



Makerbase

广州谦辉信息科技有限公司

Guangzhou Qianhui Information Technology Co.,Ltd.

MKS Closed loop motor Manual

MAKER BASE

QQ Discussion Group:489095605 232237692

E-mail:Huangkaida@makerbase.com.cn

Document Version:1.0

Release date: 2018-7-20

Copyright © Guangzhou Qianhui Information Technology Co., Ltd. All rights reserved. Without the written permission of the company, no unit or individual may, without permission, extract or reproduce part or all of the contents of this document, and shall not disseminate it in any form.

Trademark statement

or Makerbase "Trademarks are the trademarks of Guangzhou QianHUI Information Technology Co., Ltd.

ATTENTION:

The products, services or characteristics you purchase should be subject to Guangzhou Qianhui information technology commercial contract and terms. The products, services or characteristics you purchase should be subject to Guangzhou modest information technology commercial contract and terms 。 In the case of commercial contracts and terms, unless otherwise agreed by the contract, MKS Information Technology Limited does not make any express or implied representations or warranties with respect to the contents of this document. The contents of this document will be updated irregularly due to product version upgrades or other reasons. Unless otherwise agreed, this document is used only as a guide, and all statements, information and recommendations in this document do not constitute any express or implied warranty.

Firmware version update

Firmware version	Modified Time	Modify Content	Note
V1.0.0	2018.7.15	1 Initial version	

I Overview

The closed-loop motor is a product independently developed by the maker base to meet market demand. The closed-loop motor feeds back the rotation angle of the stepping motor to the drive circuit to detect whether each step of the step is gone, just to prevent lost steps. If there is a lost step, the closed-loop motor will be supplemented by the feedback information. When you lose your step, the blue LED on the closed-loop module will light up (the blue LED is the lost step indicator). It is suitable for 3D printer manufacturers with high precision in mass production.



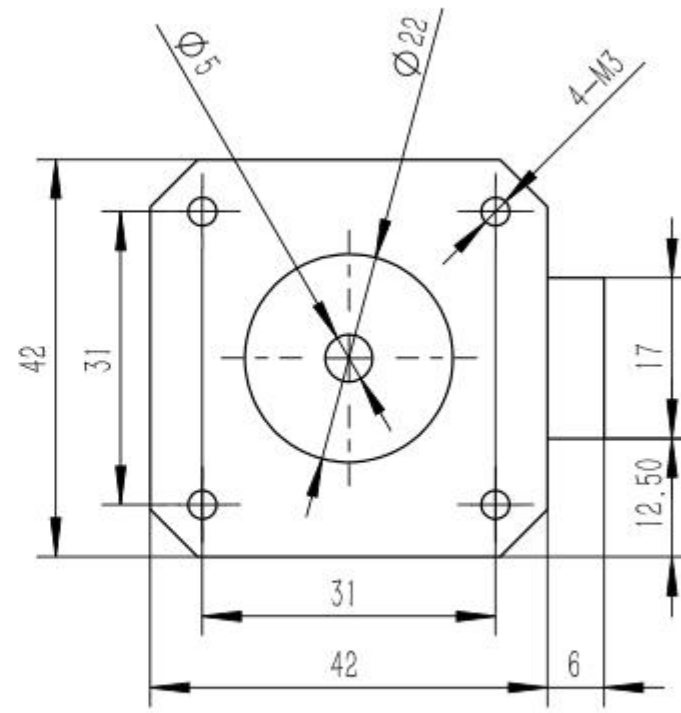
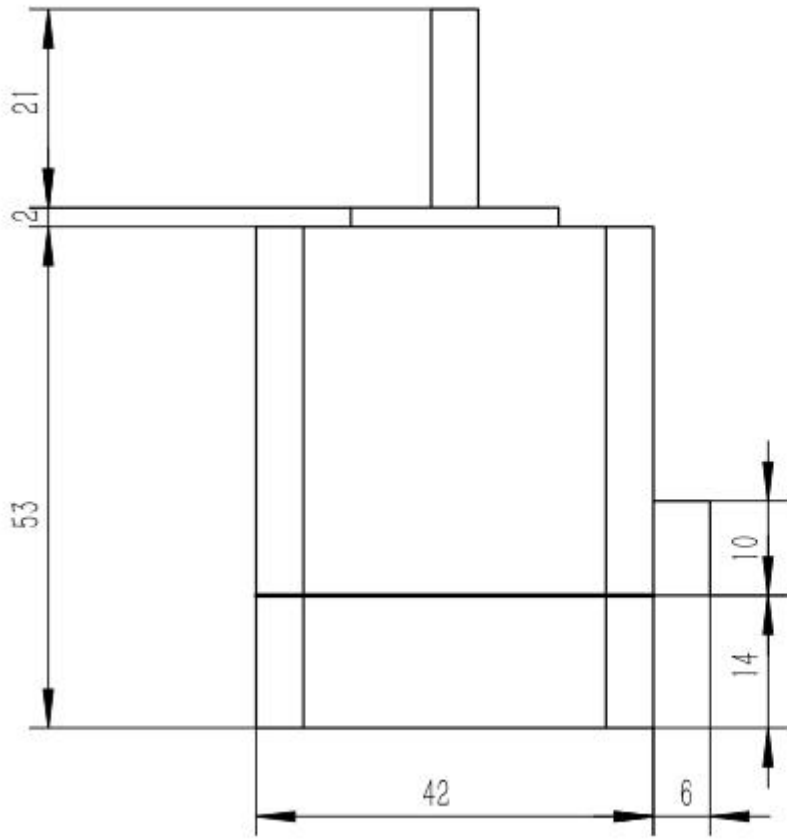
II Features

