

SD Series Servo Drive



User Manual

SD Series V2.0

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Warning and Alert



Warning

- Do not proceed to the assembly of the line while electrifying.
- Input power of servo driver have two series: 220V & 380V , please pay more attention during using
- All needs to add isolation transformer; add electrical reactor when using 380V servo driver.
- Circuit & change components between entering shutting down the power supply and stopping showing LED light of the Servo Driver.
- The output of servo drive[U,V,W]must NOT touch the AC power, and UVW is connected to UVW of servo motor one by one.
- Before remove servo driver, must power off over 5 minutes.



Alert

- ◆ Install the fan if the temperature around is too high while the Servo Driver is installed in the Control Board
- ◆ Do not proceed to the Anti-Pressure-Test to the Servo Driver.
- ◆ Confirm the quick stop function is available before operate Servo Driver.
- ◆ Matching up machine to change the user parameter setting before machine performs.If there is no according correct setting number,it could lead to out of control or breakdown.

Safety Proceeding:

Check the covering letter details before installing,running,maintaining and examining. Furthermore, only the profession-qualified people can proceed to the line-assembly.

Safety proceeding in the covering letter discriminate between “Warning” & “Alert”.



Warning : Indicating the possibility dangerous situation. It could cause the death or serious damage if being ignored.



Alert : Indicating the possibility dangerous situation. It could cause smaller or lighter human injured and damage of equipment.

Please read the user manual detail before using Servo Driver.

First of all,thank you for using SZGH SD series Servo Driver and Servo Motors. SZGH Servo Driver can be controlled by CNC Controller or motion control card, and provide excellent performance for a wide range of applications and different requirement from customers.

Read this user manual before using SZGH SD Series Servo Driver. Contents of the manual comprises:

- ◆ Servo System checking,installing and procedure of assembly line.
- ◆ Controller procedure for digital board,Status displaying,unusual alarm and strategy explanation.
- ◆ Servo System control function,running testing and procedures adjusted.
- ◆ Explanation for all parameter of Servo Driver.

In order to daily examine,maintain and understand the reason of unusual situation and handle strategy,please put this user manual in safe place to read it anytime.

P.S: The end user should own this user manual,in order to make the Servo Driver bring the best performance.

-Catalog-

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Chapter 1 Checking and Installing

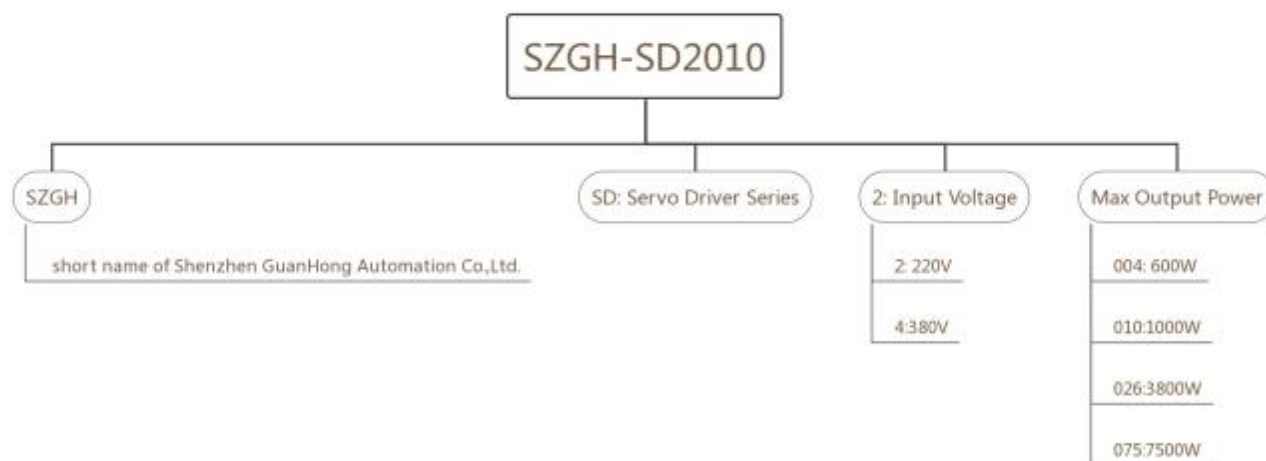
1.1 Checking Products

Our Servo Pack have already completely been functionally examined before leaving the factory. In order to protect the products from the damage during transportation, please check the items below before sealing off the pack:

- Check if the model of servo driver and motor are the same with the models of ordering.
(About the model explanation, please check the chapters below)
- Check if there are damage or scrape out side of the servo driver and motor.
(If there is any damage during transportation, do not power ON)
- Check if there are any bad assembly or slipped component in the Servo Driver and Motor.
- Check if the Motor’s rotor and shaft can be rotated smoothly by hand
(The Servo Motor with Mechanical-Brake can not be rotated directly)
- Check if there is user manual and accessories in the servo pack.
- There must be the “QC”-seal in each servo drive, if not,please do not proceed Power ON.

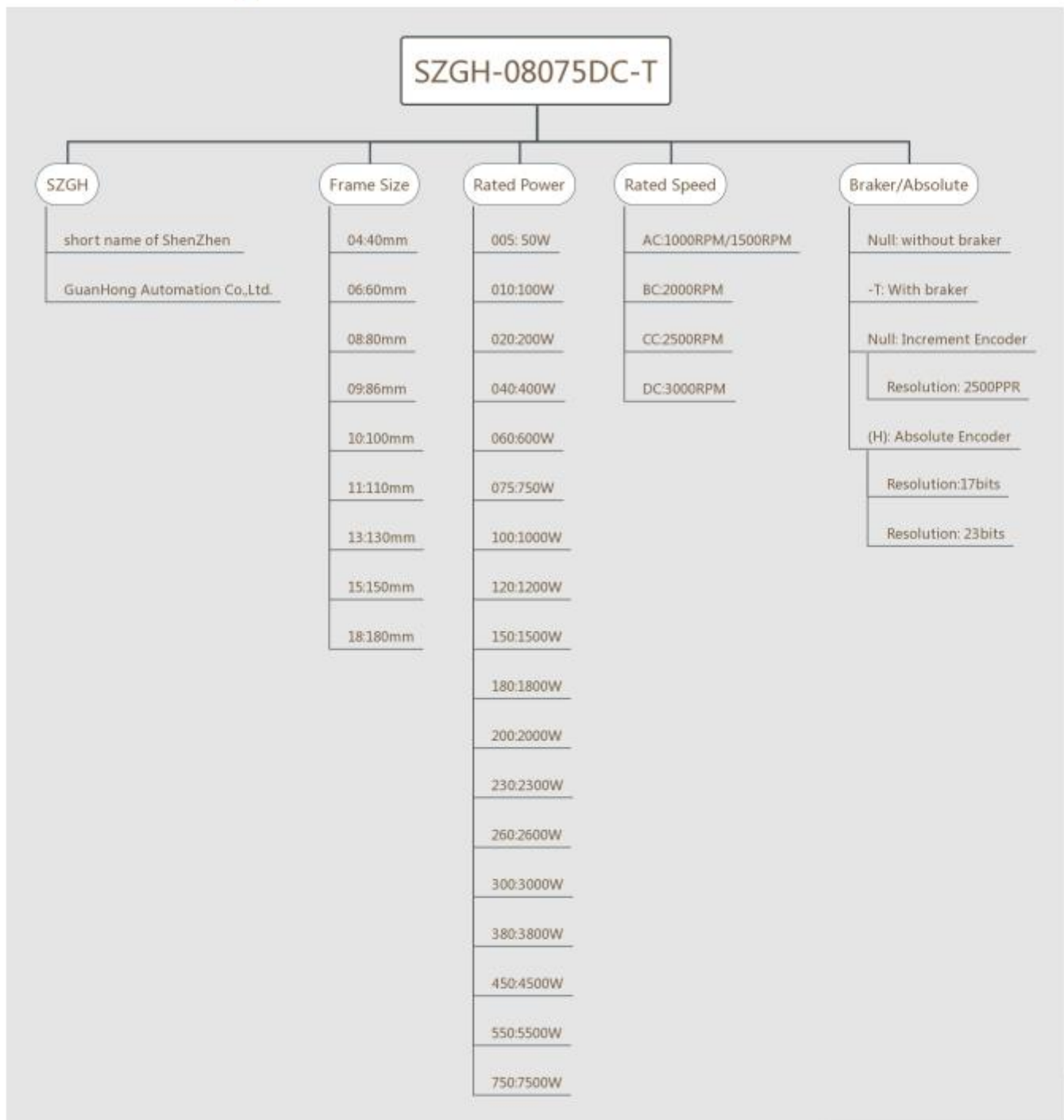
If there is any bug or irregular under the situation above,please contact with us or SZGH Local sales representative or distributor instantly.

1.1.1 Confirming with Servo Drivers



- Note:**
- 1.SZGH-SD2004 servo driver can drive SZGH-06060DC max.
 - 2.SZGH-SD2026 servo driver can drive SZGH-13380CC max.
 - 3.SZGH-SD4038 servo driver can drive SZGH-18370AC max.
 - 4.SZGH-SD4075 servo driver can drive SZGH-18750CC max.

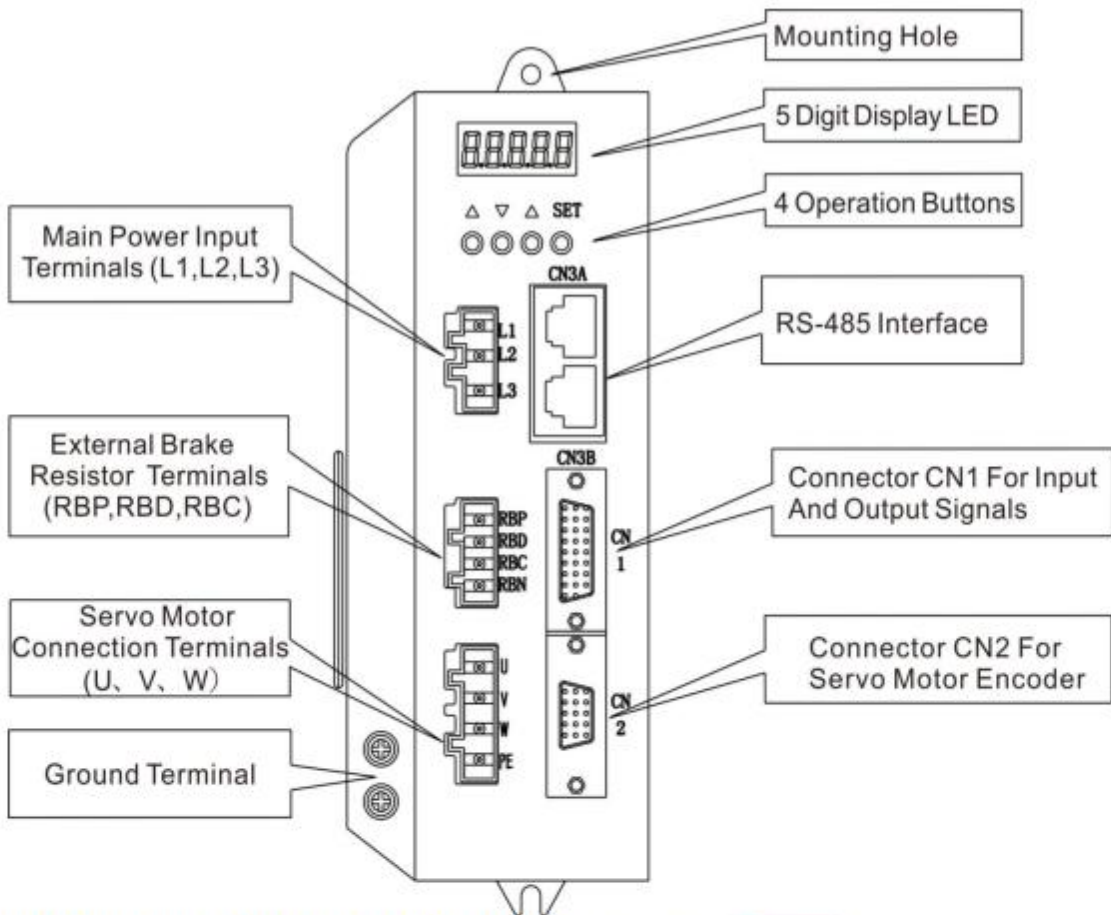
1.1.1 Confirming with Servo Motor



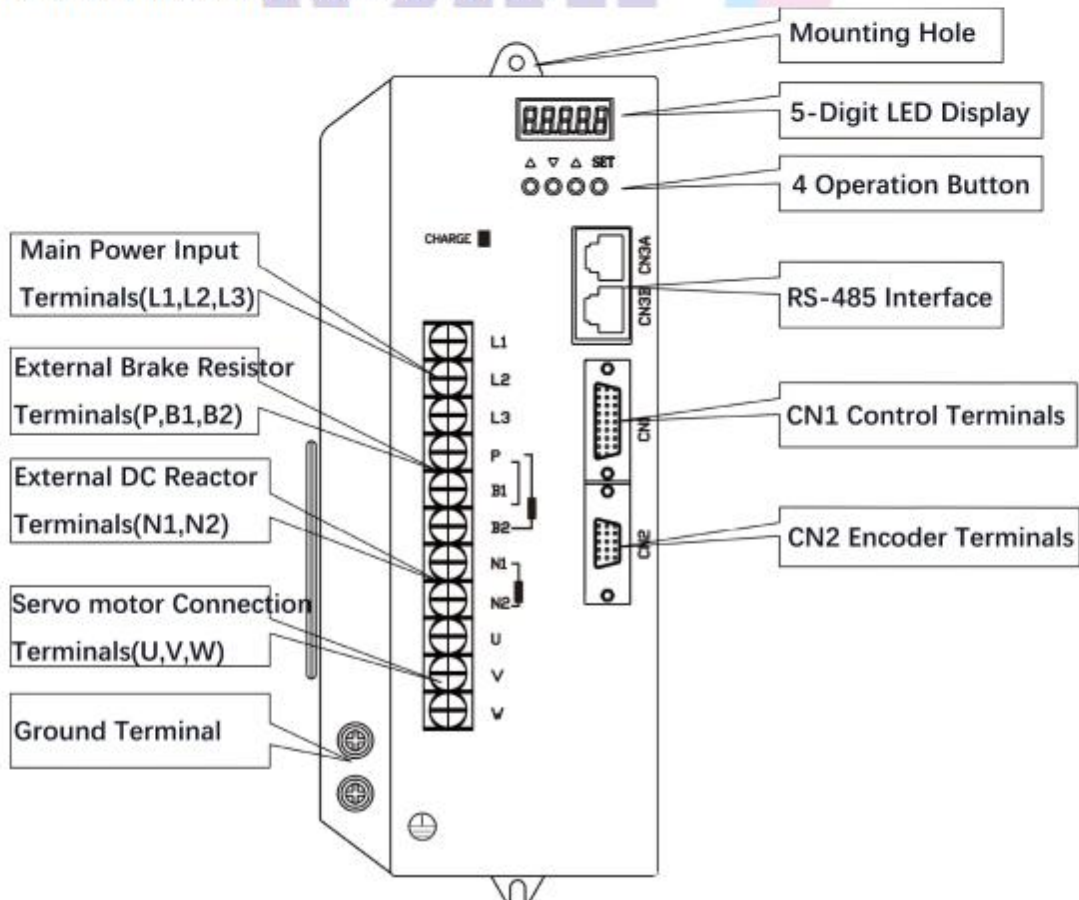
Note: These are only some model of servo motors display above as limit,not all model. Any asks ,please discuss with our sales representative or distributor.

1.2 Front Panel of Servo Driver

1.2.1 Front Panel of SZGH-SD2004/SD2010/SD2026



1.2.2 Front Panel of SZGH-SD4038/SD4075

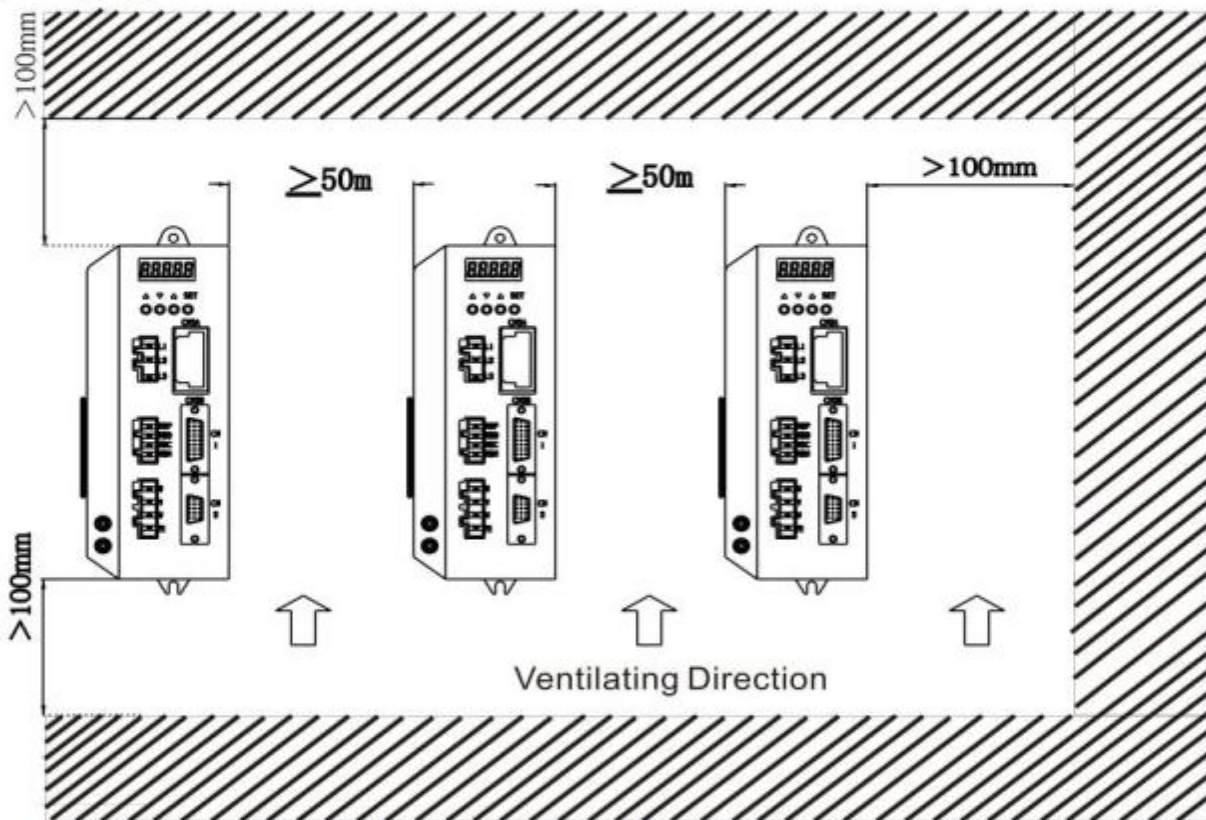


1.3 Motor and Drive Installation

1.3.1 Method of Installation of drive

- In order to get good cooling the servo drive should normally mount in vertical direction with the topside down.
- For installing the servo drive, fasten the backboard of servo driver with M4 screw.
- Reserve enough space around the servo drives as shown in the reference diagram. In order to guarantee the performance of the servo drive and the lifetime, please make the space as full as possible.
- To provide vertical wind to the heat sink of the servo drive should install ventilating fans in the control cubicle.
- Prevent the dust or the iron filings entering the servo drive when install the control cubicle.

Keep enough space between drives in the electric cabinet.



1.3.2 Environmental Conditions for Installation of drive

Since the environment conditions for servo drive installation have the direct influence to the normal function and service life of the servo driver, therefore the environment conditions must be conformed to the following conditions:

- Ambient temperature: 0 to 40 °C, Ambient humidity, less than 80% (no dew).
- Storage temperature: -40 to 50 °C, Storage humidity, less than 93% (no dew).
- Vibration: less than 0.5G.
- Preventive measure shall be taken against raindrop or moist environment.
- Preventive measure shall be taken against corrosion by oil mist and salinity.

