

SL2880D-D Digital Display Hybrid Servo Drive

Instructions



SHENZHEN SHENLI WITT MOTOR CO.,LTD

Add: 3rd Floor BuildingB2, Yangguang Industrial Area, Hezhou South Industrial Garden 2-3 , Xixiang Town, Bao'an District, Shenzhen city, Guangdong Province, P.R.C.

Tel:0086-0755-27892991

Email: gdszph@aliyun.com

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1. PROFILE

1.1. Overview

SL2880D-D is the digital display hybrid servo drive with LCD based on many years research experience on servo system. It adopts the newest DSP chip, LCD, advanced variable current algorithm and frequency conversion control algorithm. It is the good cost-efficiency solution of stepper drive for equipment manufacturers. SL2880D-D degrades electromagnetic interference among wires with small structure. Adopting the anti-vibration tech and low heat tech efficiently deal with many motor and drive problems such as fever, vibration and noise.

1.2. Features

- Voltage: input voltage is 24VDC~80VDC, recommended operating voltage is 24V/36V/48V
- Continuous output current: max 8.0A
- Accepting instructions of difference, single-end pulse and off-line.
- Having failure output indicate port function.
- Displaying related data and parameter with LCD.
- Each pulse can be set by test software or dial.
- Having protection on over/under- voltage and over-current.
- Single-double pulse model, pulse efficient edge is optional(to choose by serial port connecting the host computer)
- The max pulse frequency for control instructions is 500KHz (Factory default is 200KHz)
- The electrical-level of signal input port for impulse, direction and off-line is 4.5~28V (compatible)
- Having the test function of USB serial port and TTL electrical-level (RS232 MODEL BUS contract) , needing the special serial port test cable provided by the company.

1.3. Application

SL2880D-D is widely applied in various small-middle automation equipments and instruments such as locking screw machine, wire stripping machine, winder, terminal machine, laser machine, inkjet printer, engraving machine, electronic processing machine, automatic grab equipments, professional CNC machine, packing machine, robot and so on. There will have good effects applied in lower noise, high speed machines.

2. Electrical, mechanical and environmental parameters

2.1. Electrical parameters

Parameters	SL2880D-D			
	Min Value	Typical Value	Max Value	Unit
Continuous output current	1	-	8	A
Supply voltage (DC)	24	24/36/48	80	Vdc
Logic input current	6	10	16	mA
Logic input voltage	4.5	5	24	Vdc
Pulse frequency	0	200	500	kHz
Width of pulse high electric level	1.5	-	-	uS
Control precision of position error	-	±1	-	Pulse
Speed control precision	-	±2	-	rpm
Max acceleration(free load)	-	100	-	rpm /ms
Over-voltage protection	90	92	94	Vdc
Insulation resistance	100	-	-	MΩ

