

Detailed explanation of NT60 functions

1. Driver introduction

NT60 is a high-performance bus-controlled stepper motor driver, which integrates intelligent motion controller functions, built-in S-shaped acceleration and deceleration commands, and can independently set acceleration and deceleration. It runs Modbus protocol through RS485 network to control the driver and motor in real time.

The physical port introduction of the drive is shown in Figure 1-1:

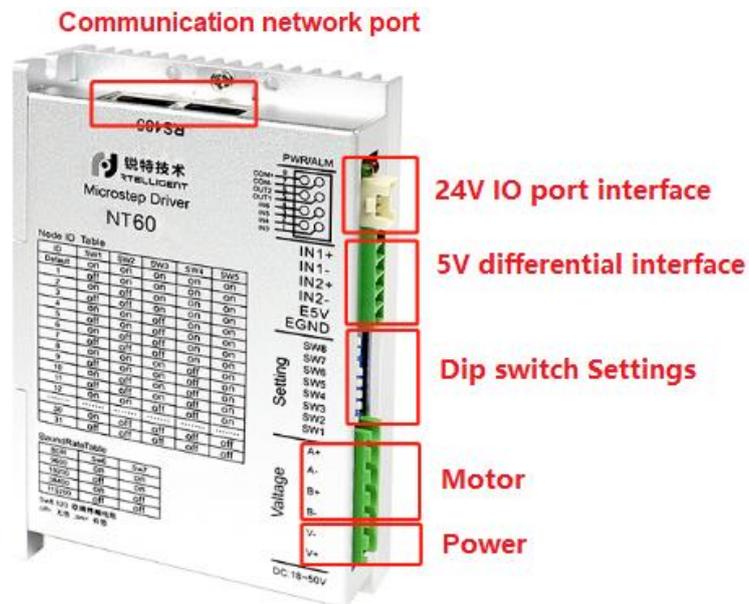


Figure 1-1

(1) Power

DC18~50V。V+ is connected to the positive pole of the DC power supply, and V- is connected to the negative pole of the DC power supply. The input voltage range is DC18~50V.

(2) Motor

A+, A-, B+, B- The driver matches two-phase stepping motor by default, please connect Red, Blue, Green and Black to A+, A-, B+, B- respectively.

(3) Dip switch Settings

SW1, SW2, SW3, SW4 and SW5 are used to set the slave address, ON = 0, OFF = 1.

Slave Address = SW1 + SW2 × 2 + SW3 × 4 + SW4 × 8 + SW5 × 16

SW6 and SW7 are used to set the communication baud rate (see the silk screen for details). SW8 is an effective terminal resistance, generally not dialed for short-distance communication.

(4) 5V differential interface (IN1、IN2)

It can be used as a closed-loop encoder and 5V pulse + direction signal (when using 24V input, please connect an external 2K resistor to limit the current).

(5) 24V IO port interface (IN3、IN4、IN5、IN6)

This port has 4 channels of 24V input in total and two channels of 0V output in total. The function can be selected in the debugging software, as shown in Figure 1-2.

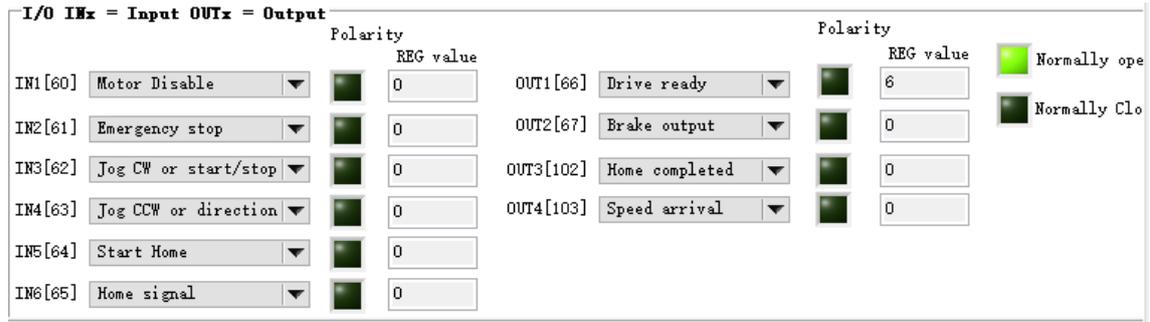
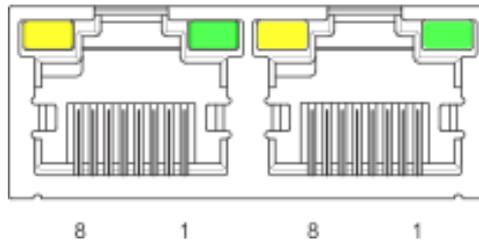


