IDV Series Integrated Low-voltage Servo User Manual

Preface

Thank you for ordering the IDV series integrated motor from Rtelligent!

IDV series is an integrated general-purpose low-voltage servo developed by Rtelligent Company. It has a position/speed/torque control mode and is equipped with a 485 communication interface to achieve communication control of the integrated motor.

This manual is a comprehensive user manual for IDV series integrated motors, providing product safety information, mechanical and electrical installation instructions, debugging applications, and maintenance guidance. For first time users, please read this manual carefully. If you have any doubts about some features and performance, please consult our company's technical support personnel for assistance.

As we are committed to the continuous improvement of integrated motors, the information provided by the company is subject to change without prior notice.

Revision History

Date	Version	Description
2022.08	V1.0	Version 1 release
2022.10	V2.0	Version 2 release
2024.5	V3.0	Added series and model specifications. Expanded functional module descriptions.
2024.6	V3.1	Additional parameter specifications included.
2024.8.13	V3.2	1.Added 1000W integrated motor dimensions in Chapter 3 2.Added RS485 communication port definitions
2025.6.13	V3.3	Revised description of parameter Pn223

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1. Safety Instructions

1.1. Safety Precautions

- Please disconnect the power supply for more than 5 minutes before removing or disassembling the integrated motor, otherwise it may cause electric shock due to residual voltage.
- Please never touch the inside of the integrated motor, otherwise it may cause electric shock.
- Please insulate the connection part of the power supply terminal, otherwise it may cause electric shock.
- Please do not damage or pull on the cable, subject the cable to excessive force, put it under heavy objects or clamp it. Doing so may result in electric shock, which may cause the product to stop or burn out.
- Unless designated personnel, please do not set up, disassemble or repair, otherwise it may cause electric shock or injury.
- Please do not remove the cover, cables, connectors and optional accessories while the power is on, otherwise it may cause electric shock and damage the integrated motor.
- Please follow the steps required by this manual for trial operation.
- If an operation error occurs while the low-voltage servo motor is connected to the machine, it will not only cause damage to the machine, but also sometimes cause personal accidents.
- Please do not change the maximum speed value, except for special purposes. Inadvertent change may damage the machine or cause injury.
- When the power is turned on and for a period of time after the power is cut off, the heat sink of the integrated motor, the external braking resistor, and the low-voltage servo motor may become hot. Please do not touch it, otherwise it may cause burns. To prevent accidental contact with hands or parts (cables, etc.), please take safety precautions such as installing an enclosure.
- Please do not touch the rotating part of the servo motor while it is running, as this may result in injury.
- If the low-voltage servo motor is installed on the supporting machine and starts to run, make sure that the low-voltage servo motor can be stopped at any time, otherwise you may get injured.
- Please install a stop device on the machine side to ensure safety.
- If power is restored after a momentary power failure occurs during operation, the machine may restart suddenly, so please do not approach the machine.
- Please take measures to ensure that personal safety will not be endangered when restarting, otherwise it may cause injury.
- Please do not modify the product in any way, otherwise it may cause injury or mechanical damage.
- Please install the integrated motor and external braking resistor on non-combustible materials, otherwise it may cause a fire.

- Between the power supply and the main circuit power supply of the integrated motor, be sure to connect an electromagnetic contactor and a non-fuse circuit breaker. Otherwise, when the integrated motor fails, the large current cannot be cut off, which may cause a fire.
- In the integrated motor and low-voltage servo motor, please do not mix oil, grease and other flammable foreign objects and screws, metal pieces and other conductive foreign objects, otherwise it may cause fire and other accidents.

1.2. Unpacking Inspection

Items	Description
Check whether the delivered products comply with you ordered.	The packaging box contains the products you ordered. Please confirm it by the nameplate model of the integrated motor.
Check whether the products are intact.	Please check the product surface to see if the product is damaged during transportation. If any omission or damage is found, please contact our company or your supplier as soon as possible.
Check whether the low-voltage servo motor is rotating smoothly	It is normal to be able to turn gently by hand.

2. Product Information

2.1. Integrated Motor Introduction

2.1.1. Naming Rule

IDV 400 - 24

① ② ③

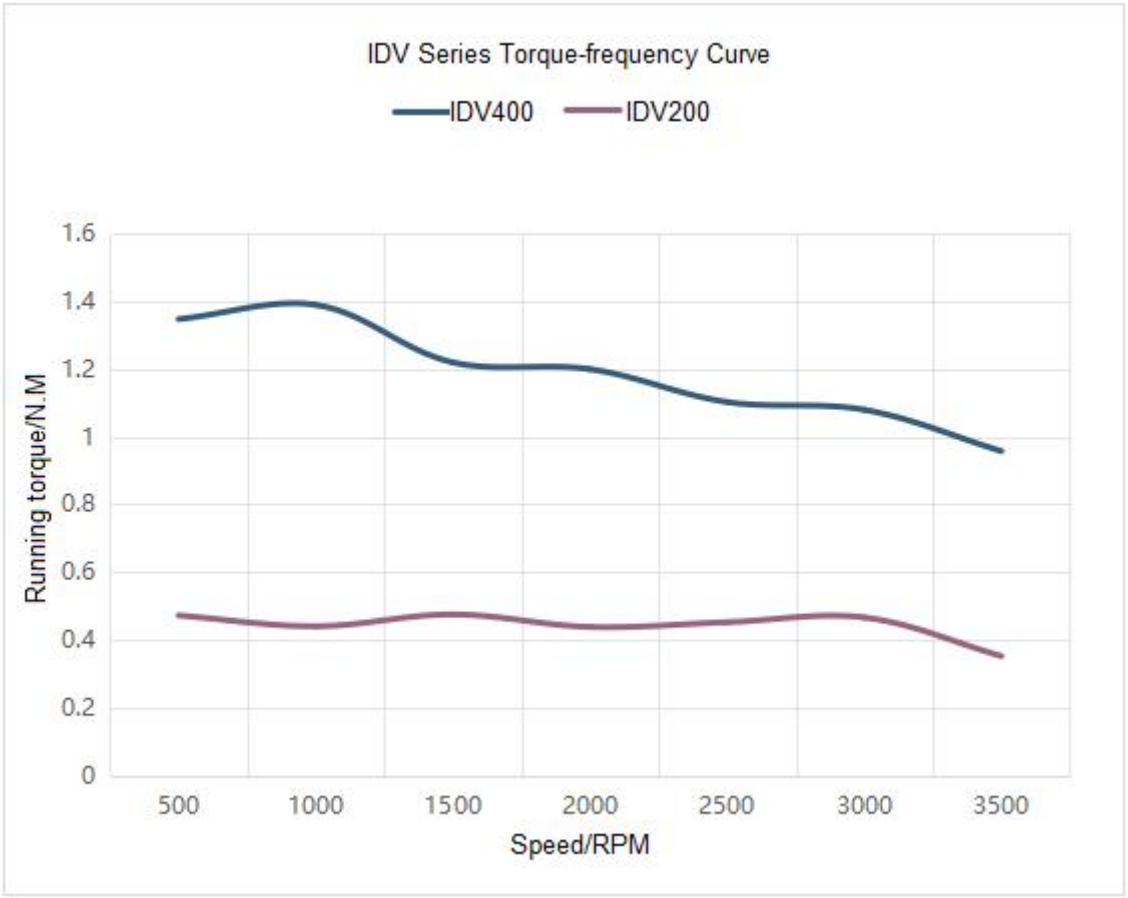
Symbol	Description
①	Series name: IDV: Rtelligent IDV series low-voltage integrated motor
②	Rated power: 200: 200W 400: 400W
③	Rated voltage: 24: The rated voltage of the motor is 24V None: The rated voltage of the motor is 48V

2.1.2. Product Specifications

- Voltage: 18VDC~48VDC, the recommended operating voltage is the rated voltage of the motor.
- 5V double terminal pulse/direction command input, compatible with NPN, PNP type input signal.
- The maximum pulse frequency of the control command is 500KHz.
- With overcurrent, overvoltage, undervoltage, overload, out-of-tolerance and other protection functions, and optional output alarm tips.
- Built-in position command smoothing filter function, the operation is more stable, the equipment operation noise is significantly reduced.
- Using FOC magnetic field positioning technology and SVPWM technology.
- Built-in 17-bit high-resolution magnetic encoder.
- With a variety of position/speed/torque command application modes.
- Configurable function of 3 digital input interfaces, 1 digital output interface.

2.1.3. Electrical Specifications

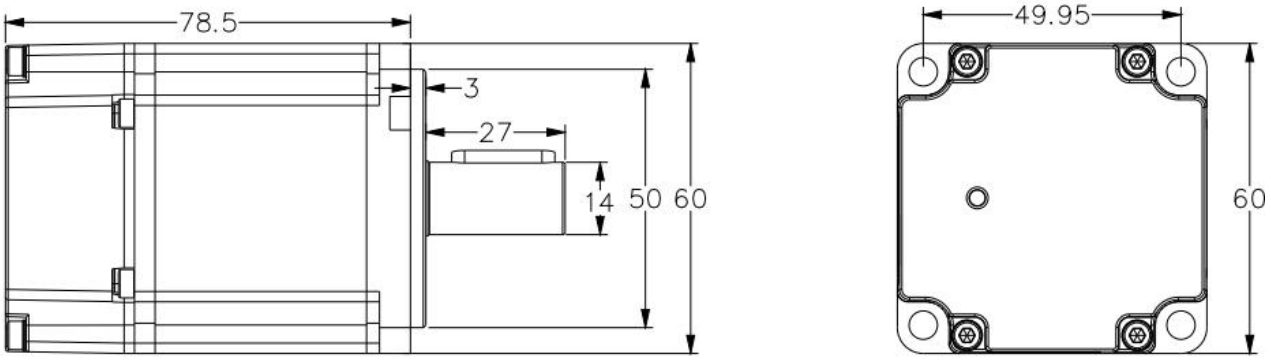
★ IDV series torque-frequency characteristic curve



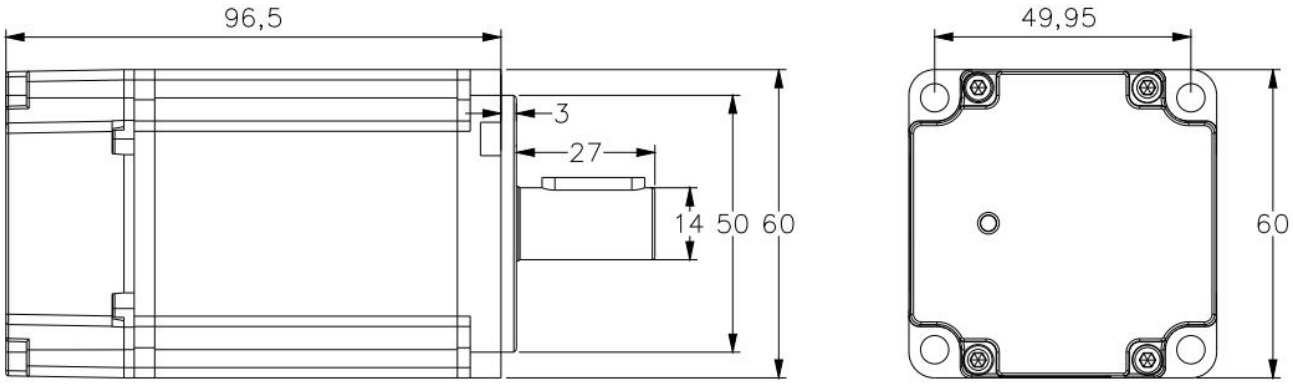
3. Installation

3.1. Dimension

1. Size of IDV200



2. Size of IDV400



3.2. Installation Site

- Please install in the installation cabinet without sun and rain.
- Do not use this product near corrosive and flammable gas environments such as hydrogen sulfide, chlorine, ammonia, sulfur, chlorinated gases, acids, bases, salts, and combustibles.
- Do not install in an environment with high temperature, humidity, dust, or metal dust.
- No vibration places.
- Pollution level of installation site: PD2.
- Please select the type with oil seal in places with grinding fluid, oil mist, iron powder, cutting, etc.
- Keep away from heat sources such as stove.
- Do not use in a closed environment, which can cause high temperature of the motor and shorten its service life.

3.3. Environmental Condition

Item	Description
Ambient temperature	-20℃~50°C
Storage temperature	-20℃~60°C
Ambient humidity	20%~95%RH (free from condensation)
Storage humidity	20%~90%RH (free from condensation)
Protection class	IP54
Vibration	Below $49\mathrm{m/s^2}$
Impact	Below $490\mathrm{m/s^2}$

3.4. Installation Precaution

- Please ensure that the installation direction is perpendicular to the wall, and use natural air convection or a fan to cool the integrated motor. Fix the integrated motor firmly on the mounting surface through 2~4 mounting holes (the number of mounting holes varies according to the capacity). When installing, please face the front of the integrated motor to the operator and make it perpendicular to the wall. Please pay attention to avoid drilling chips and other foreign matter from falling into the integrated motor during installation, otherwise it may cause drive failure.
- To ensure good heat dissipation conditions, large intervals should be left as far as possible during actual installation.
- When multiple integrated motors are installed in the control cabinet, please note that sufficient space must be reserved for the placement position to achieve sufficient heat dissipation.
- Be sure to connect the ground terminal to the ground, otherwise there may be a risk of electric shock or interference resulting in malfunction.
- When there is a vibration source (punch) near the integrated motor installation, if it is unavoidable, please use a vibration absorber or install an anti-vibration rubber gasket.
- When there are noise interference sources such as large magnetic switches and fusion splicers near the integrated motor, it is easy to cause the integrated motor to be interfered by the outside and cause malfunction. At this time, a noise filter needs to be installed, but the noise filter will increase the leakage current, therefore, it is necessary to install an insulating transformer on the input end of the integrated motor.

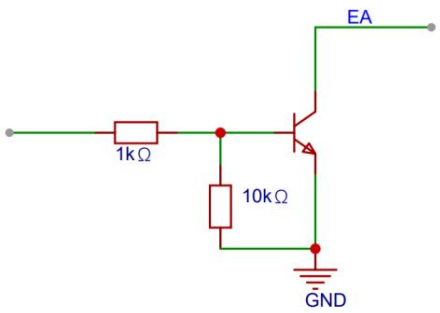
4. Wiring

4.1. Wiring Definition

4.1.1. Power Input Port

Pin	Definition	Description
1	VDC	48V power supply positive. When a braking resistor is required, one end of the braking resistor is also connected here.
2	GND	48V power supply negative
3	RB	When a braking resistor is required, the other end of the braking resistor is also connected here.
4	PE	Grounding.

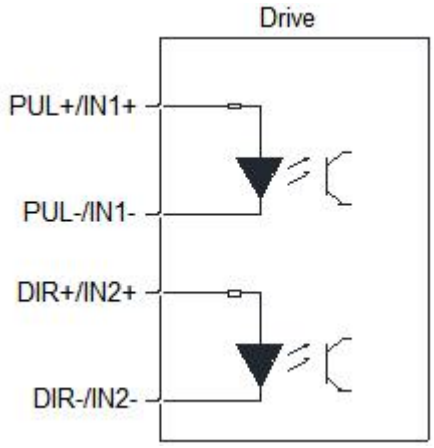
4.1.2. Control Signal Port

Definition	Description
PUL24V	PUL control signal 24V input
PUL5V	PUL control signal 5V input
PUL-	PUL external command pulse input 0V common terminal
DIR24V	DIR control signal 24V input
DIR5V	DIR control signal 5V input
DIR-	DIR external command direction input 0V common terminal
EN24	External enable 24V input
EN-	External enable input 0V common terminal
ALM	Alarm output port
COM-	Alarm output port external GND terminal
GND	Integrated motor internal power GND signal
EA	A, B and Z are collector outputs. Take EA as an example: 
EB	
EZ	

4.2. Digital Input/Output Interface Principle

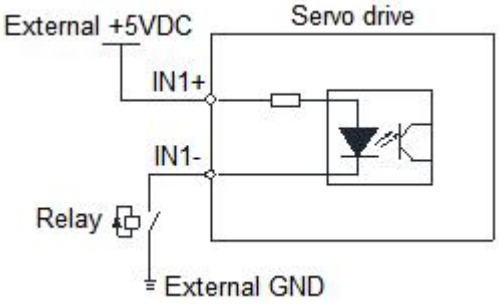
4.2.1. Digital Input Interface

The wiring diagram of digital input interface is as follows:

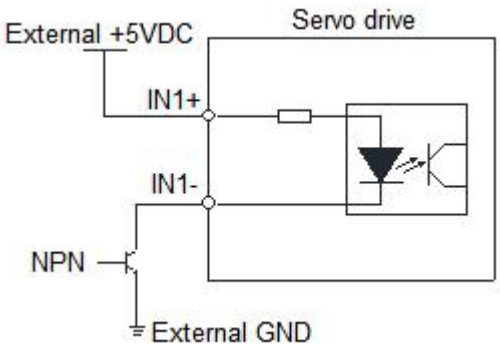


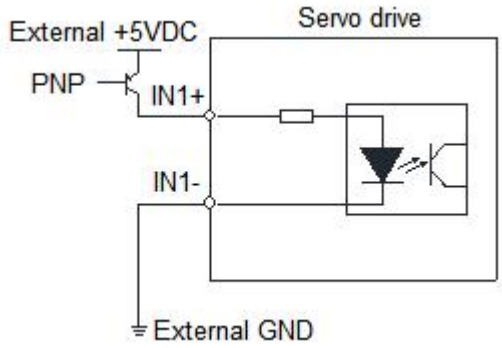
- Only one of 24V and 5V inputs is required for integrated motor PUL and DIR. Incorrect wiring may cause damage to integrated motor!

1. Wiring diagram when the upper computer is relay output



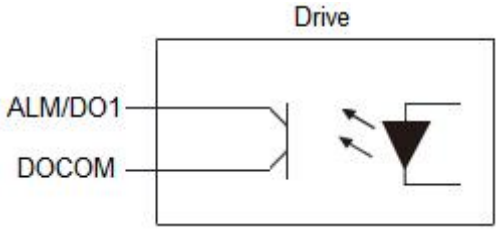
2. Wiring diagram when the upper computer is open-collector output





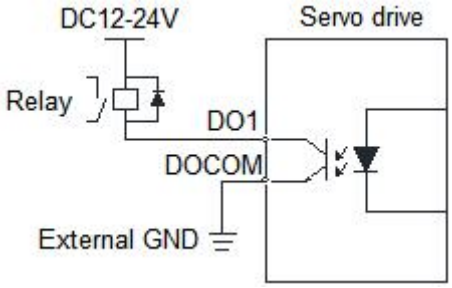
4.2.2. Digital Output Interface

IDV series includes one circuit of photoelectric isolation output signal, and the schematic diagram of digital output interface is as follows:

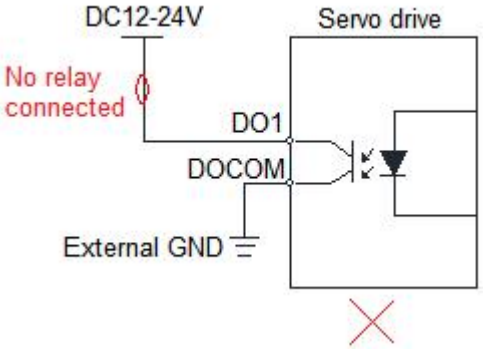


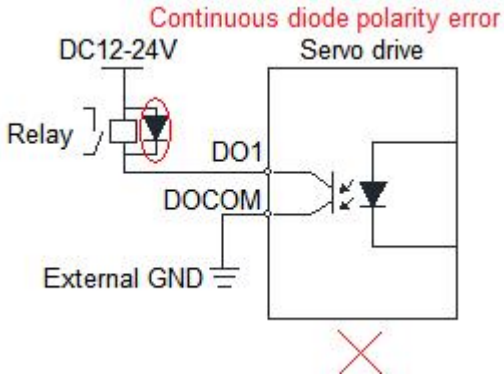
1. When the upper computer device is a relay output

(1) Correct wiring diagram

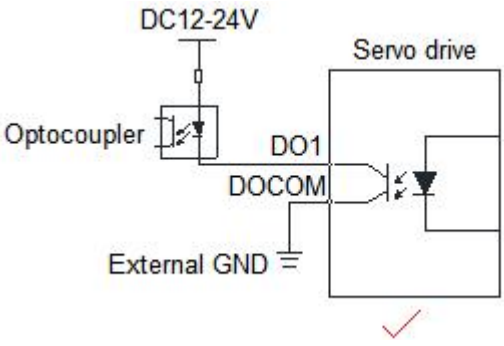


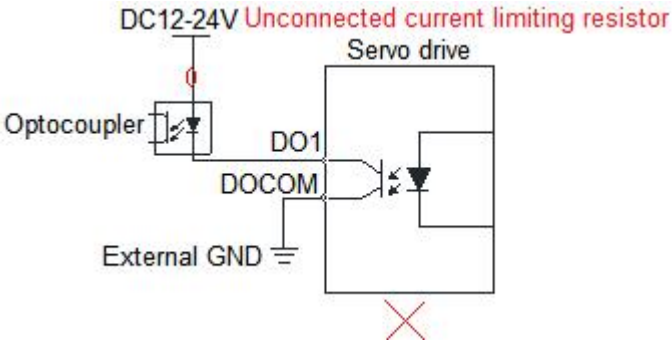
(2) Wrong wiring diagram





2. When the upper computer device is open-collector output





4.3. 485 Communication Parameters

1. IDV series low-voltage servo factory default 485 communication parameters

Communication parameters	Default
Stop bit	1
Odd-even check	none
Baud rate	38400

2. DIP switch setting parameters

IDV series integrated motor has 8 DIP switches, and the definitions of DIP SW1~SW8 are as follows:

◆ Note: Except for SW8, the modification of DIP switch takes effect after the integrated motor is restarted

(1) Slave address

SW1~SW5 set the address of RS485 communication, It will take effect after power off and restarted.

DIP status					Slave ID
SW1	SW2	SW3	SW4	SW5	
ON	ON	ON	ON	ON	Set by parameter Pn039
OFF	ON	ON	ON	ON	1
ON	OFF	ON	ON	ON	2
OFF	OFF	ON	ON	ON	3
ON	ON	OFF	ON	ON	4
……	……	……	……	……	……
ON	ON	OFF	OFF	OFF	28
OFF	ON	OFF	OFF	OFF	29
ON	OFF	OFF	OFF	OFF	30
OFF	OFF	OFF	OFF	OFF	31

◆ ON=0, OFF=1

◆ Calculation: station ID = SW1 * 1 + SW2 * 2 + SW3 * 4 + SW4 * 8 + SW5 * 16.

◆ For example:

DIP switches settings: SW1=ON, SW2=OFF, SW3=OFF, SW4=ON, SW5=OFF

Calculation results: Slave ID = 0 * 1 + 1 * 2 + 1 * 4 + 0 * 8 + 1 * 16 = 22

(2) Baud rate

SW6~SW7 set the baud rate of RS485 port communication.

DIP status		Baud rate
SW6	SW7	
ON	ON	9600bps
OFF	ON	19200bps
ON	OFF	38400bps
OFF	OFF	115200bps

(3) Terminal resistor

SW8 sets whether the RS485 communication terminal resistor is effective.

DIP status	Terminal resistor access effective status
SW8	
ON	Valid
OFF	Invalid

5. Control Mode

5.1. Basic Setting

5.1.1. Check Before Running

The following checks are required before the operation of IDV series intelligent motors:

Record	No.	Description
Wiring		
☐	1	The power input terminals VPC and GND of the integrated motor must be correctly connected, and the positive and negative polarities must be distinguished.
☐	2	All control signal cables of the integrated motor are correctly wired: external signals such as limit protection and emergency stop have been reliably connected.
☐	3	The integrated motor and motor must be reliably grounded.
☐	4	The stress of all cables is within the specified range.
☐	5	The wiring terminals have been insulated.
Environment and machinery		
☐	1	The interior and exterior of the integrated motor is free of foreign objects such as wire heads and metal shavings that could cause short circuits in the signal and power cables.
☐	2	The integrated motor is not placed on combustible objects.
☐	3	Motor installation, shaft and mechanical connection must be reliable.
☐	4	The motor and the connected machinery must be in an operable condition.
Supply voltage		
☐	1	The voltage between VDC and GND of integrated motor power supply input must be within the rated range.

5.2. Position Control Mode

Position control mode is mainly used in occasions that require positioning control, such as manipulators, placement machines, engraving (Pulse train command), CNC machine, etc. Set the value of parameter Pn0 to 0 to enable the drive to work in position control mode.

5.2.1. Position Command Input Setting

In position control mode, the position command source should be set through Pn1 first.

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
Pn1	Position command source	0: Pulse command 1: Fixed length/position table 2: Communication control 3: Debug 4: Reserved 5: APP1 6: Reserved (Don't set) 7: Position table	Set the source of the position command. The pulse command is an external position command, and the others are internal position commands	Set after stopping	Effective immediately	0

1. The source of position command is pulse command (Pn1=0)

When setting the position command source as pulse command, it is necessary to correctly set the command type of external pulse according to the host computer or other pulse output device:

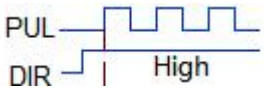
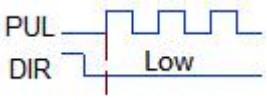
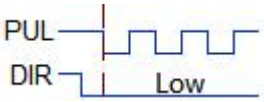
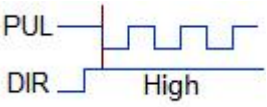
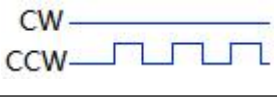
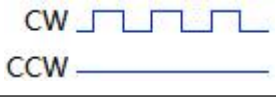
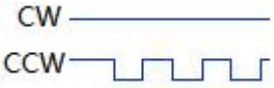
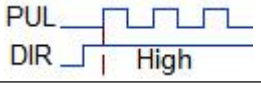
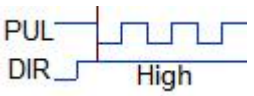
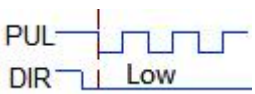
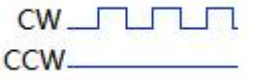
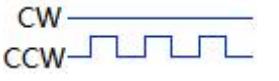
◆ Direction + pulse (positive logic or negative logic)

◆ Positive pulse / Negative pulse（CW + CCW）

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
Pn4	Pulse command type	0: Direction + pulse (positive logic) 1: Direction + pulse (negative logic) 2: CW + CCW	Select the type of external pulse command	Set after stopping	Save and restart	0

★ Description of pulse command types

Pn5 Rotation direction selection	Pn4 Command type setting	Command type	Signal	Schematic diagram of positive pulse	Schematic diagram of reverse pulse
0	0	Pulse + direction positive logic	PUL DIR		
	1	Pulse + direction negative logic	PUL DIR		
	2	CW+CCW	PUL(CW) DIR(CCW)		
					
1	0	Pulse + direction positive logic	PUL DIR		
	1	Pulse + direction negative logic	PUL DIR		
	2	CW+CCW	PUL(CW) DIR(CCW)		
					

2. The source of position command is fixed-length/position table (Pn1=1)

When the position command source is set to fixed-length/position table, it has the following functions:

- ◆ Control motor fixed-length forward and reverse through external input terminals
- ◆ Control motor jog forward and reverse through external input terminals
- ◆ Control motor running position table function through external input terminals
- ◆ Control motor fixed length forward/reverse through communication

(1) Control motor fixed-length forward and reverse through external input terminals

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn60	Point-to-point acceleration	1~2000	r/s^2	Set the acceleration of motor for fixed length running	Set when running	Next run	100
Pn61	Point-to-point deceleration	1~2000	r/s^2	Set the deceleration of motor for fixed length running	Set when running	Next run	100
Pn62	Point-to-point speed	0~3000	rpm	Set the speed of motor for fixed length running	Set when running	Next run	500
Pn63/ Pn64	Point-to-point stroke	-1073741824 ~1073741824	Command unit	Set the stroke/position of motor for fixed length running	Set when running	Next run	10000
Pn68	Emergency stop deceleration	1~2000	r/s^2	Set the deceleration during motor emergency stop	Set when running	Effective immediately	300
Pn69	Internal running position mode	0~1	-	Set the position running mode of the motor 0: incremental mode, 1: absolute mode	Set when running	Effective immediately	0

The startup mode is as follows:

Set the corresponding IN terminal function to "FUNC1(fixed length forward)", "FUNC2(fixed length reverse)" of input/output parameters, use external input to trigger the start. It should be note that the trigger signal is an edge signal. Triggering the start again while the motor is running will not work. Similarly, if the trigger signal remains valid, the motor will still not respond to other operating modes in the command source after it stops.

