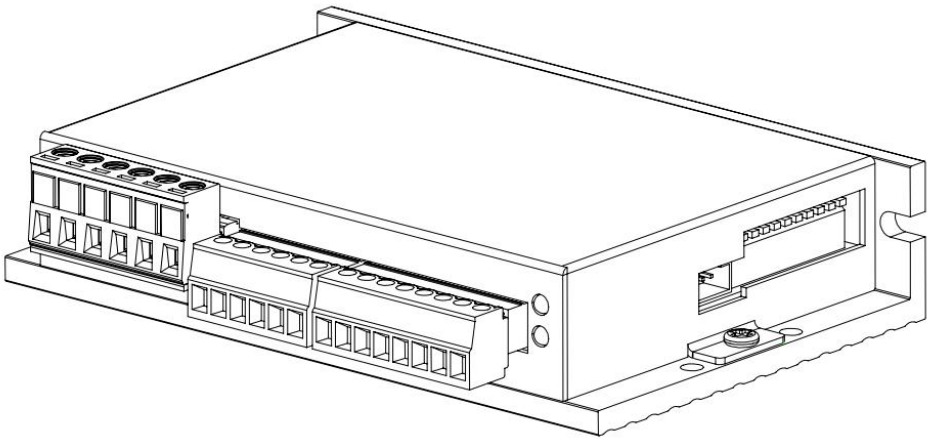
SL57D-V3.0 Manual



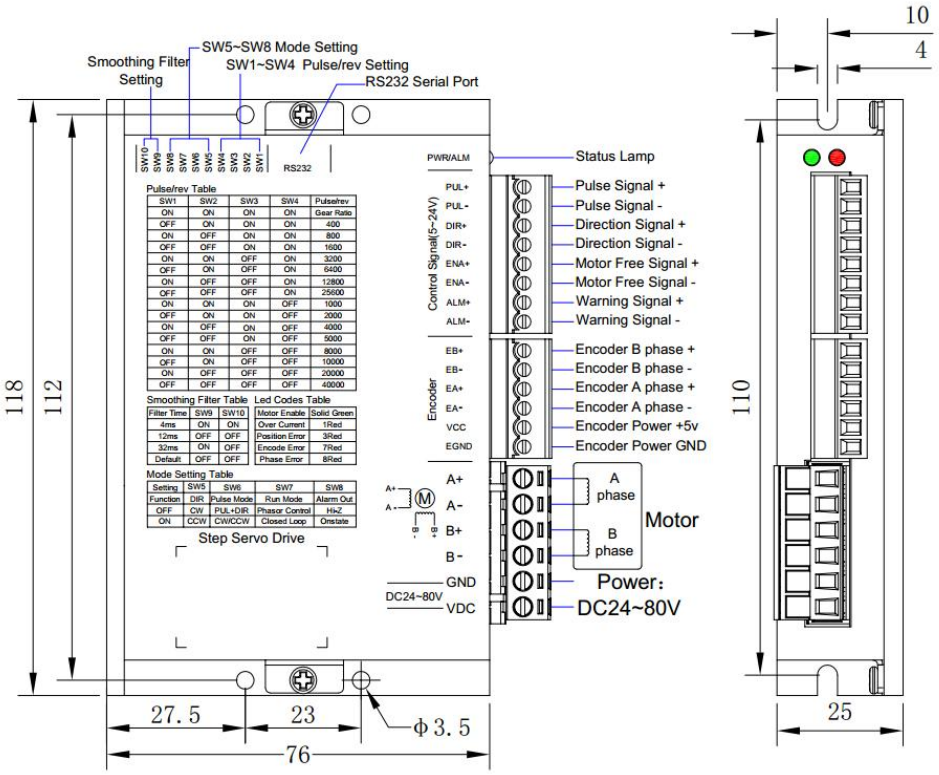
1、Introduction

SL57D is a new digital step-servo driver, using a vector controlling technology. It can drive 57 series and 60 series stepper motors.