Figure1-2

(6) Communication network port

The same two groups of RS485 interfaces can be inserted arbitrarily. The interface definitions are as follows:



Terminal serial number	Identifier	Color
1	RS485_A	Orange/White
2	RS485_B	Orange
3	GND	Green/White
4	-	Blue
5	-	Blue/White
6	-	Green
7	-	Brown/White
8	-	Brown

2. Basic software functions introduction

The basic function location of NTConfigurator software is shown in Figure 2-1. There are a total of 8 commonly used buttons, namely ①Language, ②Communication settings, ③Upload data, ④Download data, ⑤Save parameters to the drive, ⑥Restore factory settings, ⑦Save parameter file, ⑧Import parameter file.



Figure2-1

① Language: NTConfigurator software language supports Chinese (Simplified) and English (US), and the two languages can be switched. It should be noted that the software needs to be restarted each time the language is switched to take effect.

② Communication settings: The communication settings are shown in Figure2-2. Select "Modbus RS485" for the communication setting of NT60. The corresponding port at A can be viewed through "Computer-Properties-Device Manager", and the baud rate set at B refers to the driver silkscreen. After setting A and B, click on C to connect.

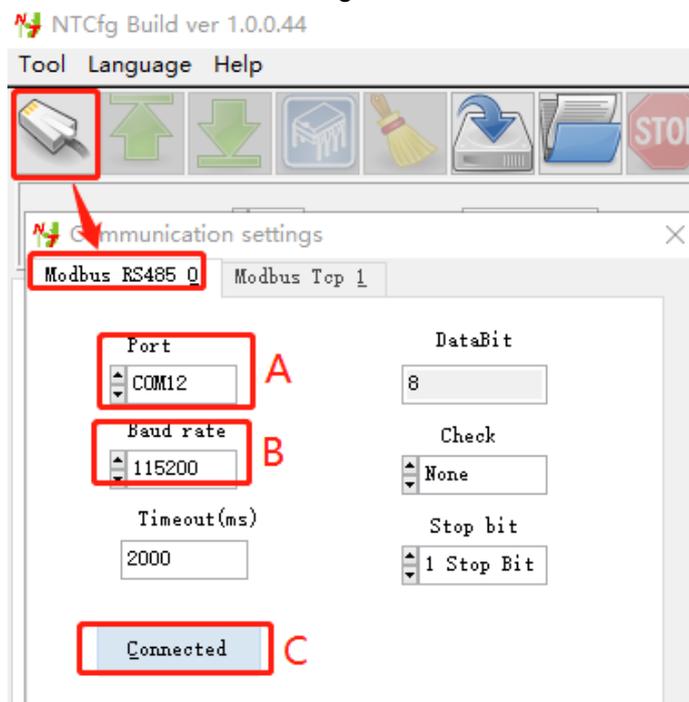


Figure2-2

- ③ Upload data: Upload the data in the drive to the debugging software.
- ④ Download data: It is only used for parameter import. After reading the parameter file from the hard disk, the parameters will be imported into the debugging software, but not to the drive. You need to click the "Download" button to download the parameters to the drive.
- ⑤ Save parameters: Permanently save the currently set/modified parameters to the drive.
- ⑥ Restore factory settings: restore the parameters of the drive to the factory default values.
- ⑦ Save file: save the parameters of the drive in the computer in the form of a file.
- ⑧ Import file: Import the drive parameter file saved before into the debugging software.

3. Driver functions introduction

The Rtelligent bus functional stepping integrates three control methods: 485 communication, pulse + direction and IO. The IO control includes speed mode start and stop plus direction, speed mode forward plus reverse, 16-segment speedometer, 16-segment position meter, fixed-length jog, zero return, limit, analog speed mode (potentiometer speed regulation) , Analog position follow mode, torque mode.

