TL-R
RS485 Bus Integrated Controller

User Manual

Contents

Chapter I Product Introduction

1.1 Product Overview

This series of stepper drive integrated controller adopts the latest generation 32-bit DSP technology and integrates RS485 bus control functions. It supports the MODBUS-RTU communication protocol and can connect up to 32 axes, enabling multi-axis bus synchronization control. The driver features 15 internal position settings and 15 internal speed settings, supporting functions such as automatic homing, absolute/relative positioning, JOG operations, and more. It can be directly controlled using a touchscreen or a controller with an RS485 interface.

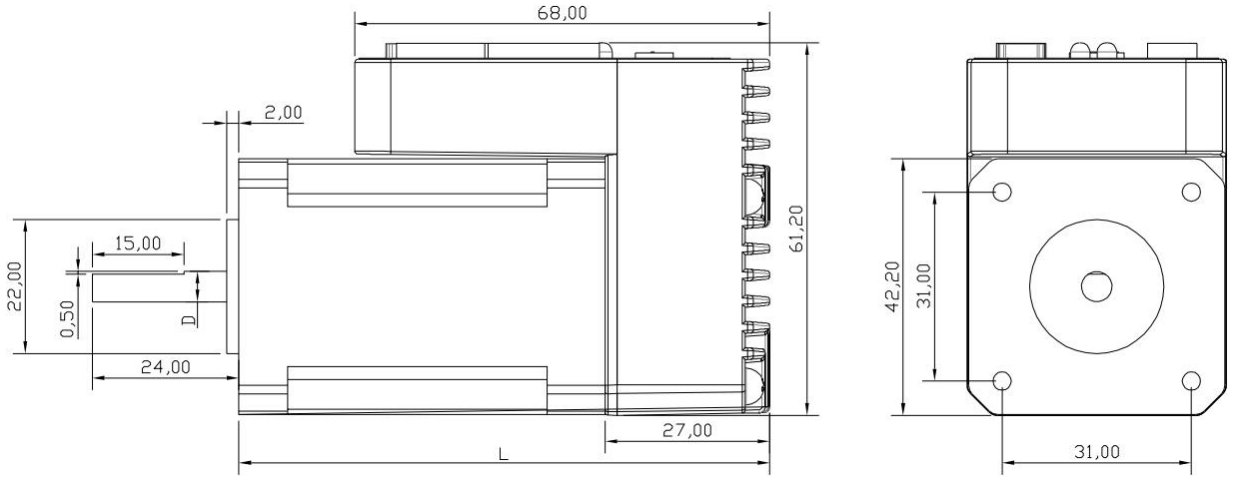
1.2 Communication Specifications

- Communication Interface: RS485
- Communication Protocol: Modbus RTU
- Baud Rates: 9600, 19200, 38400, 115200 (configured via SW5 dip switch)
- Station Number: 1-31 (configured via SW1-SW4 dip switches)
- Terminal Resistance: 120Ω (configured via SW6 dip switch)
- Parity: No parity (default), Odd parity, Even parity

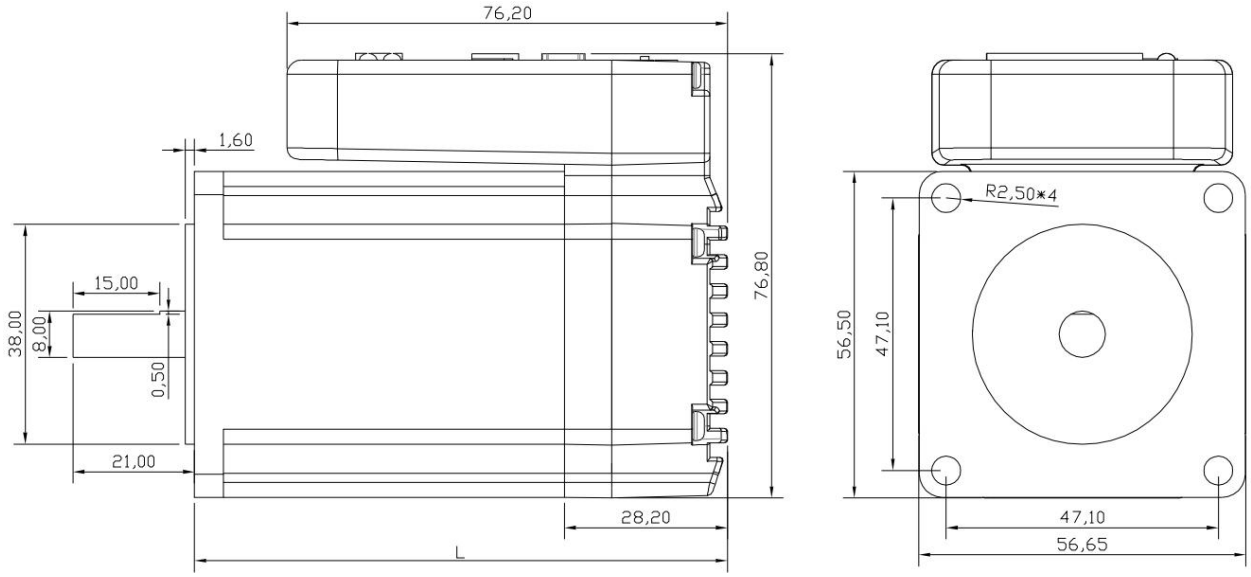
1.3 Product Specifications

Driver Models	TLC42-R	TLO42-R	TLC57-R	TLO57-R	TLC60-R	TLO60-R	TLC86-R	TLO86-R
Compatible Motor Sizes	42		57		60		86	
Power Supply Voltage	20～36V DC		24～50V DC		24～50V DC		24～70V DC	
Maximum Output Current	2.0A		4.0A		4.0A		6.0A	
DI Port Input Current	10 ~ 50mA							
DI Port Input Voltage	24V DC							
Encoder	1000 lines	None	1000 lines	None	1000 lines	None	1000 lines	None
Insulation Resistance	100MΩ							
Operating Environment	Temperature: 0°C ~ 45°C; Humidity: ≤90% RH, non-condensing Altitude: ≤1000m. Installation Conditions: Free from corrosive gases, flammable gases, oil mist, or dust. Vibration: Less than 0.5G (4.9m/s²), 10–60 Hz (non-continuous operation).							
Storage Environment:	-20℃ to 65℃ (no frost), ≤90% RH, non-condensing							