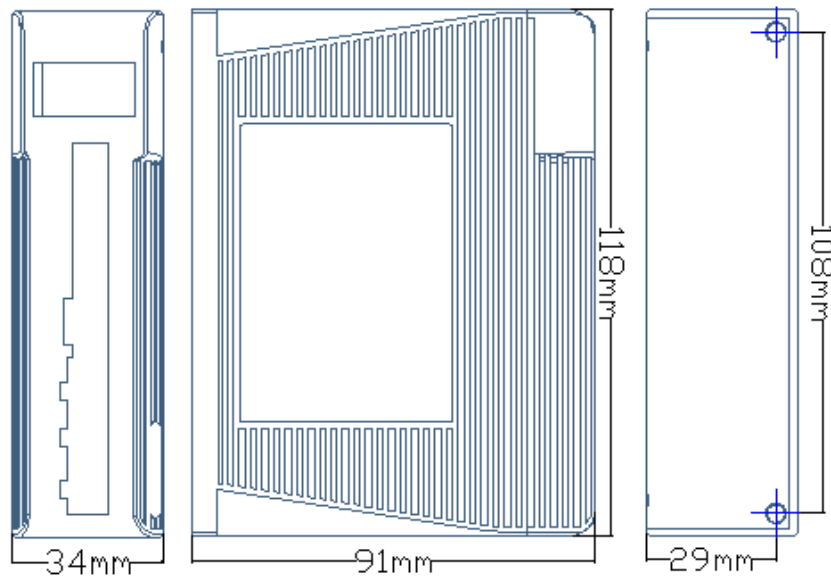
2.2. Operational environment

Cooling ways	Nature cooling or forced air cooling	
Service environment	Circumstances	Please keep it away from other heating equipments. Keep it away from the place with dust, oil, corrosive gases, humid and vibrating places. Combustible gas and conductive dust are prohibited
	Temperature	0-+50℃
	Humidity	40-90% RH
	Vibration	10~55HZ/0.15mm
Storage temperature	-20℃-+65℃	
Weight	350g	

2.3. Mechanical structure

SL2880D-D can match with Nema11/14/17/23/24/34 2 phase hybrid servo motor, the recommended holding torques include 0.2 NM, 0.4 NM, 0.6 NM, 0.8 NM, 1.0NM, 2.8NM, 3.6NM, 4.5NM and 8.5NM. Encoder resolution ranges from 250 line to 5000 line, but need to contact us to change software programs of chip. If having other requirements on low speed vibration or high speed etc, please contact us to re-edit the programs according to the motor parameters.

SL2880D-D Dimension diagram



2.4. Thermal dissipation

The reliable operation environment temperature of SL2880D-D is $-5^{\circ}\text{C} \sim 45^{\circ}\text{C}$. When the working temperature of drive is more than 50°C and the running temperature of motor exceeds 60°C , the fans should be used to forcedly dissipate the heat so as to make the drive work within the reliable working temperature.

3. Drive interface and wiring

3.1. Interface

3.1.1 Control port

Adopting the black 8 pin interval terminals with 3.81mm.

Pin No.	Signal	Function	Illustration
1	PUL+	pulse positive input port	Compatible for electric level signal with 4.5V~28V
2	PUL-	pulse negative input port	
3	DIR+	direction positive input port	
4	DIR-	direction negative input port	
5	ENA+	enable positive input port	
6	ENA-	enable negative input port	
7	ALM+	alarm signal positive input port	Open collector, Max up-pull electric level is 24V, Max output current is 100mA.
8	ALM-	alarm signal negative input port	

3.1.2 Power port

Adopting the black 2 pin interval sealing terminals with 5.08mm. (Attention to the positive and negative polar of power port. DON'T CONNECT REVERSELY!)

Pin No.	Signals	Function illustration
1	+VDC	input positive port of the supply power, input voltage is 24~80V DC
2	GND	input negative port of the supply power

3.1.3 Motor port

Adopting the black 4 pin interval sealing terminals with 5.08mm.

Pin No.	Winding	Function illustration
1	A+	2 phase, hybrid stepper motor winding A+
2	A-	2 phase, hybrid stepper motor winding A-
3	B+	2 phase, hybrid stepper motor winding B+
4	B-	2 phase, hybrid stepper motor winding B-

3.1.4 Encoder port

Adopting the beige double row 2* 7 pin interval sealing terminals with 2.0 mm.

Pin No.	Signals	Function illustration
1	VCC	drive +5V output to supply the power to encoder
2	EGD	drive GND output to supply the power to encoder
3	EA+	encoder signal A+ input
4	EA-	encoder signal A- input
5	EB+	encoder signal B+ input
6	EB-	encoder signal B- input
7	EZ+	encoder signal Z+ input (don't connect without Z signals)
8	EZ-	encoder signal Z- input (don't connect without Z signals)
9	EU	Reserved for low voltage servo or brushless servo Hall signals U
10	EV	Reserved for low voltage servo or brushless servo Hall signals V
11	EW	Reserved for low voltage servo or brushless servo Hall signals W
12	EGND	Reserved for low voltage servo or brushless servo Hall signals GND
13	NC	For internal use, no signal can be connected, otherwise the drive will be damaged
14	NC	For internal use, no signal can be connected, otherwise the drive will be damaged

3.1.5 USB serial port RS232-TTL (3.3V) electrical level communication port

To connect PC through USB serial port switching device (provided separately) and special USB serial port cable(No live plug in/out)。 To set the function and parameters of drive by PC software such as arbitrary subdivision, arbitrary current, pulse efficient edge, single-double pulse control, pulse signal width, open/chose loop motor switching, filter response time and so on, even to weaken resonance and vibration.

