in turn,				
				0=OFF,				
				1=ON, the				
				0th bit				
				corresponds				
				to DO1,,				
				the first Bit 5				
				corresponds				
				to DO6. See				
				"4.6 Variable				
				Monitoring"				
				for details of				
				parameter				
				valid state				
				display.				
P06.50	DO force output	0~63	-	When the	anytime	Immediatel	0	RW
	-			DO forced		у		
				output is				
				valid, this				
				parameter is				
				used to set				
				whether the				
				DO function				
				is valid.				
				Input in				
				decimal				
				(BCD)				
				format and				
				convert it				
				into binary				
				(Binary) to				
				be the				
				correspondin				
				g DOx input				
				signal. For				
				example:				
				P06.50=42(B				
				CD)=101010				
				(Binary), it				
				means DO2,				
				DO4 and				
		1 C						

				DO6 output				
				ON.				
P06.51	DO1 active level	0~1	-	Set the	anytime	Immediatel	0	RW
	0-active low			output level		у		
	1- active high			logic of the				
				hardware				
				DO1				
				terminal				
				when the DO				
				function				
				selected by				
				DO1 is valid.				
P06.52	DO2 active level	0~1	-	-	anytime	Immediatel	0	RW
	0-active low					у		
	1- active high							
P06.53	DO3 active level	0~1	-	-	anytime	Immediatel	0	RW
	0-active low					У		
	1- active high							

DI specific function INFn.xx configuration is shown in the following table, and its effective status can be monitored through P06.13.

DI function	DI function	effective rules
0	none	-
1	Enable	Valid when the valid state is high
2	reset the drive	Effective state changes from low to high
3	Torque AB selector switch	Valid when the valid state is high
4	Torque reverse switch	Valid when the valid state is high
5	Forward torque limit selection	Valid when the valid state is high
6	Reverse torque limit selection	Valid when the valid state is high
7	Positive speed limit selection	Valid when the valid state is high
8	Reverse speed limit selection	Valid when the valid state is high
9	forward jog	Valid when the valid state is high
10	reverse jog	Valid when the valid state is high
11	Reverse speed reference	Valid when the valid state is high
12	Main speed AB selection	Valid when the valid state is high
13	speed stop input	Valid when the valid state is high
14	Download ARM Program Reset	Effective state changes from low to high
15	Clear the encoder position counter	Effective state changes from low to high
16	Zero position fixed in speed mode	Valid when the valid state is high
17	Multi-speed speed selection switch 0	Valid when the valid state is high

18	Multi-speed speed selection switch 1	Valid when the valid state is high		
19	Multi-speed speed selection switch 2	Valid when the valid state is high		
20	Multi-speed speed selection switch 3	Valid when the valid state is high		
21	Position command prohibition	Valid when the valid state is high		
22	Position command reverse	Valid when the valid state is high		
23	Prohibition of pulse command	Valid when the valid state is high		
24	Electronic gear ratio selector switch 1	Valid when the valid state is high		
25	Position error clear	Depends on P03.21		
26	Position mode origin return command	Effective state changes from low to high		
		The rising edge of the valid state triggers the		
27	Multi-segment position trigger signal	start of the multi-segment position,		
27	Wald-segment position trigger signal	Falling edge of valid state triggers stop		
		multi-segment position		
28	Multi-stage position position selector switch 0	Valid when the valid state is high		
29	Multi-stage position position selector switch 1	Valid when the valid state is high		
30	Multi-stage position position selector switch 2	Valid when the valid state is high		
31	Multi-stage position position selector switch 3	Valid when the valid state is high		
32	Position direction in multi-segment position mode	Valid when the valid state is high		
34	Return to the origin signal input	Depends on homing mode		
	XY pulse tracking and multi-segment position	Valid when the valid state is high		
35	switching in position mode			
36	Control mode toggle switch 0	Valid when the valid state is high		
37	Control mode toggle switch 1	Valid when the valid state is high		
	Enable detection trigger interrupt fixed length signal	Valid when the valid state is high		
38	INFn.40			
39	cancel the fixed length	Valid when the valid state is high		
40	Trigger interrupts fixed-length input signal	Effective state changes from low to high		
	The first set of the second set of gain selector	Valid when the valid state is high		
41	switches			
42	reset fault	Valid when the valid state is high		
43	Position Mode Positive Limit Switch	Valid when the valid state is high		
44	Position Mode Reverse Limit Switch	Valid when the valid state is high		
	Open and closed loop switching in full closed loop	Valid when the valid state is high		
45	mode			
46	FPGA download program reset	Effective state changes from low to high		
47	Tension compensation direction	Valid when the valid state is high		
48	Tension Tracking Direction	Valid when the valid state is high		
49	Forced to limit at maximum compensation speed	Valid when the valid state is high		
50	Prohibit roll diameter calculation	Valid when the valid state is high		
51	Change roll	Valid when the valid state is high		
52	Initial roll diameter switch	Valid when the valid state is high		
53	Clear feed length	Valid when the valid state is high		

54	Force fast tightening	Valid when the valid state is high
	Tension compensation is prohibited in closed-loop	Valid when the valid state is high
55	speed mode	
56	Electronic gear ratio selector switch 2	Valid when the valid state is high
57	Motor overheating	Valid when the valid state is high
58	Emergency stop input	Valid when the valid state is high
59	Internal flip-flop reset	Effective state changes from low to high
60	Internal trigger set	Effective state changes from low to high
61	Internal counter counts pulses	Effective state changes from low to high
62	Internal counter cleared	Valid when the valid state is high
63	Speed mode UPDOWN mode UP signal	Valid when the valid state is high
64	Speed mode UPDOWN mode DOWN signal	Valid when the valid state is high
65	Speed mode UPDOWN mode hold signal	Valid when the valid state is high
	Back to the previous phase (Tension Type: Velocity	Valid when the valid state is high
66	Superposition Enabled)	
67	Correct the zero drift of all AI	Valid when the valid state is high to low
	Go to the specified phase (tension type: closed-loop	Valid when the valid state is high
68	speed/torque mode switching)	
	Positive jog fixed position (tension type: motor	Effective state changes from low to high
69	rotation direction in closed-loop speed mode)	
	Reverse jog fixed position (tension type: motor	Effective state changes from low to high
70	rotation direction in closed-loop torque mode)	
71	Rewinding and unwinding control	Valid when the valid state is high
72	Trigger correction current sensor	Effective state changes from low to high
73	Trigger learning phase	Effective state changes from low to high
74	Trigger back to absolute zero	Effective state changes from low to high
75	Activate STO	Valid when the valid state is high

The specific functions of DO OUTFn.xx are shown in the following table.

DO function	
number	DO function
0	none
1	Drive is enabled
2	Speed arrives
3	slowing down
4	speeding up
5	zero speed
6	overspeed
7	forward rotation
8	Reverse rotation
9	fault output
10	In the forward speed limit in the torque mode
11	Negative speed limit in torque mode
----	---
12	Speed limit in torque mode
13	Positioning completion output
14	Positioning close to the output
15	return home completed output
16	Position error too large output
17	Interrupt fixed length output
18	Software limit output
19	feeding output
20	feed output
21	Roll diameter calculation is valid
22	The roll diameter reaches the output
23	length arrives at output
24	Holding brake output
25	Input command is valid
26	Often OFF
27	Always ON
28	Torque limit output
29	Torque arrival
30	Internal trigger state
31	Internal counter count arrives
32	Consistent speed
33	Pulse position command is zero output
34	Roll diameter reaches 2 outputs
35	Speed command is 0 output
	The speed command is zero and the speed feedback is 0
36	output
37	Servo ready for output

### 6.2 Virtual DI/DO function

The servo drive has 16 general virtual DIs (VDIs), and each virtual DI has two types of level, including writing 1 is always valid and rising edge valid. The function of each virtual DI (P12.01 to P12.16) can be configured individually. Simulate the level of VDI by writing a value to the virtual DI input register (P12.20).

The servo driver has 16 general-purpose virtual DOs (VDOs), and each virtual DO has two level types, one is to output 1 when it is valid, and the other is to output 0 when it is valid. The function of each virtual DO (P12.41-P12.56) can be configured individually. The output level of DO can be displayed in P12.60.

The servo drive also has 2 sets of dedicated input and output: VDI20 and VDO20,

### VDI21 and VDO21. The two VDI/VDOs are directly connected internally. Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P12.01	VDI1 function configuration register	0~99	-	Set the DI function correspondin g to VDI1 (virtual input terminal 1). The specific functions of the VDI port are the same as those of the physical	anytime	Immediate	0	RW
P12.02	VDI2 function configuration register	0~99	-	– DI port.	anytime	Immediate ly	0	RW
P12.03	VDI3 function configuration register	0~99	-	-	anytime	Immediate ly	0	RW
P12.04	VDI4 function configuration register	0~99	-	-	anytime	Immediate ly	0	RW
P12.05	VDI5 function configuration register	0~99	-	-	anytime	Immediate ly	0	RW
P12.06	VDI6 function configuration register	0~99	-	-	anytime	Immediate ly	0	RW
P12.07	VDI7 function configuration register	0~99	-	-	anytime	Immediate ly	0	RW
P12.08	VDI8 function configuration register	0~99	-	-	anytime	Immediate ly	0	RW
P12.09	VDI9 function configuration	0~99	-	-	anytime	Immediate ly	0	RW

	1	0	r					
	register							
P12.10	VDI10 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.11	VDI1 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.12	VDI12 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.13	VDI13 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.14	VDI14 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.15	VDI15 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.16	VDI16 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.17	VDI20 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.18	VDI21 function	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.19	Monitoring values	-	-	Read the	-	-	-	RO
	of virtual DI20 and			virtual value				
	virtual DI2			of VDI20				
				and VDI21				
				terminals.				
P12.20	Virtual DI1-Virtual	0~65535	-	Set the input	anytime	Immediate	0	RW
	DI16 input value			value of		ly		
	setting register			VDI1-16.				
P12.21	VDI1 level type	0~1	-	The setting	anytime	Immediate	0	RW
	0-Write 1 is always			makes the DI		ly		
	valid			function				
	1- rising edge is			selected by				
	valid			VDI1 valid,				
				and the input				

			[					
				level logic of				
				the VDII				
				terminal.				
P12.22	VDI2 level type	0~1	-	-	anytime	Immediate	0	RW
	0-Write 1 is always					ly		
	valid							
	1- rising edge is							
	valid							
P12.23	VDI3 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.24	VDI4 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.25	VDI5 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.26	VDI6 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.27	VDI7 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.28	VDI8 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.29	VDI9 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.30	VDI10 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.31	VDI11 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		

	valid							
	1- Rising edge valid							
P12.32	VDI12 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.33	VDI13 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.34	VDI14 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.35	level type	0~1	-	-	anytime	Immediate	0	RW
1	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.36	VDI16 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.37	VDI20 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.38	VDI21 level type	0~1	-	-	anytime	Immediate	0	RW
	0- Write 1 is always					ly		
	valid							
	1- Rising edge valid							
P12.41	VDO1 configuration	0~99	-	Set the DO	anytime	Immediate	0	RW
	register			function		ly		
				correspondin				
				g to VDO1.				
				The specific				
				functions of				
				VDO are the				
				same as the				
				functions of				
				entity DO.				
P12.42	VDO2 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		

P12.43	VDO3 configuration	0~99	-	-	anytime	Immediate	0	RW
<b>D10.44</b>	register	0.00				ly		DUV
P12.44	VDO4 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		
P12.45	VDO5 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		
P12.46	VDO6 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		
P12.47	VDO7 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		
P12.48	VDO8 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		
P12.49	VDO9 configuration	0~99	-	-	anytime	Immediate	0	RW
	register					ly		
P12.50	VDO10	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.51	VDO11	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.52	VDO12	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.53	VDO13	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.54	VDO14	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register							
P12.55	VDO15	0~99	-	-	anytime	Immediate	0	RW
	configuration					ly		
	register					5		
P12.56	VDO16	0~99	-	_	anvtime	Immediate	0	RW
112.00	configuration	0 7 7				lv	0	
	register					5		
P12 57	VDO20	0~99	_	_	anytime	Immediate	0	RW
1 12.37	configuration	U ))			anytime	lv	v	12.17
	register					19		
P12 58	VDO21	0~00		_	anytime	Immediate	0	RW/
1 12.30	configuration	U~22		-	anytille	lw	U	
	register					iy		
D12 50	Output law-1 - C			Dood 41				DO
r12.39	Output level of	-	-	Read the	-	-	-	ĸŪ

	virtual			virtual level				
	DO20 D021			of the				
				VDO20 and				
				VDO21				
				terminals.				
P12.60	Virtual DO1-DO16	-	-	Read the	-	-	-	RO
	output level			virtual level				
				of the VDO1				
				- VDO16				
				terminals.				
P12.61	Active level of	0~1	-	When the	anytime	Immediate	0	RW
	virtual			DO function		ly		
	DO1			selected by				
	0-Output 1 when			VDO1 is				
	valid			valid, the				
	1-Output 0 when			output level				
	valid			logic of the				
				VDO1				
				terminal is				
				set.				
P12.62	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO2							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.63	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO3							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.64	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO4							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.65	Active level of	0~1	_	-	anytime	Immediate	0	RW
	virtual					ly		

						-		
	DO5 0-Output 1 when valid 1-Output 0 when valid							
P12.66	Active level of virtual DO6 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anytime	Immediate ly	0	RW
P12.67	Active level of virtual DO7 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anytime	Immediate ly	0	RW
P12.68	Active level of virtual DO8 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anytime	Immediate ly	0	
P12.69	Active level of virtual DO9 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anytime	Immediate ly	0	RW
P12.70	Active level of virtual DO10 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anytime	Immediate ly	0	RW
P12.71	Active level of virtual DO11	0~1	-	-	anytime	Immediate ly	0	RW

<b></b>								
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.72	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO12							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.73	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO13							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.74	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO14							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.75	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO15							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.76	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO16							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.77	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual				_	ly		
	DO20							
	0-Output 1 when							
1	1		1	1	1	1	1	1

-								
	valid							
	1-Output 0 when							
	valid							
P12.78	Active level of	0~1	-	-	anytime	Immediate	0	RW
	virtual					ly		
	DO21							
	0-Output 1 when							
	valid							
	1-Output 0 when							
	valid							
P12.79	Whether the virtual	0~1	-	Set whether	anytime	Immediate	1	RW
	DI1-DI16 input			the		ly		
	value register			VDI1-VDI1				
	P12.20 is cleared			6 input value				
	when powered on			register				
	0 - no zero			P12.20 is				
	1- clear			cleared after				
				power-on.				

# 6.3 Analog input AI function

#### 6.3.1 Analog input AI

VC330 servo driver has 2 AI terminals, the input range of AI1-AI2 is  $\pm 10V$  input. Analog input circuit:



Operation method and steps:

Take AI1 as an example to explain the analog voltage setting speed command method.



Noun explanation:

Zero drift: refers to the value of the servo drive sampled voltage value relative to GND when the analog channel input voltage is zero.

Offset: Refers to the input voltage value of the analog channel when the sampling voltage is zero after zero drift correction.

Dead zone: refers to the input voltage range of the analog channel when the sampling voltage is zero.

The unprocessed analog channel output voltage is shown in Figure y1. After being processed internally by the servo driver, the speed command y6 is finally obtained.





Servo driver AI processing corresponding sampling voltage example

#### • Filtering:

The servo driver provides analog channel filtering. By setting the filter time constants P06.67, P06.72, and P06.77, it can prevent the motor command fluctuation caused by the unstable analog input voltage, and can also reduce the motor fault caused by the interference signal. The filtering function has no elimination or suppression of zero drift and dead zone.

• Zero drift correction

When the actual input voltage is corrected to 0V, the voltage P06.61 collected by the analog channel AI1 deviates from the value of 0V.

In the figure, the output voltage of the analog channel without the internal processing of the driver is shown as y1. Taking the filtering time constant P06.67= 0.00ms as an example, the sampling voltage y2 after filtering is consistent with y1.

It can be seen that when the actual input voltage x=0, the collected voltage P06.61=y1=400mV, this 400mV is called zero drift.

After zero drift correction, the sampling voltage is shown as y3. y3=y1-400.0

• Offset Correction:

When the sampling voltage is set to 0, the corresponding actual input voltage value.

As shown in the figure, when the preset sampling voltage y4=0, the corresponding actual input voltage x=4000mV, this 4000mV is called offset. Set P06.64=4000.

• Dead zone settings:

Limits the valid input voltage range when the sampling voltage of the driver is not 0.

After the offset setting is completed, when the input voltage x is within 3200mV and 4800mV, the sampling voltage value is 0, and this 800mV is called the dead zone. Set P06.65=800.0, after setting the dead zone, the sampling voltage is shown as y5.

$$y_5 = \begin{cases} 0,3200 \le x \le 4800\\ y_4,4800 \le x \le 10000 \text{ or } -10000 \le x \le 3200 \end{cases}$$

• Calculate the percentage of analog commands

After the zero drift, offset and dead zone settings are completed, divide by 10000mV, and then multiply by the magnification percentage to obtain the final analog command percentage.

$$y_6 = \frac{y_5}{10000} \times (P06.66)\%$$

• Calculate speed command y6 or torque command

For example, when there is no offset, it is shown on the left of the following figure, and with an offset, it is shown on the right of the following figure. After completing the correct settings, you can view the AI1 sampling voltage value and the speed command value corresponding to the analog input in real time through the oscilloscope channel.



The relationship between the final speed command value percentage y6 and the input voltage x:

$$y6 = \begin{cases} 0, B - C \le X \le B + C \\ \frac{(x - B)}{10000} \times (P06.66 \text{ or } P06.67 \text{ or } P06.77)\%, B + C \le X \le 10000, or -10000 \le x \le B - C \end{cases}$$

Among them: B: bias; C: dead zone.

<u>To sum up, assuming that the AI1 filter time constant is 0, the AI1 analog command</u> <u>calculation process is as follows:</u>

(1) Eliminate zero drift and offset

b1 = (AI1 input voltage value P06.61) - (AI1 zero drift P06.68) - (AI1 bias P06.64)

(2) join dead zone

 $b2 = \begin{cases} 0, & |b1| < \text{dead zone P06.65} \\ b1, & |b1| > \text{dead zone P06.65} \end{cases}$ 

(3) Calculate the percentage of analog instructions

AI1 analog command percentage P06.91

$$=\frac{b2}{10000}\times(AI1 \text{ magnification P06.66})\%$$

(4) Calculate the speed command or torque command

(5)

 $\label{eq:speed_command} Speed \ command \ (rpm) = AI1 \ analog \ command \ percentage P06.91 \times Rated \ speed \ P00.02 \\ Torque \ command \ \% = AI1 \ analog \ command \ percentage \ P06.91 \\ \end{cases}$ 

The AI correction method is as follows: write 1 to P06.79 to trigger AI1 zero drift correction; write 2 to P06.79 to trigger AI2 zero drift correction; write 4 to P06.79 to trigger AI1 and AI2 zero drift correction. Or trigger INFn67 through DI, and perform zero drift correction on AI1 and AI2 at the same time.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P06.61	AI1 input voltage	-	mV	Display AI1	-	-	-	RO
				input voltage				
P06.62	AI2 input voltage	-	mV		-	-	-	RO
P06.64	AI1 bias	-10000~10	mV	Set the actual	anytime	Immediately	0	RW
		000		input voltage				
				of AI1 when				
				the driver				
				sampling				
				voltage value				
				after zero				
				drift				
				correction is				
				0.				
P06.65	AI1 dead zone	0~5000	mV	Set the AI1	anytime	Immediately	0	RW
				input voltage				
				range when				
				the sampling				
				voltage value				
				of the driver				
				is 0.				
P06.66	AI1 magnification	0~1000.0	%	Set the AI1	anytime	Immediately	100.0	RW
				magnification				

AI related parameters are as follows.

P06.67	AI1 low pass filter	0~32767	ms	Set the filter	anytime	Immediately	2	RW
	time constant			time constant				
				of the				
				software for				
				AI1 input				
				voltage				
				signal.				
P06.68	AI1 zero drift	-32767~32	mV	Zero drift:	anytime	Immediately	0	RW
		767		When the				
				input voltage				
				of the analog				
				channel is 0,				
				the sampling				
				voltage value				
				of the servo				
				driver is				
				relative to the				
				value of				
				GND.				
P06.69	AI2 bias	-10000~10	mV	-	anytime	Immediately	0	RW
		000						
P06.70	AI2 dead zone	0~5000	mV	-	anytime	Immediately	0	RW
P06.71	AI2 magnification	0~1000.0	%	-	anytime	Immediately	100.0	RW
P06.72	AI2 low pass filter	0~32767	ms	-	anytime	Immediately	2	RW
	time constant							
P06.73	AI2 zero drift	-10000~10	mV	-	anytime	Immediately	0	RW
		000						
P06.79	Automatic zero	0-7		-	anytime	Immediately	0	RW
	drift correction							
	Write 1 trigger to							
	correct AI1 zero							
	drift;							
	Write 2 trigger							
	correction AI2							
	zero drift;							
	Write 3 trigger							
	correction AI3							
	zero drift;							
	Write 4 trigger							
	correction AI1-AI3							
	zero drift;							
	White 5 this gan							

	correction current							
	sensor;							
	Write 6 to clear							
	the current							
	sensor zero drift							
	value;							
P06.91	AI1 analog command	-3276.7~3	%	display	-	-	-	RO
	percentage	276.7						
P06.92	AI2 analog command	-3276.7~3	%	display	-	-	-	RO
	percentage	276.7						

# Related input function bits.

Function bits	Bit description
INFn.67	Valid to invalid transition, trigger correction of AI1, AI2 zero drift

# Chapter 7 Auxiliary Functions

### 7.1 Fault protection

#### 7.1.1 Fault Downtime

The failure of the servo drive is divided into three categories.

Class I is a serious fault. Once such a fault is reported, the motor power must be cut off immediately and the motor is free to stop. The fault code range for class I is Er.100-Er.199.

Class II is a general fault. When reporting such a fault, customize can report the running action of the motor after the fault according to parameter P02.10. The fault code range for a Type II fault is Er.200-Er.599.

Class III is not a serious fault. When reporting such a fault, customize can report the running action of the motor after the fault according to parameter P02.11. The fault code range for Class III faults is Er.600-Er.999.

When the hardware/software travel limit occurs, the servo over travel fault stop mode can be set separately by P02.12.

There are five types of downtime. The first type is free stop; the second type is rapid deceleration stop, the drive is disconnected after stop, the motor is powered off; the third is slow deceleration stop, disconnected after parking is enabled, the motor is powered off; the fourth is Quickly decelerate to stop, keep enabling after parking, users need to disconnect the enable signal to disable; the fifth is slow deceleration stop, keep enabled after parking, users need to disconnect the enable signal to disable; the fifth is slow deceleration stop, keep enabled after parking, users need to disconnect the enable signal to disable. Free parking means that the drive is broken and the motor is free to stop by frictional resistance. Deceleration stop means that the servo drive drives the motor to decelerate. In this process, the motor is kept energized. The deceleration time for rapid deceleration stop is set by P02.16. The deceleration time for slow deceleration stop is set by P02.17. The deceleration time refers to the time from the rated speed to the zero speed. The actual deceleration time is determined by the speed at the time of the fault and the set deceleration time.

Actual deceleration time = set deceleration time  $\times \frac{\text{failure speed}}{\text{Rated speed}}$ 

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P02.10	Servo type 2 failure	0~5	-	Set the	anytime	Immediately	0	RW
	stop mode selection			deceleration				
	0-break enable free			method of the				
	parking			servo motor				

Related parameters are as follows.

	1-Fast deceleration			from rotation				
	and stop after the			to stop and				
	parking is enabled			the motor				
	2-Slow deceleration			state after				
	stop and enable			stop when the				
	3-Fast deceleration			servo class II				
	stop and keep enabled			fault occurs.				
	4-Slow deceleration							
	stop and keep enabled							
	5-Braking according							
	to the current set by							
	P02.18							
P02.11	Servo three types of	0~5	-	Set the	anytime	Immediately	0	RW
	failure mode selection			deceleration				
	0- break enable free			method of the				
	parking			servo motor				
	1- Fast deceleration			from rotation				
	and stop after the			to stop and				
	parking is enabled			the motor				
	2- Slow deceleration			state after the				
	stop and enable			stop when the				
	3-Fast deceleration			servo has a				
	stop and keep enabled			type III fault.				
	4-Slow deceleration							
	stop and keep enabled							
	5-Braking according							
	to the current set by							
	P02.18							
P02.12	Over travel stop mode	0~5	-	Set the	anytime	Immediately	0	RW
	selection			deceleration				
	0- break enable free			method of the				
	parking			servo motor				
	1- Fast deceleration			from rotation				
	and stop after the			to stop and				
	parking is enabled			the motor				
	2- Slow deceleration			state after				
	stop and enable			stop when				
	3- Fast deceleration			over travel				
	stop and keep enabled			occurs during				
	4- Slow deceleration			the servo				
	stop and keep enabled			motor				
	5-Braking according			running.				
	to the current set by							

	P02.18							
P02.16	Fast stop time	0~65535	ms	Set the	anytime	Immediately	500	RW
				deceleration				
				time when the				
				servo is				
				stopped				
				quickly.				
P02.17	Slow parking time	0~65535	ms	Set the	anytime	Immediately	1000	RW
				deceleration				
				time when the				
				servo slowly				
				stops.				

# 7.1.2 All faults

# Servo supports the following failures.

fault code	Fault description
Er.100	Software overcurrent, when the current percentage P09.31 detected by the software is greater
	than the value set by P10.01, a software overcurrent fault will be reported, and the fault can be
	shielded by BIT1 of P10.33.
Er.101	hardware overcurrent
Er.102	Overvoltage,
	For 220V driver, when the bus voltage P01.08 is greater than 420V, it will report overvoltage.
	For 380V driver, when the bus voltage P01.08 is greater than 750V, it will report overvoltage.
Er.103	Undervoltage, when the bus voltage P01.08 is less than the rated voltage P01.07*1.414*0.7, it
	will report undervoltage.
Er.104 or Er.004	The current sensor is faulty. When the power is turned on for the first time, before the relay is
	closed, the detected current is not 0, and this fault is reported.
Er.105 or Er.005	If the encoder fails and the encoder is not connected, the fault is reported.
Er.106 or Er.006	The EEPROM verify fault, and the fault is reported when the value written to the EEPROM
	and the value of the read EEPROM are inconsistent.
Er.107	Phase sampling fault, when the phase obtained through the HALL switch and the phase
	obtained through the encoder are too different, this fault is reported.
Er.108 or Er.008	When the FPGA and ARM communication are faulty, the fault is reported when the values
	written and read by the ARM are inconsistent.
Er.109	If the current changes greatly, the fault will be reported when the difference between the two
	sampled currents is 50%.
Er.110	Magnetic encoder failure
Er.111	Current phase sequence learning failure
Er.112	The output is out of phase.
Er.113	Did not scan to Z point during self-learning

Er.114	Z point offset not found
Er.115	Hall code value learning error
Er.116	Great change in rotational speed
Er.117	The drive is overheated, when it is detected that the drive temperature P01.10 is greater than
	the drive overheating threshold P10.06, the drive over temperature fault will be reported.
Er.118	When powered on, the wire-saving encoder does not feedback hall value
Er.119	Motor encoder type does not match
Er.120	Software is not authorized
Er.121	Phase loss at RST input
Er.122 or Er.022	Use timeout
Er.130	STO (INFn75) alarm input signal is valid
Er.131	There is speed when the provincial encoder starts
Er.132	ARM does not match FPGA
Er.133 or Er.033	The Profinet protocol chip cannot communicate with the ARM motor control chip
Er.200	When returns to home, the home signal INFn.34 is not assigned.
Er.201	INFn.xx repeated allocation, one input function bit is assigned to two or more DI
Er.202	Overspeed, when the speed percentage (actual speed/rated speed) exceeds P10.05, it will report
	overspeed.
Er.203	The position error is too large. When the position error P03.17 is greater than P03.19 and
	P03.19 is not equal to 0, the fault is reported. Note that it is easy to report this fault if the
	position is set to a large filter time.
Er.204	Unassigned interrupt fixed length trigger signal INFn.40
Er.205	No return to home before absolute point motion
Er.206	Motor overload
Er.207	Software limit, after enabling the software limit P03.73, when the encoder position value is less
	than the lower limit of the software limit or greater than the upper limit of the software limit,
	this fault will be reported.
Er.208	hardware limit
Er.209	Curve planning failed
Er.210	Excessive tension
Er.211	Breakage failure
Er.212	XY pulse type selection error in tension control mode
Er.213	Fully closed loop position error is too large
Er.214	Prohibit positive (reverse) turn
Er.216	Z point signal is unstable
Er.217	RPDO receive timeout
Er.218	Reserved
Er.219	Motor stall
Er.220	
	Braking resistor overload
Er.221	The forward stroke switch input function bit INFn.43 is not assigned to the entity DI
Er.221 Er.222	Braking resistor overload         The forward stroke switch input function bit INFn.43 is not assigned to the entity DI         The reverse stroke switch input function bit INFn.44 is not assigned to entity DI

Er.224	CAN bus state switching error, switching CiA402 state machine when the bus is in
	non-Operation state
Er.225	Unsupported CANopen control mode
Er.226	Absolute value mode lap overflow
Er.227	The battery of the absolute encoder is faulty. (After the battery is powered off, the fault will be
	reported when the power is turned on for the first time, prompting the customer that the
	encoder has been powered off. Connect the battery, and the fault will be automatically
	eliminated after reset.)
Er.228	Inertia learning failed, need to reset P07.03 and P07.04
Er.229	When learning fully closed loop parameters, the position value detected by the second encoder
	is too small
Er.230	reserve
Er.231	Bus error
Er.232	Second encoder battery failure
Er.234	continuous vibration
Er.237	car breakdown
Er.238	Linear motor phase finding failed
Er.239	Linear motor phase finding failed, stuck in forward direction
Er.240	Linear motor phase finding failed, stuck in reverse direction
Er.241	Over-travel error during self-learning
Er.242	Encoder learning error, encoder interference or wrong magnetic pole setting
Er.243	Linear motor phase finding failure (disconnection)
Er.244	Linear motor phase finding failure (large position error)
Er.245	Linear motor phase finding failure (current pulse width is too small)
Er.600	Motor overheating
Er.601	DI function code is not assigned
Er.602	AI zero drift is too large, when AIx zero drift P06.68/P06.73/P06.78 is greater than the
	threshold value P10.10, it will report zero drift too large fault.
Er.603	The zero return time out, when the zero return time is greater than P10.08, this fault will be
	reported.
Er.604	When the absolute encoder is self-learning, the rotation direction of the motor is wrong, and the
	UVW wiring needs to be replaced
Er.605	The battery voltage of the absolute encoder is too low, you need to replace the new battery
	when the drive is powered on
Er.606	The battery voltage of the second encoder is too low, and it needs to be replaced with a new
	battery when the driver is powered on.
Er.607	Inertia learning failed, need to increase P07.33 and then learn
Er.608	U disk read and write failed
Er.609	Drive parameters not found during factory reset
Er.610	Motor parameters not found when restoring to factory defaults
Er.611	EEPROM verification error when restoring to factory defaults
Er.612	Self-learning current loop error

Er.613	Phase finding not yet completed
Er.701	EtherCAT bus error
Er.702	EtherCAT bus dropped
Er.703	After the back clearance compensation is increased, two steps are required before returning to zero to eliminate the back clearance

### Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set metho d	Effective way	Defaults	read and write method
P09.31	Torque current	-	%	Displays the	-	-	-	RO
	feedback			torque current				
				feedback				
				value.				
P10.01	Software Overcurrent	0~800	%	When the	anytime	Reset takes	400.0	RW
	Threshold			detected		effect		
				current				
				percentage				
				P09.31 is				
				greater than				
				this value, a				
				software				
				overcurrent				
				fault will be				
				reported.				
P10.02	Overload value	0~3276.7	%	Set the	anytime	Immediately	100.0	RW
				overload				
				protection				
				point,				
				generally set				
				as motor rated				
				current/drive				
				rated				
				current*100%				
P10.03	Lock-rotor protection	0~300.0	%	When set to 0,	anytime	Immediately	100.0	RW
	current threshold			no stall			%	
				protection is				
				performed;				
				when the				
				motor is at				
				zero speed, the				
				driver current				

				P09.31 is				
				greater than				
				the stall				
				protection				
				current				
				threshold, and				
				when the				
				duration				
				exceeds the				
				stall protection				
				time threshold				
				P10.04, a stall				
				fault is				
				reported.				
P10.04	Lock-rotor protection	0~65535	ms	-	anytime	Immediately	800	RW
	time threshold							
P10.05	Over speed	0~3276.7	%	When the	anytime	Immediately	150.0	RW
	percentage			percentage of				
				the actual				
				speed/rated				
				speed is				
				greater than				
				the overspeed				
				percentage, an				
				overspeed				
				fault will be				
				reported.				
P10.06	Drive Overheat	0~3276.7	°C	When the	anytime	Immediately	80.0	RW
	Threshold			drive				
				temperature				
				P01.10 is				
				greater than				
				this value, the				
				drive				
				overheating				
				fault will be				
				reported.				
P10.08	Timeout time for	0~32767	s	When the zero	anytime	Immediately	0	RW
	returning to zero			return time				
	position			exceeds this				
				value, a zero				
				timeout fault is				
				reported.				

				When set to 0,				
				the zero return				
				timeout				
				protection is				
				not performed.				
P10.09	Power-off motor	0~1	-	Set whether to	anytime	Immediately	0	RW
	encoder position			memorize the				
	memory function			motor encoder				
	0-Power off does not			position after				
	remember motor			power off.				
	encoder position			-				
	1-Power-off memory							
	motor encoder							
	position							
P10.10	AI zero drift threshold	0~32767	mV	When the zero	anytime	Immediately	500	RW
				drift of AIx is				
				greater than				
				this value, it				
				will report the				
				excessive zero				
				drift fault.				
P10.11	Motor overload curve	0~5	-	Select the	anytime	Immediately	0	RW
	selection			motor				
				overload				
				curve. When 5				
				is selected, it				
				is a custom				
				overload curve				
P10.12	Zero speed command	0~3276.7	%	Torque limit	anytime	Immediately	0	RW
	automatically reduces			value that is				
	torque limit value			automatically				
				reduced when				
				zero-speed				
				command is				
				received				
P10.13	Custom 1.1 times	0~3276.7	S	Custom 1.1		Immediately	0	RW
	overload curve time			times overload				
				curve time				
P10.14	Custom 1.5 times	0~3276.7	s	Custom 1.5	anytime	Immediately	0	RW
	overload curve time			times overload				
				curve time				
P10.15	Custom 2.0 times	0~3276.7	s	Custom 2.0	anytime	Immediately	0	RW
	1			1				

	overload curve time			times overload				
				curve time				
P10.16	Custom 2.5 times	0~3276.7	s	Custom 2.5	anytime	Immediately	0	RW
	overload curve time			times overload				
				curve time				
P10.17	Custom 3.0 times	0~3276.7	s	Custom 3.0	anytime	Immediately	0	RW
	overload curve time			times overload				
				curve time				
P10.18	Speed detection	0~32767	-	When set to	anytime	Immediately	0	RW
	threshold			non-zero, the				
				speeding				
				protection is				
				enabled. The				
				smaller the				
				value the				
				more sensitive				
				more sensitive				
D10.20	Current fault as de			Diamlass fault				DO
P10.20	Current fault code	-	-		-	-	-	KU
D10.21		1 5				T 1 / 1	1	DW
P10.21	Selected last x	1~3	-	Used to	anytime	Immediately	1	RW
	failures			choose to				
				check the last				
				5 faults of the				
				servo drive,				
				this function				
				code is used to				
				set the number				
				of faults to be				
				checked:				
P10.22	Fault code for	-	-	Display	-	-	-	RO
	selected x faults							
P10.23	The fault code of the	-	min	Display	-	-	-	RO
	selected x faults							
P10.24	Motor speed of the	-	rpm	Display	-	-	-	RO
	selected x faults							
P10.25	The rms value of the	-	А	Display	-	-	-	RO
	motor current for the							
	selected x faults							
P10.26	Instantaneous value of	-	А	Display	_	-	-	RO
	V-phase motor current			1 5				
	for selected x faults							
P10 27	Instantaneous value of		٨	Display				RO
1 10.27	instantaneous value of	-	A	Dispiay		-	-	κυ

	1			1		r	1	
	W-phase motor current for selected x faults							
P10.28	bus voltage of selected x faults	-	V	Display	-	-	-	RO
P10.29	Drive temperature for selected x faults	-	°C	Display	-	-	-	RO
P10.30	Entity DI state of selected x failures	-	-	Display	-	-	-	RO
P10.31	Entity DO status for selected x failures	-	-		-	-	-	RO
P10.32	Hardware fault cumulative count value	-	-	Display	-	-	-	RO
P10.33	Fault shielding	0~65535		BIT0 Shield Overload BIT1 Shield Software Overcurrent BIT2 Shield Phase Fault BIT3 Shield Current Change Large BIT4 Shield Hardware Overcurrent BIT5 Shield Speed Change Large BIT6 Shield Z Point Unstable BIT7 Shield SYNC Loss BIT8 Shield Current Sensor Fault BIT9 Shield Under voltage	anytime	Immediately	12	RW

								1
				BIT10 Shield				
				Encoder				
				malfunction				
P10.34	Hardware failure time	0~65535	20ns	Set the	anytime	Immediately	150	RW
	threshold			threshold for				
				the number of				
				hardware				
				failures. When				
				the duration of				
				a single				
				hardware				
				failure exceeds				
				this value,				
				Er.101 will be				
				reported.				
P10.35	Fault minimum	0~32767	s	When	anytime	Immediately	60	RW
	duration before			reporting				
	responding to reset			software				
	fault			overcurrent,				
				hardware				
				overcurrent,				
				drive				
				overheating,				
				motor				
				overload,				
				locked rotor.				
				and braking				
				resistor				
				overload, vou				
				must wait for				
				P10 35				
				seconds to				
				reset the fault				
D10.44	Speed loop reference		0/_	Display				PO
Г 1 <b>0.44</b>	at last valid fault	-	/0	Dispitay	-	-	-	NU
P10.45	Velocity loop	-	%	Display	-	-	-	RO
	feedback at the last							
	valid fault							
P10.46	Torque reference at	-	%	Display	-	-	-	RO
	the last valid fault							
P10.47	Torque feedback at	-	%	Display	-	-	-	RO
	the last valid fault							

P10.48	Filtered position error at the last valid fault	-	-	Display	-	-	-	RO
P10.49	current record index	-	-	Display	-	-	-	RO
P10.50	The fault code of the	-	-	Display	-	-	-	RO
	fault with index 0							
P10.51	failure time for failure	-	S	Display	-	-	-	RO
	with index 0							
P10.52	Rotation speed of	-	rpm	Display	-	-	-	RO
	fault with index 0							
P10.53	The rms value of the	-	А	Display	-	-	-	RO
	current for the fault							
	with index 0							
P10.54	Instantaneous value of	-	А	Display	-	-	-	RO
	the V-phase current							
	for the fault with							
D10.55	index 0		•	D' 1				DO
P10.55	the W phase surront	-	A	Display	-	-	-	KÜ
	for the foult with							
	index 0							
	index 0							
P10.56	Capacitor voltage for	-	V	Display	-	-	-	RO
	the fault with index 0							
P10.57	The temperature of	-	° C	Display	-	-	-	RO
	the fault with index 0							
P10.58	The DI status of the	-	-	Display	-	-	-	RO
	fault with index 0							
P10.59	The DO status of the	-	-	Display	-	-	-	RO
	fault with index 0							
P10.60	The fault code of the	-	-	Display	-	-	-	RO
	fault with index 1							
P10.61	failure time for failure	-	s	Display	-	-	-	RO
	with index 1							
P10.62	The speed of the fault	-	rpm	Display	-	-	-	RO
D10.50	with index 1							<b></b>
P10.63	The rms value of the	-	A	Display	-	-	-	RO
	current for the fault							
D10.64	With index 1		•	D:1-				DO
r10.64	the W phase summer	-	A	Display	-	-	-	KU
	for the fault with							
	101 une lault with							

			r					
	index 1							
P10.65	Instantaneous value of	-	Α	Display	-	-	-	RO
	the W-phase current							
	for the fault with							
	index 1							
P10.66	Capacitor voltage for	-	V	Display	-	-	-	RO
	the fault with index 1							
P10.67	The temperature of	_	°C	Display	-	-	_	RO
110.07	the fault with index 1		Ũ	Disping				Ro
	the fault with mack f							
P10.68	The DI status of the		_	Display				RO
110.00	foult with index 1	_		Display	_	_	_	KO
P10.60	DO status of fault			Dienlay				PO
F 10.09	DO status of fault	-	-	Display	-	-	-	KU
D10 70	The fault and of the			Diamlary				DO
P10.70	fine fault code of the	-	-	Display	-	-	-	ĸŬ
D10 71								DO
P10./1	Failure time of failure	-	S	Display	-	-	-	KO
D10 50	with index 2							<b>.</b>
P10.72	Rotation speed of the	-	rpm	Display	-	-	-	RO
	fault with index 2							
P10.73	The rms value of the	-	A	Display	-	-	-	RO
	current for the fault							
	with index 2							
P10.74	Instantaneous value of	-	Α	Display	-	-	-	RO
	the V-phase current							
	for the fault with							
	index 2							
P10.75	Instantaneous value of	-	А	Display	-	-	-	RO
	W-phase current for							
	fault with index 2							
P10.76	Capacitor voltage of	-	V	Display	-	-	-	RO
	the fault with index 2							
P10.77	The temperature of	-	°C	Display	-	-	-	RO
	the fault with index 2							
P10.78	DI state of the fault	-	-	Display	-	-	-	RO
	with index 2							
P10.79	The DO status of the	-	-	Display	-	-	-	RO
	fault with index 2							
P10.80	The fault code for	-	-	Display	-	-	-	RO

			1					
	fault with index 3							
P10.81	Failure time for	-	s	Display	-	-	-	RO
	failure with index 3							
P10.82	Rotational speed of	-	rpm	Display	-	-	-	RO
	the fault with index 3							
P10.83	The rms value of the	-	А	Display	-	-	-	RO
	current of the fault							
	with index 3							
P10.84	Instantaneous value of	-	А	Display	-	-	-	RO
	the V-phase current							
	for the fault with							
	index 3							
P10.85	Instantaneous value of	-	Α	Display	-	-	-	RO
	W-phase current for							
	fault with index 3							
P10.86	Capacitor voltage of	-	V	Display	-	-	-	RO
	the fault with index 3							
P10.87	The temperature of	-	° C	Display	-	-	-	RO
	the fault with index 3							
P10.88	DI status of the fault	-	-	Display	-	-	-	RO
	with index 3							
P10.89	The DO status of the	-	-	Display	-	-	-	RO
	fault with index 3							
P10.90	The fault code for the	-	-	Display	-	-	-	RO
	fault with index 4							
P10.91	Failure time for	-	s	Display	-	-	-	RO
	failure with index 4							
P10.92	Rotational speed of	-	rpm	Display	-	-	-	RO
	the fault with index 4							
P10.93	The rms value of the	-	Α	Display	-	-	-	RO
	current of the fault							
	with index 4							
P10.94	Instantaneous value of	-	Α	Display	-	-	-	RO
	V-phase current for							
	fault index 4							
P10.95	Instantaneous value of	-	Α	Display	-	-	-	RO
	W-phase current for							
	fault with index 4							
P10.96	Capacitor voltage for	-	V	Display	-	-	-	RO
	fault with index 4							
P10.97	The temperature of	-	°C	Display	-	-	-	RO
	the fault with index 4							

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P10.98	DI state of the fault	-	-	Display	-	-	-	RO
	with index 4							
P10.99	The DO status of the	-	-	Display	-	-	-	RO
	fault with index 4							

### 7.1.3 Troubleshooting

### (1) Er.100 software overcurrent

Fault occurrence conditions:

If the current percentage P09.31 detected by the software is greater than the overcurrent threshold of P10.01, a software overcurrent fault will be reported, which can be shielded by BIT1 of P10.33.

Fault reason		Fault confirmation	Troubleshooting
1.Motor UVW phase sequence reversed or missing phase	>	Confirm the UVW phase sequence and whether the phase is missing	Adjust the UVW phase sequence or replace the motor
2.P10.01 setting is too small		Check whether the value of parameter P10.01 is too small	Increase P10.01
3.Gain setting is too large	A	Check P07.01 current loop ratio, P07.02 current loop integral gain,P07.03 speed loop proportional gain, P07.10 torque feedforward coefficient, whether these parameters are set too large	Reduce gain related parameters
4. The motor peak current percentage setting is too large	A	Check whether P00.24 motor peak current percentage is inconsistent with the actual peak current of the motor	Reduce the percentage of P00.24 motor peak current
5. Motor power is too small		Confirm according to the actual load	Replace the motor with a higher power
6. The motor output current is greater than the motor peak current	A	Check whether the torque limit value of the drive (the default limit source P05.13) is greater than the motor peak current	Decrease the torque limit value

# (2) Er.101 hardware overcurrent

Fault occurrence conditions:

The hardware detects that the driver output current reaches the peak threshold.

Fault reason		Fault confirmation	Troubleshooting		
	≻	Check UVW Phase			
1. The initial phase of the magnetic pole is incorrect		Sequence Whether the servo motor is a non-standard motor	Operate Fn005, re-learn the encoder		
2. Abnormal connection of motor UVW power cable	A A	Check whether the driver end and motor end of the UVW cable are in poor contact and the ports are aged. Unplug the UVW motor cable and check if the wire is short-circuited.	Replace or correctly connect the motor wire		
3. Motor power is too small	>	Determined according to actual load conditions	Replace the motor with a higher power		
4. Motor damage	7	Unplug the motor wire and measure the resistance between the UVW and the motor with a multi meter	Unbalanced replacement motor		
5. The braking resistance is too small or short-circuited	>	Measure whether the resistance across the driver P, Rb' is positive	Replace the braking resistor		
6. Drive failure	7	Unplug the motor cable, then enable the servo drive, but still report this fault	Replace the drive		
7. The gain setting is unreasonable	A	During the rotation of the motor, if the motor vibrates violently or makes a sharp sound, you can also observe the curve of the current loop through VECObserve	Adjust gain		
8. The acceleration/	$\triangleright$	VECObserve observes	Modify the acceleration given		

deceleration time is too short		whether the control	by the control command,			
		command is given too	increase the filter time of the			
		violently	control command, increase the			
	≻	Check whether the	acceleration and deceleration			
		parameter setting of	time			
		acceleration and				
		deceleration time is too				
		small				
	٨	Check if the motor				
0 Connect the motor UVW		cable is too long	Shorten the motor cable,			
9. Connect the motor UV w	≻	Check whether the	exclude the UVW terminal and			
line to the capacities load		motor UVW is	connect the capacitor			
		connected to a capacitor				
10.Excessive mechanical	$\checkmark$	Check if the mechanical	Paduaa machanical alaaranga			
clearance		clearance is too large	Reduce mechanical clearance			

(3) Er.102 over pressure

Fault occurrence conditions:

When the busbar voltage detection value P01.08 is greater than the overvoltage threshold, it will report overvoltage

For drives whose rated voltage P01.07 is less than 300V, the overvoltage threshold is 420V, and for drives whose rated voltage P01.07 is greater than 300V, the overvoltage threshold is 750V.

Fault reason	Fault confirmation	Troubleshooting
1. The rated voltage of the driver is incorrectly set	<ul> <li>Check whether the parameter setting of P01.07 is correct</li> </ul>	Modify the drive rated voltage P01.07
2. The bus voltage calibration coefficient is set incorrectly	<ul> <li>Check whether the parameter setting of P01.09 is correct</li> </ul>	Modify bus voltage calibration coefficient P01.09 (adjustment range 90%~110%)
3. The power supply of the drive RST is unstable	<ul> <li>Oscilloscope to check</li> <li>RST power</li> </ul>	Adjust the power supply or add a power supply noise filter
4. The DC bus voltage is too high	<ul> <li>Use a multi-meter to measure whether the voltages at both ends of the driver P and N are normal</li> </ul>	Adjust the bus voltage calibration coefficient P01.09 (the adjustment range is 90%~110%) or adjust the power supply
5. The braking resistor is not working properly	<ul> <li>Check the braking resistor for poor contact, short circuit or open circuit</li> <li>Use a multi-meter to measure whether the</li> </ul>	Correct wiring or replace braking resistor

		resistances at both ends	
		of the driver P and Rb'	
		are normal	
		Check whether the	
6 The reconnector setting of		parameters of P02.20	P02.20 can be selected by users
		for enabling dynamic	according to their needs,
the braking resistor is		braking, the resistance	P02.21 should be set correctly,
		value of braking resistor	and P02.22 can be set up to 5
unreasonable		P02.21, and the power	times the power of the braking
		of braking resistor	resistor
		P02.22 are set correctly	
7. The system is a large	$\blacktriangleright$	View the actual	Properly adjust the deceleration
inertia load, and the		deceleration time	time
deceleration time is too short			
8. The gain setting is	$\blacktriangleright$	Check to see if the	A direct the gain
unreasonable		motor oscillates	Aujusi ilie galli

### (4) Er.103 undervoltage

Fault occurrence conditions:

When the busbar voltage detection value P01.08 is less than the undervoltage threshold, it will report undervoltage.

Undervoltage threshold = drive rated voltage P01.07\*1.414\*0.7

		-	
Fault reason		Fault confirmation	Troubleshooting
1. The RST power supply of	$\triangleright$	Check whether the	
the driver does not match the		parameter setting of	Modify the drive rated voltage
rated voltage P01.07 of the		P01.07 is correct	P01.07
driver.			
2. The acceleration time is	A	View the actual	Decrease acceleration time
too short		acceleration time	
	٨	Measuring grid voltage	Adjust the drive rated voltage
3. The grid voltage is too low			P01.07 to be consistent with
			the grid voltage
	$\checkmark$	The drive reports this	
4.Other overloaded devices		fault as soon as other	A limet the DCT as seen as a lar
start		heavy-duty devices are	Adjust the KST power supply
		started	
	٨	This fault is reported as	Deuless the duine
5. Charging circuit failure		soon as the drive is	Replace the drive
		enabled	
	٨	Check whether the P	
6. Braking resistors P, Rb' are		and Rb' terminals of the	Prevent short circuit of braking
short-circuited to ground		driver are	resistor P, Rb' to ground
		short-circuited with the	

		ground	
		Or remove the broking	
		Of remove the braking	
		resistor, whether to	
		report this fault, if not,	
		it means that the	
		braking resistor P and	
		Rb' are short-circuited	
		to ground	
7. Excessive load	٨	When using a	
		single-phase power	Use three-phase power or
		supply, the actual load	derating
		is too large	
8. The three-phase current of the main power supply RST is unbalanced		Measure the three-phase	
		current of the main	Unbalanced, adjust the RST
		power supply RST,	three-phase power supply
		UVW	
9. The cross-sectional area of the RST wire is too small	$\checkmark$	Check if the RST wire	Replacing the RST power cord
		meets the driver current	with a larger cross-sectional
			area

### (5) Er.104 Current sensor failure

Fault occurrence conditions:

Current sensor failure

Fault reason	Fault confirmation	Troubleshooting
1. Current sensor failure	▶ -	Replace the drive

### (6) Er.105 Encoder failure

Fault occurrence conditions:

The encoder has no signal or the signal is unstable

Fault reason	Fault confirmation	Troubleshooting
1. The encoder wire is in poor contact	<ul><li>Check the encoder line</li></ul>	Correct wiring
2. The encoder wire is disconnected	<ul> <li>The multi-meter detects the signal line</li> </ul>	Replace the encoder wire
3.Subject to electromagnetic interference	<ul> <li>Exclude and turn off other equipment that may cause interference</li> </ul>	eliminate interference

### (7) Er.106 EEPROM failure

Fault occurrence conditions:

EEPROM read data error

Fault reason	Fault confirmation	Troubleshooting
1. EEPROM read data error	→ -	Replace the drive
# (8) **Er.107** Phase sampling fault

Fault occurrence conditions:

Phase sampling fault, when the phase obtained through the HALL switch and the phase obtained through the encoder are too different, this fault is reported.

e e		1
Fault reason	Fault confirmation	Troubleshooting
1. Phase sampling failure	> -	Set BIT2 of fault shielding parameter P10.33 to 1 to shield this fault
		1

(9) Er.108 FPGA and ARM communication failure

Fault occurrence conditions:

This fault is reported when the values written by the ARM and read to the FPGA are inconsistent.

Fault reason		Fault confirmation	Troubleshooting
1. When the value written by	A	-	
ARM and read to FPGA is			Replace the drive
inconsistent			

(10) Er.109 Large current change fault

Fault occurrence conditions:

When the two sampled currents differ by 50%, a fault is reported.

Fault reason	Fault confirmation	Troubleshooting
1. When the two sampled currents differ by 50%	> -	Set BIT3 of fault shielding
		this fault

(11) Er.111 Abnormal motor winding

Fault occurrence conditions:

When self-learning the winding direction of the motor, the current changes in the wrong direction

Fault reason	Fault confirmation	Troubleshooting
1. The motor winding is	<ul><li>Check motor UVW</li></ul>	Connect the UVW motor cable
abnormal	wiring	correctly

# (12) Er.113 Encoder Z point not detected

Fault occurrence conditions:

When the encoder is self-learning, the Z point signal cannot be detected

Fault reason	Fault confirmation		Troubleshooting			
1. The encoder wire is in	A	Check encoder wire	Correctly connect the encoder			
poor contact			wire			
	A	Connect the encoder				
2. The encoder signal is abnormal		cable correctly, after				
		self-learning three	Replace the motor			
		times, it still reports this				
		fault				

# (13) Er.114 Z point offset error

Fault occurrence conditions:

When the encoder is self-learning, it is detected that the Z point signal is larger than the encoder resolution

Fault reason		Fault confirmation	Troubleshooting
	Y	Connect the encoder	
1. The encoder signal is abnormal		cable correctly, after	
		self-learning three	Replace the motor
		times, it still reports this	
		fault	

(14) Er.115 HALL encoded value error

Fault occurrence conditions:

When self-learning encoder, the HALL code value is both 0 or 1 at the same time

Fault reason	Fault confirmation	Troubleshooting	
1 The encoder signal is	➢ After three times of		
1. The encoder signal is	self-learning, this fault	Replace the motor	
aonormai	is still reported		

# (15) Er.117 overheating

Fault occurrence conditions:

When the drive temperature P01.10 is greater than the overheating threshold P10.06, an overheating fault will be reported.

Fault reason	Fault confirmation		Troubleshooting		
1. The temperature of the		Measuring drive surface	Increase the drive cooling		
drive is overheated		temperature	increase the drive cooling		
2. The cooling fan does not	$\checkmark$	Check the fan operation	Poplace the cooling for		
work normally			Replace the cooling fail		
2 The embient terms in	≻	Thermometer measures			
too high		the temperature of the	reduce ambient temperature		
too nign		site			
4. The motor runs at low	$\checkmark$	Monitor the actual load			
frequency and high current			Increase drive power		
for a long time					

(16) Er.118 The HALL encoder value of the wire-saving encoder is wrong when the power is turned on

Fault occurrence conditions:

The HALL code value returned by the wire-saving encoder is wrong when powered on

Fault reason						Fault confirmation	Troubleshooting
1.	The	signal	of	the	A	The drive is powered on	
line	-saving	enco	oder	is		again three times, but	Replace the motor
abn	ormal					still reports this fault	

# (17) Er.119 Encoder type mismatch

Fault occurrence conditions:

The encoder type recognized by the FPGA is inconsistent with the encoder type set by the driver.

Fault reason		Fault confirmation	Troubleshooting
		Check whether P00.08	
1. Parameter setting error		and the actual encoder	Modify P00.08
		type are consistent.	
	٨	Check whether the	
		encoder type identified	
2 The motor type is upong		in the FPGA version	Change motor type or change
2. The motor type is wrong		(P01.02) is consistent	FPGA program
		with the actual	
		connected encoder type.	

## (18) Er.200 The home switch for return to zero is not assigned

Fault occurrence conditions:

The homing mode needs to be connected to the origin switch, and there is no origin switch assigned in the DI configuration.

Fault reason		Fault confirmation	Troubleshooting
1. The DI is not configured with the origin switch input signal INFn.34.	<b>A</b>	Check if the DI is configured with the origin switch input signal INFn.34	DI configuration origin switch input signal INFn.34

# (19) Er.201 DI repeat assignment

Fault occurrence conditions:

The same INFn function is assigned to two different DI or VDI terminals.

Fault reason		Fault confirmation   Troubleshooting					
1. The same INFn function is assigned to two different DI or VDI terminals.	A	View DI or VDI configuration	Modify configurat	DI ion	or	VDI	

# (20) Er.202 overspeed

Fault occurrence conditions:

When the speed percentage (actual speed/rated speed) is greater than the overspeed percentage P10.05, it will report an overspeed fault.

Fault reason	Fault confir	nation Troubleshooting
1. The setting of overspeed percentage P10.05 is too small	<ul><li>Check out P</li></ul>	Increase P10.05 or decrease the speed percentage
2. The gain is too large	<ul> <li>Check the pase</li> <li>settings of P</li> <li>P07.04 and I</li> </ul>	07.03, Decrease the gain 07.05
3. HALL switch detection error	> -	Re-learning the encoder
4. Z point offset P00.71 error	> -	For our company's motors, this

	value	is	set	to	0,	and
	P02.35	=842	21 sl	hould	be	set
	before	setti	ng thi	s valı	ıe	

## (21) Er.203 Position error is too large

Fault occurrence conditions:

When the difference between the position command and the actual position is greater than the excessive position error threshold P03.19, it will report that the position error is too large.

Fault reason	Fault confirmation	Troubleshooting
1. Position command filter parameters P03.06 and P03.07 are too large	<ul> <li>Check P03.06 and P03.07</li> </ul>	Decrease P03.06 and P03.07
2. Gain is too small	<ul> <li>Check whether the parameter settings of P07.03, P07.04 and P07.05 are reasonable</li> </ul>	Adjust the gain
3. Position command speed is	<ul><li>View position command</li></ul>	Decrease position command
too large	speed	speed
4. The position error is too large and the threshold P03.19 is too small	<ul> <li>Check the excessive position error threshold P03.19</li> </ul>	Increase the excessive position error threshold P03.19
5. Mechanical stuck motor	<ul> <li>Check whether the mechanical transmission part is stuck</li> </ul>	Dealing with Mechanical Stuck Issues

## (22) Er.204 No interrupt fixed-length trigger signal assigned

Fault occurrence conditions:

The interrupt fixed length function is enabled, but the DI terminal of the interrupt fixed length trigger function number INFn.40 is not allocated.