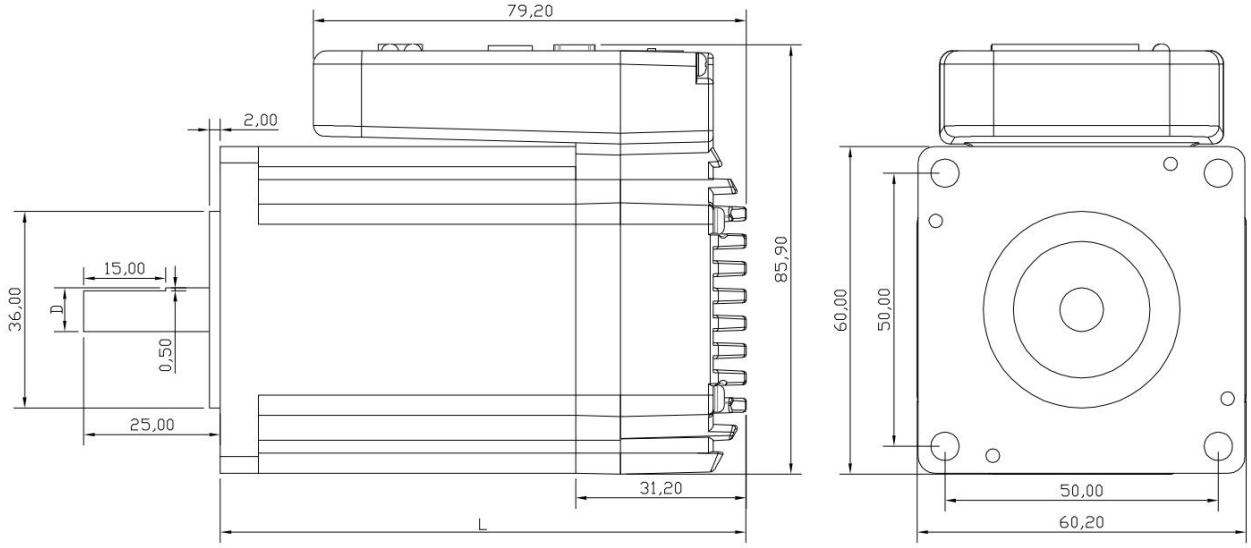
1.4 Installation Dimensions



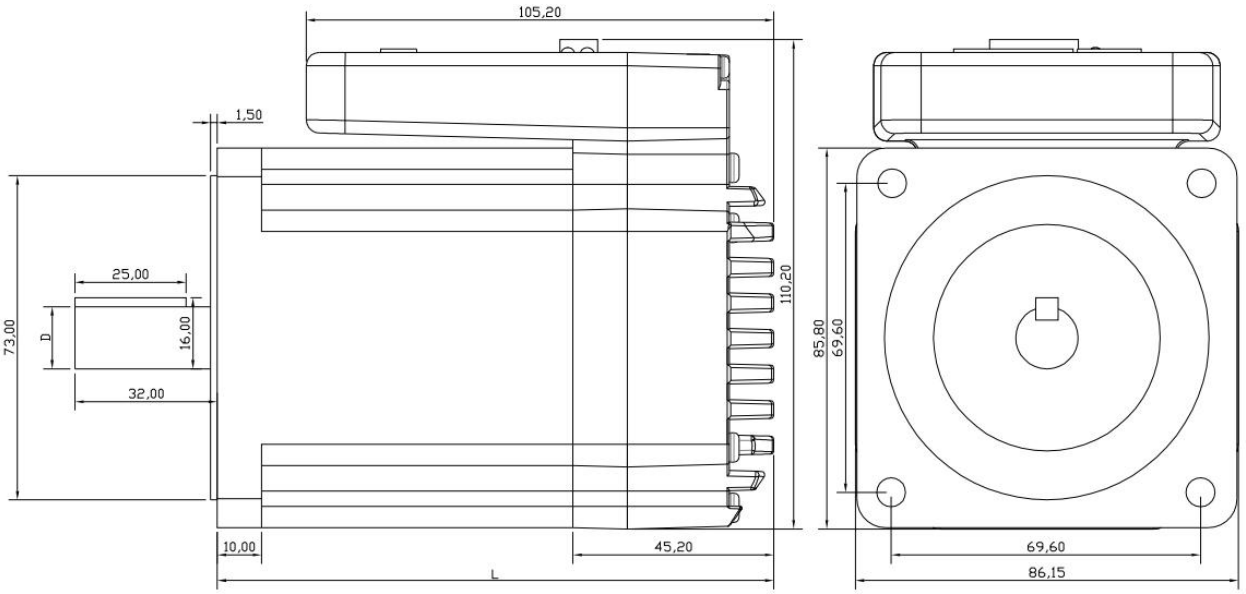
TLC42-C/TLO42-C



TLC57-C/TLO57-C



TLC60-C/TLO60-C



TLC86-C/TLO86-C

Model	D	Motor Length	Total Body Length (L)
TLC42-R/ TLO42-R-04	φ5	48	75
TLC42-R/ TLO42-R-08	φ5	60	87
TLC57-R/ TLO57-R-1	φ6.35 or φ8	56	84.2
TLC57-R/ TLO57-R-2	φ6.35 or φ8	82	110.2
TLC57-R/ TLO57-R-3	φ6.35 or φ8	100	128.2
TLC60-R/ TLO60-R-3	φ8	88	119.2
TLC60-R/ TLO60-R-3.5	φ8	100	131.2
TLC60-R/ TLO60-R-4	φ8	112	143.2
TLC86-R/ TLO86-R-4.5	φ12.7 or φ14	80	125.2
TLC86-R/ TLO86-R-8.5	φ12.7 or φ14	114	159.2
TLC86-R/ TLO86-R-10	φ12.7 or φ14	128	173.2
TLC86-R/ TLO86-R-12	φ12.7 or φ14	150	195.2

Chapter 2: Drive Ports and Wiring

2.1 Drive Port Definitions

2.1.1 RS485 Communication Port

Pin	Signal Definition
1	485-
2	485+
3	GND
4	485+
5	485-

2.1.2 Power Port

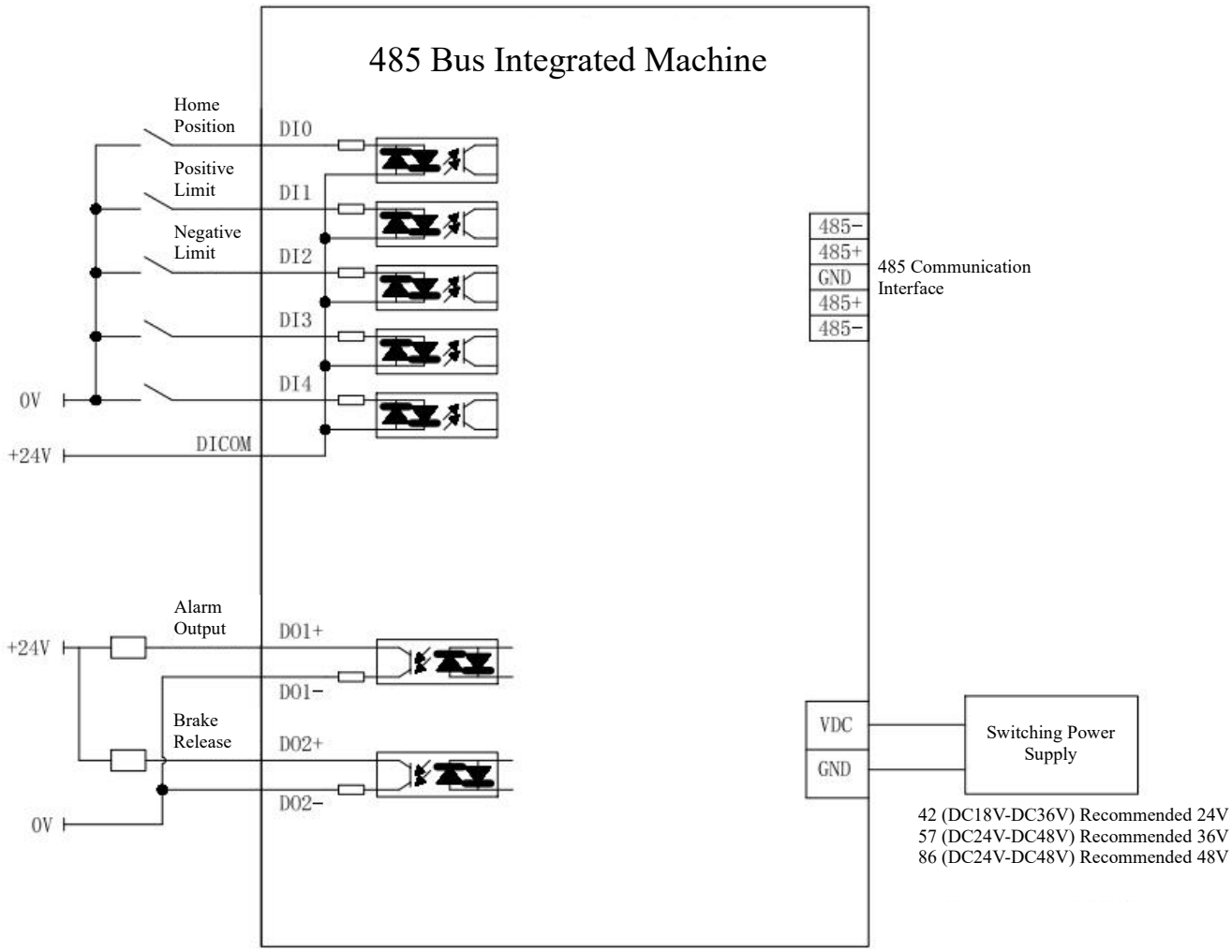
<table>
<tr><th>Pin</th><th>Definitions</th><th>Description</th></tr>
<tr><td>1</td><td>VDC</td><td>DC Power Negative Terminal
<table>
<tr><td>TL42</td><td>TL57/TL60</td><td>TL86</td></tr>
<tr><td>24～36V</td><td>24～50V</td><td>24～70V</td></tr>
</table></td></tr>
<tr><td>2</td><td>GND</td><td>DC Power Negative Terminal</td></tr>
</table>

2.1.3 DI/DO Port

<table>
<tr><th>Pin</th><th>Definitions</th><th>Description</th></tr>
<tr><td>1</td><td>DI0</td><td rowspan="5">Single-ended input; operating voltage 24V</td></tr>
<tr><td>2</td><td>DI1</td></tr>
<tr><td>3</td><td>DI2</td></tr>
<tr><td>4</td><td>DI3</td></tr>
<tr><td>5</td><td>DI4</td></tr>
<tr><td>6</td><td>DICOM</td><td>Common input; supports sinking/sourcing configurations</td></tr>
<tr><td>7</td><td>DO0+</td><td rowspan="2">Differential output 1</td></tr>
<tr><td>8</td><td>DO0-</td></tr>
<tr><td>9</td><td>DO1+</td><td rowspan="2">Differential output 2</td></tr>
<tr><td>10</td><td>DO1-</td></tr>
</table>

2.2 Wiring

2.2.1 Drive Wiring Diagram



Notes: 1. The DI input voltage is 24V. If it exceeds 24V, a current-limiting resistor is required.
2. The DI input wiring supports both sourcing and sinking configurations. When DICOM is 24V, DI is activated by connecting to 0V; when DICOM is 0V, DI is activated by connecting to 24V.
3. The DO common terminal DOCOM can only be connected to 0V and not to 24V.

