FARADYI® MOTOR DRIVER APP USER MANUAL

Windows
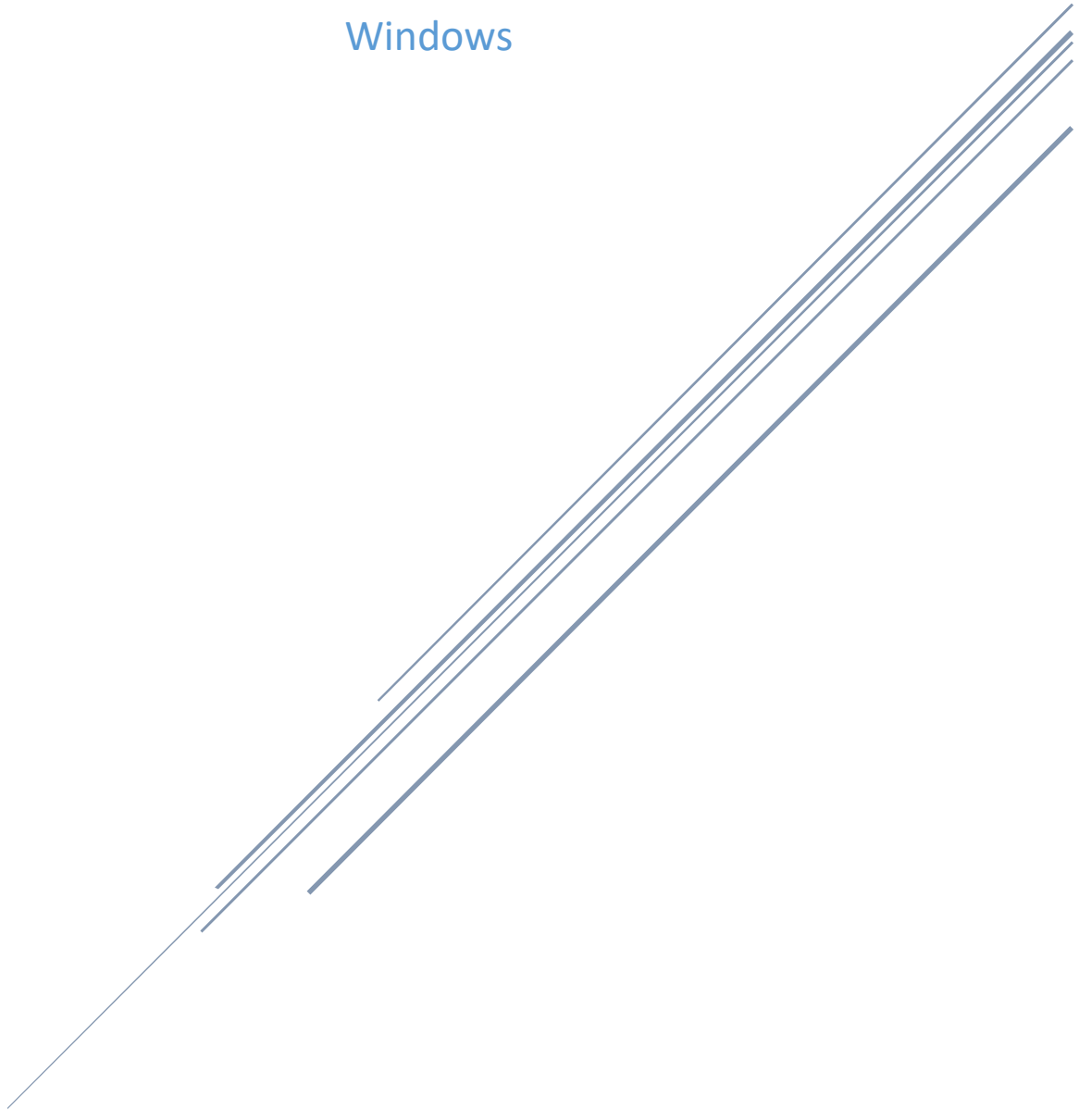
CONTENT

REVISION HISTORY

Version	Data	Revisions
1.0	2021.5.20	First version
1.1	2021.7.15	'INTERFACES' and 'ZERO' added in 'BASICS' options page
1.2	2021.9.2	'DURATIONS' added in 'DRIVE' options page
1.3	2022.3.2	'Enc Reversed' option added
1.4	2022.8.5	'CAN/RS485' interface option added
1.5	2022.8.9	'CAN Protocol' option added

1 INSTALLATION

Faradyi® GIM series motor drivers support android app 'Motor Wizard' for motor settings and tests.