SL57D can fit various automation equipment and instruments with below technical features:

- Use of 32 bit motor control MCU
- Use of vector servo control technology
- Wide range of drive current drive current from 0.4 to 6.0A/phase
- Can drive 57 series and 60 series hybrid stepper motors
- Opto-isolated signal input/output
- Highest response frequency: 200Kpps
- Provide 15 channels micro steps ,highest micro step: 51200 ppr
- Provide Electronic Gear Ratio
- Protection circuit：Over heat; Over current; Over voltage; Over-speed and position deviation
- Two control method:Position(phasor control and closed loop),Speed
- Net Weight:240g

2、Dimensions(unit:mm)



Caution:When the Driver temperature exceeds 40°C,the fan will start to work. When the Driver temperature exceeds 70°C, the current will be cut off automatically and the Driver will not work till the temperature drops to 40°C. In case this happens, please install ventilation equipment.

3、Port definition and Drive connection

3.1 Port definition

A、Stepper Motor and Power Definition

Terminal Assignment	Mark	Function	Wire Colour
1	A+	A phase+	White
2	A-	A phase-	Green
3	B+	B phase+	Blue
4	B-	B phase-	Black
5	GND	Power input	DC24～80V
6	VDC	Power input	

B、Encoder Definition

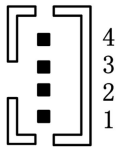
Terminal Assignment	Mark	Function	Wire Colour
1	EB+	Encoder B phase +	Yellow
2	EB-	Encoder B phase -	Green
3	EA+	Encoder A phase +	Black
4	EA=	Encoder A phase -	Blue
5	VCC	Encoder power +5V	Red
6	EGND	Encoder power GND	White

C、Control Signal

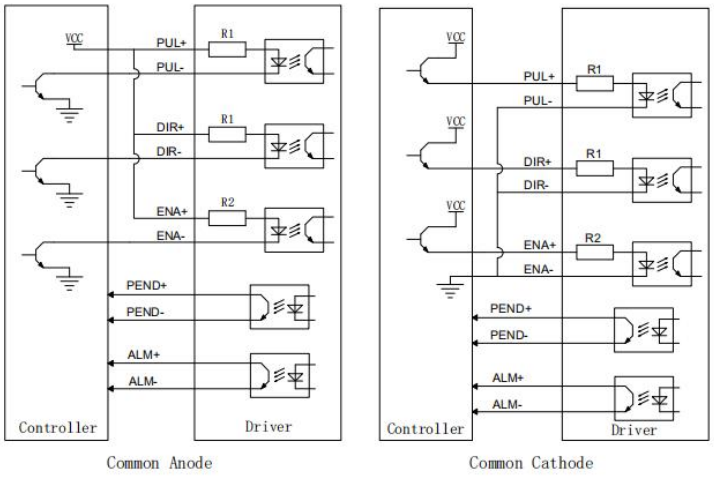
Terminal	Name	Function	Instruction
1	PUL+	Pulse signal positive side	Input voltage range from－5 to +24V
2	PUL-	Pulse signal negative side	
3	DIR+	Direction signal positive side	Input voltage range from－5 to +24V
4	DIR-	Direction signal negative side	
5	ENA+	Motor free signal positive side	When effects, the drive cut off motor current and set the motor free
6	ENA-	Motor free signal negative side	
7	ALM+	Warning signal positive output	When drive break down ,it will output ALM signal to the PC
8	ALM-	Warning signal negative output	

D、RS232 Terminal

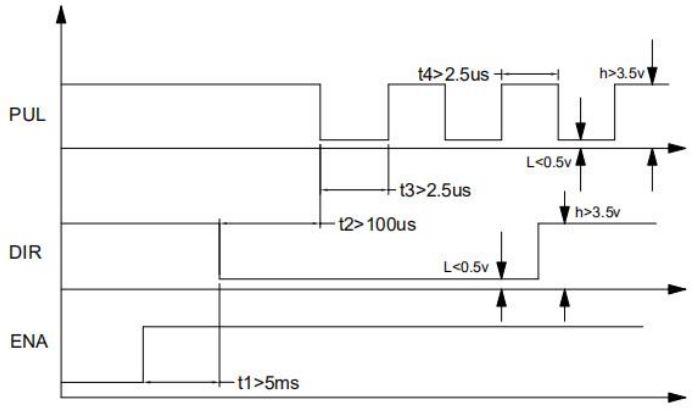
This terminal use TTL electrical level,when conmmunicate with PC,the Baud Rate is 9600.