(2) Control motor jog forward and reverse through external input terminals

★ Associated parameter description

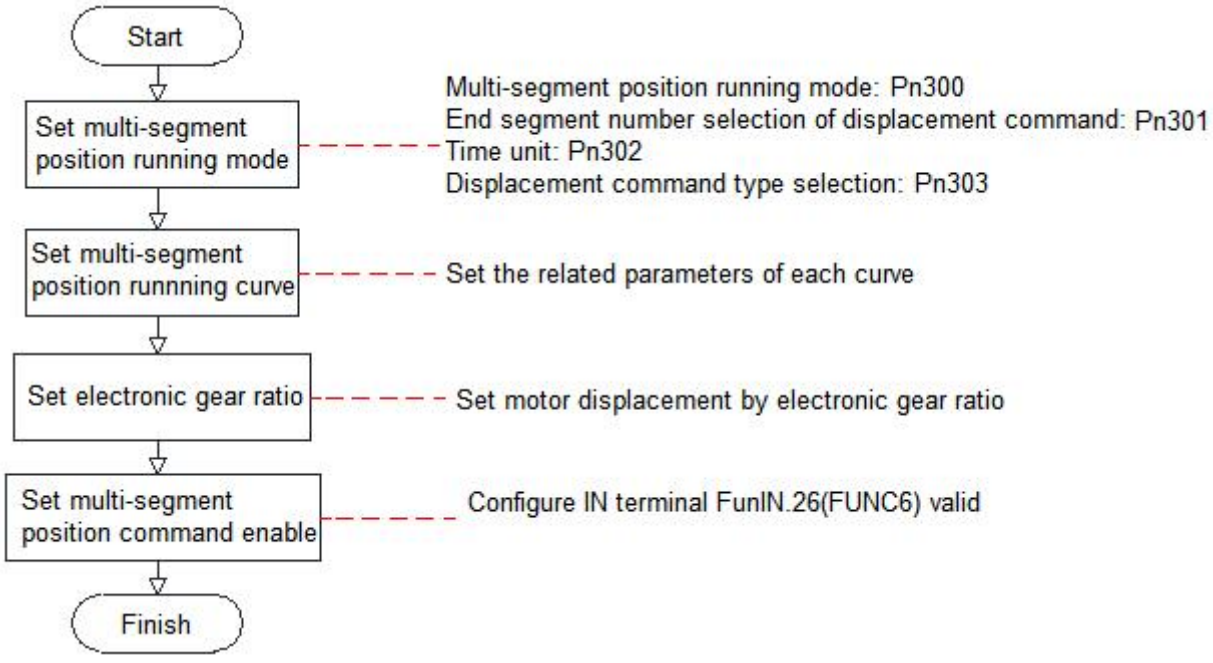
Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn65	Jog acceleration	1~2000	r/s^2	Set the acceleration of motor jog operation	Set when running	Next run	100
Pn66	Jog deceleration	1~2000	r/s^2	Set the deceleration of motor jog operation	Set when running	Next run	100
Pn67	Jog speed	0~3000	rpm	Set the speed of motor jog operation	Set when running	Next run	500
Pn68	Emergency stop deceleration	1~2000	r/s^2	Set the deceleration during motor emergency stop	Set when running	Next run	300

The startup mode is as follows:

Set the corresponding IN terminal function to "FUNC3 (jog forward)", "FUNC4 (jog reverse)" of input/output parameters, use external input to trigger the start (the trigger signal is level effective).

(3) Control motor running position table function through external input terminals

The integrated motor has multi-segment position operation function. It means that 16 position commands are stored in the integrated motor, and the displacement, maximum operating speed, acceleration and deceleration time of each segment can be set separately. The waiting time and connection mode between the segments can also be selected according to actual needs. The setting process is as follows:

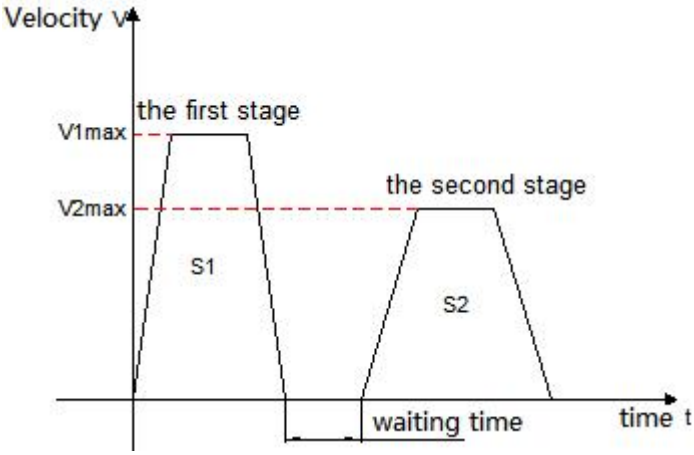


1) Set multi-segment running mode

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
Pn300	Multi-segment running mode	0: stop at the end of a single operation 1: Cycle operation 2: IN switching operation	Set the connection mode between operation sections in multi-segment position	Set after stopping	Next run	2
Pn301	The number of end segments of position command	1~16	Set the total segments of the multi-segment position command	Set after stopping	Next run	16
Pn302	Waiting time unit	0：ms 1：s	Set the waiting time unit. Note: the waiting time is only valid when Pn300=0 or 1	Set after stopping	Next run	0
Pn303	Displacement command type selection	0: Incremental position command 1: Absolute position command	Set the type of multi-segment displacement command	Set after stopping	Next run	1

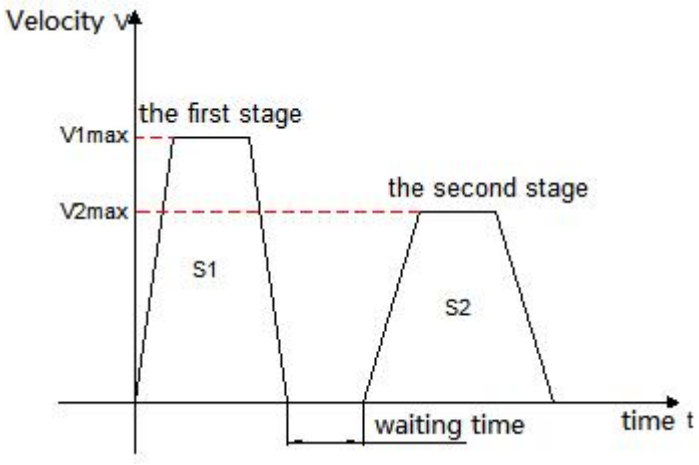
◆ Stop at the end of a single operation (Pn300=0)

Mode description	Running curve
● Run 1 round ● The segment number is automatically incremented and switched ● The waiting time can be set between each segment ● Multi-segment position command enable (FUNC6) signal is level effective	 V1max、V2max: Maximum operating speed of the first and second segment S1、S2: Segment 1 and segment 2 displacement ● After each segment of operation is completed, the motor's internal command stop signal output is valid. ● When the multi-segment position command is enabled OFF during operation, the integrated motor gives up the uncompleted displacement of this segment and stops, and the positioning completion signal is valid after the stop is completed. ● Re-enable the multi-segment position command, and the integrated motor will start to run sequentially from the first segment again.

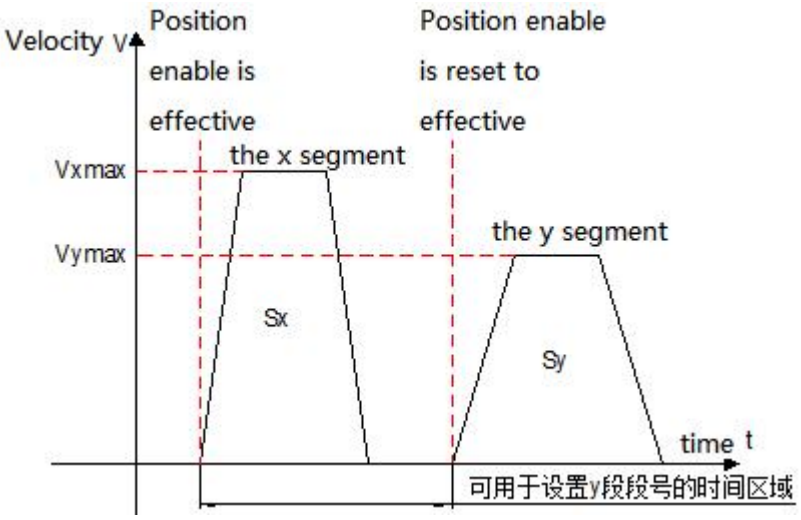
★ Term explanation

The total number of multi-segment position commands set by Pn301 when the integrated motor completes one run is called the completion of one round of operation.

◆ Cycle operation (Pn300=1)

Mode description	Running curve
● Cycle operation, the starting section number of each round is 1 ● The section number is automatically incremented switched ● Waiting time can be set between each segment ● Multi-segment position command enable (FUNC6) is effective, and the cycle operation status is maintained ● Multi-segment position command enable (FUNC6) signal is level effective	 V1max、V2max: Maximum operating speed of the first and second segment S1、S2: The first segment and the second segment displacement ● After each segment of operation is completed, the motor's internal command stop signal output is valid. ● When the multi-segment position command is enabled OFF during operation, the integrated motor gives up the uncompleted displacement of this segment and stops, and the positioning completion signal is valid after the stop is completed. ● Re-enable the multi-segment position command, and the integrated motor will start to run sequentially from the first segment again.

◆ IN switching operation (Pn300=2)

Mode description	Running curve
● When running the current segment number, the next running segment number can be set, and the motor will stop after completing the position command set by the current segment number. After the multi-segment position command enable is set to OFF again, run this time period number command ● The segment number is determined by the IN terminal logic ● There is no waiting time between each segment, the interval time is determined by the command delay of the host computer ● Multi-segment position command enable (FUNC6) signal is valid for edge change	 Vxmax、Vymax: Maximum operating speed of the x-th and y-th segment Sx、Sy: The x-th segment and the y-th segment displacement ● After each stage of operation is completed, the internal command stop signal output of the motor is valid; ● During operation, the multi-segment position command enable is OFF, the integrated motor continues to execute the unfinished displacement of this segment, and outputs the positioning completion signal ● The switching segment numbers must be in the following order: ①The segment number switch is invalid before the positioning of the x-th segment is completed ②During the x-th segment displacement operation or after the positioning is completed, turn off the multi-segment position command first, and then switch the segment number from x to y (if x=y, the driver will execute the x-segment displacement again) ③After the x-th segment displacement positioning is completed, the multi-segment position command enable is set to ON, and the driver executes the y-th segment displacement

When the multi-segment position operation mode is set to IN switching operation, please configure the 4 IN terminals of the drive (the number of IN terminals required can be set according to the actual number of running stages) as functions 13~16 (FunIN.13:CMD1~FunIN.16:CMD4, multi-segment position command switching), and confirm the valid logic of IN terminal.

★ Description of related coding function

<table>
<tr><th>Coding</th><th>Name</th><th>Function name</th><th>Function</th></tr>
<tr><td>FunIN.13</td><td>CMD1</td><td>Multi-segment running command switching 1</td><td rowspan="4">The multi-segment number is a 4-digit binary number, and the corresponding relationship between CMD1~CMD4 and the segment number is as follows:
<table><tr><th>CMD4</th><th>CMD3</th><th>CMD2</th><th>CMD1</th><th>Segment</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr><tr><td colspan="5">……</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>15</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr></table>The logic of the IN terminal is level valid, the CMD value is 1 when the input level is valid, otherwise it is 0</td></tr>
<tr><td>FunIN.14</td><td>CMD2</td><td>Multi-segment running command switching 2</td></tr>
<tr><td>FunIN.15</td><td>CMD3</td><td>Multi-segment running command switching 3</td></tr>
<tr><td>FunIN.16</td><td>CMD4</td><td>Multi-segment running command switching 4</td></tr>
</table>

2) Set multi-segment position running curve

The multi-segment position running function can set 16 different position commands, and the displacement, maximum running speed, acceleration and deceleration speed of each segment and the waiting time between segments can be set separately. Take the 1st segment as an example:

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn305/ Pn306	Segment 1 moving displacement	-1073741824 ~1073741824	Command unit	Set the sum of position commands in the segment 1	Set when running	Next run	10000
Pn307	Maximum running speed of segment 1 displacement	0~3000	rpm	Set the maximum running speed of segment 1	Set when running	Next run	500
Pn308	Acceleration and deceleration of segment 1 displacement	1~2000	r/s^2	Set the acceleration and deceleration of segment 1	Set when running	Next run	100
Pn309	Waiting time after the completion of segment 1 displacement	0~65535	ms(s)	Set the waiting time after the segment 1 positioning is completed	Set when running	Next run	500

3) Multi-segment position command enable

When selecting multi-segment position command as the source of position command, please configure 1 IN terminal of the integrated motor as function 26 (FunIN.26: FUNC6, multi-segment position command enable), and confirm the valid logic of IN terminal.

★ Associated parameter description

Coding	Name	Function name	Function
FunIN.26	FUNC6	Multi-segment position command enable	Valid: motor runs multi-segment position command Invalid: the motor is in a locked state Note: When Pn300=0/1, the logic of IN terminal corresponding to FUNC6 signal is valid for level When Pc300=2, the logic of IN terminal corresponding to FUNC6 signal is valid for edge change

3. The source of position command is communication control (Pn1=2)

In this command source mode, the motor can be started by writing the relative stroke or absolute position parameter Pn229 of the operation through communication. During the motor operation, the upper computer can dynamically modify the stroke, speed, and acceleration/deceleration through communication, and the integrated motor responds to the operation parameters in real time.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn69	Operating position mode	0~1	-	Set the position mode of the integrated motor operation 0: Incremental position mode 1: Absolute position mode	Set after stopping	Effective immediately	0
Pn225	Communication control acceleration	1~2000	r/s^2	Set the acceleration for communication control operation	Set when running	Effective immediately	100
Pn226	Communication control deceleration	1~2000	r/s^2	Set the deceleration for communication control operation	Set when running	Effective immediately	100
Pn227	Communication control speed	0~3000	r/min	Set the speed for communication control operation	Set when running	Effective immediately	500

Pn228/229	Communication control travel/position	-1073741824 ~1073741824	command unit	Set the stroke/position of communication control operation ● Pn229 is the high 16 bits and Pn228 is the low 16 bits. Communication writing Pn229 will immediately trigger an operation (when the motor is stopped) or dynamically modify the operation position (when the motor is running)	Set when running	Effective immediately	10000

◆ The motor is started by writing the high 16 bits register (Pn229) of the stroke/position via upper computer communication.

◆ In incremental position mode, when the motor is running and the reverse running stroke (Pn228/Pn229) is triggered by communication, the motor decelerates to a stop at the set deceleration speed and then runs the user-set reverse stroke, starting from the stop position.

4. The source of position command is debugging (Pn1=3)

Under this position command source, the start and stop of the motor can be controlled through communication, and the corresponding parameters can also be set to make the motor work in continuous running in one direction/reciprocating direction (demonstration running mode) for debugging or aging testing.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn80	Debugging speed	0~3000	rpm	Setting the maximum speed for internal test runs	Set when running	Next run	100
Pn81	Debugging acceleration	1~2000	ms	Setting the acceleration for internal test runs	Set when running	Next run	100
Pn82	Debugging deceleration	1~2000	ms	Setting the deceleration for internal test runs	Set when running	Next run	100

Pn83 Pn84	Debugging stroke	0~1073741824	command unit	Set the number of command pulses for internal test runs	Set when running	Next run	10000
Pn85	Motion demonstration delay time	0~65535	ms	Set the waiting time for the motion demonstration	Set when running	Next run	500
Pn86	Motion demonstration running mode	0~1	-	Setting the running mode of the motion demonstration 0: Motor running reciprocally 1: Motor running in one direction	Set when running	Next run	0
Pn87	Start direction of the motion demonstration	0~1	-	Set the start direction of the motion demonstration 0: Positive direction 1: Negative direction	Set when running	Next run	0
Pn88	Number of motion demonstration runs	0~65535	-	Set the number of runs of the motion demostration 0: unlimited number of runs 1: limited number of runs	Set when running	Next run	0
Pn69	Internal running position mode	0~1	-	Set the type of position command for the motion demonstration. 0: Incremental position mode. 1: Absolute position mode	Set when running	Next run	6
Pn68	Emergency stop deceleration	1~65535	ms	Set the deceleration during motor emergency stop	Set when running	Next run	300
Pn59	Internal motion start/stop	0~6	-	Start/stop command for debugging of integrated motor	Set when running	Next run	0
Pn89	Internal delay start/stop	0~2	-	Start/stop command for integrated motor motion demonstration	Set when running	Next run	0

The starting method is as follows:

(1) The motor operates in debugging operation mode: By writing the start and stop commands for operation through Pn59, the motor will operate according to the operation curve determined by the command stroke, speed, and acceleration/deceleration set by Pn80 to Pn84.

Value written in Pn59	Description
0	Write: Meaningless; Read: Indicates that the motor is running or waiting for trigger operation.
1	Write: Trigger the motor to run forward of the command set by Pn83 and stop. After the motor responds to the start-stop command, set Pn59 to 0.
2	Write: Trigger the motor to run reversely of the command set by Pn83 and stop. After the motor responds to the start-stop command, set Pn59 to 0.
3	Write: Trigger the motor to jog forward. After the motor responds to the start-stop command, set Pn59 to 0.
4	Write: Trigger the motor to jog reverse. After the motor responds to the start-stop command, set Pn59 to 0.
5	Write: trigger the emergency stop of the motor. After the motor responds to the start-stop command, set Pn59 to 0.
6	Write: trigger the motor to decelerate to stop. After the motor responds to the start-stop command, set Pn59 to 0.

(2) The motor operates in a cyclic operation (demonstration) mode: the start and stop commands for the demonstration are written through Pn89. In the demonstration operation mode, the motor operates for the number of times set by Pn88 in accordance with the running commands, speed, acceleration and deceleration set by Pn80 to Pn84, reciprocating or unidirectional (Pn86=0/1), positive or negative startup (Pn87=0/1). After completing the set operation command each time, delay the delay time set by Pn85, and then restart to cycle through operation.

Value written in Pn89	Description
0	Write: stop the operation of the demo mode; Read: indicates that the motor is waiting to be triggered to run.
1	Write: start the operation of the demo mode; set Pn88 to 2 after the motor responds to the start-stop command.
2	Write: meaningless; Read: indicates that the motor is working in demo mode.

5. The position command source is APP1 (Pn1=5)

When the position command source is set to APP1, it has the following functions:

- ◆ Triggering fixed length forward/reverse rotation of the motor through external input terminal control or communication.
- ◆ Linkage is achieved when the speed command source is set to APP1 and the torque command source is set to APP1.

(1) Triggering fixed length forward/reverse rotation of the motor through external input terminal control or communication.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn60	Point-to-point acceleration	1~2000	r/s^2	Set the acceleration of motor for fixed length running	Set when running	Next run	100
Pn61	Point-to-point deceleration	1~2000	r/s^2	Set the deceleration of motor for fixed length running	Set when running	Next run	100
Pn62	Point-to-point speed	0~3000	rpm	Set the speed of motor for fixed length running	Set when running	Next run	500
Pn63/ Pn64	Point-to-point stroke	-1073741824~ 1073741824	Command unit	Set the stroke/position of motor for fixed length running	Set when running	Next run	10000
Pn68	Emergency stop deceleration	1~2000	r/s^2	Set the deceleration during motor emergency stop	Set when running	Effective immediately	300
Pn69	Internal running position mode	0~1	-	Set the position running mode of the motor 0: incremental mode, 1: absolute mode	Set when running	Effective immediately	0

There are two startup methods, as follows:

1) Set the corresponding IN terminal functions to "FUNC1 (fixed length forward rotation)" and "FUNC2 (fixed length reverse rotation)" input/output parameters, and use external inputs to trigger startup. It should be noted that the trigger signal is a edge signal, and triggering the start again during motor operation will not work. Similarly, if the trigger signal remains valid, the motor will still not respond to other operating modes in the command source after stopping.

2) Write a specific value to parameter Pn59 through communication:

Value written in Pn59	Description
0	Write: Meaningless; Read: Indicates that the motor is running or waiting for trigger operation.
1	Write: Trigger the stroke/position set by the fixed length forward rotation of the motor. Set Pn59 to 0 after the motor responds to the command.
2	Write: Trigger the stroke/position set by the fixed length reverse rotation of the motor. Set Pn59 to 0 after the motor responds to the command.
5	Write: trigger the emergency stop of the motor. Set Pn59 to 0 after the motor responds to the command.
6	Write: trigger the motor to decelerate to stop. Set Pn59 to 0 after the motor responds to the command.

(2) When the speed command source is set to APP1 and the torque command source is set to APP1, the combined control of position, speed, and torque modes is achieved (the following control methods can be achieved when the integrated motor control mode Pn0 is 0/1/2):

1) The integrated motor can operate with a fixed length motor through the above external input terminal control and communication triggering.
2) The integrated motor can achieve jog forward and reverse operation in speed mode. Please refer to the speed command input settings in the speed control mode section.
3) The integrated motor can achieve forward and reverse operation in torque mode. Please refer to the torque command input settings in the torque control mode section.

6. The source of position command is position table (Pn1=7)

The position table function in this application mode has the following characteristics:

- ◆ Select 16 motion position through 4 IN input ports.
- ◆ The running position/state of the motor immediately follows the IN input signal.
- ◆ The maximum running speed, acceleration and deceleration of each section can be set separately.
- ◆ Only working in absolute position mode

(1) Set the IN input port function

Please configure the four IN terminals of the integrated motor to function 13 to 16 (FunIN.13: CMD1 to FunIN.16: CMD2, multi-segment running command switching), and determine the valid logic of the IN terminal. (The number of IN terminals required can be set based on the actual total number of operating segments)

★ Description of related coding function

<table>
<tr><th>Coding</th><th>Name</th><th>Function name</th><th>Function</th></tr>
<tr><td>FunIN.13</td><td>CMD1</td><td>Multi-segment running command switching 1</td><td rowspan="4">The multi-segment number is a 4-digit binary number, and the corresponding relationship between CMD1~CMD4 and the segment number is as follows:
<table><tr><th>CMD4</th><th>CMD3</th><th>CMD2</th><th>CMD1</th><th>Segment</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr><tr><td colspan="5">……</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>15</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr></table>The logic of the IN terminal is level valid, the CMD value is 1 when the input level is valid, otherwise it is 0</td></tr>
<tr><td>FunIN.14</td><td>CMD2</td><td>Multi-segment running command switching 2</td></tr>
<tr><td>FunIN.15</td><td>CMD3</td><td>Multi-segment running command switching 3</td></tr>
<tr><td>FunIN.16</td><td>CMD4</td><td>Multi-segment running command switching 4</td></tr>
</table>

(2) Set multi-segment position running curve

The multi-segment position running function can set 16 different position commands, and the maximum running speed, acceleration and deceleration speed of each segment can be set separately. Take the 1st segment as an example:

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn305/ Pn306	Segment 1 moving displacement	-1073741824 ~1073741824	Command unit	Set the sum of position commands in the segment 1	Set when running	Next run	10000
Pn307	Maximum running speed of segment 1 displacement	0~3000	rpm	Set the maximum running speed of segment 1	Set when running	Next run	500
Pn308	Acceleration and deceleration of segment 1 displacement	1~2000	r/s^2	Set the acceleration and deceleration of segment 1	Set when running	Next run	100

(3) Running

Since the position command mode in this application mode is absolute, it is required to determine the absolute position (zero point) of operation before running, and a homing operation is required. If it is not set to power on and automatically homing, please set the displacement of the segment number selected by default for powering on the device to 0 to prevent abnormal operation of the motor after powering on the device.

After the motor homing and determines the zero point, the upper computer selects the position to run by controlling four IN input ports, and the motor will immediately respond to input signal commands.

5.2.2. Electronic Gear Ratio

1. Electronic gear ratio concept

In the position control mode, the input position command (command unit) is to set the load displacement, and the motor position command (encoder unit) is to set the motor displacement, in order to establish the proportional relationship between the motor position command and the input position command, the electronic gear ratio function is introduced.