1.1 REQUIREMENTS

✓ Windows 10 with RAM of 2G

✓ With WIFI capabilities

✓ With screen resolution of 1920x1080 or above

1.2 SOFTWARE DOWNLOAD

For different customization requirements, Faradyi® released different versions for different customers. Please contact local support team for your customized version of APP.

1.3 INSTALLATION

Double click motorwizard.exe and follow the default installation wizard. **Please NOTE: in case that the main UI cannot be shown correctly, please change the screen zoom option to 100%.**

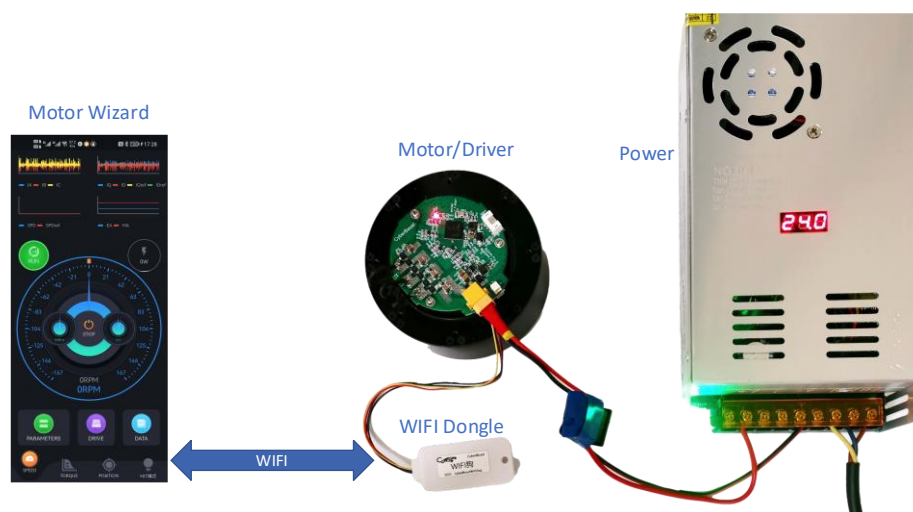# 2 CONFIGURATION

2.1 MOTOR CONNECTION

Fig 1 Motor Connection Illustration

Please follow the steps to connect host to motor driver:

1. Solder U/V/W of the motor to U/V/W on driver board

Please make sure U/V/W connections are correct, otherwise the motor may failed to run.

2. Connect power cable and WIFI dongle to driver board

Make sure that power voltage be in the limit of the driver board. For the rated voltage limit, please refer to the model number. For example, MW60XX series support the maximum voltage of 60V.

And then, connect WIFI dongle to the 4-pin connector. Switch on the power, and User should see the LED on.
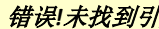
3. WIFI connection

Search the WIFI 'steadywinWifiDog' on the PC on which the APP was installed, and try to connect to it.

If successfully connected, please check the IP address of the WIFI connection, and make sure it is '192.168.4.2'.

> *In case that 'steadywinWifiDog' SSID was not found or could not be connected:*
> *Please switch off the power and re-connect the WIFI dongle to 4-pin connector on the driver board.*
> *Please make sure the PC be within 20m distance of the motor.*
> *In case the IP is not '192.168.4.2', please modify the WIFI connection with the mode of static IP '192.168.4.2'.*

4. APP 'Motor Wizard' for test

Open 'Motor Wizard', and after a very short-time hint 'Trying connecting to motor', the app should connect to the motor successfully. And then, the app tries to retrieve all parameters from the motor, if successfully, the motor should be in normal state and ready to be tested.

> *In case of 'Error encountered while retrieving parameters' or 'Timeout while retrieving parameters', please kill the app and restart it.*
> *In case that the app UI shows the running state of the motor as illustrated in* 错误!未找到引用源。*, please click 'STOP' button to stop the motor first. 。*
> *Click the right side of the UI and drag to the left, LOG page should be opened, where User can check all running and testing log outputs. Please refer to 4.2 for details.*

2.2 BASIC PARAMETERS

Basic parameters page can be opened by means of:

✓ Clicking the 'PARAMETERS' button

✓ Or clicking the left side of the UI and drag to the right, and clicking 'PARAMETERS' page

Please NOTE:

✓ Be sure to click 'SYNC' button to synchronize all changes to the motor.

