Statement

Thank you for purchasing the servo drive SVD880/SVD810.Please read this user manual carefully before use to ensure the correct use of this product. The illustrations in this user manual are for convenience and may differ slightly from the product. Due to product upgrades or specification changes, and to improve the convenience of the user manual, the content of this user manual will be updated in a timely manner without prior notice . Please refer to the instructions provided on our website.

In addition, please place this instruction manual in a conspicuous place for easy reference.

NIETZ ELECTRIC CO.,LTD

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Safety precautions

Servo drives are precision power electronic products. For the safety of operators and mechanical equipment, please ensure that they are installed and debugged by professional motor engineer. Please carefully read the symbols as "danger" and "caution" in this manual. If you have any questions, please contact our agents, Our professional team will be happy to serve you.

Note precautions:

\land Danger

- 1. Be sure to ground correctly before using the driver
- 2. Be sure to cut off power when wiring
- There is still residual voltage inside after cut off AC power, do not touch the internal circuit and components within 5 minutes after servo driver digital operation indicator light off.
- 4. Do not modify the servo drives by yourself
- 5. Be sure the driver terminal PE is correctly grounded
- 6. The servo drives cannot be used in application related to personal safety such as life-sustaining devices.

▲ Warning

- Do not make voltage withstand tests on the internal components of the servo drive, as the semiconductor devices used in the servo drive would be damaged by high voltage breakdown.
- 2. Do not operate any wiring terminals after the servo driver is connected to AC power
- 3. Installation, debugging, and repair of servo drives should be carried out by professional person.
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Anttantion

4.

▲ Note

- 1. After some functions of the servo drive are set, the motor may run immediately after the power supply is switch on or off
- 2. Select a suitable installation site to prevent high temperatures and direct sunlight, and avoid splashing of water droplets.
- 3. Prevent irrelevant operators from approaching the servo drive.

Warranty

- The warranty of the product is 18 months. Within warranty, we offer free repair if any malfunction or damage occurs during normal use. For another agreement with warranty, refer to the contract signed.
- 2. Warranty scope only limit to servo driver.
- 3. Guarantee
 - The preliminary diagnosis of the fault is carried out by user, and the final diagnosis result is determined after inspection and confirmation by our team.
 - For quality problem, it is guaranteed to return and replace within 7 days after received, and replace within 15 days, maintenance within 18 months.
 - Within warranty, user request on-site service, if it is our quality problem, we offer free service, if the fault is caused by user, then user bear the on-site service charge.
- 4. For below situation, we should require service charge even if it is within warranty
 - Fault or damage caused by user's unsafe transportation, storage, and incorrect design, installation, wiring, debugging, etc.
 - Fault or damage caused by unauthorized disassembly, modification, maintenance, etc.
 - Fault or damage caused by flooding, fires, storms, lightning strikes, abnormal power grid voltage, and other natural disasters
 - Replace consumables and expired components
 - Other faults that not cause by our product
- 5. Exemption from liability
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 Regardless of whether it is within the warranty period, all damages to your company or your company's users caused by the failure of our company's products, such as equipment, machinery, and electrical appliances, are not within the scope of compensation by our company.

Common symbols

Dual parameters function code representation:

d_N_M

 \boldsymbol{d} indicates that the function code is a dual parameter function code ;

M indicates first parameter;

N indicates second parameter;

Four-parameter function code representation:

FDCBA

A indicates first parameter;

- **B** indicates second parameter;
- **C** indicates third parameter;
- D indicates fourth parameter;

Mode description:

P: Position control mode		
Concerd company meeting	Sr: Internal register speed control mode	
5: Speed control mode	Sz: Analog speed control mode	ALL: AI CONTO
T Territo control mode	Tr: Internal register torque control mode	mode
I: Iorque control mode	Tz: Analog torque control mode	

Function code unit description

T: One control cycle,

$$T = \frac{1}{Fc}$$

Note: Fc is carrier frequency

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Chapter 1 Introduction

1.1 Product confirmation

Please note below info when you get the products:

- Is the product you get is the same as you ordered ? Please check the model of the nameplate
- Is there any damage to the product? Check whether there are any damages caused during transportation
- Is there any looseness in the screws?

Nameplate description as below: (Take the SVD880 series 400W EtherCAT bus as an example)

NIETZ AC Servo Driver MODEL: SVD880-0R4-C2 切断电源5分钟内,请勿触摸驱动 器端子和配线. 有触电危险! POWEWR: 400W Disconnect all power and INPUT : 3PH 220V~240V 50/60Hz wait 5 min before servicing OUTPUT: 3PH 0~220V 3.0A May cause electric shock /// 请勿触摸散热片,有烫伤危险 Do not touch heatsink S0R4C022303230400152 May cause bum 接地端子必须接地。 Use proper grounding techniques NIETZ ELECTRIC CO.,LTD

1.2 Model description

Driver model: (Take the 400W EtherCAT bus as an example)

		<u>SVD_880-0R</u> 4- <u>□C_02</u>
Identifying	Product	
SVD	Servo Drive	
Identifying	Series	
880/810	Drive series	
Identifvina	Rated output	
0R2	0.2KW _	
0R4	0.4KW	
0R7	0.75KW	
1R0	1KW	
1R5	1.5KW	
2R0	2.0KW	
3R0	3KW	
4R0	4KW	
5R0	5KW	
5R5	5.5KW	
7R5	7.5KW	
11	11KW	
15	15KW	
	Identifying SVD Identifying 880/810 Identifying 0R2 0R4 0R7 1R0 2R0 3R0 4R0 5R0 5R5 7R5 11 15	Identifying Product SVD Servo Drive Identifying Series 880/810 Drive series Identifying Rated output 0R2 0.2KW 0R4 0.4KW 0R7 0.75KW 1R0 1.5KW 2R0 2.0KW 3R0 3KW 4R0 4KW 5R5 5.5KW 7R5 7.5KW 11 11KW

_	Identifying	Voltage					
	02	3 phase 220V					
	04	3 phase 380V					
	Identifying	Instruction Type					
-	А	Pulse command given					
		(including modbus RTU)					
	С	Absolute+EtherCAT					
	D	Absolute+					
		MechatrolinkIII					
	Ν	Absolute+CAN					
	Р	Absolute+Profinet					
	Identifying	Encoder Type					
-	Omit	Absolute					
		valueTamagawa					
	А	ABZ type					
	В	BISSC Protocol					
	E	enData2.2 Protocol					
	Н	Highperface Protocol					
	R	Resolver Protocol					
		Encoder					
	S	Sin-Cos Protocol					



1.3 Specification

					1									
Driver model		0R	0R	0R	R	1R5	2R0	3R0	4R0	5R0	5R	7R5	11	
SVD8=0-=R=-=0=		2	4	7	0						5			
	Control circuit power	Singl	Single phase AC200V~AC240V 50/60HZ											
						Three	phase	AC200\	/∼AC2	40V 50/	60HZ			
		з		n	hase	Three	phase	AC360\	/∼AC4	20V 50/	60HZ			
Immut	Main	AC22	20\/~Δ(2240V	1000	Input	power 2	220V ai	nd 380\	/ servo	drive	3 pha	se AC	
Input	circuit	50/60)Hz	5240 0		option	al					360V-	~AC4	
	power	11.	2.13	can con	nect	Note:	2.5KW	above	driver	only all	ow to	20V		
	power	$L_1 \ L_2 \ L_3 \ can \ connect$			201/	conne	connect with three phase 220V, Connect						50/60Hz	
						to single phase need to								
		derating15%~30% in							use.					
	Rated	Three	e phas	e AC	. 0-	3 phase AC: 0~220V/3phase AC: 0~380V						3	phase	
	power					Input power: 220V and 380V can be						AC:		
	ponol	2201	1	n		selected						0~380	V	
	Rated					220V								
Output		16	2.8	5	7.	11	13	18	21	25	30	22	25	
Output)	1.0	2.0	5	6	380V	380V		-	-	22	20		
)					5.8	7.5	8.8	13	16	18			
	Rated			0.7										
	power(K	0.2	0.4	5	1	1.5	2.0	3	4	5	5.5	7.5	11	
	W)			5										
Driver SVD810-□	⁻ model R□-□0□	15	18. 5	22	30	37	45	55	75	90	110	132	160	

Input	Main circuit power supply	Th	"hree phase AC360V∼AC420V 50/60HZ										
	Rated power	Th	ree pha	se AC3	80V								
	Rated current	3 2	37	45	60	75	91	112	150	176	210	253	304
Output	Overload current (A) One minute	4 8	55. 5	67. 5	90	112 .5	136 .5	168	225	264	315	379 .5	456
	Rated power	1 5	18. 5	22	30	37	45	55	75	90	110	132	160
Environ	Temperat ure	En ⁻ Sto	Environment temperature 0°C \sim 55°C(without condensing) Storage temperature -20°C \sim 65°C (Maximum temperature 87°C 72 hours)										
ment cor	Humidity	Bo	Both using and storage need to keep below 90%RH (without condensing)										
ndition	Altitude	Lov	Lower than 1000m										
	Vibration	Les	ss than	5.88m/\$	S², 10-	60Hz(C	an not c	continuc	ous use	under r	esonan	ce frequ	lency)
Control mo	ode	IG	BTPWN	vl type s	sine wa	/e drive	, 						
Encoder feedback Encoder feedback 23Bit(8388608 resolution)Absolute encoder 24Bit(16777216 resolution)Absolute encoder 26Bit(67108864 resolution)Absolute encoder													
Communic	ation	Su	pports	EhterC	AT pro	tocol,	Mechatr	olinkIII	protoc	ol, Pro	finet p	rotocol,	CAN
									SVD	800 SE	RVO	1	

			pretocol modeus PTU						
o "									
Operation	pan	iel	3. Power workable light						
			4、SON indicate light						
			5、Vector signal monitor output						
Brake resi	stor		(0R4~11) built-in regenerative resistor (Can be external)						
Dynamic b	orak	е	Built in						
	Si	ignal	SVD880 Support EhterCAT、MechatrolinkIII、Profinet, SVD810 support external						
Position	in	put	pulse and EhterCAT						
control	Vi su ioi	bration uppress n ontrol	Support						
	Signal		SVD880 Support EhterCAT、MechatrolinkIII、Profinet, SVD810 support external						
	input		pulse and EhterCAT						
Speed	Zero speed dead zone		According to zero speed dead zone input						
-p	Instantan eous velocity observer		Can be used						
Speed comma d filter		peed omman filter	Can be used						
Torque	Si	ignal	SVD880 Support EhterCAT、MechatrolinkIII、Profinet, SVD810 support external						
control	in	put	pulse and EhterCAT						
General		Hardware	Over voltage, under voltage, overload, over heat, over current,encoder fault						
_									
		1 S	VD800 SERVO						

	Software	Position deviation too large, command pulse frequency division, EEPROM fault, ec	:t
	Alarm data track	Refer to alarm data list	
_		SVD800 SERVO 1	
		•	

Chapter 2 Control and Wiring

2.1 Control circuit wiring diagram

SVD880 Series



SVD810 Series



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1

2.2 Installation and wiring

SVD880 Dimension

1KW and below: H X D X W =160×131×50mm



1.5KW-3.0KW : H X D X W =160×150×85mm



4KW-11KW : H X D X W =210×180×100mm



SVD810 Dimension

1KW and below: H X D X W =159×156×45mm



1.5KW-3.0KW : H X D X W =168×186.5×70mm



2





11KW-15KW : H X D X W =290×202×135.5mm





18.5KW-160KW : H X D X W =290×202×135.5mm

Driver Medel		Dimension	Installation			
Driver woder			Dimensions (mm)			
	W(Width)	Vidth) H H1 D		A*B	Φd	
		(High)		(Deep)		
SVD810-18.5	102	225	260	222	122*250	5.5
SVD810-22	195	200	200	222	132 230	5.5
SVD810-30	177	420	475	256	120*460	7
SVD810-37	177	455			120 400	7
SVD810-45	220	570	615	209	160*600	0
SVD810-55	239	575	015	300	100 000	5
SVD810-75						
SVD810-90	279	600	630	340	200*612	9
SVD810-110						
SVD810-132						

SVD810-160	305	845	880	450	200*838	11
------------	-----	-----	-----	-----	---------	----

2.3 Installation

2.3.1 Install environment

- 1. Application with excellent ventilation, lower humidity and without dust;
- 2. Environment does not contain corrosive flammable gas;
- 3. Environment without vibration;
- 4. Avoid direct sunlight

2.3.2 Installation direction and space

- 1. The driver adopt natural cooling method, correct installation direction is vertical installation ;
- 2. Consider the temperature rising when install in cabinet, reserve enough space to achieve heat dissipation and cooling effects;
- 3. Do not drop debris into the driver when installation:
- 4. Use M5 screws to fix.



In order to enable the cooling fan to have low wind resistance and effectively dissipate heat, please install it according to the recommended distance.

2.4 Wiring

2.4.1 Main circuit wiring

1.Terminal names and functions

(1). (SVD880_0.2KW-3.0KW) 220V Terminals of main circuit :

Module	Terminal symbol	Name	Function
туре			
		Control power input	Connect single phase AC 220V
	L1C、L2C	terminal	to input power. Supply power to
Input			servo control circuit
input			Connect three phase AC 220V
	L1、L2、L3		input power,Supply power to
		terminal	servo main circuit
	B1、B2、B3		Driver built in brake resistor
			between B2 and B3. If the
			capacitor of the built in resistor
Brake		External, built in brake	is not enough, install external
resistor			brake resistor between B1 and
		terminal	B3. It need to disconnect the
			built in resistor(B2 and B3
			disconnect).
		Servo motor connect	Connect to servo motor's U $\$ V $\$
Output	U, V, W	terminal	W
	PE(M4 screw bolt)	Ground terminal	Connect to motor PE

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Module type	Terminal symbol	Name	Function	
Input	L1C、L2C	Control power input terminal	Connect single phase AC 220V to input power. Supply power to servo control circuit	
	L1、L2、L3	Main circuit power input terminal	Connect three phase AC 380V input power	
Brake resistor	B1、B2、B3	External, built in brake resistor connecting terminal	. If the capacitor of the built in resistor is not enough, install external brake resistor between B1 and B3. It need to disconnect the built in resistor(B2 and B3 disconnect).	
Output	U, V, W	Servo motor connect terminal	Connect to servo motor's U、V、 W	
	PE(M4 screw bolt)	Ground terminal	Connect to motor PE	

(2). SVD880_1.5KW-3.0KW) 380V Terminals of main circuit :

(3). (SVD880_4.0KW-5.5KW) 220V Terminals of main circuit :

Module type	Terminal symbol	Name	Function
Input	L1C、L2C	Control power input terminal	Connect single phase AC 220V to input power. Supply power to servo control circuit
	L1、L2、L3	Main circuit power input terminal	Connect three phase AC 220V input power,Supply power to servo main circuit

	N	DC bus -	Connect to external brake unit (Take care when wiring special function terminal)
	P+	DC bus+	P+,N as DC power input
Brake resistor	P+、B1、B2	External, built in brake resistor connecting terminal	Driver built in brake resistor between B1 and B2. If the capacitor of the built in resistor is not enough, install external brake resistor between P+ and B2. It need to disconnect the built in resistor(B1 and B2 disconnect).
Output	U, V, W	Servo motor connect terminal	Connect to servo motor's U、V、 W
	PE(M4 screw bolt)	Ground terminal	Connect to motor PE

(4). (SVD880_4.0KW-11KW) 380V Terminals of main circuit :

Module type	Terminal symbol	Name	Function
Input	L1C、L2C	Control power input terminal	Connect single phase AC 220V to input power. Supply power to servo control circuit
	L1、L2、L3	Main circuit power input terminal	Connect three phase AC 380V input power,Supply power to servo main circuit
	N	DC bus -	Connect to external brake unit (Take care when wiring special function terminal)

	P+	DC bus+	P+,N as DC power input	
Brake resistor	P+、B1、B2	External, built in brake resistor connecting terminal	Driver built in brake resistor between B1 and B2. If the capacitor of the built in resistor is not enough, install external brake resistor between P+ and B2. It need to disconnect the built in resistor(B1 and B2 disconnect).	
Output	U. V. W	Servo motor connect terminal	Connect to servo motor's U $_{\rm V}$ V $_{\rm W}$	
	PE(M4 screw bolt)	Ground terminal	Connect to motor PE	

(5). (SVD810_0.2KW-1.0KW) 220V Terminals of main circuit :

Module type	Terminal symbol	Name	Function
Input	L1、L2	Control power input terminal	Connect single phase AC 220V to input power.
	Ρ	DC bus +	Servo built in brake resistor, It must disconnect between B
	В	External brake resistor connecting terminal	and P as default, if the capacitor is not enough, connect external brake resistor between B and P
	Ν	DC bus -	Take care when wiring special function terminal
	U, V, W	Servo motor connect	Connect to servo motor's U $_{\rm N}$ V $_{\rm N}$

	1	1	1
Output		terminal	W
Output	PE	Ground terminal	Connect to motor PE
(6). (SVI	D810_1.5KW) 220\	/ Terminals of main circui	t :
Module type	Terminal symbol	Name	Function
	L1、L2	Control power input terminal	Connect single phase AC 220V to input power. Supply power to servo control circuit
lawit	L1、L2、L3	Main circuit power input terminal	Connect three phase AC 220V input power,Supply power to servo main circuit
mput	Ρ	DC bus +	If the capacitor is not enough,
	В	External brake resistor connecting terminal	between B and P
	N	DC bus -	Take care when wiring special function terminal
Output	U, V, W	Servo motor connect terminal	Connect to servo motor's U、V、 W
	PE(M4 screw bolt)	Ground terminal	Connect to motor PE

(7). (SVD810_1.5KW-3.0KW) 380V Terminals of main circuit :

Module type	Terminal symbol	Name	Function
Input	L1、L2	Control power i terminal	Connect single phase AC 220V to input power. Supply power to servo control circuit(L1,L2,L3 as 380V input, L1,L2 could be no connect)

	L1、L2、L3	Main circuit power input terminal	Connect three phase AC 220V input power,Supply power to servo main circuit
	Р	DC bus +	Servo built in brake resistor, It must disconnect between B
	В	External brake resistor connecting terminal	and P as default, if the capacitor is not enough, connect external brake resistor between B and P
	Ν	DC bus -	Take care when wiring special function terminal
Output	U. V. W	Servo motor connect terminal	Connect to servo motor's U、V、 W
	PE	Ground terminal	Connect to motor PE

(8). (SVD810_4KW-15KW) 380V Terminals of main circuit :

Module type	Terminal symbol	Name	Function	
Input	R, S, T	Main circuit power input terminal	Connect three phase AC 220V input power,Supply power to servo main circuit	
Output	(+)	DC bus +	The drive has no built-in brake	
	РВ	External brake resistor connecting terminal	resistor. Connect an external brake resistor between (+) and PB.	
	(-)	DC bus -	Take care when wiring special function terminal	
	U, V, W	Servo motor connect terminal	Connect to servo motor's U、V、 W	

ΡE

Ground terminal

Connect to motor PE

2. External brake resistor selection

Servo driver			Built i resistor	n brake	External brake	resistor
Power (Kw)	Voltag e (V)	Model	Resista nce (Ω)	Power (w)	Minimum resistance (Ω)	Power (W)
0.2	220	SVD810 /SVD880-	50	50	10	100
0.4	220	SVD810 /SVD880-	50	50	10	100
0.75	220	SVD810 /SVD880-	50	50	10	200
1	220	SVD810 /SVD880-	50	50	10	200
1.5	220	SVD810 /SVD880-	50	50	10	400
3	220	SVD810 /SVD880-	20	100	10	500
4	220	SVD810 /SVD880-	20	100	10	800
5	220	SVD810 /SVD880-	20	100	10	1000
5.5	220	SVD810 /SVD880-	20	100	10	1000
7.5	380	SVD810 /SVD880-	20	100	10	1500
11	380	SVD810 /SVD880-11-			10	2000
15	380	SVD810/SVD880-15-			10	2000
18.5	380	SVD810/SVD880-			10	3000
22	380	SVD810/SVD880-22-			10	4KW

3. Wiring example



Note: Due to the coaxial connection between the motor and encoder, do not strike when install a pulley or coupling at the motor shaft end. Otherwise, encoder may damage.(This situation is not covered by the warranty!)

2.4.2 Servo motor encoder signal connect port

1.Schematic diagram of servo motor encoder signal interface.

Suitable for model SVD880 full power, SVD810 below 1KW



SVD810(CN2)/SVD880(CN3)SM6P Servo motor encoder signal, pin name and function of connect port.