(1) Communication control setting

The communication control settings are shown in Figure 3-1 and Figure 3-2. When using communication control, it is necessary to set the Internal pulse application mode to "0: communication control".

①Jog test: As shown in Figure 3-1, the "left and right arrows" in the jog test represent the forward and reverse rotation of the motor respectively, which can be used for motor testing.

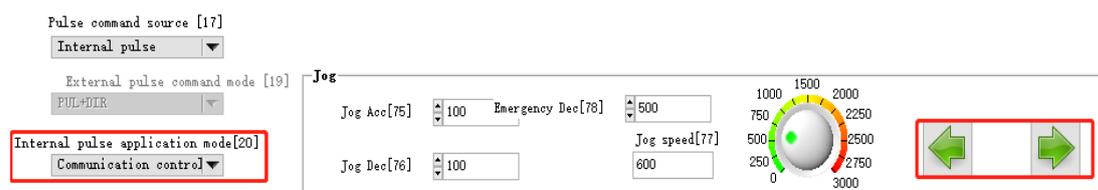


Figure3-1

②Point to point movment: As shown in Figure 3-2, "Go positon CCW" and "Go Position CW" in the point-to-point motion test respectively represent the reverse and forward rotation of the motor, which can be used for the point position test of the motor.

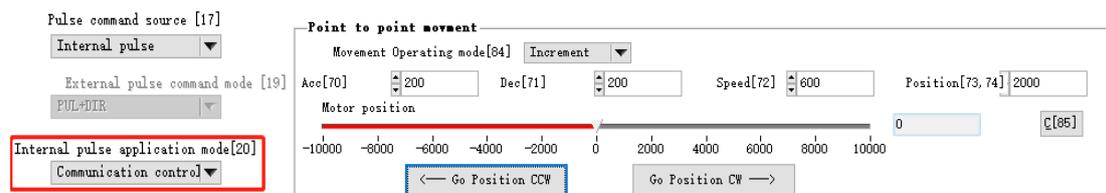


Figure3-2

(2) Motor type setting

The motor type settings are as shown in 3-3. When the drive is used with a closed-loop motor, the motor operation mode needs to be set to "servo mode 1". At the same time, IN1 is set to "Quadrature encoder B-phase input", which corresponds to the B-phase of the closed-loop motor; IN2 is set to "Quadrature encoder A-phase input", which corresponds to the A-phase of the closed-loop motor. **After the setting is completed, you need to save the parameters first, then power off and restart, the setting will take effect.**

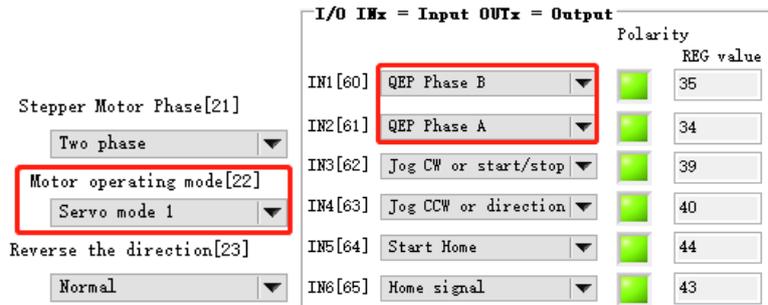


Figure3-3

(3) Pulse + direction parameter setting:

The pulse + direction parameter settings are shown in Figure 3-4. Among them, IN1 and IN2 are connected to the pulse direction input, and IN3 and IN4 can also be set as the pulse direction. The wiring between the two is different, the former is connected to 5V signal, and the latter is connected to 24V signal.

