



VER 1.1

Force Control Version Technical Guide Line

DINGS' Simple Tuner Pro



CM IN CM OUT CM IN

-RUN(GR)
-ERR(RE)

DINGS' 鼎智
www.dingsmotion.com

DS-CLS9-FRS4-01

Input Voltage: 24-48VDC
Output Current: 4.5A

Powered by SGP

Pin	DEFINITION	Pin	DEFINITION
1	A+	2	A-
3	B+	4	B-
7	Z+	8	Z-
9	FG	10	NC

Pin	DEFINITION	Pin	DEFINITION
1	+CONVRY	8	DIR
2	IN	9	DIR
3	IN	10	DIR
4	OUT1	11	DIR
5	OUT2	12	DIR
6	OUT3	13	DIR
7	OUT4	14	DIR
8	OUT5	15	DIR
9	OUT6	16	DIR
10	OUT7	17	DIR
11	OUT8	18	DIR
12	OUT9	19	DIR
13	OUT10	20	DIR
14	OUT11	21	DIR
15	OUT12	22	DIR
16	OUT13	23	DIR
17	OUT14	24	DIR
18	OUT15	25	DIR
19	OUT16	26	DIR
20	OUT17	27	DIR
21	OUT18	28	DIR
22	OUT19	29	DIR
23	OUT20	30	DIR
24	OUT21	31	DIR
25	OUT22	32	DIR
26	OUT23	33	DIR
27	OUT24	34	DIR
28	OUT25	35	DIR
29	OUT26	36	DIR
30	OUT27	37	DIR
31	OUT28	38	DIR
32	OUT29	39	DIR
33	OUT30	40	DIR
34	OUT31	41	DIR
35	OUT32	42	DIR
36	OUT33	43	DIR
37	OUT34	44	DIR
38	OUT35	45	DIR
39	OUT36	46	DIR
40	OUT37	47	DIR
41	OUT38	48	DIR
42	OUT39	49	DIR
43	OUT40	50	DIR
44	OUT41	51	DIR
45	OUT42	52	DIR
46	OUT43	53	DIR
47	OUT44	54	DIR
48	OUT45	55	DIR
49	OUT46	56	DIR
50	OUT47	57	DIR
51	OUT48	58	DIR
52	OUT49	59	DIR
53	OUT50	60	DIR
54	OUT51	61	DIR
55	OUT52	62	DIR
56	OUT53	63	DIR
57	OUT54	64	DIR
58	OUT55	65	DIR
59	OUT56	66	DIR
60	OUT57	67	DIR
61	OUT58	68	DIR
62	OUT59	69	DIR
63	OUT60	70	DIR
64	OUT61	71	DIR
65	OUT62	72	DIR
66	OUT63	73	DIR
67	OUT64	74	DIR
68	OUT65	75	DIR
69	OUT66	76	DIR
70	OUT67	77	DIR
71	OUT68	78	DIR
72	OUT69	79	DIR
73	OUT70	80	DIR
74	OUT71	81	DIR
75	OUT72	82	DIR
76	OUT73	83	DIR
77	OUT74	84	DIR
78	OUT75	85	DIR
79	OUT76	86	DIR
80	OUT77	87	DIR
81	OUT78	88	DIR
82	OUT79	89	DIR
83	OUT80	90	DIR
84	OUT81	91	DIR
85	OUT82	92	DIR
86	OUT83	93	DIR
87	OUT84	94	DIR
88	OUT85	95	DIR
89	OUT86	96	DIR
90	OUT87	97	DIR
91	OUT88	98	DIR
92	OUT89	99	DIR
93	OUT90	100	DIR

Pin	DEFINITION	Pin	DEFINITION
1	NC	2	NC
3	A	4	NC
5	NC	6	NC
7	FG (GND)	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	NC	20	NC
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
33	NC	34	NC
35	NC	36	NC
37	NC	38	NC
39	NC	40	NC
41	NC	42	NC
43	NC	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	NC
51	NC	52	NC
53	NC	54	NC
55	NC	56	NC
57	NC	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	NC	68	NC
69	NC	70	NC
71	NC	72	NC
73	NC	74	NC
75	NC	76	NC
77	NC	78	NC
79	NC	80	NC
81	NC	82	NC
83	NC	84	NC
85	NC	86	NC
87	NC	88	NC
89	NC	90	NC
91	NC	92	NC
93	NC	94	NC
95	NC	96	NC
97	NC	98	NC
99	NC	100	NC

Pin	DEFINITION	Pin	DEFINITION
1	A+	2	A-
3	B+	4	B-
5	NC	6	NC
7	NC	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	NC	20	NC
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65	NC	66	NC
67	NC	68	NC
69	NC	70	NC
71	NC	72	NC
73	NC	74	NC
75	NC	76	NC
77	NC	78	NC
79	NC	80	NC
81	NC	82	NC
83	NC	84	NC
85	NC	86	NC
87	NC	88	NC
89	NC	90	NC
91	NC	92	NC
93	NC	94	NC
95	NC	96	NC
97	NC	98	NC
99	NC	100	NC

