



# **DS8660**

## **User's Guide Of**

### **Two Phase Hybrid Servo Stepper Driver**

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## 1 Products'introduce

Based on many years application experience of closed-loop servo stepper system,we developed a new product DS8660 servo stepper driver with dispaly for our customers' use.

DS8660 adopts advanced digital control technology, with unique hardware design, has excellent performance of small size, low noise and low vibration. The parameters are set by pressing the button on the panel. With the Micro USB interface and tuning software, the product performance can be further optimized.

We hope that the excellent performance, quality and high cost-effective of our products can help you successfully complete the motion control project.

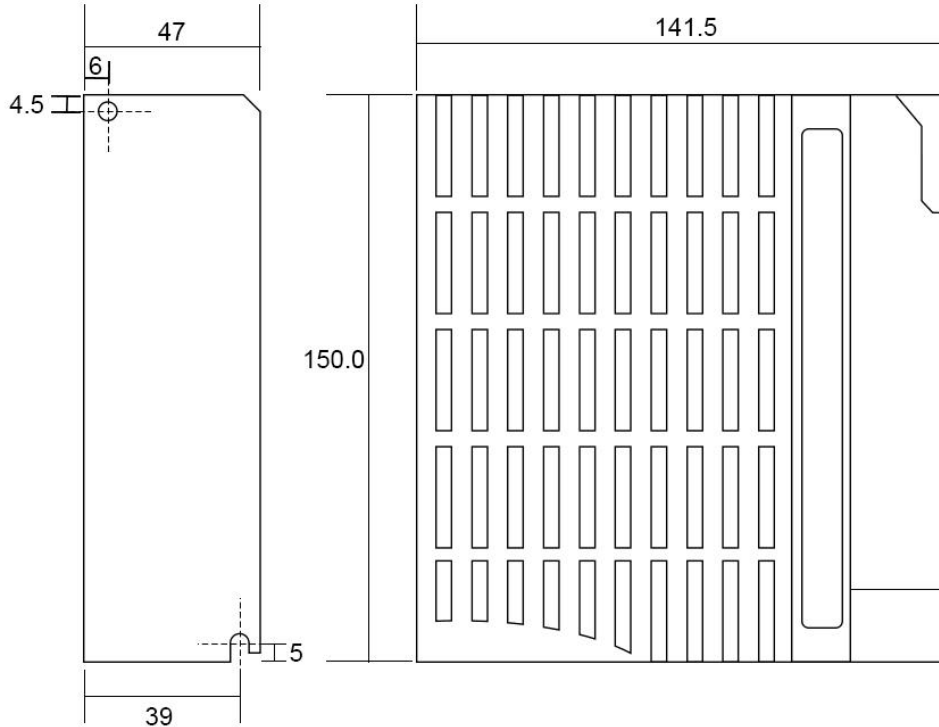
### 1.1 Charactor

- Digital High Voltage Stepper Motor Driver
- Operating Voltage: AC 18~80VAC
- Control method: PUL+DIR; CW+CCW
- Subdivision setting: 200~65535
- Output current: 0~6A (sine peak)
- Maximum phase current output: 5A/phase (sine peak)
- Encoder resolution: 4000 (Defaults)
- Input signal: 3-way optical isolation digital signal input, high level can directly receive 5-24V DC level
- Output signal: 1-way optical isolation digital signal output, maximum withstand voltage 28V, maximum input or pull-out current 50mA

## 1.2 Electrical indicators

Parameter	Minimum	Typical	Maximum	Unit
Supply voltage	18	60	80	VAC
output current(peak)	0	-	6	A
Pulse command frequency	2	-	200K	Hz
Pulse Width	2.5	-	-	us
Direction signal width	62.5	-	-	us
Undervoltage alarm	-	15	-	VAC
Overvoltage alarm	-	90	-	VAC
Input signal voltage	4	-	28	V
ALM on current	-	-	50	mA
ALM withstand voltage	-	-	30	V

## 1.3 Mechanical installation diagram



## 1.4 Safety instructions

The transportation, installation, use or repair of this product must be performed by someone who is professionally qualified and familiar with the above operations.