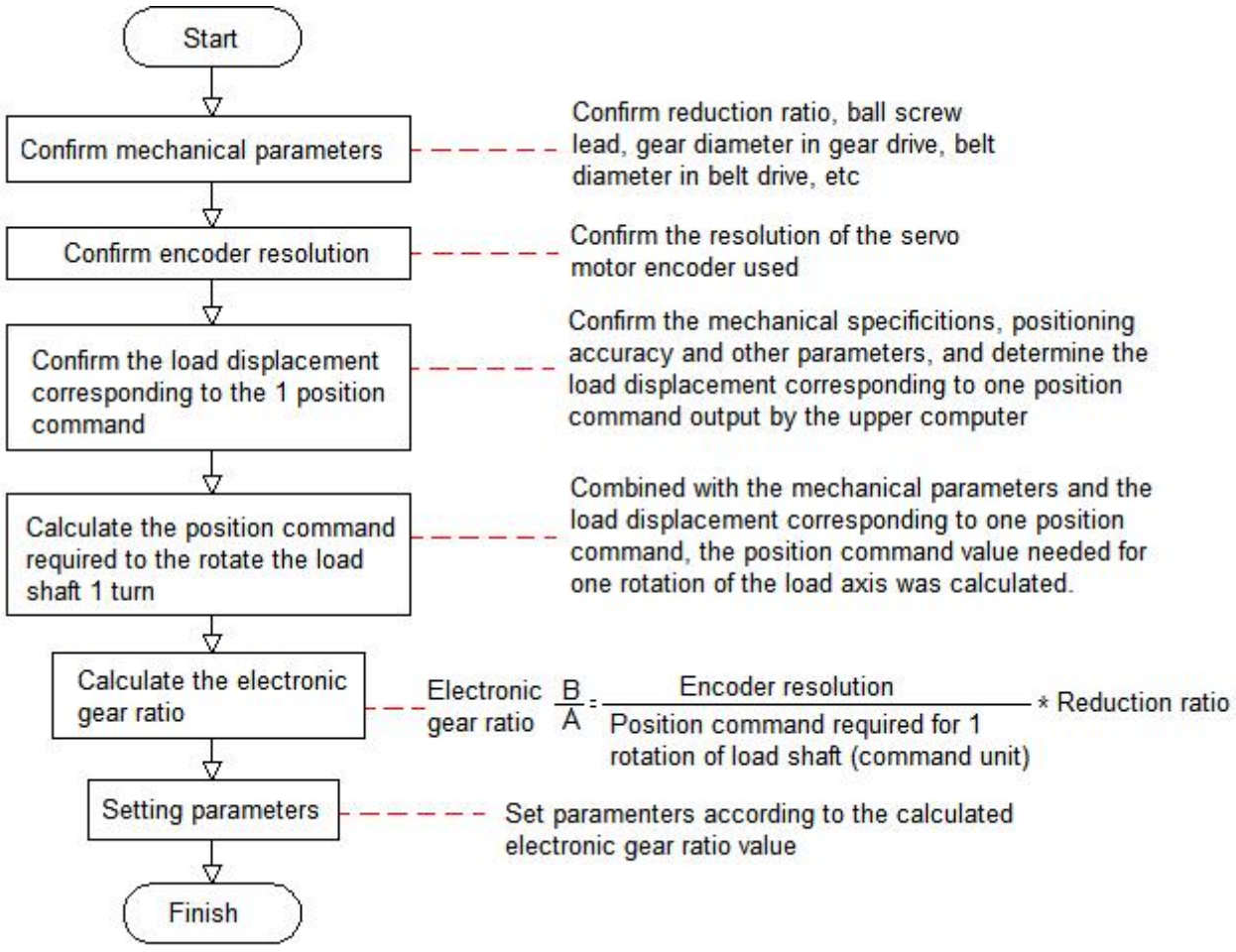
Through the frequency division (electronic gear ratio<1) or frequency multiplication (electronic gear ratio>1) function of the electronic gear ratio, the actual displacement of the motor rotation or movement can be set when the input position command is 1 command unit.

★ Term explanation

Command unit: Refers to the minimum recognizable value input from the upper device to the drive.

Encoder unit: Refers to the value of the input command after processing the electronic gear ratio.

2. Setting steps of electronic gear ratio



★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn6/7	Position command subdivision	0~1048576	p/r	Set the number of position commands for 1 revolution of the motor	Set after stopping	Effective immediately	10000
Pn8	Electronic gear ratio numerator	0~1048576	-	Set the numerator of electronic gear ratio	Set after stopping	Effective immediately	1
Pn9	Electronic gear ratio denominator	0~1048576	-	Set the denominator of electronic gear ratio	Set after stopping	Effective immediately	1

◆ Note: When Pn6/7 (Position command subdivision) is set to other than 0, the electronic gear ratio: A/B=Encoder resolution/(Pn6/7), at this time, electronic gear ratio are invalid.

5.2.3. Position Command Filtering

Position command filtering is to filter the position command (encoder unit) after the electronic gear ratio frequency division or frequency multiplication. The methods are average filtering and first-order low-pass filtering.

In the following applications, you should consider adding position command filtering:

◆ The position command output by the host computer has not been processed for acceleration and deceleration

◆ Low pulse command frequency

◆ When the electronic gear ratio is more than 10 times

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn17	Position command average filter time constant	1~2048	0.08ms	Set the time constant for the average value filter of the position command (encoder unit)	Set after stopping	Effective immediately	1

Remark：

◆ This function has no effect on the displacement (total number of position commands).

◆ If the set value is too large, the response delay will increase. The filter time constant should be set according to the actual situation.

5.2.4. Positioning Completion Function

The positioning completion function refers to when the integrated motor detects that the position command stop time exceeds the user set time (Pn16), and the position deviation meets the user set condition (Pn14), and maintains for a certain time (Pn15), it outputs the positioning completion signal.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn14	Positioning accuracy	0~65535	encoder unit	Set the positioning accuracy when outputting the motor in-position signal	Set when running	Effective immediately	10
Pn15	Positioning signal built-up time	0~65535	0.08ms	Set the built-up time of the motor in-position signal output	Set when running	Effective immediately	20
Pn16	Pulse stop detection time	0~65535	0.08ms	Set the pulse stop detection time when the motor in-position signal is output	Set when running	Effective immediately	20

5.2.5. Homing Function

1. Function introduction

- **Origin/Mechanical origin:** The origin is also called mechanical origin, which can be expressed as the origin switch signal or limit switch signal, and is set by Parameter Pn95.
- **Zero point:** The positioning target point, which can be expressed as origin + offset (Pn100/Pn101). When the offset is set to 0, the zero point coincides with the origin.
- **Homing function:** The homing function is a function that the motor will actively find the zero point and complete the positioning after triggering the homing function when the integrated motor is enabled. During the operation of homing, other position commands (including the re-triggered homing enable signal) are shielded; After the homing operation is completed, the integrated motor can respond to other position commands. The homing function includes two modes: origin homing and electrical homing.
- **Origin homing:** After the integrated motor receives the homing trigger signal , the integrated motor will actively positioning the relative position between the motor shaft and the mechanical origin according to the preset mechanical origin. First find the origin, and then move the offset to the zero point position based on the origin. The origin homing is usually used to find the zero point for the first time.
- **Electrical homing:** After the zero point position is determined by the origin homing operation, take the current position as the starting point and move a relative displacement.

After the homing is completed (including the origin homing and electrical homing), the current position of the motor (P13.07/P13.08: position command counter) is consistent with the mechanical origin offset (P03.46/P03.47: mechanical origin offset). After the homing is completed, the drive outputs the origin homing completion signal, and the upper computer can confirm that the homing is completed after receiving the signal.

2. Origin homing

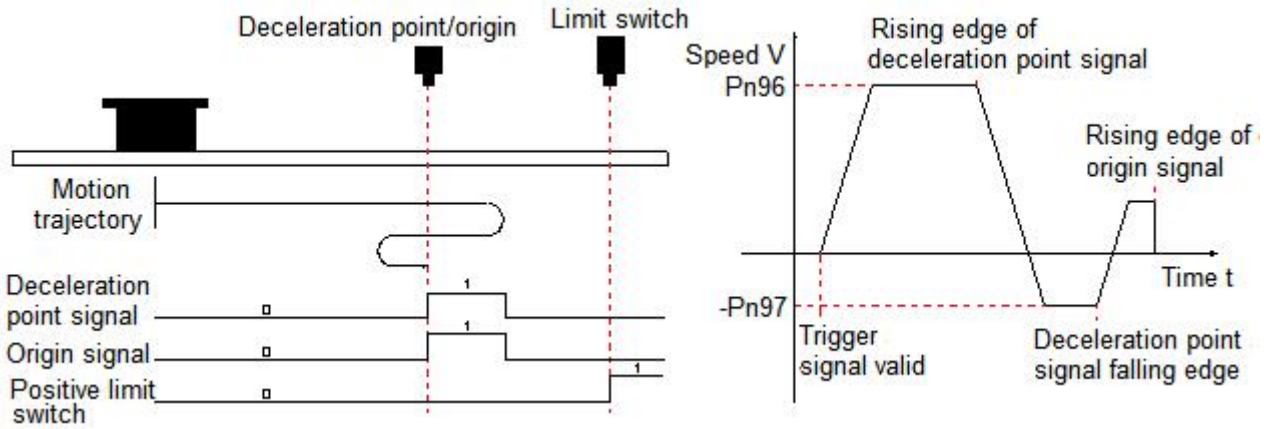
The following cases are used as examples to illustrate the operation mode of origin homing.

- ◆ Forward return to origin: deceleration point, origin as origin switch (Pn95=0)
- ◆ Forward return to origin: deceleration point, origin as forward limit switch (Pn95=2)
- ◆ Forward return to origin: deceleration point, origin as mechanical limit position (Pn95=4)

(1) Forward return to origin: deceleration point, origin as origin switch (Pn95=0)

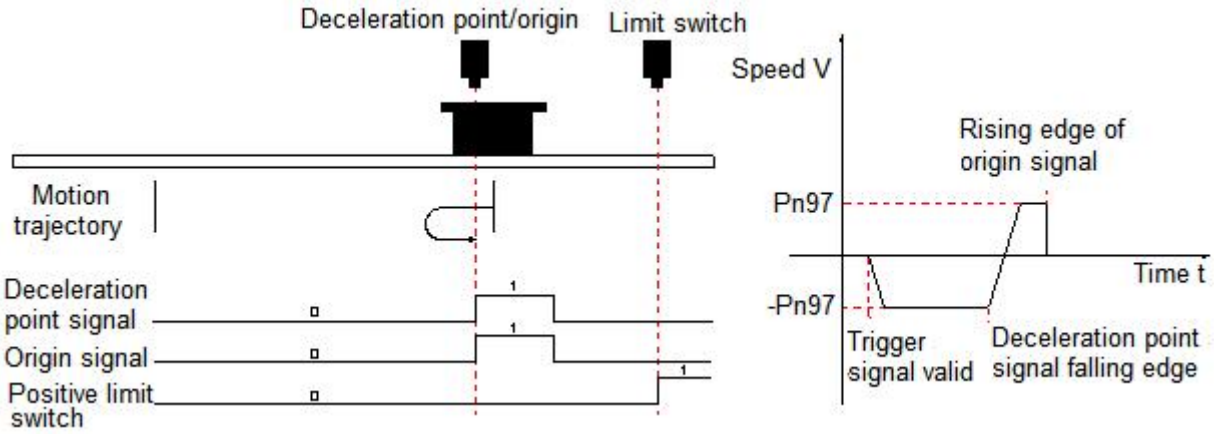
1) The origin switch (decelerate point) signal is invalid (0 - invalid, 1 - valid) before the motor returns to origin, and the positive limit switch is not triggered in the whole process.

The motor first searches for the deceleration point signal in the forward direction at the set value of Pn96 (High speed search origin switch signal speed) until it encounters the rising edge of the deceleration point. After decelerating to 0 according to the deceleration time constant set in Pn98 (Search for the acceleration and deceleration time constant of the zero switch signal), it reverses the acceleration to the set value of -Pc97 (Low speed search origin switch signal) and searches for the deceleration point signal falling edge at low speed. When it encounters the falling edge of the deceleration point signal, it will decelerate and stop, and then continue to search for the rising edge of the deceleration point in the low speed forward direction with the set value of Pn97. During forward acceleration or forward uniform speed operation, the machine will stop immediately when it encounters the rising edge signal of the origin signal.



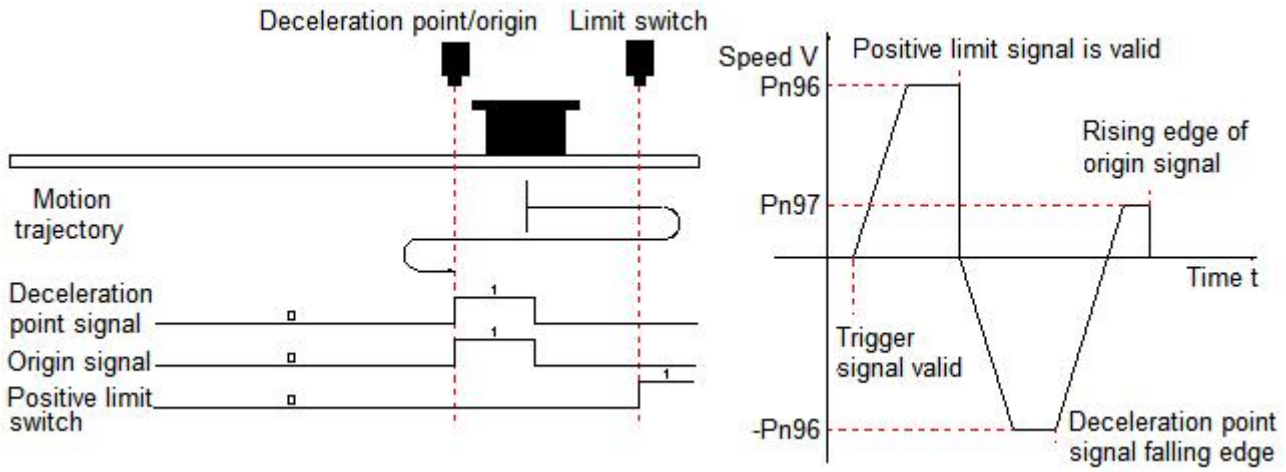
2) The origin switch (decelerate point) signal is valid (0 - invalid, 1 - valid) before the motor returns to origin, and the positive limit switch is not triggered in the whole process.

The motor directly searches for the falling edge of the deceleration point signal in the reverse direction at the set value of -Pn97 (Low speed search origin switch signal speed), and decelerates to stop when it encounters the falling edge of the deceleration point signal, and then continues to search for the rising edge of the deceleration point signal in the forward direction with the set value of Pn97, and stops immediately when it encounters the rising edge of the origin signal in the forward direction of acceleration or uniform speed operation.



3) The origin switch (decelerate point) signal is invalid (0 - invalid, 1 - valid) before the motor returns to origin, and the positive limit switch is triggered during the process of returning to origin.

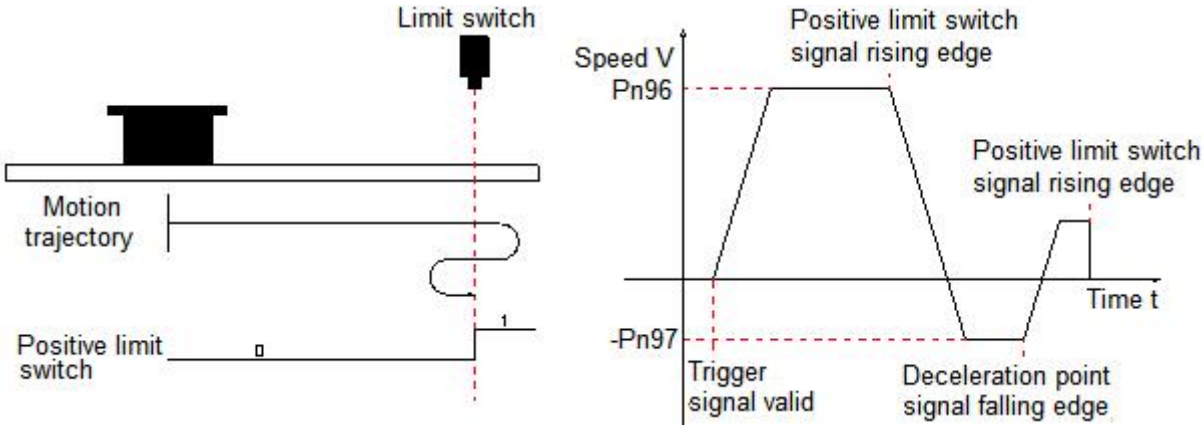
The motor first searches for the deceleration point signal in the forward direction with the set value of Pn96 (High speed search origin switch signal speed), and stops after encountering the positive limit switch and decelerating to 0 according to the deceleration time constant set in Pn98 (Search for the acceleration and deceleration time constant of the zero switch signal). And in accordance with Pn102 (Mechanical origin offset and limit processing method), immediately return to the origin in reverse direction (Pn102=2/3), or stop and wait for the upper device to give the trigger signal to return to origin again (Pn102=0/1). After the conditions are met, the motor searches for the falling edge of the deceleration point signal in the reverse direction with the set value of -Pn96 (High speed search origin switch signal speed). After encountering the deceleration point signal falling edge, decelerate the speed to 0 in accordance with the deceleration time set by Pn98 (Search for the acceleration and deceleration time constant of the zero switch signal), and then forward accelerate to the set value of Pn97 (Low speed search origin switch signal speed), and forward accelerate or forward uniformly in operation, and stop immediately when encountering the signal of the rising edge of the origin signal.



(2) Forward return to origin: deceleration point, origin as forward limit switch (Pn95=2)

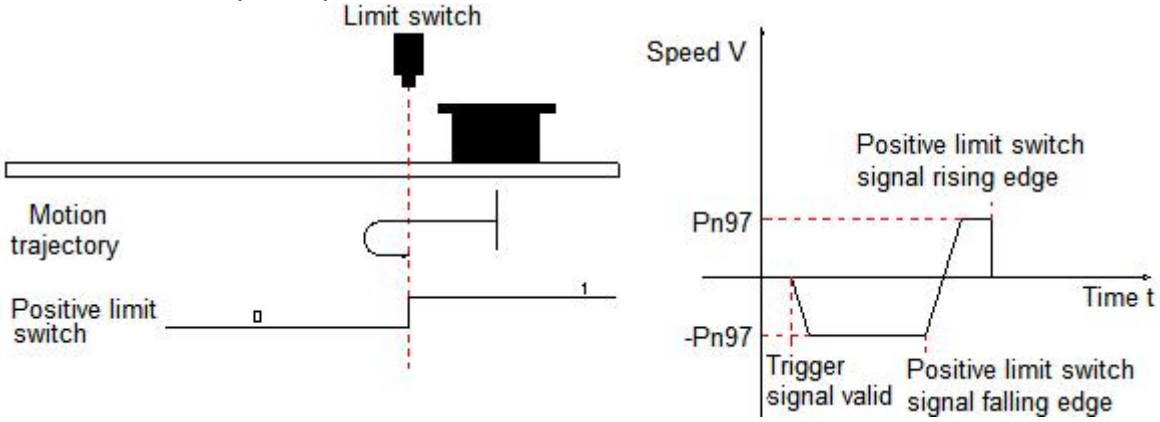
1) Positive limit switch (deceleration point) signal is invalid (0 - invalid, 1 - valid) before the motor returns to origin.

The motor first searches for the deceleration point signal in the forward direction at the value set in Pn96 (High speed search origin switch signal speed) until it encounters the rising edge of the deceleration point. After decelerating to 0 according to the deceleration time set in Pn98 (Search for the acceleration and deceleration time constant of the zero switch signal), the motor accelerates in the reverse direction to the value set in -Pn97 (Low speed search origin switch signal speed) and searches for the deceleration point signal falling edge at low speed. When it encounters the falling edge of the deceleration point signal, it will decelerate to stop, and then continue to search for the rising edge of the deceleration point in the low speed forward direction with the set value of Pn97. During forward acceleration or forward uniform speed operation, will stop immediately when it encounters the rising edge signal of the positive limit switch signal.



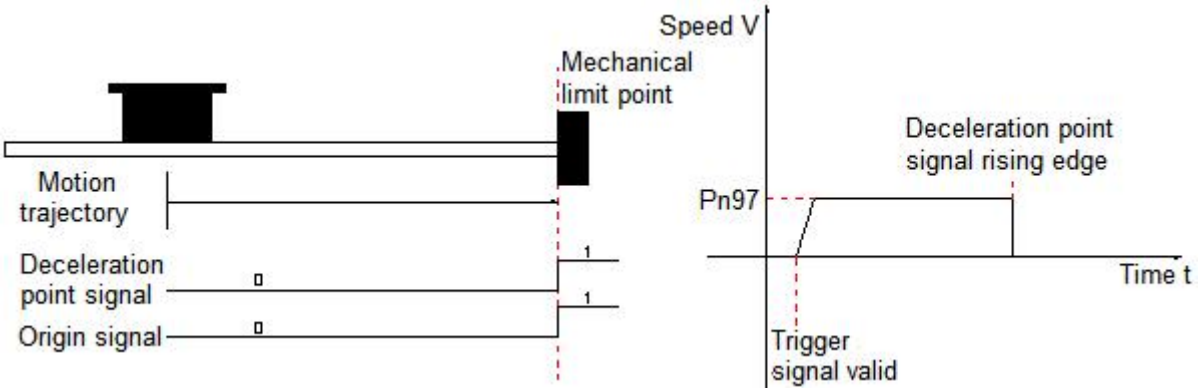
2) Positive limit switch (deceleration point) signal is valid (0 - invalid, 1 - valid) before the motor returns to origin.

The motor directly searches for the falling edge of the deceleration point signal in the reverse direction at the set value of -Pn97 (Low speed search origin switch signal speed), and immediately decelerates to stop when it encounters the falling edge of the deceleration point signal, and then continues to search for the rising edge of the deceleration point signal in the forward direction with the set value of Pn97, and stops immediately when it encounters the rising edge of the forward limit switch signal during positive acceleration or uniform speed operation.



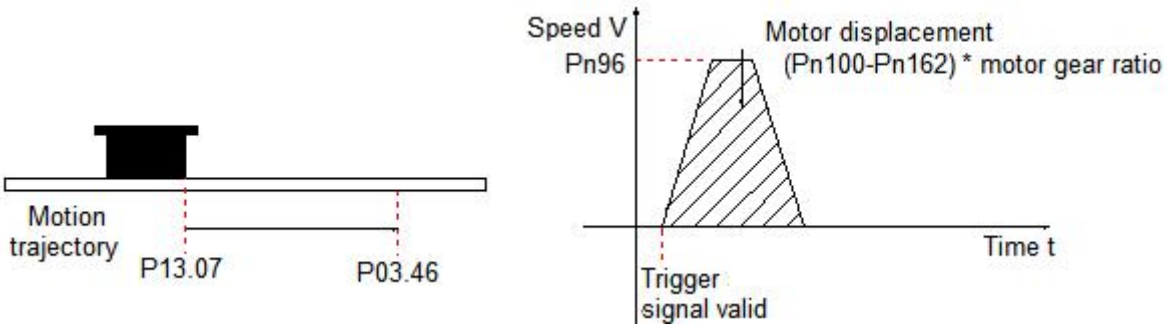
(3) Forward return to origin: deceleration point, origin as mechanical limit position (Pn95=4)

The motor first runs at low speed in the positive direction with the set value of Pn97 (Low speed search origin switch signal speed), and after collision to the mechanical limit position, if the motor torque arrival signal is valid, and the actual motor speed is lower than Pn104 (Collision homing detection speed), it is judged that the motor runs to the mechanical limit position and stops immediately.



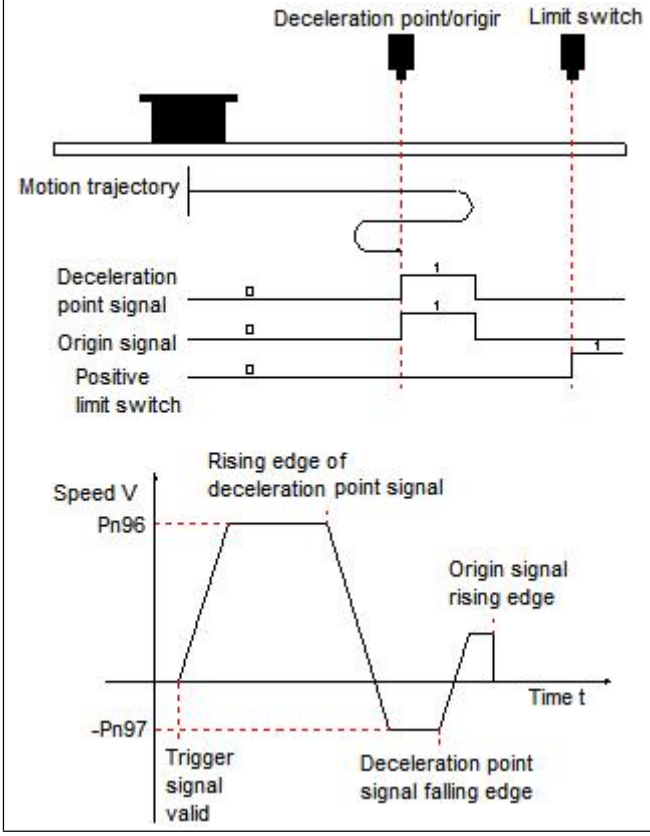
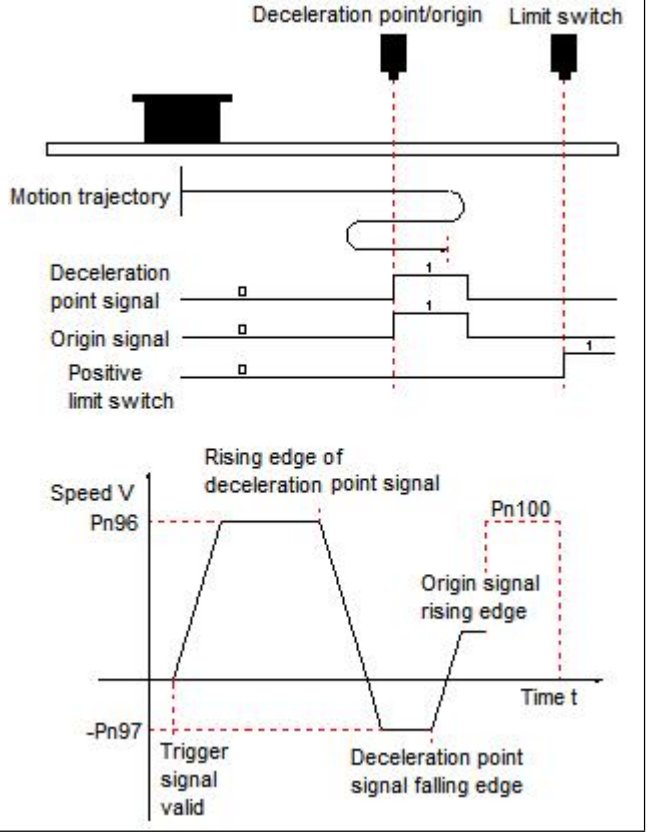
1) Electrical homing

The mechanical zero point of the system is known after the motor has undergone a mechanical homing operation. At this time, after setting Pn100/101, the motor can be moved from the current position (Pn162/163) to the specified position (Pn100/101). In the electrical homing mode, the motor runs at high speed at the set value of Pn96 (High speed search origin switch signal speed) throughout the entire process, and the total motor displacement is determined by the difference between Pn162/166 and Pn100/101, and the running direction is determined by the positive or negative of the total motor displacement. After the displacement command is completed, the motor will stop.