1. High-speed printing does not lose steps;
2. low heat, high efficiency;
3. High cost performance;
4. Easy installation and simple structure;
5. It can be configured through 0.96 inch OLED display, which is easier to operate;
6. It can be configured through serial port assistant, using multiple command configurations, and can feedback data;
7. Closed loop motor has feedback.

III Product parameters

Product parameters	
Input voltage	12-24V
Peak output Current	$\pm 2A$
Closed loop feedback frequency	6KHZ
Precision	Above 0.1125
Subdivision steps	16,32,64,128,256 (The default is 16 subdivisions)
Master chip	ATSAMD21G18A
Magnetic sensor	A1333
Motor drive chip	A4954

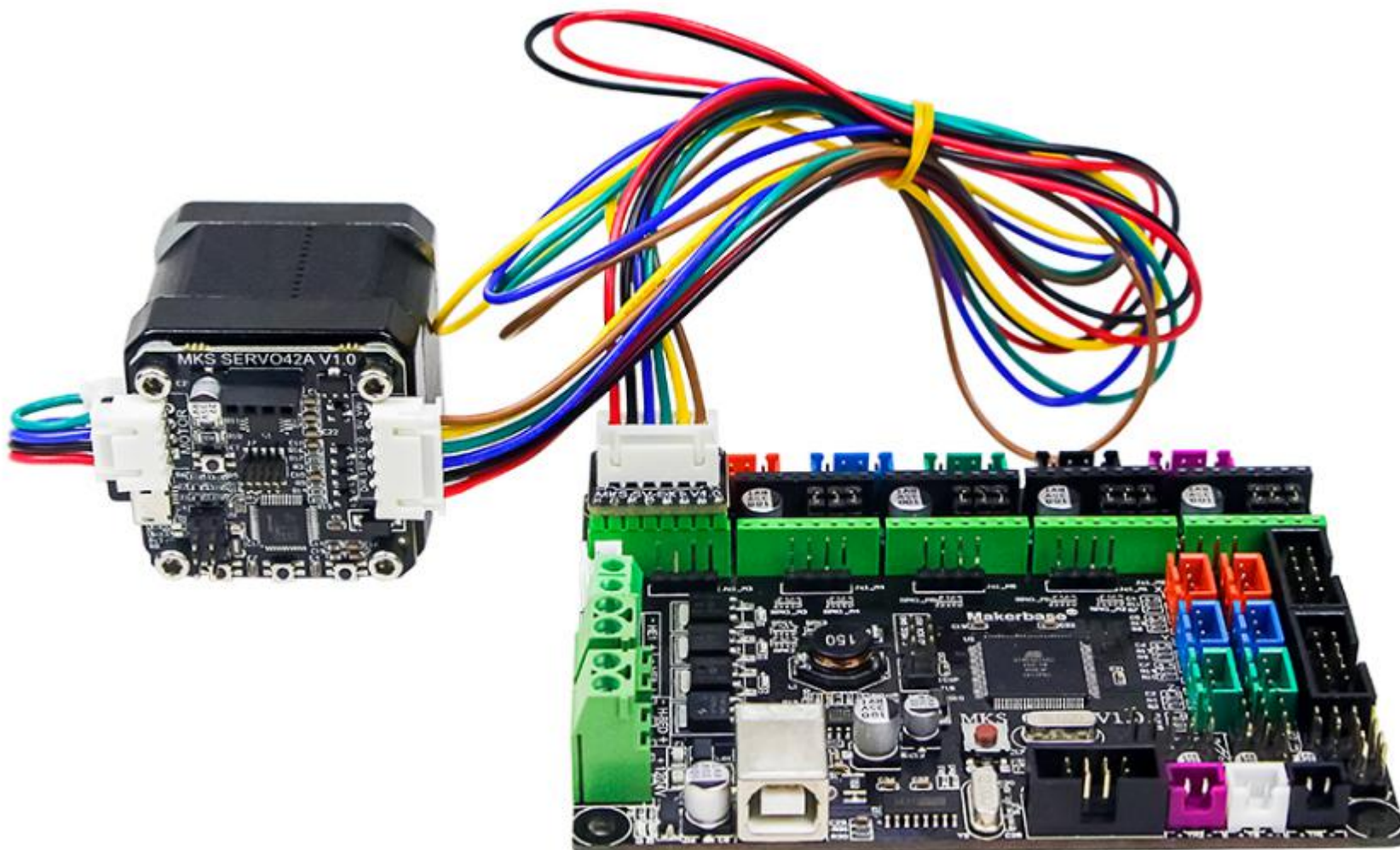
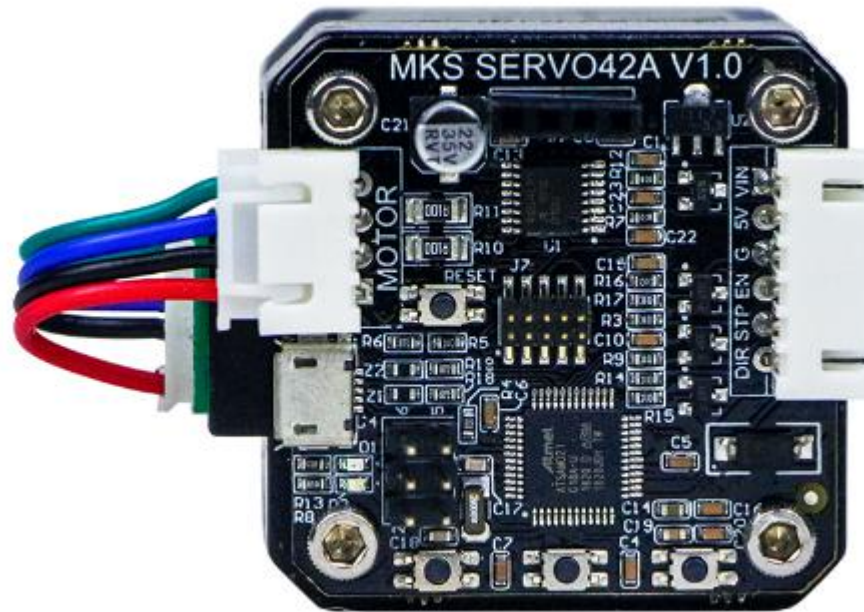
IV Product size chart



单位: mm

V Product interface diagram

The closed-loop module is connected to the motor and the main board respectively. Pay attention to the wiring sequence when connecting, so as to avoid accidentally burning the closed-loop module! !