In order to safe use, you should obey all local and national safety regulations when using this device.

System errors may also result in equipment damage or personal injury. We do not guarantee this product is suitable for your specific application, and we cannot be responsible for the reliability of your system design.

Please read all related documents before installation and use. Improper use may cause equipment damage or personal injury. Please strictly comply with relevant technical requirements during installation. Be sure to confirm the grounding of each device in the system. Ungrounded systems cannot guarantee power safety.

Some components inside the product may be damaged due to external static electricity. Before touching the product, operators should ensure that they are free of static electricity and avoid touching objects with static electricity(chemical fibers, plastic films, etc.) .

If your device is placed in the control cabinet, please close the control cabinet cover or the cabinet door during the operation, otherwise it may cause equipment damage or personal injury.

It is forbidden to hot plugging the cable while the system is running. The arc generated by Hot plugging may cause harm to operators and equipment.

Wait at least 5 seconds after turning off the power before touching the product or removing the wiring. Capacitive devices may still store dangerous electrical energy after a power failure and will take a certain amount of time to release. To ensure safety, use a multimeter to measure before touching the product.

Please obey the important safety instructions provided in this manual, including clear warning signs for potential safety hazards. Read and familiarize yourself with these instructions before installing, operating and maintaining.

## 2 Driver installation

The narrow side of the driver radiator is the mounting surface and can be mounted in the cabinet. Use M4 screws to install in the driver mounting holes.

The power section of the driver generates heat and forced air cooling is required to operate the drive at maximum power.

Do not install the driver in a location with no air flow or near a device that can cause surrounding temperature to exceed 40°C. Also, do not leave the driver in a wet environment or where metal shavings can easily fall into the driver.

## 3 Connection

### 3.1 Connect power supply

Using the connector as below to connect AC power. Use the AWG16 wire to connect the AC port of transformer.

Do not remove the power connector while the power is on!

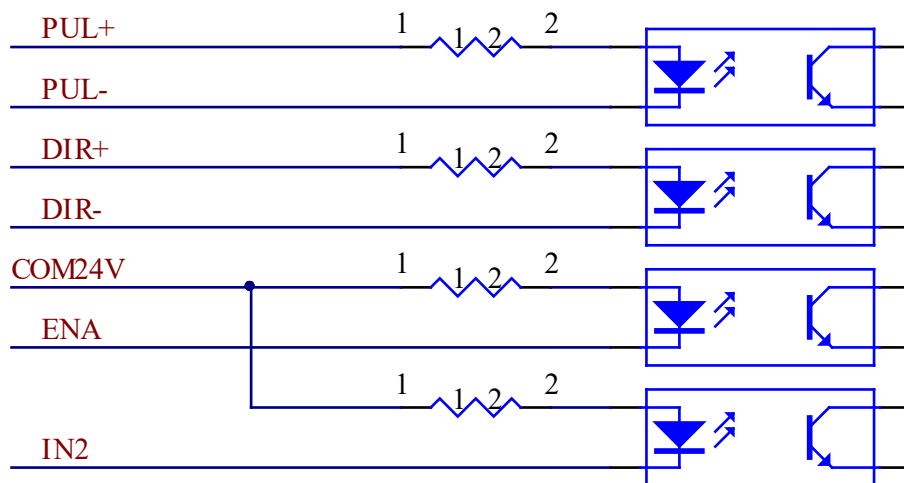
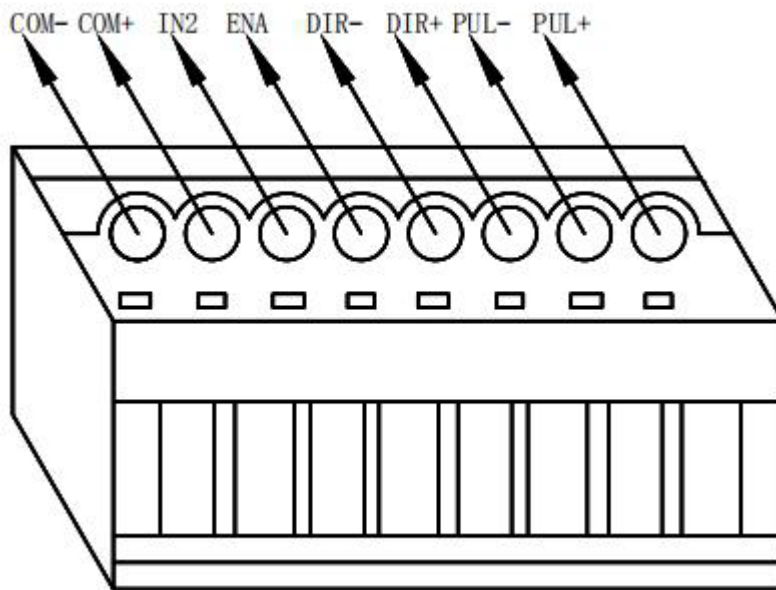
Note that the input power range of the DS8660 is 18~80VAC.

