NT60
NT86
ModbusRTU user manual

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一 Drive description

1.1 Product introduction

TheNT60/NT86 is a high-performance bus-controlled stepper motor driver with intelligent motion controller function and built-in S-shaped and deceleration instructions to set acceleration and deceleration independently. Run the Modbus protocol over the RS485 network for real-time control of the drivers and motors.

1.1.1 Characteristics

- Programmable small-size stepper motor driver
- Operating voltage DC:
  NT60:24to50VDC
  NT86:18to 80VAC
- Control: Modbus/RTU
- Communications: RS485
- Maximum phase current output:
  NT60: 5A/phase (sine peak)
  NT86: 7A/phase (Sine Peak)
- Digital IO port:
  6-way photoelectric isolation of digital signal input: IN1,IN2 for 5V differential input, can also be connected to 5V single-ended input;
  2-way photoelectric isolation of digital signal output, maximum voltage tolerance of 30V, maximum infusion or pull out of the flow of 100mA,common cathode docking.

1. 2 Prepare before you start

Before you begin, make sure you have the following components:

- A stepper motor that matches the driver
- A small one-word screwdriver for tightening connector screws
- A PC with Microsoft Windows XP/Vista/Windows 7/Windows8/Windows10(32-bit or 64-bit) operating system installed
- NTConfigurator software (available for download from Rtelligentr's website)
- Tip: When the first drive is connected to the RS-485 communication port of your computer or controller, you can cut the cable in two segments. One segment is used for the connection of the driver to the RS-485 communication port of the computer or controller, and the other section can be used to match the terminal to the resistor, connected to the RS-485 communication port at the end of the last drive on the bus.

1.2.1 Install NTConfigurator

- Download and install NTConfigurator software;
- Click Start / All Programs / RETELLIGENT / NTConfigurator to run the software;
- Use a communication cable to connect the drive to your computer.

1.2.2 Connecting the power supply

- Connection driver and DC power supply: Positive, V-DC power negative
- Ensure a reliable connection between the drive base and the earth with a ground screw

1.2.3 Connecting the motor

If you are using a Rtelligent-hit stepper motor, connect the red, blue, green, and black lines in turn to the a-plus, A-, B-, B-ports of the drive.

The motor model of the driver's default drive is a two-phase stepper motor, if the user needs to match the three-phase stepper motor, first modify the motor type through debugging software and then access the three-phase stepper motor.

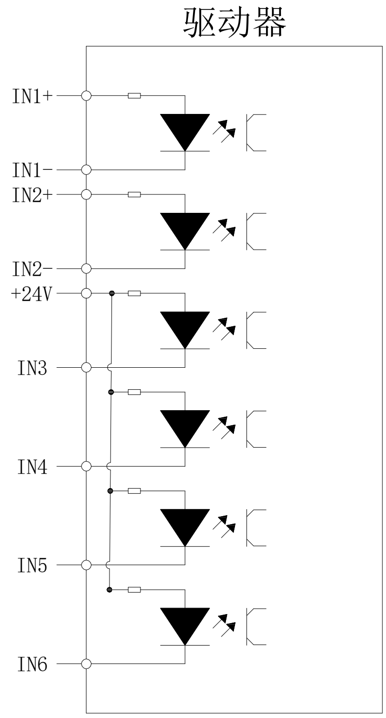
1. 3 Digital input and output ports

1.3.1 Digital input and output ports

The NT60 step drive has 6 digital inputs and2 digital outputs. Digital input and output ports can be freely configured for various functions according to their application needs.

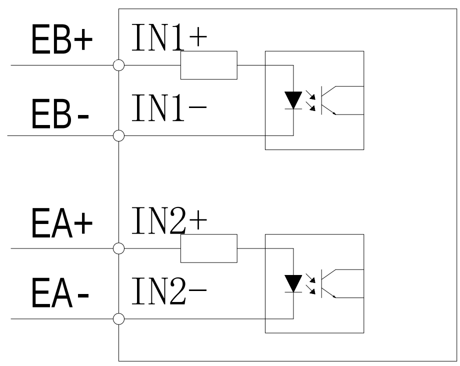
- **Note: IN1+/IN1-,IN2+/IN2-** is the **5V input terminal, do not directly** connect the input signal **above** this **voltage, otherwise the driver will be damaged!**

The schematic of the input port is shown below , and the user can wire the system according to the schematic .



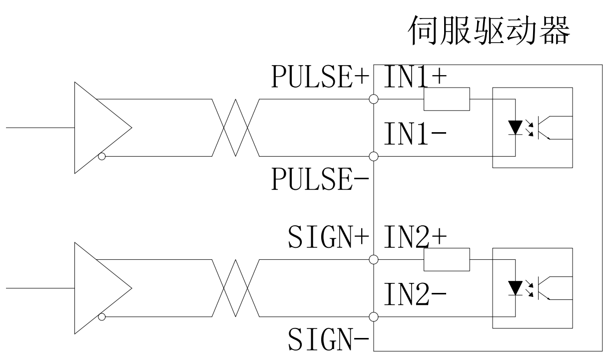
a) IN1+/IN1-, IN2 +/IN2- differential **input terminals**

1、 The external motor encoder forms the closed-loop system:

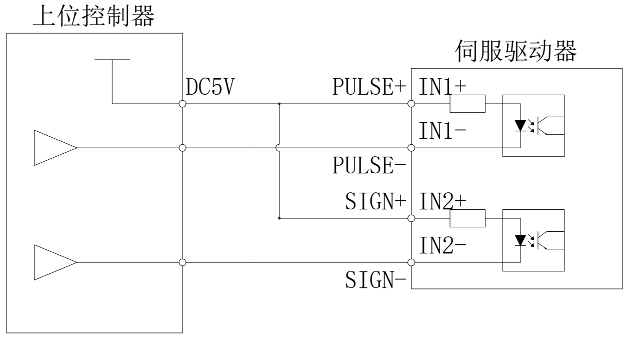


2、 External Pulses and Direction Differential Signals:

(a) 5V differential input

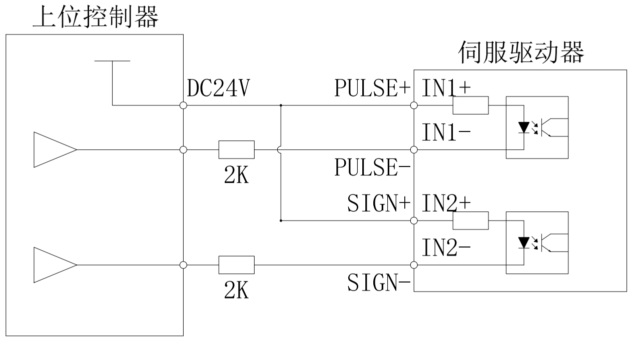


(b) 5V single-ended input

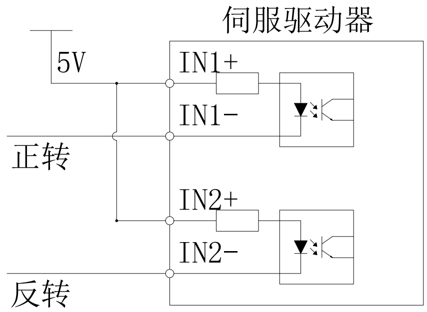


(c) 24V single-ended input

- **Note: When using the 24**V input, string the**2K current limitresist externally, otherwise the drive will be damaged.**



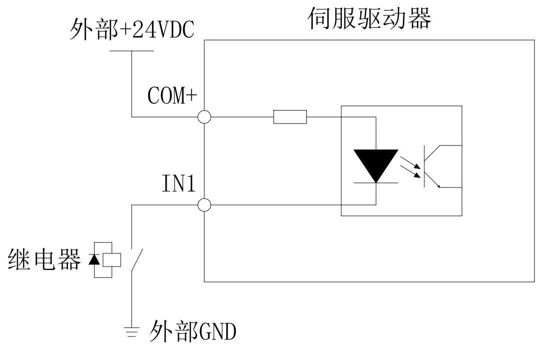
3、 Using a single-terminating method, an external common input signal, such as a positive/reverse signal:



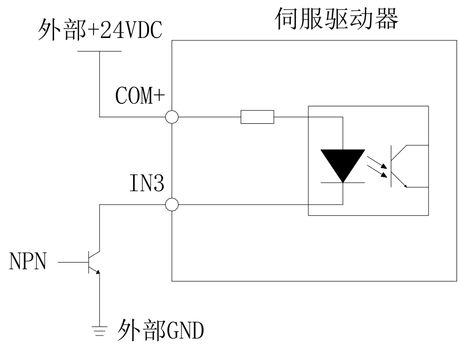
b) IN3to IN6 single-ended input terminals

Taking IN3 as an example, the IN3toIN6 interface circuits are the same.

1. When the upper unit is the relay output:

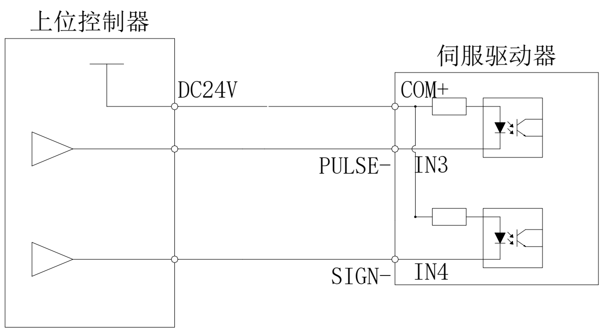


2. When the upper unit is an open output for the collector:



- **Note: PNP input is not supported**

3. Pulses and direction signals using IN3, IN4 terminal inputs



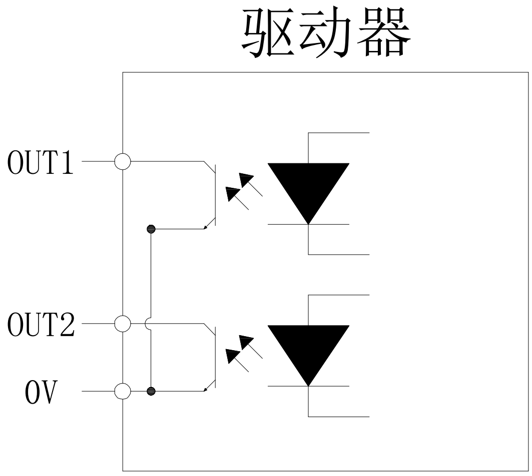
- **If conditions permit, please use IN1,IN2 as the input terminal of the pulse-direction signal.**

1.3.2 Digital output port

NT60 contains two photoelectric isolated output signals.

- OUT1 has an output current capacity of 30mA.
- OUT2 has an output current capacity of 150mA.

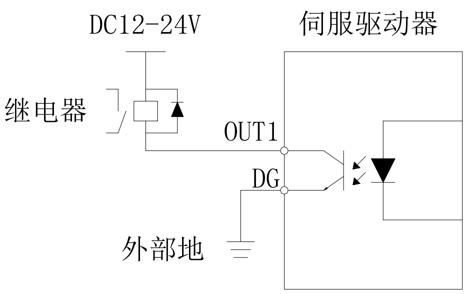
The digital output port is all normally open by default, and the output polarity can be changed with NTConfigurator debugging software.



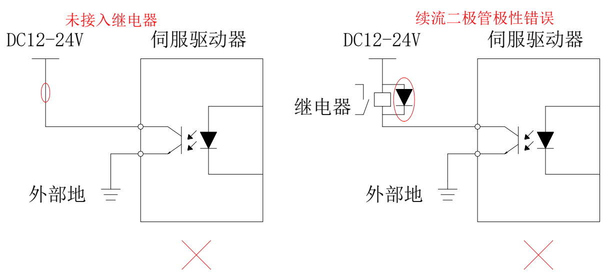
Take OUT1 as an example, the OUT1to OUT2 interface circuit is the same.

1. When the upper unit is entered for a relay:

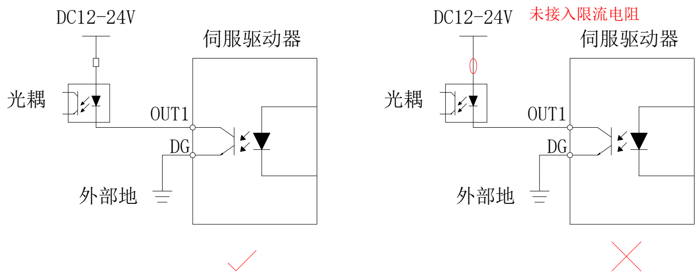
Correct wiring diagram:



Error wiring diagram:



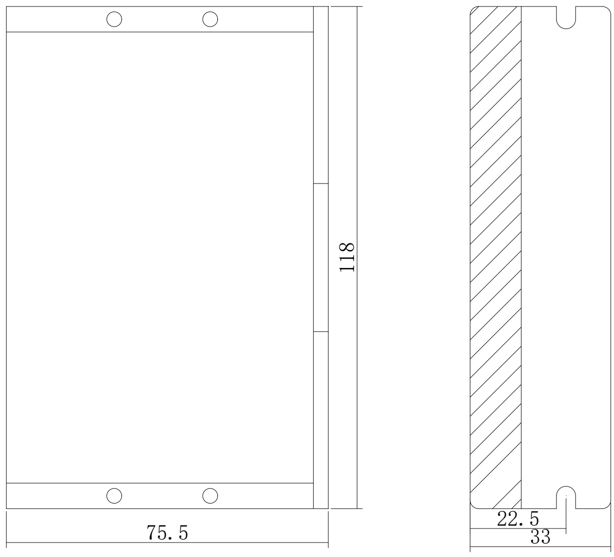
2. When the upper unit is optically coupled input:



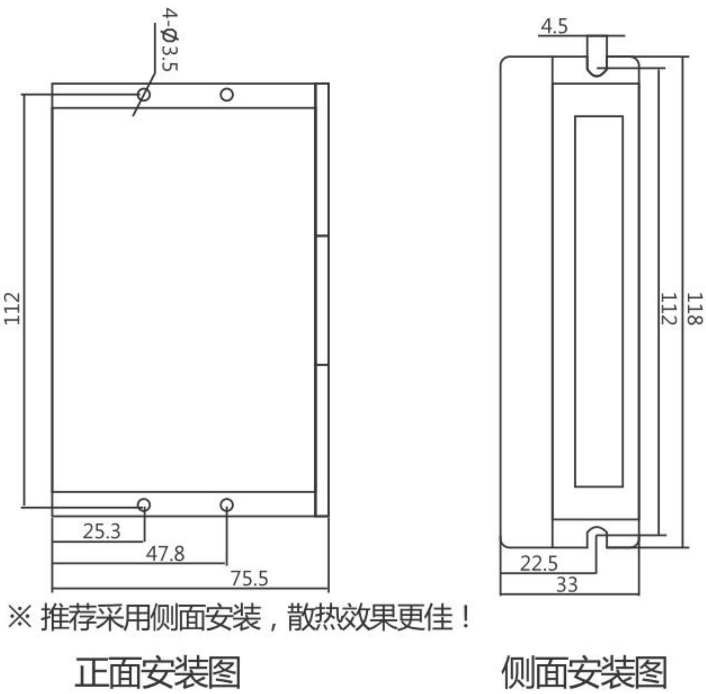
1.4 Alarm code

LED status		Drive status
	The green light is on.	Drive does not enable
	Flashing green light	Drive works
	1 green, 1 red	Drive Overcurrent
	1 green, 2 red	Drive input power overvoltage
	1 green, 3 red	There was an error in the voltage inside the driver
	1 green, 4 red	Encoder variance alarm
	1 green, 5 red	Encoder error
	1 green, 6 red	Parameter check error
	1 green, 7 red	Motor phase-out alarm

1.5 Mechanical size



NT60



NT86

1.6 Accessories

1.6.1 X1 Universal IO Signal Line

All 8 signal ports are drawn out with a shielded cable for easy customer wiring.

Model	Length (m)	Price (RMB: RMB)
CNT60-250	0.25	8
CNT60-500	0.5	10
CNT60-750	0.75	15
CNT60-1000	1	20

1.6.2 RS-485 Extension Line

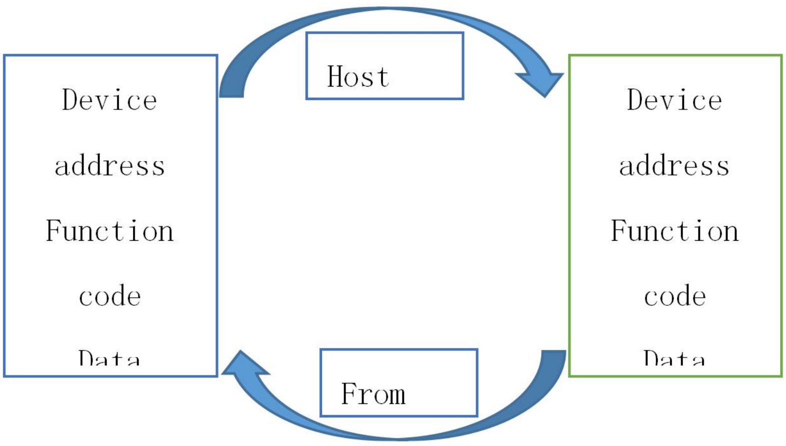
Cat6 compliant network cable.