- When several drive installments in a control cubicle, for good ventilation please reserve enough space around each driver, install fans to provide effective cooling, keep less than 40 °C for long-term trouble-free service.
- If there are vibration sources nearby (punch press for example) and no way to avoid it, please use absorb or anti-vibration rubber filling piece.
- If there is disturbance from interfering equipment nearby along the wiring to the servo, anti-jamming measure must be used to guarantee normal work of the servo drive. However, the noise filter can increase current leakage; therefore an insulating transformer in the input terminals of power supply should be installed.

1.3.3 Method of Servo motor Installation

- For horizontal installation:

in order to prevent water, oil, etc. from entering inside of the servo motor, please put the cable connector downward.

- For vertical installation:

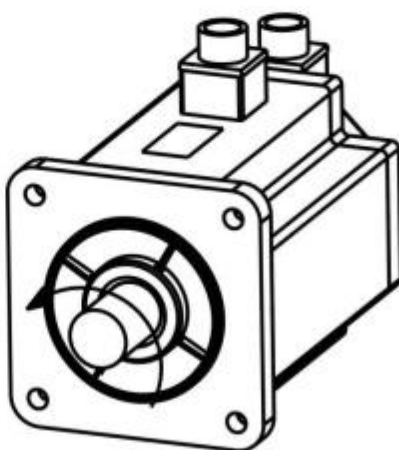
if the shaft of the servo motor is in upward direction with a speed reducer, some prevention measure shall be taken against entering inside of the servo motor by oil come from the speed reducer.

- Motor shaft extension should be long enough, or may cause vibration while motor is in running.

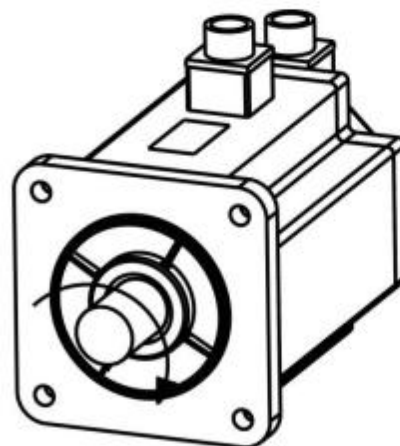
- In case of installation or removing the servo motor, please do not hit the servo motor with a hammer, otherwise the shaft and the encoder can be damaged.

1.3.4 Definition of Rotation Direction for Servo Motor

The motor rotating direction description in this manual is defined as facing the shaft of the servo motor. If the rotating shaft is in counterclockwise direction it will be called as positive direction, and in clockwise as reversal direction.



**Positive Rotation
(CCW)**



**Reversal Rotation
(CW)**

Chapter 2 Specifications

2.1 Introduction of Specifications

SD Series	SD2004	SD2010	SD2026	SD4038	SD4075
Output Power	50W~600W	400W~1kW	600W~3.8kW	2kW~3.8kW	3kW~7.5kW
Input Power	Single/Three Phase AC220V-15%~+10% 50/60Hz			Three Phase 380V	
Control Mode	0: Position Control; 1:Speed Control; 2: Torque Control; 3:Position/Speed Control; 4:Position/Torque Control; 5:Speed/Torque Control				
Protective Function	Over-speed/Over-voltage/Under-voltage/Over-current/Overload/Encoder Error/ Control Power Error/ Position Offset Error				
Monitor Function	Speed/Position/Pulses/Offset/Torque/Current/Status...				
Digital Input	1:Servo Enable; 2:Alarm Reset; 3:CCW-Forbidden; 4:CW-Forbidden; 5:Clear Position Offset; 6:Pulse Input Forbidden; 7:CCW Torque Limit; 8:CW Torque Limit				
Digital Output	Servo-Ready On/Alarm/Orientation End/Braker Control				
Energy Braking	Support built-in/External Resistor Braking				
Drive Load	Less than 3 times of rotor inertia				
Display	5 bits LED Indicator display , 4 Operate keys				
Communication	RS485				
Position Control	Input Mode	0: Pulse+Direction			
		1:CCW/CW Pulse			
		2: AB Phase Orthogonal Pulse			
		3:Inner Position Control			
	Electric Ratio	Numerator of Electric Ratio: 1~32767 Denominator of Electric Ratio: 1~32767			

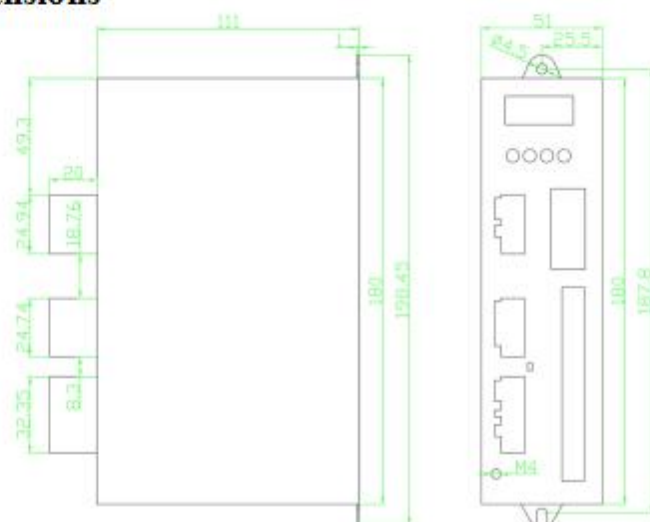
2.2 Motors table

Flange	Model	Power (W)	Torque (N.m)	Speed (rpm)	Matched Servo Drive
40mm	SZGH-04005D	50	0.16	3000	SZGH-SD2004
	SZGH-04010D	100	0.32	3000	SZGH-SD2004
60mm	SZGH-06020DC	200	0.6	3000	SZGH-SD2004
	SZGH-06040DC	400	1.3	3000	SZGH-SD2004
	SZGH-06060DC	600	1.9	3000	SZGH-SD2004
80mm	SZGH-08040DC	400	1.3	3000	SZGH-SD2010
	SZGH-08075DC	750	2.4	3000	SZGH-SD2010
	SZGH-08075BC	750	3.5	2000	SZGH-SD2010
	SZGH-08100CC	1000	4	2500	SZGH-SD2010
90mm	SZGH-09075DC	750	2.4	3000	SZGH-SD2010
	SZGH-09075BC	750	3.5	2000	SZGH-SD2010
	SZGH-09100CC	1000	4	2500	SZGH-SD2010

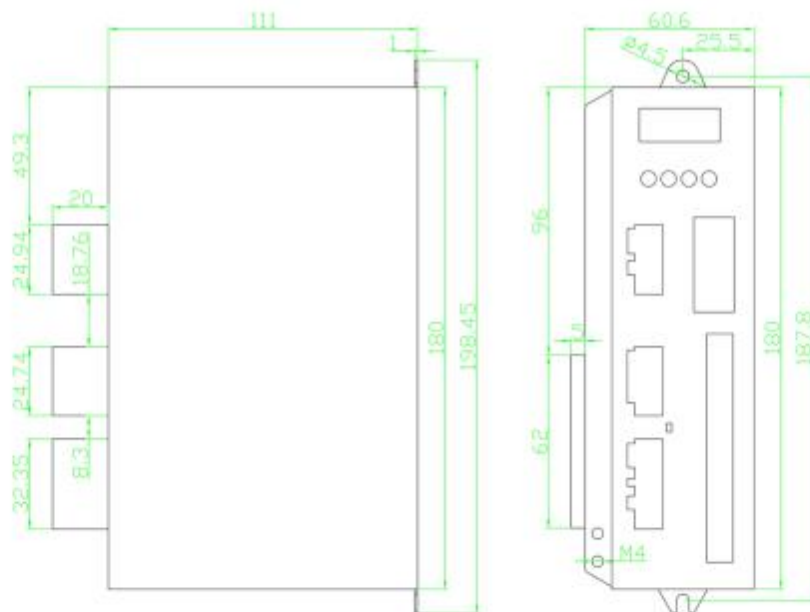
110mm	SZGH-11060DC	600	2	3000	SZGH-SD2026
	SZGH-11080DC	800	4	2000	SZGH-SD2026
	SZGH-11120DC	1200	4	3000	SZGH-SD2026
	SZGH-11150DC	1500	5	3000	SZGH-SD2026
	SZGH-11120BC	1200	6	2000	SZGH-SD2026
	SZGH-11180DC	1800	6	3000	SZGH-SD2026
130mm	SZGH-13100CC	1000	4	2500	SZGH-SD2026
	SZGH-13130CC	1300	5	2500	SZGH-SD2026
	SZGH-13150CC	1500	6	2500	SZGH-SD2026
	SZGH-13200CC	2000	7.7	2500	SZGH-SD2026/SZGH-SD4038(380V)
	SZGH-13100AC	1000	10	1000	SZGH-SD2026
	SZGH-13150AC	1500	10	1500	SZGH-SD2026
	SZGH-13230AC	2300	15	1500	SZGH-SD2026/SZGH-4038(380V)
	SZGH-13260CC	2600	10	2500	SZGH-SD2026/SZGH-4038(380V)
	SZGH-13380CC	3800	15	2500	SZGH-SD2026/SZGH-4038(380V)
150mm	SZGH-15380CC	3800	15	2500	SZGH-4038
	SZGH-15300BC	3000	15	2000	SZGH-4038
	SZGH-15360BC	3600	18	2000	SZGH-4038
	SZGH-15470BC	4700	23	2000	SZGH-4075
	SZGH-15550BC	5500	27	2000	SZGH-4075
180mm	SZGH-18270BC	2700	17.2	1500	SZGH-4075
	SZGH-18290BC	2900	27	1000	SZGH-4075
	SZGH-18300CC	3000	19	1500	SZGH-4075
	SZGH-18370BC	3700	35	1000	SZGH-4075
	SZGH-18430AC	4300	27	1500	SZGH-4075
	SZGH-18450CC	4500	21.5	2000	SZGH-4075
	SZGH-18550CC	5500	35	1500	SZGH-4075
	SZGH-18750CC	7500	48	1500	SZGH-4075

2.3 Mechanical Dimensions

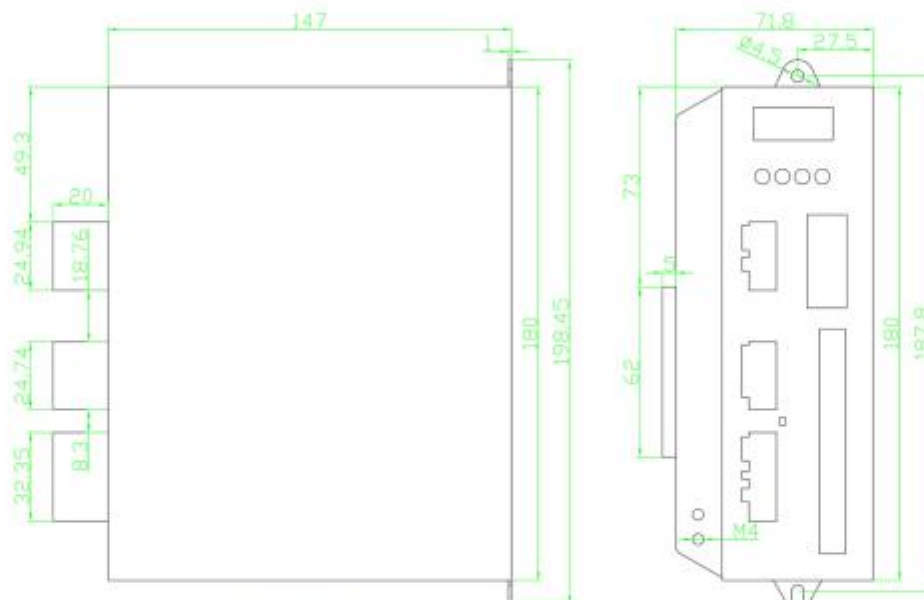
SZGH-SD2004



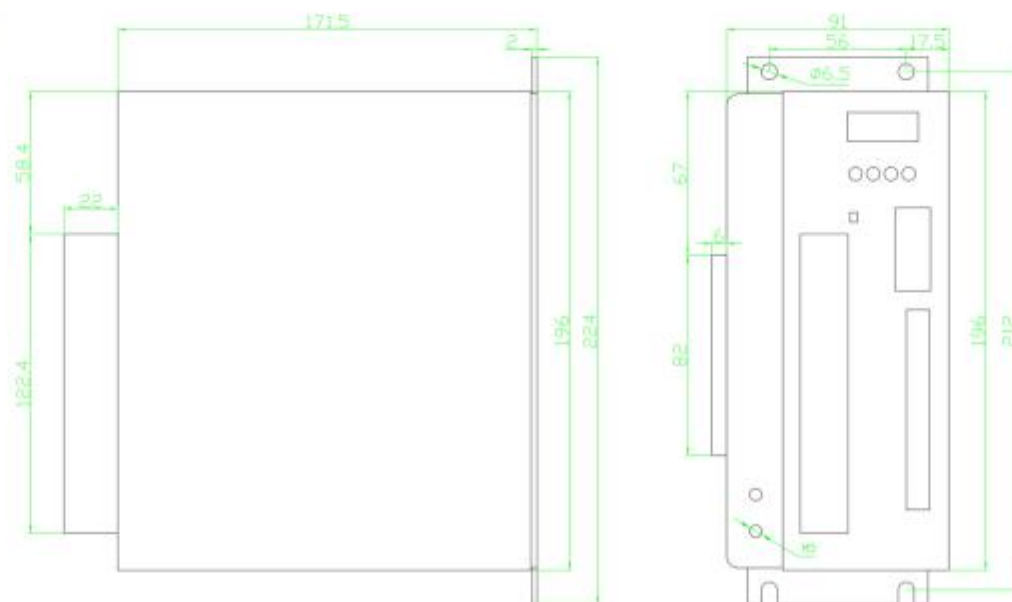
SZGH-SD2010



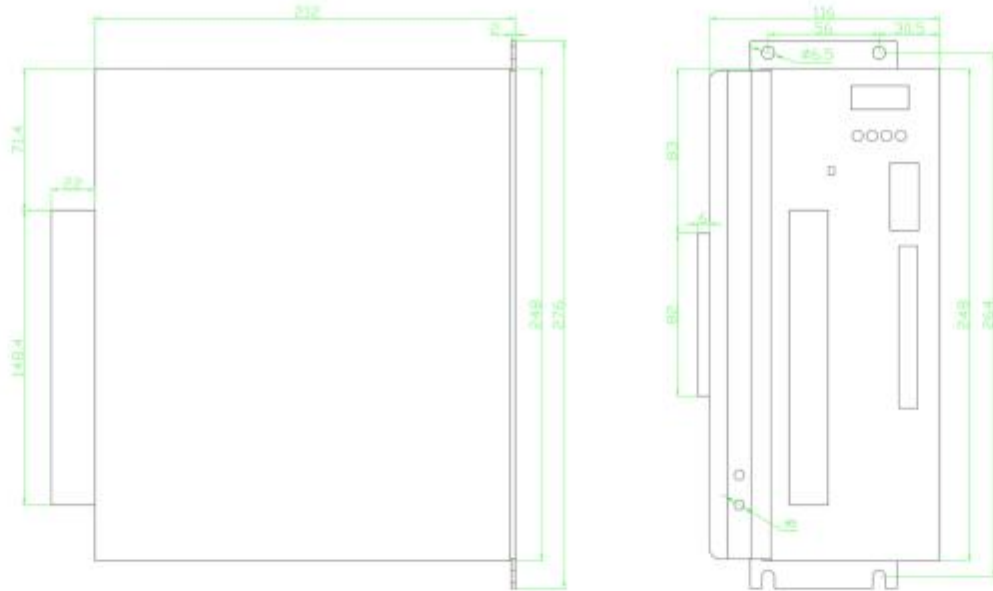
SZGH-SD2026



SZGH-SD4038

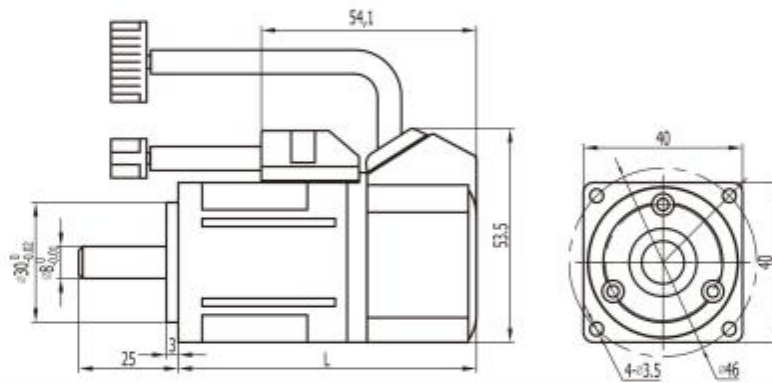


SZGH-SD4075



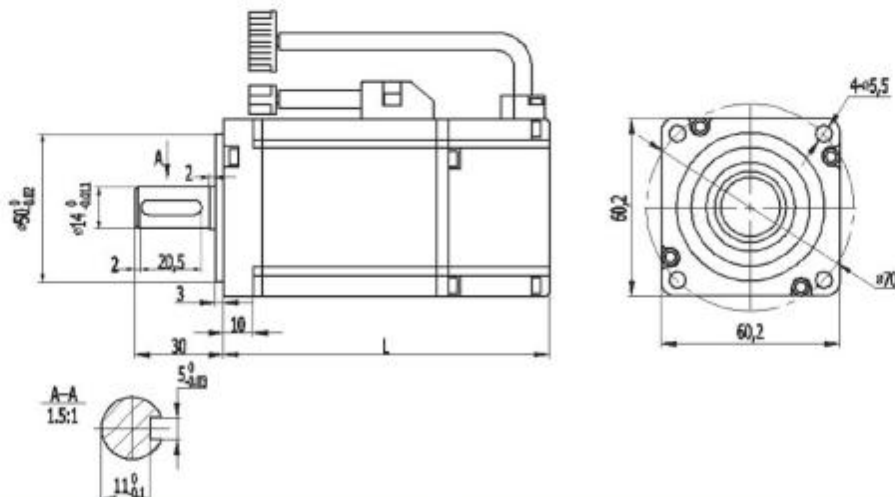
2.4 Mechanical Dimensions

2.4.1 Flange 40mm series (Unit:mm)



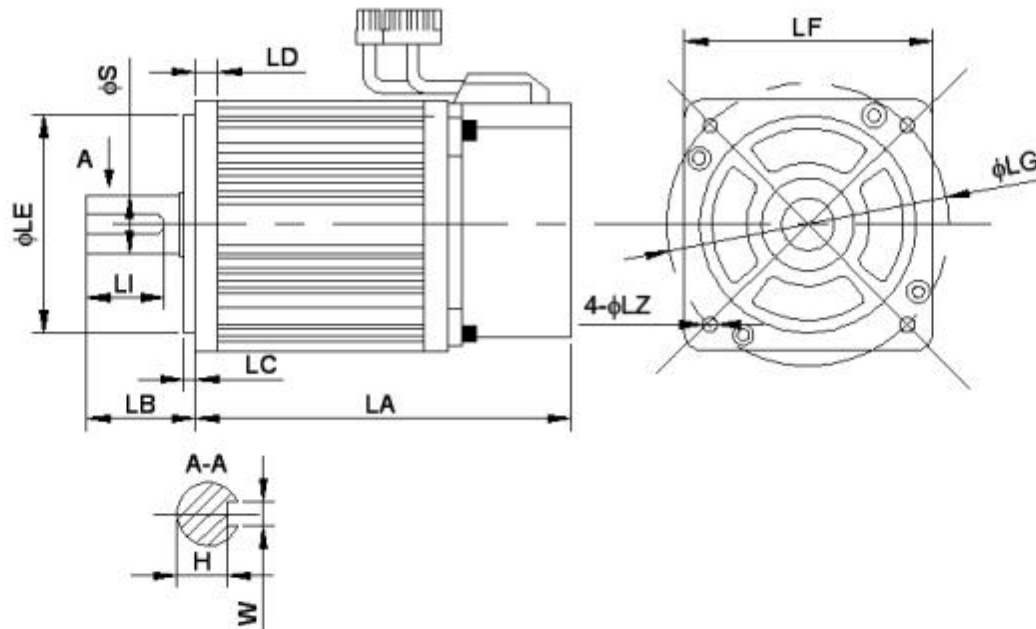
Model	L	Model	L
SZGH-04005D	75	SZGH-04005D-T(with brake)	109
SZGH-04010D	190	SZGH-04010D-T(with brake)	124