Pin No.	Symbols	Name	Illustration
1	+5V	5Vsupply power positive port	Pin near dial
2	TXD	RS232-TTL(3.3V) sending port	
3	RXD	RS232-TTL(3.3V)receiving port	
4	GND	5Vsupply power ground	0V
5	AIN	External analog quantity 0~5V input control	analog quantity electrical level or potentiometer

Attention: SL2880D-D serial port cable should be the special cable. For free to provide according to customers

conditions. Please confirm before using it to avoid damage.

3.1.6 LCD screen display and Indication

If LCD screen lights, it shows that the drive supply power is normal. When the drive connects the power, the display interface of LCD screen will appear company' information then the normal interface as the following factory default of four rows of data.

Line No.	Category	Content
1	motor type	TC28/TC42/TC57/TC60
2	subdivision	4000
3	speed	RPM
4	model	FOC/PM/LEAD/total current

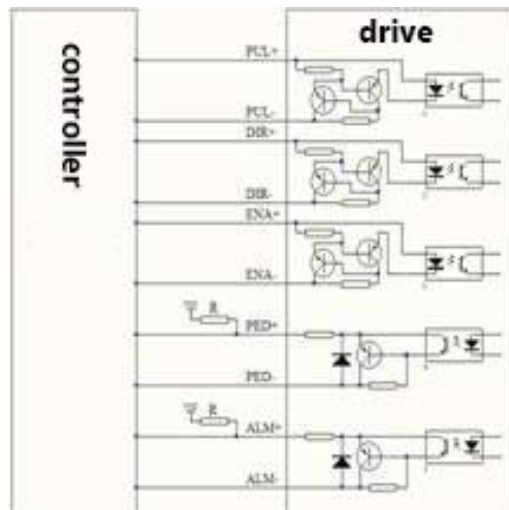
Attention: The display content can be customized according to customers' requirement. Among the control algorithm, FOC is the vector control variable-current algorithm with low temperature rising, prompt feedback, being suitable for linear transmission structure. PM is power angle algorithm with large current and high fever, being suitable for belt transmission structure because of good rigidity.

It will show the current failure of drive in LCD, when the drive fails. It will show that it is abnormal in LCD, or the light is off, when the drive is damaged.

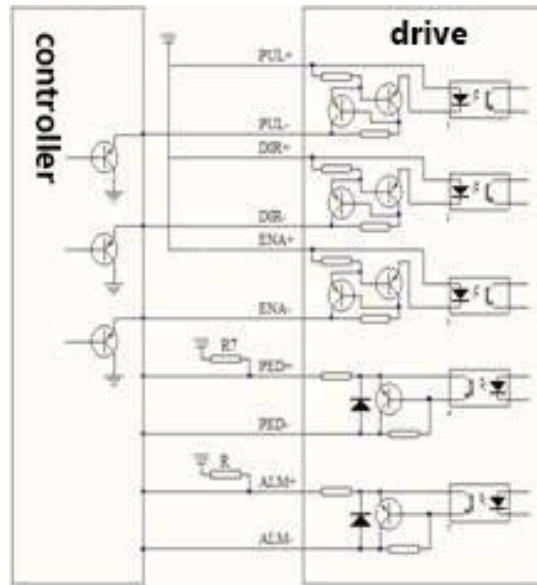
3.2. Control signal port circuit

The drive signal input port of SL2880D-D includes differential signal input, common anode signal-terminal input and common cathode signal single-terminal input. It is in-built high-speed photoelectric isolation coupler. The output way is triode collector open circle OC. The port connection is shown as following.