### 3.2 Connect motor

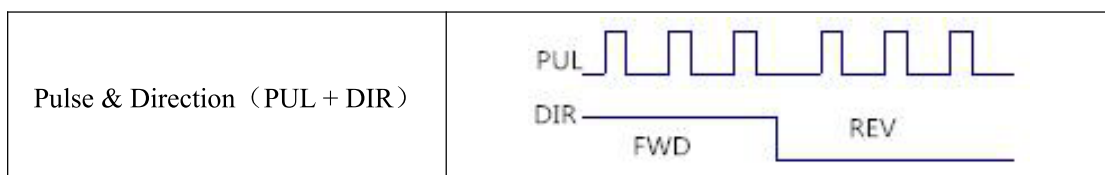
Warning: When connecting the motor to the driver, first make sure the driver power is off. The motor cannot be disconnected while the drive is powered on. Do not connect the motor lead to the ground or the power supply.

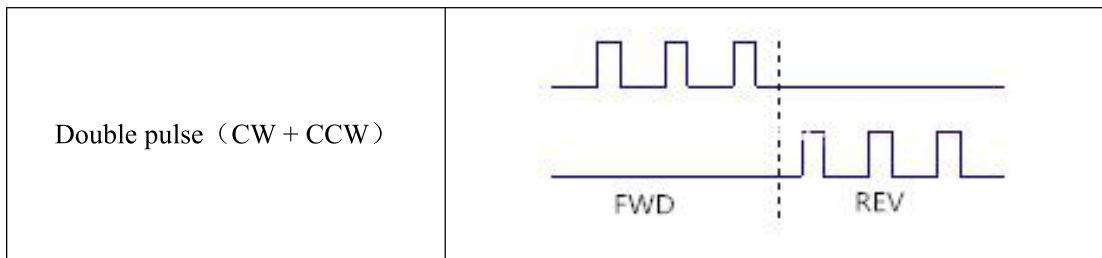
Connect the motor leads to the A+, A-, B+, B- ends of the driver. Closed-loop servo stepper motors need to be wired according to the wiring of the motor. It is not possible to change direction by reversing the A+, A- windings. You can change the direction of motor by setting parameter on the driver.

### 3.3 Control signal P1



#### 3.3.1 Pulse direction input





### 3.3.2 Enable input

About the EN input enables or the driver power is partially turned off, the signal input is optically isolated and can accept 5-24VDC single-ended or differential signals, the signal max can reach 28V.