Fault reason	Fault confirmation	Troubleshooting
1.DI unassigned interrupt	<ul> <li>View DI configuration</li> </ul>	Configure a DI as interrupt
fixed-length trigger function		fixed-length trigger function
number INFn.40		number INFn.40

# (23) Er.205 There is no zero return before triggering to go to absolute multi-segment position

Fault occurrence conditions:

There is no homing performed before triggering the absolute multi-segment position.

Fault reason	Fault confirmation	Troubleshooting
1. The zero return is not performed before triggering the absolute multi-segment position.	-	A zero return is required before triggering an absolute multi-segment position.

# (24) Er.206 overload

Fault occurrence conditions:

When the motor current works continuously for a certain period of time at a value greater than the rated current, an overload is reported.

Fault reason		Fault confirmation	Troubleshooting
	٨	Check out P10.02	Please set P10.02 as the
1. Improper parameter setting			percentage of motor rated
			current and drive fated current.
2. The motor power is not	$\checkmark$	Confirm according to	Please replace the servo system
enough		the actual load	with a higher power level

# (25) Er.207 software limit

Fault occurrence conditions:

After enabling the software limit through P03.73, when the actual user position is less than the lower limit of the position and the speed is negative, the software limit will be reported. When the actual user position is greater than the upper limit of the position and the speed is positive, the software limit will be reported.

Fault reason		Fault confirmation	Troubleshooting
1. Improper parameter setting	$\checkmark$	Check P03.73	Modify P03.73
2. Improper setting of software limit value	A	Check P03.74, P03.76	Modify P03.74, P03.76

# (26) Er.208 hardware limit

Fault occurrence conditions:

After enabling the hardware limit through P03.73, when the reverse position limit switch is valid and the speed is negative, the hardware limit is reported. When the positive position limit switch is valid and the speed is positive, the hardware limit is reported.

Fault reason		Fault confirmation	Troubleshooting
1. Improper parameter setting	$\checkmark$	Check P03.73	Modify P03.73
2.Whether the installation	A	Check whether the	Adjust the position limit switch
position of the position limit		position limit switch is	installation position
switch is appropriate.		installed in the proper	
		position.	

# (27) Er.209 4th power position curve planning failed

Fault occurrence conditions:

4th power position curve planning failed

Fault reason	Fault confirmation	Troubleshooting
	-	The 4th power position curve
1. The 4th power position		planning failed, reset the
curve planning failed		reasonable speed/position
		planning value

# (28) Er.213 Fully closed loop position error is too large

Fault occurrence conditions:

In a fully closed loop, the detected position of the second encoder is too different from

the motor encoder converted to the second encoder value.

Fault reason	Fault confirmation	Troubleshooting
1, the material slips	<ul> <li>Observe the movement of the material</li> </ul>	Press the material tightly to prevent the material from slipping seriously.
2. The full-closed loop position error is too large and the threshold P03.36 is set too small	<ul> <li>Check full closed loop position error too large threshold P03.36</li> </ul>	Increase the full-closed loop position error too large threshold P03.36
3. The full closed loop position error clearing cycle number P03.40 is not set	<ul> <li>Check the full closed loop position error clearing cycle number P03.40</li> </ul>	Set a reasonable full-closed loop position error clearing cycle number P03.40
4. Encoder polarity setting error in full closed loop mode	<ul> <li>Check whether the parameters set by encoder polarity P03.33 in full-closed loop mode match the actual situation</li> </ul>	Modify P03.33

#### (29) Er.214 Forward and reverse rotation is prohibited

Fault occurrence conditions:

The forward/reverse rotation is prohibited through P02.03, but the forward/reverse rotation command is actually input

Fault reason		Fault confirmation	Troubleshooting
1. The forward/reverse	$\checkmark$	Check whether the	
rotation is prohibited by		entered command is	
setting P02.03, but the		normal	Modify the command direction
forward/reverse rotation			
command is actually input			

## (30) Er.216 The signal at point Z is unstable

Fault occurrence conditions:

The difference between the encoder position detected twice at Z point and the actual encoder resolution is too different

Fault reason		Fault confirmation	Troubleshooting
1. The encoder wire is in poor contact	4	Check encoder wire	Correct wiring
2 The encoder signal is	٨	After three times of	
2. The encoder signal is		self-learning encoder,	Replace the motor
aononnai		this fault is still reported	

# (31) Er.217 SYNC signal timeout

Fault occurrence conditions:

The received SYNC signal exceeds the actual sync period

Fault reason	Fault confirmation	Troubleshooting
1. The received SYNC signal exceeds the actual synchronization period	<ul> <li>Check whether the CANopen/EtherCAT communication line is</li> </ul>	Correct wiring
Synemonization period	connected normally	

# (32) Er.219 locked rotor

Fault occurrence conditions:

When the drive current percentage P09.31 is greater than P10.03, and the speed is close to zero, and lasts for the time of P10.04, it will report stalled rotor.

Fault reason		Fault confirmation	Troubleshooting
	A	Check P10.03, P10.04.	
1. Improper setting of parameters		Generally, P10.03 and	
		P10.04 use the shortcut	
		button in VECObserve	Modify P10.03, P10.04
		software $\rightarrow$ the default	
		settings after a complete	
		set of matching.	
2. The machine jams the	A	View Mechanical	Dealing with mechanical
motor		Structure	structural problems
2. Matan maran is to a small		Judging by the actual	Increase motor nerver
5. Wotor power is too small		load	increase motor power

# (33) Er.220 Braking resistor overload

Fault occurrence conditions:

When the braking resistor is in the braking state continuously and the braking of the braking resistor is greater than the heat dissipation of the braking resistor, the braking resistor is overloaded.

Fault reason		Fault confirmation	Troubleshooting
1. Improper setting of parameters	A	Check braking resistor resistance value P02.21, braking resistor power P02.22, braking resistor heat dissipation coefficient P02.23	Set P02.21 according to the resistance value of the braking resistor; set the braking resistor power P02.22; P02.23 is generally set to 50
		The braking is frequent,	
2. The power of the braking		and the heat dissipation	Choose a braking resistor with
resistor is too small		of the braking resistor is	higher power
		too small	

# (34) Er.221 Forward travel limit switch not assigned

Fault occurrence conditions:

The return-to-zero mode needs to be connected to the forward travel limit switch, and the forward travel limit switch INFn.43 is not allocated in the DI configuration.

Fault reason	Fault confirmation	Troubleshooting

1. Unassigned forward travel	$\triangleright$	Check the DI function	DI	fu	nction	assi	gnment
limit switch INFn.43		configuration	Forwa	rd	travel	limit	switch
		parameters	INFn.4	43			

# (35) Er222 Reverse travel limit switch not assigned

Fault occurrence conditions:

The back-to-zero mode needs to be connected to the reverse stroke limit switch, and the reverse stroke limit switch INFn.44 is not allocated in the DI configuration.

Fault reason		Fault confirmation		Troubles	nooting
1 Unaggional nevera travel	A	Check the DI function	DI	function	assignmen
limit switch INFn.44		configuration	Rever	se stroke	limit swite
		parameters	INFn.	44	

# (36) Er223 Failed to find origin

Fault occurrence conditions:

#### During the zero return process, the origin switch was not found

Fault reason		Fault confirmation	Tro	oublesho	ooting	
1. Not connected to the origin	А	Check whether the	Correctly	wire	the	origin
switch		origin switch is	switch			
		correctly connected to				
		the DI				

# (37) Er224 CAN bus state switch failed

Fault occurrence conditions:

During the enable process, the CAN bus state machine is switched to the pre-operational mode

Fault reason		Fault confirmation	Troubleshooting
1. During the enabling	٨	Check the enable	It is not possible to switch the
process, the CAN bus state		process	CAN bus state machine to the
machine is switched to the			pre-operational mode during the
pre-operation mode			enabling process

## (38) Er.225 Unsupported CANopen bus operating mode

Fault occurrence conditions:

Unsupported CANopen bus operating mode

	Fault reason			Fault confirmation	Troubl	eshooting	
1.	Unsupported	CANopen	$\checkmark$	-	Unsupported	CANopen	bus
bus operating modes					operating mod	le	

(39) Er.226 Absolute encoder in absolute mode, the number of turns overflows Fault occurrence conditions:

Absolute encoder in absolute mode, the number of turns overflows

Fault reason	Fault confirmation	Troubleshooting
1. The number of turns	▶ -	
overflows when the absolute		
encoder is in the absolute		-
value mode.		

# (40) Er.227 Absolute encoder battery failure in absolute mode

Fault occurrence conditions:

After the battery is powered off, when the power is turned on for the first time, this fault will be reported, prompting the user that the absolute encoder battery is powered off and the multi-turn position information is lost. After connecting the battery, the fault will be automatically eliminated after reset.

Fault reason		Fault confirmation	Troubleshooting
1. The battery is out of power	$\checkmark$	Measuring encoder	Replace the battery and power
		battery voltage	on again

# (41) Er.228 Inertia learning failed

Fault occurrence conditions:

When the self-learning habit is used, the frictional resistance is too large, and the self-learning current limit P02.36 is too small.

Fault reason		Fault confirmation	Troubleshooting
1. When the self-learning	$\triangleright$	Check P02.36	Increase P02.36
habit is used, the frictional			
resistance is too large, and			
the self-learning current limit			
P02.36 is too small.			
2. The inertia of the system is	$\triangleright$	Check P07.33	Increasing P07.33
too large, and the			
acceleration and deceleration			
time P07.33 of the learning			
habit is too small			
3. The gain setting is not	$\triangleright$	If the motor shakes	Increase P07.03, decrease
appropriate			P07.04

# (42) Er.229 Full closed-loop parameter learning failed

Fault occurrence conditions:

During the full-closed-loop parameter learning process, the change of the position value of the second encoder is too small

Fault reason	Fault confirmation		Troubleshooting		
1.During the full-closed-loop	➢ Check the full		Ensure that during the full		
parameter learning process,		closed-loop learning	closed-loop learning process,		
the change of the position		process to see if the	the motor can drag the second		
value of the second encoder		second encoder is	encoder to move, and there is		
is too small		moving normally	no slippage		

# (43) Er.600 Motor overheating

Fault occurrence conditions:

Motor temperature is too high

Fault reason		Fault confirmation	Troubleshooting				
1. The load is too large, and	Measure motor		Need	to	replace	а	larger
the motor heats too seriously		temperature	capaci	ty m	otor		

2. The ambient temperature is	٨	Detect the ambient	Reduce	site	ambient
too high		temperature on site	temperature		

## (44) Er.601 DI function code is not assigned

Fault occurrence conditions:

DI function code is not assigned

Fault reason		Fault confirmation	Troubleshooting
1. The speed or torque source	$\checkmark$	Check if the DI	
AB switching is enabled but		configuration is	Configure DI compositiv
the AB switching function bit		correctly configured	Configure DI correctly
is not assigned.			

# (45) Er.602 AI zero drift is too large

Fault occurrence conditions:

All zero drift setting P06.68 or Al2 zero drift setting P06.73 or Al3 zero drift setting P06.78 is greater than Al zero drift threshold P10.10

Fault reason	Fault confirmation		Troubleshooting
	٨	Check whether the	Make sure the analog input is
1. AI zero drift is too large		input analog quantity is	normal
		normal	normai

## (46) Er.603 Back to zero timeout

Fault occurrence conditions:

The zero return process exceeds the zero return timeout time P10.08

_			
Fault reason		Fault confirmation	Troubleshooting
1. The origin signal is not	$\checkmark$	Check whether the	Normal access to the zero
properly connected		origin signal is normal	return origin signal

# (47) Er.604 Motor rotation direction is wrong during self-learning

Fault occurrence conditions:

Motor rotation direction is wrong during self-learning

Fault reason		Fault confirmation	Troubleshooting		
1. The motor rotation direction is wrong during self-learning		During self-learning,	Charle whether the motor and		
		check the rotation	check whether the motor and		
		direction of the motor	encoder are normal		
2. The UVW phase sequence		Confirm UVW Phase			
of the motor is connected		Sequence	Confirm UVW Phase Sequence		
incorrectly					

# (48) Er.605 Absolute encoder battery alarm Fault occurrence conditions:

Fault reason	Fault confirmation	Troubleshooting		
1. The absolute encoder	<ul><li>Check the battery</li></ul>	The absolute encoder		
works in absolute value	voltage	works in absolute value mode		
mode, and the battery voltage		and the battery voltage is too		
is too low		low.		

If the battery is not
needed, change the value of
P00.41 to 3 to shield the fault.

The absolute encoder works in absolute value mode, and the battery voltage is too low

# 7.1.4 Motor overload protection

The motor load ratio is defined as (torque output percentage Un013)/(overload value P10.02). The load ratio of the motor output and the time it can run continuously have the following relationship. That is, the larger the motor load ratio, the shorter the continuous running time. Once the continuous running time is exceeded, the motor overload fault will be reported.

Motor load proportion =  $\frac{\text{Torque output percentage Un013}}{\text{Overload value P10.02}}$ Torque output percentage =  $\frac{\text{actual current}}{\text{Drive rated current}} \times 100\%$ 

Different overload curves can be selected by parameter overload curve selection P10.11. This function is only valid when the ARM firmware version is 0.104 and above.



# > Overload curve 1:



Load proportion	Continuous
	running time (s)
1.1	9.7
1.2	8.1
1.4	5.9
1.5	5.1
2.0	2.9
2.5	1.8
3.0	1.2
3.5	0.9

# Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P10.02	Overload value	0~3276.7	%	Set overload	anytime	Immediately	100	RW
				point				

#### 7.1.5 Braking resistor overload protection

According to the actual set resistance value and resistance power, Brake according to the power set in P02.22. For 220V drives, when the DC bus voltage is greater than 380VDC, the dynamic braking circuit can be started by setting parameters. For 380V drives, when the DC bus voltage is greater than 680VDC, the dynamic braking circuit can be activated by setting parameters. It can brake continuously for 33s under the condition of rated power and zero heat dissipation coefficient. If the braking time is exceeded, an overload fault of the braking resistor will be reported. When the braking resistor does not work, if the heat dissipation coefficient. If the heat according to the set heat dissipation coefficient. If the heat according to the set heat dissipation coefficient. If the heat dissipation coefficient is set to 100%, the heat can be dissipated from the maximum heat to 0 in 10s. In general, please refer to the table below for the selection of braking resistors. The actual resistance used needs to be calculated according to the field conditions.

	Noise filter	Datad	R	ecommended Brak	e Resistor	
input power		Nated	Resistance	Resistor Power	Minimum automatic	
	(A)	current (A)	value ( $\Omega$ )	(W)	resistance ( $\Omega$ )	
Three phase	5	3	350	150	25	
220V	5	6	150	300	25	
220 V	10	12	80	600	45	
	10	7	250	600	75	
	20	12	150	1000	75	
	20	16	100	1500	30	
	20	20	80	2000	20	
	30	27	60	2500	20	
Thurse all see	30	32	40	3000	15	
1 nree-pnase	40	38	32	5500	14	
300 V	50	45	27	6500	14	
	70	60	20	9000	14	
	80	75	16	12000	10	
	100	90	13	13000	10	
	120	110	10	18000	7.5	
	120	150	8.2	23000	7.5	

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P02.21	Braking resistor	0~3276.7	Ω	It is used to	anytime	Immediately	0	RW
	resistance			set the				
				resistance				
				value of the				
				braking				
				resistor of the				
				driver.				
P02.22	Rated power of	0~3276.7	KW	Power used to	anytime	Immediately	0	RW
	braking resistor			set the				
				braking				
				resistor of the				
				drive				
P02.23	Braking resistor heat	0~100	%	Set the heat	anytime	Immediately	50	RW
	dissipation coefficient			dissipation				
				coefficient of				
				the resistor				
				when using a				
				braking				
				resistor. If set				
				to 100%.				
				Then 10s can				
				drop from the				
				maximum				
				heat to 0.				

Related parameters are as follows.

#### 7.1.6 Motor overheat protection

Set the DI function bit to INFn.57, and connect an external motor overheat detection circuit. The motor overheat detection circuit adopts PTC protection. The schematic diagram is as follows. When the output of the external motor overheat detection circuit pulls this DI to be valid, the driver reports the motor overheat fault Er.600.



# Motor overheat detection circuit

#### 7.1.7 Motor phase loss protection

The servo drive has input phase loss and output phase loss protection functions, and it is determined by P10.07 whether to enable or not. Input phase loss means that the input voltage R, S, T of the servo is connected to one less phase. Output phase loss means that the motor lines U, V and W are connected to one less phase. Parameter P10.07 has 16 bits, from the 0th to the 15th respectively. When the 0th bit is 1, the output phase loss protection is enabled, and when the 1st bit is 1, the input phase loss protection is enabled. That is, when P10.07=0, no phase loss protection is enabled; when P10.07=1, output phase loss protection is enabled; when P10.07=2, input phase loss protection is enabled; when P10.07=1, input phase loss protection is enabled; when 07=3, the input and output phase loss is enabled at the same time.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P10.07	Phase loss protection settings	0~32767	-	When the 0th bit is 1, the output phase loss protection is enabled; when the 1st bit is 1, the input phase	anytime	Immediately	3	RW
				oss protection is enabled.				

# 7.2 Holding brake output function

The holding brake is a mechanism that prevents the servo motor shaft from moving and keeps the motor locked in position when the servo drive is in a non-operational state, so that the moving part of the machine will not move due to its own weight or external force.

For a servo motor with a brake, if the brake output OUTFn.24 is assigned to a terminal, the brake function will be automatically enabled. It should be noted that the effective level of the brake function terminal can only be set to a low level, otherwise the brake will be released during the power-on process.

 
 Function bits
 Bit description

 OUTFn.24
 Holding brake output.

 When it is invalid, the power supply of the brake is disconnected, the brake acts, and the motor is in a position lock state;

 When it is valid, the brake power is turned on, the brake is released, and the motor can rotate.

The related output function numbers are as follows.

#### 7.2.1 Braking process

The brake is divided into two situations, the first is the static braking process, and the second is the dynamic braking process.

The braking sequence in static state refers to the braking process when the motor speed is lower than 20rpm at the moment when the off-enable command is input (that is, INFn.01 switches from ON to OFF).

The braking sequence under dynamic conditions refers to the braking process when the motor speed is higher than 20rpm at the moment when the disable enable command is input (that is, INFn.01 switches from ON to OFF).

Static brake process

The moment when INFn.01 switches from ON to OFF, the brake process when the motor speed is lower than 20rpm is as follows.



Initially, the holding brake is locked. At time a, the PLC gives the servo enable signal (INFn.01), the servo immediately energizes the motor after receiving the enable signal, the motor locks, and issues the brake release command (OUTFn.24) at the same time, waiting for 1\* this period of time Then, at time b, the brake contactor action is completed and the brake is released. The servo driver starts to receive the enable signal, and after P02.30 ms to time c, it starts to receive the position/speed/torque command, and the motor starts to rotate. After the motor rotates and reaches time d, the PLC sends out the enable signal. When the servo detects that the motor speed is lower than 20rpm, it executes the static brake process and immediately sends the brake lock signal. After a delay of 1\* time, the brake contactor acts. After completion, the brake is locked, and then at time e, the motor is powered off.

Note: 1\* is the time from the servo sending the brake signal to the actual brake contactor action.

P02.32 is the power-on time of the driver after the brake is locked to prevent the mechanical moving part from moving due to its own weight or external force after the servo is powered off.

P02.30 is the delay time from when the drive is enabled to when the input position/speed/torque command is valid.

# <u>Note: After the drive is enabled, it is forbidden to input any torque or speed</u> <u>command within the time range of P02.30. Likewise, the position/speed/torque</u> <u>commands must brake the motor when the motor is disabled.</u>

Brake process under dynamic conditions

When the servo enable is turned from ON to OFF, if the current motor speed is greater than 20rpm, the drive will execute the dynamic brake process. After the servo enable is turned off, the servo always detects the following two conditions, and if any one of the conditions is satisfied, it outputs the brake lock signal.

a. The filtered motor speed (P04.21) is lower than the brake zero speed threshold (P02.31);

b. Start timing when the servo enable turns from ON to OFF, and the time exceeds the effective maximum waiting time of the holding brake (P02.33).

After outputting the brake lock signal, the servo will continue to be powered for 50ms.



# VECTOR

Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P02.30	After the brake release command is output, the command input is delayed	0~32767	ms	The servo drive starts to receive the enable signal, and after the time of P02.30, it starts to receive the position/spee d/torque command, and the motor starts to	anytime	Immediately	250	RW
				rotate.				
P02.31	Brake zero speed threshold	0~32767	rpm	When the motor speed is lower than P02.31, the brake lock signal is output	anytime	Immediately	30	RW
P02.32	Power-on hold time	0~32767	ms	After outputting the brake lock signal, the servo will continue to maintain the power-on time P02.32. This parameter is only used when the brake output function is valid.	anytime		150	RW

VECTOR

P02.33	The	maximum	0~32767	ms	When the	anytime	Immediately	500	RW
	waiting	time of the			servo enable				
	brake sig	nal output			is turned from				
					ON to OFF,				
					the timing				
					starts. If the				
					time exceeds				
					P02.33, the				
					brake lock				
					signal is				
					output.				

# 7.3 Description of dynamic braking function

The servo driver of VEC E1 and E2 structure types (see 2.1.1 Driver Appearance) has the function of dynamic braking inside. After the driver is powered on, the servo driver will detect the DC bus voltage in real time. When the DC bus voltage reaches a specific value, the servo driver will short-circuit the U and V phases in the motor phase sequence through the pull in and turn off of the relay.

When the servo driver detects that the DC bus voltage is more than 70% of the rated voltage, the relay will be disconnected. At this time, the U and V phases are open circuited. When it detects that 65%~70% of the rated voltage, the relay will remain in the previous working state. If the relay was pulled in before, it will also remain in the pulled in state. If the previous state is disconnected, it will also remain in the disconnected state. When it detects that the DC bus voltage is less than 65% of the rated voltage, The driver will short-circuit the U and V phases of the motor phase sequence through the relay pickup, thus greatly reducing the braking time.

# 7.4 Introduction of STO safety terminal

Note: The driver with STO function needs to be ordered, and this function is non-standard, but the general servo driver does not have this function.

	1	
Pin number	dafult	describe
1	COM	STO reference ground
2	STO2	Control input of STO2
3	STO1	Control input of STO1
4	24V	24V internal power supply

Pin description of servo STO safety terminal

Two independent inputs are configured as two-channel inputs of STO function:

#### STO1/STO2.

In order to be more humanized in the debugging process, pins with power supply voltage (+24V) are added.

The STO function of CN4 port is turned on by default. If a safety circuit is installed, but STO function is not needed, it is necessary to connect STO1/STO2 to 24V. Example diagram of external 24 connection:



Example diagram of internal 24V connection:



# 7.5 Instructions for the use of absolute value encoder

The absolute value encoder not only detects the position of the motor within one rotation, but also counts the number of rotations of the motor. It can memorize 16-bit multi-turn data, and the single-turn resolution has two types: 17-bit and 24-bit. A single revolution with 17-bit resolution produces 131,072 encoded values, and a single revolution with 24-bit resolution produces 16,777,216 encoded values. The absolute value system has incremental use mode and absolute value use mode, which can be modified by P00.18. Incremental use mode uses the absolute encoder as an incremental encoder, without battery, without memorizing the number of turns, and it needs to return to zero every time. In the absolute value mode, the battery needs to be added, and the number of turns will also be memorized. It only needs to perform the zero return once, but the motor stroke is limited. Specifically, after the encoder is connected to the battery for the first time, the motor will be based on this. , the maximum can only be rotated forward 32767 circles, and the maximum can only be reversed 32767 circles, otherwise the encoder overflow fault will be reported.

For the absolute value use mode of the absolute value system, when the battery is powered on for the first time, the drive will report Er.227 (battery power failure fault). Record the mechanical zero offset (that is, the distance between the mechanical zero position and the encoder zero position). At this time, the mechanical position and the encoder position have the following relationship:

#### Mechanical position = Encoder position - Mechanical zero point offset

It should be noted that when using an incremental encoder, the encoder position will automatically return to zero after returning to zero, that is, the mechanical position and the encoder position are the same after returning to zero. However, using an absolute encoder, after returning to zero, the encoder position does not return to zero. At this time, the mechanical position and the encoder position are different from the mechanical zero offset. The command value in the multi-segment position command mode refers to the mechanical position, and the unit is the user position unit.

When the battery voltage is too low, the driver will report Er.605 (battery voltage is too low fault). At this time, the battery needs to be replaced when the driver is powered on.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P00.08	Encoder type	0~12	ms		Stop to	Reset takes	0	RW
	0:Incremental encoder				setting	effect		
	ABZ with UVW;							
	1:17-bit absolute							
	value of Tamagawa							
	multi-turn;							
	2:24-bit Nikon							
	multi-turn absolute							

Related parameters are as follows:

# 7.6 Other auxiliary functions

## 7.6.1 Internal flip-flop function

There is a software trigger inside the servo. The software trigger is realized by MCU software scanning. The trigger has a reset (clear) input function bit INFn.59, a set input function bit INFn.60, and a status output function bit. OUTFn.30. The timing of the three is shown in the figure below. It should be noted that the internal trigger is implemented by software scanning, therefore, the pulse width of all trigger signals must be greater than 2ms.



Related input function ons.	Related	input	function	bits.
-----------------------------	---------	-------	----------	-------

Function bits	Bit description
INFn.59	The rising edge resets the output OUTFn.30 of the internal flip-flop
INFn.60	The rising edge sets the output OUTFn.30 of the internal flip-flop

#### Related output function bits.

Function bits	Bit description
OUTFn.30	The output of the internal flip-flop

## 7.6.2 Software counter function

A software counter is implemented inside the servo. The software counter is realized by MCU software scanning. The counter has a count pulse input bit INFn.61, a count clear input

function bit INFn.62, and a status output function bit OUTFn.31. The timing of the three is shown in the figure below, where the count arrival register P02.39 is set to 2. The count value P02.37 counts the pulse signal. When the count value P02.37 reaches the count reach value P02.39, the count reach signal OUTFn.31 is valid. The count value clear pulse INFn.62 clears the count value. It should be noted that the internal counter is implemented by software scanning, therefore, the pulse width of all trigger signals must be greater than 2ms.



#### Related input function bits.

Function bits	Bit description
INFn.61	Count pulse input of internal software counter
INFn.62	Rising edge clears the count value of the internal software counter

## Related output function bits.

Function	Bit description
bits	
OUTFn.31	Internal counter counts up to output

#### Related parameters are as follows.

Parameter No.	Parameter Description	Set range	units	Function	Set method	Effective way	Defaults	read and write method
P02.37	Internal software	0~214748	-	This value is	-	-	-	RO
	counter count value	3647		read-only.				
				Double-byte				

				parameter,				
				and				
				power-down				
				retention				
P02.39	Internal software	0~214748	-	Double-byte	anytime	Immediately	0	RW
	counter reached value	3647		parameter.				
				When the				
				count value				
				P02.37				
				reaches the				
				count reach				
				value P02.39,				
				the count				
				reach signal				
				OUTFn.31 is				
				valid.				

## 7.6.3 U disk update/save parameter function

The servo can save all the parameters inside the servo to the U disk through the USB interface, or update the parameters in the U disk to the servo through the USB interface.

## The operation steps for saving parameters to the U disk are:

(1) Set the startup option P02.09=1.xx (save the servo parameters to the U disk before startup, the file name is xx, xx can be any number)

2 Insert U disk

③ After restarting the servo again, the parameters will be saved to the U disk, and the file name is fixed as PARAxx.CSV. If there is a PARAxx.CSV file in the U disk, it will be automatically replaced. The servo will enter the rdy state only after the file is saved.

# The operation steps for updating parameters from the U disk are:

(1) First set the startup option P02.09=2.xx (update the parameters in the U disk to the servo before startup, the file name is xx, and xx is the number in the parameter file name).

2 Insert U disk

③ After restarting the servo again, the parameters in the PARAxx.CSV file in the U disk will be updated to the servo, and the servo will enter the rdy state after completion.

# Note: U disk must be formatted as FAT32 file system to operate

# Chapter 8 Adjustment

## 8.1 Control loop gain adjustment

Control loop gains include velocity loop proportional gain, velocity loop integral gain, and position loop proportional gain. There are six types of control loop gain adjustment modes. The gain can be adjusted by selecting one of the modes. The first type, the first set of gains is fixed. The second type, the first set of gain and the second set of gain are switched. The third is to automatically calculate a suitable set of gains for normal mode according to the set stiffness level. Fourth, according to the set rigidity level, a set of suitable gains for positioning mode is automatically calculated. The fifth type is to automatically calculate the gain by setting the speed loop and position loop bandwidth. The sixth type, adjust according to the adjustment-free parameter P07.78.

The first type, the first set of gains is fixed: in this mode, the user can manually modify the three values of P07.03, P07.04, and P07.05 to optimize the control performance.

The second type, switching between the first set and the second set of gains: switch between the first set of gains and the second set of gains according to the switching condition P07.24 and other switching related parameters.

The third and fourth modes automatically calculate a set of suitable gains according to the set rigidity level and the self-learned load inertia. The difference between the two is that the gain calculated by the third mode is mainly used for ordinary mode, the gain calculated in the 4th mode is mainly used in the positioning mode.

The fifth type is to automatically calculate the gain by setting the speed loop and position loop bandwidth.

The sixth type, the adjustment-free function. Adjust the gain according to the adjustment-free parameter P07.78.

When using the 3rd/4th/5th/6th gain adjustment method, you must set the motor rated current P00.01, the motor rated torque P00.25, the motor rotor inertia P00.27, the load inertia ratio 07.29, and the drive rated current P01. 03.

In addition, the servo driver has a zero-speed gain attenuation/amplification function, that is, when the motor speed is less than the zero-speed attenuation threshold P07.32, the speed loop proportional gain/integral gain, position loop proportional gain, and current loop proportional/integral gain can be reduced or increased. up to a certain percentage. The zero-speed gain attenuation can effectively avoid the high-frequency vibration of the motor at zero speed. The zero-speed gain amplification can effectively speed up the positioning time at low speed.



Gain switching example: when the gain switching condition P07.24=2, the gain switching level P07.25=2000, and the gain switching time lag P07.26=100, the gain switching conditions are: take the speed command as the basic switching condition, the speed command When rising, when the speed command is greater than 2100 (P07.25+P07.26), switch to the second set of gains; when the speed command decreases, when the speed command is less than 1900 (P07.25-P07.26), switch back to the first set of gains gain.

Remarks: The units of parameters P07.25 and P07.26 change according to the selection of P07.24 (gain switching condition).

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method	
P07.01	Current loop proportional gain	-767	-	anytime	Immediately	100	RW	
P07.02	Current loop integral gain	0~32767	-	anytime	Immediately	20	RW	
	Speed loop proportional gain	0~32767	-	anytime	Immediately	600	RW	
P07.03	Set the proportional gain of the speed loop. This parameter determines the response of the speed loop. The larger the value, the faster the response of the speed loop. However, if it is set too large, it may cause vibration, so attention should be paid to it. In position mode, if you want to increase the position loop gain, you need to increase the speed loop gain at the same time.							
P07.04	Speed loop integral gain	0~32767	-	anytime	Immediately	50	RW	
P07.40	Speed loop differential gain	0~32767	-	anytime	Immediately	0	RW	
	Position loop proportional gain	0~32767	-	anytime	Immediately	200	RW	
P07.05	Sets the proportional gain of the position loop. This parameter determines the responsiveness of the position loop. Setting a larger position loop gain can shorten the positioning time. But be careful: setting too large may cause vibration.							

Related parameters are as follows.

	Percentage of position	0~100.0%	-	anytime	Immediately	100%	RW		
	loop maximum output			5					
P07.06	speed								
	Sets the maximum speed percentage for the position loop output								
D07.07	Output voltage filter time	0~32767	-	anytime	Immediately	0	RW		
P07.07	Set the filter time of the vol	ltage output to	the motor		L		1		
	Torque feedforward filter	0-63		anytime	Immediately	10	RW		
P07.08	time constant								
	Set the torque feedforward	filter time con	stant, the gr	eater the i	nertia, the gre	ater the valu	e		
	Speed feedforward filter	0-63		anytime	Immediately	10	RW		
<b>D</b> 07.00	time constant								
P07.09									
	Set the speed feedforward f	filter time cons	stant. The la	rger the in	ertia, the large	er the value.			
	Torque feedforward	0~32767	-	anytime	Immediately	0	RW		
P07 10	coefficient								
107.10	In non-torque control mode, the torque feedforward signal is multiplied by P07.10, and the result								
	is called torque feedforward	d, which is use	ed as a part o	of the torq	ue command.		1		
	Speed feed forward	0~300.0	-	anytime	Immediately	50.0	RW		
P07 11	coefficient								
10,111	In position control mode and full closed loop function, multiply the speed feedforward signal by								
	P07.11, and the result obtai	ned is called s	peed feedfo	rward, wh	ich is a part of	f the speed c	ommand.		
	Torque filter type	0~4	-	anytime	Immediately	0	RW		
	0-low pass filtering								
	1-notch filter								
P07.12	2-No filtering								
	3-Low pass and notch								
	cascade								
	4-Automatic calculation								
	of filter parameters								
	Gain adjustment mode	0~5	-	anytime	Immediately	0	RW		
	0-Fixed first set of gains: P07.03 to P07.05								
D07.00	1-First and second set gain	switching			D05 00				
P07.20	2-Determined according to rigidity level P07.28 and load inertia P07.29, used in normal mode								
	3-Determined according to rigidity level P07.28 and load inertia P07.29, used in positioning mode								
	4-Gain is automatically cal	culated based	on the set ba	andwidth a	ind inertia rati	0			
	5-No adjustment required,	control accord	ing to paran	neter P0/.	/8	000	DU		
P07.21	The second set of speed	0~32/6/	-	anytime	Immediately	800	RW		
	The second secon	0.227(7			T 1 / 1	10	DW		
P07.22	Ine second set of speed	0~32/6/	-	anytime	Immediately	10	KW		
	The accent to the	0 227/7			Tunne - dia ( 1	200	DW		
P07.23	ne second set of	0~32/6/	-	anytime	immediately	200	KW		
	position 100p								

	proportional gain									
	Gain switching condition	0~7	-	anytime	Immediately	0	RW			
	0-IO switching; INFn.41 switching, use the second set of gains when valid									
	1-When the torque command is large, switch to the second set of gains; when the torque command									
	is greater than (gain switching level P07.25 + gain switching delay P07.26), switch to the second									
	set of gains; torque comma	nd is less than	(P07.25- P0	07.26), swi	itch back to th	e first set of	gains.			
	2-Switch to the second set of gains when the speed command is large; switch to the second set of									
	gains when the speed command is greater than (P07.25+P07.26); switch back to the first set of									
	gains when the speed command is less than (P07.25-P07.26) gain.									
	3-Switch to the second set of	of gains when	the accelera	tion comn	nand is large;	switch to the	e second			
	set of gains when the accele	eration comma	and is greate	er than (P0	7.25+P07.26)	; switch bac	k to the			
D07 24	first set of gains when the a	acceleration co	mmand is le	ess than (P	07.25-P07.26	).				
P07.24	4-Switch to the second set of	of gains when	the speed en	ror is larg	e; switch to th	e second set	of gains			
	when the speed error is great	ater than (P07	.25+P07.26)	; switch b	ack to the firs	t set of gains	when			
	the speed error is less than	(P07.25-P07.2	26)							
	5-Switch to the second set of gains when the position error after filtering is large; switch to the									
	second set of gains when the position error after filtering is greater than (P07.25+P07.26); Switch									
	back to the first set of gains									
	6-If positioning is completed, switch to the second set of gains, and switch to the first set of gains									
	if no positioning is completed.									
	7-Motor phase switching gain; when the motor phase is in the range of (gain switching level $\pm$									
	gain switching time lag), switch to the second set of gains, and other phases switch to the first set									
	of gains; the motor phase c	an be viewed t	through P09	.39						
	Gain switching level	0~32767	-	anytime	Immediately	0	RW			
P07 25	Set the level that satisfies the gain switching condition.									
107.25	The actual switching action is affected by the two conditions of level and time delay. According to									
	the different gain switching conditions, the unit of switching level will change accordingly.									
	Gain switching time	0~32767	-	anytime	Immediately	0	RW			
	delay									
P07.26	Set the time delay that satisfies the gain switching condition.									
	The generation of the actual switching action is jointly affected by the two conditions of level and									
	time delay. According to the	e different gai	n switching	conditions	s, the unit of the	he switching	time			
	delay will change according	gly.		•						
	Gain switching time	0~32767	ms	anytime	Immediately	10	RW			
	constant									
P07.27	In position control mode, if	FP07.23 (secon	nd position l	loop gain)	is much large	r than P07.0	5 (first			
	position loop gain), set the	time for switch	hing from P	07.05 to P	07.23 after the	e switching a	action is			
	generated.									
P07.28	Rigidity level	1~31	-	anytime	Immediately	10	RW			
D07 20	Load inertia, obtained			anytime	Immediately	400	RW			
P07.29	through inertia									

	self-learning									
P07.30	Zero speed speed gain reduction/amplification	0~3276.7	%	anytime	Immediately	50.0	RW			
P07.31	Zero-speed position gain reduction/amplification	0~3276.7	%	anytime	Immediately	100.0	RW			
P07.34	Zero-speed current gain reduction/amplification	0~3276.7	%	anytime	Immediately	100.0	RW			
	Zero speed decay threshold	0~32767	rpm	anytime	Immediately	10	RW			
P07.32	When the rotation speed is less than this value, the actual active speed loop proportional gain integral gain, position loop proportional gain, and current loop proportional gain integral gain are attenuated/amplified according to P07.30, P07.31, and P07.34 respectively.									
P07.33	Inertiaself-learningaccelerationanddeceleration time	0~32767	ms	anytime	Immediately	500	RW			
P07.35	Inertia learning option 0-After the inertia learning is completed, the speed and position loop gains are not automatically matched 1-After the inertia learning is completed, match a set of gains according to the rigidity level P07.28	0~1	-	anytime	Immediately	0	RW			
P07.38	Vibration Monitoring Threshold Percentage	0~32767	%	anytime	Immediately	100	RW			
P07.39	Vibration monitor value	-	-	-	-	-	RO			
	No need to adjust parameters	0.0-3276.7	-	anytime	Immediately	4.1	RW			
P07.78	<ul> <li>A. B format</li> <li>A represents the stiffness, the setting range is 0-7. The larger the value, the greater the stiffness, generally set below 4.</li> <li>B represents the size of the load inertia, the setting range is 0-7. The larger the load inertia, the larger the value that needs to be set</li> </ul>									
P07.90	Actual speed loop proportional gain	-	-	-	-	-	RO			
P07.91	Actual speed loop integral gain	-	-	-	-	-	RO			
P07.92	Actual position loop proportional gain	-	-	-	-	-	RO			

#### 8.1.1 Current loop PI gain adjustment

When the proportional gain of the current loop is too large, the motor will make a rattling sound, and the torque current feedback has high frequency oscillation, which often reports overcurrent. As shown in the picture below. (The more obvious is the current sound)



If the current loop proportional gain is too small, the motor current response is slow, and the output is not enough in the process of rapid acceleration and deceleration.



When the current loop integral gain is too large, the torque current is prone to low frequency oscillation, and overcurrent is likely to be reported during acceleration and deceleration.



If the current loop integral gain is too small, the motor current response is slow, and the output is not enough in the process of rapid acceleration and deceleration.



#### 8.1.2 Speed loop PI gain adjustment

When the proportional gain of the speed loop is too large, the motor is prone to whistling, and the feedback of the speed loop has high frequency oscillation.



If the proportional gain of the speed loop is too small, the rigidity of the motor is very weak and the speed cannot follow.



When the integral gain of the speed loop is too large, the rigidity of the motor is enhanced, and the speed is prone to low-frequency fluctuations.



If the integral gain of the speed loop is too small, the rigidity of the motor is very weak and the speed cannot follow.



# 8.1.3 Position loop P gain adjustment

When the proportional gain of the position loop is too large, the motor speed is unstable and it is easy to shake.



When the proportional gain of the position loop is too small, the position arrives very slowly.


Gain adjustment	
mode	Adjustable speed loop/position loop parameters
P07.20=0	P07.03 (Speed loop proportional gain) P07.04 (Speed loop integral gain)
	P07.05 (Position loop proportional gain)
	P07.08 P07.10 (Torque feedforward)
	P07.09 P07.11 (speed feedforward)
P07.20=1	P07.03 P07.04 P07.05P07.08 P07.09 P07.10 P07.11 (First set of gains )
	P07.21 P07.22 P07.23 P07.24 P07.25 P07.26 P07.27 (Second set of gains)
P07.20=2/3	P07.28 (Rigidity level)
	P07.29 (ratio of load inertia)
	P07.08 P07.10 P07.41 (Torque feedforward)
	P07.09 P07.11 (speed feedforward)
P07.20=4	P07.29 (ratio of load inertia)
	P07.03 (speed loop bandwidth) P07.04 (Speed loop integral gain)
	P07.05 (position loop bandwidth)
	P07.08 P07.10 P07.41 (Torque feedforward)
	P07.09 P07.11 (speed feedforward)
P07.20=5	P07.78 (No need to adjust parameters)
	P07.11 P07.09 (speed feedforward)

8.1.4 List of parameters that need to be adjusted in different gain gain adjustment modes

P07.20=0 or P07.20=4, these two modes have the highest adjustability, and the performance that can be adjusted is also the best, which requires a higher degree of user expertise. P07.20=5 This mode has the lowest adjustability and can only meet the general application requirements, and has low requirements for the user's professional level. P07.20=2 is used for Fn006 single parameter self-adjustment.

P07.11 sets the speed feedforward coefficient. If the system requires the follow-up error to be 0, that is, the position error needs to converge to 0 at constant speed, then the value needs to be set to 100.0%. Under normal circumstances, it is sufficient to set it to 50.0%.

After self-learning the rigidity level through Fn006, if further fine-tuning is required, the bandwidth parameter corresponding to the rigidity level at this time can be set to P07.03, P07.04, P07.05, and P07.20 is set to 4, and then further Adjust P07.03-P07.05 for fine adjustment. When the rigidity level is converted into the corresponding speed loop bandwidth, integral gain, position loop when P07.20=4

Rigidity level P07.28	Speed loop bandwidth (rad/s) P07.03	Speed loop integral gain P07.04	Position Loop Bandwidth (rad/s) P07.05	Rigidity level P07.28	Speed loop bandwidth (rad/s) P07.03	Speed loop integral gain P07.04	Position Loop Bandwidth (rad/s) P07.05
0	9	1	2	16	314	31	62
1	12	1	2	17	376	38	75
2	15	2	3	18	471	47	94
3	18	2	4	19	562	56	112
4	22	2	4	20	722	72	144
5	28	3	6	21	879	88	176
6	38	4	8	22	1067	106	213
7	47	5	9	23	1318	131	263
8	57	6	11	24	1570	157	314
9	69	7	14	25	1758	175	351
10	88	8	17	26	1964	196	392
11	113	11	23	27	2135	213	427
12	157	16	31	28	2323	232	464
13	188	19	38	29	2512	251	502
14	219	22	44	30	2826	282	565
15	251	25	50	31	3140	314	628

Bandwidth is shown in the table below.

#### 8.2 Feedforward gain adjustment

#### 8.2.1 speed feedforward



Speed feedforward refers to the mathematical operation of the given position command to obtain the speed required by the motor, which is directly given to the speed loop. As shown in the figure above, the position command is input into the servo, and it is directly converted into the speed required by the motor. After filtering, it is superimposed on the speed command. Generally speaking, the speed feedforward coefficient is directly set to 50%, and the speed feedforward filter value is set according to the inertia, generally set to 0-20ms. The maximum output speed limit of the position loop means that the output of the position loop is limited within plus or minus percent P07.06. When the speed feedforward is set to 100%, the position error can converge to 0 when the speed is constant. When it is less than 100%, the position error will occur when the motor is moving.

8.2.2 Torque feedforward



Torque feedforward refers to the mathematical operation of the given speed command, combined with the load inertia, to obtain the torque that the motor needs to output, and directly superimpose it into the torque command. As shown in the figure above, the speed command is input into the servo, and is directly converted into the torque required by the motor according to the torque feedforward coefficient. After filtering, it is superimposed on the torque command. Generally speaking, the torque feedforward coefficient is determined by the load inertia. The larger the load inertia is, the larger the value will be. This value can be obtained through Fn007 to learn the habit. The torque feedforward filter is also determined by the load inertia, which is generally set to 5-20ms.

When P07.20=0 or 1, the torque feedforward coefficient is equal to the value set by P07.10. When P07.20=2 or 3 or 4, the torque feedforward coefficient adopts the value set by P07.10\*P07.41/100. When P07.20=5, the torque feedforward is invalid.

#### 8.3 Filter time adjustment

There are three filter times related to loop control, one is the torque filter time. Under normal circumstances, the torque filter is set to a low-pass filter (P07.12=0). At this time, the larger the torque filter time constant P07.13, the smoother the torque command, which can reduce the high-frequency noise of the motor and bring about The side effect is easy to produce low frequency vibration. This value needs to be increased when the inertia is large.

The second is the speed feedforward filter time. When in position mode, if the position command pulse frequency is low, and the position command filter parameters P03.06 and P03.07 are both 0, the speed feedforward filter needs to be added. It can reduce the speed pulsation of the position command and reduce the noise of the motor. The speed feedforward filter time P07.09 is generally set at about 0-20.

The third one is the torque feedforward filter time P07.08. When there are too many high-frequency components of the torque command, this value needs to be increased, generally set at around 5-20.

#### 8.4 Load torque compensation function

VC330 servo provides 3 kinds of load torque compensation modes, and 3 kinds of compensation modes are set by P07.50. When P07.50 is set to 0, the load torque compensation is derived from the fixed value of P07.53. When P07.50 is set to 1, the servo automatically observes the load torque value according to the relevant variables (focusing on stability). When P07.50 is set to 2, the servo automatically observes the load torque value according to the relevant variables (focusing on stability). When P07.50 is set to 2, the servo automatically observes the load torque value according to the relevant variables (focusing on the response), and then to compensate.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method		
P07.50	Torque Compensation Mode	0~2	-	anytime	Immediately	0	RW		
	<ul> <li>0-Torque compensation is derived from the fixed value P07.53</li> <li>1-Automatic compensation (focus on stability, adjust P07.43, P07.54, P07.51, P07.52)</li> <li>2-Automatic compensation (focus on response, adjust P07.43, P07.54)</li> </ul>								
P07.43	Torque compensation gain 1	10~1000	-	anytime	Immediately	100	RW		
P07.89	Torque compensation gain 2	10~1000	-	anytime	Immediately	100	RW		
P07.51	Torque Compensation Frequency Compensation	-1000.0~10 00.0	%	anytime	Immediately	0	RW		
P07.52	Torque Compensation Inertia Compensation	1~1000	-	anytime	Immediately	100	RW		
P07.53	Fixed torque compensation value	-3276.7~32 76.7	%	anytime	Immediately	0	RW		
P07.54	Torque Compensation Percentage	0~100	%	anytime	Immediately	100%	RW		
P07.93	Final calculated torque compensation value	-	%	-	-	0	RO		

Related parameters are as follows.

## 8.5 Mechanical resonance suppression function

If the mechanical characteristics of the equipment have a resonance point at a certain frequency, when the gain is increased, it may cause the motor to resonate, and the resonance frequency is generally above 200Hz. In this case, the servo notch filter + torque low-pass filter can be used to solve the problem. The servo provides 4 sets of notch filters (acting on the position loop) and a set of torque low-pass filters to suppress the resonance signal. When P07.12 is set to 0, a low-pass filter is used alone to suppress resonance. When P07.12 is set to 3, a low-pass filter and a notch filter are used for resonance suppression. When P07.12 is set to 4, once the servo detects oscillation greater than 200Hz, it will automatically turn on a low-pass filter and a notch filter to suppress the resonance. The vibration detection threshold is set by P07.38. The smaller the value is, the more sensitive it is to vibration and the easier it is to detect vibration. When high-frequency mechanical resonance occurs, it is preferred to use the method of automatically inputting the notch filter (P07.12 is set to 4). If it cannot be solved, P07.13-P07.19 and P07.44-P07.49 can be manually set.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method
P07.12	Torque filter type 0-low pass filtering 1-notch filter 2-No filtering 3-Low pass and notch cascade 4-Automatic calculation of filter parameters	0~4	-	anytime	Immediately	0	RW
P07.13	Torque low-pass filter time constant	0~327.67	ms	anytime	Immediately	0.80	RW
P07.14	The frequency of notch filter 1, when it is 0, the notch filter is invalid	0~32767	Hz	anytime	Immediately	0	RW
P07.15	notch filter 1 depth	0~100.0	%	anytime	Immediately	10.0	RW
P07.16	notch filter 1 width	0~1000.0	%	anytime	Immediately	50.0	RW
P07.17	The frequency of notch filter 2, when it is 0, the notch filter is invalid	0~32767	Hz	anytime	Immediately	0	RW
P07.18	notch filter 2 depth	0~100.0	%	anytime	Immediately	10.0	RW
P07.19	notch filter 2 width	0~1000.0	%	anytime	Immediately	50.0	RW
P07.44	The frequency of notch	0~32767	HZ	anytime	Immediately	0	RW

Related parameters are as follows.

	filter 3, when it is 0, the						
	notch filter is invalid						
P07.45	notch filter 3 depth	0~100.0	%	anytime	Immediately	10.0	RW
P07.46	notch filter 3 width	0~1000.0	%	anytime	Immediately	50.0	RW
	The frequency of notch			anytime	Immediately		
P07.47	filter 4, when it is 0, the	0~32767	HZ			0	RW
	notch filter is invalid						
P07.48	notch filter 4 depth	0~100.0	%	anytime	Immediately	10.0	RW
P07.49	notch filter 4 width	0~1000.0	%	anytime	Immediately	50.0	RW

## 8.6 Low frequency vibration suppression

When the motor drives a large inertia flexible load for high-speed positioning, if there is continuous low-frequency vibration below 50Hz. It can be processed by the low frequency vibration suppression function of the servo and the position command filter function. The servo provides 1 set of low frequency suppression notch filter (acting on the speed loop), 1 set of position command notch filter and 1 set of position command low pass filter to deal with the relevant low frequency vibration. The frequency of the low frequency resonance can be analyzed by VECObserver.

It should be noted that if the filter of the position command is increased, the motor motion will lag, thereby increasing the position error during tracking, and it may report that the position error is too large Er203. At this time, the position error threshold needs to be appropriately increased.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method
P07.55	The frequency of the notch filter for low frequency suppression. When it is 0, the notch filter is invalid.	0~100.0	-	anytime	Immediatel y	0	RW
P07.56	Low Frequency Rejection Notch Width	0~1000.0	-	anytime	Immediatel y	50.0	RW
P07.57	Low Frequency Rejection Notch Depth	0~100.0	-	anytime	Immediatel y	10.0	RW
P07.58	Position command notch filter frequency, when it is 0, the notch filter is	0~100.0	-	anytime	Immediatel y	0	RW

Related parameters are as follows.

	invalid						
<b>P</b> 07 50	Position command notch	0.1000.0		anytime	Immediatel	0.0	DW
P07.39	filter width	0~1000.0	-		у	0.0	KW
P07.60	Position command notch	0.100.0		anytime	Immediatel	0.0	DW
F07.00	filter depth	0~100.0	-		У	0.0	K VV
D02 07	Position given low pass	0 100 0		anytime	Immediatel	10	DW
F03.07	filter time constant	0~100.0			У	10	IX W
	Excessive position error			anytime	Immediatel		
<b>D</b> 02 10	value, when set to 0,	0~2147483			У	10	DW
F03.19	there is no excessive	648				10	ι τνν Γ
	position error protection						

#### 8.7 Model Predictive Control Capability

Model predictive control means that the system directly calculates the new position command, speed command, and torque command feed forward to the position loop, speed loop, and torque loop according to the external position command, combined with the built-in mechanical model.



Under position mode control, the servo presets 4 model predictive control methods, namely single inertia model predictive control, dual inertia model predictive control, single inertia model predictive control (no model predictive position command filtering), dual inertia model predictive control (model-free predicted position command filtering). Single inertia system refers to the rigid connection between the motor and the load, such as screw connection. The dual inertia system refers to the connection between the motor and the load with less rigidity, such as the pulley connection. The 4 model control modes are selected by the first bit of P07.61. The factory default does not use model predictive control, but uses ordinary feedforward control. When the model predictive control is enabled, the ordinary speed feedforward P07.10 and torque feedforward P07.11 are invalid. The relevant parameters of model predictive control are as follows.

Parameter No.	Parameter Description	Set range	units	Set method	Effective way	Defaults	read and write method				
	Advanced control	0.0~3276.7	-	anytime	Immediately	0	RW				
	function selection										
	AAA.B format										
	When AAA=0, the common feedforward control is adopted, and the feedforward is controlled by										
	P07.10, P07.11, etc.										
	When AAA=1, single-inertia model predictive control is used.										
P07.61	When AAA=2, dual inertia	model predict	ive control i	is adopted							
	When AAA=3, single-inert	ia model predi	ctive contro	ol (no mod	el predictive p	position com	mand				
	filtering) is used.										
	When AAA=4, the dual-inertia model predictive control (without model predictive position										
	command filtering) is used.										
	When B=0, there is no cont	tinuous vibrati	on suppress	ion functio	on.						
	When B=1, the continuous vibration suppression function is enabled.										
P07.62	Model prediction gain	1.0~2000.0	-	anytime	Immediately	50.0	RW				
P07.63	Model Prediction Compensation	50.0~200.0	-	anytime	Immediately	100.0	RW				
P07.64	Model predicts positive gain	0~1000.0	-	anytime	Immediately	100.0	RW				
P07.65	Model predicts inverse gain	0~1000.0		anytime	Immediately	100.0	RW				
	Model predicts			anytime	Immediately						
P07.66	suppression frequency 1	1.0~250.0	-	2		50.0	RW				
	Model predicts			anytime	Immediately						
P07.67	suppression frequency 2	1.0~250.0				70.0	RW				
D05 (0	Model predicts	0.1000.0		anytime	Immediately	100.0					
P07.68	feedforward velocity	0~1000.0				100.0	RW				
P07.69	Model predicts 2 gain	1.0~2000.0	-	anytime	Immediately	50.0	RW				
P07.70	Model Prediction 2 Compensation	50.0~200.0	-	anytime	Immediately	100.0	RW				

function code group	Summary of parameter groups
Group P00	Motor and Encoder Parameters
Group P01	Drive hardware parameters
Group P02	Basic control parameters
Group P03	position mode parameter
Group P04	Parameters related to the speed mode
Group P05	Related parameters of torque mode
Group P06	DIDO AIAO's related parameters
Group P07	loop control parameters
Group P08	Communication parameters
Group P09	Advanced debugging parameters
Group P10	Fail safe parameters
Group P11	Multi-speed parameters
Group P12	Virtual DI DO parameters
Group P13	Multi-segment position parameters

# Chapter 9 Parameter List

• Explanation of parameter setting method and effective method:

Zero speed setting: This parameter can only be modified when the motor is in zero speed state.

Stop to setting: Indicates that this parameter is read-only when enabled, and can only be modified when disabled.

anytime: Indicates that this parameter can be set at any time after power-on.

Immediately : Indicates that the parameter can be modified when the machine is running, that is, such parameters can be modified in any state, and will take effect immediately after the modification is completed.

Reset effective: Indicates that after the parameter is modified, the drive needs to be reset to take effect.

#### 9.1 P00 group parameters - motor and encoder parameters

P00.01	Name	Rated current o		notor Set Moment		Stop to set	Access	RW		
	Range	0~3276.7	Unit	A	active moment	Immediately	default	6.0		
This para	This parameter is password protected.									

P00.02	Name	Rated speed of the motor	Set method	Stop to set	Access	RW
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	Range	1~32767	Unit	rpm	active moment	Immediately	default	3000
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P00.03	Name	Maximum speed of the motor			Set method	Stop to set	Access	RW
	Range	1~32767	1~32767 Unit rpm		active moment	Immediately	default	3000

	Name	The direct	tion of m tation	otor	Set method	Stop to set	Access	RW
P00.04	Range	0~1	Unit	-	active moment	Immediately	default	1

Setting	Direction of rotation											
0	The positive speed of the motor is defined as the clockwise											
	rotation direction of the motor (looking at the motor shaft)											
1	The positive speed of the motor is defined as the											
	counterclockwise rotation direction of the motor (looking at the											
	motor shaft)											

<u>After setting this parameter, the encoder must be re-learned before it can run. Please</u> <u>connect the UVW power cable of the motor according to the manufacturer's standard,</u> <u>otherwise the rotation direction of the motor may be reversed.</u>

<b>D</b> 00.05	Name	Number of the	f pole pa motor	irs of	Set method	Stop to set	Access	RW
P00.05	Range	1~32767	Unit	-	active moment	Immediately	default	4

D00.06	Name	Мс	otor ID		Set method	Stop to set	Access	RW
P00.06	Range	1~32767	Unit	-	active moment	Immediately	default	0

P00.08	Name Type of 1			notor enc	oder	Set method	Stop to set	Aco	cess	RW
P00.08	F	Range	0~12	Unit	-	active moment	Immediately	def	ault	0
	Setting		etting		Ту	pe of motor	encoder			
	0		In	cremen	tal encoder A	BZ with UVW				
			1	17-bit	absolut	te value of Ta	imagawa multi-i	turn		

2	24-bit Nikon multi-turn absolute value				
3	reserve				
4	Rotary encoder to incremental				
5	Line-saving encoder				
6	23-bit absolute value of Tamagawa multi-turn				
7	23-bit absolute value of Tamagawa lap				
8	17-bit Tamagawa single lap, absolute value				
9	Incremental encoder ABZ without UVW				
10	12-bit SPI resolver				
11	14-bit resolver				
12	BISSC				

	Name	Motor end filte	coder hau r settings	rdware s	Set method	Stop to set	Access	RW
P00.09	Range	1~32767	Unit	20ns	active moment	Immediately	default	20

	Name	Motor ene filt	coder so: ter time	ftware	Set method	Stop to set	Access	RW
P00.10	Range	0~32767	Unit	ms	active moment	Immediately	default	5

	Name Motor encoder resolution		Set method	Stop to set	Access	RW		
P00.11	Range	100~ 214748364 7	Unit	-	active moment	Immediately	default	100 00

D00.12	Name         Motor encoder position (encoder unit)				Set method	-	Access	RO
P00.13	Range	-	Unit	-	active moment	-	default	-

	Name	The detection Th	cted enco olution	oder	Set method	-	Access	RO
P00.15	Range	0~32767	Unit	-	active moment	-	default	-

Nan	Nomo	Motor encoder Hall code			Set		1 00000	DO
	Iname	value		method	-	Access	ĸo	
P00.17	Range	-	Unit	-	active	-	default	-
					moment			

	Name	Absolute val mod	ue system e	1	Set method	Stop to set	Access	RW
P00.18	Range	0-Increment 1-absolute value	Unit	-	active moment	Take effect after power on	default	0

	Name	Motor en	coder sp	beed	Set	Stop to set	Access	RW	
		sampling period			method	2000 10 200	1100000		
	Range	0-7	Unit	-	active	Take effect	default	0	
					moment	after power			
						on			
	0- incremen	tal 250us , Ta	amagawa	a 300us	, Nikon 200	us;			
P00.19	1- incremen	ntal 500us , Tamagawa 360us , Nikon 240us;							
	2- incremen	tal 750us , Ta	amagawa	a 420us	, Nikon 280	us;			
	3- incremen	tal 1000us , 7	Famagav	va 480u	s , Nikon 320	Ous;			
	4- incremen	tal 50us , Tai	nagawa	60us , 1	Nikon 40us;				
	5- incremen	5- incremental 100us, Tamagawa 120us, Nikon 80us;							
	6- incremen	ncremental 150us, Tamagawa 180us, Nikon 120us;							
	7- incremen	incremental 200us, Tamagawa 240us, Nikon 160us							

	Name	Stator	resistanc	e	Set method	Stop to set	Access	RW
P00.20	Range	0~327.67	Unit	Ω	active moment	Take effect after power on	default	-

	Name	D- axis	inductar	ice	Set method	Stop to set	Access	RW
P00.21	Range	0~327.67	Unit	mH	active moment	Take effect after power on	default	-

	Name	Q- axi	s inducta	ince	Set method	Stop to set	Access	RW
P00.22	Range	0~327.67	Unit	mH	active moment	Take effect after power on	default	-

	Name	Line back	electro force	omotive	Set method	Stop to set	Access	RW
P00.23	Range	0~3276.7	Uni t	V/ krpm	active moment	Take effect after power on	default	-

P00.24	Name	Motor p	eak curr centage	ent	Set method	Stop to set	Access	RW	
	Range	0~3276.7	Unit	%	active moment	Take effect after power on	default	-	
This parameter is password protected.									