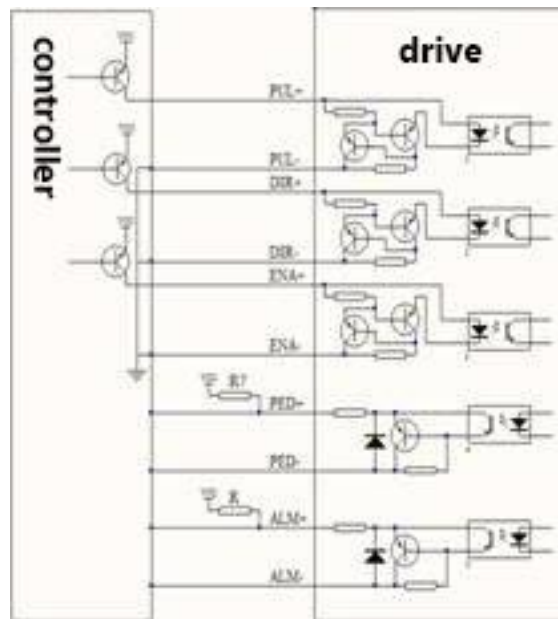
Differential signal input connection



common anode signal-terminal input connection



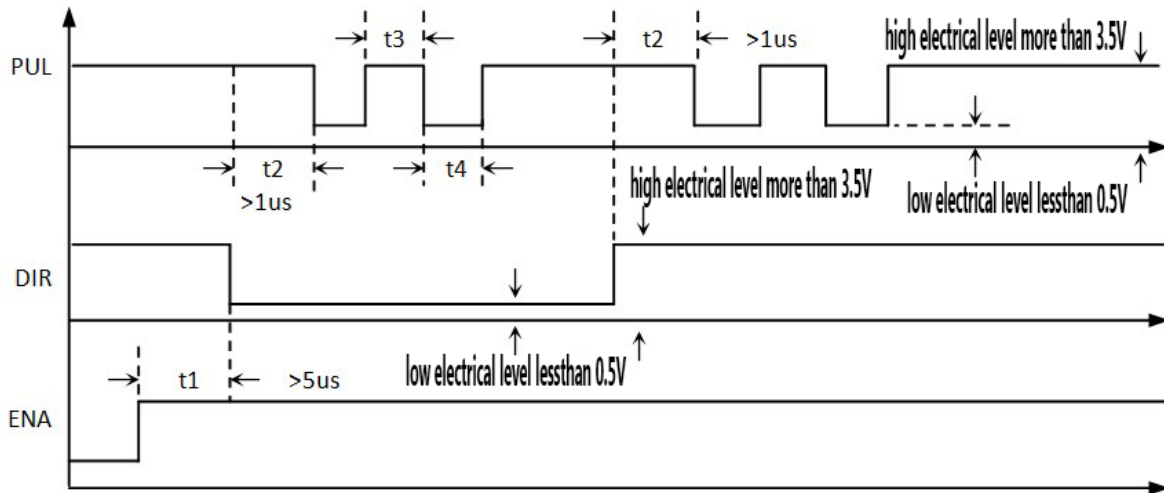
common cathode signal single-terminal input connection



Remarks: The signal input port voltage range, in the diagram, is 4.5~24VDC. No needing of series current limiting resistor in these three ways of connections. The Max external up-pull voltage for output port is 24VDC. Max output current is 50mA. To choose the suitable basic parameters of up-pull resistance according to the external up-pull voltage. If the external up-pull voltage is 24VDC, 2K should be chosen for up-pull resistance. If 12VDC, 1K should be chosen. If the drive relay or motor lock coils, please consult our engineers.

3.3. Sequence chart for control signal

To avoid the errors, PUL-, DIR- and ENA- should meet with certain requirements. It is shown as the following diagram.



