User Manual
For SD Series

BONMET

Smart & Accurate

Preface

Thank you for choosing BONMET's DC servo products.

This manual is a user guide that provides the information on how to install, operate and maintain SD series DC servo drive. The contents of this manual include the following topics:

- Installation of DC servo drives and motors
- Configuration and wiring
- Trial run steps
- Control functions and adjusting methods of DC servo drives
- Parameter settings
- Inspection and maintenance
- Troubleshooting
- Application examples

Before using the product, please read this manual to ensure correct use. Users should thoroughly understand all safety precautions (DANGERS and WARNINGS) before proceeding with the installation, wiring and operation. If you still have any problem, please contact with the local Bonmet sales representative. Place this user manual in a safe location for future reference.

Safety Precautions

● *To prevent electric shock, note the following:*

⚠DANGEROUS
• Before wiring or inspection, switch power off and wait for more than 10 minutes. Then, confirm the voltage is safe with voltage tester. Otherwise, you may get an electric shock. • Wiring must be carried by electrical engineer. • Connect the servo drive and servo motor to ground. • Operate the switches with dry hand to prevent an electric shock. • The cables should not be damaged, stressed, loaded, or pinched. Otherwise, you may get an electric shock.

● *To prevent fire, note the following:*

⚠CAUTION
• Do not install the servo drive, servo motor and regenerative brake resistor on or near combustibles. Otherwise a fire may cause. • When the servo drive has become faulty, switch off the main power. Continuous flow of a large current may cause a fire. • When there is a signal faulty as a regenerative brake resistor is used, please switch the main power off. Otherwise, a regenerative brake transistor fault may overheat the regenerative brake resistor and cause a fire.

● *Wiring Precautions*

⚠CAUTION
• Wire the equipment correctly and securely. • Connect the output terminals (U, V, W) correctly. • **Do not connect AC power directly to the servo motor or servo drive.**

● *Operation and Adjustment Precautions*

⚠CAUTION
• Do not touch the radiator and the regenerative brake resistor as they are overheated. • Do not set parameter value unduly. If so, system would be instable. • Do not touch the rotating parts of the servo motor in operation. Doing so may cause injury.

● *Others*

⚠CAUTION
• Do not attempt to remold the servo drive.

CONTENTS

Chapter 1 Model and Specifications

1.1 Unpacking Check

After receiving the DC servo drive, please check for the followings in order to prevent mistake during purchase or shipment：

- Check the following section about the model explanation of the servo drive and motor to ensure that the product is what you have ordered.
- Rotate the motor shaft slightly by hand, a smooth rotation will indicate a good motor. **However, a servo motor with holding brake can not be rotated manually unless give power to the holding brake to release the shaft.**
- Inspect the unit to insure it was not damaged during shipment.

If any items are damaged or incorrect, please inform the distributor whom you purchased the product from or your local BONMET sales representative.

1.2 Model Explanation

- Nameplate Explanation

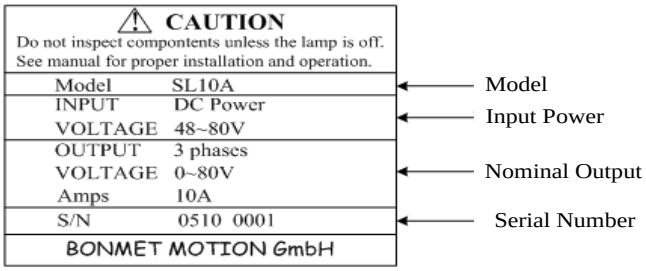


Figure 1-1 Nameplate explanation

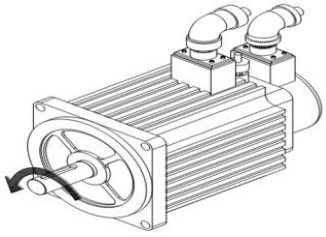
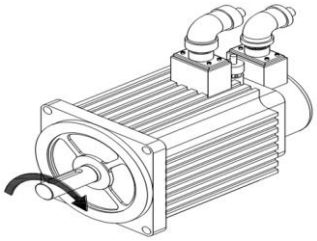
- Model Explanation

SD	L	10	A	XX
1	2	3	4	5

1. Product type: S(SD)- Series DC servo drive;
2. Power supply:48~80VDC
3. Nominal current：10A
4. Type code;
5. Software customized logo.

1.3 Product Features

- Definition of The Motor Rotation Direction

Positive direction（CCW）	Negative direction（CW）
	

Definition of the motor rotation direction：facing the motor shaft side, CCW (counterclockwise) direction is positive direction, CW (clockwise) direction is negative direction.

Model			SDL10A	SDL10B
Input Power Supply			DC 24V～85V	
Environment	Temperature		Operation：0～40℃ Storage：-40℃～50℃	
	Ambient Humidity		40%～80%(non-condensation)	
	Atmospheric Pressure		86～106kPa	
Control Method			MOSFET	
Control Mode			①Position control ②Speed control ③Torque control	
Regeneration Brake			None	
Speed Characteristics	Speed Frequency Response		300Hz or more	
	Speed Fluctuation Rate		±0.03 or less (Load 0～100%); ±0.02 or less (Power supply -15～+10%) (Value corresponds to the nominal speed)	
	Speed Ratio		1:5000	
Input Signal	Status Input Signal		Servo enable、Alarm clear	
	Command Input Signal		Analog torque / speed command input terminals、Pulse command input terminal	
Output Signal	Status Output Signal		Servo alarm、Position complete output / speed reach output	
	Position Output Signal		Differential output for A、B、Z pulse, Open collector output for Z pulse	
Position Control	Maximum Input Pulse Frequency		500KHz	
	Input mode		① Differential output ②Open collector output	
	Command mode		①Command/direction pulse ②CCW/CW pulse ③A/B pulse (set by parameters)	
	Command Smoothing Method		Position command filter	
	Electronic Gear		1～30000/1～300000（Recommended value：50～1/50）	
	Torque Limit		①Set by parameters（CCW/CW）②16 speed command set by parameters ③Controlled by analog command	
Speed Control	Command mode	Internal Command	16 speed command set by parameters,	
		Analog Command	0～±10VDC（Default：10VDC corresponds 3000rpm）	
		Pulse Command	0～500KHz（Default：500KHz corresponds 3000rpm）	
	Command Smoothing		① Analog low-pass filter order ②Increase / Decrease time constant ③ Position command filter	
	Speed Limit		Set by parameters	
Torque Control	Command mode		0～±10VDC（Default：10VDC corresponds 100% nominal torque）	
	Command Smoothing		Torque command filter	
	Speed Limit		Set by parameters	
	Torque Limit		Set by parameters（CCW/CW）	
Communication			RS-232 port、RS-485 port	
Bus Control Function			Mod bus	
Monitoring Function			The percentage of motor torque, ,Motor speed, Motor accumulated travel pulse, Torque command value, Speed command value, Accumulative command pulse, Single-phase current, Absolute position of rotor, Position deviation pulse, Alarm code, Input and output terminal signal status, etc.	
Protective Function			Encoder signal abnormalities, Overload, Over current, Speed tolerance, Over location etc.	
Applicable Load Inertia			Less than five times of motor inertia	

Chapter 2 Installation

2.1 Notes for Installation

- **Do not bend or strain** the cables between servo drive and motor;
- When mounting the servo drive and servo motor, **make sure to tighten all screws** to secure the machine in place;
- Motor shaft must be concentric with the axis of transmission;
- If the cable between drive and motor is longer than 10 meters, the cable must be thicken.

2.2 Installation Environment

- Please install the servo system in the place without oil mist, dust or electrical control cabinet (ensure the temperature below 50℃, relative humidity below 80%. The long-term safety temperature below 40℃)
- Please install the servo system in the place without radioactive matters and combustibles.
- Take an anti-vibration measure to guarantee that the servo drive is free from vibration impact, ensuring the vibration under 0.5G (4.9m/s^2).
- Please install the servo system in the place without direct sunlight.
- Interferential equipment nearby would take great effects to the power wire and control wire which will cause miss operation. For normal operation, a noise filter or any other anti-jamming measures is necessary to be carried out. Leakage current would increase after installing a noise filter, therefore an isolation transformer can be used to avoid this problem. Possessing a reasonable alignment and inhibit measures is very important because the control signal wire is easy to be interfered.

2.3 Dimensions（Unit: mm）

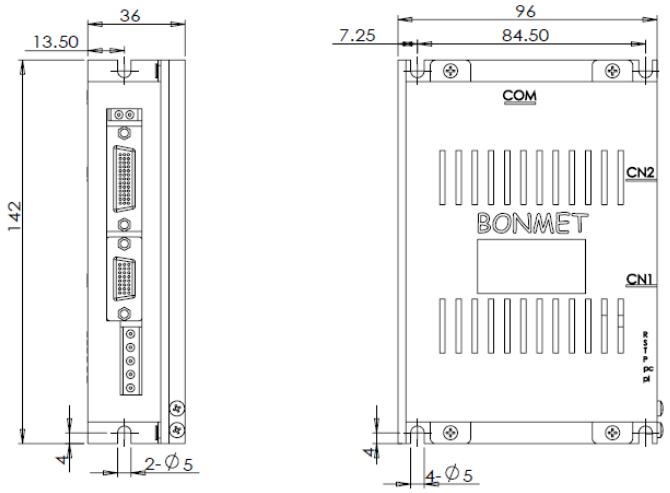


Figure 2-1 Dimension drawings

2.4 Installation Direction and Space

- The equipment must be installed in the specified direction. Otherwise, a fault may occur.
- Leave specified clearances between the servo drive and control box inside walls or other equipment.
- Leave a large clearance between the top of the servo drive and the internal surface of the control box, and install a fan to prevent the internal temperature of the control box from exceeding the environmental

conditions.

- When using heat generating equipment such as the regenerative brake option, install them with full consideration of heat generation so that the servo drive is not affected. Install the servo drive on a perpendicular wall in the correct vertical direction.

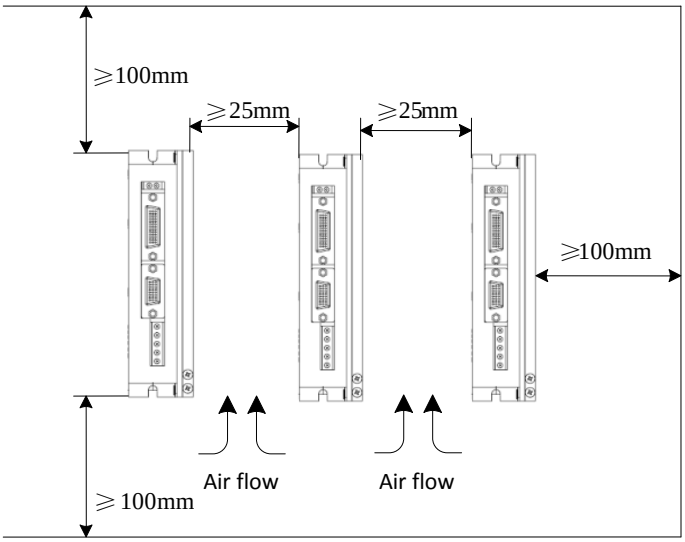


Figure 2-2 installation schematic diagram for drives

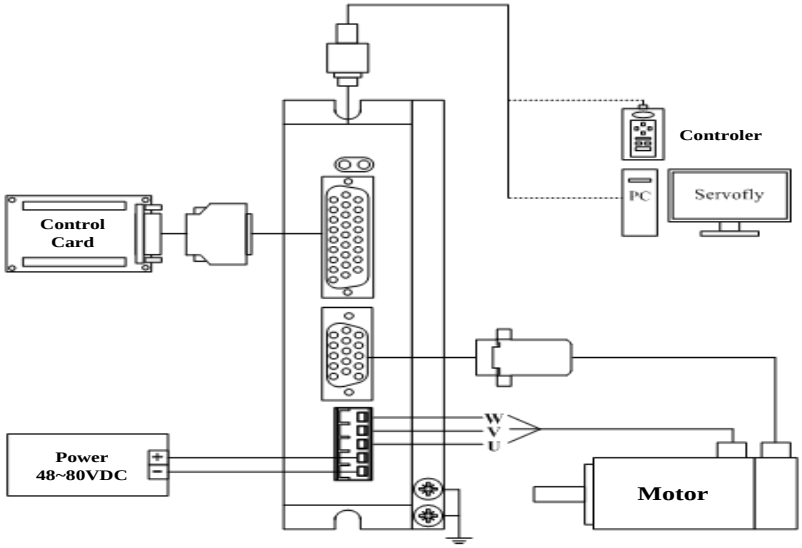
Chapter 3 Wiring

2.5 Connections

3.1.1 Note

- **All terminals and plugs must be screwed well, poor contact or disconnection could lead to accidents.**
- In order to prevent error movement caused by noise, please install isolation transformers and noise filter.
- The equipment must be grounded.
- Do not put power lines and signal lines in a same conduit or their binding them together, the distance between power lines and signal lines should be 30cm at least, otherwise it may cause interference.
- Please use the shielded twisted wire as signal cable.
- Do not switch power supply frequently. The maximum frequency should be no more than once per minute.

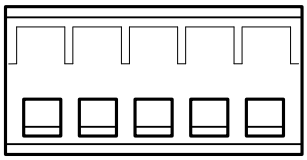
2.6 Connection



2.7 Terminals

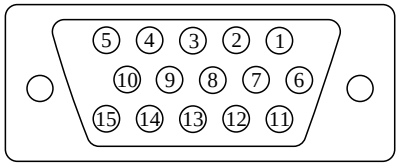
Terminal	Name	Function
+VDC、GND	Drive power terminal	Connect with 48~80VDC
U、V、W	Motor terminal	Connect with motor
CN1	Encoder Connector	Connect with encoder
CN2	I/O Connector	I/O port
COM	Communication Connector	Connect with PC or controller

2.8 Power Terminal



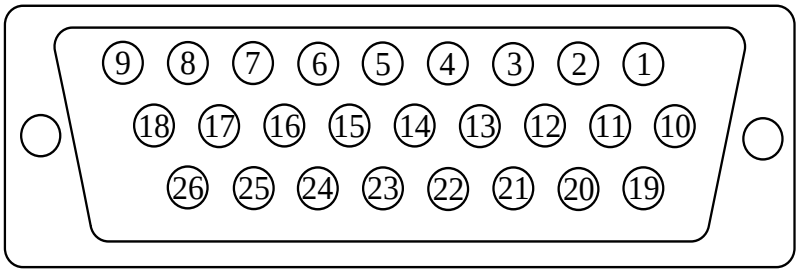
number	Name	Symbol	Description
1	Ground	GND	Connect with OV
2	Power	+VDC	Connect with 48~80V
3	Motor U、V、W terminal	U	Connect with motor power terminal
4		V	
5		W	

2.9 Encoder Connector CN1



Terminal number	Name	Function		
		Symbol	I/O	Description
1	Power supply(5V)	+5V		The power supply and public ground of encoder. It is necessary to use a parallel multi-cored wire to reduce the pressure drop of wires.
13	Public ground	0V		
7	Encoder CSL input	CSL	Type7	Connect with the electro-optic encoder CSL.
2	Encoder CSH input	CSH		Connect with the electro-optic encoder CSH.
6	Encoder CLKL input	CLKL	Type7	Connect with the electro-optic encoder CLKL.
1	Encoder CLKH input	CLKH		Connect with the electro-optic encoder CLKH.
8	Encoder DOL input	DOL	Type7	Connect with the electro-optic encoder DOL.
3	Encoder DOH input	DOH		Connect with the electro-optic encoder DOH.
4	Encoder A+ input	A＋	Type7	Connect with the electro-optic encoder A＋.
9	Encoder A- input	A－		Connect with the electro-optic encoder A-.
5	Encoder B+ input	B＋	Type7	Connect with the electro-optic encoder B+.
10	Encoder B- input	B－		Connect with the electro-optic encoder B-.
14	Encoder Z+ input	Z＋	Type7	Connect with the electro-optic encoder Z+.
15	Encoder Z- input	Z－		Connect with the electro-optic encoder Z-.

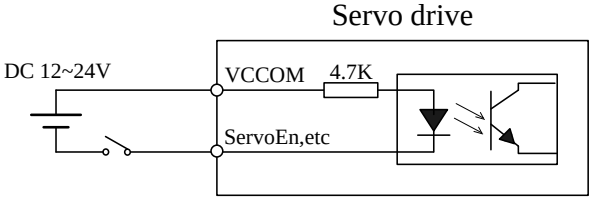
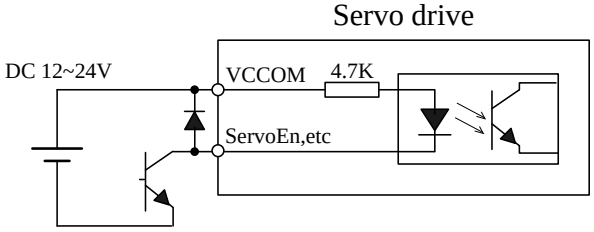
2.10 I/O Connector CN2



Control mode: **P** stands for position control, **S** stands for speed control, **T** stands for torque control.

Terminal number	Name	Terminal symbol			Function
		Symbol	I/O	mode	
20	Servo enable	ServoEn＋	Type1		Servo enable input terminal. ServoEn ON: Operation enabled; ServoEn OFF: Operation disabled. [Note 1]: Make sure the servo motor is quiescent before "ServoEn OFF" turns to "ServoEn ON" [Note 2]: Please wait for 50 ms before inputting any command in the State of "ServoEn ON".
19		ServoEn－			
3	Alarm clear	AlarmClr＋	Type1		Alarm clear input terminal. AlarmClr ON: Clear the system alarm; AlarmClr OFF: Maintain the system alarm. [Note]: As the alarm code is less than 12, please cut off the power supply and repair the drive.
12		AlarmClr－			
5	Servo alarm output	Alarm＋	Type2		Output terminal of servo alarm. ALM ON: Servo alarm output ON as there is no alarm; ALM OFF: Servo alarm output OFF as there is any alarm.
14		Alarm－			
2	Command pulse PLUS input	PulseInv＋	Type3	P	External command pulse input terminal. Note: pulse type is selected by parameter PN52. ①PN52=0, command pulse+ signal mode(default state); ②PN52=1, CCW/CW command pulse mode; ③PN52=2, 2-phase command pulse mode.
11		PulseInv－			
1	Command pulse SIGN input	SignInv＋	Type3	P	
10		SignInv－			
24	Analog command input	ASPEED＋/ ATORQUE＋	Type4	S、T	Command input terminal for external analog torque/speed (difference mode), the impedance is 10kΩ, the voltage is -10V~+10V.
25		ASPEED－/ ATORQUE－			
26	Analog ground	AGND			The grounding line of analog input.
7	Encoder Phase-A signal	PhaseA＋	Type5		1. Encoder signal A, B, Z for difference drive output (output through 26LS31, corresponding to RS422); 2. Non-isolative output (non-insulation).
16		PhaseA－			
8	Encoder phase-B signal	PhaseB＋	Type5		
17		PhaseB－			
9	Encoder phase- Z signal	PhaseZ＋	Type5		
18		PhaseZ－			

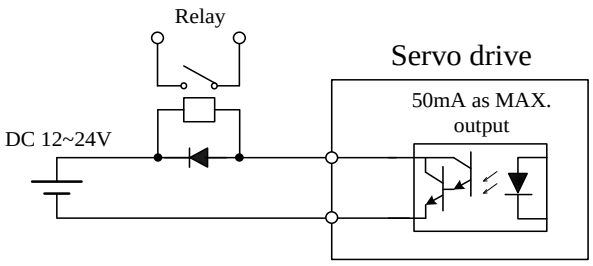
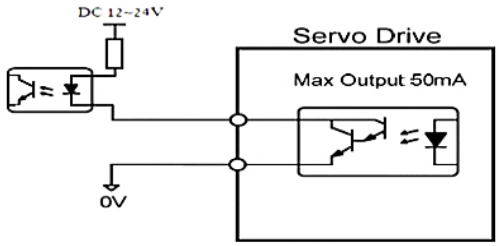
3.6.1 Wiring of Digital Input

Wiring of the relay circuit	Wiring of the open collector circuit
	

(1) Connect to contacts of switches and relays, or open collector output transistors.

(2) The power is provided by the user as the voltage range is DC12～24V and the current is more than 100mA. **Note: the internal circuit will be damaged if the power polarity is wrongly connected.**

3.6.2 Wiring of Digital Output

Wiring of the relay circuit	Wiring of the Optocoupler circuit
	

Note: it is possible to connect a freewheeling diode in the wiring of relay circuit.

(1) The output circuit is composed of open collector transistor outputs in the Darlington connection, and connect to relays or photo-couplers.

(2) The power is provided by the user as the voltage range is DC5 ~ 24V and the current is more than 50mA.
Note: the internal circuit will be damaged if the power polarity is wrongly connected.

(3) As driving the inductive load such as relay, you must connect a freewheeling diode in parallel.
Note: It would damage the serve drive as if the freewheeling is wrongly connected.

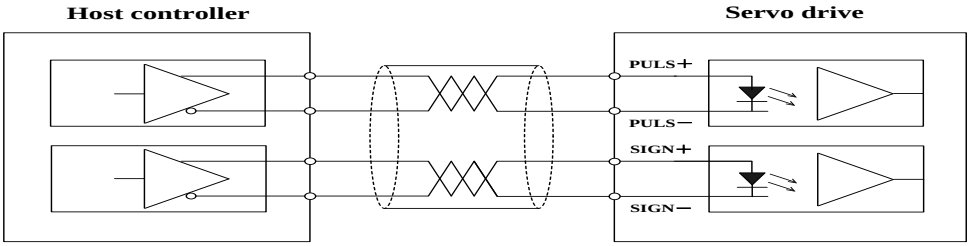
(4) There exists collector to emitter voltage, VCE (SAT) of approx. 1V at transistor-ON, due to the Darlington connection of the output or. Note that normal TTL IC cannot be directly connected since it does not meet VIL.

3.6.3 Wiring of Pulse Input

There are two kinds of pulse inputs, line drive input and open-collector input. The max. input pulse frequency is 500kpps.

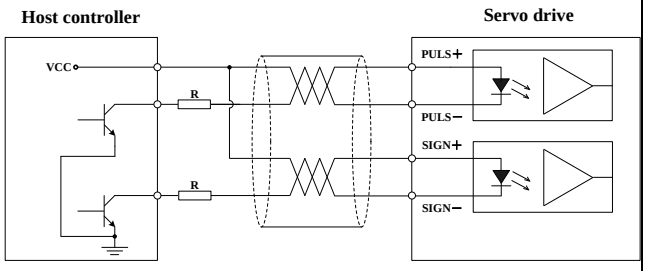
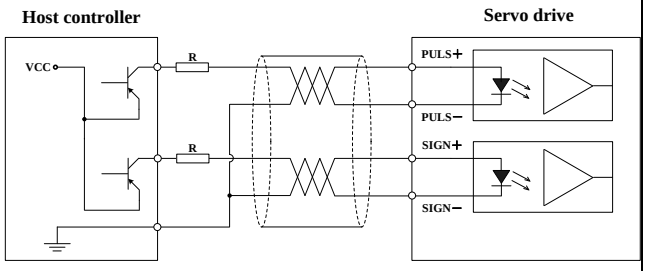
BONMET servo drive support three kind of pulse mode (Set by Pn-52): ① Pulse + Direction; ② CW+CCW pulse; ③ A/B phase pulse

- Line drive input



- Open-collector input

There are two kind of open-collector input: NPN type (like Mitsubishi, Omron, Panasonic) and PNP type (like Siemens). The wiring of open-collector as below:

Wiring of NPN type pulse input	Wiring of PNP type pulse input
	

(1) Check the pulse input kind and make the wiring according to the drawing, otherwise it may cause the damage.

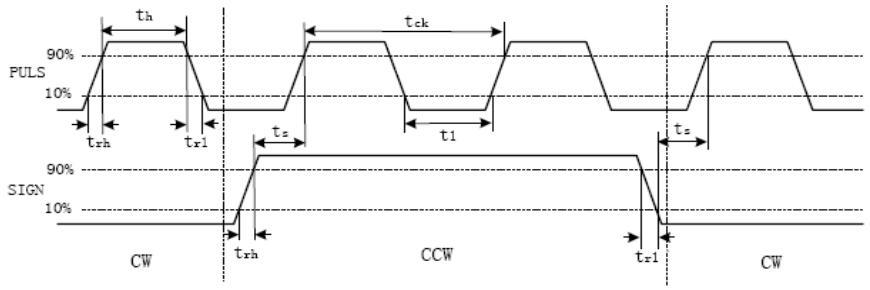
⑵ The Optocoupler supports max. to 15mA current. **We need to add a current-limiting resistance as using open-collector input.**

Voltage of open-collector input	Value of current-limiting resistance
5V	Not need
12V	400Ω
24V	1kΩ

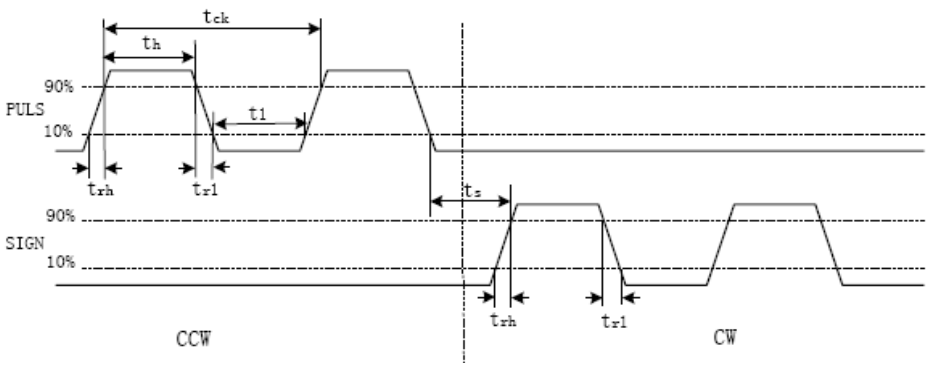
⑶ The cable of pulse input should be twisted-paired and shielded to prevent from signal interference caused by noise.