2.2.2 DI/DO Port Usage Instructions

This series of drivers provides 5 programmable input interfaces and 2 programmable output interfaces. Each DI/DO function can be configured via the RS485 bus using the upper computer debugging software. The relevant configuration parameters are shown in the table below:

Parameter No.	Address (Decimal)	Description	Default Value
PA_010	16	DI terminal normally open/closed switching	0
PA_011	17	Configure DI input port 0	1
PA_012	18	Configure DI input port 1	2
PA_013	19	Configure DI input port 2	3
PA_014	20	Configure DI input port 3	0
PA_015	21	Configure DI input port 4	0
PA_01A	26	Input port filter coefficient	2
PA_01B	27	DO terminal normally open/closed switching	0
PA_01C	28	Configure DO output port 0	1
PA_01D	29	Configure DO output port 1	0
PA_01F	31	Force output of the output port	0

DI Port Function Command Table:

Command Value	Function Description	Command Value	Function Description
0	Undefined	10	Negative JOG
1	Homing signal	11	Homing trigger
2	Positive limit	12	Position path trigger
3	Negative limit	13	Speed path trigger
4	Release signal	14	Path selection switch 0
5	Stop signal	15	Path selection switch 1
6	Forced emergency stop	16	Path selection switch 2
9	Positive JOG	17	Path selection switch 3

DO Port Function Command Table:

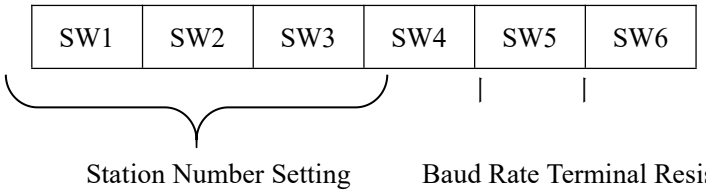
Command Value	Function Description	Command Value	Function Description
0	Undefined	5	Brake release signal
1	Alarm output	9	Forced output control 1
2	Motor Running	10	Forced output control 2
3	Homing Complete	11	Forced output control 3
4	In-position signal		

DO Port Forced Output Control Method:

PA_01F Corresponding Bit	Description
Bit0	Controls the output port with function command set to 9. 0: Off, 1: On
Bit1	Controls the output port with function command set to 10. 0: Off, 1: On

2.2.4 Dip Switch Settings

This series of RS485 bus integrated controllers has a 6-position dip switch used to set the RS485 station number, communication baud rate, and terminal resistance. The configuration is shown below:



Baud Rate Setting:

Baud Rate	SW5
115200	OFF
Custom	ON

Terminal resistance settingWhen SW5 is ON, the baud rate can be modified through PA-28 (Decimal Address 40): 0: 115200; 1: 38400; 2: 19200; 3: 9600.

Terminal Resistance Setting:

When SW6 is set to ON, a 120Ω terminal resistance is connected between the signal lines to prevent signal reflection at the end of the cable.

Driver Station Number Settings:

Station number	SW1	SW2	SW3	SW4
Custom	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Chapter 3: Communication Control Instructions

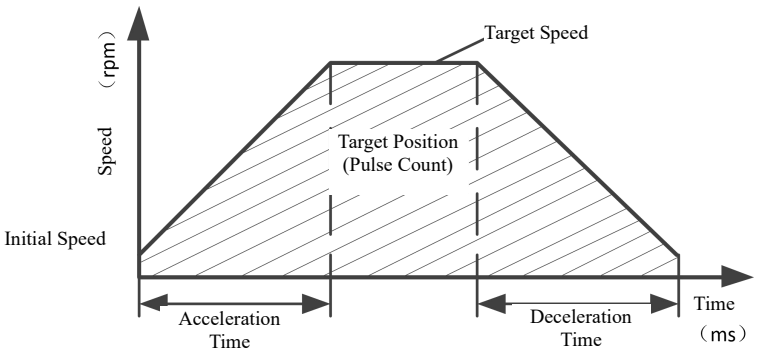
3.1 Position Mode

3.1.1 Related Parameters

Parameter No.	Address (Decimal)	Name	Setting Range	Data Type	Attributes
PA_033	51	Positioning Start Speed (r/min)	0～3000	UNSIGNED16	RW
PA_034	52	Positioning Acceleration Time (ms)	0～2000	UNSIGNED16	RW
PA_035	53	Positioning Deceleration Time (ms)	0～2000	UNSIGNED16	RW
PA_036	54	Positioning Speed (r/min)	0～3000	UNSIGNED16	RW
PA_037	55	Positioning Target (Pulses) H	-2147483648~ 2147483647	INTEGER32	RW
PA_038	56	Positioning Target (Pulses) L			
PA_04E	78	Control Word	0 ~ 127	UNSIGNED16	RW
PA_04	4	Operating Status		UNSIGNED16	RO
PA_08	8	Current Position (Pulses) H		INTEGER32	RO
PA_09	9	Current Position (Pulses) L			
PA_0A	10	Current Speed (r/min)		INTEGER16	RO

3.1.2 Position Mode Description

In position mode, the master station specifies the motion parameters: start speed (0x0033), acceleration time (0x0034), deceleration time (0x0035), running speed (0x0036), and positioning target (0x0037, 0x0038). The driver internally constructs a motion path based on these parameters to achieve precise position control. The motion curve is shown in the diagram below:



3.1.3 Control Method Explanation

1. Control Word Explanation: The control word (0x004E) uses Bit0-Bit6 for control, with each bit corresponding to a function as shown below:

Control Word Bit	Function	Description
Bit0	Positioning Control	0: Inactive; 1: Active (no reset needed, simply set to 1 again)
Bit1	Positioning Mode	0: Relative position; 1: Absolute position
Bit2	Switch Mode	0: Ignore new command if a positioning motion is in progress 1: Interrupt current positioning motion to execute new command;
Bit3	JOG Control	0: Inactive; 1: Active;
Bit4	Homing Control	0: Inactive; 1: Active (no reset needed, simply set to 1 again)
Bit5	Stop Control	0: Inactive; 1: Active;
Bit6	Emergency Stop Control	0: Inactive; 1: Active;

Status Word Explanation: By monitoring the status word (0x0004) Bit0-Bit6, the current motion status can be determined as shown below:

Status Word Bit	Function	Status Word Bit	Function
Bit0	In position	Bit4	Motor Enabled
Bit1	Homing Complete	Bit5	Positive Soft Limit
Bit2	Motor Running	Bit6	Negative Soft Limit
Bit3	Fault		

3.2 Internal Multi-Segment Positioning

3.2.1 Related Parameters

Parameter No.	Address (Decimal)	Name	Setting Range	Data Type	Attributes
PA_050	80	Positioning Path 0 (Pulses) H	-2147483648~ 2147483647	INTEGER32	RW
PA_051	81	Positioning Path 0 (Pulses) L			
PA_052	82	Positioning Path 0 Speed	0～3000	UNSIGNED16	RW
PA_053	83	Positioning Path 0 Acceleration Time	0～2000	UNSIGNED16	RW
PA_054	84	Positioning Path 0 Deceleration Time	0～2000	UNSIGNED16	RW
PA_056	86	Positioning Path 1 (Pulses) H	-2147483648~ 2147483647	INTEGER32	RW
PA_057	87	Positioning Path 1 (Pulses) L			
PA_058	88	Positioning Path 1 Speed	0～3000	UNSIGNED16	RW
PA_059	89	Positioning Path 1 Acceleration Time	0～2000	UNSIGNED16	RW
PA_05A	90	Positioning Path 1 Deceleration Time	0～2000	UNSIGNED16	RW
...					
PA_0AA	170	Positioning Path 15 (Pulses) H	-2147483648~ 2147483647	INTEGER32	RW
PA_0AB	171	Positioning Path 15 (Pulses) L			
PA_0AC	172	Positioning Path 15 Speed	0～3000	UNSIGNED16	RW
PA_0AD	173	Positioning Path 15 Acceleration Time	0～2000	UNSIGNED16	RW
PA_0AE	174	Positioning Path 15 Deceleration Time	0～2000	UNSIGNED16	RW
PA_04	4	Operating Status		UNSIGNED16	RO
PA_08	8	Current Position (Pulses) H		INTEGER32	RO
PA_09	9	Current Position (Pulses) L			
PA_0A	10	Current Speed (r/min)		INTEGER16	RO