When the EN signal is floating or low (the optocoupler is not conducting), the driver is enabled and the motor runs normally. When the EN signal is high (the optocoupler is conducting), the driver power is partially turned off and the motor is not excited.

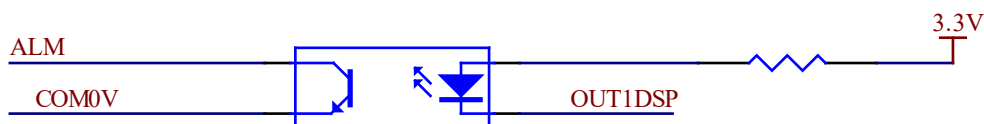
When the motor is in an error state, the EN input can be used to restart the driver. First, remove the existing fault from the application system, and then input a falling edge signal to the EN terminal. The driver can restart the power section and the motor can run.

### 3.3.3 Alarm output

The ALM port is an opto-isolated output with a maximum withstand voltage of 30 VDC and a maximum current of 100 mA.

In default, when the driver works normally, the output optocoupler will not conduct. When an alarm occurs, the optocoupler turns on.

The logic of the alarm can be changed by parameter 13.



### 3.3.4 Encoder signal output P3

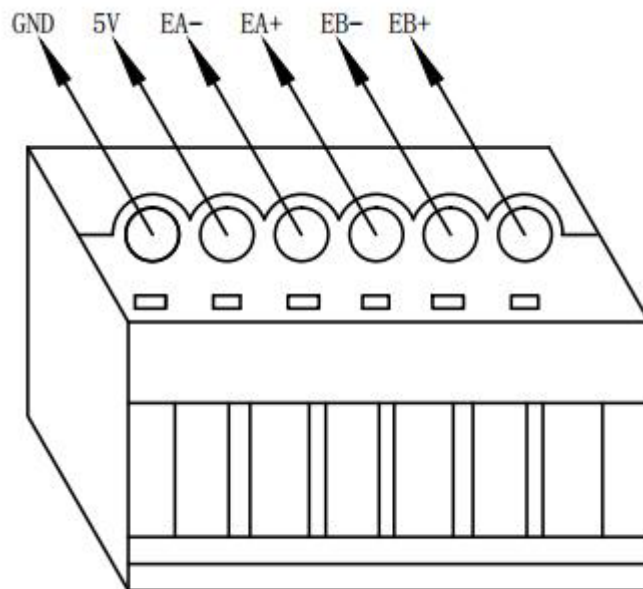
The encoder output signal is a 5V differential level output.

DS8660 receives incremental optical encoder signals. The driver only needs A and B two-phase signals. The Z-phase signal is used as an external system.

In order to improve the anti-interference performance of the optical encoder signal, usually the optical encoder signal use differential signal.



If need to match the single-ended output encoder, connect A, B, Z phase to EA+, EB+, EZ+ terminals in the above table, and the corresponding EA-, EB-, and EZ- keeping unconnected.



