In this user manual, we will try our best to describe various **GR-L** series bus type AC servo drive units.

Matters related to product operation. Due to space limitations and specific product usage, it is impossible to describe all unnecessary

Therefore, any matters not specifically specified in this manual are considered “not allowed”.

operations that can or cannot be performed.

Preface

Dear Customer

We are honored and grateful that you have chosen the products of Guangzhou CNC Equipment Co., Ltd.!

This user **manual** describes in detail the performance, installation, connection,

Matters such as debugging, use and maintenance.

To ensure the product works safely and effectively, please read this manual carefully before installing and using the product.

book.

In order to avoid personal injury to the operator and others, as well as damage to the mechanical equipment, please read this manual carefully.

Please pay special attention to the following warning signs.


DANGER Improper operation may result in serious injury or death.


Caution: If you perform incorrect operations, it may cause moderate or minor injuries and lead to

Material loss.

Caution means that if you do not pay attention to the prompt, undesirable results and status may occur.


Remind users of key requirements and important instructions during operation.


Indicates prohibition (something that must not be done).


Indicates compulsion (something that must be done).

Danger

Please tighten the main circuit terminals with appropriate force.

Failure to follow this instruction could result in loose wiring and sparking, which could create a fire hazard.

Please install the servo drive unit on non-combustible objects and keep it away from flammable objects.

Failure to follow this instruction may result in fire !

Before wiring, please confirm that the input power is in the off state.

! Failure to follow this instruction may result in

The grounding terminal PE of the servo drive unit must be grounded.

! Failure to follow this instruction may result in

Please have professional electrical engineers perform wiring or maintenance.

Failure to follow this instruction could result in electric shock or fire.

If movement, wiring, inspection or maintenance is required, it should be done 5 minutes after the power is turned off.

Failure to follow this instruction could result in electric shock.

Strictly follow the wiring method provided in the user manual for wiring.

Failure to follow this instruction could result in equipment damage and electric shock.

Be sure to tighten the power terminals and motor output terminals.

Failure to follow this instruction could result in fire.

Please do not operate the switch with wet hands.

Failure to follow this instruction could result in electric shock.

Please do not put your hands into the servo drive unit.

Failure to follow this instruction could result in electric shock.

Do not open the terminal block cover when the power is on or during operation.

Failure to follow this instruction could result in electric shock.

Do not touch the main circuit terminals of the servo drive unit directly.

Failure to follow this instruction could result in electric shock.

Danger

The servo drive unit may start suddenly after power is restored. Do not operate the servo motor shaft connection device immediately.

Failure to follow this instruction could result in personal injury.

Do not block heat dissipation or place foreign objects inside the cooling fan or radiator.

Failure to follow this instruction could result in damage or fire.

Do not place the cable on sharp edges or subject it to heavy loads or tension.

Failure to follow this instruction may result in electric shock, malfunction, or damage.

When the cover on the terminal block is removed, do not operate the servo drive with power on.

Failure to follow this instruction could result in electric shock.

careful

The motor must be equipped with an appropriate servo drive unit.

! Failure to follow these instructions may cause the device to damage.

The voltage level loaded on each terminal must comply with the voltage level specified in the user manual.

! Failure to follow these instructions may cause the device to damage.

The motor can only be operated with load after the no-load test run is successful.

! Failure to follow this instruction could result in equipment damage.

After an alarm occurs, please eliminate the fault before operating.

! Failure to follow this instruction could result in equipment damage.

During transportation of the motor, do not hold the cables and motor shaft.

Failure to follow this instruction could result in equipment damage.

If any components of the servo drive unit are missing or damaged, do not operate it and contact the seller immediately.

Failure to follow this instruction could result in equipment damage.

careful

Do not connect the power input wires R, S, T to the U, V, W terminals of the motor output wires.

Failure to follow this instruction could result in equipment damage.

Please do not turn on/off the input power frequently.

Failure to follow this instruction could result in equipment damage.

Do not touch the heat sink of the motor and servo drive unit during operation as they may generate high temperatures.

Failure to follow this instruction may result in burns.

Extreme adjustments and modifications of parameters cannot be made.

Failure to follow this instruction could result in equipment damage.

Please do not modify, disassemble or repair the servo drive unit without permission.

Failure to follow this instruction could result in equipment damage.

The internal electronic components of a scrapped servo drive unit can only be treated as industrial waste and cannot be reused.

Failure to follow this instruction could result in an accident.

Safety Responsibility

Manufacturer's safety responsibilities

——The manufacturer shall eliminate and/or control the servo drive unit and the accessories supplied with it in terms of design and structure.

Responsible for the risks of control.

——The manufacturer shall be responsible for the safety of the servo drive unit and the accessories supplied with it.

——Manufacturers should be responsible for the information and suggestions provided to users.

User safety responsibilities

——Users should learn and receive training on safe operation of the servo drive unit, and be familiar with and master the content of safe operation.

——Users should be responsible for the safety and danger caused by adding, changing or modifying the original servo drive unit and accessories.

——The user shall be responsible for the dangers caused by failure to operate, adjust, maintain, install, store and transport the product in accordance with the instructions in the manual.

responsibility.

This manual is for the end user's collection.

Sincerely thank you - when using the products of Guangzhou CNC Equipment Co., Ltd.,

Thank you for your friendly support!

Table of contents

Chapter 1 Product Introduction

The **GR-L** series bus-type AC servo drive unit (hereinafter referred to as servo drive) developed and manufactured by Guangzhou CNC Equipment Co., Ltd. Unit), is a servo drive unit product that supports the **GSK-Link** bus protocol.

Compared with other servo drive units of our company, this series of servo drive units has the following basic features:

ÿ Integrates AC permanent magnet synchronous servo motor and AC asynchronous spindle servo motor control algorithms into one, and adapts by setting motor parameters AC permanent magnet synchronous servo motor or AC asynchronous spindle servo motor;

ÿ High-speed real-time communication with CNC through GSK-Link fieldbus not only simplifies the connection, but also avoids the transmission of analog signals and pulse signals. It also supports real-time monitoring, parameter management and servo parameter tuning of the servo drive unit by CNC.

ÿ Supports multiple control modes such as position, speed, position/speed, torque, etc. ÿ Equipped with two position feedback input interfaces, supports encoder communication protocols such as BISS, Endat2.2, Tamagawa, and incremental encoders, Connect absolute or incremental grating ruler to realize full closed-loop control; ÿ Strong overload driving capability, large brake pipe capacity, support external brake resistor, fast starting and braking speed; ÿ With three voltage levels of 220V, 380V and 440V, it can adapt to different power grids.

1.1 Product model confirmation

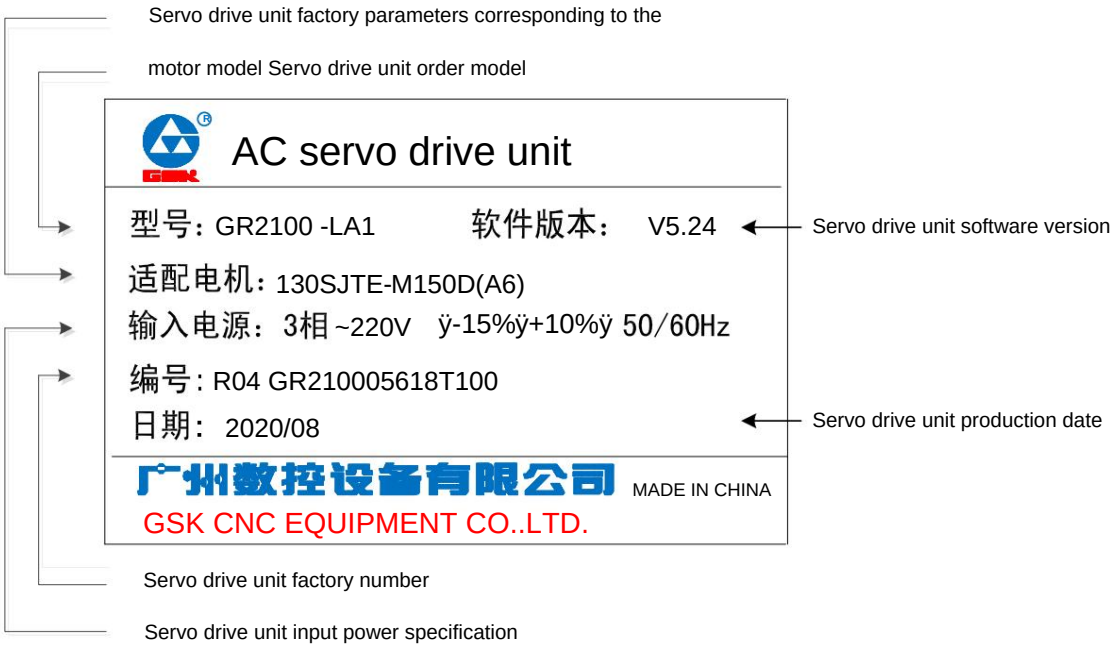
Please check the following items promptly after receiving the goods. If you have any questions, please contact the supplier or our company.

Inspection items	Remark
Check the servo drive unit and servo motor to confirm whether they are the ordered goods. Please confirm through the nameplates of the servo drive unit and servo motor.	
For special orders, you must check the software version and product configuration	Please confirm through the nameplate of the servo drive unit and servo motor. If necessary, check the monitoring status dP-dSP and dP-CPL of the servo drive unit and verify the software version and hardware version of the servo drive unit.
Check if the accessories are complete	Please check the contents of the accessories on the packing list. If the contents on the packing list do not match the accessories, Please contact the supplier in time.
Whether the goods were damaged during transportation	Please check the overall appearance of the goods, which should be complete and undamaged.
Are there any loose screws?	Please use a screwdriver to check for any loose parts.