Picture	Pin	Name	Instruction
	1	GND	Signal Ground
	2	RXD	Received Data
	3	TXD	Transmit Data
	4	+3.3V	Power positive pole

3.2 Control Signal Circuit



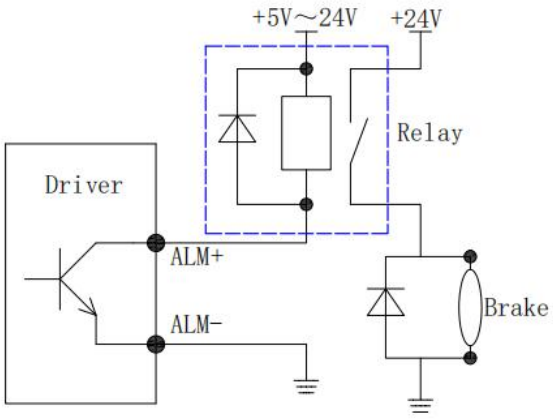
Picture 1 Control signal Interface Connection Diagram



Picture 2 Input Signal Oscillogram

3.3 Brake Control

When ALM port is using for Brake,the **SW8** must be setting ON.



4、Switch setting

4.1 Pulse/rev Table

SW1	SW2	SW3	SW4	Pulse/rev
ON	ON	ON	ON	**Gear Ratio**
OFF	ON	ON	ON	**400**
ON	OFF	ON	ON	**800**
OFF	OFF	ON	ON	**1600**
ON	ON	OFF	ON	**3200**
OFF	ON	OFF	ON	**6400**
ON	OFF	OFF	ON	**12800**
OFF	OFF	OFF	ON	**25600**
ON	ON	ON	OFF	**1000**
OFF	ON	ON	OFF	**2000**
ON	OFF	ON	OFF	**4000**
OFF	OFF	ON	OFF	**5000**
ON	ON	OFF	OFF	**8000**
OFF	ON	OFF	OFF	**10000**
ON	OFF	OFF	OFF	**20000**
OFF	OFF	OFF	OFF	**40000**

Caution: When the microstep setting is Gear Ratio,We must use a manual box to modify the value of Gear Ratio.

4.2 Mode setting Table

Setting	SW5	SW6	SW7	SW8
Function	Direction	Pulse Mode	Run Mode	Alarm output
OFF	ClockWise(C.W.)	Pulse/Dir	Phasor Control	Hi-Z (Normally Open)
ON	Counter-ClockWise （C.C.W.）	CW/CCW	Closed Loop	Onstate (Normally Closed)

4.3 Smoothing Filter Table

Smoothing Filter Time	SW9	SW10
4ms	ON	ON
12ms	OFF	ON
32ms	ON	OFF
Default	OFF	OFF

5、Alarm code

When the drive is breaking down,the Red LED will twinkle after fixed time.

Twinkle Times	Function	Instruction
1	Over current	When current exceeds rated value,the driver will stop running
2	Over-speed	The max speed is 3000r/min
3	Position deviation	When position deviation value exceeds rated value,the driver will stop running
4	Over heat	The driver temperature is exceeding 80℃
5	Over DC voltage	When input voltage exceeds rated value,the driver will stop running,the voltage range from DC24~80V
6	EPROM error	Reading or writing EPROM happen error
7	Encoder fault	Check up Encoder wire
8	Motor fault	Motor lack phase

6、Parameter Setting



Manual Box have four LED Segment Displays and four keys :↩、↓、↑ and ↵.