3.2.2 Internal Multi-Segment Position Control Instructions

1. The internal multi-segment positioning requires selection and triggering through the DI ports. The specific configuration is as follows:

Parameter No.	Address (Decimal)	Setting Value	Description
PA_011	17	12	DI0 configured as position path trigger
PA_012	18	14	DI1 configured as path selection switch 0

PA_013	19	15	DI2 configured as path selection switch 1
PA_014	20	16	DI3 configured as path selection switch 2
PA_015	21	17	DI4 configured as path selection switch 3

After configuring the DI ports as per the table above, the position segment is selected using DI1-DI4 and then triggered (rising edge) by DI0 to execute the position segment. The corresponding table is as follows:

Selection Switch 0	Selection Switch 1	Selection Switch 2	Selection Switch 3	Corresponding Position Path	Position Pulse Address	Position Speed Address	Accel Time Address	Deceleration Time Address
OFF	OFF	OFF	OFF	0	80/ 81	82	83	84
ON	OFF	OFF	OFF	1	86/ 87	88	89	90
OFF	ON	OFF	OFF	2	92/ 93	94	95	96
ON	ON	OFF	OFF	3	98/ 99	100	101	102
OFF	OFF	ON	OFF	4	104/105	106	107	108
ON	OFF	ON	OFF	5	110/ 111	112	113	114
OFF	ON	ON	OFF	6	116/ 117	118	119	120
ON	ON	ON	OFF	7	122/123	124	125	126
OFF	OFF	OFF	ON	8	128/129	130	131	132
ON	OFF	OFF	ON	9	134/135	136	137	138
OFF	ON	OFF	ON	10	140/141	142	143	144
ON	ON	OFF	ON	11	146/147	148	149	150
OFF	OFF	ON	ON	12	152/153	154	155	156
ON	OFF	ON	ON	13	158/159	160	161	162
OFF	ON	ON	ON	14	164/165	166	167	168
ON	ON	ON	ON	15	170/171	172	173	174

2. Internal Multi-Segment Position Mode Settings:

Parameter No.	Address (Decimal)	Function Definition	Default Value	Description
PA_026	38	Internal Multi-Segment Position Trigger Mode	0	0: Interrupt current positioning motion to execute new command; 1: Ignore new command if a positioning motion is in progress
PA_04A	74	Internal Multi-Segment Position Absolute/Relative Position Mode	0	0: Relative position mode; 1: Absolute position mode

3.3 Internal Multi-Segment Speed

3.3.1 Related Parameters

Parameter No.	Address (Decimal)	Name	Setting Range	Data Type	Attributes
PA_0B0	176	Speed Path 0 Running Speed	-3000～3000	INTEGER16	RW
PA_0B1	177	Speed Path 0 Acceleration Time	0～2000	UNSIGNED16	RW
PA_0B2	178	Speed Path 0 Deceleration Time	0～2000	UNSIGNED16	RW
PA_0B3	179	Speed Path 1 Running Speed	-3000～3000	INTEGER16	RW
PA_0B4	180	Speed Path 1 Acceleration Time	0～2000	UNSIGNED16	RW

PA_0B5	181	Speed Path 1 Deceleration Time	0～2000	UNSIGNED16	RW
...					
PA_0DD	221	Speed Path 15 Running Speed	-3000～3000	INTEGER16	RW
PA_0DE	222	Speed Path 15 Acceleration Time	0～2000	UNSIGNED16	RW
PA_0DF	223	Speed Path 15 Deceleration Time	0～2000	UNSIGNED16	RW
PA_04	4	Operating Status		UNSIGNED16	RO
PA_0A	10	Current Speed (r/min)		INTEGER16	RO

3.2.2 Internal Multi-Segment Position Control Instructions

The internal multi-segment speed needs to be selected and triggered via DI ports to operate, as described below:

Parameter No.	Address (Decimal)	Setting Value	Description
PA_011	17	13	DI0 configured as speed path trigger
PA_012	18	14	DI1 configured as path selection switch 0
PA_013	19	15	DI2 configured as path selection switch 1
PA_014	20	16	DI3 configured as path selection switch 2
PA_015	21	17	DI4 configured as path selection switch 3

After configuring the DI ports as per the table above, the speed segment is selected using DI1-DI4 and then triggered (connect to run, disconnect to stop) by DI0 to execute the speed segment. The corresponding table is as follows:

Selection Switch 0	Selection Switch 1	Selection Switch 2	Selection Switch 3	Corresponding Speed Path	Running Speed Address	Accel Time Address	Deceleration Time Address
OFF	OFF	OFF	OFF	0	176	177	178
ON	OFF	OFF	OFF	1	179	180	181
OFF	ON	OFF	OFF	2	182	183	184
ON	ON	OFF	OFF	3	185	186	187
OFF	OFF	ON	OFF	4	188	189	190
ON	OFF	ON	OFF	5	191	192	193
OFF	ON	ON	OFF	6	194	195	196
ON	ON	ON	OFF	7	197	198	199
OFF	OFF	OFF	ON	8	200	201	202
ON	OFF	OFF	ON	9	203	204	205
OFF	ON	OFF	ON	10	206	207	208
ON	ON	OFF	ON	11	209	210	211
OFF	OFF	ON	ON	12	212	213	214
ON	OFF	ON	ON	13	215	216	217
OFF	ON	ON	ON	14	218	219	220
ON	ON	ON	ON	15	221	222	223

3.4 Homing Mode

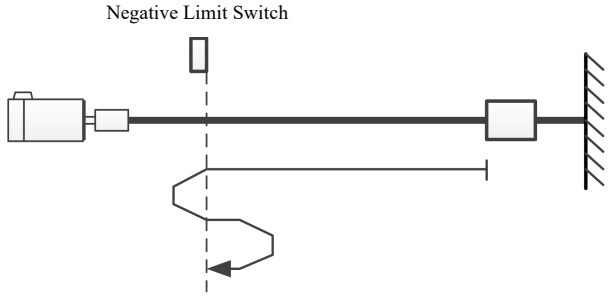
3.4.1 Related Parameters

Parameter No.	Address (Decimal)	Name	Setting Range	Data Type	Attributes
PA_040	64	Homing Mode	17, 18, 24, 29, 35	UNSIGNED 16	RW

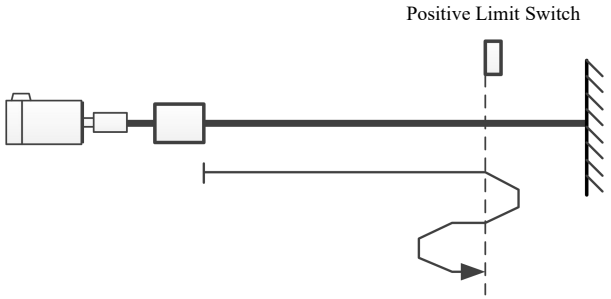
PA_041	65	Homing Speed	0～3000	UNSIGNED16	RW
PA_042	66	Homing Creep Speed	0～3000	UNSIGNED16	RW
PA_043	67	Homing Acceleration/ Deceleration Time	0～2000	INTEGER16	RW
PA_044	68	Home Offset Value H	-2147483648~ 2147483647	INTEGER32	RW
PA_045	69	Home Offset Value L			
PA_04	4	Operating Status		UNSIGNED16	RO
PA_08	8	Current Position (Pulses) H		INTEGER32	RO
PA_09	9	Current Position (Pulses) L			
PA_0A	10	Current Speed (r/min)		INTEGER16	RO

3.4.2 Homing Mode Description

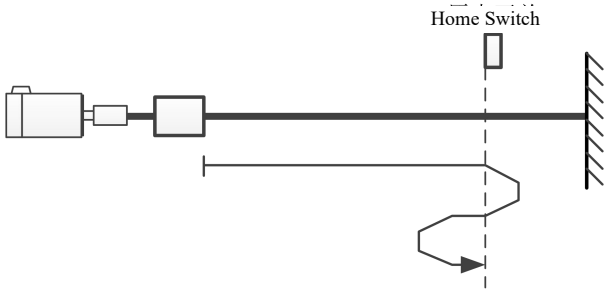
1. **Negative Limit Mode** (PA_040=17): After initiating homing, the motor runs in the negative direction at the homing speed (PA_041). When the negative limit switch is detected, the motor decelerates and stops. Then, the motor runs a certain distance in the positive direction at the homing speed (PA_041) and stops after decelerating. The motor then runs in the negative direction at the homing creep speed (PA_042). When the negative limit switch is detected again, the motor stops, completing the homing process.