Model	Length (m)	Price (RMB: RMB)
CRJ45-250	0.25	8
CRJ45-500	0.5	10
CRJ45-750	0.75	15
CRJ45-1000	1	20

二 Communication protocols

2.1 Modbus/RTU Definition

The Modbus protocol, designed by MODICON, is a bus protocol that allows the master and one or more slaves to share data, consisting of 16-bit registers. The master can read and wRtelligent a single register or multiple registers. The standard Modbus port on the Modicon controller is a serial interface that uses AN RS-232 compatible, defining connectors, wiring cables, Signal level, transmission port rate, and parity. Controller communication uses master-to-master technology, i.e. the host can start the data transmission, called query. Other devices (from the machine) return responses to queries, or handle the actions required by queries. The host device should include the main processor, programmer and PLC. The extract includes programmable controllers, servo drives and stepper drives. Its master-to-query-feedback mechanism is as follows:



2.2 Modbus/RTU Message Format

Modbus/RTU is a master-to-master technology, and CRC verification ranges from device address bits to data bits;

The message frame for Modbus/RTU is as follows:

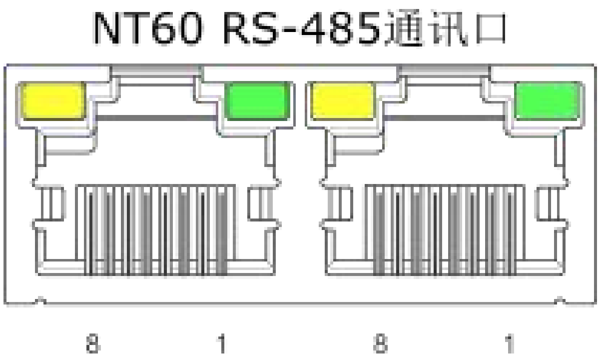
Address	Function code	Data	CRC check code (2 bytes)

domain			

2.3 Modbus/RTU Wire

Modbus/RTU has a common physical layer with the standard RS-232 or RS-485, which can be configured with 1to31 slave addresses, and an RS-485 network can be built in a topology, usually in parallel with the terminal resistance of 120 ohms at the final slave device.

NT60/NR60 RS485 network interface definition:



Terminal no.	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

- **Note: If you are not using a standard network cable, please refer to the terminal number above to the correct wiring, not according to the wire color wiring!**

2.4 Modbus/RTU Configuration

Download the software-based soft NTConfigurator for the product through the Rtelligentr

Electromechanical website (www.szruitech.com), which allows you to set commonly used parameters, and users can also use their own host to make parameter modifications.

The parameters of the Modbus/RTU newsletter are as follows:'

2.4.1 Settings for master communication parameters

1. Baud rate: consistent with the slave;
2. Data bits: 8 bits;
3. Stop bit: 1 stop bit;
4. Check position: there is no check position.

2.4.2 Configuration of the slave communication parameters

1) Slave address

In the same network, each slave has a unique address.

Slave ID	SW1	SW2	SW3	SW4	SW5
Default	ON	ON	ON	ON	ON
1	OFF	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON
3	OFF	OFF	ON	ON	ON
4	ON	ON	OFF	ON	ON
......	......	......	......	......	......
30	ON	OFF	OFF	OFF	OFF
31	OFF	OFF	OFF	OFF	OFF

ON = 0, OFF = 1

Slave Address: SW1 + SW2 x 2 + SW3 x 4 + SW4 x 8 + SW5 x 16

2) Porter Rate

The master and slave must be set to the same Baud rate.

BDR	SW6	SW7
9600	ON	ON

19200	OFF	ON
38400	ON	OFF
115200	OFF	OFF

3) Terminal matching resistance

The end can be selected depending on the situation. Usually not required for a short distance.

120 Terminal	SW8
Invalid	OFF
Effective	ON

4) Modbus/RTU-supported function code

RTELLIGENT drive NT60 currently supports the following Modbus function codes:

a) 0x03: Read Hold Register

b)0x06: WRtelligent a single register

c)0x10: WRtelligent multiple registers

5) Modbus/RTU Register

Register address description

The MODBUS register starts at 0, while in the touch screen and PLC, the address of the register is usually expressed as the 400x type, starting with 1. So:

PLC Address - MODBUS Address s1

Register action type

R-Read-Only

W-Only

R/W-Readable/WRtelligentable

Data type:

MODBUS defaults to a register of 16 bits. Two successive registers make up a 32-bit data.

SHORT - 16bit

LONG - 32bit

2.5 Register Summary

- **Note: The register addresses in the following register summary table are decimal.**

Table 2-1 Register Summary

Register address	Type of action	Data type	Description of the function	Note
0	**R**	***SHORT***	Alarm Code, Alarm Flag	
1	**R**	***SHORT***	Status Code, Drive Status Flag	
2	**R**	***SHORT***	Current input port value	
3	**R**	***SHORT***	Current output port value	
4	**R**	***SHORT***	Universal input port on trigger status	
5	**R**	***SHORT***	Universal input port disconnect trigger state	
6	**W**	***SHORT***	On Trigger State Clear Register	
7	**W**	***SHORT***	Breaking trigger state clear register	
8	**R**	***SHORT***	16 bits lower in current absolute position at internal pulse mode	Make up a LONG-type data
9	**R**	***SHORT***	16 bits above the current absolute position when the internal pulse mode	
10	**R**	***SHORT***	Given speed RPM	
11	**R**	***SHORT***	Bus voltage mV	
12	**R**	***SHORT***	Motor tracking error is 16 bits lower in closed-loop mode	Make up a LONG-type data
13	**R**	***SHORT***	Motor tracking error of 16 bits in closed-loop mode	
14	**R**	***SHORT***	External pulse counter 16 bits lower	Make up a LONG-type data
15	**R**	***SHORT***	External pulse counter 16 bits higher	
16	**W**	***SHORT***	Clear the external pulse counter	
17	**R/W**	***SHORT***	Instruction operating mode: internal instruction sororities or external pulses	

18	**R/W**	***SHORT***	Internal instruction mode and motion instruction sitating when the mode is 0	
19	**R**	***SHORT***	Pulse command form at external pulse	
20	**R/W**	***SHORT***	Application mode selection when using internal instruction mode	
21	**R/W**	***SHORT***	Motor type selection: two-phase or three-phase	
22	**R/W**	***SHORT***	Motor control mode selection: open ring, servo mode one, servo mode two	
23	**R/W**	***SHORT***	The direction of motor operation reverses	
24	**R/W**	**SHORT**	Motor segmentation (pulses/turns)	
25	**R/W**	***SHORT***	Operating current (mA)	
26	**R/W**	***SHORT***	Percentage of standby current (%)	
27	**R/W**	***SHORT***	Time to go into standby after pulse stop (ms)	
28	**R/W**	***SHORT***	S-shaped and deceleration time	
29	**R**	***SHORT***	Current position of encoder (number of pulses)	
30	**R/W**	***SHORT***	Automatic recognition of enable driven parameters	
31	**R**	***SHORT***	Auto-recognized resistance value mOhm	
32	**R**	***SHORT***	Auto-recognized inductor value mH	
33	**R/W**	***SHORT***	User-set resistance value when automatic recognition is cancelled	
34	**R/W**	***SHORT***	When automatic recognition is cancelled, the user sets the electrosteel value	
35	**R/W**	***SHORT***	Motor torque factor reserved for internal use of the drive	
36	**R/W**	***SHORT***	Current ring proportional gain	
37	**R/W**	***SHORT***	Current ring integral gain	
38	**R/W**	***SHORT***	Current ring phase ahead gain	
39	**R/W**	***SHORT***	Current ring step test	
40	**R/W**	***SHORT***	Motor encoder resolution	

41	**R/W**	***SHORT***	Tracking error alarm threshold	
42	**R/W**	***SHORT***	Positioning completion accuracy	
43	**R/W**	***SHORT***	Position time to complete	
44	**R/W**	***SHORT***	The pulse stops to the time when the start detection positioning is complete	
45	**R/W**	***SHORT***	Maximum current	
46	**R/W**	***SHORT***	Base current	
47	**R/W**	***SHORT***	First-stage speed feedback filter	
48	**R/W**	***SHORT***	Secondary speed feedback filter	
49	**R/W**	***SHORT***	Servo mode one low-speed resonance gain	
50	**R/W**	***SHORT***	Servo mode two-position ring proportional gain	
51	**R/W**	***SHORT***	Servo mode two-position ring integral gain	
52	**R/W**	***SHORT***	Servo mode two-speed ring damping 1	
53	**R/W**	***SHORT***	Servo mode two-speed ring damping 2	
54	**R/W**	***SHORT***	Servo mode two-speed ring feed-forward gain	
55	**R/W**	***SHORT***	Servo Mode II Gravity Compensation	
56	**R/W**	***SHORT***	Servo mode ii acceleration gain	
57	**R/W**	***SHORT***	Servo mode two acceleration feed-forward gain	
58	**R/W**	***SHORT***	Servo mode two-speed ring output filter	
59	**R/W**	***SHORT***	Servo mode two acceleration feed-forward filter	
60	**R/W**	***SHORT***	Input 1 SettingS Register	
61	**R/W**	***SHORT***	Input 2 Settings Register	
62	**R/W**	***SHORT***	Input 3 Settings Register	
63	**R/W**	***SHORT***	Input 4 Settings Register	
64	**R/W**	***SHORT***	Input 5 Settings Register	
65	**R/W**	***SHORT***	Input 6 Settings Register	
66	**R/W**	***SHORT***	Output 1 Setting Register	
67	**R/W**	***SHORT***	Output 2 Settings Register	

68	**R/W**	***SHORT***	Output value setting register supres at output ports 1, 2 in universal output mode	
69	**R**	***SHORT***	Enter the status of the function	
70	**R/W**	***SHORT***	Point-to-point motion acceleration (r/s?2)	
71	**R/W**	***SHORT***	Point-to-point motion reduction (r/s?2)	
72	**R/W**	***SHORT***	Maximum speed of point-to-point motion (RPM)	
73	**R/W**	***SHORT***	16-bit lower point-to-point motion stroke (PUISE)	Make up a LONG-type data
74	**R/W**	***SHORT***	16-bit high point-to-point motion stroke (PUISE)	
75	**R/W**	***SHORT***	Acceleration started during continuous operation (R/S?2)	
76	**R/W**	***SHORT***	Deceleration at continuous run time deceleration stop (R/S?2)	
77	**R/W**	***SHORT***	Speed (RPM) of continuous operation	
78	**R/W**	***SHORT***	Speed reduction in emergency stops	
79	**R/W**	***SHORT***	Zero-back mode selection	
80	**R/W**	***SHORT***	Back to zero high speed	
81	**R/W**	***SHORT***	Low speed back to zero	
82	**R/W**	***SHORT***	Zero-back acceleration	
83	**R/W**	***SHORT***	Position offset after zero completion	
84	**R/W**	***SHORT***	Position mode selection: incremental and absolute motion	
85	**R/W**	***SHORT***	Internal instruction counter zeroing	
88	**R/W**	***SHORT***	The variance alarm is invalid	
89	**R/W**	***SHORT***	Servo mode one integral gain	
90	**R/W**	***SHORT***	WRtelligent 1 saves the current parameter and then automatically zeros	
91	**R/W**	***SHORT***	WRtelligent 1 will restore factory settings and then automatically zero	
92	**R**	***SHORT***	Manufacturer reserved, do not wRtelligent any values in this register	

93	**R**	***SHORT***	Drive ID	
94	**R**	***SHORT***	Drive version	
95	**R**	***SHORT***	Non-labeled	
100	**R/W**	***SHORT***	Io switch effective time when speedometer, position table mode	
101	**R/W**	***SHORT***	Current Step Test Current (mA)	
102	**R/W**	***SHORT***	Output 3 Settings Register	
103	**R/W**	***SHORT***	Output 4 Settings Register	
104	**R**	***SHORT***	Output flag	
105	**R/W**	***SHORT***	Internal Speed 0	
106	**R/W**	***SHORT***	Internal Speed 1	
107	**R/W**	***SHORT***	Internal Speed 2	
108	**R/W**	***SHORT***	Internal Speed 3	
109	**R/W**	***SHORT***	Internal Speed 4	
110	**R/W**	***SHORT***	Internal Speed 5	
111	**R/W**	***SHORT***	Internal Speed 6	
112	**R/W**	***SHORT***	Internal Speed 7	
113	**R/W**	***SHORT***	Internal Speed 8	
114	**R/W**	***SHORT***	Internal Speed 9	
115	**R/W**	***SHORT***	Internal Speed 10	
116	**R/W**	***SHORT***	Internal Speed 11	
117	**R/W**	***SHORT***	Internal Speed 12	
118	**R/W**	***SHORT***	Internal Speed 13	
119	**R/W**	***SHORT***	Internal Speed 14	
120	**R/W**	***SHORT***	Internal Speed 15	
121	**R/W**	***SHORT***	Currently triggered location table	
122	**R/W**	***SHORT***	Default parameter ID number	
125	**R/W**	***SHORT***	Internal position 0 low 16 bits	Make up a

126	**R/W**	***SHORT***	Internal position 0 high 16 bits	LONG-type data
127	**R/W**	***SHORT***	Internal position 1 low 16 bits	Make up a
128	**R/W**	***SHORT***	Internal position 1 high 16 bits	LONG-type data
129	**R/W**	***SHORT***	Internal position 2 low 16 bits	Make up a
130	**R/W**	***SHORT***	Internal position 2 high 16 bits	LONG-type data
131	**R/W**	***SHORT***	Internal position 3 low 16 bits	Make up a
132	**R/W**	***SHORT***	Internal position 3 high 16 bits	LONG-type data
133	**R/W**	***SHORT***	Internal position 4 low 16 bits	Make up a
134	**R/W**	***SHORT***	Internal position 4 high 16 bits	LONG-type data
135	**R/W**	***SHORT***	Internal position 5 low 16 bits	Make up a
136	**R/W**	***SHORT***	Internal position 5 high 16 bits	LONG-type data
137	**R/W**	***SHORT***	Internal position 6 low 16 bits	Make up a
138	**R/W**	***SHORT***	Internal position 6 high 16 bits	LONG-type data
139	**R/W**	***SHORT***	Internal position 7 low 16 bits	Make up a
140	**R/W**	***SHORT***	Internal position 7 high 16 bits	LONG-type data
141	**R/W**	***SHORT***	Internal position 8 low 16 bits	Make up a
142	**R/W**	***SHORT***	Internal position 8 high 16 bits	LONG-type data
143	**R/W**	***SHORT***	Internal position 9 low 16 bits	Make up a
144	**R/W**	***SHORT***	Internal position 9 high 16 bits	LONG-type data
145	**R/W**	***SHORT***	Internal position 10 low 16 bits	Make up a
146	**R/W**	***SHORT***	Internal position 10 high 16 bits	LONG-type data
147	**R/W**	***SHORT***	Internal position 11 low 16 bits	Make up a
148	**R/W**	***SHORT***	Internal position 11 high 16 bits	LONG-type data
149	**R/W**	***SHORT***	Internal position 12 low 16 bits	Make up a
150	**R/W**	***SHORT***	Internal position 12 high 16 bits	LONG-type data
151	**R/W**	***SHORT***	Internal position 13 low 16 bits	Make up a
152	**R/W**	***SHORT***	Internal position 13 high 16 bits	LONG-type data
153	**R/W**	***SHORT***	Internal position 14 low 16 bits	Make up a