✓ Clicking 'RESET' will reset all parameters of the motor.

> ☺ *The motor must be stopped first before synchronizing any changes.*
> ☺ *All parameters will take effect immediately after synchronizing and resetting.*

2.2.1 BASICS
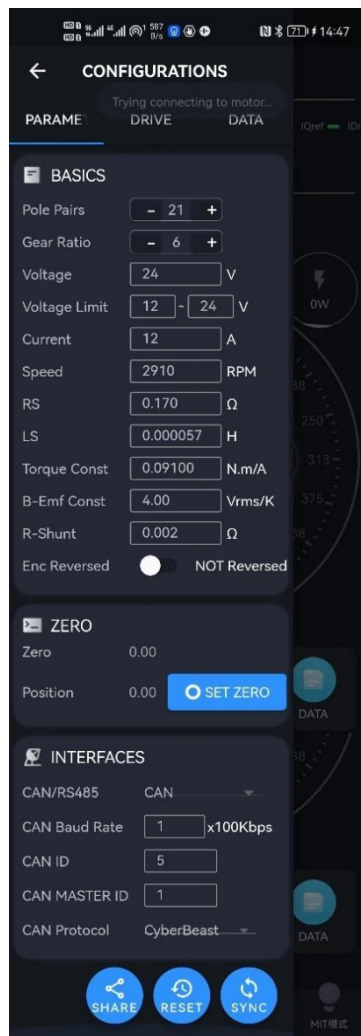
Fig 2 Basic parameters

As illustrated as above, basics parameters include: **Pole Pairs**, **Gear Ratio**, **Voltage**, **Current RS**, **LS**, **Torque Constant.** **Please NOTE that the above-listed parameters should be correctly set, otherwise the motor may run abnormally.**

> 🖈 *'Voltage Limit' indicates the under-voltage threshold and over-voltage threshold.*
> 🖈 *'Speed' indicates the speed of the rotor, not the output gear.*

1.1.1 Encoder Reversed

Please switch on this option if the motor failed to turn in one direction.

1.1.2 ZERO

'Position' shows the current position/angle of the gear, and User can click 'SET ZERO' button to set the current position as 'ZERO' position.

> 🖈 *Current 'Position' can only be retrieved when the motor is running.*
> 🖈 *'Zero' position is single-turn angle of the gear.*

2.2.2 INTERFACES

'INTERFACES' indicate parameters of CAN or RS485, including:

- ✓ CAN or RS485 as bearing interface
- ✓ CAN parameters: baud rate, CAN ID, CAN MASTER ID
- ✓ Protocol option:

  Faradyi®

  Please refer to < Faradyi® GIM Motor Driver Protocol Specification>.

  ➢ MIT

  The open-source MIT protocol. Please refer to <MIT Protocol Specification>.

Windows version also support to connect to driver using serial port, and user can select the serial port number.

2.3 DRIVING PARAMETERS (PID)

Driving parameters page can be opened by means of:

- ✓ Clicking the 'DRIVE' button
- ✓ Or clicking the left side of the UI and drag to the right, and clicking 'DRIVE' page

Please NOTE:

- ✓ Be sure to click 'SYNC' button to synchronize all changes to the motor.

- ✓ Clicking 'RESET' will reset all parameters of the motor.

> ☞ *The motor must be stopped first before synchronizing any changes.*
> ☞ *All parameters will take effect immediately after synchronizing and resetting.*

2.3.1 CURRENT LOOP

Current loop is the kernel the FoC algorithm, which is running in PWM frequency.

Kp/Ki can be tuned for current loop.

2.3.2 FLUX WEAKENING

Flux weakening loop is similar to current loop. Kp/Ki can be tuned.

2.3.3 SPEED LOOP

Speed loop is based on current loop, which is running in the rate of 1KHz. Kp/Ki can be tuned for speed loop.

2.3.4 POSITION LOOP

Position loop is based on current loop, which is running in the rate of 1KHz. Kp/Ki/Kd can be tuned for position loop.

