S4D

OPEN LOOP STEP MOTOR DRIVE User's Manual

User's Manual

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FULLING MOTOR

User's Manual

Foreword

Thank you for using our open step drive.

Before using this product, please read this manual carefully to understand the necessary safety information, precautions, and operation methods. Incorrect operation can have extremely serious consequences.

This product is designed and manufactured without the ability to protect personal safety from mechanical system threats. Users are advised to consider safety precautions during mechanical system design and manufacturing to prevent accidents caused by improper operation or product abnormalities.

Due to product improvements, the contents of this manual are subject to change without notice. Our company will not be responsible for any modification of the product by the user.

This product has passed the national mandatory 3C certification, CE certification, ROHS certification

FULLING MOTOR

1 Overview

1.1 Product Introduction

S4D is the company's new digital stepper motor driver, using the latest 32-bit ARM digital processing technology, drive control algorithm using advanced variable current technology and advanced frequency technology, the driver heat small, motor vibration small, smooth operation. USERS can set 200 ~ 51200 within the arbitrary Microstep and rated current within the arbitrary current value, to meet the needs of most applications. Due to the use of built-in micro-Microstep technology, even in the conditions of low Microstep, but also can achieve high Microstep effect, low, medium and high-speed operation is very smooth, ultra-low noise. The auto-tuning function is integrated in the driver, which can automatically generate the optimal operating parameters for different motors and maximize the performance of the motors.

1. Characteristics

- **New 32-bit ARM technology**
- **Ultra low vibration noise**
- **Built-in high Microstep**
- **Parameter power-on automatic setting function**
- **Variable current control can greatly reduce the heating of the motor**
- **At rest the current is automatically halved**
- **Can drive 4,6,8-wire two-phase stepping motor**
- **Optical isolated differential signal input**
- **Pulse response frequency up to 500 KHZ (factory default 160 Khz)**
- **The current setting is convenient, and can be anywhere from 0.1 to 3.0 a**
- **Subdivide it to 200-51200**
- **With over-voltage, under-voltage, over-current and other protection functions**

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1.3 Application areas

Suitable for all kinds of small and medium-sized automation equipment and instruments, such as: lithium battery equipment, 3C electronic equipment, engraving machine, marking machine, cutting machine, laser phototypesetting, engraving machine, plotter, CNC machine tool, automatic assembly equipment, etc. It is especially effective in applications where users expect small noise and high speed。

2 Performance Index
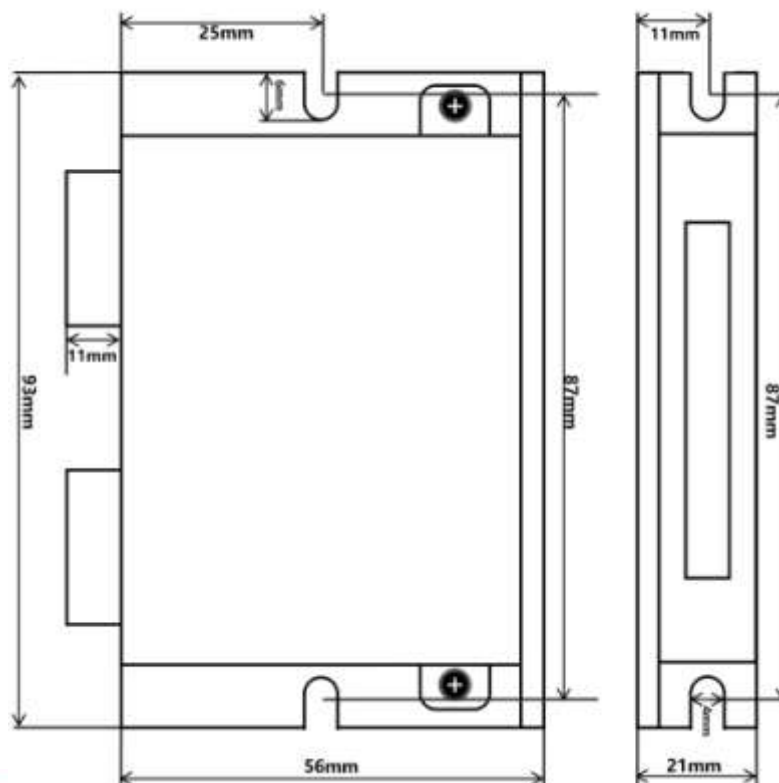
2.1 Electrical characteristics

Explanation	S4D			
	Minimum Value	Typical Value	Maximal Value	Unit
Continuous output current	0.1	-	3.0	A
Power Supply Voltage (DC)	12	24	48	Vdc
Logic input current	6	10	16	mA
Logical input voltage	5	5	24	Vdc
Minimum pulse width of input signal	1.5	-	-	us
Step frequency	0	-	200	KHz
Insulation Resistance	500	-	-	MΩ