Key Function

Key	Instruction
↩	back，cancel；return to the previous menu, cancel the operation
↓	PgDn、adjust data when value is modified
↑	PgUp、shift data when value is modified
↵	Enter the parameter setting model(press the key for 3 seconds)

When the drive start to work, it displays the driver version first, then it displays the state of driver after 3 seconds. when the step-motor start to work, it displays the speed of step-motor(r/min).Once the step-motor reverses, the top byte of speed value flashes.

6.1 Parameter Function Instruction

Parameter	Function	Range	Default Value	Instruction
P000	Control parameter		0000	Read 6.1.1 Function of P000
P001	Micro step setting	SEt, 2～256	10	Depends on SW1 to SW4
P002	Set direction of step-motor rotation	0、1	0	Depends on SW5
P003	Select the motor type	57、86	57	57 or 86 Motor type
P004	Setting Position Deviation	1～9999	4000	
P005	Standby Current Ratio	0～100%	50	
P006	Electronic Gear Ratio(Numerator)		1	SW1 to SW4 are all ON Read 6.1.2 Setting Electronic Gear Ratio
P007	Electronic Gear Ratio (Denominator)		1	
P020	Low-4-bit of Input pulse			Display the value of input pulse
P021	High-4-bit of Input pulse			
P100	Running Current Ratio	10～120%	100	*
P101	Current Loop Gain	1～1000	115	Modify is forbidden
P102	Current Loop Integral Time Constant	1～1000	45	Modify is forbidden
P103	Current Loop Damping Factor	1～1000	830	Modify is forbidden
P104	Speed Loop Gain	1～1000	15	Depends on SW7 and SW9-SW10
P105	Speed Loop Integral Time Constant	1～1000	70	
P106	Position Loop Gain	1～1000	15	
P107	Speed Loop Feed-forward	1～100	85	
P108	Enable	0、1	1	*
P109	Speed Loop Damping Factor	1～100	15	*
P110	Setting Pulse mode, ENA and ALM		0000	Setting Pulse mode,ENA, and ALM. Read 6.1.3 Function of P110
P111	positioning accuracy	1-50	1	±1 pulse
P112	resonance coefficient	1-12	6	Under the same inflexibility, the smaller the value, the shorter the positioning time, the more easily resonance occurs

P200	Run Mode	0、1、2	2	0:Position control mode (Closed loop,SW7 is ON); 1: Speed control mode 2:Position control mode (Phasor control,SW7 is OFF) 3:I/O Speed mode Read 6.1.4 Function of P200
P201	Speed setting in speed mode	1～3000	60	Speed value in Speed Mode (unit: rev/min)
P202	acceleration time in speed mode		100	unit: ms
P203	The delay time of brake on(__ms)		0	Read 6.1.5 Function of P203
P204	Control mode after Alarm	0、1、2	0	Read 6.1.6 Function of P204
P305	Time of over-load		1600	Unit:0.1ms

6.1.1 Function of P000

P000	Function
1111	Restor Default Factory Value
0101	Display the speed of motor
0102	Display DC Bus Voltage value
0103	Display the temperature value
0104	Display deviation of encode
0105	Display ex-factory Date
0106	History alarm code
0200	Self Test(speed is 60 ppr)

6.1.2 Setting Electronic Gear Ratio(P006 and P007)

When SW1 to SW4 are all setting ON,the micro step of Drive is Electronic Gear Ratio.

If the deceleration ratio of the servomotor and the load shaft is given as ***n/m*** ,where ***m*** is the rotation of the servomotor ,and ***n*** is the rotation of the load shaft, the electronic gear ratio is calculated as below:

$$\text{Electronic gear ratio} = \frac{P006}{P007}$$

$$= \frac{Encoder.resolution.ratio}{Displacement.per.load.shaft.revolution(reference.units)} \times \frac{m}{n}$$

Note that: $\frac{1}{20} \leq$ Gear Ratio ≤ 20

Encoder resolution ratio indicates the count of pulses output by the encoder during one motor rotation.