Remarks:

- 1) t1: ENA (enable signal) will be determined as being high, when it is at least 5µs in advance than DIR. In general, it is suggested to be suspended.
- 2) t2: DIR will be determined as being high or low, when it is at least 1µs in advance than PUL decline edge.
- 3) t3: Pulse width is at least no less than 1.5µs.
- 4) t4: Low electrical level width is at least no less than 1.5µs.

3.4. Model setting for control signal

Pulse trigger edge selection: to set pulse rising edge and decline edge to be efficient by PC software.

Single-double pulse selection: to set the single pulse and double pulse to be efficient by PC software.

Direction selection: to set the single pulse and double pulse to be efficient by PC software.

3.5. Attention for wiring

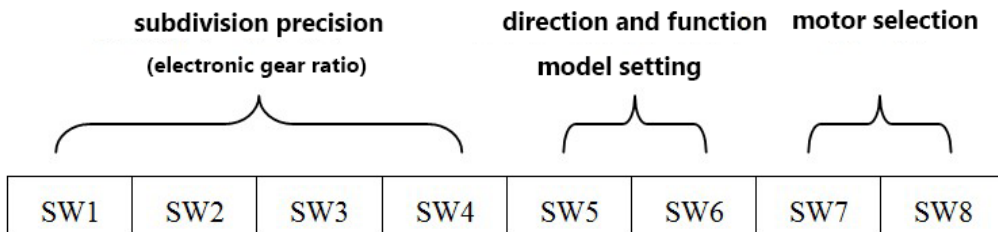
- 1) To avoid the interference in the drive, suggesting to use the shielded cable for control signals, making the shield layer connect the GND. Except for the special requirements, one end of shield wire of control signal cable should connect GND. That is the end of shield wire which is linked the host computer connects GND, the end of shield wire which is linked the drive suspends. The GND connected should be at the same point for the same machine. It maybe interferes in the drive badly without connecting GND really. If permitted, thermal grounding technology is the most effective method for shielding.
- 2) The pulse signal line, direction signal line and motor cable can't be bundled side by side. It is the best way to keep them away at least more than 10cm. Because the motor noise easily interferes the pulse direction signal to cause failures such as positioning error, system instability and so on.
- 3) If one power supply is for several drives, the drives should be parallel connected. No SERIAL CONNECTION!

- 4) Forbidding to plug in/out the drive terminal when it connects the power supply. In that case, there are still much current passing the coils although the motor stops. The huge instantaneous induction EMF may be produced to burn the drive if do so.
- 5) Forbidding to connect the tinned wire head with the terminal. The terminal may be destroyed for the overheat caused by the resistance getting large if do so.
- 6) Don't let the wire end expose outside the terminal to avoid damaging the drive for the accidental short circuit.

4.Setting of dial switch

SL2880D-D digital integrated low-voltage servo driver adopts 8-bit dial switch to set subdivision precision (electronic gear ratio), motor rotation initial direction, self-test and function mode selection. The details are as follow.

The details are as follows:



Pulse/rev	S1	S2	S3	S4
Default	On	On	On	On
800	Off	On	On	On
1600	On	Off	On	On
3200	Off	Off	On	On
6400	On	On	Off	On
7200	Off	On	Off	On
25600	On	Off	Off	On
51200	Off	Off	Off	On
1000	On	On	On	Off
2000	Off	On	On	Off
4000	On	Off	On	Off
5000	Off	Off	On	Off
8000	On	On	Off	Off
10000	Off	On	Off	Off
20000	On	Off	Off	Off
40000	Off	Off	Off	Off

Subdivision precision (electronic gear ratio): when S1,S2,S3,S4 are all on. the micro-step subdivision of the drive adopts the default micro-step fraction within the drive. The initial value of the default micro-step fraction within the driver is 400

Pulse/rev. the electronic gear ratio can also be set by debugging software. SW5 sets motor direction. When it is on, motor rotates clockwise(CW), when off, counter clockwise (CCW). SW6 sets function and model selection. When off, it is space vector control mode (FOC), when on, it is the drive point motion mole (PM) which has the good efficiency on starting / stopping.