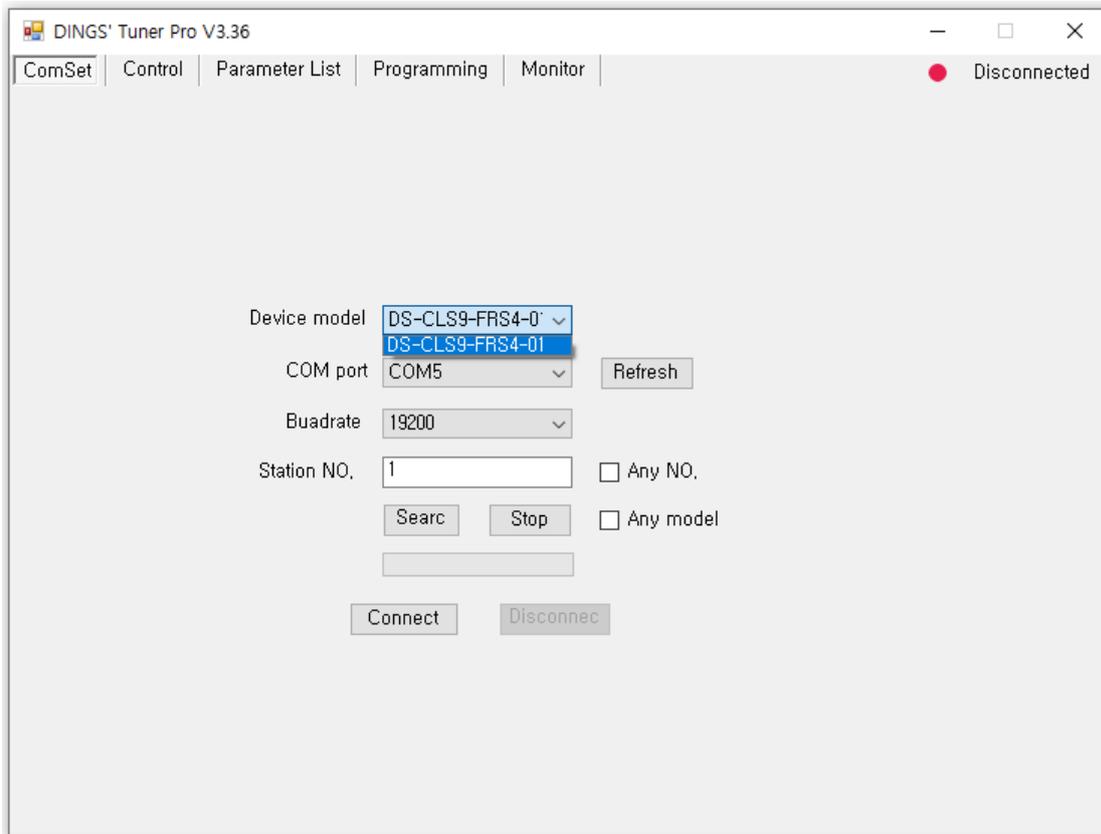
Pin	DEFINITION	Pin	DEFINITION
1	A+	2	A-
3	B+	4	B-
5	NC	6	NC
7	NC	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	NC	20	NC
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
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35	NC	36	NC
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39	NC	40	NC
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45	NC	46	NC
47	NC	48	NC
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63	NC	64	NC
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67	NC	68	NC
69	NC	70	NC
71	NC	72	NC
73	NC	74	NC
75	NC	76	NC
77	NC	78	NC
79	NC	80	NC
81	NC	82	NC
83	NC	84	NC
85	NC	86	NC
87	NC	88	NC
89	NC	90	NC
91	NC	92	NC
93	NC	94	NC
95	NC	96	NC
97	NC	98	NC
99	NC	100	NC

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1. Communication Setting Interface