> ☞ *In most cases Ki for position loop should be set to 0, otherwise vibration may cause unstoppable damage.*

2.3.5 DURATIONS

Duration indicates the target execution time of one single odometer driving command (please see 3.2 for odometer driving). For example, in position control mode, User may drive the motor to turn 200 degrees with one click, which means the motor should turn 200 degrees in pre-set duration, say 500ms. The longer the duration, the lower the motor turns.

2.4 LOG DATA

Log data parameters page can be opened by means of:

- ✓ Clicking the 'DATA' button

- ✓ Or clicking the left side of the UI and drag to the right, and clicking 'DATA' page.

On this page User can:

- ● Enable or disable data log (please refer to 4.1)

● Manage previously generated LOG files, like mailing to an address, sharing or deletion.

> *Multiple files could be selected in the list.*
> *Touch one file and hold to delete.*

3 MOTOR CONTROL AND TUNING

User can control/drive and tune the motor after correct connection and configuration as described in section 2.

3.1 MOTOR START&STOP

As illustrated in Fig 3, click the center 'START' button to start the motor. After successfully starting the motor, the odometer turns from grey to blue/green, and user can click 'STOP' button to stop running.

Fig 3 Motor in IDLE and RUN state

User can see the following elements in the above-right figure: status icon, power indicator, colorful arrows on the odometer, and the mini odometers.

> *In the UI the big odometer is the driving odometer of the current control mode.*
> *The mini odometers indicate the other two odometers except the current big one. They cannot be touched to drive, and only show the status.*

3.2 ODOMETER DRIVING

User can drive the motor with mouse like click and drag. Please NOTE that all indicators that are shown on the odometers are for output gear. For example, the odometer speed is the output gear's speed.

➢ **Click**

In motor running state, user can click any position of the odometer to drive the motor reach the targeted value, e.g., targeted speed in speed control mode, targeted torque in torque control mode, and targeted position in position control mode.

Please be noted that, one click triggers one single command that is sent to the motor to be executed, and user can set the command execution time in driving parameter configuration page (as in 2.3.5). For faster response, please set smaller execution time.

➢ **Drag**

In motor running state, user can touch any position of the odometer and hold to drag. In this way, user can continuously drive the motor with different targeted values.

➢ **Runtime Indicators**

In the upper part of the main UI, runtime indicators are shown in four charts.

4 LOG ANALYSIS

Motor Wizard records two different LOG data which may help the motor tuning process and monitor.

4.1 DATA LOG

Data log is the log that records motor's runtime indicators. For indicators customization, please contact local support. The following indicators are supported:

Ia Ib I_α I_β Iq Id IqRef IdRef Vq Vd V_α V_β Speed Angle Position PositionRef PositionOmega PositionAcc

The driver software samples the indicators every 500us. **SteadyWin® support higher sampling frequency, please contact local support for sampling frequency customization**。

Motor Wizard saves data log during every motor running period. Please refer to section 2.4 for how to open 'DATA' log option page.
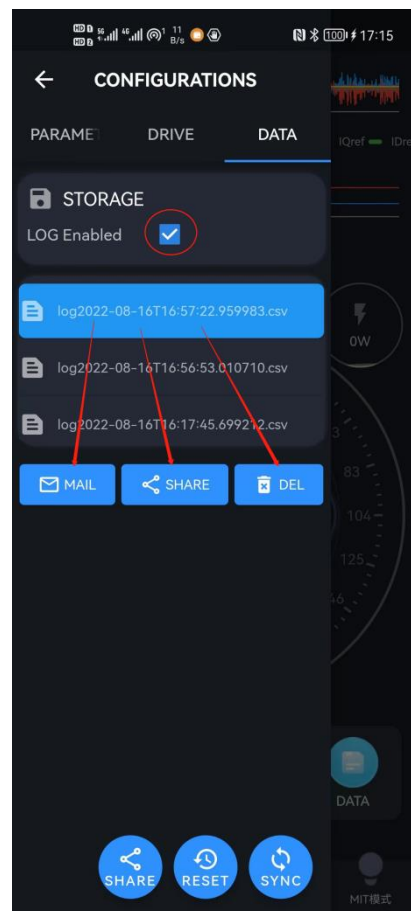