SL2880D-D drive factory default matches hybrid servo motor.

Motor	SW7	SW8
TC42	ON	ON
TC57	OFF	ON
TC60	ON	OFF
Default 【TC86】	OFF	OFF

Attention: it can also match hybrid servo motors from other factories and other types such as Nema11/14 etc. but need to connect with us.

5. Protection

5.1. Over-voltage protection

When the input voltage of SL2880D-D is higher than 90VDC, the drive is off. The failure must be dealt, then turn it on to reset at this case.

5.2. Under-voltage protection

When the input voltage of SL2880D-D is lower than 15VDC, the drive is off. The failure must be dealt, then turn it on to reset at this case.

5.3. Over-current protection

When it is over-current, the drive is off. The failure must be dealt, then turn it on to reset at this case.

5.4. Exceeding-error protection

When the error exceeds the given value, the drive is off. The failure must be dealt, then turn it on to reset at this case

△ **Attentions:** Owing to the drive without the positive-negative reverse connecting protection function, please confirm again that the correct connection of drive's positive and negative polar to the power supply before turning on it. If the connection is reversed, the safety tube in the drive will be burned out.

6.FAQ

6.1.FAQ for stepper motor

Main problems	Possible causes or side issue	Solutions
Don't work	Power light isn't on	To check the circuit of power supply, to confirm that the connection of power supply is correct.
	Motor shaft without enough strength	Pulse signal is weak, to increase the signal current to 7~16mA
	The microstep value selected is too large	To select the suitable microstep value
	The drive is protected	To turn on it again
	Enable signal is low	To enhance the signal or not connect
	Without feedback on the control signal	To check whether the power supply connection is right
	Motor circuit is broken off	To check and then connect well
	Over-voltage or under-voltage	To check the power supply
	Motor or drive is damaged	To renew the motor or drive
Large positioning error	The signals are interfered	To avoid interference
	Shield wire hasn't connected GND, or has connected wrongly	To reliably connect GND
	Motor circuit is broken off	To check and then connect well
	The microstep value is selected wrongly	To select the right microstep value
Motor stalling during its acceleration	Accelerating time is too short	To make the acceleration longer
	the torque is too small	To select the huge torque motor
	Voltage is low	To increase the voltage

6.2.FAQ for stepper drive

6.2.1 what advantage does the microstep servo drive has?

To reduce the step angle of each step and increase the homogeneity degree of step so as to make the control precision more higher.

To reduce the motor vibration, microstep is one of the best ways to improve the problem of low frequency oscillation.

To effectively reduce the torque ripple so as to increase the output torque.

These advantages are generally recognized by users and bring them benefits, so it is recommended that you choose the microstep drive.

6.2.2 Why does the motor only rotate in one direction?

Maybe the direction signal is too weak. Maybe the connection is wrong. Maybe the signal voltage is too high so as to burn the directional resistance which limits the current.

The pulse mode is wrong, the drive signal should be set the mode of pulse/ direction.

If any other problems, please contact us.

7. Warranty Clause

7.1. one-year warranty

We provide one-year warranty for raw materials and process defects of the drive from the date of shipment. During the warranty period, we provide free maintenance service for defective products.

7.2. the following cases aren't covered by warranty

- 1) Improper wire connecting, such as power's positive and negative polar connected reversely, live plug-in/out
- 2) To change the internal parts or structure without being authorized.
- 3) To be operated when it exceeds the range of electrical and environmental requirements.
- 4) To be operated in the poor heat-dissipating environment.

7.3. If needed to be maintained, please contact us directly.

Tel: 0086-0755-27892991

Email: gdszph@aliyun.com

7.4. Warranty limitations

- 1) The warranty coverage is limited to the components and technology flaws.(that is consistency)
- 2) We can't guarantee whether the drives are suitable for the specific applications of the customers. It depends on the specific technical requirements, operational conditions and environments.

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