Pin	Signal name	Description	Introduction
1	SD+	Encoder signal +	Suit for RS-485 bus
2	SD-	Encoder signal -	protocol, maximum frequency is 10MHz。
3	GND	Encoder power -	DC5V, power supply
4	+5V	Encoder power +	current is 500mA,voltage fluctuation±200mV
5-6		Reserved	

SVD880(CN4)/SM10P Secondary encoder signal,pin name and function of connect port.

Pin	Signal name	Description	Introduction
1	DATA+	BISS or EnData signal +	
2	DATA-	BISS or EnData signal -	
3	GND	Encoder power 0V	
4	+5V	Encoder power 5V+	
5	MA+	BISS or EnData clock (CLK) signal +	
6	MA-	BISS or EnData clock (CLK) signal -	
7-10		Reserved	

SVD810(CN2)Servo motor encoder signal connect port diagram

(SVD810 1.5KW -3.0kW)



Pin	Signal name	Description	Instruction
1		Reserved	
2	SD+	Encoder signal +	
3	Z+	Encoder signal Z +	
4	B+	Encoder signal B +	
5	A+	Encoder signal A +	
6		Reserved	
7	SD-	Encoder signal -	Quitfor DC 405 hus
8	Z-	Encoder signal Z -	Suit for RS-465 bus
9	B-	Encoder signal B -	frequency is 10MHz
10	A-	Encoder signal A-	DC5V power supply
11		Reserved	current is 500mA voltage
12		Reserved	fluctuation+200mVD
13	+5V	Encoder power +	
14	GND	Encoder power -]
15		Reserved	

SVD810(CN3)Servo motor encoder signal connect port diagram

(SVD810 4.0KW -15kW)



Pin	Signal name	Description	Instruction
1	PGV+	Magnetic pole signal V+	
2	PGU+	Magnetic pole signal U+	
3	PGZ+	Differential signal Z+	
4	PGB+	Differential signal B+	
5	PGA+	Differential signal A+	
6	PGV-	Magnetic pole signal V-	
7	PGU-	Magnetic pole signal U-	Incremental encoder wiring
8	PGZ-	Differential signal Z-	DC5V power supply,
9	PGB-	Differential signal B-	voltage flugtuation +200mV
10	PGA-	Differential signal A-	
11	PGW-	Magnetic pole signal W+	
12	PGW+	Magnetic pole signal W-	
13	+5V	5V power supply	
14	GND	Common ground	
15		Reserved	

引脚	符号	描述	说明
2	SD+	Encoder signal +	Absolute encoder wiring
7	SD-	Encoder signal -	DC5V power supply,
13	+5V	Encoder power +	current 500mA,
14	GND	Encoder power -	voltage fluctuation ± 200 mV

2.Servo digital input and output SVD880 (CN2) interface diagram. Fits model SVD880 full power.



SVD880 Servo digital signal Input/Output (CN2) ,pin name and function of connect port.

Pin	Signal name	Description	Introduction	
1	DI1	Analog input 1	The digital input terminal	
2	DI2	Analog input 2	to 30 V and can be	
3	DI3	Analog input 3	configured as PNP or NPN input. Its function can be	
4	DI4	Analog input 4	programmed through the	
5	хс	Analog input common	please refer to Chapter 4	
6	DO1+	Analog output 1+	Digital output terminal, with a voltage range of 12V to	
7	DO1-	Analog output 1-	30V, a maximum output current of 1A, can directly	
8	DO2+	Analog output 2+	drive the relay. Its function can be programmed	
Pin	Signal name	Description	Introduction	
-------	----------------	--------------------------	--	--
9	DO2-	Analog output 2-	through the function code, please refer to Chapter 4 for details	
10	+24V	Power supply output +24V		
11-14		Reserved	 Output 24V, Maximum current is 300mA 	
15	СОМ	Power supply output 0V		

SVD810 Servo digital signal Input/Output (CN1) connect port diagram Suitable for model SVD810 0.2KW-3.0KW.

Servo digital signal Input/Output (CN1) ,pin name and function of connect port.

Pin	Signal name	Description	Instruction
16	DOCOM	Digital output common	Connect to external power supply 0V
17	DO1	Digital output terminal 1	NPN type output,
1	DO2	Digital output terminal 2	Maximum Voltage 30V,
2	DO3	Digital output terminal 3	Maximum Output Current
3	DO4	Digital output terminal 4	1A, can connect drive relay
4	DO5	Digital output terminal 5	directly. The function can

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5	DO6	Digital output terminal 6 be set through fu		
6	DO7	Digital output terminal 7	code, refer to chapter 4	
7	DO8	Digital output terminal 8		
8	PULS24 V+	24V pulse input +		
23	SIGN24 V+	24V direction input +	External pulse signal input,	
10	PULS5V +	Pulse input +	Support 24V or 5V input, wiring according	
11	PULS-	Pulse input -	to need	
12	SIGN5V +	Direction input +		
13	SIGN-	Direction input -		
31	DICOM	Digital input common	Connect external 24V or 0V	
32	DI1	Digital input terminal 1		
22	DI2	Digital input terminal 2	Configurable PNP or NPN	
34	DI3	Digital input terminal 3	Input, Maximum Voltage	
36	DI4	Digital input terminal 4	30V,The function can be	
19	DI5	Digital input terminal 5	set through function code,	
33	DI6	Digital input terminal 6	refer to chapter 4	
18	DI7	Digital input terminal 7		
24	PZ-	Frequency Division Output Z Phase -	Dulas from an district	
25	PZ+	Frequency Division Output Z	Pulse frequency divisior	
		Phase +		

		Phase -		
27		Frequency Division Output B		
21	РDŦ	Phase +		
20	DA	Frequency Division Output A		
20	FA-	Phase -		
20		Frequency Division Output A		
29	PAT	Phase +		
43	Al1+	Input analog 1+	AI1: Speed limit	
42	Al1-	Input analog 1-	AI2: Torque limit	
30	Al2+	Input analog 2+	Input analog: 2 input	
41	Al2-	Input analog 2-	range: -10V \sim 10V	
38	DA1	Output analog 1		
37	DA2	Output analog 2	Output analog : 2, output	
14	GND	Output analog GND	range :	
35	GND	Output analog GND	-10V~10V	
44	GND	GND		
39	RS485-	485 communication wiring -	Duilt in not quitable register	
40	RS485+	485 communication wiring +	Built in net suitable resistor	
9、15	1			
20 、	,	Reserved		
21	/			

SVD810 servo digital input and output SVD810 (CN1) interface diagram Suitable for models SVD810 4.0KW-15KW.



Pin	Signal name	Description	Pin	Signal name	Description
1	COM-	Internal 24V power supply ground	2	DI1	Digital signal 1 input
3	DI2	Digital signal 2 input	4	DI3	Digital signal 3 input
5	DI4	Digital signal 4 input	6	DI5	Digital signal 5 input
7	DI6	Digital signal 6 input	8	DI7	Digital signal 7 input
9	DI8	Digital signal 8 input	10	COM-	Internal 24V power supply ground
11	COM+	External 24V power input common terminal	12	+24V	Internal 24V power output+
13	AI1	Analog 1 input	14	GND	Common ground
15	AI2	Analog 2 input			

SVD810 servo digital input and output SVD810 (CN2) interface diagram Suitable for models SVD810 4.0KW-15KW.



Pin	Signal name	Description	Pin	Signal name	Description
1	SIGN+	Command symbol input 5V+	2	SIGN-	Command symbol input-
3	SIGNH+	Command symbol input 24V+	4	PULSE +	Command pulse input 5V+
5	PULSE-	Command pulse input-	6	PULSE H+	Command pulse input 24V+
7	RSCOM	485 communication ground	8	RS-	Communication 485-
9	RS+	Communication 485+	10	DO5	Digital signal 5 output-
11	DO4	Digital signal 4 output	12	DO3	Digital signal 3 output-
13	DO2	Digital signal 2 output	14	DO1	Digital signal 1 output-
15	DO-	Digital signal common terminal			

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SVD810 (CN5) frequency division output interface diagram Suitable for SVD810 4.0KW-15KW.



Pins	Symbol	Describe	Pins	Symbol	Describe
1		Shield ground	2	COND	CAN communication
'	ΓĽ	Shield ground	2	CGND	reference ground
3	CANL	CANL	4	CANH	CANH
5	CND	Analog output reference	6	DA2	Analog output 2
5	GND	ground	0	DAZ	
7		Analog output 1	g	P7O-	PG frequency division
1	7 DAT		120-	output Z signal -	
٩	9 PBO	PG frequency division	10	PAO-	PG frequency division
3		output B signal-	10	170-	output A signal -
11	GND	Pulse output reference	12	Received	
	GND	ground	12 Reserved		
13	P7O+	PG frequency division	14		PG frequency division
15	13 P20+	output Z signal+	14	1 801	output B signal +
15	PAO+	PG frequency division			
15	PAU+	output A signal			

3. Encoder wiring example

The driver support AB pulse encoder, 1Vpp Sine-cosine encoder, RS485 bus encoder ect.

a. AB pulse encoder wiring diagram:



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b. 1Vpp Sine-cosine encoder wiring diagram:

c. RS485 bus encoder wiring diagram:



d. RS422 bus encoder wiring diagram:



2.4.3 Control signal connector

 Control signal connect port SVD880(CN1)/SVD810(CN3) as below Connect port support kinds of computer port, MECHATROLINK-III bus connect port, Ethercat bus connect port.

Connect port diagram as below:



2. Control signal connect port,pin name and function of connect port. MECHATROLINK-III bus connect port and Ethercat bus connect port

definition:

Connect port number	Pin num ber	Sym bol	Analog connect port function	Introduction
RJ1	1		Bus communication	422 communication protocol
RJ2	I	1D+	sending signal+	

Connect port number	Pin num ber	Sym bol	Analog connect port function	Introduction
	2	TD-	Bus communication sending signal-	
	3	RD+	Bus communication receiving signal+	
	6	RD-	Bus communication receiving signal-	
	8	PE	Shielded ground	

2.4.4 RS232 Communication connect port

1. RS232 Communication SVD880(CN5) connect port wiring diagram



2. RS232 signal connect port SVD880(CN5), pin name and function

Pin number	Function	Symbol
1	Power + disabled	+5V
2	Data receiving	RXD
3	Data sending	TXD
4		Reserved
5	Power-	GND

2.4.5 RS485 Communication port

1. RS485 communication port diagram

Check Servo digital input/output SVD810(CN1) diagram

2. RS485 signal port SVD810(CN1) pin name and function

Pin number	Function	Symbol
39	485 communication wiring -	RS485-
40	485 communication wiring -	RS485+

2.4.6 Wiring diagram

1.Analog input circuit

The US880 driver has an internal 24V power output, while the US810 does not. It is recommended to use an external power supply for the digital input power supply. The US880 driver is equipped with 2 digital input terminals as standard, while the US810 driver is equipped with 7 digital input terminals DI1 to DI7, a total of 7 digital input terminals, using NPN connection. To ensure that the voltage at the input terminal is between 12V and 30V during operation. Its function can be set through function code programming, please refer to Chapter 4 for details.



2.Analog output circuit

The digital output can withstand a voltage range of 12 to 30 VDC, with a maximum output current of 1A, and can directly drive relays. The US880 bus-type driver comes standard with 2 digital outputs DO1 and DO2, and the US810 pulse-type driver comes standard with 8 digital outputs DO1 to DO8. The functions can be set through function code programming. For details, please refer to Chapter 4.



3.Pulse signal input circuit

The input form is differential input. The maximum input frequency is 1M for differential input. Two levels of 24V and 5V are provided. 24V level input is generally used in PLC control systems, and the input frequency is low. Bus-type servos are not equipped with input terminals!



4. Pulse simulation output circuit

Differential output, output voltage is 5V, maximum output current is 20mA, match for 120Ω resistor in receiving end. Bus type servo is not equipped with simulation output terminal!



5.Analog input circuit

Differential input, input voltage range is -10V \sim +10V, input impedance is about 10K Ω . Bus-type servo do not with the function.



Chapter 3 Operation panel and function code setting

3.1 Operation Panel



Key's name and function

Symbol	Name	Function
0	E digit pivio	Display data and identifiers, if the data exceed 5 digit, press
O.	5 digit flixie	shift key to switch high/low bit
		1. Press the key to switch among Un $\$ Pn $\$ Fn
MODE	Mode key	2. If under data display or function execution area, exit
		Un, Pn and Fn.
UP	Up key	1. Modify data numbers for each zone
DOWN		2. Modify data value, long press to quick modify data
DOWN	Down key	value
		Press this button can move the selected bit(blinking) to left
SET/SHIFT	Set /Shift key	a bit. Enter data display zone or function execution, confirm
		the modify data.
CN5	Miero LISP	Connect adjust activers and bardwars undets connect part
terminal		



3.2 Operation panel using diagram

3.3 Monitoring Un

Monitoring driver's running parameters.

1. Monitor content as below:

Monitoring No	Content	Monitoring No	Content
Un001	Setting pulse (pulse) After cear ratio	Un002	Feedback pulse(pulse)
Un003	Pulse error(pulse)	Un004	Setting speed(r/min)
Un005	Feedback speed(r/min)	Un006	Setting torque(%)
Un007	Feedback torque(%)	Un008	Output current(0.01A)
Un009	PN voltage(v)	Un010	Input analog channel 1(10mV)

Monitoring No	Content	Monitoring No	Content
Un011	Input analog channel 2(10mV)	Un012	DI terminal state
Un013	DO terminal state	Un014	L1C,L2C control voltage
Un-15	Driver heat sink temperature(°C)	Un016	Motor temperature(°C)
Un-17	Current angle of electronic cam(optional)	Un018	Encoder A/B/Z/U/V/W level state
Un-19	Electrical angle of the motor	Un020	
Un021	Fault code	Un022	Single circle data of absolute encoder
Un023	Multi-circle data of absolute encoder	Un024	Auto-tuning forward rotate inertia
Un025	Auto-tuning reserve rotate inertia	Un026	Auto-tuning rotate inertial percentage(%)
Un027	MIII bus initial state	Un028	communication state
Un036	Mechanical position	Un037	Relative Position
Un039	Operation status display (rdy/run)	10032	Bus servo operation mode
Un040	Setting pulse(pulse)	011032	9: Speed mode

Un28 (CPU1 working status) description

Туре	Bit31~24	Bit23~16	Bit15~0
	CPU1 working	Communication initialization	CPU1 Alarm
	breathing light	status	0: No warning
MIII		0x06: Hardware	1: MIII Bus initialization alarm
		initialization completed,	2: MIII disconnect alarm
		waiting for communication	Others: Look for technical support
		packets	
		0x20: The communication	
		packet detection is	
		completed and enter into the	
		normal working mode	
	CPU1 working	OP status	Bus status machine
	breathing light	1: Initialization	0x0001: Not ready
		2: PreOP	0x0002: No allow power on
EtherCAT		3: safeOP	0x0004:Servo ready
LUIGICAI		4: OP	0x0008: Servo enable, not allow
			running
			0x0010: Running allow
			0x0020: Quick stop
			0x0040: Error
			0x0080:Error state

2. Monitoring content check

a) Monitoring No. As Un012, Un013 content represents the closed and disconnected status of the terminal (not include logic):



b) Monitoring value as 32 bit with symbol number, display lower 5 bits and upper 5 bits, switch loop display by shift key. The highest decimal point illuminated indicates a negative number, otherwise it is a positive number. Such as monitor content is -12345678.

Lower 5 bits	4. 5 6 7 8.
Upper 5 bits	0. 0 1 2. 3

3.4 Function code Pn

View and modify function code in Pn. Set steps as below:

- 1. Switch to PnXXX through MODE.
- 2. Get the function code needed by UP and DOWN.
- 3. Press the SET key enter into function code value, shift to the modify data bit through SHIFT, modify the value by UP and DOWN.
- Long press SET to save the function code value, display dnEd and auto return to PnXXX. Or directly press MODE discard modify and back to PnXXX.

Function code list

Function no.	Function	Function no.	Function
Fn001	JOG	Fn007	Force output terminal status
Fn002	Check history fault	Fn008	Reserved
	Clear fault alarm	Fn009	Reserved
E=002	Eclr0 disabled	Fn010	Reserved
FNUUS	Eclr1 Clear current alarm	Fn011	Reserved
	Eclr2 Clear history alarm	Fn012	Reserved
	STY0:No operation		Operate encoder EEPROM
	STY1: UVW Magnetic		Enc00: No function
	Dwell Angle Learning		Enc01: Read encoder
E=004	STY2:Z phase Magnetic		EEPROM data
F1004	Dwell Angle Learning	Fn013	Enc02: Write encoder
	STY3:Locked electrical 0°		EEPROM data
	STY4: Phase sequence		Enc03: Clear encoder multi-
	learning		turn data and multi-turn fault
Fn005	Software restart		Enc04: Clear encoder fault
	Pdft3: Parameter		
	Initialization		
Fn006	Pdft4: Parameter	Fn014	Reserved
	Initialization (Include factory		
	parameters)		

Chapter 4 Function Code list

4.1 Basic Operation Area 1

Dual parameter: dYYXX; Four-parameter: FDCBA

Code	Description	Default	Lower limit	Upper limit	Unit
Pn100	Software version	Model dependen t	0	65535	
Pn101	FPGA software version	Model dependen t	0	65535	
Pn102	Driver number	Model dependen t	0	10000	
Pn103	Rated voltage	Model dependen t	1	440	V
Pn104	Rated current	Model dependen t	1	65535	0.01 A
Pn105	Maximum current	Model dependen t	1	65535	0.01 A

Code	Description	Default	Lower limit	Upper limit	Unit
Pn106	Current sampling direction setting (double parameters)	Model dependen t	D00	D13	
Pn107 DYYXX	Speed sampling filter depth XX=control board type selection 0: single board control board; 1: dual board 1.5KW~3KW control board 4: 5KW and above control board YY=whether to start hardware matching judgment 0: match hardware and software settings, if not match, alarm ER1.60 ER1.61 1: do not match hardware and software settings	D 0 0	D 0 0	D 1 15	
Pn108	Speed sampling mode	0	0	1	
Pn109	Thermometer	1	0	1	
Pn110	Current channel proportional coefficient	Model dependen t	1	65535	
Pn111	Bus voltage detection compensation value	Model dependen t	1	65535	
Pn112	Control voltage sampling coefficient	680	1	65535	

Code	Description	Default	Lower limit	Upper limit	Unit
Pn113	Small current amplification coefficient	51	0	160	0.1
Pn114	Carrier frequency	20000	2000	20000	Hz
Pn115	Speed loop carrier frequency	3	1	32	
Pn116	Position loop carrier frequency	8	1	32	
Pn117	Speed sampling filter depth 0: No filtering, sampling frequency 16K 1: 2 times smoothing filter 2: 4 times 3: 8 times	0	0	3	
Pn118	Current filter depth	2	0	2	
Pn119	Torque loop proportional gain	1500	100	10000	Hz
Pn120	Torque loop integral gain	1000	1	65535	0.01 ms
Pn121	Excitation loop proportional gain	1500	1	10000	Hz
Pn122	Excitation loop integral gain	1000	1	65535	0.01 ms
Pn123	Dead zone compensation	0	0	240	
Pn124	Voltage of over voltage	395	1	1000	V
Pn125	Over voltage filter	10	0	65535	0.1s
Pn126	Voltage of under voltage	220	1	1000	V
Pn127	Under voltage filter	10	0	65535	0.1s
Pn128	Motor overload coefficient	100	50	200	
Pn129	Driver over current coefficient	100	20	100	
Pn130	Position error alarm switch	0	0	1	
Pn131	Alarm function selection(FDCBA)	F0001	F0000	F1111	

Code	Description	Default	Lower limit	Upper limit	Unit
	A=Under voltage alarm switch				
	0: Close				
	1: Open				
	B=Hardware over current(Er108)				
	selection				
	0: Open				
	1: Close				
	C=ESP function alarm selection				
	0: Close				
	1: Open				
	D=Reserved				
	Whether to clear alarm after				
Pn132	recovery of under voltage or over	0	0	1	
	voltage				
	Input terminal filter time				
Dn133	0: No filter	0	0	9	
FIII33	1-9: Input terminal filter depth	0			
	Filter time=(1-9)*2ms				
	Voltage compensation selection				
	FDCBA				
	A=AVR function effective				
Dp125	selection	E0010	E0000	E0011	
FIII33	0: Disabled	FUUTU	FUUUU	FUUTI	
	1: Enabled				
	B=Voltage compensation function				
	enabled				