1.1 Interface Introduction

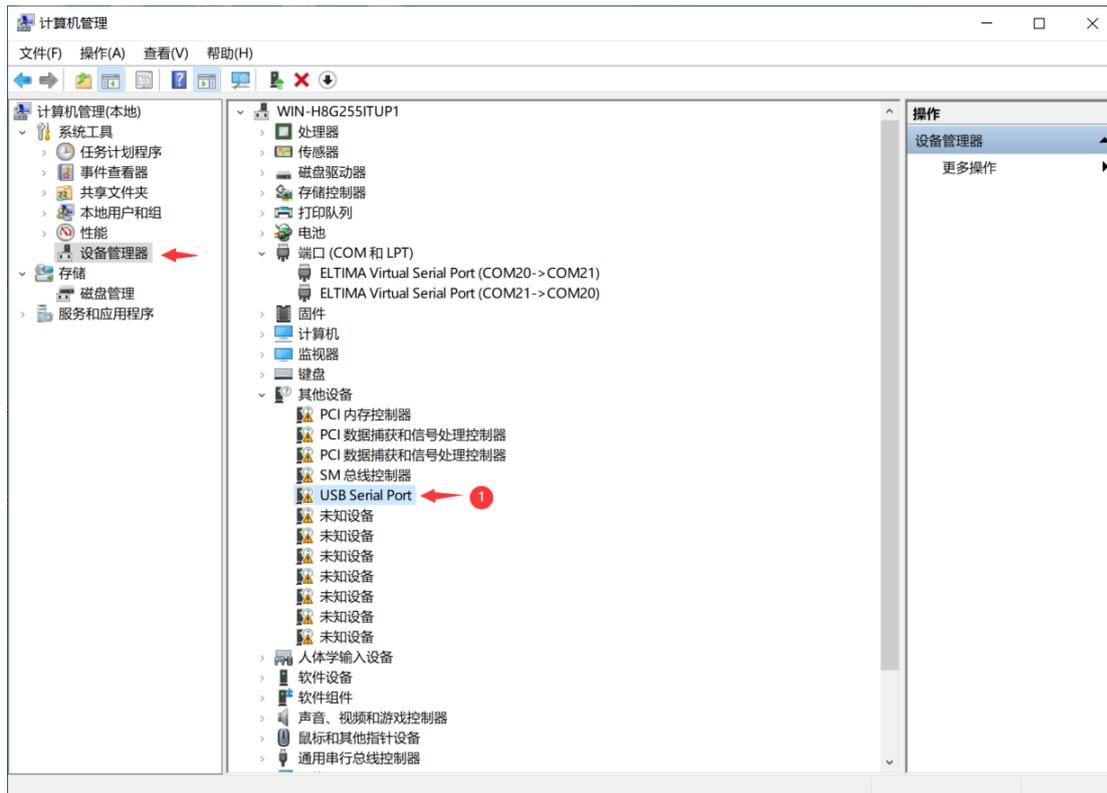


No.	Function	Remark
1	Select the device model, that is, select the connected driver model	
2	Select the serial port, it needs to be installed the driver when using the module to connect to the motor	
3	Select the serial port Baud rate, the default is 19200	
4	Select the station number, the default is 1	
5	Station search, you can search when there is only one driver connected and the station is not confirmed	
6	Connect and disconnect	

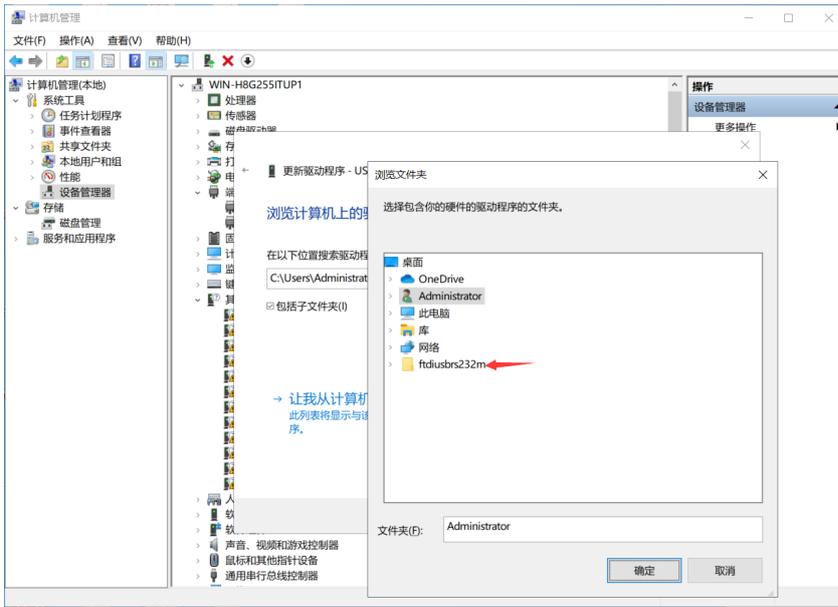
1.2 Connection Preparation

1.2.1 Driver Installation

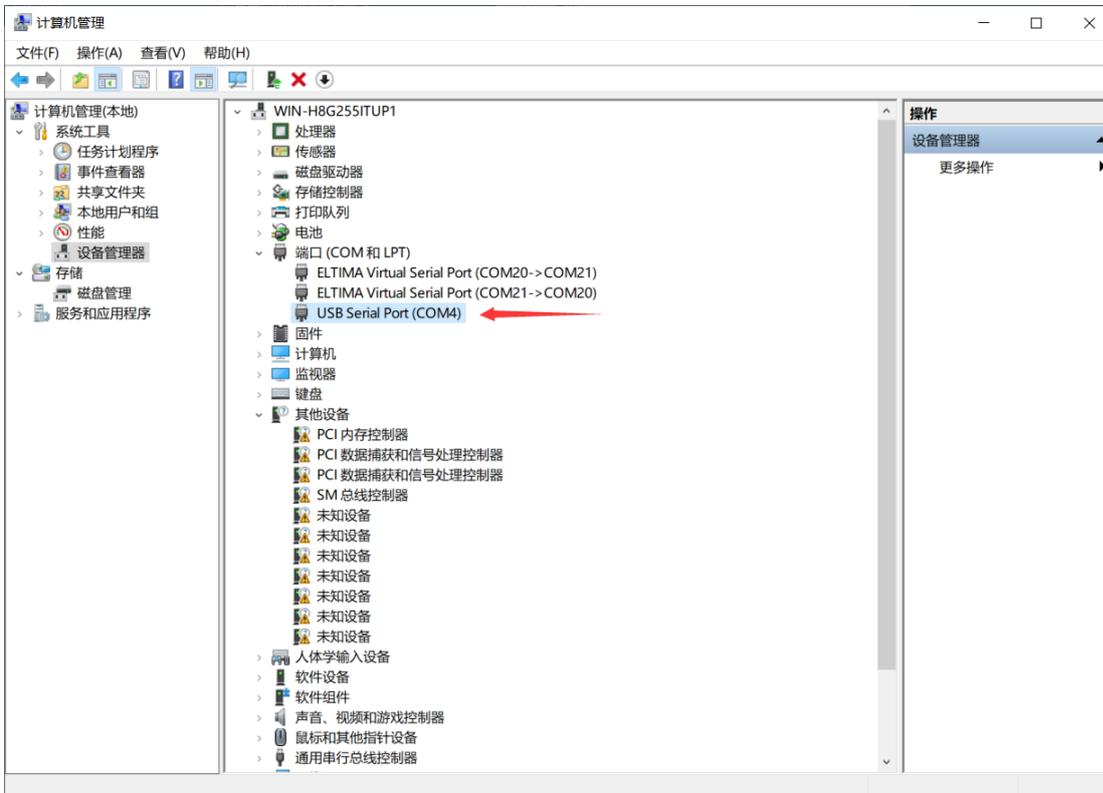
Right-click on My Computer-Manage, open the computer management interface, and select Device Manager.