2) Mechanical origin and mechanical zero point

Take P03.41=0 as an example to illustrate the difference between mechanical origin and mechanical zero point:

The mechanical origin does not coincide with the mechanical zero point	The mechanical origin coincides with the mechanical zero point
If the origin offset (Pn100/101≠0) is set and the mechanical origin does not coincide with the mechanical zero point (Pn102=0/2), during forward acceleration or forward uniform operation, the motor stops immediately after encountering the rising edge of the origin signal. And the current position of the motor Pn162/163 is forced to the set value of Pn100/101 after stopping.	If the origin offset (Pn100/101≠0) is set and the mechanical origin coincides with the mechanical zero point (Pn102=1/3), the motor stops immediately after encountering the rising edge of the origin signal during forward acceleration or forward uniform speed operation. After that, the motor stops after running the stroke of the set value Pn100/101. At this time, the current position of the motor Pn162/163 and the set value of Pn100/101 are the same.
	

5.3. Speed Control Mode

Set the value of parameter Pn0 to 1, to enable the integrated motor to work in speed control mode.

5.3.1. Speed Command Input Setting

In speed control mode, the source of speed command should be set by parameter Pn2 first.

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
Pn2	Speed command source selection	0: Digital given 1: Multi-segment speed command 2: Debugging 3: Reserved (Don't set) 4: Reserved (Don't set) 5~10: APP1	Set the source of speed command in speed control mode	Set after stopping	Effective immediately	0

1. Speed command source is digital given (Pn2=0)

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn55	Digital given speed	-3000~3000	rpm	Set the speed of motor running ● **Speed is a signed value, a positive number means positive rotation, a negative number means reverse rotation**	Set when running	Effective immediately	500
Pn56	Digital given acceleration	1~2000	r/s^2	Set the acceleration of motor running	Set when running	Next run	100
Pn57	Digital given deceleration	1~2000	r/s^2	Set the deceleration of motor running	Set when running	Next run	500
Pn68	Emergency stop deceleration	1~2000	r/s^2	Set the deceleration during motor emergency stop	Set when running	Effective immediately	300

The startup method is as follows:

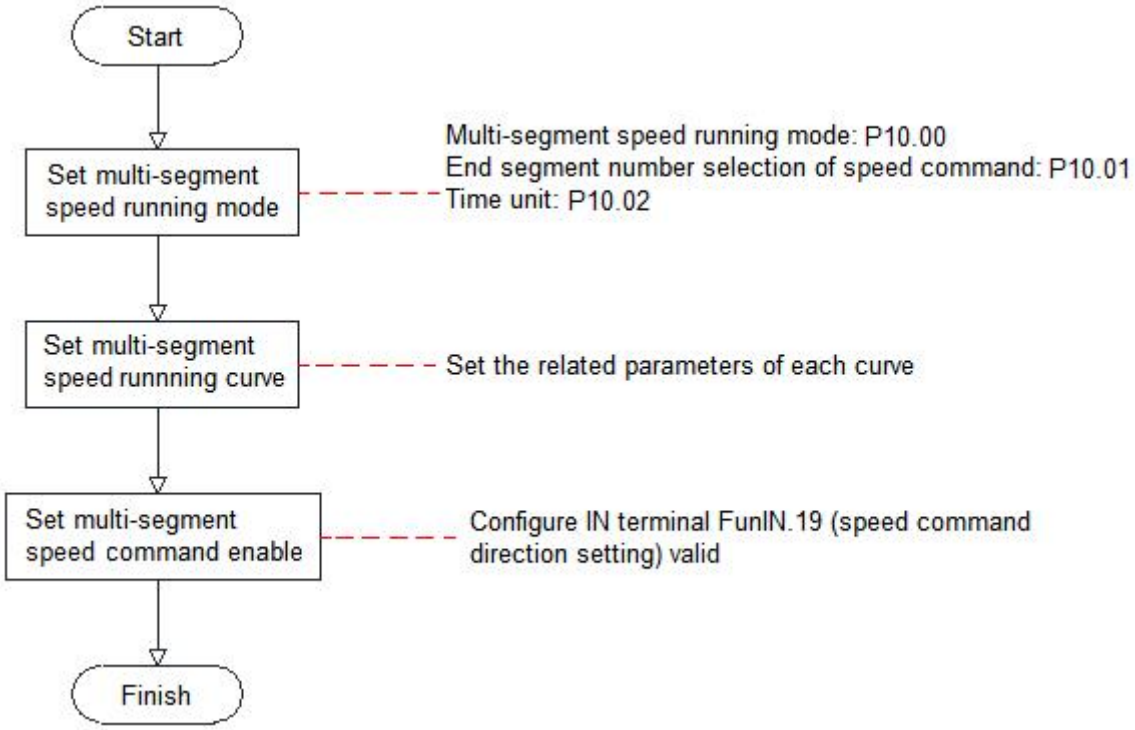
The motor starts to run when the servo is enabled, that is, the integrated motor start and stop are controlled by the integrated motor enable signal.

- The motor can modify the running speed through communication during running, and it will take effect immediately.
- When the motor encounters a limit or emergency stop input, it will decelerate to stop according to the emergency stop deceleration set by Pn68.
- The motor can select the running direction by setting the input terminal function to "Speed command direction setting". The actual running direction of the motor is as follows:

Pn5 (Running direction selection)	Pn55 (Speed command digital given value)	Speed command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-	Valid	CW

2. Speed command source is multi-segment speed command (Pn2=1)

The integrated motor has the function of multi-segment speed running. It means that there are 16 speed commands stored inside the integrated motor, and the maximum running speed and running time of each segment can be set separately. And equipped with 6 groups of acceleration and deceleration for selection. The setting process is as follows:



(1) Set multi-segment speed running mode

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
Pn237	Multi-segment speed command running mode	0: stop at the end of a single operation 1: Cycle operation 2: Switch through the external IN pot	Set multi-segment speed command running mode	Set when running	Next run	2
Pn238	Number of speed command end segments	1~16	Set the number of segments required for a multi-segment speed command	Set when running	Next run	16
Pn239	Running time unit	0: 0.1s 1: 0.1min	Select the unit of multi-segment speed command running time	Set when running	Next run	0

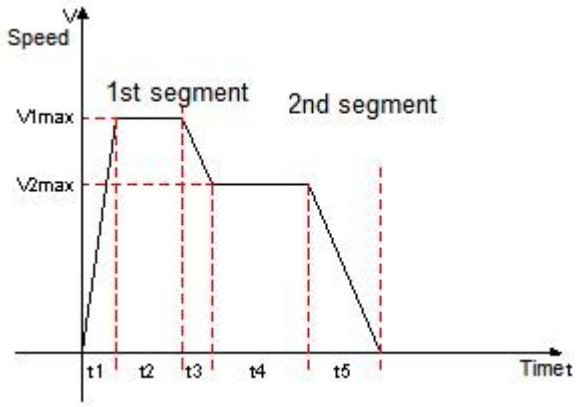
When Pn237=2, the configurable IN input function is FunIN.18 (Speed command direction setting), which is used for selecting the direction of multi-segment operation commands.

Coding	Function name	Function
FunIN.18	Speed command direction setting	Invalid: default command direction Valid: the opposite direction of the command

Take Pn237=2 as an example to illustrate each mode:

1) Stop at the end of a single operation (Pn237=0)

Pn237 is set to 0 and the single run end stop mode is selected. After setting parameters Pn238 and Pn239 respectively according to the total number of executed segments and execution time units, and setting parameters such as command value, running time and acceleration/deceleration time of the corresponding segment according to the demand, the integrated motor will run from segment 1 to segment N according to the segment code until it stops after running the last segment.

Mode description	Running curve
● Run 1 round ● The segment number is automatically incremented and switched	

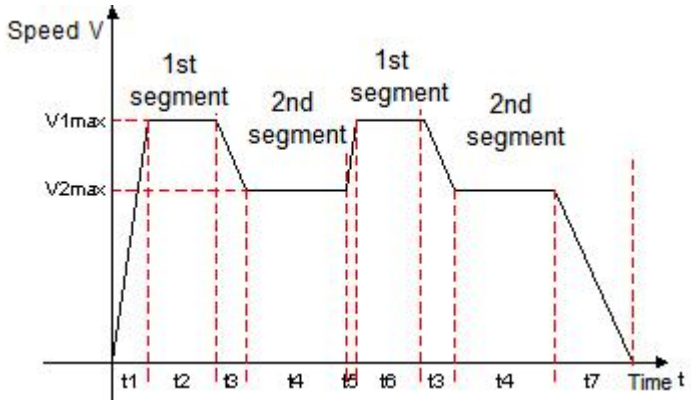
	V1max、V2max：Command speed of the 1st and 2nd segment. t1：The actual acceleration and deceleration time of the first segment. t3、t5：The actual acceleration and deceleration time of the second segment. ● A certain period of running time: the shifting time of the previous speed command switching to this speed command + the constant speed running time of this segment(for example: the running time of the first segment in the figure is t1+t2, and the running time of the second segment is t3+t4. And so on). ● When a certain period of running time is set to 0, the drive will skip this segment speed command and execute the next segment.

★ Term explanation

The total number of multi-segment speed commands set by Pn238 when the integrated motor completes one run is called the completion of one round of operation.

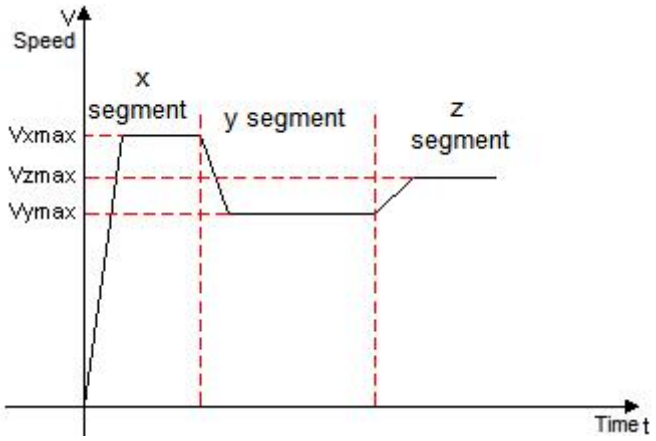
2) Cycle operation (Pn237=1)

Pn237 is set to 1, and the cycle operation mode is selected. After setting the Parameters Pn238 and Pn239 respectively according to the total number of execution segments and execution time unit, and setting the command value, running time, acceleration/deceleration time and other parameters of the corresponding segment according to the demand, the module will run according to the setting of the command running time and acceleration/deceleration time of each segment, and the integrated motor will run in the mode of speed segment from the first segment to the Nth segment, and automatically jump to the first segment for cycle operation after the last segment.

Mode description	Running curve
● Cycle operation, the starting segment number of each round is 1 ● The segment number is automatically incremented and switched ● If the servo enable is valid, the cycle running state will always be maintained	 V1max、V2max：Command speed of the 1st and 2nd segment ● A certain period of running time: the shifting time of the previous speed command switching to this speed command + the constant speed running time of this segment(for example: the running time of the first segment in the figure is t1+t2, and the running time of the second segment is t3+t4. And so on). ● When a certain period of running time is set to 0, the drive will skip this segment speed command and execute the next segment.

3) Switch through the external IN port (Pn237=2)

Set Pn237 to 2 and select the external IN port switching mode. Set the command value, running time, acceleration and deceleration parameters for the corresponding segment as required. The integrated motor will select the speed command value for the corresponding segment number to run based on the ON/OFF combination of the external IN (Multi-segment operation command switching x).

Mode description	Running curve
● If the segment number is updated, it can run continuously ● The segment number is determined by the IN terminal logic ● The interval time between segments is determined by the command delay of the host computer ● If the servo enable is valid, the cycle running state will always be maintained.	 x, y: segment number, the logical relationship between segment number and IN terminal is as follows: ● The running time of a certain segment is not affected by the parameter setting value. During the speed command operation of a certain segment, if the segment number changes, it will immediately switch to the new segment number to run.

When the multi-segment position operation mode is set to IN switching operation, please configure the 4 IN terminals of the integrated motor as functions 13~16 (FunIN.13~FunIN.16: Multi-segment operation command switching x), and confirm the valid logic of IN terminal. At the same time, one IN terminal of the integrated motor can be configured as function 18 (FunIN.18: Speed command direction setting) to switch the speed command direction.

<table>
<tr><th>Coding</th><th>Name</th><th>Function name</th><th>Function</th></tr>
<tr><td>FunIN.13</td><td>CMD1</td><td>Multi-segment running command switching 1</td><td rowspan="4">The multi-segment segment number is a 4-digit binary number, and the corresponding relationship between CMD1~CMD4 and the segment number is as follows:
<table>
<tr><th>CMD4</th><th>CMD3</th><th>CMD2</th><th>CMD1</th><th>Segment number</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td colspan="5">……</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>15</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr>
</table></td></tr>
<tr><td>FunIN.14</td><td>CMD2</td><td>Multi-segment running command switching 2</td></tr>
<tr><td>FunIN.15</td><td>CMD3</td><td>Multi-segment running command switching 3</td></tr>
<tr><td>FunIN.16</td><td>CMD4</td><td>Multi-segment running command switching 4</td></tr>
<tr><td>FunIN.18</td><td>DIR-SEL</td><td>Speed command direction setting</td><td>In multi-segment IN switching operation mode, used to set the speed command direction
Invalid: keep the original command direction
Valid: speed command direction</td></tr>
</table>

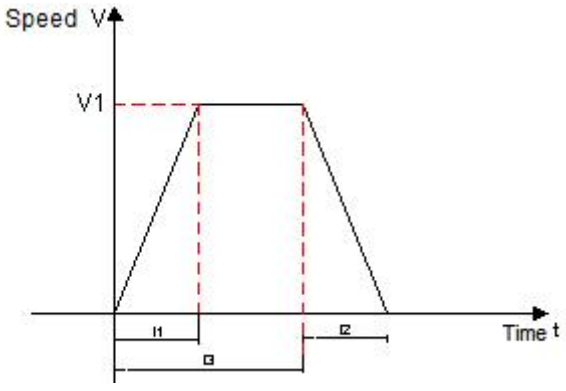
(2) Multi-segment speed running curve setting

Take the segment 1 speed command as an example, the relevant parameters are as follows:

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn240	Acceleration 1	1~2000	r/s^2	Set the first group acceleration and deceleration time constant	Set when running	Next run	100
Pn241	Deceleration 1	1~2000	r/s^2		Set when running	Next run	100
Pn250	Acceleration 6	1~2000	r/s^2	Set the 6th group acceleration and deceleration time constant	Set when running	Next run	100
Pn251	Deceleration 6	1~2000	r/s^2		Set when running	Next run	100
Pn252	Segment 1 speed command	-3000~3000	rpm	Set the first segment speed command value	Set when running	Next run	500
Pn253	Segment 1 speed command running time	0~65535	0.1sec~0.1min	Set the first segment command running time	Set when running	Next run	10
Pn254	Segment 1 speed command acceleration and deceleration selection	1~6	-	Select the first segment acceleration and deceleration mode	Set when running	Next run	1

There are 6 groups of acceleration and deceleration time for selection in the multi-segment speed command parameters, except for the 1 to 16 segments of command value and command running time. The default mode is acceleration and deceleration 1. In the multi-segment speed, Pn237=1, the end of a single operation is taken as an example, and the actual acceleration and deceleration time and running time are explained:



As shown in the figure above, the speed command of this segment is V1, and the actual acceleration time t1 is:

$$t_1 = \frac{V_1}{60 * The\ acceleration\ \ of\ the\ segment\ set}$$

Actual deceleration time t2:

$$t_2 = \frac{V_1}{60 * The\ deceleration\ of\ the\ segment\ set}$$

Running time: the shift time when the previous speed command is switched to this speed command + the constant speed running time of this segment, as shown in t3 in the figure.

3. The speed command source is debugging (Pn2=2)

Under this speed command source, it is possible to control the start and stop of the motor through communication, or to set corresponding parameters to enable continuous operation of the motor in a single direction/reciprocating direction (demonstration operation mode) for debugging purposes or aging testing purposes.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn80	Debugging speed	0~3000	rpm	Set the maximum speed for the internal test run	Set when running	Next run	100
Pn81	Debugging acceleration	1~2000	ms	Set the acceleration for the internal test run	Set when running	Next run	100
Pn82	Debugging deceleration	1~2000	ms	Set the deceleration for the internal test run	Set when running	Next run	100
Pn83 Pn84	Debugging stroke	0~10737 41824	command unit	Set the number of pulses for the internal test run	Set when running	Next run	10000
Pn85	Internal demo delay time	0~65535	ms	Set the waiting for the motion demonstration	Set when running	Next run	500
Pn86	Internal demo operation mode	0~1	-	Set the operation mode of internal demo operation 0: Motor reciprocating 1: Motor runs in one direction	Set when running	Next run	0
Pn87	Internal demo start running direction	0~1	-	Set the starting direction of the internal demo run 0: positive direction 1: negative direction	Set when running	Next run	0

Pn88	Number of internal demo runs	0~65535	-	Set the number of runs of the motion demonstration 0: Unlimited number of times 1: Limited number of times	Set when running	Next run	0
Pn69	Internal running position mode	0~1	-	Set the position command type for the motion demonstration: 0: Incremental position mode 1: Absolute position mode	Set when running	Next run	0
Pn68	Emergency stop deceleration	1~65535	ms	Set the deceleration during motor emergency stop	Set when running	Next run	300
Pn59	Internal demo start-stop command	0~6	-	Start and stop commands for debugging of integrated motor	Set when running	Next run	0
Pn89	Internal delay start/stop	0~2	-	Start and stop commands for motion demonstration of integrated motor	Set when running	Next run	0

The startup method is as follows:

- The motor works in the debugging running mode: write the start/stop command for operation through Pn59, and the motor will run in accordance with the running curve determined by the command stroke, speed and acceleration/deceleration set by Pn80~Pn84.

Value written in Pn59	Description
0	Write: meaningless. Read: indicating that the motor is running or waiting to be triggered to run.
1	Write: trigger the motor to run forward of the running command set by Pn83 and then stop. After the motor responds to the start-stop command, set Pn59 to 0.
2	Write: trigger the motor to run reversely of the running command set by Pn83 and then stop. After the motor responds to the start-stop command, set Pn59 to 0.
3	Write: trigger the motor to jog forward. After the motor responds to the start-stop command, set P59 to 0.
4	Write: trigger the motor to jog reverse. After the motor responds to the start-stop command, set Pn59 to 0.
5	Write: trigger motor emergency stop. After the motor responds to the start-stop command, set Pn59 to 0.
6	Write: trigger motor to decelerate to stop. After the motor responds to the start-stop command, set Pn59 to 0.

◆ The motor works in cycle operation (demonstration) mode: write the start-stop command of the demonstration through Pn89. In the demo running mode, the motor will start in reciprocating or single direction (Pn86=0/1) according to the running command, speed, acceleration and deceleration time constant set by Pn80~Pn84, and start in positive or negative direction (Pn87=0/1), run the number of times set by Pn88. After completing the set running command each time and setting the delay time by Pn85, restart again and run in this cycle.

Value written in Pn89	Description
0	Write: stop the running of the demo mode. Read: indicates that the motor is waiting to be triggered to run.
1	Write: start the running of the demo mode; set Pn88 to 2 after the motor responds to the start-stop command.
2	Write: meaningless. Read: indicates that the motor is working in demo mode.

4. The speed command source is APP1 (Pn2=5)

When the speed command source is set to APP1, it has the following functions:

◆ Through external input terminal control or communication trigger, the motor jogs forward and reverse.

◆ Linkage is achieved when the position command source is set to APP1 and the torque command source is set to APP1.

(1) Through external input terminal control or communication trigger, the motor jogs forward and reverse.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn65	Jog acceleration	1~2000	r/s^2	Set the acceleration for motor jog operation	Set when running	Next run	100
Pn66	Jog deceleration	1~2000	r/s^2	Set the deceleration for motor jog operation	Set when running	Next run	100
Pn67	Jog speed	0~3000	rpm	Set the speed for motor jog operation	Set when running	Next run	500
Pn68	Emergency stop deceleration	1~2000	r/s^2	Set the deceleration during motor emergency stop	Set when running	Next run	300
Pn222	Shutdown mode in speed mode	0~4	-	Set the operation mode after speed shutdown in the speed control mode: 0: No processing 1: Switch to position mode to lock the shaft 2: Servo disabled	Set when running	Next run	0

The startup method is as follows:

1) Set the corresponding IN terminal functions to "FUNC3 (jog forward)" and "FUNC4 (jog reverse)" input/output parameters, and use external inputs to trigger startup (the trigger signal is level valid).
2) Write a specific value to Pn59 through communication:

Value written in Pn59	Description
0	Write: meaningless. Read: indicating that the motor is running or waiting to be triggered to run.
3	Write: trigger the motor to jog forward. After the motor responds to the start-stop command, set P59 to 0.
4	Write: trigger the motor to jog reverse. After the motor responds to the start-stop command, set Pn59 to 0.
5	Write: trigger motor emergency stop. After the motor responds to the start-stop command, set Pn59 to 0.
6	Write: trigger motor to decelerate to stop. After the motor responds to the start-stop command, set Pn59 to 0.

◆ It can modify the running speed in real time through communication and take effect immediately.

(2) When the position command source is set to APP1 and the torque command source is set to APP1, the combined control of position, speed, and torque modes is achieved (the following control modes can be achieved when the integrated motor control mode Pn0 is 0/1/2)

1) The integrated motor can make the motor jog through the above external input terminal control and communication trigger.
2) The integrated motor can achieve fixed length forward and reverse operation in position mode. Please refer to the position command input settings in the position control mode section.
3) The integrated motor can achieve forward and reverse operation in torque mode. Please refer to the torque command input settings in the torque control mode section.

5.4. Torque Control Mode

By setting the value of parameter Pn0 to 2, the integrated motor is enabled to operate in torque control mode.

5.4.1. Torque Command Input Setting

In the torque control mode, the speed command source should first be set via parameter Pn3.

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
Pn3	Torque command source	0: Digital given 1~4: Reserved 5: APP1 6: Reserved (Don't set)	Set torque command source in torque control mode	Set after stopping	Effective immediately	0

1. The torque command source is digital given (Pn3=0)

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn140	Torque mode given torque	0~65535	0.001Nm	Set motor running torque	Set when running	Next run	300
Pn141	Torque mode acceleration	1~2000	r/s^2	Set motor torque running acceleration	Set when running	Next run	100
Pn142	Torque mode deceleration	1~2000	r/s^2	Set motor torque running deceleration	Set when running	Next run	100
Pn143	Torque mode forward running speed	0~3000	rpm	Set the forward running speed in torque mode	Set when running	Effective immediately	300
Pn144	Torque mode reverse running speed	0~3000	rpm	Set the reverse running speed in torque mode	Set when running	Effective immediately	500
Pn145	Torque reaches the reference value	0~65535	0.001Nm	Set the reference value of the motor torque when the running torque reaches the signal output	Set when running	Next run	500
Pn146	Torque reaches the effective value	0~65535	0.001Nm	Set the effective value of the motor torque when the running torque reaches the signal output	Set when running	Next run	0
Pn147	Torque reaches invalid value	0~65535	0.001Nm	Set the invalid value of the motor torque when the running torque reaches the signal output	Set when running	Next run	0
Pn148	Torque mode torque arrival signal detection time	0~65535	ms	Set the torque detection time of the motor torque when the running torque reaches the signal output	Set when running	Next run	0
Pn149	Torque mode torque holding time	0~65535	ms	Set the torque holding time after the motor torque running torque reaches the valid signal output	Set when running	Next run	0
Pn223	Shutdown mode in torque mode	0~4	-	Set the running mode after torque shutdown in torque control mode: 0: The motor running torque is set to 0 Other: No processing	Set when running	Next run	0

There are two ways to start up as follows:

(1) Set the corresponding IN terminal function to "FUNC1 (torque forward)" , "FUNC2 (torque reverse)" input/output parameters, and use external input to trigger startup (the trigger signal is level valid).

(2) Write a specific value to Pn224 through communication:

Value written in Pn224	Description
0	Write: torque operation stops; Read: indicates that the motor is in stop or has been stopped.
1	Write: motor starting torque forward operation; Read: the motor is running torque forward.
2	Write: motor starting torque reverse operation; Read：the motor is in torque reverse operation.

- In communication mode, when the motor torque is running, if you want to switch the running direction, you must first write 0 to trigger the motor to stop, then write the running start value in the opposite direction (Pn224=1/2).
- It is recommended not to mix the external input trigger control and communication trigger control, otherwise there may be abnormal conditions.

2. The torque command source is APP1 (Pn2=5)

When the torque command source is set to APP1, it has the following functions:

- Through external input terminal control or communication trigger, the motor jogs forward and reverse.
- When the position command source is set to APP1 and the torque command source is set to APP1, the combined control of position, speed, and torque modes is achieved (the following control modes can be achieved when the integrated motor control mode Pn0 is 0/1/2).

(1) Through external input terminal control or communication trigger, the motor jogs forward and reverse.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn140	Torque mode given torque	0~65535	0.001Nm	Set motor running torque	Set when running	Next run	300
Pn141	Torque mode acceleration	1~2000	r/s^2	Set motor torque running acceleration	Set when running	Next run	100
Pn142	Torque mode deceleration	1~2000	r/s^2	Set motor torque running deceleration	Set when running	Effective immediately	100
Pn143	Torque mode forward running speed	0~3000	rpm	Set the forward running speed in torque mode	Set when running	Effective immediately	300
Pn144	Torque mode reverse running speed	0~3000	rpm	Set the reverse running speed in torque mode	Set when running	Effective immediately	500

Pn145	Torque reaches the reference value	0~65535	0.001Nm	Set the reference value of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	500
Pn146	Torque reaches the effective value	0~65535	0.001Nm	Set the effective value of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	0
Pn147	Torque reaches invalid value	0~65535	0.001Nm	Set the invalid value of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	0
Pn148	Torque mode torque arrival signal detection time	0~65535	ms	Set the torque detection time of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	0
Pn149	Torque mode torque holding time	0~65535	ms	Set the torque holding time after the motor torque running torque reaches the valid signal output	Set when running	Effective immediately	0
Pn223	Shutdown mode in torque mode	0~4	-	Set the running mode after torque shutdown in torque control mode: 0: The motor running torque is set to 0 1: Switch to position mode (axis locking) 2: Servo disable (power off) 3: No processing	Set when running	Effective immediately	0

The startup method is as follows:

1) Set the corresponding IN terminal functions to "FUNC5 (torque forward)" and "FUNC6 (torque reverse)" input/output parameters, and use external inputs to trigger startup (the trigger signal is level valid).

3) Write a specific value to Pn59 through communication:

Value written in Pn59	Description
0	Write: meaningless. Read: indicating that the motor is running or waiting to be triggered to run.
7	Write: trigger the motor to torque forward. After the motor responds to the command, set P59 to 0.
8	Write: trigger the motor to torque reverse. After the motor responds to the command, set Pn59 to 0.
5	Write: trigger motor emergency stop. After the motor responds to the command, set Pn59 to 0.
6	Write: trigger motor to decelerate to stop. After the motor responds to the command, set Pn59 to 0.

- It can modify the running speed in real time through communication and take effect immediately

(2) When the position command source is set to APP1 and the torque command source is set to APP1, the combined control of position, speed, and torque modes is achieved (the following control modes can be achieved when the integrated motor control mode Pn0 is 0/1/2).