Code	Description	Default	Lower limit	Upper limit	Unit
	0: Enabled 1: Disabled C=Voltage compensation basis selection 0: Given current 1: Feedback current D=Reserved				
Pn145	Password	0	0	65535	
Pn146	Password setting	0	0	65535	
Pn147	Open factory password	0	0	65535	
Pn150	Board type: Pulse board 3, MIII bus control board 4, Ether cat bus control board	Model dependen t	0	5	

4.2 Basic Operation Area 2

Code	Description	Default	Lower limit	Upper limit	Unit
	Control mode selection				
	1: Position control mode				
	2: Speed control mode				
	4: Torque control mode				
	6: Position control mode-Speed				
Pn200	control mode	1	0	15	
	7: Position control mode-Torque				
	control mode				
	8: Speed control mode-Torque				
	control mode				
	9: VVVF control mode				
	Motor running direction setting				
Pn201	0: Forward	0	0	1	
	1: Reverse				
	Servo enable type select				
	0: Register control enable				
Pn202	1: Enable terminal control	0	0	3	
	2: Direction terminal enable				
	3: Power on auto enable				
	Register servo on enable				
Pn203	0: Servo disable	0	0	1	
	1: Servo enable				
Pn204	Servo stop mode selection (dual	D00	D00	D22	
r11204	parameter)	200	200	DZZ	

Lower bit, servo off and warning stop ; Upper bit, servo exceed range stop Parking mode (FDCBA) A=0-3 The parking mode when the control word 0x6040 has 15-3 2 B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-3 6 C=0-3 The parking mode when the control word 0x6040 has 15-3 7 D=0-3 The parking mode when the control word 0x6040 has 15-3 7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable			1		1	1
stop ; Upper bit, servo exceed range stop Parking mode (FDCBA) A=0-3 The parking mode when the control word 0x6040 has 15-3 2 B=0-3 (Baoyuan system sets this item) B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-3 6 C=0-3 The parking mode when the control word 0x6040 has 15-3 6 F0000 C=0-3 The parking mode when the control word 0x6040 has 15-3 7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable Find then disable 3: deceleration stop with maximum torque, and then disable Si deceleration stop with maximum torque, and then disable		Lower bit, servo off and warning				
Upper bit, servo exceed range stop Image: marking mode (FDCBA) A=0-3 A=0-3 The parking mode when the control word 0x6040 has 15-3/2 B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-3/6 F0000 C=0-3 The parking mode when the control word 0x6040 has 15-3/7 D=0-3 F0000 The parking mode when an error state is found F0000 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable F0000 3: deceleration stop with maximum torque, and then disable F0000		stop;				
stop Image: stop Image: stop Image: stop Parking mode (FDCBA) A=0-3 Image: stop Image: stop The parking mode when the control word 0x6040 has 15-½ 2 B=0-3 (Baoyuan system sets this item) Image: stop Image: stop The parking mode when the control word 0x6040 has 15-½ 6 Image: stop Image: stop Image: stop Image: stop The parking mode when the control word 0x6040 has 15-½ 7 Image: stop Image: stop		Upper bit, servo exceed range				
Parking mode (FDCBA) A=0-3 The parking mode when the control word 0x6040 has 15-3/2 B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-3/6 C=0-3 The parking mode when the control word 0x6040 has 15-3/7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable		stop				
A=0-3 The parking mode when the control word 0x6040 has 15-》2 B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-》6 C=0-3 The parking mode when the control word 0x6040 has 15-》7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration stop with maximum torque, and then disable 3: deceleration stop with maximum torque, and then disable		Parking mode (FDCBA)				
The parking mode when the control word 0x6040 has 15-》2 B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-》6 C=0-3 The parking mode when the control word 0x6040 has 15-》7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable		A=0-3				
control word 0x6040 has 15-》2 B=0-3 (Baoyuan system sets this item) The parking mode when the control word 0x6040 has 15-》6 C=0-3 C=0-3 The parking mode when the control word 0x6040 has 15-》7 D=0-3 D=0-3 The parking mode when an error state is found F0000 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable S: deceleration stop with maximum torque, and then disable		The parking mode when the				
B=0-3 (Baoyuan system sets this item) Interpreting mode when the control word 0x6040 has 15-% 6 Interpreting mode when the control word 0x6040 has 15-% 6 Interpreting mode when the control word 0x6040 has 15-% 7 D=0-3 The parking mode when an error state is found F0000 F03333 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable F0000 F3333 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable Si deceleration stop with maximum torque, and then disable Interpreting mode when the stop with maximum torque, and then disable		control word 0x6040 has 15-》2				
item) The parking mode when the control word 0x6040 has 15-» 6 Image: C=0-3 The parking mode when the control word 0x6040 has 15-» 7 F0000 F0000 D=0-3 F0000 F3333 The parking mode when an error state is found F0000 F3333 0: directly disable F1 slow deceleration stop, the stop F0000 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable F3333 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable F0000 3: deceleration stop with maximum torque, and then disable F0000 F0000		B=0-3 (Baoyuan system sets this				
The parking mode when the control word 0x6040 has 15-» 6 Image: C=0-3 The parking mode when the control word 0x6040 has 15-» 7 F0000 D=0-3 F0000 The parking mode when an error state is found F0000 0: directly disable F0000 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable F0000 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable F0000 3: deceleration stop with maximum torque, and then disable F0000		item)				
control word 0x6040 has 15-» 6 C=0-3 The parking mode when the control word 0x6040 has 15-» 7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable		The parking mode when the		F0000	F3333	
C=0-3 The parking mode when the control word 0x6040 has 15-» 7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable		control word 0x6040 has 15-》6	F0000			
The parking mode when the control word 0x6040 has 15-》7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable 3: deceleration stop with maximum torque, and then disable		C=0-3				
control word 0x6040 has 15-》7 D=0-3 The parking mode when an error state is found 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable		The parking mode when the				
Pn205D=0-3 The parking mode when an error state is foundF0000F33330: directly disable		control word 0x6040 has 15-》7				
Ph205 The parking mode when an error state is found F0000 F0000 F3333 0: directly disable 1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable 1.1	D-005	D=0-3				
state is found0: directly disable1: slow deceleration stop, the stopdeceleration is set by Pn516, andthen disable2: fast deceleration stop, the stopdeceleration is set by Pn518, andthen disable3: deceleration stop withmaximum torque, and thendisable	Ph205	The parking mode when an error				
0: directly disable1: slow deceleration stop, the stopdeceleration is set by Pn516, andthen disable2: fast deceleration stop, the stopdeceleration is set by Pn518, andthen disable3: deceleration stop withmaximum torque, and thendisable		state is found				
1: slow deceleration stop, the stop deceleration is set by Pn516, and then disable2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable3: deceleration stop with maximum torque, and then disable		0: directly disable				
deceleration is set by Pn516, and then disable12: fast deceleration stop, the stop deceleration is set by Pn518, and then disable13: deceleration stop with maximum torque, and then disable1		1: slow deceleration stop, the stop				
then disable2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable3: deceleration stop with maximum torque, and then disable		deceleration is set by Pn516, and				
2: fast deceleration stop, the stop deceleration is set by Pn518, and then disable 3: deceleration stop with maximum torque, and then disable		then disable				
deceleration is set by Pn518, and then disable 3: deceleration maximum torque, disable		2: fast deceleration stop, the stop				
then disable 3: deceleration stop with maximum torque, and then disable		deceleration is set by Pn518, and				
3: deceleration stop with maximum torque, and then disable		then disable				
maximum torque, and then disable		3: deceleration stop with				
disable		maximum torque, and then				
		disable				

	Note: pn516 and Pn518 are both				
	decelerations, and the set value				
	takes effect immediately.				
Pn206	Power on auto enable delay	20	0	65535	0.1s
Pn207	Control mode switch delay	100	0	65535	ms
Pn208	Forward limit enable	0	0	1	
Pn209	Reverse limit enable	0	0	1	
Pn210	Dynamic brake time	100	0	65535	ms
Pn212	Bleeding resistor resistance	0	0	0	Ω
Pn213	Bleeding resistor power	0	0	0	KW
Pn214	Bleeding voltage	375	100	1000	V
Pn215	Bleeding duty ratio	50	0	100	%
Pn216	Delay in opening the brake command after the servo command is turned on	10	0	65535	ms
Pn217	Delay time of servo OFF after brake closedstop	1000	0	65535	ms
Pn218	Delay time of servo OFF after brake closedrevolve	1000	0	65535	ms
Pn219	Speedrevolve when brake closed	100	0	6000	rpm
Pn222	Stall over temperature protection delay time	200	10	65535	ms
Pn223	Phase loss protection filter time	100	10	5000	Ms
Pn225	Inverter module over-temperature selection (FDCBA) A=0-1 module over-temperature alarm selection	F1001	F0000	F1111	

Pn226 Pn226 Pn226 0: Off 1: On C=fan operation mode 0=power on operation 1=enable operation D=blocked rotor over-temperature alarm selection 0: Off 1: On 0: Off 1: On Motor stall protection effective selection (FDCBA) A=0-1 stall effective selection 0: invalid 1: valid B=ls phase loss protection effective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure				r		
B=motor over-temperature alarm selection Image: Selection 0: Off 1: On Image: Selection C=fan operation mode Image: Selection 0=power on operation 1=enable operation Image: Selection D=blocked rotor over-temperature alarm selection Image: Selection 0: Off 1: On Image: Selection 0: Invalid 1: valid Selection A=0-1 stall effective selection Image: Selection 0: Invalid 1: valid Selection B=ls phase loss protection F0001 effective? Image: Selection 0: invalid 1: valid F0001 After setting effective, if phase is missing, the driver alarms F0001 Er1.15 Selection C=Is main power failure protection F0001 effective? Image: Selection 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power Image: Selection failure Image: Selection Image: Selection <td></td> <td>0: Off 1: On</td> <td></td> <td></td> <td></td> <td></td>		0: Off 1: On				
selection 0: Off 1: On Image: Selection of the		B=motor over-temperature alarm				
Pn226 0.: Off 1: On C=fan operation mode 0=power on operation 1=enable operation D=blocked rotor over-temperature alarm selection 0.: Off 1: On Notor stall protection effective selection (FDCBA) A=0-1 stall effective selection 0: invalid 1: valid B=ls phase loss protection effective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		selection				
Pn226 C=fan operation mode O=power on operation 1=enable operation D=blocked rotor over-temperature alarm selection O: Off 1: On Motor stall protection effective selection (FDCBA) A=0-1 stall effective selection O: invalid 1: valid B=ls phase loss protection effective? O: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection effective? O: invalid 1: valid After sting effective network After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		0: Off 1: On				
0=power on operation 1=enable operation Image: Provide the section operation 1=enable operation Image: Provide the section operation operation operation D=blocked rotor over-temperature alarm selection Image: Provide the section operation operation operation operation operation operation operation Image: Provide the section operation opera		C=fan operation mode				
operation D=blocked rotor over-temperature Image: Normal Science of Sci		0=power on operation 1=enable				
D=blocked rotor over-temperature alarm selection 0: Off 1: On		operation				
alarm selection 0: Off 1: On Image: Constant of the selection of the selection of the selection (FDCBA) A=0-1 stall effective selection A=0-1 stall effective selection 0: invalid 1: valid B=ls phase loss protection of the selective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection of effective? 0: invalid 1: valid After setting effective alarms effective? F0001 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		D=blocked rotor over-temperature				
0: Off 1: On Image: Constant of the section of the		alarm selection				
Motor stall protection effective selection (FDCBA) Image: Comparison of the comparison of th		0: Off 1: On				
selection (FDCBA) A=0-1 stall effective selection 0: invalid 1: valid B=ls phase loss protection effective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		Motor stall protection effective				
A=0-1 stall effective selection 0: invalid 1: valid B=Is phase loss protection effective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=Is main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		selection (FDCBA)				
0: invalid 1: valid B=ls phase loss protection effective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		A=0-1 stall effective selection				
B=Is phase loss protection effective? 0: invalid 1: valid After setting effective, if phase is Missing, the driver alarms F0001 Er1.15 F1111 C=Is main power failure protection F0001 effective? F0001 0: invalid 1: valid F0001 After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure ister the time to achieve rapid power		0: invalid 1: valid				
Pn226 effective? 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=Is main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		B=Is phase loss protection				
Pn226 0: invalid 1: valid After setting effective, if phase is missing, the driver alarms Er1.15 C=ls main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		effective?				
After setting effective, if phase is missing, the driver alarms Er1.15 C=Is main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		0: invalid 1: valid				
Pn226 missing, the driver alarms F0001 F0000 F1111 Er1.15 C=ls main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure loce loce loce loce loce loce loce loc		After setting effective, if phase is		F0000	F1111	
F11220 Er1.15 F0001 F0000 F1111 C=Is main power failure protection effective? 0: invalid 1: valid 1 1 After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure 1 1	Pp226	missing, the driver alarms	E0001			
C=Is main power failure protection effective? 0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure	FIIZZO	Er1.15	FUUUT			
effective?0: invalid 1: validAfter this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		C=Is main power failure protection				
0: invalid 1: valid After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		effective?				
After this function is turned on, alarm Er1.16 is issued, and forced discharge is performed at the alarm time to achieve rapid power failure black		0: invalid 1: valid				
alarm Er1.16 is issued, and forced discharge is performed at the same time to achieve rapid power failure		After this function is turned on,				
discharge is performed at the same time to achieve rapid power failure		alarm Er1.16 is issued, and forced				
same time to achieve rapid power failure		discharge is performed at the				
failure		same time to achieve rapid power				
		failure				

	D=reserved				
Pn227	Motor stall protection detection threshold Motor stall protection detection time	50	0	100	rpm
Pn228	Motor stall protection detection threshold Motor stall protection detection time	200	10	1000	ms
Pn229	Motor overspeed level setting 0: Overspeed level is 1.2 times the maximum speed 1-20000: Overspeed value is the actual setting value	0	0	20000	rpm
Pn230	Battery fault alarm selection	1	0	1	
Pn231	0: Off 1: On	1	0	1	
Pn233	Battery alarm alarm selection	0	0	1	
Pn235	0: Off 1: On	0	0	5	
Pn236	No initial phase operation mode	0	0	65535	
Pn242	Self-learning function selection	45	0	300	%

4.3 Gain adjustment area

Code	Description	Default	Lower limit	Upper limit	Unit
Pn300	Speed control gain 1	1000	10	20000	0.1H z
Pn301	Speed integral time constant	2000	15	50000	0.01 ms
Pn302	Position control proportional gain1	750	10	20000	0.1/s
Pn303	Rotate inertia ratio	100	0	20000	%
Pn304	Speed control gain 2	500	10	20000	0.1H z
Pn305	Speed integral time constant	2000	15	50000	0.1/s
Pn306	Position control proportional gain 2	750	10	20000	0.1/s
Pn307	Speed feedforward ratio	0	0	100	%
Pn308	Speed feedforward filter time constant	0	0	6400	0.01 ms
Pn309	Torque feedforward gain	0	0	100	%
Pn310	Torque feedforward filter time	0	0	6400	0.01 ms
Pn311	Rigidity level	7	0	21	
Pn312	Real-time automatic adjustment (rigidity, inertia)0: Do not enable automatic adjustment1: Automatically adjust rigidity according to Pn311 (rigidity table). Related parametersPn300~Pn302, Pn304~Pn306	0	0	6	

	2: Positioning control. Automatically adjust rigidity according to Pn311 (rigidity table), and self-learn the moment of inertia. Determine whether the inertia ratio is adjusted in real time according to the setting of Pn530. Automatically set Pn315=0x0091 to enable gain switching mode 5: Self-learning of moment of inertia, and				
	update the learned inertia ratio to the Pn303 parameter at medium speed. If the mechanical vibration is large, please				
	stop self-learning immediately				
	6: Self-learning of moment of inertia, no				
	update				
Pn313	Inertia ratio self-learning mode	0	0	4	
Pn315	Gain switchover type	0	0	13141	
Pn316	Gain switchover condition (pulse error)	10000	0	60000	
Pn317	Gain switchover condition (speed command/feedback speed)	0	0	5000	rpm
Pn318	Gain switchover condition (speed command/feedback speed)	0	0	5000	rpm
Pn319	Gain switchover condition (torque command)	0	0	300	%
Pn320	Gain switchover condition (torque command)	0	0	300	%
Pn321	P/PI condition(pulse error)	0	0	60000	

Pn322	P/PI condition(speed	0	0	5000	rpm
	command/feedback speed)				
Pn323	P/PI condition(torque command)	0	0	300	%
Pn324	Gain switchover delay	6	0	60000	ms
Pn329	Position integration time constant	с			
Pn330	Motor response frequency test function enabled	0	0	10	
Pn331	Viscous friction torque compensation	0	0	1000	0.1%
Pn332	Gravity friction torque compensation	0	0	1000	0.1%
Pn333	Forward friction torque compensation	0	0	1000	
Pn334	Reverse friction torque compensation	0	0	1000	0.1%
Pn335	Friction compensation speed	2	0	100	rpm
Pn345	Magnetic field weakening control enable	0	0	1	
Pn346	Magnetic field weakening control voltage usage frequency	90	99	1	%
Pn347	Magnetic field weakening control bandwidth	20	1	100	Hz
Pn348	Magnetic field weakening control maximum current	50	1	100	%
Pn349	Magnetic field weakening proportional gain	0	1	100	0.1%

4.4 Position loop parameters

Code	Description	Default	Lower limit	Upper limit	Unit
	Position loop command selection				
	Pn150=0 (Pn400 parameter is valid)				
	Pn200=1 (Pn400 parameter can be				
	selected as 0, 1, 2, 3)				
	0 Internal register given position;				
Pp400	1 External pulse given position	0	0	6	
F 11400	2 Spindle position control	0	0	0	
	3 Internal use				
	Pn150=3 (Pn400 parameter is invalid)				
	MIII communication given;				
	Pn150=4 (Pn400 parameter is invalid)				
	EtherCAT communication given;				
	External pulse command form				
	(FDCBA)				
	A: Pulse setting mode:				
	0: AB orthogonal pulse (4 times				
	frequency)				
Pn401	1: Pulse + direction (falling edge count)	F0300	F0000	F1317	
	2: Forward pulse + reverse pulse				
	(falling edge count)				
	3: AB orthogonal pulse 2 times				
	frequency				
	4: Pulse + direction 2 times frequency				

5: Forward pulse + reverse pulse (2					
times frequency)					
6: Pulse + direction (rising edge count)					
7: Forward pulse + reverse pulse					
(rising edge count)					
B: Pulse setting logic:					
0: positive logic; 1: negative logic					
C: Pulse setting filter:					
0: 10M; 1: 5M; 2: 2.5M; 3: 1M;					
D: spare					
Dr.402 Setting pulse filter time constant 0 0 0 65525	0.1				
Ph402 Setting pulse liner time constant 0 0 0 05555	ms				
Frequency division output logic					
(FDCBA)					
A: Frequency division output logic					
0: Positive logic; 1: Negative logic					
B: z signal output logic					
0: Positive logic; 1: Negative logic					
C: z signal source selection					
0: Simulation Z signal output 1:					
Hardware Z signal output					
D: Frequency division output					
selection					
0: Off 1: On 2: When the pulse is given,					
the frequency division output is turned					
on, and when the pulse is not given,					
the frequency division output is not					
turned on					
Pn404	Frequency division coefficient	10000	0	8088608	
--------------	---	-------	---------	----------	------
D 400	Electric gear ratio numerator			10737418	
F11400		1	1	24	
D= 100				10737418	
Pn408	Electronic gear ratio denominator		I	24	
Dp 110		0	0	10737418	
P11410	Given pulse number per pulse	0	0	24	
			-	21/7/836	
Pn412	Zero offset	0	2147483	18	
			648	40	
Pn414	PZ output width setting	1000	100	32768	
Pn415	Internal position JOG speed	100	1	500	rpm
Pn416	Internal position running speed	300	1	10000	rpm
	Frequency division output delay	1000	1000 0		
	Frequency division output off delay in				
Pn/17	frequency division output mode 2			65535	me
1 11 4 17	Set the delay time to turn off the			00000	1113
	frequency division output when there is				
	no pulse setting				
	Internal register position function				
	1: Start running (0x0001)				
	2: Stop running (0x0002)				
	16: Enter zero return mode and run				
Pn418	(0x0010)	0	0	65535	
	17: Exit zero return mode (0x0011)				
	256: Forward JOG (0x0100)				
	257: Reverse JOG (0x0101)				
	512: Set zero (0x0200)				