A USB Serial Port such as ① will appear in other devices, right click on the driver, select Browse of my computer to find the driver, click Browse, select the driver folder, confirm and click Next, the driver installation is complete.



After the driver is installed successfully, you can see USB Serial Port under the port option, then the driver is installed successfully.



1.2.2 Connection Parameter Setting

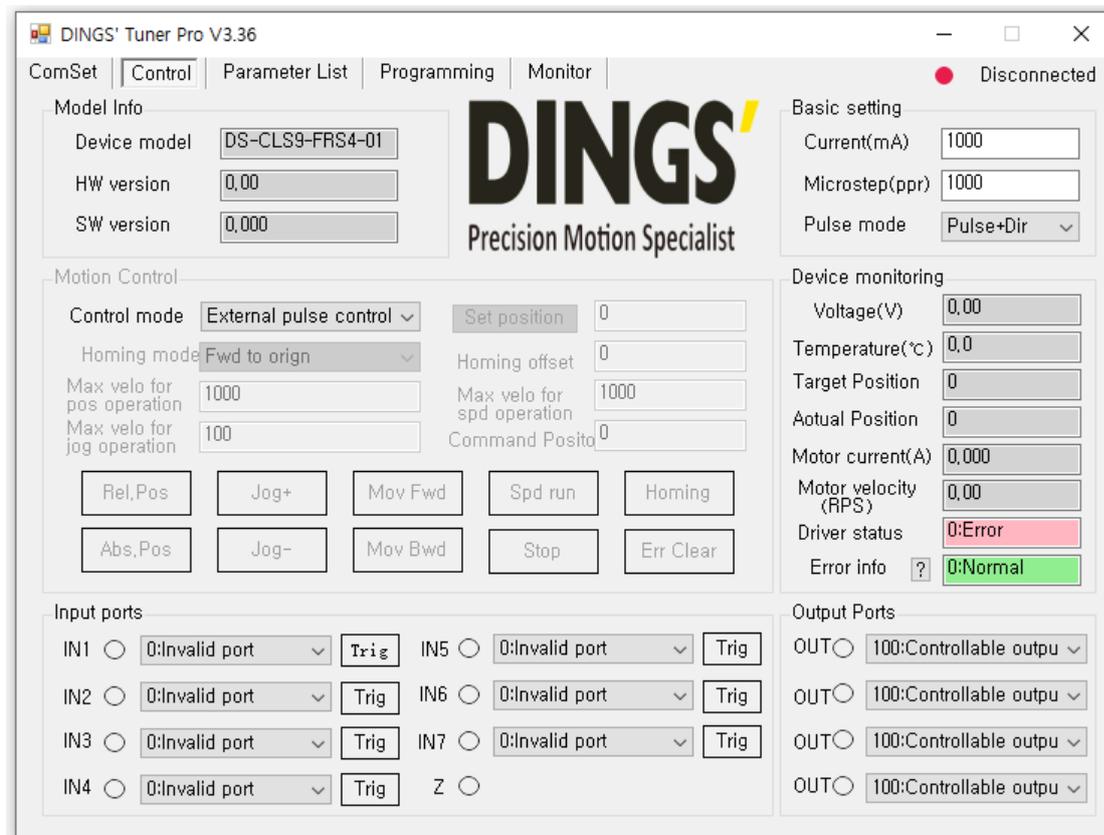
Select the device model, the device model should be match with the connected driver model, and then select the serial port, which is the extra serial port of the computer after the device is connected. If you open the serial port module that the software is connected to first, you need to press the refresh button and restart Read the serial port, and then select the correct serial port. Then select the serial port baud rate, the default baud rate is 19200, just select it directly. The last one is the station number and usually defaults to 1. if no need to change, you just need to check it.

After all verification is done, click “Connect”, and then the software screen moves to the device monitoring interface.

2. Device Monitoring Interface

2.1 Interface Introduction

The equipment monitoring interface is mainly divided into 6 parts, product information, operating parameters and control, input port configuration, basic settings, equipment detection and output port configuration.



No.	Function
1	Display of driver's basic information
2	Setting of motion parameter, basic control and alarm cancellation
3	Setting of input port configuration and software trigger
4	Setting of running subdivision and current
5	Display the current status of the device
6	Setting of output port configuration

2.2 Interface for Operation

2.2.1 Product Information and Equipment Testing

These two parts are both display parts. Product information will be automatically read when connected, and the device detection will continuously update to realize the real-time parameters of the device, including the real-time status of the motor such as the bus voltage, drive temperature, etc.

2.2.2 Basic Settings and Operating Parameters and Control

The first is to set the current setting and the subdivision setting. The value of the current setting should be match with the motor current. The subdivision setting determines the number of pulses per revolution of the motor. Normally no need the setting change after the first setting. Then there are several parameters and corresponding functions.