Orthogonal incremental encoder resolution ratio = Number of wires × 4

For example:

Displacement per load shaft revolution =6000(pulse)

Number of wires=1000

m=1,**n**=1

$$\text{Gear Ratio} = \frac{P006}{P007} = \frac{1000 \times 4}{6000} \times \frac{1}{1} = \frac{2}{3}$$

So Calculation as below: P006=2，P007=3

6.1.3 Function of P110

Default value of **P110** is 0000,

$$\textbf{P110} = \frac{0}{A}\ \frac{0}{B}\ \frac{0}{C}\ \frac{0}{D}$$

Bit D: **SW8=OFF**,this bit is 0, **ALM** output is high impedance(Normally Open);

SW8=ON,this bit is 1, **ALM** output is low impedance(Normally Closed);

Bit C:this bit is undefined;

Bit B: **SW6=OFF**,when B=0 ,Pulse+Direction,the falling edge is effective;

SW6=ON,when B=1 ,Pulse+Direction,the rising edge is effective;

SW6=OFF,when B=2 ,CCW pulse/CW pulse,the falling edge is effective;

SW6=ON,when B=3,CCW pulse/CW pulse,the rising edge is effective;

Bit A:

A=0,when **ENA** input signal is low-level, the drive cut off motor current and set the motor free.

A=1,when **ENA** input signal is high-level, the drive cut off motor current and set the motor free.

6.1.4 P200：Run mode setting

The value of P200 is depends on the SW7 is OFF or ON

SW7	P200	Function
OFF	2	Phasor control mode(include position-loop and current-loop)
OFF	1	Speed mode
ON	0	Closed-loop mode(include position-loop,current-loop and speed-loop)

When SW7=OFF (Phasor control**),PID adjust follow parameter:**

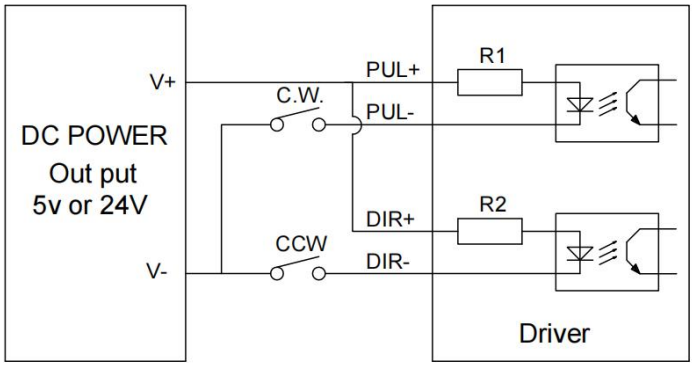
Parameter	Function	Default Value	Instruction
P104	Speed Loop Gain	15	The value is smaller, the gain is higher and response is faster
P106	Position Loop Gain	15	The value is smaller, the gain is higher and response is faster

When SW7=ON (Closed-loop**),PID adjust follow parameter:**

Parameter	Function	Default Value	Instruction
P104	Speed Loop Gain	75	The value is bigger, the gain is higher and response is faster
P105	Speed Loop Integral Time Constant	70	The value is smaller, the gain is higher and its rigidity is stronger
P106	Position Loop Gain	70	The value is bigger, the gain is higher and response is faster
P107	Speed Loop Feed-forward	85	The value is bigger, the gain is higher and response is faster

When SW7=OFF and P200 is setting 1, Driver is running in Speed Mode

PUL- point signal input level	DIR- point signal input level	Function
0	0	Motor Stop
1	0	Clockwise(CW)
0	1	Counter clockwise(CCW)
1	1	Motor Stop



6.1.5 Function of P203

P203	Function
0	Define alarm signal output
200ms	This parameter defines the delay time from the motor energized until the action(alarm output) BRK is ON (for example 200ms)

When ALM port is using for BRK,the SW8 must be setting ON.

6.1.6 Function of P204

P204	Alarm signal is on
0	PWM is closed immediately
1	PWM is closed slowly after 3 second
2	PWM keeping on 3 second,then Driver clear alarm signal,and restart.When clearing alarm signal twice,the alarm signal is keeping-on still,the Driver doesn't restart again.

7、Warranty Terms

Our company will provide warranty of 24 Months from the delivery date and free maintenance under warranty.