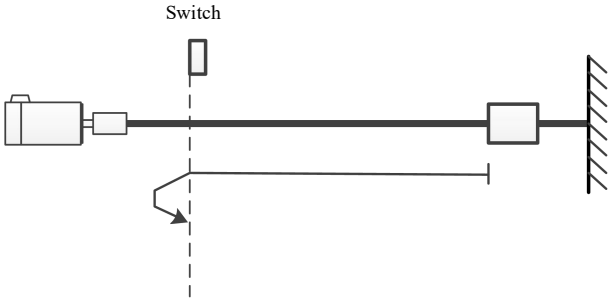
2. **Positive Limit Mode** (PA_040=18): After initiating homing, the motor runs in the positive direction at the homing speed (PA_041). When the positive limit switch is detected, the motor decelerates and stops. Then, the motor runs a certain distance in the negative direction at the homing speed (PA_041) and stops after decelerating. The motor then runs in the positive direction at the homing creep speed (PA_042). When the positive limit switch is detected again, the motor stops, completing the homing process.



3. Positive Origin Mode (PA_040 = 24):After initiating the homing process, the motor moves in the positive direction at the homing speed (PA_041). When the origin switch is detected, the motor decelerates and stops. It then moves a short distance in the negative direction at the homing speed (PA_041) and stops. The motor then moves in the positive direction at the homing creep speed (PA_042). When the origin switch is detected again, the motor stops, completing the homing process.



4. Negative Origin Mode (PA_040 = 29):After initiating the homing process, the motor moves in the negative direction at the homing speed (PA_041). When it moves away from the origin switch, the motor decelerates and stops. It then moves in the positive direction at the homing creep speed (PA_042). When the origin switch is detected again, the motor stops, completing the homing process.



5. Set Current Position as Origin (PA_040 = 35):After initiating the homing process, the current position is directly set to zero, and a homing complete signal is output.

3.4.3 Control Procedure Description

1. Ensure the default DI port configuration has not been altered;

Parameter No.	Address (Decimal)	Setting Value	Description
PA_011	17	1	DI0 configured as origin switch
PA_012	18	2	DI1 configured as positive limit switch
PA_013	19	3	DI2 configured as negative limit switch

2. Set the Relevant Homing Parameters: Configure the homing mode (PA_040), homing speed (PA_041), homing creep speed (PA_042), homing acceleration/deceleration time (PA_043), and homing offset value (PA_044, PA_045). Once configured, trigger the homing process using Bit4 of the control word (PA_04E) (rising edge). Upon completion of the homing process, a homing complete signal is output.

3.5 Detailed Parameter Description

3.5.1 Monitoring Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Attributes
PA_001	1	Software Version	Hardware Version	(RO)
PA_002	2	Hardware Version	Software Version	(RO)

<table>
<tr><td>PA_004</td><td>4</td><td>Operating Status</td><td><table><tr><th>Code</th><th>Operating Status</th></tr><tr><td>Bit0</td><td>In position</td></tr><tr><td>Bit1</td><td>Homing Complete</td></tr><tr><td>Bit2</td><td>Motor Running</td></tr><tr><td>Bit3</td><td>Fault</td></tr><tr><td>Bit4</td><td>Motor Enabled</td></tr><tr><td>Bit5</td><td>Positive Soft Limit</td></tr><tr><td>Bit6</td><td>Negative Soft Limit</td></tr></table></td><td>(RO)</td></tr>
<tr><td>PA_005</td><td>5</td><td>Current Alarm</td><td><table><tr><th>Fault Code</th><th>Content</th></tr><tr><td>0x01</td><td>Overcurrent</td></tr><tr><td>0x02</td><td>Overvoltage</td></tr><tr><td>0x03</td><td>Undervoltage</td></tr></table></td><td>(RO)</td></tr>
<tr><td>PA_006</td><td>6</td><td>DI Group Terminal Status</td><td><table><tr><th>Code</th><th>Status</th></tr><tr><td>Bit0</td><td>DI0</td></tr><tr><td>Bit1</td><td>DI1</td></tr><tr><td>Bit2</td><td>DI2</td></tr><tr><td>Bit3</td><td>DI3</td></tr><tr><td>Bit4</td><td>DI4</td></tr></table></td><td>(RO)</td></tr>
<tr><td>PA_007</td><td>7</td><td>DO Group Terminal Status</td><td><table><tr><th>Code</th><th>Status</th></tr><tr><td>Bit0</td><td>DO0</td></tr><tr><td>Bit1</td><td>DO1</td></tr><tr><td>Bit2</td><td>DO2</td></tr></table></td><td>(RO)</td></tr>
<tr><td>PA_008</td><td>8</td><td>Current Position H</td><td rowspan="2">Open loop for command position,
closed loop for feedback position;</td><td rowspan="2">(RO)</td></tr>
<tr><td>PA_009</td><td>9</td><td>Current Position L</td></tr>
<tr><td>PA_00A</td><td>10</td><td>Current Speed</td><td>Unit: r/min</td><td>(RO)</td></tr>
</table>

3.5.2 DI/DO Parameters

<table>
<tr><th>Parameter No.</th><th>Register Address (Decimal)</th><th>Item</th><th>Description</th><th>Setting Range</th></tr>
<tr><td>PA_010</td><td>16</td><td>DI terminal normally open/closed switching</td><td><table><tr><th>Code</th><th>Status</th></tr><tr><td>Bit0</td><td>DI0</td></tr><tr><td>Bit1</td><td>DI1</td></tr><tr><td>Bit2</td><td>DI2</td></tr><tr><td>Bit3</td><td>DI3</td></tr><tr><td>Bit4</td><td>DI4</td></tr></table>0: Normally Open; 1: Normally Closed</td><td>0 ~ 127</td></tr>
<tr><td>PA_011</td><td>17</td><td>DI Input Port 0</td><td rowspan="2"><table><tr><th>Code</th><th>Function</th></tr><tr><td>0x00</td><td>Undefined</td></tr><tr><td>0x01</td><td>Homing signal</td></tr><tr><td>0x02</td><td>Positive limit</td></tr><tr><td>0x03</td><td>Negative limit</td></tr></table></td><td>0 ~ 17</td></tr>
<tr><td>PA_012</td><td>18</td><td>DI Input Port 1</td><td>0 ~ 17</td></tr>
</table>