2.2 Use environment

Cooling Mode		Natural Cooling or forced air cooling
Service Environment	Occasion	Cannot be placed next to other heating equipment, to avoid dust, oil mist, corrosive gases, humidity is too large and strong vibration sites, prohibited combustible gases and conductive dust。
	Temperature	-10℃ ～ +50℃
	Humidity	40 ～ 90%RH
	Vibration	5.9m/s2MAX
Storage temperature		-20℃～60℃
Use Elevation		Below 1000 meters
Weight		0.2KG

3 Installation

3.1 Mounting dimensions

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3.2 Installation method

The reliable operating temperature of the driver is usually within 60℃, and the motor operating temperature is within 80℃。

It is recommended to use the automatic semi-flow mode when using the motor. When the motor stops, the current is automatically reduced by half to reduce the heat of the motor and the drive。

Install the drive with vertical side mounting so that the heat dissipating teeth form a strong air convection。

Install a fan near the drive when necessary to force heat dissipation to ensure that the drive works within a reliable operating temperature range。
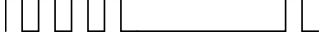
4 Driver ports and wiring

4.1 Schematic diagram of wiring
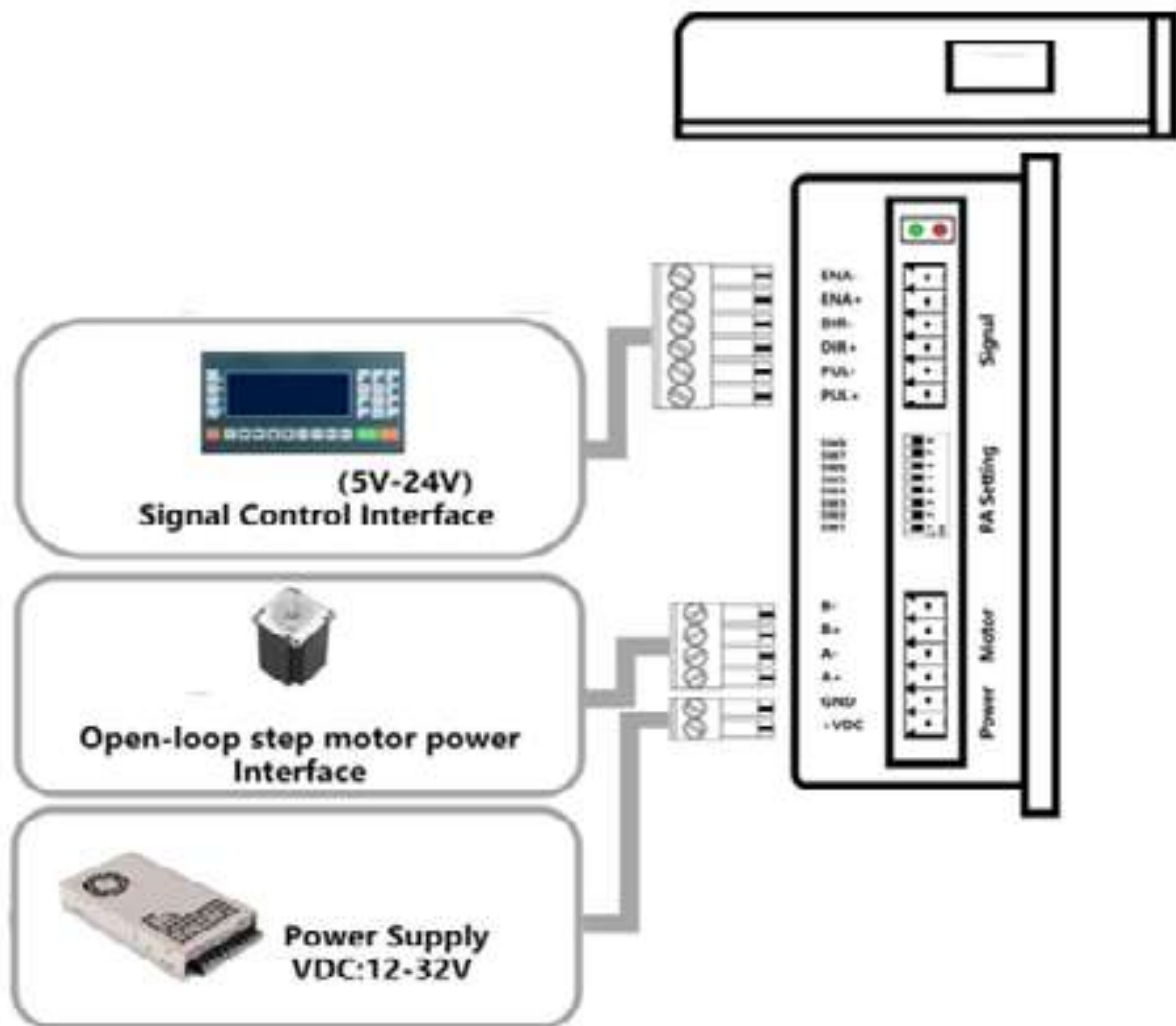
4.2 Port Definition

4.2.1 LED Lamp status indication

The green LED is the power indicator, which is always on when the driver is connected to the power; when the driver cuts off the power, the LED goes out. Red Led is the failure indicator, when there is a failure, the indicator lamp for 3 seconds cycle flashing; when the failure is cleared by the user, red LED often out. Red Led flashes in 3 seconds represent different failure information, as shown in the table below:

No.	The number of flashes	LED flashes waveform	Description of the problem
1	1		Overcurrent or interphase short circuit fault
2	2		Overvoltage fault
3	4		Undercurrent fault

4.2.2 Control Signal Input Port

Control Signal interface

| Name	Function
PUL+ PUL-	HIGH-SPEED SIGNAL: Pulse rising edge is effective, PL high level 4.5 ~ 28 VDC, Low Level 0 ~ 0.5 v. In order to respond reliably to the pulse signal, the pulse width should be greater than 1.5 s.
DIR+ DIR-	HIGH-SPEED SIGNAL: Pulse rising edge is effective, PL high level 4.5 ~ 28 VDC, Low Level 0 ~ 0.5 v. In order to respond reliably to the pulse signal, the pulse width should be greater than 1.5 s.
ENA+ ENA-	Enabling Signal: This input signal is used for enabling or disabling. When ENA + connected with 4.5 ~ 28 VDC, ENA-connected with low level (or internal optocoupler on) , the driver will cut off the current of each phase of the motor and make the motor in the Free State, then the step pulse will not be responded. When this function is not needed, the signal can be suspended.