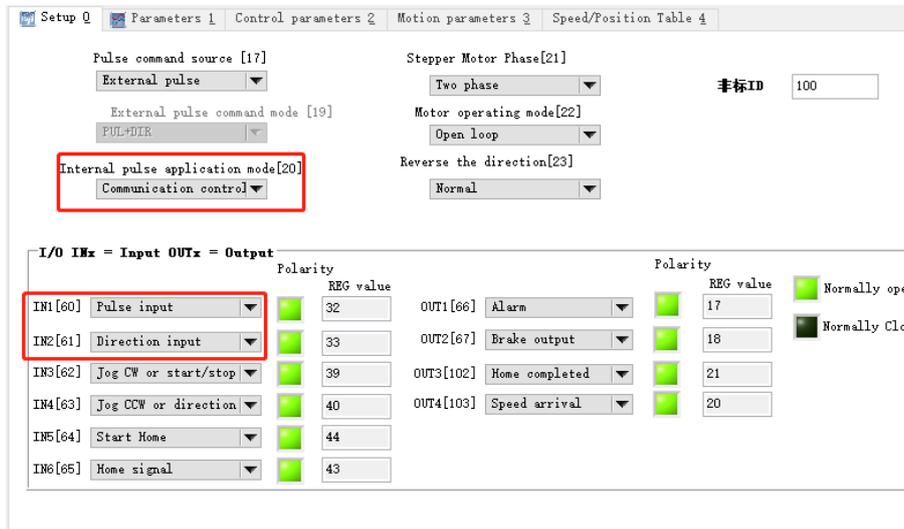


Figure3-4

(4) IO speed mode start/stop + direction setting

The IO speed mode start-stop plus direction setting is shown in Figure 3-5. The motor starts running when IN3 is connected to the level signal, and the motor switches the running direction when IN4 is connected to the level signal. The speed-related parameters are jogged with the motion parameters in the debugging software. The wiring is COM+ to 24 positive pole, IN3, IN4 to 0V.

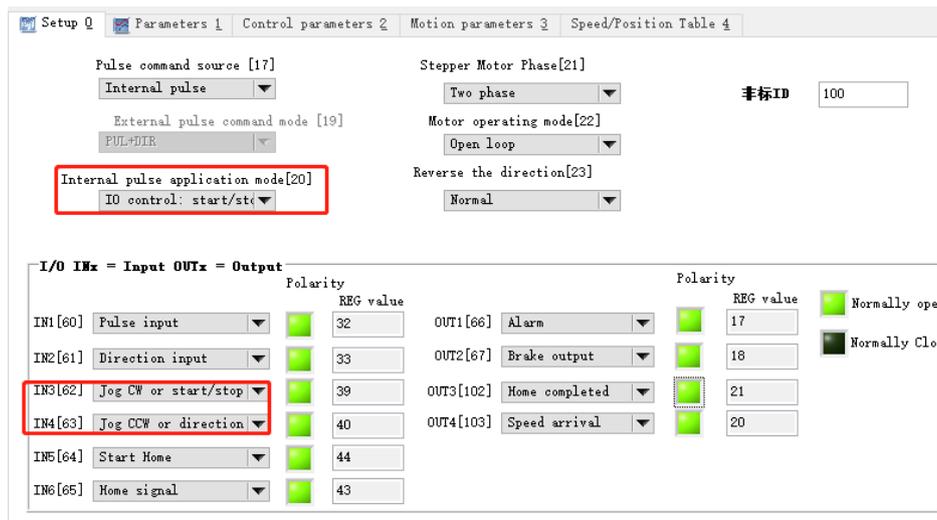


Figure3-5

(5) IO speed mode forward + reverse setting

The IO speed mode forward and reverse settings are shown in Figure 3-6. The motor rotates forward when IN3 is connected to the level signal, and the motor is reversed when IN3 is disconnected from IN4 and is connected to the level signal. Speed-related parameters and wiring are the same as start-stop plus reverse.