⑷ The max. input pulse frequency is 500kpps, the relationship between pulse frequency and speed is a proportional relationship as 500 kHz corresponds to 3000rpm.

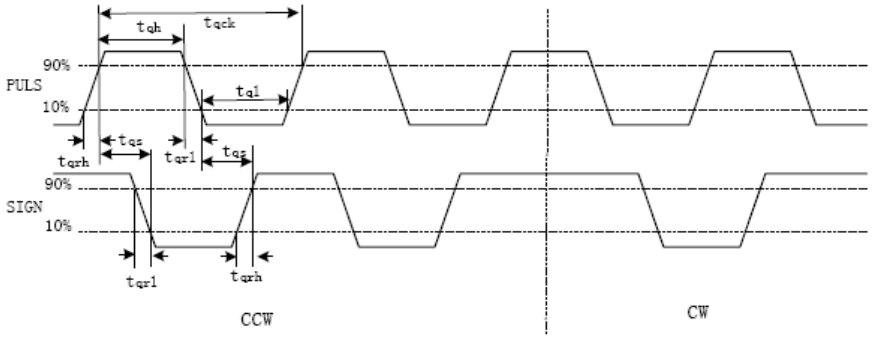
Parameters	Differential drive input	Single-ended drive input
t_{ck}	>2μS	>5μS
t_h	>1μS	>2.5μS
t_l	>1μS	>2.5μS
t_{rh}	<0.2μS	<0.3μS
t_{rl}	<0.2μS	<0.3μS
t_s	>1μS	>2.5μS
t_{qck}	>8μS	>10μS
t_{qh}	>4μS	>5μS
t_{ql}	>4μS	>5μS
t_{qrh}	<0.2μS	<0.3μS
t_{qrl}	<0.2μS	<0.3μS
t_{qs}	>1μS	>2.5μS



Sequence chart for pulse + direction

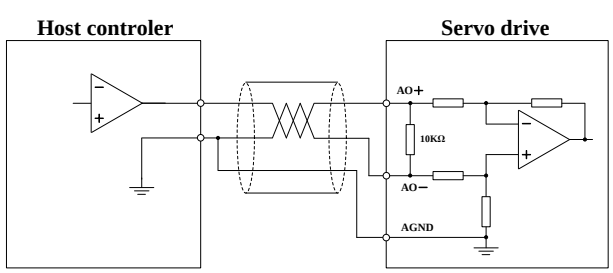
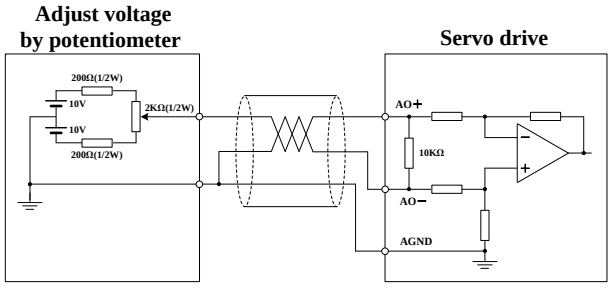


Sequence chart for CW+CCW pulse



Sequence chart for A/B phase pulse

3.6.4 Wiring of Analog Input

Analog voltage input	Potentiometer input
	

Note："AO" means analog command.

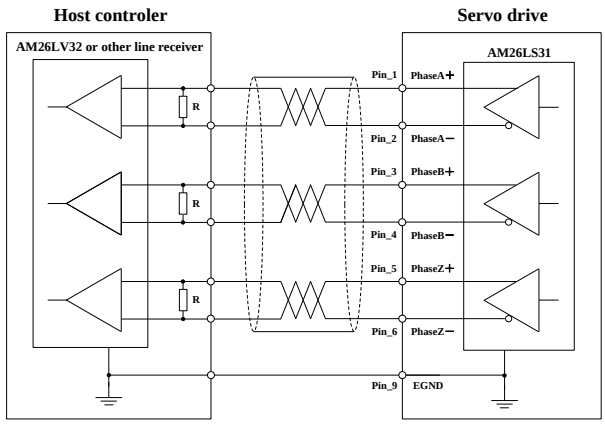
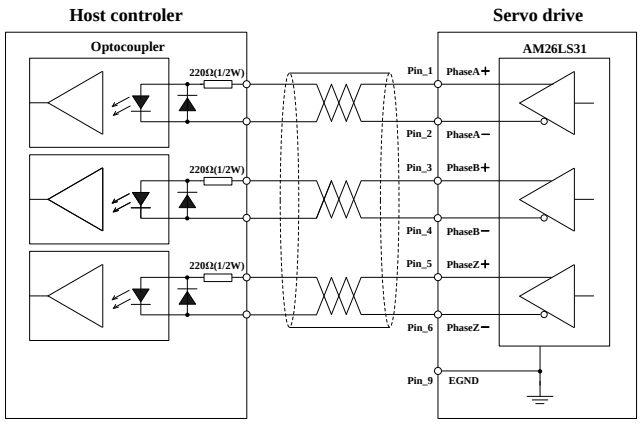
(1) AGND must be connected to the ground (0V) of analog command;

(2) Max. permissible input voltage to each input is ±10V;

(3) It is suggested that using Shielded twisted pair as the analog input cable;

(4) Analog input drift is normal, you can use analog input drift compensation function to deal with it..

3.6.5 Wiring of Encoder Differential Output

Wiring of line receiver	Wiring of optocoupler
	

(1) Feeds out the divided encoder outputs (A, B and Z-phase) in differential through each line driver.

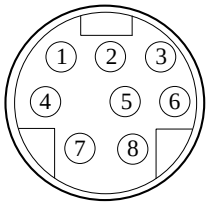
(2) Customer can use a line receiver (like AM26LV32). Install a terminal resistor (approx. 330Ω) between line receiver inputs without fail. And connect "EGND" to the ground (0V) of the receiver.

(3) Customer can use a optocoupler to receive the signals.

(4) These outputs are not insulated.

3.4

3.5 Communication Connector(CN3)



Serial-line terminal plug CN3

■ RS-232

Terminal number	Name	Function	
		Symbol	Description
3	Receive data	RXD	Receive data signal.
5	Transmit data	TXD	Transmit data signal.
1	GND	GND	Inhibit signal earth.

■ RS-485

Terminal number	Name	Function	
		Symbol	Description
7	Difference signal Data+	Data+	Data+ terminal
4	Difference signal Data-	Data-	Data- terminal
8	GND	GND	Inhibit signal earth.

Chapter 4 Operation

4.1 Operation steps

Item	Content	Reference
Installation	Please keep the motor shaft in a non-connection state, do not connect the motor with mechanical system for servo action confirmation at first.	Chapter 2
↓		
Wiring	Connect servo drive with power and peripheral device	Chapter 3
↓		
Preparation before operation	Please confirm all the necessary items before turn on the power. And check if there is any alarm.	Chapter 4
↓		
Action confirmation	Operate in speed mode to test the servo drive and servo motor without any load on the shaft.	Chapter 4
↓		
Parameters settings	Set parameters according to terms of use.	Chapter 5
↓		
Trial operation	Connect motor with mechanical systems, turn on the power, and check whether protective functions (such as emergency stop and stroke limit) are working. Check operation at both low speed and high speed.	—

↓

Gain adjustment	Adjust the gain to get a good performance.	Chapter 4

↓

Normal operation	You can carry out normal operation now. If any faulty happens, please refer to "Chapter 7 Protection."	Chapter 7

Preparing For Operation

Turning Power ON and Checking Indicators

■ **Checking Power Supply Voltage**

- Check to be sure that the power supply voltage is 24~85VDC

■ **Checking Terminal Block Wiring**

- The power supply inputs （+VDC、GND）must be properly connected to the terminal block.
- The servo motor's power line（U、V、W）must be properly connected to the terminal block.

■ **Checking the servo motor**

- The Encoder Cable must be securely connected to the Encoder Connector at the motor side.
- The power lines at the servo motor must be securely connected.

■ **Checking the Control Connectors**

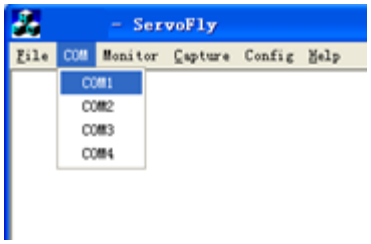
- The Control Cable must be securely connected to the I/O Control Connector (CN2).。
- The ServoEn command must be OFF.

4.2 Software（Servofly）operation instructions

4.2.1 Communication

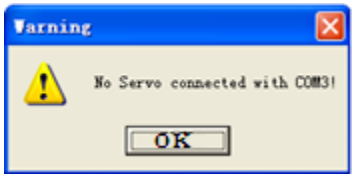
⑴ Connect servo drive with PC through serial cable.

⑵ Click "Servofly.exe" and select the COM menu，click the defined COM port(can be modified by PC).

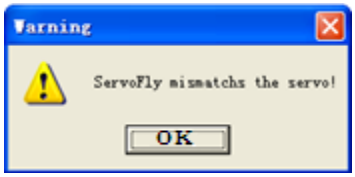


⑶ The communication succeeds as the following dialog appears.

⑷ The communication fails as the following dialog appears, please check the wiring.

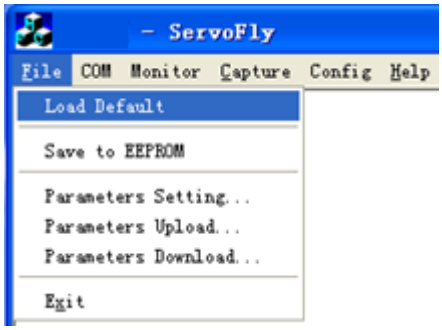


(5) The communication fails as the following dialog appears, it indicates that the software version does not match, please select Pn-0 to check the version information, and download the right software on our website.



4.2.2 Basic function

1. Customers can use the basic function of the software in the "File" menu.



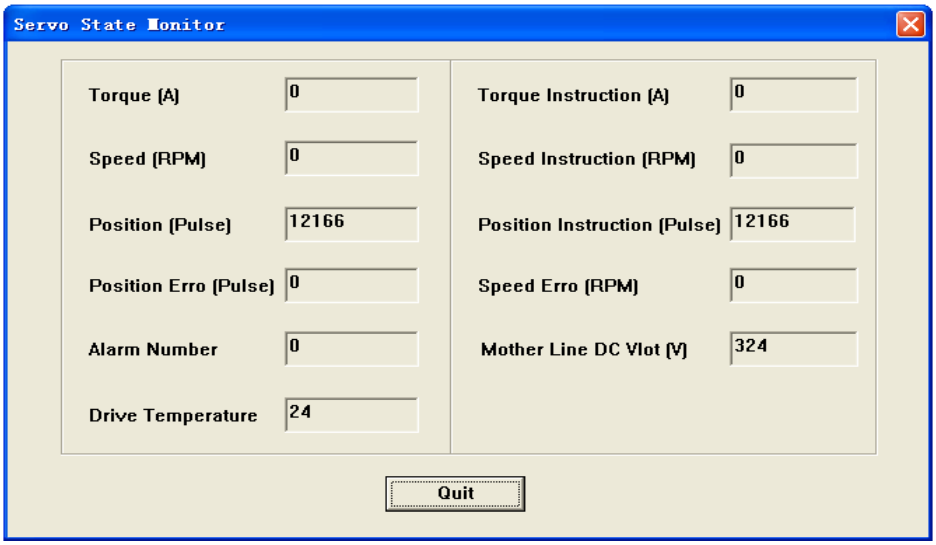
2. Function

Item	Function
Load Default	Restore default parameters（equal with "EE-Def" in panel operation）
Save to EEPROM	Save the current parameters to EEPROM
Parameters Setting…	Parameter setting
Parameters Upload…	Upload the parameters from servo drive to PC (please name the parameter file as "xx.par", otherwise the operation would be invalid)
Parameters Download…	Download the parameters from PC to servo drive(**please DO NOT use this function.**)
Exit	Exit the software

4.2.3 Monitoring function

1. Monitoring the servo state

(1) "Servo State" choice under the "Monitor" menu is the monitoring choice of the servo state.

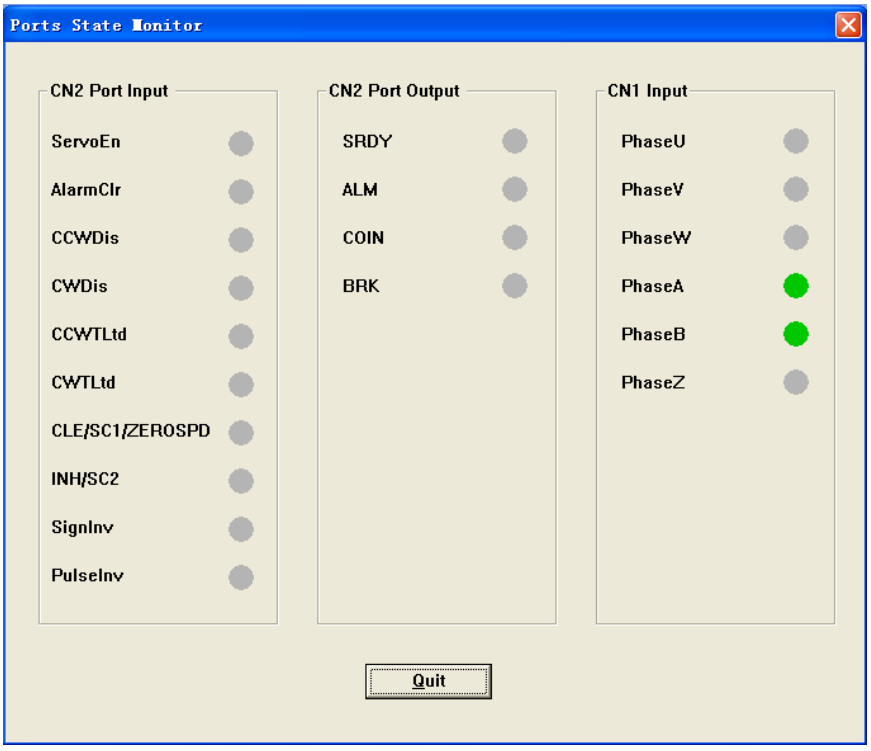


⑵ Function

Item	Function
Torque(A)	Motor Q axis current（the value divided by 1.414 is motor current）
Torque Instruction(A)	Motor Q axis current command （the value divided by 1.414 is motor current command）
Speed(RPM)	Motor speed（this is a real time value ）
Speed Instruction(RPM)	Speed command
Position(Pulse)	Feedback pulse
Posiotn Instruction(Pulse)	Pulse command
Position Erro(Pulse)	Position deviation (pulse command minus feedback pulse)
Speed Erro(Pulse)	Speed deviation（this is a real time value）
Alarm Number	Alarm code(“0” means no alarm）
Mother Line DC Vlot(V)	Mother line DC voltage
Drive Temperature	The temperature of the heat sink inside part

② Physical port status monitoring function

⑴ The “Physical State” item under the “Monitor” menu is for the physical port status monitoring function.



⑵ Function

Item	Function
CN2 Port Input	Monitor the digital input status, green light indicates “ON” and grey light indicates “OFF”, please refer to chapter 3 for details of I/O connector
CN2 Port Output	Monitor the digital output status, green light indicates “ON” and grey light indicates “OFF”, please refer to chapter 3 for details of I/O connector
CN1 Port Input	Encoder input signals, green light indicates “ON” and grey light indicates “OFF”, please refer to chapter 3 for details of I/O connector

③ Logical port status monitoring function

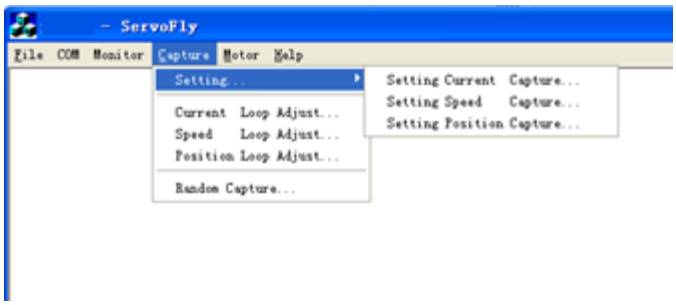
⑴ The “Logic State” item under the “Monitor” menu is for the logical port status monitoring function.

⑵ Function

Monitor the logical input status, green light indicates “ON” and grey light indicates “OFF”, please refer to chapter 3 section 3.7 for details of logical input.

4.2.4 Oscillation control and running curve monitoring function

1. Oscillation control



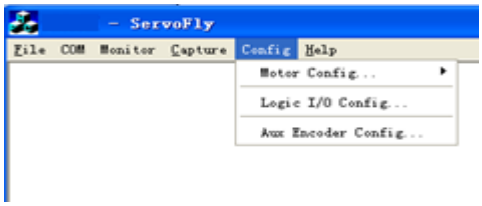
In the picture, the items “Setting…”, “Current Loop Adjust…”, “Speed Loop Adjust…” and “Position Loop Adjust…” are for oscillation control, **this function is only for factory testing use, wrong operation may cause damage, please DO NOT use this function**.

2. **Running curve monitoring function**

"Random Capture" menu is for the running curve monitoring function, customers can check the current loop curve, speed loop curve and position loop curve.

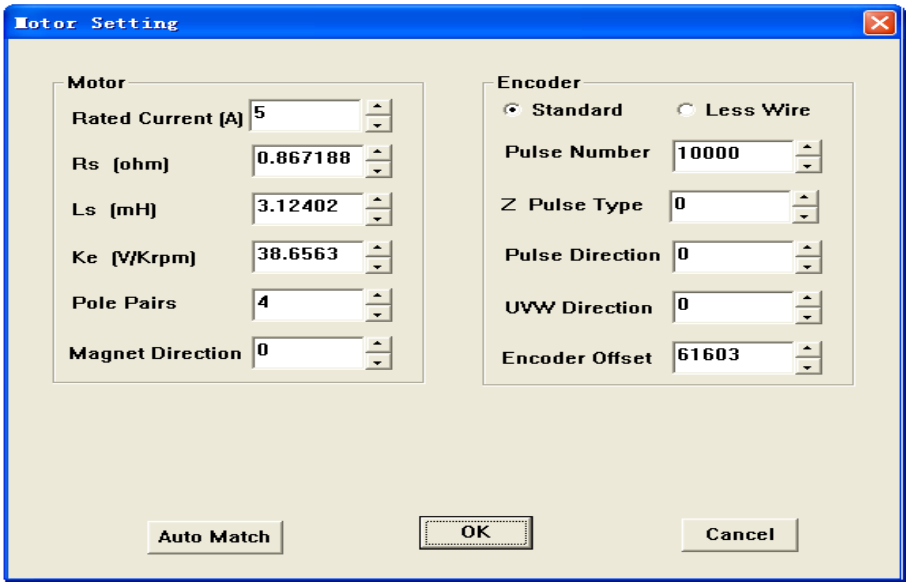
4.2.5 Config function

There are two items "Motor Config…" and "Logic I/O Config…" under the "Config" menu. **The "Aux Encoder Config…" item DOES NOT open to customers.**



1. Motor parameters adaptive function

⑴ Click "Basic Information…" and the following dialog will appear:



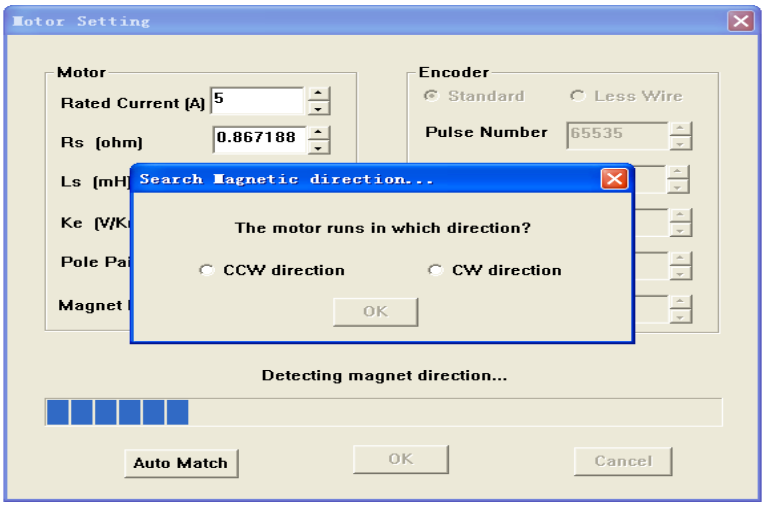
⑵ Fill in the basic data (please don't fill in other parameters)

Item	Function
Rated Current(A)	Motor nominal current
Rs（ohm）	Phase resistance
Ls（mH）	Phase inductance
Ke（V/Krpm）	Back EMF

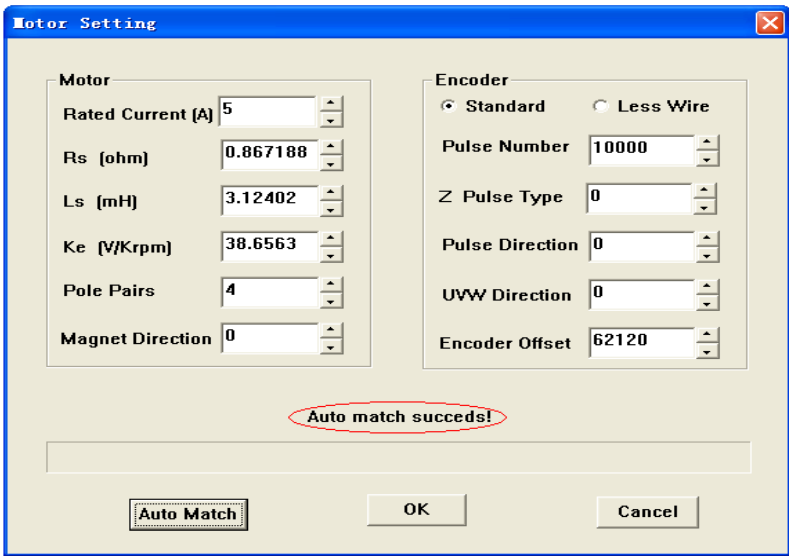
Note：This operation must be carried out by electrical engineer and the above parameters must be effective, otherwise it would cause mistake or damage.

⑶ Adaption

Click "Auto Match" to start the adaption operation, as the following dialog appears, select the right direction(face the motor shaft, "CCW direction" indicates counterclockwise direction and "CW direction" indicates clockwise0 direction), and then click "OK".



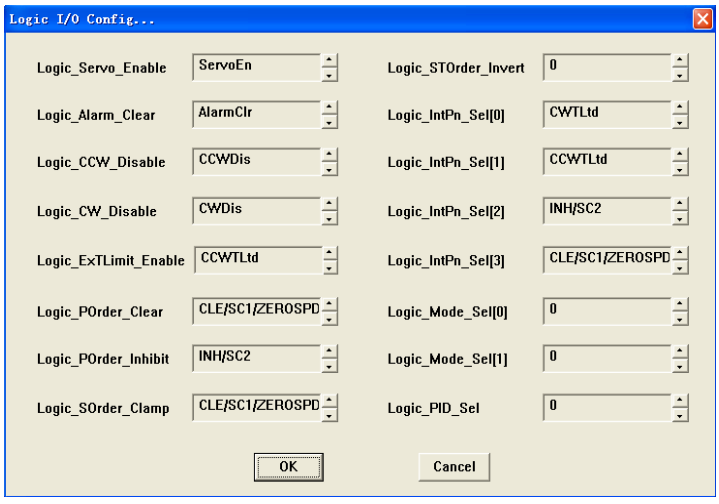
The following dialog will appear as if the adaption is successful, please save the parameters to EEPROM and power off, then power on again.



(4) If adption is not successful, maybe there is something wrong with the operation, please contact with out technical staff.

2. Mapping function

(1) Click "Logic I/O Config..." and the follow dialog will appear:



⑵ The left side part which can not be modified is the logic signal name, the right side part which can be modified by customers is the mapping port. Customers can use UP button and DOWN button to set the mapping method, then click “OK”.

Note: “0” indicates OFF or invalid, “1” indicates ON or valid.