1) The integrated motor can realize forward and reverse operation in torque mode through the external input terminals and communication triggering described above.
2) The integrated motor can achieve fixed length forward and reverse operation in position mode. Please refer to the position command input settings in the position control mode section.
3) The integrated motor can achieve jog forward and reverse operation in speed mode. Please refer to the speed command input settings in the speed control mode section.

5.4.2. Speed Limit in Torque Mode

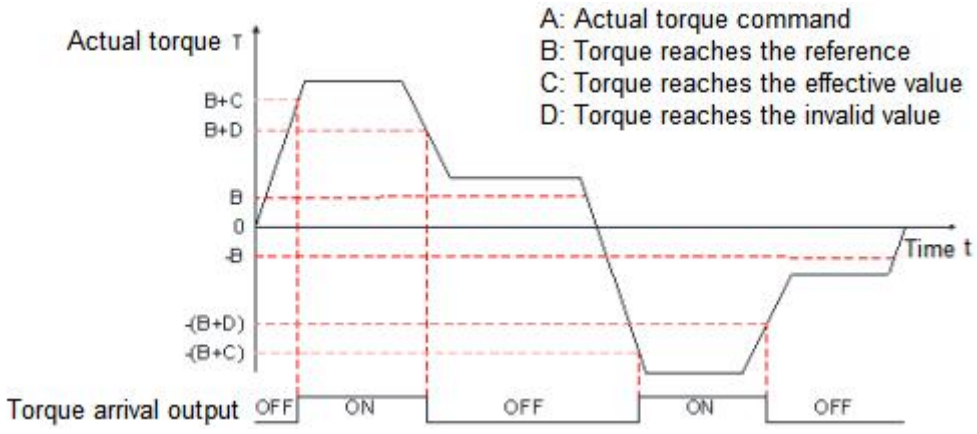
In the torque control mode, if the given torque command is too large and greater than the mechanical side load torque, the motor will continue to accelerate, overspeed may occur, and the mechanical equipment may be damaged. Therefore, in order to protect the machine, the speed of the motor must be limited.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
Pn143	Torque control forward running speed	0~3000	rpm	Set the forward running speed in torque control mode	Set when running	Effective immediately	500
Pn144	Torque control reverse running speed	0~3000	rpm	Set the reverse running speed in torque control mode	Set when running	Effective immediately	500

5.4.3. Torque Arrival Output

The torque arrival function is used to determine whether the actual torque command has reached the set interval. When the actual torque command reaches the torque command threshold, the integrated motor can output the corresponding output signal (torque arrival) for the host computer to use the input/output parameters.



Actual torque command (The value of parameter Pn178 can be read by communication): A

1. When Pn145=0.

(1) When Pn147 is set to 0, Pn146 is forced to the Pn140 setting value, i.e. Pn146=Pn140

B = 0

C = Pn146

D = Pn146 * 0.94

(2) When the Pn147 setting value is not 0, Pn146 is forced to the Pn140 setting value, i.e. Pn146=Pn140

B = 0

C = Pn146

D = C - Pn147

2. When Pn145≠0.

B = Pn145

C = B + Pn146

C = B + Pn147

Therefore, when the torque reaches the output signal from invalid to valid, the actual torque command must satisfy:

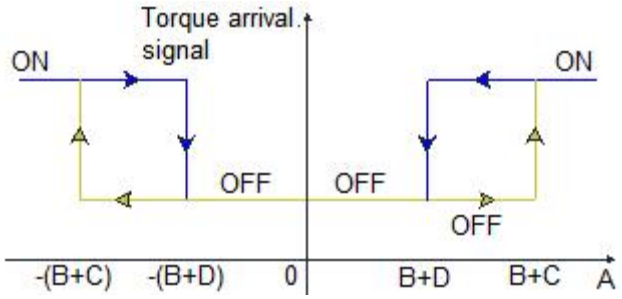
$$|A| \geq B + C$$

Otherwise, the torque arrival output signal remains invalid.

Conversely, when the torque arrival signal from valid to invalid, the actual torque command must satisfy:

$$|A| < B + D$$

Otherwise, the torque arrival output signal remains valid.



★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P05.17	Torque reaches the effective value	0~65535	0.1%	Set the effective value of the motor torque when the running torque reaches the signal output	Set when running	Next run	100
P05.18	Torque reaches invalid value	0~65535	0.1%	Set the invalid value of the motor torque when the running torque reaches the signal output	Set when running	Next run	50
P05.19	Torque mode torque arrival signal detection time	0~65535	ms	Set the torque detection time of the motor torque when the running torque reaches the signal output	Set when running	Next run	50

6. Parameter Description

- Modifying the parameters of the integrated motor through communication only sends the parameter values to the RAM area of the integrated motor. After restarting the integrated motor, the parameter values will revert to the values before being modified. If you need to permanently save parameters (which are still valid after powering off and restarting), please write the value 1 through Pn90 (the "Save Parameters" button on the Rtelligent debugging software) to save the parameter values to the FLASH sector of the all-in-one machine.
- Unless otherwise specified, all parameters take effect immediately (no permanent saving is required, power down and restart).

6.1. Parameters List

Parameter	Name	Range	Default	Unit
Pn0	Control mode	0~2	0	-
Pn1	Position command source	0~15	0	-
Pn2	Speed command source	0~15	0	-
Pn3	Torque command source	0~15	0	-
Pn4	Pulse command type	0~4	0	-
Pn5	Motor running direction	0~1	0	-
Pn6/7	Command subdivision	0~1048576	10000	Command unit
8/9	Electronic gear ratio numerator	0~1048576	1	-
Pn10/11	Electronic gear ratio denominator	0~1048576	1	-
Pn12/13	Out-of-tolerance alarm threshold	0~65535	800	0.01 turn
Pn14	Positioning accuracy	0~65535	10	Encoder unit
Pn15	In-position signal establishment time	0~65535	100	Control cycle
Pn16	Pulse stop detdetection time	0~65535	100	Control cycle
Pn17	Pulse command filtering time	1~1024	1	Control cycle
Pn18	Reserved	-	-	-
Pn19	Motor pole pairs	0~10	4	Pole pairs
Pn20	Motor rated current	0~65535	70	0.1A
Pn21	Motor rated torque	0~65535	65	0.01Nm
Pn22	Integrated motor overload coefficient	1~300	150	%

Pn23	Encoder type selection	0~10	0	-
Pn24	Encoder resolution	0~65535	16384	Encoder unit
Pn25	Encoder calibration start	0~1	0	-
Pn26	Encoder calibration torque	0~100	70	%
Pn27	Electrical angle corresponding to encoder Z-phase signal	0~65535	503	Encoder unit
Pn28	Electrical angle corresponding to encoder U-phase signal	0~65535	406	Encoder unit
Pn29	Encoder calibration flag	0~65535	21845	-
Pn30	Maximum motor speed	0~6000	3000	r/min
Pn31	Overspeed class	0~2	0	-
Pn32	Speed arrival amplitude	0~6000	1000	r/min
Pn33	Speed consistent amplitude	0~6000	1000	r/min
Pn34	Zero speed clamp threshold	0~1000	20	r/min
Pn35	Integrated motor undervoltage threshold	1~500	18	V
Pn36	Integrated motor overvoltage threshold	1~500	60	V
Pn37	Serial port baud rate	0~3	2	-
Pn38	RS485 baud rate	0~3	2	-
Pn39	RS485 station number	1~247	1	-
Pn40	Integrated motor ID	Display	-	-
Pn41	Integrated motor version	Display	-	-
Pn42-Pn43	Reserved	-	-	-
Pn44	Servo force enable	0~1	0	-
Pn45	Alarm reset	0~1	0	-
Pn46	Reset integrated motor	0~1	0	-
Pn48	Open loop operation	0~15	0	-
Pn49-Pn50	Reserved	-	-	-
Pn51	Data sampling channel 1	0~15	0	-
Pn52	Data sampling channel 2	0~15	0	-
Pn53	Data sampling interval	1~65535	1	-
Pn54	Data sampling starts and stops	0~2	0	-
Pn55	Digital given speed	0~6000	1000	r/min

Pn56	Digital given acceleration	1~2000	100	r/s^2
Pn57	Digital given deceleration	1~2000	100	r/s^2
Pn58	Measure the PWM feedback encoder duty cycle	0~1	0	-
Pn59	Internal motion starts and stops	0~15	0	-
Pn60	Point-to-point acceleration	1~2000	100	r/s^2
Pn61	Point-to-point deceleration	1~2000	100	r/s^2
Pn62	Point-to-point speed	0~6000	500	r/min
Pn63/64	Point-to-point stroke	-1073741824~1073741824	10000	Command unit
Pn65	Jog acceleration	1~2000	100	r/s^2
Pn66	Jog deceleration	1~2000	100	r/s^2
Pn67	Jog speed	0~6000	500	r/min
Pn68	Emergency stop deceleration	1~2000	300	r/s^2
Pn69	Internal motion position mode	0~1	0	-
Pn70	Input port 1 function/polarity setting	0~63	33	-
Pn71	Input port 2 function/polarity setting	0~63	34	-
Pn72	Input port 3 function/polarity setting	0~63	37	-
Pn73	Input port 4 function/polarity setting	0~63	39	-
Pn74	Input port 5 function/polarity setting	0~63	44	-
Pn75	Input port 6 function/polarity setting	0~63	43	-
Pn76	Output port 1 function/polarity setting	0~31	17	-
Pn77	Output port 2 function/polarity setting	0~31	18	-
Pn78	Output port 3 function/polarity setting	0~31	19	-
Pn79	Output port 4 function/polarity setting	0~31	21	-
Pn80	Debugging speed	0~6000	100	rpm
Pn81	Debugging acceleration	1~2000	100	r/s^2
Pn82	Debugging deceleration	1~2000	100	r/s^2

Pn83/84	Debugging stroke	0~1073741827	10000	Command unit
Pn85	Motion demo delay time	0~65535	500	ms
Pn86	Motion demo running mode	0~1	0	-
Pn87	Motion demo starting direction	0~1	0	-
Pn88	Motion demo running times	0~65535	0	-
Pn89	Motion demo start/stop command	0~2	0	-
Pn90	Save parameters	0~1	0	-
Pn91	Factory reset	0~1	0	-
Pn92	Reserved: Don’t use	-	-	-
Pn93	Encoder inverting	0~7	0	-
Pn94	Homing enable control mode	0~6	1	-
Pn95	Homing mode	0~5	0	-
Pn96	Speed of high speed searching origin switch signal	0~3000	100	r/min
Pn97	Speed of low speed searching origin switch signal	0~1000	50	r/min
Pn98	The acceleration and deceleration of searching origin swtich signal	1~2000	100	r/s^2
Pn99	Reserved	-	-	-
Pn100/101	Mechanical origin offset	-1073741824~1073741824	0	Command unit
Pn102	Mechanical origin offset and limit handling	0~3	0	-
Pn103	Collision back to origin detection time	0~65535	50	ms
Pn104	Collision back to origin detection speed	0~1000	50	r/min
Pn105	Collision back to origin torque	0~65535	300	0.001Nm
Pn106	Input force valid	0~63	0	-
Pn107	Output force valid	0~15	0	-
Pn108	Motor speed, fault code PWM output enable	0~3	0	-
Pn109	Motor speed PWM output maximum speed setting	1~20000	5000	r/min
Pn110	Position proportional gain	0~65535	300	-

Pn111	Speed proportional gain	0~65535	500	-
Pn112	Speed integral gain	0~65535	10	-
Pn113	Speed saturation gain	0~65535	256	-
Pn114-Pn117	Reserved	-	-	-
Pn118	Speed low-pass filter cut-off frequency 1	1~3000	200	Hz
Pn119	Speed low-pass filter cut-off frequency 2	1~3000	600	Hz
Pn120-Pn123	Reserved	-	-	-
Pn124	Torque proportional gain	0~65535	150	-
Pn125	Torque integral gain	0~65535	80	-
Pn126	Torque saturation gain	0~65535	256	-
Pn127	Torque low-pass filter cut-off frequency	1~3000	1000	Hz
Pn128-Pn139	Reserved	-	-	-
Pn140	Torque mode given torque	0~65535	300	0.001Nm
Pn141	Torque mode acceleration	1~2000	100	r/s^2
Pn142	Torque mode deceleration	1~2000	100	r/s^2
Pn143	Torque mode forward running speed	0~6000	500	r/min
Pn144	Torque mode reverse running speed	0~6000	500	r/min
Pn145	Torque mode torque reaches reference value	0~65535	0	0.001Nm
Pn146	Torque mode torque reaches effective value	0~65535	0	0.001Nm
Pn147	Torque mode torque reaches invalid value	0~65535	0	0.001Nm
Pn148	Torque mode torque arrival signal detection time	0~65535	50	ms
Pn149	Torque mode torque arrival hold time	0~65535	0	ms
Pn150/Pn390	Integrated motor fault code	Display	-	-
Pn151	Integrated motor status code	Display	-	-
Pn152/153	Encoder status code	Display	-	-
Pn154	Input port status	Display	-	-
Pn155	Output port status	Display	-	-

Pn156	Input port conduction edge latch state	Display	-	-
Pn157	Input port off edge latch state	Display	-	-
Pn158/Pn387	Input status flag register	Display	-	-
Pn159	Output status flag register	Display	-	-
Pn160	Integrated motor voltage	Display	-	0.01V
Pn161	Average load rate of integrated motor	Display	-	1%
Pn162/163	Motor current position	Display	-	Command unit
Pn164/165	Tracking error	Display	-	Encoder unit
Pn166/167	External pulse command counter	Display	-	Command unit
Pn168/169	Internal pulse command counter	Display	-	Command unit
Pn170/171	Encoder feedback pulse counter	Display	-	Encoder unit
Pn172/173	Encoder current position	Display	-	Encoder unit
Pn174	Motor speed command	Display	-	r/min
Pn175	Actual motor speed	Display	-	r/min
Pn176	Corresponding speed to position command	Display	-	r/min
Pn177	Motor given torque	Display	-	%
Pn178	Actual motor torque	Display	-	%
Pn179	Current electrical angle of the motor	Display	-	Encoder unit
Pn180	Motor U-phase sampling value	Display	-	--
Pn181	Motor U-phase bias	Display	-	-
Pn182	Motor V-phase sampling value	Display	-	-
Pn183	Motor V-phase bias	Display	-	-
Pn184	Integrated motor voltage sampling value	Display	-	-
Pn185	Motor U-phase current	Display	-	0.1A
Pn186	Motor V-phase current	Display	-	0.1A
Pn187	System status	Display	-	-
Pn188	Internal command status	Display	-	-

Pn189	Encoder hall signal status	Display	-	-
Pn190	Encoder forward calibration value	Display	-	-
Pn191	Encoder reverse calibration value	Display	-	-
Pn192	Encoder latch value	Display	-	-
Pn193	Encoder latch hall electrical angle	Display	-	-
Pn194	Encoder pulse counting unit count value	Display	-	-
Pn195	Analog input sampling value	Display	-	-
Pn196	Input PWM signal pulse duty cycle	Display	-	0.01%
Pn197	Motor speed PWM output signal duty cycle	Display	-	0.01%
Pn198-Pn199	Reserved	-	-	-
Pn200	Analog input bias	0~5000	0	0.001V
Pn201	Analog input low-pass filter cut-off frequency	1~3000	200	Hz
Pn202	Analog input dead zone	0~2000	0	0.001V
Pn203	Analog input zero drift	0~2000	0	0.001V
Pn204	Speed command corresponding to 5V	-6000~6000	1000	r/min
Pn205/206	Position command corresponding to 5V	-1073741824~1073741824	10000	Command unit
Pn207	DSP actual sampling voltage value	Display	-	0.001V
Pn208	Voltage after zero drift, dead zone, and bias	Display	-	0.001V
Pn209	The speed corresponding to the current input voltage	Display	-	r/min
Pn210/211	Position command corresponding to the current input voltage	Display	-	Command unit
Pn212	Position command error threshold	0~65535	10	Encoder unit
Pn213	Analog force start command	0~9	0	-
Pn214	Analog dead zone processing	0~1	0	-

	mode			
Pn215	Command overload starting detection point	0~300	100	%
Pn216	Command overload peak detection point	0~300	300	%
Pn217	Command overload detection time	0~65535	4000	ms
Pn218	Thermal overload starting detection point	0~300	100	%
Pn219	Thermal overload peak detection time	0~300	300	%
Pn220	Thermal overload detection time	0~65535	4000	ms
Pn221	Speed saturation output time	0~65535	5000	ms
Pn222	Speed mode shutdown mode	0~4	0	-
Pn223	Torque mode shutdown mode	0~4	0	-
Pn224	Forced start command	0~9	0	-
Pn225	Communication control acceleration	1~2000	100	r/s^2
Pn226	Communication control deceleration	1~2000	100	r/s^2
Pn227	Communication control speed	0~6000	500	r/min
Pn228/229	Communication control stroke/position	-1073741824~1073741824	10000	Command unit
Pn230	Braking resistor power	0~65535	100	W
Pn231	Braking resistor value	0~65535	40	Ω
Pn232	Heat dissipation coefficient of braking resistor	0~100	20	%
Pn233	Brake command	0~2	0	-
Pn234-Pn236	Reserved	-	-	-
Pn237	Multi-segment speed command operation mode	0~2	2	-
Pn238	Number of end segments for multi-segment speed commands	1~16	16	-
Pn239	Multi-segment speed command running time units	0~1	0	-
Pn240	Multi-segment speed	1~2000	100	r/s^2

	command acceleration 1			
Pn241	Multi-segment speed command deceleration 1	1~2000	100	r/s^2
Pn242	Multi-segment speed command acceleration 2	1~2000	100	r/s^2
Pn243	Multi-segment speed command deceleration 2	1~2000	100	r/s^2
Pn244	Multi-segment speed command acceleration 3	1~2000	100	r/s^2
Pn245	Multi-segment speed command deceleration 3	1~2000	100	r/s^2
Pn246	Multi-segment speed command acceleration 4	1~2000	100	r/s^2
Pn247	Multi-segment speed command deceleration 4	1~2000	100	r/s^2
Pn248	Multi-segment speed command acceleration 5	1~2000	100	r/s^2
Pn249	Multi-segment speed command deceleration 5	1~2000	100	r/s^2
Pn250	Multi-segment speed command acceleration 6	1~2000	100	r/s^2
Pn251	Multi-segment speed command deceleration 6	1~2000	100	r/s^2
Pn252	1st segment speed command	-3000~3000	500	rpm
Pn253	1st segment command running time	0~65535	10	0.1s/0.1min
Pn254	1st segment command acceleration and deceleration selection	1~6	1	-
Pn255	2nd segment speed command	-3000~3000	500	rpm
Pn256	2nd segment command running time	0~65535	10	0.1s/0.1min
Pn257	2nd segment command acceleration and deceleration selection	1~6	1	-
Pn258	3rd segment speed command	-3000~3000	500	rpm
Pn259	3rd segment command running time	0~65535	10	0.1s/0.1min

Pn260	3rd segment command acceleration and deceleration selection	1~6	1	-
Pn261	4th segment speed command	-3000~3000	500	rpm
Pn262	4th segment command running time	0~65535	10	0.1s/0.1min
Pn263	4th segment command acceleration and deceleration selection	1~6	1	-
Pn264	5th segment speed command	-3000~3000	500	rpm
Pn265	5th segment command running time	0~65535	10	0.1s/0.1min
Pn266	5th segment command acceleration and deceleration selection	1~6	1	-
Pn267	6th segment speed command	-3000~3000	500	rpm
Pn268	6th segment command running time	0~65535	10	0.1s/0.1min
Pn269	6th segment command acceleration and deceleration selection	1~6	1	-
Pn270	7th segment speed command	-3000~3000	500	rpm
Pn271	7th segment command running time	0~65535	10	0.1s/0.1min
Pn272	7th segment command acceleration and deceleration selection	1~6	1	-
Pn273	8th segment speed command	-3000~3000	500	rpm
Pn274	8th segment command running time	0~65535	10	0.1s/0.1min
Pn275	8th segment command acceleration and deceleration selection	1~6	1	-
Pn276	9th segment speed command	-3000~3000	500	rpm
Pn277	9th segment command running time	0~65535	10	0.1s/0.1min
Pn278	9th segment command acceleration and deceleration	1~6	1	-

	selection			
Pn279	10th segment speed command	-3000~3000	500	rpm
Pn280	10th segment command running time	0~65535	10	0.1s/0.1min
Pn281	10th segment command acceleration and deceleration selection	1~6	1	-
Pn282	11th segment speed command	-3000~3000	500	rpm
Pn283	11th segment command running time	0~65535	10	0.1s/0.1min
Pn284	11th segment command acceleration and deceleration selection	1~6	1	-
Pn285	12th segment speed command	-3000~3000	500	rpm
Pn286	12th segment command running time	0~65535	10	0.1s/0.1min
Pn287	12th segment command acceleration and deceleration selection	1~6	1	-
Pn288	13th segment speed command	-3000~30000	500	rpm
Pn289	13th segment command running time	0~65535	10	0.1s/0.1min
Pn290	13th segment command acceleration and deceleration selection	1~6	1	-
Pn291	14th segment speed command	-3000~3000	500	rpm
Pn292	14th segment command running time	0~65535	10	0.1s/0.1min
Pn293	14th segment command acceleration and deceleration selection	1~6	1	-
Pn294	15th segment speed command	-3000~3000	500	rpm

Pn295	15th segment command running time	0~65535	10	0.1s/0.1min
Pn296	15th segment command acceleration and deceleration selection	1~6	1	-
Pn297	16th segment speed command	-3000~3000	500	rpm
Pn298	16th segment command running time	0~65535	10	0.1s/0.1min
Pn299	16th segment command acceleration and deceleration selection	1~6	1	-
Pn300	Multi-segment position operation mode	0~2	2	-
Pn301	Number of end segments for position commands	1~16	16	-
Pn302	Time unit	0~1	0	-
Pn303	Position command type selection	0~1	1	-
Pn304	Reserved	-	-	-
Pn305/306	1st segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn307	1st segment displacement maximum running speed	0~3000	500	r/min
Pn308	1st segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn309	Waiting time after completion of segment 1 displacement	0~65535	500	ms(s)
Pn310/311	2nd segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn312	2nd segment displacement maximum running speed	0~6000	500	r/min
Pn313	2nd segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn314	Waiting time after completion of segment 2 displacement	0~65535	500	ms(s)
Pn315/316	3rd segment moving	-1073741824~1073741824	10000	Command unit

	displacement			
Pn317	3rd segment displacement maximum running speed	0~3000	500	r/min
Pn318	3rd segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn319	Waiting time after completion of segment 3 displacement	0~65535	500	ms(s)
Pn320/321	4th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn322	4th segment displacement maximum running speed	0~3000	500	r/min
Pn323	4th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn324	Waiting time after completion of segment 4 displacement	0~65535	500	ms(s)
Pn325/326	5th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn327	5th segment displacement maximum running speed	0~3000	500	r/min
Pn328	5th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn329	Waiting time after completion of segment 5 displacement	0~65535	500	ms(s)
Pn330/331	6th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn332	6th segment displacement maximum running speed	0~3000	500	r/min
Pn333	6th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn334	Waiting time after completion of segment 6 displacement	0~65535	500	ms(s)
Pn335/336	7th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn337	7th segment displacement maximum running speed	0~3000	500	r/min
Pn338	7th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn339	Waiting time after completion	0~65535	500	ms(s)

	of segment 7 displacement			
Pn340/341	8th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn342	8th segment displacement maximum running speed	0~3000	500	r/min
Pn343	8th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn344	Waiting time after completion of segment 8 displacement	0~65535	500	ms(s)
Pn345/346	9th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn347	9th segment displacement maximum running speed	0~3000	500	r/min
Pn348	9th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn349	Waiting time after completion of segment 9 displacement	0~65535	500	ms(s)
Pn350/351	10th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn352	10th segment displacement maximum running speed	0~3000	500	r/min
Pn353	10th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn354	Waiting time after completion of segment 10 displacement	0~65535	500	ms(s)
Pn355/356	11th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn357	11th segment displacement maximum running speed	0~3000	500	r/min
Pn358	11th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn359	Waiting time after completion of segment 11 displacement	0~65535	500	ms(s)
Pn360/361	12th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn362	12th segment displacement maximum running speed	0~3000	500	r/min
Pn363	12th segment displacement	1~2000	100	r/s^2

	acceleration and deceleration			
Pn364	Waiting time after completion of segment 12 displacement	0~65535	500	ms(s)
Pn365/366	13th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn367	13th segment displacement maximum running speed	0~3000	500	r/min
Pn368	13th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn369	Waiting time after completion of segment 13 displacement	0~65535	500	ms(s)
Pn370/371	14th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn372	14th segment displacement maximum running speed	0~3000	500	r/min
Pn373	14th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn374	Waiting time after completion of segment 14 displacement	0~65535	500	ms(s)
Pn375/376	15th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn377	15th segment displacement maximum running speed	0~3000	500	r/min
Pn378	15th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn379	Waiting time after completion of segment 15 displacement	0~65535	500	ms(s)
Pn380/381	16th segment moving displacement	-1073741824~1073741824	10000	Command unit
Pn382	16th segment displacement maximum running speed	0~3000	500	r/min
Pn383	16th segment displacement acceleration and deceleration	1~2000	100	r/s^2
Pn384	Waiting time after completion of segment 16 displacement	0~65535	500	ms(s)
Pn385	Speed display filtering settings	0~65535	15	-
Pn386	Speed given low-pass filter	0~3000	3000	Hz

	cut-off frequency			
Pn387	Input flag register high 16-bit	Display	-	-
Pn388	Reserved	-	-	-
Pn389	PWM interrupt control frequency of the current firmware	Display	-	Hz
Pn390	Integrated motor fault code high 16-bit	Display	-	-
Pn391	Reserved	-	-	-
Pn392	Torque mode current given filter cut-off frequency	0~3000	300	Hz
Pn393	Reserved	-	-	-
Pn394	Reserved	-	-	-
Pn395/Pn396	Given pulse counter	Display	-	Encoder unit
Pn397	Reserved	-	-	-
Pn398	Integrated motor hardware version number	Display	-	-
Pn399	Command overload alarm setting	0~65535	0	10ms
Pn400	Stall protection detection speed	0~10000	100	rpm
Pn401	Stall protection detection time	0~65535	1200	ms
Pn402	Locked-rotor alarm detection command speed	0~10000	100	rpm
Pn403	Locked-rotor alarm feedback speed upper limit	0~10000	30	rpm
Pn404	Locked-rotor protection detection time	0~65535	1200	ms
Pn405-Pn409	Reserved	-	-	-
Pn410	Motor ID	0~65535	34040	-
Pn411	Rated power	0~65535	40	0.01KW
Pn412	Rated voltage	0~65535	48	V
Pn413	Rated speed	0~65535	3000	rpm
Pn414	Maximum speed	0~65535	5000	rpm
Pn415	Maximum torque	0~65535	381	0.01Nm
Pn416	Rotor inertia	0~65535	63	0.01kgcm
Pn417	Stator resistance	0~65535	280	0.001Ω

Pn418	Stator Q-axis inductance	0~65535	56	0.01mH
Pn419	Stator D-axis inductance	0~65535	56	0.01mH
Pn420	Line back-emf coefficient	0~65535	860	0.01mv/rpm
Pn421	Torque coefficient	0~65535	12	0.01Nm/Arms
Pn422	Electrical time constant	0~65535	360	0.01ms
Pn423	Mechanical time constant	0~65535	360	0.01ms
Pn424	Multi-turn encoder multi-turn bits	0~24	16	Bits
Pn425-Pn439		-	-	-
Pn440/Pn441	Reserved	-	-	-
Pn442	Encoder data received insufficient counter	Display	-	-
Pn443	Encoder receiving data null error counter	Display	-	-
Pn444	Encoder CRC error counter	Display	-	-
Pn445	Encoder serial port error counter	Display	-	-
Pn446	Encoder continuous error counter	Display	-	-
Pn447/Pn448	Encoder multi turn data	Display	-	-
Pn449/Pn450	Encoder actual position	Display	-	-
Pn451	Encoder command error counter	Display	-	-
Pn452	Encoder status error counter	Display	-	-
Pn453/Pn454	Encoder single turn data	Display	-	-
Pn455	DIP status	Display	-	-
Pn456	Maximum braking duration	0~65535	50	ms
Pn457	Pulse signal bandwidth setting	0~15	9	-

6.2. Parameter Description

6.2.1. Basic setting parameters

Pn0	Name	Control mode			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0

Set value	Control mode
0	Position control mode
1	Speed control mode
2	Torque control mode

Pn1	Name	Position command source			Related mode	P
	Setting range	0~15	Unit	-	Factory setting	0

Set value	Control mode
0	Pulse command source
1	Fixed length/Position table
2	Communication control
3	Debugging
4	Reserved (Don’t set)
5	APP1
6	Reserved (Don’t set)
7	Position table
Other	Reserved

Pn2	Name	Speed command source			Related mode	S
	Setting range	0~15	Unit	-	Factory setting	0

Set value	Control mode
0	Digital given
1	Multi-segment speed command
2	Debugging
3	Reserved (Don’t set)
4	Reserved (Don’t set)
5	APP1
Other	Reserved

Pn3	Name	Torque command source			Related mode	T
	Setting range	0~15	Unit	-	Factory setting	0

Set value	Control mode
0	Digital given
5	APP1
6	Reserved (Don't set)
Other	Reserved

Pn4	Name	Command pulse type			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0

Set the type of external pulse input when Pn1 parameter is set to 0.