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Control Signal Interface circuit
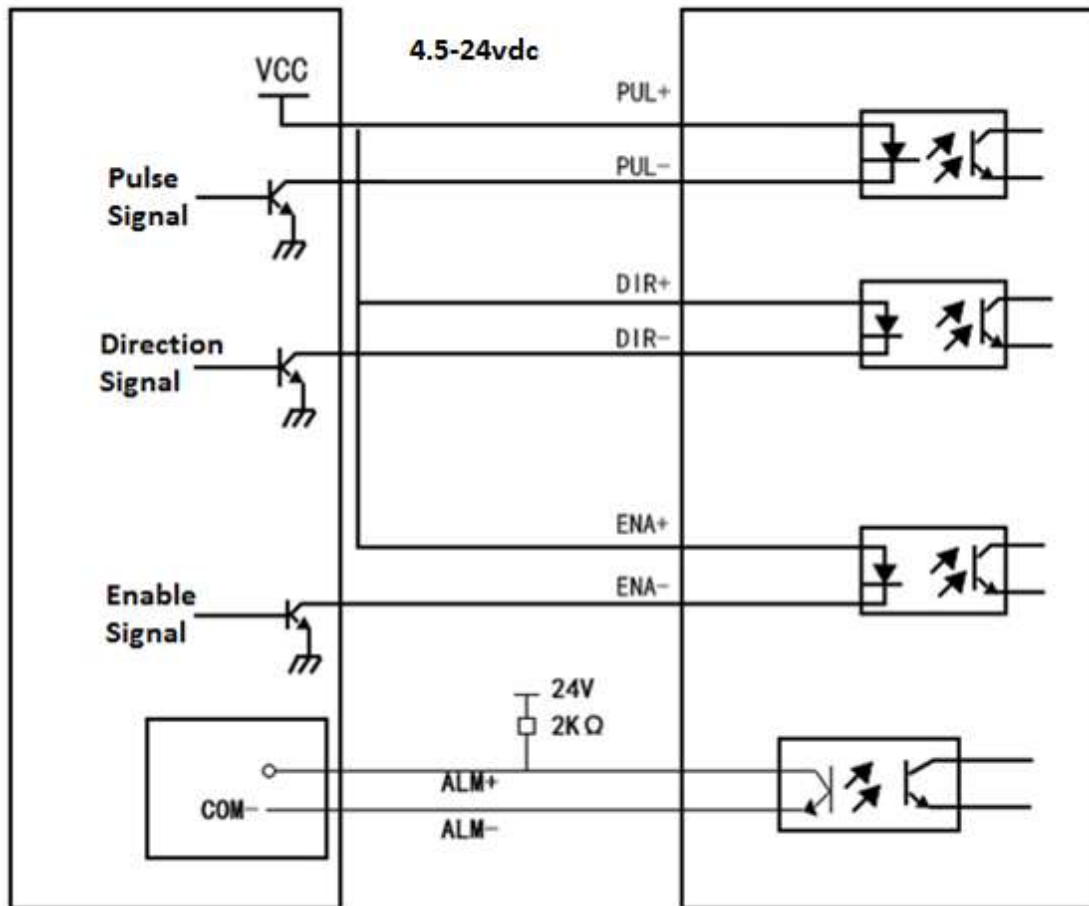
Common Anode Connection