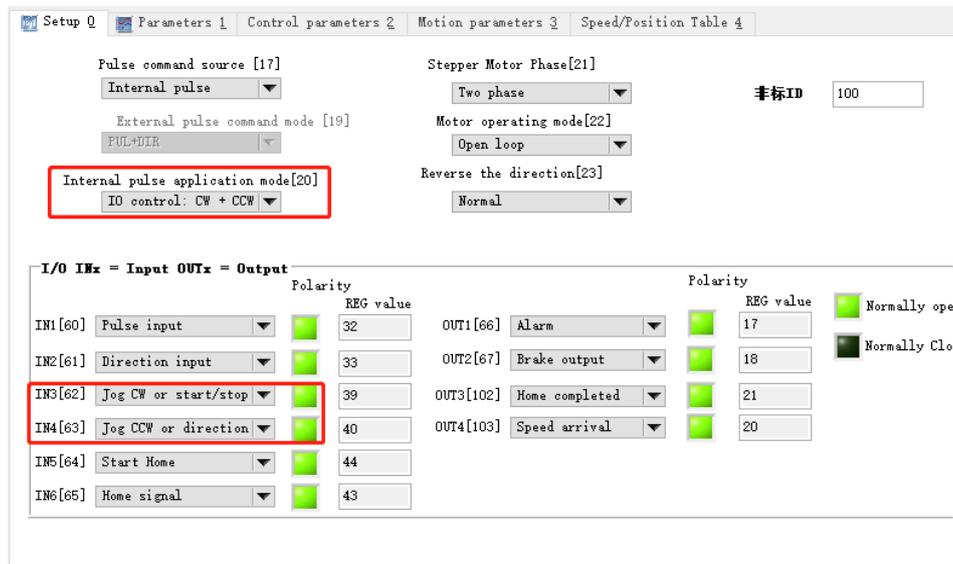


Figure3-6

(6) 16-segment speed table setting

The settings of the 16-segment speed table are shown in Figure 3-7. P105~P120 registers set the motor speed. The start of the speed table is a binary arrangement, such as running multi-stage speed control 1 100rpm, and the status of the IO port is 0 0 0 1. Note that multi-stage speed control 0 generally defaults to 0rpm, and the motor is in a shutdown state when all IO ports are 0.

Pulse command source [17]
Internal pulse

External pulse command mode [19]
PUL+DIR

Internal pulse application mode[20]
Speed table

Index switch time[100] 200

I/O INx = Input OUTx = Output

INx	Function	Polarity	REG value
IN1[60]	Pulse input	Green	32
IN2[61]	Direction input	Green	33
IN3[62]	Speed Tab Sel 0	Green	46
IN4[63]	Speed Tab Sel 1	Green	47
IN5[64]	Speed Tab Sel 2	Green	48
IN6[65]	Speed Tab Sel 3	Green	49

Modbus REG address	Name	Data	Unit
105	Speed table index 0	0	rpm
106	Speed table index 1	100	rpm
107	Speed table index 2	200	rpm
108	Speed table index 3	300	rpm
109	Speed table index 4	400	rpm
110	Speed table index 5	500	rpm
111	Speed table index 6	600	rpm
112	Speed table index 7	700	rpm
113	Speed table index 8	800	rpm
114	Speed table index 9	900	rpm
115	Speed table index 10	1000	rpm
116	Speed table index 11	1100	rpm
117	Speed table index 12	1200	rpm
118	Speed table index 13	1300	rpm
119	Speed table index 14	1400	rpm
120	Speed table index 15	1500	rpm

Modbus REG address	Name
125	Position table index 0
127	Position table index 1
129	Position table index 2
131	Position table index 3
133	Position table index 4
135	Position table index 5
137	Position table index 6
139	Position table index 7
141	Position table index 8
143	Position table index 9
145	Position table index 10
147	Position table index 11
149	Position table index 12
151	Position table index 13
153	Position table index 14
155	Position table index 15

Figure3-7

(7) 16-segment position table setting

The setting of the 16-segment location table is shown in Figure 3-8. P125~P155 registers set the motor stroke, and P72 sets the speed. Start up in the same way as the speed table.

Pulse command source [17]
Internal pulse

External pulse command mode [19]
PUL+DIR

Internal pulse application mode[20]
Position table

Index switch time[100] 200

I/O INx = Input OUTx = Output

INx	Function	Polarity	REG value
IN1[60]	Pulse input	Green	32
IN2[61]	Direction input	Green	33
IN3[62]	Pos Tab Sel 0	Green	50
IN4[63]	Pos Tab Sel 1	Green	51
IN5[64]	Pos Tab Sel 2	Green	52
IN6[65]	Pos Tab Sel 3	Green	53

Modbus REG address	Name	Data	Unit
125	Position table index 0	1000	Pulses
127	Position table index 1	2000	Pulses
129	Position table index 2	3000	Pulses
131	Position table index 3	4000	Pulses
133	Position table index 4	5000	Pulses
135	Position table index 5	6000	Pulses
137	Position table index 6	7000	Pulses
139	Position table index 7	8000	Pulses
141	Position table index 8	9000	Pulses
143	Position table index 9	10000	Pulses
145	Position table index 10	11000	Pulses
147	Position table index 11	12000	Pulses
149	Position table index 12	13000	Pulses
151	Position table index 13	14000	Pulses
153	Position table index 14	15000	Pulses
155	Position table index 15	16000	Pulses

Figure3-8

(8) Fixed-length jog setting

The setting of fixed-length jog is shown in Figure 3-9.