Notice	1. Damaged or incomplete servo drive units cannot be installed; 2. The servo drive unit must be used in conjunction with a servo motor with matching power; 3. Please strictly follow the <Section 1.3 Ordering Guide> to confirm that the parameters of the GR-L series products and the servo motors meet the requirements. Require.

1.1.1 Servo drive unit model description

ÿ Servo drive unit nameplate example



ÿ Examples of servo drive unit models

GR 2 050		L A	1
ÿ ÿ ÿ		ÿ ÿ ÿ	

ÿ	“GR” series general servo drive unit, GR: product code.
ÿ	Voltage level code: 2: 220V; 3: 380V; 4: 440V.
ÿ	Nominal current of power components, 3 digits: 024, 030, 045, 048, 050, 075, 100, 148, 150, Leading zeros cannot be omitted for 198, 200, 300 (unit A).
ÿ	Communication bus code, L: GSK-Link bus.
ÿ	Feedback (encoder) interface type code: A: CN2 and CN3 are suitable for absolute encoders, compatible with incremental encoders, and support Tamagawa protocol, BISS protocol, and EnDat2.2 protocol; S: CN2 is suitable for absolute encoders and is compatible with incremental encoders (U/V/W encoder signals are no longer supported), CN3 is suitable for Equipped with sine and cosine signal encoder. Note: The GR-L series products have added the GRÿÿÿÿ-LS2 type, which is only suitable for sine and cosine signal encoders. For details, please refer to the ordering guide.
ÿ	Feedback (encoder) interface configuration code, 1 digit, "1" means only motor feedback (first position feedback) Input interface (CN2), "2" indicates motor feedback input (CN2) and second position feedback input interface (CN3).

1.1.2 Names of the parts of the servo drive unit

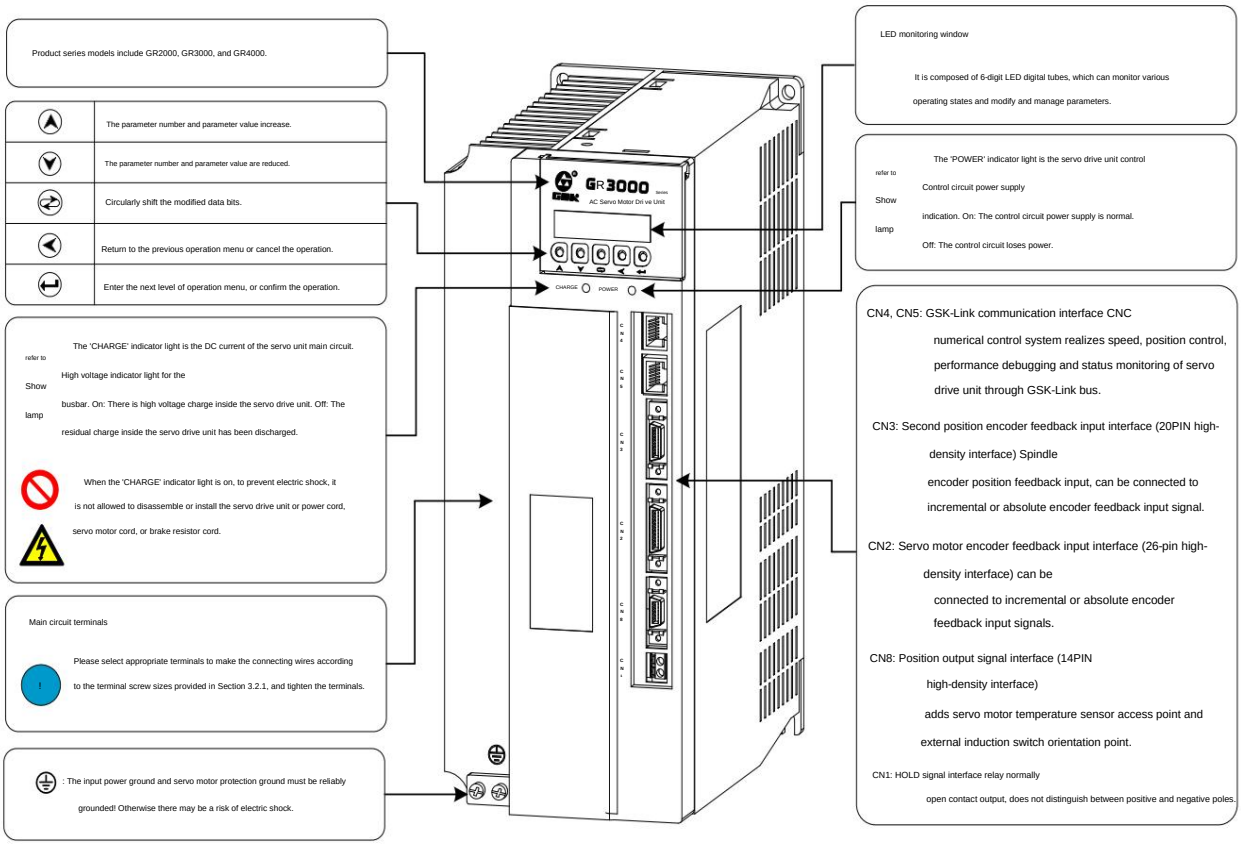


Figure 1-1 GR-L series product appearance

ÿ Servo motor encoder options include "A4ÿ" 17-bit absolute encoder, "A6" 23-bit absolute encoder, "A9ÿ" 25-bit absolute encoder and "A7" 24-bit absolute encoder need to be equipped with batteries.

Install the battery on the encoder cable and use the LS14500 battery.

ÿ The GR2024-L, GR2030-L and GR2045-L servo drive units do not support the CN8 interface function.

1.2 GR-L Series Servo Drive Unit Technical Specifications

Servo drive unit model	**GR2024-L**	**GR2030-L**	**GR2045-L**	**GR2050-L**
Continuous output current (A)	10	17	18.8	24.8
Weight (kg)	1.263	2.325		3.365
Standard servo motor Rated current **I (A)**	Iÿ4	4<Iÿ6	6<Iÿ8	8<Iÿ10
Input power 3-phase AC220V (85%ÿ110%) 50/60 Hz±1 Hz				
Braking resistor Built-in braking resistor. (External braking resistor is optional)				

Servo drive unit model	**GR2075-L**	**GR2100-L**	**GR2148-L**	**GR2200-L**
Continuous output current (A)	30.8	46	56	72
Weight (kg)	5.275	7.265	7.32	9.850
Standard servo motor Rated current **I (A)**	10<Iÿ15.5	15.5<Iÿ25	25<Iÿ45	45<Iÿ70
Input power 3-phase AC220V (85%ÿ110%) 50/60 Hz±1 Hz				
Braking resistor External braking resistor (no built-in braking resistor)				

Servo drive unit model **GR3048-L/GR4048-L**		**GR3050-L/GR4050-L**	**GR3075-L/GR4075-L**	**GR3100-L/GR4100-L**
Continuous output current (A)	13.5	19.2	28.3	41
Weight (kg)	3.42	5.38	7.6	9.755
Standard servo motor Rated current **I (A)**	Iÿ8	8<Iÿ15.5	15.5<Iÿ20	20<Iÿ27
Input Power	GR3000 series input power supply: 3-phase AC380V (85%ÿ110%) 50/60 Hz±1Hz GR4000 series input power: 3-phase AC440V (85%ÿ110%) 50/60 Hz±1Hz			
Braking resistor External braking resistor (no built-in braking resistor)				

Servo drive unit model **GR3148-L/GR4148-L**		**GR3150-L/GR4150-L**	**GR3198-L/GR4198-L**	**GR3300-L/GR4300-L**
Continuous output current (A)	42	48	56	102
Weight (kg)	9.850	13.34	13.4	31.64
Standard servo motor Rated current **I (A)**	27<Iÿ34	34<Iÿ49	49<Iÿ60	60<Iÿ90
Input Power	GR3000-L series input power: 3-phase AC380V (85%~110%) 50/60 Hz±1Hz GR4000-L series input power: 3-phase AC440V (85%~110%) 50/60 Hz±1Hz			
Braking resistor External braking resistor (no built-in braking resistor)				

Servo drive unit model	**GR-L** Series
Communication bus	GSK-Link bus interface receives position, speed, torque and control instructions, feeds back actual position/speed/torque and status data, supports real-time monitoring of servo status, uploading and downloading of servo parameters, and debugging of servo dynamic characteristics.
Working modes: manual, inching, internal speed, speed, position, torque, speed/position, speed/torque, position/torque.	
Position Control	Command range: -2 31 to 2 31 -1 Command unit: Position feedback input pulse equivalent; Position command electronic gear ratio: (1~32767)/(1~32767).
Speed control	Command range: -2 31~2 31 -1 Command unit: 0.01 r/min; Speed command electronic gear ratio: (1~1024)/(1~1024); Speed regulation range: 1 r/min~24000 r/min; Orientation function: orientation at any angle.
Torque control command range: -2 31 to 2 31 -1 Command unit: 0.0001 N·m.	
Motor feedback input	A/B/Z three pairs of differential signal input, suitable for 1024 p/r ~ 32767 p/r incremental encoder; RS485 half-duplex serial communication interface, supports BISS, Tamagawa encoder communication protocol, suitable for Danaher, Tamagawa absolute encoder. Heidenhain encoder with EnDat2.2 communication protocol can be selected; Feed servo standard 23bit multi-turn absolute encoder, optional 25bit absolute encoder; spindle servo standard 5000 p/r incremental encoder, optional 21bit absolute encoder.
Second feedback input	Feed servo optional interface, spindle servo standard interface; A/B/Z three pairs of differential signal input, adapt to incremental encoders and grating rulers; RS485 half-duplex serial communication interface, supports BISS, Endat communication protocols, adapt to Danaher, Tamagawa absolute encoders. Heidenhain encoders and grating rulers using EnDat2.2 communication protocol can be optionally equipped; New GRÿÿÿÿ-LS2 type, only adapt to sine and cosine signal encoders.
I/O Signals	CN1 fixed output signal (brake release); CN8 added 1 KTY-84 thermistor access point and 2 PTC thermal switch access points for temperature sensor; CN8 added external induction switch directional input and second-speed directional selection input.
Position feedback output (Function to be added)	Output A/B/Z differential signal based on the first or second position feedback input signal: (Function to be added)