				1	
	513: Set minimum soft limit (0x0201)				
	514: Set maximum soft limit (0x0202)				
	Software limit function selection				
	(FDCBA)				
	A: Output to output terminal after				
	exceeding the soft limit				
	0: Off; 1: Output to output terminal				
Pp/20	B: Whether to alarm after exceeding	E0000	E0000	E1111	
F11420	the soft limit	F0000	FUUUU	ГІІІ	
	0: Off; 1: Alarm				
	C: Whether to stop after exceeding the				
	soft limit				
	0: Continue to run; 1: Stop				
	D: Standby				
	Parameter storage				
Pn421	After setting to 1, Pn422, Pn424,	0	0	1	
	Pn426 are stored in EEPROM.				
			-	21474926	
Pn422	Software limit minimum value	0	2147483	21474030	
			648	40	
			-	21/7/836	
Pn424	Software limit maximum value	0	2147483	10	
			648	40	
			-	21474926	
Pn426	Relative position zero offset	0	2147483	214/4030 19	
			648	48	

Pn428	Position limit origin range	100	- 2147483 648	21474836 48	
Pn430	Mechanical position once cycle pulse It is valid when the internal register has multiple segments.	0	0	21474836 48	PP S
Pn432	Return to zero mode 1: Reverse return to zero, the deceleration point is the negative limit switch, the origin is the motor Z signal 2: Forward return to zero, the deceleration point is the positive limit switch, the origin is the motor Z signal 3-4 Forward return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal. 5-6 Reverse return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal. 7-10: Forward return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal. 11-14: Reverse return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal. 11-14: Reverse return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal. 11-16: Reserved	0	0	42	

17: Reverse return to zero, the deceleration point and the origin are the negative limit switch.	
deceleration point and the origin are the negative limit switch.	
the negative limit switch.	
18: Forward return to zero, the	
deceleration point and the origin are	
the positive limit switch.	
19-20: Forward return to zero, the	
deceleration point and the origin are	
the origin switch.	
21-22: Reverse return to zero, the	
deceleration point and the origin are	
the origin switch.	
23-26: Positive return to zero,	
deceleration point and origin are the	
origin switch, and the limit is the	
positive limit switch.	
27-30: Reverse return to zero,	
deceleration point and origin are the	
origin switch, and the limit is the	
negative limit switch.	
31-32: Reserved	
33: Single-turn reverse return to zero,	
the origin is the motor Z signal.	
34: Single-turn positive return to zero,	
the origin is the motor Z signal	
35: Take the current position as the	
origin	
40: Absolute value return to zero	

	r		1		
	41: Forward torque return to zero				
	42: Reverse torque return to zero				
	For detailed instructions, please refer				
	to Chapter 5.5.8 (page 87)				
Pn433	Return to zero at high speed	100	0	1000	rpm
Pn434	Return to zero at low speed	20	0	1000	rpm
Pn437	Push-type zero return torque limit	150	0	3000	0.1 %
Pn438	Push-type zero return delay time	100	0	65535	Ms
	Zero return function selection (FDCBA)				
	A: Whether to move the offset after				
	zero return is completed				
	0: Do not move; 1: Move				
Pn439	B: Whether to automatically exit the	F0000	F0000	F0011	
	zero return mode after zero return is				
	completed				
	0: Do not exit; 1: Exit				
	C: Reserved D: Reserved				
	Register position operation mode				
	0: Invalid				
	1: Single operation				
D= 140	2: Cycle operation	F	0	10	
P1144U	3: DI switching	5	0	10	
	4: Sequential operation, no delay				
	5: Axis control operation, only position				
	1 is valid				

	6: DI switching (with operation				
	command)				
Pn441	The internal register operate segments number	1	1	8	
	Position command type				
Pn442	0: Absolute	0	0	1	
	1: Incremental				
Pn450	Reserved				
Pn451	Maximum speed of register position 1	100	0	30000	Rp m
Pn452	Position of register position 1	10000	- 2147483 648	21474836 47	Puls e
Pn454	Acceleration and deceleration time of register position 1	100	0	65535	Ms
Pn455	Delay waiting time after register position 1 positioning is completed	100	0	65535	Ms
Pn456	Reserved				
Pn457	Maximum speed of register position 2	100	0	30000	Rp m
Pn458	Position of register position 2	100000	- 2147483 648	21474836 47	Puls e
Pn460	Acceleration and deceleration time of register position 2	100	0	65535	Ms
Pn461	Delay waiting time after register position 2 positioning is completed	100	0	65535	Ms
Pn462	Reserved				
	-				

Pn463	Maximum speed of register position 3	100	0	30000	Rp m
Pn464	Position of register position 3	100000	- 2147483 648	21474836 47	Puls e
Pn466	Acceleration and deceleration time of register position 3	100	0	65535	Ms
Pn467	Delay waiting time after register position 3 positioning is completed	100	0	65535	Ms
Pn468	Reserved				
Pn469	Maximum speed of register position 4	100	0	30000	Rp m
Pn470	Position of register position 4	100000	- 2147483 648	21474836 47	Puls e
Pn472	Acceleration and deceleration time of register position 4	100	0	65535	Ms
Pn473	Delay waiting time after register position 4 positioning is completed	100	0	65535	Ms
Pn474	Reserved				
Pn475	Maximum speed of register position 5	100	0	30000	Rp m
Pn476	Position of register position 5	100000	- 2147483 648	21474836 47	Puls e
Pn478	Acceleration and deceleration time of register position 5	100	0	65535	Ms

Pn479	Delay waiting time after register position 5 positioning is completed	100	0	65535	Ms
Pn480	Reserved				
Pn481	Maximum speed of register position 6	100	0	30000	Rp m
Pn482	Position of register position 6	100000	- 2147483 648	21474836 47	Puls e
Pn484	Acceleration and deceleration time of register position 6	100	0	65535	Ms
Pn485	Delay waiting time after register position 6 positioning is completed	100	0	65535	Ms
Pn486	Reserved				
Pn487	Maximum speed of register position 7	100	0	30000	Rp m
Pn488	Position of register position 7	100000	- 2147483 648	21474836 47	Puls e
Pn490	Acceleration and deceleration time of register position 7	100	0	65535	Ms
Pn491	Delay waiting time after register position 7 positioning is completed	100	0	65535	Ms
Pn492	Reserved				
Pn493	Maximum speed of register position 8	100	0	30000	Rp m
Pn494	Position of register position 8	100000	- 2147483 648	21474836 47	Puls e

Pn496	Acceleration and deceleration time of register position 8	100	0	65535	Ms
Pn497	Delay waiting time after register position 8 positioning is completed	100	0	65535	Ms

4.5 Speed loop parameters

Code	Description	Default	Lower limit	Upper limit	Unit
	Speed command selection Pn150=0 (Pn500 parameter is valid) Pn200=2 (Pn500 parameter can be selected as 0, 1, 2, 3) 0: Internal register speed 1				
Pn500	 (Pn502) 1: Internal register speed 1 and 2 automatically cycle 2: Select the given speed through the speed function terminal 3: Give speed through the analog interface Pn150=3 (Pn500 parameter is invalid) MIII bus given speed Pn150=4 (Pn500 parameter is invalid) EtherCAT bus given speed 	0	0	10	
Pn501	Jog speed	100	0	9000	rpm
Pn502	Internal set speed 1	100	-9000	9000	rpm
Pn503	Internal set speed 2	200	-9000	9000	rpm
Pn504	Internal set speed 3	300	-9000	9000	rpm
Pn506	Speed tracking function enable	0	0	1	

Dn507	Speed feedback filter time	0	0	65525	0.01
P11507	constant	0	0	00000	ms
Dr E09	Speed actting filter time constant	0	0	05505	0.1m
P11506	Speed setting litter time constant	0	0	00000	s
Pn500	Speed setting filter time	0	0	65535	0.1m
F 1150-9	constant(stop)	0	0	00000	s
Pn511	Speed acceleration time	300	0	65535	ms
Pn512	Speed deceleration time	300	0	65535	ms
	Torque limit mode selection				
	0: Torque limit value given by				
	internal register		0	2	
Pn515	1: Torque limit value given by	0			
	external torque terminal				
	2: Torque limit value given by				
	analog interface				
Pn516	Deceleration stop deceleration	1000	0	16777216	PPS
			-		2
Pn517	Pulse torque time	0	0	1	10ms
Pn518	Emergency stop deceleration	1000	0	16777216	PPS
1 110 10		1000	Ŭ	10111210	2
Pn520	Auto emergency acc/dec function	0	0	1	
Pn521	Auto rapid acc/dec delay	100	0	65535	s
Pn522	Direction of internal speed 1	0	0	1	
Pn523	Direction of internal speed 2	0	0	1	
	Feedback speed command unit				
Desco	selection: 0-4	2		4	
11526	0: PPS = pulses per second	3	0	4	
	1: PPM = pulses per minute				

	2: %, percentage of rated speed				
	3: rpm. Speed per minute				
	4: Maximum speed corresponds				
	to 0x0000000				
	Rotate inertia identify selection:				
Pn530	0: Do not identify	0	0	4	
	1: Identify				
Pn531	Rotate inertia identify speed	1000	200	3000	rpm
Pn532	Rotate inertia identify acc/dec time	200	0	1000	ms
Pn533	Rotate inertia identify delay time	50	0	1000	0.1s
Drs524	Rotate inertia identify effective	0	0	0	
P11004	Adjust acc/dec time	0	0	0	
Dp525	Rotate inertia identify search for	100	0	1000	mm
Pn535	jog speed of left/right stroke	100	U		rpm

4.6 Torque ring parameters

Code	Description	Default	Lower limit	Upper limit	Unit
	Torque command source				
	Pn150=0 (Pn600 parameter is valid)				
	Pn200=4 (Pn600 parameter can be				
	selected as 0, 1, 2)				
	0: Internal register torque 1 (Pn601)				
	1: Select the given torque through the				
	torque function terminal				
Pn600	2: Give torque through the analog	0	0	10	
	interface				
	Pn150=3 (Pn600 parameter is				
	invalid)				
	MIII bus given torque				
	Pn150=4 (Pn600 parameter is				
	invalid)				
	EtherCAT bus given torque				
Pn601	Internal torque setting 1	100	-3000	3000	0.1%
Pn602	Internal torque setting 2	200	-3000	3000	0.1%
Pn603	Internal torque setting 3	300	-3000	3000	0.1%
Pn604	Forward side torque limit	3000	0	5000	0.1%
Pn605	Reverse side torque limit	3000	0	5000	0.1%
Pn606	Forward side external torque limit	3000	0	5000	0.1%
Pn607	Reverse side external torque limit	3000	0	5000	0.1%
Pn610	Torque command slide time constant	100	0	1000	0.1m s

				-	
Pn611	Speed limit selection during torque control PN150=4 setting is invalid (speed limit comes from the smaller value of the object dictionary 0X607F instruction maximum speed and 0X6080 maximum speed) PN150=0 setting is valid 0: Speed limit source PN620	0	0	1	
	1: Speed limit comes from terminal selection				
Pn613	Emergency stop torque	50	0	250	0.1%
Pn614	Feedback torque command unit 0: 0.1% (EtherCAT) 1: 1% (M3) 2: Nm	0	0	2	%
Pn620	Speed limitation in torque mode	3000	0	6000	rpm
Pn630	 vvvf control mode 0: No torque boost control 1: With torque boost control 2: Auto torque boost control 	0	0	2	
Pn631	Test current	0	0	5000	
Pn632	Output frequency	5000	0	60000	0.01 Hz
Pn633	Output voltage	220	0	440	V
Pn634	Output angle	0	0	3600	0.1°
Pn635	Rated motor frequency	5000	0	60000	0.01 Hz

Pn652	Voltage corresponding to knee	100	0	100	1%
Pn651	Customize voltage 6	81	0	100	1%
Pn650	Customize frequency 6	4000	0	60000	0.01 Hz
Pn649	Customize voltage 5	63	0	100	1%
Pn648	Customize frequency 5	3000	0	60000	0.01 Hz
Pn647	Customize voltage 4	45	0	100	1%
Pn646	Customize frequency 4	2000	0	60000	0.01 Hz
Pn645	Customize voltage 3	24	0	100	1%
Pn644	Customize frequency 3	1000	0	60000	0.01 Hz
Pn643	Customize voltage 2	13	0	100	1%
Pn642	Customize frequency 2	500	0	60000	0.01 Hz
Pn641	Customize voltage 1	4	0	100	1%
Pn640	Customize frequency 1	100	0	60000	0.01 Hz
Pn639	Curve compensation	0	0	7	
Pn638	Linear compensation	100	100	500	1%
	 2: Curve torque compensation 3: Customize torque compensation 				
Pn637	Manual torque compensation way 0: No compensation 1: Linear torque compensation	0	0	3	
Pn636	Manual slip compensation	0	0	100	1%

4.7 Input, Output and Other Control Parameters

Code	Descri	Description		Lower limit	Upper limit	Unit
Code Pn700	Descri Digital selecti XX: selecti 1 2 3 4 5 6 7	ption input terminal DI1 function on(DYYXX) Input terminal function on No function Servo on Forward prohibit(forward limit) Reverse prohibit(forward limit) (ESP)External emergency stop Proportional control Proportional integral control switch Forward external torque limit Reverse external torque	Default D01	Lower limit	Upper limit	Unit
	limit 7 Reverse external torque					
	8	limit Warning clear				
	9	Position error clear				
	9 Position error clear 10 Prohibit pulse command input					

			SVD8	00 SERVO	8
0: Po:	sitive logic				
YY: Inj	out terminal logic	+			
	operation				
30	Internal position stop	Ħ			
29	Start return to zero	Ħ			
-	operation				
28	Internal position start	₩			
27	External probe input 2	₩			
26	External probe input 1	H			
25	Home signal	₩			
24	Reverse start	₩			
23	Forward start	H			
22	Ratio selection 3	H			
21	Ratio selection 2	H			
20	Ratio selection 1	H			
19	Pulse enable method	H			
18	Gain switch	\mathbf{H}			
17	Internal setting torque 2	H			
16	Internal setting torque 1	H			
15	Control mode switch	H			
. 7	direction				
14		\mathbb{H}			
13	Internal setting speed				
10		\mathbf{H}			
12	Internal setting speed				
10	clamping)				
11	Servo lock(Zero speed				

	1: Ne	gative logic				
Pn701	Digital	input terminal DI2 function	D08		D 1 63	
	selecti	on(DYYXX)	200	200	5100	
Pn702	Digital	input terminal DI3 function	D 0 10	D00	D 1 63	
	selecti	on(DYYXX)				
Pn703	Digital	input terminal DI4 function	D 0 11	D00	D 1 63	
	selecti	on(DYYXX)				
Pn704	Digital	input terminal DI5 function	D 0 9	D00	D 1 63	
	selecti	on(DYYXX)				
Pn705	Digital	input terminal DI6 function	D 0 12	D00	D 1 63	
	selecti	on(DYYXX)				
Pn706	Digital	input terminal DI7 function	D 0 13	D00	D 1 63	
	selecti	on(DYYXX)				
Pn707	Digital	input terminal DI8 function	D00	D00	D 1 63	
	Digital					
	XX [.] Oi	utput terminal function				
	selecti	on				
	0	Servo ready				
	1	Servo on enable				
Pn710	2	Warning	D00	D00	D1.63	
	3	Stop signal				
	4	Positioning completed				
	5	Speed reached				
	6	Rotate detection				
	7	Torque reached				
	8	Torque limiting				
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	9	Speed limiting				
		Position error pre-				
	10	warning				
	11	Electromagnetic brake				
	19	Minimum limit output				
	20	Maximum limit output				
	21	Origin position output				
	YY: O	utput terminal logic				
	0: Po	sitive logic				
	1: Ne	gative logic				
Pn711	Digital functio	output terminal DO2 n selection (DYYXX)	D 0 2	D 0 0	D 1 63	
Pn712	Digital DO3fu	output terminal nction selection (DYYXX)	D 0 4	D 0 0	D 1 63	
Pn713	Digital functio	output terminal DO4 n selection(DYYXX)	D 0 6	D 0 0	D 1 63	
Pn714	Digital functio	output terminal DO5 n selection(DYYXX)	D 0 8	D 0 0	D 1 63	
Pn715	Digital functio	output terminal DO6 n selection(DYYXX)	D 0 9	D 0 0	D 1 63	
Pn716	Digital output terminal DO7 function selection(DYYXX)		D 0 10	D 0 0	D 1 63	
Pn717	Digital functio	output terminal DO8 n selection(DYYXX)	D 0 18	D 0 0	D 1 63	
Pn720	Over selecti	speed function enable	0	0	1	
Pn721	Over s	peed filter time constant	0	10	9000	0.1s

Pn722	Speed reached signal detection width	10	0	9000	
Pn723	Speed detection value	5	0	9000	
Pn724	Zero servo enabled	0	0	1	
Pn725	Zero servo speed	5	0	1000	
Pn730	Position reached width	5	0	65535	Р
Pn731	Position error pre-warning pulse number	20	0	65535	KP
Pn732	Position error warning pulse number	40	0	65535	KP
Pn733	Origin positioning range	5	0	65535	
Pn734	Positioning approach range	50	0	65535	
Pn737	Torque reached width	5	0	300	0.1%
Pn740	Analog 1 selection	0	0	4	
Pn741	Analog 1 corresponding gain	10000	0	65535	
Pn744	Analog 1 offset	0	0	16777216	
Pn746	Analog 1 dead zone	0	-50000	50000	1mV
Pn748	Analog 1 filter time constant	10	0	65535	0.1m s
Pn750	Analog 2 selection	0	0	4	
Pn751	Analog 2 corresponding gain	10000	0	65535	
Pn754	Analog 2 offset	0	-50000	50000	
Pn756	Analog 2 dead zone	0	- 1677721 6	16777216	1mV
Pn758	Analog 2 filter time constant	10	0	65535	0.1m s

Pn761	Input analog zero offset auto- tuning		0	1	
Pn770	Analog 1 output function selection 1: Motor speed 1V/1000rpm 2: Speed command 1V/1000rpm 3: Torque command 1V/100% torque 4: Load rate 1V/100% torque 5: Position deviation 0.001V/1 command unit 6: Position amplifier deviation 0.001V/1 command unit 7: Position command speed 5V/rated speed	0	0	32	
Pn771	Analog output 1 gain	100	-10000		%
Pn772	Analog output 1 offset	434	-10000		mV
Pn775	Analog 2 output function selection	0	0	32	
Pn776	Analog output 2 gain	100	-10000		%
Pn777	Analog output 2 offset	434	-10000		mV
Pn790	Input terminal internal forced opening	0	0	1	
Pn791	Input terminal internal forced setting	0	0	256	
Pn792	Output terminal internal forced opening	0	0	1	
Pn793	Output terminal internal forced setting	0	0	256	

4.8 Communication Area

Code	Description	Default	Lower limit	Upper limit	Unit
Pn800	232 communication address	1	0	255	
Pn801	232 communication checksum0: No checksum1: Odd checksum2: Even checksum	0	0	2	
Pn802	 232 Communication baud rate 0: 1200; 1: 2400; 2: 4800; 3: 9600; 4: 19200; 5: 38400; 6: 57600; 7: 115200 	3	0	7	
Pn805	Channel 1 monitor selection	1	0	65535	
Pn806	Channel 2 monitor selection	2	0	65535	
Pn807	Channel 3 monitor selection	3	0	65535	
Pn808	Channel 4 monitor selection	4	0	65535	
Pn809	232 communication mode 0: Modbus RTU mode 1: Oscilloscope mode	0	0	1	
Pn810	TOG_CH	0	0	10	
Pn811	TOG_TYPE	0	0	10	
Pn812	TOG_WAY	0	0	10	
Pn813	TOG_EDGE	0	0	10	
Pn814	TOG_LEVEL	0	0	65535	
Pn815	SAMPL_T	0	0	65535	
Pn816	Channel 1 proportional value	10000	0	60000	
Pn817	Channel 2 proportional value	10000	0	60000	
Pn818	Channel 3 proportional value	10000	0	60000	

Pn819	Channel 4 proportional value	10000	0	60000
Pn820	Channel 1 data type	1	0	9
Pn821	Channel 2 data type	0	0	9
Pn822	Channel 3 data type	0	0	9
Pn823	Channel 4 data type	0	0	9
Pn830	MII Communication station number	1	1	64
Pn840	MIII Communication station number	1	1	65535
Pn850	485 communication address (1- 247)	1	1	247
Pn851	485 communication mode 0: RTU mode 1: Ascll (No support)	0	0	0
Pn852	485 communication check 0: No checksum 1: Odd checksum 2: Even checksum	0	0	2
Pn853	485 communication baud rate 0: 9600; 1: 19200; 2: 38400; 3: 57600; 4: 115200	2	0	4

Chapter 5 Driver trial operation

5.1 Servo status machine function5.1.1. The driver are with below status

Status	Status name	Status identify	Function description
code			
0	Initialization	INIT	Enter the status when control stable, under the
			status, all driver internal parameters are
			initialized. After initialization completed,
			enter into POWER-ON status.
1	Initialization	POWER_ON	Initialization is complete, and the control circuit
	completed		is powered on successfully. There is no alarm
			during initialization. If the bus voltage is less
			than the undervoltage value, it enters the
			NO_MPOWER state, and the status
			POWER_LED flashes; if the bus voltage is
			higher than the charging relay pull-in value, it
			enters the READY state, and the status
			POWER_LED goes out. An alarm occurs
			during initialization, and it enters the FAULT
			state. The status POWER_LED flashes, and
			the five-digit digital tube displays the alarm
			code.
2	Main power not	NO_MPOWER	The drive system has no alarm, the bus voltage
	on		is lower than the undervoltage value, and the
			status POWER_LED flashes. The bus
			voltage rises to the charging relay closure
			value and enters the READY state.