	Name	Motor	rated tore	que	Set method	Stop to set	Access	RW
P00.25	Range	0~21474 836.47	Unit	NM	active moment	Take effect after power on	default	-

	Name	Motor	rotor in	ertia	Set method	Stop to set	Access	RW
P00.27	Range	0~21474 836.47	Unit	Kgcm <sup>2</sup>	active moment	Take effect after power on	default	-

	Name		Туре	of moto	r	Set method	Stop to set	Access	RW
P00.29	Range	e	0~2	Unit	-	active moment	Take effect after power on	default	0
			Setting		]	Motor encode	er type		
			0		Synchronous motor				
	1			A	Asynchronous				
			2			Linear mo	otor		

P00.30	Name	Second of	encoder t	ype	Set method	Stop to set	Access	RW
	Range	0~2	Unit	-	active moment	Immediately	default	0
		Setting		S	Second encod	er type		

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0	Incremental encoder
1	Single-turn absolute encoder
2	Multi-turn absolute encoder

P00.31 Name	Nomo	Second en	coder ha	rdware	Set	Stop to get	1 00000	RW
	filter setting			method	Stop to set	Access	ΚW	
100.51	Range	1~32767	Unit	20ns	active moment	Immediately	default	20

	Nama	Second en	coder so	ftware	Set	Stop to get	1 00000	DW
P00.32	Iname	filter ti	me cons	tant	method	Stop to set	Access	ĸw
P00.52	Range	0~32767	Unit	ms	active	Immediately	default	5
	runge	0 52101	Cint	1115	moment	miniculatory		5

	Name	Second e	ncoder		Set	Stop to set	Access	RW
DO0 22	Ivanic	resolu	tion		method	Stop to set	Access	IX W
P00.55	Range	100~ 2147483647	Unit	-	active moment	Immediately	default	1000 0

D00.25	Name	Second ene (Encod	coder po der Units	sition s)	Set method	-	Access	RO
P00.55	Range	-	Unit	-	active moment	-	default	-

D00 27	Name N		ıl origin r 32 bits	offset	Set method	-	Access	RO
P00.37	Range	-	Unit	-	active moment	-	default	-

D00.20	Name	Mechanic offset h	al zero p igh 32 b	ooint its	Set method	-	Access	RO
100.39	Range	-	Unit	-	active moment	-	default	-

	Nomo	Absolute	value sys	stem	Set	Stop to get	1 00000	DW
P00.41	Ivallie	fault shielding			method	Stop to set	Access	ΚW
P00.41	Range	0~3	Unit	-	active moment	Immediately	default	0
The 0th bit shields the battery alarm; the 1st bit shields the battery failure								

P00 42	Name	Motor instantaneous	Set		Access	PO
1 00.42	Indiffe	current percentage	method	-	ALLESS	ĸo

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Range	-	Unit	%	active	-	default	0
				moment			

	Name	Motor in	nstantane percenta	ous ge	Set method	-	Access	RO
P00.43	Range	-	Unit	%	active moment	-	default	0

D00 44	Name Average load rate		ite	Set method	-	Access	RO	
P00.44	Range	-	Unit	%	active moment	-	default	0

D00.45	Name	Maxir current p	mum mo ercentag	tor e in 1s	Set method	-	Access	RO
P00.45	Range	-	Unit	%	active moment	-	default	0

P00.46 -	Name	Maximu	n motor	power	Set method	_	Access	RO
	Ivanie	percentage in 1s			Set method	-	100033	RO
	Range	_	Unit	0/2	active	_	default	0
		- Unit		70	moment	-		0

	Name	Inductio re	n motor sistance	stator	Set method	-	Access	RW
P00.47	Range	0-327.67	Unit	ohm	active moment	Take effect after power on	default	0

	Name	Inductio re	on motor sistance	rotor	Set method	-	Access	RW
P00.48	Range	0-327.67	Unit	ohm	active moment	Take effect after power on	default	0

P00.49	Name	Total leaka induc	ge induc tion mot	tance of	Set method	-	Access	RW
	Range	0-3276.7 Unit mH		active	Take	default	0	

		moment	effect	
			after	
			power	
			on	

	Name	Induction motor magnetizing inductance			Set method	-	Access	RW
P00.50	Range	0-3276.7	Unit	mH	active moment	Take effect after power on	default	0

	Name	Inductio fre	on motor equency	rated	Set method	-	Access	RW
P00.51	Range	0-3276.7	Unit	Hz	active moment	Take effect after power on	default	0

P00.52	Name	Induction motor output torque			Set method	-	Access	RO
	Range	0-3276.7	Unit	NM	active moment	-	default	0

P00.53	Name	Induction	n motor o power	output	Set method	-	Access	RO
	Range	0-327.67	Unit	Kw	active moment	-	default	0

	Name	Induction r of magnetiz is the perc rate	notor per zing curr entage o ed curren	rcentage ent, unit f motor t	Set method	-	Access	RW
P00.54	Range	0-3276.7	Unit	%	active moment	Take effect after power on	default	0

D00 55	Name	Induction to	n motor o orque 2	output	Set method	-	Access	RO
P00.55	Range	0-3276.7	Unit	NM	active moment	-	default	0

	Name	Motor	encoder i	fastest	Set	Stop to	Access	RW
		ac	celeratio	n	method	set		
						Take	default	
P00.57	Range	0-3276.7	Unit		effect	effect		
				rpm/ms	active	after		0
					moment	power		
						on		

	Name	Speed Watch Gain			Set method	Stop to set	Access	RW
P00.58	Range	0-32767	Unit	-	active moment	Take effect after power on	default	0

<b>D</b> 00.50	Name	Observati flux linkag n	on metho e of indunotor	od of uction	Set method	Stop to set	Access	RW
F00.39	Range 0~1 Unit		Unit	-	active moment	Take effect after power on	default	1
	I		Setting Obs linl		Observation method of flux linkage of induction motor			
		0		Cor	npatible with	the flux		
					vation algori	thm of the		
			C	old VC servo	driver			
		1		New	flux linkage o	observation		
					algorithr	n		

	Nam	ne	Enable abs Z	solute en offset	coder	Set method	Stop to set	Access	RW
P00.60	Rang	ge	0~1	Unit	-	active moment	Take effect after power on	default	0
			Setting 0	The	Enable absolut	absolute enc e value enco	oder Z offset der Z point offse	et	

	P00.71 is invalid, and the encoder phase will be reset when the encoder is self-learning.
1	Absolute encoder Z-point offset P00.71
	is valid, and the encoder phase will not
	be reset when the encoder is self-learning

	Name	Perma synchron weakeni	nent mag ous moto ng perce	gnet or field ntage	Set method	Stop to set	Access	RW
P00.61	Range	0-50	Unit	%	active moment	Take effect after power on	default	0

	Name	Linear m	otor pole	e pitch	Set method	Stop to set	Access	RW
P00.62	Range	0-3276.7	Unit	0.1mm	active moment	Take effect after power on	default	0

P00.64	Name	Linear mo resolutio distance c or	tor gratin on, that i orrespon ne pulse	ng scale s, the ding to	Set method	Stop to set	Access	RW
P00.64	Range	0-3276.7	Unit	0.1um	active moment	Take effect after power on	default	0

	Name	Current L Amplitud	oop Lim e Param	iting eters	Set method	Stop to set	Access	RW
P00.66	Range	0~32767	Unit	-	active moment	Take effect after power on	default	0
A total o	f 5 bits, ABC	DE, when the	e highest	t bit A is	s set to 1, the	voltage limit ar	nplitude is no	t
enabled, and when it is set to 0, the voltage limit amplitude is enabled. The B bit is the fi								
weakeni	ng regulator k	CP, the C bit	is the fie	ld weak	cening regula	tor KI, the D bit	t is to set the l	imit

amplitude of ud, set it to 0-9, representing 10% to 100%, and the E bit sets the multiple of the high-speed phase compensation.

P00 70	Name	Motor UVW phase sequence			Set method	Stop to set	Access	RW
100.70	Range	0~1	Unit	-	active moment	Immediately	default	1
			Setting		r UVW phas	e sequence		
		0	0		positive sequ	lence		
		1			reverse sequ	ience		
		I I						

This parameter is password protected and can be obtained by self-learning.

P00.71	Name	Z poi (enco	nt offset der unit)		Set method	Stop to set	Access	RW		
	Range	0~32767	Unit	-	active moment	Immediately	default	0		
The offset of the Z point relative to the magnetic pole. This parameter is password protected.										

P00.72	Name	AB phase sequence of the encoder		e of the	Set method	Stop to set	Access	RW	
P00.72	Range	e	0~1	Unit	-	active moment	Immediately	default	0
	S		Setting		AB pha	se sequence o	of the encoder		
			0			positive sequ			
	1			reverse sequ	ience				

This parameter is password protected and can be obtained by self-learning.

P00.73	Name	When the H is 1, the c electri	Iall code orrespor cal angle	value nding e	Set method	Stop to set	Access	RW	
	Range	0~1023	Unit	-	active	Immediately	default	425	
					moment				
This parameter is password protected and can be obtained by self-learning.									

P00.74	Name	When the H is 2 , the c electri	Iall code orrespor cal angle	value nding e	Set method	Stop to set	Access	RW	
	Range	0~1023 Unit -			active	Immediately	default	85	
					moment				
This parameter is password protected and can be obtained by self-learning.									

P00.75	Name	When the H is 3, the c electri	Iall code orrespon cal angle	e value Iding e	Set method	Stop to set	Access	RW	
	Range	0~1023	Unit	-	active	Immediately	default	255	
					moment				
This parameter is password protected and can be obtained by self-learning.									

er is password protected and can be obtained by self-learning. s pai

P00.76	Name	When the H is 4 , the c electri	Iall code orrespor cal angle	value nding e	Set method	Stop to set	Access	RW	
	Range	0~1023	Unit	-	active moment	Immediately	default	765	
This parameter is password protected and can be obtained by self-learning.									

P00.77	Name	When the H is 5, the c electri	Iall code orrespor cal angle	value nding e	Set method	Stop to set	Access	RW	
	Range	0~1023 Unit -		active	Immediately	default	595		
					moment				
This parameter is password protected and can be obtained by self-learning.									

P00.78	Name	When the H is 6 , the c electri	Iall code orrespor cal angle	value nding e	Set method	Stop to set	Access	RW	
-	Range	0~1023	Unit	-	active	Immediately	default	935	
					moment				
This parameter is password protected and can be obtained by self-learning									

This parameter is password protected and can be obtained by self-learning. 

P00.79	Name	Z point w	indow er	nable	Set method	Stop to set	Access	RW	
	Range	0~255	Unit	-	active moment	Immediately	default	22	
This parameter is password protected.									

# 9.2 P01 group parameters - driver hardware parameters

P01.01	Name	ARM soft	ware ver	rsion	Set method	-	Access	RO
	Range	0~65.535	Unit	-	active	-	default	-

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		moment		

P01.02	Name	FPGA sof	tware ve	rsion	Set method	-	Access	RO
	Range	0~65535	Unit	-	active moment	-	default	-

D01.02	Name Driver rated current		Set method	Stop to set	Access	RW		
101.05	Range	0~3276.7	Unit	А	active moment	Immediately	default	6.0
This para	ameter is pass	sword protect						

P01.04	Name	Driver ra	ated curr	ent	Set method	-	Access	RO
	Range	0~3276.7	Unit	А	active moment	-	default	-

P01.05	Name	U phase cu		Set	_	Access	RO	
		instantaneou	is value		method			_
	Range	-3276.7~3276.7	Unit	A	active moment	-	default	-

P01.06	Name	V phase cu instantaneou	urrent Is value		Set method	-	Access	RO
	Range	-3276.7~3276.7	Unit	A	active moment	-	default	-

D01.07	Name	Rated voltage of the drive		Set method	anytime	Access	RW	
P01.07	Range	100~32767	Unit	V	active moment	Immediately	default	220

<b>D</b> 01.00	Name	Bus voltage monitoring value			Set method	-	Access	RO
P01.08	Range	0~32767	Unit	V	active moment	-	default	-

	Name Bus voltage calibration				Set	anytime	Access	RW
		coefficient			method	anytime	Access	IX W
P01.09	Range	0~32767	Unit	%	active	Immediately	default	100.0
	runge	0 5270.7	Cint	70	moment	minediatery	aeraun	100.0

P01.10	Name	Drive temperature			Set method	-	Access	RO
	Range	0~3000	Unit	0.1℃	active moment	-	default	-

	Name	PWM frequency setting register			Set method	Stop to set	Access	RW
P01.11	Range	0~4	Unit	-	active moment	Take effect after power on	default	3
		Settin	ıg		Frequenc	;y		
		0			1.5K			
		1			2K			
		2			4K			
		3			8K			
		4			10K			
This regi	This register is password protected.							

	Name	IGBT	dead tim	e	Set method	Stop to set	Access	RW		
P01.12	Range	3~10	Unit	us	active moment	Take effect after power on	default	3		
This register is password protected										

This register is password protected.

DO1 12	Name	Driv	ver type		Set method	-	Access	RO
P01.13	Range	-	Unit	-	active moment	-	default	0

The first two digits represent the drive communication type, and the last three digits represent the drive function type.

The communication type is 5, representing general-purpose servo, RS485-Modbus communication;

The communication type is 6, which represents CANopen bus servo with CiA402 protocol;

The communication type is 7, which represents EtherCAT bus servo with CiA402 protocol;

The communication type is 9, which means PROFINET bus servo;

The function type is 1, which represents a general-purpose servo with tension control function;

The function type is 2, which represents a general-purpose servo with the function of round pressing;

The function type is 3, which represents a general-purpose servo with wheel cutting function;

The function type is 5, which represents a general-purpose servo with flying shear function;

The function type is 7, which represents a general-purpose servo with a fully closed-loop pressure

function;

D01.15	Name	;	Driver lev	el num	ber	Set method	-	Access	RW
P01.15	Range	e	0~32767	Unit	-	active moment	-	default	0
When re	storing th	ie fac	ctory defaults,	, the pa	ramete	rs related to t	he drive level w	vill be restore	d. The
numbers	and corre	espor	nding levels a	re as fo	llows:				
			E-stru	icture s	ervo dı	river class nu	mber		
		Drive class			Cur	rent (A)	Voltage (V)		
			1		3A		220V		
			2			6A	220V		
			3			12A	220V		
	4			7A		380V			
	5			12A		380V			
	40				15A	220V			

D01 16	Nam	ie	The multiple loop execution and the PW	of the s on frequ M freque	peed ency ency	Set method	anytime	Access	RW
P01.10	Rang	ge	0~3	Unit	-	active moment	Take effect after power on	default	0
	Setting		The r	The multiple of the speed loop frequency and the PWM fr			n		
			0						
	1								
	2								
	3			4 x					

Only Nikon 24-bit encoders allow setting bits 4 times, and the switching frequency must be less than or equal to 8k

P01.17	Name	Resistanc sampling	e value o g current	of t	Set method	Stop to set	Access	RW		
	Range	0~65.535 Unit		-	active moment	Take effect after power on	default	0		
This register is password protected.										

P01.18	Name	The current loop	Set method	anytime	Access	RW
		excedition nequency is a	method			

		multiple o frequ	multiple of the PWM frequency						
Raı	nge	0~4	Unit	-	active moment	Take effect after power on	d	efault	0
		Setting	The c	urrent nultip	loop executi le of the PWI	on frequency is M frequency	a		
		0			2 x				
		1			1 x				
		2			2 x				
		3			4 x				
		4	8 x						

	Name	Curre deci	nt sampling mation rate	b	Set method	anytime	Acce	SS	RW
P01.19	Range	0~4	Unit	-	active moment	Take effect after power on	defaı	ılt	0
	Set	ting	С	Current	sampling de	cimation rate			
		0	Decimation rate is 32 and avoids PWM spikes						
		1	Decimation rate is 32 to avoid PWM spikes						
		2	Decimation rate is 64, do not avoid PWM spikes						
		3	Decimation rate is 128, do not avoid PWM spikes						
		4	Decimation	tion rate is 256, do not avoid PWM spikes					

	Name		Allow PWM to immediate			tely method		anytime	Access	RW
P01.21	Range	;	0~1	0~1 Unit		-	active moment	Take effect after power on	default	0
			Setting 0		Current sampling decimation rate			cimation rate		
			1			PWM	is updated in	mmediately	-	

	Name Deadband Compensation				Set	Allow setting	Access	RW
		Percentage			method	Thow setting	1100055	
P01.22	Range	0~100	Unit	%	active moment	Take effect after power on	default	0

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P01.30	Name	C-phase cu offse	rrent san et value	npling	Set method	-	Access	RO	
	Range	0~32767	Unit	AD	active moment	-	default	0	
This parameter is password-protected and automatically calculated when power is turned on.									

P01.31	Name	B-phase cu offse	rrent san et value	npling	Set method	-	Access	RO	
	Range	0~32767 Unit AD			active moment	-	default	0	
This parameter is password protected.									

P01.32	Name	C-phase current AD			Set	_	Access	RO
		sampling value			method			
	Range	0~32767	Unit	AD	active	_	default	-
	runge				moment			

P01.33	Name	B-phase	current	AD	Set	_	Access	RO
		sampling value			method			
	Range	0~32767	Unit	AD	active moment	-	default	-

D01.04	Name	Capacitor sampl	r voltage ing valu	AD e	Set method	-	Access	RO
P01.34	Range	0~32767	Unit	AD	active moment	-	default	-

D01 36	Motor temperatur			e AD	Set	_	Access	RO
	Indiffe	sample value			method	_	Access	ко
P01.30	Range	0~32767	Unit	AD	active moment	-	default	-

P01.37	Name	continuous run time from last restore factory value			Set method	-	Access	RO
	Range	-	Unit	Ms	active moment	-	default	-

DO1 20	Name	Dri	Driver ID		Set method	-	Access	RO
P01.39	Range	-	Unit	-	active moment	-	default	0

DO1 44	Name	Driv	Driver ID2			-	Access	RO
P01.44	Range	-	Unit	-	active moment	-	default	0

D01.46	Name	Multi-function parameter 1		Set method	anytime	Access	RW	
P01.46	Range	0~65535	Unit	-	active moment	Immediately	default	220

Multi-function setting BIT0 enables AI automatic correction, BIT1 does not enable DO output protection, when BIT11=1, the voltage is low (less than 0.65\*1.1414 of the rated voltage), the relay is disconnected, and when BIT11=0, the relay will not be disconnected when it is closed. When the BIT9 universal servo is set to 1, the offset will not be performed when returning to zero, and the origin will be directly set as the offset position.

	Nomo	Multi-functi	on paran	neter	Set	our time o	1	DW
D01 51	Iname		2		method	anytime	Access	КW
P01.51	D	0 (5525	TT '4		active	т 1° / 1	1.6.1	2
	Kange	0~03333	Unit	-	moment	Immediately	default	2
When B	IT0=0, use th	e torque feedf	orward to	o calcu	ulate the torq	ue feedforward	according to	the
position	command. W	hen BIT0=1,	use the o	ld tore	que feedforwa	ard to calculate	the torque	
feedforw	ard accordin	g to the veloci	ty comm	and.				
When B	IT1=0, enable	e, torque feedf	orward v	vhen F	P07.20=0/1. ₩	When BIT1=1, o	lisabled. Torq	ue
feedforw	ard when P0	7.20=0/1.						
When B	IT2=1, power	-on triggers th	e phase	findin	g of the linea	r motor increm	ental encoder	
When B	IT3=1, Fn004	does not lear	n the mo	tor end	coder parame	eters, only VVV	F speed regul	ation
When B	IT4=1, the real	solver FREQ S	SEL1					
When B	IT5=1, resolv	er AMCD						
When B	IT6=1, the re	solver automat	tically re	sets th	e fault			
When B	IT7=1, select	the high-speed	d pulse c	omma	and as the pul	se position con	nmand. BIT7=	=0,
select the	e low-speed p	oulse command	d as the p	oulse p	osition comr	nand.		

DOO	01	Name	Drive	Control M	ode	Set method	anytime	Access	RW
P02.0	01	Range	0~7	Unit	-	active moment	Immediat ely	default	0
		Setting				Control mod	e		
		0				Position mod	le		
		1				Speed mode	e		
		2				Torque mod	e		
		3	Positi	on/torque	mode I	O switching,	select Torque	e mode when	
					Π	NFn.36 is act	ive		
		4	Position/s	speed mod	le IO sw	vitching, seled	et speed mod	e when INFn.	36
						is active			
		5	Torque/sj	peed mode	e IO swi	itching, select	t torque mode	e when INFn.3	6
						is active			
		6	Position/t	orque/spe	ed mod	e IO switchin	g, through IN	VFn.36, INFn.	37
			_			switching			
				INFn.3	37	INFn.36	working	mode	
				invali	d	invalid	Speed r	node	
				invali	d	valid	Torque	mode	
				valid		XX	Position	mode	
		7			Ded	icated control	mode		

# 9.3 P02 group parameters - basic control parameters

D02.02	N	lame	Curren operati	t Mode o on displa	of ay	Set method	-	Acces	s	RO
P02.02	R	ange	0~2	Unit	-	active moment	-	defaul	t	-
		S	etting			control mo	ode			
			0			position m	ode			
			1			speed mo	de			
			2			torque mo	ode			

	Name	Forward	d and rev	verse	Set	anytime	Access	RW
D02.02		rotation	is prohi	bited	method	-		
P02.03	Range	0~2	Unit	-	active	Immediately	default	0
					moment			

Setting	Forward/reverse setting
0	No forward and reverse restrictions
1	Forward rotation is prohibited
2	Reverse prohibited

D02.04	Name	Driv	e status		Set method	-	Access	RO
P02.04	Range	0~32767	Unit	-	active moment	-	default	-
		Settin	g		Drive stat	us		
		1			Self-check (n	ordy)		
		8			ready (rd	y)		
		16			running(ru	ın)		
		32		e	mergency sto	p(run)		
		64		Resp	onding to fai	lures (run)		
		128			Fault (Er.x	xx)		

	Name	LED displ running	lay conte or rdy st	ent in ate	Set method	anytime	Access	RW
P02.05	Range	0~10	Unit	-	active moment	Immediately	default	0
		Settin	ıg		Display cor	ntent		
		0			Display st	ate		
		1			Display sp	eed		
		2		Dis	play capacito	or voltage		
		3		Ι	Display tempo	erature		
		4			Display cur	rent		
		5		D	isplay DI lev	el value		
		6		Di	splay DO lev	vel value		
		7			AI1 voltage	value		
		8			AI2 voltage	value		
		10			Torque perce	entage		

D02.07	Name	Parameter	eter write protection		Set method	anytime	Access	RW
P02.07	Range	0~1	Unit	-	active moment	Immediately	default	1

Setting	Parameter write setting
0	write prohibited
1	writable

D02.09	Name		Paramete	er save se	election	Set method	anytime	Access	RW
P02.08		ange	0~1	Unit	-	active moment	Immediately	default	0
	Setting				Parameter save settings				
		0		The					
			1	Parameters are saved to RAM, lost when power					
				off					
			2	The parameters written by communication are					
				saved	to RAM,	and lost when	n power off, the		
				paran	neters writt	ten by the par	nel are saved to		
				EI	EPROM, a	nd saved whe	en power off		

	Name	Start	up optio	ns	Set method	anytime	Access	RW
P02.09	Range	0.00~5.00	Unit	-	active moment	Take effect after power on	default	0

a.bb format. When a=0, it starts normally. When a=1, all parameters are read to the U disk at startup, and the name in the U disk is <PARA + 'bb'.csv>. For example, if P02.09=1.05 is set, all parameters will be saved to the U disk when the system is started next time, and the file name is 'PARA05.csv'. When a=2, all parameters with the parameter name <PARA + 'bb'.csv> in the U disk will be updated to the servo at startup. For example, when P02.09=2.99, all parameters with the parameter name 'PARA99.csv' in the U disk will be updated to the servo at startup. For example, when P02.09=2.99, all parameters with the parameter name 'PARA99.csv' in the U disk will be updated to the servo at startup. When a=3, all non-motor drive parameters with the parameter name <PARA + 'bb'.csv> in the U disk will be updated to the servo at startup. 13. All parameters except P10.01, P1003, P10.04, and P10.06; when a=4, update all control parameters with the parameter name <PARA + 'bb'.csv> in the U disk to the servo , the control parameters refer to all parameters except P00, P01 group, P05.13, P10.01, P1003, P10.04, P10.06, P07 group; when a=5, record the curve in real time to U plate.

P02.10	Name	Selection Fault Sl	of Servo hutdown	o Type II Mode	Set method	anytime	Access	RW
	Range	0~5	Unit	-	active moment	Immediately	default	0

Setting	Selection of Servo Type II Fault Shutdown Mode
0	free to rotate
1	rapid deceleration stop and disable driver
2	slow deceleration stop and disable driver
3	rapid deceleration stop and keep enable driver
4	slow deceleration stop and keep enable driver
5	Braking according to the current set by P02.18

	N	lame	fault ty	fault type 3 stop mode selection		Set method	anytime	Access	RW
P02.11		ange	0~5	Unit	-	active moment	Immediately	default	0
		Setting			fault type 3 stop mode selection				
		0		free to rotate					
			1	rapi	rapid deceleration stop and disable driver				
			2	slov					
		3		rapid o					
		4		slow deceleration stop and keep enable driver					
	5		5	Braking according to the current set by P02.18					

		Name	Over tr	avel stop	mode	Set	anytime	Access	RW
D02 12		i vanne	selection			method	anytime	1100035	IX W
P02.12		Danaa	0.5	T Lait	-	active	Immediately	dafault	0
	Ran		0~3	Unit		moment	Immediately	derault	0
			•						
		Setting			Over travel stop mode selection				
			0						
			1	rapid deceleration stop and disable driver					
			2	slow deceleration stop and disable driver					
		3		rapid deceleration stop and keep enable driver					
			4	slow d	leceleration	stop and kee	p enable driver		
		5		Brakin					

	N	lame	Disable o	lriver sto election	op mode	Set method	anytime	Access	RW
P02.13	R	ange	0~2	Unit	-	active moment	Immediately	default	0
		S	etting	Ι	Disable driver stop mode selection				
			0	free to rotate					
			1	rapid deceleration stop and disable driver					
			2	slow deceleration stop and disable driver					

D02.14	N	lame	Emerg stop se	ency election		Set method	anytime	Access	RW
P02.14	P02.14 Rang		0~4	Unit	-	active moment	Immediately	default	0
		Setting			Emergency stop mode selection				
			0						
			1	rapi	rapid deceleration stop and disable driver				
		2		slov					
			3	rapid o	leceleration	stop and kee	ep enable driver		
		4		slow deceleration stop and keep enable driver					

P02.16	Name	rapic	l stop tin	ne	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

202.47	Name	slow	stop tin	ne	Set method	anytime	Access	RW
P02.17	Range	0~65535	Unit	ms	active moment	Immediately	default	1000

	Name	me Drive dynamic braking current				anytime	Access	RW
P02.18	Range	0~3276.7	Unit	%	active moment	Immediately	default	50

	Name	Enable ha b	rdware d oraking	ynamic	Set method	anytime	Access	RW
P02.19	Range	0~32767	Unit	ms	active moment	Reset takes effect	default	0

D02 20	Name	Servo	Servo braking option				anytime	Ac	cess	RW
P02.20	Range	0~2	3	Unit	-	active moment	Immediately	def	àult	2
	Sett	ting	η			Braking meth	hou			
	Den				1	braking men	lou			
	(	)	Ne			ver start the brake				
	1	l	Braking is po			ssible only when decelerating				
	2	2		1	eady	to brake at a	ny time			

3 Braking is only possible when the energy is fed back

For 220V drives, when the DC bus voltage is greater than 380VDC, the dynamic braking circuit is activated;

For 380V drives, when the DC bus voltage is greater than 680VDC, the dynamic braking circuit is activated.

P02.21 -	Name	Braking	resistor	value	Set method	anytime	Access	RW
	Range	0~3276.7	Unit	Ω	active moment	Immediately	default	0

P02.22 -	Name	Maximum <sub>J</sub>	power of esistor	fbraking	Set method	anytime	Access	RW
	Range	0~3276.7	Unit	KW	active moment	Immediately	default	0

P02.23 -	Name	Heat dissip	oation co	efficient	Set	anytime	Access	RW	
	i tullie	of braking resistor			method	unythint	1100055	I.W	
	Range	0~100	Unit	%	active moment	Immediately	default	50	
If it is set to 100%, it means that it takes 10s to drop from the maximum heat to 0.									

P02.30	Name	After the command command	e brake r d is outp input is	elease ut, the delayed	Set method	anytime	Access	RW
	Range	0~32767	Unit	ms	active moment	Immediately	default	250

P02.31 -	Name	Brake zero	speed tl	nreshold	Set method	anytime	Access	RW
	Range	0~32767	Unit	rpm	active moment	Immediately	default	30

P02.32 -	Name	Power	up hold	time	Set method	anytime	Access	RW
	Range	0~32767	Unit	ms	active moment	Immediately	default	150

P02.33	Name	Max brake disa	e hold tir ble drive	ne after er	Set method	anytime	Access	RW	
	Range	0~32767 Unit ms			active moment	Immediately	default	500	
After the enable is turned off, when the motor is rotating, the maximum waiting time for the brake									
to be effective.									

P02.35 -	Name	Drive	er passwo	ord	Set method	anytime	Access	RW
	Range	0~32767	Unit	-	active moment	Immediately	default	0

	Name	Self-learn	ning max	kimum	Set	anytime	Access	RW	
D02.26		current limit			method				
P02.30	Range	0~100	Unit	-	active	Immediately	default	30	
	Tung	0 100	0.111		moment			20	
Setting 30 is 30% of the rated current of the motor									

P02.37	Nomo	Internal so	oftware of	counter	Set		1 00000	PO	
	Indiffe	count value			method	-	Access	кU	
	Range	0~214748 3647	Unit	-	active moment	-	default	-	
This parameter is a double-byte parameter; the value is retained after power failure.									

P02.39 -	Name	Internal so	oftware of	counter	Set	anytime	Access	RW	
		arrival value			method				
	Range	0~214748	Unit	_	active	Immediat	default	0	
		3647	Om	-	moment	ely		0	
This parameter is a double-byte parameter.									

		Nama	VVVF ma	aximum	voltage	Set	anutimo	A 22255	RW
D02	D02 41	Name	output			method	anytime	Access	КW
	P02.41	Range	0~1000	Unit	V	active	Immodiately	dafault	20
	l		0~1000	0~1000 Unit		moment	minediatery	uciault	50

P02.42	Name	Linear m	otor para	ameter	Set method	anytime	Access	RW		
	Range	0~32767	Unit	-	active moment	Reset takes effect	default	0		
The linear motor parameter defaults to 0, a total of 5 digits, the lower two digits set the linear										

motor phase self-learning gain, generally set to 5-30, when it is set to 0, the gain is automatically set, and the second digit encoder self-learns the most laps. Number, that is to say, the number of encoder pulses that the self-learning takes the most = the second bit \* resolution, the third bit is the speed level of the encoder self-learning encoder, the high bit is set to 1, the encoder does not have a hall, set to 0, the encoder has hall.

P02.50	Name	Instruc	tion reve	ersal	Set method	anytime	Access	RW		
	Range	0-7	Unit	-	active moment	Immediat ely	default	0		
When th	When the 0th bit is valid, the position command is reversed;									
When th	When the first bit is valid, the speed command is reversed;									
When th	When the second bit is valid, reverse the torque command									

## 9.4 P03 Group parameter - position mode parameter

<b>D</b> 02 01	Name	S	ource o	f positio	n cmd	Set method	anytime	Access	RW	
105.01	Range	0	l~6	Unit	-	active moment	Immediat ely	default	0	
	Setting				positio	on command	source			
	0	0 Sourced from e			external XY p	nds				
	1		From internal multi-segment location planning							
	2		S	Switch between external pulse command and internal						
			position planning command through INFn.35							
	3		The o	comman	d pulse su	perimposes t	coder pulse			
					as the	position con	nmand			
	4	Command pulse superimposed internal position planning as								
		position command								
	5	5 Round pressure round sleeve label								
	6					sine wave				

P03.02	N	ame	puls	se pattern		Set method	Stop to set	Access	RW
	Range		0~4	Unit	-	active	Immediately	default	2
						moment			
		S	Setting Comm		and pulse co	unt mode			
			0	) Pulse plu		direction &p			
			1	Pulse plus			egative logic		
			2			AB pulse			

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3	CW+CCW positive logic
4	CW+CCW negative logic

P03.03	Name	Command p filte	ulse har ering	dware	Set method	Stop to set	Access	RW
	Range	0~32767	Unit	20ns	active moment	Immediately	default	50

	Name	Command pulse count value			Set	-	Access	RO
DO2 04		value			method			
103.04	Range	-2147483647~	Uni	_	active	_	default	_
		2147483647	t	_	moment	-	uoraun	

	Nomo	Position com	mand giv	/en	Set	set when	A 22255	RW
D02.06	Indiffe	median filter time constant			method	stop	Access	K.W
P03.06	Range	0~128	Unit	ms	active moment	Immediately	default	0

	Nomo	Position com	mand giv	/en	Set	set when	A 22255	DW
D02.07	low-pass filter time con		stant	method	stop	Access	Κw	
P03.07	Range	e 0~32767	Unit	ms	active	Immediately	default	20
		0~52707 Onit			moment	5		-

	Name	Electronic gear ratio 1			Set	anytime	Access	RW
D02.09	INdifie	numerator			method	anytime	100035	IC W
P03.08	Range	1~2147483647	Unit	-	active moment	Immediately	default	0

D02.10	Name	Electronic gea denomina	ur ratio 1 ator		Set method	anytime	Access	RW
P03.10	Range	1~2147483647	Unit	-	active moment	Immediately	default	1000

D02 12	Name	Electronic gea	ur ratio 2	2	Set	anytime	Access	DW/
	Inallie	numerat	or		method	anythic	Access	Κw
P03.12	Range	1~2147483647	Unit	-	active moment	Immediately	default	0

D02 14	Nama	Electronic gear ratio 2	Set	onutino	A 22233	DW
P05.14	Iname	denominator	method	anytime	Access	ΚW

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	Range	1~2147483647	Unit	-	active moment	Immediat ely	default	1000
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P03 16	Name	Electronic switching tir	gear rati ne const	io ant	Set method	anytime	Access	RW
105.10	Range	0~32767	Unit	ms	active moment	Immediately	default	0

	Nama		Position	error	Set		A	ВO
D02 17	Name		(0.0001re	ound)	method	-	Access	ĸŌ
P03.17	Range		Unit	0.0001	active		default	
		-	Unit	round	moment	-	derault	-

	Name	Maximum positive	tion erro	or	Set	anytime	Access	RW			
P03.19			onoune	1)	memou						
105119	Range	0~2147483647	Unit		active	Immediately	ely default 3	30000			
	Range	0~214/40304/	Om	-	moment	minediatery		50000			
Excessive position error threshold, when it is set to 0, no excessive position error protection will be											
performed.											

P03.21	.21	Name	Form setti deviatior IN	ng of po 1 clear si IFn.25	sition gnal	Set method	anytime	Access	RW
		Range	0~3	Unit	-	active moment	Immediately	iately default 0 i setting valid	0
[		Setting Position deviation					gnal form setting	g	
		0		Cl	ear devi	ation when IN	VFn.25 is valid		
		1	Clear t	he devia	tion whe	en INFn.25 ch	anges from inva	alid to valid	
		2	INFn.25 Invalid clear deviation						
		3	Clear the	e deviati	on wher	n INFn.25 is c	hanged from va	lid to invalid	

P03.22	Name		Positio clearin	n deviati ng optioi	on 1s	Set method	anytime	А	ccess	RW
	R	ange	0~6	Unit	-	active moment	Immediately	de	efault	0
Setting			I							
			0	Clear position error and clear velocity						
			1	reserve						
2			reserve							
3		reserve								
			4	Clear the position error, and at the same time,						
	the speed drops to zero in a straight line, and									
---	---									
	the falling time is set by P02.16									
5	reserve									
6	Clear the position error, at the same time the									
	speed drops to zero with a quadratic curve, the									
	drop time is set by P02.16									

P03.23	Name	Position co is 0, outpu	Position command speed is 0, output confirmation time		Set method	anytime	Access	RW
	Range	0~32767	Unit	ms	active moment	Immediately	default	0
This para	ameter is used	d in conjunct	ion with	OUTFn	.33.			

D02 21	N	lame	Enable fu	Enable full closed loop			Stop to set	А	ccess	RW
P05.51	R	ange	0~1 Unit -		active moment	Immediately	de	efault	0	
		S	etting	g Full		ll closed loop	option			
			0	) Disa		able fully clos	sed loop			
			1		En	able full close	ed loop			

<b>D02 22</b>	N	lame	Fully clos feed	ed loop o back mo	encoder de	Set method	anytime	A	ccess	RW
P03.32	Range 0~2		Unit	-	active moment	Immediately of		efault	0	
		S	etting		Full closed loop mode					
			0		half closed loop					
When			1		fı	Illy closed lo	op		D02 2	·
electroni	c		2	Swi	tch betwee	en full closed	l loop and semi		rus.s	52 - 2,
is used for	or		2		closed	loop accordi	ng to IO		gear	
semi-clo	sed lo	oop, and	electronic g	ear ratio	2 is used	for full-close	d loop.			

semi-closed loop, and electronic gear ratio 2 is used for full-closed loop.

D02.22	Name	Fully close	ed loop f olarity	eedback	Set method	anytime	Access	RW
P03.33	Range	0~1	Unit	-	active moment	Immediately	default	0

Setting	Fully closed loop feedback polarity
0	The values of the motor encoder counter and
	the second encoder counter are incremented or
	decremented simultaneously
1	The values of the motor encoder counter and
	the second encoder counter are incremented and
	decremented

P03.34	Name	The number of pulses of the second encoder corresponding to one revolution of the motor		Set method	anytime	Access	RW
Range 1~2147483647 Unit		Unit	-	active moment	Immediat ely	default	10000

P03.36	Name	Full closed loo error is too larg (unit is 0.000	p positio e thresho 1 round	on old )	Set method	anytime	Access	RW
	Range	0~2147483647	Unit	-	active moment	Immediately	default	10000

The fully closed loop position error refers to (the count value of the motor encoder - the count value of the second encoder reduced to the motor encoder), and the position error represents how much the relative sliding between the material and the motor is.

When this parameter is set to 0, the full-closed loop position error excessive protection will not be performed.

D02 29	Name	Fu	Full closed loop position error		Set method	-	Access	RO
105.58	Range	-	Unit	0.0001 round	active moment	-	default	-

	Nomo	Full closed loo	p positio	on	Set	our time o	A	DW
D02 40	Name	error clearing cycles			method	anytime	Access	KW
P03.40	Range	0~32767	Unit	-	active moment	Immediately	default	20
This valu	This value is valid when in full closed loop state.					he full-closed lo	op positic	on error
will not	be cleared; w	hen set to n, when	the mot	or ro	tates every n	cycles, if the at	osolute val	ue of
the full-c	full-closed loop position error is less than P03.36, the full-closed loop position error will be							
cleared.								

P03.41	Name	Fully closed loop motor encoder rate		Set method	-	Access	RO	
	Range	-	- Unit clk/5ms		active	-	default	-

				1
		moment		1

D02 42	Name	Fully closed loop second encoder rate			Set method	-	Access	RO
P03.42	Range	-	Unit	clk/5ms	active moment	-	default	-

D02	45	Name		Positioning	complet ondition	te output	Set method	anytime	Access	RW
P03.	.43	Range		0~4	Unit	-	active moment	Immediat ely	default	0
	9	Setting			Posit	ioning cor	nplete output	condition		
		0		When the threshold,	position it will b	n error is le e output d	ess than the p irectly, other cleared.	oositioning c wise, the out	ompletion put will be	
	When the position error is less than the positioning completion1threshold, and the speed command P03.95 in the position mode is zero, the output is output, otherwise the output is cleared.									
		2 When the position error is less than the positioning completion 2 threshold, and the filtered speed command P03.96 in the position mode is zero, the output is output, otherwise the output is cleared.								
	3 When the position error is less than the positioning completion threshold, and the speed command P03.95 in the position mode is zero, the output is output. When the speed command P03.95 in the position mode is not zero, the output is cleared.									
		4	7	The multi-se	gment p	osition con the position	mmand is ser	nt and the po tion threshol	sition error is ld	

P03.46	Name	positioning completion threshold (unit is 0.0001 round)			Set method	anytime	Access	RW
1 000 10	Range	0~32767	Unit	-	active moment	Immediately	default	10

D02	17	Name	Positionin	g close to onditions	o output	Set method	anytime	Access	RW
P03.	.4 /	Range	0~3	Unit	-	active moment	Immediately	default	0
	•	Setting		Positioning clo		se to output	conditions		
	0		Output whe	n the pos	sition error	r is less than	the positioning J	proximity	
		U		thres	hold, othe	rwise clear t	he output;		

	The output is when the position error is less than the positioning
1	approach threshold and the speed command P03.95 in the position mode
	is zero, otherwise the output is cleared;
	Output when the position error is less than the positioning approach
2	threshold and the filtered speed command P03.96 in position mode is
	zero, otherwise clear the output
	The output is when the position error is less than the positioning
2	approach threshold and the speed command P03.95 in the position mode
3	is zero, and the output is cleared when the speed command P03.95 in
	the position mode is not zero

D03 48	Name	positioning close threshold (unit is 0.0001round)			Set method	anytime	Access	RW
P03.48	Range	0~32767	Unit	-	active moment	Immediately	default	100

P03.49	Name	position completion thres	oning /close tin hold	ne	Set method	anytime	Access	RW	
	Range	0~32767	Unit	ms	active moment	Immediately	default	10	
When th	e position err	or is less than th	e positio	ning c	ompletion/pr	oximity thresho	ld, and the	time	
threshold	threshold is maintained, the positioning completion/proximity signal is output.								

D02 51	Name	Hom	ing meth	od	Set method	Stop to set	Access	RW
P03.51	Range	0~99	Unit	-	active moment	Immediately	default	1

	Name	Homing acceleration and			Set	anytime Access		RW
D02 52	1.0000	decelerat	ion time		method	unij unite	1100000	11.1
P05.52	Range	0~65535	Unit	ms	active	Immediately	default	500
					moment			

D02 52	Name	First hom	ing speed	d	Set method	anytime	Access	RW
r03.55	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P03.54	P03.54NameSecond homing speedRange0~32767Unitrpm		ning spe	ed	Set method	anytime	Access	RW
			rpm	active	Immediately	default	100	

		moment		

D02 55	Name Homing offset				Set method	anytime	Access	RW
P05.55	Range	-2147483647~	Unit	User	active	Immodiately	default	0
		2147483647	Om	units	moment	minediatery		0

P03.57	Name	Zero	point r	ange	Set method	anytime	Access	RW
	Range	0~32767	Uni t	0.0001 round	active moment	Immediat ely	default	5

	Name	Interrup funct	Interrupt fixed-length function enable			Stop to set	Acc	cess	RW
P03.60	Range	Range 0~2		-	active moment	Immediately	defa	ault	0
	Set	ting	Int	errupt fix	ed-length fu				
		0	Di	sable inte	errupt fixed-length function				
		1	Enable IO trigger interrupt fixed-length function						
		2	Enab	le Z poin	t trigger inter	rupt fixed lengt	h		

P03.61	Name	Interrupt fixed	l length s	speed	Set method	anytime	Access	RW
	Range	0~32767	Unit	rpm	active moment	Immediately	default	3000

P03.62	Name	Interrupt fixed long acceleration/deceleration time			Set method	anytime	Access	RW
	Range 0~32767 Unit ms		active moment	Immediately	default	500		

P03.63	Name	Interrupt fixe (user ur	ed length nit)	l	Set method	anytime	Access	RW
	Range	0~2147483647	Unit	-	active moment	Immediately	default	10000

P03.65	Name	Interrupt fixed window pos (User uni	-length ation ts)		Set method	anytime	Access	RW
	Range	0~2147483647	Unit	-	active	Immediate	default	0

		moment	ly	

P03.67	Name	Interrupt fi window (User	xed-leng 7 range units)	th	Set method	anytime	Access	RW	
	Range	0~65535	Unit	-	active moment	Immediately	default	0	
Interrupt	Interrupt fixed-length window range (user unit), when it is 0, no window will be added, and the								
interrupt	interrupt fixed-length trigger enable signal is derived from INFn.38.								

	N	ame	Cancel t	he fixed	length	Set	anytime	Access	RW
D02 69				mode		method	2		
P03.08	R	ange	0~1	Unit	-	active moment	Immediately	default	0
		S	etting	etting Cance			h mode		
			0	0 After the interr			upt fixed length is completed,		
				directly cano			pt fixed length		
			1	Rele	ease interr	upt fixed len	gth through IO		

	Name	Interrupt the lemotor po	hed	Set method	-	Access	RO	
P03.69	Range	-2147483647 ~ 2147483647	Unit	-	active moment	-	default	-

D02 72	Name	Ena	ble hardwar oftware limi	e and its	Set method	anytime	Access	RW
P03.73	Range	0~2	Unit	-	active moment	Immediately	default	0
	G. 41 <sup>°</sup>		G 6	11	1 1	с: <u>1</u>		
	Settii	ng	Sonwa	ire and hai	rdware limit	function selection	on	
	0		D	isable sof	ftware and hardware limit			
	1		Е	nable hard	dware and software limits			
	2		Enable sof	ftware and	l hardware limit after origin return			

	Name	Software limi val	it lower ue	limit	Set method	anytime	Access	RW
P03.74	Range	-2147483647 ~ 2147483647	Unit	-	active moment	Immediately	default	-10000000

	Name	Software limi val	it upper ] ue	limit	Set method	anytime	Access	RW
P03.76	Range	-2147483647 ~ 2147483647	Unit	-	active moment	Immediate ly	default	10000000

	N	ame	Selection of servo pulse			Set	anytime	Ac	cess	RW
P03 78			output source			method				
105.70	R	ange	0~2	Unit	-	active	Immediately	de	fault	0
					moment	5				
		~	•		-	2				
		S	etting	Type of output pulse						
			0	output motor pulse						
			1	Output command pulse						
			2			o output, do i	nput			

P03.79	Name	Motor puls divisio	se frequent	ency	Set method	anytime	Access	RW	
	Range	1~65535 Unit -			active moment	Reset takes effect	default	-	
If the motor type is an incremental encoder, the default is 1, The number of pulses output by the pulse output port = the number of motor pulses/P03.79;									

If the motor type is an absolute encoder, the default value is 10000,

Indicates that the motor rotates once, and the number of pulses output by the pulse output port is P03.79.

P03.80	N	ame	Frequency outpu	divisior t directio	n pulse on	Set method	anytime	А	ccess	RW
P03.80	Range		0~1	Unit	-	active moment	Reset takes effect	de	efault	0
	Setting 0		Frequ	iency di	vision pulse positive outp	output direction	L			
	1					reverse outp	ut			

DO2 81	Name	Z pulse pola	arity sele	ection	Set method	anytime	Access	RW
P03.81	Range	0~1	Unit	-	active moment	Immediately	default	0

Setting	Z pulse polarity selection
0	positive output
1	reverse output

P03.82	N	lame	Enable 4th power curve			Set method	Stop to set	А	ccess	RW
P05.82	R	ange	0~1	Unit	-	active moment	Immediately	d	efault	1
	Setting			Curve planning settings						
			0	Use a trapezoidal velocity profile						
	1				Usin	g a 4th powe	er curve			

D02.02	Name	Position curve error	e plannir r	ıg	Set method	-	Access	RO
P03.83	Range	-32767~32767	Unit	-	active moment	-	default	-

P03.84	Nama	Position	comman	d	Set	antima	1 00000	DW
	Name	sampling interval			method	anytime	Access	ĸw
	Range	0.22768	Unit	_	active	Re-enable to	dafault	1
		0~32708	Omt	-	moment	take effect	uerault	1

	Name	Mechanica (user posi	l positio tion unit	n )	Set method	-	Access	RO
P03.90	Range	-2147483647 ~ 2147483647	Unit	-	active moment	-	default	-

	Name	Mechanica	al positi	on	Set	-	Access	RO
		(encoder unit)			method			
P03.92	Range	-2147483647 ~ 2147483647	Unit	-	active moment	-	default	-

P03.94	Name	Filtered posi	tion erro	or	Set method	-	Access	RO
	Range	-32767~32767	Unit	clk	active moment	-	default	-

	Nomo	Speed comman	d monit	oring	Set		1 22255	DO	
P03.95		in position mode			method	-	Access	кO	
P03.95	Range	-	Unit	rpm	active moment	-	default	-	
Speed command monitoring in position mode.									

P03.96	Name	Velocity c monitoring aft position	ommano er filteri 1 mode	d ng in	Set method	-	Access	RO
	Range	-	Unit	rpm	active moment	-	default	-
The filte	red velocity c	command monitor	osition	mode.				

## 9.5 P04 group parameter - speed mode related parameters

D04.01	N	lame	Spe	ed source	e	Set method	anytime	А	ccess	RW	
P04.01	R	ange	0~7	Unit	-	active moment	Immediately	de	efault	0	
		S	etting		Speed source						
			0		main speed A						
			1		Auxiliary speed B						
			2	A	A/B switching through IO-INFn.12						
			3			A+B					
			4		Com	munication (I	P08.17)				
			5			Multi-speed	d				
		6									
			7		Iı	nternal sine w	ave				

D04.02	N	lame	Source of	main sp	eed A	Set method	anytime	А	ccess	RW
P04.02	R	ange	0~4	Unit	-	active	Immediately	d	efault	0
						moment				
		S	etting		Sou	rce of main s	peed A		]	
		0								
			1							
		2								
		3		Sourced from AI3 (not supported on hardware)						
			4	from pulse rate						

P04.03 -	Name	Value of ma	in speed	lΑ	Set method	anytime	Access	RW
	Range	-32767~327 67	Unit	rpm	active moment	Immediately	default	500

D04.04	Ν	Jame	Auxiliary S	Speed B	Source	Set method	anytime	А	ccess	RW
P04.04	R	lange	0~4	Unit	-	active moment Immediately		d	efault	0
		S	etting		Auxil	liary Speed B	Source			
		0		From P04.05						
			1	from AI1						
			2			from AI2				
			3	Source	d from A	I3 (not suppo	orted on hardwa	re)		
			4			from pulse ra	ite			

P04.05	Nomo	The value of	the auxi	liary	Set	onvtimo	1 22255	DW
	Ivallie	spee	d B		method	anytime	Access	ĸw
P04.05	Range	-32767~327 67	Unit	rpm	active moment	Immediately	default	500

D04.06	N	lame	Source of	speed po	ositive	Set method	anytime	А	ccess	RW
P04.00	Range		Range 0~3		-	active moment	Immediately	de	efault	0
		S	etting		Source	of positive s	peed limit			
		0		Forward Limit A						
		1		Positive Limit B						
			2			A/B switchin	ng			
			3	Aa	and B are	restricted at	the same time			

D04.07	N	lame	Source of	speed point A	ositive	Set method	anytime	A	ccess	RW
P04.07	Range		0~3	Unit	-	active moment	Immediately	de	fault	0
		S	etting		Source of	of positive spe	eed limit A			
		0		from P04.08						
		1		from AI1						
		2				from AI2				
	3		from AI3 (hardware not supported)							

P04.08	Nomo	The value of	of speed	positive	Set	antima	A 22255	DW
	Inallie	li	imit A		method	anytime	Access	ĸw
P04.08	Range	0~32767	Unit	rpm	active	Immediately	default	3000
					moment			

D04.00	N	lame	Source of v	velocity <sub>]</sub> imit B	positive	Set method	anytime	А	ccess	RW
P04.09	Range		0~3	Unit	-	active moment	Immediately	d	efault	0
		S	etting		Source of	of positive sp	eed limit B			
		0		from P04.10						
		0				from AI1				
		2			from AI2					
			3	from AI3 (hardware not supported)						

P04.10	Nome	Value of	speed po	sitive	Set	onvtime	Access	DW
	Ivanic	1	imit B		method	anytime	Access	κ.vv
	Range	Range 0~32767	Unit	rnm	active	Immediately	default	3000
	Runge	0 52101	Omt	ipm	moment	minediatery	aciduit	5000

D04 11	N	lame	Source of	velocity imiter	reverse	Set method	anytime	А	ccess	RW
P04.11	Range		0~3	Unit	-	active moment	Immediately	de	efault	0
		S	etting		Source o	f reverse velo	ocity limiter			
		0		Reverse limiter A						
			1	Reverse limiter B						
			2		A/B switch					
	3		Both A and B are restricted							

D04 12	Name Range		Source of lin	velocity niter A	reverse	Set method	anytime	А	ccess	RW
P04.12			0~3	Unit	-	active moment	Immediately	de	efault	0
		S	etting	S	ource of	reverse veloc	city limiter A			
		0		from P04.13						
			1		from AI1					
		2		from AI2						
		3		from AI3(hardware not supported)						

P0/ 13	Name	Velocity re	everse lir	niter A	Set method	anytime	Access	RW
104.15	Range	0~32767	Unit	rpm	active moment	Immediately	default	3000

D04 14	Name		Source of lin	velocity niter B	reverse	Set method	anytime	А	ccess	RW
P04.14	Range		0~3	Unit	-	active moment	Immediately	de	efault	0
		S	etting	S	ource of	reverse veloc	city limiter B			
		0		from P04.15						
			1							
			2			from AI2				
			3	from AI3(hardware not supported)						

P04.15	Name	Velocity re	everse lin	niter B	Set method	anytime	Access	RW
	Range	0~32767	Unit	rpm	active moment	Immediately	default	3000

P04.16	Name	Jog speed			Set method	anytime	Access	RW	
	Range	0~32767	Unit	rpm	active moment	Reset takes effect	default	20	
Note that this value is modified but not saved during keyboard tap trials.									

P04.17	Name	Acceler	ate time	;	Set method	anytime	Access	RW
	Range	0~32767	Unit	ms	active moment	Immediately	default	500

D0/ 18	Name	Decelera	tion tim	e	Set method	anytime	Access	RW
P04.18	Range	0~32767	Unit	ms	active moment	Immediately	default	500

P04.20	Name         Speed instruction first order filtering time constant		ìrst ne	Set method	anytime	Access	RW	
	Range	0~32767	Unit	ms	active moment	Immediately	default	20

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D04 21	Name	Display sp val	eed filte ues	ered	Set method	-	Access	RO
P04.21	Range	0~32767	Unit	rpm	active moment	-	default	-

D04 22	Name	Speed display	filterin	g time	Set method	anytime	Access	RW
P04.22	Range	0~32767	Unit	ms	active moment	Immediately	default	300

P04 22	Nomo	Speed reaches the			Set	onutimo	1 22255	DW
	Name	thres	shold		method	ethod anytime Access		
P04.23	Range	0~32767	Unit	rpm	active moment	Immediately	default	1000

P04.24	Name	Speed co thres	nsistenc shold	у	Set method	anytime	Access	RW
	Range	0~32767	Unit	rpm	active moment	Immediately	default	10

D04 25	Name	Zero speed	d thresh	old	Set method	anytime	Access	RW
P04.23	Range	0~32767	Unit	rpm	active moment	Immediately	default	5

DOLOG	Name	Zero speed t positic	hreshol	d for	Set method	anytime	Access	RW
P04.26	Range	0~32767	Unit	rpm	active moment	Immediately	default	5

P04.27	Name	Lifting sp	eed thre	shold	Set method	anytime	Access	RW					
	Range	Range 0~32767 Unit rpm/s			active moment	Immediately	default	375					
When the acceleration/deceleration is greater than the threshold, the acceleration/deceleration													
signal w	ill be output,	and the unit is	s rpm pe	signal will be output, and the unit is rpm per second.									