1.3 Ordering Guide

1.3.1 GR-L series servo drive unit selection steps

sequence Number	Selection steps	Selection content	
1	Select the motor voltage level	Optional GR2000-L series, GR3000-L series, GR4000-L series	
		AC permanent magnet synchronous servo motor	AC asynchronous spindle servo motor
2	Select the motor rated power and rated torque	Optional rated power range (0.2ÿ30) kW Optional rated torque range (0.64ÿ140) N·m	Optional rated powers include 1.5, 2.2, 3.7, 5.5, 7.5, 11, 15, 18.5, 22, 30, 37 (in kW), etc.
3	Select the rated motor speed	A: Motor rated speed 1000 r/min B: Motor rated speed 1500 r/min C: Motor rated speed 2000 r/min D: Motor rated speed 2500 r/min E: Motor rated speed 3000 r/min F: Motor rated speed 3500 r/min G: Motor rated speed 4000 r/min	1. Spindle motor rated speed: 750 r/min, maximum speed 4500 rpm 2. Spindle motor rated speed: 1000 r/min, maximum speed 7000 rpm 3. Spindle motor rated speed: 1500 r/min, maximum speed 7000 r/min or 10000 r/min 4. Spindle motor rated speed: 2000 r/min, maximum speed 12000 rpm 5. Spindle motor rated speed: 3000 r/min, maximum speed 15000 rpm
4	Determined by machining accuracy Motor encoder	5000-line incremental encoder, theoretical resolution is 360 ÿ÷20000=0.018 ÿ, control error is greater than ±0.02 ÿ. The theoretical resolution of a 17-bit absolute encoder is 360 ÿ÷131072=0.0027 ÿ, and the control error is greater than ±0.003 ÿ. The theoretical resolution of a 21-bit absolute encoder is 360 ÿ÷2097152=0.00017 ÿ, and the control error is greater than ±0.0002 ÿ. Note: As the encoder resolution increases, the difference between the actual control accuracy and the theoretical control error will increase. The error ratio of the encoder itself increases, and the error ratio of the servo drive unit control increases. Therefore, the theoretical data here is only for reference.	
5. Determine the motor model. Determine the servo motor model according to the GSK servo motor model spectrum.			
6	Determine the servo drive unit model	Determine the model of the servo drive unit according to the selection table provided in Section 1.3.3.	

Due to the influence of the mechanical and assembly accuracy of the machine tool, the resolution is not equal to the final positioning accuracy.

1.3.2 Description of encoder types and hardware versions compatible with **GR-L** series products

To adapt to the changes in market demand, the GR-L series products provide more encoder adaptation solutions. When selecting products, users must refer to this

Please select the correct product hardware version to adapt to different types of encoders!

Motor encoder code	Motor encoder type	The number of pulses corresponding to one rotation of the motor
A or None (permanent magnet synchronous motor)	Incremental 2500p/r	10000
None (AC asynchronous motor)	Incremental 1024p/r	4096
A2	Incremental 5000p/r	20000
A4/A4ÿ (permanent magnet synchronous motor)	Absolute Tamagawa protocol 17 bits	131072
A4 (AC asynchronous motor) / A4ÿ	Absolute BISS-B protocol 17 bits	131072
A5 (AC asynchronous motor)	Absolute BISS-C protocol 21 bits	2097152
A6	Absolute Tamagawa protocol 23 bits	8388608
A9ÿ	Absolute Tamagawa protocol 25 bits	33554432
A7	Absolute Nikon protocol 24 bit	16777216
A7ÿ	Absolute BISS-C protocol 24 bits	16777216
A9ÿ	Absolute BISS-C protocol 25 bits	33554432
A9	Absolute Heidenhain EnDat2.2 protocol 25 bits	33554432

The software versions of the GR-L series products are V5.24, V5.26, and V5.27, which can be used with the hardware versions listed in the table below.

Select the correct hardware version according to the encoder code or type in the table below.

Hardware version **Dp-CPL**	Only **CN2** is available	Optional **CN2+CN3**		
V1.32	CN2 supports A4ÿÿA6ÿA9ÿÿ A7, A4ÿ/A4 (AC asynchronous A5, A7ÿ, A9ÿ, Quantitative rotary encoder	CN3 optional incremental grating scale or Fagor, Renishaw Note wait BISS-C protocol grating ruler, CN2 can be equipped with A4ÿÿA6ÿ A7ÿA4ÿÿA7ÿÿA9ÿ	CN3 optional Fagor, Renishaw Note BISS-C protocol rotation Encoder. CN2 can be equipped with A4ÿ, A6, A9ÿÿA7ÿA4ÿ/A4ÿcross Asynchronous motor), A7ÿ, A9ÿÿ	CN3 optional incremental rotary encoder Encoder. CN2 can be equipped with A5, incremental Rotary encoder (for cross asynchronous motor).
V1.13	CN2 supports A4ÿ, A4ÿ, A6, A9ÿ, A9, incremental rotary encoder Encoder.	CN3 can be equipped with Heidenhain EnDat2.2 protocol grating ruler or rotary encoder. CN2 can only be equipped with A4ÿ, A4ÿ, A6, and A9ÿ.		
V1.14	CN2 supports A4ÿ, A5, A7ÿ, A9ÿ, A9, incremental rotary encoder device.	CN3 optional Heidenhain EnDat2.2 protocol encoder ruler or rotary encoder. CN2 can be equipped with A4ÿ, A5, A7ÿ and A9ÿ.	CN3 optional BISS-C protocol such as Fagor and Renishaw Linear scale or rotary encoder. CN2 can be equipped with A4ÿ and A9.	
V1.07	CN2 supports A4ÿ, A4ÿ, A6, A7ÿÿA9ÿÿA9ÿÿ	/		
Note: For GR-L series products, please contact product development for ordering encoders with BISS-C protocol such as Fagor, Renishaw, etc., as well as encoders not described in the above table. Personnel confirm the specific model.				

1.3.3 GR-L Series Product Ordering Instructions

1) Please specify the model and quantity of the ordered products (servo drive unit, servo motor, isolation transformer, CNC) and Hardware version supply, when requiring optional functions and optional accessories, must be specified on the order.

2) Be sure to specify the type, specification, and quantity of non-standard accessories (such as special cables or cable lengths, cable manufacturing processes, etc.).

Will be supplied with standard accessories.

3) Please be sure to specify the shaft extension, structural type, wiring method and other codes of the servo motor you ordered. Please indicate special order items on the order.

4) When ordering only the servo drive unit (without the servo motor), you must add "(self-matched servo motor model)" after the servo drive unit model **[Example: GR2030-LA1-(130SJT-M060D(A4I** Y1))] so that the matching parameters of the servo drive unit can be set according to the matching servo motor model before the servo drive unit leaves the factory. The servo drive unit must be parameter-adapted with the servo motor to obtain a good control effect. If the user self-matches a non- **GSK** brand servo motor, it must be confirmed by the **GSK** R&D department.

5) Servo drive units and spindle servo motors with three-phase **AC440V** power input are out of stock and must be produced according to orders.

6) Order model example

ÿ The complete ordering model of GR-L series servo drive (including GSK SJT series AC servo motor) is as follows:

GR-L servo drive unit model — SJT servo motor model

Example: GR2030-LA1-130SJT-MZ060D (A4ÿ)

Description: Order GR2030-LA1 servo drive unit and matching 130SJT-MZ060D (A4ÿ) servo motor, standard accessories.

ÿ The complete ordering model of GR-L series servo drive (including GSK ZJY series AC spindle servo motor) is as follows:

GR-L servo drive unit model — ZJY spindle servo motor model

Example: GR3075-LA2-ZJY208-7.5BM-B5LY1

Description: Order GR3075-LA2 servo drive unit and matching ZJY208-7.5BM-B5ALY1 spindle servo motor, standard

With accessories.

ÿ GR-L series servo drive unit (excluding servo motor) ordering model is as follows

GR-L servo drive unit model—(servo motor model)

Note: Only the servo drive unit is ordered. The factory parameters are adapted to the servo motor model in brackets and the accessories are standard.

1.3.4 Selection table of servo motors compatible with GR-L series servo drive units

1) The GSK SJT series AC servo motors listed in the adaptability table are not equipped with power-off brakes (holding brakes).

When installing a servo motor with a power-off brake, please add the letter "Z" to the servo motor model, such as: without installing a power-off brake

If the motor specification is 175SJT-M380B (A6), the motor specification to be installed with the power-loss brake is 175SJT-M **Z** 380B (A6).

2) The servo motor model in the adaptation table does not specify the motor's shaft extension, installation structure and wiring method. Please consult Guangshu or check

Request motor product samples.

3) "ÿ" indicates optional servo motor encoder. A4ÿ: 17 bit multi-turn absolute type, external battery is required, and position information is memorized when power is off. A6: 23 bit multi-turn absolute type, external battery is required, and position information is memorized when power is off. A9ÿ: 25 bit multi-turn absolute type, external battery is required, and position information is memorized when power is off.

4) GR2024-L has no second position feedback input interface, does not support incremental encoders yet, and has a built-in brake resistor as standard.

5) GR2030-L, GR2045-L, GR2050-L and other specifications of products are equipped with built-in brake resistors as standard.