2.4.2 Flange 60mm Series (Unit:mm)



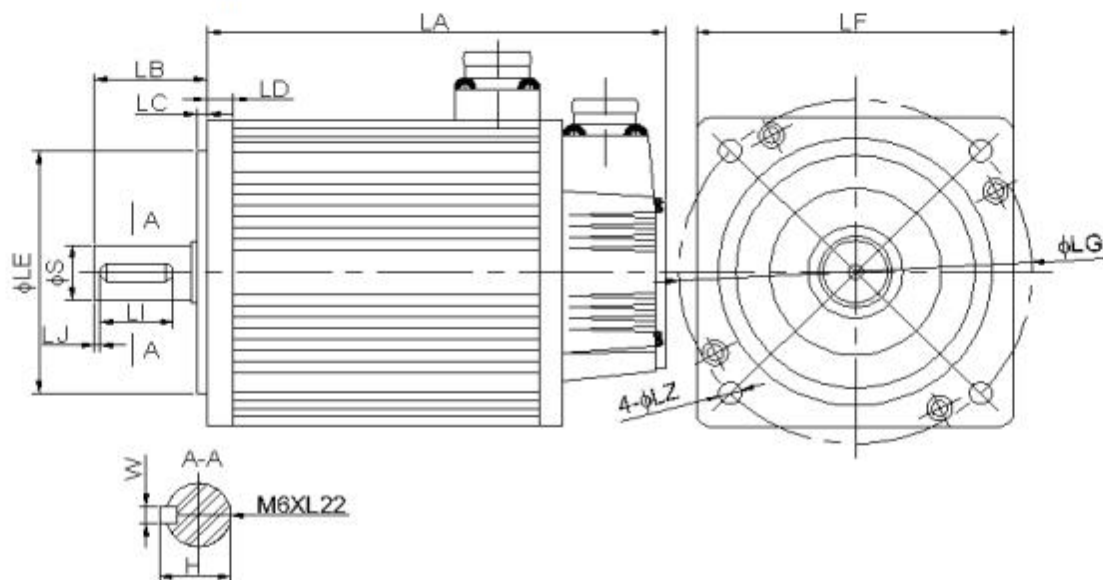
Model	L	Model	L
SZGH-06020DC	116	SZGH-06020DC-T(with brake)	164
SZGH-06040DC	141	SZGH-06040DC-T(with brake)	189
SZGH-06060DC	169	SZGH-06060DC-T(with brake)	217

2.4.3 Flange 80mm / 90mm Series (Unit:mm)



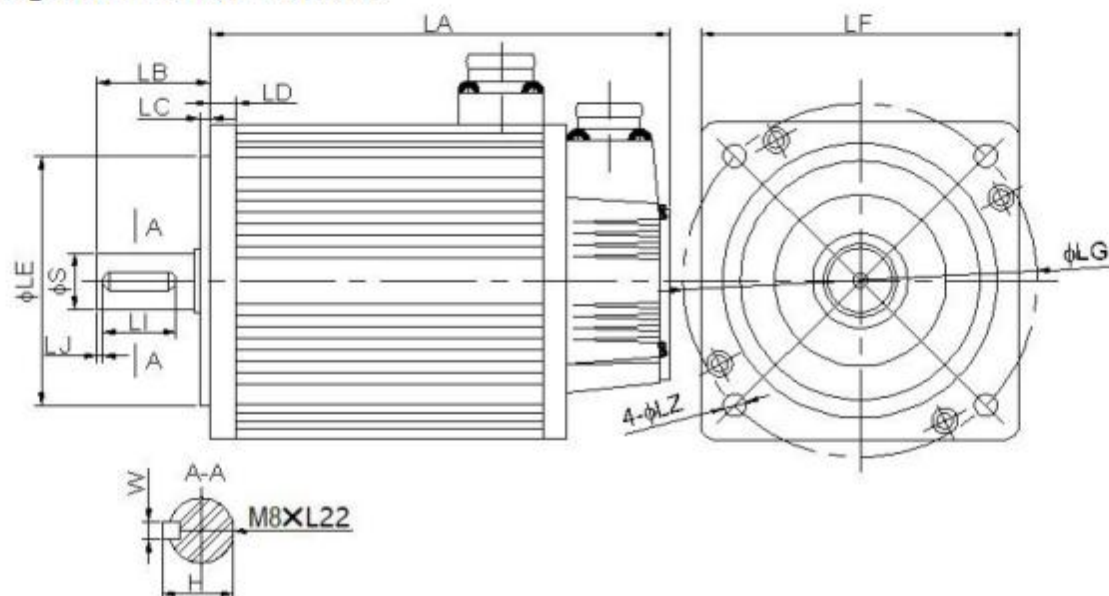
Model	LA	LB	LC	LD	LE	LF	LG	LZ	S	LI	W	H
SZGH-08040DC	124	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08040DC-T	164	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08075DC	151	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08075DC-T(with brake)	191	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08075BC	179	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08075BC-T(with brake)	219	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08100CC	191	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-08100CC-T(with brake)	231	35	3	8	70	80.4	90	6	19	25	6	15.5
SZGH-09075DC	150	35	3	8	80	86.6	100	6.5	16	25	5	13
SZGH-09075DC-T(with brake)	198	35	3	8	80	86.6	100	6.5	16	25	5	13
SZGH-09075DC	172	35	3	8	80	86.6	100	6.5	16	25	5	13
SZGH-09075DC-T(with brake)	220	35	3	8	80	86.6	100	6.5	16	25	5	13
SZGH-09100DC	182	35	3	8	80	86.6	100	6.5	16	25	5	13
SZGH-09100DC-T(with brake)	230	35	3	8	80	86.6	100	6.5	16	25	5	13

2.4.4 Flange 110mm / 130mm Series



Model	LA	LB	LC	LD	LE	LF	LG	LZ	S	H	W	LI
SZGH-11060DC	159	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11060DC -T(with brake)	215	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11080DC	189	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11080DC-T(with brake)	245	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11120DC	189	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11120DC-T(with brake)	245	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11150DC	204	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11150DC-T(with brake)	260	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11120BC	219	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11120BC-T(with brake)	275	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11180DC	219	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-11180DC-T(with brake)	275	55	5	12	95	110	130	9	19	21.5	6	40
SZGH-13100CC	166	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13100CC-T(with brake)	236	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13130CC	171	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13130CC-T(with brake)	241	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13150CC	179	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13150CC-T(with brake)	249	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13200CC	192	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13200CC-T(with brake)	262	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13100AC	213	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13100AC-T(with brake)	283	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13150AC	213	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13150AC-T(with brake)	283	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13260CC	209	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13260CC-T(with brake)	279	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13230AC	241	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13230AC-T(with brake)	311	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13380CC	231	57	5	14	110	130	145	9	22	24.5	6	40
SZGH-13380CC-T(with brake)	301	57	5	14	110	130	145	9	22	24.5	6	40

2.4.4 Flange 150mm / 180mm Series



型号	LA	LB	LC	LD	LE	LF	LG	LZ	S	H	W	LI
SZGH-15380CC	230	58	5	14	130	150	165	11	28	31	8	45
SZGH-15380CC-T	303	58	5	14	130	150	165	11	28	31	8	45
SZGH-15300BC	230	58	5	14	130	150	165	11	28	31	8	45
SZGH-15300BC-T	303	58	5	14	130	150	165	11	28	31	8	45
SZGH-15360BC	248	58	5	14	130	150	165	11	28	31	8	45
SZGH-15360BC-T	321	58	5	14	130	150	165	11	28	31	8	45
SZGH-15460BC	278	58	5	14	130	150	165	11	28	31	8	45
SZGH-15460BC-T	351	58	5	14	130	150	165	11	28	31	8	45
SZGH-15550BC	302	58	5	14	130	150	165	11	28	31	8	45
SZGH-15550BC-T	375	58	5	14	130	150	165	11	28	31	8	45
SZGH-18270BC	226	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18270BC-T	298	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18290BC	232	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18270BC-T	304	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18300CC	243	65	5	14	130	180	200	13.5	35	38	10	51
SZGH18300CC-T	315	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18430AC	262	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18430AC-T	364	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18450CC	262	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18450CC-T	334	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18550CC	292	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18550CC-T	364	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18750CC	346	65	5	14	130	180	200	13.5	35	38	10	51
SZGH-18750CC-T	418	65	5	14	130	180	200	13.5	35	38	10	51

Chapter 3 Wiring

3.1 Servo Drive Wiring Configuration

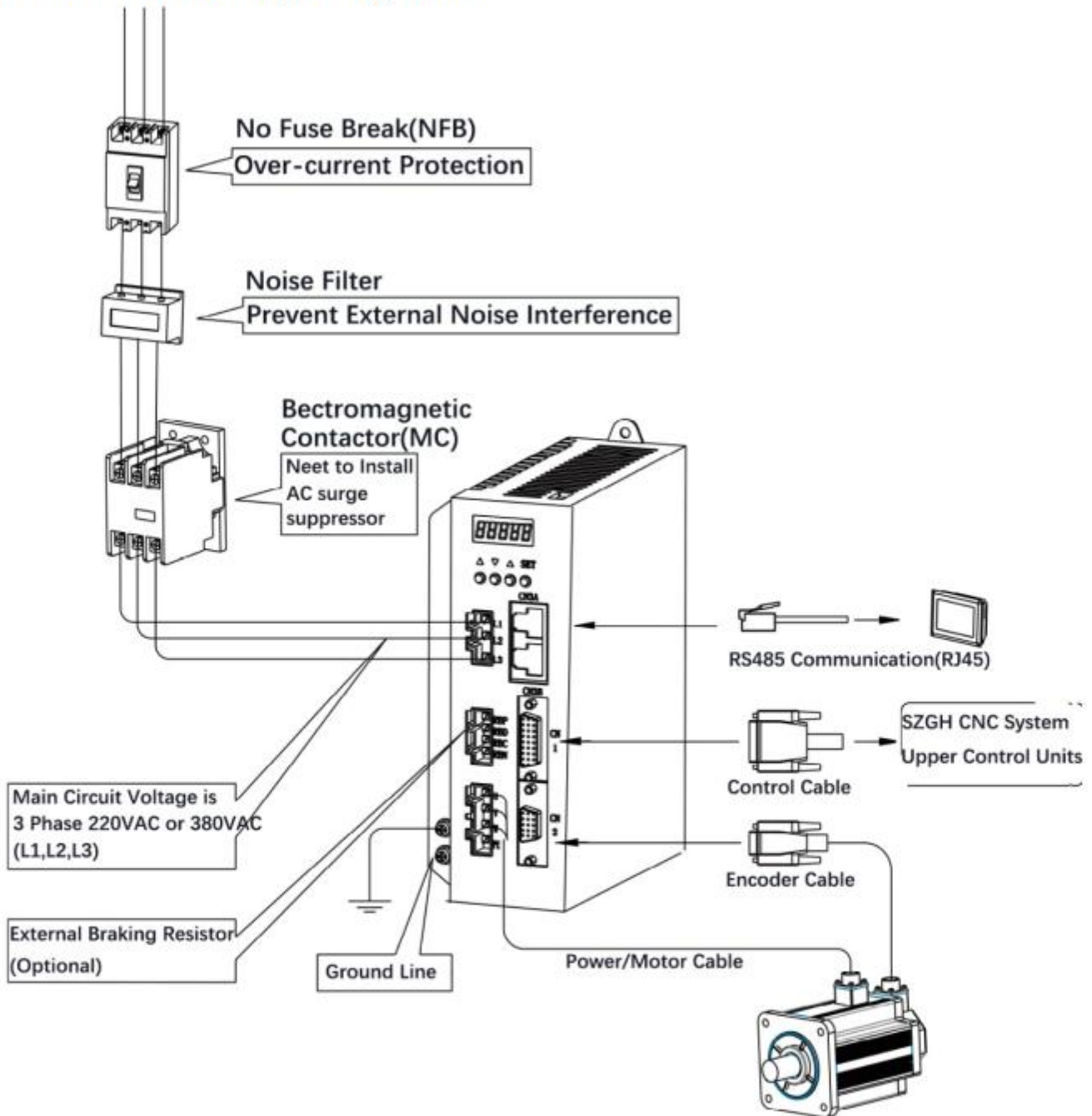


Fig.4.1 Wiring Diagram for Servo System

3.2 Wiring Explanations And Notes

- The control cable length should be less than 3 meters and the encoder cable length less than 20 meters.
- Check if MAIN power voltage (220VAC/380VAC) and wiring of L1, L2, L3 is correct.
- Do not connect to 380V power supply to 220V Servo Driver.
- The output terminals of drive (U, V, W) must be connected to the servo motor connections (U, V, W) correspondingly, otherwise the servo motor will stop or over-speed. However, by exchanging three-phase terminal cannot cause the motor to reverse; this point is different from asynchronous motor.
- Earth wiring must be reliable with a single-point connection.

- Pay attention to the correct direction of diode which is connected to the relay at the output terminal, otherwise will cause the output circuit breakdown.
- In order to protect the servo drive from noise interference that can cause malfunction, please use an insulation transformer and noise filter on the power lines.
- Power lines (power supply lines, main circuit lines, and motor power cable) MUST be laid apart from the control signal wires (at least 30cm). Do not lay them in one conduit.
- Install a non-fuse circuit breaker that can shut off the main power supply immediately in case of the servo drive fault.
- Because there are some big capacitor in inner side of servo drier, even if power off, high voltage still exist in inner circuit, so please don't touch servo driver and motor within 5 minutes power off.

3.3 Wires Specification

Terminal	Symbol	Wire Specification
Main Power Supply	L1, L2, L3	1.5~4mm ²
Servo Motor	U, V, W	1.5~4mm ²
Ground	⊕	1.5~4mm ²
Control Signals	CN1	≧ 0.14mm ² (AWG26), Shielded
Encoder Signals	CN2	≧ 0.14mm ² (AWG26), Shielded
Regenerative Resistors Terminals	P, D / P, C	1.5~4mm ²

User must use a twisted-pair cable for the encoder signal wiring. If the encoder signal cable is too long (>20m), in which the encoder power supply can be insufficient, multi-wires or thick wire must be used for the encoder power supply wiring.

3.4 Terminals Explanation

Terminal Name	Symbol	Detailed Explanation
Main Power Supply	L1, L3	For 1-phase supply: Single phase 220VAC -15% ~ +10%, 50/60Hz
	L1, L2, L3	For 3-phase supply: Three phase 220VAC -15% ~ +10%, 50/60Hz
	L1,L2,L3	Three Phase 380VAC(for SZGH-SD4038/SZGH-SD4075)
Regenerative Resistor Terminal	RBP, RBD	When use the built-in resistor, Please connect P and D.
	RBP, RBC	When the external regenerative resistor is needed, please disconnect P and D and connect the resistor to terminal P and C. Leave N unconnected.
Servo Motor terminal	U	U-phase output to servo motor
	V	V-phase output to servo motor
	W	W-phase output to servo motor
Ground	⊕	PE/ Ground terminal of servo motor

Note: The built-in resistor has been set as default by factory. RBP & RBD is short circuit.

3.5 Terminal For Control Signals

3.5.1 CN1 Terminal For Control Signals

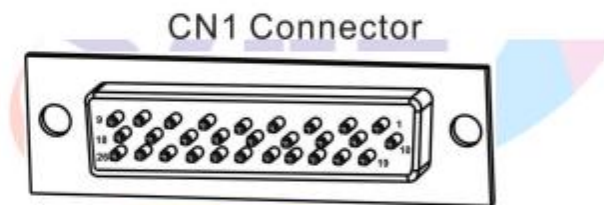
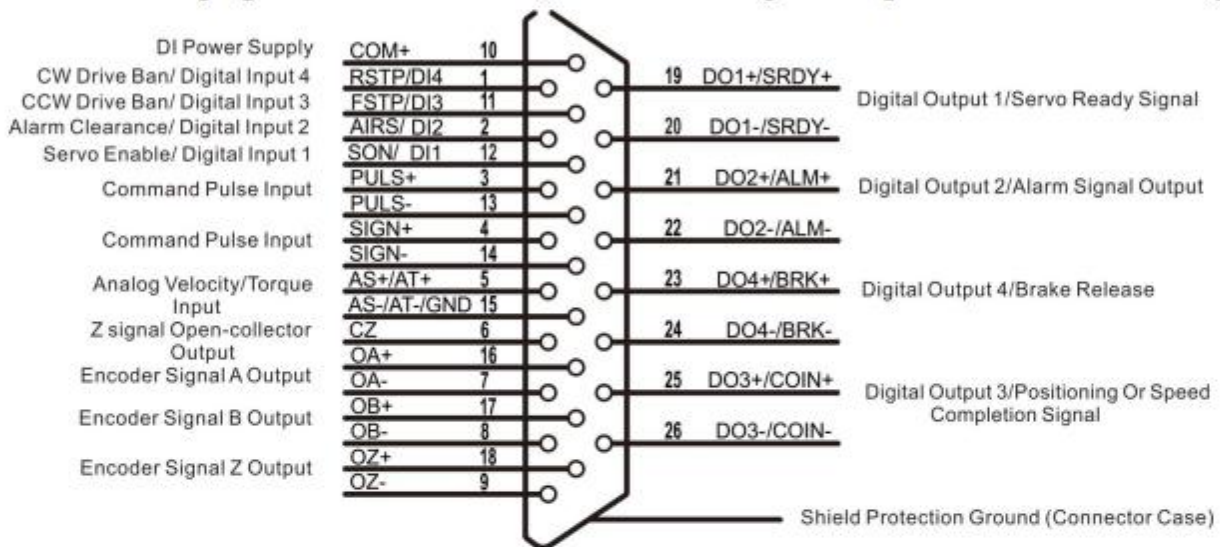
The CN1 connector DB26 plug (26-pin) provides the signals interfaced with the host-controller.

They are:

- 4 programmable input
- 4 programmable output
- Analog command input
- Pulse command input
- Encoder signal output

3.5.2 CN1 Terminal Connector

The CN1 connector plug uses DB26 male head, the contour and pin configuration is as the following:



Connector CN1 Soldering view

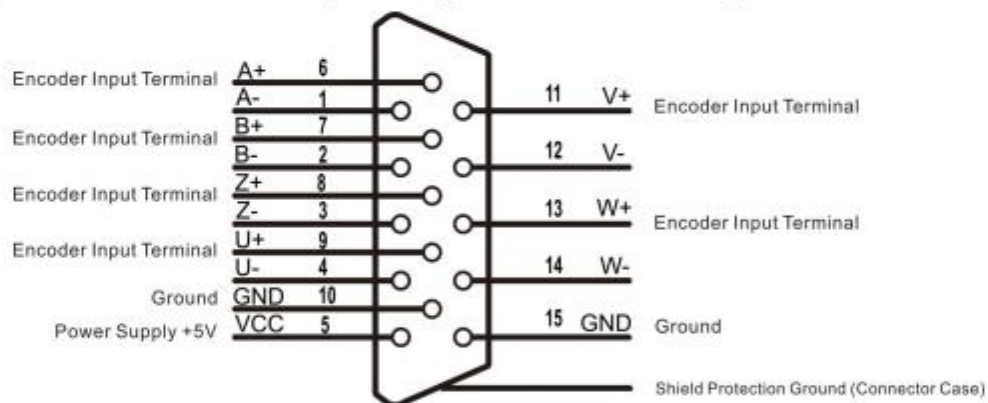
3.5.3 CN1 Connector Explanation

Name Of Signal		Pin Number	Function
Digital Input	DI1	12	Optical Isolation Input; Function is programmable; Defined by parameter P3-series (P3-0 ~ P3-17)
	DI2	2	
	DI3	11	
	DI4	1	
	COM+	10	
Digital Output	DO1+	19	Opto-coupler output; Function is programmable; Defined by parameter P3 series (P3-20 ~ P3-23)
	DO1-	20	
	DO2+	21	
	DO2-	22	
	DO3+	25	
	DO3-	26	
	DO4+	23	

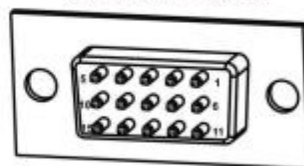
	DO4-	24	
Position Command Pulse	PULS+	3	High-speed opto-coupler input, Working mode set by parameter PA14, Pulse+Dir, CCW/CW Pulse, A/B Orthogonal pulse
	PULS-	13	
	SIGN+	4	
	SIGN-	14	
Analog Command Input	AS+/AT+	5	Analog velocity / torque input, range: -10V ~ 10V
	AS-/AT-/GND	15	
Encoder Signal Output	OA+	16	Motor encoder signal output
	OA-	7	
	OB+	17	
	OB-	8	
	OZ+	18	
	OZ-	9	
	CZ	6	
Shielded Cable Ground Protection		Metal case of connector	Shielded wire for connection with shielded cable

3.5.4 CN2 Connector For Encoder

The encoder signal connector CN2 connects to the servo motor encoder. A three-row DB15 plug (VGA plug) is used. The contour and pin configuration is as following:



CN2 Connector



Connector CN2 Soldering view


3.5.5 CN2 Connector Explanation

Signal Name Of Encoder		Pin No.	Function
Encoder Power Supply	5V	5	Use 5V power supply provided by servo drive. If the cable is longer than 20m, in order to prevent encoder from voltage-drop, use multi-wire or thick wires for power line and ground line.
	0V	10	
A-Phase	A+	6	Connect with A-phase output of encoder
	A-	1	
B-Phase	B+	7	Connect with B-phase output of encoder

	B-	2	
Z-Phase	Z+	8	Connect with Z-phase output of encoder
	Z-	3	
U-Phase	U+	9	Connect with U-phase output of encoder
	U-	4	
V-Phase	V+	11	Connect with V-phase output of encoder
	V-	12	
W-Phase	W+	13	Connect with W-phase output of encoder
	W-	14	
Ground	0V	15	Encoder Power supply 0V
Shield Ground		Metal Case	Connect with cable shield wire

Note: The U, V, W signals of encoder does not exist on wire-saving encoder which has only A, B, Z.