## 9.6 P05 group parameter - torque mode related parameters

Range		0~5	Unit	-	active moment	Immediately	d	efault	0	
	S	etting		source of torque						
		0								
		1								
		2	Р	erform A	/B switchove	r through I/O				
		3	A+B							
		4								
5			Internal sine wave							

D05.02	N	lame	The sour to	ce of the orque A	main	Set method	anytime	Ac	ccess	RW
P05.02		ange	0~3	Unit	-	active moment	Immediately	de	fault	0
	Setting				Source of main torque A					
			0	From P05.03						
		1		From AI1						
			2			From AI2				
	3			From AI3(hardware not supported)						

Nama	The value of	the mai	n	Set	anytima	1 22255	DW
Ivallie	torque A method				Access	K W	
Range	-300.0~300.0	Unit	%	active moment	Immediately	default	0.0
	Name Range	NameThe value of torqueRange-300.0~300.0	Name     The value of the main torque A       Range     -300.0~300.0     Unit	NameThe value of the main torque ARange-300.0~300.0Unit%	NameThe value of the mainSettorque $\lambda$ methodRange-300.0~300.0Unit%active moment	NameThe value of the main torque $\lambda$ Set methodanytimeRange-300.0~300.0Unit%active momentImmediately	NameThe value of the main torque $A$ Set methodanytimeAccessRange-300.0~300.0Unit%active momentImmediatelydefault

D05.04	N	lame	The source	e of assis B	t torque	Set method	anytime	А	ccess	RW
P05.04	R	ange	0~3	Unit	-	active moment	Immediately	d	efault	0
	Setting			Source of assist torque B						
			0	From P05.05						
		1		From AI1						
			2			From AI2				
	3			From AI3(hardware not supported)						

	Nomo	The value of	the assis	st	Set	antima	1 00000	DW
D05.05	Iname	torque	В		method	anytime	Access	КW
P05.05	Range	-300.0~300.0	Unit	%	active moment	Immediately	default	0.0

DO5 10	Name Torque			limit me	thod	Set method	Access	RW		
P03.10	R	ange	0~1	Unit	-	active moment	Immediately	default	0	
	Setting				Torque limit method					
		0		Both positive and negative limits come from						
				positive limiting						
			1	Positive and negative restrictions are restricted						
				separately						

D05 11	N	lame	Source of li	torque p miting	ositive	Set method	anytime	А	ccess	RW
P05.11	R	ange	0~3	Unit	-	active moment	Immediately	d	efault	0
		S	etting		Source of	f forward tore	que limiting			
		0			Forward limiter A					
		1		Forward limiter B						
		2		A/B switch						
	3		3	Both A and B are restricted						

D05 12	N	lame	Source of lin	torque foniting A	orward	Set method	anytime	A	ccess	RW
P03.12	R	ange	0~3	Unit	-	active moment	Immediately	de	efault	0
		S	etting	The	e source c	of the positive	e torque limit A			
		0			From P05.13					
		1		From AI1						
	2		From AI2							
	3		From AI3(hardware not supported)							

P05.13	Name	The value o	f torque		Set	anytime	Access	RW
	I vuille	positive li	mit A		method	unythic	1100055	
P03.13	Range	0~300.0	Unit	%	active moment	Immediately	default	150.0

D05 14	N	lame	Source of lin	torque fo niting B	orward	Set method	anytime	А	ccess	RW
P03.14	R	ange	0~3	Unit	-	active moment	Immediately	de	efault	0
		S	etting	S	ource of	forward torqu	ue limiting B			
		0		From P05.15						
			1		From AI1					
		2		From AI2						
		3		From AI3(hardware not supported)						

P05.15	Name	Torque positive value	Torque positive limiting B value			anytime	Access	RW
	Range	0~300.0	Unit	%	active moment	Immediately	default	150.0

D05 1(	N	lame	Source of li	`torque r miting	everse	Set method	anytime	А	ccess	RW
P05.16	R	ange	0~3	Unit	-	active moment	Immediately	de	efault	0
		Setting			Source o	f reverse torg	ue limiting			
		0		Reverse limiter A						
		1		Reverse limiter B						
		2		A/B switch						
	3		Both A and B are restricted							

D05 17	N	lame	Source of lin	`torque r niter A	everse	Set method	anytime	A	ccess	RW
P03.17	R	ange	0~3	Unit	-	active moment	Immediately	de	fault	0
		S	etting	S	Source of	reverse torqu	e limiting A			
		0			From P05.18					
			1		From AI1					
		2		From AI2						
	3		From AI3(hardware not supported)							

D05.10	Name	Source of torque reverse limiter A			Set method	anytime	Access	RW
P05.18	Range	0~300.0	Unit	%	active moment	Immediately	default	150.0

D05 10	N	lame	Source of lir	torque r niter B	everse	Set method	anytime	А	ccess	RW
P03.19	R	ange	0~3	Unit	-	active moment	Immediately	de	efault	0
		S	etting	S	Source of	reverse torqu	e limiting B			
		0		From P05.20						
			1		From AI1					
		2		From AI2						
		3		From AI3(hardware not supported)						

P05.20	Name	The value of torque reverse limiting B			Set method	anytime	Access	RW
	Range	0~300.0	Unit	%	active moment	Immediately	default	150.0

P05.25	Name	Time t switchin mode to	threshol ng from o speed	d for torque mode	Set method	anytime	Access	RW
	Range	0~32767	Unit	0.25ms	active moment	Immediately	default	10
When th	e amplitude	of the speed	d excee	ds the spe	ed limit plus	s the speed limi	t speed thr	eshold
(P05.26)	, and the tim	e threshold	threshold of continuous torque mode switching to spee					.25), a
speed rin	ng is construc	ted to make	the spee	ed converg	ence within t	he limit.		

	Nomo	Speed thr	eshold f	or speed	Set	onutimo	A 22255	DW
D05 26	Inallie	torque m	ode swi	tchover	method	anytime	Access	КW
P03.26	Range0~3276he amplitude of the sp		Unit rpm		active moment	Immediately	default	30
When th	e amplitude	of the spee	d excee	ds the spe	ed limit plus	s the speed limi	t speed thr	eshold
(P05.26)	, and the tim	e threshold	reshold of continuous torque mode switching to speed mode (P0					
speed rin	ng is construc	ted to make	the spee	ed converg	ence within t	he limit.		

P05.27 When the limitation,	Name	Time thre mode to s	eshold fo switch to mode	or speed o torque	Set method	anytime	Access	RW
	Range	ange 0~32767 Unit 0.25ms		active moment	Immediately	default	200	
When the	ne servo is r	running in t	inning in torque mode but		the speed lo	oop is construct	ted due to	speed
limitatio	n, the time th	hreshold for	eshold for switching from			to torque mode	is determin	ned by
P05.27								

	Nomo	Speed lim	it low p	ass filter	Set	antima	1 00000	DW		
DO5 29	Inallie	time	parame	ter	method	anytime	Access	КW		
P03.28	Danca	0~32767 Unit ms		active	Reset takes	default	500			
	Kange	$0\sim32/67$ Unit ms		moment	effect	default	300			
When th	When the speed limit changes, low-pass filtering			filtering is	s performed	on the speed l	imit value, a	nd the		
filtering	filtering time is determined by P05.28. The longer the filtering time is, the slower the speed limit									
value ch	value changes									

	Name	Torque reac reference	hed the value		Set method	anytime	Access	RW
P05.31	Range	0~300.0	Unit	%	active moment	Immediately	default	50.0

	Name	The torque re effective	eaches a value	n	Set method	anytime	Access	RW
P05.32	Range	0~300.0	Unit	%	active moment	Immediately	default	10.0

	Name	Torque reache value	ed invali e	id	Set method	anytime	Access	RW
P05.33	Range	0~300.0	Unit	%	active moment	Immediately	default	0.0

D05.24	Name	Torque sampli	ng inter	val	Set method	anytime	Access	RW
P03.34	Range	0~300	Unit	-	active moment	Reset takes effect	default	0

D05.05	Name	Maximum outp shaking suppres	out limit ssion tor	of que	Set method	anytime	Access	RW
P05.35	Range	0~10.0	Unit	%	active moment	Immediately	default	0.0

P05.36	Name	Percentage of	of flutter	•	Set	anytime	Access	RW
	Tunne	suppression gain			method	anytime	100033	
	Range	0~10.0	Unit	%	active moment	Immediately	default	0.0

P05.37	Nomo	Jitter speed det	ection ti	ime	Set	onutimo	Aggess	DW
	Iname	constant			method	anytime	Access	КW
	Range	0~10.0	Unit	%	active moment	Immediately	default	0.0

The jitter is suppressed only when the period is shorter than this time

P05.38	Name	Jitter speed detection value			Set method	anytime	Access	RO
	Range	-	Unit	Rpm	active moment	Immediately	default	-

P05.39	Name	Name Flutter supp			Set	anytime	Access	RO
	1 (unite	outp	out value		method	, ,		
105.59	Range	-	Unit	%	active moment	Immediately	default	-

# 9.7 P06 group parameter -Inputs and Outputs Function

	Name	DI1	Function co register	ntrol	Set method	anytime	Access	RW		
P06.01	Range	0~99	Unit	-	active moment	Immediately	default	1		
	Setti	ng		DI	Function Sele	ection				
	0									
	1			Enable the driver						
	2				Reset the dri	ve				
	3			S	witch AB sw	itch				
	4			Tor	que reverse s	witch				
	5		Forward torque limit switch							
	6		N	Negative torque limit selector switch						
	7									
	8									
	9									
	10	)								
	11									
	12	2		Main	speed AB sv	vitching				
	13				Stop of spee	ed				
	14	ŀ	Reset of	lrive befo	ore download	ing ARM progr	am			
	15	5		Clear e	encoder posit	ion count				
	16	)		Zero posi	tion fixed in	speed mode				
	17	1		Multi-speed speed selection 0						
	18	18		Multi-speed speed selection 1						
	19	)								
	20	)		Multi-s	peed speed s	election 3				
	21			Position	n command p	rohibition				

 22	Position command reverse
23	Prohibition of pulse command
24	Electronic gear ratio switching 1
25	clear position error
26	Trigger back to zero
27	Trigger multi-segment positions
28	Multi-segment position selection 0
29	Multi-segment position selection 1
30	Multi-segment position selection 2
31	Multi-segment position selection 3
32	Direction selection for multi-segment locations
33	reserve
34	Home switch input
35	Command pulse and internal position planning
	switching
36	Control mode switch 0
37	Control mode switch 1
38	Enable interrupt fixed-length input
39	release interrupt fixed length
40	Trigger interrupt fixed length
41	The first set of the second set of gain switch
42	reset fault
43	Positive limit switch in position mode
44	Reverse limit switch in position mode
45	Switching between open and closed loop in full closed
	loop mode
46	Reset before FPGA program update
47	Tension compensation direction
48	tracking direction
49	Force maximum JOG compensation
50	Roll diameter calculation is prohibited
51	change roll
52	Initial roll diameter switch
53	Clear the length of feed
54	Force fast tightening
55	Closed loop speed mode disables tension
	compensation
56	Electronic gear ratio switch 2
57	Motor overheating
58	Emergency stop input
59	Internal flip-flop reset

60	Internal trigger set	
61	Internal counter counts pulses	
62	Clear the internal counter	
63	Speed mode UPDOWN mode UP signal	
64	Speed mode UPDOWN mode DOWN signal	
65	Speed mode UPDOWN mode hold signal	
	Return to previous Phase	
66	(Tension special: Enable Speed Overlay)	
67	AI zero drift automatic correction	
	Go to the specified phase	
	(Tension special type: closed-loop speed/torque mode	
68	switch)	
	Jog a fixed position in the positive direction	
69	(Tension type: motor rotation direction in closed-loop	
	speed mode)	
	Reverse jog fixed position	
70	(Tension special type: motor rotation direction in	
	closed-loop torque mode)	
71	reserve	
72	Trigger correction current sensor	
73	Trigger learning phase	
74	return to zero	
75	STO activation	

P06.02	Nomo	DI2 Fun	ction co	ntrol	Set	onstimo	1 22255	DW			
	Inallie	re	egister		method	method anytime Access					
P06.02	Range	0~99	Unit	-	active moment	Immediately	default	42			
For the s	For the specific functions of the DI port, see P06.01.										

	Nama	DI3 Fun	ction co	ntrol	Set	autima	A	DW		
P06.03	Name	register			method	anytime	Access	ĸw		
P06.03	Range	0~99	Unit	-	active moment	Immediately	default	0		
For the s	For the specific functions of the DI port, see P06.01.									

	Nama	DI4 Fun	DI4 Function control			our time o	A	DW	
P06.04	Name	register			method	anytime	Access	ĸw	
P00.04	Range	0~99	Unit	-	active moment	Immediately	default	0	
For the s	For the specific functions of the DI port, see P06.01.								

DOC 12	Name DI ter	DI termi	nal valid	state	Set method	-	Access	RO					
P00.13	Range	0~1023	Unit	-	active moment	-	Access default -9 digits, the DI10, 0=OFF, 1=C	-					
Displaye	d in decimal	format, after	convers	ion to bir	hary format, i	t contains 0-9 d	igits, the						
low-orde	low-order to high-order indicates the status of digital output terminals DI1~DI10, 0=OFF, 1=ON,												
the 0th b	it correspond	s to DI1, …	the 0th bit corresponds to DI1,, the first Bit 9 corresponds to DI10.										

D06 14	Name	DI fo	rced inp	ut	Set method	anytime	Access	RW
P00.14	Range	0~1023	Unit	-	active moment	Immediately	default	0
Input in	decimal (BCI	D) format and	l conver	t it into b	inary (Binary	y), which is the	correspondin	g

DIx input signal. For example: P06.14=42(BCD)=0000101010(Binary), it means DI2, DI4 and DI6 terminals are ON.

D06 15	Name	DI termin	al actual	llevel	Set method	-	Access	RO	
P00.13	Range	0~1023	Unit	-	active moment	-	Access I default s 0-9 digits, the 1~DI10, 0=OFF, 1=ON	-	
Displayed in decimal format, after conversion to b			ion to bir	ary format, i	t contains 0-9 d	igits, the			
low-orde	low-order to high-order indicates the status of digital output terminals DI1~DI10, 0=OFF, 1=ON,								
the 0th b	it correspond	s to DI1, …	, the first	t Bit 9 co	rresponds to I	DI10.			

P06.17	Name	Low-sp	eed DI f	filter	Set anytime		Access	RW
		configuration			method		1100000	
P00.17	Range 1~32767	Unit	us	active	Immediately	default	1000	
					moment			

D06 21	N	lame	DI1 v	valid leve	el	Set method	anytime	А	ccess	RW
P00.21	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
		S	etting 0 1		Act Act	Type of leve ive when low	el 7 level h level			

D06 22	Name DI2 valid level	Set method	anytime	Access	RW			
P00.22	Range	0~1	Unit	-	active moment	Immediately	default	0

Setting	Type of level
0	Active when low level
1	Active when high level

P06.23	N	lame	DI3 valid level			Set method	anytime	А	.ccess	RW
P00.25	Range		0~1	Unit	-	active moment	Immediately	d	efault	0
	Setting				Type of leve	el				
	0									
	1			Active when high level						

P06.24	N	lame	DI4 v	valid leve	el	Set method	anytime	А	ccess	RW
P00.24	Range 0~1		0~1	Unit	-	active moment	Immediately	d	efault	0
	Setting				Type of leve	el				
			0	Active when low level						
	1			Active when high level						

	Name	DO	D1/DO2	function register	n control	Set method	anytime	Access	RW	
P06.40	Range	(	)~2	Unit	-	active moment	Immediate ly	default	0	
	Setting		Type of function							
	0		DO1 and DO2 are output with the functions configured by P06.41 and P06.42 respectively							
	1		DO1, DO2 output A and B pulses respectively							
	2	DO	1 outputs	s the Z poin confi	nt signal, DO gured by P06	2 outputs the 5.42	function			

	N	lame	DO1 fur	nction co	ntrol	Set	anytime	Access	RW
P06.41			register		method				
	R	ange	0~99	Unit	-	active	Immediately	default	9
						moment	5		
		·							
		S	etting	DO function					
			0						
		1							
			2	The speed reaches a given value					

3Slow down4Rising speed5at zero speed6overspeed7Forward rotation8Reverse rotation9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed36Feedback is 0 output37Servo is ready to output		
4Rising speed5at zero speed6overspeed7Forward rotation8Reverse rotation9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output30Internal trigger state31Internal rigger state33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	3	Slow down
5at zero speed6overspeed7Forward rotation8Reverse rotation9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output30Internal trigger state31Internal routput counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed36feedback is 0 output37Servo is ready to output	4	Rising speed
6overspeed7Forward rotation8Reverse rotation9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal reger state33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	5	at zero speed
7Forward rotation8Reverse rotation9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is 2 output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	6	overspeed
8Reverse rotation9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal trigger state33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed36feedback is 0 output37Servo is ready to output	7	Forward rotation
9fault output10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed36feedback is 0 output	8	Reverse rotation
10Forward speed limit in torque mode11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	9	fault output
11Negative speed limit in torque mode12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is 0 output.34Roll diameter reaches 2 output35The speed command is 0 output.36Feedback is 0 output	10	Forward speed limit in torque mode
12Speed limit in torque mode13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is 2 output34Roll diameter reaches 2 output36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	11	Negative speed limit in torque mode
13Positioning complete output14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is 2 output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	12	Speed limit in torque mode
14positioning proximity output15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is 2 output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	13	Positioning complete output
15Origin zero return complete output16Position error is too large output17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	14	positioning proximity output
16Position error is too large output17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36feedback is 0 output37Servo is ready to output	15	Origin zero return complete output
17Interrupt fixed length completion output18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 and the speed36feedback is 0 output37Servo is ready to output	16	Position error is too large output
18Software limit output24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36Feedback is 0 output37Servo is ready to output	17	Interrupt fixed length completion output
24Holding brake output25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 output37Servo is ready to output	18	Software limit output
25The input command is valid26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 output37Servo is ready to output	24	Holding brake output
26Always OFF27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 output37Servo is ready to output	25	The input command is valid
27Always ON28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 output37Servo is ready to output	26	Always OFF
28Torque limit output29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	27	Always ON
29Torque arrives30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed37Servo is ready to output	28	Torque limit output
30Internal trigger state31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	29	Torque arrives
31Internal counter counts arrival32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	30	Internal trigger state
32Speed is consistent33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	31	Internal counter counts arrival
33The pulse position command is zero output34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	32	Speed is consistent
34Roll diameter reaches 2 output35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	33	The pulse position command is zero output
35The speed command is 0 output.36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	34	Roll diameter reaches 2 output
36The speed command is 0 and the speed feedback is 0 output37Servo is ready to output	35	The speed command is 0 output.
30feedback is 0 output37Servo is ready to output	36	The speed command is 0 and the speed
37 Servo is ready to output		feedback is 0 output
	37	Servo is ready to output

P06.42	Name	DO2 function control register			Set method	anytime	Access	RW
	Range	0~99	Unit	-	active moment	Immediately	default	13
Please refer to P06.41 for the specific functions of the DO port.								

P06.43	Name	DO3 fur	nction co egister	ntrol	Set method	anytime	Access	RW
	Range	0~99	Unit	-	active moment	Immediately	default	0

#### Please refer to P06.41 for the specific functions of the DO port.

P06.49 -	Name	DO termi	nal valic	l state	Set method	-	Access	RO	
P00.49	Range	-	Unit	-	active moment	-	default	-	
Displaye	d in decimal	format, after	convers	ion to bin	ary format, i	t contains 0-5 d	igits, the low		
digits to	digits to high digits indicate the status of digital output terminals DO1~DO6 in turn, 0=OFF,								
1=0N, tl	1=ON, the 0th bit corresponds to DO1,, the first Bit 5 corresponds to DO6.								

P06.50	Name	DO fo	orce outp	out	Set method	anytime	Access	RW
P00.30	Range	0~63	Unit	-	active moment	Immediately	default	0
Displaye	d in decimal	format, after	converti	ng to bin	ary format, it	contains 0-5 di	igits, the	
low-orde	low-order to high-order indicates the state of digital output terminals DO1~DOI6, 0=OFF, 1=ON,							
the 0th bit corresponds to DO1,, the first Bit 2 corresponds to DO3.								

P06.51	N	lame	DO1 valid level			Set method	anytime	А	ccess	RW
Range		ange	0~1	Unit	-	active moment	Immediately	d	efault	0
	Setting				Level validi	ty				
			0							
		1			Active high le	evel				

P06.52	N	lame	DO2 valid level			Set method	anytime	А	ccess	RW
Range		0~1	Unit	-	active moment	Immediately	de	efault	0	
	Setting				Level validi	ty				
	0		Active low level							
	1			Active high level						

P06.53	Name	DO3 valid level			Set method	anytime	Access	RW
	Range	0~1	Unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low level
1	Active high level

	Name	AI1 input	voltage		Set method	-	Access	RO
P06.61	Range	0~10000	Unit	mV	active moment	-	default	-

	Name	AI2 input voltage			Set method	-	Access	RO
P06.62	Range	0~10000	Unit	mV	active moment	-	default	-

P06.64 -	Name	AI1 offset			Set method	anytime	Access	RW
	Range	-10000~10000	Unit	mV	active moment	Immediate ly	default	0

P06.65 -	Name	AI1 Deadband			Set method	anytime	Access	RW
	Range	-5000~5000	Unit	mV	active moment	Immediate ly	default	0

P06 66	Name	AI1 magnification			Set method	anytime	Access	RW
P00.00	Range	-3276.7~3276 .7	Unit	%	active moment	Immediate ly	default	100.0

P06.67	Name	AI1 low-pass filter time constant			Set	anytime	Access	RW
	Ivanic				method	anytime	ALLESS	
	Range	0-32767	I India		active	Immediate	dafault	2
		0~32707	Unit	ms	moment	ly	default	2

<b>D</b> 06 68	Name	AI1 Zero	) Drift		Set method	anytime	Access	RW
P00.08	Range	-10000~10000	Unit	mV	active moment	Immediate ly	default	0

P06.69 -	Name	AI2 of	fset		Set method	anytime	Access	RW
	Range	-10000~10000	Unit	mV	active moment	Immediate ly	default	0

P06.70 -	Name	AI2 Deadband			Set method	anytime	Access	RW
	Range	0~5000	Unit	mV	active moment	Immediate ly	default	0

P06.71 -	Name	AI2 magnification			Set method	anytime	Access	RW
	Range	-3276.7~3276 .7	Unit	%	active moment	Immediate ly	default	100.0

D0( 70	Name	AI2 low pass const	filter ti ant	me	Set method	anytime	Access	RW
P06.72	Range	0~32767	Unit	ms	active moment	Immediately	default	2

P06.73	Name	AI2 zero	o drift		Set method	anytime	Access	RW
	Range	-10000~10000	Unit	mV	active moment	Immediately	default	0

	-0	Name	Automatic correction	zero drif	Ì	Set method	anytime	Access	RW			
P06.'	79	Range	0~6	0~6 Unit -		active moment	Immediately	default	0			
		Setting		AI automatic correction of zero drift								
		0		reserve								
		1	Ι	Immediately automatically correct AI1 zero drift once								
		2	I	mmediate	ely autom	atically corre	ect AI2 zero drif	t once				
		3	Imme	liately au	tomatical	ly correct AI	3 zero drift onc	e (hardware				
					i	s not support	ed)					
		4	Imme	Immediately automatically correct AI1 AI2 AI3 zero drift once								
		5	Imm	Immediately automatically correct the zero drift of the current								
						sensor once	e					
		6		Immed	iately cle	ar the calibra	tion current sen	sor				

P06.86	Name	Internal ampli input AD n	fier tens ninimun	sion 1	Set method	anytime	Access	RW
	Range	0~4095	Unit	-	active moment	Immediat ely	default	0

P06.87	Nama	Internal amplifier tension			Set	antina	A	DW
	Name	input AD maximum			method	anytime	Access	ĸw
	Range	0.4005	Unit		active	Immediate	dafault	4005
		0~4093	Umt	-	moment	ly	delault	4093

P06.88	Name	Internal ampli input filter	fier tens ing time	sion e	Set method	anytime	Access	RW
	Range	0~32767	Unit	ms	active moment	Immediately	default	20

P06.89	Name	Internal ampli input AD	fier tens value	sion	Set method	-	Access	RO
	Range	0~4095	Unit	-	active moment	-	default	-

	Name	Percentage of fina	al AI1 in	put	Set	_	Access	RO
D06.01	Ivanie	value			method		Access	ко
P06.91	Range	-3276.7~3276.7	Unit	%	active moment	-	default	-

P06.92	Name	Percentage of fina	al AI2 in	put	Set	-	Access	RO
		value			memou			
	Range	-3276.7~3276.7	Unit	%	active moment	-	default	-

# 9.8 P07 group parameters - loop control parameters

P07.01	Name	Current loop proportional gain			Set method	anytime	Access	RW
	Range	0~32767	Unit	-	active moment	Immediately	default	100

P07.02 -	Name	Current lo	op integi	al gain	Set method	anytime	Access	RW
	Range	0~32767	Unit	-	active moment	Immediately	default	20

D07.02	Name	Speed loo	p propo gain	rtional	Set method	anytime	Access	RW
P07.03	Range	0~32767	Unit	-	active moment	Immediately	default	600

D07.04	Name	Speed loo	p integra	al gain	Set method	anytime	Access	RW
P07.04	Range	0~32767	Unit	-	active moment	Immediately	default	50

N P07 40	Name	Speed loop differential Set					Access	DW/
	Inallie		gain		method			IX W
P07.40	Range	0~32767	Unit	-	active moment	Immediately	default	50

P07.41	Nama	Forward	l torque	feed	Set	onttime	A 22255	DW
	Iname	forward percentage			method	anytime	Access	ĸw
	Range	0~100	Unit	%	active	Immediately	default	0
	runge			_	moment			

P07.81 -	Name Reverse torque				Set	onvtimo	1 00055	DW
	Iname	feedforward percentage			method	anytime	Access	Κw
	Range	0~100	Unit	0/2	active	Immediately	default	0
		0~100	Om	70	moment	miniculatory	uciaun	0

D05.40	Name	Speed loo gain j	op propoi percentag	rtional ge	Set method	anytime	Access	RW
P07.42	Range	0~100	Unit	%	active moment	Immediately	default	0

P07.05	Name	Position lo	op propo gain	ortional	Set	anytime	Access	RW
		gam			memou			
107.05	Range	0~32767	Unit	-	active moment	Immediately	default	200

D07.06	Name	Percentage maximun	of positi 1 output	on loop speed	Set method	anytime	Access	RW
P07.00	Range	0~300.0	Unit	%	active moment	Immediately	default	100.0

P07.07	Name	Output vo	oltage fil	tering	Set method	anytime	Access	RW
	Range	0~300.0 Unit		ms	active moment	Immediately	default	0

P07.08	Nomo	Torque fee	edforwar	d filter	Set	onutino	1 00000	DW	
	Iname	time constant			method	anytime	Access	κw	
	Range	0~63 Unit	Unit	me	active	Immediately	default	10	
			IIIS	moment	minediatery	ueraun	10		
This value is the angular acceleration filter time during torque feedforward.									

P07.09	Nama	Speed fee	dforwar	d filter	Set	antina	A	DW
	Name	time constant			method	anytime	Access	ĸw
	Range	0~63	Unit	-	active	Immediately	default	10
	8				moment	2		

D07 10	Name	Torque coe	feedforv efficient	vard	Set method	anytime	Access	RW
P07.10	Range	0~32767	Unit	-	active moment	Immediately	default	0

	Name	Speed f	eed forw	vard	Set method	anytime	Access	RW
P07.11	Range	0~300.0	Unit	-	active moment	Immediately	default	50.0

D07 12	Name		Torqu	e filter ty	/pe	Set method	anytime	А	ccess	RW
P0/.12	R	ange	0~4	Unit	-	active moment	Immediately	d	efault	0
		Setting								
	0 1		0	low pass filtering						
			notch filter							
			2			No filtering	5			
			3	Comb	oined low	-pass filterin	g and notch filte	er		
			4	Auto	omatic ca	lculation of f	ilter parameters			

D07 12	Name	Torque low	-pass fil	ter time	Set	Set		RW
	Inallic	constant			method	anytime	Access	
P07.15	Range	0~327.67	Unit	ms	active	Immediately	default	0.80
	Runge	0 527.07	Omt	1115	moment	minediatery	default	0.00

P07 14	Nama	Notch Filter 1			Set	anytime	A	DW
	Name	Notch Frequency			method		Access	ĸw
P0/.14	Range	0~1000	Unit	Hz	active	Immediately	default	0
					moment			

P07 15	Name	notch filter 1			Set	anvtime	Access	RW
	1 (01110	notch depth			method			
P07.15	Range	0~100.0	Unit	%	active	Immediately	default	10.0
					moment			

P07 16	Notch filter 1				Set	onutimo	A 22255	DW
	Iname	notch width			method	anytime	Access	ĸw
P07.10	Range	0~100.0	Unit	0/0	active	Immediately	default	50.0
	runge	0 100.0	Cint	70	moment	minediatery	derduit	50.0

P07 17	Name notch filter 2				Set	onvitimo	1 22255	DW
	Inallie	notch frequency			method	anytime	Access	ĸw
P07.17	Range	0~1000	Unit	ms	active	Immediately	default	0
	Kange	0~1000	Om	1115	moment	minediatery	uciaun	0

P07.18	Name	notch filter 2			Set	anytime	Access	RW
	Inallic	notch depth			method	anytime	Access	Κw
	Range	0~100.0	Unit	%	active	Immediately	default	50.0
					moment			

P07.19	Nama	notch filter 2			Set	anytime	A	DW
	Name	notch width			method		Access	ĸw
P07.19	Range	0~100.0	Unit	%	active moment	Immediately	default	50.0

P07 44	Name	Notch filter 3			Set	anytime	Access	RW
	Ivallic	Notch frequencies			method	anytime		K W
P07.44	Range	0~1000	Unit	Hz	active	Immediately	default	0
K	Kange	0,1000	Om	112	moment	minediatery	uclault	Ū

P07 45	Nama	Notch Filter 3			Set	anytime	A	DW
	Name	Notch Depth			method		Access	ĸw
P07.43	Range	0~100.0	Unit	0/0	active	Immediately	default	10.0
	Range	0.100.0	Om	70	moment	minediatery	default	10.0

P07 46	Nomo	Notch filter 3			Set	onttime	A 22255	DW
	Inallie	Notch width			method	anytime	Access	ĸw
P07.40	Range	0~100.0	Unit	%	active	Immediately	default	50.0
	Tunge	0~100.0 Unit		,0	moment	minealatery	acrauit	20.0

	Nama	Notch Filter 4			Set	anytime	A	DW
P07.47	Name	Notch Frequency			method		Access	KW
P07.47	Range	0~1000	Unit	Hz	active moment	Immediately	default	0

	Name	Note Note	h Filter ch Depth	4 1	Set method	anytime	Access	RW
P07.48	Range	0~100.0	Unit	%	active moment	Immediately	default	10.0

P07.49	Nomo	ch filter 4	1	Set	onutimo	A 00055	DW	
	Iname	notch width			method	anytime	Access	ΚW
	Range	0~100.0	Unit	0/0	active	Immediately	default	50.0
		0.100.0	Oint	70	moment	miniculatory	ueraun	30.0

P07.20 -	Name	Gain adj	ustment	mode	Set method	anytime	Access	RW		
P07.20	Range	0~5	Unit	-	active moment	Immediately	default	0		
	Setting		Gain adjustment mode							
	0		fixed first set of gain: P07.03 to P07.05							
	1		First or second set of gain switching							
	2	Automa	Automatically calculate a set of gains based on rigidity level							
			a	nd load ii	nertia (norma	l mode)				
	3	Automa	tically ca	lculates	a set of gains	based on rigidi	ty level			
			and load inertia (positioning mode)							
	4	The fir	The first set of gains is fixed and the proportional gain is in							
			units of bandwidth times 6.28							
	5	No adjus	tment re	quired, co	ontrol accord	ing to paramete	r P07.78			

P07.21 -	Name	The second set of speed			Set	anytime	Access	RW
		loop proportional gain			method	5		
	Range	0~32767	Unit	-	active moment	Immediately	default	800

	Name	The secor loop ir	nd set of ntegral g	speed ain	Set method	anytime	Access	RW
P07.22	Range	0~32767	Unit	-	active moment	Immediately	default	10

P07.23	Name	The second set of position loop proportional gain			Set method	anytime	Access	RW
	Range	0~32767	Unit	-	active moment	Immediately	default	200

D07.24	Nam	e	Gain swite	ching co	ndition	Set method	anytime	Access	RW		
P07.24	Rang	ge	0~6	Unit	-	active moment	Immediately	default	0		
	Setting				Gain swi	witching condition					
	0	ΙΟ	switching; I	NFn.41 s	witching	witching, use the second set of gains when valid.					
	Switch to the second set of gains when When the torque command is greater t gain switching delay P07.26), switch t torque command is less than (gain swi delay), switch back to the first set of g						when the torque command is large; ter than (gain switching level P07.25 + tch to the second set of gains; when the switching level - gain switching of gains gain				
	2 Switch to the second set of gains when the speed given command is large; When the speed command is greater than (gain switching level (rpm) + gain switching delay (rpm)), switch to the second set of gains; if the speed command is less than (gain switching level - gain switching delay time) switch back to the first set of gains										
	3	Switch to the second set of gains when the acceleration command is large; When the acceleration command (rpm/s) is greater than (gain switching level + gain switching delay), switch to the second set of gains; when the acceleration command (rpm/s) is less than (gain switching level - gain									
	4	Switching delay), switch back to the first set of gains set of gains. Switch to the second set of gains when the speed error is large; When the speed error (rpm) is greater than (gain switching level + gain switching time delay), switch to the second set of gains; when the speed error (rpm) is less than (gain switching level - gain switching delay time), switch back to the first set of gains.									
	5	<ul> <li>Switch to the second set of gains when the position error after filtering is large;</li> <li>When the filtered position error (unit is motor encoder pulse) is greater</li> <li>than (gain switching level + gain switching delay), switch to the second set of gains; the filtered position error (unit is motor encoder pulse) is less than (gain switching level - gain switch time delay), switch back to the first set of gains.</li> </ul>									
	6	V	When position swit	ning is co the child the	ompleted e first set	, switch to th of gains with	e second set of out positioning.	gains, and			

P07.25	Name	Gain sw	vitching 1	level	Set method	anytime	Access	RW
	Range	0~32767 Unit -		active	Immediately	default	0	

		moment		

P07.26 -	Name	Gain swite	hing tim	e delay	Set method	anytime	Access	RW
	Range	0~32767	Unit	-	active moment	Immediately	default	0

P07.27	Name	Gain switching time			Set method	anytime	Access	RW	
	Range	0~32767	Unit	ms	active moment	Immediately	default	10	
The two gain switching are smooth switching, and this parameter is the smoothing time parameter.									

P07.28	Name	rigid setting			Set method	anytime	Access	RW	
	Range	0~31	Unit	-	active moment	Immediately	default	10	
Set rigidity of the motor									

P07.29	Name	Load iner	tia coeff	ïcient	Set method	anytime	Access	RW		
	Range	0~32767	Unit	-	active moment	Immediately	default	400		
Load inertia coefficient										

P07.30	Name	Zero spe	ed speed	gain	Set	anvtime	Access	RW
	Ivanic	reduction/amplification			method	anythic	ALLSS	17.00
	Range	0~3276.7	Unit	%	active moment	Immediately	default	50.0

P07.31	Name	Zero-spee	d positio	n gain	Set	onstime	Access	DW/
	Ivallic	reduction/amplification			method	anytime	Access	K W
	Range	ge $0 \sim 3276.7$	Unit	0/0	active	Immediately	default	100.0
	Runge	0 5270.7	Oint	70	moment	minediatery	deradit	100.0

P07.32	Name	Zero speed	decay th	reshold	Set method	anytime	Access	RW
	Range	0~32767	Unit	rpm	active moment	Immediately	default	10
When the speed rpm is less than this value, the gain of the speed loop, position loop and cur								current
loop will	l be attenuate	d/amplified a	ccording	g to P07.3	30, P07.31 an	d P07.34 respec	tively.	

P07.33	Name	Inertia s accele decele	self-learr cration ar ration tir	ning nd me	Set method	anytime	Access	RW
	Range	0~32767	Unit	ms	active moment	Immediately	default	500

	Name	Zero-speed current gain reduction			Set method	anytime	Access	RW
P07.34	Range	0~3276.7	Unit	%	active moment	Immediately	default	0.0

P07.35		Nam	ie	Inertia	self-lea	rning	Set method	anytime	Access	RW
		Range		0~1	Unit	%	active moment	Immediately	default	0
	S	etting	Inertia self-learning option							
		0	Af	ter learni	ing the ir	nertia, o	nly learn the	torque feedforw	vard coefficie	nt
			After learning the inertia, automatically calculate a set of gains according							
	1 to the rigidity setting and the learned inertia coefficient and write to							<b>)</b>		
						PO	7.03 P07.04 I	207.05		

P07.38	Nomo	Vibration	Monitor	ring	Set	onutimo	1 00000	RW
	Iname	Threshold Percentage			method	anytime	Access	ĸw
	Range	0~32767	Unit	%	active moment	Immediately	default	100

P07.39	Name	Vibration	n monitor	ring	Set	anvtime	Access	RW
	1 (unite	value			method	unytime	1100000	
	Range	0~32767 Unit -		-	active moment	Immediately	default	0

P07 50		Name		torque compensation mode			Set method	anytime	Access	RW	
F07.50	Range		0~4	Unit	-	active moment	Immediatel y	default	0		
	S	Setting torq				orque co	ue compensation mode				
		0		Compensate a fixed value P07.53							
		1				Compe	pensation via AI1				
		2	Compensation via AI2								
		3 Compensation via AI3 (not supported on hardware)							]		
		4		Automat	ic comp	ensation	through compe	ensation coeffi	cient	]	
D07 42	Name	Torque compensation gain 1			Set method	anytime	Access	RW			
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P07.45	Range	10~1000	Unit	-	active moment	Immediately	default	100			

D07 80	Name	Torque compensation gain			Set method	anytime	Access	RW
P07.89	Range	10~1000	Unit	-	active moment	Immediately	default	100

	Name	Torque co filte	ompensa er time	tion	Set method	anytime	Access	RW
P07.51	Range	0~32767	Unit	ms	active moment	Immediately	default	10

Name	Nomo	Name Torque Compensa			Set	anytime	A	DW
	Name	Inertia Coefficient			method		Access	КW
P07.52	Range	0~32767	Unit	-	active moment	Immediately	default	0

D07.52	Name	Torque co fixe	ompensa d value	tion	Set method	anytime	Access	RW
P07.55	Range	-32767~ 32767	Unit	-	active moment	Immediately	default	0

P07.54	Name	Torque com	pensatio	n gain	Set method	anytime	Access	RW
	Range	-32767~ 32767	Unit	%	active moment	Immediately	default	100

D07 55	Name	low frequency rejection notch filter frequency			Set method	anytime	Access	RW
P07.55	Range	0~1000	Unit	Hz	active moment	Immediately	default	0

P07.56	Name Low frequency rejection				Set	anytime	Access	RW
	Ivanie	notch depth			method	anythic	Access	17.44
	Range	Range 0~100.0	Unit	%	active	Immediately	default	10.0
		0 100.0	om	,	moment	initioutation	derdant	10.0

P07.57 Name Low frequency rejection	Set	anytime	Access	RW
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	notch width			method			
Range	0~100.0	Unit	%	active moment	Immediately	default	50.0

P07.58	Name	Name position command notch				anytime	Access	RW
	Indiffe	filter frequency			method	anythic	Access	IX VV
	Range	ange 0~1000 Unit	Unit	Hz	active	Immediately	default	0
					moment			0

P07.59	Nomo	Position command			Set	onutimo	1 00000	DW
	Name	filt	er depth		method	anytime	Access	ĸw
	Range	Range 0~100.0	Unit	0/0	active	Immediately	default	10.0
		0 100.0	Om	70	moment	minediatery	derault	10.0

	Name	Position c	ommand	notch	Set	anytime	Access	RW
P07.60		inter width			methou			
P07.00	Range	0~100.0	Unit	%	active moment	Immediately	default	50.0

	Name	Advanced	control f	unction	Set	anytime	Access	RW	
P07.61		se	lection		method				
107.01	Range	0~9999	Unit	-	active	Immediately	default	0.0	
	C				moment	5			
AAA.B format. Ordinary feedforward control when					AAA=0; sing	gle-inertia mode	el prediction	n when	
AAA=1;	double-inert	ia model prec	diction w	hen AA	A=2; single-ii	nertia model pre	diction wh	en	
AAA=3	(no model pr	ediction posi	tion filte	r), double	e-inertia mod	el when AAA=4	4 Model		
prediction (no model prediction position filter), when B=0, the continuous vibration suppression									
function	is invalid, an	d when B=1,	the cont	tinuous v	ibration supp	ression function	is valid.		

	Name	Model pre	ediction §	gain	Set method	anytime	Access	RW
P07.62	Range	1.0~2000.0	Unit	-	active moment	Re-enable takes effect	default	50.0

	Nomo	Name Model Pred		ed Set		antimo	1 22255	DW
	Inallie	Compensation			method	anytime	Access	ĸw
P07.63	Range	50.0~200.0	Unit	-	active moment	Re-enable takes effect	default	100.0

P07.64 Name The model predicts	Set	anytime	Access	RW
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	forwa	ard gain		method			
Range	0~3000.0	Unit	-	active moment	Re-enable takes effect	default	100.0

	Name	Model pre g	dicts inv gain	erse	Set method	anytime	Access	RW
P07.65	Range	0.0~3000.0	Unit	-	active moment	Re-enable takes effect	default	100.0

	Name	Model predicts frequency of suppression 1			Set method	anytime	Access	RW
P07.66	Range	1.0~250.0	Unit	-	active moment	Re-enable takes effect	default	50.0

	Name	Model pred of supp	icts frequ pression 2	uency 2	Set method	anytime	Access	RW
P07.67	Range	1.0~250.0	Unit	-	active moment	Re-enable takes effect	default	50.0

	Name	The mode feedforw	l predicts ard veloc	s the city	Set method	anytime	Access	RW
P07.68	Range	0~3000	Unit	-	active moment	Re-enable takes effect	default	100

	Name	Model pre	edicts 2 g	gain	Set method	anytime	Access	RW
P07.69	Range	1.0~2000.0	Unit	-	active moment	Re-enable takes effect	default	50.0

	Name	Model P Comp	redictior ensation	n 2	Set method	anytime	Access	RW
P07.70	Range	50.0~200.0	Unit	-	active moment	Re-enable takes effect	default	100.0

	suppression frequency			method			
Range	1~2000	Unit	-	active moment	Immediately	default	100

P07.72	Name	Continuous vibration suppression inertia compensation			Set method	anytime	Access	RW
	Range	1~1000	Unit	-	active moment	Immediately	default	100

		Continuous Vibration						
P07.73	Nomo	Suppression Speed			Set	anutima	1 00000	DW/
	Ivanic	Feedback Compensation			method	anytime	Access	K VV
		Percentage						
	Range	0~300	Unit	%	active moment	Immediately	default	0

P07.74	Name	Continuo Suppressio Filter Tin Comp	Continuous Vibration Suppression Low Pass Filter Time Constant Compensation			anytime	Access	RW
	Range	-10~10	Unit	-	active moment	Immediately	default	0

		Continuo	us vibrat	ion				
P07.75	Name	suppression high-pass filtering time constant compensation			Set method	anytime	Access	RW
	Range	-10~10	Unit	-	active moment	Immediately	default	0

P07.76	Name	Continuo suppress feedback c perce	us vibrat sion spec compensa entage 2	ion ed ation	Set method	anytime	Access	RW
	Range	0~300	Unit	%	active	Immediately	default	0
					moment			

P07.77	Name	Continuo suppresses h frequ	us vibrat igher vib iencies	ion oration	Set method	anytime	Access	RW
	Range	1~5000	Unit	-	active moment	Immediately	default	2000

P07.78	Name	No adjustmo	ent parar	neters	Set method	anytime	Access	RW
	Range	0.0~7.7	0.0~7.7 Unit -			Immediately	default	0.0
A.B form	nat. A refers t	o the rigidity l	the rigidity level, the setting ra		range is 0-7,	generally 4 or le	ess. B refe	rs to
the inerti	ia level, the se	etting range is	0-7, gen	erally a	bout 4			

	Name	Position moo	de accele on coeffi	eration icient	Set method	anytime	Access	RW
P0/./9	Range	-32767~32 767	Unit	-	active moment	Immediately	default	0

P07.80	Name	Position mod compens cor	de accele sation tin	eration ne	Set method	anytime	Access	RW
	Range	-32767~32 767	Unit	-	active moment	Immediately	default	0

	Name	Actua propo	l speed l ortional g	loop gain	Set method	-	Access	RO
P07.90	Range	0~32767	Unit	-	active moment	-	default	-

D07.01	Name	Actual speed loop integral gain			Set method	-	Access	RO
P07.91	Range	0~32767	Unit	-	active moment	-	default	-

D07.02	Name	Actual position loop proportional gain			Set method	-	Access	RO
P07.92	Range	0~32767	Unit	-	active moment	-	default	-

P07.93	Name	Final value of torque compensation	Set method	-	Access	RO
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	Range	0~3276.7	Unit	-	active moment	-	default	-
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P07.95	Name	Proport recommen	tional ga ded curr	in of ent loop	Set method	-	Access	RO
	Range	0~32767	Unit	-	active moment	-	default	-

D07.04	Name	Recommended integral gain of current loop			Set method	-	Access	RO
P07.96	Range	0~32767	Unit	-	active moment	-	default	-

## 9.9 P08 group parameters - communication parameters

D09 16	Name	Torque comm given	unicatio	n	Set method	anytime	Access	RW
P08.16	Range	-3276.7~3276.7	Unit	-	active moment	Immediately	default	0.0

DO8 17	Name	Speed commun	ication g	given	Set method	anytime	Access	RW
P08.17	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

	Name	position communication given			Set method	anytime	Access	RW
P08.18	Range	-2147483647			active			
		~	Unit	-	momont	Immediately	default	0
		2147483647			moment			

D09 20	N	lame	Modbus ba	ud rate r	egisters	Set method	ccess	RW		
P08.20	R	ange	0~5	Unit	bps	active moment	Immediately	d	efault	1
		Setting		Modbus baud rate						
		0								
			1	9600						
			2			19200				
			3			38400				
	4		57600							

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~	11.5000	i
5	115200	ł
		1

	N	Jame	Modbu	s data foi	rmat	Set	anytime	Ac	cess	RW
DO8 21			re	egisters		method	,			
P06.21	п		0.2	I Init		active	Reset takes	dat	fault	1
	Kange		0~3	Unit	-	moment	effect	del	lault	1
		Setting		Madhug data format						
		Setting		Modbus data format						
			0	No parity, 2 stop bits						
			1		No parity, 1 stop bit					
			2		Eve	en parity, 1 st	op bit			
			3		Od	d parity, 1 sto	op bit			

This parameter is valid when reset.

DO9 22	N	lame	32-bit add and lov	32-bit address access high and low byte order			anytime	Access	RW
P08.22		ange	0~1	Unit	-	active moment	Immediately	default	1
	Setting 0 1		Byte	order wh H	nen 32-bit add High 16 bits f Low 16 bits f	dress is accessed irst irst	1		

P08.23	Name	Modbus slav	ve addre	SS	Set method	anytime	Access	RW
	Range	1~255	Unit	-	active moment	Immediat ely	default	1

	Name	Modbus fau	lt regist	er	Set method	-	Access	RO
P08.24	Range	0~32767	Unit	-	active moment	-	default	-

	Name	Transmit FI	Transmit FIFO bytes			-	Access	RO
P08.25	Range	0~32767 Unit		-	active	-	default	-
					moment			

P08.26	Name	Monitor	port bau	d rate	Set method	anytime	Access	RW
	Range	0~2	Unit	bps	active moment	Reset takes effect	default	2

Setting	RS232 monitor port baud rate
0	9600
1	38400
2	115200

P08.27	Name	MODBUS res character (characte	ponse d c cycle r time)	elay	Set method	anytime	Access	RW
	Range	0~32767	Unit	-	active moment	Reset takes effect	default	0

	N	lame	RS232 mc	nitoring	port to	Set	anvtime	Access	RW	
D09 20			send curv	ve or sen	d text	method	5			
P08.29	R	ange	0~1	Unit	-	active	Immediately	default	0	
						moment			-	
			•							
		S	etting	RS232	nd					
					text					
			0			sending curv	ve			
			1							

	N	lame	Choose AR	M serial	port or	Set	anytime	Access	RW
DO9 20			PN s	erial poi	t	method	2		
P08.30	Range		0~1	0~1 Unit		active	Reset takes	default	0
	К	ange	0 1	Oint	-	moment	effect	uclauit	0
	Setting		etting	Cho	ose ARM	I serial port o	or PN serial port		
	0				ARM				
			1			PN			

D09.21	Name	Initial valu P	e of PN 930	servo	Set method	anytime	Access	RW
P08.31	Range	0~10	Unit	-	active moment	Immediately	default	0

D00 22	Name	PN communication position compensation			Set method	anytime	Access	RW
P08.32	Range	0~1000	Unit	-	active moment	Immediately	default	0

DO8 40	Name	CAN bu	s baud r	ate	Set method	anytime	Access	RW
P08.40	Range	125~1000	Unit	Kbps	active moment	Immediately	default	500

P08.41	Name	CAN no	de num	ber	Set method	anytime	Access	RW
	Range	0~127	Unit	-	active moment	Immediately	default	0

D00.42	Name	Enable	e custom rotocol	402	Set method	anytime	Access	RW	
P08.42	Range	0~1	Unit	-	active moment	Immediately	default	0	
	Se	etting	g Enable			protocol			
		0	Use the			standard 402 protocol			
		1	Do not use the			protocol, use th	ne		
				mo	dified 402 pr	otocol			

DO9 44		Name	SDO byte order			Set method	anytime	Ac	cess	RW
P08.44	-	Range	0~1	Unit	-	active moment	Immediately	def	ault	0
		Set	tting			SDO byte or	ler			
			0	St		dard SDO by				
			1	Stan Standard			der reverse			

D09.40	Name	CANopen b Profinet ser	us resta vo enco	rt times or der status	Set method	-	Access	RO
F06.49	Range	-	Unit	-	active moment	-	default	-

P08.50	Name	CANopen b occupies space encoc	ous trans ce or Pro ler G1S	mit buffer ofinet servo TW	Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P08.51	Name	CANopen/Profinet bus send	Set	-	Access	RO
		frame count	method			

	Range	-	Unit	-	active moment	-	default	-
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P08.52	Name	CANopen receive f	/Profine rame co	et bus Punt	Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P08.53		CANopen b	us recei	ve frame	Sat			
	Name	error count	or encod	ler status	mathad	-	Access	RO
		value G1ZSW			method			
	Range	-	Unit	-	active moment	-	default	-

<b>D</b> 00 <b>5</b> 4	Name	CANopen b encoder com	ous JITT Imand G	TER or FICMD	Set method	-	Access	RO
P08.54	Range	-	Unit	-	active moment	-	default	-

DO8 55	Name	E	xtrapola	tion speed	Set method	-	Access	RO
P08.55	Range -	-	Unit	User Units/Sec	active moment	-	default	-

P08.57 -	Name	Ir	nterpolat	ion speed	Set method	-	Access	RO
	Range	-	Unit	User Units/Sec	active moment	-	default	-

P08 59	Name		filtered	l speed	Set method	-	Access	RO
P08.39	Range	-	Unit	User Units/Sec	active moment	-	default	-

P08 61	Name	Ext	trapolati	on position	Set method	-	Access	RO
P08.01	Range	-	Unit	User Units	active moment	-	default	-

P08 63	Name	int	terpolate	d position	Set method	-	Access	RO
P08.05	Range	-	Unit	User Units	active moment	-	default	-

D09 65	Name	Е	xtrapolat	tion error	Set method	-	Access	RO
P08.05	Range	-	Unit	User Units	active moment	-	default	-

P08 67	Name	ir	nterpolat	ion error	Set method	-	Access	RO
P08.07	Range	-	Unit	User Units	active moment	-	default	-

D09 60	Name		contro	l error	Set method	-	Access	RO
P08.09	Range	-	Unit	User Units	active moment	-	default	-

D09 71	Name true error		Set method	-	Access	RO		
P08.71	Range	-	Unit	User Units	active moment	-	default	-

P08 73	Name	Pred	icted po	sition error	Set method	-	Access	RO
P08.75	Range	-	Unit	User Units	active moment	-	default	-

DO8 74	Name	St CAN	atus wo Nopen4(	rd of the )2 protocol	Set method	-	Access	RO
P08.74	Range	-	Unit	-	active moment	-	default	-

P08.75 Name ECAT PDI JITTER Set - Access R	P08.75 Name	ECAT PDI JITTER	Set	-	Access	RO
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				method			
Range	-	Unit	3.556	active moment	-	default	-

DO9 76	Name	ECAT BIT STATE			Set method	-	Access	RO
P08.70	Range	-	Unit	-	active moment	-	default	-

D00 77	Name	( CAl	Control	word of	Set method	-	Access	RO
P08.77	Range	-	Unit	-	active moment	-	default	-

P08.78	Name	(	CANSE	NDERR	Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P08.79	Name	-	ECAT E	DEBUG	Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

## 9.10 P09 group parameters - advanced debugging parameters

D00.01	Name	Debug para	ameter l	l	Set method	anytime	Access	RW
P09.01	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

D00 02	Name	Debug para	ameter 2	2	Set method	anytime	Access	RW
P09.02	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

D00.02	Name	Debug para	ameter 3	3	Set method	anytime	Access	RW
P09.03	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

<b>DOD 04</b>	Name	Debug para	ameter 4	1	Set method	anytime	Access	RW
P09.04	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

P09.05	Name	Debug para	ameter 5	5	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

<b>D</b> 00.04	Name	Debug para	ameter (	5	Set method	anytime	Access	RW
P09.00	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

<b>D</b> 00.07	Name	Debug para	ameter 7	1	Set method	anytime	Access	RW
P09.07	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

P09.08	Name	Debug para	ameter {	3	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	-	active	Immediately	default	0

		moment		

P09.09	Name	Real ti	me spee	d monitoring	Set method	-	Access	RO
	Range	-	Unit	rpm	active moment	-	default	-

<b>D</b> 00 10	Name	UD	output	monitoring	Set method	-	Access	RO
P09.10	Range	-	Unit	-	active moment	-	default	-

D00 11	Name	UQ output monitoring			Set method	-	Access	RO
P09.11	Range	-	Unit	-	active moment	-	default	-

	Name	A Con	pares tl	ne value of A	Set method	-	Access	RO
P09.12	Range	-	Unit -		active	-	default	-

P09.13	Name	B com	pares th	e value of the	Set method	-	Access	RO
	Range		light		active			
		-	Unit	-	moment	-	default	-

	Name	C com	pare the regis	e value of the ster	Set method	-	Access	RO
P09.14	Range	-	Unit	-	active moment	-	default	-

D00 16	Name		Z-Point	Count	Set method	-	Access	RO
P09.10	Range	-	Unit	-	active moment	-	default	-

D00 10	Name	Electrical angle value Q10			Set method	-	Access	RO
P09.19	Range	-	Unit	-	active moment	-	default	-

D00 20	Name	S	peed loo	op given	Set method	-	Access	RO
P09.20	Range	-	Unit	‰	active moment	-	default	-

D00 21	Name	Spe	ed loop	feedback	Set method	-	Access	RO
P09.21	Range	-	Unit	%	active moment	-	default	-

D00 22	Name	Speed	loop fo	rward limiter	Set method	-	Access	RO
P09.22	Range	-	Unit	-	active moment	-	default	-

	Name	Speed	loop re	verse limiter	Set	-	Access	RO
P09.23	Range	-	Unit	-	active moment	-	default	-

D00 24	Name	The output value of the speed loop			Set method	-	Access	RO
P09.24	Range	-	Unit	-	active moment	-	default	-

D00 25	Name	D-axis current loop given			Set method	-	Access	RO
P09.25	Range	-	Unit	%	active moment	-	default	-

D00 26	Name	D-axis	D-axis current loop feedback			-	Access	RO
P09.20	Range	-	Unit	%	active moment	-	default	-

D00 27	Name	D-axis current loop positive limiting			Set method	-	Access	RO
P09.27	Range	-	Unit	-	active moment	-	default	-

P09.28 Name limiting metho
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	Range	-	Unit	-	active moment	-	default	-
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P09.29	Name	D-axis	D-axis current loop output			-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

<b>D</b> 00 20	Name	Q-axi	Q-axis current loop given			-	Access	RO
P09.30	Range	-	Unit	%	active moment	-	default	-

D00 21	Name	Q-axis	current	loop feedback	Set method	-	Access	RO
P09.31	Range	-	Unit	%0	active moment	-	default	-

D00 22	Name	Q-axis	current limit	loop positive	Set method	-	Access	RO
P09.32	Range	-	Unit	-	active moment	-	default	-

D00 22	Name	Q-axis	current limit	loop reverse	Set method	-	Access	RO
P09.33	Range	-	Unit	-	active moment	-	default	-

D00.24	Name	Q-axis	s curren	t loop output	Set method	-	Access	RO
P09.34	Range	-	Unit	-	active moment	-	default	-

<b>D</b> 00 20	Name		original	phase	Set method	-	Access	RO
P09.39	Range	-	Unit	-	active moment	-	default	-

D00 41	Name	Brakin	g resisto cyc	or PWM duty ele	Set method	-	Access	RO
P09.41	Range	-	Unit	%	active moment	-	default	-

D00 45	Name	Bef	ore Q-a filter	xis current ring	Set method	-	Access	RO
P09.43	Range	-	Unit	‰	active moment	-	default	-

D00 47	Name	Hardware self-test fault codes			Set method	-	Access	RO
P09.47	Range	-	Unit	-	active moment	-	default	-

D00.40	Name	Start time of current loop control			Set method	-	Access	RO
P09.48	Range	-	Unit	-	active moment	-	default	-

D00 40	Name	Start	time of cont	speed loop rol	Set method	-	Access	RO
P09.49	Range	-	Unit	-	active moment	-	default	-

	Name	Sine wave generator amplitude	Set method	anytime	Access	RW
P09.59	Range	-32767~32767	Unit	Speed Moo Speed % Torque mo current %	de: Motor	Rated rated
	active moment	Immediately	default		0	

<b>D</b> 00 (0	Name	Sine wave § freque	generato ncy	or	Set method	anytime	Access	RW
P09.60	Range	-32767~32767	Unit	-	active moment	Immediately	default	0

D00 62	Name	Bits that need to be monitored			Set method	anytime	Access	RW
P09.02	Range	0~65535	Unit	-	active moment	Immediately	default	0

P00.63	.63 Name	The value of the bit to	Set		Access	PO
109.05	Inallic	monitor	method	-	Access	ĸo

	Range	-	Unit	-	active moment	-	default	-
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P09.75	Name	Nun	Number of speed loop interruptions			-	Access	RO
109.75	Range	-	Unit	-	active moment	-	default	-

P09.76 -	Name	Num	ber of c	urrent loop	Set	_	Access	RO
	Ivanic	interruptions			method	_	Access	KO
	Range	_	Unit	_	active	_	default	_
			Om		moment	_	aciaun	

<b>D</b> 00.05	Name	Speed	loop ex	ecution cycle	Set method	-	Access	RO
P09.85	Range	-	Unit	us	active moment	-	default	-

<b>D</b> 00.97	Name	Speed	loop ex	ecution time	Set method	-	Access	RO
109.80	Range	-	Unit	us	active moment	-	default	-

D00.97	Name	Current	t loop ex	xecution cycle	Set method	-	Access	RO
P09.87	Range	-	Unit	us	active moment	-	default	-

	Name	Curren	t loop e	xecution time	Set method	-	Access	RO
P09.88	Range	-	Unit	us	active moment	-	default	-

<b>D</b> 00.90	Name	Speed	referenc mo	ce in position de	Set method	-	Access	RO
P09.89	Range	-	Unit	-	active moment	-	default	-

<b>D</b> 00.00	Name	Position error in position mode			Set method	-	Access	RO
P09.90	Range	-	Unit	-	active moment	-	default	-

	Name	Bı	ake resi percer	stor heat	Set method	-	Access	RO
P09.91	Range	-	Unit	%	active	-	default	-

D00 03	Name	1ms t	ask exe	cution cycle	Set method	-	Access	RO
109.95	Range	-	Unit	us	active moment	-	default	-

<b>D</b> 00.04	Name	UD f	eedforw	vard voltage	Set method	-	Access	RO
P09.94	Range	-	Unit	-	active moment	-	default	-

<b>D</b> 00.05	Name	UQ f	eedforw	vard voltage	Set method	-	Access	RO
P09.93	Range	-	Unit	-	active moment	-	default	-

<b>D</b> 00.07	Name	Absolute encoder communication error			Set method	-	Access	RO
P09.96	Range	-	Unit	-	active moment	-	default	-

P09.98	Absolute encoder				Set		A	RO
	Name	communication error 2			method	-	Access	кО
	Range	-	Unit	-	active moment	-	default	-

## 9.11 P10 group parameters - fault protection parameters

P10.01	Name	Overcurren	t Thresh	old	Set method	anytime	Access	RW	
	Range	0~800.0	0~800.0 Unit %			Reset takes effect	default	400.0	
When the detected current percentage P09.31 is greater than this value, a software overcurrent fault will be reported.									