ÿ List of SJT series, SJTA series and SJTB series AC servo motors compatible with GR2000-L series servo drive units

sequence Number	Motor Model	Rated Power kW	Rated torque N·m	Rated speed rpm	Rated current A	Encoder			Adaptive servo Drive unit
						A4ÿ A6 A9ÿ			
1	60SJTA-M006E	0.2	0.64	3000	1.1	ÿ	×	×	GR2024-LA1
2	60SJTA-M013E	0.4	1.27	3000	2.3	ÿ	×	×	
3	60SJTA-M019E	0.6	1.91	3000	3.8	ÿ	×	×	
4	80SJTA-M024C	0.5	2.4	2000	2.5	ÿ	ÿ	ÿ	
5	80SJTA-M024E	0.75	2.4	3000	3.8	ÿ	ÿ	ÿ	
6	80SJTA-M032C	0.66	3.2	2000	3.2	ÿ	ÿ	ÿ	
7	130SJT-M040DÿAÿ	1.0	4	2500	4	ÿ	ÿ	ÿ	
8	80SJTA-M032E	1.0	3.2	3000	5.5	ÿ	ÿ	ÿ	GR2030-LA1 GR2030-LA2
9	110SJT-M040DÿAÿ	1.0	4	2500	4.5	ÿ	ÿ	ÿ	
10	110SJT-M040EÿAÿ	1.2	4	3000	5	ÿ	ÿ	ÿ	
11	130SJT-M050DÿAÿ	1.3	5	2500	5	ÿ	ÿ	ÿ	
12	130SJT-M060DÿAÿ	1.5	6	2500	6	ÿ	ÿ	ÿ	
13	130SJT-M100BÿAÿ	1.5	10	1500	6	ÿ	ÿ	ÿ	
14	110SJT-M060DÿAÿ	1.5	6	2500	7	ÿ	ÿ	ÿ	GR2045-LA1 GR2045-LA2
15	110SJT-M060EÿAÿ	1.8	6	3000	8	ÿ	ÿ	ÿ	
16	130SJT-M050EÿAÿ	1.57	5	3000	7.2	ÿ	ÿ	ÿ	
17	130SJT-M060EÿAÿ	1.88	6	3000	7.8	ÿ	ÿ	ÿ	
18	130SJT-M075DÿAÿ	1.88	7.5	2500	7.5	ÿ	ÿ	ÿ	
19	130SJT-M075EÿAÿ	2.36	7.5	3000	9.9	ÿ	ÿ	ÿ	GR2050-LA1 GR2050-LA2
20	130SJT-M100DÿAÿ	2.5	10	2500	10	ÿ	ÿ	ÿ	
21	130SJTB-M150BÿAÿ	2.4	15	1500	10	ÿ	ÿ	ÿ	
22	175SJT-M150B	2.4	15	1500	11	ÿ	ÿ	ÿ	
23	175SJT-M120E	3	9.6	3000	13	ÿ	ÿ	ÿ	GR2075- LA1 GR2075- LA2
24	175SJT-M150D	3.1	12	2500	14	ÿ	ÿ	ÿ	
25	175SJT-M180B	2.8	18	1500	15	ÿ	ÿ	ÿ	
26	130SJTE-M150DÿAÿ	3.9	15	2500	19.5	ÿ	ÿ	ÿ	GR2100- LA1 GR2100- LA2
27	175SJT-M180D	3.8	14.5	2500	16.5	ÿ	ÿ	ÿ	
28	175SJT-M220B	3.5	22	1500	17.5	ÿ	ÿ	ÿ	
29	175SJT-M220D	4.5	17.6	2500	19	ÿ	ÿ	ÿ	
30	175SJT-M300B	4.7	30	1500	24	ÿ	ÿ	ÿ	
31	175SJT-M300D	6	24	2500	27.5	ÿ	ÿ	ÿ	GR2148- LA1 GR2148- LA2
32	175SJT-M380B	6	38	1500	29	ÿ	ÿ	ÿ	

ÿ List of SJTF series AC servo motors compatible with GR2000-L series servo drive units

sequence Number	Motor Model	Rated Power **kW**	Rated torque **N·m**	Rated speed **rpm**	Rated current **A**	Encoder **A4ÿ A6 A9ÿ**			Adaptive servo Drive unit
1	130SJTF-M048C	1.0	4.77	2000	6.5	ÿ	ÿ	ÿ	GR2045-LA1 GR2045-LA2
2	130SJTF-M072C	1.5	7.16	2000	9	ÿ	ÿ	ÿ	GR2050-LA1 GR2050-LA2
3	130SJTF-M096C	2.0	9.55	2000	12	ÿ	ÿ	ÿ	GR2075-LA1 GR2075-LA2
4	130SJTF-M120C	2.5	11.9	2000	15	ÿ	ÿ	ÿ	
5	175SJTF-M150B	2.4	15	1500	12	ÿ	ÿ	ÿ	
6	175SJTF-M150D	3.1	12	2500	16	ÿ	ÿ	ÿ	
7	175SJTF-M180B	2.8	18	1500	14	ÿ	ÿ	ÿ	
8	175SJTF-M180D	3.8	14.5	2500	17.5	ÿ	ÿ	ÿ	GR2100- LA1 GR2100- LA2
9	175SJTF-M220B	3.5	22	1500	17.5	ÿ	ÿ	ÿ	
10	175SJTF-M220D	4.6	17.6	2500	22.5	ÿ	ÿ	ÿ	
11	175SJTF-M300B	4.7	30	1500	23.5	ÿ	ÿ	ÿ	
12	175SJTF-M300D	6.3	24	2500	29.5	ÿ	ÿ	ÿ	GR2148- LA1 GR2148- LA2
13	175SJTF-M380B	6.0	38	1500	30.5	ÿ	ÿ	ÿ	

ÿ List of SJT series and SJTG series AC servo motors compatible with GR3000-L series servo drive units

sequence Number	Motor Model	Rated Power **kW**	Rated torque **N·m**	Rated speed **rpm**	Rated current **A**	Encoder **A4ÿ A6 A9ÿ**			Adaptive servo Drive unit
1	130SJTG-M040GH	1.7	4	4000	4.8	ÿ	ÿ	ÿ	GR3048-LA2
2	130SJTG-M050GH	2.1	5	4000	6	ÿ	ÿ	ÿ	
3	130SJTG-M060GH	2.5	6	4000	7.2	ÿ	ÿ	ÿ	
4	130SJTG-M075GH	3.1	7.5	4000	7.5	ÿ	ÿ	ÿ	
5	130SJTG-M100GH	4.2	10	4000	10	ÿ	ÿ	ÿ	GR3050-LA2
6	175SJTG-M120EH	3.8	12	3000	10.5	ÿ	ÿ	ÿ	
7	175SJTG-M150EH	4.7	15	3000	12.5	ÿ	ÿ	ÿ	GR3075-LA2
8	175SJTG-M180EH	5.7	18	3000	15.5	ÿ	ÿ	ÿ	
9	175SJT-M380BH	6	38	1500	15	ÿ	ÿ	ÿ	
10	175SJTG-M220EH	6.9	22	3000	18.5	ÿ	ÿ	ÿ	GR3100-LA2
11	175SJT-M500BH	7.8	50	1500	20	ÿ	ÿ	ÿ	
12	175SJTG-M300EH	9.4	30	3000	25	ÿ	ÿ	ÿ	GR3148-LA2
13	175SJTG-M380EH	11.9	38	3000	32	ÿ	ÿ	ÿ	
14	175SJT-M380DH	7.9	30	2500	26	ÿ	ÿ	ÿ	
15	175SJT-M500DH	10.5	40	2500	33	ÿ	ÿ	ÿ	

ÿ List of SJTE series AC servo motors compatible with GR3000-L series servo drive units

sequence Number	Motor Model	Rated Power kW	Rated torque N·m	Rated speed rpm	Rated current A	Encoder			Adaptive servo Drive unit
						A4ÿ A6 A9ÿ			
1	265SJTE-M700CHY1	11	52.5	2000	32	ÿ	ÿ	ÿ	GR3198-LA2
2	265SJTE-M1000CHY1	15	71.6	2000	37	ÿ	ÿ	ÿ	
3	265SJTE-M1400CHY1	22	105	2000	55	ÿ	ÿ	ÿ	GR3300-LA2
4	265SJTE-M2000CHY1	30	143.3	2000	66	ÿ	ÿ	ÿ	