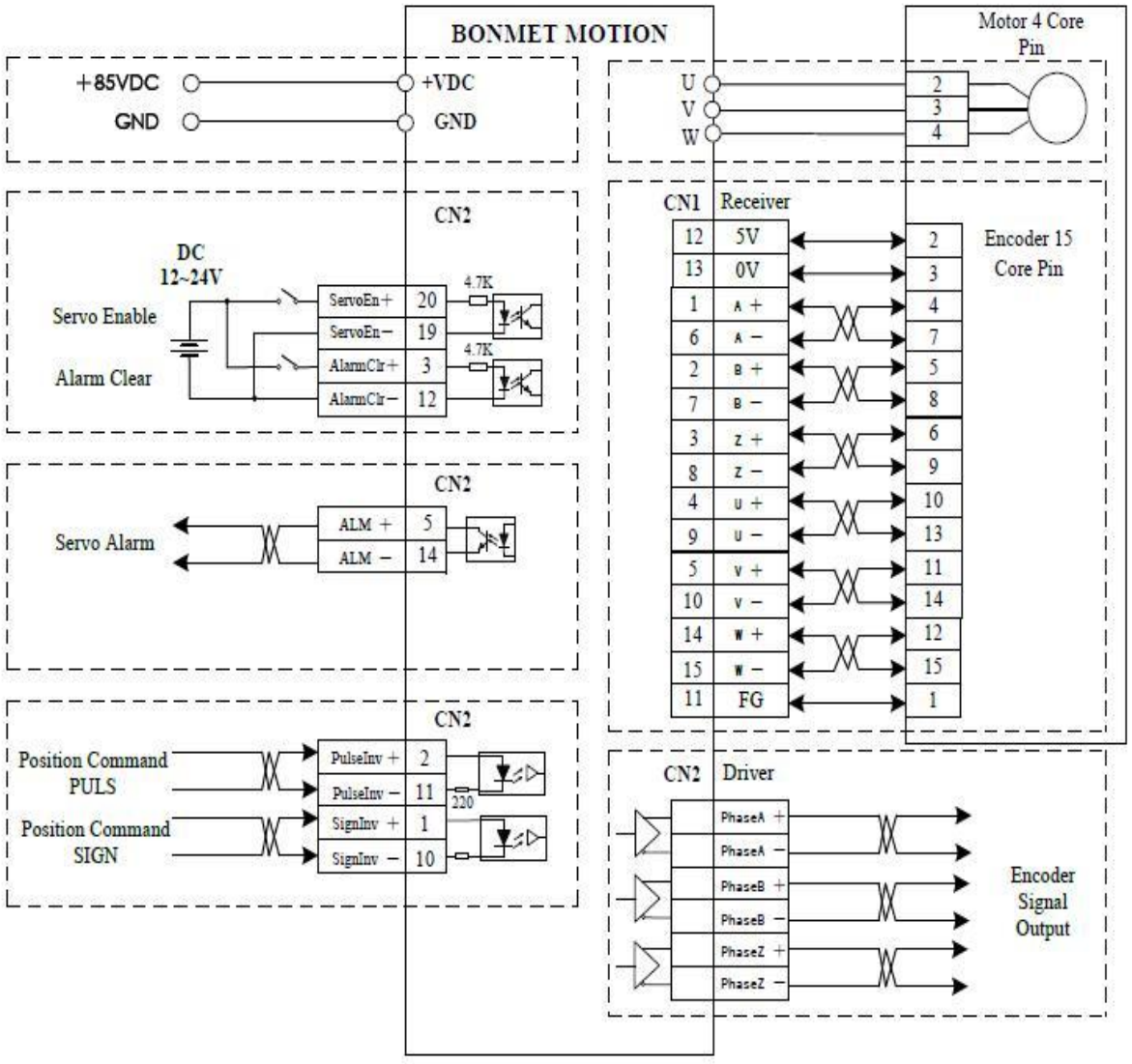
⑶ Please refer to chapter 3 for each logic input signal definition.

⑷ Please confirm that the mapping method is unique, otherwise it would cause abnormal conditions.

4.3 Position Control Mode

- Three type optional input pulse command (pulse + direction pulse, CCW+CW pulse, A /B phase pulse)
- Two types of input signal optional（open collector signal、differential signal）
- Optional electric gears
- The number of dividing pulse
- Speed limitation and torque limitation can be set

4.3.1 Terminal Diagram

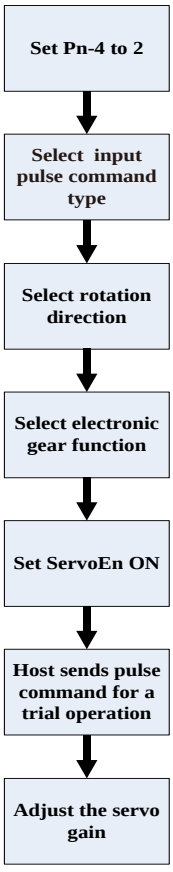


4.3.2 Parameters Settings

No.	Parameter	Function
Pn-4	Motor control mode	Select position control mode(Value: 2)
Pn-48	Denominator of electric gear	Two sets of electronic gear can be switched by the external trigger signal.
Pn-49	Numerator 1 of electric gear	
Pn-50	Numerator 2 of electric gear	
Pn-51	Dynamic electronic gear function enable	
Pn-52	External Pulse Input Type	Select the pulse command type.
Pn-53	Invert of pulse command direction	The direction of position command can be inverted with this function.
Pn-55	Position error detection range	The drive will issue position tolerance alarm when the position offset counter value exceeds the selected value×100 in position control mode.
Pn-56	Position error detection function	Set this parameter to enable the position error function or not.
Pn-30	The first speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-31	The first speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-32	The first low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-33	The first low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-36	The second speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-37	The second speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-38	The second low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-39	The second low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-44	The first Position loop proportional gain	Higher gain results in greater mechanical stiffness and less position tracking error. Too large value may cause overshoot or oscillation. It can be switched with the second Position loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-45	The first position loop differential proportional gain	Higher gain results in greater mechanical stiffness and less position tracking error. Too big value may cause overshoot or oscillation; This parameter is usually set to zero unless very fast response is required. It can be switched with the second position loop differential proportional gain automatically or

		manually (refer to chapter 5 section 4.8).
Pn-46	The first cut-off frequency of position feed forward filter	The filter is used to increase the stability of compound position control. It can be switched with the second cut-off frequency of position feed forward filter automatically or manually (refer to chapter 5 section 4.8).
Pn-47	Constant of position command filter	①Smoothen filter for the command pulse with the accelerate of index form, the value stands for time constant. The unit is ms; ②Filter would not lose input pulse but may lead to delay; ③The filter works in the follow conditions: ● Host controller has not acceleration and deceleration function; ● Larger electronic gear ratio (＞10); ● Lower command frequency; ● Motor running with jumps or other unstable conditions; ④Filter is inactive as set to 0.
Pn-66	The second Position loop proportional gain	Higher gain results in greater mechanical stiffness and less position tracking error. Too large value may cause overshoot or oscillation. It can be switched with the first Position loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-67	The second position loop differential proportional gain	Higher gain results in greater mechanical stiffness and less position tracking error. Too big value may cause overshoot or oscillation; This parameter is usually set to zero unless very fast response is required. It can be switched with the first position loop differential proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-68	The second cut-off frequency of position feed forward filter	The filter is used to increase the stability of compound position control. It can be switched with the first cut-off frequency of position feed forward filter automatically or manually (refer to chapter 5 section 4.8).
Pn-69	Enhancement of torque loop response function	As set the value to 1, it can enhance the response of the torque, but it may cause some current noise in the motor.

4.3.3 Operation Flow Chart



(1) Select position control mode.

(2) Select input pulse command type (support pulse/direction pulse , CCW/CW pulse, A phase/B phase pulse) by Pn-52.

(3) Select rotation direction by Pn-53.

(4) Select electronic gear ratio by Pn-48, Pn-49, Pn-50.

(5) Set signal "ServoEn" ON or set Pn-8 to 100000, and the motor get the power.

(6) In no-load conition (leave the motor shaft free), send pulse command for forward, reverse, acceleration / deceleration and other operation for a trial operation.

(7) Make a trial processing and adjust the servo gain according to the running status.

4.3.4 Function

1. Position error detection function（Related parameters：Pn-56, Pn-55）

⑴ The function is only effective in position mode and point to point mode, if the position deviation exceeds a threshold value, it would occur Err-16;

⑵ Set Pn-56 to 0, enable the position error detection function;

⑶ Set the threshold alarm value by Pn-55, the servo drive would alarm as the position deviation (difference between pulse command and actual stroke position) exceeds the threshold value.

The threshold alarm value = the value of Pn-55 *100pulse

2. Electronic gear function（Related parameters：Pn-48, Pn-49, Pn-50,Pn51）

⑴ $G = \frac{P}{Po} = \frac{\text{Denominator of electric gear}}{\text{Numerator of electric gear}}$

Po：The required pulse number per round

P： Encoder resolution

G： Electronic gear ratio

For example：the encoder resolution of SM110-050-30LFB is 10000ppr, if you want count 1000pulse per round,

$G = \frac{P}{Po} = \frac{10000}{1000} = 10$

Then you should set Pn-49 to 10 and Pn-48 to 1.

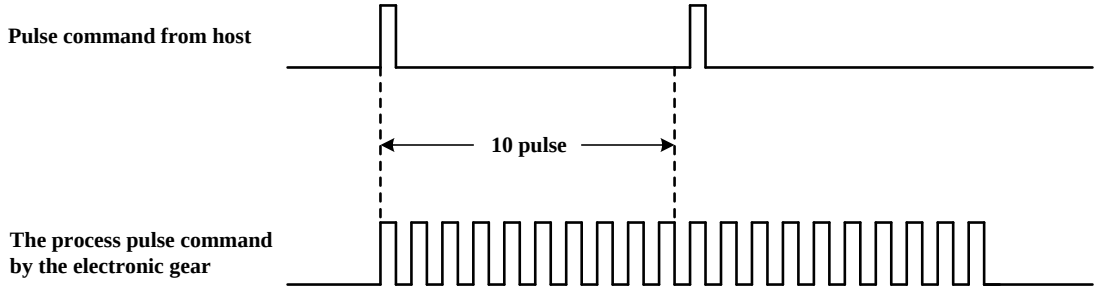


Figure 5-4 Electronic function

⑵ Set Pn-51 to 1 to enable dynamic electronic gear function, customers can switch two sets of electronic gear by the logic control signal" Logic_IntPn_Sel [0]".

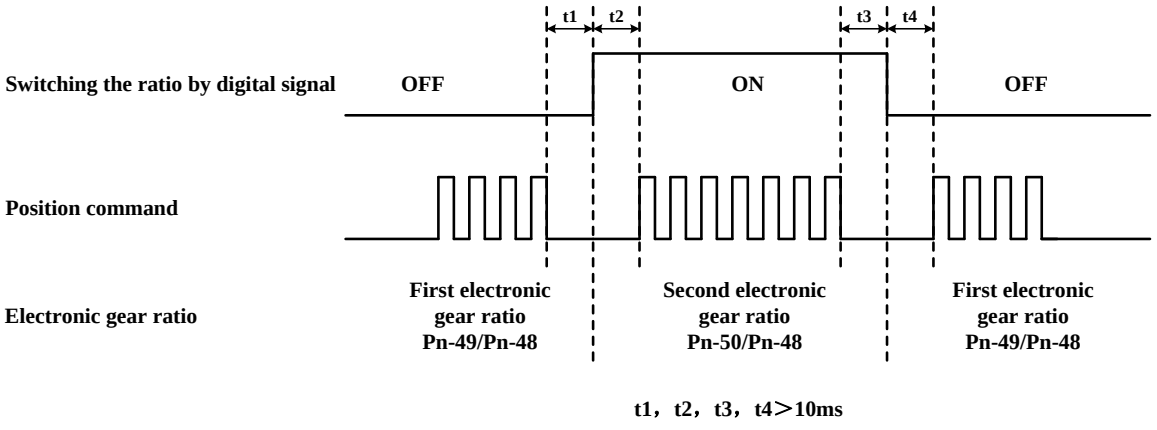
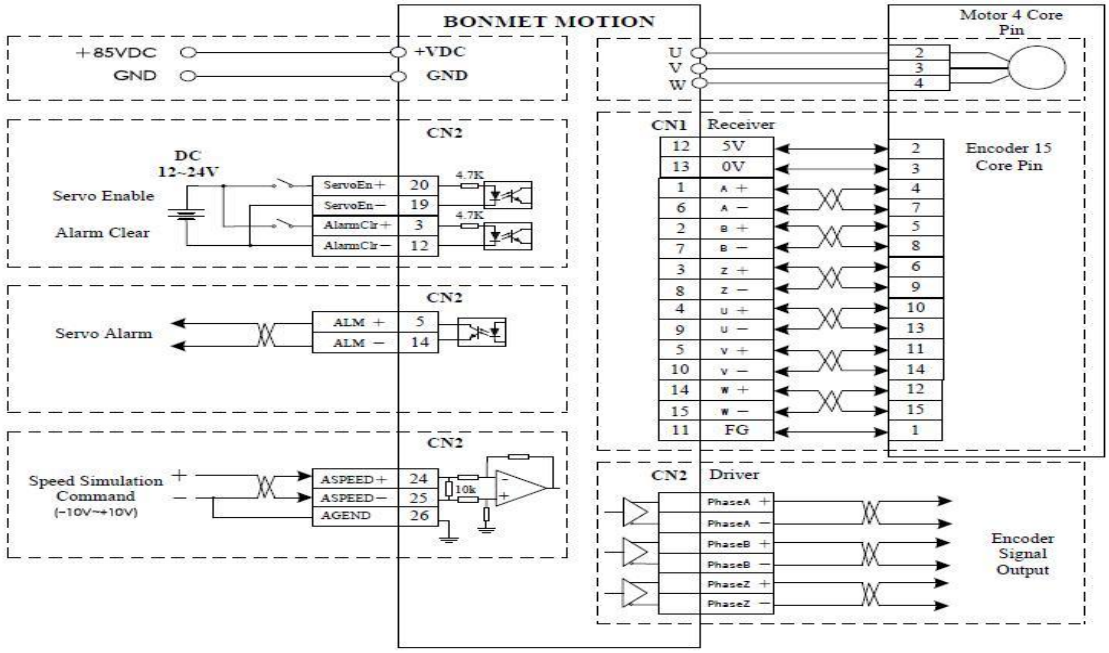


Figure 5-5 Dynamic electronic gear function

4.4 Analog Speed Control Mode

- ±10V Analog input, control the motor speed and torque simultaneously
- Control through the I / O port,
- Acceleration / deceleration time setting
- Support encoder output
- Speed limitation and torque limitation can be set

4.4.1 Terminal Diagram



4.4.2 Parameters Settings

No.	Parameter	Function
Pn-4	Motor control mode	Select speed control mode(Value: 1)
Pn-15	Gain of analog torque command input	Set the ratio between the input voltage of analog torque and actual motor torque
Pn-18	Gain of analog speed command input	Set the ratio between the input voltage of analog speed and actual motor speed.
Pn-19	Analog input drift compensation	The zero-bias compensation for the analog speed input.
Pn-20	Direction inversion of analog speed input	Set the rotation direction.(Effective in analog speed mode)
Pn-21	Low-pass bandwidth of analog speed input	Set the response time of speed analog input.
Pn-34	Acceleration time constant	Set the acceleration time constant.
Pn-35	Deceleration time constant	Set the deceleration time constant.
Pn-40	Command type of speed control	Select command type.（Value：1）
Pn-30	The first speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-31	The first speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop integral time constant automatically or manually (refer to chapter 5 section

		4.8).
Pn-32	The first low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-33	The first low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-36	The second speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-37	The second speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-38	The second low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-39	The second low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-69	Enhancement of torque loop response function	As set the value to 1, it can enhance the response of the torque, but it may cause some current noise in the motor.

4.4.3 Operation Flow Chart

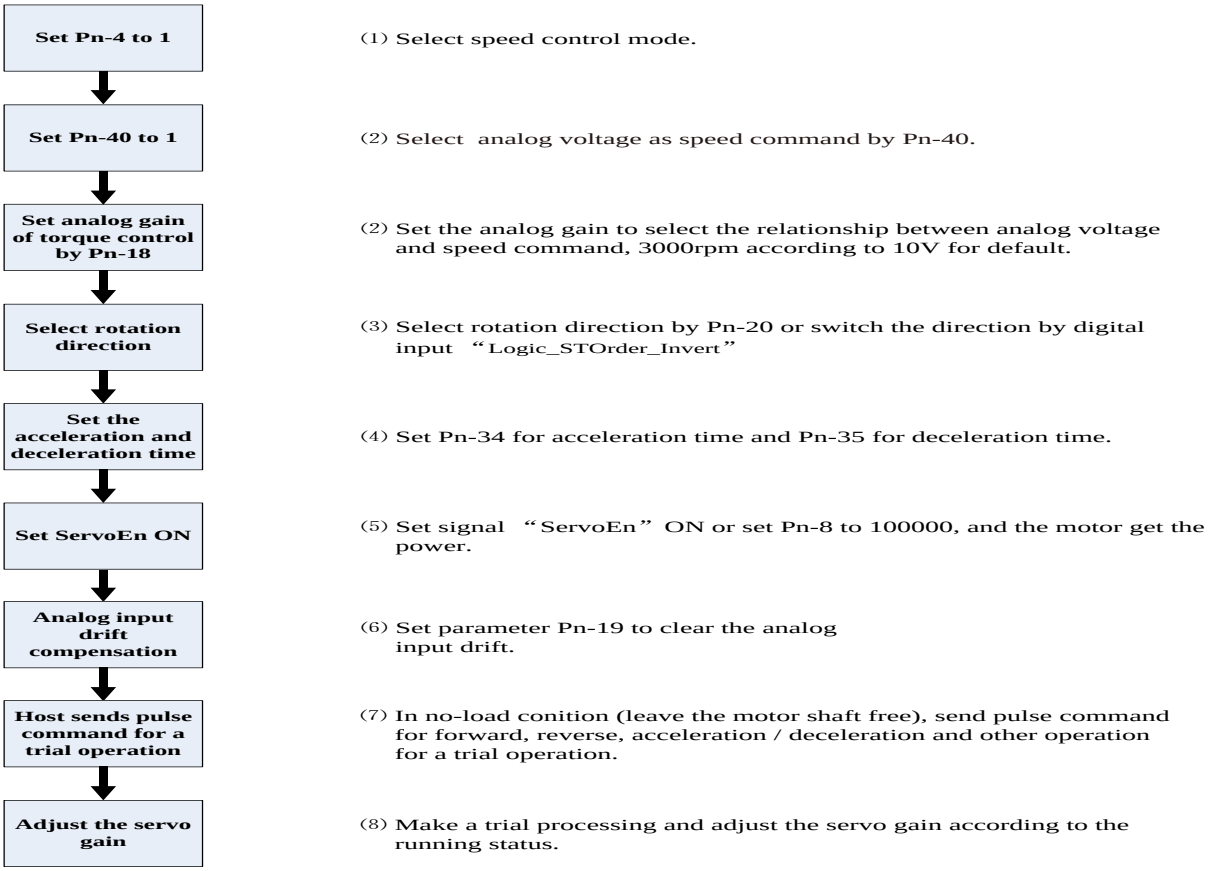
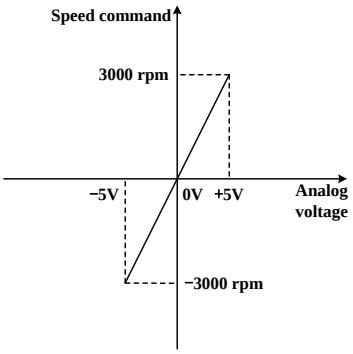
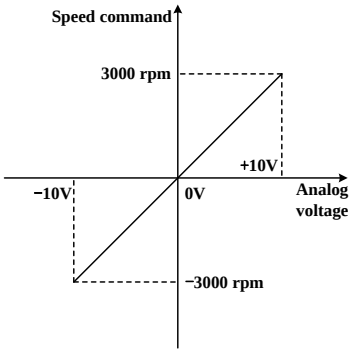
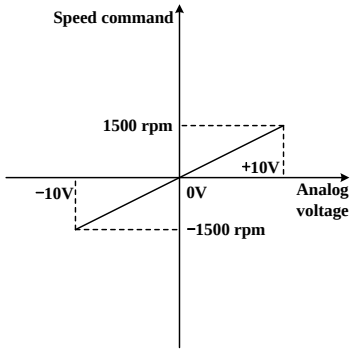


Figure 5-7 Operation Flow Chart

Function

1. Analog gain setting function（Related parameters：Pn-18）

Set the ratio between the input voltage of analog speed and actual motor speed.，they are proportional relationship. Value of Pn-18=(Max. input/Max. speed command)×30000。The default value is 100， which means 10Vsupport speed command of 3000rpm.

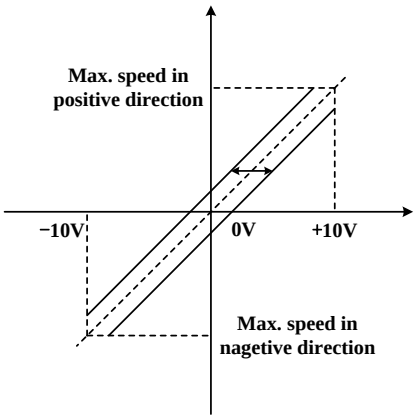
Item	Pn-18=50	Pn-18=100	Pn-18=200
Relationship of input voltage and output speed			

2. Analog input drift compensation function（Related parameters：Pn-19）

- Customers can use the analog input drift compensation function to deal with the analog input drift.

⑴ Make a correct wiring and set the analog voltage to 0V.

⑵ Check the motor speed by the drive monitor functions, adjust the value of the parameter Pn-19 to compensate. As the zero-drift speed is a positive value, the parameter should be set a positive value; while the zero-drift speed is a negative value, the parameter should be set a negative value.



3. Acceleration / deceleration time setting（Related parameters：Pn-34，Pn-35）

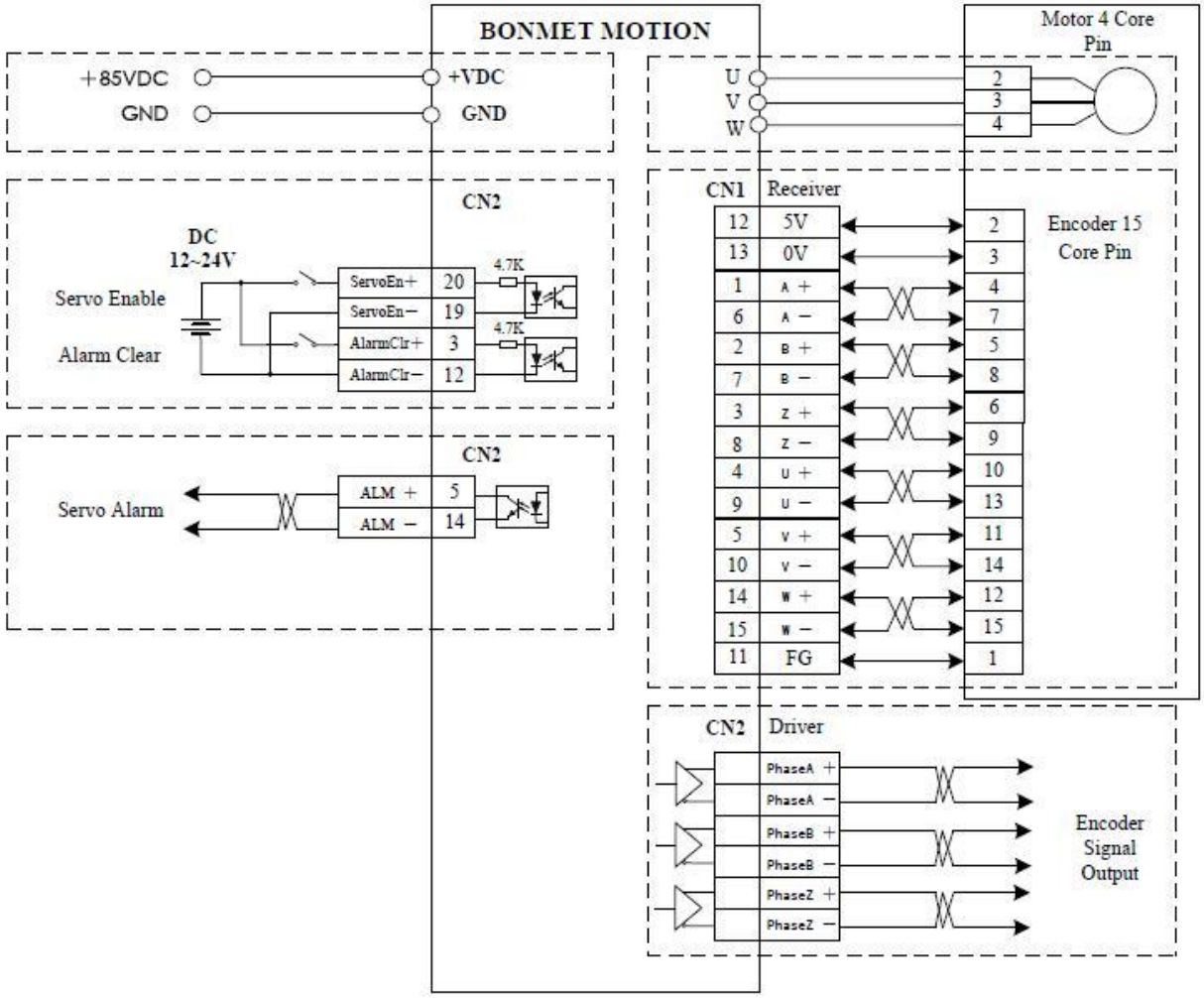
⑴ In case of overloading, it is suggested to set the acceleration / deceleration time to avoid the impact of the instantaneous large current to avoid error or failure.