3.5.6 CN3A and CN3B Terminal Definition

RS485	Can be connected to the PC or controller through special serial cable. Don't plug it to any power supply. Twisted-pair shielded wires are suggested with less than 2 meters in length.(CAN bus is for spare)				
Terminal	CN3A	Name	CN3B	Name	Picture
1	VCC	Positive power supply	NC	Null	
2	GND	Ground	GND	Ground	
3	CAN H	CAN Bus Pin	CAN H	CAN Bus Pin	
4	RS485-	RS485 Communication	RS485-	RS485 Communication	
5	RS485+		RS485+		
6	CAN L	CAN Bus Pin	CAN L	CAN Bus Pin	
7	GND	Ground	GND	Ground	
8	VCC	Positive power supply	NC	Null	

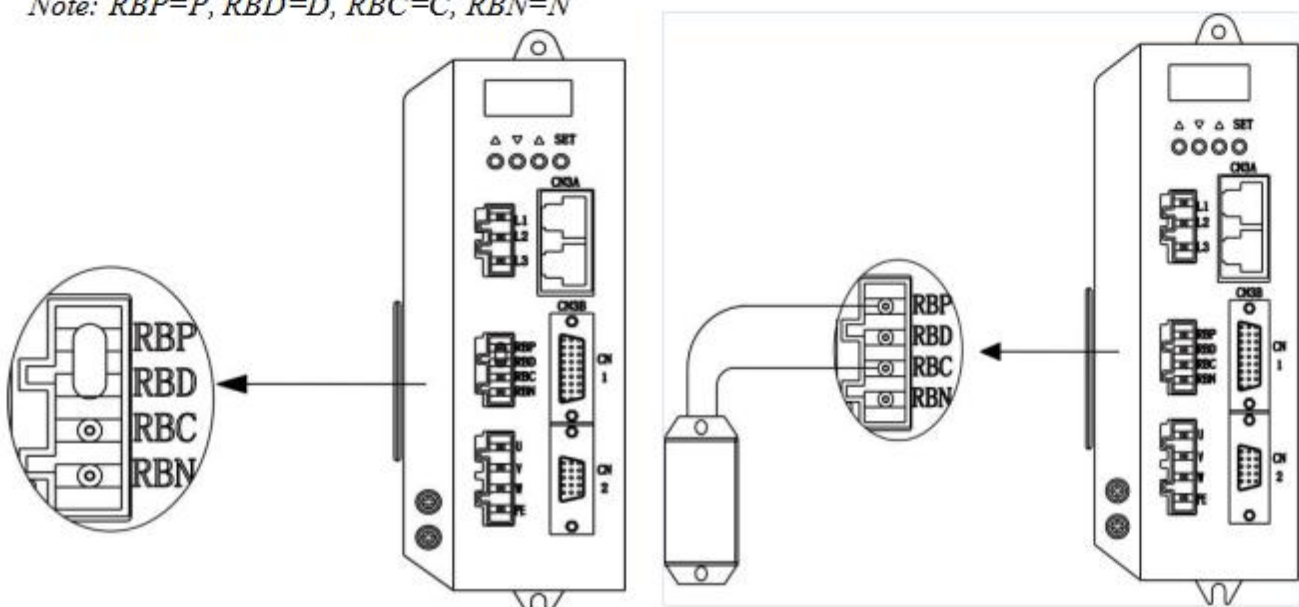
3.5.7 Regenerative Resistor Connection

If use the built-in resistor, please connect P and D (The built-in resistor has been connected by factory, so you can use directly), as showed in picture A.

When an external regenerative resistor is needed to be connected to the servo drive, firstly, the short circuit between terminal P and D must be disconnected.

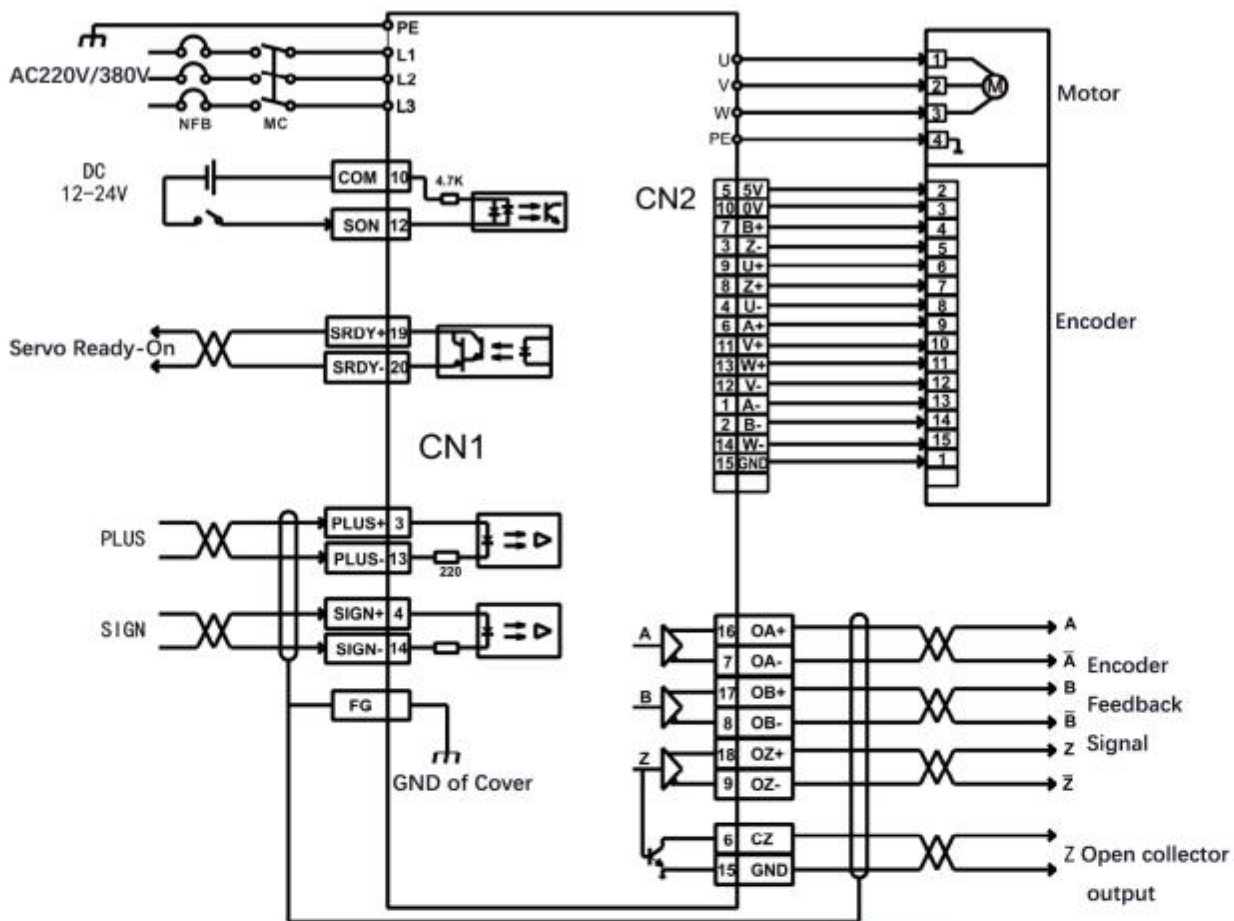
Then external regenerative resistor should be connected between P and C, as showed in picture B.

Note: RBP=P, RBD=D, RBC=C, RBN=N



3.6 Wiring Diagram & Parameter Explanation

3.6.1 Wiring Example in Position Mode



The wiring example (above) is for servo motors with flange size 60mm, 80mm and 90mm.

When connected with flange size 110mm and 130mm, 150mm, 180mm servo motors, series please make connections as following:

Power	Signal	U			V				W			PE				
	Pin No.	2			3				4			1				
Encoder	Signal	5V	0V	A+	B+	Z+	A-	B-	Z-	U+	V+	W+	U-	V-	W-	PE
	Pin No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1

Notes:

1. If use 3-phase AC220V main power , please connect with terminal L1, L2, L3.
2. If use 3-phases AC380V main power, please connect with terminal L1,L2,L3(SZGH-SD4038/SZGH-SD4075).
3. If use 1-phase AC220V main power , please connect with terminal L1, L3.
3. Current capacity of the external power supply for digital inputs and outputs (12~24vdc) should be more than 100mA.
4. AWG24-26 shielded cable is recommended for control and feedback signals. DO ground the shield of the cable.
5. Cable for control signals (CN1) should be less than 3 meters long, and cable for feedback signals (CN2) should be less than 10 meters long.
6. A Circuit breaker (NFB) is recommended to cut off power in case of an overload. Use an electromagnetic contactor to switch servo motor ON and OFF.

3.6.2 Parameters in Position Mode

The following parameters need to be adjusted when in position mode:

3.6.2.1 Gain & Smooth-Filter Parameter

Parameter	Definition	Value	Default Value
PA4	Control mode	0	0
PA9	Position Proportional Gain	1-1000	80
PA19	Position Command Smooth Filter	0-30,000×0.1ms	300

3.6.2.2 Parameter for DI Input

Parameter	Define	Value	Default Value
PA11	Command pulses for one rotation of motor	0-30,000 pulse	10,000
PA12	1 st numerator of electronic gear for position command pulse	1~32,767	0
PA13	Denominator of electronic gear for position command pulse	1~32,767	10,000
PA14	mode of position command pulse	0-2	0
PA15	Direction change of position command pulse	0-1	0
PA59	The effective edge of command pulse	0-1	0
PA77	2 nd numerator of electronic gear for position command pulse	1~32,767	0
PA78	3 rd numerator of electronic gear for position command pulse	1~32,767	0
PA79	4 th numerator of electronic gear for position command pulse	1~32,767	0
PA80	Effective level of command direction signal	0-1	0
PA81	Command pulse (PULS) signal filter	0-15	4
PA82	Command pulse (SIGN) signal filter	0-15	4

3.6.2.3 Parameter for DO Output

Parameter	Define	Value	Default Value
PA16	Range of positioning completion	0~3000 pulse	10
PA17	Detection of over-travel range	0~30,000×100 pulse	400
PA18	Invalid error of over travel	0-1	0
PA83	CWL, CCWL direction prohibited mode	0-1	0
PA84	Hysteresis for position completion	0~32,767 pulse	5
PA85	Range for approach positioning	0~32,767 pulse	500

PA86	Hysteresis for approach positioning	0~32,767 pulse	50
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3.6.2.4 Parameters related to Input and Output Terminals

Parameter	Definition	Value	Default Value
PA55	Effective level control for input terminals	0000-1111	0000
PA57	Effective level control for output terminals	0000-1111	0000
PA58	Anti-jitters time constant of digital input terminals	1-1000×0.1ms	2
P3-0	Digital Input DI1 function	0-99	1
P3-1	Digital Input DI2 function	0-99	2
P3-2	Digital Input DI3 function	0-99	3
P3-3	Digital Input DI4 function	0-99	4
P3-15	Force digital input 1	00000000-11111111	00000000
P3-16	Force digital input 2	00000000-11111111	00000000
P3-17	Force digital input 3	00000000-11111111	00000000
P3-20	Digital Input DO1 function	0-99	2
P3-21	Digital Input DO2 function	0-99	3
P3-22	Digital Input DO3 function	0-99	4
P3-23	Digital Input DO4 function	0-99	8

3.6.2.5 Parameters & Explanation for Inner Position Control (Pr)Mode

Command Source of Pr mode are using Parameter (P4-2,P4-3)-(P4-23, P4-24) 8 groups built-in position command registers, Mode of Pr mode is set by P4-0: a: absolute type; b:Increment type.It works with external I/O(CN1,POS0-POS2 & CTRG), to select one group among of 8 groups as position command, shown as following table:

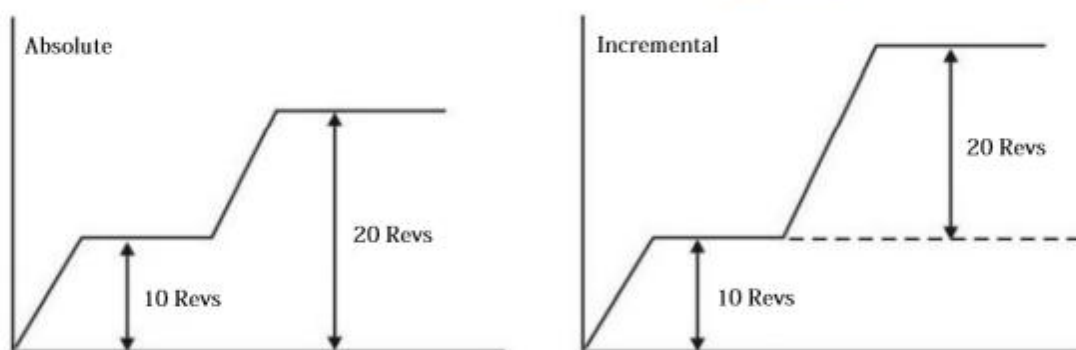
Position Code	POS2	POS1	POS0	CTRG	Para.	Explanation	Speed register
P1	0	0	0	↑	P4-2	Revolutions(+/-30000)	P4-4 (V1)
					P4-3	Pulses(+/- max cnt)	
P2	0	0	1	↑	P4-5	Revolutions(+/-30000)	P4-7 (V2)
					P4-6	Pulses(+/- max cnt)	
P3	0	1	0	↑	P4-8	Revolutions(+/-30000)	P4-10 (V3)
					P4-9	Pulses(+/- max cnt)	

P4	0	1	1	↑	P4-11	Revolutions(+/-30000)	P4-13 (V4)
					P4-12	Pulses(+/- max cnt)	
P5	1	0	0	↑	P4-14	Revolutions(+/-30000)	P4-16 (V5)
					P4-15	Pulses(+/- max cnt)	
P6	1	0	1	↑	P4-17	Revolutions(+/-30000)	P4-19 (V6)
					P4-18	Pulses(+/- max cnt)	
P7	1	1	0	↑	P4-20	Revolutions(+/-30000)	P4-22 (V7)
					P4-21	Pulses(+/- max cnt)	
P8	1	1	1	↑	P4-23	Revolutions(+/-30000)	P4-25 (V8)
					P4-24	Pulses(+/- max cnt)	

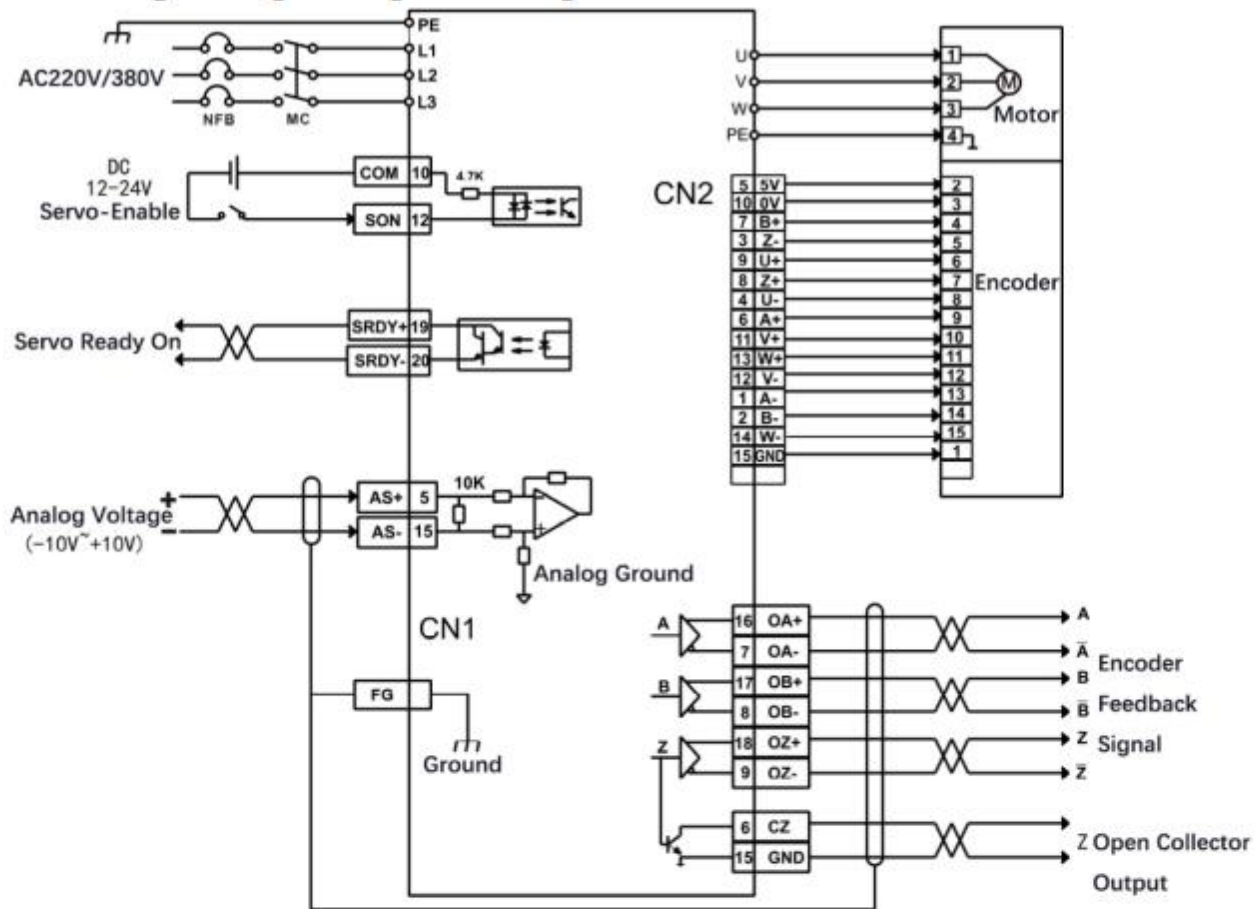
Status of POS0~POS2: 0 : input point is OFF(open), 1: Input point is ON(Close).