ÿ List of ZJY series AC spindle servo motors compatible with GR2000-L series servo drive units

sequence Number	Motor Model	Rated Power kW	Rated speed rpm	Maximum speed rpm	Rated current A	Encoder (Note 1)			Adaptive servo Drive unit
						1024 A2 A5			
1	ZJY182A-3.7BL-L	3.7	1500	4500	17.9	ÿ	ÿ	ÿ	GR2075-LA2
2	ZJY182A-5.5BL-L	5.5	1500	4500	23.9	ÿ	ÿ	ÿ	GR2100-LA2
3	ZJY182A-1.5BH-L	1.5	1500	10000	10.7	ÿ	ÿ	ÿ	GR2050-LA2
4	ZJY182A-2.2BH-L	2.2	1500	10000	12.9	ÿ	ÿ	ÿ	GR2050-LA2
5	ZJY182A-3.7BH-L	3.7	1500	10000	23.5	ÿ	ÿ	ÿ	GR2100-LA2
6	ZJY182A-5.5BH-L	5.5	1500	10000	30	ÿ	ÿ	ÿ	GR2100-LA2
7	ZJY208A-3.7WL-L	3.7	750	4500	19.6	ÿ	ÿ	ÿ	GR2075-LA2
8	ZJY208A-2.2AM-L	2.2	1000	7000	11.6	ÿ	ÿ	ÿ	GR2050-LA2
9	ZJY208A-3.7AM-L	3.7	1000	7000	17.7	ÿ	ÿ	ÿ	GR2075-LA2
10	ZJY208A-5.5AM-L	5.5	1000	7000	28.2	ÿ	ÿ	ÿ	GR2100-LA2
11	ZJY208A-3.7BM-L	3.7	1500	7000	14.9	ÿ	ÿ	ÿ	GR2075-LA2
12	ZJY208A-5.5BM-L	5.5	1500	7000	22.5	ÿ	ÿ	ÿ	GR2100-LA2
13	ZJY208A-7.5BM-L	7.5	1500	7000	29.4	ÿ	ÿ	ÿ	GR2100-LA2
14	ZJY208A-2.2BH-L	2.2	1500	10000	15.3	ÿ	ÿ	ÿ	GR2075-LA2
15	ZJY208A-3.7BH-L	3.7	1500	10000	21.8	ÿ	ÿ	ÿ	GR2100-LA2
16	ZJY208A-5.5BH-L	5.5	1500	10000	31.8	ÿ	ÿ	ÿ	GR2100-LA2
17	ZJY208A-7.5BH-L	7.5	1500	10000	38.9	ÿ	ÿ	ÿ	GR2148-LA2
18	ZJY208A-7.5EF-L	7.5	3000	12000	30.7	ÿ	×	ÿ	GR2100-LA2
19	ZJY265A-5.5WL-L	5.5	750	4500	28.2	ÿ	ÿ	ÿ	GR2100-LA2
20	ZJY265A-7.5WL-L	7.5	750	4500	37	ÿ	ÿ	ÿ	GR2148-LA2
21	ZJY265A-7.5BM-L	7.5	1500	7000	31	ÿ	ÿ	ÿ	GR2100-LA2
22	ZJY265A-11BM-L	11	1500	7000	44.7	ÿ	ÿ	ÿ	GR2148-LA2
23	ZJY265A-15BM-L	15	1500	7000	62.3	ÿ	ÿ	ÿ	GR2200-LA2
24	ZJY265A-7.5BH-L	7.5	1500	10000	36.5	ÿ	ÿ	ÿ	GR2148-LA2
25	ZJY265A-11BH-L	11	1500	10000	51.9	ÿ	ÿ	ÿ	GR2200-LA2
26	ZJY265A-15BH-L	15	1500	10000	70.5	ÿ	ÿ	ÿ	GR2200-LA2

Note: The code for 1024-line encoder is omitted. Code “A2” is for 5000-line encoder and code “A5” is for 21-bit encoder.

ÿ List of ZJY series AC spindle servo motors compatible with GR3000-L series servo drive units

sequence Number	Motor Model	Rated Power **kW**	Rated speed **rpm**	Maximum speed **rpm**	Rated current **A**	Encoder			Adaptive servo Drive unit
						1024 A2 A5			
1	ZJY182A-1.5BH	1.5	1500	10000	7.3	ÿ	ÿ	ÿ	GR3048-LA2 GR3050-LS2
2	ZJY182A-2.2BH	2.2	1500	10000	7.5	ÿ	ÿ	ÿ	
3	ZJY182A-3.7BL	3.7	1500	4500	10.4	ÿ	ÿ	ÿ	GR3050-LA2 GR3050-LS2
4	ZJY182A-3.7BH	3.7	1500	10000	15.5	ÿ	ÿ	ÿ	
5	ZJY182A-3.7EG	3.7	3000	15000	11.6	ÿ	× ÿ		
6	ZJY182A-5.5BL	5.5	1500	4500	13.8	ÿ	ÿ	ÿ	
7	ZJY182A-5.5BH	5.5	1500	10000	17.3	ÿ	ÿ	ÿ	GR3075-LA2 GR3075-LS2
8	ZJY182A-5.5EG	5.5	3000	15000	16.6	ÿ	× ÿ		
9	ZJY182A-7.5EG	7.5	3000	15000	20.2	ÿ	×	ÿ	GR3100-LA2 GR3100-LS2
10	ZJY208A-2.2AM	2.2	1000	7000	6.7	ÿ	ÿ	ÿ	GR3048-LA2 GR3050-LS2
11	ZJY208A-2.2BH	2.2	1500	10000	8.9	ÿ	ÿ	ÿ	GR3050-LA2 GR3050-LS2
12	ZJY208A-3.7WL	3.7	750	4500	11.3	ÿ	ÿ	ÿ	
13	ZJY208A-3.7AM	3.7	1000	7000	10.2	ÿ	ÿ	ÿ	
14	ZJY208A-3.7BM	3.7	1500	7000	8.6	ÿ	ÿ	ÿ	
15	ZJY208A-3.7BH	3.7	1500	10000	12.6	ÿ	ÿ	ÿ	
16	ZJY208A-5.5AM	5.5	1000	7000	16.3	ÿ	ÿ	ÿ	GR3075-LA2 GR3075-LS2
17	ZJY208A-5.5BL	5.5	1500	4500	12.9	ÿ	ÿ	ÿ	GR3050-LA2 GR3050-LS2
18	ZJY208A-5.5BM	5.5	1500	7000	13	ÿ	ÿ	ÿ	
19	ZJY208A-5.5EF	5.5	3000	12000	12.8	ÿ	× ÿ		
20	ZJY208A-5.5BH	5.5	1500	10000	18.4	ÿ	ÿ	ÿ	GR3075-LA2 GR3075-LS2
21	ZJY208A-5.5CF	5.5	2000	12000	19	ÿ	× ÿ		
22	ZJY208A-7.5BL	7.5	1500	4500	17.9	ÿ	ÿ	ÿ	
23	ZJY208A-7.5BM	7.5	1500	7000	17	ÿ	ÿ	ÿ	
24	ZJY208A-7.5EF	7.5	3000	12000	17.7	ÿ	× ÿ		
25	ZJY208A-7.5BH	7.5	1500	10000	22.4	ÿ	ÿ	ÿ	GR3100-LA2 GR3100-LS2
26	ZJY208A-7.5CF	7.5	2000	12000	25.8	ÿ	× ÿ		
27	ZJY208A-9BL	9	1500	4500	21.6	ÿ	ÿ	ÿ	
28	ZJY208A-11CM	11	2000	7000	28.3	ÿ	ÿ	ÿ	GR3100-LA2 GR3100-LS2
29	ZJY208A-11CH	11	2000	10000	28.3	ÿ	ÿ	ÿ	
30	ZJY208A-11EH	11	3000	10000	25.2	ÿ	ÿ	ÿ	
31	ZJY208A-11EF	11	3000	12000	25.2	ÿ	ÿ	ÿ	

sequence Number	Motor Model	Rated Power kW	Rated speed rpm	Maximum speed rpm	Rated current A	Encoder			Adaptive servo Drive unit
						1024 A2 A5			
32	ZJY265A-5.5WL	5.5	750	4500	16.3	ÿ	ÿ	ÿ	GR3075-LA2 GR3075-LS2
33	ZJY265A-7.5BM	7.5	1500	7000	18	ÿ	ÿ	ÿ	
34	ZJY265A-7.5WL	7.5	750	4500	21.4	ÿ	ÿ	ÿ	GR3100-LA2 GR3100-LS2
35	ZJY265A-7.5AM	7.5	1000	7000	21.5	ÿ	ÿ	ÿ	
36	ZJY265A-7.5BH	7.5	1500	10000	21	ÿ	ÿ	ÿ	
37	ZJY265A-11BM	11	1500	7000	26	ÿ	ÿ	ÿ	
38	ZJY265A-11WL	11	750	4500	30	ÿ	ÿ	ÿ	GR3148-LA2 GR3148-LS2
39	ZJY265A-11AM	11	1000	7000	30.9	ÿ	ÿ	ÿ	
40	ZJY265A-11BH	11	1500	10000	30	ÿ	ÿ	ÿ	
41	ZJY265A-15AM	15	1000	7000	48.3	ÿ	ÿ	ÿ	GR3150-LA2 GR3150-LS2
42	ZJY265A-15BM	15	1500	7000	35	ÿ	ÿ	ÿ	
43	ZJY265A-15BH	15	1500	10000	40.7	ÿ	ÿ	ÿ	
44	ZJY265A-18.5BM	18.5	1500	7000	48.7	ÿ	ÿ	ÿ	
45	ZJY265A-22BM	22	1500	7000	58	ÿ	ÿ	ÿ	GR3198-LA2 GR3198-LS2
46	ZJY320-18.5WL	18.5	750	4500	51	ÿ	ÿ	ÿ	
47	ZJY320-22WL	22	750	4500	58	ÿ	ÿ	ÿ	
48	ZJY320-30BL	30	1500	4500	69	ÿ	ÿ	ÿ	GR3300-LA2 GR3300-LS2
49	ZJY320-37BL	37	1500	4500	87	ÿ	ÿ	ÿ	
50	ZJY320-45BL	45	1500	4500	100	ÿ	ÿ	ÿ	

1.3.5 **GR-L** Series Servo Drive Unit Accessories

ÿ **GR-L** series product standard accessories list

Order Type Servo Drive Unit		**GR-L** Series Servo Drive Unit Accessories							
		product use manual	Motor coding Cable	Motor power supply Wire	External brake Resistors (Note 1)	**CN2** interface plug	**CN3** Port plug (Note **2)**	**CN8** interface plug	Fan power supply Wire
CNC, servo Drive unit, Servo motor Supply	GR2000-LA1 Seriesÿ		ÿ	ÿ	ÿ	----			
	GR2000-LA2 Series GR3000-LA2 Series	ÿ	ÿ	ÿ	ÿ	— ÿ		ÿ	ÿ
Servo drive unit Element, servo motor Complete set supply (without CNC)	GR2000-LA1 Seriesÿ		ÿ	ÿ	ÿ	----			
	GR2000-LA2 Series GR3000-LA2 Series	ÿ	ÿ	ÿ	ÿ	— ÿ		ÿ	ÿ
Servo drive unit Available separately	GR2000-LA1 Seriesÿ — —				ÿ	ÿ — ——			
	GR2000-LA2 Series GR3000-LA2 Series	ÿ — —			ÿ	ÿ	ÿ	ÿ	-

Note 1: GR2024-L, GR2030-L, GR2045-L, GR2050-L and other specifications are equipped with internal braking resistors as standard, which are suitable for frequent starting and braking applications. An external braking resistor is optional.