⑵ Set the value of Pn-34 for acceleration time constant while Pn-35 for deceleration time constant, the unit is ms.

4.5 Internal Speed Control Mode

- Internal speed command
- Switch commands by digital input terminal
- Acceleration / deceleration time setting
- Speed limitation and torque limitation can be set

4.5.1 Terminal Diagram

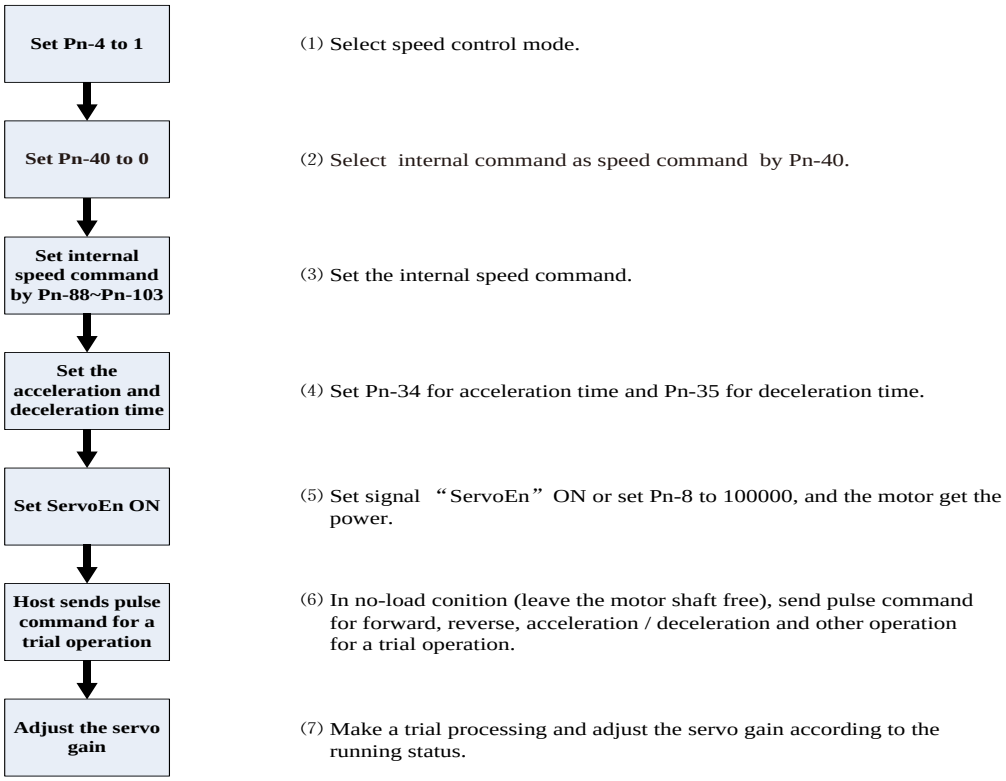


4.5.2 Parameters Settings

No.	Parameter	Function
Pn-4	Motor control mode	Select speed control mode(Value: 1)
Pn-34	Acceleration time constant	Set the acceleration time constant.
Pn-35	Deceleration time constant	Set the deceleration time constant.
Pn-40	Command type of speed control	Select command type.（Value: 0）
Pn-88~ Pn-103	Internal speed command 1~ 16	Set the speed command, the unit is rpm.
Pn-30	The first speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).

Pn-31	The first speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-32	The first low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-33	The first low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-36	The second speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-37	The second speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-38	The second low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-39	The second low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-69	Enhancement of torque loop response function	As set the value to 1, it can enhance the response of the torque, but it may cause some current noise in the motor.

4.5.3 Operation Flow Chart



4.5.4 Function

1. Acceleration / deceleration time setting（Related parameters: Pn-34，Pn-35）

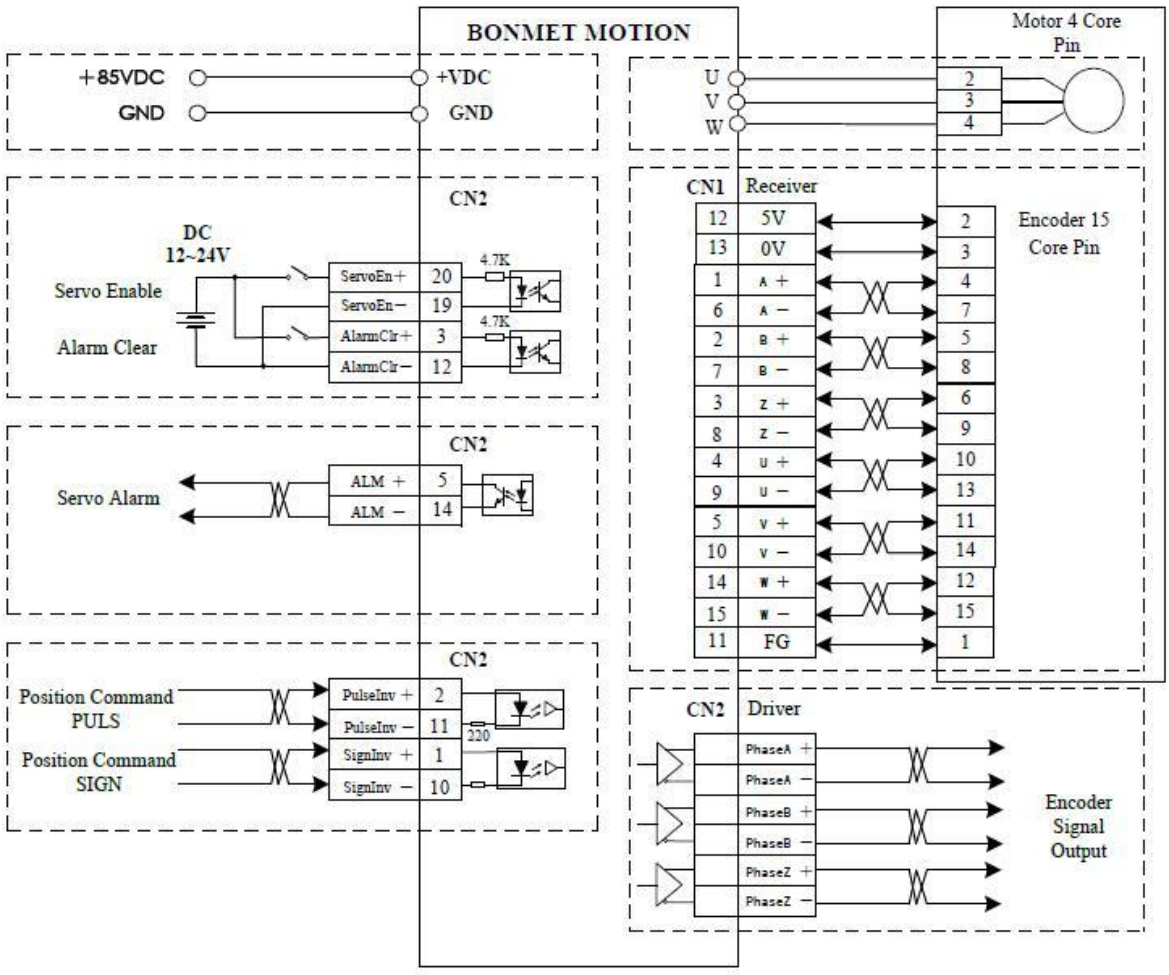
⑴ In case of overloading, it is suggested to set the acceleration / deceleration time to avoid the impact of the instantaneous large current to avoid error or failure.

⑵ Set the value of Pn-34 for acceleration time constant while Pn-35 for deceleration time constant, the unit is ms.

4.6 Pulse Speed Control Mode

- Three type optional input pulse command(pulse/direction pulse, CCW/CW pulse, A phase/B phase pulse)
- Two types of input signal optional（open collector signal、differential signal）
- Optional electric gears
- Speed limitation and torque limitation can be set

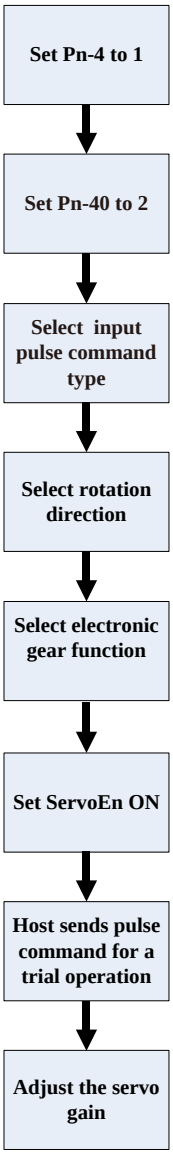
4.6.1 Terminal Diagram



4.6.2 Parameters Setting

No.	Parameter	Function
Pn-4	Motor control mode	Select speed control mode(Value: 1)
Pn-40	Command type of speed control	Select command type.（Value: 2）
Pn-48	Denominator of electric gear	Two sets of electronic gear can be switched by the external trigger signal.
Pn-49	Numerator 1 of electric gear	
Pn-50	Numerator 2 of electric gear	
Pn-51	Dynamic electronic gear function enable	
Pn-52	Input pulse command mode	Select the pulse command type.
Pn-53	Invert direction of pulse command	The direction of position command can be inverted with this function.
Pn-30	The first speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-31	The first speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the second speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-32	The first low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-33	The first low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the second low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-36	The second speed loop proportional gain	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop proportional gain automatically or manually (refer to chapter 5 section 4.8).
Pn-37	The second speed loop integral time constant	The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. It can be switched with the first speed loop integral time constant automatically or manually (refer to chapter 5 section 4.8).
Pn-38	The second low-pass bandwidth of speed loop	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass bandwidth of speed loop automatically or manually (refer to chapter 5 section 4.8).
Pn-39	The second low-pass filter bandwidth of torque command	Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation. It can be switched with the first low-pass filter bandwidth of torque command automatically or manually (refer to chapter 5 section 4.8).
Pn-69	Enhancement of torque loop response function	As set the value to 1, it can enhance the response of the torque, but it may cause some current noise in the motor.

4.6.3 Operation Flow Chart



⑴ Select speed control mode.

⑵ Select pulse command as speed command by Pn-40.

⑶ Select input pulse command type (support pulse/direction pulse , CCW/CW pulse, A phase/B phase pulse) by Pn-52.

⑷ Select rotation direction by Pn-53.

⑸ Select electronic gear ratio by Pn-48, Pn-49, Pn-50.

⑹ Set signal “ServoEn” ON or set Pn-8 to 100000, and the motor get the power.

⑺ In no-load conition (leave the motor shaft free), send pulse command for forward, reverse, acceleration / deceleration and other operation for a trial operation.

⑻ Make a trial processing and adjust the servo gain according to the running status.

4.6.4 Function

1. Acceleration / deceleration time setting（Related parameters: Pn-34，Pn-35）

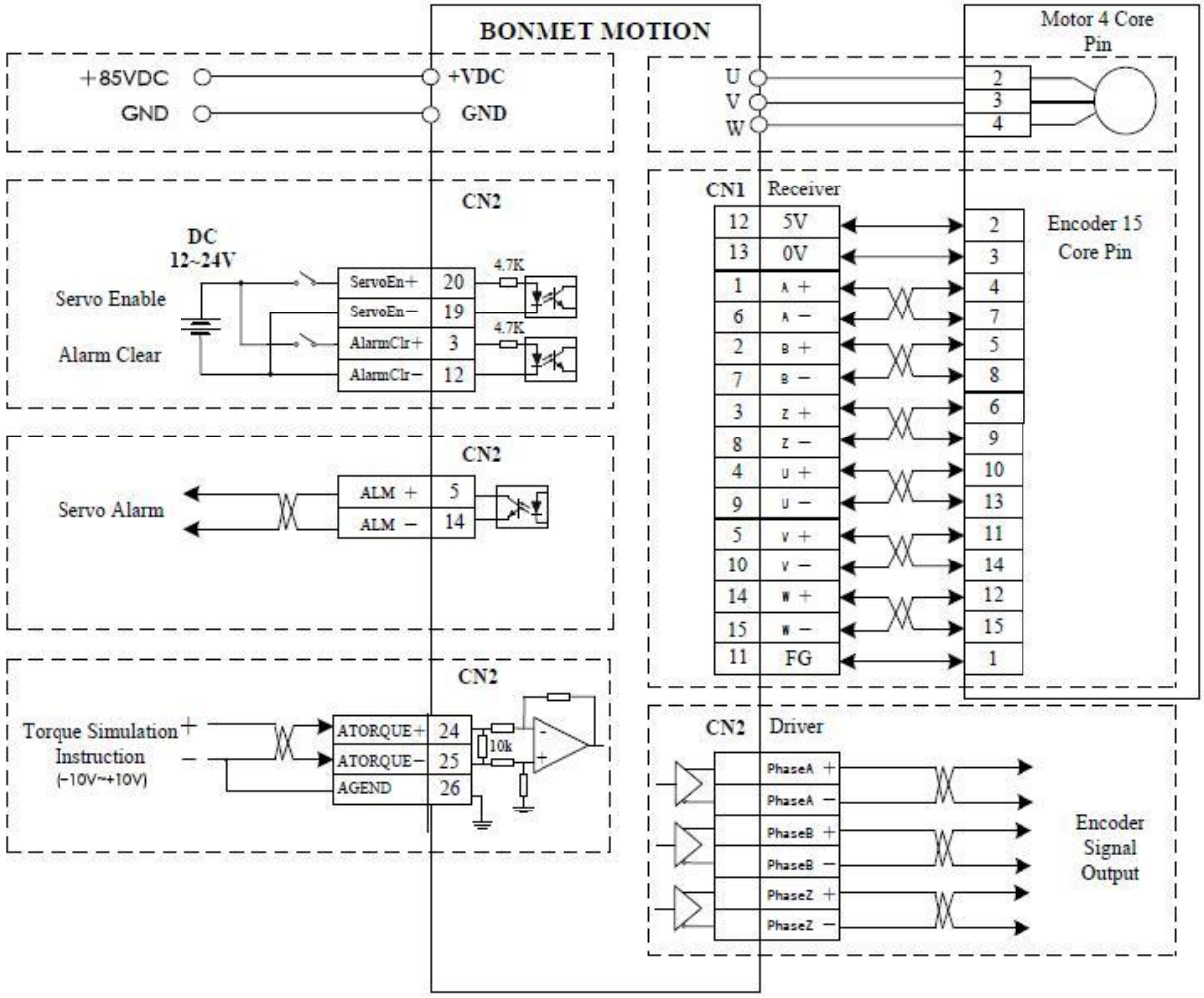
⑴ In case of overloading, it is suggested to set the acceleration / deceleration time to avoid the impact of the instantaneous large current to avoid error or failure.

⑵ Set the value of Pn-34 for acceleration time constant while Pn-35 for deceleration time constant, the unit is ms.

4.7 Analog Torque Control Mode

- ±10V Analog input
- Analog input drift compensation function
- Control through the I / O port, switching the rotation direction by digital input terminal
- Speed limitation and torque limitation can be set

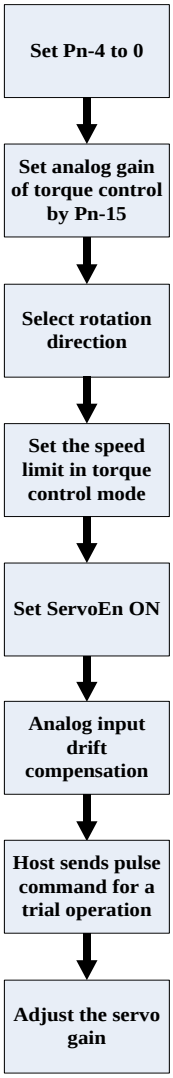
4.7.1 Terminal Diagram



4.7.2 Parameters Setting

No.	Parameter	Function
Pn-4	Motor control mode	Select torque control mode(Value: 0)
Pn-15	Gain of analog torque command input	Set the ratio between the input voltage of analog torque and actual motor torque
Pn-16	Analog input drift compensation	The zero-bias compensation for the analog torque input.
Pn-17	Direction inversion of analog speed input	Set the rotation direction.(Effective in analog torque mode)
Pn-42	Speed limit	Limit the maximum speed in torque control mode to avoid overspeed when the motor is unloaded, parameter unit is rpm.

4.7.3 Operation Flow Chart



(1) Select torque control mode.

(2) Set the analog gain to select the relationship between analog voltage and torque command, 100% output torque according to 10V for default.

(3) Select rotation direction by Pn-17 or switch the direction by digital input "Logic_STOrder_Invert"

(4) Set the speed limit in torque control mode by Pn-42.

(5) Set signal "ServoEn" ON or set Pn-8 to 100000, and the motor get the power.

(6) Set parameter Pn-16 to clear the analog input drift.

(7) In no-load conition (leave the motor shaft free), send pulse command for forward, reverse, acceleration / deceleration and other operation for a trial operation.

(8) Make a trial processing and adjust the servo gain according to the running status.

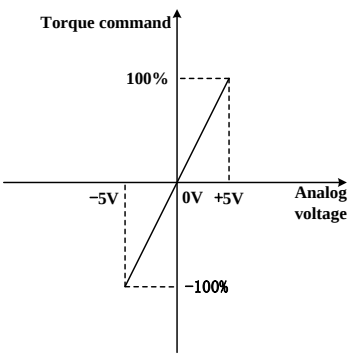
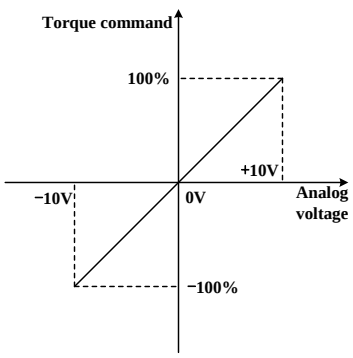
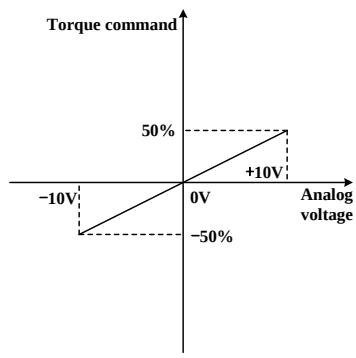
Figure 5-22 Operation Flow Chart

4.7.4 Function

1. Analog gain setting function（Related parameters：Pn-15）

Set the ratio between the input voltage of analog torque and actual motor torque.，they are proportional relationship.

Value of Pn-15=(Max. input/Max. torque command)×10。The default value is 100，which means 10Vsupport 100% torque.

Item	Pn-15=50	Pn-15=100	Pn-15=200
Relationship of input voltage and output torque			

2. Analog compensation function（Related parameters：Pn-16）

- Customers can use the analog input drift compensation function to deal with the analog input drift.

⑴ Make a correct wiring and set the analog voltage to 0V.

⑵ Check the output torque by the drive monitor functions, adjust the value of the parameter Pn-16 to compensate. As the zero-drift torque is a positive value, the parameter should be set a positive value; while the zero-drift torque is a negative value, the parameter should be set a negative value.

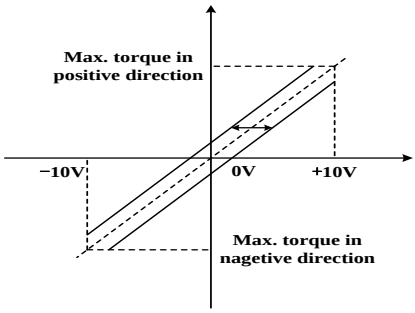


Figure 5-23

4.8 Gain Adjustment

- The purpose of adjusting the servo system is to minimize the level of inaccuracy of the servo motor when operating under instructions and also shorten the time of travel. Doing so needs to adjust gain parameter and compensation parameter.
- The wrong parameter settings may lead to equipment failure and accidents, users should confirm the correctness of the parameters before operation.
- It is suggested that operate without load for testing firstly.

1. Speed adjust

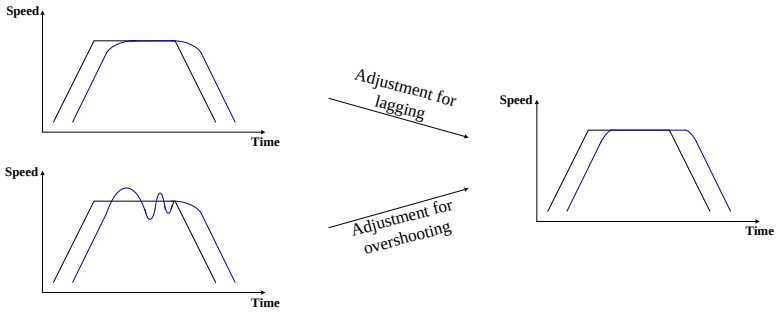


Figure 5-40

2. Position adjust

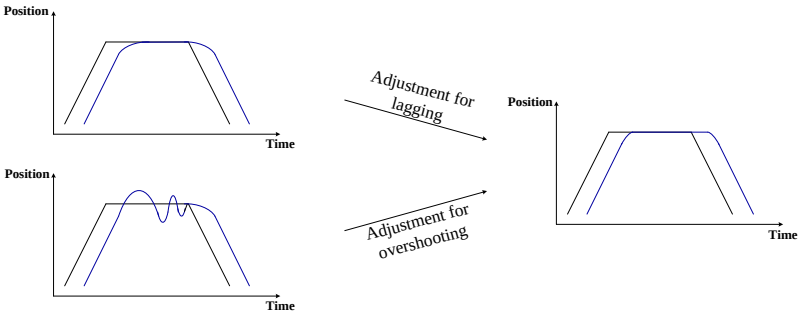
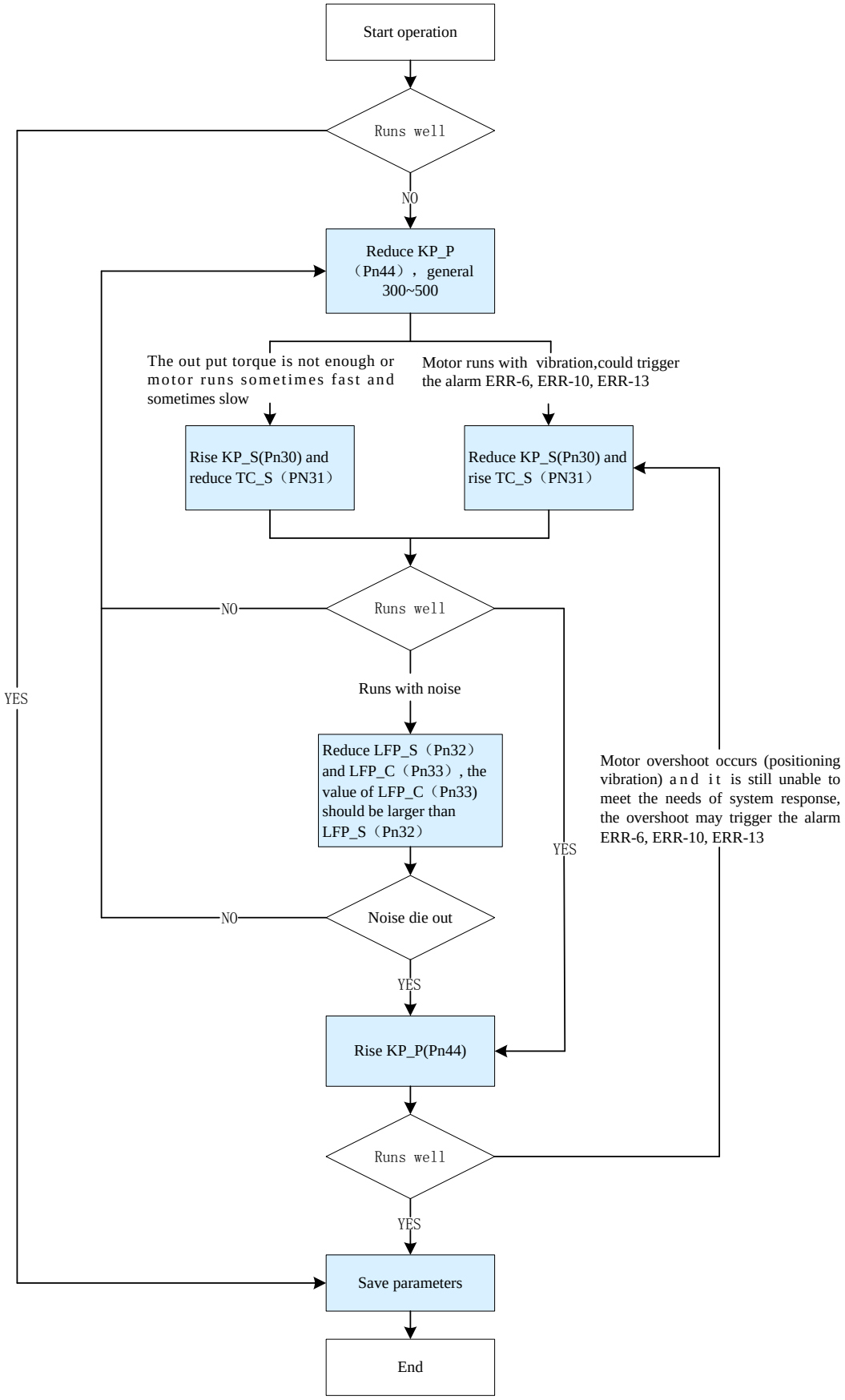


Figure 5-41

3. Function

- **Speed loop gain（KP_S; Related parameters: Pn-30，Pn-36）**
  The larger the value is, the greater the stiffness would be. The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. If there is no oscillation, the larger the value is the better the servo system performs.
- **Speed loop integral time constant（TC_S; Related parameters: Pn-31, Pn-37）**
  The smaller the value is, the greater the stiffness is. The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. Set the parameter as small as possible without oscillation.
- **Low-pass bandwidth of speed loop（LFP_S; Related parameters: Pn-32, Pn-38）**
  Normally, smaller value results in slower and smoother speed response. Too small value may cause system oscillation.
- **Low-pass filter bandwidth of torque command（LFP_C; Related parameters: Pn-33, Pn-39）**
  Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation.
- **Position loop proportional gain（KP_P; Related parameters: Pn-44，Pn-66）**
  Higher gain results in greater mechanical stiffness and less position tracking error. Too large value may cause overshoot or oscillation. The value is determined by the type and the load of servo drive.
- **Position loop differential proportional gain（Kd; Related parameters: Pn-45，Pn-67）**
  Higher gain results in greater mechanical stiffness and less position tracking error. Too big value may cause overshoot or oscillation; This parameter is usually set to zero unless very fast response is required
- **The cut-off frequency of position feed forward filter（FLFP_P; Related parameters: Pn-46，Pn-68）**
  The filter is used to increase the stability of compound position control. Normally, users do not need to change the default value.
- **Enhancements of the current loop response（Pn-69）**
  As requiring higher response, users can use this function to enhance current loop response by set Pn-69 to 1. It will enhance the stiffness of the motor and may cause some noise.