CTRG↑ : Up edge (Input point is from OFF to ON)

Inner position control mode can be applied to many occasions, it looks like one simple control program. User could make cycle operations only according to above table. Example: P1 position command is 10 revs , P2 position command is 20 revs, firstly run P1,and then P2, this is difference between Absolute & Incremental mode as following picture shown,



3.6.3 Wiring Example in Speed / Torque Mode



The wiring example (above) is for servo motors with flange size 60mm, 80mm and 90mm. When connected with servo motors with flange size 110mm and 130mm, 150mm, 180mm, please connect as following:

Power	Signal	U			V				W			PE				
	Pin No.	2			3				4			1				
Encoder	Signal	5V	0V	A+	B+	Z+	A-	B-	Z-	U+	V+	W+	U-	V-	W-	PE
	Pin No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1

Notes

- 1.If use 3-phase AC220V main power supply, please connect with terminal L1, L2, L3.
- 2.If use 3-phases AC380V main power, please connect with terminal L1,L2,L3 (SZGH-SD4038/SZGH-SD4075).
- 3.If use 1-phase AC220V main power supply, please connect with terminal L1, L3.
- 4.Current capacity of the external power supply for digital inputs and outputs (12~24vdc) should be more than 100mA.
- 5.AWG24-26 shielded cable is recommended for control and feedback signals. DO ground the shield of the cable.
- 6.Cable for control signals (CN1) should be less than 3 meters long, and cable for feedback signals (CN2) should be less than 10 meters long.
- 7.A Circuit breaker (NFB) is recommended to cut off power in case of an overload. Use an electromagnetic contactor to switch servo motor ON and OFF.

3.6.4 Parameters in Speed/Torque Control Mode

3.6.4.1 Parameters in Speed Control Mode

The following parameters need to be adjusted when in Speed control mode:

Parameter	Definition	Value	Default Value
PA4	Control Mode	1	0
PA5	Gain Of Speed Loop	5-2000 Hz	150
PA6	Integral time constant of Speed loop	1-1000 ms	75
PA22	The source of Speed Command	0-5	0
PA24	Internal Speed 1	-6000~6000 rpm	100
PA25	Internal Speed 2	-6000~6000 rpm	500
PA26	Internal Speed 3	-6000~6000 rpm	1000
PA27	Internal Speed 4	-6000~6000 pm	2000
PA28	Arrival Speed	0-3000 rpm	3000
PA40	Acceleration Time Constant of Speed Command	1-10,000 ms	100
PA41	Deceleration Time Constant of Speed Command	1-10,000 ms	100
PA43	Gain of Analog Speed Command	10-3000 rpm/V	10
PA44	Direction of Analog Speed Command	0-1	0
PA45	Zero Offset Compensation of Analog Speed Command	-5000~5000 mv	0
PA46	Filter of Analog Speed Command	1-1000 Hz	100
PA75	Range For "Zero-Speed" Detection	0-1000 rpm	10
PA76	Speed Coincidence Range	0-1000 rpm	10
PA87	Hysteresis Of Arrival Speed	0-5000 rpm	30
PA88	Polarity Of Arrival Speed	0-1	0
PA92	Hysteresis For "Zero-Speed" Detection	0-1000 rpm	5

3.6.4.2 Parameters in Torque Mode

The following parameters need to be adjusted when in Torque mode:

Parameter	Definition	Value	Default Value
PA4	Control Mode	2	0
PA29	Gain of Analog Torque Command	Set by user	30
PA32	Selection For Internal And External Torque Command	0-2	0
PA33	Direction of Analog Torque Command	0	0
PA39	Zero Offset Compensation of Analog Speed Command	0	0
PA50	Speed Limit In Torque Control Mode	Set by user	Rated speed
PA64	Internal Torque 1	-3000~3000	0
PA65	Internal Torque 2	-3000~3000	0
PA66	Internal Torque 3	-3000~3000	0
PA67	Internal Torque 4	-3000~3000	0

PA83	Inhibition Method	0-1	0
PA89	Arrival Torque	-300% ~ 300%	100
PA90	Hysteresis of Arrival Torque	0% ~ 300%	5
PA91	Polarity of Arrival Torque	0-1	0

3.6.4.3 Parameters related to ModBus communication

Parameter	Definition	Value	Default Value
PA71	MODBUS ID No.	1-254	1
PA72	MODBUS Communication Baud Rate	48-1152×100	96
PA73	MODBUS Protocol Selection	0-2	1
PA74	Communication Error Handling	0-1	0

3.7 Homing(Zero point)

3.7.1 Parameters for Homing(Zero point)

Parameter	Explanation	Value	Default Value
P4-32	Type & Direction of Homing	0-5	0
P4-33	Mode After Homing	0-2	0
P4-34	Mode of Start Homing	0-2	0
P4-35	Mode of Stop Homing	0-1	0
P4-36	Homing Speed_1st period	1-2000 rpm	1000
P4-37	Homing Speed_2nd period	1-500 rpm	50
P4-38	Homing Offset Revs	+/- 30000	0
P4-39	Homing Offset Pulses	+/- max cnt	0

3.7.2 Explanation of Homing

A. Mode of Start Homing (P4-34)

There are two modes that start homing: one is automatically homing when booting, another one is input points activate homing.

P4-34=0: OFF Homing function.

When P4-34 set to 0, turn off the function of homing(return to zero point),cannot do homing whatever other parameters set.

P4-34=1: Automatically homing when power on servo driver.

When power on driver & before starting work, it will do homing. It normally apply to that it no needs to homing often. It can save one input point for homing.

P4-34=2: Input to SHOM point to activate homing function

When set this function, it must configure one input point of DI inputs (from P3-0 to P3-3) to SHOM input point. It can do homing at anytime when SHOM is ON.

B. Type & Direction of Homing(P4-32)

Limit switches at positive direction or negative direction, can be as homing switch, and also one alone switch(Sensor/Proximity Switch) can as homing switch, If servo motor run within one rev, we can set Z-Phase signal as home (zero point).

P4-32=0: Go homing with CCW direction,and take CCWL as 1st input point for homing. After homing, CCWL as limit input, and CCWL be on again, it will hint limit alarm. If using CCWL as homing input point too, suggest detect Z Phase signal(set P4-33=0)

P4-32=1: Go homing with CW direction, and take CWL as 1st input point for homing. After homing, CWL as limit input, and CWL be on again, it will hint limit alarm. If using CWL as homing input point too, suggest detect Z Phase signal (set P4-33=0)

P4-32=2: Go homing with CCW direction, and take ORGP (alone input point for homing) as 1st input point for homing. If using ORGP as homing input point, it can detect Z Phase signal (set P4-33=0) or not (P4-33=1)

P4-32=3: Go homing with CW direction, and take ORGP (alone input point for homing) as 1st input point for homing. If using ORGP as homing input point, it can detect Z Phase signal (set P4-33=0) or not (P4-33=1)

P4-32=4: Z-Phase signal as home (zero point), Move Detect Z phase signal with CCW direction, this apply to servo work within one rev, and no need any switches.

P4-32=5: Z-Phase signal as home (zero point), Move Detect Z phase signal with CW direction, this apply to servo work within one rev, and no need any switches.

C. Mode after homing (P4-33)

P4-33=0: After detect homing switch, and reverse movement and find Z-phase signal of servo motor encoder, which is mechanical zero point.

P4-33=1: After detect homing switch, and keep movement and find Z-phase signal of servo motor encoder, which is mechanical zero point.

P4-33=2: After detect homing switch (up edge of ORGP) & stop, where set to mechanical zero point. (when P4-32=2 or 3); or when find Z phase signal (Z pulse) & stop (when P4-32=4 or 5).

D. Mode of Stop Homing (P4-35)

P4-35=0: After detecting homing switch, motor decelerate speed & reverse move to zero point. After detect homing switch with homing speed_2nd period (set by P4-37), motor decelerate & stop. After stop, and then reverse move to mechanical zero point with P4-37 speed.

P4-35=1: After detecting homing switch, motor decelerate speed & keep moving to zero point. After detect homing switch with homing speed_2nd period (set by P4-37), motor decelerate & stop. It don't After stop, and position offset cannot be revise, but it doesn't means zero point changed as different position offset.

Chapter 4 Operation and display

4.1 Introduction to Front Panel And Function

4.1.1 Front Panel

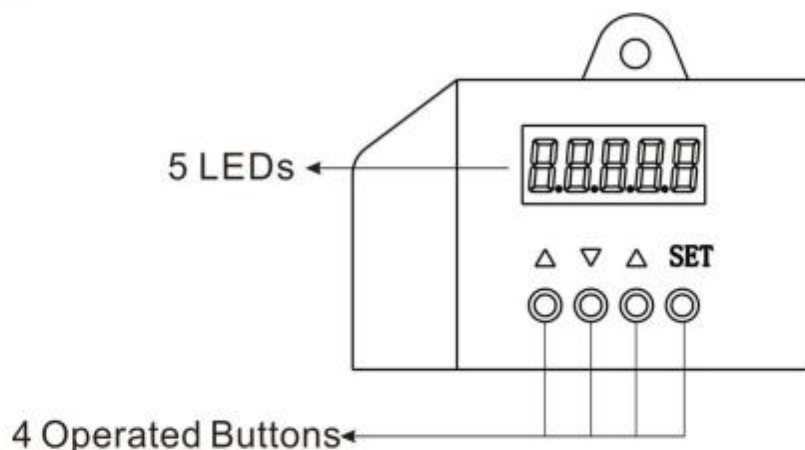


Fig4.1 Front Panel

“SET” Button: Enter the parameter settings or set the values to select parameters and exit.

- ▲ UP Button: Increase the selected value by 1.
- ▼ DOWN Button: Decrease the selected value by 1.
- ◀ BACK Button: Press this to come back to before data.

The panel consists of 5 digital LED and 4 buttons including ↑, ↓, ←, SET to display all system status and set parameters.

The operation is hierarchical. ← button indicates “Back” and SET button indicates “forward” while it also has the meaning of “Enter”. ← button also has the meaning of “Cancel” and “Exit”. ↑ button indicates “Increase” and ↓ button indicates “Decrease”. If you press and hold the ↑ button or ↓ button, you would get a duplicate result and when hold longer, the repetition rate is higher.

4.1.2 Front Panel keys explanation

Symbol	Name	Function
▲	Increase	Increase number or value; Press down and hold to repeat increasing.
▼	Decrease	Decrease number or value; Press down and hold to repeat decreasing.
◀	Exit, Back	Menu exit; Cancel the operation
SET	Confirm, Set	Menu entered; Confirm the operation

4.2 Main Menu

The first layer is the main menu and has four operating modes. Press ↑ or ↓ button to change the operation mode. Then press SET button to enter into the second layer. Press ← button returns to the main menu from the second layer.

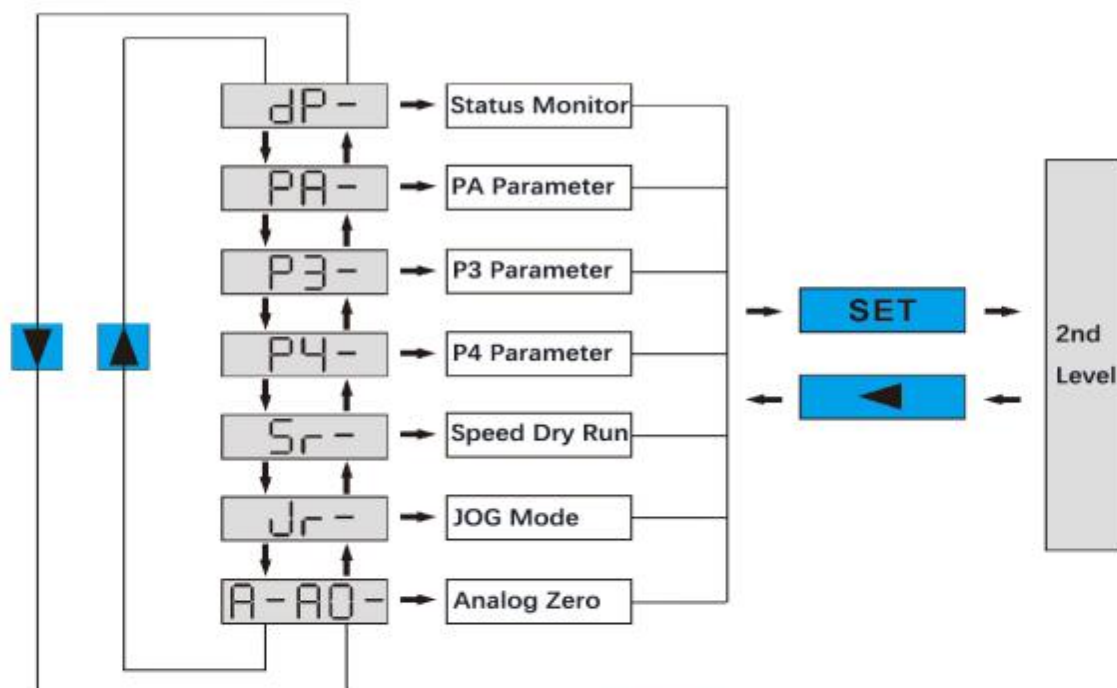


Fig4.2 Operating display layer

4.3 Status Monitoring









In the first layer, please select “dP--” and press the SET button to enter into monitoring mode. There are 16 statuses to be displayed in total. You can select the desired display mode with ↑ or ↓ button, and then press SET button to enter into the specific status.

Monitoring	Operation	Example	Definition
dP-SPd		r 1000	Speed : 1000 r / min
dP-PoS		P45806	The current position of rotor : 1245806 pulse
dP-PoS.		P. 12	
dP-CPo		C45810	Position Command : 1245810 pulse
dP-CPo.		C. 12	
dP-EPo	<div style="text-align: center;"> SET → ← </div>	E 4	Position Deviation : 4 pulse
dP-EPo.		E. 0	
dP-t9		t 70	Motor Torque 70%

dP- I	I 2.3	Motor Current 2.3A
dP-Cnt	Cnt 0	Control Method 0
dP-tEP		
dP- CS	r. 500	Analog Quantity input speed: 500 r/ min
dP- Ct	t 0.50	Torque 50% in Torque Mode
dP-APo	A 3265	Absolute Rotor Position : 3265
dP-APo.	A .0	
dP- In	In 1111	Digital Input Terminal
dP-oUt	oUt 111	Digital Output Terminal
dP-Cod	Cod 1111	Encoder Signal
dP-UdC	UC 336	Bus Voltage: 336V
dP-FPR.		
dP- rL	rL - on	Relay on Opening State
	rL - oF	Relay on Closing State
	rL - Er	Alarm
dP- rn	rn - on	Running State
	rn - oF	Disable
	rn - CH	Uncharged
	rn - Er	Alarm
dP-Err	Err 9	Alarm No.9
dP- US	U - on	Normal
	U.LoU	Main wire under Voltage
	U-Err	Alarm
dP- AS		
dP- AS.		




4.4 Process of Setting Parameter

Please firstly select "PA--", and press SET button to enter the status of parameter setting mode.

Use  or  to choose required parameter and push SET button to display the parameter value. You can modify the parameter value with  or . Press  or  button one time, the parameter increases or decreases by 1. Pressing and holding  or  key can continuously increase or decrease the value. After modifying the value of the parameter press SET button and when the LED flashes two times, it means modification is completed. Finally turn the drive OFF and ON again to activate the changes.

4.5 Setting Analog Quantity to 0

After the setting, driver will test offset of analog quantity and reserve it into PA39(or PA45). It need not to write parameter again because the operation of setting analog to 0 reserved the parameter to EEPROM.

Firstly, choose the parameter 'A-A0', then press SET to enter. Next choose 'A-SPd' (Setting speed analog quantity to 0) or 'A-Trq' (Setting torque analog quantity to 0) by  and , choose one of the operation and Holding & press 'SET' button for more than 3 seconds, wait for displaying 'donE' on the screen, activate the operation. After that, you can press  button back to the menu.

4.6 Recovery Parameters To Default Values






In case of the following situations, please use the function of resuming the default parameters (ex-factory default parameter):


- The parameter is adjusted chaotically; the system is unable to work normally.
- The servo motor is replaced by a different new model.
- For any other reason, drive is not matched with motor model which is set in PA01.

The procedure for resuming the default parameter values is as the following:

1. Inspect servo motor code (PA01) whether it is correct or not.
2. Modify the password (PA0) from 315 to 385.
3. Modify the servo motor code (PA1) with related servo motor code.
4. Enter operations of parameter,do following steps

Resume default value of all parameters means that all of parameters that have been edited by customers would be recovered to the manufacture parameters value.

Press  button back to main menu, and choose "PA--" mode with  or  button. Press SET button entering into the second layer. Then press  or  button to set PA=0 and press SET button going into the third layer to set PA0=385, and press SET button to enter it.

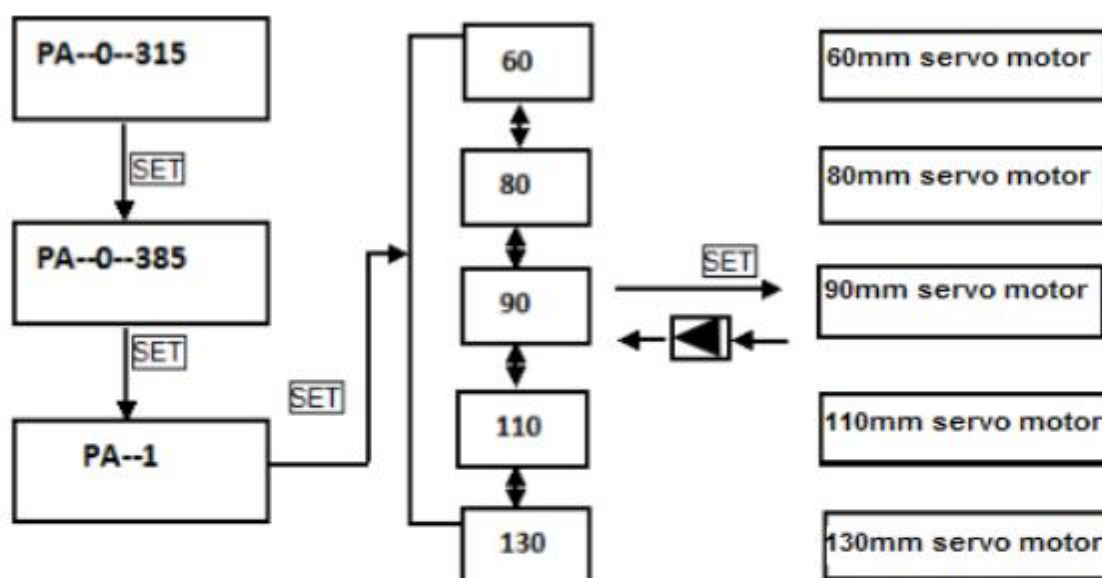
Press  button back to the "PA--" layer, and set PA1=dEF-. Press SET button for 5 seconds. When the LEDs in the screen flashes several times, it means the operation is successful. Finally turn OFF and ON the power to activate the changes.

4.7 Parameter Set for Servo Motor Code

The value of PA-01 should be set referring to the following table. If there is a mismatch, it will cause an alarm. Pay attention that different motors have different default parameters.

For example, SZGH-08075DC(80mm frame size,2.4Nm,3000RPM,code is 80-02430),so the factory default model of this ac servo motor is 80-02430.

If there is necessary to modify the motor code or restore setting parameters that was already set by manufacturer, please firstly change *PA--0 from 315 to 385*, then enter into PA-01 and press ▲ or ▼ key to select the appropriate motor model. The steps are shown as the following picture:



Pic 3. Choose motor type

Note: 1. The parameter PA-01 of drive must be configured with the exact servo motor that you are using, if not, which will affect efficient of servo motor would be down or alarm.

2. Normally we set PA1 parameter well before ex-factory, please use related SZGH-SD series driver for related SZGH series servo motor.