Set value	Command pulse type
0	Pulse+direction (positive logic)
1	Pulse+direction (negative logic)
2	CW + CCW
3	Invalid
4	Reserved (Don't set)

- Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.

Pn5	Name	Motor running direction			Related mode	PST
	Setting range	0~1	Unit	-	Factory setting	0

Set value	Motor running direction
0	The positive direction of motor operation is CCW (viewed from the motor output shaft)
1	The positive direction of motor operation is CW (viewed from the motor output shaft)

Pn6/7	Name	Command subdivision			Related mode	P
	Setting range	0~1048576	Unit	Command/turn	Factory setting	10000

Set the subdivisions of integrated motor operation command transformation. Wherein, Pn6 is the low 16-bit data and Pn7 is the high 16-bit data, which are combined into 32-bit unsigned data.

- When Set value is 0: the integrated motor uses the electronic gear ratios Pn8/9 and Pn10/11 to change the position command.

Pn8/9	Name	Electronic gear ratio numerator			Related mode	P
	Setting range	1~8388608	Unit	-	Factory setting	1

Set the electronic gear ratio numerator of the integrated motor operation command transformation. Wherein, Pn8 is the low 16-bit data and Pn9 is the high 16-bit data, which are combined into 32-bit unsigned data.

- Effective when Pn6/7 is set to 0.

Pn10/11	Name	Electronic gear ratio denominator			Related mode	-
	Setting range	1~8388608	Unit	-	Factory setting	1

Set the electronic gear ratio numerator of the integrated motor operation command transformation. Wherein, Pn10 is the low 16 bit data and Pn11 is the high 16 bit data, which are combined into 32-bit unsigned data.

- Effective when Pn6/7 is set to 0.

Pn12/13	Name	Out-of-tolerance alarm threshold			Related mode	P
	Setting range	0~2147483647	Unit	Command unit	Factory setting	1310720

Set the out-of-tolerance threshold value when the integrated motor goes out-of-tolerance fault alarm. Wherein, Pn12 is the low 16-bit data and Pn13 is the high 16-bit data, which are combined into 32-bit unsigned data.

Pn14	Name	Positioning accuracy			Related mode	P
	Setting range	0~65535	Unit	Encoder unit	Factory setting	10

Set the position error threshold when the positioning completion output of the integrated motor is valid.

Pn15	Name	Establishment time of arrival signal			Related mode	P
	Setting range	0~65535	Unit	Control cycle	Factory setting	20

Set how long to output the positioning completion signal after the pulse stops when the positioning completion output of the integrated motor is valid.

- Note: The control cycle time can be calculated from Pn389 (control cycle frequency), with control cycle=1/Pn389 (s).

Pn16	Name	Pulse stop detection time			Related mode	P
	Setting range	0~65535	Unit	Control cycle	Factory setting	20

When the positioning of the integrated motor is completed and the output is valid, the integrated motor detects that there is no pulse input, and after the set time delay, the pulse is considered to stop.

- Note: The control cycle time can be calculated from Pn389 (control cycle frequency), with control cycle=1/Pn389 (s).

Pn17	Name	Pulse command filtering time			Related mode	P
	Setting range	1~1024	Unit	Control cycle	Factory setting	1

Set the pulse command filtering time of the integrated motor.

- Note: The control cycle time can be calculated from Pn389 (control cycle frequency), with control cycle=1/Pn389 (s).

6.2.2. Motor parameters

- Note: When the encoder type is communication type, the all-in-one machine will automatically read the motor parameters stored in the motor encoder chip EEPROM when it is powered on, and update these parameters to the following all-in-one machine parameters, such as Pn19 (motor pole pairs).
- Note: The parameters of the communication type motor have been calibrated at the factory, and the relevant parameters of the motor have been written in the EEPROM inside the motor encoder chip. If not guided by the manufacturer, do not save the motor parameters to the encoder chip or reset the motor.

Pn19	Name	Motor pole pairs			Related mode	-
	Setting range	0~256	Unit	Pole pairs	Factory setting	5
Set the number of pole pairs for the motor. Please set the pole number of the motor correctly, otherwise it will cause abnormal operation. ● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Pn20	Name	Motor rated current			Related mode	-
	Setting range	0~65535	Unit	0.1A	Factory setting	70
● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Pn21	Name	Motor rated torque			Related mode	-
	Setting range	0~65535	Unit	0.01Nm	Factory setting	65
● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Pn22	Name	Overload coefficient of integrated motor			Related mode	-
	Setting range	0~300	Unit	%	Factory setting	150
● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Pn23	Name	Encoder type selection			Related mode	-
	Setting range	0~10	Unit	-	Factory setting	5
Set the encoder output type of the motor. Please set the encoder type correctly, or the all-in-one machine will run abnormally or report an error. ● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Set value	Encoder type selection
0	ABZ+UVW (Reserved, please don't set)
1	ABZ+RS485 (Reserved, please don't set)
2	ABZ (Reserved, please don't set)
3	ABZ provincial line (Reserved, please don't set)
4	UVW (Reserved, please don't set)
5	Communication type single turn encoder
6	AB
7	AB+UVW (Reserved, please don't set)
8	AB+RS485 (Reserved, please don't set)
9	AB+PWM (Reserved, please don't set)
10	Communication type multi turn encoder
11	Sensorless (Reserved, please do not set)

Pn24	Name	Encoder resolution			Related mode	-
	Setting range	0~65535	Unit	Number of pulses/bits	Factory setting	17

When the set value is less than 24, the integrated motor will analyze the set value as the bit of encoder resolution; If the set value is greater than or equal to 24, it will be interpreted as the number of encoder pulses. If the setting value is 23, it means the motor encoder resolution is 23 bits; if the setting value is 10000, it means the motor encoder resolution is 10000 pulses/r

- Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.

Pn25	Name	Encoder calibration start			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

Set value	Control mode
0	Does not work, wait for trigger encoder calibration
1	Trigger encoder calibration operation Note: If 1 is written, read back the following values: Read back 5555: It indicates that the integrated motor has errors such as over-current, over-voltage, under-voltage, and internal voltage error, and the encoder cannot be calibrated. Read back 1: Zero adjustment of motor encoder is in progress Read back 0: End of motor encoder zero adjustment (When Pn90=0, the motor zero adjustment ends normally; when Pn90=2, the motor zero adjustment ends abnormally) Read back other values: Abnormal zero adjustment of motor encoder

6	Abort encoder zero adjustment process
9	Clear the current encoder single turn value to 0 ● Note: Do not perform this operation unless instructed by the manufacturer, otherwise the zero position of motor encoder will be abnormal.
10	Clear the current multi turn value of encoder to 0, and clear the encoder fault information (Mainly including battery failure, multi turn data failure, etc).
11	Clear encoder fault information (Mainly including battery failure, multi turn data failure, etc).
Other	It has no effect, and after writing, the integrated motor will change this parameter to 0.

● Please calibrate the encoder when the motor is not enabled.

Pn26	Name	Encoder calibration torque			Related mode	-
	Setting range	0~100	Unit	%	Factory setting	70
Set the motor running torque calibrated by the encoder. Unit is the percentage of the motor rated torque.						

Pn27	Name	Electric angle corresponding to encoder Z-phase signal/encoder zero offset low 16-bit			Related mode	-
	Setting range	0~65535	Unit	Encoder unit	Factory setting	0
Set the electrical angle corresponding to the encoder Z-phase signal. Set/display the low 16 bit data of the encoder zero offset value, which together with Pn28 parameter constitutes a 32-bit encoder zero offset. ● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Pn28	Name	Electrical angle corresponding to encoder U-phase signal/encoder zero position offset high 16-bit			Related mode	-
	Setting range	0~65535	Unit	Encoder unit	Factory setting	0
Set the electrical angle corresponding to the encoder U-phase signal. Set/display the high 16-bit data of the encoder zero offset value, which together with Pn27 parameter constitutes a 32-bit encoder zero offset. ● When the motor rotates clockwise, the corresponding electrical angle of the rising edge of phase U. ● Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.						

Pn29	Name	Reserved (Please do not set)			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

Pn410	Name	Motor ID			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	34040

Pn411	Name	Rated power			Related mode	-
	Setting range	0~65535	Unit	0.01KW	Factory setting	40

Pn412	Name	Rated voltage			Related mode	-
	Setting range	0~65535	Unit	V	Factory setting	48

Pn413	Name	Rated speed			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	3000

Pn414	Name	Maximum speed			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	5000

Pn415	Name	Maximum torque			Related mode	-
	Setting range	0~65535	Unit	0.01Nm	Factory setting	381

Pn416	Name	Rotor inertia			Related mode	-
	Setting range	0~65535	Unit	0.01kgcm	Factory setting	63

Pn417	Name	Stator resistance			Related mode	-
	Setting range	0~65535	Unit	0.001Ω	Factory setting	280

Pn418	Name	Stator Q-axis inductance			Related mode	-
	Setting range	0~65535	Unit	0.01mH	Factory setting	56

Pn419	Name	Stator D-axis inductance			Related mode	-
	Setting range	0~65535	Unit	0.01mH	Factory setting	56

Pn420	Name	Linear back electromotive force coefficient			Related mode	-
	Setting range	0~65535	Unit	860	Factory setting	0.01mv/rpm

Pn421	Name	Torque coefficient			Related mode	-
	Setting range	0~65535	Unit	0.01Nm/Arms	Factory setting	12

Pn422	Name	Electrical time constant			Related mode	-
	Setting range	0~65535	Unit	0.01ms	Factory setting	360

Pn423	Name	Mechanical time constant			Related mode	-
	Setting range	0~65535	Unit	0.01ms	Factory setting	360

Pn424	Name	Multi turn encoder Multi turn number			Related mode	-
	Setting range	0~24	Unit	Bits	Factory setting	16

6.2.3. Integrated motor parameters

Pn30	Name	Maximum operating speed			Related mode	PST
	Setting range	0~6000	Unit	r/min	Factory setting	4000

Pn31	Name	Overspeed class			Related mode	PST
	Setting range	0~2	Unit	-	Factory setting	0

Pn32	Name	Speed arrival amplitude			Related mode	PST
	Setting range	0~6000	Unit	r/min	Factory setting	1000

Pn33	Name	Speed consistent amplitude			Related mode	PST
	Setting range	0~6000	Unit	r/min	Factory setting	1000

Pn34	Name	Zero speed clamp threshold			Related mode	PST
	Setting range	0~1000	Unit	r/min	Factory setting	20

Pn35	Name	Integrated motor undervoltage threshold			Related mode	-
	Setting range	1~500	Unit	V	Factory setting	18

Set the voltage threshold when the integrated motor reports undervoltage fault.

- Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.

Pn36	Name	Integrated motor overvoltage threshold			Related mode	-
	Setting range	1~500	Unit	V	Factory setting	60

Set the voltage threshold when the integrated motor reports overvoltage fault.

- Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.

Pn37	Name	Serial port baud rate			Related mode	-
	Setting range	0~3	Unit	-	Factory setting	2

The DV series integrated motor has a DIP switch for setting the communication baud rate, so the modified parameter is used to display the baud rate setting value of the current serial communication:

Set value	Description
0	9600 bps
1	19200 bps
2	38400 bps
3	115200 bps

Pn38	Name	RS485 baud rate			Related mode	-
	Setting range	0~3	Unit	-	Factory setting	2

The DV series integrated motor has a DIP switch for setting the communication baud rate, so the modified parameter is used to display the baud rate setting value of the current serial communication:

Set value	Description
0	9600 bps
1	19200 bps
2	38400 bps
3	115200 bps

Pn39	Name	RS485 station number			Related mode	-
	Setting range	1~247	Unit	-	Factory setting	1

Set the slave station number of RS485 communication integrated motor.

- Note: Only when the DIP switches SW1-SW4 are set to ON, the RS485 communication station number of the integrated motor is set by this parameter. In other DIP settings, this parameter is used to display the station number set by the current DIP.
- Note: It is required to write 1 permanent saved parameter through Pn90, and the power failure and restart will take effect.

Pn40	Name	Integrated motor ID			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn41	Name	Integrated motor version number			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn44	Name	Servo forced enable			Related mode	PST
	Setting range	0~1	Unit	-	Factory setting	0

Software servo enable: If there is no external enable, you need to set this parameter to 1 to enable the integrated motor.

- When this parameter is 1, the enabling state of the all-in-one machine will no longer be controlled by the external enabling signal.

Pn45	Name	Alarm reset			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

Communication reset integrated motor fault state: Write "1" to this parameter to reset integrated motor fault once through communication. After the reset, the parameter value changes to 0.

Pn46	Name	Reset			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

Communication reset integrated motor: Write "1" to this parameter to perform the soft reset operation of the integrated motor.The user can reset the integrated motor without powering down.

Pn48	Name	Open loop operation			Related mode	-
	Setting range	0~15	Unit	-	Factory setting	0

Control the start and stop operation of motor open loop operation:

Set value	Description
0	No sense/wait for triggering operation
3	Open loop forward rotation
4	Open loop reverse rotation
6	Deceleration shutdown
Other	Reserved

Relevant setting parameters for open-loop operation:

Related parameters	Description
Pn26	Open loop running torque
Pn65	Open loop running acceleration
Pn66	Open loop running deceleration
Pn67	Open loop running speed

- It is recommended to trigger open loop operation when the motor is stationary, otherwise it may cause abnormal operation.

Pn49	Name	Motor rotor shaft locking operation			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0

Control the start and stop of motor shaft locking operation:

Set value	Description
0	Write: Stop motor shaft locking operation; Read: Motor stop
1	Write: Motor shaft locking starts; Set Pn49 to 2 after response
2	Write: meaningless; Read: Motor shaft locking is in operation
3	Read: It indicates that there is a warning during shaft locking operation. Generally, shaft locking operation is prohibited when the motor is under overvoltage, overcurrent and other alarms.
4	Write: Conduct open-loop control of motor voltage to test whether PWM output and MOS hardware of the motor are normal.

Setting parameters related to locking shaft operation:

Related parameters	Description
Pn26	Locking shaft torque
Pn51	Locking shaft rotor position

- It is recommended to trigger shaft locking operation when the motor is stationary, otherwise abnormal operation may occur.

Pn50	Name	Motor lock shaft rotor position			Related mode	-
	Setting range	0~65535	Unit	Encoder unit	Factory setting	0
Used to turn the motor rotor to the set electrical angle position when setting the motor shaft lock. The set value shall be within the motor electrical angle resolution, and the maximum value is: encoder resolution/motor pole pairs.						

Pn51	Name	Data sampling channel 1			Related mode	-
	Setting range	0~15	Unit	-	Factory setting	0

Pn52	Name	Data sampling channel 2			Related mode	-
	Setting range	0~15	Unit	-	Factory setting	0

Pn53	Name	Data sampling interval			Related mode	-
	Setting range	0~65535	Unit	0.08ms	Factory setting	1

Pn54	Name	Data sampling start stop flag			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0

Pn93	Name	Encoder inverting			Related mode	-
	Setting range	0~3	Unit	-	Factory setting	0

Used to set whether to invert the encoder input.

DV series integrated motor requires that when the motor rotates counterclockwise, Pn162/Pn163 is in an increasing count state (Motor encoder with A and B signals), and when it is required to rotate counterclockwise, the serial number of Pn189 cycles according to 5, 1, 3, 2, 6, 4 (Motor encoder with A, B signals and U, V, W signals) .

If the count of Pn162/Pn163 is in a decreasing state when rotating counterclockwise, then Pn93 can be set to 1 to increase the count of Pn162/Pn163. If the serial number of Pn189 is 5, 4, 6, 2, 3, 1 counterclockwise, you can set Pn93 to 2 to change the Pn189 serial number to 5, 1, 3, 2, 6, 4.

Set value	Description
0	Neither A、B signal nor U、V、W signal are not anti-phased
1	A、B signal anti-phased, U、V、W signal not anti-phased
2	A、B signal not anti-phased, U、V、W signal anti-phased
3	Both A、B signal and U、V、W signal are anti-phased

- Note: After the parameter is modified and written to 1 through Pn90 (save the parameter), the restart takes effect (software reset or power on can be performed through Pn46 writing to 1).

Pn215	Name	Command overload starting detection point			Related mode	PS
	Setting range	0~300	Unit	%	Factory setting	100

Pn216	Name	Command overload peak detection point			Related mode	PS
	Setting range	0~300	Unit	%	Factory setting	300

Pn217	Name	Command overload detection time			Related mode	PS
	Setting range	0~65535	Unit	ms	Factory setting	4000

Pn218	Name	Thermal overload starting detection point			Related mode	PS
	Setting range	0~300	Unit	%	Factory setting	100

Pn219	Name	Thermal overload peak detection point			Related mode	PS
	Setting range	0~300	Unit	%	Factory setting	300

Pn220	Name	Thermal overload detection time			Related mode	PS
	Setting range	0~65535	Unit	ms	Factory setting	4000

Pn221	Name	Speed saturation output alarm detection time			Related mode	PS
	Setting range	0~65535	Unit	ms	Factory setting	5000

6.2.4. Internal operating parameters

Pn55	Name	Digital given speed			Related mode	-
	Setting range	0~3000	Unit	r/min	Factory setting	500
In the speed control mode, the motor running speed setting value when the speed command source is set to "0".						

Pn56	Name	Digital given acceleration			Related mode	-
	Setting range	1~2000	Unit	r/s^2	Factory setting	100
In the speed control mode, the motor running acceleration setting value when the speed command source is set to "0".						

Pn57	Name	Digital given deceleration			Related mode	-
	Setting range	1~2000	Unit	r/s^2	Factory setting	100
In the speed control mode, the motor running deceleration setting value when the speed command source is set to "0".						

Pn59	Name	Internal motion starts and stops			Related mode	PST
	Setting range	0~15	Unit	-	Factory setting	0
In the internal operation mode, the communication triggers the start and stop of the position/speed/torque. For details, see the relevant instructions in Chapter 5.						

Pn60	Name	Point-to-point acceleration			Related mode	PST
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn61	Name	Point-to-point deceleration			Related mode	PST
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn62	Name	Point-to-point speed			Related mode	PST
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn63/64	Name	Point-to-point stroke			Related mode	PST
	Setting range	-1073741824 ~ 1073741824	Unit	Command unit	Factory setting	10000

Pn65	Name	Jog acceleration			Related mode	PST
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn66	Name	Jog deceleration			Related mode	PST
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn67	Name	Jog speed			Related mode	PST
	Setting range	0~6000	Unit	r/min	Factory setting	500

Pn68	Name	Emergency stop deceleration			Related mode	PST
	Setting range	1~2000	Unit	r/s^2	Factory setting	300

Pn69	Name	Internal motion position mode			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	0

When setting position control mode (Pn0=0), the type of position command when the set value of position command source Pn01 is 2/3/5;

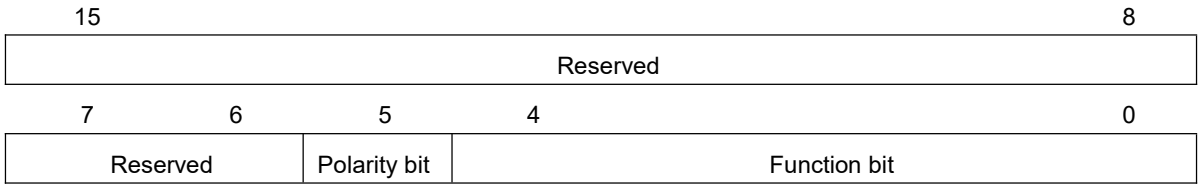
0: Incremental position mode

1: Absolute position mode

6.2.5. Input/output parameters

Pn70	Name	IN 1 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	33

16-bit data register, each bit of which is defined as follows:



Polarity bit setting value	IN polarity
0	Normal close
1	Normal open

Function bit setting value	IN function	Function bit setting value	IN function
0	Normal input	16	CMD4 (Multi-segment operation command switching 4)
1	PUL (Pulse)	17	Rsvd (reserved)
2	DIR (Direction)	18	SpdDirSel (Speed command direction setting)
3	Rsvd (reserved)	19	ToqDirSel (Torque command direction setting)
4	Rsvd (reserved)	20	Rsvd (reserved)
5	S-ON (Servo enable)	21	FUNC1 (Multi-function input 1)
6	ALM_RST (Fault and warning reset)	22	FUNC2 (Multi-function input 2)
7	PulseInhibit (Pulse command inhibit)	23	FUNC3 (Multi-function input 3)
8	EMG-STOP (Emergency stop)	24	FUNC4 (Multi-function input 4)
9	POS-OT (Positive limit switch)	25	FUNC5 (Multi-function input 5)
10	NEG-OT (Negative limit switch)	26	FUNC6 (Multi-function input 6)
11	HOME-SWITCH (Origin switch)	27	FUNC7 (Multi-function input 7)
12	HOME-START (Start homing)	28	Rsvd (reserved)
13	CMD1 (Multi-segment operation command switching 1)	29	Rsvd (reserved)
14	CMD2 (Multi-segment operation command switching 2)	30	Rsvd (reserved)
15	CMD3 (Multi-segment operation command switching 3)	31	Rsvd (reserved)

Pn71	Name	IN 2 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	34

Pn72	Name	IN 3 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	37

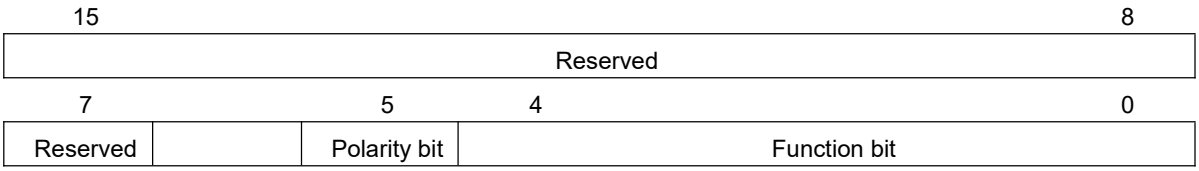
Pn73	Name	IN 4 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	39

Pn74	Name	IN 5 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	44

Pn75	Name	IN 6 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	43

Pn76	Name	OUT 1 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	33

16-bit data register, each bit of which is defined as follows:



Polarity bit setting value	OUT polarity
0	Normal close
1	Normal open

Function bit setting value	OUT function	Function bit setting value	OUT function	Function bit setting value	OUT function
0	Normal output	5	Homing completed	10	FUNC3
1	Alarm	6	Ready	11	Internal pulse command stop
2	Brake	7	Torque reaches	12	Input function forwarding 1
3	Position arriving	8	FUNC1	13	Input function forwarding 1
4	Speed reaches	9	FUNC2	Other	Reserved

- Note: If the function bit is set to 12/13, Pn198/Pn199 parameters need to be set to select the input function flag bit to be output.

Pn77	Name	OUT 2 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	34

Pn78	Name	OUT 3 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	35

Pn79	Name	OUT 4 function/polarity setting			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	37

Pn106	Name	Input port forced valid			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	0

The software used to set the input port is forced to be valid/invalid. It is mainly written into a single register through communication to control the validity/invalidity of all input ports of the integrated motor.

15 ~ 8	7	5	4	3	0
Reserved	Reserved	Bit.IN6	Bit.IN5	Bit.IN4	Bit.IN3	Bit.IN2	Bit.IN1

The corresponding bit Bit.INx of Pn106 register is 1, which will force the corresponding function of the input port to be valid, otherwise it is invalid (controlled by the actual input signal of the integrated motor).

- Note: When the corresponding bit is 1, the input port will no longer be controlled by the external input signal.

Pn107	Name	Output port forced valid			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	0

The software used to set the output port is forced to be valid/invalid. It is mainly written into a single register through communication to control the validity/invalidity of all input ports of the integrated motor.

15 ~ 8	7 ~ 5	4	3	0
Reserved	Reserved	Bit.OUT4	Bit. OUT3	Bit. OUT2	Bit. OUT1

The corresponding bit Bit.OUTx of Pn107 register is 1, which will force the corresponding function of the output port to be valid, otherwise it is invalid (controlled by the actual output signal of the integrated motor).

- Note: When the corresponding bit is 1, the output port will no longer be controlled by the integrated motor output logic.