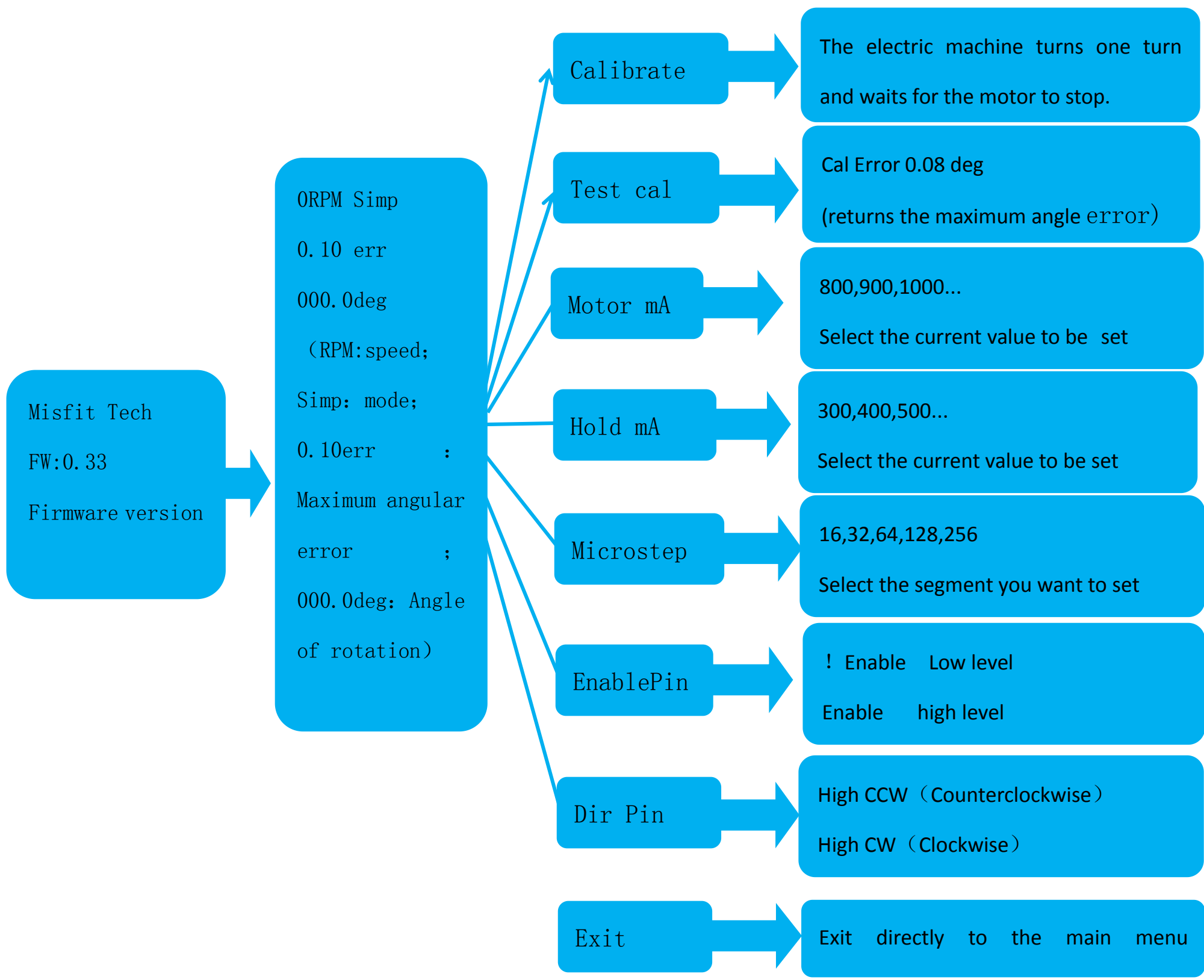


Down button

Confirm button

Menu

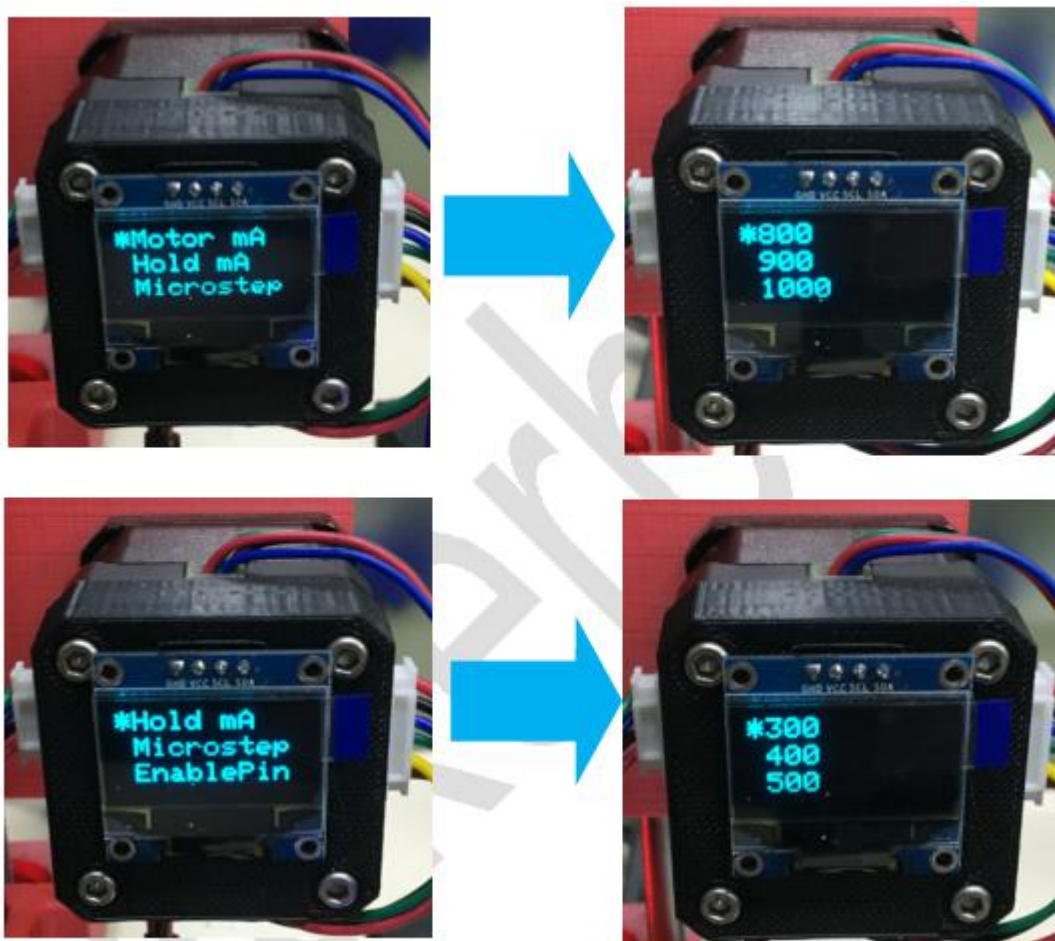
VI OLCD screen menu interface tree



VII Parameter setting (the default setting has been set at the factory, if you need to reset it, refer to the following)

1 Setting the motor current

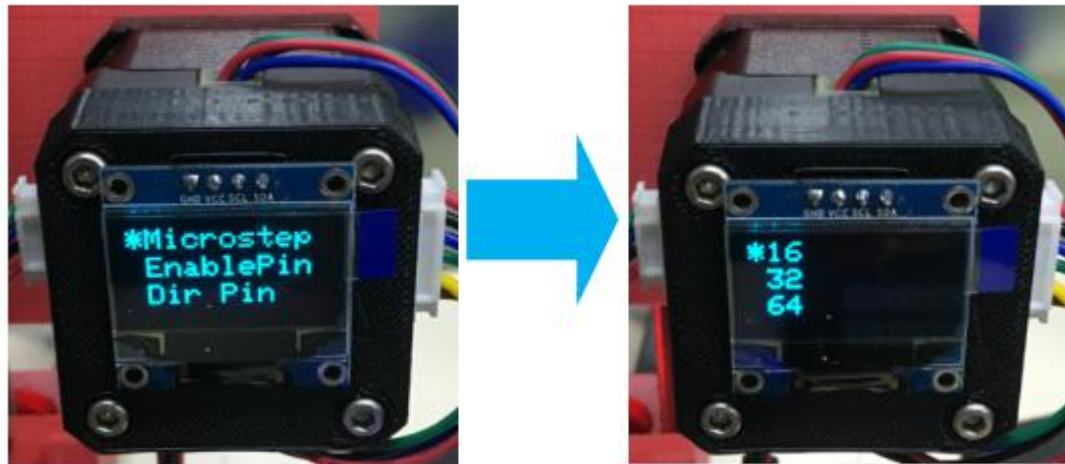
(1) Select “Motor mA” and “Hold mA” in the menu to set the maximum current and holding current for the motor respectively, and select the appropriate maximum current and holding current according to the rated current of the motor. Example: The rated current of the motor is 1000mA, the maximum current can be set to 800mA, and the current is 300mA. As shown below:



(2) Set the motor current through the serial port assistant to send the command, and keep the current and the maximum current according to the rated current of the motor. Example: Set the holding current to 300mA, send the command "holdcurrent 300", set the maximum current to 800mA, and send the command "maxcurrent 800". Send a command on the serial port assistant to set the motor current, and the closed loop module returns the corresponding command data.