P10.02	Name	Overloa	ad value		Set method	anytime	Access	RW	
	Range	Range 0~3276.7 Unit %				Immediately	default	100.0	
This value is recommended to be set to $\frac{\text{Motor rated current}}{\text{Drive rated current}}$ .									

P10.03	Nomo	Lock-rotor	protect	ion	Set		A	DW			
	Ivallic	current threshold			method	anytime	Access	ĸw			
	Range	0 200 0	Unit	%	active	Immediately	dafault	100			
		0~300.0	Unit		moment	minediatery	uclauit	100			
When th	When the drive current percentage P09.31 exceeds this value and lasts for the time of P10.04, and										
the speed is less than 5rpm, a fault will be reported. This value is recommended to use the shortcut											
button in	button in the VECObserve software $\rightarrow$ the default value after a full set of matching.										

P10.04	Nama	Lock-rotor protection time			Set	our time o	A	DW			
	Inallic	threshold			method	anytime	Access	ĸw			
	Range	0. 65535	Unit	ms	active	Immodiately	dafault	800			
		0~05555			moment	minediatery	ucidult	000			
When th	When the drive current percentage P09.31 exceeds P10.03, and lasts for the time of P10.04, and										
the speed is less than 5rpm, a fault will be reported. This value is recommended to use the shortcut											
button in the VECObserve software $\rightarrow$ the default value after a full set of matching.											

P10.05	Name	Over speed	l percent	tage	Set method	anytime	Access	RW			
	Range	Range 0~3276.7 Unit %				Immediately	default	150.0			
Speed percentage: The percentage of actual speed relative to rated speed. When the speed											
percenta	percentage is greater than the over-speed percentage, an over-speed fault is reported.										

P10.06	Name	Drive Overh	eat Thre	shold	Set method	anytime	Access	RW
	Range	0~3276.7	Unit	°C	active moment	Immediately	default	80.0

P10.07	Name	Phase loss pro	tection s	settings	Set method	anytime	Access	RW	
	Range	0~32767 Unit			active moment	Immediately	default	0	
When the 0th bit is 1, the output phase loss protection is enabled; when the 1st bit is 1, the input phase loss protection is enabled.									

P10.08	Name	Return to or ti	rigin tim me	e-out	Set method	anytime	Access	RW
	Range	0~32767	Unit	s	active moment	Immediately	default	0

P10.09	Name Motor e			coder position function when ver is off		Set method	anytime	A	ccess	RW
	Ra	ange	0~1	Unit	-	active moment	Immediately	de	fault	0
	Setting			Pow	Power-off motor encoder position memory selection					
	0			Th me	The position of the motor encoder is not memorized when the power is turned off					
	1			Power-off memory motor encoder position						

P10.10	Name	AI zero dr	ift thresh	nold	Set method	anytime	Access	RW
	Range	0~32767	Unit	mV	active moment	Immediately	default	500

P10.11	Name	Overload cu	ırve sele	ction	Set method	anytime	Access	RW
	Range	0~4	Unit	-	active moment	Immediately	default	0

P10.12	Name	Zero speed automatically limit	d comma reduces value	and torque	Set method	anytime	Access	RW
	Range	0~3276.7	Unit	%	active moment	Immediately	default	0

	Name	Custom 1.1 t	imes ove e time	erload	Set method	anytime	Access	RW
P10.13	Range	0~3276.7	Unit	S	active moment	Immediately	default	0

	Name	Custom 1.5 t curv	imes ovo e time	erload	Set method	anytime	Access	RW
P10.14	Range	0~3276.7	Unit	s	active moment	Immediately	default	0

P10.15	Name	Custom 2.0 t curve	imes ove e time	erload	Set method	anytime	Access	RW
	Range	0~3276.7	Unit	S	active moment	Immediately	default	0

	Name	Custom 2.5 t	imes ove e time	erload	Set method	anytime	Access	RW
P10.16	Range	0~3276.7	Unit	S	active moment	Immediately	default	0

	Name	Custom 3.0 t curve	imes ovo e time	erload	Set method	anytime	Access	RW
P10.17	Range	0~3276.7	Unit	S	active moment	Immediately	default	0

<b>D</b> 10.10	Name	Speed monitoring value			Set method	anytime	Access	RW
P10.18	Range	0~32767	Unit	-	active moment	Immediately	default	0

	Nan	ne	current fa	ult code		Set	-	Access	RO
P10.20						active			
	Range		0~32767	Unit	-	moment	-	default	-
fault code				F	ault descripti	on			
Er.10	00	Softv	ware overcurrent						
Er.10	)1	hard	ware overcurrent						
Er.10	)2	Over	voltage						
Er.10	)3	Unde	ervoltage						
Er.104 or	Er.004	The	current sensor is fa	ulty					
Er.105 or	Er.005	If the	e encoder fails and	the encod	er is no	ot connected, th	e fault is reported	•	
Er.106 or	Er.006	The	EEPROM verify fa	ult					
Er.10	)7	Phas	e sampling fault,	when the	phas	e obtained thro	ough the HALL	switch and the	e phase
		obtai	ned through the en	coder are	too dif	ferent, this faul	t is reported.		
Er.108 or	Er.008	Whe	n the FPGA and AI	RM comm	unicat	ion are faulty			
Er.10	)9	If the	e current changes g	reatly					
Er.1	10	Mag	netic encoder failu	e					
Er.1	11	Curr	ent phase sequence	learning	failure				
Er.1	12	The output is out of phase.							
Er.1	13	Did 1	not scan to Z point	during sel	f-learr	ning			
Er.1	14	Z po	int offset not found						
Er.1	15	Hall	code value learning	g error					

Er.116	Great change in rotational speed
Er.117	The drive is overheated
Er.118	When powered on, the wire-saving encoder does not feedback hall value
Er.119	Motor encoder type does not match
Er.120	Software is not authorized
Er.121	Phase loss at RST input
Er.122 or Er.022	Use timeout
Er.130	STO (INFn75) alarm input signal is valid
Er.131	There is speed when the provincial encoder starts
Er.132	ARM does not match FPGA
Er.133 or Er.033	The Profinet protocol chip cannot communicate with the ARM motor control chip
Er.200	When returns to home, the home signal INFn.34 is not assigned.
Er.201	INFn.xx repeated allocation, one input function bit is assigned to two or more DI
Er.202	Overspeed
Er.203	The position error is too large
Er.204	Unassigned interrupt fixed length trigger signal INFn.40
Er.205	No return to home before absolute point motion
Er.206	Motor overload
Er.207	Software limit
Er.208	hardware limit
Er.209	Curve planning failed
Er.210	Excessive tension
Er.211	Breakage failure
Er.212	XY pulse type selection error in tension control mode
Er.213	Fully closed loop position error is too large
Er.214	Prohibit positive (reverse) turn
Er.216	Z point signal is unstable
Er.217	RPDO receive timeout
Er.218	Reserved
Er.219	Motor stall
Er.220	Braking resistor overload
Er.221	The forward stroke switch input function bit INFn.43 is not assigned to the entity DI
Er.222	The reverse stroke switch input function bit INFn.44 is not assigned to entity DI
Er.223	Search home error
Er.224	CAN bus state switching error
Er.225	Unsupported CANopen control mode
Er.226	Absolute value mode lap overflow
Er.227	The battery of the absolute encoder is faulty
Er.228	Inertia learning failed, need to reset P07.03 and P07.04
Er.229	When learning fully closed loop parameters
Er.230	reserve

Er.231	Bus error
Er.232	Second encoder battery failure
Er.234	continuous vibration
Er.237	car breakdown
Er.238	Linear motor phase finding failed
Er.239	Linear motor phase finding failed, stuck in forward direction
Er.240	Linear motor phase finding failed, stuck in reverse direction
Er.241	Over-travel error during self-learning
Er.242	Encoder learning error, encoder interference or wrong magnetic pole setting
Er.243	Linear motor phase finding failure (disconnection)
Er.244	Linear motor phase finding failure (large position error)
Er.245	Linear motor phase finding failure (current pulse width is too small)
Er.600	Motor overheating
Er.601	DI function code is not assigned
Er.602	AI zero drift is too large
Er.603	The zero return time out, when the zero return time is greater than P10.08, this fault will be
	reported.
Er.604	When the absolute encoder is self-learning
Er.605	The battery voltage of the absolute encoder is too low
Er.606	The battery voltage of the second encoder is too low
Er.607	Inertia learning failed, need to increase P07.33 and then learn
Er.608	U disk read and write failed
Er.609	Drive parameters not found during factory reset
Er.610	Motor parameters not found when restoring to factory defaults
Er.611	EEPROM verification error when restoring to factory defaults
Er.612	Self-learning current loop error
Er.613	Phase finding not yet completed
Er.701	EtherCAT bus error
Er.702	EtherCAT bus dropped
Er.703	After the back clearance compensation is increased, two steps are required before returning to
	zero to eliminate the back clearance

P10.21	Name	Selected fault	code cou	unt	Set method	anytime	Access	RW
	Range	1~5	Unit	-	active moment	Immediately	default	5

P10.22	Name	Selected trou	ible cod	e	Set method	-	Access	RO
	Range	0~32767	Unit	-	active moment	-	default	-

D10 22	Name	Selected failure point in time			Set method	-	Access	RO
P10.25	Range	0~32767	Unit	min	active moment	-	default	-

P10.24	Name	Motor speed at selected fault			Set method	-	Access	RO
	Range	-32767~32767	Unit	rpm	active moment	-	default	-

P10.25	Nomo	RMS value of motor current at					1 00000	DO
	Iname	selected fault			method	-	Access	KÜ
P 10.25	Range	0~3276.7	Unit	А	active moment	-	default	-

P10.26	Name	Motor V-phase cr fau	selected	Set method	-	Access	RO
	Range	-3276.7~3276.7	Unit	А	active moment	-	default

D10.27	Name	Motor W-pha selecte	ent at	Set method	-	Access	RO	
P10.27	Range	-3276.7~3276.7	Unit	А	active moment	-	default	-

P10.28	Name	Bus voltage a	d fault	Set method	-	Access	RO
	Range	0~32767	Unit	V	active moment	-	default

P10.29	Nama	Name Electric drive temperature at					A	DO
	Name	selected fault			method	-	Access	ĸŪ
P10.29	Range	0~3276.7	Unit	°C	active moment	-	default	-

<b>D</b> 10 20	Name	Entity DI state at the time of the selected failure			Set method	-	Access	RO
P10.30	Range	-	Unit	-	active moment	-	default	-

D10 21	Namo	Entity DO state at the time of the	Set		1 22255	PO
F 10.51	Iname	selected fault	method	-	Access	KO

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	Range	-	Unit	-	active moment	-	default	-
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P10.22	Name	Hardware fault c val	umulati ue	ve count	Set method	-	Access	RO
1 10.52	Range	0~32767	Unit	-	active moment	-	default	-

D10 22	Name	fault	fault shield			anytime	Access	RW
P10.33	Range	0~65535	Unit	-	active moment	Immediately	default	12

Displayed in decimal format, after conversion to binary format, the 0th digit shields the overload, the 1st digit shields the overcurrent, the 2nd digit shields the phase fault, the 3rd digit shields the large current change fault, the 4th digit shields the hardware overcurrent major fault, The 5th bit shields the large speed change fault, the 6th bit shields the Z point instability, the 7th bit shields the SYNC loss, and the 8th bit shields the current sensor fault. Bit 9 masks undervoltage faults. The 10th bit shields the encoder fault, the 12th bit shields the stall fault

<b>D</b> 10 34	Name	Hardware failure time threshold			Set method	anytime	Access	RW	
P10.34	Range	0~32767 Unit 20ns		active moment	Immediately	default	250		
After the IGBT fault exceeds this time, the fault will be reported									

D10.25	Name	Fault minimum duration to respond to reset faults			Set method	anytime	Access	RW
P10.35	Range	0~32767	Unit	s	active moment	Immediately	default	60

D10 44	Name	Speed loop reference at last valid fault			Set method	-	Access	RO
P10.44	Range	-	Unit	%	active moment	-	default	-

D10.45	Name	Speed loop feedback at last valid fault			Set method	-	Access	RO
P10.45	Range	-	Unit	%	active moment	-	default	-

D10.46	Nama	Torque reference at the last	Set		1 22255	PO
F 10.40	Iname	valid fault	method	-	Access	ĸo

	Range	-	Unit	%	active moment	-	default	-
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D10.47	Name Torque feed vali	ack at the last fault		Set method	-	Access	RO	
1 10.47	Range	-	Unit	%	active moment	-	default	-

<b>D10</b> 40	Name	Filtered position error at the last valid fault			Set method	-	Access	RO
P10.48	Range	-	Unit	-	active moment	-	default	-

D10.40	Name	Index of current record			Set method	-	Access	RO
P10.49	Range	-	Unit	-	active moment	-	default	-

	Name	The fault code of the fault with index 0			Set method	-	Access	RO
P10.50	Range	-	Unit	-	active moment	-	default	-

D10 51	Name	failure time for failure with index 0			Set method	-	Access	RO
P10.51	Range	-	Unit	S	active moment	-	default	-

P10.52	Name	Rotation speed of fault with index 0			Set method	-	Access	RO
	Range	-	Unit	rpm	active moment	-	default	-

P10.53	Name	The rms value	e of the o	current	Set	-	Access	RO
		for the fault with index 0			method			
	Range	-	Unit	А	active moment	-	default	-

P10.54	Name	Instantaneou V-phase curre with i	ns value o ant for th ndex 0	of the e fault	Set method	-	Access	RO
	Range	-	Unit	А	active	-	default	-

moment					
moment					
			moment		
			111011101110		

P10.55	Name	Instantaneou W-phase curre with i	ns value ent for the ndex 0	of the ne fault	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.56	Name	Capacitor voltage for the fault with index 0			Set method	-	Access	RO
	Range	-	Unit	V	active moment	-	default	-

	Name	temperature of fault with			Set	-	Access	RO
P10.57	Range	-	Unit	°C	active moment	-	default	-

<b>D10 50</b>	Name	The DI status of the fault with index 0			Set method	-	Access	RO
P10.58	Range	-	Unit	-	active moment	-	default	-

P10.59	Name	DO status of fault with index 0			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.60	Name	The fault code of the fault with index 1			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.61	Name	failure time for failure with index 1			Set method	-	Access	RO
	Range	-	Unit	s	active moment	-	default	-

P10.62	Name	The speed of the fault with index 1			Set method	-	Access	RO
	Range	-	Unit	rpm	active moment	-	default	-

P10.63	Name	The rms value of the current for the fault with index 1			Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.64	Name	Instantaneou V-phase curre with i	ns value ont for the ndex 1	of the le fault	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.65	Name	Instantaneou W-phase curre with i	s value o ent for th ndex 1	of the ne fault	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.66	Name	Capacitor voltage for the fault with index 1			Set method	-	Access	RO
	Range	-	Unit	V	active moment	-	default	-

P10.67	Name	temperature of fault with index 1			Set method	-	Access	RO
	Range	-	Unit	°C	active moment	-	default	-

P10.68	Name	The DI status of the fault with index 1			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.69	Name	DO status of fault with index 1			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.70	Name	The fault code for fault with index 2			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.71	Name	Failure time of failure with index 2			Set method	-	Access	RO
	Range	-	Unit	S	active moment	-	default	-

P10.72	Name Rotation speed of the fa				Set		A	DO
	Iname	with index 2			method	-	Access	ĸO
	Range	- Unit rpm		rpm	active moment	-	default	-

P10.73	Name	The rms value for the fault	e of the o with ino	current lex 2	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.74	Name	Instantaneou V-phase curre with i	ns value ant for the ndex 2	of the le fault	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.75	Name	W-phas instantaneous with i	e curren value fo ndex 2	t or fault	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.76	Name	Capacitor voltage for fault with index 2			Set method	-	Access	RO
	Range	-	Unit	V	active moment	-	default	-

	Name	temperature of fault with index 2			Set method	-	Access	RO
P10.77	Range	-	Unit	°C	active moment	-	default	-

P10.78	Name	DI state of the fault with index 2			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.79	Name	DO status of fault with index 2			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

P10.80	Name The fault code for fault with				Set		A	RO
	Name	index 3			method	-	Access	ĸO
	Range	-	Unit	-	active moment	-	default	-

D10.91	Name Failure time for failure with				Set		A	DO
	Iname	ind	index 3 method			-	Access	KÜ
P10.81	Range	-	Unit	s	active moment	-	default	-

P10.82	Name	Rotational speed of the fault with index 3			Set method	-	Access	RO
	Range	-	Unit	rpm	active moment	-	default	-

	Name	The rms value of the fault	e of the o with ind	current ex 3	Set method	-	Access	RO
P10.83	Range	-	Unit	А	active moment	-	default	-

P10.84	Name	Instantaneou V-phase curre with i	ns value ant for the ndex 3	of the le fault	Set method	-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

P10.85	Instantaneous value of NameInstantaneous value of W-phase current for fault with index 3	e of fault	Set method	-	Access	RO		
	Range	-	Unit	А	active moment	-	default	-

P10.86	Name	Capacitor voltage of the fault with index 3			Set method	-	Access	RO
	Range	-	Unit	V	active moment	-	default	-

P10.87	Name	The temperature of the fault with index 3			Set method	-	Access	RO
	Range	-	Unit	°C	active moment	-	default	-

	Name	DI status of ind	the fault ex 3	with	Set method	-	Access	RO
P10.88	Range	-	Unit	-	active moment	-	default	-

	Name	The DO state with i	us of the ndex 3	e fault	Set method	-	Access	RO
P10.89	Range	-	Unit	-	active moment	-	default	-

<b>D10.00</b>	Name	The fault coc with i	le for the ndex 4	e fault	Set method	-	Access	RO
P10.90	Range	-	Unit	-	active moment	-	default	-

<b>D10 01</b>	Name	Failure time for failure with index 4			Set	-	Access	RO
		IIIdCA 4			methou			
P10.91	Range	-	Unit	S	active moment	-	default	-

<b>D10.02</b>	Name	Rotational spo with i	eed of th ndex 4	e fault	Set method	-	Access	RO
P10.92	Range	-	Unit	rpm	active moment	-	default	-

	Name	The rms value	e of the o	current	Set	_	Access	RO
D10.02	i tuine	of the fault	with ind	lex 4	method		1100035	RO
P10.93	Range	-	Unit	А	active moment	-	default	-

P10.94	Name	Instantaned V-phase cur ind	Instantaneous value of V-phase current for fault index 4			-	Access	RO
	Range	-	Unit	А	active moment	-	default	-

	W-phase current for the fault			method			
	with index 4						
Range	-	Unit	А	active moment	-	default	-

D10.04	Name	Capacitor v fault wit	oltage ( h index	of the	Set method	-	Access	RO
P10.90	Range	-	Unit	V	active moment	-	default	-

P10.07	Nama	The temperat	ure of th	e fault	Set		A	DO
	Name	with index 4			method	-	Access	ĸŬ
P10.97	Range	-	Unit	°C	active moment	-	default	-

<b>D10.00</b>	Name	DI state of t ind	he fault ex 4	with	Set method	-	Access	RO
P10.98	Range	-	Unit	-	active moment	-	default	-

P10.99	Name	The DO status of the fault with index 4			Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default	-

## 9.12 P11 group parameters - multi-speed parameters

D11.01	N	lame	Multi-speed	running r	node	Set method	Stop to set	A	ccess	RW
F11.01	R	ange	0~2	Unit	-	active moment	Immediately	de	efault	0
		S	etting Mult			i-speed runni	ng mode			
			0		run once					
			1			Cycle run	Cycle run			
			2	2			ning			

P11.02	Name	total segr	nent cou	int	Set method	anytime	Access	RW
	Range	1~16	Unit	-	active moment	Immediately	default	16

D11.02	N	lame	running	time unit		Set method	anytime	Access	RW
P11.05	Range		0~1	Unit	-	active moment	Immediately	default	1
	Setting				unit				
	0		ms						
	1				S				

P11.04	Name	Accelerat	tion time	: 1	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.05	Name	Deceleration time 1			Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.06	Name	Accelerat	tion time	2	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.07	Name	Decelerat	tion time	2	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.08	Name	Accelerat	tion time	e 3	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.09	Name	Decelerat	tion time	23	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.10 Name Acceleration time 4	Set method	anytime	Access	RW
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	Range	0~65535	Unit	ms	active moment	Immediately	default	500
D11.11	Name	Deceleration time 4			Set method	anytime	Access	RW
F11.11	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P11.12	Name	The size of command of the	the spee ne first s	ed tage	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.13	Nomo	The first speed	l comma	and	Set	antima	A 22255	DW		
	Iname	running	time		method	anytime	Access	K W		
	Range	0~32767	Unit	-	active moment	Immediately	default	10		
The unit of this parameter is set in P11.03.										

P11.14	Name	T acce	The first leration time	section s and dece selectior	peed eleration	Set method	anytime	Access	RW		
	Range	0~4		Unit	-	active moment	Immediately	default	0		
	Setting			Acceleration and deceleration time selection							
	0 Use			Use universal speed mode acceleration and deceleration							
						time					
	1			Use acceleration and deceleration time 1							
	2			Use acceleration and deceleration time 2							
	3 Use acceleratio					n and deceleration time 3					
	4			Use a	cceleration	n and deceler					

P11.15	Name	The size of command of stag	the spee the seco ge	ed ond	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.16	Name	The second spec	ed comr	nand	Set	onvtime	Access	DW/
	Ivallic	running time			method	anytine	Access	IX VV
	Range	0~32767	Unit	-	active	Immediately	default	10

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moment

The unit of this parameter is set on P11.03.

P11.17	Name	The accele	second section speed ration and deceleration time selection			Set method	anytime	Access	RW		
	Range	0~4		Unit	-	active moment	Immediately	default	0		
	Setti	ng		Acceleration and deceleration time selection							
	0	0			Use universal speed mode acceleration and deceleration						
						time					
	1			Use a	cceleration	on and deceleration time 1					
	2	2 Use a			cceleration	n and deceler	ration time 2				
	3	3 Use acceleration				n and deceleration time 3					
	4			Use a	cceleration	n and deceler					

P11.18	Name	The size of command of th	the spee third s	ed stage	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.19	Nama	The third speed	d comm	and	Set	antina	Access	DW	
	Iname	running time			method	anytime	Access	ĸw	
	Range	0~32767	Unit	-	active moment	Immediately	default	10	
The unit of this parameter is set on P11.03.									

P11.20	Name	The acceler	third tation time	section s and dece selectior	speed eleration	Set method	anytime	Access	RW		
	Range	0~4		Unit	-	active moment	Immediately	default	0		
	Setti	Setting			Acceleration and deceleration time selection						
	0			Use universal speed mode acceleration and							
					dece	eleration time	5				
	1			Use acceleration and deceleration time 1							
	2	2			Use acceleration and deceleration time 2						
	3	3 Use acceler				n and deceler	ration time 3				
	4			Use a	cceleration	n and deceler					
	command of the	e fourth	stage	method							
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Range	-32767~32767 Unit rpm		active	Immediately	default	0					
				moment							

P11.22	Name	Name The fourth spec			Set	onvtime	Access	DW/	
	Ivanic	running time			method	anythic	ALLISS	ĸw	
	Range	0~32767	Unit	-	active moment	Immediately	default	10	
The unit of this parameter is set on P11.03.									

P11.23	Name	The fou accelerati tii	on and deceleration ne selection		Set method	anytime	Access	RW
	Range	0~4	Unit	-	active moment	Immediately	default	0
	Set	tting	Accele	ration and	deceleration	time selection		
		0	Use ur	Use universal speed mode acceleration and				
				deceleration time				
		1	Use a	Use acceleration and deceleration time 1				
		2	Use acceleration			Use acceleration and deceleration time 2		
		3	Use a	acceleratio	n and deceler	ration time 3		
		4	Use a	acceleration	n and deceler	ration time 4		

P11.24	Name	The size of command of the	the spee ie fifth s	d tage	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.25	Nomo	The fifth speed	l comm	and	Set	onutimo	Access	DW		
	Indiffe	running time			method	anytime	Access	κw		
	Range	0~32767	Unit	-	active moment	Immediately	default	10		
The unit of this parameter is set on P11.03.										

P11.26	Name	Name         The fifth section spectrum           Name         acceleration and decele           time selection				Set method	anytime	Acce	ss	RW
	Range	0~4	4	Unit	-	active moment	Immediately	defau	ılt	0
	Setti	ng	g Acceleration and			deceleration	time selection			
	0		Use	universa	l speed mo	ode acceleration and deceleration				
						time				
	1			Use a	cceleration	on and deceleration time 1				
	2			Use acceleration and deceleration time 2						
	3			Use a	cceleration	ion and deceleration time 3				
	4			Use a	cceleration	n and deceleration time 4				

P11.27	Name	The size of command of th	the spee e sixth	ed stage	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.28	Nomo	The sixth speed command			Set	onutino	A 22255	DW	
	ivanie	running time			method	anytime	Access	K W	
	Range	0~32767	Unit	-	active	Immediately	default	10	
					moment				
The unit of this parameter is set on P11.03.									

P11.29	Name	The sixth acceleration time	section s and dece selection	speed eleration	Set method	anytime	Access	RW
	Range	0~4	Unit	-	active moment	Immediately	default	0

Setting	Acceleration and deceleration time selection
0	Use universal speed mode acceleration and deceleration
	time
1	Use acceleration and deceleration time 1
2	Use acceleration and deceleration time 2
3	Use acceleration and deceleration time 3
4	Use acceleration and deceleration time 4

P11.30	Name	The size of command of stag	the spee the seve ge	ed enth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.31	Name	The seventh spe running	ed comr time	nand	Set method	anytime	Acces s	RW		
	Range	0~32767	Unit	-	active	Immediately	default	10		
					moment					
The unit of this parameter is set on P11.03.										

P11.32	Name	The accele	sevent eration time	h section and dece selectior	n speed eleration	Set method	anytime	Acces	ss RW	
	Range	2 0~4		Unit	-	active moment	Immediately	defau	lt 0	
	Settin	g	Acceleration and a			deceleration				
	0		Use	Use universal speed mode acceleration and deceleration						
						time				
	1			Use a	cceleration	n and deceler				
	2		Use acceleration			Use acceleration and deceleration time 2				
	3			Use a	cceleration	on and deceleration time 3				
	4			Use a	cceleration	on and deceleration time 4				

P11.33	Nome	The size of	the spee	ed	Set	onstime	Access	DW
	Traffic	command of the	e eighth	stage	method	anythic		
F11.55	Range	-32767~32767	Unit	rpm	active	Immediately	default	0
					moment			

P11.34 -	Name	The eighth spee	ed comm	nand	Set	anytime	Access	RW		
	i tullio	running time			method	anytime	1100035	IX VV		
	Range	0~32767	Unit	-	active moment	Immediately	default	10		
The unit of this parameter is set on P11.03.										

P11.35	Name	The accel	e eighth eration time	n section and dece selectior	speed eleration	Set method	anytime	Access	RW	
	Range	ange 0~4		Unit	-	active moment	Immediately	default	0	
	Setting			Acceleration and deceleration time selection						
	0		Use	Use universal speed mode acceleration and deceleration						
				time						
	1		Use accelera			n and deceler				
	2			Use acceleration and deceleration time 2						
	3		Use acceleration			on and deceleration time 3				
	4			Use a	acceleratio	n and deceler				

P11.36	Name	The size of command of th	the spee e ninth	ed stage	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.37	Name	The ninth spee	d comm	and	Set	anytime	Access	RW		
		running	time		method	unythine	1100033	1000		
	Range	0~32767	Unit	-	active moment	Immediately	default	10		
The unit of this parameter is set on P11.03.										

P11.38	Name	The acceler	The ninth section speed acceleration and deceleration time selection			Set method	anytime	Access	RW	
	Range	0~4		Unit	-	active moment	Immediately	default	0	
	Setti	ng		Acceleration and deceleration time selection						
	0	-		Use universal speed mode acceleration and						
				deceleration time						
	1		Use a			Use acceleration and deceleration time 1				
	2			Use a	acceleratio	n and deceler	ration time 2			

3	Use acceleration and deceleration time 3
4	Use acceleration and deceleration time 4

D11 20	Name	The size of command of th	the spec te tenth	ed stage	Set method	anytime	Access	RW
P11.39	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

	Name	The tenth spee	d comm	and	Set	anytime	Access	RW		
D11 40		Tunning	time		memou					
P11.40	Range	0~32767	Unit	-	active moment	Immediately	default	10		
The unit of this parameter is set on P11.03.										

P11.41	Name	The accele	e tenth section speed ration and deceleration time selection			Set method	anytime	Access	RW	
	Range	0~4	0~4		-	active moment	Immediately	default	0	
	Sett	ing	g Acceleration and d			deceleration t	ime selection			
	0	<u> </u>	Use	Use universal speed mode acceleration and deceleration						
				time						
	1			Use						
	2			Use acceleration and deceleration time 2						
	3		Use acceleratio			e acceleration and deceleration time 3				
	4			Use	acceleratior	n and deceleration time 4				

P11.42	Name	The size of command of t stag	the spee he eleve ge	ed enth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

D11 42	Name	The eleventh spe running	eed com time	mand	Set method	anytime	Access	RW
P11.43	Range	0~32767	Unit	-	active moment	Immediately	default	10
The unit	of this param	neter is set on P11.	.03.					

P11.44	Name	The accel	eleven eration time	oth section and dece selection	on speed eleration n	Set method	anytime	Acce	ess	RW
	Range	0~	4	Unit	-	active moment	Immediately	defa	ult	0
	Settin	ng		Accele	eration and	deceleration t	ime selection			
	0		Use	univers	al speed mo	de acceleratio	on and decelerat	tion		
						time				
	1			Use	acceleration	and decelera	ation time 1			
	2			Use	acceleration	and decelera	ation time 2			
	3			Use	acceleration	and decelera	ation time 3			
	4			Use	acceleration	and decelera	ation time 4			

P11.45	Name	The size of command of stag	the spee the twel e	ed fth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

	Nomo	The twelfth spe	ed com	mand	Set	onutimo	Access	DW
D11 46	Ivallie	running	time		method	anythile	Access	КW
r11.40	Range	0~32767	Unit	-	active moment	Immediately	default	10
The unit	of this param	eter is set on P11.	.03.					

P11.47	Name	Thacce	e twelft leration time	th section and dec selectio	n speed eleration n	Set method	anytime	Access	RW
	Range	0~	-4	Unit	-	active moment	Immediately	default	0
	Settin	g		Acceleration and deceleration t			ime selection		
	0		Use	univers	al speed mo	de acceleratio	on and decelerat	tion	
						time			
	1			Use	acceleratior	and decelera	ation time 1		
	2			Use	acceleratior	and decelera	ation time 2		
	3			Use	acceleratior	and decelera	ation time 3		
	4			Use	acceleration	and decelera	ation time 4		

P11.48	Name	The size of command of th stag	the spee ne thirte e	ed enth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

	P11.49 Range	The thirteer	nth spee	d	Set	antima	1 22255	DW
D11 40	Iname	command ru	nning tii	ne	method	anytime	Access	КW
P11.49	Range	0~32767	Unit	-	active moment	Immediately	default	10
The unit	of this param	eter is set on P11.	.03.					

P11.50	Name	The accel	hirteenth section speed eration and deceleration time selection			Set method	anytime	Acce	ess	RW
	Range	0~	4	Unit	-	active moment	Immediately	defa	ult	0
	Settir	ıg		Accele	eration and	deceleration t	ime selection			
	0	-	Use	e univers	al speed mo	de acceleratio	on and decelerat	ion		
						time				
	1			Use	acceleration	and decelera	ation time 1			
	2			Use	acceleration	and decelera	ation time 2			
	3			Use	acceleration	and decelera	ation time 3			
	4			Use	acceleration	and decelera	ation time 4			

P11.51	Name	The size of command of th stag	the spee ne fourte ge	ed eenth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

D11 52	Name	The fourteer command run	nth spee nning tii	ed me	Set method	anytime	Access	RW
F11.52	Range	0~32767	Unit	-	active moment	Immediately	default	10
The unit	of this param	eter is set on P11.	.03.					

P11.53	Name	The fourtee acceleration time	nth section and decesselection	on speed eleration n	Set method	anytime	Access	RW
	Range	0~4	Unit	-	active	Immediately	default	0

					moment			
Setti	ng		Accele	eration and o	leceleration t	ime selection		
0		Use	universa	al speed mo	de acceleratio	on and decelerati	on	
					time			
1			Use	acceleration	and decelera	tion time 1		
2			Use	acceleration	and decelera	tion time 2		
3			Use	acceleration	and decelera	tion time 3		
4			Use	acceleration	and decelera	tion time 4		

P11.54	Name	The size of command of t stag	the spee he fiftee ge	ed enth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

P11.55	Nome	The fifteenth spe	eed com	mand	Set	onstime	Access	DW	
	Traffic	running time			method	anytime	Access	κw	
	Range	0~32767 Unit -			active moment	Immediately	default	10	
The unit of this parameter is set on P11.03.									

P11.56	Name	The accel	fifteer leration time	th section and decesselection	n speed eleration n	Set method	anytime	Access	s RW	
	Range	0~	4	Unit	-	active moment	Immediately	defaul	0	
	Settin	ıg		Accel	Acceleration and deceleration time selection					
	0		Use	Use universal speed mode acceleration and deceleration						
						time				
	1		Use acceleration			n and deceler				
	2		Use acceleration			eration and deceleration time 2				
	3		Use acceleration			on and deceleration time 3				
	4		Use accelerat			on and deceleration time 4				

P11.57	Name	The size of command of the stag	the spee he sixtee ge	ed enth	Set method	anytime	Access	RW
	Range	-32767~32767	Unit	rpm	active moment	Immediately	default	0

	Name	th speed	d	Set	anytime	Access	RW		
D11 59	i vuille	command running time			method		1100000	1.11	
P11.58	Range	0~32767	Unit	-	active moment	Immediately	default	10	
The unit of this parameter is set on P11.03.									

P11.59	Name	The si acceler	xteenth section speed ation and deceleration time selection			Set method	anytime	Access	RW
	Range	0~4		Unit	-	active moment	Immediately	default	0
	Se	tting	ing Acceleration a			deceleration t	ime selection		
		0		Use u					
		1	Use acceleration			and decelera			
		2	Use acceleratio			Use acceleration and deceleration time 2			
		3	Use acceleratio			and decelera	ation time 3		
		4		Use	acceleration	and decelera	ation time 4		

## 9.13 P12 group parameters - virtual DI DO parameters

P12.01	Name	Virtual l conf	DI1 func iguration	tion 1	Set method	anytime	Access	RW		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.										

P12.02	Name	Virtual Conf	DI2 func iguration	rtion 1	Set method	anytime	Access	RW		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.										

P12.03	Nama	DI3 func	tion	Set	austina	A	DW			
	Inallic	configuration			method	anytime	Access	ĸw		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.										

P12.04	Nama	DI4 func	ction	Set	autima	A	DW		
	Inallie	configuration			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.05	Nama	DI5 func	tion	Set	aurtima	A	DW			
	Inallie	configuration			method	anytime	Access	ĸw		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.										

P12.06	Nomo	DI6 func	tion	Set	onutimo	1 00055	DW			
	Inallie	configuration			method	anytime	Access	ĸw		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.										

P12.07	Nomo	Virtual DI7 function			Set	onutimo	1 00000	DW	
	Inallie	configuration			method	anytime	Access	КW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.08	Nama	Virtual	DI8 func	tion	Set	onttime	1 00000	RW
	Iname	configuration			method	anytime	Access	κw
	Range	0~99	Unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.								

P12.09	Nomo	Virtual	DI9 func	tion	Set	onttime	1 00000	DW	
	Inallie	configuration			method	anytime	Access	κw	
	Range	0~99 Unit -			active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.10	Nomo	Virtual I	DI10 fun	ction	Set	anytimo	1 00055	DW	
	Inallie	configuration			method	anytime	Access	Κw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.11	Nama	Virtual DI11 function Set				ontimo	1 00000	DW	
	Iname	configuration			method	anytime	Access	κw	
	Range	0~99 Unit -			active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.12	Nama	Virtual DI12 function			Set	our time o	A	DW	
	Iname	configuration			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.13	Nama	Virtual I	Virtual DI13 function		Set	onutimo	1 00000	DW	
	Ivallie	configuration			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.14	Nomo	Virtual I	DI14 fun	ction	Set	1 00000	DW		
	Inallie	configuration			method	anytime	Access	ΚW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.15	Nama	Virtual I	DI15 fun	ction	Set	our time o	A	DW
	Iname	configuration			method	anytime	Access	κw
	Range	0~99 Unit -			active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.								

P12.16	Nomo	Virtual I	DI16 fun	ction	Set	onttime	1 00000	DW
	Inallie	configuration			method	anytime	Access	κw
	Range	0~99	Unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.								

P12.17	Nomo	Virtual DI20 function			Set	anytimo	1 00055	DW	
	Inallie	configuration			method	anytime	Access	κw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.18	Nomo	Virtual I	DI21 fun	ction	Set	onutino	1 00000	DW	
	Ivallie	configuration			method	anytime	Access	КW	
	Range	0~99	Unit	-	active	Immediately	default	0	
					moment				
The specific function of the VDI port is the same as the DI port function. For details, see P06.01.									

P12.19 -	Name	The monito DI20 and vir	lue of virtual 1	Set method	-	Access	RO
	Range	-	Unit	-	active moment	-	default

P12 20	Name	Virtual DI1-DI16 input value setting register			Set method	anytime	Access	RW
P12.20	Range	0~65535	Unit	-	active moment	Immediately	default	0

D12 21	N	lame	Virtual I	DI1 level type		Set method	anytime	А	ccess	RW
F12.21	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
	Setting				Level type	1				
			0	Write 1 is always valid						
	1		Valid on rising edge							

P12.22	N	ame	Virtual I	DI2 level	type	Set method	anytime	А	ccess	RW
F 12.22	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
	Setting				Level type	:				
			0		Wri	te 1 is always	s valid			
			1		Va	lid on rising	edge			

P12.23 -	N	lame	Virtual I	DI3 level	type	Set method	anytime	А	ccess	RW
F12.25	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
		Setting				Level type	1			
			0	Write 1 is always valid						
		1		Valid on rising edge						

D12 24	N	ame	Virtual I	)I4 level type		Set method	anytime	Acc	ess	RW
F12.24	R	ange	0~1	Unit	-	active moment	Immediately	defa	ult	0
	Setting				Level type					
		0			Wri	te 1 is always	s valid			
		1		Valid on rising edge						

P12.25	N	lame	Virtual I	Virtual DI5 level type			anytime	А	ccess	RW
F 12.23	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
	Setting		etting			Level type	1			
			0		Wri	te 1 is always	s valid			
	1		Valid on rising edge							

D12 26	N	lame	Virtual I	DI6 level	type	Set method	anytime	Ac	ccess	RW
P12.20	R	ange	0~1	Unit	-	active	Immediately	de	fault	0
						moment				
		Setting		ting			1			
			0							
			1		Valid on rising edge					

D12 27	N	ame	Virtual I	DI7 level	type	Set method	anytime	Acces	s	RW
F12.27	R	ange	0~1	Unit	-	active	Immediately	defau	lt	0
						moment				
		S	etting	Level type						
			0		Wri	te 1 is always	s valid			
			1		Valid on rising edge					

D12 29	Name	Virtual I	DI8 level	type	Set method	anytime	Access	RW
P12.28	Range	0~1	Unit	-	active moment	Immediately	default	0

Setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

D12 20	N	lame	Virtual I	DI9 level	type	Set method	anytime	Ac	cess	RW
F12.29	R	Range 0~1		Unit	-	active	Immediately	de	fault	0
						moment				
		S	etting	lg Level type						
			0							
			1							

D12 20	N	ame	Virtual D	0110 leve	l type	Set method	anytime	А	ccess	RW
F12.50	R	Range 0~1		Unit	-	active	Immediately	d	efault	0
						moment				
		S	etting			Level type	:			
			0		Wri	te 1 is always	s valid			
		1		Valid on rising edge						

D12 21	Ň	lame	Virtual D	III leve	l type	Set method	anytime	А	ccess	RW
P12.51	R	Range 0~1		Unit	-	active moment	Immediately	de	efault	0
		Setting				Level type	:			
		0			Wri	te 1 is always	s valid			
			1		Va	lid on rising	edge			

D12 22	N	lame	Virtual D	I12 leve	l type	Set method	anytime	А	ccess	RW
P12.52	R	Range 0~1		Unit	-	active moment	Immediately	de	efault	0
		Setting				Level type	:			
		0			Wri	te 1 is always	s valid			
			1		Va	lid on rising	edge			

P12.33 Name	Virtual DI13 level type	Set method	anytime	Access	RW
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R	ange	0~1	Unit	-	active moment	Immediately	default		0
	Setting				Level type				
	0								
	1								

D12 24	N	lame	Virtual D	114 leve	l type	Set method	anytime	А	.ccess	RW
P12.34	Range 0~1		0~1	Unit	-	active moment	Immediately	d	efault	0
		Setting				Level type	:			
		0			Wri	te 1 is always	s valid			
			1		Va	lid on rising	edge			

D12 25	Ň	lame	Virtual DI15 level type			Set method	anytime	А	ccess	RW
P12.55	R	Range 0~1		Unit	-	active moment	Immediately	de	efault	0
		S	etting		Wai	Level type	valid			
			1		Va	lid on rising	edge			

D12 26	N	lame	Virtual D	0116 leve	l type	Set method	anytime	A	ccess	RW
P12.50	Range 0~		0~1	Unit	-	active moment	Immediately	de	efault	0
		S	etting 0		Wri	Level type te 1 is always	s valid			
			1		Va	lid on rising	edge			

D12 27	N	ame	Virtual D	0120 leve	l type	Set method	anytime	А	ccess	RW
P12.57	R	Range 0~1		Unit	-	active moment	Immediately	de	efault	0
		S	etting 0		Wri	Level type te 1 is always	s valid			
			1		Va	lid on rising	edge			

D12 29	N	ame	Virtual D	I21 leve	l type	Set method	anytime	Acces	s	RW
F12.36	12.38 Range 0~1		0~1	Unit	-	active	Immediately	defau	lt	0
						moment				
		S	etting			Level type	1			
			0		Wri	te 1 is always	s valid			
			1							

P12.41	Nomo	Virtual DO	1 config	uration	Set	onttime	1 00000	DW	
	Inallie	re	egister		method	anytime	Access K		
F 12.41	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

	Nama	Virtual DO	2 config	uration	Set		A	DW		
P12.42	Name	re	egister		method	anytime	Access	ĸw		
P12.42	Range	0~99	Unit	-	active moment	Immediately	default	0		
The VDO port function is the same as the DO port function. For details, please refer to P06.41.										

P12.43	Nama	Virtual DO	Virtual DO3 configuration			our times	A	DW	
	Inallie	register			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.44	Nomo	Virtual DO	4 config	uration	Set	ontimo	1 00000	DW	
	Ivanie	register			method	anytime	Access	κw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.45	Name	Virtual DO5 configuration			Set	anytime	Access	RW		
		register			method					
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The VDO port function is the same as the DO port function. For details, please refer to P06.41.										

P12.46	Manaa	Virtual DO	6 config	uration	Set		A	DW	
	Inallie	register			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.47	Nomo	Virtual DO	7 configuration Set		Set	onutimo	1 00055	DW	
		register			method	anytime	Access	ΚW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.48	Name	Virtual DO re	8 config egister	uration	Set method	anytime	Access	RW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.49	Nomo	Virtual DO	Virtual DO9 configuration			onutimo	1 00000	DW	
		register			method	anytime	Access	КW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.50	Nomo	Virtı	Virtual DO10 Set		1 00000	DW				
	Ivallie	configuration register			method	anytime	Access	IX W		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The VDO port function is the same as the DO port function. For details, please refer to P06.41.										

P12.51	Nama	Virtı	1al DO11		Set	our time o	A	DW	
	Iname	configuration register			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.52	Nama	al DO12	2	Set	ontimo	1 00000	DW		
		configuration register			method	anytime	Access	КW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.53	Nomo	Virtı	Virtual DO13 Set		onttime	1 00000	DW			
	INAILIC	configuration register			method	anytime	Access	ΚW		
	Range	0~99	Unit	-	active moment	Immediately	default	0		
The VDO port function is the same as the DO port function. For details, please refer to P06.41.										

P12.54	Nama	Virtı	Virtual DO14 Set			A	DW		
	Inallic	configuration register			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.55	Name	Virtı	al DO1:	5	Set	anytime	Access	RW	
	Ivanie	configuration register			method	anytine	Access	КW	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

	Nama	Virtual DO16			Set	antima	1 00000	DW	
P12.56	Ivallie	configuration register			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

P12.57	Nomo	Virtı	al DO2	0	Set	onutimo	1 00000	DW	
	ivanic	configuration register			method	anytime	Access	ĸw	
	Range	0~99	Unit	-	active moment	Immediately	default	0	
The VDO port function is the same as the DO port function. For details, please refer to P06.41.									

	Nomo	Virtı	al DO2	1	Set	onstimo	1 00055	DW
P12.58	Ivanic	configuration register			method	allytille	Access	K W
	Range	0~99	Unit	-	active moment	Immediately	default	0
The VD0	The VDO port function is the same as the DO port function. For details, please refer to P06.41.							

P12.59	Name	Set method	-	Access	RO		
	Range	0~3	Unit	-	active moment	-	default

P12.60	Name	Virtual D	01-D01	6 output	Set	anytime	Access	RW
	Ivanic	level			method	anytine	Access	IX VV
	Range	0~65535	Unit	-	active moment	Immediately	default	0

P12.61	N	lame	Active leve	l of virtu	al DO1	Set method	anytime	А	ccess	RW
Range		ange	0~1	Unit	-	active moment	Immediately c		efault	0
	Setting				Level type	1				
	0		Output 1 when valid							
	1		Output 0 when valid							

P12.62	N	Jame	Active leve	l of virtual DO2		Set method	anytime	А	ccess	RW
P12.62		lange	0~1	Unit	Unit - active moment Immediately		Immediately	de	efault	0
	Setting				Level type					
	0			Output 1 when valid						
	1			Output 0 when valid						

D12.62	Ň	lame	Active leve	el of virtual DO3		Set method	anytime	А	ccess	RW
P12.63		ange	0~1	Unit	-	active moment	Immediately	de	default	
	Setting				Level type					
	0		Output 1 when valid							
	1		Output 0 when valid							

P12.64	Name	Active leve	l of virtu	al DO4	Set method	anytime	Access	RW
	Range	0~1	Unit	-	active moment	Immediately	default	0

Setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.65	N	lame	Active level of virtual DO5			Set method	anytime	А	ccess	RW
P12.03	R	ange	0~1 U		-	active moment	Immediately	de	efault	0
	Sett		etting	lg Level type						
	0			Output 1 when valid						
	1		Output 0 when valid							

D12.66	N	lame	Active level of virtual DO6			Set method	anytime	А	ccess	RW
P12.00	R	Range 0~		Unit	-	active moment	Immediately	d	efault	0
		S	etting			Level type	1			
		0			Ou	tput 1 when	valid			
		1		Output 0 when valid						

D12.67	N	lame	Active level of virtual DO7		Set method	anytime	А	ccess	RW	
P12.07	R	ange	0~1	Unit	-	active moment	Immediately	d	efault	0
		S	etting			Level type	:			
		0			Οι	tput 1 when	valid			
			1		Οι	tput 0 when	valid			

D12.69	N	lame	Active level of virtual DO8		Set method	anytime	А	ccess	RW	
P12.08	R	ange	ge 0~1 Uni		-	active moment	Immediately	de	efault	0
		S	etting			Level type	:			
		0			Ou	tput 1 when	valid			
			1		Ou	tput 0 when	valid			

P12.69	Name	Active level of virtual DO9			Set method	anytime	Access	RW
	Range	0~1	Unit	-	active	Immediately	default	0

				moment			
	S	etting		Level type			
		0	Ou	tput 1 when	valid		
		1	Ou	tput 0 when	valid		

D12 70	N	lame	Active le	evel of v DO10	irtual	Set method	anytime	А	ccess	RW
P12.70	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
		S	etting			Level type				
			0		01	itput 1 when	valid			
			1		Ou	tput 0 when	valid			

D10 71	N	ame	Active level of virtual DO11			Set method	anytime	А	ccess	RW
P12./1	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
		S	etting			Level type				
		0		Output 1 when valid						
			1		Οι	tput 0 when	valid			

D12 72	Ň	lame	Active level of virtual DO12		Set method	anytime	А	ccess	RW	
P12.72	R	ange	0~1	Unit	-	active moment	Immediately	d	efault	0
		S	etting			Level type	:			
		0			Οι	tput 1 when	valid			
			1		Οι	tput 0 when	valid			

D10 72	N	ame	Active level of virtual DO13		Set method	anytime	А	ccess	RW	
P12.73	Name Range	0~1 Unit		-	active moment	Immediately	de	efault	0	
		S	etting			Level type	:			
		0			Oı	tput 1 when	valid			
			1		Οι	tput 0 when	valid			

P12.74	Name	Active level of virtual	Set	anvtime	Access	RW
		DO14	method	5		

R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
	S	etting			Level type	:			
		0		Οι	tput 1 when	valid			
		1		Οι	tput 0 when	valid			

D12 75	N	lame	Active le	evel of v DO15	irtual	Set method	anytime	А	ccess	RW
F12.75	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
		S	etting		Oı	Level type	valid			
			1		01 01	tput 0 when	valid			

P12.76	N	lame	Active le	evel of v DO16	irtual	Set method	anytime	A	ccess	RW
P12.70	R	ange	0~1	Unit	-	active moment	Immediately	de	default	
	Setting				Level type					
	0			Output 1 when valid Output 0 when valid						

P12.77 -	N	ame	Active le	evel of v DO20	irtual	Set method	anytime	А	ccess	RW
P12.//	R	ange	0~1	Unit	-	active moment	Immediately	Immediately de		0
	Setting 0			Οι	Level type tput 1 when	valid				
	1			Output 0 when valid						

	N	ame	Active le	evel of v	irtual	Set method	anytime	А	ccess	RW
P12.78	R	ange	0~1	Unit	-	active moment	Immediately	de	efault	0
	Setting 0				Ou	Level type itput 1 when	valid			
	1			Output 0 when valid						

P12.79	Ν	ame	Wheth DI1-DI register P2 on 2	er the vi 16 input 12.20 is j is cleared	rtual value powered d.	Set method	anytime	Access	RW
	R	ange	0~1	Unit	-	active moment	Immediately	default	1
		S	etting			Clear type			
			0	Virtual	'n				
			1	Virtual DI input value P12.20, clear at power-on					

## 9.14 P13 group parameters - multi-segment position parameters

	N	lame	Multi-seg	ment pos	sition	Set	Stop to set	Ac	cess	RW
D12 01			mode			method	1			
P15.01	D	0000	0.2	Unit		active	Immediately	dət	Soult	0
	Kang		0~2	Unit		moment	minediatery	uer	aun	0
		Satting					1. 1			
	Setting		Multi-segment position working mode							
			0	Stop after a single run						
			1	Cycle operation						
			2	DI switching operation						
When DI is switched to run, the value read (INFn.31, INFn.30, INFn.29, INFn.28) is run as the										
segment					number.					

D12.02	Name	Total numb	er of seg	gments	Set method	anytime	Access	RW
F 13.02	Range	1~16	Unit	-	active moment	Immediately	default	16

D12 02	N	lame	Idle wait	ing time	unit	Set method	anytime A		cess	RW
P13.03	R	ange	0~1	Unit	-	active moment	Immediately defa		ault	1
	Setting			Ic	lle waiting ti	me unit				
	1			s						

D12 04	N	lame	remainde m	er proces ethod	sing	Set method	anytime	Ac	cess	RW
P13.04	R	ange	0~1	Unit	-	active moment	Immediately	def	fault	0
	Setting0Re-jum				remai mp to th	nder process ne first positio	ing method	run		
			1 Fro			m the last sto	p section			

Margin processing method selection: when triggering multi-segment position again, whether to jump to the first position command to run again, or to start from the position command that was stopped last time.

P13.05	N	lame	Absolute position co	e or relat mmand s	ive setting	Set method	anytime	Ac	cess	RW
P13.03	R	ange	0~1	Unit	-	active moment	Immediately def		ault	1
	Setting 0 1			Absolu	ute or re	elative position Absolute com relative com	on command set nmand mand	tting		

P13.10	Name	Number o commands in th segn	of position ne first p nent	on position	Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	100 00

P13.12	Name	Speed of fir	st positi	on	Set	anytime	Access	RW	
	Tume	segm	lent		method	unytime	1100035	IX W	
	Range	0~32767	Unit	rnm	active	Immediately	default	500	
	Range	0,~52707	Om	ipin	moment	minediatery	uciaun	500	

D12 12	Name	acceleration time of first			Set	anytime	Access	RW
		position segment			method			
F15.15	Range	0~65535	Unit	ms	active	Immediately	default	500
	Kange	0,-05555	Om	1115	moment	minediatery	ueraunt	500

P13.14	Name	idle time of first position			Set	anvtime	Access	RW
	Ivanie	segment			method	unythic	1100035	1
	Range	0~32767 Unit -		active	Immediately	default	1	

				moment		
The unit	of this param	eter is set in P13	.03.			

P13 15	Name	Number o commands i position	Number of position commands in the second position segment			anytime	Access	RW
P13.15	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	100 00

	Name	Name Speed of second position				onvtime	Access	DW
D13 17	Iname	segment			method	anytime	Access	кw
F13.17	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

<b>D12 10</b>	Name	acceleration time of second position segment			Set method	anytime	Access	RW
P13.18	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.19	Name idle time of second position				Set	anvtime	Access	RW	
		segment			method	uniyunit		10.0	
	Range	0~32767	Unit	-	active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

P13.20	Name	Number of position commands in the third position segment			Set method	anytime	Access	RW
P13.20	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

	Nome	Speed of thi	rd positi	ion	Set	anytime	Access	DW
P13 22		segment			method	anythic	Access	
P13.22	Range	0~32767	Unit	rpm	active	Immediately	default	500
					moment			

P13.23	Name	The acceleration/o tim	3th decelera 1e	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active	Immediately	default	500

 	-			-	
			moment		
•	•	•		•	

	Name	idle time of th	nird posi	tion	Set	anytime	Access	RW	
D12 24		segment			method				
r 13.24	Range	0~32767	Unit	-	active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

D12 25	Name	Number of position commands in the fourth position segment			Set method	anytime	Access	RW
P13.25	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

	Name	Speed of fou	rth posit	tion	Set method	anytime	Access	RW
P13.27	Range	0~32767	Unit	rpm	active	Immediately	default	500

P13.28	Name	The acceleration/o tim	The 4th acceleration/deceleration time		Set method	anytime	Access	RW
-	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.29	Name	idle time of fo	urth pos	sition	Set	anytime	Access	RW/
	Indiffe	segment			method	anytime	Access	IX VV
P13.29	Range	0~32767	Unit	-	active moment	Immediately	default	1
The unit of this parameter is set in P13.03.								

P13.30	Name	Number of position commands in the fifth position segment			Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

P13.32	Name	Speed of fifth position segment		Set method	anytime	Access	RW	
	Range	0~32767	0~32767 Unit rpm		active	Immediately	default	500

		moment		
			-	

P13.33	Name	The 5th acceleration/deceleration time		Set method	anytime	Access	RW	
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

	Name	idle time of fi	ifth posi	tion	Set	anytime	Access F			
P13.34		segment			method	2				
P13.34	Range	0~32767	Unit	-	active moment	Immediately	default	1		
The unit of this parameter is set in P13.03.										

P13.35	Name	Number of position commands in the sixth position segment			Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

D12 27	Name	Speed of six segm	th positi ent	ion	Set method	anytime	Access	RW
P13.37	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P13.38	The 6thNameacceleration/deceleration3.38time		Set method	anytime	Access	RW		
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.39	Nomo	idle time of si	xth posi	ition	Set	onutimo	A 22255	DW	
	Ivallie	segment			method	anytime	Access	κw	
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

P13.40	Name	Number of commands in position	of position the seven segmen	on venth t	Set method	anytime	Access	RW
	Range	-2147483647 Unit User		active	Immediately	default	10000	

	~	units	moment		
	2147483647				

P13.42	Name	Speed of seve segm	enth posi lent	ition	Set method	anytime	Access	RW
	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P13.43	Name	The 7th acceleration/deceleration			Set method	anytime	Access	RW
		tim	ne					
	Range	ange 0~65535	Unit	ms	active	Immediately	default	500
		0~05555 Onit		1115	moment	minediatery	default	500

P13.44	Name	idle time of seventh position segment			Set method	anytime	Access	RW	
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

	Name	Number of position in the eighth position	ition co osition s	mmands segment	Set method	anytime	Acces s	RW
P13.45	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

P13 /7	Name	Speed of eigl	hth posi	tion	Set	anytime	Access	RW
	Ivanic	segment			method	anythic	Access	17.44
P15.47	Range	0~32767	Unit	rnm	active	Immediately	default	500
	Range 0~32767		Om	ıhm	moment	minediatery	ueraun	500

P13.48	The 8thNameacceleration/deceleration13.48time		Set method	anytime	Access	RW		
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.49	Name idle time of eighth position				Set	onvitimo	<b>A</b> 22255	DW	
	Iname	segment		method	anytime	Access	ĸw		
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

	Name	Number of posit	tion con	nmands	Set	anytime	Access	RW
	Inallic	in the ninth pos	sition se	gment	method	anythic	Access	IX VV
P13.50	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

	Nome	Speed of nin	th posit	ion	Set	onvtime	Access	DW
D12 52	Inallie	segment			method	anythic	Access	K W
P13.32	Range	0~32767	Unit	rnm	active	Immediately	default	500
	Kange 0~32/6/		Oint	ipin	moment	minediatery	uciaun	500

P13.53	3 The 9th acceleration/deceleration time		Set method	anytime	Access	RW		
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.54	Nomo	idle time of ninth position			Set	onstimo	Access	DW	
	Ivallie	segment			method	anytime	Access		
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

	Name	Number of position commands in the tenth position segment			Set method	anytime	Access	RW
P13.55	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

D12 57	Nome	Speed of ten	th posit	ion	Set	onstime	Access	DW
	Inallie	segment			method	anytime	ALLISS	IX VV
F15.57	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P13.58	Name	The 1 acceleration/o tim	l0th decelera ne	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.59	idle time of tenth position				Set	autiusa	A	DW	
	Name	segment			method	anytime	Access	ĸw	
	Range	0~32767 Unit	Unit	-	active	Immodiately	dafault	1	
			Unit		moment	minediatery	delaun	1	
The unit of this parameter is set in P13.03.									