154	**R/W**	***SHORT***	Internal position 14 high 16 bits	LONG-type data
155	**R/W**	***SHORT***	Internal position 15 low 16 bits	Make up an
156	**R/W**	***SHORT***	Internal position 15 high 16 bits	***LON-type*** data
157	**R/W**	***SHORT***	Torque mode speed ring proportional gain	
158	**R/W**	***SHORT***	Torque mode speed ring integral gain	
214	**R/W**	***SHORT***	3.3V voltage input The corresponding pulse command is 16 bits lower	Make up a
215	**R/W**	***SHORT***	3.3V voltage input Corresponding pulse command 16 bits higher	LONG-type data
216	**R**	***SHORT***	The position command for the current input voltage is 16 bits lower	Make up a
217	**R**	***SHORT***	Position command for current input voltage is 16 bits higher	LONG-type data
218	**R/W**	***SHORT***	Set the instruction error range without simulated volume relocation	
221	**R/W**	***SHORT***	Multi-stage operation mode setting	
222	**R/W**	***SHORT***	Multi-stage position displacement end segment set	
223	**R/W**	***SHORT***	Multi-segment run wait time unit setting	
224	**R/W**	***SHORT***	The maximum running speed of the 1st displacement	
225	**R/W**	***SHORT***	Segment 1 displacement plus subtraction speed	
226	**R/W**	***SHORT***	Wait time after the first displacement is completed	
227	**R/W**	***SHORT***	The maximum running speed of the 2nd displacement	
228	**R/W**	***SHORT***	Segment 2 displacement plus subtraction speed	
229	**R/W**	***SHORT***	Wait time after segment 2 displacement is completed	
230	**R/W**	***SHORT***	Segment 3 displacement maximum running speed	
231	**R/W**	***SHORT***	Segment 3 displacement plus subtraction speed	
232	**R/W**	***SHORT***	Wait time after segment 3 displacement is completed	
233	**R/W**	***SHORT***	4th displacement maximum running speed	
234	**R/W**	***SHORT***	Segment 4 displacement plus subtraction speed	

235	**R/W**	***SHORT***	Wait time after 4th displacement is complete	
236	**R/W**	***SHORT***	The maximum run speed of the 5th displacement	
237	**R/W**	***SHORT***	Segment 5 Displacement Plus And Subtraction Speed	
238	**R/W**	***SHORT***	Wait time after the 5th displacement is complete	
239	**R/W**	***SHORT***	Segment 6 displacement maximum running speed	
240	**R/W**	***SHORT***	Segment 6 Displacement Plus And Subtraction Speed	
241	**R/W**	***SHORT***	Wait time after segment 6 displacement is completed	
242	**R/W**	***SHORT***	The maximum run speed of the 7th displacement	
243	**R/W**	***SHORT***	Segment 7 displacement plus subtraction speed	
244	**R/W**	***SHORT***	Wait time after segment 7 displacement is completed	
245	**R/W**	***SHORT***	The maximum run speed of the 8th displacement	
246	**R/W**	***SHORT***	Segment 8 Displacement Plus And Subtraction Speed	
247	**R/W**	***SHORT***	Wait time after the 8th displacement is complete	
248	**R/W**	***SHORT***	Segment 9 displacement maximum running speed	
249	**R/W**	***SHORT***	Segment 9 Displacement Plus And Subtraction Speed	
250	**R/W**	***SHORT***	Wait time after segment 9 displacement is completed	
251	**R/W**	***SHORT***	Segment 10 displacement maximum running speed	
252	**R/W**	***SHORT***	Segment 10 Displacement Plus and Subtract Speed	
253	**R/W**	***SHORT***	Wait time after segment 10 displacement is completed	
254	**R/W**	***SHORT***	Segment1 displacement maximum running speed	
255	**R/W**	***SHORT***	Segment 11 Displacement Plus and Subtract Speed	
256	**R/W**	***SHORT***	Wait time after segment1 displacement completes	
257	**R/W**	***SHORT***	Segment 12 displacement maximum running speed	
258	**R/W**	***SHORT***	Segment 12 Displacement Plus and Subtract Speed	
259	**R/W**	***SHORT***	Wait time after segment2 displacement is completed	
260	**R/W**	***SHORT***	Segment 13 displacement maximum running speed	
261	**R/W**	***SHORT***	Segment 13 Displacement Plus and Subtract Speed	
262	**R/W**	***SHORT***	Wait time after segment3 displacement is completed	

263	**R/W**	***SHORT***	Segment 14 displacement maximum running speed	
264	**R/W**	***SHORT***	Segment 14 Displacement Plus and Subtract Speed	
265	**R/W**	***SHORT***	Wait time after segment1 4 displacement is completed	
266	**R/W**	***SHORT***	Segment 15 displacement maximum running speed	
267	**R/W**	***SHORT***	Segment 15 Displacement Plus and Subtract Speed	
268	**R/W**	***SHORT***	Wait time after segment 15 displacement is completed	
269	**R/W**	***SHORT***	Segment 16 displacement maximum running speed	
270	**R/W**	***SHORT***	Segment 16 Displacement Plus and Subtract Speed	
271	**R/W**	***SHORT***	Wait time after segment 16 displacement is completed	
272	**R/W**	***SHORT***	Analog input bias	
273	**R/W**	***SHORT***	Analog input Low-pass filter cut-off frequency	
274	**R/W**	***SHORT***	Analog input dead zone	
275	**R/W**	***SHORT***	Analog input zero drift	
276	**R/W**	***SHORT***	3.3V voltage input corresponding to speed instruction	
277	**R**	***SHORT***	DSP current sampling voltage value	
278	**R**	***SHORT***	Input voltage valueafters after zero drift, dead zone, bias processing	
279	**R**	***SHORT***	The corresponding speed of the current voltage input	
280	**R/W**	***SHORT***	Modbus bus error counter	
281	**R/W**	***SHORT***	Modbus CRC Error Counter	
282	**R/W**	***SHORT***	Modbus receives byte error counter	
287	**R/W**	***SHORT***	Origin re-entry enables control	
288	**R/W**	***SHORT***	Origin Return Mode	
289	**R/W**	***SHORT***	Speed of high-speed search for the origin signal	
290	**R/W**	***SHORT***	Speed of low-speed search for origin signal	
291	**R/W**	***SHORT***	Search for the speed of addition and decrease of the origin signal	
292	**R**	***SHORT***	Keep	

293	**R/W**	***SHORT***	Mechanical origin offset 16 bits lower	
294	**R/W**	***SHORT***	Mechanical origin offset 16 bits high	
295	**R/W**	***SHORT***	Mechanical origin offset processing	
296	**R/W**	***SHORT***	Collision back origin detection time	
297	**R/W**	***SHORT***	Collision back to origin speed judgment threshold	
298	**R/W**	***SHORT***	Collision back to origin torque limit	

2.6 Register details

2.6.1 Drive Flag Registers (0to 1)

2.6.1.1 Alarm Flag Registers

All alarm flags for the drive are defined. MODBUS Address :0

15	11	10	9	8
Keep				ECDE1
R-0				R-0

7	6	5	4	3	2	1	0
POSE	MPE	Mem	OT	Uv	OV	Oc	IVE
R-0	R-0	R-0	R-0	R-0	R-0	R-0	R-0

BIT	Name	Describe
9~15	Keep	Read always returns 0
8	ECDE1	Encoder failure 0: Encoder signal OK 1: Encoder signal abnormal
7	POSE	Tracking error alarm 0: No tracking error alarm 1: A tracking error alarm occurs and the motor does not follow the encoder properly. The possible effects are as follows: Position variance alarm threshold The wiring of the encoder Wiring for the motor Whether the parameters such as speed and acceleration are set

		reasonable
6	MPE	Motor phase-out alarm 0: No shortage of phase alarm 1: A phase-out alarm occurs and the driver cannot detect the current of the motor winding properly. Need to detect motor wiring, motor type
5	Mem	Parameter check error 0: The parameter is correct 1: There is an error with the parameter check.
4	OT	Overtemperature alarm sign 0: Drive temperature is normal 1: The internal device temperature of the driver is too high
3	UV	Underpressure alarm sign 0: No undervoltage alarm 1: Drive underpressure
2	OV	Overpressure alarm flag 0: No overvoltage alarm 1: The drive has been pressurized and the following tests need to be done: Check the input power supply Check the pump up voltage when the motor slows down
1	OC	Overcurrent alarm flag 0: No overcurrent alarm 1: Drive overcurrent alarm, possible cause: Short circuit to motor winding Too much current set by the driver causes the motor to burn down Damage to the internal components of the drive
0	IVE	Internal voltage error alarm flag 0: No internal voltage errors 1: Internal voltage error, usually caused by damage to the internal components of the driver

2.6.1.2 Drive Status Registers

Some status flags are defined inside the drive. MODBUS Address: 1

15	11	10	9	8
Keep	TC	POW	NL	PL

R-0

7	6	5	4	3	2	1	0
CLAMP	ARRSPD	RDY	HOME	MOV	INPOS	Alm	ENA
R-0	R-0	R-0	R-1	R-0	R-0	R-0	R-1

BIT	Name	Describe
8to15	Keep	Read always returns 0
11	Tc	Moment reached the state 0: The torque does not reach the set value 1: The torque reaches the set value
10	POW	Power state 0: Drive not powered 1: Drive in power
9	NL	Negative limit valid state 0: Not in negative limit position 1: In the negative limit position
8	Pl	Positive limit valid status 0:Not in positive limit position 1: In the positive limit position
7	CLAMP	Motor mechanical lock state 0: The lock is not open, the mechanical hold motor shaft 1: The lock is open and the motor can run
6	ARRSPD	Whether the motor is running to the set speed 0: Speed not reached 1: Speed has arrived In the internal pulse command mode, it is used to indicate whether the motor has reached the set speed.
5	RDY	Drive Ready Flag 0: Not Ready 1: Ready Typically, the drive is in a ready state when it is in an enabling state. But the motor never makes the transition to enable, it takes 100ms of time to be in a ready state. Automatic recognition of parameters when powering up, and current step testing can cause the motor to be out of order.
4	HOME	Back to zero flag 0: Zero-zero not completed 1: Zero back has been completed
3	MOV	Motor movement signs

		0: Motor stop status 1: The motor is running When the motor is running, it cannot respond to a new motion command and can only respond to a stop command.
2	INPOS	Motor positioning completion sign in closed-loop mode 0: Positioning not completed 1: Positioning complete
1	Alm	Drive alarm flag 0: Drive no alarm 1: There was an alarm on the drive, check the status of the register REG_ALMCODE (address 0)
0	ENA	Drive enable flag 0: Drive not enabled 1: The drive has enabled Powering on the default drive has already enabled

2.6.2 Input and output status registers (2to 7)

2.6.2.1 Input Port Value Register

The value used to indicate the current input port. Because the input port is photoelectric isolation, for ease of understanding, the paper uses optocoupletity to indicate the status of the input port. MODBUS Address :2

15 … 8
Keep
R-0

7	6	5	4	3	2	1	0
Keep		IN6	IN5	IN4	IN3	IN2	IN1
R-0		R-0	R-0	R-0	R-0	R-0	R-0

BIT	Name	Describe
6to15	Keep	Read always returns 0
5	IN6	Level status of input port IN6 0: Input port 6 does not disonuate 1: Input port 6 on
4	IN5	Level status of input port IN5

		0:Input port 5 does not disonuate 1: Enter port 5 on
3	IN4	Level status of input port IN4 0: Input port 4 is not on 1: Input port 14 on
2	IN3	Level status of input port IN3 0: Input port 3 does not disonuate 1: Enter port 3 on
1	IN2	Level status of input port IN2 0: Input port 2 is not on 1: Enter port 2 on
0	IN1	Level status of input port IN1 0: Input port 1 does not disonuate 1: Enter port 1 on

2.6.2.2 When the value of the front output port is 3

The output port value register. MODBUS Address :3

15 … 8
Keep
R-0

7 … 4	3	2	1	0
Keep	OUT4	OUT3	OUT2	OUT1
R-0	R-0	R-0	R-0	R-0

BIT	Name	Describe
4to15	Keep	Read always returns 0
3	OUT4	Level status of output port 4(used by other products) 0: Output port 4 is not on 1: Output port 4 on
2	OUT3	Level status of output port 3(used by other products) 0: Output port 3 is not on 1: Output port 3 on
1	OUT2	Level status of output port 2 0: Output port 2 is not on

		1: Output Port 2 On
0	OUT1	Level status of output port 1 0: Output port 1 is not on 1: Output port 1 on

2.6.2.3 Input port on along latch register

Each time the port changes from off to on, the drive locks the change along. MODBUS Address:4

15							8
Keep							
R-0							

7	6	5	4	3	2	1	0
Keep		IN6	IN5	IN4	IN3	IN2	IN1
R-0		R-0	R-0	R-0	R-0	R-0	R-0

BIT	Name	Describe
6to15	Keep	Read always returns 0
5	IN6	Input port IN6 on along the latch ing-latch flag 0: No on-edge has been made on input port 6 1:Input port 6 has an on edge
4	IN5	Input port IN5 on along the latch ing-latch flag 0: No on edge in input port 5 1:Input port 5 has an on edge
3	IN4	Input port IN4 on along the latch ing-latch flag 0: No on-edge has been made on input port 4 1:Input port 4 has an on edge
2	IN3	Input port IN3 on along the latch ing-latch flag 0: No on edge in input port 3 1:Input port 3 has an on edge
1	IN2	Input port IN2 on along the latch ing-latch flag 0: No on edge in input port 2 1:Input port 2 has an on edge
0	IN1	Input port IN1 on along the latch ing-latch flag 0: No on edge in input port 1

		1:Input port 1 has an on edge

2.6.2.4 Input port shut down along latch register

Each time the port changes from on to off, the drive locks the change along. MODBUS address:5

15							8
Keep							
R-0							

7	6	5	4	3	2	1	0
Keep		IN6	IN5	IN4	IN3	IN2	IN1
R-0		R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

BIT	Name	Describe
6to15	Keep	Read always returns 0
5	IN6	Input port IN6 off along the latch flag 0: No crossing edge occurred on input port 6 1:Entry port 6 has a break edge
4	IN5	Input port IN5 off along the latch flag 0: No crossing edge occurred on input port 5 1:Entry port 5 has a break edge
3	IN4	Input port IN4 off along the latch flag Input port 4 does not have a pass break edge 1:Entry port 4 has a break edge
2	IN3	Input port IN3 off along the latch flag 0: No crossing edge occurred in input port 3 1:Entry port 3 has a break edge
1	IN2	Enter port IN2 off along the latch flag 0: No crossing edge occurred on input port 2 1:Entry port 2 has a break edge
0	IN1	Enter port IN1 off along the latch flag 0: No crossing edge occurred on input port 1 1:Entry port 1 has a break edge

2.6.2.5 Input port on edge clear register

The on-edge flag used to clear the latch. MODBUS address:6

15							8
Keep							
R-0							

7	6	5	4	3	2	1	0
Keep		IN6	IN5	IN4	IN3	IN2	IN1
R-0		R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

BIT	Name	Describe
6to15	Keep	Read always returns 0
5	IN6	Clear the on-edge latch status flag for IN6 0: No effect 1: Clear the on-edge latch flag of the IN6 port
4	IN5	Clear the on-edge latch status flag for IN5 0: No effect 1: Clear the on-edge latch flag for the IN5 port
3	IN4	Clear the on-edge latch status flag for IN4 0: No effect 1: Clear the on-edge latch ingenuity flag for the IN4 port
2	IN3	Clear in3's on-edge latch status flag 0: No effect 1: Clear the on-edge latch ingenuity flag for the IN3 port
1	IN2	Clear in2's on-edge latch status flag 0: No effect 1: Clear the on-edge latch flag for the IN2 port
0	IN1	Clear the on-edge latch status flag for IN1 0: No effect 1: Clear the on-edge latch flag of the IN1 port

2.6.2.6 Input port off edge clear register

The off-edge flag used to clear the latch. MODBUS Address:7

15							8
Keep							
R-0							

7	6	5	4	3	2	1	0
Keep		IN6	IN5	IN4	IN3	IN2	IN1
R-0		R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0

BIT	Name	Describe
6to15	Keep	Read always returns 0
5	IN6	Clear the lock-off status flag of IN6 0: No effect 1: Clear the lock-off sign for the IN6 port
4	IN5	Clear the lock-off status flag of IN5 0: No effect 1: Clear the lock-off sign for the IN5 port
3	IN4	Clear the lock-off status flag of IN4 0: No effect 1: Clear the lock-off sign for the IN4 port
2	IN3	Clear the lock-off status flag of IN3 0: No effect 1: Clear the lock-off sign for the IN3 port
1	IN2	Clear the lock-off status flag of IN2 0: No effect 1: Clear the lock-off sign for the IN2 port
0	IN1	Clear the lock-off status flag of IN1 0: No effect 1: Clear the lock-off sign for the IN1 port

2.6.3 Current position of the motor, speed phase off register (8to 16)

MODBUS Address	Property	The default value	Range	Describe
8	R	0	[0,65535]	16 bits lower in current absolute position at internal pulse mode
9	R	0	[0,65535]	16 bits above the current absolute position when the internal pulse mode

10	R	0	[-3000,3000]	The current instruction speed. Signed 16-bit data in RPM
11	R	-	[0,100]	Current bus voltage value, unit mV
12	R	0	[0,65535]	Motor tracking error is 16 bits lower in closed-loop mode Units: Encoder resolution
13	R	0	[0,65535]	High motor tracking error of 16 bits in closed-loop mode
14	R	0	[0,65535]	External pulse counter 16 bits lower
15	R	0	[0,65535]	External pulse counter 16 bits higher
16	R/W	0	[0,1]	Clear the external pulse counter WRtelligent 0 has no effect, read always returns 0 Writing 1 clears the external pulse counter and the register14, 15 values change to 0. This register will then change to 0.

