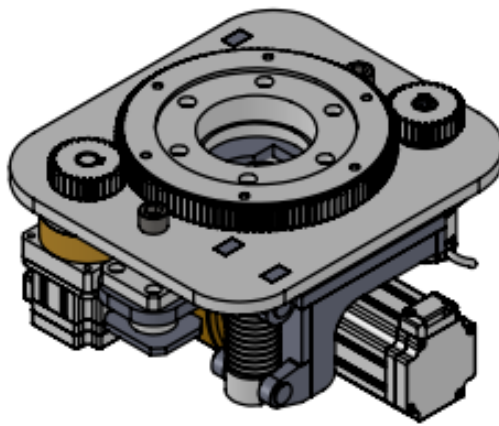


# CKTD-400S200 User Manual

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**DR Drive Co., Ltd.**

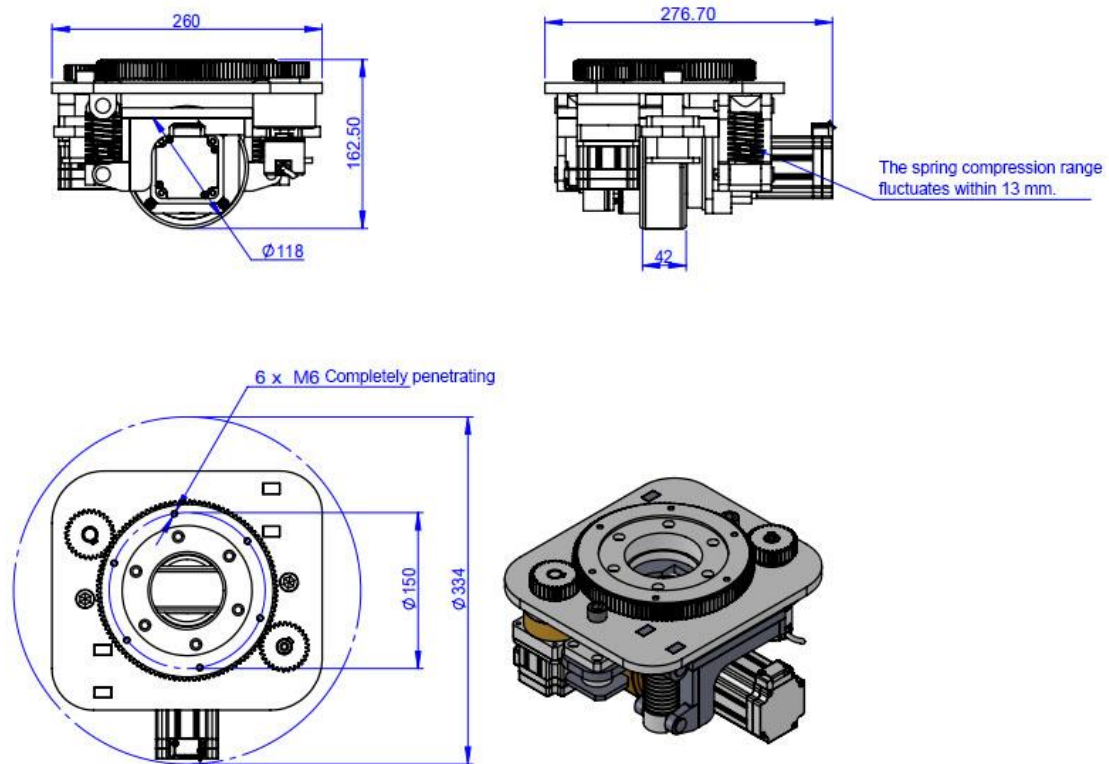
## Catalog

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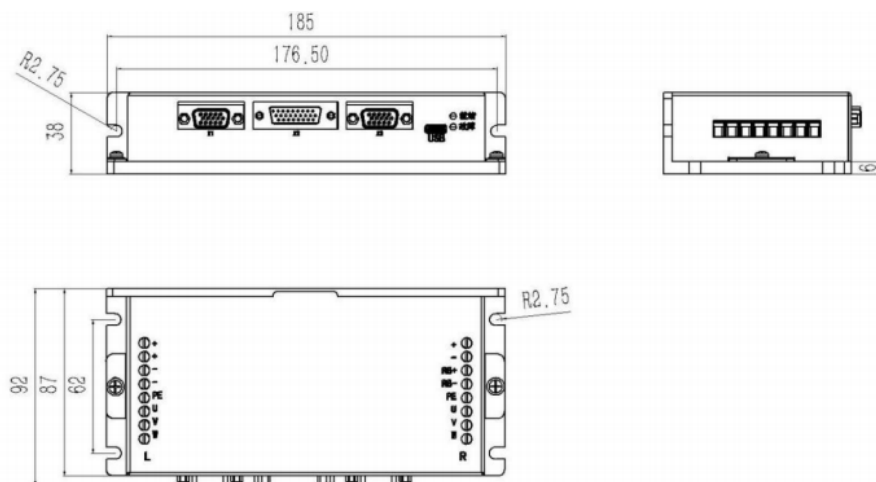
## 1. Dimensions and Parameters

### 1.1 Dimension

#### CKTD-400S200 24v Appearance and Dimensions



#### MDSM25B96G-2 Appearance and Dimensions

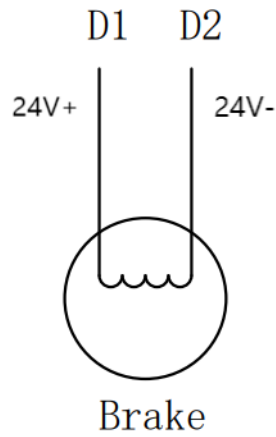


## 1.2 Motor parameters

| Traction Motor Parameters |                            |        |
|---------------------------|----------------------------|--------|
| 1                         | Motor Type                 | Servo  |
| 2                         | Rated Power (s2-60min) (W) | 400    |
| 3                         | Rated Voltage (V)          | 24     |
| 4                         | Rated Speed (rpm)          | 3000   |
| 5                         | Rated Current (A)          | 23     |
| 6                         | Brake voltage(V)           | 24     |
| 7                         | Encode(ppr)                | 2500   |
| 8                         | Rated torque (Nm)          | 1.27   |
| 9                         | Reduce ratio               | 27     |
| 10                        | Brake torque (Nm)          | 6      |
| 11                        | Protection grade           | IP54   |
| Rotate Parameters         |                            |        |
|                           | Motor Type                 | Servo  |
| 1                         | Rated Power (s2-60min) (W) | 200    |
| 2                         | Rated voltage (V)          | 24     |
| 3                         | Rated speed (rpm)          | 3000   |
| 4                         | Rated current (A)          | 12     |
| 5                         | Gearbox reduction ratio    | 35     |
| 6                         | Master-slave gear ratio    | 114:30 |
| 7                         | Encode(ppr)                | 2500   |
| 8                         | Rated torque (Nm)          | 0.637  |
| 9                         | Protection grade           | IP54   |
| 10                        | Maximum steering angle(°)  | ±130   |

## 2. Electric Description

### 2.1 Traction motor and driver



Electrical schematic diagram of brake system

Interface definition:

| Power Cable Sequence   |              |          |
|------------------------|--------------|----------|
| Pin                    | Color        | Function |
| 1                      | RED          | U        |
| 2                      | BLU          | V        |
| 3                      | YEL          | W        |
| 4                      | YEL-GRE      | GND      |
| Encoder Cable Sequence |              |          |
| Pin                    | Color        | Function |
| 1                      | Green        | A        |
| 2                      | Green-Black  | A-       |
| 3                      | Gray         | B        |
| 4                      | Gray-Black   | B-       |
| 5                      | Yellow       | Z        |
| 6                      | Yellow-Black | Z-       |
| 7                      | Brown-Black  | U-       |

|    |             |        |
|----|-------------|--------|
| 8  | White-Black | V-     |
| 9  | Blue-Black  | W-     |
| 10 | Black       | GND    |
| 11 | Red         | +5V    |
| 12 | Shield      | Shield |

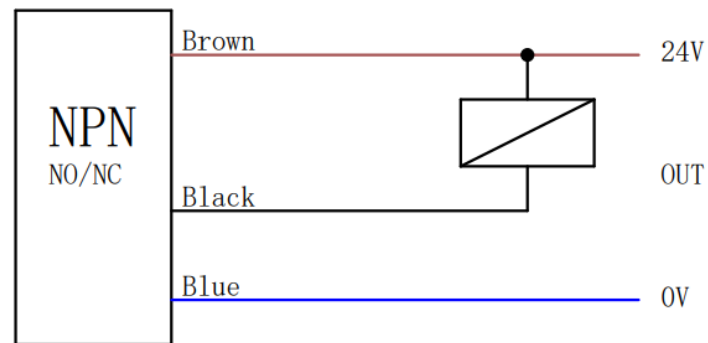
Power line connector:



Encoder line connector:



## 2.2 Steering motor interface definition



NPN proximity switch electrical schematic diagram

Interface definition:

| Power Cable Sequence   |              |          |
|------------------------|--------------|----------|
| Pin                    | Color        | Function |
| 1                      | RED          | U        |
| 2                      | BLU          | V        |
| 3                      | YEL          | W        |
| 4                      | YEL-GRE      | PE       |
| Encoder Cable Sequence |              |          |
| Pin                    | Color        | Function |
| 1                      | Shield       | FG       |
| 2                      | Red          | 5V       |
| 3                      | Black        | 0V       |
| 4                      | Green        | A        |
| 5                      | Yellow-Black | Z-       |
| 6                      | Brown        | U        |
| 7                      | Yellow       | Z        |
| 8                      | Brown-Black  | U-       |
| 9                      | Gray         | B        |
| 10                     | White        | V        |

|    |             |    |
|----|-------------|----|
| 11 | Blue        | W  |
| 12 | Blue-Black  | W- |
| 13 | Gray-Black  | B- |
| 14 | Green-Black | A- |
| 15 | White-Black | V- |

Power cable connector:



Encoder cable connector:



## 2.3 Driver interface information

### MDSM25C96G-2 Power Interface Definition

| No.         | Item | Definition                            | High temperature wear-resistant multi-strand copper core cross-sectional area |
|-------------|------|---------------------------------------|-------------------------------------------------------------------------------|
| 1           | B+   | Input power positive                  | 6~10mm <sup>2</sup>                                                           |
| 2           | B-   | Input power negative                  | 6~10mm <sup>2</sup>                                                           |
| 3           | U    | Motor U phase                         | 6~10mm <sup>2</sup>                                                           |
| 4           | V    | Motor V phase                         | 6~10mm <sup>2</sup>                                                           |
| 5           | W    | Motor W phase                         | 6~10mm <sup>2</sup>                                                           |
| Precautions |      | ①Maximum torque of terminal: 1.2N · m |                                                                               |

|  |                                                         |
|--|---------------------------------------------------------|
|  | ②Recommend using pre insulated terminal crimping pliers |
|--|---------------------------------------------------------|

#### MDSM25C96G-2 Brake resistor interface definition

| No. | Item | Definition        | High temperature wear-resistant multi-strand copper core cross-sectional area |
|-----|------|-------------------|-------------------------------------------------------------------------------|
| 1   | RB+  | Braking resistor+ | 6mm <sup>2</sup>                                                              |
| 2   | RB-  | Braking resistor- | 6mm <sup>2</sup>                                                              |

#### MDSM25C96G-2 X2 Communication Interface Definition

| Definition of communication terminal interface and selection of wire diameter, terminal, and crimping tool |        |                                                                                                |
|------------------------------------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------------------------|
| Pin No.                                                                                                    | Signal | Signal Definition                                                                              |
| 1                                                                                                          | 485A   | 485 bus (without 120 resistors)                                                                |
| 2                                                                                                          | 485B   |                                                                                                |
| 3                                                                                                          | CANL   | CAN bus (without 120 resistors), terminal resistors must be added externally                   |
| 4                                                                                                          | CANH   |                                                                                                |
| 5                                                                                                          | GND    | CAN bus and 485 bus ground, it is recommended to ground them<br>Ground for IO input and output |
| 6                                                                                                          | IN0    | IO input, high voltage input range: 3V to 12VDC<br>(configurable capture input)                |
| 7                                                                                                          | IN1    |                                                                                                |
| 8                                                                                                          | IN2    |                                                                                                |
| 9                                                                                                          | IN3    |                                                                                                |
| 10                                                                                                         | 485A   | 485 bus (without 120 resistors)                                                                |
| 11                                                                                                         | 485B   |                                                                                                |
| 12                                                                                                         | CANL   | CAN bus (without 120 resistors), terminal resistors must be added externally                   |
| 13                                                                                                         | CANH   |                                                                                                |
| 14                                                                                                         | GND    | CAN bus and 485 bus ground, it is recommended to ground them<br>Ground for IO input and output |
| 15                                                                                                         | IN4    | IO input, high voltage input range: 3V~12VDC<br>(configurable capture input)                   |
| 16                                                                                                         | IN5    |                                                                                                |

|    |      |                                                                                                                |
|----|------|----------------------------------------------------------------------------------------------------------------|
| 17 | IN6  | IO input, high voltage input range: 3V~12VDC                                                                   |
| 18 | GND  | Ground for IO input and output                                                                                 |
| 19 | VCC  | 5V power supply, maximum 200mA: can be used for non isolated IO output and input, as well as for analog input. |
| 20 | AIN0 | Input analog voltage: 0V~5VDC (input impedance 10K)                                                            |
| 21 | AIN1 |                                                                                                                |
| 22 | AGND | Simulation of AIN1 and AIN2                                                                                    |
| 23 | OUT0 | IO output collector open circuit output, maximum withstand voltage 30V, maximum continuous current 100mA.      |
| 24 | OUT1 |                                                                                                                |
| 25 | OUT2 |                                                                                                                |
| 26 | PE   | Connect the shell shield                                                                                       |

#### X1 interface definition and X3 interface definition of MDSM25C96G-2

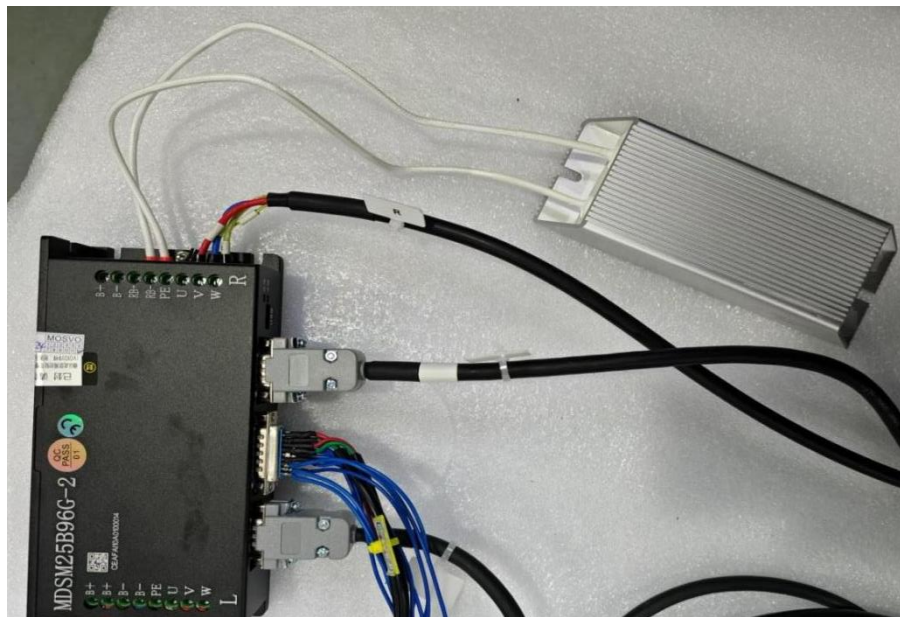
| Feedback for G series feedback terminals X2 and X4 interface definitions and wiring harness selection                                                                                                                                                       |        |         |        |                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|--------|--------------------------------------------------------------------------------------------------------------------------------------|
| Pin No.                                                                                                                                                                                                                                                     | Signal | Pin No. | Signal | Cable harness                                                                                                                        |
| 1                                                                                                                                                                                                                                                           | B+     | 9       | V-     | Suggest using a cable harness with tinned copper braided mesh, with a copper core cable cross-sectional area of 0.15 mm <sup>2</sup> |
| 2                                                                                                                                                                                                                                                           | A+     | 10      | U-     |                                                                                                                                      |
| 3                                                                                                                                                                                                                                                           | W+     | 11      | Z+     |                                                                                                                                      |
| 4                                                                                                                                                                                                                                                           | V+     | 12      | Z-     |                                                                                                                                      |
| 5                                                                                                                                                                                                                                                           | U+     | 13      | +5V    |                                                                                                                                      |
| 6                                                                                                                                                                                                                                                           | B-     | 14      | GND    |                                                                                                                                      |
| 7                                                                                                                                                                                                                                                           | A-     | 15      | PE     |                                                                                                                                      |
| 8                                                                                                                                                                                                                                                           | W-     |         |        |                                                                                                                                      |
| If it is Hall feedback, connect U+, V+, W+,+5V, GND. Single ended TTL feedback is connected to signals A+, B+, Z+, U+, V+, W+,+5V, GND. When soldering, the pin numbers should correspond one-to-one with the pin numbers marked on the matching male head. |        |         |        |                                                                                                                                      |