4. Adjust operation



Note: in speed control mode, customers just need to adjust speed gain.

5. Gain switching function

BONMET servo drive support two sets PID parameters for gain switching function.

The first set of PID parameter		The second set of PID parameter	
Number	Name	Number	Name
Pn-30	Speed loop proportional gain（PID1）	Pn-36	Speed loop proportional gain（PID2）
Pn-31	Speed loop integral time constant（PID1）	Pn-37	Speed loop integral time constant（PID2）
Pn-32	Low-pass bandwidth of speed loop（PID1）	Pn-38	Low-pass bandwidth of speed loop（PID2）
Pn-33	Low-pass filter bandwidth of torque command（PID1）	Pn-39	Low-pass filter bandwidth of torque command（PID2）
Pn-44	Position loop proportional gain（PID1）	Pn-66	Position loop proportional gain（PID2）
Pn-45	Position loop differential proportional gain（PID1）	Pn-67	Position loop differential scale factor（PID2）
Pn-46	The cut-off frequency of position feed forward filter（PID1）	Pn-68	The cut-off frequency of position feed forward filter（PID2）

① Fixed to the first set of PID parameters.

Set Pn-64 to 0.

② Fixed to the second set of PID parameters.

Set Pn-64 to 1.

③ Switch the PID parameters by digital input. (NOT SUPPORT)

⑴ Set Pn-64 to 2 and build the mapping of the logic signal “Logic_PID_Sel” and the physical digital input (refer to chapter 5 section 5.16.5).

⑵ As “Logic_PID_Sel” is OFF, the first set of PID parameters are valid, while as “Logic_PID_Sel” is ON, the second set of PID parameters are valid.

④ Switch the PID parameters by position deviation.

⑴ Set Pn-64 to 3 for switch mode, and set the trigger value by Pn-65.

⑵ As the position deviation value (position deviation value = pulse commands － feedback pulse, the unit is pulse) is less than trigger value, the first set of PID parameters are valid, while as the position deviation value is larger than trigger value, the second set of PID parameters are valid.

⑤ Switch the PID parameters by speed deviation.

⑴ Set Pn-64 to 4 for switch mode, and set the trigger value by Pn-65.

⑵ As the speed deviation value (speed deviation value = speed commands －motor speed, the unit is rpm) is less than trigger value, the first set of PID parameters are valid, while as the speed deviation value is larger than trigger value, the second set of PID parameters are valid.

⑥ Switch the PID parameters by motor speed.

⑴ Set Pn-64 to 5 for switch mode, and set the trigger value by Pn-65.

⑵ As the motor speed (the unit is rpm) is less than trigger value, the first set of PID parameters are valid, while as the motor speed is larger than trigger value, the second set of PID parameters are valid.

⑦ Switch the PID parameters by motor output torque.

⑴ Set Pn-64 to 6 for switch mode, and set the trigger value by Pn-65.

⑵ As the motor output torque (the unit is %) is less than trigger value, the first set of PID parameters are valid, while as the motor output torque is larger than trigger value, the second set of PID parameters are valid.

4.9 Overload Alarming Function

1. Function

When the motor output torque is over the alarming threshold value (Pn-22) and the last time is over the selected testing time, the servo drive will alarm Err-18, the motor will stop.

2. Operation

⑴ Set the overload alarming threshold value by Pn-22

⑵ Set the overload testing time through by Pn-23

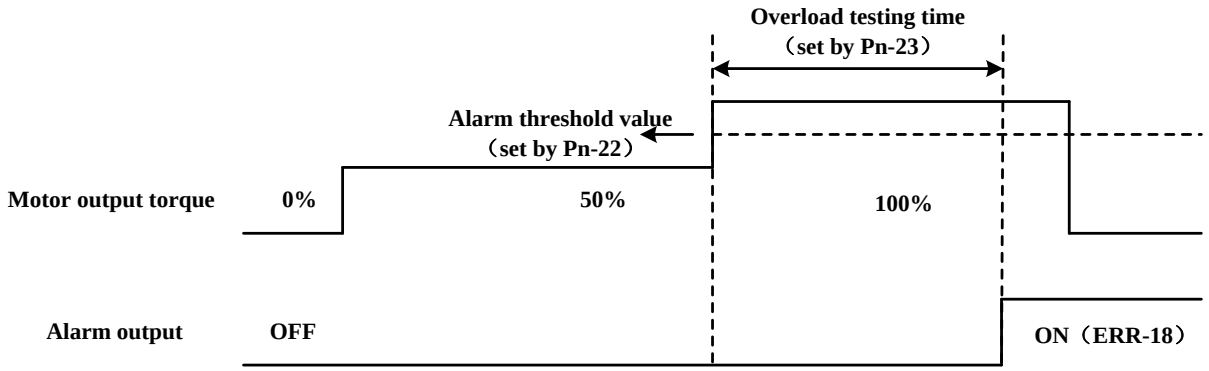


Figure 5-38 Overload alarming function

Chapter5 Parameters

6.1 Parameter List

- The parameter “R-1”~“R-34” only can be modified by bus functions, can not be modified by panel.
- Control mode: “ALL” means for the parameter is valid for all control mode, “P” means for the parameter is valid for position control mode, “S” means for the parameter is valid for speed control mode, “T” means for the parameter is valid for torque control mode, “SP” means for the parameter is valid for point to point control mode, “D” means for the parameter is valid for demo mode.

No.	Control mode	Parameter	No.	Control mode	Parameter
0	ALL	Firmware version	25	ALL	Internal torque limit in negative (CW) direction
1	ALL	Motor type code	26	ALL	Internal torque limit in positive (CCW) direction
2	ALL	User constants protection code	27	ALL	Torque limit mode
3	ALL	Drive status (Front Panel Display)	28	ALL	Notch function
4	ALL	Motor control mode	29	ALL	Notch frequency
5	ALL	Mechanical brake delay time	30	ALL	The first speed loop proportional gain（PID1）
6	ALL	Current turn off delay time	31	ALL	The first speed loop integral time constant（PID1）
7	ALL	Threshold speed of current turn off delay time	32	ALL	The first low-pass bandwidth of speed loop（PID1）
8	ALL	Anti-control of low-6-bit digital input	33	ALL	The first low-pass filter bandwidth of torque command（PID1）
9	ALL	Anti-control of high-4-bit digital input	34	S	Acceleration time in speed control

No.	Control mode	Parameter	No.	Control mode	Parameter
10	ALL	Anti-control of encoder feedback	35	S	Deceleration time in speed control
11	ALL	Force-ON of low-6-bit digital input	36	ALL	The second speed loop proportional gain（PID2）
12	ALL	Force-ON of high-4-bit digital input	37	ALL	The second speed loop integral time constant（PID2）
13	ALL	Anti-control of high-4-bit digital output	38	ALL	The second low-pass bandwidth of speed loop（PID2）
14	ALL	Anti-control of low-3-bit digital output	39	ALL	The second low-pass filter bandwidth of torque command（PID2）
15	T	Gain of analog torque command input	40	S	Speed command mode
16	T	Analog input drift compensation of torque command	41	S	Speed command in JOG control mode（NOT SUPPORT）
17	T	Invert the direction of analog torque command	42	ALL	Speed limit
18	S	Gain of analog speed command input	43	S	Theshold value of speed reached output（NOT SUPPORT）
19	S	Analog input drift compensation of speed command	44	P	The first Position loop proportional gain（PID1）
20	S	Invert the direction of analog speed command	45	P	The first position loop differential proportional gain（PID1）
21	S	Low-pass bandwidth of analog speed input	46	P	The first cut-off frequency of position feed forward filter（PID1）
22	ALL	Threshold value of torque overload alarm	47	P	Constant of position command filter
23	ALL	Testing time of torque over load alarm	48	P，S	Denominator of electric gear ratio
24	ALL	Internal brake resistor temperature alarm function（NOT SUPPORT）	49	P，S	Numerator 1 of electric gear ratio
50	P，S	Numerator 2 of electric gear ratio	81	D	Internal torque command 10
51	P，S	Electric gear ratio switching function	82	D	Internal torque command 11
52	P	External pulse input type	83	D	Internal torque command 12
53	P	Invert of pulse command direction	84	D	Internal torque command 13
54	P	Range of positioning complete function（NOT SUPPORT）	85	D	Internal torque command 14
55	P	Position error detection range	86	D	Internal torque command 15
56	P	Position error detection function	87	D	Internal torque command 16
57	ALL	Encoder output ratio（NOT SUPPORT）	88	S，D	Internal speed command 1
58	SP	Homing mode（NOT SUPPORT）	89	S，D	Internal speed command 2
59	SP	Homing speed（NOT SUPPORT）	90	S，D	Internal speed command 3
60	SP	Acceleration / deceleration in homing operation（NOT SUPPORT）	91	S，D	Internal speed command 4
61	SP	High bit of home position offset（NOT SUPPORT）	92	S，D	Internal speed command 5
62	SP	Low bit of home position offset（NOT SUPPORT）	93	S，D	Internal speed command 6
63	SP，D	Demo or point to point mode selection	94	S，D	Internal speed command 7
64	ALL	Gain (PID) parameter switching mode	95	S，D	Internal speed command 8

No.	Control mode	Parameter	No.	Control mode	Parameter
65	ALL	Trigger value of gain (PID) parameter switching function	96	S，D	Internal speed command 9
66	P	The second position loop proportional gain（PID2）	97	S，D	Internal speed command 10
67	P	The second position loop differential proportional gain（PID2）	98	S，D	Internal speed command 11
68	P	The second cut-off frequency of position feed forward filter（PID2）	99	S，D	Internal speed command 12
69	ALL	Enhancement of torque loop response function	100	S，D	Internal speed command 13
70	—	Reservation	101	S，D	Internal speed command 14
71	—	Reservation	102	S，D	Internal speed command 15
72	D	Internal torque command 1	103	S，D	Internal speed command 16
73	D	Internal torque command 2	104	SP，D	High bit of internal position command 1
74	D	Internal torque command 3	105	SP，D	Low bit of internal position command 1
75	D	Internal torque command 4	106	SP，D	Speed of internal position command 1
76	D	Internal torque command 5	107	SP，D	Acceleration/deceleration of internal position command 1
77	D	Internal torque command 6	108	SP，D	Peak torque of internal position command 1
78	D	Internal torque command 7	109	SP，D	High bit of internal position command 2
79	D	Internal torque command 8	110	SP，D	Low bit of internal position command 2
80	D	Internal torque command 9	111	SP，D	Speed of internal position command 2
112	SP，D	Acceleration/deceleration of internal position command 2	143	SP，D	Peak torque of internal position command 8
113	SP，D	Peak torque of internal position command 2	144	SP，D	High bit of internal position command 9
114	SP，D	High bit of internal position command 3	145	SP，D	Low bit of internal position command 9
115	SP，D	Low bit of internal position command 3	146	SP，D	Speed of internal position command 9
116	SP，D	Speed of internal position command 3	147	SP，D	Acceleration/deceleration of internal position command 9
117	SP，D	Acceleration/deceleration of internal position command 3	148	SP，D	Peak torque of internal position command 9
118	SP，D	Peak torque of internal position command 3	149	SP，D	High bit of internal position command 10
119	SP，D	High bit of internal position command 4	150	SP，D	Low bit of internal position command 10
120	SP，D	Low bit of internal position command 4	151	SP，D	Speed of internal position command 10
121	SP，D	Speed of internal position command 4	152	SP，D	Acceleration/deceleration of internal position command 10
122	SP，D	Acceleration/deceleration of internal position command 4	153	SP，D	Peak torque of internal position command 10
123	SP，D	Peak torque of internal position command 4	154	SP，D	High bit of internal position command 11
124	SP，D	High bit of internal position command 5	155	SP，D	Low bit of internal position command 11
125	SP，D	Low bit of internal position command 5	156	SP，D	Speed of internal position command 11

No.	Control mode	Parameter	No.	Control mode	Parameter
126	SP，D	Speed of internal position command 5	157	SP，D	Acceleration/deceleration of internal position command 11
127	SP，D	Acceleration/deceleration of internal position command 5	158	SP，D	Peak torque of internal position command 11
128	SP，D	Peak torque of internal position command 5	159	SP，D	High bit of internal position command 12
129	SP，D	High bit of internal position command 6	160	SP，D	Low bit of internal position command 12
130	SP，D	Low bit of internal position command 6	161	SP，D	Speed of internal position command 12
131	SP，D	Speed of internal position command 6	162	SP，D	Acceleration/deceleration of internal position command 12
132	SP，D	Acceleration/deceleration of internal position command 6	163	SP，D	Peak torque of internal position command 12
133	SP，D	Peak torque of internal position command 6	164	SP，D	High bit of internal position command 13
134	SP，D	High bit of internal position command 7	165	SP，D	Low bit of internal position command 13
135	SP，D	Low bit of internal position command 7	166	SP，D	Speed of internal position command 13
136	SP，D	Speed of internal position command 7	167	SP，D	Acceleration/deceleration of internal position command 13
137	SP，D	Acceleration/deceleration of internal position command 7	168	SP，D	Peak torque of internal position command 13
138	SP，D	Peak torque of internal position command 7	169	SP，D	High bit of internal position command 14
139	SP，D	High bit of internal position command 8	170	SP，D	Low bit of internal position command 14
140	SP，D	Low bit of internal position command 8	171	SP，D	Speed of internal position command 14
141	SP，D	Speed of internal position command 8	172	SP，D	Acceleration/deceleration of internal position command 14
142	SP，D	Acceleration/deceleration of internal position command 8	173	SP，D	Peak torque of internal position command 14
174	SP，D	High bit of internal position command 15	R-10	ALL	FPGA version
175	SP，D	Low bit of internal position command 15	R-11	ALL	Index Reset Status
176	SP，D	Speed of internal position command 15	R-12	ALL	Index reset encoder counts
177	SP，D	Acceleration/deceleration of internal position command 15	R-13	ALL	Real-time encoder counts
178	SP，D	Peak torque of internal position command 15	R-14	ALL	CN2 input terminal status
179	SP，D	High bit of internal position command 16	R-15	ALL	Encoder input terminal status
180	SP，D	Low bit of internal position command 16	R-16	ALL	CN2 output terminal status
181	SP，D	Speed of internal position command 16	R-17	ALL	The analog voltage of analog input port A
182	SP，D	Acceleration/deceleration of internal position command 16	R-18	ALL	The analog voltage of analog input port B
183	SP，D	Peak torque of internal position command 16	R-19	ALL	DC bus voltage
184	ALL	Fieldbus selection	R-20	ALL	The current torque value
185	ALL	Modbus address	R-21	ALL	The current speed value
186	ALL	Modbus communication baud rate	R-22	ALL	The current high bit position value
187	ALL	Modbus communication frame type	R-23	ALL	The current low bit position value

No.	Control mode	Parameter	No.	Control mode	Parameter
188	ALL	CANOpen node ID（NOT SUPPORT）	R-24	ALL	Torque error value
189	ALL	CANOpen baud rate（NOT SUPPORT）	R-25	ALL	Speed error value
R-1	ALL	Index reset clear	R-26	ALL	High bit position error value
R-2	ALL	Operation command for EEPROM	R-27	ALL	Low bit position error value
R-3	ALL	Modbus synchronous command selection	R-28	ALL	Torque command
R-4	T	Synchronous torque command	R-29	ALL	Speed command
R-5	S	Synchronous speed command	R-30	ALL	High bit position command
R-6	P	High bit of synchronous position command	R-31	ALL	Low bit position command
R-7	P	Low bit of synchronous position command	R-32	ALL	Alarm code
R-8	ALL	Synchronous command enable	R-33	ALL	BootRom version
R-9	ALL	The implementation state of EEPROM operation	R-34	ALL	Software version

6.2 Details

- “RO” indicates read only, R/W indicates read and write, WC indicates write and clear.

Pn-0	Parameter	Firmware version			Modbus address	0x1C7D	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：Firmware verion of servo drive, can not be modified.

Pn-1	Parameter	Motor type code			Modbus address	0x1240	Unit	—
	Range	0~21	Default	—	CANbus object	0x2240.0	Attrib	R/W

Control mode：All

Details：Motor type ccode, customers must ensure the motor type code is correct when restore the default parameters.

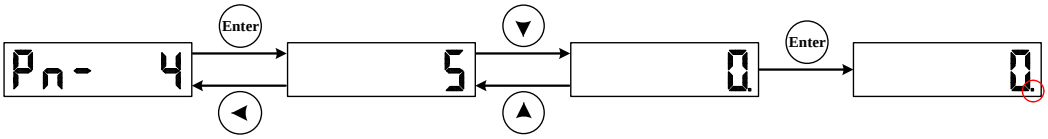
Code	Motor model	Code	Motor model	Code	Motor model
0	Factory parameters	8	SM110-060-30LFB	16	SM130-150-15LFB
1	SM80-013-30LFB	9	SM130-040-25LFB	17	SM130-150-25LFB
2	SM80-024-30LFB	10	SM130-050-25LFB	18	SM150-150-25LFB
3	SM80-033-30LFB	11	SM130-060-25LFB	19	SM150-180-20LFB
4	SM110-020-30LFB	12	SM130-077-20LFB	20	SM150-230-20LFB
5	SM110-040-30LFB	13	SM130-077-30LFB	21	SM150-270-20LFB
6	SM110-050-30LFB	14	SM130-100-15LFB		
7	SM110-060-20LFB	15	SM130-100-25LFB		

Pn-2	Parameter	User constants protection code			Modbus address	0x1241	Unit	—
	Range	0~32767	Default	28977	CANbus object	0x2241.0	Attrib	R/W

Control mode：All

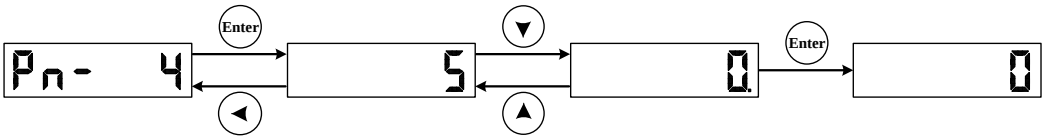
Details：It is used to prevent the parameters from being changed accidentally. The parameters can not be modified as the value is set to any number except 28977.

Example：① After adjust the parameters, set Pn-2 to 28990，click “Enter” button, then the other parameters can not be modified.



Change the parameter value and click "Enter" button, the decimal point does not disappear, the parameter can not be modified.

② The parameters can be modified as Pn-2 is set to 28977.



Pn-3	Parameter	Drive Status (Front Panel Display)			Modbus address	0x1242	Unit	—
	Range	0~18	Default	0	CANbus object	0x2242.0	Attrib	R/W

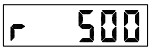
Control mode：All（**SDL10A drive, NOT SUPPORT**）

Details：Select the information displaying on the panel, customers can find the details in chapter 4 section 4.2.2

Value	Display	Unit	Value	Display	Unit
0	Motor output torque (%)	%	10	Reservation	—
1	Motor speed (rpm)	rpm	11	Low 5 bit of position deviation	pulse
2	Low 5 bit of feedback pulse	pulse	12	High 5 bit of position deviation	pulse
3	High 5 bit of feedback pulse	pulse	13	Control mode	—
4	Torque command	%	14	Alarm display	—
5	Speed command	rpm	15	Low 4 bit of digital input status	—
6	Low 5 bit of position command	pulse	16	High 6 bit of digital input status	—
7	High 5 bit of position command	pulse	17	Digital output status	—
8	Motor current	Amp	18	Encoder input status	—
9	Absolute rotor position	pulse			

Example：① The default value of Pn-3 is 0, it indicates the display will show the motor output torque (%).

② Set Pn-3 to 1, now the display will show motor speed (rpm).



Pn-4	Parameter	Motor control mode			Modbus address	0x1243	Unit	—
	Range	0~7	Default	2	CANbus object	0x2243.0	Attrib	R/W

Control mode：All

Details：This parameter is used to select the control mode of servo drive, please refer to chapter 5 section 4.2~4.9 for details.

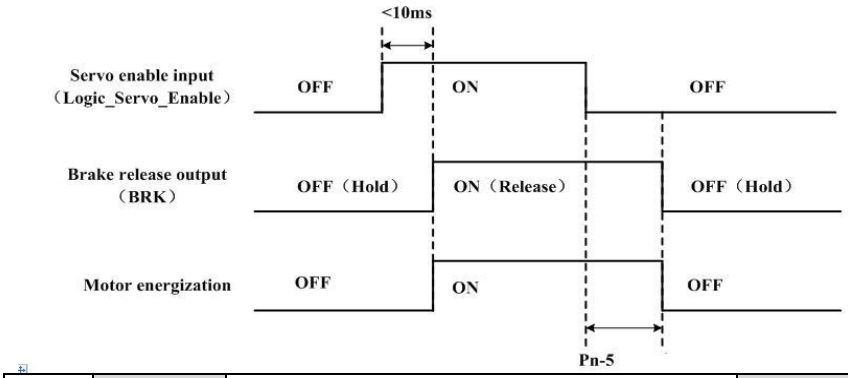
Value	Control mode	Function
0	Torque control mode	Control by analog command
1	Speed control mode	①Control by internal command ②Control by analog command ③Control by external pulse command
2	Position control mode	Control by external pulse command
3	JOG control mode	Control by panel （**NOT SUPPORT**）
4	Speed trial control mode	Control by internal command（**NOT SUPPORT**）
5	Analog input drift compensation	Used to analog input drift compensation function

6	Point-to-point control mode	Control by demo mode
7	Position/speed/torque control mode	Switch the control mode among position control, speed control and torque control. **（NOT SUPPORT）**

Pn-5	Parameter	Mechanical brake delay time			Modbus address	0x1244	Unit	ms
	Range	1~1000	Default	10	CANbus object	0x2244.0	Attrib	R/W

Control mode：All

Details：Set the delay time from the moment that ServoEn signal is OFF to the time mechanical brake available (output terminals BRK changes from OFF to ON). This parameter should be bigger than mechanical braking delay time to avoid motor for micro-displacement or falling.