Fig 4 Data log records and share

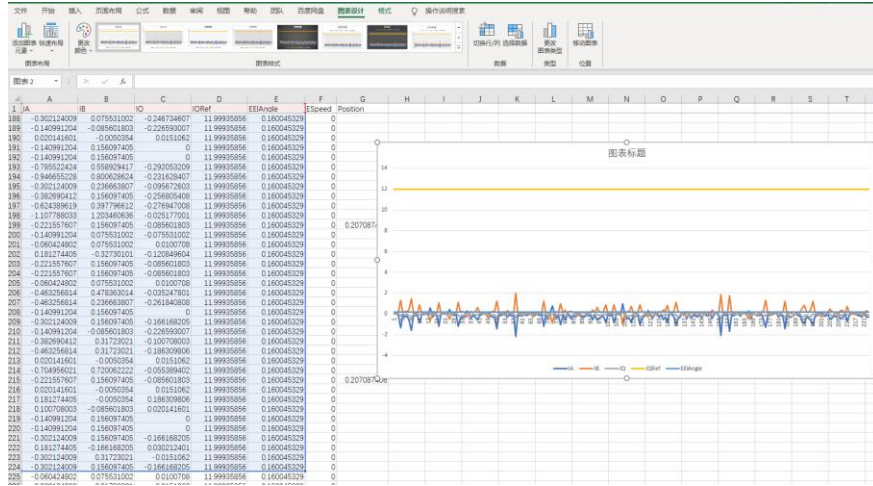Data log is in CSV format which can be analyzed in excel:

Fig 5 Data log analysis in Excel

4.2 DEBUG LOG

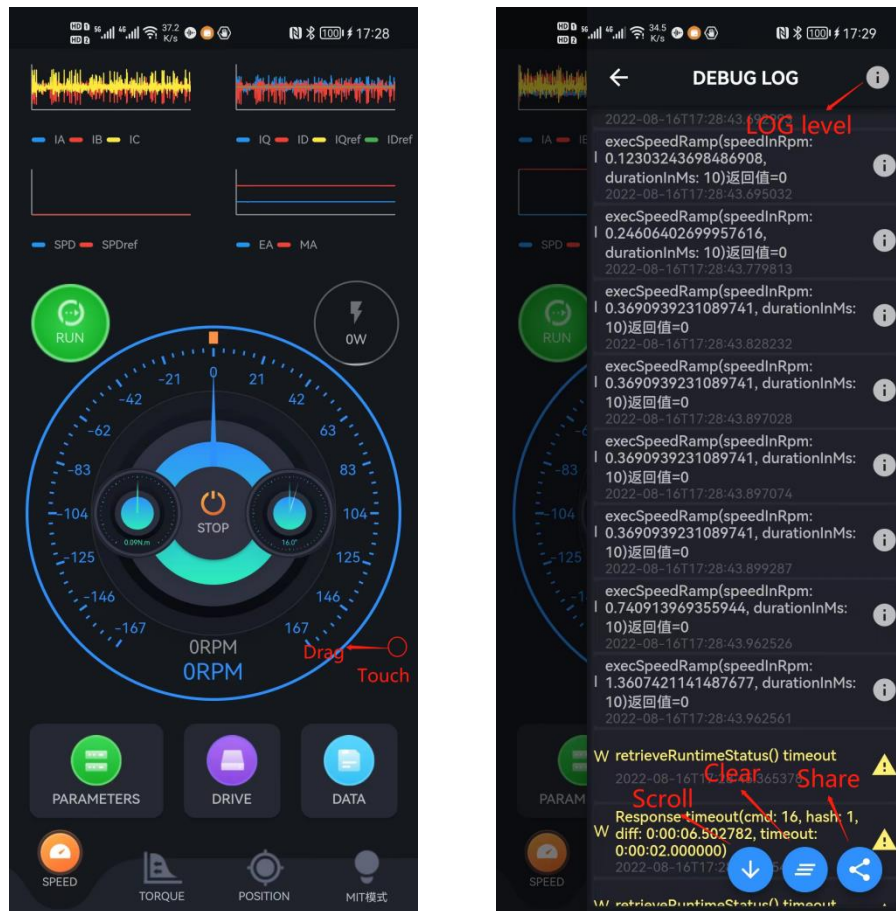Debug log if the log records that software outputs during runtime.

Fig 6 Debug log

Debug log is the basics that help post-sales engineers to debug the problems users may encounter. In case of any issues, please open the above-mentioned log page and share the log file to support engineers.

Windows version does support sharing files. Please refer to system's document directory for latest log file records.