2 Segmentation settings

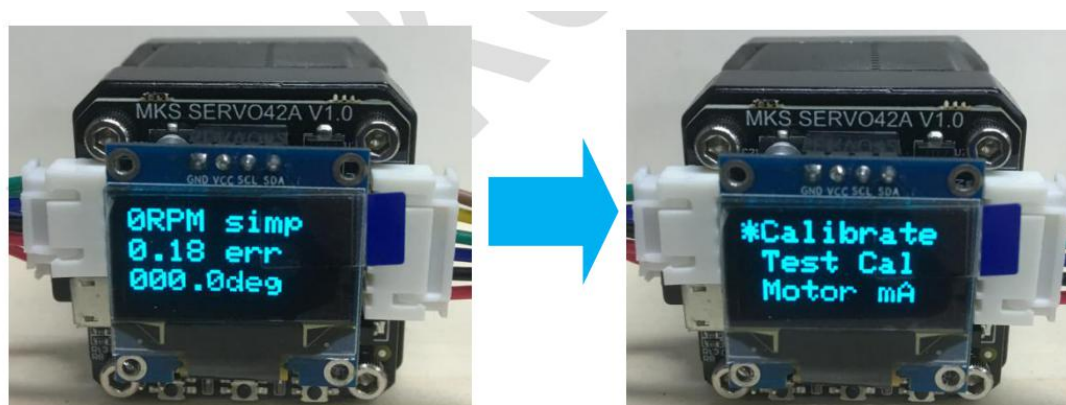
(1) Select “Microstep” in the menu to enter the subdivision setting, and set according to the subdivision when the pulse value is calculated.



(2) Set the subdivision through the serial port assistant, and send the command “microsteps subdivision” in the serial port assistant to set. Example: Set to 16 subdivisions and send the command "microsteps 16". The serial port assistant sends the command to set the subdivision, and the closed loop module will return the corresponding command data. Example: Send "microsteps 16" and the closed loop module returns "microsteps 16".

3 Calibration (caution: no power failure during calibration)

(1) Select "Calibrate" in the main menu to enter the calibration, the calibration process will be motor rotation, until the motor rotation, closed-loop module calibration completed

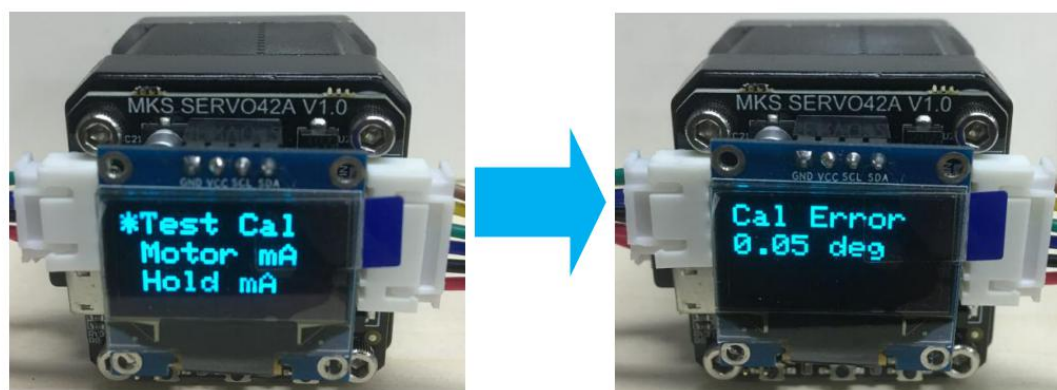


(2) through serial assistant calibration, serial assistant sends the instruction "calibrate" to calibrate. Sending commands through serial port assistant

After calibration, the closed-loop module can return the calibrated data

4 Test calibration

(1) Select "Test Cal" in the menu to enter the test calibration; the motor will rotate for test calibration, and return the maximum error angle after test calibration.



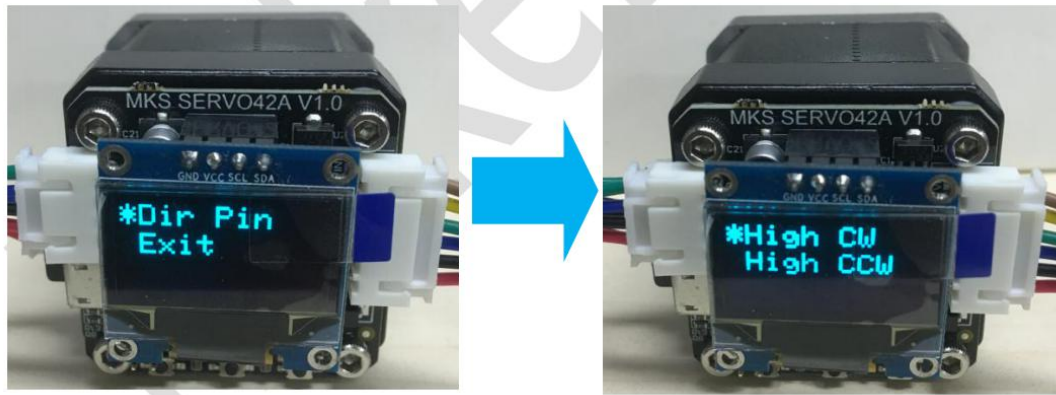
(2) through serial assistant test calibration, serial assistant send "Test Cal" for testing calibration. The motor will be rotated for testing.