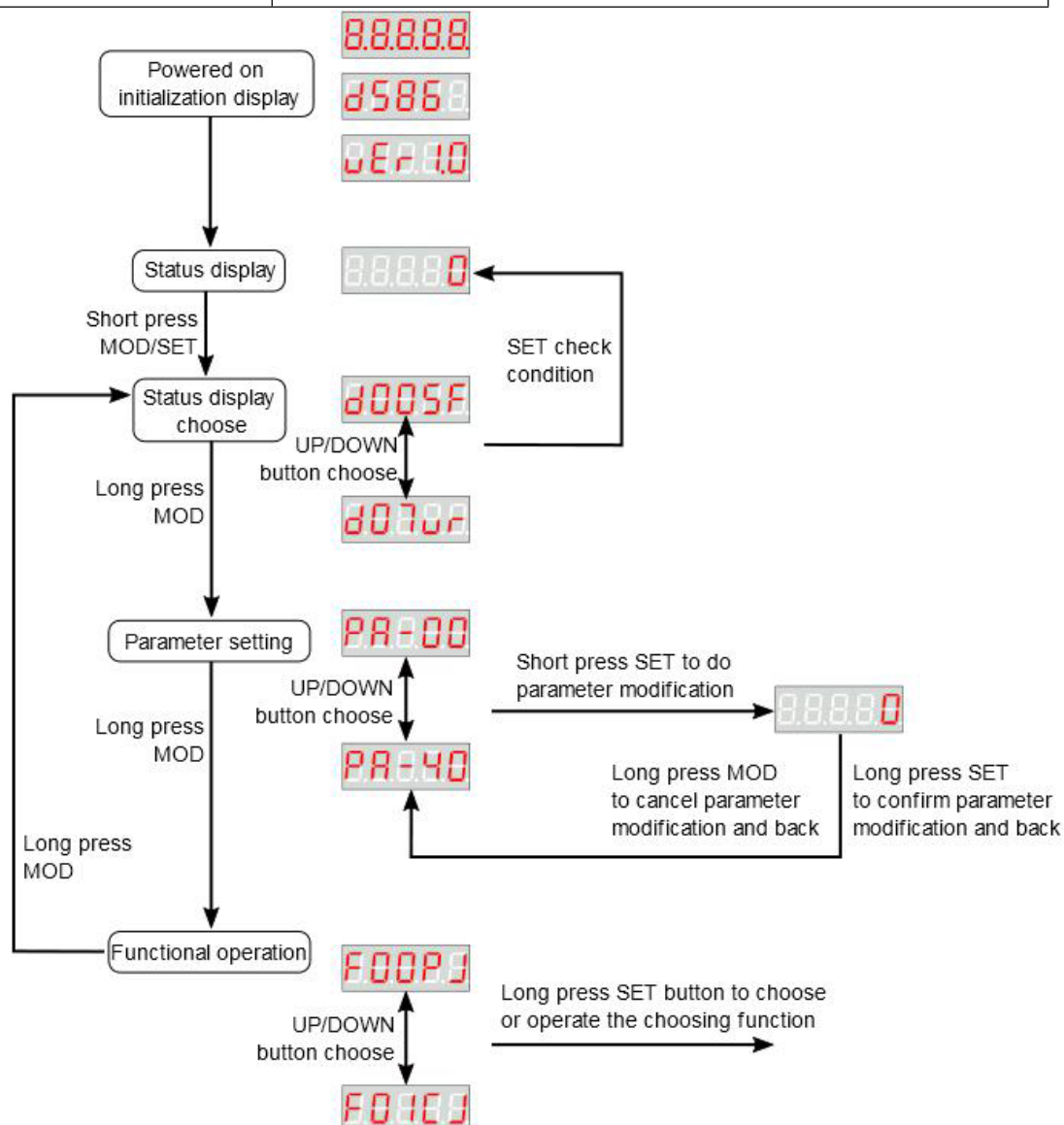


## 4 Button operation







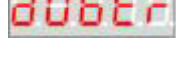

### 4.1 Button operation logic

DS8660 has 4 buttons, respectively defined as follows:

Icon	Instructions
	MOD key Usually use to return the previous menu and cancel the operation.
	UP key Use for menu selection, data setting
	DOWN key Use for menu selection, data setting
	SET key Function confirmation



## 4.2 Driver monitoring

Monitoring parameters	symbol	Instructions
0		Current driver's speed feedback Unit: RPM
1		Current driver's given speed Unit: RPM
2		See the current position of the encoder in one circle
3		Current number of pulses received by the driver Unit: The resolution set by subdivision
4		Check the current tracking error of the driver Tracking error based on encoder resolution
5		Check the driver bus line voltage Voltage value = display value / 100
6		Check the drive error code 1 Overcurrent alarm 2 Overvoltage alarm 3 Internal voltage error 4 Location out of tolerance alarm 5 Encoder error 6 Parameter check error
7		Check the driver version

## 4.3 Parameter settings

The parameter can be set from PA-00 to PA-40




No.	Name	Range	Defaults	Instructions
0	Control mode	[0,2]	1	0 Open-loop operation 1 Easy servo mode one 2 Easy servo mode two
1	Subdivision	[200,65535]	1600	The number of pulses required to run one circle by motor
2	Max current	[100,7000]	7000	Unit: mA Matching different motors, first confirm that the maximum current is appropriate and then connect the motor.