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3	Ready	READY	The bus voltage is normal, the status
			POWER_LED is always on, and the drive
			system is ready. In the current state, the
			servo motor is not powered and is waiting for
			the driver enable command.
4	Motor running	RUN	The servo enable command is received, the
			motor is powered on, and if there is a run
			command, the motor rotates. Status
			SON_LED is always on
5	Driver fault	FAULT	Status LED blinking, servo on disabled, 5 digit
			nixie display fault code

5.1.2. Status machine switchover diagram



5.2 Servo control mode selection

Servo control mode selection through Pn200 setting

	Servo control mode selection			
	Pn200	DI_MODE_CHG	Control mode	
Pn200	1	хх	Position control mode	
	2	хх	Speed control mode	
	3	хх	Torque control mode	
	4	хх	Register torque control mode	
	5	хх	Analog torque control mode	
	6	OFF	Position control mode	
		ON	Analog speed control mode	
	7	OFF	Position control mode	
		ON	Analog torque control mode	
	8	OFF	Analog torque control mode	
		ON	Analog speed control mode	
	9	xx	VVVF control mode, mainly use in	
			Asynchronous machine operation and	
			debugging	
	Note: If Pn150 is set to 4 and Ethercat bus control is used, this function code is			
	invalid and the servo control mode is controlled by the host system.			

5.3 Servo on running

The selection of servo on mode is determined by function code Pn202.

	Servo on mode selection				
	0: Internal enable, set by Pn203(Servo on register).				
0: Driver exit RUN status, motor power not on.					
	1: Driver enter	into RUN status, mo	tor power on locked,	waiting for run	
	command				
	1: Terminal enable,	DI terminal control d	lriver enable via serv	o on DI_OFF:	
	Driver exit RUN stat	us, motor power not	on.		
	DI_ON: Driver	enter into RUN state	us, motor power on lo	ocked, waiting for	
	run command.				
Pn202	2: Direction termina	al enable, DI terminal	enable signal via for	ward start or	
	reverse start. G	enerally used in mair	nshaft control		
	3: The servo is powe	ered on and enabled.	After the servo is po	owered on, the drive	
	is automatically	controlled to enable			
	Reverse start DI	Servo status	Command		
	terminal		direction		
	OFF	READY	NULL		
	OFF	RUN	Forward]	
	ON	RUN	Reverse		
	ON	RUN	Forward		

When set Pn202=3, open power on auto enable function. Driver enter into READY status, with delay setting of Pn206, driver auto set Pn203=1, servo enter RUN status.

5.4 Servo brake output

When the servo is not enabled, the servo motor may be displaced due to external force. To prevent this undesirable situation, the motor can be mechanically held by an electromagnetic brake. All DO output interfaces can directly drive 24V relays. It is recommended to use an external power supply and use the normally open contact of the relay to control the electromagnetic brake, which effectively prevents the DO terminal from outputting insufficient power and burning the internal circuit. The recommended wiring circuit is as follows:



SVD880 Electromagnetic Brake Wiring Example:

SVD810 Electromagnetic Brake Wiring Example:



After the servo enable command is sent, the driver immediately enters the RUN state, the motor is powered on and locked, and no speed command is received. After the delay time of Pn216 (delay of brake command opening after servo command ON), the electromagnetic brake opens. To ensure that the electromagnetic brake is fully opened, a delay of T1 (10ms~1s) is required before the driver is allowed to receive speed commands.

After the drive receives the servo de-enable command, the electromagnetic brake is immediately closed, and speed commands are not allowed to be received at this time. When the motor is stopped, after the delay time of Pn217, the motor is powered off and the driver enters the READY state. The delay time of Pn217 is because the electromagnetic brake has a mechanical action delay, which can ensure that the electromagnetic brake truly locks the motor to prevent misoperation. If the driver receives the servo disable command while the motor is still running, the driver decides whether to immediately remove the motor enable state according to Pn204 (servo stop mode selection): Pn204.XX=0 or 1, the motor is disabled, and then after the delay of Pn219 (delay time of servo OFF after brake command is closed), the electromagnetic brake is closed to lock the motor shaft.

When motor stop brake work sequence diagram:



When motor running brake work sequence diagram:



5.5 Servo running command setting

5.5.1 Position loop position command setting

1.Position loop position command setting



2.Internal position command setting

Internal position command is a command of PLC, driver control the motor to position at a command speed (Pn416) from the current mechanical position to the command incremental position (Pn415), then delay (Pn417), and reposition to the starting mechanical position, and reciprocating.

Pn415	Internal position jog speed	
	Set the jog speed of the drive in position mode in rpm	
Pn416	Internal position running speed	
	Sets the speed at which the driver sends pulses	

1



3. Pulse command selection

Select pulse as position command setting, set the format of pulse







5.5.2 Mainshaft specialize position command Pulse

The servo spindle will switch between speed mode and position mode. The control mode is switched by the state of the input function terminal (DI_MODE_CHG). When the DI_MODE_CHG state is ON, the servo spindle enters the position control mode. The servo spindle dedicated position command will select the pulse command or the zero speed lock command (servo spindle accurate stop) to control the motor. The switch is made through the input function terminal (DI_BACK0).

DI_BAC	Command source		
ON	Zero speed locked, driver positioning to mechanical zero point with		
	command speed(PnE04), and offset specialize position (PnE02),		
	locked in the position.		
OFF	Pulse command, refer to above		
Ze	ro speed locked function code as below:		
	ero speed locked command mechanical zero point type selection		
	1: Mainshaft motor encoder signal Z;		
PnE01	2: External encoder signal Z;		
	3: Approach switch;		
	Absolute		
PnE02	Zero speed locked command offset		
	et the benchmark as the pulse current of one revolution position of		
	the motor encoder		
PnE04	Zero speed locked command position speed		

5.5.3Electronic gear setting

Proportional relationship between electronic gear setting position command and motor rotate position. Such as input position command 10000 pulses, motor rotate one circle, one revolution of motor encoder pulse is 8388608, then electronic gear should set

 $\frac{\text{Numerator}}{\text{Denominator}} = \frac{8388608}{10000}$

There are two ways to set the electronic gear. Directly set Pn410 (the number of command pulses for the motor to rotate one circle) = 10000. At this time, Pn406 and Pn408 are invalid. You can also set Pn406 (numerator of the electronic gear) = 8388608, Pn408 (denominator of the electronic gear) =
10000. At this time, Pn410 should be set to 0. When setting Pn406 and Pn408, you can reduce the set value, Pn406 = 524288, Pn408 = 625, but no decimals are allowed.

1

5.5.4 Limit output function

Motor encoder select absolute encoder, set current mechanical left right limit by encoder absolute position, to avoid collision by malfunction.

	Limit function selection(FDCBA)		
	A: Output to output terminal after exceeding soft limit		
	0, invalid; 1, output to output terminal		
D:: 100	B: Whether the servo alarms after reaching the limit position		
Pn420	0, off; 1, drive alarm		
	C, whether to stop running after exceeding the soft limit		
	0: continue running 1, stop running		
	D: Reserved		
	Parameter storage		
Pn421	After setting to 1, Pn422 and Pn424 are stored in EEPROM.		
	After setting the soft limit, it must be stored, otherwise it will be invalid.		
	Limit minimum		
	The minimum value of the limit function is valid when Pn420.A=1.		
Pn422	When the mechanical position is less than this value, the DO_P_MIN		
	output terminal is ON. If Pn420.B=1, the drive alarm Er1.40 is		
	triggered.		
	Limit maximum		
Dn/2/	The minimum value of the limit function is valid when Pn420.A=1.		
F11424	When the mechanical position > this value, the DO_P_MAX output		
	terminal is ON. If Pn420.B=1, the drive alarm Er1.41.		
Pn426	Relative position zero point offset		
Pn428	Position limit origin range		



5.5.5 Speed loop speed command setting

1.When set to PLC speed, the driver cycles running between Pn502 speed and Pn503 speed. Pn502 is forward speed value, Pn503 is reverse speed value, running time set by Pn521(auto acc/dec delay). Running process as below



1



2.When set to terminal speed, driver select running speed according to speed function terminal, as below time

DI_SPD1	DI_SPD2	DI_SPD_DIR	Speed value
OFF	OFF	ХХ	0
ON	OFF	OFF	Pn502
OFF	ON	OFF	Pn503
ON	ON	OFF	Pn503
ON	OFF	ON	-Pn502
OFF	ON	ON	-Pn503
ON	ON	ON	-Pn503

3.When set to analog speed, driver running the speed set by analog channel voltage

	Analog speed command channel selection
Pn740	0: Analog speed command keep as 0
	1: Analog speed command get from analog channel 1, its hardware
	connect port are pin 42,43 of CN1
	2: Analog speed command get from analog channel 2, its hardware

connect port are pin 30, 41 of CN1

Analog channel voltage range is -10V~+10V, Pn741 set as 10V voltage corresponding to percentage of rated speed. The relationship between voltage and speed command as below:



Analog speed command offsetWhen speed command is 0, analog channel input offset of voltage..Default as 8388608, corresponding input voltage value as 0V. For
example,If want 1V corresponding to speed command 0, Set $Pn741 = \frac{16777216 \times 1V}{10V \times 2} + 8388608$ In condition of servo disabled, set Pn761=1, restart driver, driver will
auto get analog voltage value, and calculate speed command
offset.





command to 0, without filtering; The larger the set value, the smoother
the speed command, but the slower the response to the input analog

4. Torque limit in speed mode

The torque limit command source is set by Pn515. If the torque limit value exceeds the maximum torque (Pn012 motor maximum torque), the torque is limited to the maximum torque, otherwise the torque is limited to within the torque limit value

Pn515	DI_TQ	DI_TQ_	Forward torque	Reverse torque limit
	_LF	LR	limit value	value
0	Х	х	Pn604	Pn605
1	ON	OFF	Pn606	Maximum torque
1	OFF	ON	Maximum torque	Pn607
1	ON	ON	Pn606	Pn607
2	Х	х	Analog torque	Analog torque

5.5.6 Torque loop torque command setting



1. Terminal torque

DI_TRQ1	DI_TRQ2	DI_SPD_DIR	Speed value
OFF	OFF	ХХ	0
ON	OFF	OFF	Pn601
OFF	ON	OFF	Pn602
ON	ON	OFF	Pn603
ON	OFF	ON	-Pn601
OFF	ON	ON	-Pn602
ON	ON	ON	-Pn603

2. Analog torque

When set to analog torque, the drive selects the analog channel voltage as the torque reference value to run.

	Analog torque command channel selection
	0: Analog torque command keep to 0
D=750	1: Analog torque command get from analog channel 1, its hardware
Pn750	connect port are pin 42,43 of CN1
	2: Analog torque command get from analog channel 2, its hardware
	connect port are pin 30,41 of CN1

Analog channel voltage range is -10V~+10V, Pn751 set 10V, voltage corresponding to percentage of rated torque. Refer to the setting of analog speed command.

Dn754	Analog torque command offset
F11734	
Pn756	Analog torque command dead zone (0.1mV)
Dn759	Analog torque command filter time constant (0.1ms)
Pn/58	

5.5.7 Internal multi-segment position command setting

When Pn200=1, Pn400=0, and Pn150=0, the servo runs in the internal register position control mode.

Internal register position control is an operation control based on the setting of each internal position. The driver provides 8 internal positions, namely internal register position 1-> internal register position 8. The function code can set the operation mode, maximum speed, position, acceleration and deceleration time and delay time after positioning for each position.

Internal register position control uses relative position as the coordinate system reference. The mechanical position (see Un-36) is the actual feedback position of the encoder, and the relative position (see Un-37) is the feedback position based on the zero point. The relationship between the two is as follows:

Relative position = mechanical position – Pn426 (relative position zero point offset)

Realize the internal register position control function by changing the Pn418 parameter

Code	Description	Default	Lower limit	Upper limit	Unit
Code Pn41 8	Description Internal register position control function 1: Start running (0x0001) 2: Stop running (0x0002) 16: Zero return running (0x0010) 256: Forward JOG (0x0100) 257: Reverse JOG (0x0101) 512: Set zero (0x0200) 513: Set minimum software limit (0x0201)	Default 0	Lower limit	Upper limit	Unit
	514: Set maximum software limit (0x0202)				

Detailed description

1 (0x0001): Start running. Start running each segment register position

according to the setting mode of Pn440

2 (0x0002): Stop running.

16 (0x0010): Return to zero operation. Start the zero return operation according to the zero return mode set by Pn432

256 (0x0100) and 257 (0x0101): Jog. It operates at Pn415 (jogging speed) and is not restricted by the software limit. Please operate with caution to prevent collision. To exit JOG, you can set Pn418=2

512 (0x0200): Set zero. Set the current mechanical position as the zero of the relative position, that is, Pn426 (relative position zero offset) = mechanical position. The setting will not save Pn426 to EEPROM and will be lost after powering on again. If you want to save, you need to set Pn421 to 1 and perform the storage operation.

513 (0x0201): Set the minimum software limit. Set the current relative position to the minimum software limit, that is, Pn422 (minimum software limit) = current relative position. The setting will not save Pn422 to EEPROM and will be lost after powering on again. If you want to save, you need to set Pn421 to 1 and perform the storage operation.

514 (0x0202): Set the maximum software limit. Set the current relative position to the maximum software limit, that is, Pn424 (maximum software limit) = current relative position. The setting will not save Pn424 to EEPROM and will be lost after powering on again. If you want to save, you need to set Pn421 to 1 and perform the storage operation.

When setting PN418 to run, first enable the servo.

The software limit is disabled by factory default. If you need to set it, please set Pn420.C=1.

Code	Description	Default	Lower limit	Upper limit	Unit
Pn420	Software limit function selection (FDCBA) A: After exceeding the software limit, output to the output terminal. 0: Close 1: Output to the output terminal B:Whether to alarm after exceeding the soft limit 0: Close 1: Alarm C : Whether to stop after exceeding the soft limit 0: Continue to running 1: Stop D: Reserved	F0000	F0000	F0111	
Pn421	Parameter storage After setting to 1, Pn422, Pn424, Pn426 are stored in EEPROM.	0	0	1	
Pn422	Software limit minimum value	0	- 2147483648	2147483647	
Pn424	Software limit maximum value	0	- 2147483648	2147483647	
Pn426	Relative position zero offset	0	- 2147483648	2147483647	
Code	Description	Default	Lower limit	Upper limit	Unit
Pn430	Number of pulses per mechanical position	10000	0	2147483647	PPS

Code	Description	Default	Lower limit	Upper limit	Unit
	Set the number of pulses sent by				
	the motor for one revolution.				
	When the mechanical structure				
	reduction ratio is 1:1, Pn410				
	needs to be set to the value of				
	Pn430.				
	Zero return method				
	0~35: Other zero return methods				
Pn432	40: Pn433 (zero return high	40	0	50	
	speed) directly return to the				
	relative position zero				
Pn433	Return to zero at high speed	100	0	1000	Rpm
Pn434	Return to zero at low speed	20	0	1000	Rpm
	Register position operating mode				
	0: Invalid		0	10	
	1:Single run				
D= 140	2: Loop operation	F			
P11440	3:DI switching	5			
	4: Sequential operation, no delay				
	5: Axis control operation, only				
	position 1 is valid				

1: Single operation, Pn418=1, runs from segment 1 to the number of segments set by Pn441, and then enters the stop state. To run again, you need to reset Pn418=1. and then position again.

2: Circular operation, Pn418=1, runs from segment 1 to the number of segments set by Pn441, then enters segment 1 again and runs to the number

of segments set by Pn441, and runs in a loop. Set Pn418=2 to stop running

3: DI switching, select segment operation according to the status of DI terminal.

DI(Internal	DI(Internal given	DI(Internal given	
given speed	speed selection 2)	speed	
direction)		selection1)	
Pn70X=14	Pn70X=13	Pn70X=12	Terminal function setting value
0	0	0	Internal register position 1
0	0	1	Internal register position 2
0	1	0	Internal register position 3
0	1	1	Internal register position 4
1	0	0	Internal register position 5
1	0	1	Internal register position 6
1	1	0	Internal register position 7
1	1	1	Internal register position 8

4: Sequential operation, no delay. Pn418=1, runs from segment 1 to the number of segments set by Pn441, and then enters the stop state. To run again, you need to reset Pn418=1. When switching between segments, there will be no more delay and waiting.

5: Axis control operation, only position 1 is valid. After Pn418=1, positioning of segment 1 is executed. The set position of segment 1 changes and the motor is immediately positioned to the new position.

For the position, speed, acceleration and deceleration, and waiting time of each segment of the internal register, please refer to page 50 of the manual to set the corresponding parameter number correctly.

6: The internal position start, stop, and return to zero can be controlled through the terminals. All use rising edge wake-up control of terminal status.

For function definition, please refer to page 58 of input terminal parameters.

5.5.8Home Return

The home return function refers to the function in position control mode, when the servo is enabled, the servo motor will actively find the zero point according to the selected home return method to complete the positioning. By selecting the home return method (Pn432), the home return signal (positive limit switch, negative limit switch, home switch, motor Z signal) can be clearly established. The different home return positions are clearly indicated in the figure below. The number in a circle indicates the code for selecting this home return mode. The direction of movement is also further indicated. The home return method can be set using the home return method (Pn432).

Before modifying the home return parameters, first set the Pn430 and Pn526 parameters and re-power on, otherwise the home return is invalid or abnormal.

In the home return sequence diagram shown below, the encoder count increases as the axis position moves to the right, with the minimum position on the left and the maximum position on the right. This method clearly describes the precise sequence of the home return operation.

After the origin return is completed, the relative position (Un-37) will be assigned a value of "0".

Relative position = Un-36 (mechanical position) - Pn426 (relative position zero offset)

During the origin return operation, other position instructions will not be executed. The servo drive will execute other position instructions only after the origin return operation is completed. After the origin return is completed, the servo drive outputs a return completion signal. The host computer determines that the origin return is completed through this signal.

Origin return supports return to zero through the etherCAT bus. The return to zero setting can be changed by changing the object dictionary 0x6098, 0x6099, and 0x609A through SDO. These object dictionaries are not recommended to be changed using PDO. The modified value of 0x6098 is written to Pn432; the modified value of 0x6099.01 is written to Pn433, and the modified value of 0x6099.02 is written to Pn434.

Before returning to the origin, please ensure that the trigger signal is correctly connected to the input terminal (positive limit switch, negative limit switch, origin switch) and the input terminal function code is correctly set.