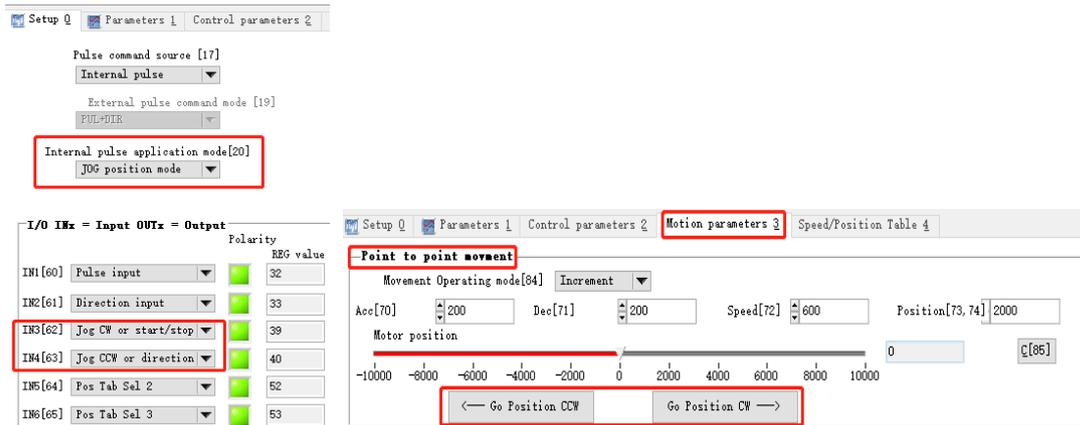


Figure3-9

(9) Homing setting

The setting of the homing mode is shown in Figure 3-10. The parameters of the homing mode are only available in the latest debugging software NTConfigurator 1.0.0.44, and the old debugging software needs to be changed by writing the value of the 06 function code.



Figure3-10

(10) Limit setting

The limit settings are shown in Figure3-11. The limit defaults to a normally open sensor. When connecting to a normally closed sensor, you need to change the polarity of the IO port (the small green box is dotted into black and it will take effect after power off and restart).

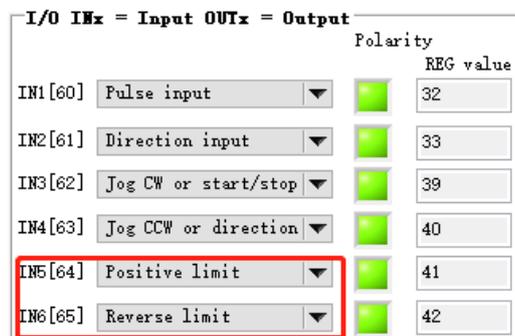


Figure3-11

(11) Analog speed mode setting

The setting of analog speed mode is shown in Figure3-12.

I/O INx = Input	OUTx = Output	Polarity	REG value
IN1[60]	Pulse input	+	32
IN2[61]	Direction input	+	33
IN3[62]	Jog CW or start/stop	+	39
IN4[63]	Jog CCW or direction	+	40
IN5[64]	Positive limit	+	41
IN6[65]	Reverse limit	+	42

Figure3-12

Connect the internal lead of the driver to a potentiometer, and then set parameters such as P272 offset, P273 filter, P274 dead zone, P275 zero drift, and P276 3.3V corresponding speed.

Zero drift: Refers to the value of the sampling voltage of the driver relative to GND when the input voltage of the analog channel is zero.

Offset: After the zero drift correction of the value, when the sampling voltage is zero, it corresponds to the input voltage value of the analog channel.

Dead zone: When the sampling voltage is set to zero, it corresponds to the input voltage range of the analog channel.

Speed setting: Input the speed command at the speed corresponding to P276 3.3V.

Speed calculation: The actual speed is equal to the P277 sampling voltage divided by 3300 times the speed corresponding to P276 3.3V.

(12) Analog position follow setting

The follow-up setting of the analog position is shown in Figure 3-13.