3	Basic current percentage	[1,100]	50	
4	Encoder resolution	[500,65535]	4000	The number of pulses feed back by one motor revolution For quadrature encoders, the driver inside has 4 times frequency. So the 1000-line encoder has a resolution of 4000
5	Position error Alarm threshold	[100,65535]	4000	Set alarm threshold of driver tracking error
6	Reverse direction	[0,1]	0	0 default direction 1 motor operation direction reversed
7	Instruction filtering	[1,512]	128	The driver has a built-in pulse command filter that smoothes the pulse command. At the same time, it will cause lag Lag time = set value × 50us. For point motion, setting the pulse filter can make the motor start and stop more smoothly. For interpolation motion, set the filter parameter to 1.
8	Pulse mode	[0,1]	0	0 pulse + direction 1 double pulse
9	Pulse effective edge	[0,1]	0	0 rising edge is valid 1 falling edge is valid
10	Enable level	[0,1]	0	0 open 1 close
11	Enable action	[0,1]	0	0 Motor without shaft lock 1 Motor with shaft lock
12	ALM multiplexing function	[0,2]	0	0 alarm output 1 In position signal 2 Brake output
13	ALM output level	[0,1]	0	0 open 1 close
14	In-position signal mode	[0,1]	0	0 Detection after pulse stop 1 Detected at any time
15	In-position signal accuracy	[1,1000]	10	Indicates the precision range of the motor in position. The unit is based on the encoder resolution.
16	In-position signal output	[20,1000]	20	The duration time after the motor enters the in-position accuracy range.



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				time = set value ×50us
17	Shaft lock time	[200,65535]	1000	time = set value ×50us
18	Automatic PI function	[0,1]	1	0 no use automatic recognition 1 use automatic recognition When Using the automatic recognition function, the current loops Kp, Ki are automatically calculated,no need setting.
19	Current loop Kp	[200,10000]	—	
20	Current loop KI	[0,2000]	—	
21	Current loop Kc	[0,1023]	256	
22	User setting resistor	[100,10000]	1000	In easy servo mode 2, when the automatic recognition function is not used, the winding resistance of the motor needs to be set. Unit: mOhm
23	User setting inductance	[1,20]	1	In easy servo mode 2, when the automatic identification function is not used, the winding inductance of the motor needs to be set. Unit: mH
24	Torque constant	[0,2000]	600	In easy servo mode 2, the user needs to set the torque constant according to the characteristics of the motor. <i>57SC09 set 150</i> <i>57SC22 set 200</i> <i>86SC45 set 400</i> <i>86SC85 set 600</i>
25	Easy servo mode 1 -Position loop Kp	[0,5000]	2500	In easy servo mode 1, the control parameters usually use the default parameters, no need tuning
26	Easy servo mode 1 -Position loop Ki	[0,1000]	0	
27	Easy servo mode 1 -Position loop Kd	[0,1000]	200	
28	Easy servo mode 1	[0,100]	30	