## 2.4 Braking resistor

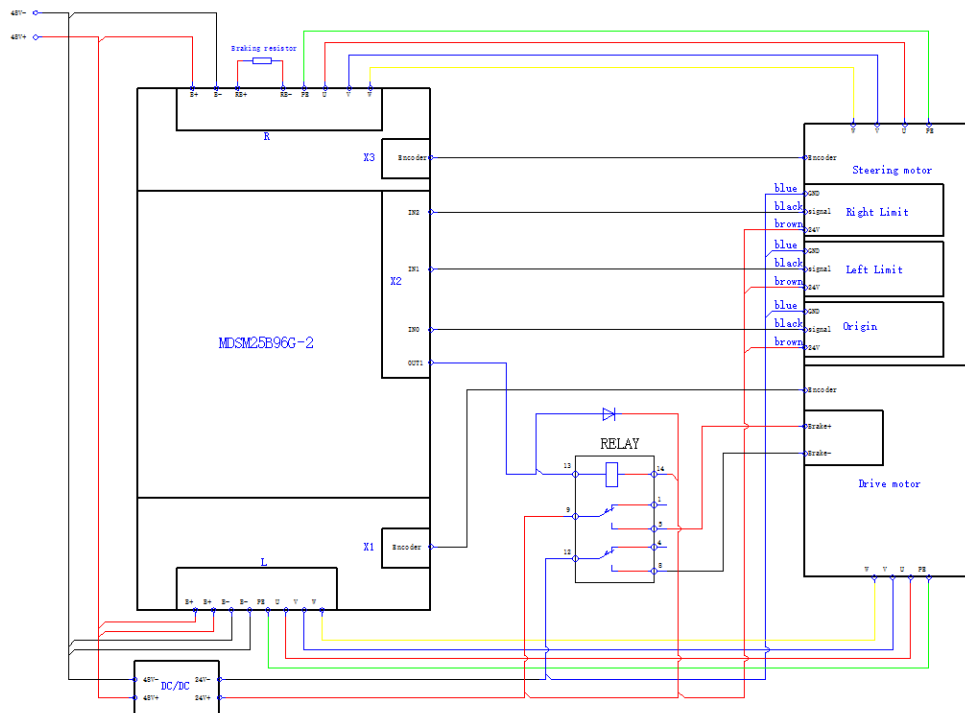
Braking resistor: In a mechanical system for rapid parking, a device that helps the motor convert the regenerated electrical energy generated by rapid parking into thermal energy.

The driver is equipped with a 3  $\Omega$ /200W braking resistor at the factory.

One end of the braking resistor is connected to the driver's "RB+" pin, and the other end is connected to the driver's "RB -" pin.



## 2.5 Steering wheel electrical connection example



## 2.6 Attention before powering on

To ensure normal and error free operation, please perform the following checks before powering on.

- ① Before powering on, check for any wiring errors in components such as servo drives, brakes, limit switches, and absolute encoders (optional).
- ② Before powering on, check whether the cable sleeve numbers of the servo drive, brake, limit switch, absolute value encoder (optional) and other components are correct, whether they are connected according to the markings on the drive, and whether the same wire number on both ends of the cable is connected to the same wire.
- ③ Before powering on important components, the electrical engineer must confirm that the wiring is correct before powering on.
- ④ Check if the component wiring is correct and if the crimping is secure; Disconnect the power cord of important components first, and then connect it again after the measured voltage is correct.
- ⑤ Before powering on, use a multimeter to measure whether each component has a short circuit, and then measure the power supply voltage correctly before powering on one by one.

## 3. Testing and Use

### 3.1 Steering motor(Right motor)

#### Step 1

Connect the PC and drive with USB(Type-C). Then open the software.

#### Step 2

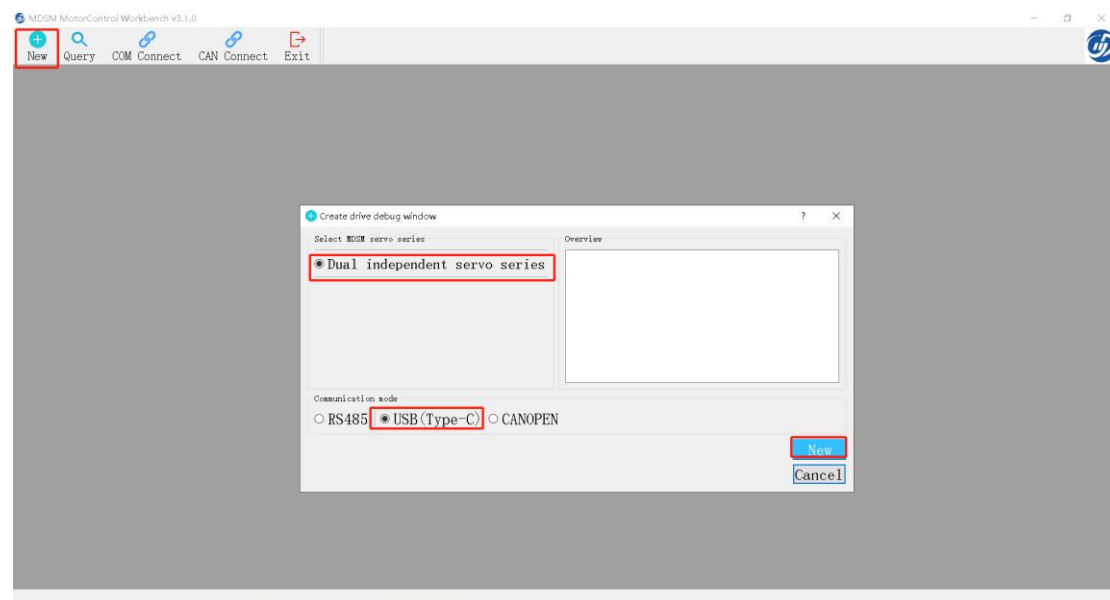
-> New

-> Create drive debug window

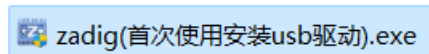
-> Dual independent servo series

-> USB(Type-C)

-> New



(If cannot connect properly, install the drive in the installation directory of the upper computer software.)



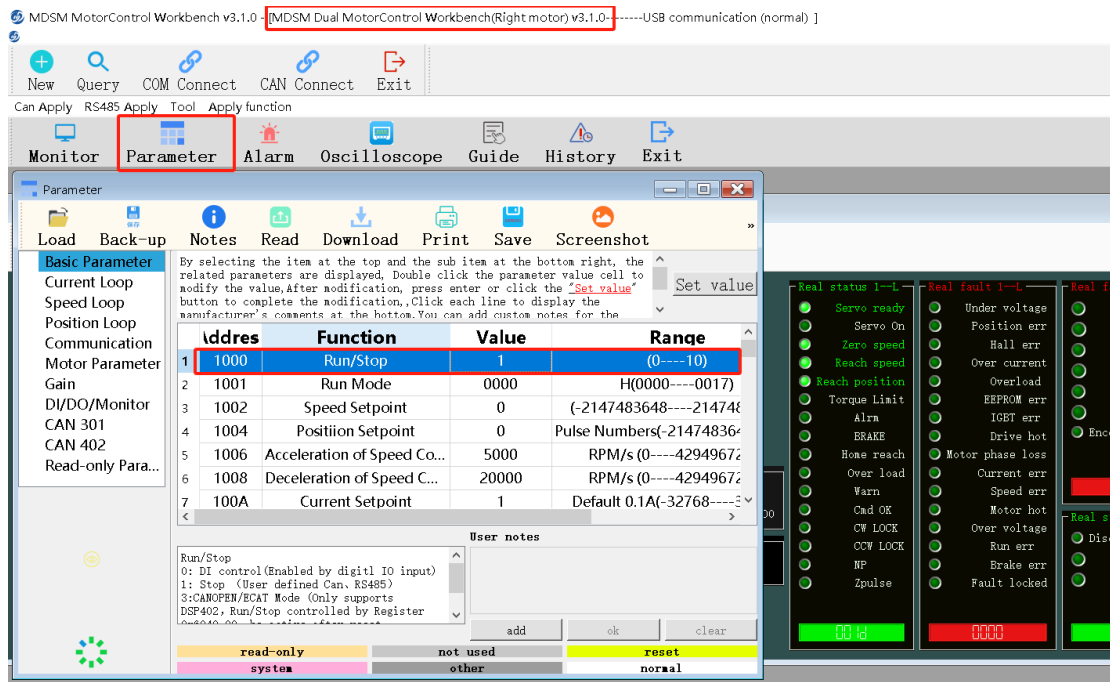
#### Step 3

->Right motor

->Parameter

-> Basic Parameter

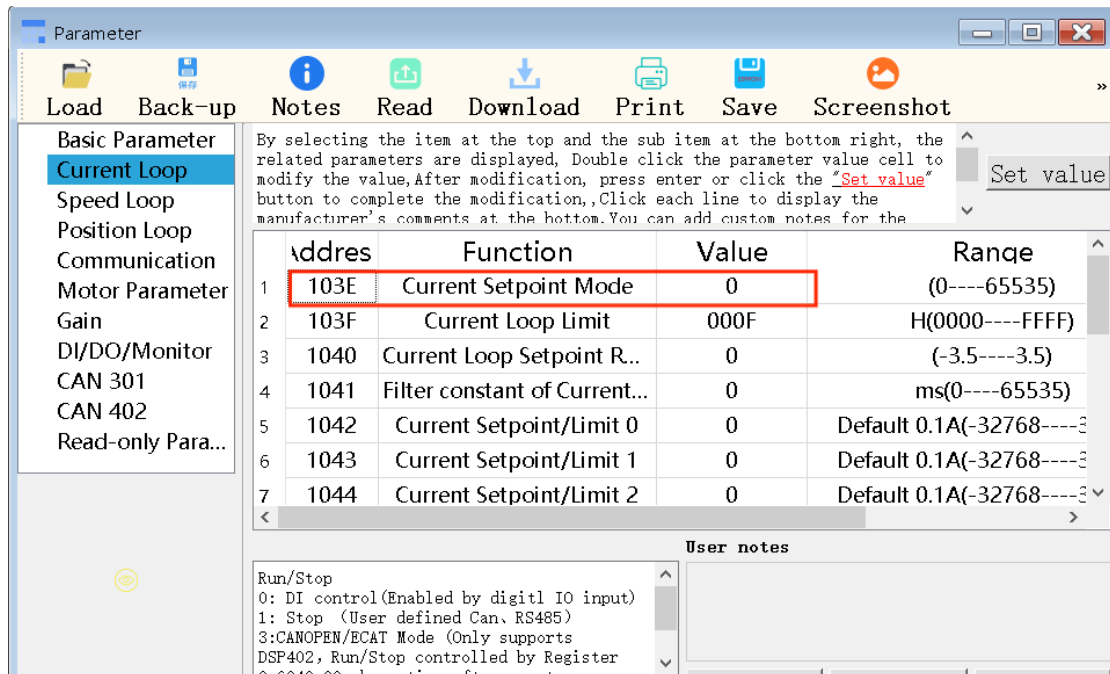
-> set 1000 Run/Stop 1



#### Step 4

-> Current Loop

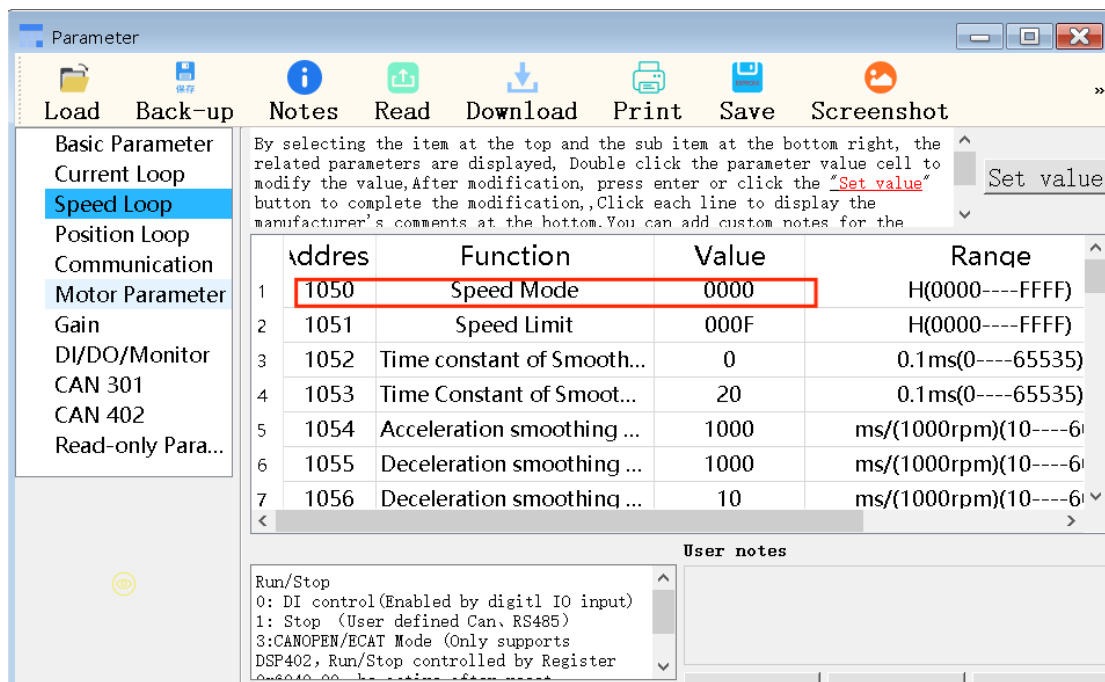
-> set 103E Current Setpoint Mode 0000



#### Step 5

-> Speed Loop

-> set 1050 Speed Mode 0000



## Step 6

-> Position Loop

-> set 107B Position Loop Mode 0000

->Set 1098 Find Home 0200

->Set 1099 Return to Home-Speed0(Non CANOPEN) 500

->Set 109A Return to Home-Speed1(Non CANOPEN) 100

->Set 109B Return to Home Mode (Non CANOPEN) 2

->Set 109C Postion of Home -476000

Parameter

Load Back-up Notes Read Download Print Save Screenshot

Basic Parameter  
Current Loop  
Speed Loop  
**Position Loop**  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Para...