P13.60	Name	Number of commands in position	of position the ele segmen	on venth t	Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

	Name	Speed of eleventh position			Set	anytime	Access	RW
D12.62		segm	lent		method			
P15.02	Range	0~32767	Unit	rnm	active	Immediately	default	500
	Range	0~32707	Om	ipin	moment	minediatery	uclault	500

P13.63	Name	The 1 acceleration/o tim	l 1 th lecelera 1e	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13 64	idle time of eleventh positio				Set	autiusa	A	DW	
	Name	segment			method	anytime	Access	ĸw	
P13.04	Range	0~32767	Unit	-	active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

P13.65	Name	Number of position commands in the twelfth position segment			Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

D12 (7	Name	Speed of twelfth position segment			Set method	anytime	Access	RW
P13.67	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P13.68	Name	The 1 acceleration/o tim	l2th decelera ne	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.69	Name	idle time of tw	elfth po	sition	Set	anytime	Access	RW	
	Indiffe	segment			method	anythic	Access		
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

P13.70	Name	Number of commands in position	of positic the thirt segment	on eenth t	Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

P13.72	Name	me Speed of thirteenth position Set				anytime	Access	RW
		segment			method			
	Range	0~32767	Unit	rom	active	Immediately	default	500
		0~32707	Om	ihm	moment	minediatery	uciault	300

P13.73	Name	The 1 acceleration/o tim	13th decelera ne	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.74	Name	idle time of	thirteen	ıth	Set	anvtime	Access	RW	
		position segment			method				
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

P13.75	Name	Number of commands in position	of position the four segmen	on teenth t	Set method	anytime	Access	RW
	Range	-2147483647 ~	Unit	User units	active moment	Immediately	default	10000

	2147483647			

D12 77	Name	Speed of fourteenth position segment			Set method	anytime	Access	RW
P13.//	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P13.78	Name	The 1 acceleration/o tim	l4th decelera ne	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

P13.79	Name	idle time of fourteenth position segment			Set method	anytime	Access	RW	
	Range	0~32767 Unit -			active moment	Immediately	default	1	
The unit of this parameter is set in P13.03.									

P13.80	Name	Number of commands in position	of position n the fift a segmen	on ceenth it	Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

	Name	Speed of fiftee	enth pos	ition	Set	anytime	Access	RW
D12.92		segm	nent		method	unythine	1100035	IX VV
F15.62	Range	0~32767	Unit	rnm	active	Immediately	default	500
	Range	0 52101	Omt	ipiii	moment	minediatery	derdant	500

P13.83	Name	The 1 acceleration/o tim	l 5th decelera ne	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

	Name	idle time of fift	eenth po	sition	Set	anytime	Access	RW
D12.04		segm	lent		method			
P13.84	Range	0~32767	Unit	-	active moment	Immediately	default	1
The unit of this parameter is set in P13.03.								

P13.85 -	Name	Number of commands in position	of position the sixt segmen	on teenth ıt	Set method	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	Unit	User units	active moment	Immediately	default	10000

	Name	Speed of sixte	enth pos	sition	Set	onstime	Access	DW
D12.97	segment			method	anytine	Access	ΚW	
F13.87	Range	0~32767	Unit	rpm	active moment	Immediately	default	500

P13.88	Name	The 1 acceleration/o tim	l 6th decelera 1e	tion	Set method	anytime	Access	RW
	Range	0~65535	Unit	ms	active moment	Immediately	default	500

D12 20	Name	idle time of position s	f sixteen segment	th	Set method	anytime	Access	RW
P13.89	Range	0~32767	Unit	-	active moment	Immediately	default	1
The unit of this parameter is set in P13.03.								

D12 00	Name	The 1st Decel	eration	time	Set method	anytime	Access	RW
F13.90	Range 0~65535 Unit ms		active moment	Immediately	default	500		

D12 01	Name	The 2st Decel	eration	time	Set method	anytime	Access	RW
F 13.91	Range	0~65535	0~65535 Unit ms		active moment	Immediately	default	500

P13.92 -	Nomo	Multi-segme	ent posit	ion	Set	ontimo	A 22255	DW	
	Inallie	command trigg	ger signa	l type	method	anytime	Access	κw	
P13.92	Range	0~3	Unit	-	active moment	Immediately	default	1	
When BI	T0=0, the ris	ing edge of INFr	n27 trigg	gers the	multi-segme	ent position, and	the falling	edge	
stops exe	stops executing the multi-segment position. When BIT0=1, the rising edge triggers and does not								
stop. When BIT1=0, when the multi-segment position comes from DI, a change of DI									

automatically triggers the multi-segment position. When BIT1=1, when the multi-segment position comes from DI, the DI change does not automatically trigger the multi-segment position, and only when INFn27 is re-triggered will the position execution be triggered.

	Name	dition for the next			Set	anytime	Access	RW			
P13.93		cor	nmand	to be sei	11	method .					
	Range	0~	0~1		1 Unit -		Immediately	default	0		
	6					moment	5				
	Setti	ng	Se	Selection of acceleration and deceleration time							
		8	T. 1								
	0		lt 1	It is necessary to wait for the previous position to							
			compl	ete the c	output a	nd then delay	efore				
				send	ing the	next position					
	1	After the previous p				previous position command is sent, wait for					
			the	idle tim	e to dir	rectly send the second position					
						command					

<b>D12</b> 04	Name	The so the first	ource of st positi	the spectrum the spectrum	ed of nand	Set method	anytime	Acce	ess	RW
P13.94	Range	0~4		Unit	-	active moment	Immediately	defa	ult	0
	Setti	ng		Parameter Description						
	0			From P13.12						
	1			From AI1						
	2			From AI2						
	3	3		From AI3(Hardware not supported)						
	4			from pulse rate						

## Chapter 10 Commissioning

## 10.1 Factory debugging matching motor steps

1. Connect the motor power cable and encoder cable, and connect the RS232 monitoring cable;

2. Open VECObserve and follow the steps below.



	CObserve V1.9 1	6
Ena	Force recovery of drive parameters Complete matching 2	
Dis 7 2 0 Tune	Complete matching  Select the general motor category Motor type  SPMSM IM  PMSM Linear motor  Motor n 68 4.Enter the motor model New Selected motor ID68 60MB R4030A21F MF2M txt ID168 130ME-R8515A21F-BM.txt ID368 155MB-5R930A33Fa-MF2D.txt ID368 00MB R4030A21F MF2M tert	-      -      ×      Drive type 5.Select servo drive type     VC structure C VC+X structure • VCXXX structure     Drive level nu ID01_00323H     Selected drive level 1D01_00323H txt      D01_00323H.txt
0	SPMSM:ID68_60MB_R4030A21F_MF2M.txt Rated current (A):2.8 Percentage of maximum current (%):300 Rated velocity (rpm):3000 Maximum motor velocity rpm:5000 Rotor inertia (Kgcm^2):0.29 Correlation of motor Rated torque (NM):1.27 Back-EMF coefficient (V/krpm):29.6 Stator phase resistance (ohm):2.35	VD structure E:ID01_00323H.txt Rated voltage (V):220 Rated current (A):3 Percentage of maximum current (%):300 Bus voltage correction factor (%):105 switching frequency:8kHz dead zone time (us):3 information of servo driver Stall time (ms):200 Stall current (ms):200 Discense user at the previous cullicker):15
	Flectrical time constant (ms);6 17	Current sampling extraction rate 0 Cancel
# 10.2 Location Mode Debugging Guidelines



#### 10.2.1 Position Mode Block Diagram

#### 10.2.2 Preliminary analysis of the curve

Set the servo drive to position mode, the position comes from multiple positions, run one of the positions, and record the waveform, as shown in Figure 1, the first curve is the planned speed command curve, after filtering, the filtered speed command curve is obtained, the larger the filter time constant, the more serious the lag of the filtered speed command, but the softer. Ideally, the actual velocity curve should coincide with the filtered velocity curve, which is the control target of the position loop. The position error is the accumulated value of the speed command minus the actual speed. Obviously, due to the lag of the filtering, the position error will become larger, and in the later stage of the filtering, the position error curve should coincide with the filtered position error curve. The filtered position error refers to the accumulated value of the filtered speed command minus the actual speed. As mentioned above, ideally, the actual speed curve should be coincident with the filtered speed curve, which means that the filtered speed The position error is always 0 under ideal conditions, but in fact, in the early stage of acceleration, the actual speed will lag behind the filtered speed command, that is to say, in the early stage of acceleration, the filtered position error will continue to increase, and after reaching a constant speed, the filtered position error gradually converges to zero, the speed of convergence depends on the gain of the position loop, the greater the gain, the faster the convergence. As shown in Figure 2 below.





### 10.2.3 Current loop understanding and tuning

For brushless DC motors, under the condition of no excitation, the greater the current, the greater the output torque. The two are in a proportional relationship. The magnitude of output torque can be monitored through P09.31.



The control goal of the current loop PI is to ensure that the actual motor current (Q-axis current loop feedback) tracks the current command (Q-axis current loop given). As shown in the picture below. The Q-axis current loop feedback tracks the Q-axis current loop reference.



If these two curves are not tracked well, P07.01 and P07.02 need to be adjusted manually. The principle of current loop adjustment is, **Increase the proportional gain and integral gain as much as possible. However, if the current feedback has high frequency oscillation,** the proportional gain P07.01 should be appropriately reduced. If the current feedback has low frequency oscillation, the current loop integral gain P07.02 should be reduced. If the two curves are not close, increase P07.01 and P07.02 appropriately. P07.01 and P07.02 are generally adjusted between 100-300, and the integral gain is generally smaller than the proportional gain.

There are two kinds of current oscillations, one is high frequency oscillation and the other is low frequency oscillation. High frequency oscillation is caused by too large proportional gain P07.01. Low frequency oscillation is caused by too large integral gain P07.02.





The larger the current command amplitude, the larger the output torque. Specifically, the greater the forward current command (more positive), the greater the output forward torque; the greater the reverse current command (more negative), the greater the output reverse torque. When the current command is close to 0, the output torque is also close to zero. As shown in the figure below, the motor speed is 0 at the beginning, and the motor torque is close to 0. After that, the motor torque increases in the positive direction, and the motor starts to accelerate. The greater the motor forward torque, the greater the motor acceleration, and then the forward torque is slow. Slowly reduce to zero, the motor speed remains constant and does not increase. After that, the motor torque gradually decreases to negative, and the motor begins to decelerate. The greater the negative motor torque, the greater the motor deceleration. The final motor torque is 0, and the motor speed remains unchanged.



10.2.4 Speed loop understanding and tuning



The input of the speed loop is the given speed and the feedback actual speed, and the output is the torque command. The goal is to make the feedback actual speed track the given speed by adjusting the torque. The torque command consists of two parts, one is feedforward and the other is speed loop PI output. The torque feedforward is obtained by multiplying the acceleration of the given speed by a torque feedforward coefficient, and the speed loop PI can quickly eliminate the error between the given speed and the actual speed.

There is a filter after the torque command output, usually low-pass filter (P07.12=0). The function of low-pass filtering is to reduce torque jump and reduce motor noise. Generally speaking, the larger the torque filter time constant P07.13, the smaller the motor noise, but it may cause low-frequency fluctuations in the torque. Generally speaking, the larger the load inertia is, the larger the required torque filter time constant P07.13, and the larger the speed loop proportional gain.

Torque feedforward coefficient P07.10 and torque filter time constant P07.13 can be obtained through inertia self-learning, and generally do not need to be adjusted. It is mainly necessary to adjust the proportional gain and integral gain of the speed loop PI.

The adjustment principles of speed loop proportional gain P07.03 and integral gain P07.04 are:

- <u>The speed loop proportional gain is generally more than 10 times greater than</u> the integral gain, and the speed loop proportional gain is adjusted between <u>1000-10000</u>, and the speed loop integral gain is generally adjusted between <u>20-500</u>. If the integral gain is too large relative to the proportional gain, it is easy to cause low-frequency fluctuation of the rotational speed. The specific performance is that the speed has been reversed and cannot converge.
- 2. When the inertia is large, the proportional gain of the speed loop needs to be increased.
- 3. <u>When the proportional gain of the speed loop is too large, abnormal noise will occur during the static process of the motor.</u>
- 4. <u>When the integral gain of the speed loop is too large, the motor speed is always</u> forward and reverse, and it cannot converge.
- 5. <u>The speed loop proportional gain and integral gain are too small, the given</u> <u>speed and the feedback speed cannot be coincident, the motor rigidity is very</u> <u>small, especially soft.</u>





### 10.2.5 Position loop understanding and adjustment

The position loop gain is generally set to 100-500. If the position loop proportional gain is too large, it is easy to cause the motor to shake. If it is too small, the convergence rate of the position error is slow.

# Chapter 11 Introduction to the Profinet Protocol

## 11.1 Introduction to Profinet

Profinet is an industrial bus standard designed to collect and transmit data in industrial systems and enables real-time data transmission and reception (1ms or less). The Profinet standardization organization is part of Profibus&Profinet intermational (PI), located in Karlsruhe, Germany. Since 2003, PROFINET is part of the IEC 61158 and IEC 61784 standards. PROFINET=PROFIbus+Ethernet, transplant the master-slave structure of Profibus to Ethernet, so profinet will have Controller and Device, and their relationship can simply correspond to the Master and Slave of profibus. In addition, because profinet is based on Ethernet, it can have topological structures such as Ethernet, while profibus has only bus type. So profinet is the product of combining the master-slave structure of profibus and the topology of ethernet.

### 11.2 Introduction to PROFIdrive

The Profinet bus defines 3 standard profiles for drive technology applications (PROFIenergy, PROFIdrive, PROFIsafe), of which PROFIdrive is the application profile for motion control.

PROFIdrive defines 6 application classes, the most important of which are the following 3 application classes:

#### (1) AC1 Simple Drive

The drive is controlled by the speed setpoint delivered by the controller. The entire speed control is carried out during the drive. The acceleration/deceleration time is also realized in the drive. Typical applications for AC1: Simple frequency converters for controlling water pumps and fans.

### (2) AC3 Single-axis positioning drive with local position control

In addition to speed control in the application of AC3, the drive also has functions such as position closed-loop control and position curve planning. Therefore, the servo drive works as a self-controlled simple positioning drive when the process is run on the controller. Positioning tasks can be transferred to the drive controller via PROFINET and started. Typical applications of AC3: single-axis positioning, simple machines that perform point-to-point movements.

# (3) AC4 Multi-axis synchronous motion control with central interpolation and speed setting interface

AC4 defines a speed setpoint interface, the speed closed-loop control is in the servo, and the position closed-loop control is in the controller. It is usually used in robots and machine tools, because this application usually requires multiple drives to coordinate operation. The motion control is mainly realized by the central numerical control system (NC). The position loop is connected via a bus, ie the communication between the control system and the drive must be isochronous.

### 11.3 IP address and device name of PN bus servo

The Profinet bus determines the specific servo through the IP address and device name. When P08.41=0, the IP address and device name need to be set through the controller software. When P08.41=X, and 0 < X < 255, the servo will automatically set the servo device name to vc1pnX, automatically set the IP address to 192.168.0.X, and set the subnet mask to vc1pnX when the servo is powered on. Set it to 255.255.0.0 and set the gateway to 192.168.0.X.

### 11.4 PN bus servo

### 11.4.1 Support message

VC330 servo (PN servo for short) supports AC1, AC3 and AC4 applications, and supports standard telegrams and Siemens telegrams in speed control mode and basic positioner control mode. Auxiliary telegrams can only be used together with the main telegram, not alone. use. From the point of view of the driving device, the received process data is the receive word, the process data to be sent is the transmit word, and a PZD is a 16-bit word. The detailed description is shown in the following table:

message	Number of received PZDs	Number of sent PZDs
Standard message 1	2	2
Standard message 3	5	9
Siemens message 102	6	10
Siemens message 111	12	12
Siemens message 105	10	10
Siemens message 750 (Auxiliary telegram)	3	1

11.4.2 Telegram for speed control mode

message	1			3	10	)2	10	)5
Application level	1	1	1、4	1、4	1、4	1、4	4	4
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	NSOLL_A	NIST_A	NSOLU D	NIST D	NSOLU D	NICT D	NIST D	NICT D
PZD3			NSOLL_B NISI_B	NSOLL_B	NISI_D	NISI_B	NISI_B	
PZD4			STW2	ZSW2	STW2	ZSW2	STW2	ZSW2
PZD5			G1_STW	G1_ZSW	MOMRED	MELDW	MOMRED	MELDW
PZD6				C1 VIST1	G1_STW	G1_ZSW	G1_STW	G1_ZSW
PZD7				GI_XISTI		C1 VICT1	VEDD	C1 VIET1
PZD8				C1 VIET2		01_71211	AEKK	01_71211
PZD9				GI_AIS12		G1_XIST2	KPC	G1_XIST2

PZD10				

### 11.4.3 Auxiliary message

When the 750 message is used, PZDM\_LIMIT\_POS must set the upper limit of the forward torque, and it must be a positive value. PZDM\_LIMIT\_NEG must set the lower limit value of negative torque, and must be negative.

message	75	50
Application level		-
PZD1	M_ADD1	M_ACT
PZD2	M_LIMIT_POS	
PZD3	M_LIMIT_NEG	-

### 11.4.4 Messages of Basic Locator Mode

message	1	11	
Application level	3	3	
PZD1	STW1	ZSW1	
PZD2	POS_STW1	POS_ZSW1	
PZD3	POS STW2	POS ZSW2	
PZD4	STW2	ZSW2	
PZD5	OVERRIDE	MELDW	
PZD6	MDL TABBOS	VICT A	
PZD7	MDI_IARPOS		
PZD8	MDI VELOCITY	NICT D	
PZD9	MDI_VELOCITY	NISI_B	
PZD10	MDI_ACC	FAULT_CODE	
PZD11	MDI_DEC	WARN CODE	
PZD12	None	None	

### 11.4.5 I/O data signal

Signal	description	Receive word/Send word	type of data	Description
STW1	Control word 1	receive word	U16	
STW2	Control word	receive word	U16	
ZSW1	Status word 1	send word	U16	
ZSW2	Status word 2	send word	U16	
NSOLL_A	Speed setting value A	receive word	116	4000hex ÷ Rated speed
NSOLL_B	Speed setting value B	receive word	132	40000000hex ÷ Rated speed
NIST_A	Actual speed value A	send word	116	4000hex ÷ Rated speed
NIST_B	Actual speed value B	send word	132	40000000hex ÷ Rated speed

G1_STW	Encoder 1 control word	receive word	U16	
G1_ZSW	Encoder 1 Status word	send word	U16	
G1_XIST1	Encoder 1 actual position 1	send word	U32	
G1_XIST2	encoder 1 actual position 2	send word	U32	
MOMRED	torque deceleration	receive word	116	4000hex ÷ maximum torque
MELDW	message word	send word	U16	
MDI_TARPOS	MDI position	receive word	132	1hex =1LU
MDI_VELOCITY	MDI speed	receive word	132	1hex= 1000 LU/min
MDI_ACC	MDI acceleration override	receive word	116	4000hex = 100%
MDI_DEC	MDI deceleration override	receive word	116	4000hex ÷ 100%
XIST_A	Actual position value A	send word	132	1hex = 1LU
OVERRIDE	Position speed override	receive word	116	4000hex = 100%
FAULT_CODE	fault code	send word	U16	
WARN_CODE	Warning Code	send word	U16	
None	User-defined Receive Word 0 - no function	receive word	116	
None	User-defined sending word 0 - no function	send word	116	

# 11.4.6 Definition of control word

# (1) STW1 control word (for telegrams 1, 3)

Signal	description
STW1 0	1=ON(can enable pulse)
S1 W1.0	0=OFF1(ramp stop, pulse elimination, ready to switch on)
STW1 1	1=non OFF2(allow enable)
51 W1.1	0=OFF2(Coasting stop, eliminate pulse, prohibit switch-on)
STW1 2	1=non OFF3(allow enable)
51 W1.2	0=OFF3(quick stop, eliminate pulses, prohibit switching on)
STW1 3	1=allow to run
51 W1.5	0=run prohibited
	1=Operating Conditions (Ramp-Function Generators can be enabled)
STW1.4	0=Freeze command disables ramp-function generator (sets ramp-function
	generator output to zero)
STW1.5	1=Operating conditions continue ramp-function generator
	0=Freeze command freezes ramp-function generator, AC4 not applicable
STW16	1=Enable set value
51 W1.0	0=Disable the set point (set ramp-function generator input to zero)
STW1.7	0-1 Rising edge, acknowledge fault
STW1.8	reserve
STW1.9	reserve
STW1 10	1=Controlled by PLC
S1 W1.10	0=non-PLC control

STW1.11	reserve	
STW1.12	reserve	
STW1.13	reserve	
STW1.14	reserve	
STW1.15	reserve	

# (2) STW1 Control Word (for telegrams 102, 105)

Signal	description
STW1 0	1=ON(pulse can be enabled)
S1 W1.0	0=OFF1(ramp stop, pulse elimination, ready to switch on)
STW1.1	1=non OFF2(allow enable) 0=OFF2(Coasting to stop, eliminating pulses, prohibiting switching on)
STW1.2	1=non OFF3(allow enable) 0=OFF3(quick stop, eliminate pulses, prohibit switching on)
STW1.3	1=allow to run 0=run prohibited
STW1.4	1=Operating Conditions (Ramp Function Generator can be enabled) 0=Disable the ramp-function generator (set the output of the ramp-function generator to zero)
STW1.5	1=continue ramp-function generator 0=Freeze ramp-function generator, AC4 not applicable
STW1.6	1=Enable set value 0=Disable the set point (set ramp-function generator input to zero)
STW1.7	0-1 Rising edge, acknowledgment fault
STW1.8	reserve
STW1.9	reserve
STW1 10	1=Controlled by PLC
51 W1.10	0=Non-PLC control
STW1.11	1=Ramp-function generator in effect
STW1.12	1=Unconditionally open the brake, release the brake
STW1.13	reserve
STW1.14	1=Torque control takes effect 0=Speed control takes effect
STW1.15	reserve

# (3) STW1 Control Word (for telegram 111)

Signal	description
STW1.0	1=ON(pulse can be enabled)
	0=OFF1(ramp stop, pulse elimination, ready to switch on)
STW1.1	1=non OFF2(allow enable)
	0=OFF2(Coasting stop, eliminate pulse, prohibit switch-on)
STW1.2	1=non OFF3(allow enable)
	0=OFF3(quick stop, eliminate pulses, prohibit switching on)
STW1.3	1=allow to run
	0=run prohibited
STW1.4	1=Do not refuse to perform the task
	0=refuse to perform the task
STW1.5	1=Do not suspend task execution
	0=Pause task execution
STW1.6	0-1Rising edge, activates the running task
STW1.7	0-1Rising edge, acknowledgment fault
STW1.8	1=Start forward jog
	0=Close forward jog

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STW1.9	1=Start negative jog
	0=Turn off negative jog
STW1.10	1=Controlled by PLC
	0=Non-PLC control
STW1.11	1=start zero return
	0=stop returning to zero
STW1.12	reserve
STW1.13	reserve
STW1.14	reserve
STW1.15	reserve

# (4) STW2 Control Word (for telegrams 1, 3, 111)

Signal	description
STW2.0~STW2.7	reserve
STW2.8	reserve
STW2.9~STW2.11	reserve
STW2.12	Master sign of life, bit 0
STW2.13	Master sign of life, bit 1
STW2.14	Master sign of life, bit 2
STW2.15	Master sign of life, bit 3

# (5) STW2 Control Word (for telegrams 102, 105)

Signal	description
STW2.0~STW2.3	reserve
STW2.4	1=Ignore the ramp-function generator
STW2.5	reserve
STW2.6	reserve
STW2.7	reserve
STW2.8	reserve
STW2.9~STW2.11	reserve
STW2,12	Master sign of life, bit 0
STW2.13	Master sign of life, bit 1

### (6) POS\_STW1 positioning control word

Signal	description
POS_STW1.0	reserve
POS_STW1.1	reserve
POS_STW1.2	reserve
POS_STW1.3	reserve
POS_STW1.4	reserve
POS_STW1.5	reserve
POS_STW1.6	reserve
POS_STW1.7	reserve
POS_STW1.8	1 = Absolute positioning
	0 = Relative positioning
POS_STW1.9	1 = Positive speed positioning
POS_STW1.10	2 = Negative speed positioning
POS_STW1.11	reserve
POS_STW1.12	reserve
POS_STW1.13	reserve
POS_STW1.14	0 = Target by location
	1 = Position by speed
POS STW1.15	0 = Disable MDI

1 = Activate MDI

Signal	description
POS_STW2.0	reserve
POS_STW2.1	1 = Set reference point
POS_STW2.2	1 = Reference stop/home switch forced activation
POS_STW2.3	reserve
POS_STW2.4	reserve
POS_STW2.5	1 = Activate jog
POS_STW2.6	reserve
POS_STW2.7	reserve
POS_STW2.8	reserve
POS_STW2.9	reserve
POS_STW2.10	reserve
POS_STW2.11	reserve
POS_STW2.12	reserve
POS_STW2.13	reserve
POS_STW2.14	1 = activate the software limit switch
	0 = Close the software limit switch
POS_STW2.15	1 = Activate hardware limit switch
	0 = Close the hardware limit switch

### (7) POS\_STW2 Position control word

Note: The hardware limit and software limit are controlled by POS\_STW2.14/15 and parameter P03.73 at the same time. Only when both parameters enable the hardware/software limit, the hardware/software limit is valid.

### 11.4.7 Definition of status word

# (1) ZSW1 Status word (for telegrams 1, 3)

Signal	description
ZSW1.0	1 = Ready to switch on
	0 = Not connected ready
ZSW1.1	1 = Ready for operation
	0 = Not ready for operation
ZSW1.2	1 = Operation enabled
	0 = Operation disabled
ZSW1.3	1 = Fault exists
	0 = No fault
ZSW1.4	1 = Coasting stop is invalid
	0 = Coasting stop is valid
ZSW1.5	1 = Quick stop disabled
	0 = Quick stop enabled
ZSW1.6	1 = Prohibit to connect to take effect
	0 = Disable connection is invalid
ZSW1.7	1 = warning exists
	0 = no warning
ZSW1.8	1 = The speed error is within the tolerance (P04.24)
	0 = The speed error exceeds the tolerance (P04.24)
ZSW1.9	1 = there is a control request
	0 = No  control request
ZSW1.10	1=Reach or exceed the speed comparison value (P04.23)
	0=The speed comparison value is not reached or exceeded
	(P04.23)

ZSW1.11	reserve	
ZSW1.12	reserve	
ZSW1.13	reserve	
ZSW1.14	reserve	
ZSW1.15	reserve	

## (2) ZSW1 Status word (for telegrams 102, 105)

Signal	description
ZSW1.0	1 = Ready to switch on
	0 = not ready to switch on
ZSW1.1	1 = ready for operation
	0 = Not ready to operate
ZSW1.2	1 = Operation enabled
	0 = Operation disabled
ZSW1.3	1 = fault exists
	0 = No fault
ZSW1.4	1 = Coasting stop is invalid
	0 = Coasting stop is valid
ZSW1.5	1 = Quick stop disabled
	0 = Quick stop enabled
ZSW1.6	1 = Prohibit to connect to take effect
	0 = Disable connection is invalid
ZSW1.7	1 = warning exists
	0 = no warning
ZSW1.8	1 = The speed error is within the tolerance (P04.24)
	0 = The speed error exceeds the tolerance (P04.24)
ZSW1.9	1 = there is a control request
	0 = no control request
ZSW1.10	1 = reach or exceed the speed comparison value (P04.23)
	0 = Unreached or exceeded the speed comparison value (P04.23)
ZSW1.11	reserve
ZSW1.12	reserve
ZSW1.13	reserve
ZSW1.14	Closed-loop torque control takes effect
ZSW1.15	reserve

# (3) ZSW1 status word (for telegram 111)

Signal	description
ZSW1.0	1 = Ready to switch on
	0 = Not ready for connection
ZSW1.1	1 = Ready for operation
	0 = Not ready for operation
ZSW1.2	1 = Operation enabled
	0 = Operation disabled
ZSW1.3	1 = Fault exists
	0 = No fault
ZSW1.4	1 = Coasting stop is invalid
	0 = Coasting stop is valid
ZSW1.5	1 = Quick stop disabled
	0 = Quick stop enabled
ZSW1.6	1 = Prohibit to connect to take effect
	0 = Disable connection is invalid
ZSW1.7	reserve
ZSW1.8	1 = Position tracking error is within tolerance (P03.19/2)

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	0 = Position tracking error is out of tolerance (P03.19/2)
ZSW1.9	1 = there is a control request
	0 = no control request
ZSW1.10	1 = The target position has been reached
	0 = The target position has not been reached
ZSW1.11	1 = The reference point has been set, and the zero return is
	completed
	0 = The reference point is not set, and the zero return is not
	completed
ZSW1.12	0-1 Rising edge, positioning activated, move task confirmed
ZSW1.13	1 = Drive has stopped
	0 = Drive is running
ZSW1.14	reserve
ZSW1.15	reserve

# (4) ZSW2 Status Word

Signal	description
ZSW2.0~ZSW2.7	reserve
ZSW2.8	reserve
ZSW2.9	reserve
ZSW2.10	reserve
ZSW2.11	reserve
ZSW2.12	Slave sign of life, bit 0
ZSW2.13	Slave sign of life, bit 1
ZSW2,14	Slave sign of life, bit 2
ZSW2.15	Slave sign of life, bit 3

# (5) POS\_ZSW1 Status Word

Signal	description
POS_ZSW1.0	reserve
POS_ZSW1.1	reserve
POS_ZSW1.2	reserve
POS_ZSW1.3	reserve
POS_ZSW1.4	reserve
POS_ZSW1.5	reserve
POS_ZSW1.6	reserve
POS_ZSW1.7	reserve
DOS 7SW1 8	1 = Negative hardware limit active
105_25W1.6	0 = Negative hardware limit not active
DOS 7SW10	1 = Positive hard limit active
105_25 \vert 1.9	0 = Positive hard limit is not active
POS 75W1 10	1 = JOG mode active
POS_ZSW1.10	0 = JOG mode is not active
DOS 75W1 11	1 = Reference point return active
POS_23w1.11	0 = referencing is not active
POS_ZSW1.12	reserve
POS_ZSW1.13	reserve
POS_ZSW1.14	reserve
DOS 75W1 15	1=MDI activation
r05_25w1.15	0=MDI not activated

Signal	description
POS_ZSW2.0	reserve
POS_ZSW2.1	reserve
POS_ZSW2.2	reserve
POS_ZSW2.3	reserve
POS_ZSW2.4	1 = axis moves forward 0 = axis not moving
POS_ZSW2.5	1 = axis moves backwards $0 = axis not moving$
POS_ZSW2.6	1 = Negative software limit switch active 0 = Negative software limit switch is not active
POS_ZSW2.7	1 = Positive software limit switch active 0 = Positive software limit switch is not active
POS_ZSW2.8	reserve
POS_ZSW2.9	reserve
POS_ZSW2.10	reserve
POS_ZSW2.11	reserve
POS_ZSW2.12	reserve
POS_ZSW2.13	reserve
POS_ZSW2.14	reserve
POS ZSW2.15	reserve

### (6) POS\_ZSW2 status word

# 11.5 Status indication of Profinet bus servo drive



# Chapter 12 PN Servo Application Example

This chapter combines Siemens' mainstream PLC master station (S7-1500, S7-200 SMART) with VC330 (PN) servo to realize common motor motion functions.

# 12.1 TIA V16 project creation, GSDML import, device addition, online

# modification of IP and name

Take the S7-1500 master as an example.

### 12.1.1 Open the TIA V16 software and create a project

7 Siemens				_ # X
				Fotally Integrated Automation PORTAL
Start	Open existing project Create new project Migrate project Close project Welcome Tour	Create new project 2 E Projec name: Path: Version: Author: Comment:	Inter the project name	Totally Integrated Automation PORTAL
Online & Diagnostics	Welcome four First steps Installed software Help User interface language			
Project view				

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Siemens - D:\Siemens	Project1\Proje	ct1		_ # X
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Motion & technology		Close project	Devices & Configure 2 device	
Visualization	Í		networks	
Online & Diagnostics	1	Welcome Tour First steps	PLL programming with PLL program	
			technology technology objects	
		Installed software	Visualization Configure an HM screen	
		🔵 Help		
		🕼 User interface language		
			Project view Open the project view	
Project view		Opened project: D:\Siemens\Project	t1\Project1	

# 12.1.2 Import GSD files

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Common data									Find in substructures	
Documentation settings		Content of Imp	orted path						Find in hidden texts	
Languages & resources		File		Version	Language	Status	Info			
Version control interface		GSDML-V2.33	Inovance-IS620F-20.	. V2.33	English	Not yet installed	IS620F		Use wildcards	
Gonline access		GSDML-V2.33-	VECTOR-VC1PN-201	V2.33	English	Already installed	VC1PN		Use regular expressions	
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### 12.1.3 Add the device S7-1500

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Canguages & resources	HM	CPU 1513-1 PN	Version: V2.8		Use wildcards	s
Gonline access		CPU 1515-2 PN	Description		Use regular expressions	
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		CPU 1518-4 PN/DP	and 1 MB data; 60 ns bit operation time; 4-		Olin	
	_	E CPU 1518-4 PN/DP ODK	functions: motion control, closed-loop		End	
	PC systems	CPU 1518-4 PN/DP MFP	control, counting and measuring; tracing; Buntime options; for all PROFINET interfaces;		Ting	
		CPU 1511F-1 PN	transport protocol TCP/IP, secure Open User		Replace with:	
		CPU 1515F-2 PN	communication, 57 communication, 57 routing, IP forwarding, Web server, DNS client,	100 C		*
		CPU 1516F-3 PN/DP	OPC UA: Server DA, Client DA, methods,		Whole document	
		CPU 1517F-3 PN/DP	controller, supports RTilRT, performance	ostics	From current position	
	ener	CPU 1518F-4 PN/DP	MRPD, isochronous mode; firmware V2.8 with		O Selection	
		CPU 1518F-4 PN/DP ODK	DI16/DQ16, AI5/AQ2: Digital input module		Replace Replace all	
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		• 📴 CPU 1515T-2 PN	Analog input module AI4 x UII, AI 1xRTD, 16-bit, grouping 5; Analog output module AQ2 x U/I,		Languages & resources	
			16-bit, grouping 2; 6 channels for counting	ble	Editing language:	<u> </u>
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### 12.1.4 Add servo drive

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V Online & diagnostics		corresponds to the me	esh (OUT) on the	servo on	Port_1	PC systems	
Software units		the servo			Port_2	Drives & starters	
Program blocks					<ul> <li>GSD device_1</li> </ul>	Network components	
Technology objects					<ul> <li>VC1PN</li> </ul>	Detecting & Monitoring	
External source files					▼ Interface	Distributed I/O	
PIC tags					Port 1	Power supply and distribution	
PLC data types					Port 2	Field devices	
Watch and force tables	VCIPN	and the second se				- The Other field devices	
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Traces	Not assigned						
OPC UA communication						- In Drives	
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ame	Consul						
	General						

### 12.1.5 Modify IP and name online

The Profinet bus determines the specific servo through the IP address and device name. When P08.41=0, the IP address and device name need to be set through the controller software (such as TIA Portal software). When P08.41=X, and 0<X<255, the servo will automatically set the servo device name to vc1pnX, automatically set the IP address to 192.168.0.X, and set the sub net mask to vc1pnX when the servo is powered on. Set it to 255.255.0.0 and set the gateway to 192.168.0.X. This section describes setting the IP address and device name through the controller software.

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Details view     4. Double click Online and Diagnostics	
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🖣 Portal View 🗄 Devices & n 🖞 Online & día 🖏 Online & día 🖓 🕺 Online & día	pleted for int



# 12.2 Simple speed control with telegram 1 based on S7-1500

In general, when using telegram 1, only simple speed control can be achieved. IRT is not required. The PLC sends the speed command to the servo, and the servo controls the speed of the motor according to the speed command after the acceleration and deceleration processing. Change the acceleration/deceleration time by modifying the servo parameters P04.17 and P04.18. The PLC also needs to send commands such as enable and stop to the servo.

## 12.2.1 Add device

Follow section 12.1 to add devices.

## **12.2.2 Device configuration**

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PLC_1 [CPU 1511-1 PN]		7 15 23	Rack 0
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🗢 🕓 Online & diagnostics 🛛 🗏		14 10 11	• 🔳 PS 🔣
Software units			• 📠 CPU 🧕
Program blocks		v	· · · · · · · · · · · · · · · · · · ·
Technology objects	<	> 100%	• 📠 DQ 💡
External source files	PROFINET 接口 1 [X1]	Desperties	• 🛄 DI/DQ
PLC tags		roperues Sinto Diagnosucs	• 🛄 Al 🧉
PLC data types	General IO tags System constants Texts		• 📠 AQ
Watch and force tables	General	Add new subnet	Al/AQ
Online backups	Ethernet addresses 2	3. Set the IP address, the IP address	Communications modules
🕨 🔄 Traces	Time-of-day synchronization IP protocol	should be consistent with the PLC address	Figure Technology modules
OPC UA communication	Operating mode		SIMATIC Drive Controller
Device proxy data	Advanced options	Set IP address in the project	Interface modules
20 Program info	Web server access	IR address 102 168 0 2	= <u></u>
PLC supervisions & alarms		192.100.0 .2	Tar I a
PLC alarm text lists		Subnet mask: 255 . 255 . 0	ies
Local modules		Use router	
Distributed I/O			
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✓ Details view		O in address is set directly at the device	-
			3
	PROFINET		
Name	4.Check	PROFINE I device name is set directly at the device	
		Generate PROFINET device name automatically	
	PROFINET device name	: plc_1.profinet 接口_1	
	Converted name	plcxb1.xn-profinetxaxb1f144-0x72a430t	
	Device number		Information
Portal view     Portal view     PLC_1			

Double-click the PLC in the topology view.

Double-click the servo in the topology view.

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Click on the web view

M Siemens - D:\Siemens\porject1\porject1			_ # ×
Project Edit View Insert Online Options Tools	Window Help		Totally Integrated Automation
Project tree	porject1 > Devices & networks	1 _ # # X	Hardware catalog
Devices	🛃 Topology view	Network view Device view	Options
	💦 Network 🔢 Connections HMI connection 💌 💹 🖏 🗃 🔛 🛄 🔍 ±	Network overvie 4 >	Hard
Add new device     Devices & networks     Devices to a networks	PLC_1 VC1PN1 2 BP HORM	Device     S71500/ET200     PLC_1     GSD device_1	Catalog     Cearch>     Mil Mil     Filter Profile: <all>     W     Controllers</all>
Online & diagnostics     Software units     Software units     Program blocks     Technology objects	StekTD controller     Act / PROFILE THE CONTROL      ACT		HM     M C systems     Drives & starters     M Network components     Detecting & Monitoring
Betermal source files     Determal source files     Determal source files     Determal source files     Determal source tables     Determal source tables	General	1 Info 1 Diagnostics	Im Distributed IIO     Im Power supply and distribution     Im Field devices     Im Other field devices
<ul> <li>Comme trackups</li> <li>Stacks</li> <li>COPC UA communication</li> <li>Stacks</li> <li>Coperations</li> <li>Tragaramino</li> <li>Colementations</li> <li>TCC alarm text lists</li> <li>TCC alarm text lists</li> <li>TCC alarm text lists</li> </ul>	No 'properties' available. No 'properties' can be shown at the moment. There is either no object selected or the selected object of properties.	loes not have any displayable	sts 🔟 Librarios
Ungrouped devices      Details view			Add-ins
Name			
			> Information
Portal view 🗄 Overview 🍰 Device	es & ne		

Set the message of the servo



Assign the name of the servo online. As shown in the picture below.

It should be noted that if the name and IP address are assigned through TIA software, P08.41 must be set to 0.

Otherwise, the servo will automatically set the name according to the value of P08.41.



Note: If the names are inconsistent, please refer to Section 12.1.5 to modify the names.

### 12.2.3 new variable

In the "PLC\_1->Program Block" drop-down menu, double-click "Add New Block" and select the data block. Add the following variables inside.

Vision Siemens -	<ul> <li>D:\Siemens\porject1\porject1</li> </ul>								_ # X
Project Edit	View Insert Online Options Tools	Window Help							Totally Integrated Automation
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ž		Add new blo	ck			×	Deals	fler 1	✓ Catalog
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Ar 💕 Ar	dd new device	Block_1					0	0 X1	
di D	levices & networks						0	1	Printer Profile: CAI>
- III PI	LC_1 [CPU 1511-1 PN]	-	Language: LA	D			0	11	Tead module
å <b>–</b>	Device configuration					-	0	12 0	PROEldrive Module
	Online & diagnostics	-08	Number: 1	÷			0	13	Submoduler
8	Browner units 2 3	Organizat	on	Manual			0	2	Simens Telegram 750.PZD-12/12
	riogram blocks	block		Automatic			0	3	Standard Telepram 1.PZD-7/2
	Add new block		_				0	4	Standard telegram 102, PZD-6/10
	Technology objects						0	5	Standard telegram 105, PZD-10/10
	External course fler		Description:				0	6	Standard telegram 110, PZD-12/7
	PLC taos	-+E	Eurostions are code blos	kr or subroutines without	t dedicated memory		0	7	Standard Telegram 111,PZD-12/12
	PLC data types	Function b	ock	is of subroughes without	redicated memory.		0	8	Standard Telegram 3,PZD-5/9
	Watch and force tables						0	9	Standard Telegram 5,PZD-9/9
•	Online backups						0	10	Standard telegram 7, PZD-2/2
	Traces						0	11	Standard telegram 9, PZD-10/5
• 🔽	OPC UA communication	FC					0	12	5
• 🕞	Device proxy data	E.matic					0	13	100
20	Program info	runcoo					0	14	ies
5	PLC supervisions & alarms						0	15	
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		<						>	> Information
4 Portal	VC1	PN						IN 🗸 Cr	appection to PLC 1 terminated
1 TOTAL									sincedon to rec_r terminates.
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	and an and the second second							Ä	
- III-	setspeed in	it.	0						
	ackerror Bo	ool	false		$\checkmark$				
	ENABLEATSTARTUP BO	ool	false						

# 12.2.4 Program with SINA\_SPEED in Main

The first use of the SINA\_SPEED command requires the installation of the Siemens Drive\_Lib\_S7\_1200\_1500.zal16 component. Install according to the following diagram.

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Project Edit View Insert Online	Options Tools	Window Help	
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Project tree	Support packa	ages	-1 PN]   Program blocks   Block_1 [FC1]
Devices	Manage gener Start Automati	eral station description files (GSD) tion License Manager	
E	Show reference	ce text	
▼ porject1	Global librarie:	es	Create new library Default value Comment
Add new device	Block call		Open library
Devices & networks		2 🕣 🕨 Output	
PLC_1 [CPU 1511-1 PN]		3 📶 🕨 InOut	
Device configuration	1	■ 4 - 1 • Temp	
😵 Online & diagnostics		5 📶 🕨 Constant	
Software units		6 📶 🕨 Return	
💌 🛃 Program blocks			

Find the SINA\_SPEED command in the option package, drag it to the program, and write the program.

M Siemens - D:\Siemens\porject1\porject1		_ # X
Project Edit View Insert Online Options Tools	Window Help	Totally Integrated Automation
📑 📑 🔚 Save project 📑 🐰 🗓 🕞 🗙 🌱 🗄	t 🖞 🛄 🔛 🔛 🙀 💋 Go online 🖉 Go online 👔 🕼 🧗 🛣 📩 🗠 <a></a>	PORTAL
Project tree	porject1 > PLC_1 [CPU 1511-1 PN] > Program blocks > Main [OB1]	X Instructions
Devices		Options
	요	al est • 🗆 🔟 🗟
	Main	Y Equaritar
▼ porject1	Name Data type Default value Comment	- Tavontes
Add new device	1 I hput	<u>→ + +/ + - → ☆ → → </u>
🗄 Devices & networks	2 💶 🕨 Temp	
PLC_1 [CPU 1511-1 PN]	3 Constant	<u> </u>
Device configuration		Tes
S Online & diagnostics		ting
Software units	"SinaSpeed_DB"	<u>^</u>
Add new block	SinaSpeed	
The Main [OB1]	the state st	✓ Basic Instructions
SinaSpeed [FB301]	enablexisEnableXis LockoutO	Name Descrip u
SinaSpeed_DB [DB1]	"我提换_1". ActVelocity — 0.0	General     A
■ 数据块_1 [DB2]	Addimor Error	Imer operations
<ul> <li>System blocks</li> </ul>	*gtd#g_1*. Status == 0	Counter operations
Program resources	3000.0 Br/Seed	= C Comparator operations
Technology objects	16#003F ConfigAxis	▶ ± Math functions ✓ 8
External source files	267 - HWDSTW	< III >
PLC tags	267 — HWDZSW	> Extended instructions
Log PLC data types		> Technology
Quine backups		Communication
Traces	▼"款据决_1*.ackerror	V Ontingel and hand
OPC Us communication	*	Optional packages
✓ Details view	*數据块_1*.setspeed	Name Description
		SinaPos Instruction
Mama	Main (081)  Q Properties Unifo U Diagnostics	SinaSpeed Instruction
Name	General Texts	SinaPara Instruction
	General An analysis of the second and drag it to MAIN	<ul> <li>SinaParaS Instruction</li> </ul>
	Information	E SinaInfeed Instruction
	Time stamps	Energy Suite extensions
	Compilation V Name: Main	v < II >
Portal view 🗄 Overview III Main	(OB1) 🧉 數据決_1 (D 🔓 SinaSpeed_D 📩 🕩	Connection to PLC_1 terminated.

The SINA\_SPEED block input parameters are described as follows:

EnableAxis: Enable the axis

ACKERROR: Rising edge reset error

Speedsp: Set speed, unit rpm

Refspeed: Rated speed, unit rpm, this value must be consistent with servo parameter P00.02.

ConfigAxis: By default.

HWIDSTW: This value must be the same as the ID of packet 1.

HWIDZSW: This value must be consistent with the ID of packet 1.

The ID of message 1 is shown in the figure below.

Pro	ject Edit View Insert Online Options Tools	líndow Help		Totally Integrated Automation	
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	12	🔐 VC1PN [VC1PN] 💌 🔛 🔀 🔛 🛄 🔍 ± 📑 🚺 Device overview			Har
Ť.		A W Module Rack Slot		✓ Catalog	- Wa
8.	<ul> <li>porject1</li> </ul>	E VC1PN 0 0	^	<search></search>	
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	Internology objects	Show hardware system constant 💌			- 60
	Pic taor	Name Type Hardware ident. Used by Comment			E.
	PLC data types	VC1PN-PROFidrive_Module_1-Standard_Telegram_1 Hw_SubModule 267 PLC_1			bra
	Watch and force tables	A The ID of measure 1 is disclosed here			ries
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	🕨 🔄 Traces				
ŀ	OPC LIè communication				dd
	V Details view				-in
	Name				
				> Information	
	Portal view      Main (	DB1) 🔰 数据块_1 (D 🔓 SinaSpeed_D 🔥 VC1PN	Cor	pection to PLC 1 terminated	

## 12.2.5 Compile and download the program for testing.

Note that if the message of the servo is changed, the servo needs to be powered on again after downloading the program.

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a m	💣 Add new device			1 📶	Input				
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F	Device configuration		≡			177 b		+	
	🛂 Online & diagnostics					**	-	-	
	Software units			•	Network 1	:			
	🔻 🛃 Program blocks		-	(	omment				
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	- Main [OB1]							~	

Debug in the program page.

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SinaSpeed [FB301]	2. Doui	ble-click to enab	JIE ENO								- 2
SinaSpeed_DB [DB1]	•	FALSE		FALSE						Change	
■ 数据块_1 [DB2]	•	"数据换_1". enableaxis	AxisEnabled	<b>d 1</b> 0							
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Module	<	11				> 90%	·				- 1
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Name		and Course t	L Com II	Curtan		3,110 4	and and and a states	~	Call hierarchy		
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Portal view     Derview	🔁 Main (OB1)	👅 数据块_1 (D 🍶	SinaSpeed_D				<b></b>	🚺 The open	and "数据块_1"	enableaxis' w	

# 12.2.6 Precautions for use of message 1.

(1) The acceleration/deceleration time is controlled by parameters P04.17 and P04.18, the unit is ms, which refers to the acceleration/deceleration time from 0 to rated speed. The actual acceleration time is related to the difference between the target speed and the current speed.

Actual acceleration and deceleration time

= Set acceleration and deceleration time  $\times \frac{\text{Variation of input speed command}}{\text{Rated speed}}$ 

(2) The input parameter Refspeed of the SINA\_SPEED block must be consistent with the rated speed of the servo P00.02.

 $(3)\,$  After changing the message, the servo and PLC must be powered on again to take effect.

12.3 Based on S7-1500, use message 3 to realize positioning control,

## speed control, and zero return control

Generally speaking, when using message 3, the position control is realized in the PLC, and the output of the position control loop is sent to the servo as a speed command through message 3. After the server receives the speed command, it runs at the set speed. Because the position loop is connected by bus, its real-time performance must be guaranteed, so IRT must be enabled. At the same time, the acceleration and deceleration time P04.17 and P04.18 of the servo need to be set to 0. Otherwise, when the acceleration and deceleration time of the position command is less than the acceleration and deceleration time of the servo speed, the position loop will have low frequency oscillation.

### 12.3.1 Create a new project

Follow the introduction in section 12.1 to create a new project, add equipment, and configure the equipment.

# 12.3.2 Configuration message 3



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Add new device	1		✓ VC1PN		0 0	^	Search>		
Devices & networks	A		► Inte	erface	0 0 X1		🖌 Filter Profile: <all></all>		
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Device configuration	i ř		Par	ameter Access Point	0 11		Module		
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Software units			3		0 13		Simens Telegram 750,PZD-12/12		
Program blocks	_				0 3		Standard Telegram 1,PZD-2/2		
Technology objects	-	DP-NORM	~		0 4	~	Standard telegram 102, PZD-6/10		
External source files	< 11	> 100%				>	Standard telegram 105, PZD-10/10		
PLC tags	Standard Telegram 3.PZD-5/9	Standard Telegram 3.PZD-5/91	C Properties	1 Info 2 Diagr	oetice		Standard telegram 110, PZD-12/7		
Eg PLC data types			Shoperdes		iostics		Standard Telegram 111,PZD-12/12		
Watch and force tables	General IO tags Sys	tem constants Texts					Standard Telegram 3,PZD-5/9		
Online backups	▶ General	Start address:				^	Standard Telegram 5,PZD-9/9		
🕨 🔀 Traces	I/O addresses	End address:	17				Standard telegram 7, PZD-2/2		
OPC UA communication			Isochronous mode 4				Standard telegram 9, PZD-10/5		
Device proxy data			isochionous mode						
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PLC alarm text lists							8		
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		<b>1</b>	Isochronous mode 6						
				7					
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							A Information		
						~	7 Information		
Portal view 🔛 Overview 🚭 Main (	(OB1) 📥 VC1PN 🍸 Si	ttings 🔂 MC-Servo (O				🖉 Proj	ect saved under D:\Siemens\PROFIN		

12.3.3 Create a new technology object, configure the technology object



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# Configuring the technology object PostingAxis



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### 12.3.4 Configure Sync Domain

Check "Isochronous Mode"

7% Siemens - D:\Siemens\PROFINET示例\\$7-1500速度	2报文1\速度报文1						_ <b>a</b> X
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Device configuration					Standard Telegram 3,PZ.	0 12	
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Software units						0 2	0
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Watch and force tables	General 10 tags Syst	tem constants Texts					1
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Distributed I/O	Media redundansu	Application cycle:	1.000			ms 🎽	• H
	V Isochronous mode	Ti/To values:	Automatic minimum				- A
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VECTOR

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General Text General Information Time stamps Compilation Protection Attributes Cycle time	S Cycle time Cycle time (ms) Cycle time (ms) Synchronous to the bus Source of the send clock: PROFINET IO-System (100) Send clock (ms) 4 Factor: 1 Cycle time (ms) 4 If CPU time is not enough, you can increase the factor
	OK Cancel

# 12.3.5 Trial run

On the debugging page, you can try running the motor.

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# 12.3.6 Create new data blocks, write PLC program

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2	-0	•	trigmoveabs	Bool	🔳 false		<b></b>	<b></b>	<b></b>		
3	-0	•	homepos	Real	0.0			<b></b>	<b></b>		
4	-0	•	homemode	Int	3						
5	-	•	JOGNEG	Bool	false		<b></b>		<b></b>		
6	-0	•	JOGPOS	Bool	false			<b></b>	<b></b>		
7	-	•	enableaxis	Bool	false				<b></b>		
8	-0	•	setspeed	Int	0				<b></b>		
9	-0	•	ackerror	Bool	false			<b></b>	<b></b>		
10	-0	•	ACC	Real	2000.0		<b></b>	<b></b>	<b></b>		
11	-0	•	DEC	Real	2000.0						
12	-0	•	SPED	Real	300.0		<b></b>		<b></b>		
13	-0	•	DISTANCE	Real	300.0		<b></b>	<b></b>	<b></b>		
14	-0	•	bit1	Bool	false		<b>~</b>				
15	-0	•	bit3	Bool	false		<b></b>		<b></b>		
16	-0	•	bit2	Bool	false		<b></b>		<b></b>		
17	-0	•	bit0	Bool	false						
18	-0	•	trigmove1	Bool	false		<b></b>		<b></b>		
19	-0	•	NEGTORQUE_LIMIT	Int	500		<b></b>		<b></b>		
20	-0	•	POSTORQUE_LIMIT	Int	500				<b></b>		
21	-0	•	ENABLEATSTARTUP	Bool	false		<b></b>				

Instructions can be found in Craft->Motion Control.





#### Jog



### relative point movement



#### Absolute point movement

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A brief introduction to returning to zero.

Mode = 0: The absolute type directly returns to the zero point, and the position value of the axis is set to the value of the parameter "Position".

Mode = 1: The relative type directly returns to the zero point, and the position value of the axis is equal to the current axis position + the value of the parameter "Position".

Mode = 2: Passive zero return, that is to say, the motor will not move after triggering the zero return module, but by other commands. Let the motor move to achieve zero return. After zero return, the position value of the axis is the value of the parameter "Position".

Mode = 3: Active zero return, the position value of the axis is the value of the parameter "Position".

Modes 2 and 3 only configure the encoder type as: Incremental.

Mode = 6: Absolute encoder regulation (relative). The position value of the axis is equal to the current axis position + the value of the parameter "Position". This is for the zero return of the multi-turn absolute encoder with battery, and the power-down position is not lost.

Mode = 7: Absolute encoder regulation (absolute). The position value of the axis is the value of the parameter "Position". This is for the zero return of the multi-turn absolute encoder with battery, this is for the zero return of the multi-turn absolute encoder with battery, and the power-down position is not lost.

It is recommended to use mode 3, which needs to be reset to zero after power-on, and only need to return to the absolute value of zero once when using mode 6/7.

### 12.3.7 Introduction to the relevant command parameters

Axis: Parameter is the axis technology object configured by the Motion Control Wizard. Status: The parameter reflects the enable state of the motion axis. When it is 0, it means that the motion axis is disabled, and the axis will not execute motion control instructions; when it is 1, it means that the motion axis is enabled, and the motion axis is ready to execute

motion control instructions. Busy: TRUE to reflect that the instruction is active.

Error: When it is TRUE, it reflects that an error occurs in the instruction or related technological objects. The specific cause of the error can be explained in combination with the parameters of ErrorID and ErrorInfo.

MC POWER command:

①Enable: When the parameter is "TRUE", the axis is enabled, and when the parameter is "FALSE", all current motion is interrupted according to the configured StopMode, stopping and disabling the motion axis.

②StartMode: When the parameter is 0, the positioning axis/synchronous axis is not controlled by the position, and when the parameter is 1, the positioning axis/synchronous axis is controlled by the position. If the configured motion axis adopts pulse train control, this parameter is invalid.

③StopMode: When the parameter is 0, it is an emergency stop; when the parameter is 1, it stops immediately; when the parameter is 2, it is an emergency stop with acceleration change rate control.

MC\_MOVEJOG command:

①JogForward: When the parameter is "TRUE", the axis moves in the positive direction at the speed specified in the parameter "Velocity".

2 JogBackward: When the parameter is "TRUE", the axis moves in the negative direction of the velocity specified in the parameter "Velocity".

③Velocity: When the parameter is "TRUE", the axis moves in the negative direction of the velocity specified in the parameter "Velocity".

(4) Acceleration: Acceleration, parameter > 0.0 uses specified value; parameter = 0.0 not allowed; parameter < 0.0 uses acceleration configured in "Technical Objects > Configuration > Extended Parameters > Dynamic Defaults".

(5) Deceleration: Deceleration, when parameter > 0.0 use the specified value; when parameter = 0.0 not allowed; when parameter < 0.0 use the deceleration configured in "Technical Objects > Configuration > Extended Parameters > Dynamic Defaults".

6 Jerk: Jerk, parameter > 0.0 for constant acceleration velocity profile use specified values; parameter = 0.0 for trapezoidal velocity profile; < 0.0 jerk is configured with "Technical Objects > Configuration > Extended Parameters > Use Dynamic Defaults".

Relative point movement MC\_MOVERELATIVE instruction:

①Distance: The distance relative to the current position (positive and negative is the direction), the unit is (mm).