<table>
<tr><td>PA_013</td><td>19</td><td>DI Input Port 2</td><td rowspan="4"><table><tr><td>0x04</td><td>Release signal</td></tr><tr><td>0x05</td><td>Stop signal</td></tr><tr><td>0x06</td><td>Forced emergency stop</td></tr><tr><td>0x09</td><td>Positive JOG</td></tr><tr><td>0x0A</td><td>Negative JOG</td></tr><tr><td>0x0B</td><td>Homing trigger</td></tr><tr><td>0x0C</td><td>Position path trigger</td></tr><tr><td>0x0D</td><td>Speed path trigger</td></tr><tr><td>0x0E</td><td>Path address 0</td></tr><tr><td>0x0F</td><td>Path address 1</td></tr><tr><td>0x10</td><td>Path address 2</td></tr><tr><td>0x11</td><td>Path address 3</td></tr></table></td><td>0 ~ 17</td></tr>
<tr><td>PA_014</td><td>20</td><td>DI Input Port 3</td><td>0 ~ 17</td></tr>
<tr><td>PA_015</td><td>21</td><td>DI Input Port 4</td><td>0 ~ 17</td></tr>
<tr><td>PA_01A</td><td>26</td><td>Input port filter coefficient</td><td colspan="2">Input port filter coefficient
0～1024</td></tr>
<tr><td>PA_01B</td><td>27</td><td>DO terminal normally open/closed switching</td><td><table><tr><td>Code</td><td>Status</td></tr><tr><td>Bit0</td><td>DO0</td></tr><tr><td>Bit1</td><td>DO1</td></tr></table>0: Normally Open; 1: Normally Closed</td><td>0~7</td></tr>
<tr><td>PA_01C</td><td>28</td><td>DO Output Port 0</td><td rowspan="2"><table><tr><td>Code</td><td>Function</td></tr><tr><td>0x00</td><td>Undefined</td></tr><tr><td>0x01</td><td>Alarm output</td></tr><tr><td>0x02</td><td>Motor Running</td></tr><tr><td>0x03</td><td>Homing Complete</td></tr><tr><td>0x04</td><td>In-position signal</td></tr><tr><td>0x05</td><td>Brake signal</td></tr></table></td><td>0~3</td></tr>
<tr><td>PA_01D</td><td>29</td><td>DO Output Port 1</td><td>0~3</td></tr>
<tr><td>PA_01F</td><td>31</td><td>Force output of the output port</td><td><table><tr><td>Code</td><td>DO function code</td></tr><tr><td>Bit0</td><td>0x09</td></tr><tr><td>Bit1</td><td>0x0A</td></tr></table>0: Normally Open; 1: Normally Closed
Note: The output port function must be set according to the corresponding function code. The output will only occur when the corresponding bit is connected.</td><td>0~7</td></tr>
</table>

3.5.3 Communication Control Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range
PA_020	32	485 ID	Custom station number	0 ~ 254
PA_021	33	485 Data Type Selection	0: 8-bit data, no parity, 1 stop bit; 1: 8-bit data, no parity, 2 stop bits; 2: 8-bit data, even parity, 1 stop bit; 3: 8-bit data, odd parity, 1 stop bit	0~3
PA_022	34	Default Direction Setting	0: Default; 1: Reverse;	0~1
PA_023	35	Subdivision Setting	Subdivision Setting	400～51200
PA_024	36	Limit Stop	0: Stop; 1: Forced emergency stop	0~1
PA_025	37	Soft Limit Activation	0: Disabled; 1: Enabled;	0~1

			Note: Soft limits are only effective after homing	
PA_26	38	Internal Multi-Segment Position Trigger Mode	0: Interrupt current positioning motion to execute new command; 1: Ignore new command if a positioning motion is in progress	
PA_28	40	RS485 Baud Rate	0：115200； 1：38400； 2：19200； 3：9600；	
PA_030	48	JOG Operating Speed	Unit: r/min	-3000～3000
PA_031	49	JOG Acceleration Time	Unit: ms	0～2000
PA_032	50	JOG Deceleration Time	Unit: ms	0～2000
PA_033	51	Positioning Start Speed	Unit: r/min	0～3000
PA_034	52	Positioning Acceleration Time	Unit: ms	0～2000
PA_035	53	Positioning Deceleration Time	Unit: ms	0～2000
PA_036	54	Positioning Speed	Unit: r/min	0～3000
PA_037	55	Positioning Target H	Unit: pulse	-2147483648~ 2147483647
PA_038	56	Positioning Target L		
PA_040	64	Homing Mode	17: Negative limit approach; 18: Positive limit approach; 24: Positive limit origin approach; 29: Negative limit origin approach; 35: Current position as origin	17~35
PA_041	65	Homing Approach Speed	Unit: r/min	0～3000
PA_042	66	Homing Creep Speed	Unit: r/min	0～3000
PA_043	67	Homing Acceleration/ Deceleration Time	Unit: ms	0～2000
PA_044	68	Home Offset Value H	Unit: pulse	-2147483648~ 2147483647
PA_045	69	Home Offset Value L		
PA_046	70	Positive Soft Limit H	Unit: pulse	-2147483648~ 2147483647
PA_047	71	Positive Soft Limit L		
PA_048	72	Negative Soft Limit H	Unit: pulse	-2147483648~ 2147483647
PA_049	73	Negative Soft Limit L		
PA_04A	74	Internal Multi-Segment Position Absolute/Relative Position Mode	0: Relative position mode; 1: Absolute position mode	0~1

<table>
<tr>
<td>PA_04E</td>
<td>78</td>
<td>Control Word</td>
<td>
<table>
<tr><th>Bit</th><th>Function</th><th>Description</th></tr>
<tr><td>Bit0</td><td>Positioning Control</td><td>0: Disabled;
1: Enabled;</td></tr>
<tr><td>Bit1</td><td>Positioning Mode</td><td>0: Relative;
1: Absolute;</td></tr>
<tr><td>Bit2</td><td>Switch Mode</td><td>0: Ignore new command if a positioning motion is in progress
1: Interrupt current positioning motion to execute new command;</td></tr>
<tr><td>Bit3</td><td>JOG Control</td><td>0: Disabled;
1: Enabled;</td></tr>
<tr><td>Bit4</td><td>Homing Control</td><td>0: Disabled;
1: Enabled;</td></tr>
<tr><td>Bit5</td><td>Stop Control</td><td>0: Disabled;
1: Enabled;</td></tr>
<tr><td>Bit6</td><td>Emergency Stop Control</td><td>0: Disabled;
1: Enabled;</td></tr>
</table>
</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>PA_04F</td>
<td>79</td>
<td>Auxiliary Control</td>
<td>
<table>
<tr><th>Code</th><th>Function</th></tr>
<tr><td>0x0000</td><td>N/A</td></tr>
<tr><td>0x0100</td><td>Restore Factory Parameters</td></tr>
<tr><td>0x0200</td><td>Save Current Parameters</td></tr>
<tr><td>0x0300</td><td>Clear Current Alarm</td></tr>
<tr><td>0x0400</td><td>Clear Current Position</td></tr>
<tr><td>0x0500</td><td>Motor Enabled</td></tr>
<tr><td>0x0600</td><td>Motor Release</td></tr>
</table>
</td>
<td></td>
</tr>
</table>

3.5.4 Internal Multi-Segment Positioning

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range
PA_050	80	Position Path 0 Target H	Unit: pulse	-2147483648~ 2147483647
PA_051	81	Position Path 0 Target L		
PA_052	82	Positioning Path 0 Speed	Unit: r/min	0～3000
PA_053	83	Positioning Path 0 Acceleration Time	Unit: ms	0～2000
PA_054	84	Positioning Path 0 Deceleration Time	Unit: ms	0～2000
PA_056	86	Position Path 1 Target H	Unit: pulse	-2147483648~ 2147483647
PA_057	87	Position Path 1 Target L		
PA_058	88	Positioning Path 1 Speed	Unit: r/min	0～3000
PA_059	89	Positioning Path 1 Acceleration Time	Unit: ms	0～2000
PA_05A	90	Positioning Path 1 Deceleration Time	Unit: ms	0～2000