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the

| Address | Function                    | Value | Range          |
|---------|-----------------------------|-------|----------------|
| 107B    | Position Loop Mode          | 0     | (0----65535)   |
| 107C    | Electronic Gear Numerat...  | 1     | (1----65535)   |
| 107D    | Reserved                    | 1     | (1----65535)   |
| 107E    | Reserved                    | 1     | (1----65535)   |
| 107F    | Electronic Gear Denomin...  | 1     | (0----65535)   |
| 1080    | Position Filter             | 0     | ms(0----65535) |
| 1081    | Check time of Reach Posi... | 1000  | ms(0----65535) |

User notes

Run/Stop  
0: DI control (Enabled by digitl IO input)  
1: Stop (User defined Can, RS485)  
3: CANOPEN/ECAT Mode (Only supports DSP402, Run/Stop controlled by Register)

Set value

Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
**Position Loop**  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

| Address | Function                              | Value   | Range                       |
|---------|---------------------------------------|---------|-----------------------------|
| 1092    | Motor Internal Position Command 5     | 0       | (-2147483648----2147483647) |
| 1094    | Motor Internal Position Command 6     | 0       | (-2147483648----2147483647) |
| 1096    | Motor Internal Position Command 7     | 0       | (-2147483648----2147483647) |
| 1098    | Find Home                             | 0200    | H(0000----FFFF)             |
| 1099    | Return to Home - Speed 0(Non CANOPEN) | 500     | rpm or 0.1rpm(0----32767)   |
| 109A    | Return to Home - Speed 1(Non CANOPEN) | 100     | rpm or 0.1rpm(0----32767)   |
| 109B    | Return to Home Mode(Non CANOPEN)      | 2       | (0----37)                   |
| 109C    | Postion of Home (Non CANOPEN)         | -476000 | (-2147483648----2147483647) |
| 5091    | HomingMethod (CANOPEN)                | 2       | (-32768----32767)           |

Set value

Step 7

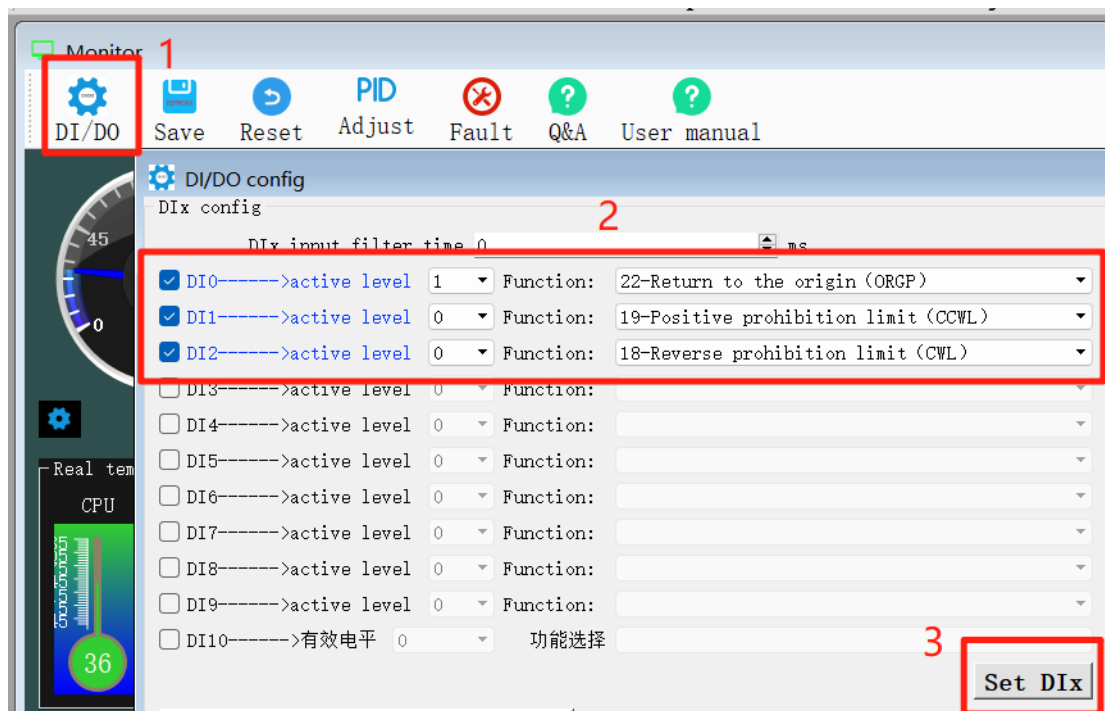
->DI/DO

->DI0--1--Return to the origin(ORGP)

->DI1--0--Positive prohibition limit(CCWL)

->DI2--0--Reverse prohibition limit(CWL)

->Set DIx



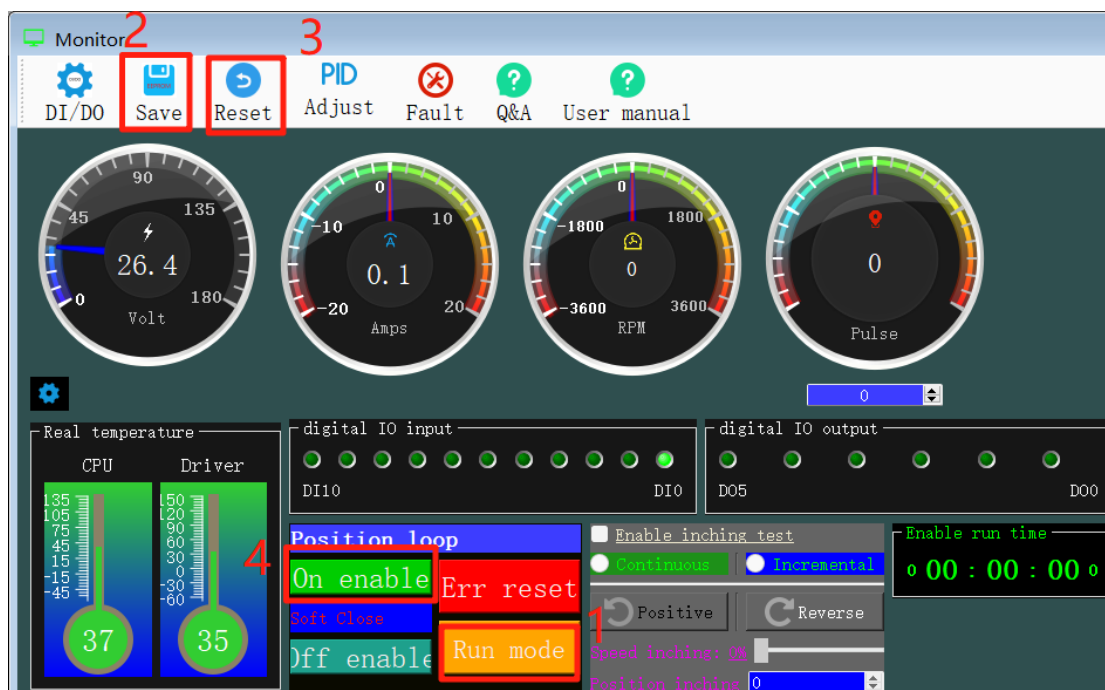
Step 8

->Run Mode: Position loop

->Save

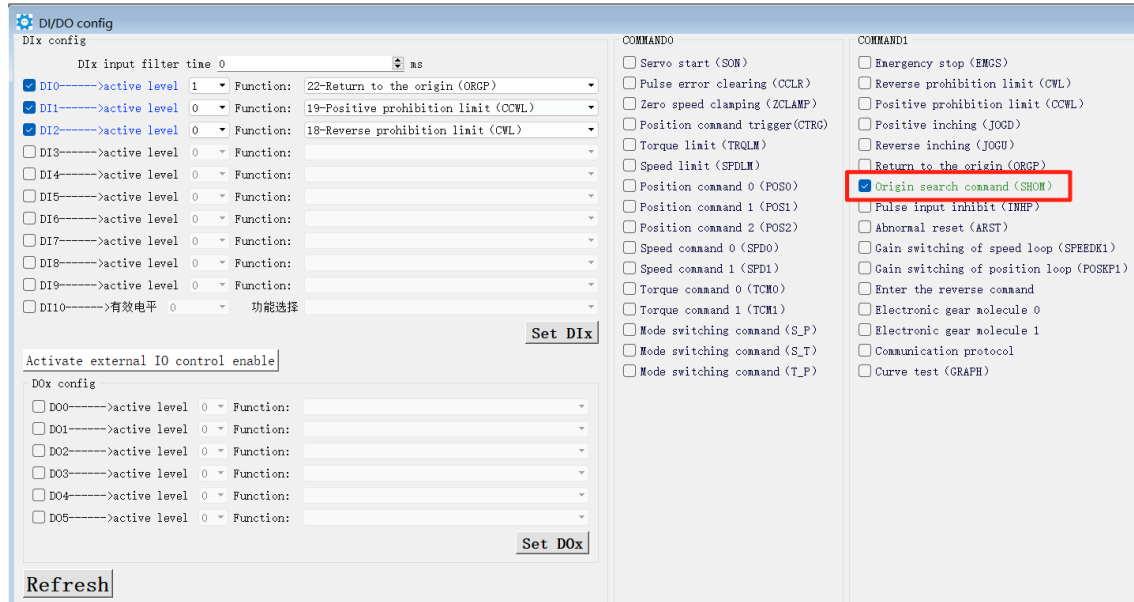
->Reset (Wait for the reset to complete)

-> On enable



-> click “Origin search command(SHOM)”

The steering motor begins to find the origin, and when the forward limit signal is triggered, the steering motor stops rotating, and the yellow light of the limit switch can be observed.



-> Enter the number of pulses corresponding to the position in the setting

For example:0(Origin location)(Press "Enter" to determine),

90°:  $0+332500=332500$

-90°:  $0-332500=-332500$



->Off enable

->Save



If the motor runs normally , the test is finished.

### 3.2 Traction motor(Left motor)

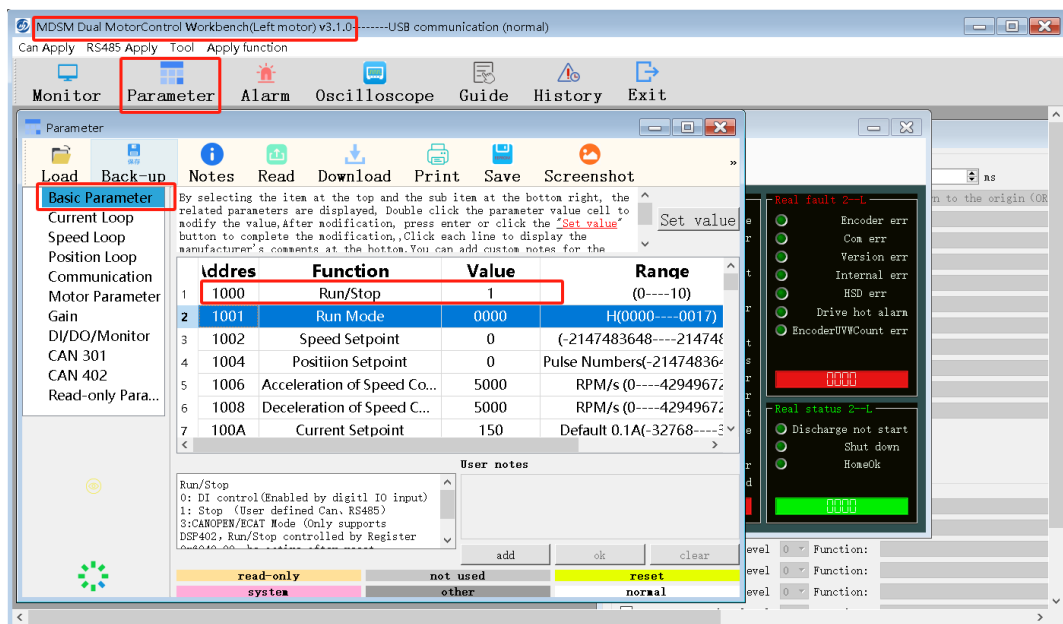
Step 1

->Left motor

-> Parameter

-> Basic Parameter

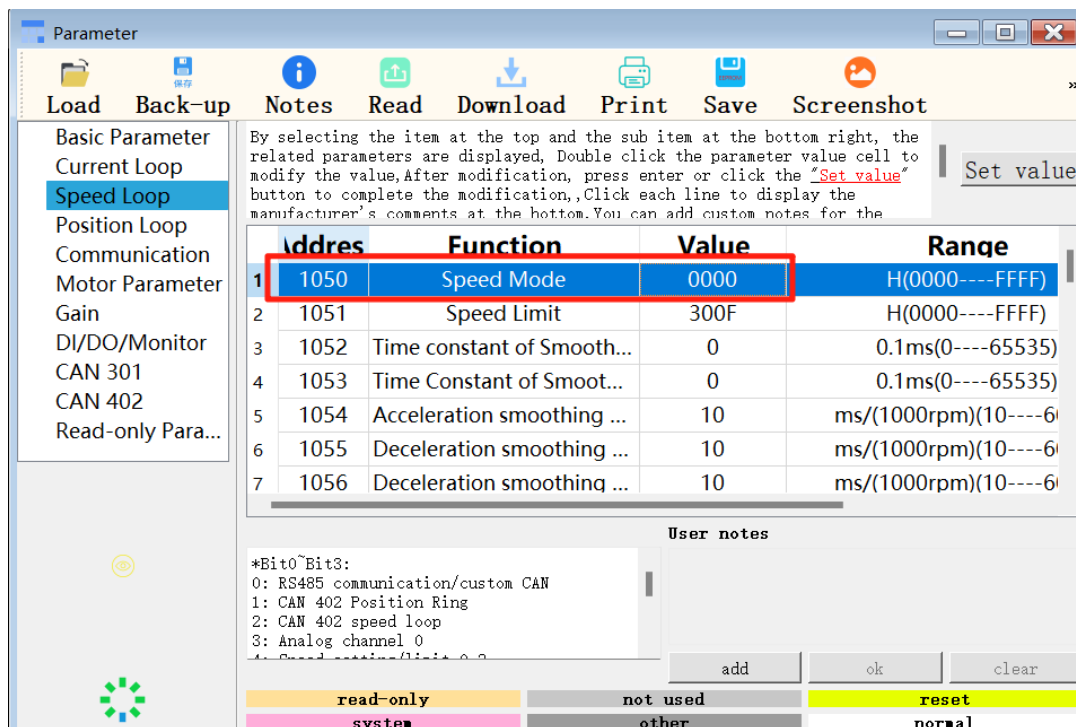
-> set            1000        Run/Stop        1