<sup>(2)</sup>Velocity: Movement speed, in millimeters per second.

Absolute point movement MC\_MOVEABSOLUTE command:

①Position: Absolute motion position target, unit is (mm).

②Velocity: The running speed, the unit is (mm per second).

③Direction: Running direction, parameter 1-3, the direction is the direction closest to

the target position (the direction of the shortest moving distance).

### 12.3.8 Precautions for use of message 3

(1) If the positioning technology object is used, the acceleration and deceleration time P04.17 and P04.18 of the servo need to be set to 0.

## 12.4 Using message 3 to realize multi-axis synchronous control based

on S7-1500

# **12.4.1** Create a new project

Follow the introduction in Section 12.1 to create a new project, add equipment, and configure equipment.

Because the function of this implementation is multi-axis synchronous control, multiple servo drives need to be added. This section takes two-axis synchronous control as an example, so two servo drives need to be added.

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# 12.4.2 Configuration message 3

Configuration telegram 3 is required for each servo drive added. For specific steps, refer to Section 12.3.2.

# 12.4.3 Create a new technology object, configure the technology object

A new TO\_PositioningAxis and several TO\_SynchronousAxis technology objects are required. If there are several slave axes, several TO\_SynchronousAxis technology objects need to be created. In this example, there is only one slave axis, so it is only necessary to

create a new TO\_SynchronousAxis technology object.

For the setting of TO\_PositioningAxis technology object parameters, please refer to Section 12.3.3.

Below are the settings for some TO\_SynchronousAxis technology object parameters.

Configure the drives of the TO\_SynchronousAxis technology object, each TO SynchronousAxis technology object corresponds to a slave axis servo drive.



VECTOR

VC330 series servo driver instruction manual



VC330 series servo driver instruction manual

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# 12.4.4 Configure a sync domain

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Set the send clock

VC330 series servo driver instruction manual

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VC330 series servo driver instruction manual



# 12.4.5 Create a new data block and write a PLC program

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Instructions can be found in Craft->Motion Control.

#### Enable the axis





# 12.4.6 Synchronous control instruction parameter description

Use the parameters "RatioNumerator" "RatioDenominator" to specify the electronic gear ratio as the relationship between the two axes (numerator/denominator) Instructions are as follows:

①The values in each coupled motion cycle vary as follows:

Distance traveled by the following axis from the coupled position = distance traveled by the leading axis from the coupled position  $\times$  gear ratio.

Speed of following axis = speed of leading axis  $\times$  gear ratio.

Acceleration of the following axis = acceleration of the leading axis  $\times$  gear ratio Shaft deceleration = lead shaft deceleration  $\times$  gear ratio.

2For the input acceleration and deceleration: the input value is valid when >0. =0 is not allowed. <0 uses the TO object's configuration default.

# 12.5 Based on S7-1500 using telegram 102+750 to realize torque limit

in speed mode

# 12.5.1 Create a new project

Follow the introduction in Section 12.1 to create a new project, add equipment, and configure equipment.

# 12.5.2 Configure telegrams 102 and 750

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## 12.5.3 Create a new technology object, configure the technology object

Create a new TO SpeedAxis technology object



# 12.5.4 Configure a sync domain

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# 12.5.5 Create a new data block and write a PLC program

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Command can be found in Craft->Motion Control. Enable the axis





### 12.5.6 Description of related command parameters

Speed command MC\_MOVEVELOCITY:

①Velocity: The parameter is the specified speed of the motion axis. If the TO object is a speed axis, the unit is (RPM); if the TO object is a positioning axis, the unit is (millimeters per second).

<sup>(2)</sup>Direction: The parameter is the direction of the specified motion. When it is 0, the speed is determined according to the sign of the parameter Velocity value; when it is 1, it rotates in the forward and reverse directions; when it is 2, it rotates in the negative direction.

③Current: When the parameter is 0, the motion speed will be determined according to the values of Velocity and Direction; when it is 1, the current speed will be maintained without reference to the values of Velocity and Direction.

④PositionControlled: When the parameter is 0, it means non-position control operation; when it is 1, it means position control operation. This parameter applies as long as the "MC\_MoveVelocity" job is executing. Note: When using a velocity axis, this parameter will be ignored.

<sup>(5)</sup>Invelocity: When the parameter is 1, it means that the current speed has reached the value specified by Velocity.

©CommandAborted: The parameter "TRUE" indicates that the job was aborted by another job during execution.

Torque limit command MC\_TORQUELIMITING:

(1)Limit: Torque limit value (calculated in the configured unit of measure), the specified value is irrelevant if the drive and telegram do not support torque limit. When the parameter is  $\geq 0.0$ , the value specified in the parameter is used; when the parameter is < 0.0, the value configured in the TO object "torque limit" configuration window is used, and the unit is (Nm).

②Mode: When the parameter is 0, the torque is limited; when the parameter is 1, the fixed stop detection, which is applicable if the drive and the telegram support the torque limit. (parameter not applicable here is 1)

# 12.6 Realize torque control based on S7-1500 using message 102+750

# 12.6.1 Create a new project

Follow the introduction in Section 12.1 to create a new project, add equipment, and configure equipment.

# 12.6.2 Configure message 102 and 750

Configure packets 102 and 750 as described in Section 12.5.2.

# 12.6.3 Create a new technology object, configure the technology object

Create a new technology object and configure the technology object according to the introduction in section 12.5.3.

### 12.6.4 Configure a sync domain

Configure the synchronization domain as described in Section 12.5.4.

# 12.6.5 Create a new data block and write a PLC program

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T Coordavis 1 [DB1]															

Command can be found in Craft->Motion Control.

Enable the axis



#### **12.6.6 Description of related command parameters**

Value: Additional torque setting value in Nm.

The motion control instruction "MC\_TorqueAdditive" allows additional torque to be applied in the drive. For example, additional setpoint torque is used in the specification of torque feedforward control or tensile torque for winding applications.

To set the additional torque setpoint, the following requirements must be met: SINAMICS drive; SINMENS additional telegram 750 for transferring torque data to the

drive.

UpperLimit: Torque upper limit (in the configuration unit), the parameter value cannot be less than the value of the parameter "LowerLimit", the unit is Nm.

LowerLimit: The lower limit of torque (in the configuration unit), the parameter value cannot be greater than the value of the parameter "UpperLimit", the unit is Nm.

# 12.7 DSC control based on S7-1500 using message 105

# 12.7.1 Create a new project

Follow the introduction in Section 12.1 to create a new project, add equipment, and configure equipment.

# 12.7.2 Configuration message 105





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VECTOR
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# 12.7.3 Create a new technology object, configure the technology object

Create a new TO\_PositioningAxis technology object. Please refer to Section 12.3.3 for related configuration. Then tick "Position control in the drive (enable DSC)".

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# 12.7.4 Configure a sync domain





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### 12.7.5 Create a new data block and write a PLC program

For related data blocks and program instructions, please refer to Section 12.3.6.

#### 12.7.6 DSC related instructions

If the position loop (we often say TO) is calculated cyclically in the PLC, the update time of the position loop will depend on the bus cycle time of the communication. If the cycle time of the bus is shortened, it will inevitably increase the load of the CPU or affect the normal cycle time of OB1.

DSC (Dynamic Servo Control) is a control method that moves the position loop calculation and interpolation to the drive through a specific message, and uses the speed of the drive to control the clock quickly, which improves the quality and performance of positioning.

Without the DSC function, a step change in the speed reference due to a longer position control period would result in a large torque or current ripple.

When the DSC function is activated, the position loop calculation is moved to the drive, the calculation cycle is greatly shortened, and the torque or current ripple becomes smaller.

Using the DSC function (Dynamic Servo Control), the following benefits can be obtained:

(1) The position controller is in the speed control loop cycle (for example,  $125 \ \mu$  s or  $250 \ \mu$  s). The shorter the cycle is, the bandwidth of the system will be greatly improved.

<sup>(2)</sup>With a higher gain factor Kv of the position controller, drives with high dynamic performance can perform a faster reference response to the setpoint.

<sup>③</sup>The dynamic anti-interference ability is strong, and the disturbance can be quickly suppressed for the mechanical rigid system.

(4) The load on the controller can be reduced by using longer motion control cycle times.

#### 12.8 Based on S7-1500 using message 111 to realize point movement

### 12.8.1 Create a new project

Follow the introduction in Section 12.1 to create a new project, add equipment, and configure equipment.

# 12.8.2 Configuration message 111



12.8.3 Create a new data block and write a PLC program

Project tree		报文111	实现点位运动 <b>,</b> F	LC_1 [CPU 1511-1	PN] → Program b	locks ▶ 数据	;块_1 [DB1]					- 1	₹∎X
Devices													
1 Bi	💷 🖻	2	🔍 🛃 🚞 🧐 Ke	ep actual values 🛛 🔒	Snapshot 🔤 🛍	Copy snap	shots to start va	lues 🔣	🖳 Load	start values	as actual va	lues 🗐, 🎙	
2		数据	夬_1										
📫 Add new device	^	Na	ime	Data type	Start value	Retain	Accessible f	Writa	Visible in	Setpoint	Supervis	Comment	
devices & networks		1 🕣 🔻	Static										
PLC_1 [CPU 1511-1 PN]		2 🕣 🛚	enableaxis	Bool	false		<b></b>						
Device configuration		3 🕣 🗉	ackerror	Bool	false		Image: A start and a start						
😮 Online & diagnostics	=	4 🕣 🗉	positive	Bool	false								
Software units		5 🕣 🗉	negative	Bool	false								
🔻 🛃 Program blocks		6 🕣 🗉	flyref	Bool	false								
💣 Add new block		7 🕣 🛚	executemode	Bool	false								
Main [OB1]		8 🕣 🗉	JOGNEG	Bool	false								
■ 数据块_1 [DB1]		9 🕣 🗉	JOGPOS	Bool	false								
System blocks		10 🕣 🔳	modepos	Int	0								
Technology objects		11 🕣 🗉	position	Dint	0								
External source files		12 🕣 🔳	velocity	Dint	0								

The command can be found in the option package -> SINAMICS.



HWIDSTW: This value must be the same as the ID of packet 111. HWIDZSW: This value must be the same as the ID of packet 111.

# The ID of message 111 is shown in the figure below.

Weight Siemens - D:\Siemens\PROFINET示例\S7	1500报文111实现点位运动报文111实现点位运动		
项目(P) 编辑(E) 视图(V) 插入(I) 在线(O)	送项(N) 工具(T) 窗口(W) 帮助(H)		
📑 🎦 保存项目 💷 🗶 🗐 📬 🗙 🕨	) * (*** 🖫 🌐 🖳 🖉 装革在线 🧭 装革高线 🧦 🖪 🦷 🛪 🚽 🛛 《在项目中提案》		
项目树 🔳 🖌	报文111实现点位运动 ▶ 未分组的设备 ▶ VC1PN1 [VC1PN]	_ • •	×
10.52			
			· .
E		2	
	2 2 復決	. 机架 插槽 1	
※ ▼ 1 报文111实现点位运动 ▲	13 VC1PN1	0 0	^
□ · 添加新设备	DP-NORM Interface	0 0 X1	
	H PROFIdrive Module_1	0 1	
PLC_1 [CPU 1511-1 PN]	Standard Telegram 3,PZD-5/9 Parameter Access Point	0 11	
	Standard Telegram 111	0 12 0	
	30	0 13	
		0 2	
● 注户// ● 添加新快		0 3	
Main [OB1]		0 4	
■ 教据決 1 [DB1]	DP.NORM	0 5	
▶ 🔜 系统块		0 6	
▶ 3 工艺対象		0 /	
▶ 🔤 外部源文件		0 0	
▶ 🔁 PLC 变量		0 10	
▶ 💽 PLC 数据类型	v	0 11	~
▶ 🛄 监控与强制表	< III > 100% • • • • • • • • • • • • • • • •		>
▶ 🙀 在线备份	Standard Telegram 111,PZD-12/12 [Standard Telegram 111,PZD-12/12] 5 嘎 雇性 14 信息	21诊断 -	
🕨 🔽 Traces			
▶ 🧔 OPC UA 通信			_
▶ 🔛 设备代理数据	<u>「辺示線日本設備素」</u>		
21 程序信息 ×	名称 类型 硬件标识符 使用者 注释		
✓ 详细视图	VC1PN1~PROFIdrive_Module_1~Standard_Telegram Hw_SubModule 267 PLC_1		

# 12.8.4 Description of related parameters

input signal	type	Defaults	meaning					
ModePos	INT	0	Operation mode: 1 = MDI relative positioning (support) 2 = MDI absolute positioning (supported) 3 = Continuous operation at the specified speed (supported) 4 = Back to reference point operation (supported) 5 = Set back to reference point position (support) 6 = Run block 0 - 15 (not supported) 7 = Jog at a specified speed (supported) 8 = Jog by specified distance (not supported)					
EnableAxis	BOOL	0	Switch command: $0 = OFF1$ , $1 = ON$					
CancelTraversing	BOOL	1	0 = Refuse to run jobs in active state 1 = not refuse					
IntermediateStop	BOOL	1	0 = Active run command interrupted 1 = stop without interruption					
Positive	BOOL	0	Positive direction					
Negative	BOOL	0	negative direction					
Jog1	BOOL	0	forward jog					
Jog2	BOOL	0	reverse jog					
FlyRef	BOOL	0	0 = Cancel active reference point return 1 = Select active reference point return					
AckError	BOOL	0	fault response					
ExecuteMode	BOOL	0	Activate run job/accept setpoint/activate referencing function					

Position	DINT	0[LU]	Position set point (unit [LU]) for operating mode "direct set point specification/MDI" or traversing block number for operating mode "traversing block"
Velocity	DINT	0[LU/min]	Speed applicable to MDI operation mode (unit [LU/min])
OverV	INT	100[%]	The speed override for all operating modes is valid: $0 \sim 199\%$
OverAcc	INT	100[%]	The acceleration magnification is valid $0 \sim 100\%$
OverDec	INT	100[%]	Deceleration multiplier is valid $0 \sim 100\%$
ConfigEPos	DWORD	3h	The control bit of the transmission message 111 can be used to transmit signals such as hardware limit enable and origin switch. If a variable is assigned to this pin in the program, it must be ensured that both ConfigEPos.%X0 and ConfigEPos.%X1 are 1 to enable the drive to run.
HWIDSTW	HW_IO	0	Hardware identifier of message111
HWIDZSW	HW_IO	0	Hardware identifier of message111

Output parameters of SinaPos:

F F F						
output signal	type	default	meaning			
AxisEnabled	BOOL	0	The drive is ready to switch on			
AxisPosOk	BOOL	0	The axis target position has been reached			
AxisRef	BOOL	0	Return to the reference point position completed			
AxisWarn	BOOL	0	Drive alarm is valid			
AxisError	BOOL	0	drive failure			
Lockout	BOOL	0	Forbid to connect			
ActVelocity	DINT	0	current velocity			
ActPosition	DINT	0[LU]	Current position (unit LU)			
ActMode	INT	0	currently active operating mode			
EPosZSW1	WORD	0	EPOS ZSW1(binary grain matrix) status			
EPosZSW2	WORD	0	EPOS ZSW2(binary grain matrix) status			
ActWarn	WORD	0	Current alarm number			
ActFault	WORD	0	Current fault number			
Error	BOOL	0	1 = faulty			
			16#7002: No fault - the block is running			
			16#8401: drive fault			
			16#8402: Forbid to connect			
			16#8403: Floating reference point function cannot be started			
Status	INT	0	16#8600: DPRD DAT error			
		Ũ	16#8601. DPWR DAT error			
			10#8001: DI WK_DAI CHOI			
			16#8202: The selected operating mode is incorrect			
			16#8203: The set point parameter is incorrect			
			16#8204: The selected traversing block number is incorrect			
DiagID	WORD	0	Extended communication error			

Relevant parameter description:

① Motor speed (RPM) = (Velocity pin \* OverV% \* 1000 \* gear ratio)  $\div$  encoder resolution.

2 The number of turns of the relative positioning motor = (Position pin \* gear ratio)  $\div$  encoder resolution.

③ CancelTraversin and IntermediateStop are in effect for all run modes except jog and must be set to 1 at run time.

④ The currently running command can be replaced by a new command on the rising edge of ExecuteMode, but only for running modes ModPOS=1, 2, 3.

(5) Set CancelTraversin = 0, the axis will decelerate and stop at the maximum speed, discarding the working data, if you set CancelTraversin = 1 again, the axis will not continue to run.

6 Set IntermediateStop = 0, use the currently applied deceleration value to stop on a ramp without discarding the working data, if you set IntermediateStop = 1 again, the axis will continue to run, which can be understood as the suspension of the axis, and the running mode can be performed after the axis is stationary. switch.

 $\bigcirc$  The modification of the acceleration/deceleration ratio (OverAcc, OverDec) in JOG mode is ineffective.

### 12.9 SinaPos function description

#### **12.9.1** relative positioning

Relative positioning operation mode: It can be realized by driving the relative positioning function. It adopts the internal position controller driven by SINAMICS to realize relative position control.

Request:

① Use ModePos=1 to select this operating mode.

② Start the device with "EnableAxis".

③ The axis does not have to be referenced and the encoder does not have to be adjusted (absolute encoders can be left uncorrected).

(4) If the switching mode is greater than 3, the axis must be stationary. Switching between MDI operating modes (1, 2, 3) can be done at any time.

sequence:

① Specify the travel path and dynamic response by entering Position, Velocity, OverV (Velocity Override), OverAcc (Acceleration Override), OverDec (Deceleration Override).

② The run conditions "CancelTraversing" and "IntermediateStop" must be set to "1". "Jog1" and "Jog2" are invalid and must be set to "0" (not).

③ In relative positioning, the running direction is determined according to the positive or negative value of the value set in "Position".

④ The run is started with a positive edge in "ExecuteMode". The current status of valid instructions can be monitored via "EPosZSW1/EPosZSW2" (see Section 12.4 for details on status word assignment).

<sup>(5)</sup> The function block confirms that the end point of the traversing path has been successfully reached and the "AxisPosOk" bit is 1. If an error occurs during operation, the "Error" output signal is active.

illustrate:

A currently running instruction can be replaced in real time with a new instruction via "ExecuteMode". This only applies to "ModePos" 1, 2, 3 operating modes.

12.9.2 absolute positioning

Absolute positioning operating mode: The "absolute positioning" operating mode is executed with the drive function "MDI absolute positioning". In this mode, the absolute position can be approached in a position-controlled manner via the integrated position controller of the SINAMICS drive.

Request:

① Use ModePos=2 to select this operating mode.

② Start the device with "EnableAxis".

3 The axis must be referenced, or the encoder must be adjusted (the encoder must be calibrated).

(4) If the switching mode is greater than 3, the axis must be at rest. It is possible to switch between MDI operating modes (1, 2, 3) at any time.

sequence:

① Specify the travel path and dynamic response by entering Position, Velocity, OverV (Velocity Override), OverAcc (Acceleration Override), OverDec (Deceleration Override).

② The run conditions "CancelTraversing" and "IntermediateStop" must be set to "1". Jog1 and Jog2 are invalid and must be set to "0".

③ In absolute positioning, the direction of travel is basically determined based on the shortest path to the target position. Input "Positive" and "Negative" as "0".

④ The run is started with a positive edge in "ExecuteMode". The current status of valid instructions can be monitored via "EPosZSW1/EPosZSW2" (see Section 12.4 for details on status word assignment).

(5) The function block uses Busy to indicate the current command processing situation, and confirms the successful arrival of the target position AxisPosOk through Done. If a fault occurs during operation, the Error output signal is active.

illustrate:

When both Positive and Negative are selected at the same time, the axis stops immediately. If it is a linear axis, the selection is invalid and can be ignored.

A currently running instruction can be replaced in real time with a new instruction via "ExecuteMode". This only applies to "ModePos" 1, 2, 3 operating modes.

# **12.9.3** Continuous running mode (running at specified speed)

Continuous operation mode: Continuous operation mode allows the axis to run at a constant speed in forward or reverse. In continuous operation mode, the axis can be traversed with constant speed and position control in the positive or negative traversing direction without specifying the target position via the "MDI setting" function.

Request:

① Use ModePos=3 to select this operating mode.

2 Start the device with "EnableAxis".

③ The axis does not have to be referenced and the encoder does not have to be adjusted (absolute encoders can be left uncorrected).

(4) If the switching mode is greater than 3, the axis must be at rest. It is possible to switch between MDI operating modes (1, 2, 3) at any time.

sequence:

① Specify the travel path and dynamic response by entering Velocity, OverV (velocity override), OverAcc (acceleration override), and OverDec (deceleration override).

2 The run conditions "CancelTraversing" and "IntermediateStop" must be set to "1".

Jog1 and Jog2 are invalid and must be set to "0".

3 The running direction is determined by "Positive" and "Negative". Both directions cannot be selected at the same time.

④ The run is started with a positive edge in "ExecuteMode". The current status of valid instructions can be monitored via "EPosZSW1/EPosZSW2" (see Section 12.4 for details on status word assignment).

⑤ If a fault occurs during operation, the Error output signal is active.

illustrate:

A currently running instruction can be replaced in real time with a new instruction via "ExecuteMode". This only applies to "ModePos" 1, 2, 3 operating modes.

### 12.9.4 Reference point return operation

Reference point approach - reference point approach mode: In this operating mode, the referencing process of the axis can be carried out in the positive or negative traversing direction with the help of the preconfigured velocity and referencing mode, which can be carried out via the drive function "Active Reference point approach" to activate this operating mode.

Request:

① Use ModePos=4 to select this operating mode.

② Start the device with "EnableAxis".

③ The axis is at a standstill.

sequence:

(1) The required speed characteristics are saved in the SINAMICS drive as a speed profile. In addition, preset acceleration and deceleration are applied to the axis's operating profile. The speed override "OverV" affects the preconfigured operating speed.

② The run conditions "CancelTraversing" and "IntermediateStop" must be set to "1". Jog1 and Jog2 are invalid and must be set to "0".

③ The running direction is determined by "Positive" and "Negative". Both directions cannot be selected at the same time.

④ The run is started with a positive edge in "ExecuteMode". The current status of valid instructions can be monitored via "EPosZSW1/EPosZSW2" (see Section 12.4 for details on status word assignment).

⑤ The "Error" output signal is output if a fault occurs during operation.

### 12.9.5 Set back to reference point position

Set reference point position: This mode ensures that the axis is referenced at any position and is executed by the "set reference point" drive function.

Request:

① Use ModePos=5 to select this operating mode.

(2) The axis can be closed-loop controlled, but the axis must be stationary.

sequence:

① The axis is at standstill and the reference point position is set with the rising edge of "ExecuteMode".

② If a fault occurs during reference point position setting, the Error output signal is output.

# 12.9.6 JOG

Jog: The Jog operating mode is executed by driving the function "Jog". In this mode, the axis can be operated in a position-controlled and velocity-based manner via the integrated position controller of the SINAMICS drive.

Request:

- ① Use "ModePos"=7 to select this operating mode.
- ② Start the device with "EnableAxis".
- ③ The axis is at a standstill.

(4) The axis does not have to come back referenced and the encoder does not have to be adjusted (absolute encoders can be left uncorrected).

sequence:

1 The jog speed is set in the drive, and the speed override is also valid in this operating mode, and should be set by "OverV".

② The operating conditions "CancelTraversing" and "IntermediateStop" are irrelevant conditions in this operating mode and can be set to "1" by default.

3 Inputs "Positive" and "Negative" are irrelevant parameters in this run mode and can be set to "0" by default.

④ The current status of valid instructions can be monitored via "EPosZSW1/EPosZSW2" (see Section 12.4 for details on status word assignment).

(5) The function block uses Busy to indicate the current command processing status, and confirms the end of the jog function (Jog1 or Jog2 = 0) with AxisPosOK when the axis reaches a standstill. If a fault occurs during operation, the Error output signal is active.

illustrate:

① Jog1 and Jog2 are signal sources for jog mode in EPOS. The direction is set by default for Jog1 to be positive and Jog2 to be negative.

② Through Jog1 or Jog2, a new command can be used to actively replace the currently running command. Only valid while still in one of the jog modes.

# 12.10 Based on S7-200 SMART using message 111 to realize point

#### movement

# 12.10.1 Create a new project

The S7-200 uses STEP 7-MicroWIN SMART software.

Open STEP 7-MicroWIN SMART software, the software will automatically create a new project, click Save, and enter the file name.

	File	Edit	View	PLC	Debug	Tools	Help				
New	jਔ Oper ⊡ Close	Save	n Carlor Carlor Pr	nport * port * revious *	Upload D	lownload	Print	🔔 Preview 🛄 Page Setup	Project POU Data Page	Create Cpen Folder	GSDML Management
	0	perations		_	Tran	sfer		Print	Protection	Libraries	GSDML

# 12.10.2 Import GSD files

	Tab. Juli	- 0 >	
New Close Previous Up Operations	Rud Look Pepp Look Pepp Look Pepp Look Pepp Pept Pert		
Main q	🚦 💽 🥥 🖄   👚 Upload - 🐥 Download -   🎎 Insert - 🎇 Delete - 🔯 💯 👘 💼 😁 🏝 🚳 🔯 🕼	: 12 12	
	4 MAIN X 5 Manage general station description files	v l	Þ
E- Project1	Program Comments	*	
	1 Network Comment		
R Program Block	"GSDML management" allows you to install and delete GSDML files for PROFINET.		
Symbol Table			
Status Chart			
Data Block	Imported CSDUL files		
Cross Heterence		Installation Uate Status	
Wizerds	2 Enter contribution	2022-05-26 15:24:45 OK	
Tools			
E 0 Instructions	3. check file		
- Eavorites			
Bit Logic			
Gommunications			
E Commande Commande	3 Enter comment		
Convert			
E Counters			
Floating-Point Math			
Integer Meth			
Interrupt			
<ul> <li>Edgical Operations</li> <li>Move</li> </ul>	4 Enter comment		
Program Control	2. Click Browse and select	the GSD file	
Bhit/Rotate	Install new GSDML		
E in String	Status Chart D:\PN_project\	A. Click OK	1 ×
Toble			
B PROFINET		ОК	
H III Libraries	Address	da Type Comment	_
Coll Subroutines	1 Signed	1 TEMP	
	2 Signed	2 TEMP	
	3 Sinsed	3 TEMP	
	4 Sinned	4 TEMP	
	5 Sinsed		
	H + F H Chart 1		
	Symbol Table	🖙 Variable Table 🔤 Cross Reference 💽 Output Window	
L&D Network 1 Row 1 Col 1 INS	Not connected		

# 12.10.3 Search for master and slave devices

Search for the master (S7-200):

	D-1 - T-1	11.1			
File     Edit     View     PLC       Open     Import *     Export *       Close     Save     Previous *	Upload Download	Help Preview Print Page Setup Print	Project POU Data Page	Create Create Open Folder	SSDML Management
Operations	Transfer	Print	Protection	Libraries	GSDML
Main Click	₽ <b>○ ○ ∛</b> 4 MA	│	nload 👻 👘 Ins	sert 👻 🙀 Delete	-   🎘 🔝 🗆 😁 🛎

Communication Interface 1. Select the communication in	nterface
TP-LINK Gigabit Ethernet USB Adapter.TCPIP.Auto.1	Press the "Edit" button to change the IP data and station name of the selected CPU. Press the "Elach Lights" button to continuously
I Found CPUs	flash CPU LEDs to visually locate a connected CPU.
Added CPUs	
192.108.0.1	MAC Address
	00:00:00:00:00 Flash Lights
	IP Address
	192.168.0.1 Edit IP address
	Subpot Mack
	Default Gateway
	0.0.0.
	Station Name (ASCII characters a-z, 0-9, - and .)
2	
Find CPUs Add CPU Edit CPU Delete CPU	
Find Cros Add Cro Edit Cro Delete Cro	3
	OK Cancel
	Current

Search for slaves (VC330 drives):

The Profinet bus determines the specific servo through the IP address and device name. When P08.41=0, the IP address and device name need to be set through the controller software (such as TIA Portal software). When P08.41=X, and 0<X<255, the servo will automatically set the servo device name to vc1pnX, automatically set the IP address to 192.168.0.X, and set the subnet mask to vc1pnX when the servo is powered on. Set it to 255.255.0.0 and set the gateway to 192.168.0.X. Here is the introduction of setting IP address and device name through P08.41.

First set P08.41 to 2, reset the drive, and then search for slaves. Note that P08.41 here cannot be set to 1, because it will conflict with the IP address of the master station.

6 11		- 🚄 📼		*									
	- Fi	le Ed	lit V	liew	PLC	Debug	Tools	Help				click	
	***	***	***				**	***		<u>~~</u>	<b>2</b>	rth -	
Hig	h Speed	Motion	PID	PWM	Text	Get/Put	Data	PROFINET	Motion	PID Control	SMART Drive	Find PROFINET	Options
C	ounter				Display	V	Log		Control Pane	Panel	Configuration <b>T</b>	Devices	
													Settings

Find PROFINET Devices 1. Select communicati	on interface ×
Communication Interface TP-LINK Gigabit Ethernet USB Adapter.TCPIP.Auto.1	Press the "Edit" button to change the device name of the selected device. Press the "Flash Lights" button to continuously flash device LEDs to visually locate a connected device.
□         ✓         VC1PN           □         192.168.0.3(vc1pn3)	BC:F9:4F:51:31:3D Flash Lights
	IP Address 192 . 168 . 0 . 3 Drive IP address
	Subnet Mask 255 . 255 . 255 . 0
	Default Gateway 192.168.0.2
	Device Name (Chinese, ASCII characters 'a' - 'z', '0' - '9', '.' and '-' , should not start with number, '.' , '-', or 'port-n(n=09)', should not end with '.' or '-' )
	vc1pn2 Edit
2	Convert name: vc1pn2 drive device name
Find Devices	3
	Close

# 12.10.4 Add device S7-200, configure IP address

File Edit View	<u> </u>	LC Debug Tools	Help								
		Taxt Got/Rut Date		PID		ro Find PPC					
Counter	VVIVI	Display Log	Control Panel		System Block	In LINA DOL					×
counter	Wiza	rds	Control raner		System block						~
<u></u>				-	Module	0	Version	Input	Output	Order Number	^
Main 🏨	0	🔾 🥂 🕆 Upload	* 🕂 Download *	IS C	CPU CPU SR30 (AC/I	DC/Relay)	V02.05.01	<b>D</b> .0	Q0.0	6ES7 288-1SR30-0AA0	
	4			S							
□ 顶目 报文111无中文 (C)	-4	Lonantion		E	2. Select CPU	model a	and vers	sion			
What's New	<b></b>	程序注释		E	EM 1						
CPU SR30	1	Enable2	SINA_POS	E	EM 2						
Program Block		┝┥┝┿━	EN	E	EM 3						
1 double click				E	EM 4						~
T. GOUDIE CIICK			VW7000-Mod~ ActV~-VI	DE		Fthorno	t Post				
🗉 🛄 Data Block			VD7002 Positi~ ActP~ -VI	D	Communication	Etherne	t Fort				
System Block			VD7006-Velo~ Warn~-W	W		IP a	ddress data	is fixed to the	ne values be	low and cannot be changed by other mean	5
🗉 🔚 Cross Reference			V7010.0-Enab <sup>~</sup> Fault <sup>~</sup> -∨	w	II.0 - 11.7			_			
			V7010.1 Canc~ Done V3	70	I2.0 - I2.7		IP A	ddress: 1	.92 . 168	. 0 . 10	
🗉 🔣 Wizards			V7010.2 Inter~	1	Digital Outputs						
🗈 🖂 Tools			V7010.3 Exec~	1	Retentive Ranges		Subne	t Mask:   2	255 . 255	. 255 . 0	
Instructions			&IB170-St_I_~		Security		Default Co		0 0	0 0	
Favorites			&QB162-St_Q~		Startup		Derduit Ge	ateway:	0.0	. 0 . 0	
Bit Logic			&∨B8000-Contr~				Station	Name: plo	200smart		
E Clock			&∨B9000-Statu~				button	indition (Pro			
E Communications	<	1		1		Backgro	und Time	1			
Compare						Select	Communical	tione Backer	ound Time (	5 - 50%)	
E Counters	Stat	us Chart				Delect		uona backyi	ound time (	5 50%)	
Eleating-Point Math	-	· X1 - 1	1/ 3 3 2 21	-		120	-				
H Integer Math											
to manual interrupt		Address	Format V	al		RS485 P	ort				
E logical Operations	1	VW7000	Signed			PC405	cottings allo	w you to ad	liust the con	munications parameters that the PLC and	
E- Move	2	VD7006	Signed			HMI de	vices use to	communica	ite	intrancoustis parameters that the PLC and	
Program Control	3	VW7000	Signed					ddenan la	-		
🗉 🛄 Shift/Rotate	4	VD7002	Signed				A	uuress:  2	•		
E B String	5	VD7006	Signed				Bau	d Rate: 9.6	5 Kbps	•	
🗉 🖮 🧰 Table	6	√7010.0	Bit								
🗈 🐻 Timers	7	∀7010.1	Bit							3. Click OK	
	8	√7010.2	Bit							D. Cher Ort	
🕀 🔟 Libraries	9	√7010.3	Bit								
🖻 🛅 Call Subroutines	10	VD8000	Signed							ОК	Cancel
	11	V/D0000	Signed	۰.							
VECTOR

VC330 series servo driver instruction manual



#### 12.10.5 Add drive servo, configure IP address

PROFINET Configuration Wizar	d	×
PROFINET network  Controller(CPU SR30_plc200smart)  Controller(Nevcpn3  CONTROLLER(N)  PROFIdme Module(1)  Completion	The device table lists all devices that are currently configured for this PROFIMET net You can add devices from the device catalog tree on the right.	Catalog ☐ PLC 57-200 SMART ☐ CPU SR20 ☐ CPU SR20 ☐ CPU SR40 ☐ CPU SR40 ☐ CPU ST30 ☐ CPU ST30 ☐ CPU ST30 ☐ CPU ST40 ☐ CPU ST60 ☐ PROFINET-I0 ☐ Drives ☐ VCLPN ☐ VCLPN ☐ VCLPN ☐ L Click
	Device table       Device Number     Type     Device Name     IP Setting     IP Address       1     VCIPN     vcipn3     Set by user     192.168.0.3       3     3. Modify the device name and IP address,       4     3. Modify the device name and IP address of the driver searched earlier       8     address of the driver searched earlier       2     4       4     c       2     4	Article no.: 0 Version: GSDML-V2.33-VECTOR-VC1PN-20190610.xml Description: GSDML-V2.33-VECTOR-VC1PN- 20190610.xml VECTOR Driver VC1PN profinet, shared device

### 12.10.6 Configuration message 111

PROFINET Configuration Wizard	b								×
PROFINET network	]								VC1PN
VC1PN-vc1pn3	Click the device.	"Add" button t	o add a	nodule fo	r this				VCIPN 1. click
PROFIdrive Module(1)	Ind	Module Name		Submodule N	lame	Slot_Subs	. PNI Start	Input Size	PROFIdrive Module
Completion		VCIPN		Interface		0 32768	-		Submodule
	3 -			Port 1		0 32769			Standard Telegram 1,PZD-2/2
	4 -	DDOGU: N. LL		Port 2		0 32770		4	- Standard telegram 102, P2D-6/10 - Standard telegram 105, PZD-10/10
	6 🔽 –	PRUFIDIWE MODULE		Standard Tel	egram 3.PZD-5/9	12	170	18	Standard telegram 110, PZD-12/7
	7 -					13			Standard Tologram 2 PZD-5/9
	3. Check I	message 3				2			5. Add message 111 PZD-9/9
	9 -					4	-		Standard telegram 9, PZD-10/5
	11 🔽 -					5			
	12 -					6			-
	14 -					8			-
	15 -					9			
	16 -					10	-	-	-
	18 -					12	-		Article pp :
	19 -					13			Version
	20 -	4				14			
	22 -					16	-		_
	Realization 1		7					1	Description: Standard Telegram 3: Closed-loop speed
									control plus 1 position encoder, PZD length
	< <u>2</u>		ete mes	sage 3				,	
	Add	Delete	- ( )	4.00	-		2 -	1	
			e nime (ms)	14.00	- Data i	1010 ]	<u> </u>	1	
									~
		1							
< >>	< Previous	Next >				Conorato		0 1	
						Generate		Cancel	
PROFINET Configuration Wizard	d					Generate		Cancel	×
PROFINET Configuration Wizard	1 1 1					Generate	J _	Cancel	VCIPN
PROFINET Configuration Wizard PROFINET network Controller(CPU SR30_plc200smart)	d Click the	"Add" button t	o add a	nodule fo	r this	Generate		Cancel	VCIPN Head module
PROFINET Configuration Wizard	d Click the device. Submodul	<b>'Add' button t</b>	o add a	nodule for	r this	IQ Start Ou	tout Siz Fir	mware Version	VCIPN Head module U-VCIPN Hodule
PROFINET Configuration Wizard PROFINET network Controller(CPU SR30_plc200smart) 	d Click the device. Submodul 1	<b>"Add" button t</b> Name	o add a Slot_Subs.	nodule fo: PNIStart	r this InputSize PN	IQ Start Our	tput Siz Fir	mware Version	VCIPN Head module UCIPN Hodule ROFEdrive Module Submodule
PROFINET Configuration Wizard PROFINET network Controller(PU SR30_plc200smart) -  VCIPN-vc1pn3 VCIPN-vc1pn3 VCIPN-vc1pn3 Completion	Click the device. Submodul 1 2 Interface	<b>″∆dd″ button t</b> ⊨Name	o add a Slot_Subs 0 0 32768	nodule fo: PNIStart	r this	Q Start Ou	tput Siz Fir	mware Version	VCIPN Head module UCIPN Module FROFIdrive Module Submodule Submodule Simens Telegram 750,P2D-12/12 Simens Telegram 750,P2D-12/12
PROFINET Configuration Wizard PROFINET network Controller(PU SR30_plc200smart) - UCIPH-vc1pn3 - VCIPH-vc1pn3 - VCIPH-vc1pn3 - Conpletion	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2	<b>'Add' button t</b> le Name	o add a Slot_Subs. 0 0 32768 0 32769 0 32770	nodule fo: PNIStart	r this	IQ Start Ou	tput Siz Fir	mware Version	VCIPN Head module UCIPN Module FROFIdrive Module Submodule Submodule Simens Telegram 750,PZD-12/12 - Standard Telegram 1,PZD-2/2 - Standard Telegram 102, FZD-6/10
PROFINET Configuration Wizard PROFINET network Controller(PU SR30_plc200smart) - UCIPH-vc1pn3 - VCIPH-vc1pn3 - VCIPH(0) - PROFIdrive Module(1) - Completion	Click the device. Submodul 1 2 Interface 3 Port1 4 Port2 5	<b>"Add" button t</b> le Name	o add a Slot_Subs 0 0 32768 0 32769 0 32770 1	nodule fo:	r this	Q Start Ou	tput Siz Fir	mware Version	X VCIPN Head module VCIPN NOVCIPN Nodule Submodule Submodule Submodule Submodule Sundard Telegram 150,P2D-12/12 Standard Telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 105, P2D-10/10 Standard telegram 105, P2D-12/7
PROFINET Configuration Wizard PROFINET network Controller(PU SR30_plc200smart) - UCIPH-vc1pn3 - VCIPH-vc1pn3 - VCIPH(0) - PROFIdrive Module(1) - Completion	Click the device. Submodul 1 2 Interface 3 Port1 4 Port2 5 5 6 Standard	<b>*Add* button t</b> le Name Telegram 111.PZD-1	o add a Slot_Subs. 0 0 32768 0 32769 0 32770 1 1 1 2	NI Start	r this	IQ Start Ou	tput Siz Fir	mware Version	X VCIPN Head module VCIPN NCVCIPN NCVCIPN NCVCIPN Submodule Submodule Submodule Submodule Simens Telegram 750,P2D-12/12 Standard Telegram 102, P2D-6/10 Standard telegram 105, P2D-10/10 Standard telegram 105, P2D-10/10 Standard telegram 110, P2D-12/7 Standard Telegram 111,P2D-12/12
PROFINET Configuration Wizard PROFINET network Controller(PU SR30_plc200smart) - UCIPH-vc1pn3 - VCIPH-vc1pn3 - VCIPH-vc1pn3 - Conpletion	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8	<b>*Add* button t</b> le Name Telegram 111,PZD-1	<b>Solution</b> 0 32768 0 32769 0 32770 1 1 2 1 3	PNI Start	r this InputSize Pr 24 17	Q Start Ou 2 24	tput Siz Fir	mware Version	X VCIPN Head module VCIPN VCIPN NOVEN Submodule Submodule Submodule Submodule Standard Telegram 750,PZD-12/12 Standard Telegram 102, PZD-6/10 Standard telegram 102, PZD-6/10 Standard telegram 102, PZD-6/10 Standard Telegram 111,PZD-12/12 Standard Telegram 3,PZD-5/9 Standard Telegram 5,PZD-5/9 Standard Telegram 5,PZD-5/9
PROFINET Configuration Wizard	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8 9	<b>*Add* button t</b> le Name Telegram 111.PZD-1 <b>Thi</b>	o add a Slot_Subs. 0 02768 0 32769 0 32770 1 1 2 3 5 is the	PNI Start	r this InputSize Pr 24 17 address ar	IQ Start. Ou 2 24 d PNQ s	tputSiz Fir	mware Version	X VCIPN Head module VCIPN VCIPN Kovine Submodule Submodule Submodule Submodule Sundard Telegram 750,P2D-12/12 Standard Telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 111,P2D-12/2 Standard Telegram 111,P2D-12/12 Standard Telegram 57,P2D-9/9 Standard Telegram 5,P2D-9/9 Standard telegram 7, P2D-9/9 Standard tel
PROFINET Configuration Wizard	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8 9 9	<b>*Add* button t</b> le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32769 0 32770 1 12 13 5 is the ssage 1	PNI Start	r this Input SizePh 24 17 address ar will be use	Q Stert Ou 2 24 d PNQ s d when o	tput Siz Fir	mware Version ress of ing the	X VCIPN Head module VCIPN VCIPN NOCHTINE Module Submodule Submodule Submodule Sundard Telegram 750,P2D-12/12 Standard telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 111,P2D-12/12 Standard Telegram 3,P2D-5/9 Standard Telegram 5,P2D-5/9 Standard Telegram 5,P2D-5/9 Standard telegram 7, P2D-2/2 Standard telegram 7, P2D-10/5
PROFINET Configuration Wizard	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8 9 9 10 11	<b>*Add* button t</b> le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 32768 032769 032770 1 1 1 2 1 3 3 5 is the ssage 1	PNI Start	r this Input SizePh 24 17 address ar will be use Pos param	Q Stert Ou 2 24 d PNQ s d when a eter later	tput Siz Fin	mware Version	X VCIPN Head module VCIPN VCIPN Module Submodule Submodule Sundard Telegram 750,P2D-12/12 Standard telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 111,P2D-12/12 Standard Telegram 3,P2D-5/9 Standard Telegram 5,P2D-5/9 Standard telegram 9,P2D-10/5
PROFINET Configuration Wizard	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8 9 9 9 10 11 12 13	*Add* button t le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 32768 032769 032770 1 1 1 2 1 3 3 5 is is the ssage 1 7	Nodule for PNIStat	r this Input Size Pr 24 17 address ar will be use Pos param	Q Stert Ou 2 24 d PNQ s d when o eter later	tput Siz Fin	mware Version	X VCIPN Head module VCIPN OVEN Module Submodule Sumana Telegram 750,P2D-12/12 Standard Telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 111,P2D-12/12 Standard Telegram 3,P2D-5/9 Standard telegram 3,P2D-10/5
PROFINET Configuration Wizard	Click the device. Submodul 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 7 8 9 9 9 9 10 11 12 13 13	*Add* button t le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 032768 032769 032770 1 12 13 5 s is the ssage 1 7 8	Nodule for PNI Start	r this Input Size. Ph 24 17 address ar will be use Pos param	Q Stert Ou 2 24 d PNQ s d when o eter later	tput Siz Fin	mware Version	X VCIPN Head module VCIPN OVENN Module Submodule Sumant Felegram 750,P2D-12/12 Standard telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 110, P2D-12/12 Standard Telegram 111,P2D-12/12 Standard Telegram 3,P2D-3/9 Standard telegram 3,P2D-10/5
PROFINET Configuration Wizard	Click the device. Submodul 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8 9 9 9 10 11 12 13 13 14 15 16	*Add* button t le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32770 1 1 1 3 5 5 5 5 5 5 5 5 5 5 5 5 5	Nodule for PNI Start	r this	Q Stert Ou 2 24 d PNQ s d when o eter later	tput Siz Fin	mware Version	VCIPN Head module -VCIPN Module -Sumost Telegram 750,PZD-12/12 -Standard Telegram 105, PZD-12/12 -Standard Telegram 105, PZD-10/10 -Standard telegram 105, PZD-10/10 -Standard telegram 11, PZD-12/12 -Standard Telegram 11, PZD-12/12 -Standard Telegram 3, PZD-5/9 -Standard Telegram 7, PZD-2/2 -Standard Telegram 7, PZD-2/2 -Standard Telegram 7, PZD-10/5
PROFINET Configuration Wizard	Click the device. Submodul 1 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 9 9 9 10 11 12 13 13 13 14 15 16	*Add* button t le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32769 0 32770 1 1 1 3 5 5 5 5 5 5 5 5 5 5 6 9 10 11 11 11 11 11 11 11 11 11	Nodule for PNI Start	r this	IQ Start	tput Siz Fir	mware Version	VCIPN Head module -VCIPN Module -Stondard Telegram 750,PZD-12/12 -Stondard Telegram 105, PZD-12/12 -Stondard telegram 105, PZD-10/10 -Stondard telegram 105, PZD-10/10 -Stondard telegram 11, PZD-12/12 -Stondard telegram 11, PZD-12/12 -Stondard Telegram 3, PZD-5/9 -Stondard Telegram 7, PZD-2/2 -Stondard Telegram 7, PZD-2/2 -Stondard Telegram 7, PZD-2/2 -Stondard telegram 9, PZD-10/5
PROFINET Configuration Wizard	Click the device. Submodul 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 7 8 9 9 9 9 10 11 12 13 13 13 13 14 15 16 16 17 17	*Add* button t le Name Telegram 111.PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32769 0 32770 1 12 13 5 5 5 5 5 5 5 5 5 5 5 5 5	Nodule for	r this	IQ Start Qu 2 24 ad PNQ s ad when a eter later	tput Siz Fir	ress of ing the	VCIPN Head module -VCIPN Module -Stondard telegram 1750,PZD-12/12 -Standard Telegram 1750,PZD-12/12 -Standard telegram 105, PZD-10/10 -Standard telegram 105, PZD-10/10 -Standard telegram 11,PZD-12/2 -Standard telegram 11,PZD-12/2 -Standard Telegram 3,PZD-5/9 -Standard Telegram 7, PZD-2/2 -Standard Telegram 7, PZD-2/2 -Standard telegram 7, PZD-10/5
PROFINET Configuration Wizard	Click the device. Submodul 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 7 8 9 9 9 9 9 10 11 11 12 13 13 14 13 13 14 15 16 16 17 17 18 19 20	*Add* button t le Name Telegram 111,PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32769 0 32770 1 12 13 5 5 5 5 5 5 5 5 5 5 5 5 5	Nodule for	r this	IQ Start Qu 2 24 Id PNQ s d when o eter later	tput Siz Fir	ress of	VCIPN Head module -VCIPN Module -Submodule -Sundard Telegram 150,PZD-12/12 -Standard telegram 105, PZD-10/10 -Standard telegram 105, PZD-10/10 -Standard telegram 105, PZD-10/10 -Standard telegram 11,PZD-12/12 -Standard Telegram 3,PZD-5/9 -Standard Telegram 7, PZD-2/2 -Standard Telegram 7, PZD-2/2 -Standard Telegram 7, PZD-10/5
PROFINET Configuration Wizard	Click the device. Submodul 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 9 9 9 9 10 11 11 12 13 13 14 15 13 14 15 16 16 17 17 18 19 20 20	"Add" button t le Name Telegram 111,PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32768 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 13 14 15	Nodule for	r this	iQ Start Ou 2 24 d PNQ s d when o eter later	tput Siz Fir	ress of ing the	VCIPN Head module -VCIPN Module Submodule -Sindraf Telegram 1750;P2D-12/12 -Standard Telegram 10; P2D-12/12 -Standard telegram 10; P2D-10/10 -Standard telegram 10; P2D-10/10 -Standard Telegram 11; PZD-12/12 -Standard Telegram 7; PZD-2/2 -Standard Telegram 7; PZD-2/2 -Standard Telegram 7; PZD-10/5
PROFINET Configuration Wizard PROFINET network 	Click the device. Submodul 1 2 Interface 3 Port1 4 Port2 5 5 5 5 5 5 5 5 5 5 5 6 5 5 5 6 5 5 7 7 8 9 9 10 11 12 13 11 12 13 14 15 15 16 16 17 12 13 14 12 12 13 14 14 12 12 11 12 12 11 12 12 12 14 14 14 14 14 14 14 14 14 14 14 14 14	*Add* button t le Name Telegram 111,PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32768 0 32770 1 12 13 5 5 5 5 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 8 9 10 11 12 13 13 13 14 15 16 16 16 16 16 16 16 16 16 16	Nodule for	r this	IQ Start Ou 2 24 d PNQ s d when o eter later	tart add	rress of ing the	✓ VCIPN Head module VCIPN Module Submodule Sundard Telegram 1720-720-12/12 Sandard telegram 102, P2D-6/10 Standard telegram 102, P2D-6/10 Standard telegram 110, P2D-12/7 Standard telegram 110, P2D-12/7 Standard Telegram 3, P2D-5/9 Standard Telegram 3, P2D-5/9 Standard Telegram 7, P2D-2/2 Standard telegram 7, P2D-2/2 Standard telegram 7, P2D-10/5
PROFINET configuration Wizard PROFINET network 	Click the device. Submodul 1 2 Interface 3 Port1 4 Port2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	*Add* button t le Name Telegram 111,PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 11 11 11 11 11 11 11 11	Nodule for	r this	IQ Start Ou 2 24 dd PNQ s dd when o eter later	tput Siz Fir	ress of ing the	VCIPN Head module - VCIPN Module - Submodule - Sundard Telegram 1720-720-12/12 - Standard telegram 102, P2D-6/10 - Standard telegram 102, P2D-6/10 - Standard telegram 110, P2D-12/7 - Standard telegram 110, P2D-12/7 - Standard Telegram 3, P2D-5/9 - Standard Telegram 3, P2D-5/9 - Standard Telegram 7, P2D-2/2 - Standard Telegram 7, P2D-2/2 - Standard telegram 7, P2D-10/5
PROFINET configuration Wizard	Click the device. Submodul 2 Interface 3 Port1 4 Port2 5 Standard 7 8 9 9 10 11 12 13 14 15 15 16 17 15 16 17 18 19 20 21 22	*Add* button t le Name Telegram 111,PZD-1 Thi me	o add a Slot_Subs. 0 0 32768 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 14 15 16	Nodule for	r this	IQ Stort Ou 2 24 dd PNQ s dd when o eter later	tput Siz Fir	ress of ing the	VCIPN Head module - VCIPN Module - Submodule - Sundard Telegram 1720-720 - Standard telegram 102, F2D-6/10 - Standard telegram 102, F2D-6/10 - Standard telegram 110, F2D-12/7 - Standard telegram 110, F2D-12/7 - Standard Telegram 3, F2D-5/9 - Standard Telegram 3, F2D-5/9 - Standard Telegram 7, F2D-2/2 - Standard telegram 7, F2D-2/2 - Standard telegram 7, F2D-10/5
PROFINET configuration Wizard PROFINET network 	Click the device. Submodul 1 2 Interface 3 Port1 4 Port2 5 5 6 Standard 7 8 9 9 10 11 12 13 14 15 16 17 18 19 20 21 22 22	*Add* button t le Name Telegram 111,PZD-1 Thi me iime, if CPU tin	o add a Slot_Subs. 0 0 32769 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 14 15 16 me is no	odule for PNI Start 188 PNI start 1, which Sina	r this	IQ Start Ou 2 24 dd PNQ s dd when o eter later	tput Siz Fir	rress of ing the riately	VCIPN Head module - VCIPN Module - Submodule - Sundard Telegram 1720-720-720-720-720-720-720-720-720-720-
PROFINET configuration Wizard PROFINET network 	Click the device. Submodul 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 9 10 11 12 13 14 15 16 17 18 19 20 21 22 22 Vpdate t	*Add* button t le Name Telegram 111,PZD-1 Thi me ime, if CPU tin	o add a Slot_Subs. 0 0 32769 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 12 7 8 9 10 11 12 13 12 7 8 9 10 11 12 13 12 7 8 8 9 10 11 11 12 13 14 15 16 16 10 11 12 13 14 15 16 16 17 16 17 18 19 10 11 11 12 13 10 11 12 13 14 15 16 16 16 16 16 17 10 11 11 12 13 14 15 16 16 16 16 17 16 16 17 17 17 18 19 10 11 12 15 16 16 16 16 16 16 16 16 16 16	Andule for	r this	IQ Stort Ou 2 24 dd PNQ s dd when o eter later	tput Siz Fir	ress of ing the riately	VCIPN Head module - VCIPN - VCIPN - Module - Sudmotal Telegram 750,P2D-12/12 - Standard telegram 102, P2D-6/10 - Standard telegram 102, P2D-6/10 - Standard telegram 110, P2D-12/7 - Standard telegram 110, P2D-12/7 - Standard Telegram 3,P2D-5/9 - Standard Telegram 3,P2D-5/9 - Standard Telegram 7,92D-9/9 - Standard telegram 7,
PROFINET configuration Wizard	Click the device. Submodul 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 9 10 11 12 13 14 14 15 16 17 18 19 20 21 22 21 22 21 22	*Add* button t le Name Telegram 111,PZD-1 Thi me ime, if CPU tim Delete Uupdat	o add a Slot_Subs. 0 0 32769 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 12 7 8 9 10 11 12 13 12 13 12 13 12 13 12 13 12 13 12 13 15 16 10 11 12 13 14 15 16 16 17 17 18 19 10 11 12 13 14 15 16 16 17 17 18 19 10 11 11 12 13 14 15 16 16 16 16 17 16 17 17 18 19 19 10 11 11 12 15 16 16 16 16 17 17 18 19 10 11 11 15 16 16 16 16 16 16 16 16 16 16	Odule for PNI Start IN	r this	IQ Stort Ou 2 24 dd PNQ s dd when o eter later acrease it iold	tput Siz Fir tart add configur 	ress of ing the riately i	VCIPN Head module 
PROFINET configuration Wizard	Click the device. Submodul 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 10 11 12 13 14 14 15 15 16 17 18 19 20 21 21 22 21 21 22 21 22 21 22	*Add* button t le Name Telegram 111,PZD-1 Thi me ime, if CPU tin	o add a Slot_Subs. 0 0 32768 0 32768 0 32770 1 12 13 5 is is the ssage 1 7 8 9 10 11 12 13 14 15 16 ne is no <sup>2</sup>	Odule for PNI Start  188 PNI start 1, which Sina	r this	IQ Stort Ou 2 24 dd PNQ s dd when o eter later all all all all all all all all all all	tput Siz Fir tart add configur 	ress of ing the riately i	VCIPN         Image: Control of the con
PROFINET network  PROFINET network  Controller(CPU SR0_plc200smart)  PROFINET network  Completion  Completion	Click the device. Submodul 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 10 11 12 13 14 14 15 15 16 17 18 19 20 21 22 20 21 22 20 21 22 20 21 22	*Add* button t le Name Telegram 111.PZD-1 Thi me ime, if CPU tim	o add a Slot_Subs. 0 32768 0 32770 1 1 2 1 3 5 5 5 5 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 10 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 11 12 13 7 8 9 9 10 11 12 13 13 14 15 16 16 17 17 18 19 10 11 11 12 13 13 14 15 16 16 17 17 18 19 10 11 11 12 13 14 15 16 16 17 17 18 18 18 19 10 11 11 12 13 14 15 16 16 16 16 16 17 17 18 18 18 18 18 19 19 10 11 12 13 14 15 16 16 16 16 16 16 16 17 16 16 16 16 16 16 16 16 16 16	odule for PNI Start 188 PNI start 1. which Sina 4.00	r this	IQ Start Que 2 24 dd PNQ s dd when o eter later acrease it fold	tput Siz Fir tart add configur 	ress of ing the initial initia initial initial initial initial initial initial initial	VCIPN         Image: Control of the state of the sta

### 12.10.7 Write PLC program

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File Edit View PLC	Debug Tools	Help						
High Speed Motion PID PWM Tex	xt Get/Put Data PRI	OFINET Motion PI	Control SMART Drive	Find PROFINET Options	s			
Counter Disp	lay Log	Control Panel	Panel Configuration	<ul> <li>Devices</li> </ul>				
Wizards					s			
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	MAIN X	SBR 0 INT 0	T BRO MADE C T VOCC	A TAO BOLLO COL			() III ()	
Cross Reference								
- Communications								
E Wizards								
E Tools								
E D Instructions								
- Favorites	3							
🗉 📴 Bit Logic								
E Clock								
Communications								
E S Compare								
E Convert	4							
Counters								
E Eloating-Point Math								
E 1 Integer Math								
E Interrupt								
E logical Operations	5							
E Move								
Program Control	<							
🗉 🧱 Shift/Rotate	Canture Chant					Alexandra Talata		
E String	Status Chart				4.7	Variable lable		
🕀 🖮 Table	97 - X1 - 17 1	n 61 / 6 6 6	1 Al M 🖸 -			3 3 4		
🗉 🔯 Timers	Address	Farmet	Mahua	Maussiahun		Address Combal	VerTime	Data Tra
E PROFINET	Audress	Olimat	Value	INEW Yolde	-	Audress Symbol	Vai Type	Daia Ty
E- 🔯 Libraries	1 VW/000	Signed		-	-		TEMP	
H Modbus RTU Master (v2.0)	2 VD7006	Signed			-	2	TEMP	
Modbus RTU Master2 (v2.0	3 VW7000	Signed			_	3	TEMP	
H Modbus RTU Slave (v3.1)	4 VD7002	Signed				4	TEMP	
Modbus TCP Client (v1.4)	5 VD7006	Signed						
E-00 Modbus TCP Server (v1.0)	6 ∨7010.0	Bit						
Open User Communication	7 \7010.1	Bit						
PN Read Write Record (v1	8 √7010.2	Bit			_			
SINAMICS Control (v1.1)	9 \(\textstyle 10.3)	Bit	-		_			
SINA_POS	47010.5	Dit			-			
SINA_SPEED DOUD	ple-click to ac	dd to select -			-			
E SINAMICS Paramet	CILLA DOC!				_			
	SINA POS II	nstruction			-			
🗉 🔛 Call Subroutines 🗸 🗸	Long				~	·		
< >	14 4 > >1 图表1					🔝 Variable Table 🛛 🔛 Cr	oss Reference 🛛 🧝	Output Win
Project Tree	INS OCONNecto	ed 192.168.0.1	RUN					

In the main program, write the following program, note that the addresses of  $St_I$  add and  $St_Q$  add must correspond to the IO address of message 111:

For the four input parameters "St\_I\_add", "St\_Q\_add", "Control\_table" and "Status\_table", the addressing instruction operand mode is indirect addressing. The & sign must be entered at the beginning of the input operand and the offset must be the same as in the PROFINET wizard.