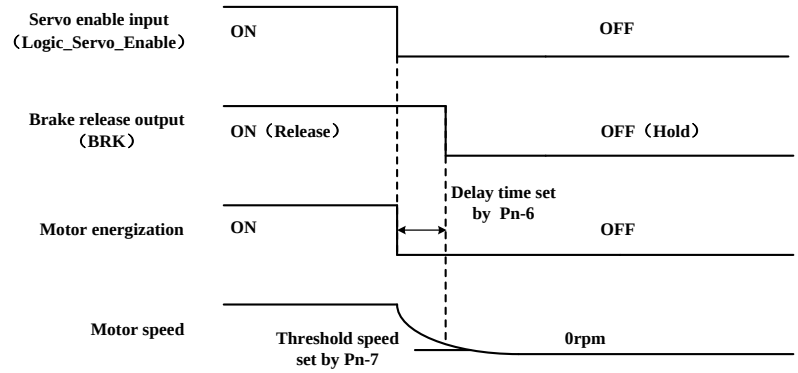


Pn-6	Parameter	Current turn off delay time			Modbus address	0x1245	Unit	ms
	Range	1~1000	Default	10	CANbus object	0x2245.0	Attrib	R/W

Control mode：All

Details：Customers can set up time from when detecting the off of Servo-ON input signal (Logic_Servo_Enable) is to when external brake release signal (BRK-OFF) turns off, while the motor turns to servo off during the motor in motion.

The actual time is the minimum value between PN5 and the time speed falls to PN6.



Pn-7	Parameter	Threshold speed of current turn off delay time			Modbus address	0x1246	Unit	rpm
	Range	1~6000	Default	30	CANbus object	0x2246.0	Attrib	R/W

Control mode：All

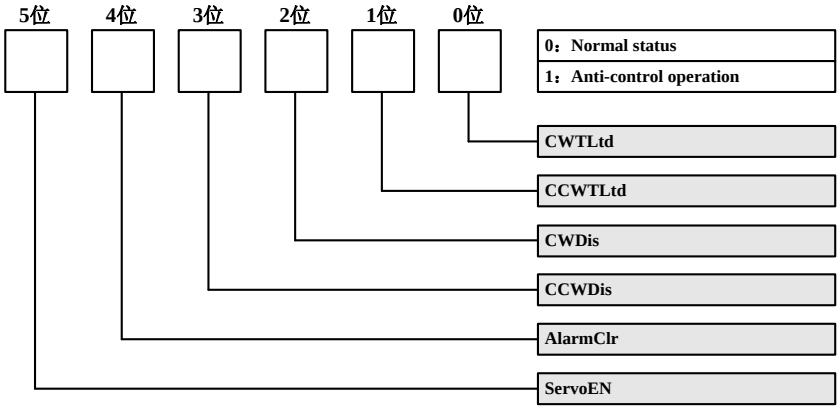
Details：Set up the speed timing of brake output checking during operation.

The actual time is the minimum value between PN5 and the time speed falls to PN6.

Pn-8	Parameter	Anti-control of low-6-bit digital input			Modbus address	0x1247	Unit	—
	Range	0~63	Default	0	CANbus object	0x2247.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 6-bit binary number. It is used for anti-control of low 6 bit digital input, “0” indicates original state, and “1” indicates anti-control for this signal.



Note：This function is used for physical port anti-control operation, please refer to chapter 3 section 3.7.2 and chapter 5 section 5.16.5 for details of digital input/output function and mapping function.

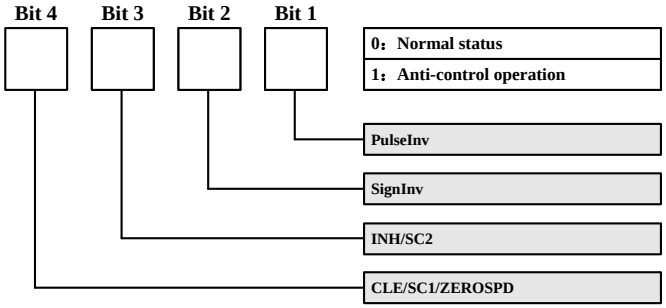
Example：As the physical port status of “ServoEn” signal is OFF：

Item	Initial state	Anti-control operation
Parameter setting	000000	100000
Signal status	OFF	ON

Pn-9	Parameter	Anti-control of high-4-bit digital input			Modbus address	0x1248	Unit	—
	Range	0~15	Default	0	CANbus object	0x2248.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 4-bit binary number. It is used for anti-control of high 4 bit digital input, “0” indicates original state, and “1” indicates anti-control for this signal.



Note：

① This function is used for physical port anti-control operation, please refer to chapter 3 section 3.7.2 and chapter 5 section 5.16.5 for details of digital input/output function and mapping function.

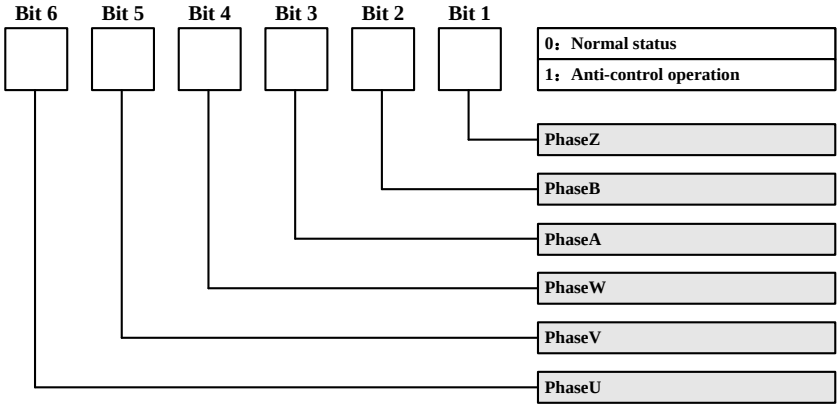
② Please DO NOT take anti-control operation for “PulseInv” and “SignInv” signal for normal control, it may cause error.

Example：Please refer to the example of parameter “Pn-8”.

Pn-10	Parameter	Anti-control of encoder feedback			Modbus address	0x1249	Unit	—
	Range	0~63	Default	0	CANbus object	0x2249.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 6-bit binary number. It is used for anti-control of of encoder feedback, “0” indicates original state, and “1” indicates anti-control for this signal.



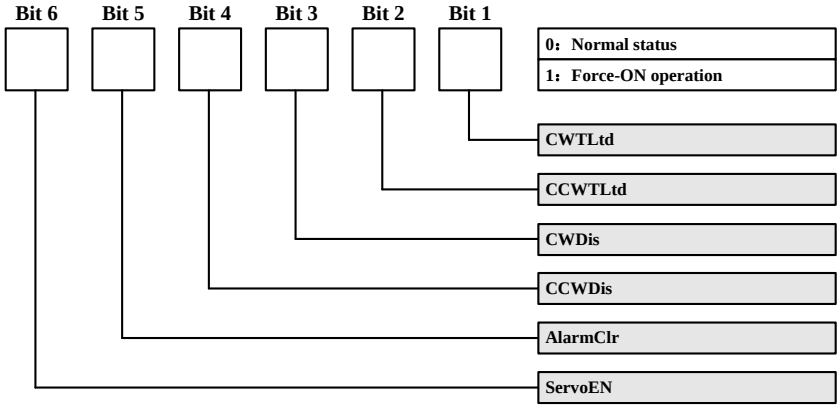
Note：Normally, we do not suggest customers to use this function.

Example：Please refer to the example of parameter “Pn-8”.

Pn-11	Parameter	Force-ON of low-6-bit digital input			Modbus address	0x124A	Unit	—
	Range	0~63	Default	0	CANbus object	0x224A.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 6-bit binary number. It is used for force-ON control of low-6-bit digital input, “0” indicates original state, and “1” indicates force-ON control for this signal. As if customers carry out the force-ON control, the signal will stay “ON” status.



Note：This function is used for physical port force-ON control operation, please refer to chapter 3 section 3.7.2 and chapter 5 section 5.16.5 for details of digital input/output function and mapping function.

Example：As the physical port status of “ServoEn” signal is OFF：

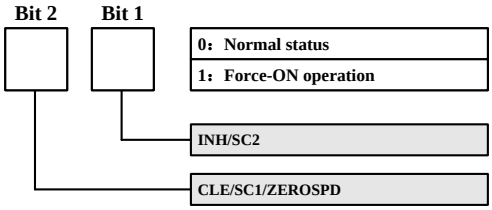
Item	Initial state	Anti-control operation
Parameter setting	000000	100000
Signal status	OFF	ON

Pn-12	Parameter	Force-ON of high-2-bit digital input			Modbus address	0x124B	Unit	—
	Range	0~3	Default	0	CANbus object	0x224B.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 2-bit binary number (“PulseInv” and “SignInv” can not be modified). It is used for force-ON control of high-2-bit digital input, “0” indicates original state, and “1” indicates force-ON control for this signal. As if

customers carry out the force-ON control, the signal will stay “ON” status.



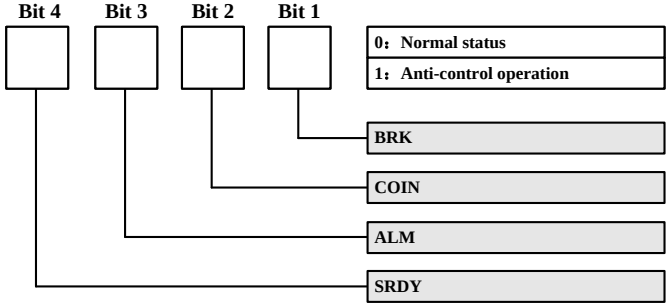
Note：This function is used for physical port force-ON control operation, please refer to chapter 3 section 3.7.2 and chapter 5 section 5.16.5 for details of digital input/output function and mapping function.

Example：Please refer to the example of parameter “Pn-11”.

Pn-13	Parameter	Anti-control of high-4-bit digital output			Modbus address	0x124C	Unit	—
	Range	0~15	Default	0	CANbus object	0x224C.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 4-bit binary number. It is used for anti-control of of digital output, “0” indicates original state, and “1” indicates anti-control for this signal.

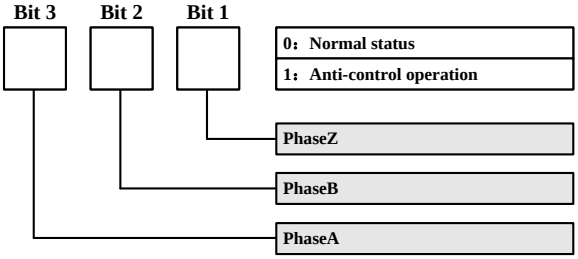


Note：As carry out anti-control of digital outputs, the signal status will change in very short time when power on, as the system reset.

Pn-14	Parameter	Anti-control of low-3-bit digital output			Modbus address	0x124D	Unit	—
	Range	0~7	Default	0	CANbus object	0x224D.0	Attrib	R/W

Control mode：All

Details：This parameter is expressed by a 3-bit binary number. It is used for anti-control of of digital output, “0” indicates original state, and “1” indicates anti-control for this signal.



Pn-15	Parameter	Gain of analog torque command input			Modbus address	0x124E	Unit	—
	Range	10~300	Default	100	CANbus object	0x224E.0	Attrib	R/W

Control mode：Torque control mode

Details：This parameter is used to set the proportion relationship between analog torque input voltage and torque command. Parameter value=(Max. input/Max. torque command)×10。The default value is 100，which means 10Vsupport 100% torque.

Example：Please refer to chapter 5 section 5.7.4 for details.

Pn-16	Parameter	Analog input drift compensation of torque command			Modbus address	0x124F	Unit	mV
	Range	-30000~30000	Default	0	CANbus object	0x224F.0	Attrib	R/W

Control mode：Torque control mode

Details：This function is used to adjust the analog input drift compensation. As the zero-drift torque is a positive value, the parameter should be set a positive value; while the zero-drift torque is a negative value, the parameter should be set a negative value.

Example：Please refer to chapter 5 section 5.7.4 for details.

Pn-17	Parameter	Invert the direction of analog torque command			Modbus address	0x1250	Unit	—
	Range	0~1	Default	0	CANbus object	0x2250.0	Attrib	R/W

Control mode：Torque control mode

Details：The analog torque command is a vector parameter.

Set the parameter to 0, as if the input voltage is a positive voltage, the motor will run in positive direction, while the input voltage is a negative voltage, the motor will run in negative direction.

Set the parameter to 1, as if the input voltage is a positive voltage, the motor will run in negative direction, while the input voltage is a negative voltage, the motor will run in positive direction.

Pn-18	Parameter	Gain of analog speed command input			Modbus address	0x1251	Unit	—
	Range	10~300	Default	100	CANbus object	0x2251.0	Attrib	R/W

Control mode：Speed control mode

Details：This parameter is used to set the proportion relationship between analog speed voltage and speed command.

Parameter value =(Max. input/Max. speed command)×30000。The default value is 100，which means 10Vsupport speed command of 3000rpm.

Example：Please refer to chapter 5 section 5.4.4 for details.

Pn-19	Parameter	Analog input drift compensationof speed command			Modbus address	0x1252	Unit	mV
	Range	-30000~30000	Default	0	CANbus object	0x2252.0	Attrib	R/W

Control mode：Speed control mode

Details：This function is used to adjust the analog input drift compensation. As the zero-drift speed is a positive value, the parameter should be set a positive value; while the zero-drift speed is a negative value, the parameter should be set a negative value.

Example：Please refer to chapter 5 section 5.4.4 for details.

Pn-20	Parameter	Invert the direction of analog speed command			Modbus address	0x1253	Unit	—
	Range	0~1	Default	0	CANbus object	0x2253.0	Attrib	R/W

Control mode：Speed control mode

Details：The analog speed command is a vector parameter.

Set the parameter to 0, as if the input voltage is a positive voltage, the motor will run in positive direction, while the input voltage is a negative voltage, the motor will run in negative direction.

Set the parameter to 1, as if the input voltage is a positive voltage, the motor will run in negative direction, while the input voltage is a negative voltage, the motor will run in positive direction.

Pn-21	Parameter	Low-pass bandwidth of analog speed input			Modbus address	0x1254	Unit	Hz
	Range	1~1000	Default	300	CANbus object	0x2254.0	Attrib	R/W

Control mode：Speed control mode

Details：This parameter is used to set the low-pass filter bandwidth of analog speed input. The greater the value is, it would bring faster response of analog speed input and more signal noise; The smaller the value is, it would bring slower response of analog speed input and less signal noise.

Pn-22	Parameter	Threshold value of torque overload alarm			Modbus address	0x1255	Unit	%
	Range	1~400	Default	150	CANbus object	0x2255.0	Attrib	R/W

Pn-23	Parameter	Testing time of torque over load alarm			Modbus address	0x1256	Unit	ms
	Range	1~32767	Default	100	CANbus object	0x2256.0	Attrib	R/W

Control mode：All

Details：These two parameters are used to for the torque overload function. As the motor output torque is over the threshold value(Pn-22) for a period time over the testing time(Pn-23), the drive will alarm Err-18.

Pn-24	Parameter	Internal brake resistor temperature alarm function			Modbus address	0x1257	Unit	—
	Range	0~1	Default	1	CANbus object	0x2257.0	Attrib	R/W

（NOT SUPPORT）

Pn-25	Parameter	Internal torque limit in negative (CW) direction			Modbus address	0x1258	Unit	%
	Range	1 ~ 400	Default	300	CANbus object	0x2258.0	Attrib	R/W

Pn-26	Parameter	Internal torque limit in positive (CCW) direction			Modbus address	0x1259	Unit	%
	Range	1 ~ 400	Default	300	CANbus object	0x2259.0	Attrib	R/W

Control mode：All

Details：These two parameters are used to set the torque limit in positive direction and negative direction, the motor output torque will be limited under the parameter value.

Example：If customer want 2 times overload for the motor, which indicates that the max peak output will be 200% of motor norminal torque, customer needs to set Pn-25 and Pn-26 to 200

Pn-27	Parameter	Torque limit mode			Modbus address	0x125A	Unit	—
	Range	0~2	Default	0	CANbus object	0x225A.0	Attrib	R/W

Control mode：All

Details：This parameter is used for selecting the torque limit mode. Please refer to chapter 5 section 5.13 for details.

Parameter value	Control mode	Control mode
0	Internal torque limit	Set by parameters（Pn-25，Pn-26）
1	External torque limit	Switch the torque limit value(16 in all) from digital input（Pn72-~Pn-87）
2	Analog command torque limit	Limit the torque output by analog command

Pn-28	Parameter	Notch function			Modbus address	0x125B	Unit	—
	Range	0~1	Default	0	CANbus object	0x225B.0	Attrib	R/W

Control mode：All

Details：This parameter is used to enable the notch function or not. Set it to 0, the notch function is valid; set it to 1, the notch function is invalid.

Pn-29	Parameter	Notch frequency			Modbus address	0x125C	Unit	—
	Range	0~3000	Default	1500	CANbus object	0x225C.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the notch frequency.

Pn-30	Parameter	The first speed loop proportional gain（PID1）			Modbus address	0x125D	Unit	—
	Range	0~1000	Default	—	CANbus object	0x225D.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the first speed loop proportional gain, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

The larger the value is, the greater the stiffness would be. The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. If there is no oscillation, the higher the value is the better the servo system performs.

Note：For different motor, the default value is different.

Pn-31	Parameter	The first speed loop integral time constant（PID1）			Modbus address	0x125E	Unit	—
	Range	1~8000	Default	—	CANbus object	0x225E.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the first speed loop integral time constant, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

The smaller the value, the greater the stiffness. The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. Set the parameter as small as possible without oscillation.

Note：For different motor, the default value is different.

Pn-32	Parameter	The first low-pass bandwidth of speed loop（PID1）			Modbus address	0x125F	Unit	Hz
	Range	1~1500	Default	400	CANbus object	0x225F.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the first low-pass bandwidth of speed loop, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8for gain switching function.

Normally, smaller value results in slower and smoother speed response. Too small value may cause system oscillation.

Pn-33	Parameter	The first low-pass filter bandwidth of torque command（PID1）			Modbus address	0x1260	Unit	Hz
	Range	10~12000	Default	1000	CANbus object	0x2260.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the first low-pass filter bandwidth of torque command, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation.

Pn-34	Parameter	Acceleration time in speed control			Modbus address	0x1261	Unit	10ms
	Range	0~1000	Default	0	CANbus object	0x2261.0	Attrib	R/W

Pn-35	Parameter	Deceleration time in speed control			Modbus address	0x1262	Unit	10ms
	Range	0~1000	Default	0	CANbus object	0x2262.0	Attrib	R/W

Control mode：Speed control mode

Details：These two parameters are used to set the acceleration time and deceleration time from 0rpm to 1000rpm.

Note：It is suggested that set Pn-34 and Pn-35 to 0 in position control mode.

Pn-36	Parameter	The second speed loop proportional gain（PID2）			Modbus address	0x1263	Unit	—
	Range	1~1000	Default	—	CANbus object	0x2263.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the second speed loop proportional gain, customers can switch it from the first speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

The larger the value is, the greater the stiffness would be. The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. If there is no oscillation, the higher the value is the better the servo system performs.

Note：For different motor, the default value is different.

Pn-37	Parameter	The second speed loop integral time constant（PID2）			Modbus address	0x1264	Unit	—
	Range	1~8000	Default	—	CANbus object	0x2264.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the second speed loop integral time constant, customers can switch it from the first speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

The smaller the value, the greater the stiffness. The value is determined by the type of servo and the load condition. In general, larger load inertia needs larger value. Set the parameter as small as possible without oscillation.

Note：For different motor, the default value is different.

Pn-38	Parameter	The second low-pass bandwidth of speed loop（PID2）			Modbus address	0x1265	Unit	Hz
	Range	1~1500	Default	400	CANbus object	0x2265.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the second low-pass bandwidth of speed loop, customers can switch it from the first speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

Normally, smaller value results in slower and smoother speed response. Too small value may cause system oscillation.

Pn-39	Parameter	The second low-pass filter bandwidth of torque command（PID2）			Modbus address	0x1266	Unit	Hz
	Range	10~12000	Default	1000	CANbus object	0x2266.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the second low-pass filter bandwidth of torque command, customers can switch it from the first speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

Normally, smaller value results in slower and smoother speed response. But too much small value may cause system oscillation.

Pn-40	Parameter	Speed command mode			Modbus address	0x1267	Unit	—
	Range	0~2	Default	0	CANbus object	0x2267.0	Attrib	R/W

Control mode：Speed control mode

Details：This parameter is used to select the speed command mode.

Value	Control mode	Details
0	Internal speed control mode	Set speed command by 16 parameters（Pn88~Pn103），customers can switch the speed command by digital input.
1	Analog speed control mode	Receive external analog command as speed command.
2	Pulse speed control mode	Receive external pulse command as speed command.

Pn-41	Parameter	Speed command in JOG control mode			Modbus address	0x1268	Unit	rpm
	Range	0~3000	Default	1500	CANbus object	0x2268.0	Attrib	R/W

（NOT SUPPORT）

Pn-42	Parameter	Speed limit			Modbus address	0x1269	Unit	rpm
	Range	0~6000	Default	—	CANbus object	0x2269.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the speed limit, it is valid in both direction.

Note：

① If the parameter value is larger than the motor nominal speed, the motor only can run at a speed no more than nominal speed.

② The default value is different for each motors, and the default value is the motor nominal speed.

Pn-43	Parameter	Threshold value of speed reached output			Modbus address	0x126A	Unit	rpm
	Range	1~6000	Default	1500	CANbus object	0x226A.0	Attrib	R/W

（NOT SUPPORT）

Pn-44	Parameter	The first Position loop proportional gain（PID1）			Modbus address	0x126B	Unit	—
	Range	1~32000	Default	—	CANbus object	0x226B.0	Attrib	R/W

Control mode：Position control mode

Details：This parameter is used to set the first position loop proportional gain, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

Higher gain results in greater mechanical stiffness and less position tracking error. Too large value may cause overshoot or oscillation.

Note：For different motor, the default value is different.

Pn-45	Parameter	The first position loop differential proportional gain（PID1）			Modbus address	0x126C	Unit	—
	Range	0~300	Default	0	CANbus object	0x226C.0	Attrib	R/W

Control mode：Position control mode

Details：This parameter is used to set the first position loop differential proportional gain, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function.

Higher gain results in greater mechanical stiffness and less position tracking error. Too big value may cause overshoot or oscillation.

Note：This parameter is usually set to zero unless customers need very fast response.

Pn-46	Parameter	The first cut-off frequency of position feed forward filter（PID1）			Modbus address	0x126D	Unit	Hz
	Range	1~1000	Default	400	CANbus object	0x226D.0	Attrib	R/W

Control mode：Position control mode

Details：This parameter is used to set the first cut-off frequency of position feed forward filter, the unit is Hz.

Customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.8 for gain switching function. The filter is used to increase the stability of compound position control.

Pn-47	Parameter	Constant of position command filter			Modbus address	0x126E	Unit	ms
	Range	0~1000	Default	0	CANbus object	0x226E.0	Attrib	R/W

Control mode：Position control mode

Details：Smoothen filter for the command pulse with accelerate of index form, the value stands for time constant. The unit is ms; Filter would not lose input pulse but may lead to delay. Filter is inactive as set to 0.

The filter works in the follow conditions:

- Host controller has not acceleration and deceleration function;
- Larger electronic gear ratio (＞10);
- Lower command frequency;
- Motor running with jumps or other unstable conditions;

Pn-48	Parameter	Denominator of electric gear ratio			Modbus address	0x126F	Unit	—
	Range	1~30000	Default	20	CANbus object	0x226F.0	Attrib	R/W

Pn-49	Parameter	Numerator 1 of electric gear ratio			Modbus address	0x1270	Unit	—
	Range	1~30000	Default	20	CANbus object	0x2270.0	Attrib	R/W

Pn-50	Parameter	Numerator 2 of electric gear ratio			Modbus address	0x1271	Unit	—
	Range	1~30000	Default	20	CANbus object	0x2271.0	Attrib	R/W

Pn-51	Parameter	Electric gear ratio switching function			Modbus address	0x1272	Unit	—
	Range	0~1	Default	0	CANbus object	0x2272.0	Attrib	R/W

Control mode：Position control mode，Speed control mode

Details：These parameters are used for the electric gear ratio function in position control mode or external speed control mode by Pn-48, Pn-49, Pn-50.

Note：Please refer to chapter 5 section 5.2.4 for details.

Pn-52	Parameter	External pulse input type			Modbus address	0x1273	Unit	—
	Range	0~2	Default	0	CANbus object	0x2273.0	Attrib	R/W

Control mode：Position control mode，Speed control mode

Details：This parameter is used to set the pulse input command type：

Value	Pulse type
0	Pulse + direction pulse
1	CCW+CW pulse
2	A /B phase pulse

Pn-53	Parameter	Invert of pulse command direction			Modbus address	0x1274	Unit	—
	Range	0~1	Default	0	CANbus object	0x2274.0	Attrib	R/W

Control mode：Position control mode，Speed control mode

Details：This function is used to set the inverting function of pulse command direction. “0” indicates normal direction while “1” indicates reverse the direction of pulse command.

Pn-54	Parameter	Range of positioning complete function			Modbus address	0x1275	Unit	pulse
	Range	0~30000	Default	1	CANbus object	0x2275.0	Attrib	R/W

（NOT SUPPORT）

Pn-55	Parameter	Position error detection range			Modbus address	0x1276	Unit	pulse
	Range	1~30000	Default	400	CANbus object	0x2276.0	Attrib	R/W

Control mode：Position control mode

Details： This parameter is used to set the position error detection range. The threshold alarm value = the value of Pn-55 *100pulse, as the position deviation counting pulse is over the threshold alarm value, the servo drive will alarm ERR-16

Note：Please refer to chapter 5 section 5.2.4 for details.