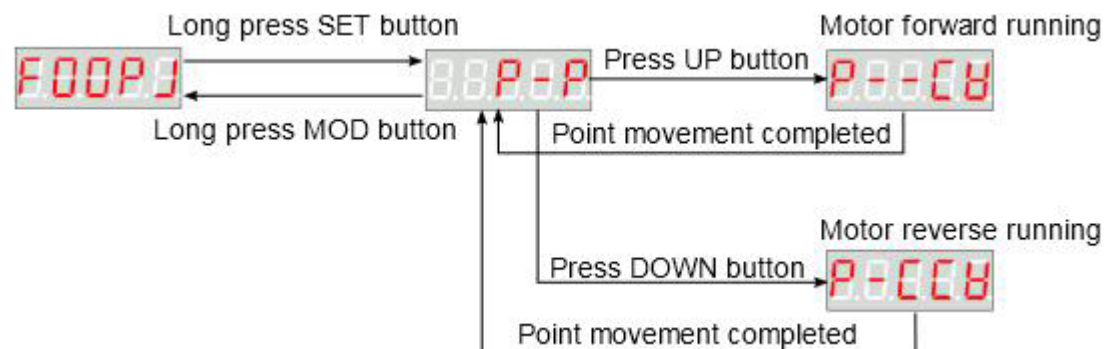
	-Position loop Kvff			
29	Servo mode 1 low speed vibration damping Kdi	[0,500]	200	
30	Easy servo mode 2-Position loop Kp	[0,20000]	4000	
31	Easy servo mode 2 -Position loop Ki	[0,20000]	2000	
32	Easy servo mode 2- Speed feedback Kv1	[0,2000]	200	
33	Easy servo mode 2- Speed feedback Kv2	[0,2000]	300	
34	Easy servo mode 2- Speed feedback Kvff	[0,2000]	200	
35	Easy servo mode 2- Gravity compensation	[0,1023]	512	
36	Internal test Pulse frequency	[0,65535]	1600	
37	Internal test stroke	[0,65535]	1600	
38	Internal test time	[0,65535]	200	
39	Speed filtering FV1	[10,2000]	200	
40	Speed filtering FV2	[10,2000]	600	

## 4.4 Auxiliary operation

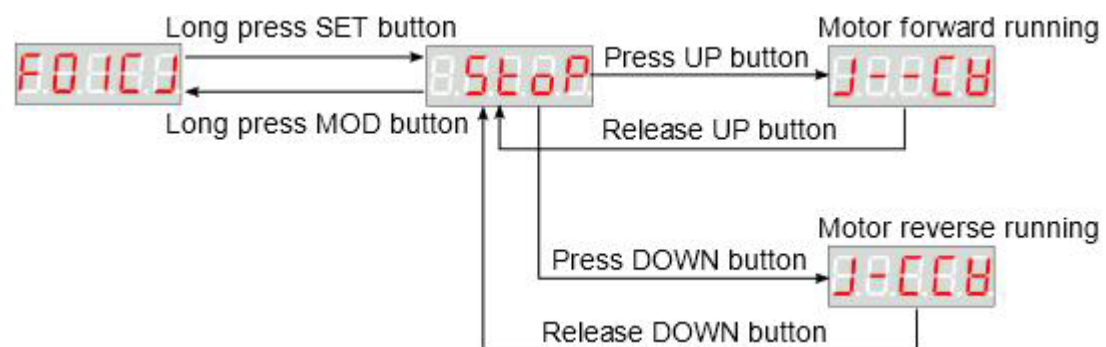
With auxiliary operations, the driver can complete the following instructions

No.	symbol	Instructions
0		Point to point motion test
1		Continuous motion test
2		Save parameter
3		Clear parameters, restore factory settings

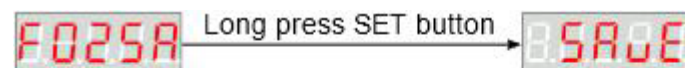
Point-to-point motion test operating logic is as follows:



Continuous motion test operating logic is as follows:





Save parameter operating logic is as follows:



The drive will reset automatically after saving is completed, and reinitialize parameters



Restore factory settings operating logic is as follows:

 Long press SET button 

Restore factory setting, the driver will reset automatically and reinitialize parameters