Motion Control			
Control mode	Integrate contrc ▾	Set position	<input type="text" value="0"/>
Homing mode	0:Fwd to origin ▾	Homing offset	<input type="text" value="0"/>
Max velo for pos operation	<input type="text" value="1000"/>	Max velo for spd operation	<input type="text" value="1000"/>
Max velo for jog operation	<input type="text" value="100"/>	Command Position	<input type="text" value="0"/>

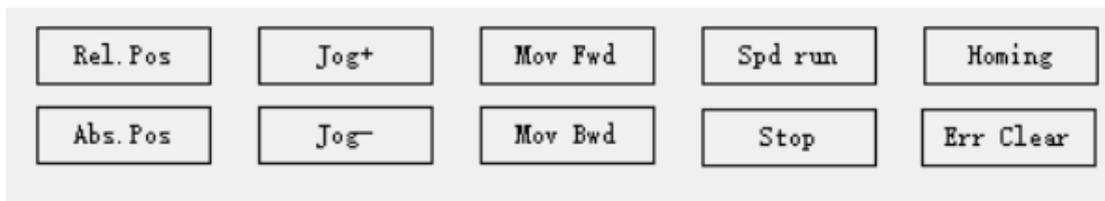
No.	Control button	Function
1	Relative position, Absolute position, Move Forward, Move Backward	Set position mode speed unit (0.01rps) is not related with subdivision
2	Jog forward, Jog backward	Jog mode setting
3	Position setting	Click the set position to replace the actual position with the value in the box
4	Homing	Set the origin offset, the pulse input in the additional motion box after the end of the return to origin motion
5	Constant speed mode	Set speed mode of speed
6	Relative position, Absolute position, Move Forward, Move Backward	Set the number of pulses to run

The main concern is the speed of several movements, the units are all 0.01rps, no need to calculate the subdivision, it is directly calculated the number of laps per second.

The specific position of the motion needs to reference the command position and the actual position, the motor without encoder cannot display the actual position and always shows 0, but the motor with the encoder shows the actual position.

The operation of all buttons will modify the command position. In the closed loop mode, the command position will always remain equal to the actual position. The deviation that may occur in the open loop mode, the default command position after power-on is 0, which is the default origin. The relationship between the command position and the subdivision is as follow : The subdivision is set for one pulse to run for one revolution. For example, when the subdivision is set to 1000, when the command position is 1000, the motor rotates one revolution in the forward direction. And when the command position is -1000, the motor runs one circle in reverse direction.

Then there is the control mode, the internal pulse control is to directly control the motor through the drive, and you can directly use the ten buttons on the software interface to control the motor. Button functions are as follows :



No.	Data Reference	Function
1. Rel. Pos	Position mode speed Number of operating pulses	The command position increases the number of operating pulses. The actual motor movement (subdivision setting/running pulse number) circle, with sign, reverse movement when the operating pulse number is negative
2. Abs. Pos	Position mode speed Number of operating pulses	Setting the command position as the number of operating pulses, and the motor will run to the command position
3. Jog +	Jog mode speed	Press and hold to move forward at the speed of the jog mode
4. Jog -	Jog mode speed	Press and hold to move backward at the speed of the jog mode
5. Mov Fwd	Position mode speed Number of operating pulses	Same as relative position (No.1)

6.Mov Bwd	Position mode speed Number of operating pulses	The command position increases the number of operating pulses. The motor actually moves in the reverse direction (subdivision setting/operating pulse number) circle, with sign, when the running pulse number is negative, it moves in the positive direction
7.Spd run	Speed mode speed	Operate according to the speed of the speed mode, the command position is automatically increased according to the subdivision
8.Stop	Stop	Operation stop while operating
9.Homing	Homing	Homing mode, which will be explained separately below
10.Err Clear	Error Clear	Checking the cause of alarm when there is an alarm

The operating logic of the Homing mode is shown in Figure 2.1 for Forward Homing and Figure 2.2 for Reverse Homing.