6.2.6. Debugging operation parameters

Pn80	Name	Debugging speed			Related mode	-
	Setting range	0~3000	Unit	rpm	Factory setting	100

Pn81	Name	Debugging acceleration			Related mode	-
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn82	Name	Debugging deceleration			Related mode	-
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn83/84	Name	Debugging stroke			Related mode	-
	Setting range	0~1073741824	Unit	Encoder unit	Factory setting	10000

Pn85	Name	Motion demo delay time			Related mode	-
	Setting range	0~65535	Unit	ms	Factory setting	500

Pn86	Name	Motion demo running mode			Related mode	-
	Setting range	0: Motor reciprocating operation 1: Motor running in one direction	Unit	-	Factory setting	0

Pn87	Name	Motion demo starting direction			Related mode	-
	Setting range	0: The starting direction is positive 1: The starting direction is negative	Unit	-	Factory setting	0

Pn88	Name	Motion demo running times			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

Set the operation time when the motor works in the motion demonstration mode.In the reciprocating operation mode (Pn86=0), the motor operates in a complete reciprocating manner once, which is counted as the number of operations once. In the single direction operation mode (Pn86=1), the motor stops after running, which is counted as one operation.

Pn88=0: the motor has no limit on the number of runs, and runs until the upper computer gives a stop signal.

Pn88 ≠ 0: the motor will run according to the running times set by Pn88, and then stop.

Pn89	Name	Motion demo start/stop command			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0

Demo operation mode for starting/stopping the motor. In the motion demonstration mode, the motor will run according to the running track set by Pn80~Pn88. (Requirement: In the position control mode, please set Pn01 as 3; in the speed control mode, please set Pn02 as 2).

Pn89=0: Stop motion demonstration mode.

Pn89=1: Start motion demonstration mode.

Pn89=2: the reading value is 2, indicating that the motor is working in the motion demonstration mode; Write value 2, no effect.

6.2.7. Parameter management parameters

Pn90	Name	Save Parameters			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

Write 1 to this parameter to save it. After the parameter is saved successfully, the parameter value will change to 0 (if the parameter changes to 2, it indicates that the parameter is failed to be saved).

- All parameters that need to be saved permanently (the parameter setting is still valid after power on) must be written 1 to the parameter after modification.
- It is necessary to operate when the motor stops running, otherwise it will lead to abnormal operation.
- Write 99 to save the motor parameters to the encoder EEPROM (do not perform this operation unless instructed by the manufacturer).

Pn91	Name	Restore factory settings			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

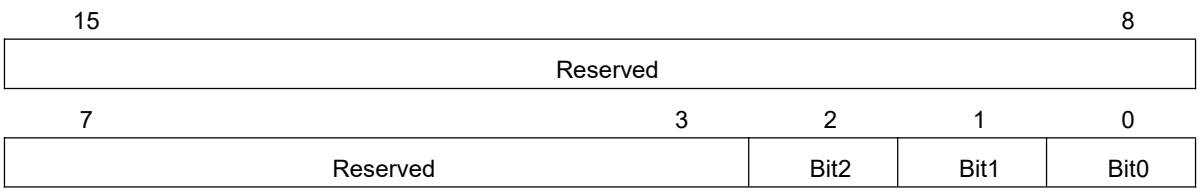
Writing 1 to this parameter will restore factory settings, and all parameters will restore factory settings. When the operation is completed, the parameter value will change to 0.

- In case of abnormal operation due to modification of some parameters, the factory settings of the integrated motor can be restored through this operation.
- It is necessary to operate when the motor stops running, otherwise it will lead to abnormal operation

Pn92	Name	Reserved: Do Not Use			Related mode	-
	Setting range	-	Unit	-	Factory setting	0

Pn93	Name	Encoder/PWM signal inversion control			Related mode	-
	Setting range	0~7	Unit	-	Factory setting	0

The register is used for inverting control operation of encoder signal and PWM pulse duty cycle signal, which are defined as follows:



Bitx	Set value	Description
Bit0	0: Encoder A、B signals normal phase sequence 1: Encoder A、B signals reverse phase sequence	It is used to set the phase sequence of the incremental encoder A/B signal, so that when the motor shaft rotates counterclockwise, parameter Pn172 is in the incremental counting mode. ● Effective after saving and restarting
Bit1	0: Encoder U, V, W Hall signals normal phase sequence 1: Encoder U, V, W Hall signals reverse phase sequence	It is used to set the phase sequence of encoder Hall signal, so that when the motor shaft rotates counterclockwise, the Hall signal state represented by Pn189 parameter cycles according to the serial number of 5, 1, 3, 2, 6 and 4. ● Effective after saving and restarting
Bit2	0: PWM pulse speed regulating signal duty cycle normal phase sequence 1: PWM pulse speed regulating signal duty cycle reverse phase sequence	When Pn4 is set to 4, the phase sequence of PWM signal duty cycle is used when the PWM duty cycle signal is input externally for speed regulation. ● Effective immediately
Bit3	Reserved	Reserved
Bit4	0: Enable phase loss alarm 1: Disable phase loss alarm	In the AB encoder mode, the shaft locking operation will be carried out when the power is on, and the motor power cable phase loss will be detected in the shaft locking.
Bit5	0: Disable USB communication 1: Enable USB communication	In the DV series integrated motor, the communication mode is set through DIP SW7. When RS485 communication is used, whether the USB communication function is enabled is set through this bit. Note that the baud rate of the USB communication function is set in Pn037 parameter. Please set it below 38400, and the default is 38400.

6.2.8. Homing operating parameters

Pn94	Name	Homing enabling control mode			Related mode	PST
	Setting range	0~6	Unit	-	Factory setting	1

Set the control mode of homing:

Set value	Control mode
0	Disable homing function
1	Use the IN terminal with the IN input function of "start homing" to trigger the mechanical homing function.
2	Use the IN terminal with the IN input function of "start homing" to trigger the electrical homing function. Electrical homing is generally used after mechanical homing, and sensor input signal is not required. Return to the position command set by Pn100/101 parameter directly according to the absolute position. After the completion of the electrical homing, the parameter Pn162/163 is equal to parameter Pn100/101.
3	Power on automatic mechanical homing Set to this value, and after writing 1 to Pn90 parameter (save the parameter), the next power on will automatically return to the origin. ● Only when the integrated motor is powered on again and the motor is enabled, it will trigger back to the original point
4	Communication trigger mechanical homing function When the motor is enabled, writing this value will immediately trigger the mechanical homing function. After the homing is completed, the register is cleared to zero.
5	Communication trigger electrical homing function When the motor is enabled, writing this value will immediately trigger the electrical homing function. After the homing is completed, the register is cleared to zero.
6	Communication trigger takes the current position as the origin When the motor is enabled, write this value, and the integrated motor will take the current position as the origin. After the homing is completed, the register is cleared to zero.

Pn95	Name	Homing mode			Related mode	PST
	Setting range	0~5	Unit	-	Factory setting	0

Set the homing mode of the integrated motor:

Set value	Homing mode
0	Forward return to origin Deceleration point: Origin switch Origin: Origin switch
1	Negative return to origin Deceleration point: Origin switch Origin: Origin switch
2	Forward return to origin Deceleration point: Positive limit switch Origin: Positive limit switch
3	Negative return to origin Deceleration point: Negative limit switch Origin: Negative limit switch
4	Forward return to origin Deceleration point: Mechanical limit position Origin: Mechanical limit position
5	Negative return to origin Deceleration point: Mechanical limit position Origin: Mechanical limit position

Pn96	Name	Speed of high speed searching origin switch signal			Related mode	PST
	Setting range	0~3000	Unit	r/min	Factory setting	100

Pn97	Name	Speed of low speed search origin switch signal			Related mode	PST
	Setting range	0~1000	Unit	r/min	Factory setting	50

Pn98	Name	Acceleration and deceleration of search origin switch signal			Related mode	PST
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn100/101	Name	Mechanical origin offset			Related mode	PST
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	0

Set the mechanical origin offset: Pn100 is the low 16-bit data, and Pn101 is the high 16-bit data. The two are combined into a signed 32-bit data.

- Note: When Pn95=0/Pn95=1, when Pn100/101 parameter is positive, it means positive offset, otherwise it means negative offset. When Pn95 is the value of other parameters, the offset symbol set by Pn100/101 does not work, and the offset is opposite to the direction of returning to the origin.

Pn102	Name	Mechanical origin offset and limit handling			Related mode	PST
	Setting range	0~3	Unit	-	Factory setting	0

Set the mechanical origin offset of the integrated motor origin reset and the handling method when encountering the limit position:

Set value	Mechanical origin offset and limit handling
0	Pn100/101 is the coordinates after homing After encountering the limit and re-triggering the homing function, find the origin in the reverse direction. ● Remarks Mechanical origin: The mechanical origin does not coincide with the mechanical zero. After finding the origin, the current position parameter P162/163 is forced to be the set value of P100/101. Handling of limit: Give the origin return trigger signal again, and the motor performs the origin return operation in reverse.
1	Pn100/101 is the relative offset after homing After encountering the limit and re-triggering the homing function, find the origin in the reverse direction. ● Remarks Mechanical origin: The mechanical origin coincides with the mechanical zero point. After finding the origin, the motor stops after running the command stroke set by parameter P100/101. The current position parameter P162/163 is equal to the set value of parameter P100/101. Handling of limit: Give the origin return trigger signal again, and the motor performs the origin return operation in reverse.
2	Pn100/101 is the coordinates after homing Automatically reverse to find the origin when encountering the limit. ● Remarks Mechanical origin: The mechanical origin does not coincide with the mechanical zero. After the origin is found, the current position parameter P162/163 is forced to be the set value of the parameter P100/101. Handling of limit: Automatically reverse to continue the homing operation.
3	Pn100/101 is the relative offset after homing After encountering the limit and re-triggering the homing function, find the origin in the reverse direction. ● Remarks Mechanical origin: The mechanical origin coincides with the mechanical zero point. After finding the origin, the motor stops after running the command stroke set by parameter P100/101. The current position parameter P162/163 is equal to the set value of parameter P100/101. Handling of limit: Automatically reverse to continue the homing operation.

Pn103	Name	Collision back to origin detection time			Related mode	PST
	Setting range	0~65535	Unit	ms	Factory setting	50

When the Pn95 parameter is set to 4/5, enable the collision return to origin function. When the running speed of the motor is lower than the set value of parameter Pn104, and the actual torque of the motor is greater than or equal to the set value of parameter Pn105, it is considered that the mechanical limit position has been reached. At this time, the internal collision return-to-origin counter starts counting, and when the counter time is greater than the set value of Pn103, the motor completes the operation of returning to the origin.

Pn104	Name	Collision back to origin detection speed			Related mode	PST
	Setting range	0~1000	Unit	r/min	Factory setting	50

Pn105	Name	Collision back to origin torque			Related mode	PST
	Setting range	0~65535	Unit	0.001Nm	Factory setting	300

6.2.9. I/O function related parameters

Pn106	Name	Input force valid			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	0

This register is used to force the input signal to be valid by software, and its bits are defined as follows:

15 ~ 8	7	6	5	4	3	2	1	0
Reserved	Reserved		Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

Bitx	Set value
Bit0	The software valid status of the input port IN1 setting function: 0: Invalid 1: Valid
Bit1	The software valid status of the input port IN2 setting function: 0: Invalid 1: Valid
Bit2	The software valid status of the input port IN3 setting function: 0: Invalid 1: Valid
Bit3	The software valid status of the input port IN4 setting function: 0: Invalid 1: Valid
Bit4	The software valid status of the input port IN5 setting function: 0: Invalid 1: Valid
Bit5	The software valid status of the input port IN6 setting function: 0: Invalid 1: Valid

Pn107	Name	Output force valid			Related mode	-
	Setting range	0~15	Unit	-	Factory setting	0

This register is used to force the output signal to be valid by software, and its bits are defined as follows:

15 ~ 8	7 ~ 4	3	2	1	0
Reserved	Reserved	Bit3	Bit2	Bit1	Bit0

Bitx	Set value
Bit0	The software valid status of the output port OUT1 setting function: 0: Invalid 1: Valid
Bit1	The software valid status of the output port OUT2 setting function: 0: Invalid 1: Valid
Bit2	The software valid status of the output port OUT3 setting function: 0: Invalid 1: Valid
Bit3	The software valid status of the output port OUT4 setting function: 0: Invalid 1: Valid

Pn108	Name	Motor speed, fault code PWM output enable			Related mode	-
	Setting range	0~3	Unit	-	Factory setting	0

This is used to enable the motor speed, the PWM pulse duty cycle output of the fault code, the definitions are as follows:

15 ~ 8	7 ~ 2	1	0
Reserved	Reserved	Bit1	Bit0

Bitx	Set value
Bit0	The output port OUT1 is used for PWM signal output motor speed, the output PWM signal frequency is 2KHz, the duty cycle is 0%~100%, the reference value is the set value of Pn108, that is, the output PWM signal duty cycle is: PWM duty cycle = (motor actual speed / Pn108 setting value) x 100%

		0: Disable 1: Enable ● Effective after saving and restarting
	Bit1	The PWM signal is used to output the fault code of the integrated motor. The frequency of the output PWM signal is 50Hz, the duty cycle is 0%~100%, and the step is 4%. That is, when there is no fault, the output is a PWM signal with a duty cycle of 0%, and the over-current fault is a PWM signal with a duty cycle of 4%, and so on. For the duty cycle corresponding to specific faults, please refer to the number of flashes of the fault LED red light in the fault list. Conversion formula: PWM duty cycle=(number of red light flashes/25) x 100% 0: Invalid 1: Valid ● Effective after saving and restarting. ● It is required to take effect when the function of the corresponding output port is set to "alarm output" ● When enabling PWM signal to output motor speed, OUT2 can only be used as the output of PWM fault code.

Pn109	Name	Motor speed PWM output maximum speed setting			Related mode	-
	Setting range	0~20000	Unit	r/min	Factory setting	5000
Set the reference value used to calculate PWM signal duty cycle when enabling PWM signal output motor speed: PWM duty cycle = (motor actual speed / Pn109 set value) x 100%						

Pn198	Name	Input function forwarding selection 1			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	0
It is used to set which input port function flag the output port of the integrated motor needs to output when the output port function bit is set to "12" or "13". For example: when Pn76=44 (input function forwarding 1, normally open), Pn198 is set to 11 (refer to the function setting of the input port, the function bit is 11, indicating the origin signal), then the integrated motor will output the state of the origin switch signal through the output port 1.						

Pn199	Name	Input function forwarding selection 2			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	0
Refer to Pn198.						

6.2.10. Control gain parameters

Pn110	Name	Position proportional gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	300

Pn111	Name	Speed proportional gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	500

Pn112	Name	Speed integral gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	10

Pn113	Name	Speed saturation gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	256

Pn118	Name	Speed low-pass filter cut-off frequency 1			Related mode	-
	Setting range	0~3000	Unit	Hz	Factory setting	200

Pn119	Name	Speed low-pass filter cut-off frequency 2			Related mode	-
	Setting range	0~3000	Unit	Hz	Factory setting	600

Pn124	Name	Torque proportional gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	150

Pn125	Name	Torque integral gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	80

Pn126	Name	Torque saturation gain			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	256

Pn127	Name	Torque low-pass filter cut-off frequency			Related mode	-
	Setting range	0~3000	Unit	Hz	Factory setting	1000

6.2.11. Torque operating parameters

Pn140	Name	Torque mode given torque			Related mode	T
	Setting range	0~65535	Unit	0.001Nm	Factory setting	300
For the setting instructions of the relevant parameters of the torque operation mode, please refer to the torque mode part in "Chapter 5 Control Mode".						

Pn141	Name	Torque mode acceleration			Related mode	T
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn142	Name	Torque mode deceleration			Related mode	T
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn143	Name	Torque mode forward running speed			Related mode	T
	Setting range	0~6000	Unit	r/min	Factory setting	500

Pn144	Name	Torque mode reverse running speed			Related mode	T
	Setting range	0~6000	Unit	r/min	Factory setting	500

Pn145	Name	Torque mode torque reaches reference value			Related mode	T
	Setting range	0~65535	Unit	0.001Nm	Factory setting	0

Pn146	Name	Torque mode torque reaches effective value			Related mode	T
	Setting range	0~65535	Unit	0.001Nm	Factory setting	0

Pn147	Name	Torque mode torque reaches invalid value			Related mode	T
	Setting range	0~65535	Unit	0.001Nm	Factory setting	0

Pn148	Name	Torque mode torque arrival signal detection time			Related mode	T
	Setting range	0~65535	Unit	ms	Factory setting	50
Set the time for detecting the arrival of the motor torque in the torque operation mode. If the set time is too short, it may cause the torque arrival signal output to be valid when the torque has not reached (stable).						

Pn149	Name	Torque mode torque arrival hold time			Related mode	T
	Setting range	0~65535	Unit	ms	Factory setting	0
Set the time for the motor to maintain the torque after the motor torque reaches the torque running mode. After the holding time is reached, the motor will be offline or lock the shaft (determined by different torque command sources). For details, refer to the operating instructions of each command source. When set to 0, the motor will keep running in torque mode until it is manually stopped.						

6.2.12. Monitoring parameters

Pn150	Name	Integrated motor fault code			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

It is used to display the fault code of integrated motor. Each definition is as follows:

31 ~ 8	23 ~ 22	21	20 ~ 18	17 ~ 16
		Program exception	0 - Error-free 1 - Encoder parameter reading error 2 - Encoder parameter writing error 3 - Parameter writing and reading error	0 - Error-free 1 – Stall 2 – Locked-rotor 3 – Locked-rotor 2

15	14	13	12	11	10	9	8
Encoder count	Encoder interference	Braking timeout	Speed saturation	Command overload	Thermal overload	Limit	Encoder

7	6	5	4	3	2	1	0
Out-of-tolerance	Phase loss	Storage of parameters	Overtemperature	Undervoltage	Overvoltage	Overcurrent	Internal voltage

Pn390	Name	Integrated motor fault code high 16-bit			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

This register is the high 16-bit value of the integrated motor fault code. For the definition of register bits, please see the description of Pn150 register

Pn151	Name	Integrated motor output function status code			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

The flag register used to display whether the current output function of the integrated motor is valid. Each definition is as follows:

15 ~ 3	2	1	0
Reserved	USER3	USER2	USER1

7	6	5	4	3	2	1	0
Torque reaches	Ready	Homing completed	Speed reaches	Position arriving	Brake	Alarm	Normal output

Pn152/153	Name	Encoder status code			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

It is used to display the encoder status code of integrated motor. Each definition is as follows:

31	30	29	28	27	26	25	24
			Lock shaft flag	Encoder PWM duty cycle			

23	22	21	20	19	18	17	16
Encoder PWM interrupt level		Encoder count	Hall state	Encoder calibration	Encoder type	Serial port receiving error	SF status error

15	14	13	12	11	10	9	8
Program exception	CRC error	Command error	Receive timeout	Power on data empty	Battery alarm	Battery error	Multi turn data

7	6	5	4	3	2	1	0
Overheat	Count overflow	Count error	Status error	Overspeed	Delimiter fault	Check bit fault	Fault occurred

Pn154	Name	Input port status			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

It is used to display the input port status of integrated motor. Each definition is as follows:

15	14	13	12	11	10	9	8
Reserved							

7	6	5	4	3	2	1	0
Reserved		IN6	IN5	IN4	IN3	IN2	IN1

Bit display value	Description
0	Input optocoupler not conducting
1	Input optocoupler conduction

Pn155	Name	Output port status			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

It is used to display the output port status of integrated motor. Each definition is as follows:

15	14	13	12	11	10	9	8
Reserved							

7	6	5	4	3	2	1	0
Reserved				OUT4	OUT3	OUT2	OUT1

Bit display value	Description
0	Output optocoupler not conducting
1	Output optocoupler conduction

Pn156	Name	Input port conduction edge latch state			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

It is used to display the Input port conduction edge latch state of integrated motor. Each definition is as follows:

15							8
Reserved							
7	6	5	4	3	2	1	0
Reserved		IN6	IN5	IN4	IN3	IN2	IN1

Bit display value	Description
0	Input port not conducting
1	At least one conduction trigger has occurred on the input port

- Writing any value to this parameter will reset the register value to zero.

Pn157	Name	Input port off edge latch state			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

It is used to display the Input port off edge latch state of integrated motor. Each definition is as follows:

15							8
Reserved							
7	6	5	4	3	2	1	0
Reserved		IN6	IN5	IN4	IN3	IN2	IN1

Bit display value	Description
0	Input port not turned off
1	At least one shutdown trigger has occurred on the input port

- Writing any value to this parameter will reset the register value to zero.

Pn158	Name	Input status flag register			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

The flag register used to display whether the current input function of the integrated motor is valid (the function of the input port is set by Pn70~Pn76), and the Pn387 register is the high 16-bit of the input status flag register.

31	30	29	28	27	26	25	24
Reserved			BRK	FUNC7	FUNC6	FUNC5	FUNC4
23	22	21	20	19	18	17	16
FUNC3	FUNC2	FUNC1	Reserved	ToqDirSel	SpdDirSel	Reserved	CMD4

15							8
CMD3	CMD2	CMD1	Origin signal	Start homing	Negative limit	Positive limit	Emergency stop
7	6	5	4	3	2	1	0
Inhibiting pulse	Fault reset	Enable	Reserved	Reserved	Direction	Pulse	Normal input

Pn159	Name	Output status flag register			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

The flag register used to display whether the current output function of the integrated motor is valid is defined as follows:

15							8
Reserved					USER3	USER2	USER1
7	6	5	4	3	2	1	0
Torque reached	Ready	Homing completed	Speed reaches	Position arriving	Brake	Alarm	Normal output

Pn160	Name	Integrated motor voltage			Related mode	-
	Setting range	Display	Unit	0.01V	Factory setting	-

Pn161	Name	Average load rate of integrated motor			Related mode	-
	Setting range	Display	Unit	%	Factory setting	-

Pn162/163	Name	Motor current position			Related mode	-
	Setting range	Display	Unit	Command unit	Factory setting	-

Used to display the current motor position. It is a signed 32-bit integer value. Among them, Pn166 represents the low 16-bit, and Pn167 represents the high 16-bit. Positive and negative respectively represent pulses in a given positive and negative direction.

- After returning to the origin, its value is equal to the offset set value in the origin reset.

Pn164/165	Name	Tracking error			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

Used to display the current number of tracking errors of the motor. It is a signed 32-bit integer value. Among them, Pn164 represents the low 16-bit, and Pn165 represents the high 16-bit.

Pn166/167	Name	External pulse command counter			Related mode	-
	Setting range	Display	Unit	Command unit	Factory setting	-

Used to display the number of external given pulse counts. It is a signed 32-bit integer value. Among them, Pn166 represents the low 16 bits, and Pn167 represents the high 16 bits. Positive and negative respectively represent pulses in a given positive and negative direction.

- Writing any value to Pn167 will perform a reset operation on Pn166/167.

Pn168/169	Name	Internal pulse command counter			Related mode	-
	Setting range	Display	Unit	Command unit	Factory setting	-

Used to display the number of internal given pulse counts. It is a signed 32-bit integer value. Among them, Pn168 represents the low 16-bit, and Pn169 represents the high 16-bit. Positive and negative respectively represent pulses in a given positive and negative direction.

- Writing any value to Pn169 will perform a reset operation on Pn168/169.

Pn170/171	Name	Encoder feedback pulse counter			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

Used to display the number of encoder feedback pulse counts. It is a signed 32-bit integer value. Among them, Pn170 represents the low 16-bit, and Pn171 represents the high 16-bit. Positive and negative respectively represent pulses in a given positive and negative direction.

Pn172/173	Name	Encoder current position			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

Used to display the number of encoder feedback pulse counts. It is an unsigned 32-bit integer value. Among them, Pn172 represents the low 16-bit, and Pn173 represents the high 16-bit.

- Display value range: 0~Pn24 (encoder resolution)

Pn174	Name	Motor speed command			Related mode	-
	Setting range	Display	Unit	r/min	Factory setting	-

Pn175	Name	Actual motor speed			Related mode	-
	Setting range	Display	Unit	r/min	Factory setting	-

Pn176	Name	Corresponding speed to position command			Related mode	-
	Setting range	Display	Unit	r/min	Factory setting	-

Used to display the motor speed value corresponding to the current input pulse command (external/internal pulse) frequency.

Pn177	Name	Motor given torque			Related mode	-
	Setting range	Display	Unit	%	Factory setting	-

The given torque of the motor during operation. The unit is the percentage of the rated torque of the motor.

Pn178	Name	Actual motor torque			Related mode	-
	Setting range	Display	Unit	%	Factory setting	-

The actual torque of the motor during operation. The unit is the percentage of the rated torque of the motor.

Pn179	Name	Current electrical angle of the motor			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-
The current electrical angle of the motor. Its unit is the encoder unit. Conversion to degree formula: Electric angle degree = Pn179/(encoder resolution/motor pole number)						

Pn180	Name	Motor U-phase sampling value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn181	Name	Motor U-phase bias			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn182	Name	Motor V-phase sampling value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn183	Name	Motor V-phase bias			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn184	Name	Digital value of motor bus voltage sampling			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn185	Name	Motor U-phase current			Related mode	-
	Setting range	Display	Unit	0.01A	Factory setting	-

Pn186	Name	Motor V-phase current			Related mode	-
	Setting range	Display	Unit	0.01A	Factory setting	-

Pn187	Name	System status			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn188	Name	Internal pulse command trajectory status			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn189	Name	Motor Hall encoder status			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn190	Name	Encoder calibration forward value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn191	Name	Encoder calibration reverse value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn192	Name	Encoder latch value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn193	Name	Hall angle of latch			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn194	Name	Encoder pulse counting unit count value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn195	Name	Analog input sampling value			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn196	Name	Input PWM signal pulse duty cycle			Related mode	-
	Setting range	Display	Unit	0.01%	Factory setting	-

Pn197	Name	Motor speed PWM output signal duty cycle			Related mode	-
	Setting range	Display	Unit	0.01%	Factory setting	-

Pn387	Name	Input flag register high 16-bit (Please check Pn158)			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

Pn388	Name	Reserved			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

Pn389	Name	PWM interrupt control frequency of the current firmware			Related mode	-
	Setting range	Display	Unit	Hz	Factory setting	-

Pn390	Name	Integrated motor fault code high 16-bit (Please check Pn150)			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn395 Pn396	Name	Given pulse counter			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

Pn398	Name	Integrated motor hardware version number			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn440 Pn441	Name	Reserved			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

Pn442	Name	Encoder data received insufficient counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn443	Name	Encoder receiving data null error counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn444	Name	Encoder CRC error counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn445	Name	Encoder serial port error counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn446	Name	Encoder continuous error counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn447 Pn448	Name	Encoder multi turn data			Related mode	-
	Setting range	Display	Unit	turn	Factory setting	-

Pn449 Pn450	Name	Encoder actual position (Accumulated after power on, write 1 to clear)			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

Pn451	Name	Encoder command error counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn452	Name	Encoder status error counter			Related mode	-
	Setting range	Display	Unit	-	Factory setting	-

Pn453 Pn454	Name	Encoder single turn data (Single turn value feedback from encoder)			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

Pn455	Name	DIP status			Related mode	-
	Setting range	Display	Unit	Encoder unit	Factory setting	-

6.2.13. Extension parameters

Pn222	Name	Speed mode shutdown mode			Related mode	S
	Setting range	0~4	Unit	-	Factory setting	0

Under the speed control mode, after the speed is stopped, the operating mode of the motor is as follows:

Set value	Description
0	No processing
1	Switch to position mode lock shaft
2	Servo not enabled
Other	Reserved

- This parameter only takes effect under certain speed command sources, please refer to the speed control mode for specific situations.