PA_05C	92	Position Path 2 Target H	Unit: pulse	-2147483648~ 2147483647
PA_05D	93	Position Path 2 Target L		
PA_05E	94	Positioning Path 2 Speed	Unit: r/min	0～3000
PA_05F	95	Positioning Path 2 Acceleration Time	Unit: ms	0～2000
PA_060	96	Positioning Path 2 Deceleration Time	Unit: ms	0～2000
PA_062	98	Position Path 3 Target H	Unit: pulse	-2147483648~ 2147483647
PA_063	99	Position Path 3 Target L		
PA_064	100	Positioning Path 3 Speed	Unit: r/min	0～3000
PA_065	101	Positioning Path 3 Acceleration Time	Unit: ms	0～2000
PA_066	102	Positioning Path 3 Deceleration Time	Unit: ms	0～2000
PA_068	104	Position Path 4 Target H	Unit: pulse	-2147483648~ 2147483647
PA_069	105	Position Path 4 Target L		
PA_06A	106	Positioning Path 4 Speed	Unit: r/min	0～3000
PA_06B	107	Positioning Path 4 Acceleration Time	Unit: ms	0～2000
PA_06C	108	Positioning Path 4 Deceleration Time	Unit: ms	0～2000
PA_06E	110	Position Path 5 Target H	Unit: pulse	-2147483648~ 2147483647
PA_06F	111	Position Path 5 Target L		
PA_070	112	Positioning Path 5 Speed	Unit: r/min	0～3000
PA_071	113	Positioning Path 5 Acceleration Time	Unit: ms	0～2000
PA_072	114	Positioning Path 5 Deceleration Time	Unit: ms	0～2000
PA_074	116	Position Path 6 Target H	Unit: pulse	-2147483648~ 2147483647
PA_075	117	Position Path 6 Target L		
PA_076	118	Positioning Path 6 Speed	Unit: r/min	0～3000
PA_077	119	Positioning Path 6 Acceleration Time	Unit: ms	0～2000
PA_078	120	Positioning Path 6 Deceleration Time	Unit: ms	0～2000
PA_07A	122	Position Path 7 Target H	Unit: pulse	-2147483648~ 2147483647
PA_07B	123	Position Path 7 Target L		
PA_07C	124	Positioning Path 7 Speed	Unit: r/min	0～3000
PA_07D	125	Positioning Path 7 Acceleration Time	Unit: ms	0～2000
PA_07E	126	Positioning Path 7 Deceleration Time	Unit: ms	0～2000
PA_080	128	Position Path 8 Target H	Unit: pulse	-2147483648~ 2147483647
PA_081	129	Position Path 8 Target L		
PA_082	130	Positioning Path 8 Speed	Unit: r/min	0～3000
PA_083	131	Positioning Path 8 Acceleration Time	Unit: ms	0～2000
PA_084	132	Positioning Path 8 Deceleration Time	Unit: ms	0～2000
PA_086	134	Position Path 9 Target H	Unit: pulse	-2147483648~ 2147483647
PA_087	135	Position Path 9 Target L		
PA_088	136	Positioning Path 9 Speed	Unit: r/min	0～3000
PA_089	137	Positioning Path 9 Acceleration Time	Unit: ms	0～2000
PA_08A	138	Positioning Path 9 Deceleration Time	Unit: ms	0～2000
PA_08C	140	Position Path 10 Target H	Unit: pulse	-2147483648~ 2147483647
PA_08D	141	Position Path 10 Target L		
PA_08E	142	Positioning Path 10 Speed	Unit: r/min	0～3000
PA_08F	143	Positioning Path 10 Acceleration Time	Unit: ms	0～2000
PA_090	144	Positioning Path 10 Deceleration Time	Unit: ms	0～2000
PA_092	146	Position Path 11 Target H	Unit: pulse	-2147483648~ 2147483647
PA_093	147	Position Path 11 Target L		

PA_094	148	Positioning Path 11 Speed	Unit: r/min	0～3000
PA_095	149	Positioning Path 11 Acceleration Time	Unit: ms	0～2000
PA_096	150	Positioning Path 11 Deceleration Time	Unit: ms	0～2000
PA_098	152	Position Path 12 Target H	Unit: pulse	-2147483648~ 2147483647
PA_099	153	Position Path 12 Target L		
PA_09A	154	Positioning Path 12 Speed	Unit: r/min	0～3000
PA_09B	155	Positioning Path 12 Acceleration Time	Unit: ms	0～2000
PA_09C	156	Positioning Path 12 Deceleration Time	Unit: ms	0～2000
PA_09E	158	Position Path 13 Target H	Unit: pulse	-2147483648~ 2147483647
PA_09F	159	Position Path 13 Target L		
PA_0A0	160	Positioning Path 13 Speed	Unit: r/min	0～3000
PA_0A1	161	Positioning Path 13 Acceleration Time	Unit: ms	0～2000
PA_0A2	162	Positioning Path 13 Deceleration Time	Unit: ms	0～2000
PA_0A4	164	Position Path 14 Target H	Unit: pulse	-2147483648~ 2147483647
PA_0A5	165	Position Path 14 Target L		
PA_0A6	166	Positioning Path 14 Speed	Unit: r/min	0～3000
PA_0A7	167	Positioning Path 14 Acceleration Time	Unit: ms	0～2000
PA_0A8	168	Positioning Path 14 Deceleration Time	Unit: ms	0～2000
PA_0AA	170	Position Path 15 Target H	Unit: pulse	-2147483648~ 2147483647
PA_0AB	171	Position Path 15 Target L		
PA_0AC	172	Positioning Path 15 Speed	Unit: r/min	0～3000
PA_0AD	173	Positioning Path 15 Acceleration Time	Unit: ms	0～2000
PA_0AE	174	Positioning Path 15 Deceleration Time	Unit: ms	0～2000

3.5.5 Internal Multi-Segment Speed

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range
PA_0B0	176	Speed Path 0 Running Speed	Unit: r/min	-3000～3000
PA_0B1	177	Speed Path 0 Acceleration Time	Unit: ms	0～2000
PA_0B2	178	Speed Path 0 Deceleration Time	Unit: ms	0～2000
PA_0B3	179	Speed Path 1 Running Speed	Unit: r/min	-3000～3000
PA_0B4	180	Speed Path 1 Acceleration Time	Unit: ms	0～2000
PA_0B5	181	Speed Path 1 Deceleration Time	Unit: ms	0～2000
PA_0B6	182	Speed Path 2 Running Speed	Unit: r/min	-3000～3000
PA_0B7	183	Speed Path 2 Acceleration Time	Unit: ms	0～2000
PA_0B8	184	Speed Path 2 Deceleration Time	Unit: ms	0～2000
PA_0B9	185	Speed Path 3 Running Speed	Unit: r/min	-3000～3000
PA_0BA	186	Speed Path 3 Acceleration Time	Unit: ms	0～2000
PA_0BB	187	Speed Path 3 Deceleration Time	Unit: ms	0～2000
PA_0BC	188	Speed Path 4 Running Speed	Unit: r/min	-3000～3000
PA_0BD	189	Speed Path 4 Acceleration Time	Unit: ms	0～2000
PA_0BE	190	Speed Path 4 Deceleration Time	Unit: ms	0～2000
PA_0BF	191	Speed Path 5 Running Speed	Unit: r/min	-3000～3000
PA_0C0	192	Speed Path 5 Acceleration Time	Unit: ms	0～2000
PA_0C1	193	Speed Path 5 Deceleration Time	Unit: ms	0～2000
PA_0C2	194	Speed Path 6 Running Speed	Unit: r/min	-3000～3000

PA_0C3	195	Speed Path 6 Acceleration Time	Unit: ms	0～2000
PA_0C4	196	Speed Path 6 Deceleration Time	Unit: ms	0～2000
PA_0C5	197	Speed Path 7 Running Speed	Unit: r/min	-3000～3000
PA_0C6	198	Speed Path 7 Acceleration Time	Unit: ms	0～2000
PA_0C7	199	Speed Path 7 Deceleration Time	Unit: ms	0～2000
PA_0C8	200	Speed Path 8 Running Speed	Unit: r/min	-3000～3000
PA_0C9	201	Speed Path 8 Acceleration Time	Unit: ms	0～2000
PA_0CA	202	Speed Path 8 Deceleration Time	Unit: ms	0～2000
PA_0CB	203	Speed Path 9 Running Speed	Unit: r/min	-3000～3000
PA_0CC	204	Speed Path 9 Acceleration Time	Unit: ms	0～2000
PA_0CD	205	Speed Path 9 Deceleration Time	Unit: ms	0～2000
PA_0CE	206	Speed Path 10 Running Speed	Unit: r/min	-3000～3000
PA_0CF	207	Speed Path 10 Acceleration Time	Unit: ms	0～2000
PA_0D0	208	Speed Path 10 Deceleration Time	Unit: ms	0～2000
PA_0D1	209	Speed Path 11 Running Speed	Unit: r/min	-3000～3000
PA_0D2	210	Speed Path 11 Acceleration Time	Unit: ms	0～2000
PA_0D3	211	Speed Path 11 Deceleration Time	Unit: ms	0～2000
PA_0D4	212	Speed Path 12 Running Speed	Unit: r/min	-3000～3000
PA_0D5	213	Speed Path 12 Acceleration Time	Unit: ms	0～2000
PA_0D6	214	Speed Path 12 Deceleration Time	Unit: ms	0～2000
PA_0D7	215	Speed Path 13 Running Speed	Unit: r/min	-3000～3000
PA_0D8	216	Speed Path 13 Acceleration Time	Unit: ms	0～2000
PA_0D9	217	Speed Path 13 Deceleration Time	Unit: ms	0～2000
PA_0DA	218	Speed Path 14 Running Speed	Unit: r/min	-3000～3000
PA_0DB	219	Speed Path 14 Acceleration Time	Unit: ms	0～2000
PA_0DC	220	Speed Path 14 Deceleration Time	Unit: ms	0～2000
PA_0DD	221	Speed Path 15 Running Speed	Unit: r/min	-3000～3000
PA_0DE	222	Speed Path 15 Acceleration Time	Unit: ms	0～2000
PA_0DF	223	Speed Path 15 Deceleration Time	Unit: ms	0～2000