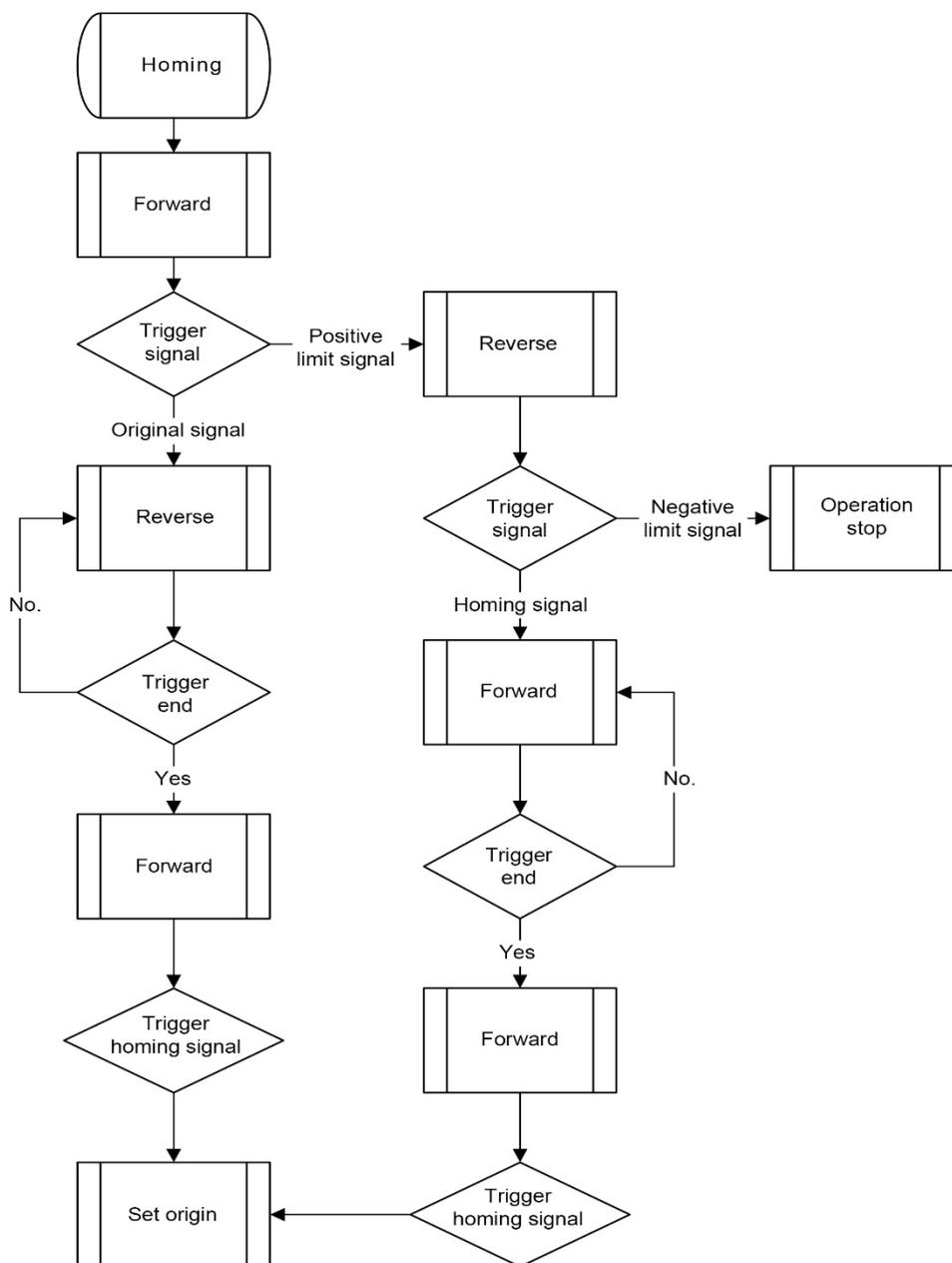


Fig. 2.1 Forward Homing

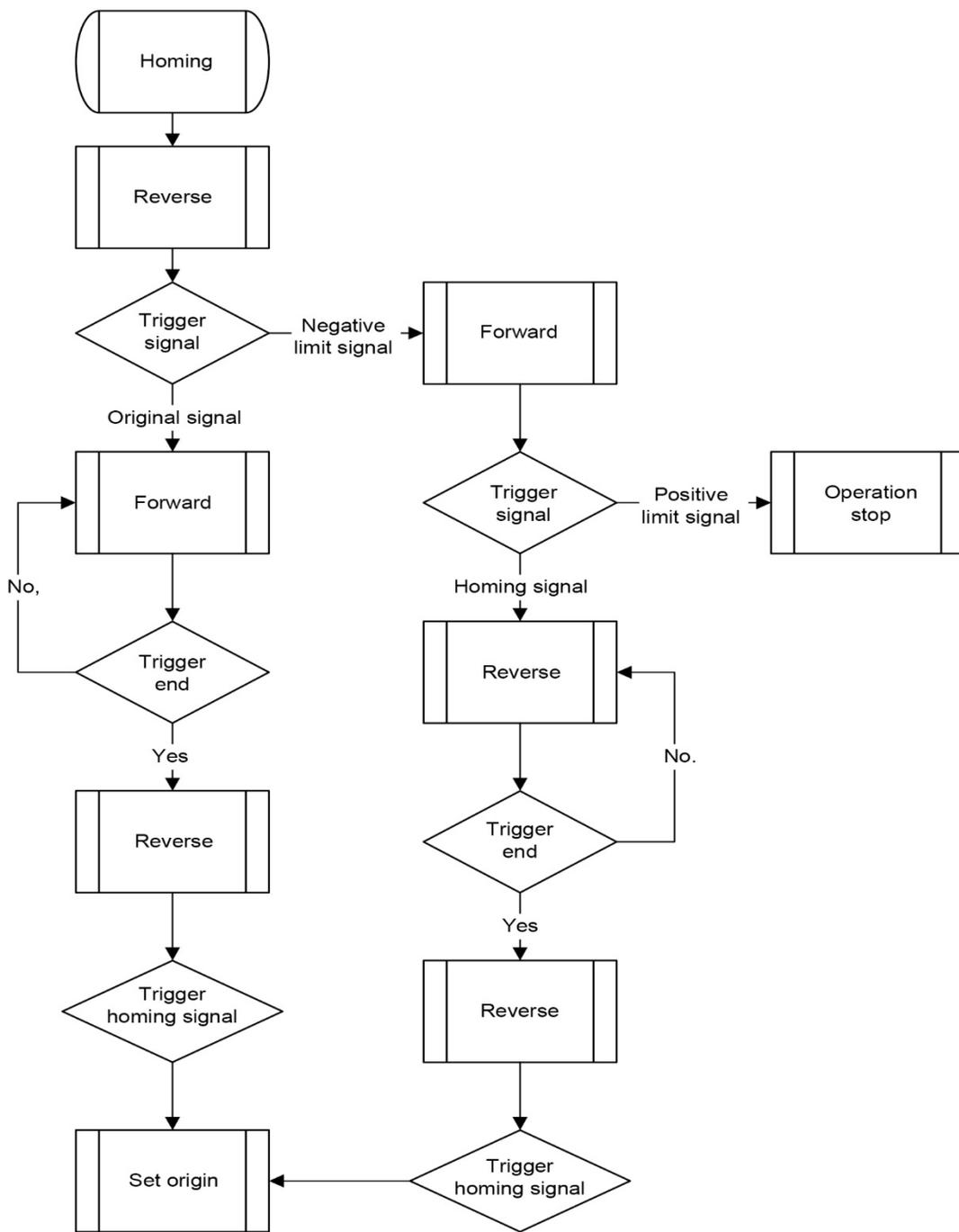


Fig 2.3 Backward Homing

2.2.3 Input Port and Output Port Configuration

Through the input port configuration, simple control can be realized through external triggering. The functions with the same name as the above button in the drop-down list will not be repeated, mainly the functions not mentioned above.

The first is the input port configuration.

Function No.	Function	Remark
0	Port invalidation, no action	
7	Make port stop quickly, faster than deceleration stop	
9	Trigger positive limit signal	Use Homing
10	Trigger negative limit signal	Use Homing
16	Start multi- axes operation	
17	Pause multi- axes operation	
18	Stop multi- axes operation	
20	The motor is offline when triggered and restarts when not triggered.	
25	Multi-axes bit0 input	
26	Multi-axes bit1 input	
27	Multi-axes bit2 input	
28	Multi-axes bit3 input	
29	Multi-axes bit4 input	

The multi-axes bit input of 25-29 is described in the following multi-axes unified description.

Then the output port configuration

Function No.	Function	Remark
100	General output, can be triggered by parameter modification	
101	Triggered in no alarm state	
102	Positioning complete trigger	
103	Trigger when the control is enabled and offline	
104	invalid	

3. Parameter Setting Interface

3.1 Interface Introduction

The parameter setting interface is mainly to adjust the motion parameters and import parameters in batches. Most of the parameters are matched by our engineers. This part mainly describes the parameters that are commonly used and need to be modified in the parameter setting interface and how to import and export parameters.

3.2 Parameter Introduction

The main parameters that need to be used are as follows

Classification	Address	Function
Basic parameter setting	298	Serial port baud rate
Basic parameter setting	299	Slave station number
Input port logic	429	Input port logic
Output port settings	428	Universal digital output control
Output port logic	430	Output port logic

The serial port bit rate is the serial port baud rate on the connection interface. The default is 19200. If you need to change it, you can manually change it, but it should not exceed the online support of the driver.