Chapter 5 Parameters

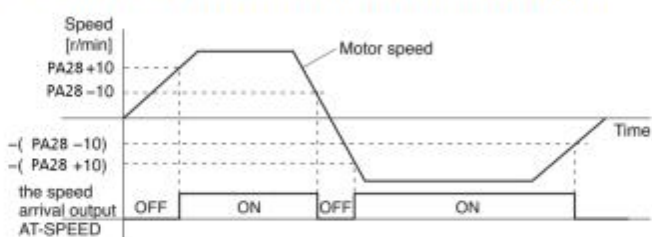
5.1 PA Group Parameter

No.	Name	Function	Range	Default Value
0	Password	<ol style="list-style-type: none"> 1. Default password is 315 to set or change parameters. 2. To change the Motor type it must be changed to 385. 	0-9999	315
1	Motor type selection	<ol style="list-style-type: none"> 1. The different motor type code has different default parameters. If you want to use the function of recovering the default parameter value make sure that you have chosen the correct motor type. 2. If you want to edit PA-01 parameter, please set the PA0 to 385 firstly. 	80-90-110-130-150-180	-
3	Initial display status	<ol style="list-style-type: none"> 0. Display the current motor speed 1. Display the current position in 5-bit (low byte) 2. Display the current position in 5-bit (high byte) 3. Display position command (command pulse accumulation) in 5-bit (low byte) 4. Display position command (command pulse accumulation) in 5-bit (high byte) 5. Display position deviation in 5-bit (low byte) 6. Display position deviation in 5-bit (high byte) 7. Display motor torque 8. Display motor current 9. Display control mode 10. Display temperature of heat-sink on IPM 11. Display Analog speed command 12. Display Analog torque command 13. Display absolute position of the rotor in a turn in 5-bit (low byte) 14. Display absolute position of the rotor in a turn in 5-bit (high byte) 15. Display Digital input status 16. Display Digital output status 17. Display encoder input signal 18. Display DC voltage value of main power 19. Display alarm code 20. Display logic chip version number 21. Display the actuation state of the relay 22. Display external voltage state 23. Display external voltage state 	0-23	0
4	Control mode	<ol style="list-style-type: none"> 0: position control mode 1: speed control mode 2: torque control mode 	0-5	0

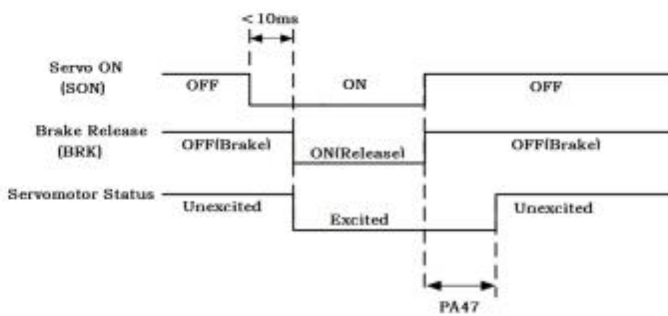
		3: position + speed control mode 4: position + torque control mode 5: speed + torque control mode		
5	Proportional gain of speed loop	1. The bigger value means the more gain and higher rigidity. The parameter value is set according to your servo motor model and the load behavior. Generally, the greater the load inertia, the bigger the value. 2. Set as high value as system does not generate any oscillation.	5-2000Hz	200
6	Integral constant of speed loop	1.The smaller value means the integral time is faster and the ability of system in resisting deviation is stronger. But if it is too small, it will cause oscillation.	1-1000ms	75
7	Torque filter	1. To set the character of torque command filter. 2. To suppress resonance from torque applied to load. 3. The smaller value means the cut-off frequency is lower and vibration with generated noise by the motor is less. If the load inertia is great, reduce the setting value. If the value is too small, it would lead to low response, which would result in shaking and non-smooth operation. 4. The bigger value means the cut-off frequency is higher and the response frequency is quicker. If you need higher torque response frequency,increasing the setting value is recommended.	20-500%	100
8	Speed detection filter	1. To set the degree of speed detection filter. 2. The smaller value means the cut-off frequency is lower and noise fromthe motor is smaller. If the load inertia is great, reducing the setting value is recommended. If the value is too small, it would lead to low response, which would result in shaking and non-smooth operation. 3. The bigger value means the cut-off frequency is higher and the response frequency is quicker. If you need higher speed response frequency, it is recommended to increase the setting value.	20-500%	100
9	Proportional gain of position loop	1. The bigger value means the gain is higher and its rigidity is stronger. So the position lag is smaller under the same frequency command pulse condition. But if it is too big, it will cause oscillation. 2. The parameter value is set according to your servo motor model and the load condition.	1-1000 (1/s)	80
11	Command pulses for one turn of motor rotation	1. When it is set to 0 , then PA12 and PA13 are valid, otherwise this parameter defines the input pulse command number required to turn the motor for one turn.	1-30,000 pulse	10,000
12	1 st numerator of electronic gear for position command pulse	1. In position control mode, it is convenient to match all kinds of pulse source through setting the parameter PA12 and PA13, which helps to reach ideal control resolution (angle/pulse). 2. $P \times G = N \times C \times 4$ P: input pulse command number, G: electric gear ratio, N: numbers of motor rotation, C: resolution of optical encoder (ppr), default value is 2500. 3. For example: for input command pulse P of 6000, we need the	0-32,767	0

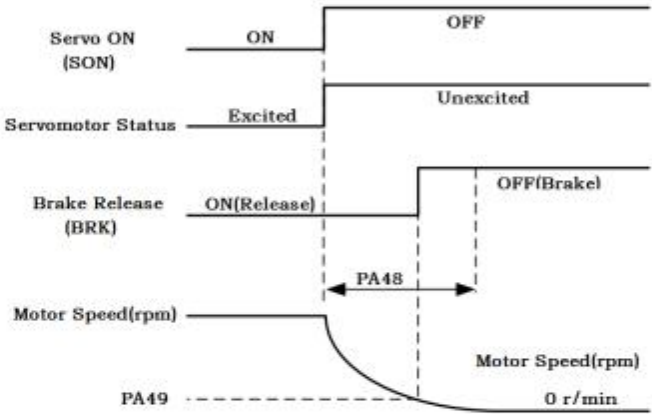
		<p>servo motor to rotate one turn</p> <p>4. $G=(N \times C \times 4) / P = (1 \times 2500 \times 4) / 6000 = 5/3$, So PA12 should be set to 5, PA13 should be set to 3.</p> <p>5.The numerator of electronic gear for command pulse is decided by combination of Gear1 and Gear2 digital inputs which points to one of the parameters PA12, PA77, PA78, and PA79.</p> <p>The denominator is decided by PA13.</p> <p>The detail is as following:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">DI Signal</th> <th rowspan="2">Numerator</th> </tr> <tr> <th>Gear 2</th> <th>Gear 1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1st Numerator (Parameter PA 12)</td> </tr> <tr> <td>0</td> <td>1</td> <td>2nd Numerator (Parameter PA 77)</td> </tr> <tr> <td>1</td> <td>0</td> <td>3rd Numerator (Parameter PA 78)</td> </tr> <tr> <td>1</td> <td>1</td> <td>4th Numerator (Parameter PA 79)</td> </tr> </tbody> </table> <p>Note: 0=OFF, 1=ON.</p>	DI Signal		Numerator	Gear 2	Gear 1	0	0	1 st Numerator (Parameter PA 12)	0	1	2 nd Numerator (Parameter PA 77)	1	0	3 rd Numerator (Parameter PA 78)	1	1	4 th Numerator (Parameter PA 79)		
DI Signal		Numerator																			
Gear 2	Gear 1																				
0	0	1 st Numerator (Parameter PA 12)																			
0	1	2 nd Numerator (Parameter PA 77)																			
1	0	3 rd Numerator (Parameter PA 78)																			
1	1	4 th Numerator (Parameter PA 79)																			
13	Denominator of position command pulse	Refers to parameter PA12	1-32,767	10,000																	
14	mode of position command pulse	<p>To set one of 3 input modes:</p> <p>0: Pulse+Direction</p> <p>1: CCW pulse/CW pulse</p> <p>2: A-phase and B-phase orthogonal input.</p> <p>3:External position input</p>	0-3	0																	
15	Direction of command pulses	<p>0: Normal</p> <p>1: Reverse position command pulse</p>	0-1	0																	
16	Range of positioning completion	<p>1. To Set the pulse range of positioning completion under the position control mode.</p> <p>1. To set the pulse range of positioning completion under the position control mode.</p> <p>2. When the pulse number in the position deviation counter is smaller than or equal to this setting value , the digital output (DO) COIN is ON, otherwise is OFF.</p> <p>3. The comparator has hysteresis function, it is set by PA84.</p>	0-30,000 pulse	10																	
17	Detection of over-travel range	In position control mode, if the value in position deviation counter is greater than this parameter, the drive will alarm.	0-30,000x 100 pulse	400																	
18	Invalid error of over travel	<p>0: The alarm for detection of over travel is valid.</p> <p>1: The alarm for detection of over travel is invalid, and stops to detect the error.</p>	0-1	0																	
19	Position command smooth filter	<p>1. To filter the input command pulse. Acceleration and deceleration are with exponential form. The value is time constant.</p> <p>2. The filter does not lose input pulses, but will cause a command delay.</p> <p>3.The filter applies in</p> <p>(1. PC controller without acceleration and deceleration function.</p> <p>(2. The electronic gear ratio is big (>10).</p> <p>(3. The command frequency is low.</p>	0-30,000 x 0.1ms	300																	

		(4. When the motor runs, there are step jumps in speed. 5. When set to value"0", the filter does not work.																																				
20	drive inhibition	0: CCW drive inhibition or CW drive inhibition is effective. If the digital input of CCW drive inhibition is ON (N.C. contact on its digital input), CCW drive is permitted. If the switch of CCW drive inhibition is OFF (the contact has been opened), CCW torque keeps 0. The similar definition is for CW drive inhibition but in opposite direction. If both CCW and CW drive inhibition are OFF, it will come to error alarm of drive inhibition input. 1: Cancel CCW or CW drive inhibition. No matter what state of the contact of CCW or CW drive inhibition inputs are, CCW or CW drive is allowed. Meanwhile, if the contacts of CCW and CW drive inhibition are OFF, it will not cause any alarm.	0-1	1																																		
21	JOG speed	Set the running speed of JOG operating.	0-6000 rpm	100																																		
22	The source of speed command	In speed control mode, it sets the source of speed command. 0: Analog Terminal AS+, AS- input analog speed command. 1: Internal speed command is decided by SP1 and SP2 digital inputs : <table border="1" data-bbox="450 1070 1070 1335"> <thead> <tr> <th colspan="2">DI Signal</th> <th rowspan="2">Speed Command</th> </tr> <tr> <th>SP2</th> <th>SP1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Internal Speed 1 (Parameter PA24)</td> </tr> <tr> <td>0</td> <td>1</td> <td>Internal Speed 2 (Parameter PA25)</td> </tr> <tr> <td>1</td> <td>0</td> <td>Internal Speed 3 (Parameter PA26)</td> </tr> <tr> <td>1</td> <td>1</td> <td>Internal Speed 4 (Parameter PA27)</td> </tr> </tbody> </table> <p>Note: 1=ON, 0=OFF</p> 2: Analog speed command + internal speed command: <table border="1" data-bbox="450 1420 1070 1684"> <thead> <tr> <th colspan="2">DI Signal</th> <th rowspan="2">Speed Command</th> </tr> <tr> <th>SP2</th> <th>SP1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Analog Speed Command</td> </tr> <tr> <td>0</td> <td>1</td> <td>Internal Speed 2 (Parameter PA25)</td> </tr> <tr> <td>1</td> <td>0</td> <td>Internal Speed 3 (Parameter PA26)</td> </tr> <tr> <td>1</td> <td>1</td> <td>Internal Speed 4 (Parameter PA27)</td> </tr> </tbody> </table> 3: JOG speed command, if carry out JOG operation. 4: Keyboard speed command, if carry out Sr—operation. 5: control of JOG operation from digital input terminals.	DI Signal		Speed Command	SP2	SP1	0	0	Internal Speed 1 (Parameter PA24)	0	1	Internal Speed 2 (Parameter PA25)	1	0	Internal Speed 3 (Parameter PA26)	1	1	Internal Speed 4 (Parameter PA27)	DI Signal		Speed Command	SP2	SP1	0	0	Analog Speed Command	0	1	Internal Speed 2 (Parameter PA25)	1	0	Internal Speed 3 (Parameter PA26)	1	1	Internal Speed 4 (Parameter PA27)	0-5	0
DI Signal		Speed Command																																				
SP2	SP1																																					
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0	0	Analog Speed Command																																				
0	1	Internal Speed 2 (Parameter PA25)																																				
1	0	Internal Speed 3 (Parameter PA26)																																				
1	1	Internal Speed 4 (Parameter PA27)																																				
23	Maximum speed limit	Set the highest speed of the servo motor. It is independent to rotating direction. If the setting value is beyond the rated speed of the motor, the rated speed of the motor is considered as the maximum permissible value.	0-6000 rpm	5000																																		
24	Internal speed 1	In speed control mode (PA22=1), when SP1 and SP2 are OFF, internal speed 1 is as the speed command.	-6000~6000 rpm	100																																		

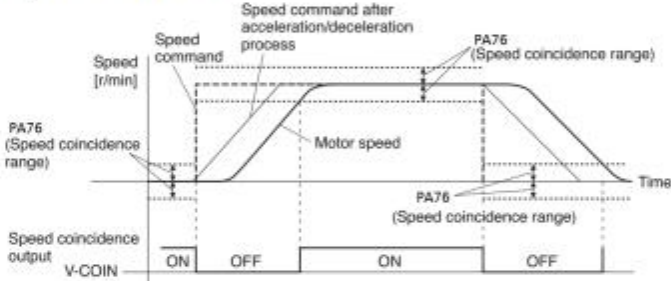
25	Internal speed 2	In speed control mode (PA22=1 or 2), when SP1 is ON, while SP2 is OFF, internal speed 2 is as the speed command.	-6000~6000 rpm	500											
26	Internal speed 3	In speed control mode (PA22=1 or 2), when SP1 is OFF, while SP2 is ON, internal speed 3 is as the speed command.	-6000~6000 rpm	1000											
27	Internal speed 4	In speed control mode (PA22=1 or 2), when SP1 and SP2 are ON, internal speed 4 is as the speed command.	-6000~6000 rpm	2000											
28	At speed (Speed arrival)	<p>Set the detection timing of the speed arrival output.</p> <p>When the servomotor speed surpasses this parameter, the digital output (DO) ASP (arrival speed) is ON, otherwise is OFF.</p> <p>The comparator has hysteresis function set by PA87.</p> <p>Detection is associated with 10 r/min hysteresis.</p>  <p>3. It also has the polarity setting function:</p> <table border="1" data-bbox="438 929 1077 1198"> <thead> <tr> <th>PA8</th> <th>PA28</th> <th>Comparator</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>>0</td> <td>Speed independent to direction</td> </tr> <tr> <td rowspan="2">1</td> <td>>0</td> <td>Only detect CCW speed</td> </tr> <tr> <td><0</td> <td>Only detect CW speed</td> </tr> </tbody> </table>	PA8	PA28	Comparator	0	>0	Speed independent to direction	1	>0	Only detect CCW speed	<0	Only detect CW speed	0-3000 rpm	3000
PA8	PA28	Comparator													
0	>0	Speed independent to direction													
1	>0	Only detect CCW speed													
	<0	Only detect CW speed													
29	Gain of analog torque command	<p>1. Set the relation between input analog voltage for torque command and the actual motor running torque.</p> <p>2. The setting value unit is 0.1v/100%.</p> <p>3. The default value is 30, corresponding to 3v/100%. it means if the input voltage is 3V, it would generate 100% rated torque.</p>	10-100 (0.1v/100%)	30											
30	The alarm value of torque overload	<p>1. The value is the percentage of rated torque. The limit is independent to direction and CW or CCW direction is protected.</p> <p>2. When PA31>9, motor torque>PA30 and duration>PA31, the drive alarms and the code is Err-29. The motor stops working. It must repower on after clearing errors.</p>	1-300	300											
31	The detection time for torque overload	<p>1. The detection time for torque overload, unit:ms. Detection time=PA31×0.1;</p> <p>2. When set to 0~9, the function of torque overload alarming is prohibited. In general,the value is set to 0.</p>	0-32,767	0											
32	The source of torque command	<p>0: Analog input torque command by terminals AS+ and AS-.</p> <p>1: Internal torque command by combination of TRQ1 and TRQ2 digital inputs (DI) which points to one of the parameters PA64, PA65, PA66, and PA67.</p> <table border="1" data-bbox="446 2004 1069 2139"> <thead> <tr> <th colspan="2">DI Signal</th> <th rowspan="2">Torque Command</th> </tr> <tr> <th>TRQ2</th> <th>TRQ1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Internal Torque1 (Parameter PA64)</td> </tr> </tbody> </table>	DI Signal		Torque Command	TRQ2	TRQ1	0	0	Internal Torque1 (Parameter PA64)	0-1	0			
DI Signal		Torque Command													
TRQ2	TRQ1														
0	0	Internal Torque1 (Parameter PA64)													

		<table border="1"> <tr> <td>0</td> <td>1</td> <td>Internal Torque2 (Parameter PA65)</td> </tr> <tr> <td>1</td> <td>0</td> <td>Internal Torque3 (Parameter PA66)</td> </tr> <tr> <td>1</td> <td>1</td> <td>Internal Torque4 (Parameter PA67)</td> </tr> </table> <p>Note: 0=OFF, 1=ON</p> <p>2: Analog torque command + internal torque command:</p> <table border="1"> <thead> <tr> <th colspan="2">DI Signal</th> <th rowspan="2">Torque Command</th> </tr> <tr> <th>TRQ2</th> <th>TRQ1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Analog Torque Command</td> </tr> <tr> <td>0</td> <td>1</td> <td>Internal Torque2 (Parameter PA65)</td> </tr> <tr> <td>1</td> <td>0</td> <td>Internal Torque3 (Parameter PA66)</td> </tr> <tr> <td>1</td> <td>1</td> <td>Internal Torque4 (Parameter PA67)</td> </tr> </tbody> </table>	0	1	Internal Torque2 (Parameter PA65)	1	0	Internal Torque3 (Parameter PA66)	1	1	Internal Torque4 (Parameter PA67)	DI Signal		Torque Command	TRQ2	TRQ1	0	0	Analog Torque Command	0	1	Internal Torque2 (Parameter PA65)	1	0	Internal Torque3 (Parameter PA66)	1	1	Internal Torque4 (Parameter PA67)		
0	1	Internal Torque2 (Parameter PA65)																												
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0	1	Internal Torque2 (Parameter PA65)																												
1	0	Internal Torque3 (Parameter PA66)																												
1	1	Internal Torque4 (Parameter PA67)																												
33	Direction of analog torque command	<p>When set to 0 and the analog torque command is positive, torque direction is CCW.</p> <p>When set to 1 and the analog torque command is positive, torque direction is CW.</p>	0-1	0																										
34	Internal CCW torque limit	<p>1. The setting value is the percentage of rated torque.</p> <p>2. It is always valid independence of the drive control mode.</p> <p>3. If the setting value is bigger than the maximum overload capacity of the drive for the matched motor, the max overload capacity is concerned as the actual torque limit.</p>	0~300%	300%																										
35	Internal CW torque limit	Refer to PA34.	-300~0%	-300%																										
36	Externally controlled CCW torque limit	<p>1. It is valid only when the input terminal (FIL) of CCW torque limit is ON.</p> <p>2. When the limit function is valid, the actual torque limit is the Minimum value of:</p> <p>1: max overload capacity of the drive for matched motor,</p> <p>2: internal CCW torque limit (PA34),</p> <p>3: externally controlled CCW torque limit (PA36).</p>	0~300%	100%																										
37	External CW torque limit	<p>1. It is valid only when the input terminal (RIL) of CW torque limit is ON.</p> <p>2. When the limit function is valid, the actual torque limit is the Minimum value of:</p> <p>1: max overload capacity of the drive for matched motor,</p> <p>2: internal CW torque limit (PA35),</p> <p>3: externally controlled CW torque limit (PA37).</p>	-300~0%	-100%																										
39	Zero offset compensation of analog torque command	Make an offset adjustment for analog torque command.	-2000~2000	0																										
40	Acceleration time constant	<p>Linear acceleration / deceleration characteristics are available.</p> <p>The setting value means the acceleration time of the motor from 0 rpm to 1000 rpm (or from 1000 rpm to 0 rpm).</p> <p>It only applies in speed control mode, while is invalid in position control mode.</p> <p>This parameter should be set to 0 if the drive is used in</p>	1-10,000ms	100																										

		combination with an external position loop controller (like CNC controller) to avoid extra acc/dec which is not decided by the controller.		
41	Deceleration time constant	Refer to PA40.	1-10,000ms	100
43	Gain of analog speed command	1. Set the relation between input analog voltage for speed command and the actual motor running speed. 2. The setting value unit is 0.1v/100%. 3. The default value is 10; corresponding to 10 rpm/V, it means if the input voltage is 5V, it would run the motor at 50 rpm	10-3000 rpm/V	300
44	Direction of analog speed command	1.If Set to 0 and analog speed command is positive, the speed direction is CCW. 2.If Set to 1 and analog speed command is positive, the speed direction is CW.	0-1	0
45	Zero offset compensation of analog speed command	Make an offset adjustment for analog speed command with this parameter.	-5000~5000	0
46	Filter of analog speed command	1.The input low pass filter of analog speed command. 2.If the setting value is bigger, the response frequency is quicker to speed input analog quantity and the influence of signal noise is higher.	1-1000Hz	300
47	Delay time for electromagnetic brake when servomotor is in standstill	1. Use the electromagnetic brake when SON is from ON to OFF or alarm occurs in the servo driver. This parameter defines the delay time from the action(the BRK is OFF from DO terminals) of The electromagnetic brake until excitation removal of the servomotor during the servomotor to be in static. 2.After setting, the parameter should not be smaller than the delay time in which the machinery applies the brake. This parameter will make the brake reliable and then turns off the servomotor excitation to guarantee against the small displacement of the servomotor or depreciation of the work piece. 3. The timing chart as follow: 	0-200 x10ms	0