Step 2

-> Speed Loop

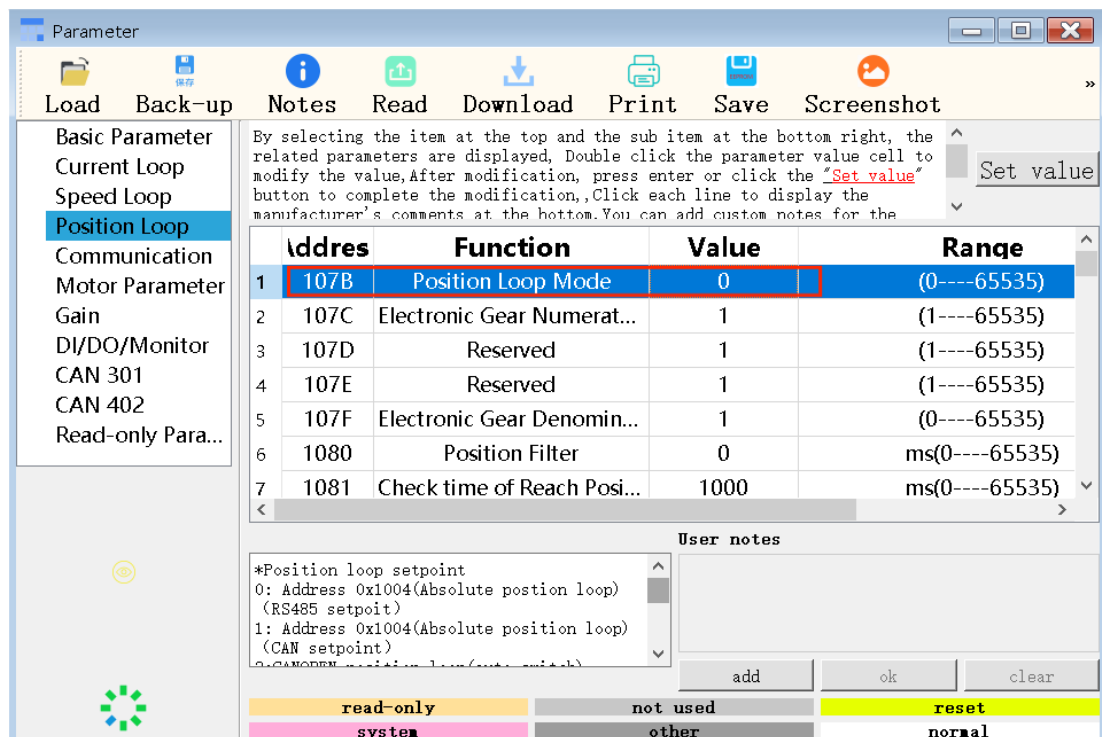
-> set 1050 Speed Mode 0000



Step 3

-> Position Loop

-> set 107B Position Loop Mode 0

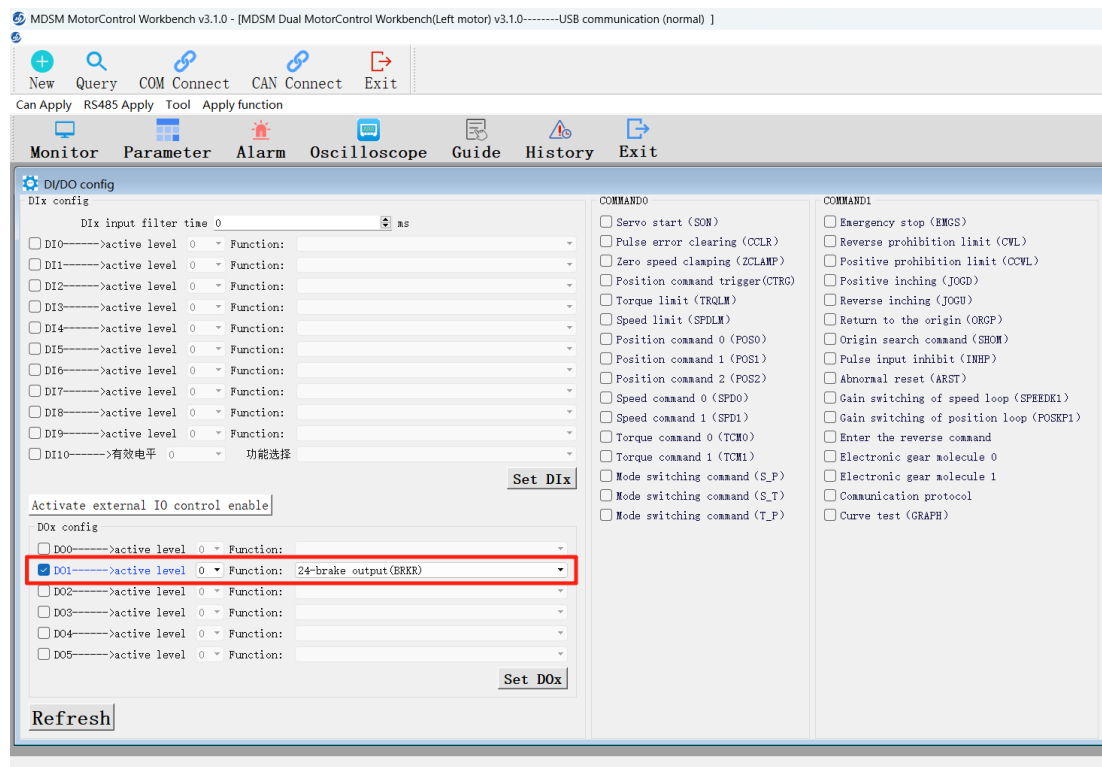


Step 4

-> DI/DO

->DO1---brake output(BRKR)

->Set DOx



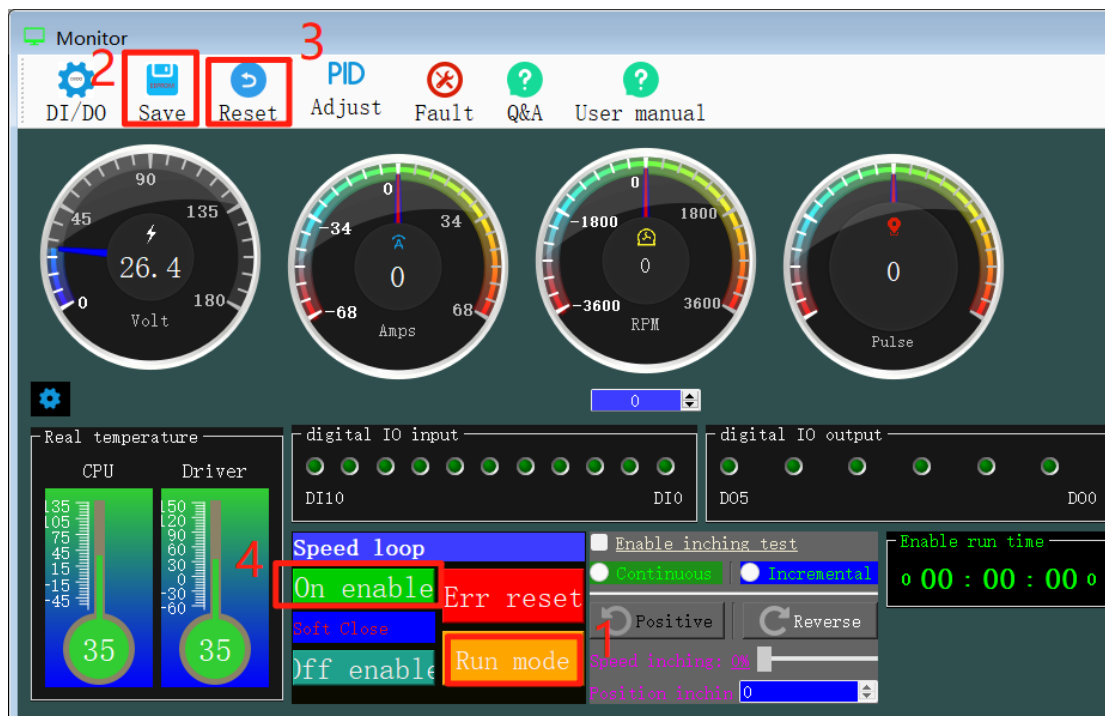
### Step 5

->Run Mode: Speed loop

->Save

->Reset(Wait for the reset to complete)

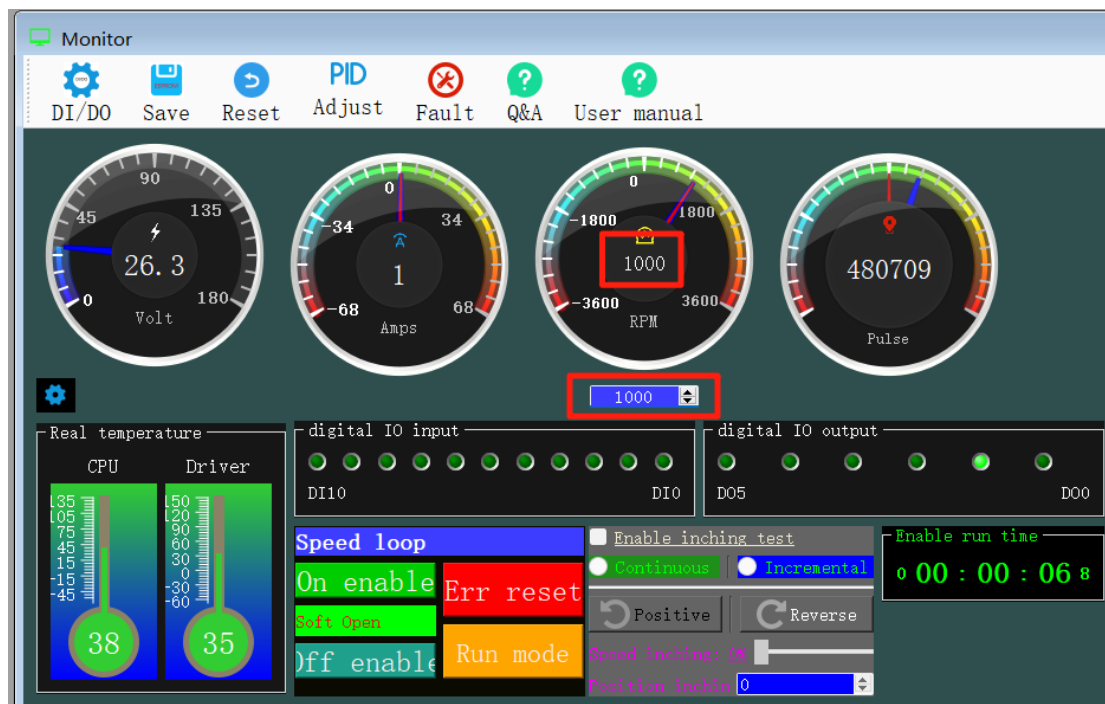
-> On enable (hear the brake open sound "da")



### Step 6

-> Enter the target RPM

For example: 1000RPM (Press "Enter" to determine)



->Off enable

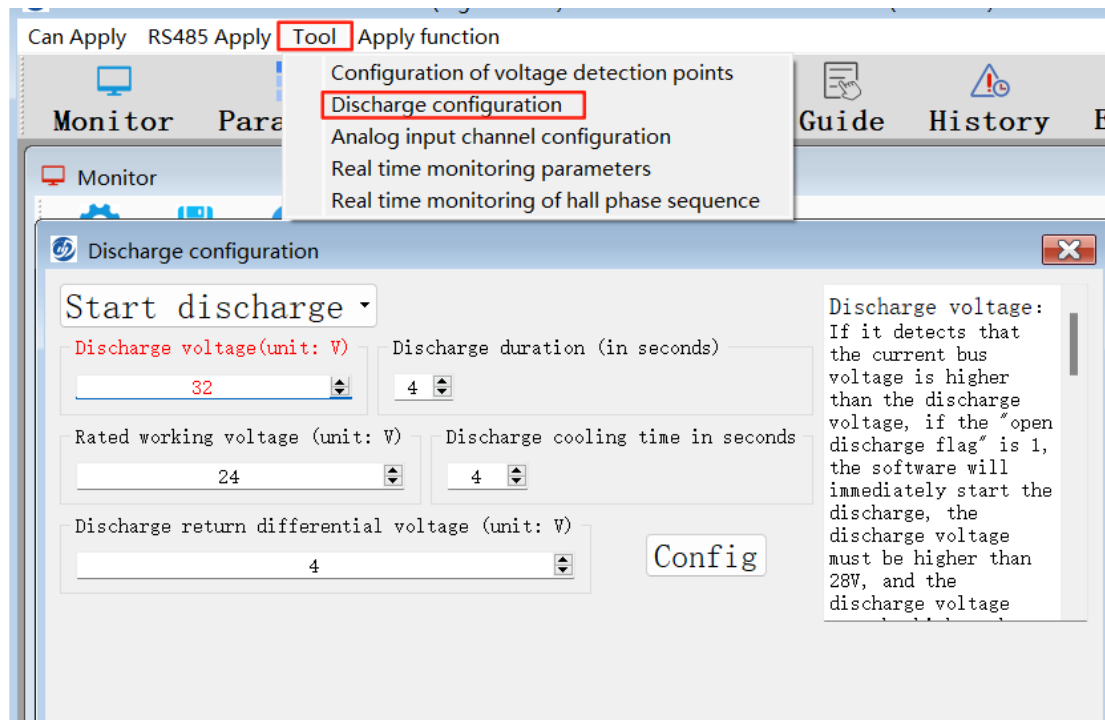
->Save



If the motor runs normally ,the test is finished.

### 3.3 Configure braking resistor

Configure braking resistor



## 4. Usage Routine

### 4.1 485modbus usage routine

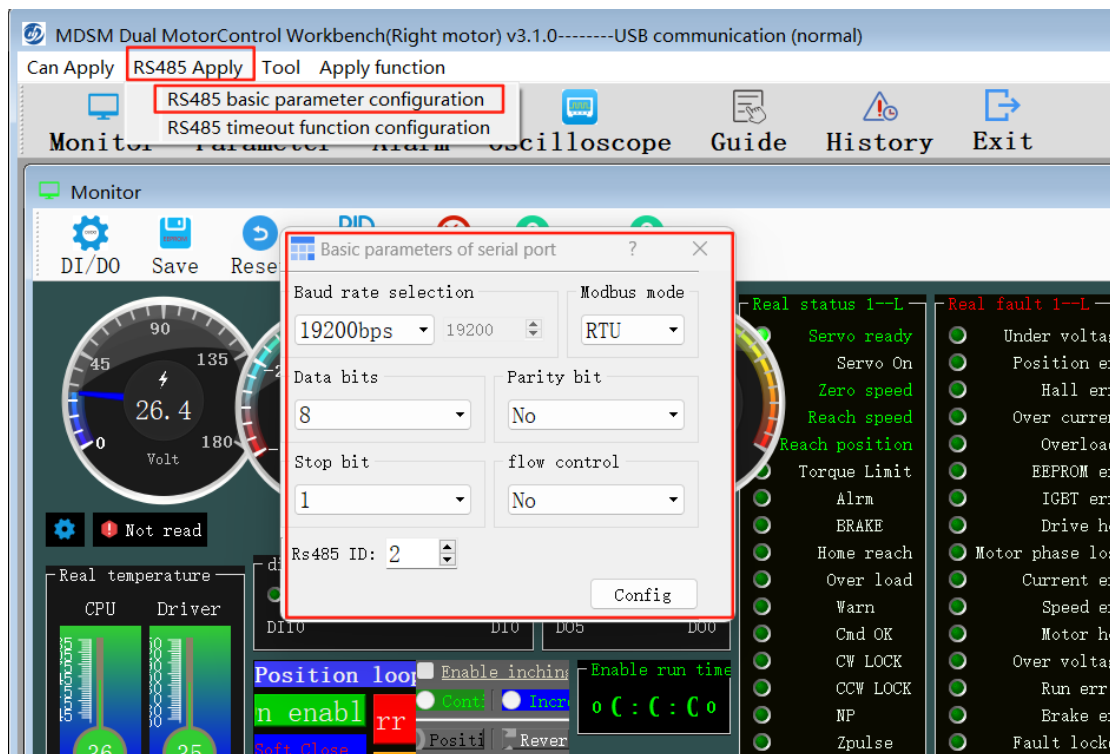
The ID and baud rate settings used in the routine are as follows:

|                             | RS485ID | RS485 baud rate | CANID | CAN baud rate |
|-----------------------------|---------|-----------------|-------|---------------|
| Traction motor(Left motor)  | 1       | 19200           | 1     | 500k          |
| Steering motor(Right motor) | 2       | 19200           | 2     | 500k          |