The slave station number corresponds to the station number on the connection interface. The 485 bus can be connected to many devices at the same time, and the communication is carried out through the modbus protocol. The station number of each machine should be unique. At this time, the station number needs to be modified to achieve multiple Access and control of equipment.

The input port logic can change the trigger logic of the input port. The input range is 0-65535, where bit0-bit6 correspond to in1-in7 respectively. When the corresponding bit data is 1, the logic of the input port is reversed. Here is an example, When the address 429 (input port setting) data is 1, then bit0=1, then in1 logic is reversed, the default trigger, when there is a signal input, the trigger ends.

IN1	IN2	.....	IN7	Data
0	0	.....	0	0
1	0	.....	0	1
0	1	.....	0	2
1	1	.....	0	3
.....		
1	1	.....	1	127

The modification of the output port logic is the same as the input port logic, so it will not be explained in details here.

The universal digital output control corresponds to the universal digital output. When the universal output is set in the output port configuration, the output can be directly controlled by the data of this address. The input range is 0-15, and the data bit0-bit3 correspond to out1-out4 respectively. Here is an example where when the data at address 428 (universal digital output control) is 1, bit0=1 and out1 outputs high. Voltage flat in normal output mode.

OUT1	OUT2	OUT3	OUT4	Data
0	0	0	0	0
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
.....
1	1	1	1	15

4. Multi-axes Operation Interface

4.1 Multi-axes Function Introduction

The multi-axes position mode function is to combine multiple position axes in a certain order, trigger movement through an external IO signal, and complete a series of position axes actions. This function can be regarded as a multi-axes combination of the position mode. The user can store the description parameters of several position axes, such as acceleration/deceleration, pulse number, etc., in the EEPROM in advance. When these position axes need to be enabled, only one trigger operation finish signal is required.