48	Waiting time for electromagnetic brake when servomotor is in motion	<p>1. Use the electromagnetic brake when SON is from ON to OFF or alarm occurs in the servo driver. This parameter defines the delay time from excitation removal of the servomotor until the action(the BRK is OFF from DO terminals) of the electromagnetic brake during the servomotor to be in motion.</p> <p>2. This parameter will make the servomotor deceleration from high speed down to low speed and then applies the brake to avoid damaging the brake.</p> <p>3. The actual action time is the smaller value between the parameter PA48 and the time in which the servomotor decelerates to the value of PA49.</p> <p>4. The timing chart as below.</p> 	0-200 ×10ms	50										
49	Action speed for electromagnetic brake When servomotor is in motion	Refers to the explanation of parameter PA48.	0-3000 rpm	100										
50	Speed limit in torque control mode	<p>1: In torque control mode, the motor running speed is limited in the range of this parameter.</p> <p>2: It prevents over-speed due to the light load.</p>	0-5000 rpm	3000										
53	Servo Force Enable	<p>0: The enable signal is controlled by SON of digital input (DI)</p> <p>1: Software forces to servo ON.</p>	0-1	0										
54	Servo enable delay time at SERVO-OFF	After the servo signal is deactivated on the digital input, it delays to cut the current of motor by this delay time.	0-30,000× 0.1ms	0										
55	Effective level control of digital inputs	<p>Represented by a byte of 4 bits. Each bit corresponds to one digital input. If any bit is 0, it means the related digital input terminal acts as normal and does not reverse (is activated when closed). While it is 1, it means the terminal logic is reversed (is activated when opened).</p> <p>The byte represents the digital input terminals as following:</p> <table border="1" data-bbox="513 1917 1008 2011"> <tr> <td>bit</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>definition</td> <td>DI4</td> <td>DI3</td> <td>DI2</td> <td>DI1</td> </tr> </table> <p>0: High level is valid (is activated when closed)</p> <p>1: Low level is valid (is activated when opened)</p>	bit	3	2	1	0	definition	DI4	DI3	DI2	DI1	0000-1111	0000
bit	3	2	1	0										
definition	DI4	DI3	DI2	DI1										

57	Effective level control of digital outputs	<p>Represented by a byte of 4 bits. Each bit corresponds to one digital output. If any bit is 0, it means the related digital output terminal acts as normal and does not reverse (is activated when switched ON). While it is 1, it means the terminal logic is reversed (is activated when switched OFF).</p> <p>The byte represents the digital output terminals as following:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>bit</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>definition</td> <td>DO4</td> <td>DO3</td> <td>DO2</td> <td>DO1</td> </tr> </table> <p>0: High level is valid (is activated when switched ON) 1: Low level is valid (is activated when switched OFF)</p>	bit	3	2	1	0	definition	DO4	DO3	DO2	DO1	0000-1111	0000
bit	3	2	1	0										
definition	DO4	DO3	DO2	DO1										
58	Anti-jitter time constant of digital input terminals	<p>1. If the value is smaller, the input terminal frequency response is faster.</p> <p>2. If the value is bigger, the anti-jitter performance of input terminal is better, but the response frequency becomes slower.</p>	1-20ms	2										
59	Effective command pulse edge	<p>0: the rising edge is effective</p> <p>1: the falling edge is effective</p>	0-1	0										
60	Soft reset	<p>0: Soft reset is invalid</p> <p>1: Soft reset is effective and the system will be restart.</p>	0-1	0										
61	System alarm clear	<p>0: System alarm clear is invalid</p> <p>1: System alarm clear is effective</p>	0-1	0										
62	Encoder selection	<p>0: 15-line incremental 2500-line encoder (A, B, Z, U, V, W)</p> <p>1: wire-saving 2500-line encoder (A, B, Z)</p>	0-1	0										
63	Load inertia ratio	<p>Set the ratio of load inertia to motor inertia.</p> <p>The setting value = $[(\text{load inertia} + \text{rotating inertia}) / (\text{rotating inertia})] \times 100$.</p>	1-500	100										
64	Internal Torque 1	In torque control mode (PA4=2 and PA32=1), when TRQ1=OFF and TRQ2=OFF, internal torque 1 is as the torque command.	-300~300	0										
65	Internal Torque 2	In torque control mode (PA4=2 and PA32=1), when TRQ1=ON and TRQ2=OFF, internal torque 2 is as the torque command.	-300~300	0										
66	Internal Torque 3	In torque control mode (PA4=2 and PA32=1), when TRQ1=OFF and TRQ2=ON, internal torque 3 is as the torque command.	-300~300	0										
67	Internal Torque 4	In torque control mode (PA4=2 and PA32=1), when TRQ1=ON and TRQ2=ON internal torque 4 is as the torque command.	-300~300	0										
71	MODBUS ID No.	MODBUS communication ID No.	1-254	1										
72	MODBUS communication baud rate	MODBUS communication baud rate	48-1152 ×100	96										
73	MODBUS protocol selection	<p>0: 8, N, 2 (MODBUS, RTU)</p> <p>1: 8, E, 1 (MODBUS, RTU)</p> <p>2: 8, O, 1 (MODBUS, RTU)</p> <p>The parameter decides the communication protocol. Value 8 represents the transmitted data is 8 bits long; N, E, O indicates "none", "even" and "odd" priority, respectively. Value 1 or 2 indicates communication of 1 byte or 2 bytes.</p>	0-2	0										

74	Communication error handing	When communication is wrong, choose: 0: keep working, OR 1: Alarm and stop working	0-1	0
75	Range for zero speed detection	1. If the motor running speed is less than the value of this parameter, the ZSP (zero speed) of digital output (DO) is ON, and else is OFF. 2. If ZCLAMP of digital input (DI) is ON and speed command is less than the value of this parameter, the value of speed command is forced to be zero and the motor stops. 3. The comparator has hysteresis function. It is set by PA92.	0-1000 rpm	10
76	Speed Coincidence Range	1. Set the speed coincidence(VCOIN) output detection timing. 2. Output the speed coincidence(VCOIN ON) when the difference between the speed command and the motor speed is equal to or smaller than the speed specified by this parameter PA76, otherwise is OFF. For example, PA76=10 and the command speed is 1000rpm, while the actual speed ranges from 990rpm~1010rpm, then the digital output VCOIN is ON.  * Because the speed coincidence detection is association with 10 r/min hysteresis, actual detection range is as shown below: Speed coincidence output OFF → ON timing(PA76-10)r/min Speed coincidence output ON → OFF timing(PA76+10)r/min	0-1000 rpm	10
77	2 nd numerator of electronic gear ratio	Refer to parameter PA12	0-32,767	0
78	3 rd numerator of electronic gear ratio	Refer to parameter PA12	0-32,767	0
79	4 th numerator of electronic gear ratio	Refer to parameter PA12	0-32,767	0
80	Effective level of Direction (SIGN)	0: High level is positive direction 1: Low level is positive direction	0-1	0
81	PULS input command filter	1. To filter the input PULS command. 2. The default value (4) is correspondent to the maximum pulse input frequency, which is 500Khz. If the value of this parameter is bigger, the maximum workable input frequency will be smaller. 3. To filter the noise from the signal line in order to avoid incorrect counting. If it goes wrong due to the incorrect counting, you can increase the value of this parameter properly. 4. After editing this parameter, you must save it and turn the drive OFF and ON to make it effective.	0-15	4
82	SIGN input command filter	1. To filter the input SIGN command. 2. The default value (4) is correspondent to the maximum pulse	0-15	4

		<p>input frequency, which is 500Khz (when used in CW/CCW pulse mode). If the value of this parameter is bigger, the maximum workable input frequency will be smaller.</p> <p>3. To filter the noise from the signal line in order to avoid incorrect counting. If it goes wrong due to the incorrect counting, you can increase the value of this parameter properly.</p> <p>4. After editing this parameter, you must save it and turn the drive OFF and ON to make it effective.</p>													
83	CWL/CCWL inhibit method	<p>When the machine touches the mechanical limit switch at any end of stroke and activates CW/CCW limit, you can choose the following methods to work with this parameter.</p> <p>0: To limit the torque in the current direction to be 0.</p> <p>1: The input pulse of the current direction is inhibited.</p>	0-1	0											
84	Hysteresis for positioning completion	Refer to parameter PA16.	0-32,767 pulse	5											
85	Range for approach positioning	<p>1. To set the pulse range of approach positioning under the position control mode.</p> <p>2. When the pulse number in position deviation counter is smaller than or equal to the setting value of this parameter, the digital output (DO) NEAR(approach positioning) is ON, otherwise is OFF.</p> <p>3. The comparator has hysteresis function set by PA86.</p> <p>4. Use this function in case that in near positioning, the host controller is accepting the NEAR signal to carry on the preparation to the next step. In general, this parameter value should be bigger than PA16.</p>	0-32,767 pulse	500											
86	Hysteresis for approach positioning	Refer to parameter PA85.	0-32,767 pulse	50											
87	Hysteresis of arrival speed	Refer to parameter PA28.	0-5000 rpm	30											
88	Polarity of arrival speed	<p>Refer to parameter PA28.</p> <p>The polarity setting function:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>PA88</th> <th>PA28</th> <th>Comparator</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>>0</td> <td>Speed independent to direction</td> </tr> <tr> <td rowspan="2">1</td> <td>>0</td> <td>Only detect CCW speed</td> </tr> <tr> <td><0</td> <td>Only detect CW speed</td> </tr> </tbody> </table>	PA88	PA28	Comparator	0	>0	Speed independent to direction	1	>0	Only detect CCW speed	<0	Only detect CW speed	0-1	0
PA88	PA28	Comparator													
0	>0	Speed independent to direction													
1	>0	Only detect CCW speed													
	<0	Only detect CW speed													
89	Arrival torque	<p>1. When the servomotor torque surpasses this parameter, the digital output (DO) ATRQ (arrival torque) is ON, otherwise is OFF.</p> <p>2. The comparator has hysteresis function set by PA90.</p> <p>3.It also has the polarity setting function:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>PA91</th> <th>PA89</th> <th>Comparator</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>>0</td> <td>Torque independent to direction</td> </tr> <tr> <td>1</td> <td>>0</td> <td>Only detect CCW torque</td> </tr> </tbody> </table>	PA91	PA89	Comparator	0	>0	Torque independent to direction	1	>0	Only detect CCW torque	-300% ~300%	100%		
PA91	PA89	Comparator													
0	>0	Torque independent to direction													
1	>0	Only detect CCW torque													

			<0	Only detect CW torque		
90	Hysteresis of arrival torque	Hysteresis for PA89.			0-300%	5%
91	Polarity of arrival torque	Refer to parameter PA89. The polarity setting function:			0-1	0
		PA91	PA89	Comparator		
		0	>0	Torque independent to direction		
		1	>0	Only detect CCW torque		
<0	Only detect CW torque					
92	Hysteresis of zero speed detection	Hysteresis for PA75.			0-1000 rpm	5
94	The delay time of brake on	This parameter defines the delay time from the servomotor energized until the action(the digital output(DO) BRK is ON).			0-200×10ms	0



5.2 P3 Group Parameter

5.2.1 Parameter Table

SZGH-SD Series servo drivers have 4 Digital Input terminals and 4 Digital Output terminals. which can be re-defined their functions through P3 group parameters.

Default valid level of Input pins is Low level.

Parameter	Definition	Range	Default Value
P3-0	Digital Input DI1 Function	0-99	1
P3-1	Digital Input DI2 Function	0-99	2
P3-2	Digital Input DI3 Function	0-99	3
P3-3	Digital Input DI4 Function	0-99	4
P3-15	Digital Input DI forced effective1	00000000-11111111	00000000
P3-16	Digital Input DI forced effective2	00000000-11111111	00000000
P3-17	Digital Input DI forced effective3	00000000-11111111	00000000
P3-20	Digital Output DO1 Function	0-99	2
P3-21	Digital Output DO2 Function	0-99	3
P3-22	Digital Output DO3 Function	0-99	5
P3-23	Digital Output DO4 Function	0-99	8
P3-30	Virtual Input Control	0-1	0
P3-31	Virtual Input Status Value	00000000-11111111	00000000
P3-32	Virtual Output Control	0-1	0
P3-33	Virtual Output Status Value	00000000-11111111	00000000

5.2.2 DI Function Explanation

Digital Input terminals (4 input terminals are corresponding to the definitions of P3-0, P3-1, P3-2, P3-3)

Value	Symbol	Function	Explanation
0	NULL	No	Input is deactivated.
1	SON	Servo Enable	Input terminal of servo enable. OFF: servo drive is not enabled and servo motor is not energized. ON: servo drive is enabled and servo motor is energized.
2	ARST	Alarm Clear	Input terminal of alarm clear. When an alarm occurs and the alarm has permission to be cleared, then the rising edge of ARST will clear the alarm. Attention: only some part of alarms has the permission to be cleared.
3	CCWL	CCW Drive Inhibition	1. Input terminal of CCW drive inhibition: OFF: Inhibit CCW running. ON: Enable CCW running. 2. Use this function for protection of the mechanical stroke limit. The function is controlled by the parameter PA20. Pay attention that the default value of PA20 neglects this function. Therefore you need to modify PA20 if need to use this function: (1): When PA20=0, the function of input inhibition is effective. Order to inhibit for CCW direction is decided by PA83. (2): When PA20=1, the function of input inhibition is not effective. 2. Inhibition function is valid (PA20=0): (1) PA83=0, CCW torque limit is 0, but it does not limit CCW pulse input. (2) PA83=1, it inhibits CCW pulse input.
4	CWL	CW Drive Inhibition	1. Input terminal of CW drive inhibition: OFF: Inhibit CW running. ON: Enable CW running. 2. Use this function for protection of the mechanical stroke limit. The function is controlled by the parameter PA20. Pay attention that the default value of PA20 neglects this function. Therefore you need to modify PA20 if need to use this function: (1): When PA20=0, the function of input inhibition is effective. Order to inhibit for CW direction is decided by PA83. (2): When PA20=1, the function of input inhibition is not effective. 3. Inhibition function is valid (PA20=0): (1) PA83=0, CW torque limit is 0, but it does not limit CW pulse input. (2) PA83=1, it inhibits CW pulse input.
5	TCCW	CCW Torque Limitation	OFF: Torque is not limited by parameter PA36 in CCW direction. ON: Torque is limited by parameter PA36 in CCW direction. Attention: Whether the TCCW is effective or not, the torque is also limited by PA34 in CCW direction.
6	TCW	CW Torque Limitation	OFF: Torque is not limited by parameter PA37 in CW direction. ON: Torque is limited by parameter PA37 in CW direction. Attention: Whether the TCW is effective or not, the torque is also limited by

			PA35 in CW direction.
7	ZCLAMP	Zero Speed Clamping	When the following conditions are satisfied, the function of zero speed clamping is activated (speed is forced to zero): 1: speed control mode (PA4=1) and external speed source is chosen (PA22=0). 2: ZCLAMP digital input is ON. 3: speed command is lower than the value of PA75. When any one of the above conditions is not satisfied, it will perform normal speed control.
8	CZERO	Zero Command	In speed or torque control mode, speed or torque input command will be: OFF: Normal command ON: Zero command
9	CINV	Command inverse	In speed or torque control mode, speed or torque command will be: OFF: Normal command ON: Reverse Command
10	SP1	Speed Choice 1	In speed control mode (PA4=1) and internal speed selection (PA22=1). SP1 and SP2 combinations are used to select different internal speeds: SP2= OFF, SP1= OFF: internal speed 1(PA-24)
11	SP2	Speed Choice 2	SP2= OFF, SP1= ON: internal speed 2 (PA-25) SP2= ON, SP1= OFF: internal speed 3 (PA-26) SP2 =ON, SP1= ON: internal speed 4 (PA-27)
13	TRQ1	Torque Choice 1	In torque control mode (PA4=2) and internal torque selection (PA32=1). TRQ1 and TRQ2 combinations are used to select different internal torque: TRQ2 =OFF, TRQ1= OFF: internal torque 1 (PA-64)
14	TRQ2	Torque Choice 2	TRQ2 =OFF, TRQ1= ON: internal torque 2 (PA-65) TRQ2 =ON, TRQ1= OFF: internal torque 3 (PA-66) TRQ2 =ON, TRQ1= ON: internal torque 4 (PA-67)
16	CMODE	Mix Control Mode	When PA4 is set to 3, 4, 5, it is in mix control mode. It can change control mode with this input terminal: (1)PA4=3, CMODE =OFF, it is position control mode; CMODE =ON, it is speed control mode; (2)PA4=4, CMODE =OFF, it is position control mode; CMODE =ON, it is torque control mode; (3)PA4=5, CMODE= OFF, it is speed control mode; CMODE= ON, it is torque control mode.
18	GEAR1	Electronic Gear 1	When PA11=0, Gear1 and Gear2 combinations are used to select different numerator of gear ratio: GEAR2 =OFF, GEAR1 =OFF: numerator 1 (PA-12) is selected.
19	GEAR2	Electronic Gear 2	GEAR2= OFF, GEAR1 =ON: numerator 2 (PA-77) is selected. GEAR2= ON, GEAR1= OFF: numerator 3 (PA-78) is selected. GEAR2= ON, GEAR1= ON: numerator 4 (PA-79) is selected.
20	CLR	Position Deviation Clear	In position control mode, it is the position deviation counter clear input terminals.
21	INH	Input Pulse Inhibit	In position control mode it is position command pulse inhibit terminal: OFF: permits the position command pulse to go through the drive.

			ON: position command pulse is inhibited (motor stops even if the controller sends the command pulse).					
22	JOGP	CCW Inching	In speed control mode, if PA22=5, by activating this input, motor starts in inching motion in CCW direction with a speed which is set by PA21. Attention: If both JOGP and JOGN inputs are activated simultaneously, inching function does not work.					
23	JOGN	CW Inching	In speed control mode, if PA22=5, by activating this input, motor starts in inching motion in CW direction with a speed which is set by PA21. Attention: If both JOGP and JOGN inputs are activated simultaneously, inching function does not work.					
27	HOLD	Internal Position Control Command Stops	When at internal position register mode, the signal ON and motor will stop motion.(Only can be used when internal position mode parameter PA-14=3)					
28	CTRG	Internal Position Command trigger	Chose POS0-2(Internal Position register control command) when at internal position register mode, then signal will be triggered, and motor motion according to the command. Only after output ZSPD=1, it would received the next internal position command.					
29	POS0	Internal Position Command selection 0	Position Command	POS2	POS1	POS0	CTRG	Corresponding Parameter
			P1	0	0	0	↑	P4-2 P4-3
30	POS1	Internal Position Command selection 1	P2	0	0	1	↑	P4-5 P4-6
			P3	0	1	0	↑	P4-8 P4-9
			P4	0	1	1	↑	P4-11 P4-12
31	POS2	Internal Position Command selection 2	P5	1	0	0	↑	P4-14 P4-15
			P6	1	0	1	↑	P4-17 P4-18
			P7	1	1	0	↑	P4-20 P4-21
			P8	1	1	1	↑	P4-23 P4-24
33	SHOM	Start Homing	When at internal register mode, the origin need to be found and the searching origin function is started after the signal connected.(Please consult the setting about P4-34)					
34	ORGP	The Origin	Searching origin when at internal register mode, the point will become origin after servo system connected.(Please consult the setting of P4-32.)					