2.6.4 Drive control mode settings . . . .

MODBUS Address	Property	The default value	Range	Describe
17	R/W	0	[0,1]	Instruction mode sets register, sets the source of the pulse instruction of the drive 0: Internal Pulse Command 1: External pulse command
18	R/W	0	[0,6]	Control instructions for internal pulse mode 0: Wait ingres status. The drive receives any control instructions and will resume the bit wait state after the drive has processed it. So reading this register always returns 0. 1: The fixed length is turning. In relative position mode, the motor is running forward according to the 70-74 register parameters. In absolute position mode, the running state is determined according to the current position and the absolute position set 70 to 74. 2: Fixed length reversal.

				In relative position mode, the motor operates in reverse according to the 70-74 register parameters. In absolute position mode, the running state is determined according to the current position and the absolute position set 70 to 74. 3:Speed mode, continuous positive turn. The motor is running forward and accelerated according to the 75, 77 registers 4: Speed mode, continuous reversal. The motor is operated at reverse acceleration according to the 75, 7 7registers 5: Emergency stop. Motor slows down according to 78 register 6: Slow down to stop. Position mode, motor slows down according to 71 register Speed mode, motor slows down according to 76 register Other: No effect. This register only works if the internal pulse pattern register has a value of 0
19	R/W	0	[0,2]	External pulse command mode setting register 0:IN1 is the pulse input and IN2 is the direction input 1:IN1 is a forward pulse input and IN2 is a reverse pulse input 2: IN1 is the orthogonal encoder A-phase input port, IN2 is the orthogonal encoder B-phase input Other: Invalid Note mode 2 here, although the drive receives a orthogonal encoder signal, but at this point the drive only follows it, which is a form of instruction. It is not a position feedback signal for the stepper motor itself. This feature can be used to follow the encoder signal output from other devices, such as servo drivers.
20	R/W	0	[0,5]	Preset application selection when internal pulse mode 0: Respond to instructions for the 18 register 1: Keep, do not use

				2: Preset IO control mode one: start and stop direction 3: Preset IO Control Mode II: Forward-Turn-Reverse 4: Preset IO Control Mode III: Internal Speedtable 5: Pre-io control mode 4: internal position table 6: Preset IO control mode 5: step position 7:Custom1 8: Custom2 9: Custom3 10: Custom4 11: Custom5 12: Custom 6 13: Custom 7 14: Custom 8 15: Custom 9 16: Custom 10 17: Custom 11 18: Custom 12 19: Custom 13 20: Custom 14 21: Analog speed (custom 15) 22: Analog position (custom 16)
21	R/W	0	[0,1]	Motor type setting register 0: Two-phase stepper motor 1: Three-phase stepper motor
22	R/W	0	[0,2]	Motor Operating Mode Settings Register 0: Open ring run 1: Servo Mode One 2: Servo Mode II
23	R/W	0	[0,1]	Motor direction reverse setting register 0:Default running direction 1: The direction of motor operation reverses

2.6.5 Open-loop operation parameter settings . . . .

MODBUS Address	Property	The default value	Range	Describe

24	R/W	4000	[200,65535]	Segmentation settings Set the breakdown of the drive running
25	R/W	3000	(0,6000)	Open-loop operating current The sine peak of the drive while running the open ring. Unit: mA
26	R/W	50	[0,100]	Percentage of standby current Sets the percentage of the current relative to the running current when the drive open-loop mode enters standby. Units: %
27	R/W	500	[10,65535]	Standby time settings Set the drive to run while the pulse stops for a certain amount of time and the drive goes into standby. Unit: ms
28	R/W	128	[1,512]	Pulse command filter For smoothing pulse instructions (including internal and external pulses), filtertime s set value s 50us
29	R	-	-	The current position of the encoder (number of pulses)

2.6.6 Motor and current ring parameters .30-39

MODBUS Address	Property	The default value	Range	Describe
30	R/W	0	[0,1]	Automatic PI enable function The drive has built-in parameter recognition and gain optimization algorithms. Usually, good results can be achieved. If the customer needs optimization, you can disable this feature. 0: No automatic PI function 1: Use the automatic PI function
31	R	-	[100,65535]	Automatically recognized resistance values Read the motor winding resistance value that the drive automatically recognizes. Unit: mOhm
32	R	-	[1,65535]	Auto-recognized inductor values Read the motor winding inductor value that the drive automatically recognizes. Unit: mH
33	R/W	1000	[100,10000]	The resistance value set by the user

				With the automatic PI function removed, the resistance value set by the user takes effect. Unit: mOhm
34	R/W	1	[1,10]	User-set inductor values The user-set inductor value takes effect with the automatic PI function removed. Unit: mH
35	R/W	200	[0,1000]	Motor torque constant The parameters are only valid if the motor control mode is servo mode II
36	R/W	1000	[200,10000]	Current ring proportional gain KP in the current ring PI algorithm. When the auto-PI function is enabled, ILOOPKP is automatically generated, and when the automatic PI function is not enabled, the user can modify the ILOOPKP.
37	R/W	200	[0,2000]	Current ring integral gain KI IN THE CURRENT RING PI ALGORITHM. Enable automatic PI function, ILOOPKI automatically generated, when not enable disenable automatic PI function, the user can modify ILOOPKI
38	R/W	256	[0,1024]	KC in the current ring PI algorithm.
39	R/W	0	[0,1]	Current Step Test WRtelligent 0 has no effect, read always returns 0 Writing 1 will start the current ring step test. At this point, the current of the motor winding will first be 0 and then increase to 1000mA. Users can view step responses through NTConfigurater, manually adjust ILOOPKP and ILOOPKI, and optimize motor responses.

2.6.7 Closed-loop control motor parameters .40-48

MODBUS Address	Property	The default value	Range	Describe
40	R/W	4000	[256,65535]	Encoder feedback resolution The drive is capable of receiving orthogonal encoder input signals and performing 4x frequency processing.

				Encoder Resolution - Encoder Line X 4
41	R/W	2000	[100,65535]	Tracking error alarm threshold The alarm threshold is in encoder resolution.
42	R/W	10	[1,65535]	Positioning completion accuracy In encoder resolution.
43	R/W	50	[1,65535]	Position the duration of completion Set the motor into completion accuracy, the duration of the duration of the setting x 50us
44	R/W	100	[1,65535]	Locate when the test ingres sits After the drive has stopped receiving the pulse, after the set time, then begin to determine whether the positioning is complete. Set-up time - set-up X 50us
45	R/W	4000	[0,5000]	Maximum current for closed-loop control Set the maximum allowable current allowed to run when the drive closed loop is running, sine peak, in mA
46	R/W	50	[0,100]	Percentage of base current for closed-loop control
47	R/W	200	[10,5000]	First-level speed filtering, in Hz
48	R/W	600	[10,5000]	Secondary speed filtering, in Hz

2.6.8 Closed-loop servo parameters .49-59

MODBUS Address	Property	The default value	Range	Describe
49	R/W	0	[0,500]	Servo mode one low-speed resonance gain
50	R/W	3000	[0,65535]	Servo mode two-position ring proportional gain
51	R/W	1000	[0,65535]	Servo mode two-position ring integral gain
52	R/W	0	[0,65535]	Servo mode two-speed ring damping 1
53	R/W	800	[0,65535]	Servo mode two-speed ring damping 2
54	R/W	600	[0,65535]	Servo mode two-speed ring feed-forward gain
55	R/W	512	[0,1024]	Servo Mode II Gravity Compensation
56	R/W	0	(0,65535)	Servo mode ii acceleration gain
57	R/W	0	(0,65535)	Servo mode two acceleration feed-forward gain
58	R/W	5000	(10,5000)	Servo mode two-speed ring output filter
59	R/W	2000	(10,5000)	Servo mode two acceleration feed-forward filter

2.6.9 The input and output settings registers (60 to 69)andtheinput and output settings registers (60 to 6 9), and the informations102to104.

2.6.9.1 Input setting registers (60to65)

The drive contains six inputs, each of which is set up the same way.

15	8
Keep	
R-0	

7 6	5	4 0
Keep	GPOLARPIN ITY	GPINPUTFUNC
R-0	R/W-0	R/W-0

BIT	Name	Describe
6to15	Keep	Read always returns 0
5	GPOLARPINITY	Active level of input 0: Normally closed 1: Normally on (default)
0to4	GPINPUTFUNC	Input port function selection 0: Pulse input 1: Direction input 2: Orthogonal encoder A phase input 3: Orthogonal encoder B-phase input 4: Motor offline 5: Clear the fault 6: Emergency stop 7: Point-moving forward/start-stop 8: Point Reversal/Direction 9: Forward limit input 10:Reverse limit input 11:Zero signal 12:Start Back to Zero 13:Motor operating direction reverse

		14:Multi-segment speed control 0 15:Multi-segment speed control1 16:Multi-segment speed control2 17:Multi-segment speed control 3 18:Multi-segment position control 0 19:Multi-segment position control1 20: Multi-segment position control2 21:Multi-segment position control3 22: USER1 23: USER2 24: USER3 25: USER4 26: USER5 27: USER6 28: USER7 29: USER8 30: USER9 31: USER10 Other: the input port has no effect, only do ordinary input port

MODBUS Address	Proper ty	The default value	Range	Describe
60	R/W	0	(0,31)	Input 1 SettingS Register
61	R/W	1	(0,31)	Input 2 Settings Register
62	R/W	4	(0,31)	Input 3 Settings Register
63	R/W	7	(0,31)	Input 4 Settings Register
64	R/W	12	(0,31)	Input 5 Settings Register
65	R/W	11	(0,31)	Input 6 Settings Register

2.6.9.2 Output setting registers (66to69)

The drive contains two output ports, each set up the same way

15	8
Keep	

R-0

7	6	5	4	3	0
Keep			OUT_POLARI TY	GPOUTPUTFUNC	
R-0			R/W-0	R/W-0	

BIT	Name	Describe
5to15	Keep	Read always returns 0
4	polarITY OUT_	Polarity of exports 0: Normally closed 1: Normally on (default)
0to3	GPOUTPUTFUNC	Out port function selection 0: Normal output, user control 1: Alarm output, OUT0 default 2: Lock signal output 3: Signal output in place 4: Speed reaches output, OUT1 default 5: Zero-zero finish output 6: Drive ready to output 7: Motor stop status output 8: Positive limit output 9: Negative limit output 10:Power indicates output 11:Moment reaches output Other: the input port has no effect, only do ordinary input port

MODBUS Address	Property	The default value	Range	Describe
66	R/W	1	(0,11)	Output 1 Setting Register
67	R/W	4	(0,11)	Output 2 Settings Register
102	R/W	1	(0,11)	Output 3 Settings Register (Other Products)
103	R/W	4	(0,11)	Output 4 Settings Register (Other Products)

- When the output 1/2 setting register value is set to 0 (normal output, user control),the register with the MODBUS address of 68 is used to set whether the output port is on. It is important to note thatthe output port polarity in MODBUS address 66/67 still works. The MODBUS address 68 register is described below:

15			8
Keep			
R-0			

7 ... 2	1	0
Keep	OUT1VAL	OUT0VAL
R-0	R/W-0	R/W-0

BIT	Name	Describe
2 to 15	Keep	Read always returns 0
1	OUT1VAL	Set the level status of the output port OUT1 0:Output port 1 does not disonbehave 1: Output Port 1 On
0	OUT0VAL	Set the level status of the output port OUT0 0: Output port 0 is not on 1: Output port 0 on

MODBUS Address	Property	The default value	Range	Describe
68	R/W	0	(0,1)	OUT0, OUT1 as normal output when the output state settings
69	R	-	-	The active flag bit of the current input function (consistent with the digital input port function) 0: The corresponding function is not valid 1: The corresponding function is valid
104	R	-	-	The current output function active flag bit (consistent with the function of the digital output port) 0: The corresponding function is not valid 1: The corresponding function is valid

2.6.10 Point motion parameter settings . . . .

MODBUS Address	Property	The default	Range	Describe

		value		
70	R/W	200	[10,1000]	Acceleration at point motion, inR/S?2
71	R/W	200	[10,1000]	The deceleration of point motion, inR/S?2
72	R/W	600	[0,3000]	Maximum speed when point movement, in RPM
73 74	R/W	2000	-16777216,16777216	Running Pulse Command situ at Point Motion, Unit: Number of Pulses P73 is low 16 bits of data and P74 is high 16 bits

The 73 and 74 registers form a 32-bit signed register.

- In incremental mode, the absolute values of 73 and 74 indicate the distance to run, and the motor is run forward or reverse by writing to 1 or 2 through register 18.
- In absolute position mode, the signed data of 73 and 74 represents the target position, and the motor runs to the set distance by writing 18 to 1.

2.6.11 Point mode parameter settings . . . .

MODBU Address	Proper ty	The default value	Range	Describe
75	R/W	100	[10,1000]	Point Acceleration, Unit:R/S?2
76	R/W	100	[10,1000]	Point-down reduction speed, in:R/S?2
77	R/W	600	[0,3000]	Point Speed, Unit: RPM
78	R/W	500	[10,1000]	Emergency stop-and-minus speed, in:R/S?2

2.6.12 Internal pulse control parameters (84to89)

MODBU Address	Proper ty	The default value	Range	Describe
84	R/W	0	s0,1	Internal pulse command operating mode 0: Incremental position mode 1: Absolute position mode
85	R/W	0	[0,1]	0: WRtelligent 0 is invalid, read returns 0 1: Internal pulse command counter zeroing
88	R/W	0	s0,1	0: Differential alarm effective

				1:The variance alarm is invalid
89	R/W	50	(0,500)	Servo mode one integral gain

2.6.13 Drive Basic Parameter Registers(90to 99)

MODBU Address	Proper ty	The default value	Range	Describe
90	R/W	0	s0,1	0: WRtelligent 0 is invalid, read returns 0 1:WRtelligent 1 Save the current parameter
91	R/W	0	s0,1	0: WRtelligent 0 is invalid, read returns 0 1:WRtelligent 1 will restore factory settings
92	-	-	-	Vendors retain usage, users prohibit writing data
93	R	-	-	Drive ID letter
94	R	-	-	Drive version number
95	R	-	-	Non-labeled

2.6.14 Built-in speedometer parameter settings . . . .

MODBUS Address	Property	The default value	Range	Describe
100	R/W	200	[0,65535]	When expressorate, position table mode, IO switch ingest time - set value x 50us
101	R/W	1000	(0,3000)	Current step test current setting
105	R/W	0	[0,3000]	Internal Speed 1,Unit: RPM
106	R/W	100	[0,3000]	Internal Speed 2,Unit: RPM
107	R/W	200	[0,3000]	Internal Speed 3,Unit: RPM
108	R/W	300	[0,3000]	Internal Speed 4,Unit: RPM
109	R/W	400	[0,3000]	Internal Speed 5,Unit: RPM
110	R/W	500	[0,3000]	Internal Speed 6,Unit: RPM
111	R/W	600	[0,3000]	Internal Speed 7,Unit: RPM
112	R/W	700	[0,3000]	Internal Speed 8,Unit: RPM
113	R/W	800	[0,3000]	Internal Speed 9,Unit: RPM
114	R/W	900	[0,3000]	Internal speed 10,unit: RPM
115	R/W	1000	[0,3000]	Internal Speed1 1,Unit: RPM

116	R/W	1100	[0,3000]	Internal Speed 12,Unit: RPM
117	R/W	1200	[0,3000]	Internal Speed 13,Unit: RPM
118	R/W	1300	[0,3000]	Internal speed 14,unit: RPM
119	R/W	1400	[0,3000]	Internal speed 15,unit: RPM
120	R/W	1500	[0,3000]	Internal speed 16, unit: RPM