Calibrate, calibrate and return the maximum error angle.

5 Setting motor rotation direction

(1) After the closed-loop module is calibrated, the motor is equipped with an epithelial belt to move the X-axis and Y-axis motors. If the motor rotates in the opposite direction, it can be served as the main course.

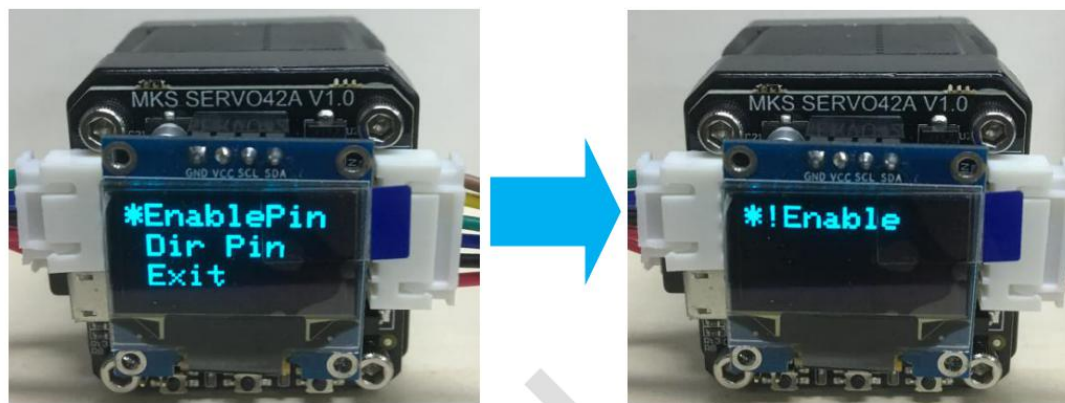
Select "Dir Pin" into the motor rotation direction setting, HIGH CW for high level clockwise, HIGH CCW for high level counterclockwise;



(2) Set the direction of the motor through the serial assistant, and set the direction of the motor corresponding to the serial assistant sending "dirpin 1" or "dirpin 0". The serial assistant sends instructions to set the direction of the motor rotation, and the closed loop module can return the corresponding data. Example: send "dirpin 1", closed loop module returns "dir pin 1".

6 ENABLE

In the main menu, select "Enable Pin" to enable Enable. Select Enable for high level, not enable control signal, select! Enable for low level, enable control signal



VIII Command list

1.help

The help command returns a list of all commands.

2.calibrate

Corrected 200 correction data for the encoder. The motor first needs to rotate a circle to determine the specific angle of each step. It is considered a circle of 200 steps (our motor step angle is 1.8 degrees).

3.getcal

Obtaining the corrected angle data will display 200 tables of corrected angle data.

4.testcal

Test correction to enter this command. The motor will turn around to test and correct.

5.microsteps

The subdivision value gets or sets the value of the subdivision of the step motor drive when using the step command or step pin. The micro step does not affect the resolution of the controller, but it can set the precision of the location.

6.step

Move one step clockwise, and the step is based on the current microstep settings. Counterclockwise movement uses "step 1". alongThe 16 step of the clockwise mobile motor is the use of "step 016", the counterclockwise movement of the motor, and the 16 step of using the "ST".

7.feedback

Feedback start / close loop feedback control.

Feedback 0-disables (closed)

Feedback 1-enables (open)

8.readpos

Read the angle to read the current angle value.

9.encoderdiag

The encoder diagnoses the value of the AD5047D internal register, which is at the purpose of diagnosis.

10.spid

Set Kp, Ki, and Kd - for the simple location PID controller.

11.vpid

Set Kp, Ki, and Kd - speed PID controller.

12.ppid

Set Kp, Ki, and Kd - for the position PID controller.