#### Allocate the V address area used by the program library:

Wizards	uy Log	Library Memory Allocation	×
Main 🎵	🚺 🔾 🏹   👚 Upload	SINAMICS Control (v1.1)	
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	▲ MAIN × SBR 程序注释 1 Enable2	The instruction library 'SINAMICS Control (v1.1)' requires 188 bytes of global V-memory. Specify an address where this amount of V-memory can be used by the library. Click 'Suggest Address' to use program cross reference to locate an unused block of the required size.	F V
Symbol T     Help     Symbol T     Help     Symbol T     Help     System Blo     Cross Refe then click Libr     Communications     Communications     System S     Tools	he library, ary Storage	1 Suggest Address Delete Library Symbols VB188 through VB375 2 确定 取消	

#### 12.10.8 Compile and download the program for testing

Note that if the message of the servo is changed, the servo and PLC need to be powered on again after downloading the program to take effect.

VECTOR

Main 🌐	🔾 🔾 👌 🕆 Upload - 😽 Download - 👘	insert - 🎇 Delete -   🎇 🛜   👝 😁	🔿 🏝 🔁 📾	• ७ ७ दिन्÷ → + ० न। • • # ४ छि। ७ व
	SBR 0			
B-ST 项目 报文11 1. Compile t	the program 3. Downlo	ad the program		
- What's New				
- CPU SR30	1 Enable2 SINA_POS			
Program Block	EN EN			
- AIN (061)				
	VW7000 Mod" Actv"	/D7020		
INT_0 (INTO)	VD7002 Positi" ActP"	/D/024		
B Chu nos rann	VD/UU6-Velo" Warn	///////////////////////////////////////		1
E SinA POS (SBR1)	Download		×	
E Status Chart				-
Data Block	Download blocks to CPU			
	Select blocks to download.			
Cross Reference				
- E Communications	Click Download to begin			
E Wizards	U			
Tools	4			
OI Instructions				
Pavorites	Sta			3 X Output Window 3
E Clock	P Blocks	Options		2.0
Communications	Frogram Block	Promotion BUIN to STOP		
Compare	▼ Data Block	Prompt on STOP to BUN		A Compiling Program Block MAIN (061)
Gonvert	System Block	Close dialog on success		SBR_0 (SBR0)
E Counters	2			SINA_POS (SBR1) BIT 0 (MTD)
Floating-Point Math	-			Block Size = 3538 (bytes), 0 errors
Integer Math	🔮 🥝 Click for Help and Support	Download	Close	
interrupt	6 \/2010.0 Dit			Block Size = 0 (Mode). 0 errors
E Move	2 V/2010.1 Dit	4 download		
Be Program Control	8 V/2010.2 Bit			Compiling System Block
⊕ ☐ Shift/Rotate	9 V/2010.2 Dit			Complete block with 0 errors of wennings
🕀 🔤 String	10 VD8000 Signed			Total Errors: 0
🟵 📷 Table	11 VD9000 Signed			2 Check the program for errors
⊕- 🙆 Timers	12 W8002 Signed			2. check the program for errors
PROFINET	13 VW8004 Signed			HI 4 F FI Build
E Libraries V	Signed			
< >				🛐 Variable Table 📴 Cross Reference 🔝 Output Window

### Relevant functional tests through state diagrams:

File Edit View PLC	Debug Tools Help				
Read Write	Chart Status Force	Conforce All	Execute Single	G Edit In Run	
All Relevant functio	nal tests	Force	Scan	Settinos	
via state diag	grams		é luca		
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	MAIN X SBR_(	0_TNI C			
□- 🔞 项目 报文111无中文 (C:\Users\. ^	程序注释				
	1 Enclose ONL		-		
CPU SR30	Enable2=UN	SINA_PUS			
Program Block		EN			
MAIN (OB1)					
		+0-VW7~ VD70	° -0		
		+0-VD70**VD70	<b>~</b> −0		
🖻 📉 Library		+0-VD70~ VW7	°-0		
SINA_POS (SBR1)		2#0-V701~ VW7	°-0		
Symbol Table		2#0 V701~ V703	~-2#0		
Status Chart		2#0-\/701~			
Data Block		2#0-\/701~			
System Block	16#00	0000BC-&IB188			
Cross Reference	16#01	0000AC-&QB~			
Wizards	16#08	3001F40-&∨B8~			
	16#00	8002328- <u>&amp;</u> VB9~			
	<				
Eavorites				-	
Bit Logic	Status Chart	write the	new value to t	the program	ά×
E Clock	97 - X1 - 17 m 6				
Communications				Alexander	
🗄 🔁 Compare	Address	Format	Value	New Value	
🕀 🔤 Convert	1 VW/000	Signed	+U		
🕀 🐨 🔝 Counters	2 VD7006	Signed	+0		
🕮 Floating-Point Math	3 VW7000	Signed	+0		
🗉 🔠 Integer Math	4 VD7002	Signed	+0		
⊡ Interrupt	5 VD7006	Signed	+0	The second second second	Charles and the second second second
⊞	6 V7010.0	Bit	2#0	Assign values to	related parameters
Move	7 V7010.1	Bit	2#0		
🕀 🖬 Program Control	8 V7010.2	Bit	2#0		
Shift/Rotate	9 V7010.3	Bit	2#0		
⊞ 100 String	10 VD8000	Signed	+0		
	11 VD9000	Signed	+1073938432		
	12 VW8002	Signed	+0		
	13 VW8004	Signed	+0		~
<					

### 12.11 Simple speed control using telegram 1 based on S7-200 SMART

#### 12.11.1 Create a new project

Open STEP 7-MicroWIN SMART software, the software will automatically create a new project, click Save, and enter the file name.

11四				100 H 100	1.5.76	28 28	1000				
	File	Edit	View f	PLC	Debug Too	ols H	Help				
New	Dper	Save	Impo Expor	rt * rt * ous *	Upload Downle	oad	Print	🔌 Preview <u>]</u> Page Setup	Project POU Data Page	Create	GSDML Management
	0	perations	5	5	Transfer			Print	Protection	Libraries	GSDML

### 12.11.2 Search for master and slave devices

Search master (S7-200):	
File Edit View PLC Debug Tools He	qle
High Speed Motion PID PWM Text Get/Put Data PROF Counter Display Log Wizards	INET Motion PID Control SMART Drive Find PROFINET Control Panel Panel Configuration T Devices Tools
Main click ♥ ♥ ♥ ♥ 1 ■ ■ ■ ■ ■ ■ ■	YUpload → 🐥 Download →   🙀 Insert → 🉀 Delete →   🎘 👘   × <u>PN_WR_REC_PARA_S</u>
Communications 1. Select communication i	nterface ×
Communication Interface TP-LINK Gigabit Ethernet USB Adapter.TCPIP.Auto.1	Press the "Edit" button to change the IP data and station name of the selected CPU. Press the "Flash Lights" button to continuously flash CPU LEDs to visually locate a connected CPU. MAC Address 8C:F3:19:07:81:F1 Flash Lights IP Address 192 . 168 . 0 . 1 Edit IP address Subnet Mask 255 . 255 . 255 . 0 Default Gateway 0 . 0 . 0 . 0 Station Name (ASCII characters a-z, 0-9, - and .) plc200smart
2	
Find CPUs Add CPU Edit CPU Delete CPU	3
	OK Cancel

Search Slave (VC330 Drive):

The Profinet bus determines the specific servo through the IP address and device name. When P08.41=0, the IP address and device name need to be set through the controller software (such as TIA Portal software). When P08.41=X, and 0<X<255, the servo will automatically set the servo device name to vc1pnX, automatically set the IP address to 192.168.0.X, and set the subnet mask to vc1pnX when the servo is powered on. Set it to 255.255.0.0 and set the gateway to 192.168.0.X. Here is an introduction to setting the IP address and device name through P08.41.

First, set P08.41 to 2, reset the drive, and then search for the slave. Note that P08.41 here cannot be set to 1, because it will conflict with the IP address of the master station.



### 12.11.3 Add device S7-200, configure IP address

File Edit View High Speed Motion PID FI	PLC Debug Tools	Help	
Counter Main #	Display Log Wizards	Control Panel     System Blo     Module     Download      A	ick X ■ Version Input Output Order Number SR30 (AC/DC/Relay) V02.05.01 [0.0 00.0 6ES7 288-1SR30-0AA0
「い」で見ていたい。     「い」で見ていたいたい。     「い」で見ていたいたい。     「い」で見ていたいたい。     「い」ではないたいたいたい。     「い」ではないたいたい。     「い」ではないたいたい。     「い」ではないたいたいたい。     「い」ではないたいたいたい。     「い」ではないたいたいたいたいたいたいたいたいたいたいたいたいたいたいたいたいたいたいた	4         MAIN × SBR_0           1         Enable2           1         Enable2           1         Enable2           2         V           V         V           Status Chart         T           Address         T           1         VV7000         S           2         VD7006         S           5         VD7006         S           6         V7010.0         S           7         V7010.3         T           V         V0000	INLO         STA_POS           SINA_POS         2. Select           EN         EM1           M7000         Mod" Actv           VD7012         Positi           VD7012         Positi           V7010.0         Eneb           Fault         VV           V7010.1         Campon           V7010.2         Inter"           V7010.3         Exec"           SIB170         St_0~           R8000         Contr"           V8000         Statu"	tt CPU model and version
File Edit View F	LC Det 1 Tools Help	Rignod	
High Speed Motion PID PWM Counter	Text Get/Put I 2 Display	Motion PID Control SMART Drive Find P Control Panel Configuration D	PROFINET Options
Main ■ ■ PLTEST_RW_VCIPN(D\PN) ■ © PN_TEST_RW_VCIPN(D\PN) ■ CPU SR30 ■ CPU SR30 ■ Program Block ■ Symbol Table	PROFINET Configuration	Wizard 200sma le(1) Introductio This wizard allows yo the project, which can	in to configure a PROFINET network step by step. The PROFINET configuration is generated and stored in in be downloaded to the PLC together with the project.
Sistes Chart     Sistes Chart     Sistes Chart     Sistem Block     S		PLC Kole Select a role for the PL Controller Controller Parameter ass Ethernet Port Parameter ass Ethernet Port Parameter ass Default Gateway: Station Name:	LC. . Check the controller signment of PROFINET interface by higher-level ID controller and name 192 . 168 . 0 . 1 255 . 255 . 0 0 . 0 . 0 . 0 pic200emant For the master station searched earlier
		<pre>5 </pre>	Generate Cancel

### 12.11.4 Add drives, configure IP addresses

FROFERET retroits       Consider Status       Constatus       Consider Status       Cons	PROFINET Configuration Wizard		×
Device Number     Type     Device Name     IP Setting     IP Address       1     VCIPN     vcipn3     Set by user     192.168.0.3       3     3. Modify the device name and IP address,     Article no.: 0       4     which should be the same as the device name and IP       6     address of the driver searched earlier       8     South V2.33-VECTOR-VCIPN-20190610.xml       C     Comparison       Add     Delete       2     Comparison	PROFINET network	The device table lists all devices that are currently configured for this PROFINET net You can add devices from the device catalog tree on the right.	Catalog ☐ PLC 57-200 SMART ☐ CPU SR20 ☐ CPU SR20 ☐ CPU SR40 ☐ VCIPN ☐ VCIPN ☐ VCIPN ☐ VCIPN ☐ VCIPN ☐ VCIPN
< Province Next > Constal Constal		Device Number Type Device Name IP Setting IP Address VCIPN VCIPN Set by user 192.168.0.3 3. Modify the device name and IP address, which should be the same as the device name and IP address of the driver searched earlier Add Delete 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5	Article no.: 0 Version: GSDML-V2.33-VECTOR-VC1PN-20190610.xml Description: GSDML-V2.33-VECTOR-VC1PN- 20190610.xml VECTOR Driver VC1PN profinet, shared device

## 12.11.5 Configuration message 1

PROFINET Configuration Wizard	d									×
PROFINET network	]								VC1PN	
VC1PN-vc1pn3	Click the device.	e Add button t	o add a	nodule for	this this				VCIPN 1. click	
PROFIdrive Module(1)	Ind	Module Name	_	Submodule N	ame	Slot_Subs	PNI Star	t InputSize	PROFIdrive Module	
Completion	2 -	VCIPIN		Interface		0 32768			Submodule Simens Telegram 750,PZD-	12/12
	3 -			Port 1		0 32769			Standard Telegram 1,PZD-2	2/2
	4 -	PROFILI: N. LL		Port 2		0 32770			5. add message 1 ram 105, PZI	D-10/10
	6 -	PROFidrive Module		Standard Tele	oram 111.PZD-1	2	170	24	Standard Telegram 110, PZI	D-12/7
	7	Charles I.				13			Standard Telegram 3,PZD-5	5/9
	8 3.	Check the mes	ssage			2			Standard Telegram 5,PZD-9	9/9 2/2
	9 -					4			Standard telegram 9, PZD-1	10/5
	11 -					5				
	12 -					6				
	13 -					7			-	
	15 -					9				
	16 -					10				
	17 -					11			+	
	18 -					12			Article no.:	
	20 -					14			Version:	
	21 🗌 –					15				
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									Standard Telegram 1: Closed-loo	op speed 🛛 🔨
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PROFINET Configuration Wizard	d	A. C. C. M.				2				×
PROFINET Configuration Wizard	d ]					2			VC1PN	×
PROFINET Configuration Wizard PROFINET network Controller(CPU SR30_plc200smart)	d Click the	e "Add" button t	o add a	nodule for	• this	2			VC1PN	×
PROFINET Configuration Wizard PROFINET network - © Controller(CPU SR30_plc200smart) - © VC1PN-vc1pn3 VC1PN(0)	d Click the device.	e <b>"Add" button t</b>	o add a	nodule for	this	O Start	utrut Siz	Firmware Vereio	VCIPN Head module VCIPN VCIPN Module	×
PROFINET Configuration Wizar PROFINET network 	d Click the device. Submodu	e <b>*Add</b> * button t ule Name	co add a Slot_Subs 0	nodule for	this	Q Start 0	utput Siz	Firmware Versio	VCIPN Head module VCIPN Module PROFINITIVE Module	×
PROFINET Configuration Wizard FROFINET network 	d Click the device. Submode 1 2 Interface	e <b>"Add" button t</b> ule Name	co add a Slot_Subs 0 0 32768	∎odule for	this	Q Start 0	utput Siz	Firmware Versio	VCIPN Head module L-VCIPN Module -RROFINITIVE Module Submodule - Simens Telegram 750,P2D-	-12/12
PROFINET Configuration Wizar PROFINET network 	d Click the device. Submodu 1. 2. Interface 3. Port1 4. Dev12	e <b>"Add" button t</b> ule Name	o add a Slot_Subs 0 0 32768 0 32769	nodule for	this	Q Start 0	utput Siz	Firmware Versio	VCIPN Head module VCIPN Module PROFINITIVE Module Submodule Submodule Standard Telegram 102, PZD- Standard Telegram 102, PZD-	+12/12 2/2 D-6/10
PROFINET Configuration Wizar PROFINET network 	d Click the device. Submodu 1 2 Interface 3 Port1 4 Port2 5	e ″ <b>∆</b> dd″ button t uleName	o add a Slot_Subs 0 0 32768 0 32769 0 32770 1	Nodule for	nput Size. PN	Q Start O	utput Siz	Firmware Versio	VCIPN Head module VCIPN Module FROFdrive Module Submodule Submodule Standard Telegram 102, PZD Standard Telegram 103, PZD Standard Telegram 103, PZD Standard Telegram 103, PZD	+12/12 2/2 D=6/10 D=10/10
PROFINET Configuration Wizar FROFINET network 	d Click thu device. Submodu 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard	e <b>*Add* button t</b> ule Name 1 Telegram 1,P2D-2/2	o add a Slot_Subs 0 0 32768 0 32769 0 32770 1 1 1 2	Nodule for	nputSize PN	Q Start O	utput Siz	Firmware Versio	VC1PN Head module VC1PN Hotle Submodule Submodule Submodule Standard Telegram 12, 72, 72 Standard telegram 102, 721 Standard telegram 102, 721 Standard telegram 110, 721 Standard telegram 110, 721 Standard telegram 110, 721 Standard telegram 110, 721	× -12/12 2/2 D=6/10 D=10/10 D=12/12 D=12/12
PROFINET Configuration Wizard	d Click th device. Submodu 2 Interface 3 Port 1 4 Port 2 5 5 Standard 7	e <b>*Add* button t</b> ule Name 1 Telegram 1.PZD-2/2	<b>o add a</b> <b>Slot_Subs</b> 0 0 32768 0 32769 0 32770 1 1 2 1 3 0	PNI Stert	nputSize PN	Q Start 0	utput Siz	Firmware Versio	VC1PN UC1PN	+12/12 2/2 D-6/10 D-10/10 D-12/17 D-12/12 5/9 9/9
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  CONTROLLERVSLPN3  CO	d Click th device. Submodu L I I I I I I I I I I I I I I I I I I	e <b>*∆dd* button t</b> ule Name I Telegram 1,PZD-2/2	co         add         a           0         0         0           0         0         0           0         32768         0           0         32769         0           1         1         2           1         2         3	Nodule for PNI Stert 170 This is the	this nputSize PN 4 162 PNI start a	Q Start 0 4 ddress	utput Siz and PN	Firmware Versio	VCIPN Head module VCIPN PROFIdrive Module PROFIdrive Module Submodule Submodule Standard Telegram 17,02,721 Standard telegram 105, 721 Standard telegram 110, 721 Standard telegram 110, 721 Standard telegram 110, 721 Standard telegram 11,722 Standard telegram 11,723 Standard telegram 11,723 Standard telegram 11,723 Standard telegram 17,7203 Standard Telegram 7,7203 Standard telegram 7,7203	+12/12 2/2 D-6/10 D-10/10 D-12/12 5/9 9/9 2/2
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  CONTROLLERVSLpn3  CONTROLLERVSLpn3  Completion  Completion	d Click th device. Submot 2 Interface 3 Port 4 Port 5 6 Standard 7 8 9 10	e <b>*Add* button t</b> ule Name I Telegram 1.PZD-2/2	co         add         a           Slot_Subs         0         0         32768           0 32768         0 32769         0         32770         1           1 2         1         3         2         3         4         C	sodule for PNI Start 170 This is the f packet 1	this nputSize FN 162 PNI start a 1, which will	Q Start 0 4 ddress be use	utput Siz and PN d when	Firmware Versio	VCIPN Head module VCIPN PROFIdrive Module Submodule Submodule Standard telegram 110, PZI Standard telegram 1, PZO- Standard telegram 3, PZO- Standard Telegram 3, PZO- Standard telegram 7, PZO- Standard telegram 7, PZO- Standard telegram 9, PZO- Standard telegram 9, PZO-	+12/12 2/2 D-6/10 D-10/10 D-12/7 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(VC1PN(0))  Controller(0)  Completion	d Submode Submode Submode 1 2 Interface 3 Port 1 4 Port 2 5 6 Standard 7 8 9 9 10 11 10 11 11	e <b>*Add* button t</b> ule Name I Telegram 1.PZD-2/2	Siot_Subs           0           0.32768           0.32769           0.32769           0.32770           1           1.2           1.3           2           3           4           5	PNIStan 170 This is the	• this nputSize FN 4 162 • PNI start a 1, which will Sina_Spec	O Start 0 4 ddress be use ed para	utput Siz and PN d when meter Ia	Firmware Versio	vc:PN → Head module → vc:PN → Module → Standard Telegram 150, P2D- → Standard telegram 110, P2I → Standard telegram 110, P2I → Standard telegram 110, P2I → Standard telegram 110, P2I → Standard telegram 11, P2I → Standard telegram 1, P2D- → Standard telegram 7, P2D- → Standard telegram 7, P2D- → Standard telegram 7, P2D-	× -12/12 2/2 D-6/10 D-10/10 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d  Click th  device.  Click th  device.  Click th  device.  Submode  1  2  Interface  3  Port1  4  Port2  5  6  Standard  7  8  9  9  10  11  12  12  12  12  12  12  12  12	e <b>*Add* button t</b> ule Name I Telegram 1,PZD-2/2	Siot_Subs           0           0.32769           0.32769           0.32769           0.32770           1           1.2           1.3           2           3           4           5           6	nodule for PNIStart. 170 This is the of packet 1	• this nputSize. PN 4 162 • PNI start a 7, which will Sina_Spec	O Start 0 4 ddress be use ed para	utput Siz and PN d when meter Is	Firmware Versio	VCIPN → Head module → VCIPN → Module → RoPidrive Module → Standard Telegram 150, P20- → Standard Telegram 110, P21 → Standard Telegram 110, P21 → Standard Telegram 110, P21 → Standard Telegram 110, P21 → Standard Telegram 3, P20- → Standard Telegram 3, P20- → Standard Telegram 3, P20- → Standard Telegram 9, P20-1	× -12/12 2/2 D-6/10 D-10/10 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(V0)  Controller(V0)  Completion	d Click the device. Submode Submode 1 2 Interface 3 Port1 4 Port2 5 6 Standard 7 8 9 9 11 12 11 12 11 12 11 12 11 12 13 14 15 15 16 16 16 16 16 16 16 16 16 16	e <b>*Add* button t</b> ule Name I Telegram 1,PZD-2/2	Slot_Subs           0           0           0           0           0           0           0           0           0           0           0           0           0           12           13           2           3           4           5           6           7           8	nodule for PNIStar.	this nputSize PN 4 162 PNI start a 7, which will Sina_Spece	O Start 0 4 ddress be use ed para	utput Siz and PN d when meter Is	Firmware Versio	vcIPN → VcIPN → VcIPN → Module → PROFIdrive Module → Standard Telegram 15,0,P2D- → Standard Telegram 10, P2I → Standard Telegram 10, P2I → Standard Telegram 11,P2I → Standard Telegram 11,P2I → Standard Telegram 3,P2D- → Standard Telegram 3,P2D- → Standard Telegram 9,P2D-1 → Standard telegram 9,P2D-1	× -12/12 2/2 D=6/10 D=10/10 D=12/12 D=12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d Click the device. Submode Submode Click the device. Submode Port2 5 6 Standard 7 8 9 9 10 11 12 13 14 15 5	e <b>*Add* button t</b> ule Name I Telegram 1.PZD-2/2	Slot_Subs           0           0           0           0           0           0           0           0           0           0           0           0           0           12           13           2           3           4           5           6           7           8           9	nodule for PNIStar 170 This is the of packet 1	this nputSize PN f f 162 PNI start a , which will Sina_Spec	0 Stort 0 ddress be use ed para	and PN d when meter la	Firmware Versio	VCIPN → VCIPN → VCIPN → Module → PROFIdrive Module → Standard Telegram 1,520-7 → Standard Telegram 3,720-7 → Standard Telegram 3,720-7 → Standard Telegram 3,720-7 → Standard Telegram 9,720-7 → Standard telegram 9,720-7	× -12/12 2/2 D=6/10 D=10/10 D=12/12 D=12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizara PROFINET network  Controller(CPU SR30_plc200smart)  Controller(PV stpn3  Controller(0)  Completion	d  Click the device.  Click the	e <b>*Add* button t</b> ule Name	o         add         a           Slot_Subs         0         0         32768           0 32769         0 32770         1         1           1 2         1         3         2         3           4         5         6         6         7           7         8         9         10         10	PNISter PNISter 170 This is the of packet 1	this nputSize PN PNI start a , which will Sina_Spec	ddress be use ed para	and PN d when meter la	Firmware Versio	VCIPN → VCIPN → VCIPN → Module → RROHdrive Module → Standard Telegram 1,520 → Standard Telegram 1,520 → Standard telegram 10, 521 → Standard telegram 10, 721 → Standard telegram 10, 721 → Standard Telegram 1,1,721 → Standard Telegram 3,720-5 → Standard Telegram 3,720-5 → Standard telegram 3,720-5 → Standard telegram 7, 720-3 → Standard Telegram 7,	× -12/12 2/2 D=6/10 D=10/10 D=12/7 D=12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizara PROFINET network  Controller(CPU SR30_plc200smart)  Controller(PV stpn3  Controller(0)  Completion	d  Click th device.  Click th	e <b>*Add* button t</b> ule Name I Telegram 1,P2D-2/2	o         add         a           Slot_Subs         0         0         0         0         2         0         2         0         3         2         0         3         1         1         1         1         1         1         2         3         4         5         5         6         7         6         7         8         9         10         10         11         10         11         10         11         10         11         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11         10         11	PNISter PNISter 170 This is the of packet 1	this nputSizePN t PNI start a , which will Sina_Spec	O Stort 0 4 ddress be use ed para	and PN d when meter la	Firmware Versio	VCIPN     Head module     └─VCIPN     Module     FROFIdrive Module     Submodule     Standard Telegram 15,20;     Standard telegram 10, 27;     Standard telegram 10, 27;     Standard telegram 10, 27;     Standard telegram 11,62;     Standard telegram 11,62;     Standard telegram 3,720;     Standard telegram 3,720;     Standard telegram 9,720;     Standard telegram 9, 720;     Standard te	× -12/12 2/2 2/2 D-6/10 D-10/10 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizar PROFINET network 	d  Click the device.  Click the device.  Click the device.  Click the click	e <b>'Add' button t</b> ule Name	Slot_Subs           0           0 32768           0 32769           0 32770           1           12           13           2           3           4           5           6           7           8           9           10           11           12	PNISter	this nputSize PN t PNI start a , which will Sina_Spec	ddress be use	and PN d when meter I	Firmware Versio	VCIPN Head module -VCIPN Module -Storbidrive Module -Storbidrive Mo	+12/12 2/2 D-6/10 D-10/10 D-12/7 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d  Click the device.  Click the device.  Click the device.  Click the click	e <b>*Add* button t</b> ule Name	solut_Subs         solut_Subs           0         0         32769           0 32769         32770         1           1 2         1         3         2           1 3         2         4         5           6         7         8         9           10         11         12         13           14         14         14         14	Polule for PNISter	this nputSize PN f PNI start a , which will Sina_Spec	ddress be use ed para	and PN d when meter la	Firmware Versio IQ start add a configurir ater.	VCIPN Head module -VCIPN -VCIPN -VCIPN -VCIPN -PROFIdrive Module -Stomdard Telegram 120, PZD -Standard Telegram 110, PZI -Standard telegram 10, PZI -Standard telegram 10, PZI -Standard telegram 9, PZD-1	+12/12 2/2 D-6/10 D-10/10 D-12/17 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d  Click th device.  Submodu  1  2 Interface 3 Port1 4 Interface 1 Inter	e <b>'Add' button t</b> ule Name	so add a           Slot_Subs           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           1           12           13           2           4           5           6           7           8           9           10           11           12           13           14           15	Podule for PNIStar 170 This is the f packet 1	PNI start a , which will Sina_Spec	a Stert 0 4 ddress be use ed para	and PN d when meter I	Firmware Versio	VCIPN Head module -VCIPN -VCIPN -VCIPN -VCIPN -VCIPN -Stondard Telegram 750,P2D- -Standard telegram 102, P21 -Standard telegram 104, P21 -Standard telegram 7, P20- -Standard telegram 9, P2D-1 -Standard teleg	× -12/12 2/2 D-6/10 D-10/10 D-12/7 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d	e <b>*Add* button t</b> ule Name	o         add         a           0         0         0           0         32769         0         32770           1         1         1         1         1           1         2         3         4         5           6         7         3         4         6           7         8         9         10         11           12         13         14         15         16	nodule for PNIStar 170 This is the f packet 1	PNI start a l, which will Sina_Spec	a Stort 0 4 ddress be use ed para	and PN d when meter Ia	Firmware Versio	<pre>VCIPN UCIPN Head module VCIPN PROFIdrive Module PROFIdrive Module Submodule Submodule Standard telegram 10, PZI Standard telegram 110, PZI Standard telegram 19, PZD-1 Article no.: Version: Description:</pre>	× -12/12 2/2 D-6/10 D-10/10 D-12/7 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d	e <b>*Add* button t</b> ule Nome	o         add         a           0         0         0         0           0         32769         0         32770           1         1         1         1           1 2         1         3         4           5         6         7         8           9         10         11         12           13         14         15         16	nodule for PNIStar 170 This is the f packet 1	PNI start a , which will Sina_Spec	a Stert 0 4 ddress be use ed para	and PN d when meter Ia	Firmware Versio	<pre>VCIPN UCIPN Head module VCIPN PROFIdrive Module PROFIdrive Module Submodule Submodule Standard telegram 10, PZD Standard telegram 110, PZI Standard telegram 110, PZI Standard telegram 110, PZI Standard telegram 110, PZI Standard telegram 11, PZI Standard telegram 12, PZI Standard telegram 10, PZI Standard telegram 10, PZI Standard telegram 12, PZI S</pre>	× -12/12 2/2 D-6/10 D-10/10 D-12/12 5/9 9/9 2/2 10/5
PROFINET configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d  Click the device.  Click the	e 'Add' button t ule Nome I Telegram 1,P2D-2/2 I f the	o         add         a           0         0         0           0         32769         0         32770           1         1         1         1         1           1         2         1         3         4         5           6         7         8         9         10         11         12         13         14         15         16         16         16         16         CPU tir         CPU tir         16	nodule for PNIStat 170 This is the f packet 1	PNI start a , which will Sina_Spect	a Start 0 4 ddress be use ed para	and PN d when meter Is	Firmware Versio	VCIPN → Head module → VCIPN → Module → ROPIdrive Module → Standard Telegram 150, P2D- → Standard telegram 102, P2I → Standard telegram 110, P2I → Standard telegram 110, P2I → Standard telegram 110, P2I → Standard telegram 11, P2D- → Standard telegram 12, P2D- → Standard telegram 7, P2D- → Standard telegram 1, P2D	-12/12 2/2 D-6/10 D-10/10 D-12/12 5/9 9/9 2/2 10/5
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(V0)  Configuration   d  Click the device.  Click the	e 'Add' button t ule Name I Telegram 1.PZD-2/2 If the can in	so add a           Slot_Subs           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           12           13           4           5           6           7           8           9           10           11           12           13           14           15           16           CPU time	nodule for PNIStat 170 This is the f packet 1	PNI start a , which will Sina_Spect	a Start 0 4 ddresss be use ed para	and PN d when meter Is	Firmware Versio	<pre>VCIPN → VCIPN → Module → VCIPN → Module → Standard Telegram 150, PZD- → Standard Telegram 110, PZI → Standard telegram 110, PZI → Standard telegram 110, PZI → Standard telegram 110, PZI → Standard telegram 11, PZI → Standard telegram 12, PZI → Standard telegr</pre>	x	
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d  Click th device.  Click th	e 'Add' button t ule Name I Telegram 1.PZD-2/2 I fithe can in Update	so add a           Slot_Subs           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           12           13           2           3           4           5           6           7           8           9           10           11           12           13           14           15           16           CPU time           CPU time           Crease           we time (ms)	nodule for PRNIStar 170 This is the f packet 1         	PNI start a , which will Sina_Spect	a Start 0 4 ddress be use ed para	and PN d when meter Is	Firmware Versio	<pre>VCIPN Head module VCIPN PROFIdrive Module PROFIdrive Module Submodule Submodule Standard Telegram 170, P21 Standard telegram 110, P21 Standard telegram 110, P21 Standard telegram 110, P21 Standard telegram 11, P20 Standard telegram 12, P20-1 Standard telegram 11, P20 Standard telegram 12, P20-1 </pre>	x
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d Click the device. Submode	e 'Add' button t ule Name I Telegram 1.P2D-2/2 I fifte can in Updat	o         add         a           Slot_Subs         0         0         32769           0         32770         1         1           1         2         3         4         5           5         6         7         8         9         10           11         12         13         14         15         16           CPU tir           CPU tir           CPU tir           CPU tir	PNISter PNISter 170 This is the of packet 1  the is not the time a 	PNI start a , which will Sina_Spect	a Start 0 4 ddress be use ed para	and PN d when meter Ia	Firmware Versio	<pre>VCIPN Head module VCIPN PROFIdrive Module Submodule Submodule Submodule Standard telegram 102, P21 Standard telegram 110, P21 Standard telegram 110, P21 Standard telegram 110, P21 Standard Telegram 3, P20- Standard Telegram 3, P20- Standard telegram 7, P20- Standard telegram 7, P20- Standard telegram 9, P20-1 Article no.: Version: Description: Standard Telegram 1: Closed-loo control, P2D length 2/2 words </pre>	x
PROFINET Configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200	d Click the device. Submode Submode Submode Click the device. Submode Submo	e 'Add' button t ule Name I Telegram 1.P2D-2/2 I fifte can in Updat	o         add         a           Slot_Subs         0         0         32768           0         32770         1         1           1         2         3         4         5           5         6         7         8         9         10           11         12         13         14         15         16           CPU tir           CPU tir           CPU tir           CPU tir	PNISter PNISter 170 This is the of packet 1  he is not the time a	enough, you	a Start 0 4 ddress be use ed para by old ck "Gen	and PN d when meter la and g	Firmware Versio	<pre>VCIPN Head module VCIPN PROFIdrive Module Submodule Submodule Submodule Standard telegram 102, P21 Standard telegram 110, P21 Standard telegram 110, P21 Standard Telegram 3, P20- Standard Telegram 3, P20- Standard Telegram 3, P20- Standard telegram 12, P21 Standard Telegram 3, P20- Standard telegram 12, P21 Standard telegram 12, P21 Standard telegram 12, P21 Standard Telegram 3, P20- Standard telegram 12, P21 Standard Telegram 3, P20- Standard telegram 12, P21 Standard telegra</pre>	x
PROFINET configuration Wizars PROFINET network  Controller(CPU SR30_plc200smart)  Controller(CPU SR30_plc200smart)  Completion  Completion  Completion	d  Click the device.  Click the	e 'Add' button t ule Name I Telegram 1.PZD-2/2 I fitte can in Updat	o     add       Slot_Subs       0       0 32768       0 32770       1       1 2       1 3       2       3       4       5       6       7       8       9       10       11       12       13       14       15       16   CPU time (ms)	PNISter PNISter 170 This is the of packet 1  the time a  170 This is the formation of the time a 	PNI start a , which will Sina_Spectrum enough, you appropriate	a Start 0 4 ddress be use ed para by old ck "Gen	and PN d when meter la arate"	Firmware Versio	<pre>VCIPN Head module -VCIPN PROFIdrive Module Submodule Submodule Submodule Standard telegram 102, P21 Standard telegram 110, P21 Standard telegram 110, P21 Standard Telegram 3, P20- Standard Telegram 3, P20- Standard Telegram 3, P20- Standard telegram 7, P20- Standard telegram 1, P21- Standard telegram 7, P20- Standard telegram 7, P20- Standard telegram 7, P20- Standard telegram 1, P21- Standard telegr</pre>	× -12/12 2/2 D-6/10 D-10/10 D-12/7 D-12/12 5/9 9/9 2/2 10/5

### 12.11.6 Write PLC program

•					
File Edit View PLC	Debug Tools Help				
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			-	
High Speed Motion PID PWM Tex	t Get/Put Data PROFINE	T Motion PID Co	ntrol SMART Drive Fir	nd PROFINET Options	
Counter Disp	lay Log	Control Panel Panel	el Configuration 🔻	Devices	
Wizards				Settings	
Main 🎝	🔾 🔾 🛃   👚 Upload	- 🕂 Download - 🗌	Ginsert 💌 🎇 Delete 💌	湖湖  🗆 🕾 🖻	2 🖆 🖆 🖀 🖆 📬
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🗉 弦 Wizards					
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E-B Instructions					
- 🔯 Favorites	3				
🕀 📴 Bit Logic					
🗉 🔯 Clock					
Communications					
🗈 🚺 Compare					
🗄 🔤 Convert	4				
🕀 🔝 Counters					
🗄 🖽 Floating-Point Math					
🗉 💷 Integer Math	4, pull the i	instruction into t	he main progra	m	
🕀 💷 Interrupt					
E Logical Operations	5				
Move	N				
Program Control					
B Bhift/Rotate	Status Chart				α×
E B String	A A A A A A A A A A A A A A A A A A A	1 Ala a at a			
ti mi Table					
	Address	Format	Value	New Value	^
H PROFINET 1	1 VW7000	Signed			
E Cloraries	2 VD7006	Signed			
Modbus RTU Master (v2.0)	3 \\7000	Signed			
H Modbus RTU Slave (v2.)	4 VD7002	Ginned			1 .
INIOUDUS KTO Slave (vs.1)		Sidned			
H Modbus TCP Client (v1 4)	5 VD7006	Signed			
Modbus TCP Client (v1.4     Modbus TCP Server (v1.0)	5 VD7006	Signed Signed Bit			
Modbus TCP Client (v1.4)     Modbus TCP Server (v1.6)     Modbus TCP Server (v1.6)	5 VD7006 6 V7010.0	Signed Bit Bit			
B a Modbus TCP Client (v1.4)     D a Modbus TCP Server (v1.9)     D a Open User Communication     P a PN Read Write Record (v1.1)	5 VD7006 6 V7010.0 7 V7010.1	Signed Signed Bit Bit			
Modbus TCP Client (v1.4 Modbus TCP Server (v1.9) Open User Communication PN Read Write Record (v1.1) INNAMICS control (v2.1)	5 VD7006 6 V7010.0 7 V7010.1 8 V7010.2	Signed Signed Bit Bit Bit			
Modbus TCP Client (v1.4 Modbus TCP Server (v1.0) Open User Communication PN Read Write Recor (v1. SINAMICS Control (v1.1) SINAMICS Control (v1.1) SINAPOS	5 VD7006 6 V7010.0 7 V7010.1 8 V7010.2 9 V7010.3	Signed Signed Bit Bit Bit Bit			
Modbus TCP Client (v1.4 Modbus TCP Server (v1.0) Open User Communication PN Read Write Recort (v1.1) SINAMICS Control (v1.1) IL SINA POS SINA SPEED	5 VD7006 6 V7010.0 7 V7010.1 8 V7010.2 9 V7010.3 10 VD8000	Signed Bit Bit Bit Bit Signed			
Modbus TCP Client (v1.4 Modbus TCP Server (v1.6) Open User Communication P Read Write Recort (v1.1) SINAMICS Control (v1.1) SINA POS SINA, SPEED SINAMICS Parameter (v1.0)	5         \UD7006           6         \UD7010.0           7         \UD7010.1           8         \UD7010.2           9         \UD7010.3           10         \UD8000           11         \UD9000	Signed Signed Bit Bit Bit Signed Signed			
Modbus TCP Client (v1.4 Modbus TCP Server (v10) Open User Communication PN Read Write Recor (v1. SINAMICS Control (v.1) SINA POS SINASPEED SINASPEED USS Protocol (v2.1)	5 VD7006 6 V7010.0 7 V7010.1 8 V7010.2 9 V7010.3 10 VD8000 11 VD9000 12 VW8002	Signed Signed Bit Bit Bit Signed Signed			
Modbus TCP Client (v1.4 Modbus TCP Server (v1.9) Open User Communication PN Read Write Recort (v1.1) SINAMICS Control (v1.1) SINAMICS Parameter (v1.0) USS Protocol (v2.1) Call Subroutines	5 VD7006 6 V7010.0 7 V7010.1 8 V7010.2 9 V7010.3 10 VD8000 11 VD9000 12 VW8002 13 VW8004	Signed Signed Bit Bit Bit Signed Signed Signed Signed			
Modbus TCP Client (v1.4 Modbus TCP Server (v1.6) Open User Communication PN Read Write Recort (v1.7) SINAMICS Control (v1.7) SINAMICS Control (v1.7) SINAMICS Pretent SINAMICS Parameter (v1.0) GISINAMICS Parameter (v1.0) Call Subroutines	5     ∨D7006       6     ∨7010.0       7     ∨7010.1       8     ∨7010.2       9     ∨7010.3       10     ∨D8000       11     ∨D9000       12     ∨W8002       13     ∨W8004	Signed Signed Bit Bit Bit Signed Signed Signed			

In the main program, write the following program, note that the addresses of Starting\_I\_add and Starting\_Q\_add must correspond to the IO address of message 1:

For inputs "Starting\_I\_add" and "Starting\_Q\_add", the addressing instruction operand mode is indirect addressing. You must enter an & sign at the beginning of the input operand and ensure that the offset corresponds to the offset in the PROFINET wizard.

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rogram
program

Allocate the V address area used by the program library:

ლ 🐻 项目 报文111无中文 (C:\Users\Administrator\Desktop)	^
E Program Block	
MAIN (OB1)	
SBR_0 (SBR0)	
E Library	
Library Memory	
Help	
E Symbol 1a	
Data Block     Right-click the library,	
System Block then click Library Storage	<u> </u>
E Gross Reference	-
Communications	
Wizards	
Library Memory Allocation	2
The instruction library 'SINAMICS Control (v1.1)' required global V-memory. Specify an address where this amore can be used by the library. Click 'Suggest Address' to cross reference to locate an unused block of the regulation of the regilation o	uires 188 bytes of ount of V-memory o use program wired size
cross reference to locate an unused block of the req	
1	
1       Suggest Address   Delete Library Symiles	bols
1       Suggest Address       VB188       through VB375       2	bols

### 12.11.7 Compile and download the program for testing

Note that if the message of the servo is changed, the servo needs to be powered on again after downloading the program.

🕥 🔾 者 Upload - 🦊 Dow	mload 👻 🚓 Insert 🔹 🛱 Delete 🔹 🌠 📷 🗧	) 😁 😁 🏝 🔁 👔	ì°an °ài l'≩ -⊋ -≜ -≯ I + -⊘ -1 I ⊂ • ## B' I‰ I & *	
1. compile the program	3. Download the program			Þ
2 Always~:SM0.0	SINA_SPEED EN			^
Download		×		
Download blocks to CPU Select blocks to download.				
			<b>` ` `</b>	~
Blocks	Options		Output Window	×
Program Block	Prompt on RUN to STOP			
Data Block	Prompt on STOP to RUN		× 2	
System Block	Close dialog on success	, j	Compiling Program Block MAIN (051) SBR_0 (SBR0) SINL_POS (SBR1)	
Click for Help and Support	Download	Close	SINA_SPEED (SBR2)	
A AXISENADIE:VTUUT2.0 DI	A download		Block Size = 3950 (bytes), 0 errors	
5 ConfigAxis:VW10010 Signed	4. download		Complian Data Data	
6 EnableAxis:V10000.0 Bit			Block Size = 0 (bytes), 0 errors	
7 Error:V10012.2 Bit				
8 Lockout/10012.1 Bit			Compiling System Block Compiled Block with Diemors, Dwemings	
9 RetSpeed:VD10002 Signed				
10 SetSpeed:VD10006 Signed			Total Errors: 0	
11 Signed			2. Confirm that the program has no errors	
12 Sighed			H 4 b N Build	_
Signed		~		
met a			The Manual Manual Manual Manual Manual Manual Manual	
I A P P VEIZE 1			Variable lable 💆 Cross Reference 🔛 Output window	

Relevant functional tests through state diagrams:

Note that to enable the drive, the "ConfigAxis" variable must be set to 63 (decimal). The units of the "SetSpeed" and "RefSpeed" variables are (RPM).



#### 12.12 Use SINA\_PARA\_S to read and write servo parameters

All parameters inside the servo can be read or written through SINA\_PARA\_S, and continuous reading and writing of multiple parameters is temporarily not supported, that is, the SINA\_PARA command is not supported. The usage steps are as follows.

#### 12.12.1 Configure according to Section 12.3 first.

12.12.2 Add data blocks (some parameters are not used in the figure, the display is only helpful to read the following program)

	Static						
	trigsinaread32	Bool 🔳	false		<b></b>		
	trigs in a write 16	Bool	false		<b></b>		
• 🗈	trigs in a write 32	Bool	false		<b></b>		
• 🗈	trigsinaread16	Bool	false		<b></b>		
• 🗈	sinaparas_readorwite	Bool	false		<b>~</b>		
• 🗈	sinapara_writevalue2	Dint	1234567		<b></b>		
• 🗈	sinapara_wrievlaue	Int	5624		<b></b>		
• 🗈	sinaparas_parameter	Int	10001		<b></b>		
• 🗈	trigwrite32	Bool	false		<b>~</b>		
• 🗈	trigwrite16	Bool	false		$\checkmark$		
	trigread32	Bool	false		$\checkmark$		
	trigread16	Bool	false		<b></b>		
	sxParameter	SinaParameter			$\checkmark$		
	sxParameter2	SinaParameter			<b></b>	<b></b>	
• 🗈	allpara	Array[015] of Sina			<b>~</b>	<b>~</b>	
	RequestRead16	Struct			<		
	ResponseRead16	Struct			$\checkmark$		
	RequestRead32	Struct		<b></b>	<b></b>		
	ResponseRead32	Struct		<b></b>	<b>~</b>		
	RequestWrite16	Struct		<b></b>	<b></b>		
	ResponseWrite16	Struct		<b></b>	<b></b>		
- 🗈	ResponseWrite32	Struct		<b></b>	<b></b>		
- 🗈	RequestWrite32	Struct		<b></b>	<b></b>		
<							>

#### 12.12.3 write programs

(1) The procedure for reading 16-bit parameter data is as follows.



SINA\_PARA\_S The input parameters are introduced as follows.

Start: Startup parameter read and write

ReadWrite: false is read. True is write.

Parameter: Set to servo parameter number + 10000, for example

parameter=10001 corresponds to P00.01; parameter=10002 corresponds to P00.02;

parameter=10201 corresponds to P02.01;

parameter=11001 corresponds to P10.01;

ValueWrite1: The value of the 16-bit parameter that needs to be written.

ValueWrite2: The value of the 32-bit parameter that needs to be written.

ValueRead1: The value of the 16-bit parameter read.

ValueRead2: The value of the 32-bit parameter read.

AxisNo:The fixed value is 1. No matter how many axes, it is set to 1. The specific axis to read and write is distinguished by the hardwareid.

Hardwareid: Hardware identifier set to 3 of the message. As shown in the following figure.



(2) The procedure to read 32-bit parameter data is as follows.



(4) The program to write 32-bit parameter data is as follows.



#### 12.13 On-the-fly measurement using message 3 based on S7-1500

The servo supports the rapid measurement of the motor encoder, and the measurement pulse is fixedly input from DI1. After enabling on-the-fly measurement, the rising or falling edge of DI1 can trigger the latching of the motor encoder position.

## 12.13.1 Configure according to Section 12.3 first.

D			CPU 1511-1 PNI > Ter	chnology objects	PositioningAxis 1 [DR1] > N	leasuring input	MeasuringInnut	1 [DB3] X
Ŵ	Devices			childingy objects	Tostioning this_T [DDT] + N		Eunction view	Parameter view
			2. Choos	se basic para	neters			
		Basic p	arameters 📀	Pasis paramet				
	■ 数据块_1 [DB2]	A Hardwa	are interface	basic paramet	3.	Specify the n	notor shaft	
starr	System blocks      Technology objects	Extend	ed parameters 🥑			- F · · · · · · · · · · · · · · ·		
	Add new object				Name:	MeasuringInput_1		<b>A</b>
	<ul> <li>PositioningAxis_1 [DB1]</li> </ul>				Assigned axis of external encoder	PositioningAxis_1		
	Configuration							
	Contraction in the second seco	=				PLC		V-I
	🕨 🚂 Output cam				1			
	<ul> <li>Measuring input</li> <li>Add new measuring input</li> </ul>	inquit						
	✓ ▲ MeasuringInput_1 [D	B3]						$\rightarrow$
	Configuration	1. Double cl	ick to increase		User program	lechnology axis	object led m	easuring input
	Diagnostics	measure	ment input					
	PLC tags			Units of me	asure			
	PLC data types			-		Use position va	lues with higher res	olution
	Watch and force tables				Unit of measure for position:	mm	1 The unit of m	easure depends on the
	Contine backups     Traces						or the assignment	ed external encoder.
	OPC UA communication							
	Device proxy data	~						
~ 1	Details view							
N	Name							
起立	2377月71日11日 110	DI 1511 1 DN	Tachnology obj	osto b Docition	ingAvic 1 [DP1] > Moo		Measuringler	wet 1 [DP2]
1RX	3关现《还闲里,口C_1[(	PO ISTI-IPN	Technology obje		IIIIgAXIS_1 [DD1] V Meas	sunng input 🕨	weasunnging	
								Function vie
00h								
Bas	💼 🖻 🖻 sic parameters 🛛 🤡							
Bas	sic parameters	Hardware inter	face					
Bas Har	Image: sic parameters     Image: sic parameters       rdware interface     Image: sic parameters       tended parameters     Image: sic parameters	Hardware inter	iace					
Bas Har Exte	sic parameters     rdware interface     tended parameters	Hardware interf	face					
Bas Har Exte	ic parameters     Image: Constraint of the second sec	Hardware interf Input measur Measuring in	iaceing input					
Bas Har Exte	Image: Sic parameters     Image: Sic parameters       rdware interface     Image: Sic parameters       tended parameters     Image: Sic parameters	Hardware interf Input measur Measuring in	iaceing input	uring using Timer	DI			
Bas Har Ext	Image: Sic parameters     Image: Sic parameters       rdware interface     Image: Sic parameters       tended parameters     Image: Sic parameters	Hardware interf Input measur Measuring in	iace ing input nput type O Measu	uring using Timer	DI			
Bas Har Exte	Image: Sic parameters     Image: Sic parameters       rdware interface     Image: Sic parameters       tended parameters     Image: Sic parameters	Hardware interf Input measur Measuring in	iace ing input nput type Measi Measi	uring using Timer uring via SINAMIC	DI 5 (central probe)			
Bas Har Ext	Image: Sic parameters     Image: Sic parameters       rdware interface     Image: Sic parameters       tended parameters     Image: Sic parameters	Hardware interf Input measur Measuring in	face ing input Measi Measi Measi Measi	uring using Timer uring via SINAMIC uring using PROFI	DI 5 (central probe) Jrive telegram (drive or extern	al encoder)		
Bas Har Ext	Image: sic parameters     Image: sic parameters       rdware interface     Image: sic parameters       tended parameters     Image: sic parameters	Hardware interf Input measur Measuring in	face ing input Meas Meas Meas	uring using Timer uring via SINAMIC: uring using PROFI	DI 5 (central probe) Jrive telegram (drive or extern	al encoder)		
Bas Har Ext	Image: sic parameters     Image: sic parameters       rdware interface     Image: sic parameters       tended parameters     Image: sic parameters	Hardware interf Input measur Measuring in	ing input nput type Measi Measi	uring using Timer uring via SINAMIC uring using PROFI	DI 5 (central probe) drive telegram (drive or extern	al encoder)		
Bas Har Exte	Image: sic parameters     Image: sic parameters       rdware interface     Image: sic parameters       tended parameters     Image: sic parameters	Hardware interf Input measur Measuring in Hardware co	iace ing input mput type Measu Measu ennection	uring using Timer uring via SINAMIC uring using PROFI	DI 5 (central probe) Irive telegram (drive or extern	al encoder)		
Bas Har Exto	Image: Sic parameters     Image: Sic parameters       rdware interface     Image: Sic parameters       tended parameters     Image: Sic parameters	Hardware interf Input measur Measuring in Hardware co	iace ing input Meas Meas Meas Meas	uring using Timer uring via SINAMIC uring using PROFI	DI 5 (central probe) Irive telegram (drive or extern	al encoder)		
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Bas Har Exte		Hardware interf Input measur Measuring in Hardware co	ing input ing input mput type Measu Measu Measu Mumber of the m section time for the me	uring using Timer uring via SINAMIC uring using PROFI easuring input: easuring signal:	DI 5 (central probe) Jrive telegram (drive or extern 1 0.0	al encoder)	vice configuratio	'n
Bas Har Extr		Hardware interf Input measur Measuring in Hardware co	ing input ing input mput type Measu Measu Measu Measu Mumber of the m	uring using Timer uring via SINAMIC uring using PROFI easuring input: easuring signal:	DI 5 (central probe) Jrive telegram (drive or extern 1 0.0 Correction time can be used t	al encoder)	vice configuratio	on
oon Bass Har Ext	Comparameters     Compara	Hardware interf Input measur Measuring in Hardware co	face ing input Measu MEBO M	uring using Timer uring via SINAMIC uring using PROFI easuring input: easuring signal:	DI 5 (central probe) drive telegram (drive or extern 1 0.0 Correction time can be used t - that can occur directly in t for the mechanical deflect	al encoder)	vice configuratio delay times 1, for example, ing input or ter,	on times es for the
oon Bass Har Ext	Image: Sic parameters       Image: Sic parameters         rdware interface       Image: Sic parameters         tended parameters       Image: Sic parameters	Hardware interf Input measur Measuring in Hardware co Corre	face ing input Measu Measu @ Measu @ Measu onnection Measu 	uring using Timer uring via SINAMICI uring using PROFI easuring input: easuring signal:	DI 5 (central probe) drive telegram (drive or extern 1 0.0 Correction time can be used t - that can occur directly in t for the mechanical deflect generation of the measuri	al encoder)	vice configuratio delay times 1, for example, ing input or ter, ing input at measur	on times es for the ing module;
oon Bass Han Extr		Hardware interf Input measur Measuring in Hardware co Corre	face ing input mput type Measur	uring using Timer uring via SINAMIC uring using PROFI easuring input: easuring signal:	DI 5 (central probe) Brive telegram (drive or extern 1 0.0 Correction time can be used t for the mechanical deflect generation of the measuri - Switching times in the det	al encoder)	vice configuratio delay times 1, for example, ing input or time input at measur ., filter times at	on times es for the ing module; the input.
oon Bass Har Extr		Hardware interf Input measur Measuring in Hardware co Corre	face ing input Measu MAU 	uring using Timer uring via SINAMIC uring using PROFI easuring input: easuring signal:	DI 5 (central probe) drive telegram (drive or extern 1 0.0 Correction time can be used t - that can occur directly in t for the mechanical deflect generation of the measuri - Switching times in the det	al encoder)	vice configuration delay times ut, for example, ing input ar transur j., filter times at	on times ss for the ing module; the input.

### 12.13.2 Add measurement input configuration

### 12.13.3 Add a data block (some variables in the figure are not used)

P	roject tree 🔲 🕯	(报	文3实现	见飞速测量 → PLC_1	[CPU 1511-1 PN] ▶	Program blocks	▶ 数据均	ዲ_1 [DB2]				
Г	Devices											
1	ù 🔟 🖬	1	i 🥹 (	keep	actual values 🔒 S	napshot 🔤 🛤	Copysnap	shots to start va	lues 🛃 🖁	Load	start values	as actual va
2			数据均	٤1								
	Add new device	^	Na	me	Data type	Start value	Retain	Accessible f	Writa V	isible in	Setpoint	Supervis
an	Devices & networks	1	-	Static								
5	PLC_1 [CPU 1511-1 PN]	2		ACTPOSION	LReal	0.0						
2	Device configuration	3	-	enmeasur	Bool	false						
3	🖞 Online & diagnostics	4	- 12-	measuemode	Int	0						
	Software units	5	-	trigmeasur	Bool	false						
	🔻 🙀 Program blocks	6	- 13-	trigmoveabs	Bool	false						
	Add new block	7	-	homepos	Real	0.0						
	Main [OB1]	8	-	homemode	Int	0						
	MC-Interpolator [OB92]	9	- 12-	JOGNEG	Bool	false						
	MC-Servo [OB91]	10	-	JOGPOS	Bool	false						
	■ 数据块_1 [DB2] 2	11	-0	enableaxis	Bool	false						
	System blocks	12		setspeed	Int	0						
	<ul> <li>Technology objects</li> </ul>	13	-	ackerror	Bool	false						
	Add new object	14		ACC	Real	0.0						
	PositioningAxis_1 [DB1]	15	-	DEC	Real	0.0						
	Configuration	16	-0-	SPED	Real	0.0						
	A Commissioning	17	-	DISTANCE	Real	0.0	Ā				Ē	
	S Diagnostics	18	-	bit1	Bool	false						
	Output cam	19		bit2	Bool	false	Ä				Ē	
	Measuring input	20		bit3	Bool	false	Ā				Ē	
	Add new measuring input	21		bit0	Bool	false						
	MeasuringInput 1 [DR3]	22	-	trigmove1	Bool	false	Ā					
~	Details view	23		NEGTORQUE_LIMIT	Int	0					Ä	
		24	-	POSTORQUE LIMIT	Int	0	Ä					
		25		ENABLEATSTARTUP	Bool	false					Ä	
		26		<新增>			Ā				Ā	
	Name Offset Data	-										
	ACTPOSION LReal	_										
	enmeasur Bool											
	measuemode Int											

### 12.13.4 write programs



	"数据块_1".	7401 "M MEASURI D MC_MEASU	K_ NGINPUT_ B*		~
	enmeasur %DB10 *MeasuringInput_ 1* FALSE *数据决_1*.	EN MeasuringInput Execute	ENO ENO Done	MOVE EN ENO 18454.801 "PositioningAvis_ 1" ActualPosition IN OUTI ACTPOSION	
	measuemode FALSE false 0.0 0.0	Mode MeasuringRang e StartPosition EndPosition	Errorid 15±0 MeasuredValue 0.0 MeasuredValue 2 0.0		=
<			Ш	> 100%	

An introduction to measurement input modules.

MeasringInput: Configuration name of the measurement input.

Execute: Start measuring input.

Mode:

When Mode=0, measure the value of the encoder on the rising edge of DI1.

When Mode=1, measure the value of the encoder at the falling edge of DI1.

When Mode=2,measure the value of the encoder on the rising and falling edges of DI1.

. Mode=3 Currently not supported

Mode=4 Not supported at the moment

MeasuringRange: The measurement range is activated. After activation, the measurement input will only be activated if the position value is between StartPosition and EndPosition.

#### 12.14 Internal zero return mode for telegram 111

Please refer to chapter 5.2.9 for the homing mode.

# Version Update Record

release date	Description of changes	version
2022-03-10	The naming of the servo series is updated to VCXXX, the version number is added, and the calibration manual	1.01
2022-03-16	Calibration Manual	1.02
2022-04-21	Split the manual to generate the VC330 resolver feedback servo manual	1.03
2022-12-13	Modify the description of CN3-9/10 pin, and modify the pin number of torque and speed block diagram	1.04
2022-12-21	Add STO function description and dynamic braking function description.	1.05
2023-09-01	Add -E structure dimension drawing	1.06