2.6.15 Built-in position table parameter settings . . . .

MODBUS Address	Proper ty	The default value	Range	Describe
121	R	-	-	Currently triggered location table
122	R/W	100	[100,110]	Default parameter ID number (do not modify)
125 126	R/W	0	(-16777216,16777216)	Internal Position 1 Directive P125 is 16 bits lower andP126 is 16 bits high
127 128	R/W	0	(-16777216,16777216)	Internal Position 2 Directive P127 is 16 bits lower and P128 is 16 bits high
129 130	R/W	0	(-16777216,16777216)	Internal Position 3 Instruction P129 is 16 bits lower and P130 is 16 bits high
131 132	R/W	0	(-16777216,16777216)	Internal Position 4 Instruction P131 is 16 bits lower and P132 is 16 bits high
133 134	R/W	0	(-16777216,16777216)	Internal Position 5 Directive P133 is 16 bits lower and P134 is 16 bits high
135 136	R/W	0	(-16777216,16777216)	Internal Position 6 Directive P135 is 16 bits lower and P136 is 16 bits high
137 138	R/W	0	(-16777216,16777216)	Internal Position 7 Directive P137 is 16 bits lower and P138 is 16 bits high
139 140	R/W	0	(-16777216,16777216)	Internal Position 8 Directive P139 is 16 bits lower and P140 is 16 bits high
141 142	R/W	0	(-16777216,16777216)	Internal Position 9 Directive P141 is 16 bits lower and P142 is 16 bits high
143 144	R/W	0	(-16777216,16777216)	Internal Position 10 Instruction P143 is 16 bits lower and P144 is 16 bits high
145 146	R/W	0	(-16777216,16777216)	Internal Position 11 Directive P145 is 16 bits lower and P146 is 16 bits high
147	R/W	0	(-16777216,16777216)	Internal Position 12 Directive

148				P147 is 16 bits lower and P148 is 16 bits high
149 150	R/W	0	(-16777216,16777216)	Internal Position 13 Instruction P149 is 16 bits lower and P150 is 16 bits high
151 152	R/W	0	(-16777216,16777216)	Internal Position 14 Instruction P151 is 16 bits lower and P152 is 16 bits high
153 154	R/W	0	(-16777216,16777216)	Internal Position 15 Directive P153 is 16 bits lower and P154 is 16 bits high
155 156	R/W	0	(-16777216,16777216)	Internal Position 16 Directive P15 5is 16 low and P156 is 16 bits high

2.6.16 Torque mode registers (157to158)

MODBUS Address	Proper ty	The default value	Range	Describe
157	R/W	1000	1,65535,	Torque mode speed ring proportional gain
158	R/W	15000	0,65535,	Torque mode speed ring integral gain

2.6.17 Analog position control mode parameters(214to218)

MODBUS Address	Proper ty	The default value	Range	Describe
214 215	R/W	4000	0,0xFFFFF ...	Position instruction when setting analog input voltage at 3.3V 214 is low 16 bitdata and 215 is high 16 bit data
216 217	R	-	-	Position instruction for the current input voltage 216 is low 16 bits of data, 217 is high 16 bits of data
218	R/W	5	0,32767,	The difference between the position instruction corresponding to the analog input voltage and the current position command is not adjusted when the position instruction is within the set range. Frequent jitter when the motor is stationary to eliminate the presence of jitter in the analog input voltage or when the P214/215 parameter setting is relatively large.

2.6.18 Multi-stage operation control mode parameters(221to271)

<table>
<tr><th>MODBUS Address</th><th>Property</th><th>The default value</th><th>Range</th><th>Describe</th></tr>
<tr><td>221</td><td>R/W</td><td>0</td><td>0 , 2 ,0,2,</td><td>Set how multiple positions run
0: Single run mode
From the beginning of the first displacement, the number of end-point displacement segments set by the P222 parameter, and then the shutdown;
1: Cycle mode
The number of end-point displacement segments from the beginning of the first displacement to the end displacement set by the P222 parameter, and then the cycle starts again from the 1st displacement;
2: Control mode by IN input signal
The selection ofdisplacement segments via the IN input function is "Multi-segment Position Control3/2/1/0"
<table>
<tr><th>Multi-segment control 3</th><th>Multi-segment control 2</th><th>Multi-segment control 1</th><th>Multi-segment control 0</th><th>Displacement selection</th></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Paragraph 1</td></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>Paragraph 2</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>Paragraph 3</td></tr>
<tr><td>......</td><td>......</td><td>......</td><td>......</td><td>......</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>Paragraph 16</td></tr>
</table></td></tr>
<tr><td>222</td><td>R/W</td><td>16</td><td>s1,16</td><td>Set the number of end segments of multiple displacements,
● The parameter only takes effect when the P221 parameter is set to 0/1</td></tr>
<tr><td>223</td><td>R/W</td><td>0</td><td>s0,1</td><td>Units that set the wait time after each displacement run
0:ms
1:s</td></tr>
</table>

				● The parameter only takes effect when the P221 parameter is set to 0/1
224	R/W	100	0,3000. . .	Segment 1 displacement maximum operating speed, unit RPM ● Shift stroke please refer to the built-in position table parameter settings of the "Internal Position 1" setting
225	R/W	100	1,2000,	Segment 1 displacement acceleration, deceleration, units:R/S
226	R/W	100	0,65535,	Wait time after segment 1 displacement ends ● The parameter only takes effect when the P221 parameter is set to 0/1
227	R/W	100	0,3000. . .	2nd displacement maximum running speed, unit RPM
228	R/W	100	1,2000,	Segment 2 displacement acceleration, deceleration, units: R/S
229	R/W	100	0,65535,	Wait time after segment 2 displacement ends
230	R/W	100	0,3000. . .	Segment 3 Displacement Maximum Running Speed, UNIT RPM
231	R/W	100	1,2000,	Segment 3 displacement acceleration, deceleration, units: R/S
232	R/W	100	0,65535,	Wait time after segment 3 displacement ends
233	R/W	100	0,3000. . .	4th displacement maximum running speed, unit RPM
234	R/W	100	1,2000,	Segment 4 displacement acceleration, deceleration, units: R/S
235	R/W	100	0,65535,	Wait time after the 4th displacement ends
236	R/W	100	0,3000. . .	Segment 5 displacement maximum running speed, unit RPM
237	R/W	100	1,2000,	Segment 5 displacement acceleration, deceleration, units: R/S
238	R/W	100	0,65535,	Wait time after the 5th displacement ends
239	R/W	100	0,3000. . .	Segment 6 displacement maximum running speed, unit RPM
240	R/W	100	1,2000,	Segment 6 displacement acceleration, deceleration, units: R/S
241	R/W	100	0,65535,	Wait time after the 6th displacement ends
242	R/W	100	0,3000. . .	7th displacement maximum running speed, unit RPM

243	R/W	100	1,2000,	Segment 7 displacement acceleration, deceleration, units: R/S
244	R/W	100	0,65535,	Wait time after segment 7 displacement ends
245	R/W	100	0,3000. . .	8th displacement maximum running speed, unit RPM
246	R/W	100	1,2000,	Segment 8 displacement acceleration, deceleration, units: R/S
247	R/W	100	0,65535,	Wait time after the 8th displacement ends
248	R/W	100	0,3000. . .	9th displacement maximum running speed, unit RPM
249	R/W	100	1,2000,	Segment 9 displacement acceleration, deceleration, units: R/S
250	R/W	100	0,65535,	Wait time after segment 9 displacement ends
251	R/W	100	0,3000. . .	Segment 10 displacement maximum running speed, unit RPM
252	R/W	100	1,2000,	Segment 10 displacement acceleration, deceleration, units: R/S
253	R/W	100	0,65535,	Wait time after the end of the 10th displacement
254	R/W	100	0,3000. . .	Segment1 displacement maximum running speed, unit RPM
255	R/W	100	1,2000,	Segment1 1 displacement acceleration, deceleration, units: R/S
256	R/W	100	0,65535,	Wait time after the end of the 11th displacement
257	R/W	100	0,3000. . .	Segment 12 displacement maximum operating speed, unit RPM
258	R/W	100	1,2000,	Segment 12 displacement acceleration, deceleration, units: R/S
259	R/W	100	0,65535,	Wait time after the end of the 12th displacement
260	R/W	100	0,3000. . .	Segment 13 Displacement Maximum Running Speed, Unit RPM
261	R/W	100	1,2000,	Segment 13 displacement acceleration, deceleration, units: R/S
262	R/W	100	0,65535,	Wait time after the 13th displacement ends
263	R/W	100	0,3000. . .	Segment 14 displacement maximum operating speed, unit RPM
264	R/W	100	1,2000,	Segment 14 displacement acceleration, deceleration, units: R/S
265	R/W	100	0,65535,	Wait time after the end of the 14th displacement

266	R/W	100	0,3000. . .	Segment 15 Displacement Maximum Running Speed, UNIT RPM
267	R/W	100	1,2000,	Segment 15 displacement acceleration, deceleration, units: R/S
268	R/W	100	0,65535,	Wait time after the end of the 15th displacement
269	R/W	100	0,3000. . .	Segment 16 displacement maximum operating speed, unit RPM
270	R/W	100	1,2000,	Segment 61 displacement acceleration, deceleration, units:R/S
271	R/W	100	0,65535,	Wait time after the end of the 16th displacement

2.6.19 Analog input parameter settings (272to279)

MODBUS Address	Property	The default value	Range	Describe
272	R/W	0	0,1650,	Set analog input voltage bias, unit: mV
273	R/W	10	0,2000,	Set the analog input voltage low-pass filter cut-off frequency, in Hz
274	R/W	50	0,1000. . .	Set analog input voltage dead zone, unit: mV
275	R/W	0	0,1000. . .	Set analog input voltage zero drift, unit: mV
276	R/W	100	0,3000. . .	When setting the analog input voltage at 3.3V, the corresponding speed, in RPM
277	R	-	-	DSP current sampling voltage value, in mV
278	R	-	-	After zero drift, dead zone, bias processing after the analog input voltage value, unit: mV
279	R	-	-	The current analog input voltage corresponds to the speed, in RPM

2.6.20 Modbus Communication Error Counter (280to282)

MODBUS Address	Property	The default value	Range	Describe
280	R/W	-	-	Modbus bus error counter Read: Number of Modbus Bus Errors After Last Reset Counter

				WRtelligent: Reset Modbus bus error counter
281	R/W	-	-	Modbus CRC Error Counter Read: Number of Modbus CRC errors since the last reset counter WRtelligent: Reset Modbus CRC error counter
282	R/W	-	-	Modbus Receives Byte Error Counter Read: Modbus receives byte error counter from last reset counter WRtelligent: Reset Modbus receives bytes error counter

2.6.21 **Back to Origin Control Mode Settings . 287-298**

MODBUS Address	Property	The default value	Range	Describe

<table>
<tr>
<td>287</td>
<td>R/W</td>
<td>1</td>
<td>0,6 , 0 ,6,</td>
<td>
Set the way the origin re-return enables control
<table>
<tr><th>Set value</th><th>How to control</th></tr>
<tr><td>0</td><td>Prohibit Origin Resettlement Function</td></tr>
<tr><td>1</td><td>In terminals that use the IN input function as "start-back to zero" trigger the mechanical back-to-origin function</td></tr>
<tr><td>2</td><td>Trigger the electrical back to origin function using the IN input function for "Start back to zero"
Electrical return origin is generally used after the mechanical return origin, does not require the sensor input signal. Directly according to the absolute position to run back to the position instruction set by the P293/294 parameter,p8/9 parameter is equal to The P293/294 parameter after the completion of the electrical return origin</td></tr>
<tr><td>3</td><td>Power-up automatic machinery back to origin
This value is set and the next time the call-up is automatically returned after you wRtelligent 1 permanently to the P90 parameter.
Trigger back to origin only after powering on and the motor enables</td></tr>
<tr><td>4</td><td>Communication triggers mechanical back to origin function
In the case of motor enable, writing this value will immediately trigger the mechanical back to origin function. When the return origin is complete, the register is zeroed</td></tr>
<tr><td>5</td><td>Communication triggers electrical back to origin function
Writing this value in the case of motor enable, the electrical back to origin function is immediately triggered. When the return origin is complete, the register is zeroed</td></tr>
<tr><td>6</td><td>Communication trigger sits at current location
In the case of motor enable, the value is written and the drive will be at its current position as the origin. When the return origin is complete, the register is zeroed</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><td>288</td><td>R/W</td><td>0</td><td>0,5 , 0 ,5,</td><td>Set origin return mode
<table>
<tr><th>Set value</th><th>Control mode</th></tr>
<tr><td>0</td><td>Forward back to origin
Slowdown point: Origin switch
Origin: Origin Switch</td></tr>
<tr><td>1</td><td>Negative back to origin
Slowdown point: Origin switch
Origin: Origin Switch</td></tr>
<tr><td>2</td><td>Forward back to origin
Slow-down point: forward limit switch
Origin: Forward limit switch</td></tr>
<tr><td>3</td><td>Negative back to origin
Slow-down point: negative limit switch
Origin: Negative Limit Switch</td></tr>
<tr><td>4</td><td>Forward back to origin
Slowdown point: mechanical limit position
Origin: Mechanical Limit Position</td></tr>
<tr><td>5</td><td>Forward back to origin
Slowdown point: mechanical limit position
Origin: Mechanical Limit Position</td></tr>
</table></td></tr>
<tr><td>289</td><td>R/W</td><td>50</td><td>0,1000. . .</td><td>Speed of high-speed search for origin switch signal, unit: RPM</td></tr>
<tr><td>290</td><td>R/W</td><td>10</td><td>0,1000. . .</td><td>Speed of low-speed search for origin switch signal, unit: RPM</td></tr>
<tr><td>291</td><td>R/W</td><td>200</td><td>1,1000 , 1000.</td><td>Search for the addition and subtraction speed of the origin switch signal, inR/S?2</td></tr>
<tr><td>292</td><td>-</td><td>-</td><td>-</td><td>Keep</td></tr>
<tr><td>293
294</td><td>R/W</td><td>0</td><td>-1048576,1048576</td><td>Set mechanical origin offset, unit: command pulse
● Note: When the P293/294 parameter is set at a positive number, it indicates a positive operation</td></tr>
<tr><td>295</td><td>R/W</td><td>0</td><td>0,1 , 0 ,1,</td><td>Mechanical origin offset and limit handling:
<table>
<tr><th>Set value</th><th>Mechanical origin offset and limit-limit processing</th></tr>
<tr><td>0</td><td>P293/P294 is the coordinates after the return of the origin.
Reverse to find the origin after encountering a limit re-triggering the origin re-entry enable
Note:
Mechanical origin: The mechanical origin does not coincide with the mechanical zero point,</td></tr>
</table></td></tr>
</table>

					after finding the origin switch signal,the current position P8/9 parameter is forced toset the p293/294 parameter setting Limit processing mode: give the origin re-return trigger signal again, the motor direction to perform origin re-return
				1	P293/P294 is the relative offset after the origin is returned. Reverse to find the origin after encountering a limit re-triggering the origin re-entry enable Note: Mechanical origin: Mechanical origin coincides with mechanical zero point, after finding the origin switch signal,the motor runs p293/394 parameter set after the instruction stroke stop, P8/9 parameter equals P293/P294 parameter setting Limit processing mode: give the origin re-return trigger signal again, the motor direction to perform origin re-return
				2	P293/P294 is the coordinates after the return of the origin. Encounter limit automatic reverse search origin Note: Mechanical origin: Mechanical origin does not coincide with mechanical zero point, after finding the origin switch signal,the current position P8/9 parameter is forced to setthe p293/294 parameter setting Limit handling: Automatic reverse execution back to origin
				3	P293/P294 is the relative offset after the origin is returned. Encounter the limit automatic reverse to find the origin Note: Mechanical origin: mechanical origin and mechanical zero coincide, find the origin switch signal,the motor to run P293/394 parameter set after the instruction stroke, P8/9 parameter equal to P293/P294 parameter settings Limit handling: automatic reverse execution back to origin

296	R/W	5000	(1000,65535)	At P288 set to 4/5, the ability is to collide back to the origin. Whenthe motor running speed is lower than the P297 parameter setting, andthe actual current of the motor is greater than or equal to the P298 parameter setting, it is considered that the mechanical limit position has been reached, at this time the internal collision back to the origin counter starts to count, whenthe counter time is greater than the P296 setting, the motor is completed back to the origin. Set the collision back point detection time in 50us
297	R/W	5	1,1000 , 1000.	Set the collision back origin detection speed, unit: PRM
298	R/W	1000	1,6000. . .	Set the moment size of the collision back point torque in mA

三 Modbus/RTU routine

3. 1 Origin Resettlement Related Settings

3.1.1 Features

Origin: That is, the mechanical origin, can be expressed as the origin switch signal or limit switch signal, by the P288 parameter set.
Zero point: that is, the target point is positioned, which can be expressed as the origin and offset(P293/P294 setting). When the offset is set 0, the zero and origin coincide.
The origin reassignment function is in the driver enable state, triggerthe origin return function, the motor will actively find zero points, complete the positioning function.
Other location instructions, including the re-triggered origin reassignment enable signal, are blocked during the origin return run, and the drive responds to other location instructions after the origin re-run is complete.
Origin re-entry features include origin back zero and electrical back zero.
Origin zero: After receiving the origin re-return trigger signal, the drive actively locates the relative position of the motor shaft and the mechanical origin according to the pre-set mechanical origin, first finds the origin, and then moves the offset on the origin to reach the zero position. The origin return to zero, which is usually used in the first time to find zero.
Electrical back to zero: After the zero position has been determined by the origin back zero operation, a relative displacement is moved with the current position as the starting point.
When the origin return is complete (including origin return zero and electrical zero), the current positionof the motor(P8/P9) is consistent with the mechanical origin offset(P293/P294).