5.2.3 DO Function Explanation

Digital Output terminals (4 Output terminals are corresponding to the definitions of P3-20, P3-21, P3-22, P3-23)

Value	Symbol	Function	Explanation
1	ON	Always valid	Forced Output ON.
2	RDY	Servo Ready	OFF: servo main power supply is OFF, or there is an alarm. ON: servo main power supply is normal, no alarm.
3	ALM	Alarm	OFF: there is an alarm. ON: no alarm.
4	ZSP	Zero Speed	In speed or torque control mode: OFF: motor speed is higher than the value of PA-75 (independent to direction). ON: motor speed is lower than the value of PA-75 (independent to direction).
5	COIN	Positioning Completion	In position control mode: OFF: position deviation is bigger than parameter PA-16. ON: position deviation is smaller than parameter PA-16.
6	ASP	At Speed	In speed or torque control mode: OFF: motor speed is lower than parameter PA28. ON: motor speed is higher than parameter PA28. Refer to the explanation of PA28 for polarity selection.
7	ATRQ	At Torque	OFF: motor torque is lower than parameter PA89. ON: motor torque is higher than parameter PA89. Refer to the explanation of PA89 for polarity selection.
8	BRK	Electromagnetic Brake	OFF: electromagnetic brake engages the brake with rotor. ON: electromagnetic brake releases the brake from rotor.
9	RUN	Servo Running	OFF: servo motor is not energized. ON: servo motor is energized.
10	NEAR	Approach Position	In position control mode: OFF: position deviation is bigger than parameter PA-85. ON: position deviation is smaller than parameter PA-85.
11	TRQL	Torque Limitation	OFF: motor torque has not reached the limitation. ON: motor torque has reached the limitation. Torque limitation is set by PA34, PA35, PA36 and PA37.
12	SPL	Speed Limitation	In torque control mode: OFF: motor speed has not reached the limitation. ON: motor speed has reached the limitation. Speed limitation is set by PA-50.
13	VCOIN	Speed Coincidence Range	Output the speed coincidence(VCOIN ON) when the difference between the speed command and the motor speed is equal to or smaller than the speed specified by this parameter PA76, otherwise is OFF.
15	HOME	Origin regression complete	OFF:Origin regression not completed, no output signal ON:Origin regression completed, output signal
16	CMDOK	Internal Position Command complete	OFF:When internal position command not competed or stop, no output signal.

			ON;When internal position command competed or stop, output signal after the time set by P4-1.
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5.2.4 DI Forced activated

There are 3 parameters (P3-15, P3-16, and P3-17) in P3-group which are used to turn the digital inputs ON and OFF by bits. They are useful when you need to communicate with drive through MODBUS protocol.

(1) Corresponding functions for P3-15 is represented by 8-bit binary:

bit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	CZERO	ZCLAMP	TCW	TCCW	CWL	CCWL	ARST	SON

(2) Corresponding functions for P3-16 is represented by 8-bit binary:

bit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	CMODE	NULL	TRQ2	TRQ1	NULL	SP2	SP1	CINV

(3) Corresponding functions for P3-17 is represented by 8-bit binary:

bit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	NULL	JOGN	JOGP	INH	CLR	GEAR2	GEAR1	NULL

(4) Corresponding functions for P3-18 is represented by 8-bit binary:

bit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	NULL	POS2	POS1	POS0	CTRG	HOLD	NULL	NULL

(5) Corresponding functions for P3-19 is represented by 8-bit binary:

bit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	NULL	NULL	NULL	NULL	NULL	NULL	ORPG	SHOM

Parameter explanation:

Already Planned means functions of parameters has been chosen by P3-0~P3-3 in digital input definition DI1~DI4 section.

Unplanned means functions of parameters has not been chosen by P3-0~P3-3.

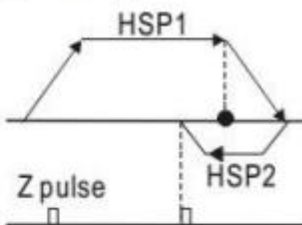
ANY of 3 parameters	Corresponding Function	Result
0	Unplanned	OFF (forced Deactivated)
	Already Planned	Its function is according to its definition through related parameter P3-0~P3-3.
1	Either Unplanned Or Already Planned	ON (forced Activated)

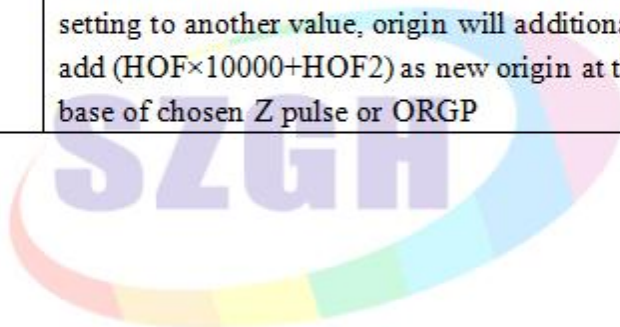
5.3 P4 Group Parameter

NO.	Para.name	Function	Parameter Range	Initial Value
P4-0	Internal position instruction control mode	0:Absolute position instruction 1:Incremental position instruction	0-1	0
P4-1	Internal position command completes digital output delay	After the internal command or stop and then waiting for the while set by P4-1, Output internal position to finish DO signal. When P4-1 set to 0, the ZSPD set to 1, it will received the signal to trigger internal position command. Setting P4-1 set to other number, or setting to 1 after DO signal finished Internal Position Command complete(CMDOK), and the Internal Position Command can be triggered by DI Signal Command trigger(CTRG).	0~200ms	0
P4-2	Setting the laps of position of internal position instruction 1	Setting the laps of position at the first step internal position.	-30000~30000	0
P4-3	Setting the pulse of internal position instruction 1	1.Setting the position and pulse at the first internal position 2.Internal position instruction 1= the value of laps in position+the value of pulse at first internal position.	+/-max. cnt/rev	0
P4-4	Setting speed of internal position control 1	Setting speed of internal position control 1	0-5000r/min	1000
P4-5	Setting the laps at position of internal position instruction 2	Setting the laps at position of internal position instruction 2	-30000-30000	0
P4-6	Setting the pulse in one cycle at position of internal position instruction 2	Setting the laps at position of internal position instruction 2 Internal position instruction 2= the value of laps in position+the value of pulse at second internal position.	+/-max. cnt/rev	0
P4-7	Setting speed of internal position control 2	Setting speed of internal position control 2	0-5000r/min	1000
P4-8	Setting the laps at position of internal position instruction 3	Setting the laps at position of internal position instruction 3	-30000-30000	0

P4-9	Setting the pulse in one cycle at position of internal position instruction 3	Setting the laps at position of internal position instruction 3 Internal position instruction 3= the value of laps in position+the value of pulse at third internal position.	+/-max. cnt/rev	0
P4-10	Setting speed of internal position control 3	Setting speed of internal position control 3	0-5000r/min	1000
P4-11	Setting the laps at position of internal position instruction 4	Setting the laps at position of internal position instruction 4	-30000-30000	0
P4-12	Setting the pulse in one cycle at position of internal position instruction 4	Setting the laps at position of internal position instruction 4 Internal position instruction 4= the value of laps in position+the value of pulse at fourth internal position.	+/-max. cnt/rev	0
P4-13	Setting speed of internal position control 4	Setting speed of internal position control 4	0-5000r/min	1000
P4-14	Setting the laps at position of internal position instruction 5	Setting the laps at position of internal position instruction 5	-30000-30000	0
P4-15	Setting the pulse in one cycle at position of internal position instruction 5	Setting the laps at position of internal position instruction 5 Internal position instruction 5= the value of laps in position+the value of pulse at fifth internal position.	+/-max. cnt/rev	0
P4-16	Setting speed of internal position control 5	Setting speed of internal position control 5	0-5000r/min	1000
P4-17	Setting the laps at position of internal position instruction 6	Setting the laps at position of internal position instruction 6	-30000-30000	0
P4-18	Setting the pulse in one cycle at position of internal position instruction 6	Setting the laps at position of internal position instruction 6 Internal position instruction 6= the value of laps in position+the value of pulse at sixth internal position.	+/-max. cnt/rev	0
P4-19	Setting speed of internal position control 6	Setting speed of internal position control 6	0-5000r/min	1000
P4-20	Setting the laps at position of	Setting the laps at position of internal position instruction 7	-30000-30	0

	internal position instruction 7		000	
P4-21	Setting the pulse in one cycle at position of internal position instruction 7	Setting the laps at position of internal position instruction 7 Internal position instruction 7= the value of laps in position+the value of pulse at seventh internal position.	+/-max. cnt/rev	0
P4-22	Setting speed of internal position control 7	Setting speed of internal position control 7	0-5000r/min	1000
P4-23	Setting the laps at position of internal position instruction 8	Setting the laps at position of internal position instruction 8	-30000-30000	0
P4-24	Setting the pulse in one cycle at position of internal position instruction 8	Setting the laps at position of internal position instruction 2. Internal position instruction 8= the value of laps in position+the value of pulse at seventh internal position.	+/-max. cnt/rev	0
P4-25	Setting speed of internal position control 8	Setting speed of internal position control 8	0-5000r/min	1000
P4-32	Origin detector type and search direction setting	0: Return to origin forward, as CCWL as origin 1: Return to origin reverse, as CWL as origin 2: Return to origin forward, as ORGP as origin 3: Return to origin reverse, as ORGP as origin 4: Search Z pulse and used it as origin forward. 5: Search Z pulse and used it as origin reverse.	0-5	0
P4-33	The setting of short range movement mode to reach the origin	0: Found reference origin, then find Z pulse as mechanical origin inversely 1: Found reference origin and further to find Z pulse as mechanical origin 2: Find the rising edge of ORGP detector as mechanical origin and then decelerate to stop (when P4-33 set to 2, P4-32 can set to 2, 3, 4, 5).	0-2	0
P4-34	Origin regression start mode	0: Close 1: Execution automatically when power on 2: Origin regression activated when origin searching function (SHOM) input contact.	0-2	0
P4-35	Origin cease mode setting	0: After origin detection finished, motor come back to origin with deceleration 1: After origin detection finished, motor decelerate to stop further.	0-1	0

<p>P4-36</p>	<p>The origin regression speed setting at 1st high speed range(HSPD1)</p>	<p>Setting the origin regression speed at 1st high speed range</p> 	<p>1-2000 r/min</p>	<p>1000</p>
<p>P4-37</p>	<p>The origin regression speed setting at 2nd high speed range(HSPD2)</p>	<p>Setting the origin regression speed at 2nd high speed range</p>	<p>1-500 r/min</p>	<p>50</p>
<p>P4-38</p>	<p>The number of offset cycles should move after origin regression (HOF1)</p>	<p>Setting the number of offset cycles</p>	<p>-30000 ~ +30000</p>	<p>0</p>
<p>P4-39</p>	<p>The number of offset pulse should move after origin regression (HOF2)</p>	<p>Setting the number offset pulse When HOF1 and HOF2 are setting to 0, the origin will be chosen to Z pulse or ORPG according to the type of origin regression. If setting to another value, origin will additionally add (HOF×10000+HOF2) as new origin at the base of chosen Z pulse or ORGP</p>	<p>+/-max. cnt/rev</p>	<p>0</p>



Chapter 6 Alarm

Alarm No.	Fault Name	Reason of alarm
-	Normal	
1	Over-speed	Motor speed is greater than the setting value
2	Main circuit over-voltage	The voltage of main circuit is too high
3	Main circuit under-Voltage	The voltage of main circuit is too low
4	Over-travel	The value of position deviation counter is more than the limit value.
5	Drive over-heat	The temperature of the drive is too high
6	Speed amplifier saturation fault	Motor speed has not reached to the Speed command for long time
7	Drive inhibition abnormal	The inputs of CW/CCW drive inhibition are not effective
8	Position deviation accumulation is out of range	Absolute value of position deviation accumulation is greater than 2^{30} pulses.
9	Encoder error	Encoder Signal Error
10	Disconnection alarm	Power line UVW to motor is disconnected or one phase is disconnected
11	IPM module error	IPM smart module error
13	Drive over-load	Servo drive and motor over-load (or over-heat instantaneously)
14	Brake fault	Regenerative brake resistor circuit Error
15	Encoder counter error	Encoder counts wrongly
19	Delay to open the brake	PA94 was set too big
20	EEPROM error	EEPROM error
21	FPGA module error	FPGA module function is abnormal
23	Current sampling circuit fault	Current sensor or sampling circuit fault
29	Alarm for torque overload	PA30 and PA31 settings are unreasonable; Large load suddenly occurs
30	Encoder Z-pulse missing	Encoder Z-pulse error
31	Encoder UVW signal error	Encoder UVW signal corrupted; Encoder Z signal corrupted; Bad cables; Bad shielding of cables; The shielding ground is not connected well; The circuit around the encoder interface occurs error
32	Illegal coding of encoder UVW signal	All UVW signal of the encoder are in high level or low level, Or the encoder is mismatched.
33	UVW signal fault	No high-Z at encoder outputs in powering ON of the drive
34	UVW signal unstable	UVW signal unstable
36	When connecting to 9-line encoder, illegal states for long time	When connecting to 9-line encoder, illegal states for long time at encoder outputs

42	AC input under-voltage	AC input under-voltage
47	Over-voltage when main circuit in power ON	Over-voltage when main circuit in power ON
55	CRC check occurs errors for 3 times in a row	The check for internal communication occurs error
56	MODBUS frame is too long	Data Receiving from MODBUS frame is too long
57	MODBUS serial communication abnormal	Internal communication abnormal



Chapter 7 Solution for Solve Alarm

Alarm No.	Alarm name	Motion state	Reason	Measures
1	Overspeed	Emerge with connecting control power	The board of control electric circuit in trouble. Encoder in trouble.	Exchange the servo driver. Exchange the servo motor.
		Emerge with motor working	The pulse frequency input too high	Input pulse frequency correctly
			Acceleration/Deceleration time is so short that speed overshoot is too large	Increase the number of acceleration/deceleration time
			It is large for the rate of electronic gear	Setting it correctly
			Encoder in trouble	Exchange the servo motor
			Encoder cable in trouble	Exchange the encoder cable
			The unstable servo system lead to speed overshoot	Reset the gain number If unable to set to appropriate number, please try to decrease the dynamic inertia ratio.
		Emerge once motor be in motion	Excessive load	Decrease the loads Replace driver and motor by high power
			Error for zero point of encoder.	Exchange the servo motor.
			Error for connection of motor cable(U, V, W). Error for connection of encoder cable.	Demand manufacturer to reset zero point of encoder. Connection cable correctly.
2	Main circuit over voltage	Emerge with connecting control power	The circuit board breakdown	Exchange the servo driver
		Emerge with connecting main circuit	Power supply voltage is too high Power supply voltage waveform abnormally	Check up the power supply
		Brake resistance disconnected.	Recover the connection	
			Brake transistor breakdown. Internal brake resistance breakdown.	Exchange the servo driver

		Emerge with motor working	The resistance is insufficient	Reduce the frequency of Start-Stop Increase the number of acceleration/deceleration time Decrease the limited number of torque. Decrease the loads inertia. Replace the driver and motor by high power
3	Main circuit under voltage	Emerge with connecting main circuit	The board of circuit breakdown. The insurance of power supply breakdown. The soft-startup power supply in trouble Rectifier breakdown.	Exchange servo driver
			The power supply under voltage. The time of power cut more than 20 seconds	Check the power supply
		Emerge with motor working	The power capacity is not enough. Instantaneous power failure.	Check the power supply
			Heatsink OT	Check the case of loads
4	Position overshoot	Emerge with connecting control power	The board of power breakdown.	Exchange the servo driver
		After everything were installed,the motor not to rotate or reverse	Zero point change for encoder. Encoder breakdown.	Adjust the zero point for encoder. Exchange the servo driver.
		Emerge with motor working	The detection range of position overshoot is too small.	Increase the detection of position overshoot.
			Position proportional gain is too small	Increase the number of gain
			Torque deficiency	Check the limited number of torque. Decrease the loads. Switch to more powerful drivers and motors.

			The pulse frequency of instruction too high	Decrease the frequency
			Zero change of encoder	Reset the zero of encoder
5	Driver overheating	Emerge during the motion of driver	The board of circuit in trouble. Driver overheating.	Decrease the temple of driver. Exchange the servo driver.
6	The speed increase reach even more than the largest limitation	Emerge with motor working	Overload. The motor was stuck by machine.	Decrease the load. Switch to more powerful drivers and motors. Check the load part of machine.
7	The stop instruction of driver is abnormal		The driver plug for input CW/CCW disconnected.	Check the connection of cable
8	The date exceed the limitation Position deviation counter		The motor was stuck by machine. Input instruction pulse abnormality.	Check the load part of machine. Check instruction pulse. Check whether the motor rotates according to the instruction pulse.
11	PM module failure	Emerge with connecting control power	Circuit board fault	Exchange the servo driver
			Under voltage. Overheating.	Check the driver Power on again Exchange the driver
			The motor cable(U, V,W) Short-circuit	Check the cable connection
			Bad contact of ground wire.	Connection correctly

		Emerge with motor working	The insulation was damaged.	Exchange the motor
			Be disturbed	Add line Filter Far away from the disturb origin
13	Overload	Emerge with connecting control power	The circuit board fault	Exchange the servo driver
			Emerge with motor working	Motion over rated torque
		Holding brake close		Check the brake
		Motor unstable oscillation		Adjust the gain Increase the time of acceleration/deceleration Reducing load inertia
		One of U, V, W cable disconnected. Error connection of encoder cable.	Check the connection of cable	
14	Brake failure		Brake circuit failure	Exchange the driver
15	Encoder counting error		Encoder breakdown Incorrect number of encoder line The encoder disc breakdown False Z signal exist in encoder.	Exchange the encoder
			The encoder cable connection is incorrect	Check the connection
			Imprefect grounding	Correct grounding Check whether the shield line is grounded

18	Relay switch failure		Relay damage	Return to factory for repair
19	Brake holding delay not opened		Parameter values setting so large that the control pulse is coming but the brake hasn't been opened yet	Decrease the number of PA94
20	EEPROM Fault		Chip or circuit board damage	Exchange the servo motor. After repairing, driver model must be reset(PA10) then restored default parameters
21	FPGA Module failure		FPGA module dysfunction	Exchange the driver
23	Current Acquisition Circuit Fault		Current Acquisition Circuit Fault	Exchange the servo driver
29	User Torque Overload Alarm		PA30, PA31 parameters is Unreasonable. Unexpected heavy load	Modify parameters. Inspection machinery
30	Z-pulse loss of encoder		Z pulse does not exist and encoder is damaged Poor cable Poor shielding of cables. Shielded ground wire not connected properly Encoder Interface Circuit Fault.	Exchange the encoder. Check Coder Interface Circuit
31	Encoder and UVW Signal Error		Encoder and UVW Signal breakdown. The Z signal of encoder breakdown. Bad cable. Bad shielding of cables. Shielded ground wire not connected properly. Encoder Interface Circuit Fault.	Exchange the encoder. Check the encoder interface circuit.

32	The signal of encoder and U, V, W code illegal		Encoder and UVW Signal breakdown. Bad cable. Bad shielding of cables. Shielded ground wire not connected properly. Encoder Interface Circuit Fault.	Exchange the encoder. Check the encoder interface circuit.
33	Dart encoder alarm		Parameter mismatch	Setting parameter PA62 correctly
34	The signal of U, V, W instability		The signal of U, V, W instability	Check the connection
36	When connect dart encoder, the length of illegal time excessive		When connect dart encoder, the length of illegal time excessive	Check the connection
42	AC input voltage is too low	Running on power failure	Normal. AC input voltage is too low	Check the input of AC 220V
47	Overvoltage of main circuit when power on		External AC voltage input is too high Main Circuit Fault	Check the input of AC 220V. Exchange driver

55	Three consecutive errors in CRC calibration		MODBUS communication data CRC calibration error continuously	Exchange driver
56	MODBUS frame overlength error		Communication protocol mismatch. Be disturbed	Confirm the length of frame. Increase line filter, away from interference
57	MODBUS abnormal communication format		Improper setting of communication parameters. Incorrect communication address or value	Exchange the driver.