The following is the setting of the origin return trigger signal:

Trigger	Trigger signal	Parameter setting	Definition of object
signal	input terminal	(Pn70X = D YY XX,	dictionary 0x60FD in
	(optional)	YY selects logic, XX	EtherCAT
		selects function)	communication
Positive	DI1~DI4	Pn70X=D 0 2	0x60FD.bit1
limit			
Negative	DI1~DI4	Pn70X=D 0 3	0x60FD.bit0
limit			
Home	DI1~DI4	Pn70X=D 0 25	0x60FD.bit2
switch			
Motor Z	No setup		0x60FD.bit5
signal	required		

		SVD800 SERVO	1
return	ringger signal	indstrate	
Zero	Trigger signal	Illustrate	

method		
(Pn432)		
1	Negative limit switch, motor Z	Return to zero on negative limit switch
	signal	and motor Z signal
2	Positive limit switch, motor Z	Return to zero on positive limit switch and
	signal	motor Z signal
3-4	Origin switch, motor Z signal	Return to zero on positive origin switch
		and motor Z signal
5-6	Origin switch, motor Z signal	Return to zero on negative origin switch
		and motor Z signal
7-10	Origin switch, motor Z signal,	Return to zero on origin switch, motor Z
	positive limit switch	signal and positive limit switch
11-14	Origin switch, motor Z signal,	Return to zero on the origin switch, motor
	negative limit switch	Z signal and negative limit switch
17	Origin switch	Return to zero on the negative limit switch
18	Origin switch	Return to zero on the positive limit switch
19-20	Origin switch	Return to zero on the positive origin switch
21-22	Origin switch	Return to zero on the negative origin
		switch
23-26	Origin switch, positive limit switch	Return to zero on the origin switch and
		positive limit switch
27-30	Origin switch, negative limit	Return to zero on the origin switch and
	switch	negative limit switch
33-34	Motor Z signal	Return to zero on the motor Z signal in a
		single turn
35	Origin signal	Positioning at the current position as the
		origin

40	Pn418=512 (set origin) requires	Return to zero by absolute value
	Pn421=1 to save	
41-42	Motor Z signal	Return to zero on the motor Z signal and
		torque

Description of origin return

Reverse return to zero, the deceleration point is the negative limit switch, and the origin is the motor Z signal.



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Track 1: At the beginning of the return to zero operation, the negative limit switch is invalid, and the motor runs in the reverse direction. When the negative limit switch is valid, it reverses and runs forward at a low speed to return to zero. The origin is the first Z signal detected when the negative limit switch changes from valid to invalid.

Return to zero in the positive direction, the deceleration point is the origin switch, and the origin is the motor Z signal.



Trace 1: When the return-to-zero operation starts, the forward limit switch is invalid, and the motor runs forward at the return-to-zero high speed. When the forward limit switch is valid, the motor reverses and runs in the reverse direction at the return-to-zero low speed. The origin is the first Z signal detected when the forward limit switch changes from valid to invalid.

Return to zero in the positive direction, the deceleration point is the origin switch, and the origin is the motor Z signal.



Track 1: At the beginning of the return to zero operation, the origin switch is invalid, the motor runs forward at the return to zero high speed, and

reverses to the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

- Track 2: At the beginning of the return to zero operation, the origin switch is valid, the motor runs in the reverse direction at the return to zero high speed, and continues to run in the reverse direction at the return to zero low speed when the origin switch is invalid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.
- Track 3: At the beginning of the return to zero operation, the origin switch is invalid, the motor runs forward at the return to zero high speed, and continues to run in the reverse direction at the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from invalid to valid.
- Track 4: At the beginning of the return to zero operation, the origin switch is valid, the motor runs in the reverse direction, and reverses to the return to zero low speed when the origin switch is invalid. The origin is the first Z signal detected when the origin switch changes from invalid to valid.

1

Reverse return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal.



- Track 1: When the return to zero operation starts, the origin switch is valid, the motor runs forward at the return to zero high speed, and continues to run forward at the return to zero low speed when the origin switch is invalid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.
- Track 2: When the return to zero operation starts, the origin switch is invalid, the motor runs in the reverse direction at the return to zero high speed, and reverses to run forward at the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.
- Track 3: When the return to zero operation starts, the origin switch is valid, the motor runs forward at the return to zero high speed, and reverses to run reversely at the return to zero low speed when the origin switch is invalid. The origin is the first Z signal detected when the origin switch changes from invalid to valid.
- Track 4: When the return to zero operation starts, the origin switch is invalid, the motor runs in the reverse direction at the return to zero high

speed, and continues to run reversely at the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from invalid to valid.

Return to zero in the positive direction, the deceleration point is the origin switch, and the origin is the motor Z signal.



Track 1: The origin switch is invalid and the forward limit switch is invalid at the beginning of the return to zero operation

Return to zero mode 7 The motor runs forward at the return to zero high speed, and reverses to the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from valid to invalid. Return to zero mode 8 The motor runs forward at the return to zero high speed, and

continues to run forward at the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from invalid to valid.

Return to zero mode 9 The motor runs forward at the return to zero high speed, and reverses to the return to zero low speed when the falling edge of the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from

invalid to valid.

Return to zero mode 10, the motor runs forward at the return to zero high speed, and continues to run forward at the return to zero low speed when the falling edge of the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Track 2: When the return to zero operation starts, the origin switch is valid and the forward limit switch is invalid.

Return to zero mode 7 The motor runs in reverse at the return to zero high speed, and continues to run in reverse at the return to zero low speed when the origin switch is invalid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Return to zero mode 8 The motor runs in reverse at the return to zero high speed, reverses when the origin switch is invalid and runs forward at the return to zero low speed, and the origin is the first Z signal detected when the origin switch changes from invalid to valid.

Return to zero mode 9 The motor runs in forward at the return to zero high speed, reverses when the origin switch is invalid and runs in reverse at the return to zero low speed, and the origin is the first Z signal detected when the origin switch changes from invalid to valid.

Return to zero mode 10 The motor runs in forward at the return to zero high speed, and continues to run forward at the return to zero low speed when the origin switch is invalid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

> Track 3: The origin switch is invalid and the positive limit switch is invalid at the beginning of the return to zero operation

Return to zero mode 7 The motor runs forward at the return to zero high speed, reverses when the positive limit switch is valid, and continues to run in the reverse direction at the return to zero low speed when the falling edge of the origin switch is

valid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Return to zero mode 8 The motor runs forward at the return to zero high speed, reverses when the positive limit switch is valid, reverses and runs forward at the return to zero low speed when the falling edge of the origin switch, and the origin is the first Z signal detected when the origin switch changes from invalid to valid. Return to zero mode 9 The motor runs forward at the return to zero high speed, reverses when the positive limit switch is valid, and continues to run in the reverse direction at the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from invalid to valid. Return to zero mode 10 The motor runs forward at the return to zero high speed, reverses when the positive limit switch is valid, reverses and runs forward at the return to zero low speed when the origin switch is valid, and the origin is the first Z signal detected when the origin switch is valid, and the origin is the first Z signal

Reverse return to zero, the deceleration point is the origin switch, and the origin is the motor Z signal.

1



Track 1: The origin switch is invalid and the negative limit switch is invalid at the beginning of the return to zero operation Return to zero mode 11 The motor runs in reverse at the return to zero high speed, and the origin switch is reversed to run forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Return to zero mode 12 The motor runs in reverse at the return to zero high speed, and continues to run in reverse at the return to zero low speed when the origin switch is valid. The origin is the first Z signal detected when the origin switch changes from invalid to valid. Return to zero mode 13 The motor runs in reverse at the return to zero high speed, and the falling edge of the origin switch is reversed to run forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from invalid to valid. Return to zero mode 14 The motor runs in reverse at the return to zero high speed, and continues to run in reverse at the return to zero high speed, and continues to run in reverse at the return to zero low

speed when the origin switch drops and is valid. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Track 2: When the return to zero operation starts, the origin switch is valid and the negative limit switch is invalid Return to zero mode 11 The motor runs forward at the return to zero high speed. When the origin switch is invalid, it continues to run forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from valid to invalid. Return to zero mode 12 The motor runs forward at the return to zero high speed. When the origin switch is invalid, it reverses and runs reversely at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from invalid to valid. Return to zero mode 13 The motor runs reversely at the return to zero high speed. When the origin switch is invalid, it reverses and runs forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from invalid to valid. Return to zero mode 14 The motor runs forward at the return to zero high speed. When the origin switch is invalid, it continues to run forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Track 3: The origin switch is invalid and the negative limit switch is invalid at the beginning of the return to zero operation Return to zero mode 11 The motor runs in reverse at the return to zero high speed, the negative limit switch is reversed effectively, and the falling edge of the origin switch is valid. It continues to run forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Return to zero mode 12 The motor runs in reverse at the return to zero

high speed, the negative limit switch is reversed effectively, and the falling edge of the origin switch is reversed to reverse at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from invalid to valid.

Return to zero mode 13 The motor runs in reverse at the return to zero high speed, the negative limit switch is reversed effectively, and the origin switch is valid. It continues to run forward at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from invalid to valid.

Return to zero mode 14 The motor runs in reverse at the return to zero high speed, the negative limit switch is reversed effectively, and the origin switch is reversed when the origin switch is valid. It runs in reverse at the return to zero low speed. The origin is the first Z signal detected when the origin switch changes from valid to invalid.

Reverse return to zero, the deceleration point and the origin are negative limit switches.



Trace 1: The negative limit switch is invalid at the beginning of the return to zero operation, and the motor runs in the reverse direction at the return to zero high speed, with the origin being the negative limit switch.

Forward return to zero, the deceleration point and origin are the positive limit switches.



Trace 1: When the return-to-zero operation starts, the positive limit switch is invalid, the motor runs forward at the return-to-zero high speed, and the origin is the positive limit switch.

Return to zero in the positive direction, the deceleration point and the origin are the origin switch.



- Track 1: The origin switch is invalid at the start of the return to zero operation, the motor runs forward at the return to zero high speed, and the origin is the origin switch.
- Track 2: The origin switch is valid at the start of the return to zero operation, the motor runs reverse at the return to zero high speed, and the origin is the origin switch.
- Track 3: The origin switch is invalid at the start of the return to zero operation, the motor runs forward at the return to zero high speed, and the origin is the origin switch.
- Track 4: The origin switch is valid at the start of the return to zero operation, the motor runs reverse at the return to zero high speed, and the origin is the origin switch.

Reverse return to zero, deceleration point and origin are the origin switch.



- Track 1: When the return to zero operation starts, the origin switch is valid, the motor runs forward at the return to zero high speed, and the origin is the origin switch.
- Track 2: When the return to zero operation starts, the origin switch is invalid, the motor runs reverse at the return to zero high speed, and the origin is the origin switch.
- Track 3: When the return to zero operation starts, the origin switch is valid, the motor runs forward at the return to zero high speed, and the origin is the origin switch.
- Track 4: When the return to zero operation starts, the origin switch is invalid, the motor runs reverse at the return to zero high speed, and the origin is the origin switch.

Return to zero in the positive direction, the deceleration point and the origin are the origin switch, and the limit is the positive limit switch.



Track 1: At the beginning of the return to zero operation, the origin switch is invalid and the forward limit switch is invalid

Return to zero mode 23 The motor runs forward at the return to zero high speed, and reverses to the return to zero low speed when the origin switch is valid, and the origin is the origin switch.

Return to zero mode 24 The motor runs forward at the return to zero high speed, and continues to run forward at the return to zero low speed when the origin switch is valid, and the origin is the origin switch. Return to zero mode 25 The motor runs forward at the return to zero high speed, and reverses to the return to zero low speed when the falling edge of the origin switch is valid, and the origin is the origin switch. Return to zero mode 26 The motor runs forward at the return to zero

high speed, and continues to run forward at the return to zero low speed when the falling edge of the origin switch is valid, and the origin is the origin switch.

Track 2: At the beginning of the return to zero operation, the origin switch is valid and the forward limit switch is invalid Return to zero mode 23 The motor runs reversely at the return to zero high speed, and continues to run reversely at the return to zero low speed when the origin switch is invalid, and the origin is the origin switch.

In zero return mode 24, the motor runs in reverse at zero return high speed, and reverses when the origin switch is invalid and runs forward at zero return low speed. The origin is the origin switch.

In zero return mode 25, the motor runs in forward at zero return high speed, and reverses when the origin switch is invalid and runs in reverse at zero return low speed. The origin is the origin switch.

In zero return mode 26, the motor runs in forward at zero return high speed, and continues to run forward at zero return low speed when the origin switch is invalid, and the origin is the origin switch.

Track 3: The origin switch is invalid and the forward limit switch is invalid at the beginning of the zero return operation In zero return mode 23, the motor runs in forward at zero return high

speed, reverses when the forward limit switch is valid, and continues to run in reverse at zero return low speed when the origin switch falls, and the origin is the origin switch.

In zero return mode 24, the motor runs in forward at zero return high speed, reverses when the forward limit switch is valid, and reverses when the origin switch falls and runs forward at zero return low speed. The origin is the origin switch.

Home mode 25 The motor runs forward at home high speed, reverses when the forward limit switch is effective, and continues to run in the reverse direction at home low speed when the origin switch is effective. The origin is the origin switch.

Home mode 26 The motor runs forward at home high speed, reverses when the forward limit switch is effective, reverses when the origin switch is effective, and runs forward at home low speed, and the origin is the origin switch.

Reverse return to zero, the deceleration point and origin are the origin switch, and the limit is the negative limit switch.



Track 1: At the beginning of the return to zero operation, the origin switch is invalid and the negative limit switch is invalid Return to zero mode 27 The motor runs in reverse at the return to zero high speed, and the origin switch is reversed to run forward at the return

to zero low speed. The origin is the origin switch.

Return to zero mode 28 The motor runs in reverse at the return to zero high speed, and continues to run in reverse at the return to zero low speed when the origin switch is valid. The origin is the origin switch. Return to zero mode 29 The motor runs in reverse at the return to zero high speed, and the falling edge of the origin switch is reversed to run forward at the return to zero low speed. The origin is the origin switch. Return to zero mode 30 The motor runs in reverse at the return to zero high speed, and continues to run in reverse at the return to zero high speed, and continues to run in reverse at the return to zero low speed when the origin switch is valid. The origin is the origin switch.

Track 2: At the beginning of the return to zero operation, the origin switch is valid and the negative limit switch is invalid

Return to zero mode 27 The motor runs in forward at the return to zero high speed, and continues to run forward at the return to zero low speed when the origin switch is invalid. The origin is the origin switch.

Return to zero mode 28: The motor runs forward at return to zero high speed, reverses when the origin switch is invalid, and runs reversely at return to zero low speed, and the origin is the origin switch.

Return to zero mode 29: The motor runs reversely at return to zero high speed, reverses when the origin switch is invalid, and runs forward at return to zero low speed, and the origin is the origin switch.

Return to zero mode 30: The motor runs forward at return to zero high speed, and continues to run forward at return to zero low speed when the origin switch is invalid, and the origin is the origin switch.

Track 3: The origin switch is invalid and the negative limit switch is invalid at the beginning of the return to zero operation Return to zero mode 27: The motor runs reversely at return to zero high speed, reverses when the negative limit switch is valid, and continues to run forward at return to zero low speed when the falling edge of the origin switch is valid, and the origin is the origin switch. Return to zero mode 28: The motor runs reversely at return to zero high speed, reverses when the negative limit switch is valid, and reverses when the falling edge of the origin switch is valid, and runs reversely at return to zero low speed, and the origin is the origin switch. Home mode 29 The motor runs in reverse at home high speed, reverses when the negative limit switch is effective, and continues to run forward at home low speed when the origin switch is effective. The origin is the origin switch. Home mode 30 The motor runs in reverse at home high speed, reverses when the negative limit switch is effective, reverses when the origin switch is effective, and runs in reverse at home low speed, and the origin is the origin switch.



♦ Single-turn zero return, the origin is the Z signal.
- Track 1: Return to zero mode 33 The motor returns to zero in the reverse direction, and the origin is the motor Z signal.
- Track 2: Return to zero mode 34 The motor returns to zero in the forward direction, and the origin is the motor Z signal.

♦ Current position is the origin

Return to zero mode 35, take the current position as the origin.

♦ The absolute value returns to zero.

Zero return mode 40 returns to the relative position zero point directly with Pn433 (zero return high speed)

The torque returns to zero and the deceleration point origin is the mechanical limit position.



Trace 1: Zero return mode 41 The motor returns to zero in the positive direction at the zero return low speed (pn434). When it reaches the positive mechanical limit position, the torque reaches the set value (Pn437) and delays the time of Pn438. When the speed is zero, the current position is the origin.

Zero return mode 42 The motor returns to zero in the reverse direction at the zero return low speed (pn434). When it reaches the negative

mechanical limit position, the torque reaches the set value (Pn437) and delays the time of Pn438. When the speed is zero, the current position is the origin

Chapter 6 Digital input output terminal function

6.1 Input terminal

6.1.1 Input terminal function setting

The distribution of digital input terminals is as follows:

Pn150	SVD880(CN2)	SVD810(CN1)
0: Pulse type		Default as 4 (Can select 7)
3: M3	2	
4: EtherCAT	2	2

Digital input terminal function setting, Pn700~Pn709 set each input terminal function and logic, input format is dYYXX

XX: Input terminal function setting, input terminal function can not be repeated, otherwise the terminal is invalid.

YY: Input terminal logic set, 0, Positive logic; 1, Negative logic. XX Each function as below:

DI functio	DI function setting (function code setting format = DYYXX. Function code number			
Pn700.XX	≺~Pn707.XX)			
Functio	Function Name Description (H means the input is valid; L means the input is invalid)			
n				
Numbe				
r				
0	No function			
1	Servo enabled	Input is on when Pn202=1. Level control. H=servo enable; L=servo		
	disable.			
2	Forward	★This function is only valid in position control mode.		
	prohibited	\star When Pn208=1, the forward limit input is turned on; when		

	(forward limit)	Pn209=1, the reverse limit input is turned on.	
3	Reverse	\star After the input is valid, the servo action is determined by	
	prohibited	Pn204.C	
	(reverse limit)	Pn204.C = 0, servo is disabled	
		Pn204.C = 1, servo is not enabled. When the forward limit is	
		valid, the motor does not receive the forward command, and the	
		reverse command is not affected; when the reverse limit is valid, the	
		motor does not receive the reverse command, and the forward	
		command is not affected.	
4	(ESP) External	H=Emergency stop is valid. If the motor is in running state, the	
	emergency stop	enable will be removed and the servo will enter the ready state.	
		However, if Pn131.C=1, the servo drive will alarm Er107 and enter	
		the alarm state.	
5	Proportional		
	control		
	Proportional		
	integral control		
	switch		
6	Forward	\star This input function is valid in position mode, speed mode, and	
	external torque	torque mode	
	limit	★The input function is enabled when Pn515=1.	
7	Reverse	\star When the forward external torque limit function is valid, the	
	external torque	forward torque is limited to Pn606; when it is invalid, the forward	
	limit	torque is limited to the maximum torque.	
		\star When the reverse external torque limit function is valid, the	
		reverse torque is limited to Pn607; when it is invalid, the reverse	
		torque is limited to the maximum torque.	
8	Alarm clear	When the input is valid, the current alarm is cleared.	