Creation base

Sixteen

13.dirpin

Dir pin direction this command sets the direction of the motor's rotation when the directional pin is pulled high. The directional pin is only in the step pin. Sampling on rising edge. 'dirpin 0' will set up the motor. When the dir pin is high, turn the 'dirpin 1' clockwise to set the motor.

14.enablepinmode

Gets / sets the function of enabling pin.

15.errorlimit

The maximum acceptable error margin, when the error pin is set to the error output, is output to the error pin when the error range is exceeded. Errorlimit 1.8 sets the error limit to 1.8 degrees.

16.ctrlmode

Get / set up feedback controller operation mode. This command uses integers from 0 to 4 and sets the control mode according to the following table:

Controller off - 0 - current firmware is not used.

Open loop - 1 - this is open-loop without feedback.

Simple PID - 2 - simple location PID, factory default value

Location PID - 3 - based on current PID mode, you need to adjust your machine.

Speed PID - 4 - speed based PID, you need to adjust your machine and speed range.

17.maxcurrent

This will set the maximum current of the drive motor. "Maxcurrent 800" sets the current to a maximum

value of 0.8A. "Maxcurrent The unit of value is 'mA'

18.holdcurrent

Get/set the motor holding current in milliamps, for simple position PID mode only. "Holdcurrent 300" will keep the current set to 0.3A. The unit of value after "Holdcurrent 300" is mA. For the simple position PID mode, the minimum current (ie, the current without position error) is the holding current. You can set this current based on the holding torque required for your application. The higher the holding current, the hotter the motor and the greater the noise, but the greater the holding torque. For the position PID mode, the PID adjustment parameters must be set correctly so that the feedback controller dynamically determines the holding torque. Before leaving the factory, we set these parameters and use them directly out of the box.

19.homecurrent

Get / set the motor motion and hold current when the pin A3 is low.

20.motorwiring

Get/set the motor wiring direction. The firmware always uses a positive angle as a clockwise rotation. However, the stepper motor may be reversed when the wire is plugged in, which will reverse the motor operation. The intelligent stepper firmware will use the encoder to detect the motor wiring direction and the firmware will correct the reverse wiring motor. After the factory reset, the reverse or forward wiring of the motor is detected at the first power-on. If you change after wiring, you can use this command to modify it.

21.stepsperrotation

Gets/sets the number of motor steps per rotation. The intelligent stepper firmware will be turned on for the first time after the factory reset to detect the complete number of steps per step of the stepper motor and stored in the flash. This command reads this parameter from flash and allows the user to change this parameter when the motor changes.

22.boot

You can enter the bootloader, or you can do it by pressing the reset button.

23.move

The motor moves to the absolute angular position. The user can specify the rotational speed (RPM) of the movement. For example, if the current motor position is at angle 0 and "move 3600" is issued, the motor

will rotate 10 turns clockwise at an angle of 3600 degrees. If "move 3600" is issued again, nothing happens because the motor is already at angle 3600. If the motor is at angle 0 and the user issues the command "Move 3600 30", the motor will move 10 turns to 3600 clockwise at 30RPM. angle.

24.Velocity

When set to the speed PID` mode, this parameter sets the speed of the rotary motor.

25.factoryreset

Factory reset. The calibration and other system and motor parameters will be erased and the device will be reset to factory state. After this command, the unit will need to be calibrated again.

26.stop

Stop instruction. If the user moves the command incorrectly and takes a long time and wants to stop moving before it is finished,The user can issue a stop command to stop the mobile operation.

27.setzero

Set the reference angle to zero. This command will get the current motor position and set it to an absolute zero angle. Note that if you move in the middle, it will take the position of the command and use it, so it is recommended to stop moving or wait for completion before issuing setzero.

28.data

Enable / disable binary data output.

29.looptime

Returns control cycle processing time.

IX Technical support and protection

1. Power test will be done prior to shipment to ensure normal use of the product

2. Welcome friends to join the discussion group: [232237692](#).

3. Welcome to Blog Exchange : <http://flyway97.blog.163.com>.

4. 3D printer motherboard contact

Miss Zhong: [15521638375](tel:15521638375) Mr. Huang: [13148932315](tel:13148932315) Mr. Tan: [13640262556](tel:13640262556).

Mr.Peng: [13427595835](tel:13427595835)

5. If you have any questions you can contact our customer service or find technical support staff in the group, we will be happy to serve you.



MKS official website



MKS Taobao website