#### 4.1.1 Steering motor(Right motor)

->RS485 Apply

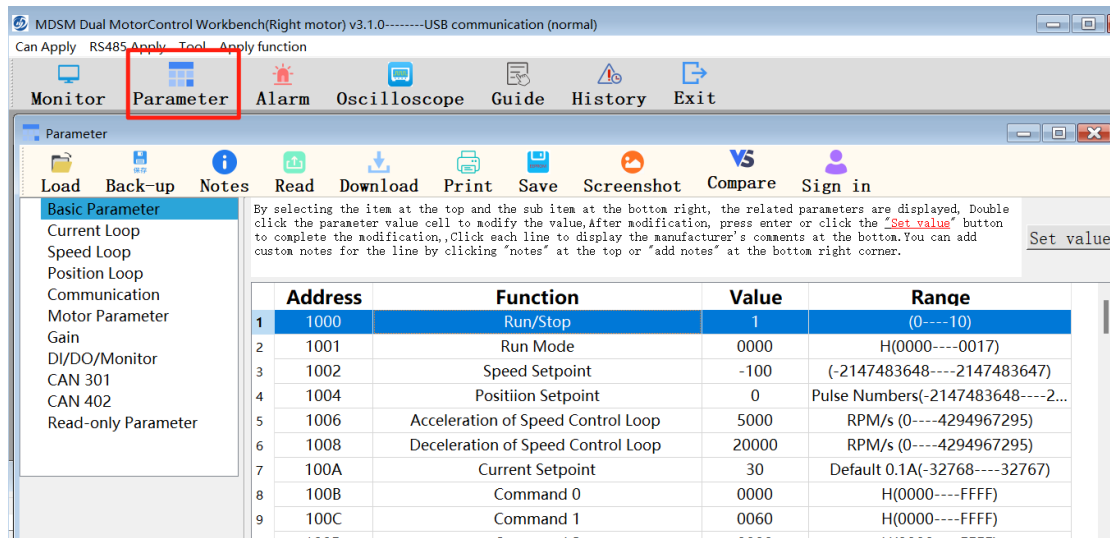
->RS485 basic parameter configuration



-> Parameter

-> Basic Parameter

-> set          1000      Run/Stop      1



Parameter

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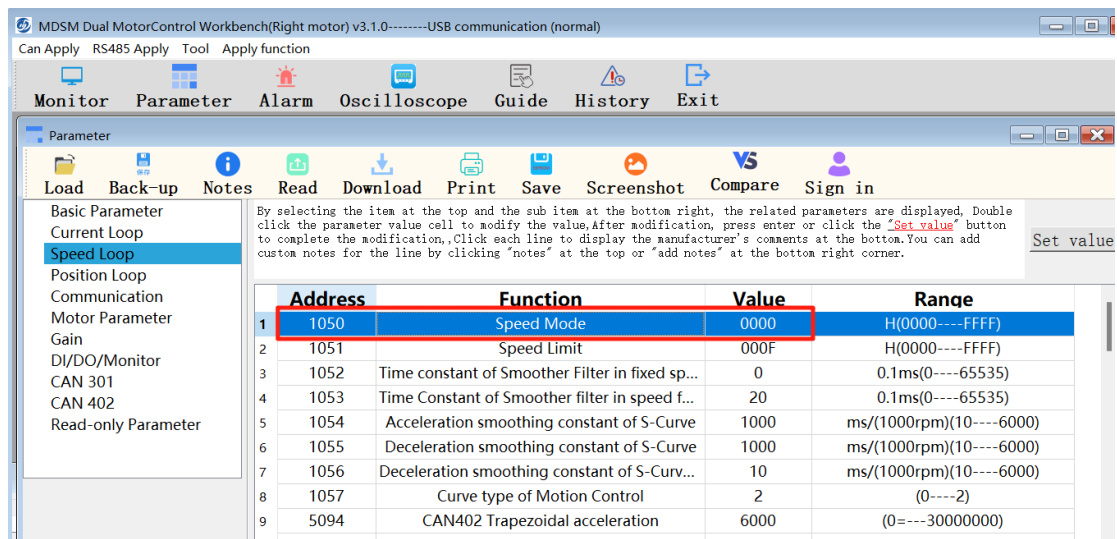
Basic Parameter  
Current Loop  
Speed Loop  
Position Loop  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|   | Address | Function                           | Value | Range                             |
|---|---------|------------------------------------|-------|-----------------------------------|
| 1 | 1000    | Run/Stop                           | 1     | (0----10)                         |
| 2 | 1001    | Run Mode                           | 0000  | H(0000----0017)                   |
| 3 | 1002    | Speed Setpoint                     | -100  | (-2147483648----2147483647)       |
| 4 | 1004    | Position Setpoint                  | 0     | Pulse Numbers(-2147483648----2... |
| 5 | 1006    | Acceleration of Speed Control Loop | 5000  | RPM/s (0----4294967295)           |
| 6 | 1008    | Deceleration of Speed Control Loop | 20000 | RPM/s (0----4294967295)           |
| 7 | 100A    | Current Setpoint                   | 30    | Default 0.1A(-32768----32767)     |
| 8 | 100B    | Command 0                          | 0000  | H(0000----FFFF)                   |
| 9 | 100C    | Command 1                          | 0060  | H(0000----FFFF)                   |

-> Speed Loop

-> set 1050 Speed Mode 0000



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

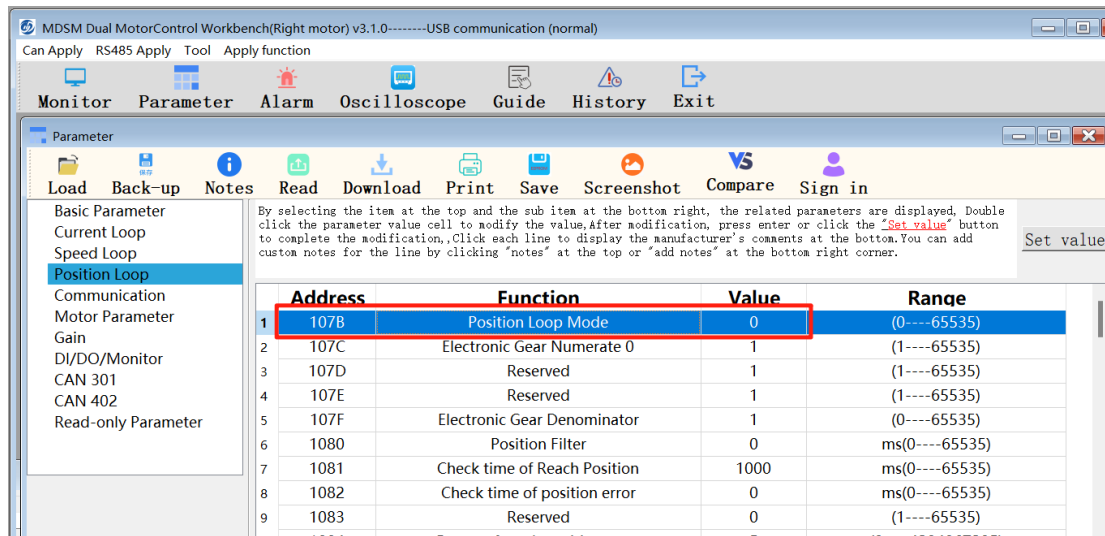
Basic Parameter  
Current Loop  
Speed Loop  
Position Loop  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|   | Address | Function                                        | Value | Range                    |
|---|---------|-------------------------------------------------|-------|--------------------------|
| 1 | 1050    | Speed Mode                                      | 0000  | H(0000----FFFF)          |
| 2 | 1051    | Speed Limit                                     | 000F  | H(0000----FFFF)          |
| 3 | 1052    | Time constant of Smoother Filter in fixed sp... | 0     | 0.1ms(0----65535)        |
| 4 | 1053    | Time Constant of Smoother filter in speed f...  | 20    | 0.1ms(0----65535)        |
| 5 | 1054    | Acceleration smoothing constant of S-Curve      | 1000  | ms/(1000rpm)(10----6000) |
| 6 | 1055    | Deceleration smoothing constant of S-Curve      | 1000  | ms/(1000rpm)(10----6000) |
| 7 | 1056    | Deceleration smoothing constant of S-Curv...    | 10    | ms/(1000rpm)(10----6000) |
| 8 | 1057    | Curve type of Motion Control                    | 2     | (0----2)                 |
| 9 | 5094    | CAN402 Trapezoidal acceleration                 | 6000  | (0=---30000000)          |

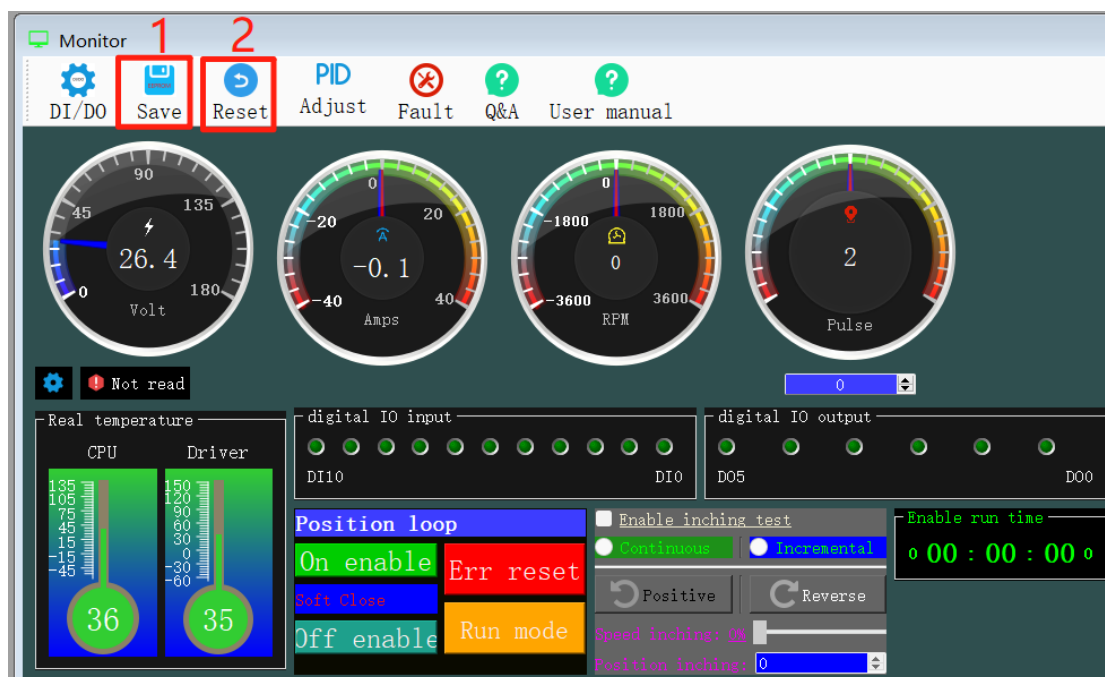
-> Position Loop

-> set 107B Position Loop Mode 0000

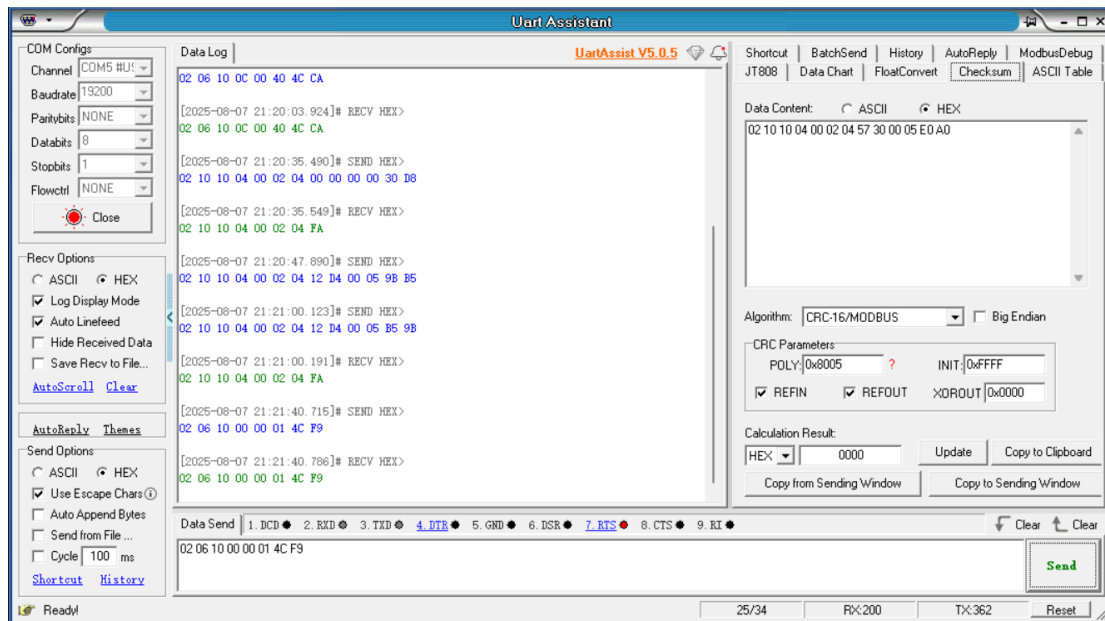


-> save

->Reset



open the software Uart Assistant



send the command

02 06 10 01 00 00 DC F9 (Position mode)

02 06 10 00 00 0A 0D 3E (Send enable command)

02 06 10 0C 00 40 4C CA (Set bit 6 of command1 to trigger zero search)

02 10 10 04 00 02 04 00 00 00 00 30 D8 (Given position 0)

02 10 10 04 00 02 04 12 D4 00 05 B5 9B (Rotate 90°)

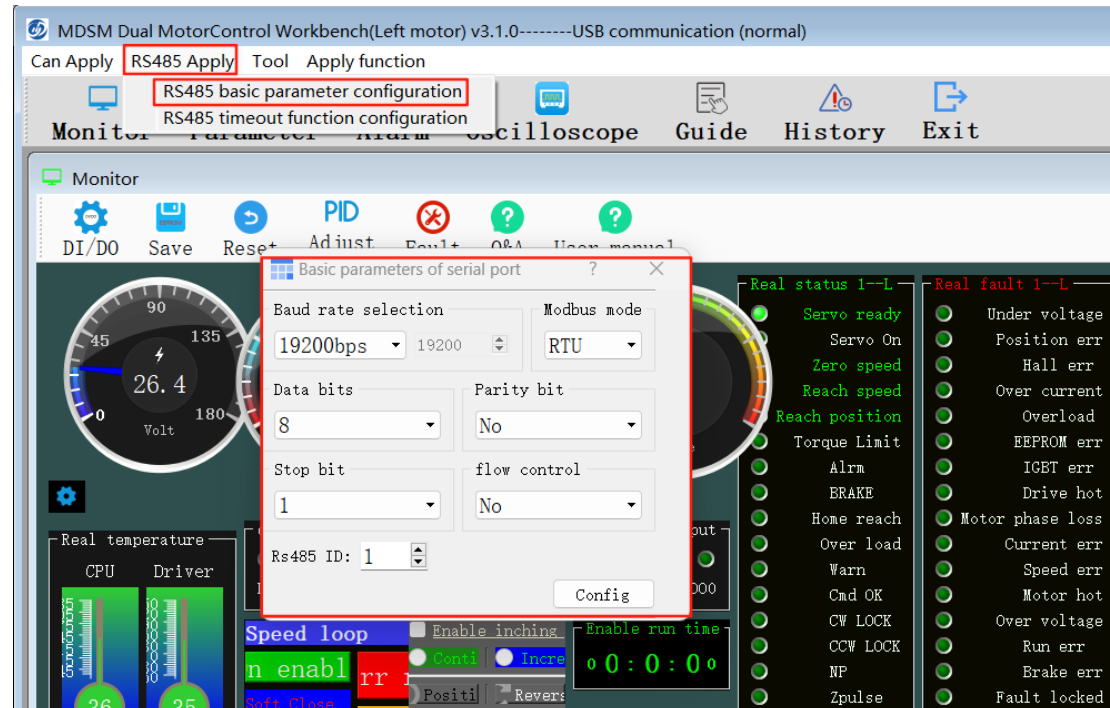
02 06 10 00 00 01 4C F9 (Disable)

RS485 RTU Mode test complete

#### 4.1.2 Traction motor(Left motor)

->RS485 Apply

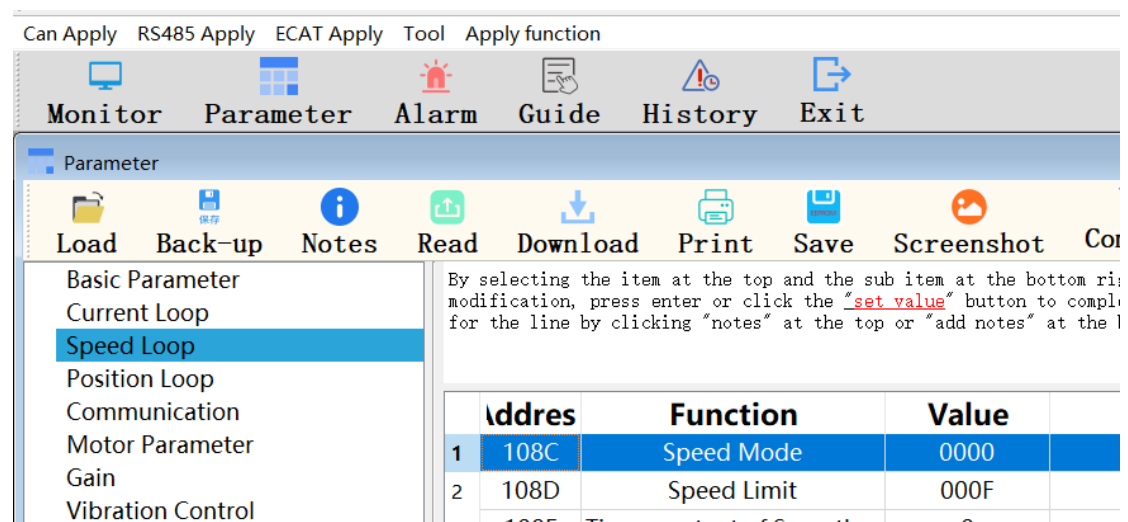
->RS485 basic parameter configuration



-> Parameter

-> Speed Loop

-> set 108C Speed Loop 0000



-> Speed Loop

-> set 1050 Speed Mode 0000

Parameter

Load Back-up Notes Read Download Print Save Screenshot

Basic Parameter  
Current Loop  
**Speed Loop**  
Position Loop  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Para...