Pn223	Name	Torque mode shutdown mode			Related mode	T
	Setting range	0~4	Unit	-	Factory setting	0

Under the speed control mode, after the speed is stopped, the operating mode of the motor is as follows:

Set value	Description
0	Set the motor operating torque to 0
1	Switch to position mode lock shaft
2	Servo not enabled
3	No processing
Other	Reserved

- This parameter only takes effect under certain torque command sources, please refer to the torque control mode for specific situations.

Pn224	Name	Forced start-stop command			Related mode	PST
	Setting range	0~9	Unit	-	Factory setting	0

Start-stop commands used for certain command sources in position, speed, and Control mode. Please refer to the instructions for each instruction source in the operation section for details.

Pn225	Name	Communication control acceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Used to set the running curve acceleration when communicating and controlling the position command source in position control mode.

Pn226	Name	Communication control deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Used to set the running curve deceleration when communicating and controlling the position command source in position control mode.

Pn227	Name	Communication control speed			Related mode	P
	Setting range	0~6000	Unit	r/min	Factory setting	500
Used to set the running curve maximum speed when communicating and controlling the position command source in position control mode.						

Pn228/229	Name	Communication control stroke/position			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000
Used to set the incremental stroke/absolute position when communicating and controlling the position command source in position control mode. For specific instructions, please refer to the communication control command source in the position command input settings.						

Pn230	Name	Braking resistor power			Related mode	-
	Setting range	1~65535	Unit	W	Factory setting	100

Pn231	Name	Braking resistor value			Related mode	-
	Setting range	0~6000	Unit	Ω	Factory setting	40

Pn232	Name	Heat dissipation coefficient of braking resistor			Related mode	-
	Setting range	0~100	Unit	%	Factory setting	20

Pn233	Name	Brake command			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0
The motor braking command is generally used in the mode of single Hall sensor or no Hall sensor to short circuit the motor power cable, causing a certain degree of viscous force in the motor. In this mode, the integrated motor generates a square wave driving voltage of 50% duty cycle. 0: Stop, 1: Start, 2: Braking in operation						

Pn385	Name	Speed display filtering settings			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	15
The set values of BIT14 to BIT0 are used to set the sliding average filtering frequency for speed feedback, with a setting range of 0-20. The set value of BIT15 is used to set the speed feedback display source: BIT15=0: speed value after sliding average, BIT15=1: speed feedback low-pass filtering.						

Pn386	Name	Speed given low-pass filter cut-off frequency			Related mode	-
	Setting range	0~3000	Unit	Hz	Factory setting	3000
In the set speed mode, the low-pass filtering cutoff frequency given by the speed plays a role in smoothing the speed given.						

Pn392	Name	Torque mode current given filter cut-off frequency			Related mode	-
	Setting range	0~3000	Unit	Hz	Factory setting	3000

Pn399	Name	Command overload alarm setting			Related mode	-
	Setting range	0~65535	Unit	10ms	Factory setting	0

Set the handling method when the integrated motor experiences command overload:

Set value 0: When the integrated motor experiences command overload, a command overload alarm will occur and the machine will stop immediately.

Other Set values: When the integrated motor experiences command overload, the maximum torque output is limited to the rated torque, and the overload capacity is only restored after the set time is maintained.

Pn400	Name	Stall protection detection speed			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	100

Stall protection detection principle: When the actual speed of the motor is greater than the Pn400 set value, stall detection begins. When the actual speed direction of the motor is different from the given direction of the motor Q-axis current, and the Pn401 set value continues, the integrated motor will stall alarm.

- Note: In situations where the motor shaft is dragged and running, there may be false alarms. Pn400 can be set to 0 to disable the stall alarm function.

Pn401	Name	Stall protection detection time			Related mode	-
	Setting range	0~65535	Unit	ms	Factory setting	1200

Pn402	Name	Locked-rotor alarm detection command speed			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	100

Locked rotor protection detection principle: When the motor command speed is greater than Pn402 set value and the actual motor speed is lower than Pn403 set value, locked rotor detection begins. Under these two conditions, if the time set by Pn404 continues to exceed, a locked rotor alarm occurs.

- Note: When it is necessary to cancel the alarm function, Pn402 can be set to a larger value, such as 65535.

Pn403	Name	Locked-rotor alarm feedback speed upper limit			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	30

Pn404	Name	Locked-rotor protection detection time			Related mode	-
	Setting range	0~65535	Unit	ms	Factory setting	1200

Pn405	Name	Set value for the upper limit of automatic fault reset times			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

Pn406	Name	Interval time for decreasing the number of automatic fault resets			Related mode	-
	Setting range	0~65535	Unit	10ms	Factory setting	180

Pn407	Name	Locked rotor alarm 2 feedback speed upper limit Set value			Related mode	PS
	Setting range	0~65535	Unit	rpm	Factory setting	10

Pn408	Name	Locked rotor alarm 2 detection time			Related mode	-
	Setting range	0~65535	Unit	ms	Factory setting	1800

When both the actual speed of the motor is lower than Pn407 and the actual torque is greater than 95% of the maximum torque, and the duration exceeds the time set by Pn408, the integrated motor will alarm for locked rotor.

- Note: When the alarm function needs to be cancelled, Pn408 can be set to a larger value, such as 65535

Pn457	Name	Pulse signal bandwidth setting			Related mode	-
	Setting range	0~15	Unit	-	Factory setting	9

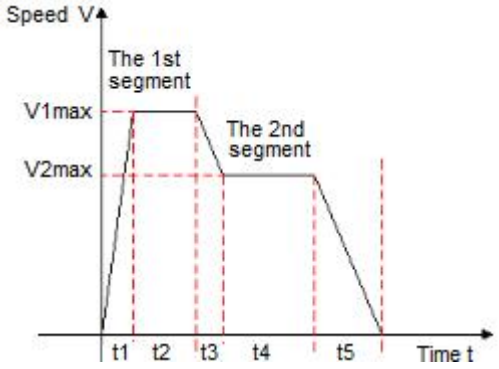
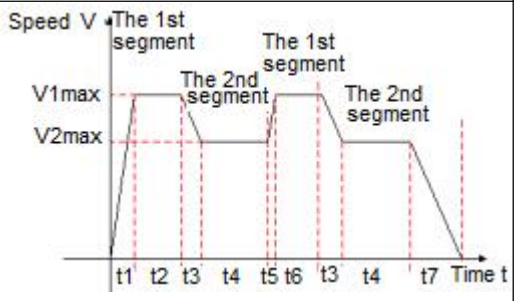
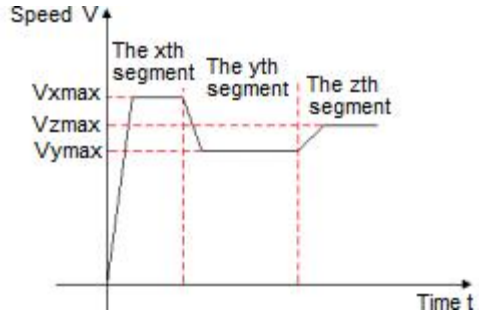
Set the digital filtering of the pulse signal input terminal, whose set value affects the frequency of the maximum pulse signal received by the integrated motor. The following data is set according to the pulse command with a 50% duty cycle:

Set value	Digital filtering bandwidth	Set value	Digital filtering bandwidth
0	42MHz	8	0.875MHz
1	21MHz	9	0.656MHz
2	10.5MHz	10	0.525MHz
3	5.25MHz	11	0.4375MHz
4	3.5MHz	12	0.328MHz
5	2.625MHz	13	0.2625MHz
6	1.75MHz	14	0.2187MHz
7	1.3125MHz	15	0.164MHz

6.2.14. Multi-segment speed parameters

Pn237	Name	Multi-segment speed command operation mode			Related mode	S
	Setting range	0~2	Unit	-	Factory setting	2

When the control mode is set to speed control mode (Pn0=1) and the speed command source is a multi-segment speed command source (Pn2=1), the multi-segment speed operation mode is set.

Set value	Operation mode	Remark	Operating waveform
0	Shutdown at the end of a single operation	Stop after running for 1 round; The segment number is automatically switched in increasing order.	 V1max、V2max: the first and second command speeds; S1、S2: the first and second displacement.
1	Cyclic operation	Cycle operation, the starting segment number of each round is 1; the segment number is automatically switched in increasing order; If the servo enable is valid, the cycle running state will always be maintained.	 V1max、V2max: the first and second segment maximum operating speeds. S1、S2: the first and second displacement.
2	Switch through the external IN port	The segment number is determined by the IN terminal logic; The running time of each speed command is only determined by the switching interval time of the segment number; FunIN.18 (speed command direction setting) can be used to switch the speed command direction.	 Vxmax、Vymax: the maximum operating speed of the x and y segments. Sx、Sy: displacement of the x and y segments.

During the operation of each speed command, the servo enable must be ensured, otherwise, the integrated motor will stop.

Pn238	Name	Number of end segments for multi-segment speed commands			Related mode	S
	Setting range	1~16	Unit	-	Factory setting	16

Set the total number of segments for multi segment speed commands. Different operating speeds, operating times, and acceleration/deceleration speeds can be set for different segments.

When Pn237=0/1, multi-segment numbers automatically increase and switch, switching order: 1, 2, 3,..., Pn238.

When Pn237=2, four IN should be set as input functions FunIN.13~FunIN.16 (CMD1~CMD4), and the IN terminal logic should be controlled by the upper computer to achieve segment number switching. Multi-segment numbers are 4-bit binary numbers, and the corresponding relationship between CMD1~CMD4 and segment numbers is shown below.

FunIN.16	FunIN.15	FunIN.14	FunIN.13	Segment
CMD4	CMD3	CMD2	CMD1	number
0	0	0	0	1
0	0	0	1	2
……				
1	1	1	0	15
1	1	1	1	16

When the IN terminal logic is valid, the value of CMD(n) is 1, otherwise it is 0.

Pn239	Name	Multi-segment speed command running time units			Related mode	S
	Setting range	0~1	Unit	-	Factory setting	0

When using the multi speed function and setting Pn237=0/1, set the Unit of the running time.

Set value	Time unit
0	0.1s
1	0.1min

Pn240	Name	Multi-segment speed command acceleration 1			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Set the first group of acceleration for multi-segment speed commands. For each multi-segment speed command, there are 6 sets of acceleration and deceleration options to choose from.

Pn241	Name	Multi-segment speed command deceleration 1			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn242	Name	Multi-segment speed command acceleration 2			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn243	Name	Multi-segment speed command deceleration 2			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn244	Name	Multi-segment speed command acceleration 3			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn245	Name	Multi-segment speed command deceleration 3			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn246	Name	Multi-segment speed command acceleration 4			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn247	Name	Multi-segment speed command deceleration 4			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn248	Name	Multi-segment speed command acceleration 5			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn249	Name	Multi-segment speed command deceleration 5			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn250	Name	Multi-segment speed command acceleration 6			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn251	Name	Multi-segment speed command deceleration 6			Related mode	S
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn252	Name	1st segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn253	Name	1st segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Set the running time of the first speed command.

Running time: the variable speed time of switching from the previous speed command to this speed command + the constant speed running time of this segment.

If the running time is set to 0, the integrated motor will automatically skip this speed command.

When Pn237=2, as long as the segment number determined by the external IN terminal does not change, the speed command of that segment will continue to run, regardless of the command running time.

Pn254	Name	1st segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Select the acceleration and deceleration of the first speed command.

Set value	Acceleration and deceleration	Remark
1	Acceleration and deceleration 1	Acceleration: Pn240 Deceleration: Pn241
2	Acceleration and deceleration 2	Acceleration: Pn242 Deceleration: Pn243
3	Acceleration and deceleration 3	Acceleration: Pn244 Deceleration: Pn245
4	Acceleration and deceleration 4	Acceleration: Pn246 Deceleration: Pn247
5	Acceleration and deceleration 5	Acceleration: Pn248 Deceleration: Pn249
6	Acceleration and deceleration 6	Acceleration: Pn250 Deceleration: Pn251

V1max、V2max: the first and second segment command speeds;

t1: the actual acceleration and deceleration time of the first segment;

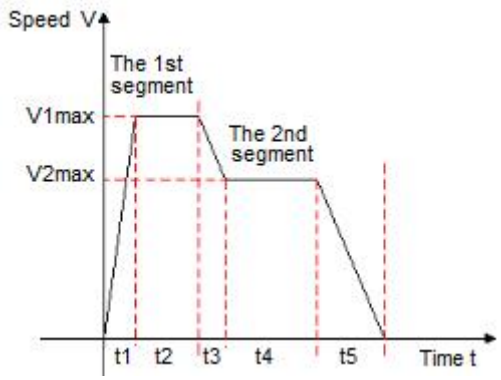
t3、 t5: the actual acceleration and deceleration time of the second segment;

A certain period of running time: the shifting time of the previous speed command switching to this speed command + the constant speed running time of this section (for example: the running time of the first segment in the figure is t1+t2, and the running time of the second segment is t3+t4. And so on);

When a certain period of running time is set to 0, the driver will skip this section of speed command and execute the next section;

$$t_1 = \frac{V_1}{1000} \times \text{Acceleration time set for this speed segment}$$

$$t_3 = \frac{|V_2 - V_1|}{1000} \times \text{The acceleration time set in the second segment}$$



Pn255	Name	2nd segment speed command			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	500

Pn256	Name	2nd segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn257	Name	2nd segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn258	Name	3rd segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn259	Name	3rd segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn260	Name	3rd segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn261	Name	4th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn262	Name	4th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn263	Name	4th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn264	Name	5th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn265	Name	5th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn266	Name	5th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn267	Name	6th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn268	Name	6th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn269	Name	6th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn270	Name	7th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn271	Name	7th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn272	Name	7th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn273	Name	8th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn274	Name	8th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn275	Name	8th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn276	Name	9th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn277	Name	9th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn278	Name	9th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn279	Name	10th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn280	Name	10th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn281	Name	10th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn282	Name	11th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn283	Name	11th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn284	Name	11th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn285	Name	12th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn286	Name	12th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn287	Name	12th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn288	Name	13th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn289	Name	13th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn290	Name	13th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn291	Name	14th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn292	Name	14th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn293	Name	14th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn294	Name	15th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

Pn295	Name	15th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn296	Name	15th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

Pn297	Name	16th segment speed command			Related mode	S
	Setting range	-3000~3000	Unit	rpm	Factory setting	500

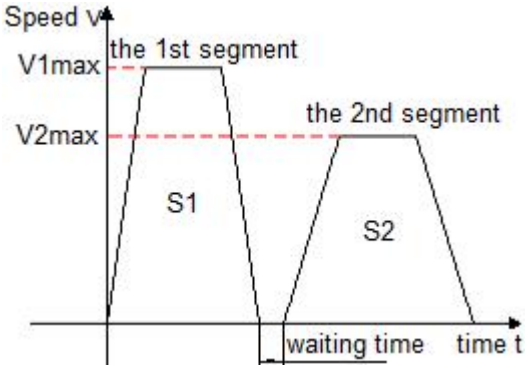
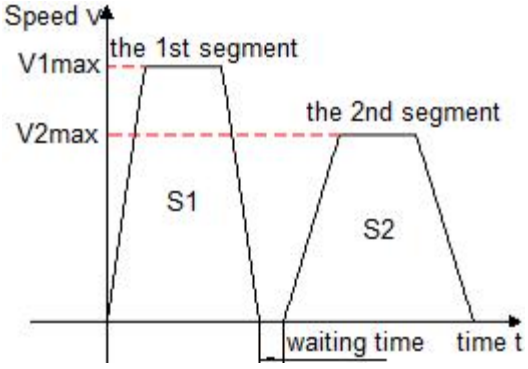
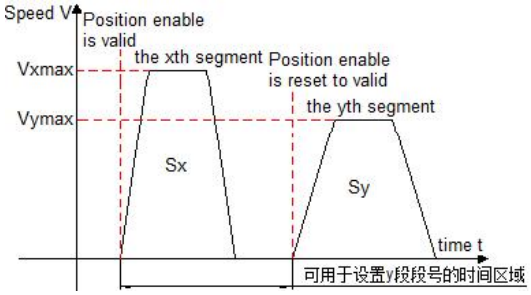
Pn298	Name	16th segment command running time			Related mode	S
	Setting range	0~65535	Unit	0.1s/0.1min	Factory setting	10

Pn299	Name	16th segment command acceleration and deceleration selection			Related mode	S
	Setting range	1~6	Unit	-	Factory setting	1

6.2.15. Multi-segment position parameters

Pn300	Name	Multi-segment position operation mode			Related mode	P
	Setting range	0~2	Unit	-	Factory setting	2

When setting the control mode to position control mode (Pn0=0) and the position command source is a fixed length/position table (Pn1=1), set the multi-segment position operation mode.

Set value	Operation mode	Remark	Operating waveform
0	Shutdown at the end of a single operation	Stop after running for 1 round; The segment number is automatically switched in increasing order; Waiting time can be set between segments; Multi-segment position enable is level effective.	 V1max、V2max: the first and second command maximum speeds; S1、S2: the first and second displacement.
1	Cyclic operation	Cycle operation, the starting segment number after the first round is 1; The segment number is automatically switched in increasing order; Waiting time can be set between segments; Multi-segment position enable is level effective.	 V1max、V2max: the first and second command maximum speeds; S1、S2: the first and second displacement.
2	IN switching operation	If the segment number is updated, it can run continuously; The segment number is determined by IN terminal logic; The interval between segments is determined by the command delay time of the host computer; Multi-segment position enable is effective for edge change.	 Vxmax、Vymax: maximum operating speed of the x and y segments; S1、S2: displacement of the x and y segments.

When using the multi segment position function, one IN port must be set as the IN function FunIN.26 (FUNC6: multi-segment position enable). Please refer to "Input/Output Parameters" for the setting method.

Pn301	Name	Number of end segments for position commands			Related mode	P
	Setting range	1~16	Unit	-	Factory setting	16

Set the total number of segments for multi-segment position commands. Different segments can be set with different displacements, operating speeds, and acceleration/deceleration.

When Pn300=0/1, multi-segment numbers automatically increase and switch, switching order: 1, 2, 3,..., Pn301.

When Pn300=2, four IN should be set as input functions FunIN.13~FunIN.16 (CMD1~CMD4), and the IN terminal logic should be controlled by the upper computer to achieve segment number switching. Multi-segment numbers are 4-bit binary numbers, and the corresponding relationship between CMD1~CMD4 and segment numbers is shown below.

FunIN.16	FunIN.15	FunIN.14	FunIN.13	segment
CMD4	CMD3	CMD2	CMD1	number
0	0	0	0	1
0	0	0	1	2
.....				
1	1	1	0	15
1	1	1	1	16

The value of CMD(n) is 1 when the IN terminal logic is valid, otherwise it is 0.

Pn302	Name	Time unit			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	0

When using the multi segment position function and setting Pn300=0/1, set the unit of waiting time between segments.

Waiting time: The time interval between the end of this command run and the start of the next command run.

Set value	Time unit
0	ms
1	s

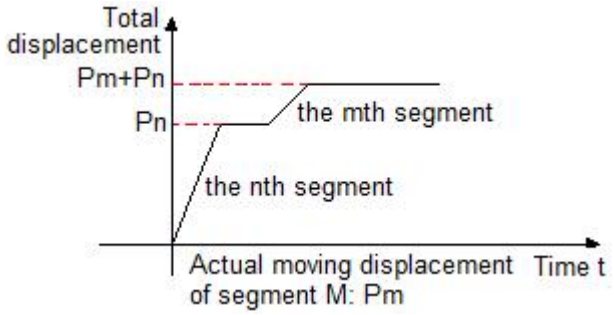
Pn303	Name	Position command type selection			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	1

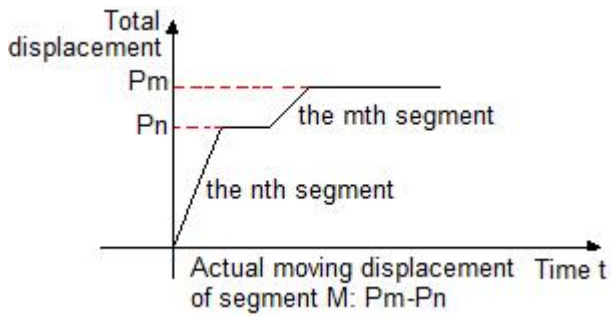
When using the multi-segment position function to run, set the type of displacement command.

Displacement command: the sum of position commands in a period of time.

The relative displacement is the increment of the target position relative to the current position of the motor; the absolute displacement is the increment of the target position relative to the motor origin. For example: the movement displacement of the nth segment is Pn (Pn＞0), and the movement displacement of the mth segment is Pm (Pm＞0).

Assuming Pm＞Pn, the comparison is as follows:

Set value	Position command type	Remark
0	Relative displacement command	

	1	Absolute displacement command		

Pn305/306	Name	1st segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000
Set the first segment movement position of the multi-segment position (Command unit). Among them, Pn305 represents the low 16-bit value, and Pn306 represents the high 16-bit value. Pn305 and Pn306 form a signed 32-bit integer.						

Pn307	Name	1st segment displacement maximum running speed			Related mode	P
	Setting range	0~6000	Unit	r/min	Factory setting	500
Set the maximum running speed of the first segment at multi-segment positions. The maximum running speed refers to the uniform running speed of the motor that is not in the process of acceleration and deceleration. If Pn305/306 (the first segment movement displacement) is too small, the actual motor speed will be less than the Pn307 setting value.						

Pn308	Name	1st segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100
Set the acceleration and deceleration values for the first segment of the motor operation curve at multiple positions.						

Pn309	Name	Waiting time after completion of segment 1 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500
Set the waiting time before running the next segment of displacement after completing the first segment of displacement at multiple positions. ● Only valid when Pn300=0/1.						

Pn310/311	Name	2nd segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn312	Name	2nd segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn313	Name	2nd segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn314	Name	Waiting time after completion of segment 2 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn315/316	Name	3rd segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn317	Name	3rd segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn318	Name	3rd segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn319	Name	Waiting time after completion of segment 3 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn320/321	Name	4th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn322	Name	4th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn323	Name	4th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100
Used to set the position control mode and communicate the highest speed of the operating curve when controlling the position command source.						

Pn324	Name	Waiting time after completion of segment 4 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn325/326	Name	5th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn327	Name	5th segment displacement maximum running speed			Related mode	P
	Setting range	0~6000	Unit	r/min	Factory setting	500

Pn328	Name	5th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn329	Name	Waiting time after completion of segment 5 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn330/331	Name	6th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn332	Name	6th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn333	Name	6th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn334	Name	Waiting time after completion of segment 6 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn335/336	Name	7th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn337	Name	7th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn338	Name	7th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn339	Name	Waiting time after completion of segment 7 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn340/341	Name	8th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn342	Name	8th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn343	Name	8th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn344	Name	Waiting time after completion of segment 8 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn345/346	Name	9th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn347	Name	9th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn348	Name	9th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn349	Name	Waiting time after completion of segment 9 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn350/351	Name	10th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn352	Name	10th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn353	Name	10th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn354	Name	Waiting time after completion of segment 10 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn355/356	Name	11th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn357	Name	11th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn358	Name	11th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn359	Name	Waiting time after completion of segment 11 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn360/361	Name	12th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn362	Name	12th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn363	Name	12th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn364	Name	Waiting time after completion of segment 12 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn365/366	Name	13th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn367	Name	13th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn368	Name	13th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn369	Name	Waiting time after completion of segment 13 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn370/371	Name	14th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn372	Name	14th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn373	Name	14th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn374	Name	Waiting time after completion of segment 14 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn375/376	Name	15th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

Pn377	Name	15th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn378	Name	15th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn379	Name	Waiting time after completion of segment 15 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

Pn380/381	Name	16th segment moving displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command unit	Factory setting	10000

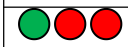
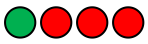
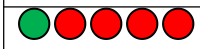
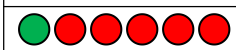
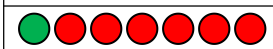
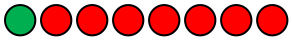
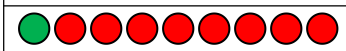
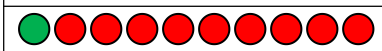
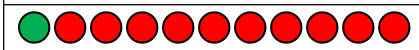
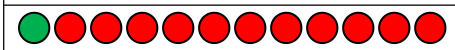
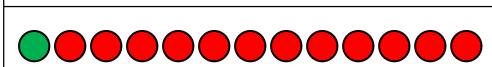
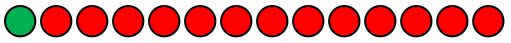
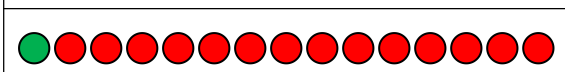
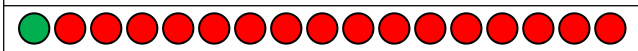
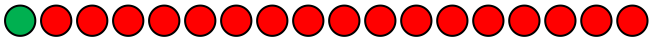
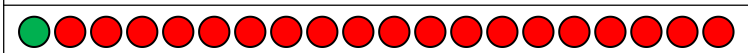
Pn382	Name	16th segment displacement maximum running speed			Related mode	P
	Setting range	0~3000	Unit	r/min	Factory setting	500

Pn383	Name	16th segment displacement acceleration and deceleration			Related mode	P
	Setting range	1~2000	Unit	r/s^2	Factory setting	100

Pn384	Name	Waiting time after completion of segment 16 displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	500

7. Troubleshooting

7.1. Fault List

LED status	Description
	Steady green light: the integrated motor is not enabled
	Flashing green light: the integrated motor is enabled and working normally
	1 green, 1 red: integrated motor overcurrent
	1 green, 2 red: integrated motor overvoltage
	1 green, 3 red: the internal voltage of the integrated motor is wrong
	1 green, 4 red: encoder out of tolerance alarm
	1 green, 5 red: integrated motor undervoltage
	1 green, 6 red: parameter storage error
	1 green, 7 red: Motor phase loss alarm
	1 green, 8 red: encoder failure
	1 green, 9 red: limit input error warning
	1 green, 10 red: motor thermal overload warning
	1 green, 11 red: motor commandoverload warning
	1 green, 12 red: motor output saturation overtime warning
	1 green, 13 red: braking parameter setting, braking timeout error
	1 green, 14 red: encoder interference, wire breakage error
	1 green, 15 red: multi turn encoder battery, multi turn data error
	1 green, 16 red: Motor stall and locked rotor error
	1 green, 17 red: encoder parameter reading, writing, uncalibration, and other errors
	1 green, 18 red: abnormal software operation and encoder type setting
	1 green, 19 red: other undefined faults