After the origin return is completed, the driver outputs the origin back to zero completion signal, and the upper machine can confirm that the origin return is complete. The function settings of the output port please refer to the output port settings register . . . .

3.1.2 **Origin Back zero**

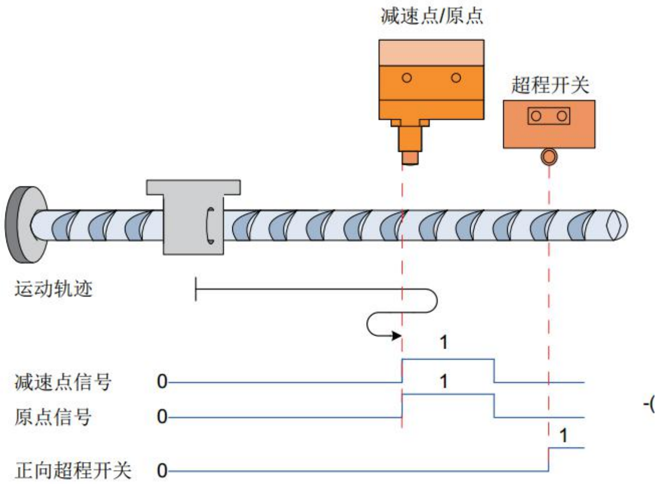
Take the following example to illustrate the origin back to zero:

- Forward return to zero, deceleration point, origin switch(P288-0)
- Forward return to zero, deceleration point, origin is positive limit switch(P288 x 2)
- Forward return to zero, deceleration point, origin is mechanical limit position(P288 x 4)

（1） Origin back to zero: forward back to zero, deceleration point, origin switch(P288-0)

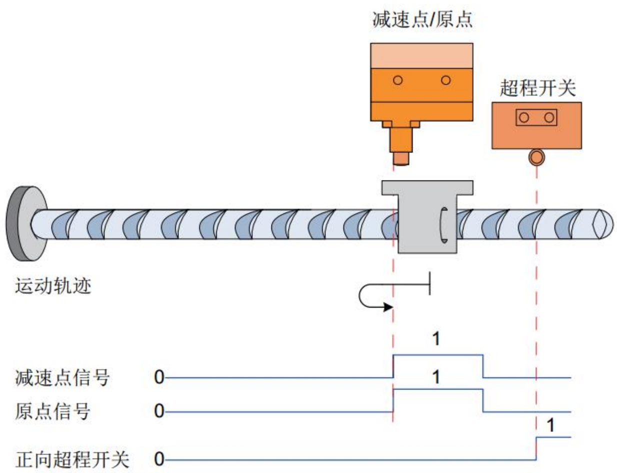
① The origin switch (deceleration point) signal is invalid when the motor starts to move(0-invalid, 1-effective), the forward limit switch is not triggered throughout the

The motor first searches for the deceleration point signalat the high-speed forward direction set by P289 until it encounters the rising edge of the deceleration point, reduces the speed to 0 according to the reduction speed set by P291, reverses to the low-speed search deceleration point signal drop-off edge of -P290, and stops immediately after the deceleration point signal drops, and then stops at P290 Continue to search for the rising edge of the origin signal at low speed, in positive acceleration or forward uniform operation, when the ascending edge of the origin signal is encountered immediately stop.



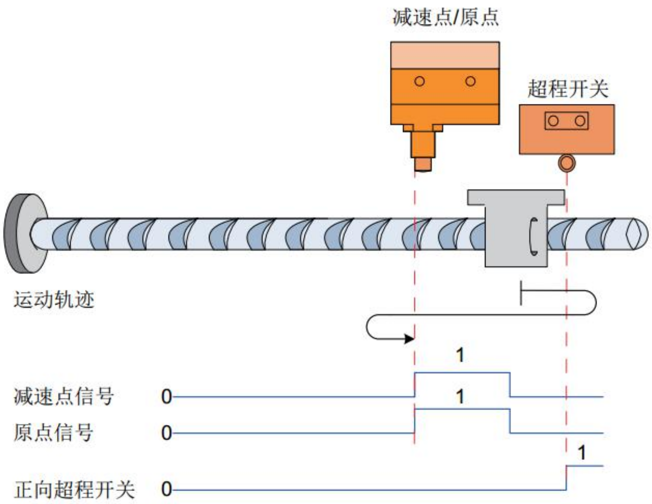
② The origin switch (deceleration point) signal is valid when the motor is running and no forward limit switch is triggered

The motor directly to the -P290 set point low-speed reverse search deceleration point signal drop edge, encounter the deceleration point signal drop edge immediately stop, and then withthe P290 setting is positive to continue to search for the origin signal rising edge, forward acceleration or forward uniform operation, encounter the origin signal rise edge immediately stop.



③ The origin switch (deceleration point) signal is invalid when the motor is starting to run and the forward limit switch is triggered in the process

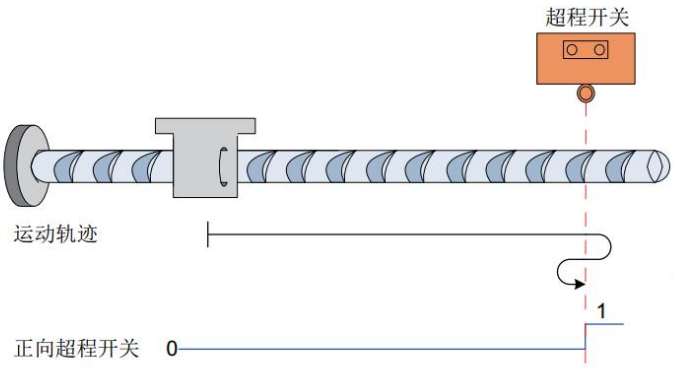
The motor first has a High-speed forward search for deceleration point signal at the P289 setting, and after encountering the forward limit switch, the driver, according to the P295 setting, decides to reverse back to zero immediately (P295x2 or 3), or shut down and wait for the upper machine to give the origin zero trigger signal again (P295x0 or 1), after meeting the conditions, the drive is down along the low-speed reverse-search ingre0able signal with -P289. After encountering the deceleration point signal drop edge, in accordance with the P291 set deceleration to 0, and then in accordance withthe P290 setting value is to search for the origin signal rising edge, positive acceleration or forward uniform speed operation process, encounter the origin signal rise edge immediately stop.



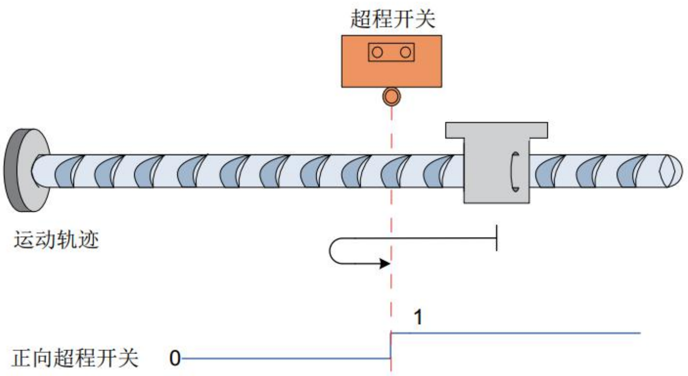
（2） Origin Zero: Forward zero, deceleration point, origin is positive limit switch(P288 x 2)

① Forward limit switch signal is invalid when motor starts movement(0-invalid, 1-effective)

The motor first searches forward high-speed forward limit switch with P289 setting, encounters the rising edge of the forward limit switch signal, slows down to 0 according to the reduction speed set by P291,then searches for the forward limit switch signal at a low speed with a forward limit setting of -P290, encounters the forward limit switch signal drops the positive direction immediately after stopping, resumes forward operation,and moves the low speed search limit switch in the P290 set direction. The positive limit switch signal is immediately stopped on the rising edge.



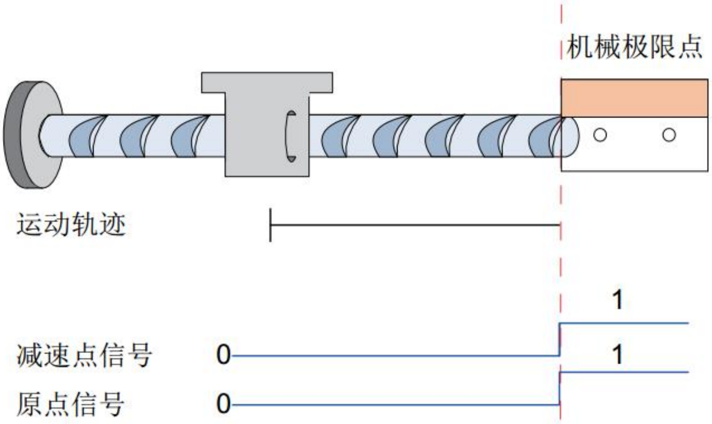
② The forward limit switch signal is valid when the motor starts to move The motor directly reverses the forward limit switch signal to the -P290 setting point, and immediately stops after encountering the downward edge of the forward limit switch signal, then searchs for the forward limit switch signal ascent slings at the P290 setting point, and in the process of positive acceleration or forward uniform operation, the forward limit switch signal is immediately stopped.



（3） Origin Zero: Forward zero, deceleration point, origin is positive limit switch(P288 x4)

The motor first runs at ap290 setting point is running at a forward low speed, after hittingthe mechanical limit position, if the motor torque reaches the Upper Limit of P298 torque and the motor speed is lower thanthe P297 setting, this state remains P296 set time, and the motor is determined to reach the mechanical limit position, the motor shuts down immediately.

- **Note: This back-zero mode(P288-4/5) is available in closed-loop mode only**



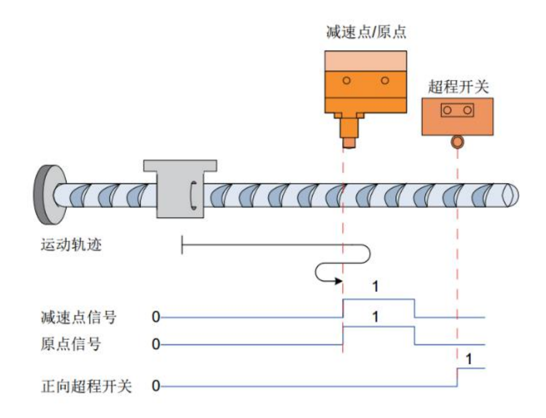
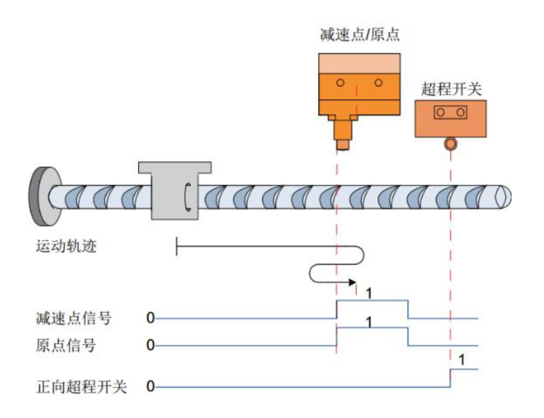
3.1.3 Electrical back to zero

When the mechanical zero position of the system is known after the origin zero is completed, the motor can be moved from the current position (P8/P9) to the specified position (P293/P294)when P293/P294 isset. In the electrical back zero mode, the motorruns at a high speed with the P289 setting value,and the total displacement of the motor is determined by the difference between P293/P294 andP8/P9, and the direction of operation is determined by the positive and negative of the total displacement of the motor, the displacement instruction is completed, and the motor is immediately stopped.

3.1.4 Mechanical Origin and Mechanical Zero

The difference between the mechanical origin and the mechanical zero point is illustrated by p288.

The mechanical origin does not coincide with the mechanical zero point	Mechanical origin coincides with mechanical zero
If the origin offset (P 293/P294x0) is set	If the origin offset (P293/P294x0)is set and

<table>
<tr><td>and the mechanical origin does not coincide with the mechanical zero (P295 x0),the positive acceleration or forward uniform operation is immediately stopped when the rising edge of the origin signal is encountered, and the current positionof the motor P8/P9 is forced to P293/P294 after shutdown Set the value.</td><td>the mechanical origin coincides with the mechanical zero(P295 x 1),the motorcontinues to move after encounteringthe rising edge of the origin signal until the current absolute position P8/P9 is p293/P294 setting.</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Zero-zero specific parameter settings and addresses please refer to the back point control mode settings . . . .

3. 2 Communication control mode

In this mode, the user can make the motor run the specified pulse stroke or tap run by communicating a given operating instruction. The details are as follows.

3.2.1 Point control mode

NT60/NR60 has the function of the communication control motor running the specified pulse stroke. The patterns and parameters that need to be set are as follows (register addresses are decimal numbers if not specifically not marked or noted):

（1） Set the value of register address 20 (preset application selection when the internal pulse mode)is 0(communication control, in response tothe instruction of register address 18);

（2） According to the application needs and the actual terminals, set the function of the digital input and output port;

（3） Set motion parameters:

Address	Unit	Parameter description
70	R/S?2	Acceleration of point motion
71	R/S?2	The deceleration of the point motion
72	RPM	Speed of point motion
73	Command Pulse	The number of command pulses for point motion is 16 bitregisters lower
74	Command Pulse	1 6-bit register of the number of command pulses for the point motion
78	R/S?2	Speed of emergency stop-and-minus
84	-	Set the position run mode: 0: Incremental 1: Absolute

（4） Communication given a run instruction: start the point motion by writing the value 1 (fixed forward),2 (fixed long reversal) to register 18 (for a detailed description of the register, see register 18 in the "Drive Control Mode Settings");

（5） During operation, if a shutdown is required, the value 6 can be writtento register 18 (deceleration stop, deceleration is register 71 setting), value 5 (emergency stop stop, deceleration is register 78 setting).

- Attention:
- The motor is in operation and only responds to the stop command (slow down or emergencystop). If you need to change the direction of the motor by instruction, you need to send a stop command to send a start signal in the other direction after the motor has stopped.
- The acceleration (register 70),the deceleration (register 71),the speed

(register 72) changes during the motor operation, but the driver does not respond to these settingsimmediately and needs to be started again after the motor shuts down before running at the set value. It should be noted in particular that the emergency stop-and-des-speed (register 78) in the current movement emergency stop is responded to, without waiting for the next movement of the emergency stop stop.

3.2.2 Point control mode

The NT60/NR60 has the function of controlling the movement of the motor through communication. The patterns and parameters that need to be set are as follows (register addresses are decimal if not specifically marked or noted):

（1） Set a value of register address 20 (preset application selection when the internal pulse mode)is set to 0(communication control, in response toinstructions of register address 18);

（2） According to the application needs and the actual terminals, set the function of the digital input and output port;

（3） Set motion parameters:

Address	Unit	Parameter description
75	R/S?2	Point motion acceleration
76	R/S?2	Point Motion Reduction Speed Reduction
77	RPM	Point Motion Motion Speed
78	R/S?2	Speed of emergency stop-and-minus

（4） Communication given a run instruction: start the point motion by writing a value of 3 (continuous forward), 4 (continuous reversal) to register 18 (for a detailed description of the register, see register 18 in the "Drive Control Mode Settings");

（5） During operation, if a shutdown is required, the value 6 can be writtento register 18 (deceleration stop, deceleration is register 76 setting), value 5 (emergency stop stop, deceleration is register 78 setting).