I/O INx = Input	OUTx = Output	Polarity	REG value
IN1[60]	Pulse input	+	32
IN2[61]	Direction input	+	33
IN3[62]	Jog CW or start/stop	+	39
IN4[63]	Jog CCW or direction	+	40
IN5[64]	Positive limit	+	41
IN6[65]	Reverse limit	+	42

Figure3-13

In the application mode of analog position following, there is no other IN start/stop or enable trigger signal. It changes the analog input voltage through potentiometers and other devices to follow the analog position. Since there is no external IN enable/start signal, the position adjustment may follow the analog input immediately after power-on.

Beware of the collision behavior caused by this!

The P214 215 register sets the motor position command, and the P216 217 register checks the current position.

(13) Torque Mode Settings

The torque mode settings are shown in Figure 3-14.

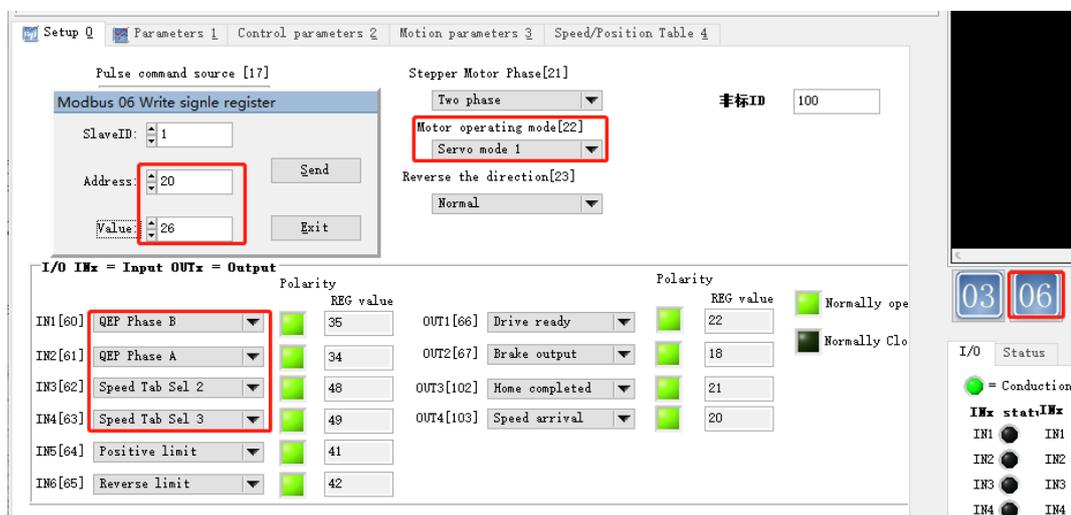


Figure3-14

The torque mode needs to update the program to NT60_V230.ehex, and the torque mode needs to match the closed-loop motor.

In the internal application mode 26, the torque forward rotation is realized by setting IN_multi-stage speed control 2, and the torque reverse rotation is realized by IN_multi-stage speed control 3.

Torque setting: write the current in the 165 register, as shown in Figure 3-15.

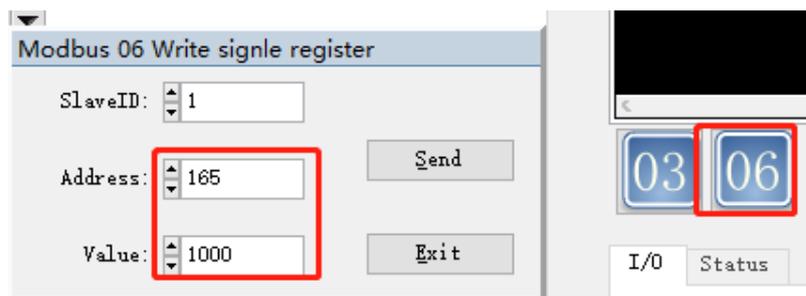


Figure3-15

Torque parameters:

P165: Running torque, unit mA

P75-P77: acceleration, deceleration, speed

P219: Torque hold time, unit ms When it is set to 0, it means that the torque is kept all the time. After the torque reaches the holding time, the state of the motor will be controlled by P220, offline or position-locked.

P220=0, the motor is offline; **P220=1**, the motor position locks the shaft.