Note 2: GR2024-L does not have CN3 and CN8 interfaces, and GR2030-L and GR2045-L do not have CN8 interfaces.

ÿ Select the corresponding motor encoder line according to the selected servo motor and matching servo drive unit

GR-L servo drive unit and servo motor encoder connection cable list

Serial number	Motor specifications	Cable specifications			
		Ordering model	Ordering code	Type 16 core twisted pair	Connectors
1	80SJT/80SJTA series incremental encoders, Direct cable outlet	***-00-761F	70008947	shield	MDR26-15 Needle Square Plastic plug
2	80SJT/80SJTA series incremental encoders, Socket outlet	***-00-761G	70008910	16-core twisted pair shield	MDR26-15 hole aviation plug
3	110SJT/130SJT/175SJT Series Incremental Encoder, socket outlet	***-00-761C	70008909	16-core twisted pair shield	MDR26-15 hole aviation plug
4	80SJT/80SJTA Series Absolute Encoders (A4I), direct cable outlet	***-00-761E	70008946	8-core twisted pair shield	MDR26-15 Needle Square Plastic plug
5	80SJT/80SJTA Series Absolute Encoders (A4I), socket outlet	***-00-761K	70008948	8-core twisted pair shield	MDR26-15 hole aviation plug
6	110SJT/130SJT/175SJT Series Absolute Encoders Encoder (A4I), socket outlet	***-00-761B	70008908	8-core twisted pair shield	MDR26-15 hole aviation plug
7	60SJT/80SJT Series Absolute Encoders (A4ÿX/A6), direct cable outlet	***-00-761MD	70018800	8-core twisted pair shield	MDR26-10 pin rectangular plastic Plug with battery box
8	80SJT Series Absolute Encoders (A4ÿ/A6), socket outlet	***-00-761KD	70018801	8-core twisted pair shield	MDR26-15 hole aviation plug, With battery box
9	60SJT/80SJT Series Absolute Encoders (A4ÿXsy/A6), direct cable outlet	***-00-761SY	70018876	8-core twisted pair shield	MDR26-10 hole aviation plug, With battery box
10	110SJT/130SJT/175SJT Series Absolute Encoder (A4ÿ/A6), socket outlet	***-00-761BD	70018405	8-core twisted pair shield	MDR26-15 hole aviation plug, With battery box
11	ZJY208/ZJY265 series incremental encoder, Socket outlet	***-00-761C	70008944	8-core twisted pair shield	MDR26-15 hole aviation plug
12	ZJY208A/ZJY265A Series Incremental Encoder Socket outlet	***-00-761G	70008952	8-core twisted pair shield	MDR26-12 hole round plug
13	ZJY182 series incremental encoder, direct Outgoing	***-00-761F	70008945	8-core twisted pair shield	MDR26-12 Needle Square Plastic plug
14	ZJY208A/ZJY 265A Series Absolute Encoders Device (A4/A5), socket outlet	***-00-761I	70007574	8-core twisted pair shield	MDR26-12 hole round plug
15	Equipped with DZY series electric spindle motor (Tamo Chuan magnetic Resistive encoder, protocol output)	***-00-761J	70016073	4-core twisted pair shield	MDR26-9 square plug
	Equipped with DZY series electric spindle motor (Heidenhain optical Scale, magnetic encoder, protocol output)	***-00-761K	70016074	8-core twisted pair shield	MDR26-M12 Connector (8 pin)

1. "***" in the ordering model refers to the specific specifications of the servo drive unit when ordering, such as "GR3050-LA2-00-761C".

2. Please specify the cable length when placing an order.

3. DZY series electric spindle motors are direct-drive AC asynchronous spindle servo motors for CNC machine tools produced by **GSK .** Currently, only fixed Sub coil and squirrel cage rotor.

ÿ The **GR-L** servo drive unit is equipped with an AC permanent magnet synchronous servo motor power input cable, with a standard quantity of **1 .**

sequence Number	Servo drive unit specifications	Motor specifications	Cable specifications			
			Ordering Model (Note)	Ordering Code	Cable Specifications	Servo motor current adaptation
1	GR2024-L	60SJTA/80SJTA series direct outlet Cable (A4ÿX/A6X, 4pin square plastic Material plug)	***-00-765Q	70017531	1.0 mm2 4-core sheathed cable;	Iÿ4A
2		60SJTA/80SJTA series direct outlet Cable, with brake (A4ÿX/A6X, 6pin Square plastic plug)	***-00-765QZ	70017532		
3		60SJTA/80SJTA series socket outlet Cable (A4ÿX/A6X, small 4pin plug)	***-00-765P	70017530		
4		110SJT/130SJT Series Socket Outlet Wire	***-00-765N	70017529		
5	GR2030-L	80SJTA series socket outlet (4pin Aviation plug)	***-00-765C	70008894	1.0 mm2 4 core sheathed cable	Iÿ6A
6		80SJTA series direct outlet (4 pin plug)	***-00-765M	70008895	1.0 mm2 4 core sheathed cable	Iÿ6A
7		110SJT/130SJT/130SJTG Series Socket outlet	***-00-765J	70008896	1.0 mm2 4 core sheathed cable	Iÿ6A
8	GR2045-L GR2050-L GR3048-L GR3050-L	80SJTA series socket outlet (4pin Aviation plug)	***-00-765K	70008900	1.5 mm2 4 core sheathed cable	6A<Iÿ7.5A
9		80SJTA series direct outlet (4 pin Aviation plug)	***-00-765H	70008899	1.5 mm2 4 core sheathed cable	6A<Iÿ7.5A
10		110SJT/130SJT/130SJTG Series Socket outlet (4-pin aviation plug)	***-00-765D	70008898	1.5 mm2 4 core sheathed cable	6A<Iÿ10A
11	GR2075-L GR3075-L	130SJT/175SJT/175SJTG Series Socket outlet	***-00-765E	70008901	2.5 mm2 4 core sheathed cable	10A<Iÿ15A
12	GR2100-L	130SJT/175SJT/175SJTG Series Socket outlet	***-00-765I	70008902	2.5 mm2 4 core sheathed cable	15A<Iÿ25A
13	GR2100-L GR3100-L	175SJT/175SJTG Series Socket Outgoing	***-00-765F	70008903	4.0 mm2 4 core sheathed cable	20A<Iÿ29A
14	GR3148-L GR3150-L	175SJT/175SJTG Series Socket Outgoing	***-00-765G	70008904	6.0 mm2 4 core sheathed cable	29A<Iÿ34A

Note: The "***" in the model number refers to the specific specifications when ordering. Please complete it after selecting the model number. For example, "GR3050-LA2-00-765K".

The length needs to be specified when placing an order!

ÿ The **GR-L** series servo drive unit is equipped with an AC asynchronous spindle servo motor power input cable, the standard quantity is 1.

Serial number	Servo drive Unit Specifications	Motor specifications	Cable specifications			
			Ordering Model (Note)	Ordering Code Cable	Specifications	Adaptive servo Motor current
1	GR3048-L GR4048-L	ZJY182/ZJY208A	***-00-765C	70008933	1.0 mm2 4 core sheathed cable	Iÿ8A
2	GR2050-L GR3048-L GR4048-L	ZJY182/ZJY208A/ ZJY 265A	***-00-765K	70008936	1.5 mm2 4 core sheathed cable	8A< Iÿ15.5A
3	GR2075-L GR3050-L GR4050-L	ZJY182/ZJY208A/ ZJY 265A	***-00-765D	70008935	1.5 mm2 4 core sheathed cable	8A< Iÿ15.5A
4	GR2075-L GR3050-L GR4050-L	ZJY182/ZJY208A/ ZJY 265A	***-00-765L	70008942	2.5 mm2 4 core sheathed cable	10A< Iÿ15.5A
5	GR2100-L GR3075-L GR4075-L	ZJY182/ZJY208A/ ZJY 265A	***-00-765E	70008937	2.5 mm2 4 core sheathed cable	15.5A< Iÿ20A
6	GR2100-L GR3100-L GR4100-L	ZJY182/ZJY208A/ ZJY 265A	***-00-765F	70008939	4.0 mm2 4 core sheathed cable	20A< Iÿ27A
7	GR2100-L GR2150-L GR3148-L GR4148-L	ZJY208A/ ZJY265A	***-00-765G	70008940	6.0 mm2 4 core sheathed cable	27A<Iÿ34A
8	GR2148-L GR3150-L GR4150-L	ZJY208A/ ZJY 265A	***-00-765I	70008941	10.0 mm2 4 core sheathed cable	34A< Iÿ49A
9	GR3198-L GR4198-L	ZJY208A/ ZJY 265A	***-00-765M	70015173	3×16+10 mm 2 3+1 single core plastic Sheathed wire	49A<Iÿ60A
10	GR3048-L DZY156		***-00-765K	70008936	1.5 mm2 4 core sheathed	8A< Iÿ13A
11	GR3075-L	DZY120/DZY156/ DZY156A	***-00-765E	70008937	cable 2.5 mm2 4 core sheathed	13A< Iÿ20A
12	GR3100-L	DZY156/DZY156A/ DZY180	***-00-765F	70008939	cable 4.0 mm2 4 core sheathed	20A< Iÿ27A
13	GR3148-L DZY180		***-00-765G	70008940	cable 6.0 mm2 4 core sheathed	27AÿIÿ34A
14	GR3300-L GR4300-L	ZJY265A/ZJY320	***-00-765N	70015174	cable 3×25+10 mm2 3+1 single core plastic Sheathed wire	60AÿIÿ90A

Note: The "***" in the model number refers to the specific specifications when ordering. Please complete it after selecting the model number. For example, "GR3050-LA2-00-765K".