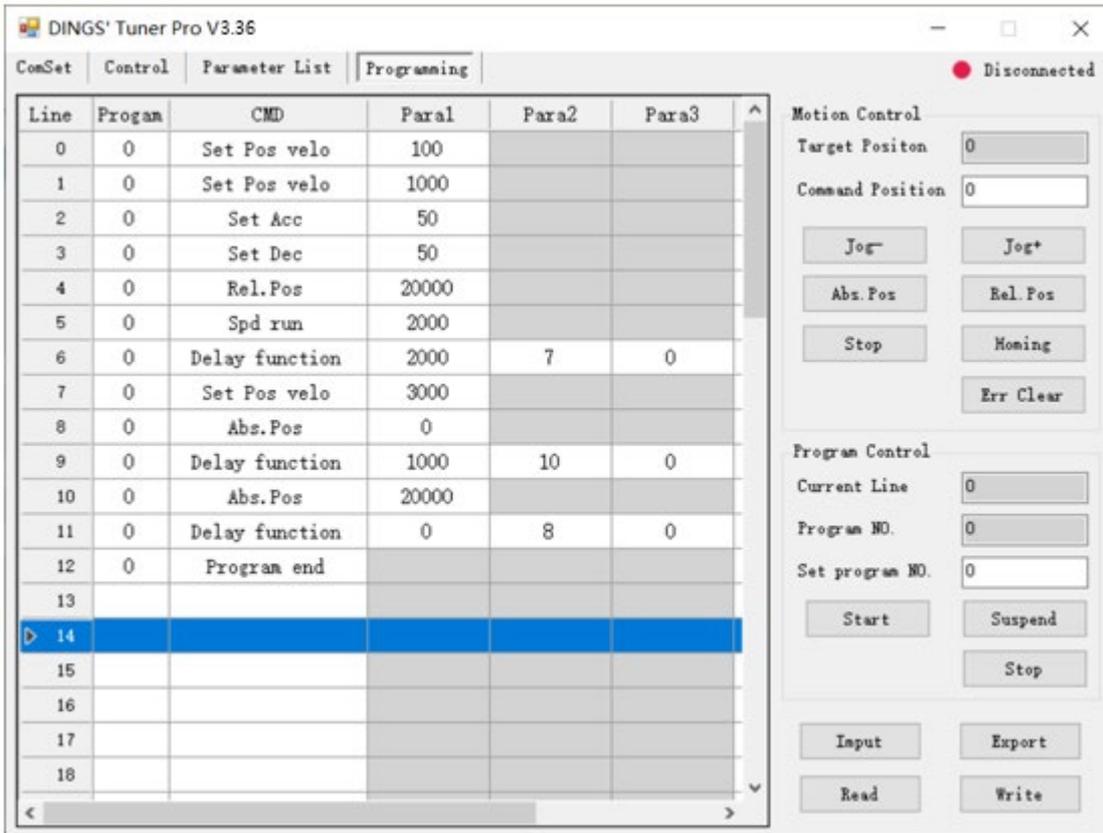
4.2 Multi-paragraph Writing

Multi-axes function can write multiple paragraphs, each paragraph can be set to its own movement, up to 16 paragraphs, each paragraph must end with the end of the paragraph to be triggered normally.

The content of the paragraph can be arbitrarily arranged. First, pull down in the command bar and select the instruction you need. Most instructions only have one parameter and you can enter the corresponding parameter. Here we will talk about the delay jump and speed mode separately.

The first digit of the delayed jump is fixed in ms. delay time unit, the second number is the jump line number, and the third number is fixed at 0, but when using delayed jumps, it should be set 1ms. of delay time at least. otherwise, it won't work properly.

The constant speed mode runs at the set speed, and the running time can be set by connecting a delay jump at the back. Here is an example.



This is multi-axes operation window. Lines 0-3 set operating parameters. Line 4 executes a relative motion for 20000, then line 5 starts executing at a rate of 2rps, sets line 6 to run for 2 seconds, then jumps to line 7. line, then the 8th line resets the position velocity to 3rps, the absolute position runs to 0 at a rate of 3rps, then the ninth line delays 1 second, jumps to the 10th line, and the absolute position runs to 20000 runs. Jump to line 8 with a line 11 delay of 1 second and continue looping. The end of line 11 of a paragraph marks the end of multiple paragraphs.

4.3 Selection of Multi-axes Number



Multi-axes number selection is based on multi-axes bits. Multi-axes bits need to be entered through the input port. Multi-segment bits have a total of 4 bits, all of which are 0 by default. It can be set a multi-segment bit on the input port and then trigger by the input. Here is the multi-axes bit and multi-axes selection relationship.

Bit0	Bit1	Bit2	Bit3	Bit4
0	0	0	0	0
1	0	0	0	0
0	1	0	0	0
1	1	0	0	0
...
1	1	1	1	1

For example, when bit 1 is high level, the number of axes is chosen as 2. At this time, if multi-axes start is enabled, the multi-segment with segment number 2 is executed.

Input ports

IN1	<input type="radio"/>	25:Program bit0	▼	Trig	IN5	<input type="radio"/>	29:Program bit4	▼	Trig
IN2	<input checked="" type="radio"/>	26:Program bit1	▼	Trig	IN6	<input type="radio"/>	0:Invalid port	▼	Trig
IN3	<input type="radio"/>	27:Program bit2	▼	Trig	IN7	<input type="radio"/>	0:Invalid port	▼	Trig
IN4	<input type="radio"/>	28:Program bit3	▼	Trig					

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ConSet Control Parameter List **Programming** Connected

Line	Progam	CMD	Paral	Para2	Para3
▶ 0	0	Abs.Pos	10000		
1	0	Program end			
2	1	Abs.Pos	20000		
3	1	Program end			
4	2	Abs.Pos	30000		
5	2	Program end			
6	3	Abs.Pos	40000		
7	3	Program end			
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Motion Control

Target Position: 0

Command Position: 2000

Jog- Jog+

Abs.Pos Rel.Pos

Stop Homing

Err Clear

Program Control

Current Line: 0

Program NO.: 2

Set program NO.: 0

Start Suspend

Stop

Input Export

Read Write

In this case, when you click to start multi-axes, the absolute position of the number 2 starts and runs up to 30000.

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