- Attention:
- The motor is in operation and only responds to the shutdown command (slow down or emergency stop). If you need to change the direction of the motor by instruction, you need to send a stop command until the motor stops before sending a start signal in the other direction.
- The acceleration (register 75)and the deceleration (register 76)are changed during motor operation, but thedrive does not respond to these settings immediately and needs to be started again after the motor is shut down. In particular, the emergency stop-and-desis not required to wait for the next movement to stop and stop at the current motion with out of action for the speed of the current movement (register 78).
- The speed can be changed during the operation of the motor (register7 7)and thedriver responds immediately, i.e. the motor runs immediately at the set speed value without having to start again after a shutdown.

3. 3 IO Control: Start-Stop-and-Direction

The NT60/NR60 uses this mode to control the operation of the motor using two IN ports. One of the IN terminals is used to control the start/stop of the motor and one of the IN terminals is used to control the direction of operation of the motor. The settings are as follows:

（1） Set the value of register address 20 (preset application selection when the internal pulse mode) is 2 (start-stop-and-direction mode);

（2） Set the function of the digital input and output port according to the application needs and the actual terminals. Among them, the function of the two IN terminals is set to "point movement forward/start and stop", "point reversal/direction"to control the start/stop direction of the motor. In terminal function settings please refer to the "input port settingregister "60-65";

（3） Set motion parameters:

Address	Unit	Parameter description
75	R/S?2	Point motion acceleration
76	R/S?2	Point Motion Reduction Speed Reduction
77	RPM	Point Motion Motion Speed
78	R/S?2	Speed of emergency stop-and-minus

（4） The appropriate level is entered through the corresponding IN port to control the operation and direction of the motor.

- Attention:
- Dynamic changes in acceleration (register 75),despeed (register 76),speed (register 77),emergency stop (register 78) during motor operation, and the drive responds to these settings immediately.
- The direction signal can be switched during the operation of the motor, at which point the motor will slow down at the reduction speed set in register 75 and then accelerate to the set speed in the opposite direction.

3. 4 IO Control: Forward-and-Reverse

The NT60/NR60 uses this mode to control the operation of the motor using two IN ports. One of the IN terminals is used to control the forward rotation of the motor and one of the IN terminals is used to control the reversal of the motor. The settings are as follows:

（1） Set the value of register address 20 (preset application selection when the internal pulse mode) is 3 (forward-and-reverse mode);

（2） Set the function of the digital input and output port according to the application needs and the actual terminals. Among them, the function of the two IN terminals is set to "point movement forward/start and stop", "point reversal/direction" to control the positive and reverse movement of the motor. In terminal function settings please refer to the "input port settingregister "60-65";

（3） Set motion parameters:

Address	Unit	Parameter description
75	R/S?2	Point motion acceleration
76	R/S?2	Point Motion Reduction Speed Reduction
77	RPM	Point Motion Motion Speed
78	R/S?2	Speed of emergency stop-and-minus

（4） Input the appropriate level through the corresponding IN port to control the forward and reverse motion of the motor

- Attention:
- The user can dynamically change the acceleration (register 75),the despeed (register 76),thespeed (register 77),the emergency stop (register 78),and thedriver responds to these settings immediately.
- Change the direction of operation while the motor is running, first undo the operating signal in this direction and then give the operating signal in the other direction after the motor stops.

3. 5 IO Control Speedometer Mode

This mode selects 16-speed speed with up to 4 IO. The first speed is usually set at 0, indicating that the motor has stopped.

After switching the IO state, the new speed takes effect after the time set by register 100.

The relevant registers are as follows:

Parameters	Unit	RTU register address	Routine settings
Point acceleration	R/S?2	40076 (0x004B)	100 (0x0064)
Point-and-decrease speed	R/S?2	40077 (0x004C)	100 (0x0064)
Speed reduction in emergency stops	R/S?2	40079 (0x004E)	500 (0x01F4)
IN1 Port Features	-	40077 (0x003C)	46 (0x002E)

IN2 Port Features	-	40077 (0x003D)	47 (0x002E)
IN3 port functionality	-	40077 (0x003E)	48 (0x002E)
IN4 Port Features	-	40077 (0x003F)	49 (0x002E)
Effective time after IO switch	50us	40101 (0x0064)	200 (Time: 200 x 50us x 1ms)
Speed Table 0	Rpm	40106 (0x0069)	0
Speed Table 1	Rpm	40107 (0x0070)	100
Speed Table 2	Rpm	40108 (0x0070)	200
Speed Table 3	Rpm	40109 (0x0072)	300
Speed Table 4	Rpm	40110 (0x0073)	400
Speed Table 5	Rpm	40111 (0x0074)	500
Speed Table 6	Rpm	40112 (0x0075)	600
Speed Table 7	Rpm	40113 (0x0076)	700
Speed Table 8	Rpm	40114 (0x0077)	800
Speed Table 9	Rpm	40115 (0x0078)	900
Speed Table 10	Rpm	40116 (0x0079)	1000
Speed Table 11	Rpm	40117 (0x007A)	1100
Speed Table 12	Rpm	40118 (0x007B)	1200
Speed Table 13	Rpm	40119 (0x007C)	1300
Speed Table 14	Rpm	40120 (0x007D)	1400
Speed Table 15	Rpm	40121 (0x007E)	1500

Step 1:20 register set app control mode:4

Step2: Set acceleration and reduce speed.

WRtelligent message:01 10 00 69 00 10 00 00 00 64 00 C8 01 01 01 01 F4 02 58 02 BC 03 03 03 84 03 E8 08 4C 04 05 05 14 05 78 05 DC 03 92

Feedback message:01 10 00 69 00 10 11 D9

Step3: Set the IO port and polarityused to select the speed table.

IN1,IN2,IN3,IN4 port functions should be set to: internal speed control 0,1,2,3,the corresponding register value bit 46,47,48,49.

WRtelligent message:01 10 00 3C 00 04 08 00 2E 00 2F 00 30 00 31 3C 35

Feedback message:01 10 00 3C 00 04 01 C6

Step4: Enter the appropriate level at the appropriate IO port to control the motor operation.

The user can dynamically modify the speed table and deceleration information during operation.

The user can also use an input port to control the direction in which the motor is running. The function of the port should be set to the internal speed instruction reverse.

The user motor switches the direction signal during operation, the motor will first slow down and stop and then accelerate in the opposite direction to the set speed.

3.6 IO Control Position Table Mode

Set in the same way as 7.5

3.7 Internal Pulse Application Mode 20

The internal pulse application mode 20 integrates a variety of application modes, in which IN dot, IN point, communication point, communication point, multi-segment operation, etc. can be realized. The settings are as follows:

3.7.1 Relevant settings for implementing positive timing of point movement

（1） Set the acceleration, reduction speed, speed, speed of the stop and decrease: Please set the corresponding value by reference to the description in the point mode parameter setting s75-78;

（2） Set the corresponding IN pin function: input setting register

IN Pin	Set a value	
	Polar bit	Function bit
INx	0/1(according to input polarity settings)	7 (Dot moving forward/start and stop)
INx	0/1(according to input polarity settings)	8(Point Reversal/Direction)

（3） How to start

- Through the PLC or key to the corresponding IN pin a level trigger signal, the motor can be achieved the point movement forward/reverse;
- WRtelligent 3(point forward), 4(point reversal),5 (emergency stop), 6 (deceleration stop)to the P18 registerwith 48 communicationto achieve the positive/reversal of the motor The ;
- Through the 485 communication, the "polarity" bit in the corresponding IN pin configuration register can be flipped to simulate an external IN trigger signal to achieve the positive/reversal of the motor;

（4） In the tap operation, the drive responds to parameters such as acceleration, speed reduction, velocity, etc. modified through 485 communication in real time.

3.7.2 Relevant settings for implementing positive reversal of points

（1） Set the acceleration, reduction speed, speed, stroke of the point:

Please refer to the point motion parameters set in the description of the corresponding value;

（2） Set the speed of emergency stop and decrease in point motion: Please set the corresponding value by reference to the description in the point mode parameter setting s75-78;

（3） Set the position instruction operating mode P84 parameter in the point motion: please set the corresponding value by reference to the description in the internal pulse control parameters .

（4） Set the corresponding IN pin function: input setting register

IN Pin	Set a value	
	Polar bit	Function bit
INx	0/1(according to input polarity settings)	22(USER1: Forward)
INx	0/1(according to input polarity settings)	23(USER2:Inverted)

（5） How to start

- Through the PLC or key to the corresponding IN pin an edge trigger signal, the motor's point forward/reverse;
- WRtelligent 1 (point forward),2(point reversal),5 (emergency stop), 6(slowdown stop) via 485 communication, The point of the motor can be achieved positive/reversed;
- With 485 communication, the "polarity" bit in the corresponding IN pin configuration register is flipped to simulate an external IN trigger signal to achieve the positive/reversal of the motor's point.

3.7.3 Point start-stop-and-direction control mode-related settings

（1） Set the acceleration, reduction speed, speed, speed of the stop and decrease: please set the corresponding value by reference to the description in the point mode parameter setting s75-78;

（2） Set the corresponding IN pin function: input setting register s 60-65;

IN Pin	Set a value	
	Polar bit	Function bit
INx	0/1(according to input polarity settings)	25(USER4: Start and stop)
INx	0/1(according to input polarity settings)	14 (Multi-segment speed control 0: direction)

（3） How to start

- Through the PLC or key to the corresponding IN pin a level trigger signal, the motor can be realized the point start-stop and direction control mode;
- Through 485 communication, the "polarity" bit in the corresponding IN pin configuration register can be flipped to simulate an external IN trigger signal, and the motor's point start-stop-and-direction control mode can be realized;

（4） In the point operation, the drive can respond in real time to parameters such as acceleration, speed reduction, velocity, etc. modified through 4 85 communication.

3.7.4 Implementing the settings for multi-segment position control mode

（1） Set the operating mode of the position table, the number of end periods to run, the time unit: Please refer to the register description in the multi-segment position operation control mode parameters .

（2） Set the stroke, plus and minus speed, speed, wait time, etc. for each segment of the position: the built-in position table parameters are set, the multi-segment position operation control mode parameters are 221 to 271;

（3） Set the corresponding IN pin function: input setting register

- When parameter P221 is set to 0/1: Single sequential run shutdown/cycle sequence run mode

IN Pin	Set a value	
	Polar bit	Function bit
INx	0/1(according to input polarity settings)	24 (USER3:Multi-stage start signal)

In this operating mode, the trigger signal is a level signal

- When parameter P221 is set to 2: INx controls switching mode for multiple positions

IN Pin	Set a value	
	Polar bit	Function bit
INx	0/1(according to input polarity settings)	24 (USER3:Multi-stage start signal)
INx	0/1(according to input polarity settings)	18 (Multi-segment position control 0)
INx	0/1(according to input polarity settings)	19 (Multi-segment position control 1)
INx	0/1(according to input polarity settings)	20 (Multi-segment position control 2)
INx	0/1(according to input polarity settings)	21 (Multi-segment position control 3)

The relationship between the INx feature and the selected multi-segment location is as follows:

Multi-segment position control 3	Multi-segment position control 2	Multi-segment position control 1	Multi-segment position control 0	Multi-segment position
OFF	OFF	OFF	OFF	1
OFF	OFF	OFF	ON	2
OFF	OFF	ON	OFF	3
......	......	......	......	
ON	ON	ON	ON	16

In this operating mode, the trigger signal is the edge signal

（4） How to start

- Through the PLC or key to the corresponding IN pin a level / edge start signal, the motor can be achieved multi-segment position operation;
- Through 485 communication, the "polarity" bit in the corresponding IN pin configuration register can be flipped to simulate an external IN trigger signal to achieve multi-stage operation of the motor;

3. 8 Internal Pulse Application Mode 21

The internal pulse application mode 21 is the analog speed control mode. The setting of the running direction can be achieved by an IN input start-stop signal, through in or analog amount bias.

（1） Set an IN pin function: input setting register

IN Pin	Set a value	
	Polar bit	Function bit
INx	0/1(according to input polarity settings)	7(Point Moving Forward /Start and Stop : Start and Stop Signal)
INx	0/1(according to input polarity settings)	8(Point Reversal/Direction: Direction Signal)

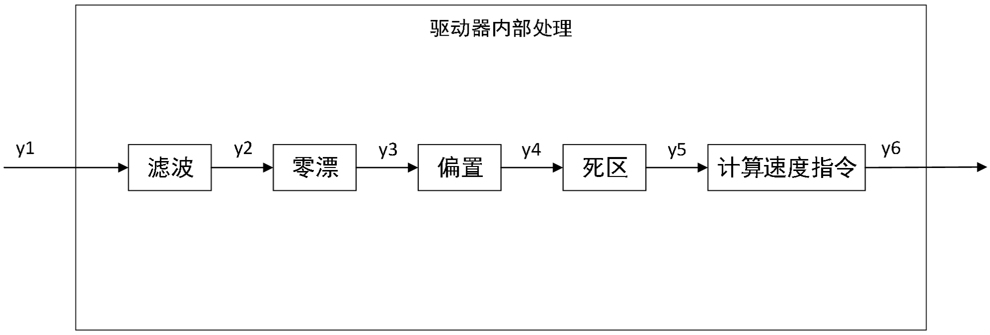
（2） Set the bias, filtering, dead zone, zero drift, 3.3V corresponding to the parameters of the analog input channel: the analog input parameter setting s.272 to 279

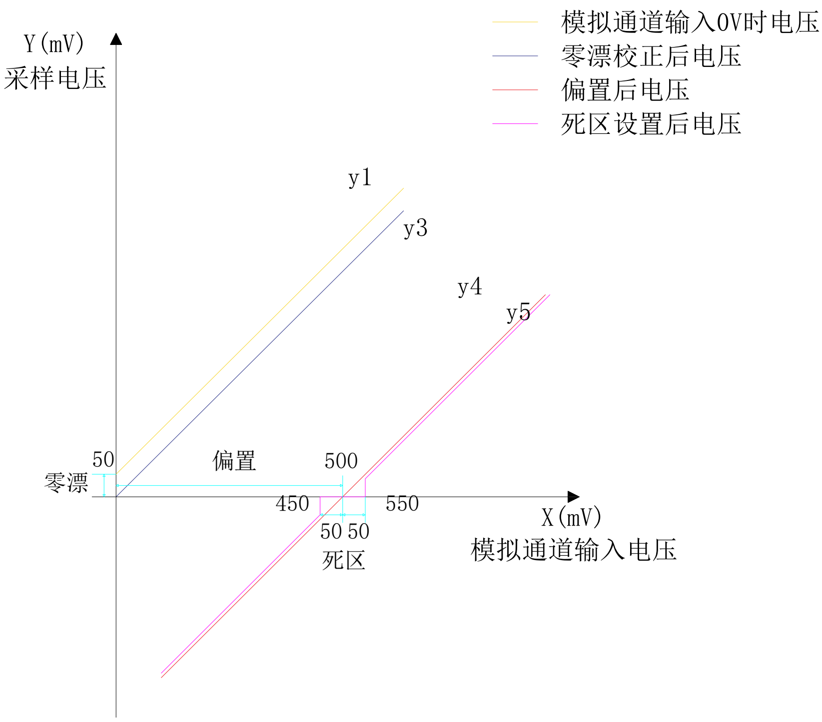
- Noun interpretation

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

Bias: After zero drift correction, the analog channel input voltage value is corresponded when the sampling voltage is zero.

Dead zone: When the sampling voltage is zero, the analog channel input voltage interval is corresponding.





- Filtering:

The driver provides analog channel filtering to prevent fluctuations in motor commands due to unstable analog input voltages and to reduce motor errors caused by interference signals by setting the low-pass filter cut-off frequency P273 parameter. The filtering function has no elimination or inhibition effect on zero drift and dead zone.

- Zero drift correction:

When the actual input voltage is corrected to be 0V, the analog channel output voltage deviates from the value of 0V.

In the figure, the analog channel output voltage that is not handled internally by the driver is shown in y_1. Setting a large low-pass filter cut-off frequency assumes thatthe filtered sampling voltage y_2 is consistent with y_1.

It can be seen that when the actual input voltage isx -0, the output voltage yis50mV, at which point 50mV is called zero drift.

Set P275by50mV manuallyand, after zero drift correction, the sampling voltage isshown in y3. y_3sy_1-50

The zero drift value of the analog channel can be calculated by using the P277 parameter when both the bias and dead zoneares are set to 0, with the input at 0V.