9	Position error				
	clear				
10	Prohibit pulse	★This input fur	nction is effec	tive in positio	n mode.
	command input	★When the inp	ut is valid, the	e position sett	ting command is no longer
		received.			
11	Servo lock (zero				
	speed clamp)				
12	Internal given	★In position co	ntrol mode, it	is valid when	Pn400=0 (position control
	speed selection	mode selects	internal reg	ister positior	n control) and Pn440=3
	1	(register positio	on operation r	node selects	DI switching mode).
13	Internal given	Speed	Speed 2	Speed 1	Register position s
	speed selection	direction			number
	2	0	0	0	Register position 1 (Pn45)
14	Internal given	0	0	1	Register position 2 (Pn45
	speed direction	0	1	0	Register position 3 (Pn464
		0	1	1	Register position 4 (Pn47
		1	0	0	Register position 5 (Pn47
		1	0	1	Register position 6 (Pn48
		1	1	0	Register position 7 (Pn48
		1	1	1	Register position 8 (Pn494
		★ In speed co	ntrol mode,	it is effective	e when Pn500=2 (speed
		comes from terminal setting).			
		Speed 2	Speed 1	Speed refer	rence source
		0	0	0	
		0	1	Internally se	et speed 1 (Pn502)
		1	0	Internally se	et speed 2 (Pn503)
		1	1	Internally se	et speed 3 (Pn504)

			r				
			When the	When the speed direction input function is valid, the given speed is			
			forward; v	forward; when it is invalid, the given speed is reverse.			
			★ In torqu	e control mo	de, it is valid when Pn611 (speed limit source		
			selection)	= 1.			
			Speed 2	Speed 1	Speed reference source		
			0	0	Speed limit comes from internal register		
					Pn502		
			0	1	Speed limit comes from internal register		
					Pn502		
			1	0	Speed limit comes from internal register		
					Pn503		
			1	1	Speed limit comes from internal register		
			Pn504				
			The	The speed direction input function is invalid.			
15	Control	mode					
	switching						
16	Internal	given	★Only valid in torque control mode				
	torque 1		★Valid wł	nen Pn600=1			
17	Internal	given	Torque 2	Torque 1	Torque setting source		
	torque 2		0	0	0		
			0	1	The given torque comes from the internal		
					register Pn601		
			1	0	The given torque comes from the internal		
			register Pn602				
			1	1	The given torque comes from the internal		
					register Pn603		
			★Only valid in position control and speed control mode				
18	Gain swite	ching	★Only va	lid in position	control and speed control mode		

		when input function is valid, select gain group 2; when input function		
		is invalid, select gain group 1		
19	Pulse enable			
	mode			
20	Multiplier			
	selection 1			
21	Multiplier			
	selection 2			
22	Multiplier			
	selection 3			
23	Forward start	★Only valid in speed mode		
24	Reverse start	★Function is enabled when Pn202=2		
		\star Forward start input function is valid, motor is enabled, when there		
		is a speed command, the motor rotates forward; invalid, the motor		
		is disabled.		
		\star Reverse start input function is valid, motor is enabled, when there		
		is a speed command, the motor rotates reversely; invalid, the motor		
		is disabled.		
		\star Forward start and reverse start are valid at the same time, motor		
		is enabled, when there is a speed command, the motor rotates		
		forward; invalid, the motor is disabled.		
25	Origin signal	\star Effective in homing mode, Pn200=1, enter homing mode through		
		bus or Pn418=16 or start the homing input terminal function.		
26	External probe	★Effective when bus control (Pn150=3 or 4)		
	input 1			
27	External probe			
	input 2			
28	Register	★Effective in position control mode		

	position start	★Function is enabled when Pn400=0	
	operation	\star Rising edge is effective, the motor starts running according to the	
		set internal register setting mode, and automatically enters the stop	
		state after execution. If you need to start again, you need to	
		generate a rising edge pulse signal.	
29	Start return to	★Effective in position control mode	
	zero	★Rising edge is effective	
30	Register	★Effective in position control mode	
	position stop	★Function is enabled when Pn400=0	
	operation	\star Rising edge is effective, the motor stops in the internal register	
		setting mode.	

6.2 Output terminal

6.2.1 Output terminal function setting

The distribution of digital output terminals is as follows:

Pn150	SVD880(CN2)	SVD810(CN1)
0: Pulse type		Default as 4 (Can select 8)
3:M3	2	
4:EtherCAT	2	2

Pn710~Pn719 set each output terminals function and logic, input format

is dYYXX

XX: Output terminal function setting

YY: Output terminal logic setting, 0, Positive logic; 1, Negative logic

XX each function as below:

DO function setting (function code setting format = DYYXX. Function code number Pn710.XX~Pn717.XX)

Functio		Description (H means the output is valid; L means the output is
n	Function Name	invalid)
Numbe	Function Name	
r		
	Sorvo roody	H = Servo drive is ready
0	Servoready	L = Servo drive has not been initialized or has an alarm
	Serve enabled	H = Servo drive is enabled
1	Servo enabled	L = Servo drive is not enabled
	Alorm	H = Servo drive has an alarm
2	Alaini	L = Servo drive has no alarm
3	Stop signal	
		\star Valid in position mode, uncertain in other modes
	Desitioning	H=motor reaches given position, given position - feedback
	Positioning	position <pn730 (pulse)<="" td=""></pn730>
	compieted	L=motor is positioning, given position - feedback position >=Pn730
4		(pulse)
5	Speed reached	
	7	★Valid in all modes
	Zero speed	H=motor is at zero speed, feedback speed <pn723< td=""></pn723<>
6	state output	L=motor is rotating, feedback speed >Pn723
7	Torque reached	
		★ Valid in all modes
	Torque limited	H = given torque reaches the maximum torque limit
8		L = given torque does not reach the maximum torque limit
9	Speed limited	

10	Position error pre-alarm	 ★Effective in position mode H= Pulse error > Pn731(0.1r) L= Pulse error < Pn731(0.1r)
11	Electromagnetic brake	 ★ Valid in all modes H = electromagnetic brake open L = electromagnetic brake closed
12	Motor z signal output	 ★Valid in all modes H=Motor position is not on Z signal L=Motor position is on Z signal
18	Return to zero completed output	 ★Effective in position mode H=zero return completed, always H until zero return is started again, the output changes to L L=zero return in progress
19	Minimum limit output	
20	Maximum limit output Origin position	
21	output	

Chapter 7 Gain adjustment

7.1 Speed loop gain adjustment

1. Speed loop control gain diagram



2. Gain switchover function

Driver built in two group control gain parameters, switchover according to different application.

Item	Gain group 1	Gain group 2
Speed loop proportional gain	300	304
Speed loop integral time constant	301	305
Position loop proportional gain	302	306

Gain switchover mode set depend on Pn315

Pn315	Gain switchover mode FDCBA						
	A,Gain group switchover condition						
	Pn315.A	Pn315.A Switch by Gain group 1 Gain group 2					
	0	0 Terminal DI_GAIN_SEL=OFF DI_GAIN_SEL=ON					
	switchover						
	1	Pulse error	Pulse error< Pn316	Pulse error≥Pn316			

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2	Set speed	Set speed <pn317< th=""><th>Set speed≥Pn317</th></pn317<>	Set speed≥Pn317	
3	Feedback	Feedback	Feedback speed	
	speed	speed <pn317< th=""><th colspan="2">≥Pn317</th></pn317<>	≥Pn317	
4	Set torque	Set torque <pn319< th=""><th>Set torque≥Pn319</th></pn319<>	Set torque≥Pn319	
5	Feedback	Feedback	Feedback	
	torque	torque <pn319< th=""><th>torque≥Pn319</th></pn319<>	torque≥Pn319	

B,PI/P Switchover condition

Pn315.B	Switch by	PI control	P control
0	Terminal	DI_GAIN_SEL=OFF	DI_GAIN_SEL=ON
	switchover		
1	Pulse error	Pulse error< Pn321	Pulse error≥Pn321
2	Set speed	Set speed <pn322< td=""><td>Set speed≥Pn322</td></pn322<>	Set speed≥Pn322
3	Feedback	Feedback	Feedback
	speed	speed <pn322< td=""><td>speed≥Pn322</td></pn322<>	speed≥Pn322
4	Set torque	Set torque <pn323< td=""><td>Set torque≥Pn323</td></pn323<>	Set torque≥Pn323
5	Feedback	Feedback	Feedback
	torque	torque <pn323< td=""><td>torque≥Pn323</td></pn323<>	torque≥Pn323

C, Gain group switchover invalid

0: Gain group not switch, select gain group 1 as control gain

1 or 2: Gain group single condition switching, the switching condition is determined by Pn315.A $\,$





3. Gain adjustment detail description

Speed loop P(Pn300|Pn304) adjust control rigidity. The larger the value, the faster the speed response, the smaller the overshoot, and the smaller the fluctuation during stable speed operation. However, if this value exceeds the mechanical response frequency, it may cause the adjustment fail to converge, lead the mechanical vibration.



The speed loop I (Pn301 | Pn305) is an integral time constant to eliminate static errors. The smaller the value, the greater the integral gain, and the faster the response. However, the overshoot will increase, the adjustment time will be extended, and excessive overshoot will cause steady-state oscillation.

Torque feedforward compensation is to improve the response of feedback speed. The larger the set value, the faster the speed response, but it is easy to cause oscillation. To eliminate oscillations, first-order inertial filtering is applied to torque feedforward compensation, and the filtering time is set by Pn310. If Pn309 is 0, torque feedforward compensation is no longer effective.

4. Moment of inertia self-learning function

Pn530 Rotate inertial auto-tuning function mode selection

0: Only online learning is performed, and the value of Pn302 is not updated.

1: Slow self-learning. The value of Pn302 is changed at a low speed according

to the learned moment of inertia.

2: Medium self-learning. The value of Pn302 is changed at a medium speed according to the learned moment of inertia.

3: Fast self-learning. The value of Pn302 is changed at a high speed according to the learned moment of inertia.

Rotate inertial auto-tuning should meet below condition:

- 1. Motor forward reverse running, minimum speed not less than 100 rpm $_{\circ}$
- 2. Motor acc/dec time not less than 200ms/1000rpm
- 3. If in the process of rotate inertial auto-tuning, make sure limit switch is valid
- 4. Motor running speed should be smooth.

After start the auto-tuning function, the learned rotate inertia can be viewed in

the Un area

Un-24	Forward rotate inertial learned value(0.01kg.cm2)
Un-25	Reverse rotate inertial learned value(0.01kg.cm2)
Un-26	Rotate inertial learned average(%), The learned result is percentage of the
	rotate inertial of the motor

7.2 Position loop gain adjustment

1. Position gain adjustment diagram



2. Relate function code

Position loop proportional gain 1

This parameter is used to adjust the following performance of the set pulse and feedback pulse. The larger the set value, the smaller the following error of the given pulse and feedback pulse, and the faster the response. However, if the set value is too large, exceeding the vibration frequency of the mechanical system can cause vibration.

Pn302 This value can be increased without mechanical vibration as much as possible, and when increase this value, the proportional gain of the speed loop should be increased to prevent insufficient gain of the speed loop from causing the response of the speed loop to lag behind the changes in the position loop, cause vibration. When reduce this value, the proportional gain of the speed loop should also be reduced to prevent overshoot of the speed loop from causing vibration. For the high mechanical vibration frequency of the screw or rack, the value is higher when the load is on these mechanical structures; When the load is a belt or chain, this value is also lower because their mechanical vibration frequency is lower.

	Position loop proportional gain 2				
Pn306	When switchover condition is met, take the gain as position loop proportional				
	gain.				
Pn307	Speed feedforward compensation proportional gain				
	The parameter is to reduce static pulse error, improve dynamic response				
Pn308	Speed feedforward compensation filter time constant				
	Perform first-order inertial filtering on velocity feedforward compensation. The				
	larger the set value, the slower the feedforward compensation response				

3. Position loop dual gain switching function

Pn315(FDCB	A = Switch Gain	B = Gain	C=PI/P	D=PI/P
A)	Enable	switching mode	switching enable	switching mode
0	Switching is	Fixed gain 1	Switching is	NULL
	invalid		invalid	
1	Switching is	Fixed gain 2	Switching is	NULL
	invalid		invalid	
2	NULL	Terminal switch	NULL	NULL
3	NULL	NULL	NULL	NULL
9 NULL		Position	NULL	NULL
		command +		
		feedback speed		

When Pn315.B=9, the functions are as follows:

Gain group 2: with position command given

Gain group 1: without position command given, and the feedback speed is less than the speed of Pn317, after the delay of Pn324 on the basis of meeting the above conditions, enter gain group 1

7.3 Torque loop gain adjustment

1. Torque loop gain adjustment diagram



Torque loop control gain parameters

Pn119	Torque loop proportional gain					
	The larger the setting value, the faster the torque response and the smaller					
	the following error between the given torque and the feedback torque.					
	However, if the setting value exceeds the motor response frequency, the					
	output torque will oscillate and the motor noise will increase.					
Pn120	Torque loop integral gain: used to eliminate static error					

2. Weak field control

Weak field control is used for the embedded permanent magnet synchronous motors, which improves the operating speed of the motor when the back EMF of the motor is saturated

Pn345	Weak field function valid
	0: No
	1: Use weak field control
Pn346	Voltage use ratio
	The larger the set value, the weaker the magnetic current will decrease at the

	same speed. The recommended maximum setting is 98%.				
Pn347	Weak field control gain				
	The larger the set value, the faster the weak field response, but will easy lead				
	to vibration				
Pn348	Maximum current of weak field control, The value is the percentage of				
	maximum torque.				
Pn349	Factory debugging, please set to 1				

Chapter 8 Communication function

8.1 RS232 Hardware connect of controller

SVD880/SVD810 driver supports the serial communication function of RS232, and the communication protocol is MODBUS RTU protocol. It provides PC communication software to assist in debugging. Wiring please refer to the chapter 2.4.4.

8.2 RS232 Communication parameter of controller

Pn800	Comm	Communication address (0-247,0 is broadcast address)									
Dp901	RS232	Commu	inication	odd/eve	n parity	bit					
FIIOUT	0, No check; 1, Odd parity check; 2, Even parity check										
	RS232 communication baud rate										
	Set communication speed ratio										
Pn802	Set val ue	0	1	2	3	4	5	6	7		
	Ba ud rat e	1200	2400	4800	9600	19200	38400	57600	115200		

8.3 RS232 communication protocol

8.3.1 Character structure

RTU mode: 11 bit structure. Structure Format as below:

Check way (d1-03)	Starting bit	Data bit	Check bit	Stop bit
0(No check)	1	8	0	2
1(Odd parity check)	1	8	1	1
2(Even-parity check)	1	8	1	1

8.3.2 Data format

1.RTU mode:

STX	ADR	CMD	DAT	LRC	END

Start	Communication	Communication	Data	Data		Data	Check	End flag
Flag T	address	command	1	2		n	code	Т

Note: T is the stationary time period, which depends on the

communication baud rate. Set t=the time of sending 1 byte data ,T=4t $_{\circ}$

2.Data format description:

Format of data DAT is depend on communication command CMD.

Register address definition :

Parameter	Start	Offs	For example	Operation
area	addre	et		
	SS			
Pn area	0x3B2C	2	Pn300 address=0x3B2C+2*300	Read-write
Un area	0x493C	4	Un-08 address=0x493C+4*(8-1)	Read-only
Fn area	0x4874	2	Fn=05 address=0x4874+4*(5-1)	Write-only

(1) Communication command 03H: Read the value of register

Read the value of function code Pn300, address is 0x3D84,host request:

Addre	Function	Register	Register	CRC
ss	code	address	number(2B	check
		(2Byte)	yte)	(2Byte)
01	03	0x3D84	0x0001	

Driver normal response: (Value of Pn300 is 300)

Addre	Function	Register	Register 1		CRC
SS	code	bytes (2Byte)	value (2Byte)		check
					(2Byte)
01	03	0x0002	0x01F4	More register data	

Driver response command for communication fault:

Addre	Function	Error code	CRC check
SS	code		(2Byte)
01	86	0x01	

- (2)
 - Communication command 06H: Set value of register
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Set value of driver Pn300 to 1000, Pn300 corresponding address is 0x3D84, data

format as below:

Addres	Function	Address	Refer value	CRC check
s	code	(2Byte)	(2Byte)	(2Byte)
01	06	0x3D84	0x03E8	

Driver normal response:

Addres	Function	Address	Refer value	CRC check
s	code	(2Byte)	(2Byte)	(2Byte)
01	06	0x3D84	0x03E8	

Driver response command for communication error:

Addre	Function	Error	CRC check
SS	code	code	(2Byte)
01	86	0x01	

(3) Communication command 10H: set value of various register

Set Pn410 of driver as 8388608, upper PC send command

Addres	Function	Address(Register	Byte	Register	CRC
s	code	2Byte)	number(2By	s	value	check
			te)			(2Byte)
01	10	0x3E60	0x0002	4	0x00800000	

Driver receive command correctly and response

Addr	Function	Address(2	Register number	CRC check
ess	code	Byte)	(2Byte)	(2Byte)
01	10	0x3E60	0x0002	

Driver response command for communication error or command error

Addr	Function	Error code	CRC check (2Byte)
ess	code		
01	90	0x01	

(4)

Communication error code description

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Data	Desc	cription		
01	Illegal function code			
02	Illegal data address			
03	Illegal data			
04	Reserved			
05	Slave equipment fault			
06	Check fault			
07	Data address exceed limit	Data address exceed limit		
08	Password not open			
09	Set data over limit	The estima register value		
0.0	Not allow modify when			
UA	running	enor		
0B	Write EEPROM error			

(5) Fn command description

Address (16-bit binary)	Data	Function
0x4874	0001H	Enter JOG mode and servo on
	0002H	Forward JOG
	0003H	Reverse JOG
	0004H	Servo stop rotate
	0005H	Servo exit enable,and exit JOG mode
0x4878	0001H	Clear fault
0x487C	0001H	Software reset
0x4880	8001H	Force output terminal 1 valid
	8002H	Force output terminal 2 valid
	8004H	Force output terminal 3 valid

Address (16-bit binary)	Data	Function
	8008H	Force output terminal 4 valid
	8XXXH	Enter force output terminal mode, each bit of
		the low byte corresponds to force output
		state
	0XXXH	Exit force output terminal mode

8.4 RS485 Hardware connect of controller

SVD810 driver supports RS485 serial communication function. The communication protocol is MODBUS RTU protocol. The wiring definition is as follows

P	in	Symbol Description		Introduction
		DC 495	485 communication cable	The driver built with a
	39	K3480-	terminal -	network matching resistor,
CN1	40	RS485	485 communication cable	so no need additional half-
40		+	terminal +	duplex communication

8.5 RS485 Communication parameter of controller

After the communication function parameters are set, the driver needs to be powered on again to be effective.

	Communication address(1-247)
Pn850	Set communication address, default as 1, When multiple slave stations are
	used in cascade, the addresses of multiple slave stations cannot be repeated.
Dp951	Communication mode
PIIODI	Support to set to 0, that is RTU mode

Dn952	Communication odd/even parity bit
P11002	0, No check; 1, Odd parity check; 2, Even parity check
	Communication baud rate (0~7)
	Set communication rate (bps) default as 2
	0=9600
Dp952	1=19200
P11000	2=38400
	3=57600
	4=119200
	其他=38400

8.6 RS485 Communication Protocol

8.6.1 Character structure

RTU mode: 11 bit structure. Structure Format as below:

Check way (Pn852)	Starting bit	Data bit	Check bit	Stop bit
0(No check)	1	8	0	2
1(Odd parity check)	1	8	1	1
2(Even-parity check)	1	8	1	1

8.6.2 Data format

1.RTU mode:

STX	ADR	CMD	DAT				CRC	END
Start Flag T	Communication address	Communication command	Data 1	Data 2		Dat a n	Check code	End flag T
	8 bit	8 bit	8 bit	8 bit	8 bit	8 bit	16 bit	

Note: A. T is the quiescent time period, default as 3ms.

B. Maximum length of the data format is 60, it will alarm if exceed

2. Register definition:

Parameter	Start	Bytes	For example	Operation

area	address			
Pn area	0	2	The function code address is the	Read-write
			communication address. If you	
			want to read and write register	
			Pn300, its register address is	
			0x012C	
Fn area	1700	2	Fn-01 address=1701(0x06A5)	Write-only
			Fn-02 address=1702(0x06A6)	
			Fn-13 address=1713(0x06B1)	
Un area	1800	4	Un-01 address=1800(0x0708)	Read-only
			Un-02 address=1801(0x0709)	
			Un-03 address=1802(0x070A)	
			Un-40 address=1839(0x072F)	

3. Data format description:

Format of data DAT is depend on communication command CMD.

Register address definition

(1) Communication command 03H: Read the value of register

Read the value of function code Pn300, address is 0x3D84,host request:

Addre	Function	Register	Register	CRC
ss	code	address	number(2B	check
		(2Byte)	yte)	(2Byte)
01	03	0x012C	0x0001	

Driver normal response: (Value of Pn300 is 300)

Addre	Function	Register	Register 1	 CRC
SS	code	bytes (2Byte)	value (2Byte)	check

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					(2Byte)
01	03	0x0002	0x01F4	More register data	

Driver response command for communication fault:

Addre	Function	Error code	CRC check
SS	code		(2Byte)
01	86	0x01	

Note: Each address in the Un area corresponds to 4 bytes, and the number of registers must be set to 0x0002 to read the correct value.

Some function codes in the Pn area are 32bit, and the number of registers must be set to 0x0002 when reading, such as Pn410.