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the

|   | Address | Function                   | Value | Range                 |
|---|---------|----------------------------|-------|-----------------------|
| 1 | 1050    | Speed Mode                 | 0000  | H(0000----FFFF)       |
| 2 | 1051    | Speed Limit                | 300F  | H(0000----FFFF)       |
| 3 | 1052    | Time constant of Smooth... | 0     | 0.1ms(0----65535)     |
| 4 | 1053    | Time Constant of Smoot...  | 0     | 0.1ms(0----65535)     |
| 5 | 1054    | Acceleration smoothing ... | 10    | ms/(1000rpm)(10----6) |
| 6 | 1055    | Deceleration smoothing ... | 10    | ms/(1000rpm)(10----6) |
| 7 | 1056    | Deceleration smoothing ... | 10    | ms/(1000rpm)(10----6) |

User notes

\*Bit0~Bit3:  
0: RS485 communication/custom CAN  
1: CAN 402 Position Ring  
2: CAN 402 speed loop  
3: Analog channel 0

Set value

-> Position Loop

-> set 107B Position Loop Mode 0000

Parameter

Load Back-up Notes Read Download Print Save Screenshot

Basic Parameter  
Current Loop  
Speed Loop  
**Position Loop**  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Para...

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the

|   | Address | Function                    | Value | Range          |
|---|---------|-----------------------------|-------|----------------|
| 1 | 107B    | Position Loop Mode          | 0     | (0----65535)   |
| 2 | 107C    | Electronic Gear Numerat...  | 1     | (1----65535)   |
| 3 | 107D    | Reserved                    | 1     | (1----65535)   |
| 4 | 107E    | Reserved                    | 1     | (1----65535)   |
| 5 | 107F    | Electronic Gear Denomin...  | 1     | (0----65535)   |
| 6 | 1080    | Position Filter             | 0     | ms(0----65535) |
| 7 | 1081    | Check time of Reach Posi... | 1000  | ms(0----65535) |

User notes

Run/Stop  
0: DI control (Enabled by digitl IO input)  
1: Stop (User defined Can, RS485)  
3: CANOPEN/ECAT Mode (Only supports DSP402, Run/Stop controlled by Register  
on RS485, the setting is after reset

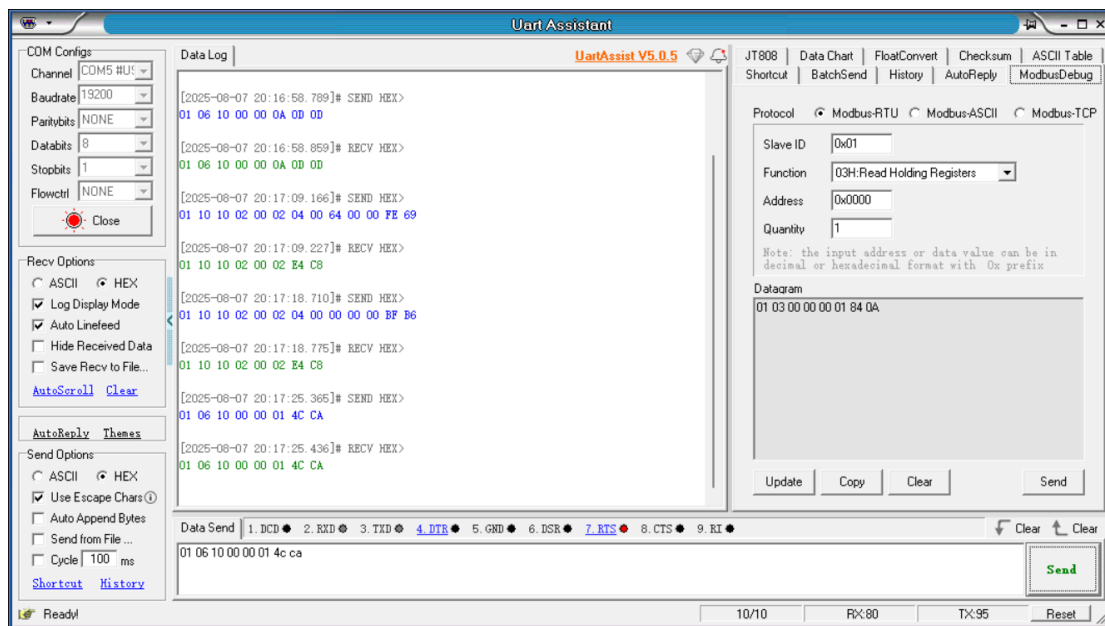
add ok clear

read-only system not used other reset normal

-> save

-> Reset

open the software Uart Assistant



open the software Serial Port Utility

send the command

01 06 10 0a 00 01 6c c8 (Speed mode)

01 06 10 00 00 0a 0d 0d (Enable)

01 10 10 02 00 02 04 00 64 00 00 fe 69 (Speed 100 RPM)

01 10 10 02 00 02 04 00 00 00 00 BF B6 (0RPM)

Motor rotation visible

01 06 10 00 00 01 4c ca (Disable)

RS485 RTU Mode test complete

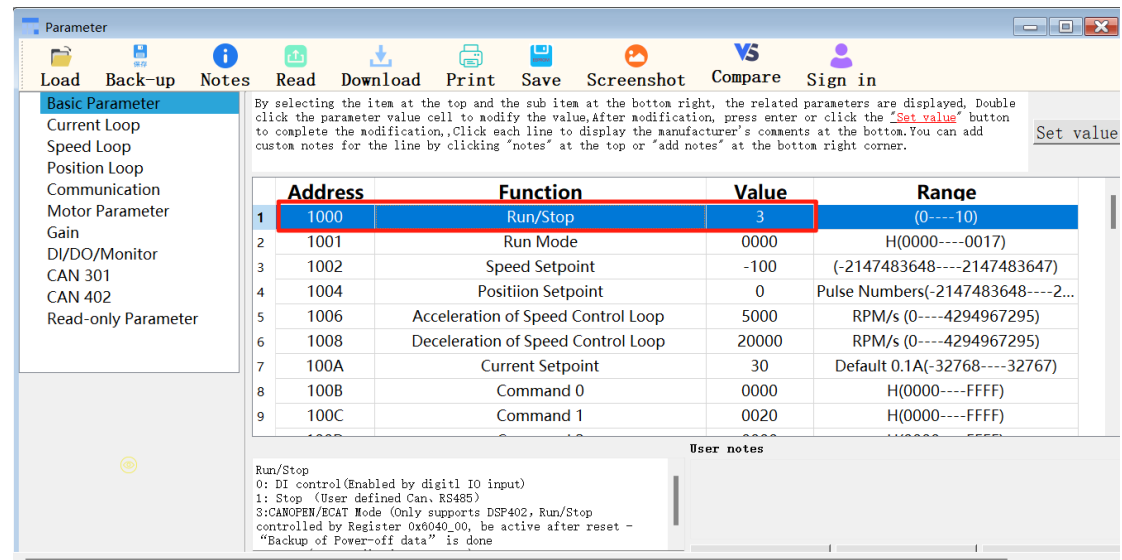
## 4.2 Canopen usage routine

### 4.2.1 Steering motor(Right motor)

Step 1

-> Basic Parameter

-> set 1000 Run/Stop 3



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter

Current Loop

Speed Loop

Position Loop

Communication

Motor Parameter

Gain

DI/DO/Monitor

CAN 301

CAN 402

Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

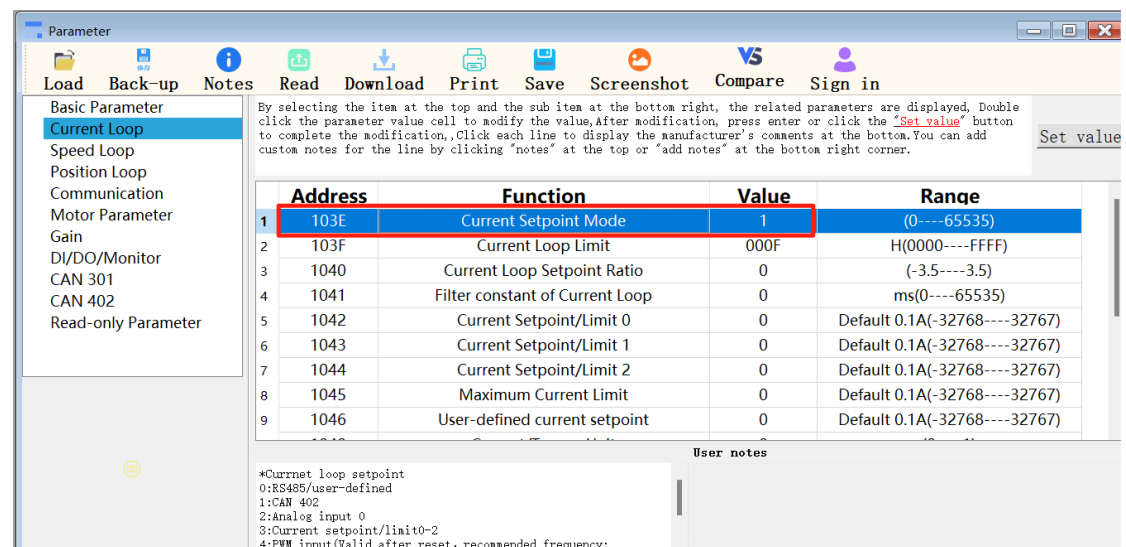
| Address | Function                           | Value | Range                             |
|---------|------------------------------------|-------|-----------------------------------|
| 1 1000  | Run/Stop                           | 3     | (0----10)                         |
| 2 1001  | Run Mode                           | 0000  | H(0000----0017)                   |
| 3 1002  | Speed Setpoint                     | -100  | (-2147483648----2147483647)       |
| 4 1004  | Position Setpoint                  | 0     | Pulse Numbers(-2147483648----2... |
| 5 1006  | Acceleration of Speed Control Loop | 5000  | RPM/s (0----4294967295)           |
| 6 1008  | Deceleration of Speed Control Loop | 20000 | RPM/s (0----4294967295)           |
| 7 100A  | Current Setpoint                   | 30    | Default 0.1A(-32768----32767)     |
| 8 100B  | Command 0                          | 0000  | H(0000----FFFF)                   |
| 9 100C  | Command 1                          | 0020  | H(0000----FFFF)                   |

User notes

Run/Stop  
0: DI control(Enabled by digitl IO input)  
1: Stop (User defined Can, RS485)  
3:CANOPEN/ECAT Mode (Only supports DSP402, Run/Stop controlled by Register 0x6040\_00, be active after reset - "Backup of Power-off data" is done

-> Current Loop

-> set 103E Current Setpoint Mode 1



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter

Current Loop

Speed Loop

Position Loop

Communication

Motor Parameter

Gain

DI/DO/Monitor

CAN 301

CAN 402

Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

| Address | Function                        | Value | Range                         |
|---------|---------------------------------|-------|-------------------------------|
| 1 103E  | Current Setpoint Mode           | 1     | (0----65535)                  |
| 2 103F  | Current Loop Limit              | 000F  | H(0000----FFFF)               |
| 3 1040  | Current Loop Setpoint Ratio     | 0     | (-3.5----3.5)                 |
| 4 1041  | Filter constant of Current Loop | 0     | ms(0----65535)                |
| 5 1042  | Current Setpoint/Limit 0        | 0     | Default 0.1A(-32768----32767) |
| 6 1043  | Current Setpoint/Limit 1        | 0     | Default 0.1A(-32768----32767) |
| 7 1044  | Current Setpoint/Limit 2        | 0     | Default 0.1A(-32768----32767) |
| 8 1045  | Maximum Current Limit           | 0     | Default 0.1A(-32768----32767) |
| 9 1046  | User-defined current setpoint   | 0     | Default 0.1A(-32768----32767) |

User notes

\*Current loop setpoint  
0:RS485/user-defined  
1:CAN 402  
2:Analog input 0  
3:Current setpoint/limit0-2  
4:PWM input(Valid after reset, recommended frequency:

Step 2

-> Speed Loop

-> set 1050 Speed Mode 0001

Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
**Speed Loop**  
Position Loop  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|   | Address | Function                                        | Value | Range                    |
|---|---------|-------------------------------------------------|-------|--------------------------|
| 1 | 1050    | Speed Mode                                      | 0001  | H(0000----FFFF)          |
| 2 | 1051    | Speed Limit                                     | 000F  | H(0000----FFFF)          |
| 3 | 1052    | Time constant of Smoother Filter in fixed sp... | 0     | 0.1ms(0----65535)        |
| 4 | 1053    | Time Constant of Smoother filter in speed f...  | 20    | 0.1ms(0----65535)        |
| 5 | 1054    | Acceleration smoothing constant of S-Curve      | 1000  | ms/(1000rpm)(10----6000) |
| 6 | 1055    | Deceleration smoothing constant of S-Curve      | 1000  | ms/(1000rpm)(10----6000) |
| 7 | 1056    | Deceleration smoothing constant of S-Curv...    | 10    | ms/(1000rpm)(10----6000) |
| 8 | 1057    | Curve type of Motion Control                    | 2     | (0----2)                 |
| 9 | 5094    | CAN402 Trapezoidal acceleration                 | 6000  | (0----30000000)          |

User notes

\*Bit0~Bit3:  
0: RS485 communication/custom CAN  
1: CAN 402 Position Ring  
2: CAN 402 speed loop  
3: Analog channel 0  
4: Speed setting/limit 0-2

Set value

### Step 3

->107B Position Loop Mode 2

-> set

1098 Find Home 0000

5091 Homing Method 2

5018 Return to Home-Speed 0 (CANOPEN) 500

501A Return to Home-Speed 1 (CANOPEN) 100

507E Postion of Home(CANOPEN) -476000

Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
**Position Loop**  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

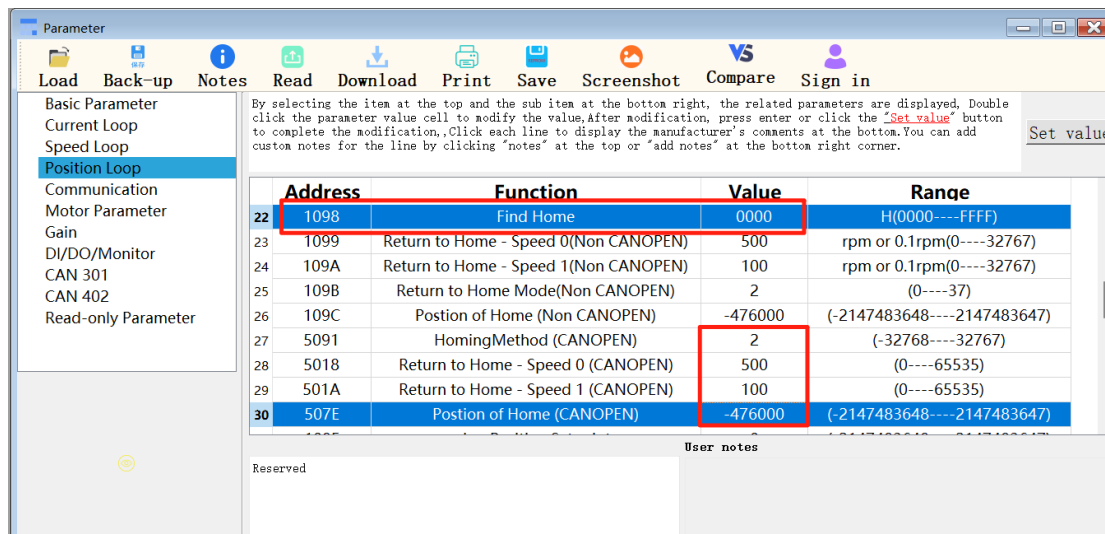
By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|   | Address | Function                     | Value | Range          |
|---|---------|------------------------------|-------|----------------|
| 1 | 107B    | Position Loop Mode           | 2     | (0----65535)   |
| 2 | 107C    | Electronic Gear Numerate 0   | 1     | (1----65535)   |
| 3 | 107D    | Reserved                     | 1     | (1----65535)   |
| 4 | 107E    | Reserved                     | 1     | (1----65535)   |
| 5 | 107F    | Electronic Gear Denominator  | 1     | (0----65535)   |
| 6 | 1080    | Position Filter              | 0     | ms(0----65535) |
| 7 | 1081    | Check time of Reach Position | 1000  | ms(0----65535) |
| 8 | 1082    | Check time of position error | 0     | ms(0----65535) |
| 9 | 1083    | Reserved                     | 0     | (1----65535)   |