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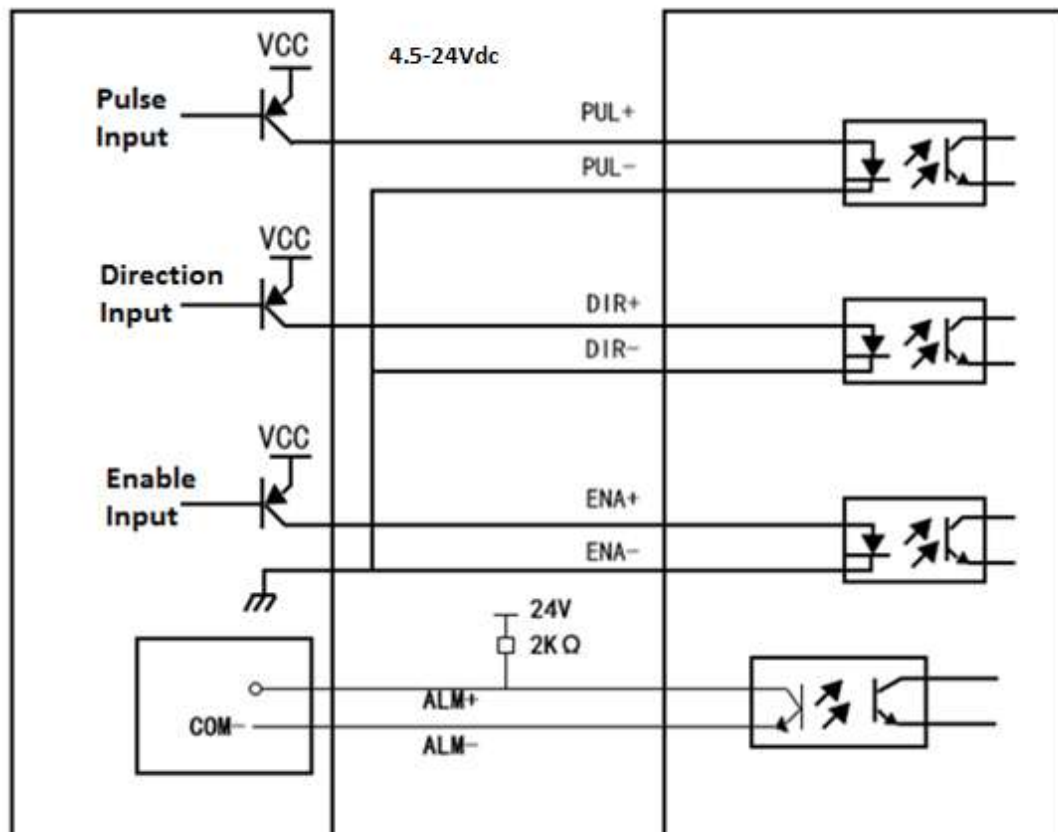
Common Cathode Connection
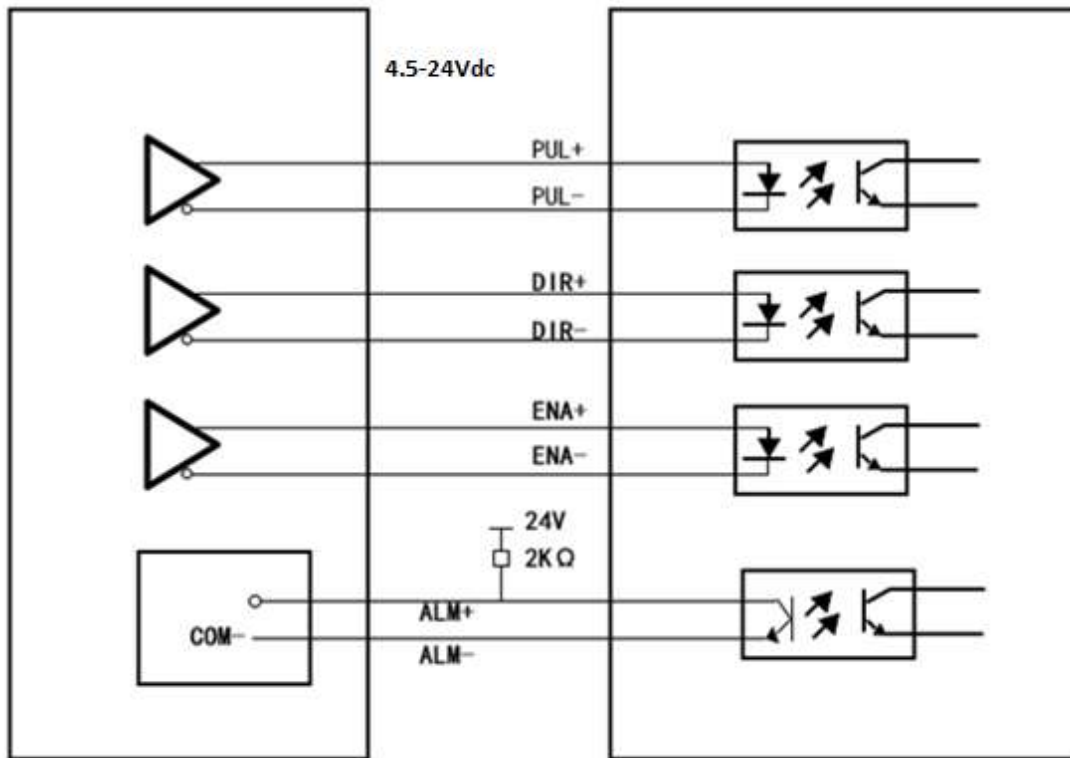
Differential Signal Connection