(2) Communication command 06H: Set value of register Set value of driver Pn300 to 1000, Pn300 corresponding address is 0x012C, data format as below:

Addres	Function	Address	Refer value	CRC check
s	code	(2Byte)	(2Byte)	(2Byte)
01	06	0x012C	0x03E8	

Driver normal response:

Addres	Function	Address	Refer value	CRC check
s	code	(2Byte)	(2Byte)	(2Byte)
01	06	0x012C	0x03E8	

Driver response command for communication error:

Addre	Function	Error	CRC check
ss	code	code	(2Byte)
01	86	0x01	

(3) Communication command 10H: set value of various register

Set Pn410 of driver as 8388608, upper PC send command

Addres	Function	Address(Register	Byte	Register	CRC
s	code	2Byte)	number(2By	s	value	check

			te)			(2Byte)
01	10	0x019A	0x0002	4	0x00800000	

Driver receive command correctly and response

Addre	Function	Address(2	Register number	CRC check
SS	code	Byte)	(2Byte)	(2Byte)
01	10	0x019A	0x0002	

Driver response command for communication error or command error

Addre	Function	Error code	CRC check (2Byte)
SS	code		
01	90	0x01	

(4) Communication error code description

Data	Description					
01	Illegal function code					
02	Illegal data address					
03	Illegal data					
04	Reserved	Reserved				
05	Slave equipment fault					
06	Check fault					
07	Data address exceed limit					
08	Password not open					
09	Set data over limit	The potting register value				
	Not allow modify when	The setting register value				
UA	running	enor				
0B	Write EEPROM error					

(5) Fn command description

Address	Dete	Function	
(decimal)	Data	Function	
1701	0001H	Enter JOG mode and servo on	
	0002H	Forward JOG	
	0003H	Reverse JOG	
	0004H	Servo stop rotate	
	0005H	Servo exit enable,and exit JOG mode	
1702	No support	Write any data will return to fault code 0x02	
1703	0001H	Clear fault	
1705	0001H	Software reset	
1707	8001H	Force output terminal 1 valid	
	8002H	Force output terminal 2 valid	
	8004H	Force output terminal 3 valid	
	8008H	Force output terminal 4 valid	
	8XXXH	Enter force output terminal mode, each bit of	
		the low byte corresponds to force output	
		state	
	0XXXH	Exit force output terminal mode	
1713	0001H	Read encoder EEPROM	
	0002H	Write encoder EEPROM	
	0003H	Clear encoder multi-turn data and alarm	
	0004H	Clear encoder alarm	

8.7 MODBUS CRC(Cyclical Redundancy Check)

CRC verification method: Redundant cyclic code (CRC) contains 2 bytes, that is, 16 bits of binary. The CRC code is calculated by the sending

device and placed at the end of the transmitted information. The receiving device recalculates the CRC code of the received information and compares whether the calculated CRC code matches the received one. If the two do not match, it indicates an error. The calculation method of the CRC code is to first preset the 16-bit register to all 1. Then gradually process each 8-bit data information. When calculating the CRC code, only 8 data bits are used, the start bit and the stop bit, and the parity bit if there is a parity bit, are not involved in the CRC code calculation. When calculating the CRC code, the 8-bit data is XORed with the data in the register, and the result is shifted one byte to the lower position, and the highest bit is filled with 0. Then check the lowest bit. If the lowest bit is 1, the content of the register is XORed with the preset number. If the lowest bit is 0, no XOR operation is performed. This process is repeated 8 times. After the 8th shift, the next 8 bits are XORed with the current content of the register, and the process is repeated 8 times as above. When all data information is processed, the final register content is the CRC code value. The data in the CRC code is sent and received with the low byte first.

The CRC code calculation steps:

1. Preset 16 bit register to hexadecimal FFFF (all are 1). The register is CRC register.

2. The first 8-bit data are separate and dissimilar or the low bit of the 16-bit CRC register and place the result in the CRC register.

3. Move the contents of the register to the right one bit (towards the low bit), fill the highest bit with 0, and check the least bit.

4. If the least bit is 0: repeat step 3 (move again); If the least bit is1: CRC register XOR with polynomial A001 (1010 0000 0000 0001);

5. Repeat steps 3 and 4 until moved 8 times to the right, so that the entire 8-bit data has been processed; Repeat steps 2 to 5 for the next

8-bit data processing; The final CRC register is the CRC code

8.8 Mechatrolink-III、Ethercat communication protocol related setting



8.8.1 MECHATROLINK-III communication protocol setting

Pn840	MIII Communication station number					
	This protocol support up to 62 slave stations. Please set the value between					
	~62.					
Pn841	MIII communication fault code					

8.8.2 Ethercat communication protocol setting



Note: No need to set Ethercat communication station number,Be sure the network cable entering from the lower port of SVD880(CN1)/SVD810(CN3) and outputting from the upper port!

1. EtherCAT introduction

EtherCAT is an industrial Ethernet technology based on the standard Ethernet physical layer, it is more suitable for industrial control scenarios compared to traditional Ethernet protocols. It meet the requirements of small data volume but high real-time reliability and also with simple and flexible networking.

EtherCAT equipment has master station and slave station. The master station category includes CNC control systems, PLCs, etc., while the slave station category includes servo controllers, IO, etc. Normal network cables can be connected to the master and slave stations. For the environmental impact of industrial sites, generally select category 5 and above network cables.

The SVD880-C02 servo belongs to the slave category, and current support application protocol is CoE (EtherCAT based CAN application protocol). The master station need to configure SVD880-C02 as a DS402 type.

2. PDO data object

The real-time data in the control data is transmitted through PDO (Process Data Object) by synchronization managers 2 and 3 respectively. In PDO, the master station sends out slave station receive called RxPDO or Output, and the slave

station sends out master station receive, called TxPDO or Input. After the EtherCAT data frame is sent from the master station, it is sequentially transmitted from the first slave station to the last slave station. During this process, each slave station exchanges data with the data frame, and then sends it back from the last slave station to the master station

Configure TxPDO mapping table for synchronization manager 2 (0x1C13), which can be mapped to $0x1A00 \sim 0x1A02$

Index number	Name	English name
0x6041	Status word	Status Word
0x6064	Actual position	Actual Position
0x606C	Actual speed	Actual Velocity
0x6077	Actual torque	Torque Actual Value
0x6011	Operation mode display	Mode Of Operation Display
0x603F	Alarm code	Error Code
0x60B9	Probe status	Touch Probe Status
0x60BA	Probe position 1	Touch Probe 1 Position Value
0x60BC	Probe position 2	Touch Probe 2 Position Value

TxPDO support below objects

TxPDO mapping table as below

Index	Sub-Index	Default	Setting range
1A00	0	5	0~9
CSV CSP mode	1	0x60410010	
	2	0x60640020	
	3	0x606C0020	
	4	0x60770010	
	5	0x60610008	

1A01	0	3	0~9
CSP mode	1	0x60410010	
	2	0x60640020	
	3	0x60770010	
1A02	0	2	0~9
CSV mode	1	0x60410010	
	2	0x606C0020	

RxPDO support below objects

Index	Name	English Name
0x6040	Control word	Control Word
0x607A	Target position	Target Position
0x60FF	Target speed	Target Velocity
0x6060	Operation mode	Mode Of Operation
0X6061	Current control mode	
0x60B8	Probe function control	Touch Probe Function

RxPDO mapping table as below

Index	Sub-index	Default	Setting range
1600	0	4	0~9
CSV CSP mode	1	0x60400010	
	2	0x607A0020	
	3	0x60FF0020	
	4	0x60600008	
1601	0	2	0~9
CSP mode	1	0x60400010	
	2	0x607A0020	
1602	0	2	0~9
CSV mode	1	0x60400010	
	2	0x60FF0020	

Note : Above PDO default to mandatory allocation, Sync management

0x1C12 default selection 0x1600 $\$ 0x1C13 default selection 0x1A00,

0x1600~1602 and 0x1A00~0x1A02 both can be configured through the upper system.
3.SDO data object

SDO data is transmitted by synchronization managers 0 and 1 through mailboxes and is mainly used to transmit data that does not require high realtime performance, such as parameter configuration.

Index	Data	Number of	Access	Name	English name
number (hex)	Types	sub-	Rights		
		indexes			
603F	UINT16	0	RO	Error code	Error Code
6040	UINT16	0	RW	Control word	Control Word
6041	UINT16	0	RO	Status word	Status Word
6060	INT8	0	RW	Operation	Modes of Operation
				mode	
6061	INT8	0	RO	Operation	Modes of Operation Display
				mode display	
6064	INT32	0	RO	Actual position	Position Actual Value
606C	INT32	0	RO	Actual speed	Velocity Actual Value
6077	INT16	0	RO	Actual torque	Torque Actual Value
607A	INT32	0	RW	Target position	Target Position
60FF	INT32	0	RW	Target speed	Target Velocity
6502	UINT32	0	RO	Supported	Supported Drive Modes
				modes	
60FB	RECORD	3	RW	Position control	Position Control Parameters
				parameters	
60F9	ARRAY	2	RW	Speed control	Velocity Control Parameters
				parameters	
60F6	RECORD	5	RW	Torque control	Torque Control Parameters

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				parameters		
The sub i	ndexes of	f the RECC	ORD type	description		
Index(HEX) Sub-inde	x Data	Access	Name	Minimum	Maximum
	No	o type	permissio	n	value	value
60FB	0	UINT8	RO	Index number	-	-
60FB	1	UINT32	RW	Position control ga	ain 100	10000
60FB	2	UINT32	RW	Rigidity level settir	ng 1	20
60FB	3	UINT32	RW	Inertial ratio setting	g 0	1500
60F9	0	UINT8	RO	Index number	-	-
60F9	1	UINT16	RW	Speed control gair	n 100	10000
60F9	2	UINT16	RW	Speed control	100	10000
				integral time		
				constant		
60F6	0	UINT8	RO	Index number	-	-
60F6	1	UINT32	RW	Torque command	10	5000
				gain		
60F6	2	UINT32	RW	Torque command	10	5000
				integral time		
				constant		
60F6	3	UINT32	RW	Friction	0	200
				compensation		
				positive torque		
				percentage		
60F6	4	UINT32	RW	Friction	0	200

				compensation negative torque percentage		
60F6	5	UINT32	RW	Friction compensation speed	0	1000

Index	Data	Sub-	Access	Name	Minimu	Maximu	Default
(hex)	type	index	permissio		m	m value	value
		No.	n		value		
2000	UINT32	0	RW	Control mode	0	22	1
2001	UINT32	0	RW	Servo enable way	0	6	6
2002	UINT32	0	RW	Motor forward	0	1	0
2003	UINT32	0	RW	Dynamic brake time	100	50000	300
				(ms)			
2004	UINT32	0	RW	Discharge resistance	20	1000	50
				value (Ω)			
2005	UINT32	0	RW	Discharge resistor	1	30000	50
				power (W)			
2006	UINT32	0	RW	Delay timestop	0	60000	100
				after brake			
				command close			
				servo OFF(ms)			
				Delay timerotate			
2007	UINT32	0	RW	after brake	0	60000	100
				command close			
				servo OFF(ms			
				Speedrotate when			
2008	UINT32	0	RW	brake command	0	600	100
				close (RPM)			
2009	UINT32	0	RW	Electronic gear	1	99999	1

				molecule			
200A	UINT32	0	RW	Electronic gear	1	99999	1
				denominator			
200B	UINT32	0	RW	Position reached	0	65535	5
				width (1pulse)			
200C	UINT32	0	RW	Position error pre-	0	10000	100
				warning pulse			
				number (1% turn)			
200D	UINT32	0	RW	Position error	0	10000	200
				warning pulse			
				number(1% turn)			

EtherCAT bus communication also supports the following control modes

(Un032 monitors the current control mode):

0x06: home mode

0x08: CSP position control mode

0x09: CSV speed control mode

0x0A: CST torque control mode

Control mode	Related	Illustrate
(Un032)	Object	
	Dictionary	
0x06	0x6098	Zero return mode
home	0x6099.01	Zero return high speed: speed before touching the
		zero switch: unit/s
	0x6099.02	Zero return low speed: speed after touching the zero
		switch: unit/s
	0x609A	Zero return acceleration time: unit/s2

0x08	0x607A	Position control command: unit	
CSP	0x6064	Current position: unit	
	0x60E0	Forward torque limit: 0.1%.	
	0x60E1	Reverse torque limit: 0.1%.	
0x09	0x60FF	Speed control command: unit	
CSV	0x606C	Current speed: unit	
	0x60E0	Forward torque limit: 0.1%. Pn515 setting 2 is valid	
	0x60E1	Reverse torque limit: 0.1%. Pn515 setting 2 is valid	
0x0A	0x6071	Torque control command: 0.1%.	
CST	Ox6077	Current torque: 0.1%	
	0x607F	Speed limit: speed unit.	
	0x6080	Maximum speed: rpm. This object dictionary is not	
		supported for the time being	

4.Alarm code list

The alarm code is uploaded to the master station device through 0x603F

Error code(HEX)	Servo display	Description
2220	Er.101	Current too large protection
3210	Er.103	Bus voltage too high
3220	Er.104	Bus voltage too low
4210	Er.105	Overheat protection
8A80	Er.107	External emergency stop
		protection
5410	Er.108	Inverter unit protection
8611	Er.111	Position error too large
8A81	Er.112	Forward/Reverse prohibit at the
		same time
8400	Er.113	Speed exceed protection
7380	Er.210	Encoder communication fault
7381	Er.212	Encoder communication overtime
7382	Er.213	Encoder parameter read error
7383	Er.220	Encoder error overspeed
7384	Er.221	Encoder error FS
7385	Er.222	Encoder error count fault
7386	Er.223	Encoder error OF
7387	Er.224	Encoder error overheat
7388	Er.225	Encoder error multi-circle fault
7389	Er.226	Encoder error battery fault
738A	Er.227	Encoder error battery warning
738B	Er.228	Encoder error OTHER
5210	Er.114	Current sensor fault

Chapter 9 Fault and treatment measures

9.1 Fault list

Fault	Description	Possible Causes and solutions
code		
Er0.20	Main board FPGA error	Looking for technical support
Er0.30	Servo internal fault	Looking for technical support
Er0.40	EEPROM initialization fault	Parameter register initialization failed
Er1.01	Over current	1, Acceleration time too short
		2, Motor cable U,V,W wiring error
		3, Encoder initialization fault
		4, Pn105 setting value too small,
		increase Pn105 value
		5, The torque limit of driver is too
		large, check the value of Pn604
		and Pn605
		6,Servo motor fault, change servo
		motor
Er1.02	Motor overload	1,Motor cable U,V,W wiring error or
		encoder wiring error
		2, The setting of motor parameters in
		the driver is different from the actual
		motor parameters
		3, Motor stall or the load suddenly
		change
		4, Load problem, Change the load
		5, The brake do not release when

Fault	Description	Possible Causes and solutions
code		
		running
		6, Input voltage abnormal
Er1.03	Bus over voltage	1,Check the 3phase input voltage of
		the power
		2, Release resistor fault
		3, Setting too low for the over
		voltage
		4, Deceleration time is too short
Er1.04	Bus under voltage	1,Check three phase of the power
		and output bus voltage
		2, Release unit fault
		3, Setting too high for the under
		voltage
Er1.05	Driver overheat	1,Fan fault, change fan
		2,Load too large, increase cooling or
		change to higher power driver
		3, Environment temperature too high
		4, Release unit fault or release
		power set too large
		5, Driver install improper
Er1.06	Motor overheat	1,Motor fan fault
		2,Motor power not enough, change
		to higher power motor
		3,Motor temperature sensor damage
Er1.07	External emergency stop	DI terminal ESP effective
		1,Input terminal function setting

Fault	Description	Possible Causes and solutions
code		
		error, check the setting value of
		Pn700~Pn709
		2, Eliminating external faults,
		Release ESP terminal effective
Er1.08	Output short circuit	Module pass-through protection
		IPM fault
		UVW phase short circuit or ground
		short circuit
		Check motor U,V,W,PE wiring, and
		check whether the motor insulation
		is good
Er1.09	Inverter unit drive fault	The drive signal of the inverter unit is
		blocked
Er1.10	Control power fault	Control power input voltage is too
		low or control circuit fault
Er1.11	Position pulse error too large	1, U,V,W 3 phase wiring fault
		2, Upper PC given speed exceed
		motor maximum speed
		3, Load problem
		4, Motor abnormal
Er1.12	Forward and reverse signal abnormal	Forward limit switch and reverse limit
	prohibit	switch effect at the same time
		1, Check whether the hardware limit
		wiring is correct.
		2, Check whether the hardware limit
		parameters of Pn700~Pn709 are

Fault	Description	Possible Causes and solutions
code		
		correct.
		3, Pn208=0 shields the forward
		hardware limit; Pn209=0 shields the
		reverse hardware limit.
Er1.13	Speed too high	1,Position pulse command frequency
		is too high
		2, Motor U,V,W wiring error or
		encoder wiring error
		3, Speed loop gain setting too large
Er1.14	Current detection initialization error	Output current detection sensor
	warning	fault, looking for technical support
Er1.15	Output phase loss	Driver fault
Er1.20	Pn parameter detection exceed limit	1, Motor parameters setting error
	warning	2, Gain parameters setting error
		3, The magnetic declination setting
		exceeds the limit. Please check the
		following function codes:
		Pn015,Pn300,Pn301,Pn302,Pn303,
		Pn026,Pn030
Er1.21	Frequency division parameter setting	1.The output frequency may exceed
	error	500K due to the frequency division
		parameter setting value.
		Check whether the settings of
		Pn406, Pn408 and Pn410 are
		correct. 2. Set Pn403.D=0 to turn off
		the hardware frequency division

Fault	Description	Possible Causes and solutions
code		
		output function
Er1.30	Hardware detection error	Looking for technical support
Er1.40	Position exceed limit warning	1,Check whether the settings of
		Pn422,Pn424 are correct,
		Pn422 <pn424< td=""></pn424<>
		2, Check mechanical position
Er1.60	Software settings do not match hardware	Software settings do not match
		hardware
		Set Pn107 parameters correctly
Er1.61	Software settings do not match hardware	Software settings do not match
		hardware
		Set Pn107 parameters correctly
Er1.70	Motor stall alarm	The machine is stuck, check the
		machine.
Er1.71	Motor stall alarm	1: The encoder initial position
		acquisition failed to update the motor
		angle.
		2: The motor phase sequence wiring
		error caused the motor to stall,
		check the UVW wiring.
Er2.01	First encoder module error	The first encoder does not support
		this encoder type
Er2.02	Second encoder module error	The second encoder does not
		support this encoder type
Er2.10	Encoder continuously fail to detect	Er2.XX fault codes are all Tamagawa
	position data warning	communication encoder faults

Fault	Description	Possible Causes and solutions
code		
Er2.11	Encoder response data verification error	1,Check encoder shielding and
Er2.12	Encoder disconnect warning	solder joints
Er2.13	Encoder write EEPROM Fault	2,Rewrite encoder EEPROM motor
Er2.14	Encoder read EEPROM fault	parameter data
Er2.15	Encoder response data check fault	3, Check whether the motor
Er2.16	Encoder command sending overflow fault	parameters written to the encoder
Er2.17	Encoder communication module fault	are correct
Er2.18	Encoder EEPROM doesn't find motor	4,Check whether the setting value of
	parameter fault	Pn028, Pn029, Pn030, Pn038,
Er2.19	Encoder communication data verification	and Pn044 are correct
Er2.1A	error	5,ERP39: Battery error clear failed, if
Er2.1B		restart can not clear the fault, set
Er2.1C	Encoder sending command not match	Pn230,Pn231 to 0, close and restart,
Er2.1D	Encoder initialization communication	set Pn230, Pn231 to 1 again.
	abnormal	
Er2.20	Over-speed fault was detected inside the	There is warning inside the encoder
	encoder	1. Execute the operation of clearing
Er2.21	Encoder detected absolute data anomaly	the encoder warning, and then reset
Er2.22	Encoder internal position data calculation	the driver
	fault	
Er2.23	Encoder detect count exceed	
Er2.24	Over-temperature fault was detected	
	inside the encoder.	
Er2.25	Encoder detect multi-turn exceed	
Er2.26	Encoder battery under voltage warning	Battery voltage too low
		Replace the battery, clear the

Fault code	Description	Possible Causes and solutions
		encoder warning and multi-turn data,
		and pay attention to the mechanical
		zero position.
Er2.27	Encoder battery under voltage warning	The battery voltage is lower than
		3.2V, replace the battery
Er2.28	The encoder detected other errors	There is waning inside the encoder
		1. Execute the operation of clearing
		the encoder warning, and then reset
		the drive
Er2.29	Encoder detect CRC check error	1, Check the encoder cable and
		shield.
		Replace the encoder cable.
		2, Check whether the ground cable
		is in good condition
Er4.01	Bus communication disconnect	1, Bus communication is interfered.
		2, The network cable is
		disconnected
Er4.02	Bus communication module detection	Check whether the setting of Pn150
	fault	matches the drive model.
Er4.10	Bus communication other warning	Looking for technical support

9.2 Fault history record

Fault records can be queried through functional area Fn002. 1-xxx are the latest fault records. Adjust the up and down keys to view the last 10 fault records. Fault history can be cleared through function parameter Fn003