User notes

\*Position loop setpoint  
0: Address 0x1004(Absolute position loop) (RS485 setpoint)  
1: Address 0x1004(Absolute position loop) (CAN setpoint)  
2: CANOPEN position loop(auto-switch)  
3: Direction+Pulse (Incremental position loop, valid after reset)

Set value



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
**Position Loop**  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|    | Address | Function                              | Value   | Range                       |
|----|---------|---------------------------------------|---------|-----------------------------|
| 22 | 1098    | Find Home                             | 0000    | H(0000----FFFF)             |
| 23 | 1099    | Return to Home - Speed 0(Non CANOPEN) | 500     | rpm or 0.1rpm(0----32767)   |
| 24 | 109A    | Return to Home - Speed 1(Non CANOPEN) | 100     | rpm or 0.1rpm(0----32767)   |
| 25 | 109B    | Return to Home Mode(Non CANOPEN)      | 2       | (0----37)                   |
| 26 | 109C    | Position of Home (Non CANOPEN)        | -476000 | (-2147483648----2147483647) |
| 27 | 5091    | HomingMethod (CANOPEN)                | 2       | (-32768----32767)           |
| 28 | 5018    | Return to Home - Speed 0 (CANOPEN)    | 500     | (0----65535)                |
| 29 | 501A    | Return to Home - Speed 1 (CANOPEN)    | 100     | (0----65535)                |
| 30 | 507E    | Position of Home (CANOPEN)            | -476000 | (-2147483648----2147483647) |

Reserved

User notes

Set value

Step 4

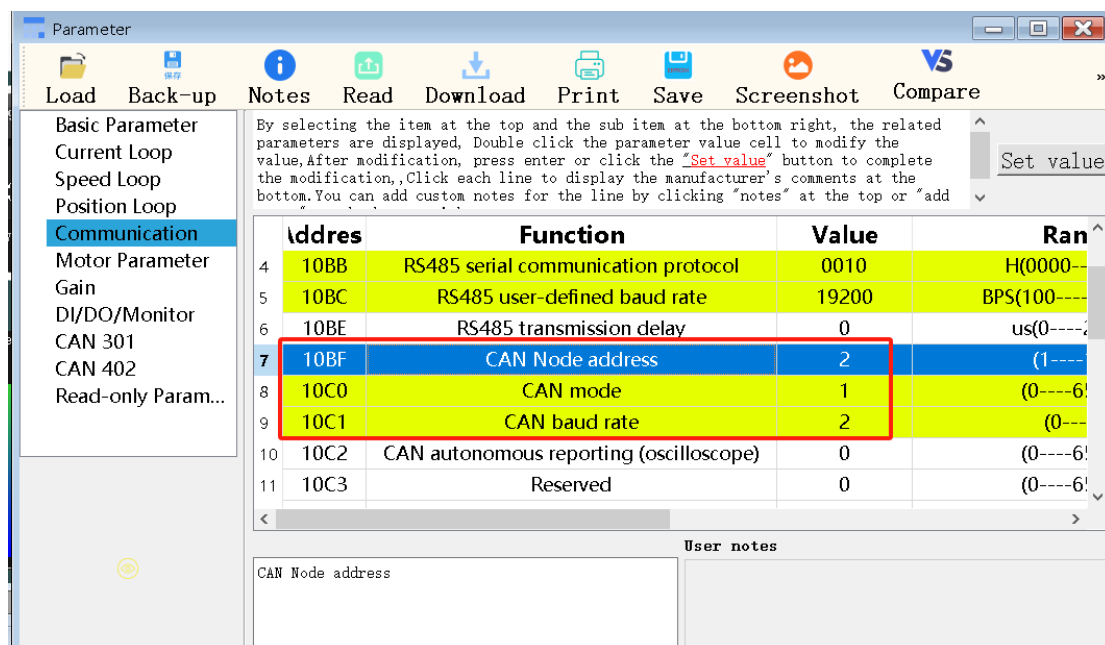
Communication ->

-> set

10BF CAN Node address 2

10C0 CAN mode 1

10C1 CAN baud rate 2



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare

Basic Parameter  
Current Loop  
Speed Loop  
Position Loop  
**Communication**  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Param...

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|    | Address | Function                                | Value | Range       |
|----|---------|-----------------------------------------|-------|-------------|
| 4  | 10BB    | RS485 serial communication protocol     | 0010  | H(0000--    |
| 5  | 10BC    | RS485 user-defined baud rate            | 19200 | BPS(100---- |
| 6  | 10BE    | RS485 transmission delay                | 0     | us(0----    |
| 7  | 10BF    | CAN Node address                        | 2     | (1----      |
| 8  | 10C0    | CAN mode                                | 1     | (0----6     |
| 9  | 10C1    | CAN baud rate                           | 2     | (0----      |
| 10 | 10C2    | CAN autonomous reporting (oscilloscope) | 0     | (0----6     |
| 11 | 10C3    | Reserved                                | 0     | (0----6     |

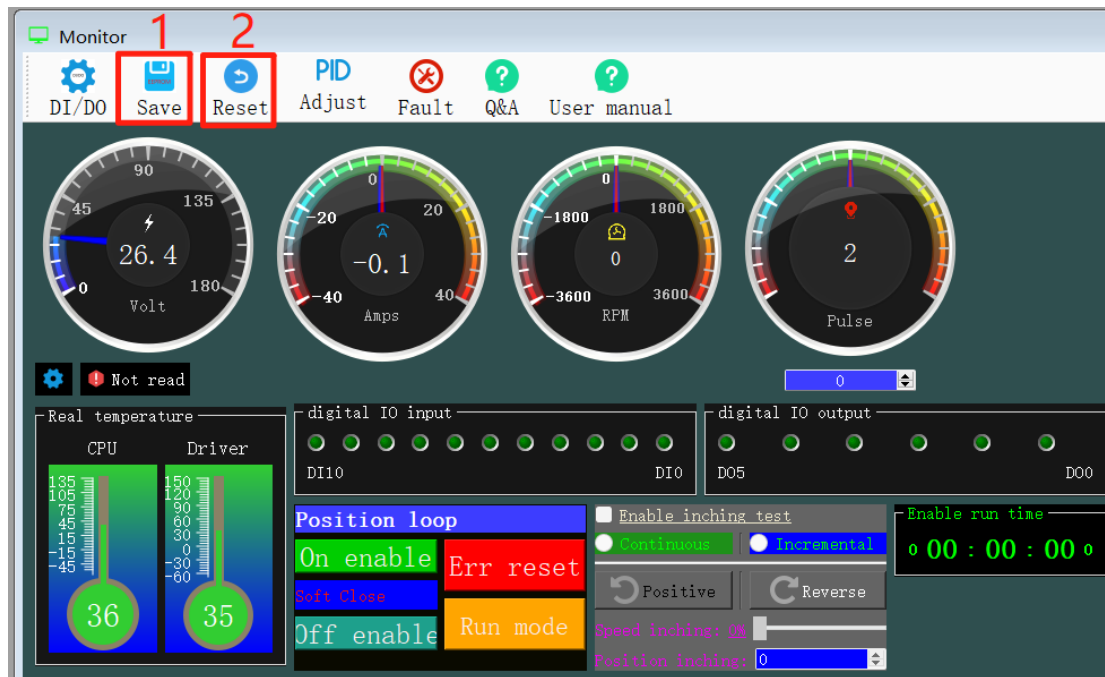
User notes

Set value

CAN Node address

-> save

->Reset



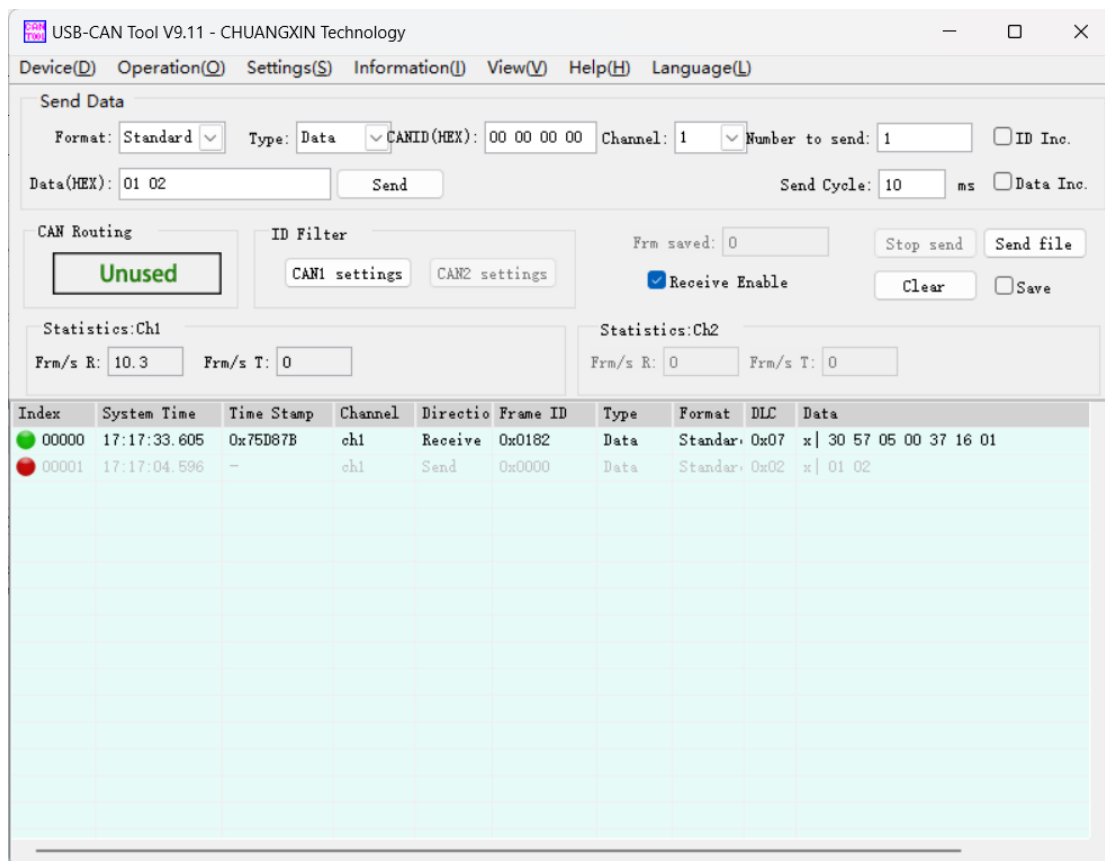
#### Step 5



-> Open

-> send the command one by one

| CANID | Command                 | Exegesis                                                                                   |
|-------|-------------------------|--------------------------------------------------------------------------------------------|
| 000   | 01 02                   | Enable node 2                                                                              |
| 602   | 2F 60 60 00 06 00 00 00 | Origin return mode                                                                         |
|       | 2B 40 60 00 0F 00 00 00 | Servo wait enable → Servo run                                                              |
|       | 2B 40 60 00 1F 00 00 00 | Start zero search (wait for the motor to stop rotating before continuing to send commands) |
|       | 2F 60 60 00 01 00 00 00 | Position mode                                                                              |
|       | 23 7A 60 00 00 00 00 00 | Return to 0 position (23 7A 60 00 D4 12 05 00 (forward rotation 90°) )                     |
|       | 23 81 60 00 E8 03 00 00 | Set speed to 1000 rpm                                                                      |
|       | 2B 40 60 00 2F 00 00 00 | Trigger motor operation                                                                    |
|       | 2B 40 60 00 3F 00 00 00 |                                                                                            |
|       | 2B 40 60 00 07 00 00 00 | Disable                                                                                    |

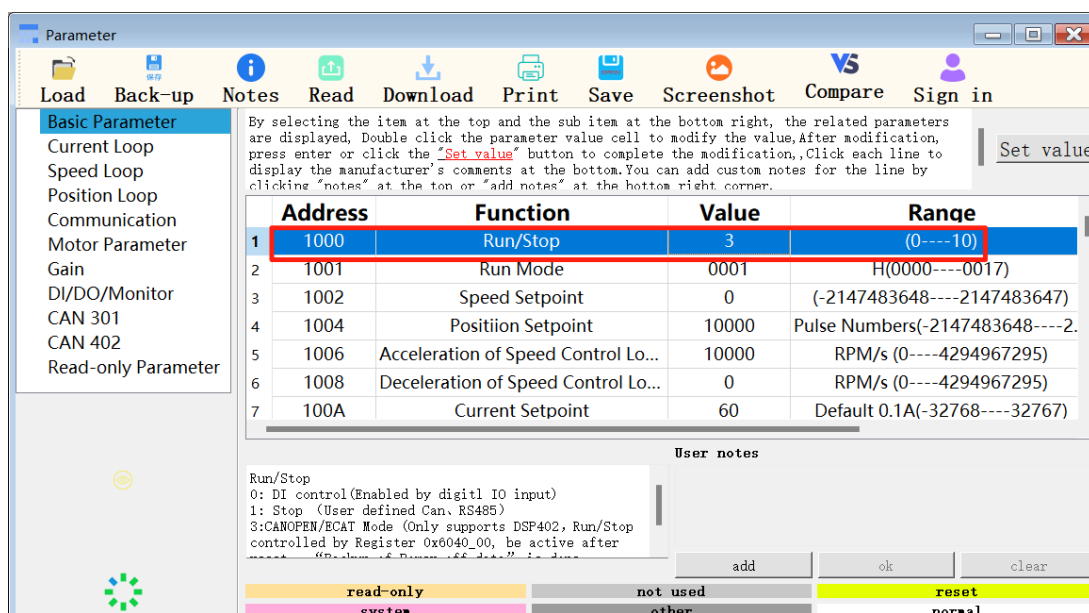


If the motor runs normally ,this way of the test is finished.