Pn-56	Parameter	Position error detection function			Modbus address	0x1277	Unit	—
	Range	0~1	Default	1	CANbus object	0x2277.0	Attrib	R/W

Control mode：Position control mode

Details：This parameter is used to set enable the position error detection function. As set the parameter value to 0, the position error detection function is valid; while set the parameter value to 1, the position error detection function is invalid.

Pn-57	Parameter	Encoder output ratio			Modbus address	0x1278	Unit	—
	Range	1~1023	Default	33	CANbus object	0x2278.0	Attrib	R/W

（NOT SUPPORT）

Pn-58	Parameter	Homing mode			Modbus address	0x1279	Unit	—
	Range	0~2	Default	0	CANbus object	0x2279.0	Attrib	R/W

（NOT SUPPORT）

Pn-59	Parameter	Homing speed			Modbus address	0x127A	Unit	rpm
	Range	1~6000	Default	100	CANbus object	0x227A.0	Attrib	R/W

（NOT SUPPORT）

Pn-60	Parameter	Acceleration / deceleration in homing operation			Modbus address	0x127B	Unit	R / S^2
	Range	1~1000	Default	50	CANbus object	0x227B.0	Attrib	R/W

（NOT SUPPORT）

Pn-61	Parameter	High bit of home position offset			Modbus address	0x127C	Unit	pulse
	Range	-30000~30000	Default	0	CANbus object	0x227C.0	Attrib	R/W

Pn-62	Parameter	Low bit of home position offset			Modbus address	0x127D	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x227D.0	Attrib	R/W

（NOT SUPPORT）

Pn-63	Parameter	Demo or point to point mode selection			Modbus address	0x127E	Unit	—
	Range	0~6	Default	2	CANbus object	0x227E.0	Attrib	R/W

Control mode：All

Details：This function is used to set the command type of demo mode or point to point mode.

① Set the parameter value to 0, the drive will work in torque demo mode. From step 1 to 16（torque commands from parameters Pn-72~ Pn-87）, servo runs each step one by one and loops forever. In every step torque value and lasting time can be set independently.

② Set the parameter value to 1, the drive will work in speed demo mode. From step 1 to 16（speed commands from parameters Pn-88~ Pn-103）, servo runs each step one by one and loops forever. In every step torque value and lasting time can be set independently.

③ Set the parameter value to 2, the drive will work in position demo mode, From step 1 to 16（position commands from parameters Pn-104~ Pn-183）, servo runs each step one by one and loops forever. In every step position, speed, acceleration and maximum torque value can be set independently.

Pn-64	Parameter	Gain (PID) parameter switching mode			Modbus address	0x127F	Unit	—
	Range	0~6	Default	0	CANbus object	0x227F.0	Attrib	R/W

Control mode：All

Details：This parameter is used to set the gain parameter switching mode.

Value	Switching mode
0	Fixed to the first set of PID parameters
1	Fixed to the second set of PID parameters
2	**（NOT SUPPORT）**
3	Switch the PID parameters by position deviation
4	Switch the PID parameters by speed deviation
5	Switch the PID parameters by motor speed
6	Switch the PID parameters by motor output torque

Note: Please refer to chapter 5 section 5.11 for details.

Pn-65	Parameter	Trigger value of gain (PID) parameter switching function			Modbus address	0x1280	Unit	—
	Range	0~32767	Default	0	CANbus object	0x2280.0	Attrib	R/W

Control mode：All

Details：① This function is used to set the trigger value of gain parameter switching function, it is valid while set Pn-65 to 3/4/5/6.

② The parameter unit depends on Pn-64. As set Pn-65 to 3, the unit is pulse; set Pn-65 to 4 or 5, the unit is rpm; set Pn-65 to 6, the unit is %.

Pn-66	Parameter	The second position loop proportional gain（PID2）			Modbus address	0x1281	Unit	—
	Range	1~32000	Default	1000	CANbus object	0x2281.0	Attrib	R/W

Control mode：Position control mode

Details：This parameter is used to set the second position loop proportional gain, customers can switch it from the second speed loop proportional gain, please refer to chapter 5 section 5.11 for gain switching function.

Higher gain results in greater mechanical stiffness and less position tracking error. Too large value may cause overshoot or oscillation.

Note：For different motor, the default value is different.

Pn-67	Parameter	The second position loop differential proportional gain（PID2）			Modbus address	0x1282	Unit	—
	Range	0~100	Default	0	CANbus object	0x2282.0	Attrib	R/W

Control mode：Position control mode

Details：Details：This parameter is used to set the second position loop differential proportional gain, customers can switch it from the first speed loop proportional gain, please refer to chapter 5 section 5.11 for gain switching function.

Higher gain results in greater mechanical stiffness and less position tracking error. Too big value may cause overshoot or oscillation.

Note：This parameter is usually set to zero unless customers need very fast response.

Pn-68	Parameter	The second cut-off frequency of position feed forward filter（PID2）			Modbus address	0x1283	Unit	Hz
	Range	1~1000	Default	500	CANbus object	0x2283.0	Attrib	R/W

Control mode：Position control mode

Details：This parameter is used to set the second cut-off frequency of position feed forward filter, the unit is Hz.

Customers can switch it from the first speed loop proportional gain, please refer to chapter 5 section 5.11 for gain switching function.The filter is used to increase the stability of compound position control.

Pn-69	Parameter	Enhancement of torque loop response function			Modbus address	0x1284	Unit	—
	Range	0~1	Default	0	CANbus object	0x2284.0	Attrib	R/W

Control mode：All

Details：This parameter is used to enable the enhancement of torque loop response function. As set the parameter value to 1, the torque loop response will be enhanced, but it may cause little current noise.

Pn-70	Parameter	Reservation			Modbus address	0x1285	Unit	—
	Range	—	Default	—	CANbus object	0x2285.0	Attrib	R/W

Control mode：Reservation

Details：Reservation.

Pn-71	Parameter	Reservation			Modbus address	0x1286	Unit	—
	Range	—	Default	—	CANbus object	0x2286.0	Attrib	R/W

Control mode：Reservation

Details：Reservation.

Pn-72	Parameter	Internal torque command 1			Modbus address	0x1287	Unit	%
	Range	-400~400	Default	10	CANbus object	0x2287.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 1, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-73	Parameter	Internal torque command 2			Modbus address	0x1288	Unit	%
	Range	-400~400	Default	-10	CANbus object	0x2288.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 2, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-74	Parameter	Internal torque command 3			Modbus address	0x1289	Unit	%
	Range	-400~400	Default	20	CANbus object	0x2289.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 3, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-75	Parameter	Internal torque command 4			Modbus address	0 x128A	Unit	%
	Range	-400~400	Default	-20	CANbus object	0x228A.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 4, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-76	Parameter	Internal torque command 5			Modbus address	0x128B	Unit	%
	Range	-400~400	Default	30 •	CANbus object	0x228B.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 5, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-77	Parameter	Internal torque command 6			Modbus address	0x128C	Unit	%
	Range	-400~400	Default	-30	CANbus object	0x228C.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 6, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-78	Parameter	Internal torque command 7			Modbus address	0x128D	Unit	%
	Range	-400~400	Default	40	CANbus object	0x228D.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 7, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-79	Parameter	Internal torque command 8			Modbus address	0x128E	Unit	%
	Range	-400~400	Default	-40	CANbus object	0x228E.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 8, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-80	Parameter	Internal torque command 9			Modbus address	0x128F	Unit	%
	Range	-400~400	Default	50	CANbus object	0x228F.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 9, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-81	Parameter	Internal torque command 10			Modbus address	0x1290	Unit	%
	Range	-400~400	Default	-50	CANbus object	0x2290.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 10, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-82	Parameter	Internal torque command 11			Modbus address	0x1291	Unit	%
	Range	-400~400	Default	60	CANbus object	0x2291.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 11, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-83	Parameter	Internal torque command 12			Modbus address	0x1292	Unit	%
	Range	-400~400	Default	-60	CANbus object	0x2292.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 12, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-84	Parameter	Internal torque command 13			Modbus address	0x1293	Unit	%
	Range	-400~400	Default	70	CANbus object	0x2293.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 13, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-85	Parameter	Internal torque command 14			Modbus address	0x1294	Unit	%
	Range	-400~400	Default	-70	CANbus object	0x2294.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 14, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-86	Parameter	Internal torque command 15			Modbus address	0x1295	Unit	%
	Range	-400~400	Default	80	CANbus object	0x2295.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 15, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-87	Parameter	Internal torque command 16			Modbus address	0x1296	Unit	%
	Range	-400~400	Default	-80	CANbus object	0x2296.0	Attrib	R/W

Control mode：Demo mode

Details：Internal torque command 16, the parameter value indicates the percentage of the nominal torque, the unit is %.

Pn-88	Parameter	Internal speed command 1			Modbus address	0x1297	Unit	rpm
	Range	-6000~6000	Default	10	CANbus object	0x2297.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 1，the unit is rpm.

Pn-89	Parameter	Internal speed command 2			Modbus address	0x1298	Unit	rpm
	Range	-6000~6000	Default	20	CANbus object	0x2298.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 2，the unit is rpm.

Pn-90	Parameter	Internal speed command 3			Modbus address	0x1299	Unit	rpm
	Range	-6000~6000	Default	30	CANbus object	0x2299.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 3，the unit is rpm.

Pn-91	Parameter	Internal speed command 4			Modbus address	0x129A	Unit	rpm
	Range	-6000~6000	Default	40	CANbus object	0x229A.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 4，the unit is rpm.

Pn-92	Parameter	Internal speed command 5			Modbus address	0x129B	Unit	rpm
	Range	-6000~6000	Default	50	CANbus object	0x229B.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 5，the unit is rpm.

Pn-93	Parameter	Internal speed command 6			Modbus address	0x129C	Unit	rpm
	Range	-6000~6000	Default	60	CANbus object	0x229C.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 6，the unit is rpm.

Pn-94	Parameter	Internal speed command 7			Modbus address	0x129D	Unit	rpm
	Range	-6000~6000	Default	70	CANbus object	0x229D.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 7，the unit is rpm.

Pn-95	Parameter	Internal speed command 8			Modbus address	0x129E	Unit	rpm
	Range	-6000~6000	Default	80	CANbus object	0x229E.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 8，the unit is rpm.

Pn-96	Parameter	Internal speed command 9			Modbus address	0x129F	Unit	rpm
	Range	-6000~6000	Default	-10	CANbus object	0x229F.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 9，the unit is rpm.

Pn-97	Parameter	Internal speed command 10			Modbus address	0x12A0	Unit	rpm
	Range	-6000~6000	Default	-20	CANbus object	0x22A0.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 10，the unit is rpm.

Pn-98	Parameter	Internal speed command 11			Modbus address	0x12A1	Unit	rpm
	Range	-6000~6000	Default	-30	CANbus object	0x22A1.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 11，the unit is rpm.

Pn-99	Parameter	Internal speed command 12			Modbus address	0x12A2	Unit	rpm
	Range	-6000~6000	Default	-40	CANbus object	0x22A2.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 12，the unit is rpm.

Pn-100	Parameter	Internal speed command 13			Modbus address	0x12A3	Unit	rpm
	Range	-6000~6000	Default	-50	CANbus object	0x22A3.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 13，the unit is rpm.

Pn-101	Parameter	Internal speed command 14			Modbus address	0x12A4	Unit	rpm
	Range	-6000~6000	Default	-60	CANbus object	0x22A4.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 14，the unit is rpm.

Pn-102	Parameter	Internal speed command 15			Modbus address	0x12A5	Unit	rpm
	Range	-6000~6000	Default	-70	CANbus object	0x22A5.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 15，the unit is rpm.

Pn-103	Parameter	Internal speed command 16			Modbus address	0x12A6	Unit	rpm
	Range	-6000~6000	Default	-80	CANbus object	0x22A6.0	Attrib	R/W

Control mode：Speed control mode，Demo mode

Details：Internal speed command 16，the unit is rpm.

Pn-104	Parameter	High bit of internal position command 1			Modbus address	0x12A7	Unit	pulse
	Range	-30000~30000	Default	50	CANbus object	0x22A7.0	Attrib	R/W

Pn-105	Parameter	Low bit of internal position command 1			Modbus address	0x12A8	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22A8.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 1 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-106	Parameter	Speed of internal position command 1			Modbus address	0x12A9	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22A9.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 1, the unit is rpm.

Pn-107	Parameter	Acceleration/deceleration of internal position command 1			Modbus address	0x12AA	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22AA.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 1.

Pn-108	Parameter	Peak torque of internal position command 1			Modbus address	0x12AB	Unit	%
	Range	0~400	Default	125	CANbus object	0x22AB.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 1, the unit is %.

Pn-109	Parameter	High bit of internal position command 2			Modbus address	0x12AC	Unit	pulse
	Range	-30000~30000	Default	125	CANbus object	0x22AC.0	Attrib	R/W

Pn-110	Parameter	Low bit of internal position command 2			Modbus address	0x12AD	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22AD.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 2 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-111	Parameter	Speed of internal position command 2			Modbus address	0x12AE	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22AE.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 2, the unit is rpm.

Pn-112	Parameter	Acceleration/deceleration of internal position command 2			Modbus address	0x12AF	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22AF.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 2.

Pn-113	Parameter	Peak torque of internal position command 2			Modbus address	0x12B0	Unit	%
	Range	0~400	Default	125	CANbus object	0x22B0.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 2, the unit is %.

Pn-114	Parameter	High bit of internal position command 3			Modbus address	0x12B1	Unit	pulse
	Range	-30000~30000	Default	90	CANbus object	0x22B1.0	Attrib	R/W

Pn-115	Parameter	Low bit of internal position command 3			Modbus address	0x12B2	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22B2.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 3 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-116	Parameter	Speed of internal position command 3			Modbus address	0x12B3	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22B3.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 3, the unit is rpm.

Pn-117	Parameter	Acceleration/deceleration of internal position command 3			Modbus address	0x12B4	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22B4.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 3.

Pn-118	Parameter	Peak torque of internal position command 3			Modbus address	0x12B5	Unit	%
	Range	0~400	Default	125	CANbus object	0x22B5.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 3, the unit is %.

Pn-119	Parameter	High bit of internal position command 4			Modbus address	0x12B6	Unit	pulse
	Range	-30000~30000	Default	20	CANbus object	0x22B6.0	Attrib	R/W

Pn-120	Parameter	Low bit of internal position command 4			Modbus address	0x12B7	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22B7.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 4 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-121	Parameter	Speed of internal position command 4			Modbus address	0x12B8	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22B8.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 4, the unit is rpm.

Pn-122	Parameter	Acceleration/deceleration of internal position command 4			Modbus address	0x12B9	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22B9.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 4.

Pn-123	Parameter	Peak torque of internal position command 4			Modbus address	0x12BA	Unit	%
	Range	0~400	Default	125	CANbus object	0x22BA.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 4, the unit is %.

Pn-124	Parameter	High bit of internal position command 5			Modbus address	0x12BB	Unit	pulse
	Range	-30000~30000	Default	50	CANbus object	0x22BB.0	Attrib	R/W

Pn-125	Parameter	Low bit of internal position command 5			Modbus address	0x12BC	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22BC.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 5 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-126	Parameter	Speed of internal position command 5			Modbus address	0x12BD	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22BD.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 5, the unit is rpm.

Pn-127	Parameter	Acceleration/deceleration of internal position command 5			Modbus address	0x12BE	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22BE.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 5.

Pn-128	Parameter	Peak torque of internal position command 5			Modbus address	0x12BF	Unit	%
	Range	0~400	Default	125	CANbus object	0x22BF.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 5, the unit is %.

Pn-129	Parameter	High bit of internal position command 6			Modbus address	0x12C0	Unit	pulse
	Range	-30000~30000	Default	80	CANbus object	0x22C0.0	Attrib	R/W

Pn-130	Parameter	Low bit of internal position command 6			Modbus address	0x12C1	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22C1.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 6 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-131	Parameter	Speed of internal position command 6			Modbus address	0x12C2	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22C2.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 6, the unit is rpm.

Pn-132	Parameter	Acceleration/deceleration of internal position command 6			Modbus address	0x12C3	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22C3.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 6.

Pn-133	Parameter	Peak torque of internal position command 6			Modbus address	0x12C4	Unit	%
	Range	0~400	Default	125	CANbus object	0x22C4.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 6, the unit is %.

Pn-134	Parameter	High bit of internal position command 7			Modbus address	0x12C5	Unit	pulse
	Range	-30000~30000	Default	50	CANbus object	0x22C5.0	Attrib	R/W

Pn-135	Parameter	Low bit of internal position command 7			Modbus address	0x12C6	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22C6.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 7 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-136	Parameter	Speed of internal position command 7			Modbus address	0x12C7	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22C7.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 7, the unit is rpm.

Pn-137	Parameter	Acceleration/deceleration of internal position command 7			Modbus address	0x12C8	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22C8.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 7.

Pn-138	Parameter	Peak torque of internal position command 7			Modbus address	0x12C9	Unit	%
	Range	0~400	Default	125	CANbus object	0x22C9.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 7, the unit is %.

Pn-139	Parameter	High bit of internal position command 8			Modbus address	0x12CA	Unit	pulse
	Range	-30000~30000	Default	30	CANbus object	0x22CA.0	Attrib	R/W

Pn-140	Parameter	Low bit of internal position command 8			Modbus address	0x12CB	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22CB.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 8 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-141	Parameter	Speed of internal position command 8			Modbus address	0x12CC	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22CC.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 8, the unit is rpm.

Pn-142	Parameter	Acceleration/deceleration of internal position command 8			Modbus address	0x12CD	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22CD.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 8.

Pn-143	Parameter	Peak torque of internal position command 8			Modbus address	0x12CE	Unit	%
	Range	0~400	Default	125	CANbus object	0x22CE.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 8, the unit is %.

Pn-144	Parameter	High bit of internal position command 9			Modbus address	0x12CF	Unit	pulse
	Range	-30000~30000	Default	10	CANbus object	0x22CF.0	Attrib	R/W

Pn-145	Parameter	Low bit of internal position command 9			Modbus address	0x12D0	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22D0.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 9 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-146	Parameter	Speed of internal position command 9			Modbus address	0x12D1	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22D1.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 9, the unit is rpm.

Pn-147	Parameter	Acceleration/deceleration of internal position command 9			Modbus address	0x12D2	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22D2.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 9.

Pn-148	Parameter	Peak torque of internal position command 9			Modbus address	0x12D3	Unit	%
	Range	0~400	Default	125	CANbus object	0x22D3.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 9, the unit is %.

Pn-149	Parameter	High bit of internal position command 10			Modbus address	0x12D4	Unit	pulse
	Range	-30000~30000	Default	80	CANbus object	0x22D4.0	Attrib	R/W

Pn-150	Parameter	Low bit of internal position command 10			Modbus address	0x12D5	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22D5.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 10 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-151	Parameter	Speed of internal position command 10			Modbus address	0x12D6	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22D6.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 10, the unit is rpm.

Pn-152	Parameter	Acceleration/deceleration of internal position command 10			Modbus address	0x12D7	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22D7.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 10.

Pn-153	Parameter	Peak torque of internal position command 10			Modbus address	0x12D8	Unit	%
	Range	0~400	Default	125	CANbus object	0x22D8.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 10, the unit is %.

Pn-154	Parameter	High bit of internal position command 11			Modbus address	0x12D9	Unit	pulse
	Range	-30000~30000	Default	50	CANbus object	0x22D9.0	Attrib	R/W

Pn-155	Parameter	Low bit of internal position command 11			Modbus address	0x12DA	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22DA.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 11 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-156	Parameter	Speed of internal position command 11			Modbus address	0x12DB	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22DB.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 11, the unit is rpm.

Pn-157	Parameter	Acceleration/deceleration of internal position command 11			Modbus address	0x12DC	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22DC.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 11.

Pn-158	Parameter	Peak torque of internal position command 11			Modbus address	0x12DD	Unit	%
	Range	0~400	Default	125	CANbus object	0x22DD.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 11, the unit is %.

Pn-159	Parameter	High bit of internal position command 12			Modbus address	0x12DE	Unit	pulse
	Range	-30000~30000	Default	60	CANbus object	0x22DE.0	Attrib	R/W

Pn-160	Parameter	Low bit of internal position command 12			Modbus address	0x12DF	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22DF.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 12 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-161	Parameter	Speed of internal position command 12			Modbus address	0x12E0	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22E0.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 12, the unit is rpm.

Pn-162	Parameter	Acceleration/deceleration of internal position command 12			Modbus address	0x12E1	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22E1.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 12.

Pn-163	Parameter	Peak torque of internal position command 12			Modbus address	0x12E2	Unit	%
	Range	0~400	Default	125	CANbus object	0x22E2.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 12, the unit is %.

Pn-164	Parameter	High bit of internal position command 13			Modbus address	0x12E3	Unit	pulse
	Range	-30000~30000	Default	30	CANbus object	0x22E3.0	Attrib	R/W

Pn-165	Parameter	Low bit of internal position command 13			Modbus address	0x12E4	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22E4.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 13 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-166	Parameter	Speed of internal position command 13			Modbus address	0x12E5	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22E5.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 13, the unit is rpm.

Pn-167	Parameter	Acceleration/deceleration of internal position command 13			Modbus address	0x12E6	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22E6.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 13.

Pn-168	Parameter	Peak torque of internal position command 13			Modbus address	0x12E7	Unit	%
	Range	0~400	Default	125	CANbus object	0x22E7.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 13, the unit is %.

Pn-169	Parameter	High bit of internal position command 14			Modbus address	0x12E8	Unit	pulse
	Range	-30000~30000	Default	50	CANbus object	0x22E8.0	Attrib	R/W

Pn-170	Parameter	Low bit of internal position command 14			Modbus address	0x12E9	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22E9.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 14 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-171	Parameter	Speed of internal position command 14			Modbus address	0x12EA	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22EA.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 14, the unit is rpm.

Pn-172	Parameter	Acceleration/deceleration of internal position command 14			Modbus address	0x12EB	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22EB.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 14.

Pn-173	Parameter	Peak torque of internal position command 14			Modbus address	0x12EC	Unit	%
	Range	0~400	Default	125	CANbus object	0x22EC.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 14, the unit is %.

Pn-174	Parameter	High bit of internal position command 15			Modbus address	0x12ED	Unit	pulse
	Range	-30000~30000	Default	100	CANbus object	0x22ED.0	Attrib	R/W

Pn-175	Parameter	Low bit of internal position command 15			Modbus address	0x12EE	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22EE.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 15 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-176	Parameter	Speed of internal position command 15			Modbus address	0x12EF	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22EF.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 15, the unit is rpm.

Pn-177	Parameter	Acceleration/deceleration of internal position command 15			Modbus address	0x12F0	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22F0.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 15.

Pn-178	Parameter	Peak torque of internal position command 15			Modbus address	0x12F1	Unit	%
	Range	0~400	Default	125	CANbus object	0x22F1.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 15, the unit is %.

Pn-179	Parameter	High bit of internal position command 16			Modbus address	0x12F2	Unit	pulse
	Range	-30000~30000	Default	50	CANbus object	0x22F2.0	Attrib	R/W

Pn-180	Parameter	Low bit of internal position command 16			Modbus address	0x12F3	Unit	pulse
	Range	-9999~9999	Default	0	CANbus object	0x22F3.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set position command 16 in point to point control mode or demo mode, the unit is pulse. The position command=high bit part×10000＋low bit part.

Pn-181	Parameter	Speed of internal position command 16			Modbus address	0x12F4	Unit	rpm
	Range	1~6000	Default	2000	CANbus object	0x22F4.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the motor speed of internal position 16, the unit is rpm.

Pn-182	Parameter	Acceleration/deceleration of internal position command 16			Modbus address	0x12F5	Unit	R / S^2
	Range	1~1000	Default	25	CANbus object	0x22F5.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the acceleration and deceleration of internal position command 16.

Pn-183	Parameter	Peak torque of internal position command 16			Modbus address	0x12F6	Unit	%
	Range	0~400	Default	125	CANbus object	0x22F6.0	Attrib	R/W

Control mode：Point to point control mode，Demo mode

Details：Set the torque limit of internal position command 16, the unit is %.

Pn-184	Parameter	Fieldbus selection			Modbus address	0x12F7	Unit	—
	Range	0~3	Default	0	CANbus object	—	Attrib	R/W

Control mode：All

Details：Choose fieldbus interface between the following：

Value	fieldbus interface
0	Modbus RS232 interface
1	Modbus RS485 interface
2	**（NOT SUPPORT）**
3	**（NOT SUPPORT）**

Pn-185	Parameter	Modbus address			Modbus address	0x12F8	Unit	—
	Range	1~247	Default	1	CANbus object	—	Attrib	R/W

Control mode：All

Details：Set the servo fieldbus address in ModBus communication, the range is 1~247;

Note：The address must be set to 1 to communicate with Servofly.