To avoid some mistakes and deviations, Pul, Dir, and Ena should meet certain requirements, as shown in the following figure:
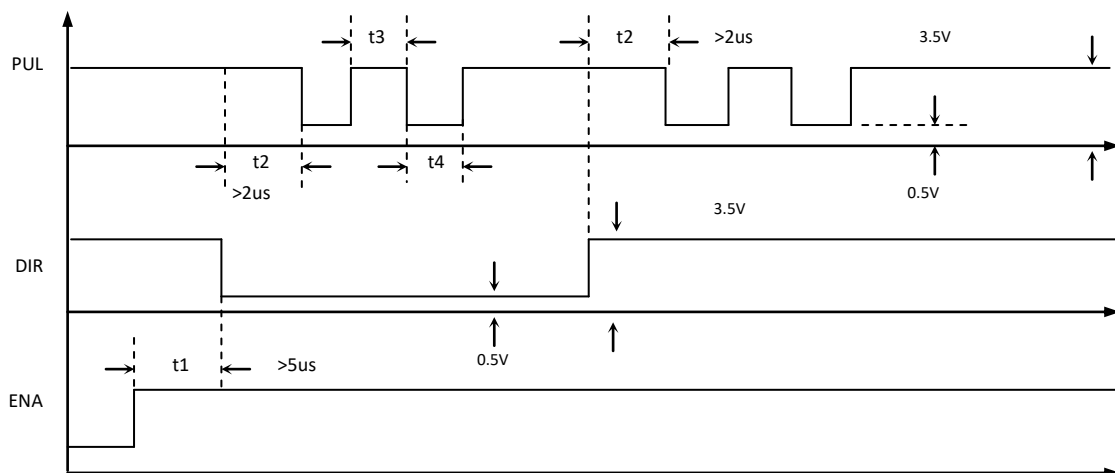
Notes:

T1: Ena (enable signal) should be at least 5 s ahead of Dir, determined as high. Generally, it is recommended that ENA + and ENA-hover.

T2: Dir is at least 2 seconds ahead of Pul's descent to determine whether it is high or low.

T3: Pulse width not less than 2 seconds.

T 4: LOW LEVEL WIDTH NOT LESS THAN 2 S.

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4.2.3 Output ports of power supply and motor

Power supply and motor power interface

Name	Function
GND	DC power source
+VDC	DC Power Supply Positive Pole, supply voltage range: DC 12-50VDC, recommended 24VDC work.
A+	Motor phase a coil interface
A-	
B+	Motor phase a coil interface
B-	

     The power supply voltage can work normally between the specified ranges. The driver is preferably powered by an unregulated DC power supply, or a transformer buck + bridge rectifier + capacitor filter. Note, however, that the peak voltage ripple after rectification should not exceed its specified maximum voltage. It is recommended that the user supply power with a DC voltage lower than the maximum voltage to prevent the grid from fluctuating beyond the operating range of the driver voltage.

If using a regulated switching power supply, be aware that the output current range of the switching power supply must be set to maximum.

Please note:

When wiring, pay attention to the positive and negative poles of the power supply, do not reverse connection;

It is better to use an unstable power supply;

The output capacity of the power supply current should be greater than 60% of the set current of the driver when an unstable power supply is used;

When a regulated switching power supply is adopted, the output current of the power supply shall be greater than or equal to the working current of the driver;

To reduce costs, two or three drives can share a power supply, but the power supply should be large enough.

5 Dial definition

5.1 The current setting

Peak	RMS	SW1	SW2	SW3	SW4
Default[0.1A]		on	on	on	on
0.28A	0.2A	off	on	on	on
0.42A	0.3A	on	off	on	on
0.60A	0.5A	off	off	on	on
0.84A	0.6A	on	on	off	on
0.98A	0.7A	off	on	off	on
1.12A	0.8A	on	off	off	on
1.40A	1.0A	off	off	off	on
1.68A	1.2A	on	on	on	off
1.82A	1.3A	off	on	on	off
2.10A	1.5A	on	off	on	off
2.24A	1.6A	off	off	on	off
2.38A	1.7A	on	on	off	off
2.52A	1.8A	off	on	off	off
2.80A	2.0A	on	off	off	off
3.00A	2.2A	off	off	off	off

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5.2   IO

Pulse/red and IO Table

Microstepping	Pulse/rev	SW5	SW6	SW7	SW8	IO/RPM
1	Default[200]	on	on	on	on	10
2	400	off	on	on	on	20
4	800	on	off	on	on	30
8	1600	off	off	on	on	40
16	3200	on	on	off	on	50
18	3600	off	on	off	on	60
32	6400	on	off	off	on	80
64	12800	off	off	off	on	100
5	1000	on	on	on	off	120
10	2000	off	on	on	off	150
20	4000	on	off	on	off	200
25	5000	off	off	on	off	250
36	7200	on	on	off	off	300
40	8000	off	on	off	off	350
50	10000	on	off	off	off	450
256	51200	off	off	off	off	600

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5.3 Function setting

SW9:Edge selection, off = Fall（Falling Edge is valid）;on=Rise（Rising Edge）		
SW10:S- Filter	OFF = 4ms	High Response
	ON = 10ms	Low Vibration

Mode Sel

MODE	SW11	SW12	OBSERVATIONS
PULSE & DIRECTION	**OFF**	**OFF**	**Bi direction - When direction input is high/low; the direction changes.**
AUTO MODE(IO)	**ON**	**ON**	**Bi direction - When direction input is high/low; the direction changes.**
	ON	**OFF**	**When direction input is high the motor shaft is holded/electronically braked.**

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