3.5.6 Manufacturer Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range
PA_100	256	Operating Mode (Effective after restart)	1: Open-loop; 2: Closed-loop;	1~2
PA_101	257	Encoder Resolution	Encoder Resolution	
PA_102	258	Maximum Effective Current	Maximum current output by the driver, unit: mA;	
PA_103	259	Closed loop maximum current ratio	Closed loop maximum current ratio	
PA_104	260	Base current ratio	Base current ratio	
PA_105	261	Open loop maximum current ratio	Open loop maximum current ratio	
PA_106	262	Lock current ratio	Lock current ratio	
PA_107	263	Lock Motor Time	Lock Motor Time	
PA_109	265	Low-pass filter coefficient	Low-pass filter coefficient	
PA_10A	266	Position error threshold	Position error threshold	
PA_10B	267	Positioning accuracy threshold	Positioning accuracy threshold	

PA_10C	268	Positioning completion time	Positioning completion time	
PA_10D	269	Average filter coefficient	Average filter coefficient	
PA_10E	270	Current loop gain adjustment ratio	Current loop gain adjustment ratio	
PA_10F	271	Current Loop Kp	Current Loop Kp	
PA_110	272	Current Loop Ki	Current Loop Ki	
PA_111	273	Current Loop Kc	Current Loop Kc	
PA_112	274	LA Speed Kp1	LA Speed Kp1	
PA_113	275	LA Speed Kv1	LA Speed Kv1	
PA_114	276	Speed node 1	Speed node 1	
PA_115	277	LA Speed Kp2	LA Speed Kp2	
PA_116	278	LA Speed Kv2	LA Speed Kv2	
PA_117	279	Speed node 2	Speed node 1	
PA_118	280	Speed feedforward	Speed feedforward	
PA_119	281	Position integration	Position integration	

3.6 Alarm Handling

The alarm information for this series of drivers can be identified by the number of times the indicator light blinks. The specific alarm information is as follows:

Indicator Light Blinking Frequency	Alarm Description	Troubleshooting	Reset
Blinks once every 5 seconds	Overcurrent Alarm	1. Motor wiring short circuit, check motor wiring; 2. Motor damage, measure the resistance of the motor's A-phase and B-phase windings; 3. Driver damage, replace the driver.	Restart to reset
Blinks twice every 2 seconds	Overvoltage Alarm	1. Power supply voltage is too high, measure the power supply voltage or replace the power supply; 2. Driver damage, replace the driver.	Restart to reset
Blinks three times every 5 seconds	Undervoltage Alarm	1. Power supply voltage is too low, measure the power supply voltage or replace the power supply; 2. Driver damage, replace the driver.	Restart to reset
Blinks 4 times every 5 seconds	Memory Read/Write Error	Driver damage, please replace the driver.	Can be reset
Blinks five times every 5 seconds	Position Error Alarm	1. Motor power line phase sequence error, check wiring sequence; 2. Motor line phase loss, check if the wire is broken or has poor contact; 3. Encoder line disconnection; 4. Load jam; 5. Speed too fast.	Can be reset

Chapter 4: MODBUS RTU Instructions

4.1 Read Parameter Command (0x03)

Master (e.g., PLC) Sends the Command:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x03	CMD	Function code, here 0x03, indicating a read parameter command
3rd Byte	0x00	Start AddrH	High 8 bits of the starting address of the parameter to be read
4th Byte	0x0A	Start AddrL	Low 8 bits of the starting address of the parameter to be read
5th Byte	0x00	Num_ High(Byte)	High 8 bits of the number of parameters to read (in words, not bytes)
6th Byte	0x01	Num_Low(Byte)	High 8 bits of the number of parameters to read
7th Byte	0Xa4	CRC_H	High byte of the CRC check (CRC check is done on bytes 1 through 6)
8th Byte	0x08	CRC_L	Low byte of the CRC check

[Example: The master reads one parameter (2 bytes) from the slave at address 1, starting from address 10 (0x000A)]

Slave (Driver) Responds:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x03	CMD	Function code, 0x03, corresponding to the master command
3rd Byte	0x02	Data Lenth	Length of the response data, in bytes
4th Byte	0x00	Data0	Data0 (High byte of the first register)
5th Byte	0x00	Data0	Data0 (Low byte of the first register)
6th Byte	0Xb8	CRC_H	High byte of the CRC check (CRC check is done on bytes 1 through 9)
7th Byte	0x44	CRC_L	Low byte of the CRC check

[Response Data0: 0x0000]

4.2 Write to a single register (0x06)

Master (e.g., PLC) Sends the Command:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x06	CMD	Function code, here 0x06, indicating a write single parameter command
3rd Byte	0x00	Start AddrH	High 8 bits of the starting address of the parameter to be written
4th Byte	0x70	Start AddrL	Low 8 bits of the starting address of the parameter to be written
5th Byte	0x00	DATA(0)	High 8 bits of the data to be written
6th Byte	0x14	DATA(1)	Low 8 bits of the data to be written
7th Byte	0x88	CRC_H	High byte of the CRC check (CRC check is done on bytes 1 through 6)
8th Byte	0x1E	CRC_L	Low byte of the CRC check

[Example: The master writes a value of 20 (0x0014) to the slave at address 1, starting from address 112 (0x0070)]

Slave (Driver) Responds:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x06	CMD	Function code, 0x06, corresponding to the master command
3rd Byte	0x00	Start AddrH	High 8 bits of the starting address of the written parameter
4th Byte	0x70	Start AddrL	Low 8 bits of the starting address of the written parameter
5th Byte	0x00	DATA(0)	High 8 bits of the written data
6th Byte	0x14	DATA(1)	Low 8 bits of the written data
7th Byte	0x88	CRC_H	High byte of the CRC check (CRC check is done on bytes 1 through 6)
8th Byte	0x1E	CRC_L	Low byte of the CRC check

4.3 Write Multiple Registers Command (0x10)

Master (e.g., PLC) Sends the Command:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x10	CMD	Function code, here 0x10, indicating a write multiple parameters command
3rd Byte	0x00	Start AddrH	High 8 bits of the starting address of the parameter to be written
4th Byte	0xB0	Start AddrL	Low 8 bits of the starting address of the parameter to be written
5th Byte	0x00	NUM_H	High 8 bits of the number of parameters (registers) to be written
6th Byte	0x02	NUM_L	Low 8 bits of the number of parameters (registers) to be written
7th Byte	0x04	Data Lenth	Length of the data to be written, which is twice the number of registers
8th Byte	0x03	DATA(0)	High 8 bits of the first data to be written
9th Byte	0xE8	DATA(0)	Low 8 bits of the first data to be written
10th Byte	0x00	DATA(1)	High 8 bits of the second data to be written
11th Byte	0x64	DATA(1)	Low 8 bits of the second data to be written
12th Byte	0x79	CRC_H	High byte of the CRC check (CRC check is done on bytes 1 through 6)
13th Byte	0x40	CRC_L	Low byte of the CRC check

[Example: The master writes two parameters to the slave at address 1, starting from address 176 (0x00B0): 176(0x00B0)=1000(0x03E8)、177(0x00B1)=100(0x0064)]

Slave (Driver) Responds:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x10	CMD	Function code, 0x10, corresponding to the master command
3rd Byte	0x00	Start AddrH	High 8 bits of the starting address of the written parameter
4th Byte	0xB0	Start AddrL	Low 8 bits of the starting address of the written parameter
5th Byte	0x00	NUM_H	High 8 bits of the number of parameters (registers) written
6th Byte	0x02	NUM_L	Low 8 bits of the number of parameters (registers) written
7th Byte	0x40	CRC_H	High byte of the CRC check (CRC check is done on bytes 1 through 6)
8th Byte	0x2F	CRC_L	Low byte of the CRC check

4.4 Exception Responses and Error Codes

When a slave encounters an exception while processing a read or write command, its response frame will change as follows:

Byte Order	Example Command	Symbol	Function
1st Byte	0x01	Slave Addr	Slave address, here it is 1
2nd Byte	0x06	CMD|0x80	The highest bit of the function code is set to 1
3rd Byte	0x04	Error Code	Error code indicating the type of error encountered:
			0x02: Illegal address
			0x03: Illegal data
			0x04: Execution denied
4th Byte	0x10	CRC_H	High byte of the CRC check High byte of the CRC check (CRC check is done on bytes 1 through 3)
5th Byte	0x00	CRC_L	Low byte of the CRC check