Pn-186	Parameter	Modbus communication baudrate			Modbus address	0x12F9	Unit	Bps
	Range	0~4	Default	4	CANbus object	—	Attrib	R/W

Control mode：All

Details：Set Modbus communication rate; the following baudrates are supported:

Value	0	1	2	3	4
Baudrates	9600Bps	19200 Bps	38400 Bps	57600 Bps	115200 Bps

Note：The communication rate must be set to 115200bps when communicate with Servofly

Pn-187	Parameter	Modbus communication frame type			Modbus address	0x12FA	Unit	—
	Range	0~2	Default	1	CANbus object	—	Attrib	R/W

Control mode：All

Details：Set the frame type in modbus communication; three frame types are supported as following:

Value	Frame type
0	8 bit, no parity bit, 2 stop bit
1	8 bit, odd parity bit, 2 stop bit
2	8 bit, even parity bit, 2 stop bit

Pn-188	Parameter	CANOpen node ID			Modbus address	—	Unit	—
	Range	1~127	Default	1	CANbus object	—	Attrib	R/W

（NOT SUPPORT）

Pn-189	Parameter	CANOpen baudrate			Modbus address	—	Unit	—
	Range	0~5	Default	5	CANbus object	—	Attrib	R/W

（NOT SUPPORT）

R-1	Parameter	Index reset clear			Modbus address	0x1C51	Unit	—
	Range	—	Default	—	CANbus object	0x2C51.0	Attrib	WC

Control mode：All

Details：This parameter is used to Clear the current index reset status, and start to search index;

Value	Function
0x01	Clear the current index reset status
Others	No effects

R-2	Parameter	Operation command for EEPROM			Modbus address	0x1C53	Unit	—
	Range	—	Default	—	CANbus object	0x2C53.0	Attrib	WC

Control mode：All

Details：This parameter is used to adjust EEPROM,when dealing with user parameters.

Value	Function
0	Termination current EEPROM operation
1	Read the data from EEPROM
2	Read the data from the backup area of EEPROM
3	Write the data into EEPROM
4	Write the data into the backup area of EEPROM
5	Restore default value

R-3	Parameter	Modbus synchronous command selection			Modbus address	0x1C27	Unit	—
	Range	0~2	Default	0	CANbus object	—	Attrib	R/W

Control mode：All

Details：This parameter is used to select the synchronous command selection for position/speed/torque control mode.

Value	Function
0	Synchronous command invalid，drive would receive command through traditional I/O mode only.
1	Manufacturer parameter, doesn’t open to customers.

2	Synchronous command valid, drive would receive synchronous command, traditional I/O command is invalid.

R-4	Parameter	Synchronous torque command			Modbus address	0x1C28	Unit	A
	Range	-65535~65535	Default	0	CANbus object	—	Attrib	R/W

Control mode：Torque control mode

Details：This parameter is used to set the synchronous torque command in synchronous torque control mode, data format is _IQ7. The corresponding physical quantity of data is Q-axis current of the motor, the unit is Amps.

Note：This parameter is valid in synchronous torque control mode, when modbus synchronous command is valid and set "Synchronous command enable" ON.

Example：$\text{Synchronous torque command} = \frac{\text{To}}{\text{Mn}} \times \text{In} \times 1.414 \times 2^7$

To：It indicates the torque command, the unit is N·m

Mn：It indicates the norminal torque, the unit is N·m

In：It indicates the norminal current，the Uunit is A

R-5	Parameter	Synchronous speed command			Modbus address	0x1C29	Unit	2^{-2} ·Rpm
	Range	-65535~65535	Default	0	CANbus object	—	Attrib	R/W

Control mode：Speed control mode

Details：This parameter is used to set the synchronous speed command in synchronous speed control mode, data format is _IQ2. The corresponding physical quantity of data is speed, the unit is rpm.

Note：This parameter is valid in synchronous speed control mode, when modbus synchronous command is valid and set "Synchronous command enable" ON.

R-6	Parameter	High bit of synchronous position command			Modbus address	0x1C2A	Unit	Pulse
	Range	-65535~65535	Default	0	CANbus object	—	Attrib	R/W

R-7	Parameter	Low bit of synchronous position command			Modbus address	0x1C2B	Unit	Pulse
	Range	-65535~65535	Default	0	CANbus object	—	Attrib	R/W

Control mode：All

Details：This parameter is used to set the synchronous position command in synchronous position control mode, data format is _IQ0. The corresponding physical quantity of data is the motor position, the unit is pulse. The parameter is directly spliced by (H, L) to form a 32-bit position command.

Note：This parameter is valid in synchronous position control mode, when modbus synchronous command is valid and set "Synchronous command enable" ON.

R-8	Parameter	Synchronous command enable			Modbus address	0x1C55	Unit	—
	Range	-65535~65535	Default	0	CANbus object	—	Attrib	WC

Control mode：All

Details：This parameter is used to trigger the parameters of synchronous torque, speed, position register effective. Write 0x55AA to the register, "Synchronous command enable" is ON, other value is in invalid.

R-9	Parameter	The implementation state of EEPROM operation			Modbus address	0x1C62	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter is used for DSP and application interaction, the application queries the value of the parameter to determine the EEPROM operation is completed or not.

Value	Function
0	Operation completed successfully
1	Operation in progress
2	Operation failed

R-10	Parameter	FPGA version			Modbus address	0x1C64	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：FPGA version number is stored in this parameter for application inquiry

R-11	Parameter	Index Reset Status			Modbus address	0x1C65	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter instructs encoder counter to complete index reset operation or not.

Value	Function
0	Home position reset completed
1	W phase signal of encoder
2	V phase signal of encoder
3	U phase signal of encoder

R-12	Parameter	Index reset encoder counts			Modbus address	0x1C66	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter is used to latch encoder count value when index reset operation carried out. The hardware carries out latch operation during home position reset operation, the parameter is used to guarantee the coherence of pulse counting.

R-13	Parameter	Real-time encoder counts			Modbus address	0x1C67	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the current value of the encoder counter, the unit is pulse. This parameter reflects the physical location of the motor shaft

R-14	Parameter	CN2 input terminal status			Modbus address	0x1C68	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the digital input status of CN2 input interface.

Value	Function	Value	Function
0	PulseInv status	5	CCWLtd status
1	SignInv status	6	CWDis status
2	INH status	7	CCWDis status
3	CLE status	8	AlarmClr status

4	CWLtd status	9	ServoEn status

R-15	Parameter	Encoder input terminal status			Modbus address	0x1C69	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the status of encoder input terminals.

Value	Function	Value	Function
0	Z signal (Index) status	3	W Hall signal status;
1	B signal status	4	V Hall signal status
2	A signal status	5	U Hall signal status

R-16	Parameter	CN2 output terminal status			Modbus address	0x1C6A	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the signal terminal state of CN2 output interface.

Value	3	2	1	0
Function	SRDY status	Alarm status	COIN status	BRK status

R-17	Parameter	The analog voltage of analog input port A			Modbus address	0x1C6B	Unit	mV
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the actual input voltage of analog input port A (torque), the unit is mV.

R-18	Parameter	The analog voltage of analog input port B			Modbus address	0x1C6C	Unit	mV
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the actual input voltage of analog input port B (speed), The unit is mV.

R-19	Parameter	DC bus voltage			Modbus address	0x1C6D	Unit	V
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the current power supply board DC bus voltage, the unit is mV.

R-20	Parameter	The current torque value			Modbus address	0x1C6F	Unit	A
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantity of data is the actual Q-axis current of the motor, the unit is Amps. Data format is _IQ7

Example：The current torque value $= \frac{\mathrm{T}}{\mathrm{Mn}} \times \mathrm{In} \times 1.414 \times 2^7$

T：It indicates the motor output torque, the unit is N·m

Mn：It indicates the nominal torque, the unit is N·m

In：It indicates the nominal current, the unit is A

R-21	Parameter	The current speed value			Modbus address	0x1C70	Unit	2^{-2} ·Rpm
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantity of data is the current actual speed, the unit is 2^{-2} ·Rpm. Data format is _IQ2.

R-22	Parameter	The current high bit position value			Modbus address	0x1C71	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

R-23	Parameter	The current low bit position value			Modbus address	0x1C72	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantity of data is the motor position, the unit is pulse. Data format is _IQ0, directly spliced by (H, L) to form a 32-bit position command

R-24	Parameter	Torque error value			Modbus address	0x1C73	Unit	A
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantities of data is the difference between torque command and actual torque (Q-axis current), the units is Amps. Data format is _IQ7

R-25	Parameter	Speed error value			Modbus address	0x1C74	Unit	2^{-2} ·Rpm
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantities of data is the difference between speed command and actual speed, the units is 2^{-2} ·Rpm. Data format is _IQ2.

R-26	Parameter	High bit position error value			Modbus address	0x1C75	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

R-27	Parameter	Low bit position error value			Modbus address	0x1C76	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantities of data is the difference between position command and actual position, the units is pulse. Data format is _IQ0, directly spliced by (H, L) to form a 32-bit position command.

R-28	Parameter	Torque command			Modbus address	0x1C77	Unit	A
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantities of data is the Q-axis current command, the units is Amps。 Data format is _IQ7.

Example：Please refer to R-4.

R-29	Parameter	Speed command			Modbus address	0x1C78	Unit	2^{-2} ·Rpm
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantities of data is the speed command, the units is 2^{-2} ·Rpm. Data format is _IQ2

R-30	Parameter	High bit position command			Modbus address	0x1C79	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

R-31	Parameter	Low bit position command			Modbus address	0x1C7A	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：The corresponding physical quantities of data is the position command, the units is pulse. Data format is _IQ0, directly spliced by (H, L) to form a 32-bit position command。

R-32	Parameter	Alarm code			Modbus address	0x1C7B	Unit	Pulse
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：This parameter indicates the current alarm code, please refer to chapter 8 for details.

Note：When the value is 0, indicating there is no warning

R-33	Parameter	BootRom version			Modbus address	0x1C7C	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：BootRom version number is stored in this parameter for application inquiry.

R-34	Parameter	Software version			Modbus address	0x1C7D	Unit	—
	Range	—	Default	—	CANbus object	—	Attrib	RO

Control mode：All

Details：Software version number is stored in this parameter for application inquiry.

Chapter6 Communication

6.1 Communication Hardware Interface

Bonmet SA Series servo drives have three communication modes: RS-232, RS-485 and CANOpen. All aspects of control, operation and monitoring as well as programming of the controller can be achieved through communication. However, only one communication mode can be used at a time. Users can select the desired communication mode by parameter Pn184.

Please refer to the following sections for connections and limitations.

6.2 ModBus Communication Protocol

When using RS-232/485 serial communication interface, each SA series AC servo drive has a pre-assigned communication address specified by parameter Pn185. The computer then

controls each AC servo drive according to its communication address. SA series AC servo drives can be set up to communicate on a MODBUS networks using on RTU (Remote Terminal Unit)mode.

6.1.1Code Description:

When controllers are setup to communicate on a Modbus network using RTU(Remote Terminal Unit) mode, each

8–bit byte in a message contains two 4–bit hexadecimal characters. The main advantage of this mode is that its greater character density allows better data throughput than ASCII for the same baud rate. Each message must be transmitted in a continuous stream.

The format for each byte in RTU mode is:

Error Check Field:	Cyclical Redundancy Check (CRC)
Coding System:	8–bit binary, hexadecimal 0–9, A–F
	Two hexadecimal characters contained in each
	8–bit field of the message
Bits per Byte:	1 start bit
	8 data bits, least significant bit sent first
	1 bit for even/odd parity; no bit for no parity
	1 stop bit if parity is used; 2 bits if no parity
Error Check Field:	Cyclical Redundancy Check (CRC)

6.1.2RTU Framing

In RTU mode, messages start with a silent interval of at least 3.5 character times. This is most easily implemented as a multiple of character times at the baud ratethat is being used on the network (shown as T1–T2–T3–T4 in the figure below).The first field then transmitted is the device address.

The allowable characters transmitted for all fields are hexadecimal 0–9, A–F.Networked devices monitor the network bus continuously, including during the ‘silent’ intervals. When the first field (the address field) is received, each devicede codes it to find out if it is the addressed device.

Following the last transmitted character, a similar interval of at least 3.5 character times marks the end of the message. A new message can begin after this interval .The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 1.5 character times occurs before completion of the frame, the receiving device flushes the incomplete message and assumes that the next byte will be the address field of a new message.

Similarly, if a new message begins earlier than 3.5 character times following a previous message, the receiving device will consider it a continuation of the previous message. This will set an error, as the value in the final CRC field will not be valid for the combined messages. A typical message frame is shown below.

START	ADDRESS	FUNCTION	DATA	CRC CHECK	END
T1–T2–T3–T4	8 BITS	8 BITS	n x 8 BITS	16 BITS	T1–T2–T3–T4

6.1.3CRC Checking

In RTU mode, messages include an error–checking field that is based on a Cyclical Redundancy Check (CRC) method. The CRC field checks the contents of the entire message. It is applied regardless of any parity check method used for the individual characters of the message.

The CRC field is two bytes, containing a 16–bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, an error results.

The CRC is started by first preloading a 16–bit register to all 1's. Then a process begins of applying successive 8–bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each 8–bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place.

This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next 8–bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

In ladder logic, the CKSM function calculates a CRC from the message contents. For applications using host computers, a detailed example of CRC generation is contained in Appendix C.

6.1.4Communication Parameter Write-in and Read-out

■ 03 (0x03) Read Holding Registers

Description

Reads the binary contents of holding registers (4X references) in the slave.Broadcast is not supported.Appendix B lists the maximum parameters supported by various controller models.

Query

The query message specifies the starting register and quantity of registers to be read. Registers are addressed starting at zero: registers 1–16 are addressed as 0–15.

Here is an example of a request to read registers 40108–40110 from slave device 17:

QUERY	
	Example
Field Name	(Hex)
Slave Address	11
Function	03
Starting Address Hi	00
Starting Address Lo	6B
No. of Points Hi	00
No. of Points Lo	03
Error Check (CRC)	—

Response

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

Data is scanned in the slave at the rate of 125 registers per scan for 984–X8X controllers (984–685, etc), and at the rate of 32 registers per scan for all other controllers. The response is returned when the data is completely

assembled.

Here is an example of a response to the query on the opposite page:

RESPONSE	
	Example
Field Name	(Hex)
Function	11
Byte Count	03
Data Hi (Register 40108)	06
Data Lo (Register 40108)	2B
Data Hi (Register 40109)	00
Data Lo (Register 40109)	00
Data Hi (Register 40110)	00
Data Lo (Register 40110)	64
Error Check (CRC)	—

The contents of register 40108 are shown as the two byte values of 02 2B hex, or 555 decimal. The contents of registers 40109–40110 are 00 00 and 00 64 hex, or 0 and 100 decimal.

■ 16 (0x10) Preset Multiple Registers

Description

Presets values into a sequence of holding registers (4X references). When broadcast, the function presets the same register references in all attached slaves.

Note The function will override the controller's memory protect state. The preset values will remain valid in the registers until the controller's logic next solves the register contents. The register values will remain if they are not programmed in the controller's logic.

Appendix B lists the maximum parameters supported by various controller models.

Query

The query message specifies the register references to be preset. Registers are addressed starting at zero: register 1 is addressed as 0. The requested preset values are specified in the query data field. M84 and 484 controllers use a 10–bit binary value, with the six high order bits set to zeros. All other controllers use 16–bit values. Data is packed as two bytes per register. Here is an example of a request to preset two registers starting at 40002 to 00 0A and 01 02 hex, in slave device 17:

QUERY	
	Example
Field Name	(Hex)
Slave Address	11
Function	10
Starting Address Hi	00
Starting Address Lo	01
No. of Registers Hi	00
No. of Registers Lo	02
Byte Count	04
Data Hi	00
Data Lo	0A
Data Hi	01
Data Lo	02

Error Check (CRC)	—

Response

The normal response returns the slave address, function code, starting address, and quantity of registers preset. Here is an example of a response to the query shown above.

RESPONSE	
	Example
Field Name	(Hex)
Slave Address	11
Function	10
Starting Address Hi	00
Starting Address Lo	01
No. of Registers Hi	00
No. of Registers Lo	02
Error Check (CRC)	—

Chapter 7 Protective Function

8.1 Alarm List

Alarm code	Protective function
0	Normal state
1	System error
2	Z phase error protection
3	Hall(U/V/W phase) signal error protection
4	A/B phase signal error protection
5	Encoder counter missing error
6	Overcurrent protection of power module
7	Main circuit relay disconnected
8	Overvoltage
9	Undervoltage
10	Motor (IR^2) overheat protection
11	Motor phase current gain error
12	EEPROM operation error
13	Drive overheat protection
14	Over-regeneration load protection (NOT SUPPORT)
15	Over-travel inhibition error
16	Excessive deviation
17	Reservation
18	Torque overload alarm

8.2 Details

8.2.1 Err-1_system initialization

Probable causes	Conforming method	Measures
System initialization error	—	Update the firmware.
Failure of servo drive	—	Repair or replace the drive with a new one.

8.2.2 Err-2_ Z phase error protection

Probable causes	Conforming method	Measures
Encoder disconnected	Check if the encoder is connected or not	Connect the encoder with drive.
Wiring error	Check the wiring	Rewiring.
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one.
Communication error caused by interference	—	① Separate the encoder cable and the power cable if they are bound together ② Use shielded twisted wire.
Failure of encoder	—	Repair or replace the servo motor with a new one.

8.2.3 Err-3_ Hall(U/V/W phase) signal error protection

Probable causes	Conforming method	Measures
Encoder disconnected	Check if the encoder is connected or not	Connect the encoder with drive
Wrong motor parameter	—	Restores the default parameter of the motor
Wiring error	Check the wiring	Rewiring according to operation manual
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one
Communication error caused by interference	—	① Separate the encoder cable and the power cable if they are bound together ② Use shielded twisted wire
Failure of encoder	—	Repair or replace the servo motor with a new one

8.2.4 Err-4_ A/B phase signal error protection

Probable causes	Conforming method	Measures
Encoder disconnected	Check if the encoder is connected or not	Connect the encoder with drive
Wiring error	Check the wiring	Rewiring according to operation manual
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one
Communication error caused by interference	—	① Separate the encoder cable and the power cable if they are bound together ② Use shielded twisted wire
Failure of encoder	—	Repair or replace the servo motor with a new one

8.2.5 Err-5_Encoder counter missing error

Probable causes	Conforming method	Measures
Encoder disconnected	Check if the encoder is connected or not	Connect the encoder with drive
Wiring error	Check the wiring	Rewiring according to operation manual
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one
Communication error caused by interference	—	① Separate the encoder cable and the power cable if they are bound together ② Use shielded twisted wire
Incorrect installation of encoder	—	Reinstall the encoder
Failure of encoder	—	Repair or replace the servo motor with a new one

8.2.6 Err-6_Overcurrent protection of power module

Probable causes	Conforming method	Measures
Wrong wiring of the power cable (U, V, W, PE)	Check the wiring	Rewiring according to operation manual
Wrong wiring of the encoder cable.	Check the wiring	Rewiring according to operation manual
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one
Wrong motor parameter	—	Restores the default parameter of the motor
Incorrect gain adjustment	—	Restores the default parameter of the motor and adjusts it according to the operation manual
Machine failure	Check the mechanical connection	Improve the mechanical transmission parts
Overloaded	Check if the motor output torque is too large	Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load
Power capacity is not enough	Check power specifications	Use three-phase power supply
Input command error caused by interference	Use the internal command to test the machine	① Separate the input command cable and the power cable if they are bound together ② Use shielded twisted wire
Communication error caused by interference	—	① Separate the encoder cable and the power cable if they are bound together ② Use shielded twisted wire
Failure of motor	Measure the resistance among the motor power terminal U,V,W and PE	Repair or replace the servo motor with a new one
Failure of encoder	—	Repair or replace the encoder with a new one
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.7 Err-7_ Main circuit relay disconnected

Probable causes	Conforming method	Measures
Power supply disconnected	Use voltmeter to check whether input voltage at main circuit is normal	Rewiring according to operation manual
Supply voltage is too low or unstable	Use voltmeter to check whether input voltage at main circuit is normal	Use a regulator
Failure of motor	—	Repair or replace the servo motor with a new one
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.8 Err-8_ Overvoltage

Probable causes	Conforming method	Measures
Supply voltage is too high or unstable	Use voltmeter to check whether input voltage at main circuit is normal	Use a regulator.
The motor brake frequently and the brake resistance is not connected	—	Connect the brake resistor
Failure of motor brake resistor	Check the resistance of the resistor	Replace the brake resistance with a new one
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.9 Err-9_ Under voltage

Probable causes	Conforming method	Measures
No input voltage at main circuit.	Use voltmeter to check whether input voltage at main circuit is normal	Rewiring according to operation manual.
Wiring error	Check the wiring	Rewiring according to operation manual
Failure of main circuit connector	Check the connector	Replace the connector with a new one
Supply voltage is too low or unstable	Use voltmeter to check whether input voltage at main circuit is normal	Use a regulator
Instantaneous power-off.	—	Use a regulator
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.10 Err-10_ Motor (IR^2) overheat protection

Probable causes	Conforming method	Measures
Wrong wiring of the power cable (U, V, W, PE)	Check the wiring	Rewiring according to operation manual
Wrong wiring of the encoder cable.	Check the wiring	Rewiring according to operation manual
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one.
Wrong motor parameter	—	Restores the default parameter of the motor
Incorrect gain parameters setting	—	Restores the default parameter of the motor and adjusts gain parameters according to the operation manual.
Machine failure	Check the mechanical connection	Improve the mechanical transmission parts
Overloaded	Check if the motor output torque is too large	Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load
Power capacity is not enough	Check power specifications	Use three-phase power supply
Failure of motor	Measure the resistance among the motor power terminal U,V,W and PE	Repair or replace the servo motor with a new one
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.11 Err-11_ Motor phase current gain error

Probable causes	Conforming method	Measures
Wrong update of firmware	—	Update the firmware.
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one.
Failure of motor	Measure the resistance among the motor power terminal U,V,W and PE	Repair or replace the servo motor with a new one
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.12 Err-12_ EEPROM operation error

Probable causes	Conforming method	Measures
Wrong update of firmware	—	Update the firmware.
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.13 Err-13_ Drive overheat protection

Probable causes	Conforming method	Measures
The internal temperature of drive is over 80℃	Measure the temperature	Use air-cooling to decrease the temperature of the drive.
Wrong wiring of the power cable (U, V, W, PE)	Check the wiring	Rewiring according to operation manual
Wrong wiring of the encoder cable.	Check the wiring	Rewiring according to operation manual
Failure of encoder cable	Check the encoder cable according to the wiring diagram	Repair or replace the cable with a new one.
Wrong motor parameter	—	Restores the default parameter of the motor
Incorrect gain parameters setting	—	Restores the default parameter of the motor and adjusts gain parameters according to the operation manual.
Machine failure	Check the mechanical connection	Improve the mechanical transmission parts
Overloaded	Check if the motor output torque is too large	Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load
Failure of motor	Measure the resistance among the motor power terminal U,V,W and PE	Repair or replace the servo motor with a new one
Motor fault	survey the U,V,W line of the motor	Repair or change the motor.
Failure of servo drive	—	Repair or replace the servo drive with a new one

8.2.14 Err-14_ Over-regeneration load protection

Probable causes	Conforming method	Measures
（NOT SUPPORT）		

8.2.15 Err-15_ Over-travel inhibition error

Probable causes	Conforming method	Measures
CN2 cable wrong wiring	Check CN2 cable according to the wiring diagram	Repair or replace the cable with a new one
Wrong Parameters	Check Parameter Pn-14 and Pn-15	The positive over-travel inhibition and negative over-travel inhibition should not be valid at the same time

Communication error caused by interference	Check the digital input status through monitor function	① Separate the encoder cable and the power cable if they are bound together ② Use shielded twisted wire

8.2.16 Err-16_ Excessive deviation

Probable causes	Conforming method	Measures
Maximum deviation parameter setting is too small	Check the maximum deviation parameter setting and observe the position error value when the motor is running	Increases the parameter setting value of Pn-55
Gain value is too small	Check for proper gain value	Correctly adjust gain value
Torque limit is too low	Check torque limit value	Correctly adjust torque limit value
Machine failure	Check the mechanical connection	Improve the mechanical transmission parts
Input pulse command over frequency	Check the input pulse frequency whether it is over 500kHz	Reduce the pulse frequency.
Incorrect electric gear ratio setting	Check the input pulse frequency whether it is over 500kHz after set the electric gear ratio	Reduce the ratio.

8.2.17 Err-18_ Torque overload alarm

Probable causes	Conforming method	Measures
Maximum overload testing parameter setting is too small	Check the maximum overload testing parameter setting	Increases the parameter setting value of Pn-22, usually we suggest customer to set it under 150.
Machine failure	Check the mechanical connection	Improve the mechanical transmission parts
The drive has exceeded its rated load during continuous operation.	Check if the drive is overloaded by monitoring the motor torque, 100% or less continuous motor output torque is OK	Increase motor capacity or reduce load
The wiring of drive and encoder is in error	Check the wiring of U, V, W and encoder	Ensure all wiring is correct