#### 4.2.2 Traction motor(Left motor)

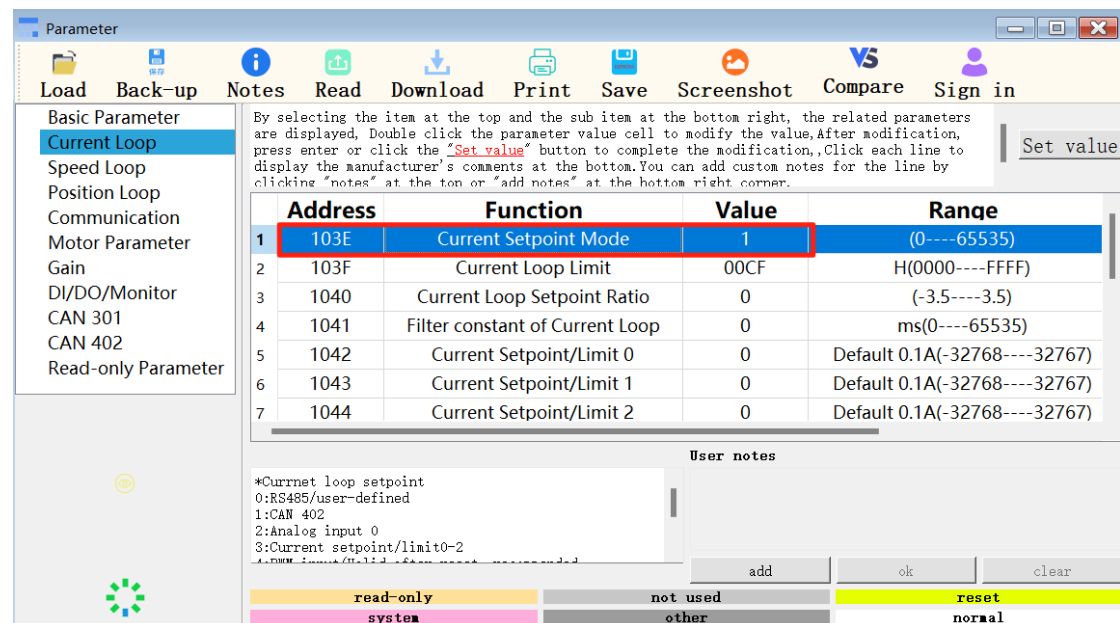
-> Basic Parameter

-> set 1000 Run/Stop 3



-> Current Loop

-> set 103E Current Setpoint Mode 1



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
Position Loop  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

| Address | Function                        | Value | Range                         |
|---------|---------------------------------|-------|-------------------------------|
| 1 103E  | Current Setpoint Mode           | 1     | (0---65535)                   |
| 2 103F  | Current Loop Limit              | 00CF  | H(0000----FFFF)               |
| 3 1040  | Current Loop Setpoint Ratio     | 0     | (-3.5----3.5)                 |
| 4 1041  | Filter constant of Current Loop | 0     | ms(0---65535)                 |
| 5 1042  | Current Setpoint/Limit 0        | 0     | Default 0.1A(-32768----32767) |
| 6 1043  | Current Setpoint/Limit 1        | 0     | Default 0.1A(-32768----32767) |
| 7 1044  | Current Setpoint/Limit 2        | 0     | Default 0.1A(-32768----32767) |

User notes

\*Current loop setpoint  
0:RS485/user-defined  
1:CAN 402  
2:Analog input 0  
3:Current setpoint/limit0-2  
4:Current setpoint/limit1-2

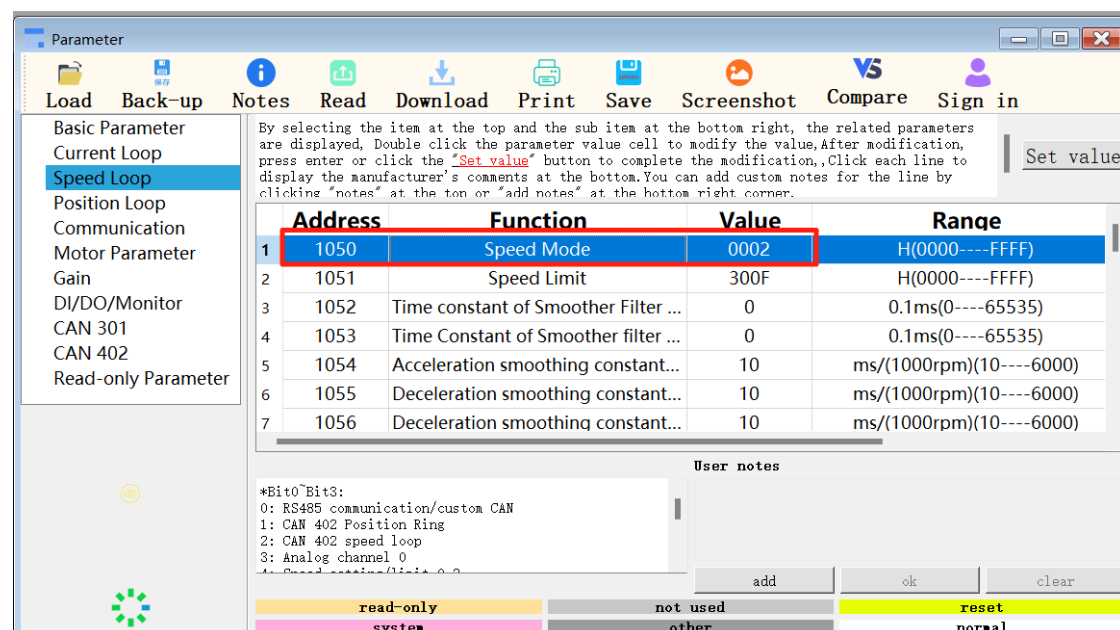
add ok clear

read-only not used reset  
system other normal

Step 2

-> Speed Loop

-> set 1050 Speed Mode 0002



Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
Position Loop  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

| Address | Function                             | Value | Range                    |
|---------|--------------------------------------|-------|--------------------------|
| 1 1050  | Speed Mode                           | 0002  | H(0000----FFFF)          |
| 2 1051  | Speed Limit                          | 300F  | H(0000----FFFF)          |
| 3 1052  | Time constant of Smoother Filter ... | 0     | 0.1ms(0---65535)         |
| 4 1053  | Time Constant of Smoother filter ... | 0     | 0.1ms(0---65535)         |
| 5 1054  | Acceleration smoothing constant...   | 10    | ms/(1000rpm)(10----6000) |
| 6 1055  | Deceleration smoothing constant...   | 10    | ms/(1000rpm)(10----6000) |
| 7 1056  | Deceleration smoothing constant...   | 10    | ms/(1000rpm)(10----6000) |

User notes

\*Bit0~Bit3:  
0: RS485 communication/custom CAN  
1: CAN 402 Position Ring  
2: CAN 402 speed loop  
3: Analog channel 0  
4: Speed setpoint/limit 0

add ok clear

read-only not used reset  
system other normal

Step 3

-> 107B Position Loop Mode 2

Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
**Position Loop**  
Communication  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|   | Address | Function                     | Value | Range         |
|---|---------|------------------------------|-------|---------------|
| 1 | 107B    | Position Loop Mode           | 2     | (0---65535)   |
| 2 | 107C    | Electronic Gear Numerate 0   | 1     | (1---65535)   |
| 3 | 107D    | Reserved                     | 1     | (1---65535)   |
| 4 | 107E    | Reserved                     | 1     | (1---65535)   |
| 5 | 107F    | Electronic Gear Denominator  | 1     | (0---65535)   |
| 6 | 1080    | Position Filter              | 0     | ms(0---65535) |
| 7 | 1081    | Check time of Reach Position | 1000  | ms(0---65535) |

User notes

\*Position loop setpoint  
0: Address 0x1004(Absolute position loop) (RS485 setpoint)  
1: Address 0x1004(Absolute position loop) (CAN setpoint)  
2: Address 0x1004(Absolute position loop) (RS485 setpoint)

add ok clear

read-only not used reset  
system other normal

Step 4

-> Communication

-> set

10BF CAN Node address 1

10C0 CAN mode 1

10C1 CAN baud rate 2

Parameter

Load Back-up Notes Read Download Print Save Screenshot Compare Sign in

Basic Parameter  
Current Loop  
Speed Loop  
Position Loop  
**Communication**  
Motor Parameter  
Gain  
DI/DO/Monitor  
CAN 301  
CAN 402  
Read-only Parameter

By selecting the item at the top and the sub item at the bottom right, the related parameters are displayed. Double click the parameter value cell to modify the value. After modification, press enter or click the "Set value" button to complete the modification. Click each line to display the manufacturer's comments at the bottom. You can add custom notes for the line by clicking "notes" at the top or "add notes" at the bottom right corner.

|    | Address | Function                                | Value | Range              |
|----|---------|-----------------------------------------|-------|--------------------|
| 4  | 10BB    | RS485 serial communication protocol     | 0010  | H(0000---FFFF)     |
| 5  | 10BC    | RS485 user-defined baud rate            | 19200 | BPS(100---2000000) |
| 6  | 10BE    | RS485 transmission delay                | 0     | us(0---20000)      |
| 7  | 10BF    | CAN Node address                        | 1     | (1---127)          |
| 8  | 10C0    | CAN mode                                | 1     | (0---65535)        |
| 9  | 10C1    | CAN baud rate                           | 2     | (0---7)            |
| 10 | 10C2    | CAN autonomous reporting (oscilloscope) | 0     | (0---65535)        |

User notes

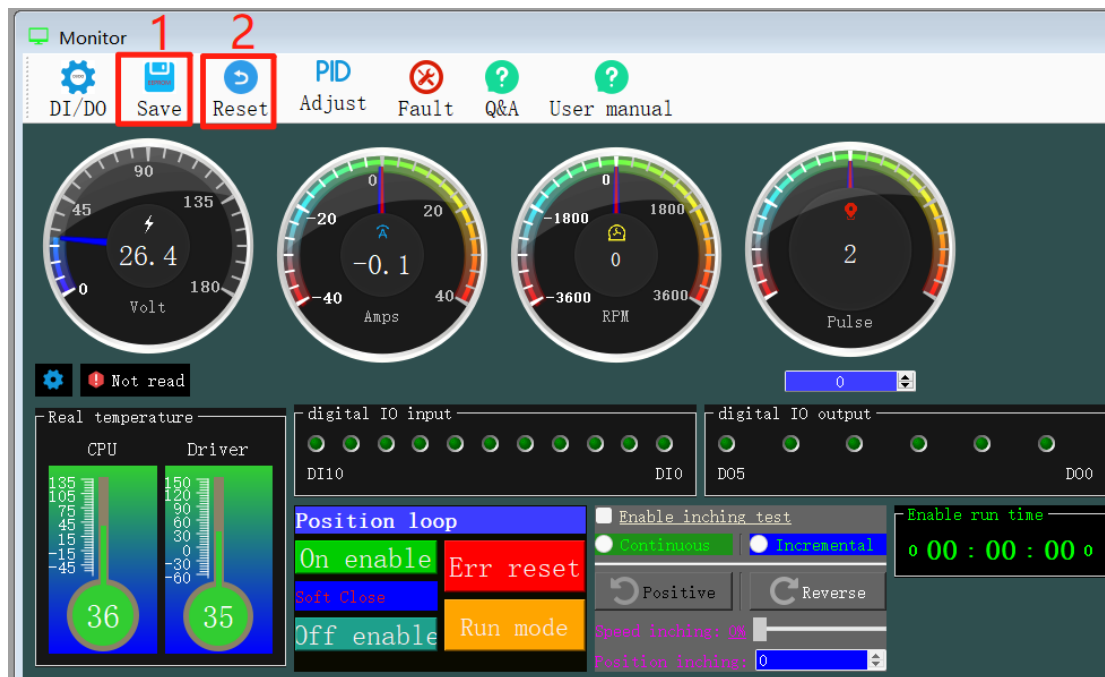
CAN Node address

add ok clear

read-only not used reset  
system other normal

-> save

-> Reset



-> Open

-> send the command one by one

| Traction motor CAN message |                         |                            |                                          |
|----------------------------|-------------------------|----------------------------|------------------------------------------|
| CANID                      | Command                 | Exegesis                   |                                          |
| 000                        | 01 01                   | Enable node 1              |                                          |
| 601                        | 2F 60 60 00 03          | Speed mode                 |                                          |
|                            | 2B 40 60 00 06 00       | Enable process             | Servo fault-free → Servo ready           |
|                            | 2B 40 60 00 07 00       |                            | Servo ready → Servo waiting for enable   |
|                            | 2B 40 60 00 0F 00       |                            | Servo waiting for enable → Servo running |
|                            | 23 FF 60 00 C8 00 00 00 | Given motor speed 200 rpm  |                                          |
|                            | 23 FF 60 00 38 FF FF FF | Given motor speed -200 rpm |                                          |
|                            | 23 FF 60 00 00 00 00 00 | Given motor speed 0 rpm    |                                          |
|                            | 2B 40 60 00 06 00 00 00 | Disabled                   |                                          |

USB-CAN Tool V9.11 - USBCAN-II - SN:Serial number: 31F100018BA, firmware version number: V3.41 - CHUANGXI...

Device(D) Operation(O) Settings(S) Information(I) View(V) Help(H) Language(L)

**Send Data**

Format: Standard Type: Data CANID(HEX): 00 00 00 00 Channel: 1 Number to send: 1 ☐ ID Inc.

Data(HEX): 01 01 Send Send Cycle: 10 ms ☐ Data Inc.

**CAN Routing** **ID Filter** Frm saved: 0 Stop send Send file

Unused CAN1 settings CAN2 settings ☒ Receive Enable Clear ☐ Save

**Statistics:Ch1** **Statistics:Ch2**

Frm/s R: 10.3 Frm/s T: 0.3 Frm/s R: 0 Frm/s T: 0

| Index | System Time  | Time Stamp | Channel | Directio | Frame ID | Type | Format  | DLC  | Data                     |
|-------|--------------|------------|---------|----------|----------|------|---------|------|--------------------------|
| 00000 | 17:29:07.023 | 0xDF85C8   | chl     | Receive  | 0x0181   | Data | Standar | 0x07 | x   D0 59 FD FF 21 12 03 |
| 00001 | 17:29:05.903 | -          | chl     | Send     | 0x0000   | Data | Standar | 0x02 | x   01 01                |

USB-CAN Tool V9.11 - USBCAN-II - SN:Serial number: 31F100018BA, firmware version number: V3.41 - CHUANGXI...

Device(D) Operation(O) Settings(S) Information(I) View(V) Help(H) Language(L)

**Send Data**

Format: Standard Type: Data CANID(HEX): 00 00 06 01 Channel: 1 Number to send: 1 ☐ ID Inc.

Data(HEX): 2B 40 60 00 0F 00 00 00 Send Send Cycle: 10 ms ☐ Data Inc.

**CAN Routing** **ID Filter** Frm saved: 0 Stop send Send file

Unused CAN1 settings CAN2 settings ☒ Receive Enable Clear ☐ Save

**Statistics:Ch1** **Statistics:Ch2**

Frm/s R: 10.3 Frm/s T: 0 Frm/s R: 0 Frm/s T: 0

| Index | System Time  | Time Stamp | Channel | Directio | Frame ID | Type | Format  | DLC  | Data                        |
|-------|--------------|------------|---------|----------|----------|------|---------|------|-----------------------------|
| 00000 | 17:30:11.164 | 0xE94BEB   | chl     | Receive  | 0x0181   | Data | Standar | 0x07 | x   D0 59 FD FF 37 16 03    |
| 00001 | 17:29:56.817 | -          | chl     | Send     | 0x0000   | Data | Standar | 0x08 | x   2B 40 60 00 0F 00 00 00 |
| 00002 | 17:30:05.481 | -          | chl     | Send     | 0x0601   | Data | Standar | 0x08 | x   2B 40 60 00 0F 00 00 00 |
| 00003 | 17:30:05.495 | 0xE86EF3   | chl     | Receive  | 0x0581   | Data | Standar | 0x08 | x   60 40 60 00 00 00 00 00 |

The test is finished

## 5. Common Faults and Troubleshooting

| No. | Fault Symptoms                                    | Handling Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | The driver reports an encoder or HALL error.      | <ol style="list-style-type: none"><li>1. Check if the encoder wiring is normal;</li><li>2. Check if the encoder wires are running parallel to high-power wires, causing excessive interference. Separate the encoder wires from high-power wires to reduce interference;</li></ol>                                                                                                                                                                                                       |
| 2   | The driver reports undervoltage during operation. | Ensure the power supply has sufficient capacity and adequate power. Avoid using low-power power supply devices such as switching power supplies. It is recommended to use batteries with sufficient discharge capacity for power supply;                                                                                                                                                                                                                                                 |
| 3   | The motor cannot rotate.                          | <ol style="list-style-type: none"><li>1. Check if the motor brake is opening properly;</li><li>2. Check if the motor power cables and encoder cables are connected properly;</li><li>3. If the steering motor cannot rotate, check if there are positive/negative limit signals, and verify if the motor has reached the hard limit, preventing rotation;</li></ol>                                                                                                                      |
| 4   | 485 or CAN communication failure.                 | <ol style="list-style-type: none"><li>1. Check if the driver's communication baud rate is correct;</li><li>2. If there are multiple drivers, check if the IDs conflict;</li><li>3. Check if the connections are correct;</li><li>4. The connection length should not be too long;</li><li>5. Add a terminating resistor at the farthest device to enhance interference resistance;</li><li>6. Keep communication lines away from high-power power lines to avoid interference;</li></ol> |

|   |                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | The drive reports overload          | <ol style="list-style-type: none"><li>1. Check whether the motor-related parameter settings in the drive match;</li><li>2. Check whether the motor phase lines and encoder connections are correct, and whether there are any disconnections or poor contacts;</li><li>3. The actual load is too heavy, causing the motor to operate continuously in the overload range, with current exceeding the rated value;</li><li>4. Check whether the brake is opening normally;</li><li>5. If the current remains high during the no-load test, replace the motor with a new one for testing;</li></ol> |
| 6 | The steering motor cannot find zero | <ol style="list-style-type: none"><li>1. Check if the drive has been properly configured with zero-seeking mode parameters;</li><li>2. Check if the limit switch signals or origin signals are functioning normally and changing appropriately;</li><li>3. Check if the IO functions have been correctly configured;</li></ol>                                                                                                                                                                                                                                                                   |