- Bias settings:

When the sampling voltage is set at 0, the corresponding book input voltage value.

As shown in the figure, the corresponding input voltage x is500mV when the sample voltage is pre-set, which iscalled bias.

Set P272s500mV manually, after biasing, sampling voltage $y_4$sx-500sy_3-500

- Dead Zone Correction:

The valid input voltage range is not 0 when the limit driver sampling voltage is not 0.

When the bias setting is complete, the input voltage x is within 450mV and 550mV, the sample voltage value is 0, this 50mV is called the dead zone.

Set P274,50mV, and after the dead zone iscorrected, the sampling voltage isshown in y5.

$$y_5 = \begin{cases} 0 & 450 \le x \le 550 \\ y_4 & 0 \le x < 450 \text{ 或 } 550 < x \le 3300 \end{cases}$$

- Calculating speed instructions:

After zero drift, bias, dead zone setting is completed, the sampling voltage at this time must be set by P276, 3.3V corresponding to thespeed command value, the actual speed instruction y 6:

$$y_6 = \frac{y_5}{3300} \times P276$$

This value is given as a speed instruction for the analog speed control mode.

When the correct setup is complete, the sample voltage value of the analog input channel can be viewed in real time through P278, or the speed command value for the amount of analog input can be viewed through P279.

（3） How to start

- Through the PLC or key to the corresponding IN pin a level start signal, the motor can be realized the analog speed operation mode;
- Through the 485 communication, the "polarity" bit in the corresponding IN pin configuration register can be simulated once the external IN trigger signal, and the analog speed operation mode of the motor can be realized;

Note: The bias, dead zone, zero drift, and speed corresponding to 3.3V of the analog channel**take effect after reboot or direction switching.**

3. 9 Internal Pulse Application Mode 22

The internal pulse application mode 22 is the application mode followed by the analog position, there is no other IN start-stop or enable-trigger signal, the position follows to the absolute position running mode, andthe P84 parameter setting is invalid.

（1） Set the bias, filter, dead zone, zero drift parameters of the analog input channel: the analog input parameter setting s.272-279,the specific meaning of thenoun please refer to the introduction of the previous section of the internal pulse application mode 21;

（2） Set 3 .3V corresponding to the positioninstruction: analog position control mode parameters . . . .

（3） By changing the analog input voltage through the potustiometer and other devices, the follow operation of the analog quantity position can be carried out.

- The position command value corresponding to the analog voltage of the input can be viewed by the Parameter P216/P217;

- As there is no external IN enable/start signal, the position adjustment may be carried out immediately after power-up, so beware of the resulting collision behavior!

3. 10 Internal Pulse Application Mode 27

Internal Pulse Application Mode 27(Pn20 parameter set to 27)with functions:

- Control the motor forward through an IN terminal and control the motor inreverse through an IN terminal;
- The operating mode of the motor is controlled by an IN terminal: speed mode, position control mode;
- The switching of the motor's running speed is controlled by an IN terminal.

（1） Set the function and polarity of the IN terminals:

According to the instructions of "Input port setting register s 60-65", set the function bit and polarity bit of the motor:

Function bit Setting value	Polar bit setting	Set-up function Description
7	0: Normally closed /1: Always open	Motor is starting forward
8	0: Normally closed/1: Always open	Motor reverse start
22	0: Normally closed/1: Always open	Speed gear input
23	0: Normally closed/1: Always open	Control mode input

Such as:

Set the IN3 input terminal function to "Motor forward start,　normal lying polarity";

Set the IN4 input terminal function to "motor reverse start, normally closed polarity";

Set the IN5 input terminal function to "speed gear input, normally open polarity";

Set the IN6 input terminal function to "control mode input, normally open polarity";

You need to wRtelligent 39(1x32x7x39)to the Pn62 parameter, andPn63 parameter wRtelligent40(1x32) 8s40),Pn64 parameter wRtelligents to 54(1x32s22s54), , Pn65 is written to 55(1x32x23x55).

Control mode settings:

Control mode input signal	Description
Invalid	The drive operates in speed control mode
Effective	The drive operates in position control mode

Note: In motor operation, the input signal does not respond to the control mode and is only valid when the motor is stopped and started again.

（2） Set the parameters of speed, acceleration, deceleration, position, etc.

Speed control mode:

<table>
<tr><th>Argument address</th><th>Parameter description</th></tr>
<tr><td>Pn75</td><td>Speed control mode runs acceleration in units: r/s</td></tr>
<tr><td>Pn76</td><td>Speed control mode runs acceleration in units: r/s</td></tr>
<tr><td>Pn105</td><td rowspan="2">Speed control mode runs at speed in r/min
Select Pn105 as the operating speed when "Speed Gear Input" is not valid
Select Pn106 as the operating speed when the Speed Gear Input is valid
Note: In Speed Running mode, the speed can be switched dynamically and take effect immediately</td></tr>
<tr><td>Pn106</td></tr>
</table>

Position control mode:

Argument address	Parameter description
Pn70	Position Control mode runs acceleration in units: r/s
Pn71	Position Control mode runs acceleration in units: r/s
Pn73/Pn74	Position control mode runs instruction strokes in pulse Note: Pn73 and Pn74 form 3 2-bit signed instruction stroke, Pn73 is lower1 6-bit data, And Pn74 is high1 6-bit data
Pn107	Position Control mode running at speed, in r/min Select Pn10 7 as the running speed when Speed Gear Input is invalid
Pn108	Select Pn10 8 as the operating speed when Speed Gear Input is valid

（3） Other relevant parameters

Other setting parameters such as motor operating current, subdivision, etc., as detailed in the manual parameters description.

（4） Start-up

According to the above steps correctly set the function of the IN terminal, the operating parameters, through the given input "motor forward", "motor reversal" to start the positive and reverse operation of the motor.

Note: In speed control mode, the positive reversal input signal is valid for the level, and in position control mode, the positive inverting input signal is valid for edge change.

四 Appendix

Appendix A function code message format

Function 03 Read Hold Register:

Enquiry message:

QUERY Field Name	Example (Hex)
From the machine address	01
Function code	03
8-bit high starting address	00
8 bits lower starting address	00
Data length is 8 bits high	00
Data length is 8 bits lower	05
CRC check low 8 bits	85
CRC check high 8 bits	C9

In response to the message:

RESPONSE Field Name	Example (Hex)
From the machine address	01
Function code	03
Number of bytes returned	0A
Data High (Register 40001)	00
Low data (Register 40001)	00
Data High (Register 40002)	00
Low data (Register 40002)	01
Data High (Register 40003)	00
Low data (Register 40003)	00

Data High (Register 40004)	00
Low data (Register 40004)	03
Data High (Register 40005)	Ff
Low data (Register 40005)	Ff
CRC check low 8 bits	C5
CRC check high 8 bits	C6

Function 06 wRtelligents to a single register:

Enquiries:**01 06 00 12 00 00 29 CF**

QUERY Field Name	Example (Hex)
From the machine address	01
Function code	06
Address 8 bits high	00
8 digits lower address	12
Data high 8 bits	00
Data is 8 bits lower	00
CRC check low 8 bits	29
CRC check high 8 bits	Cf

In response to the message:

QUERY Field Name	Example (Hex)
From the machine address	01
Function code	06
Address 8 bits high	00
8 digits lower address	12
Data high 8 bits	00
Data is 8 bits lower	00
CRC check low 8 bits	29

CRC check high 8 bits	Cf

Function 16 (10 HEX) is written to multiple registers:

Enquiries:**01 10 00 4B 00 04 08 00 64 00 64 02 58 01 F4 86 EC**

QUERY Field Name	Example (Hex)
From the machine address	**01**
Function code	**10**
8-bit high starting address	**00**
8 bits lower starting address	**4B**
Data length is 8 bits high	**00**
Data length is 8 bits lower	**04**
Bytes	**08**
Data High (Register 40076)	**00**
Low Data (Register 40076)	**64**
Data High (Register 40077)	**00**
Low Data (Register 40077)	**64**
Data High (Register 40078)	**02**
Low Data (Register 40078)	**58**
Data High (Register 40079)	**01**
Low Data (Register 40079)	**F4**
CRC check low 8 bits	**86**
CRC check high 8 bits	**EC**

In response to the message:

QUERY Field Name	Example (Hex)
From the machine address	**01**
Function code	**10**
8-bit high starting address	**00**

8 bits lower starting address	**4B**
Data length is 8 bits high	**00**
Data length is 8 bits lower	**04**
CRC check low 8 bits	**B1**
CRC check high 8 bits	**DC**

Appendix B Modbus/RTU Abnormal Response and Code

NT60 drive response and code in the event of an abnormal communication

```
exception code
#define ILLEGAL_FUNCTION  0x01
#define ILLEGAL_DATA_ADD  0x02
#define ILLEGAL_DATA_VAL  0x03
#define DEVICEFAIL        0x04
```

Appendix C CRC Check

The cyclic redundancy check CRC area is 2 bytes, a 16-bit binary data. The CRC value is calculated by the sending device and attached to the calculation value in the information, and when the receiving device receives the information, the CRC value is recalculated and the calculated value is compared with the actual value received in the CRC zone, resulting in an error if the two are not the same.

CRC begins by placing all 16 bits of the register as "1" and then placing the data of the adjacent 2 8-bit bytes into the current

In the depositor, only 8 bits of data per character are used to produce CRC, start bit, stop bit and parity bit without CRC

. During the CRC generation, every 8 bits of data and register median value for different or operation, the result of the right shift one bit (to the LSB direction), and "0" filled in THE MSB, detection LSB, if LSB is "1" is different from the preset fixed value or, if LSB is "0" no different or different operation. Repeat the above procedure until the 8th shift, after the 8th shift, the next 8 bits of data, different from the current value of the register or, after all the information processing, the final value in the deposit is CRC value.

Process for generating CRC:

1. Set the 16-bit CRC register to FFFF.
2. The first 8-bit data is different from the CRC register 8 bits or operations, the result is put into the CRC register.
3. CRC register moves one bit to the right, MSB fills in zero, checks LSB.
4. (If LSB is 0): Repeat 3, and move one bit to the right.

(If LSB is 1): CRC register is different from A001H or

5. Repeat 3 and 4 until 8 shifts are completed and 8 bits of bytes are processed.
6. Repeat 2 to 5 steps and process the next 8 bits of data until all bytes are

processed.

7. The final value of the CRC register is the CRC value.

8. When placing CRC values in the information, the high 8 bits and the low 8 bits should be placed separately. Put the CRC value in the information

Appendix D Modbus/RTU16-bit CRC check routine

CRC routines are written using C language specifications to facilitate user porting to various platforms. The CRC_Checksum.c file contains two functions for calculating CRC.

Try CRC by calculation:

```
unsigned short  CalcCRCby Algorithm(unsigned  charspDataaigned,
unsigneds long long   usDataLen)
{
    /* Use the Modbus algorithm as detailed in the Watlow comms guide */

    const unsigned short POLYNOMIAL = 0xA001;
    unsigned short wCrc;
    int iByte, iBit;

    /* Initialize CRC */
    wCrc s 0xFFFF;

    for (iByte = 0; iByte < usDataLen; iByte++)
    {
        /* Exclusive-OR the byte with the CRC */
        wCrc ^= *(pDataBuffer + iByte);

        /* Loop through all 8 data bits */

        for (iBit = 0; iBit <= 7; iBit++)
        {
            /* If the LSB is 1, shift the CRC and XOR the polynomial mask
```

```
with the CRC */

                /* Note - the bit test is performed before the rotation, so can't
move the << here */
                if (wCrc & 0x0001)
                {
                     wCrc >>= 1;
                     wCrc ^= POLYNOMIAL;
                }
                else
                {
                     /* Just rotate it */
                     wCrc >>= 1;
                }
           }
     }

     return wCrc;
}
```

Crc is calculated by checking the table:

```
/s---Of CRC Values
Const uns shortigned    TABLE_CRC16 . . .
{
     0x0000, 0xC0C1, 0xC181, 0x0140, 0xC301, 0x03C0, 0x0280, 0xC241,
     0xC601, 0x06C0, 0x0780, 0xC741, 0x0500, 0xC5C1, 0xC481, 0x0440,
     0xCC01, 0x0CC0, 0x0D80, 0xCD41, 0x0F00, 0xCFC1, 0xCE81, 0x0E40,
     0x0A00, 0xCAC1, 0xCB81, 0x0B40, 0xC901, 0x09C0, 0x0880, 0xC841,
     0xD801, 0x18C0, 0x1980, 0xD941, 0x1B00, 0xDBC1, 0xDA81, 0x1A40,
     0x1E00, 0xDEC1, 0xDF81, 0x1F40, 0xDD01, 0x1DC0, 0x1C80, 0xDC41,
```

```
    0x1400, 0xD4C1, 0xD581, 0x1540, 0xD701, 0x17C0, 0x1680, 0xD641,
    0xD201, 0x12C0, 0x1380, 0xD341, 0x1100, 0xD1C1, 0xD081, 0x1040,
    0xF001, 0x30C0, 0x3180, 0xF141, 0x3300, 0xF3C1, 0xF281, 0x3240,
    0x3600, 0xF6C1, 0xF781, 0x3740, 0xF501, 0x35C0, 0x3480, 0xF441,
    0x3C00, 0xFCC1, 0xFD81, 0x3D40, 0xFF01, 0x3FC0, 0x3E80, 0xFE41,
    0xFA01, 0x3AC0, 0x3B80, 0xFB41, 0x3900, 0xF9C1, 0xF881, 0x3840,
    0x2800, 0xE8C1, 0xE981, 0x2940, 0xEB01, 0x2BC0, 0x2A80, 0xEA41,
    0xE01, 0x2EC0, 0x2F80, 0xEF41, 0x2D00, 0xEDC1, 0xEC81, 0x2C40,
    0xE401, 0x24C0, 0x2580, 0xE541, 0x2700, 0xE7C1, 0xE681, 0x2640,
    0x2200, 0xE2C1, 0xE381, 0x2340, 0xE101, 0x21C0, 0x2080, 0xE041,
    0xA001, 0x60C0, 0x6180, 0xA141, 0x6300, 0xA3C1, 0xA281, 0x6240,
    0x6600, 0xA6C1, 0xA781, 0x6740, 0xA501, 0x65C0, 0x6480, 0xA441,
    0x6C00, 0xACC1, 0xAD81, 0x6D40, 0xAF01, 0x6FC0, 0x6E80, 0xAE41,
    0xAA01, 0x6AC0, 0x6B80, 0xAB41, 0x6900, 0xA9C1, 0xA881, 0x6840,
    0x7800, 0xB8C1, 0xB981, 0x7940, 0xBB01, 0x7BC0, 0x7A80, 0xBA41,
    0xBE01, 0x7EC0, 0x7F80, 0xBF41, 0x7D00, 0xBDC1, 0xBC81, 0x7C40,
    0xB401, 0x74C0, 0x7580, 0xB541, 0x7700, 0xB7C1, 0xB681, 0x7640,
    0x7200, 0xB2C1, 0xB381, 0x7340, 0xB101, 0x71C0, 0x7080, 0xB041,
    0x5000, 0x90C1, 0x9181, 0x5140, 0x9301, 0x53C0, 0x5280, 0x9241,
    0x9601, 0x56C0, 0x5780, 0x9741, 0x5500, 0x95C1, 0x9481, 0x5440,
    0x9C01, 0x5CC0, 0x5D80, 0x9D41, 0x5F00, 0x9FC1, 0x9E81, 0x5E40,
    0x5A00, 0x9AC1, 0x9B81, 0x5B40, 0x9901, 0x59C0, 0x5880, 0x9841,
    0x8801, 0x48C0, 0x4980, 0x8941, 0x4B00, 0x8BC1, 0x8A81, 0x4A40,
    0x4E00, 0x8EC1, 0x8F81, 0x4F40, 0x8D01, 0x4DC0, 0x4C80, 0x8C41,
    0x4400, 0x84C1, 0x8581, 0x4540, 0x8701, 0x47C0, 0x4680, 0x8641,
    0x8201, 0x42C0, 0x4380, 0x8341, 0x4100, 0x81C1, 0x8081, 0x4040
};

unslongigned  usDataLen)  CalcCRC_TAB(unsigned
charspDataBuffer,  uns longigned   usDataLen)
```

```
{
    unsigned char nTemp;
    unsigned short wCRCWord = 0xFFFF;

    while (usDataLen--)
    {
        nTemp = wCRCWord ^ *(pDataBuffer++);
        wCRCWord >>= 8;
        wCRCWord ^= TABLE_CRC16[nTemp];
    }

    return wCRCWord;
}
```

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