The length needs to be specified when placing an order!

Chapter 2 Installation

2.1 Installation Environment Requirements

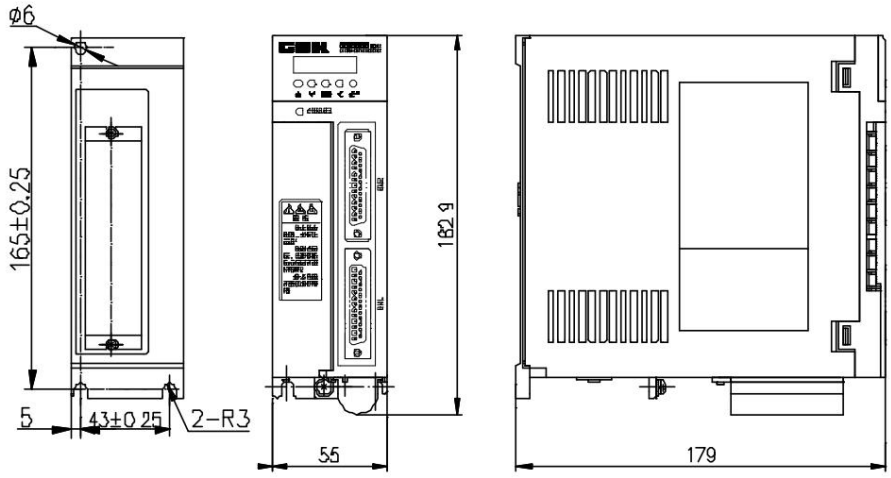
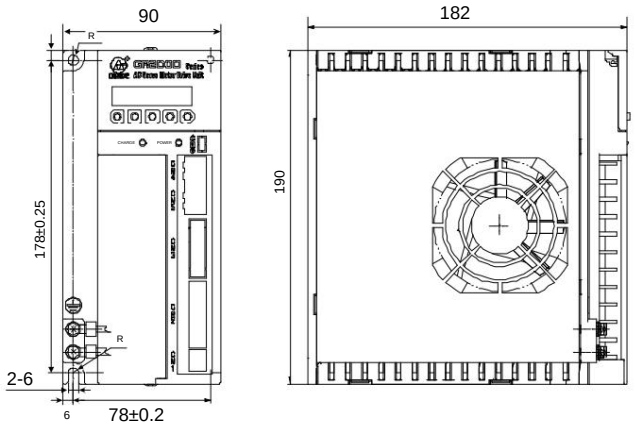
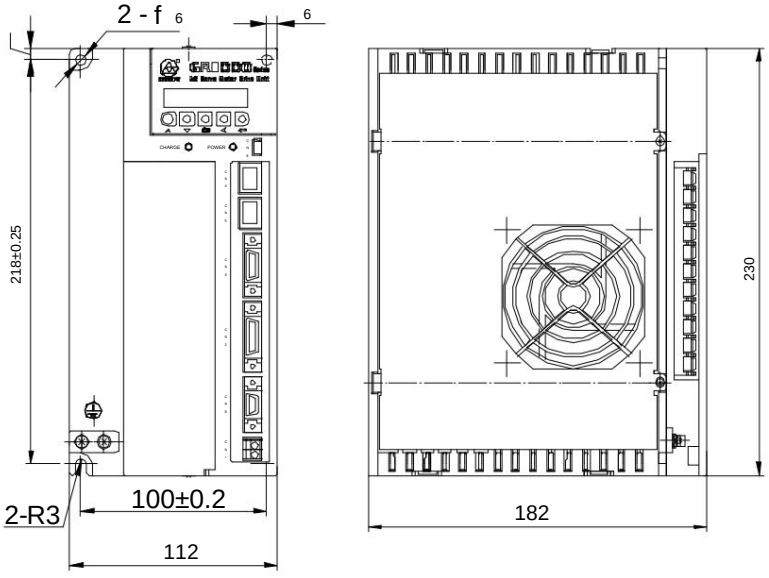
The environmental conditions in which the GR-L series bus-type AC servo drive unit is installed have a direct impact on its normal function and service life.

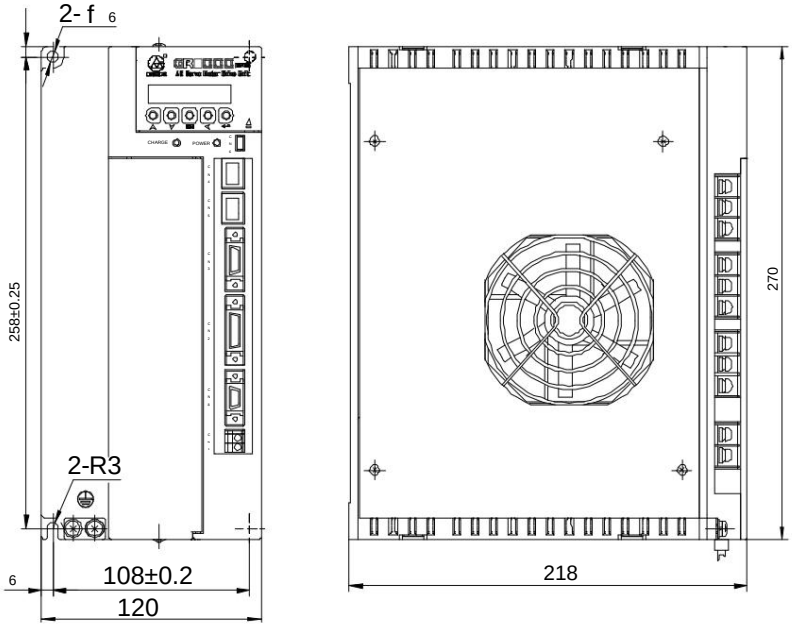
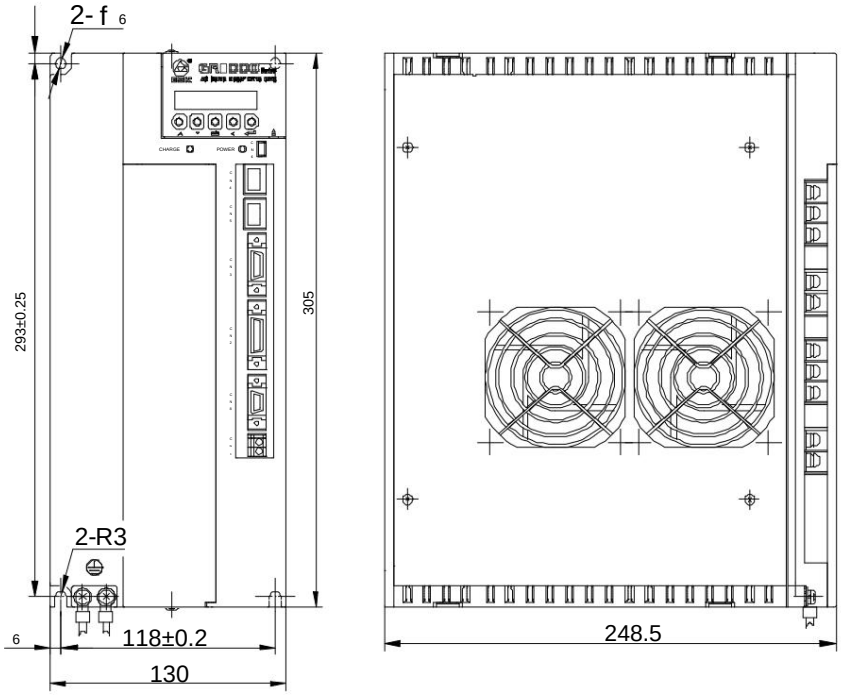
Please be sure to follow the instructions below to install it correctly.

Notice	ÿ Be sure to install it in a place free from water droplets, steam, dust and oily dust. ÿ Be sure to install it in a place without corrosive, flammable gases, metal particles, and conductive dust. ÿ Be sure to install it in a place without high heat generating devices and electromagnetic noise interference. ÿ Be sure to install it in an electrical cabinet with ventilation, moisture-proof and dust-proof facilities. ÿ The installation location must be away from flammable surfaces to prevent accidental fire. ÿ The installation location should be convenient for maintenance and inspection.

project	index
Operating temperature	0 ÿÿ40 ÿ
Storage and transportation temperature	-40 ÿÿ70 ÿ
Operating humidity	30%ÿ95% (no condensation)
Storage humidity	ÿ95%ÿ40 ÿÿ
Atmospheric environment	There is no corrosive gas, flammable gas, oil mist or dust in the control cabinet.
Altitude	Below 2000 m above sea level
vibration	ÿ0.6 G(5.9 m/s2)
Atmospheric pressure	86 kPaÿ106 kPa

2.2 Installation dimensions

Applicable products: GR2024-Lÿ (Unit: mm)	
Applicable products: GR2030-Lÿ GR2045-Lÿ (Unit: mm)	
Applicable products: GR2050-Lÿ GR3048-Lÿ GR4048-Lÿ (Unit: mm)	

Applicable products: GR2075-Lÿ GR3050-Lÿ GR4050-Lÿ (Unit: mm)	
Applicable products: GR2100-Lÿ GR3075-Lÿ GR4075-L. (Unit: mm)	

Applicable products:

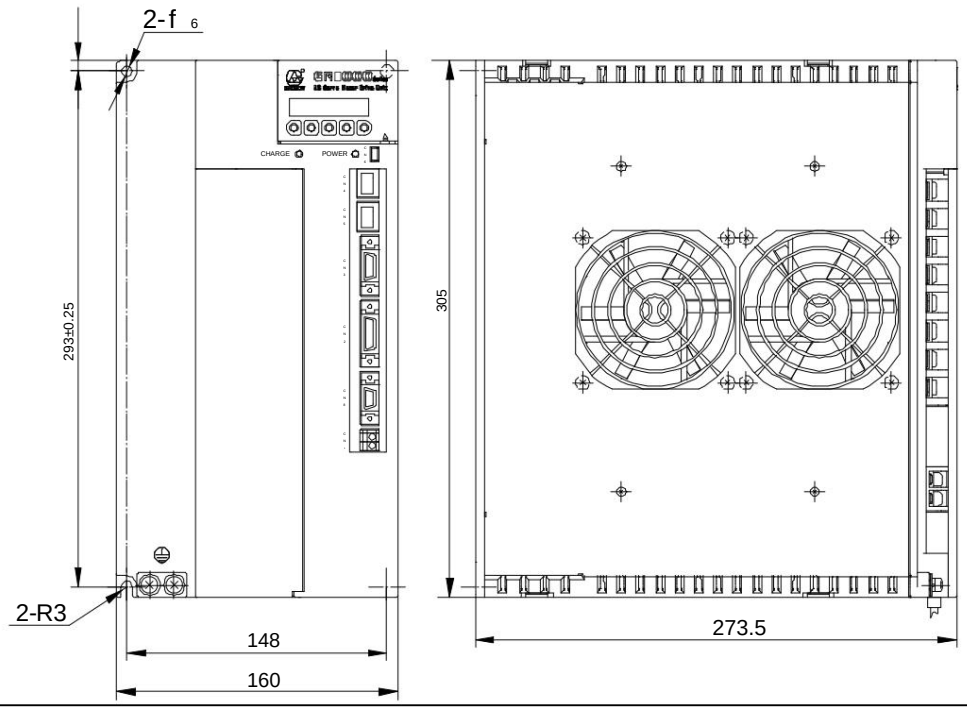
GR3100-Lÿ

GR4100-Lÿ

GR3148-Lÿ

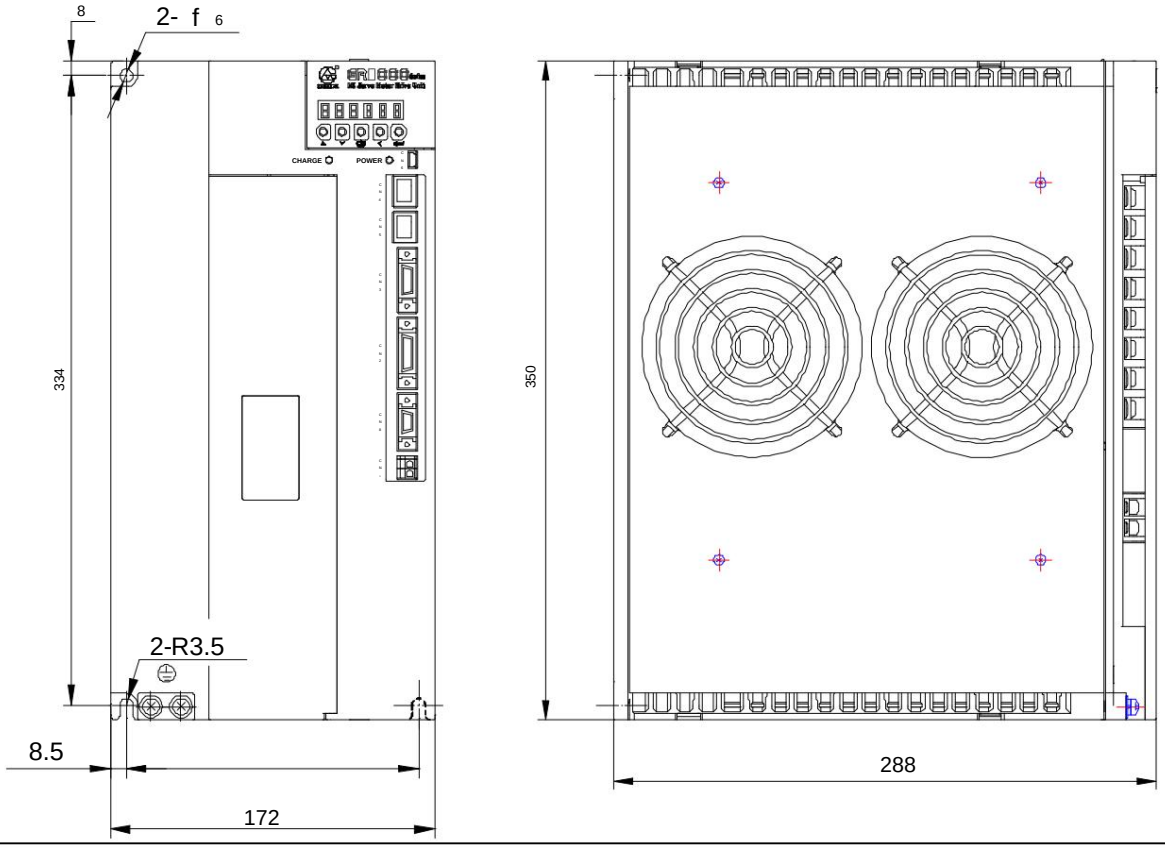
GR4148-Lÿ

(Unit: mm)



The following figure applies to the following products: GR3150-L, GR4150-L, GR3198-L, GR4198-L.

(Unit: mm)

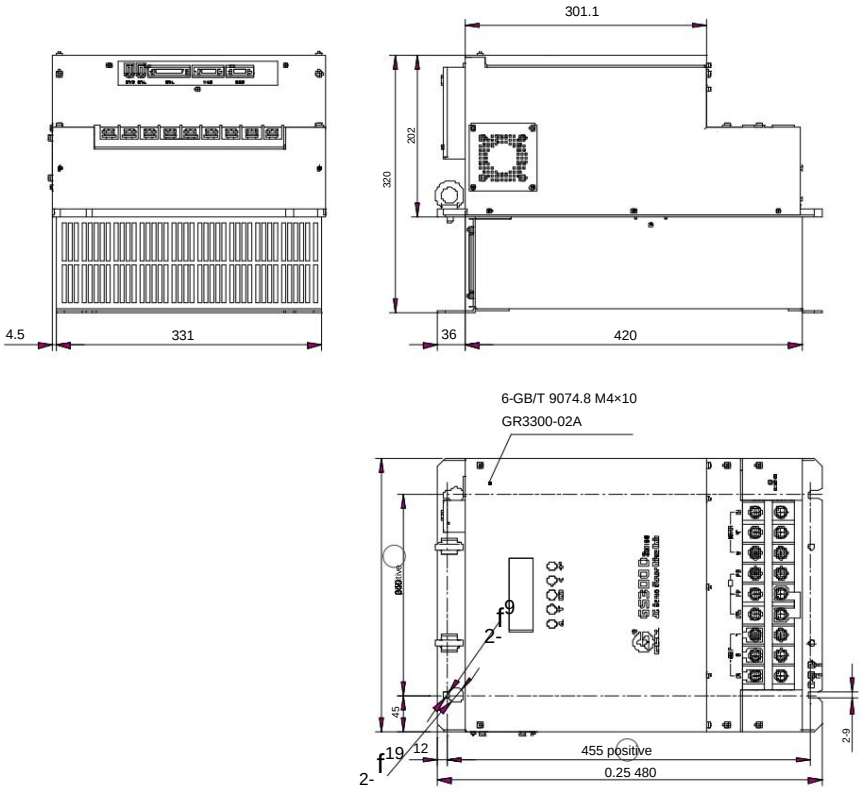


The following image applies to the product: GR3300-L.

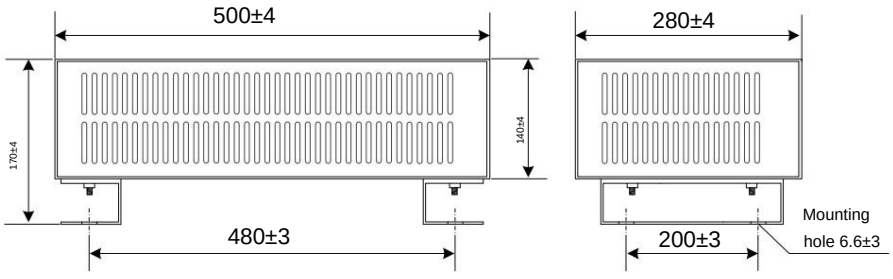
Different from the above products, GR3300-L is installed through the wall. The heat sink of the product is inserted into the installation plate, and the heat dissipation is different from that of the servo.

The servo drive unit is isolated, which is beneficial for the electrical appliances in the electrical cabinet where the servo drive unit is located to be in a good temperature environment.

(Unit: mm)



The dimensions of the brake resistor unit for the GR3300-L servo drive unit are as follows.



Note: The brake resistor unit cannot be installed inside the electrical cabinet, otherwise the high temperature may damage the electrical appliances inside the cabinet!

2.3 Installation interval

GR-L series bus type AC servo drive units are all installed on the bottom plate, with the installation direction perpendicular to the installation surface.

Place the front of the servo drive unit forward and the top upward to facilitate heat dissipation, and make sure to leave necessary space around it.

When installing multiple servo drive units, a larger spacing should be left as much as possible during actual installation to ensure good heat dissipation conditions.

To ensure that the temperature around the servo drive unit does not continue to rise, there should be convection air dissipation in the electrical cabinet.

Figure 2-1 and Figure 2-2 are the recommended installation distances for the servo drive unit.

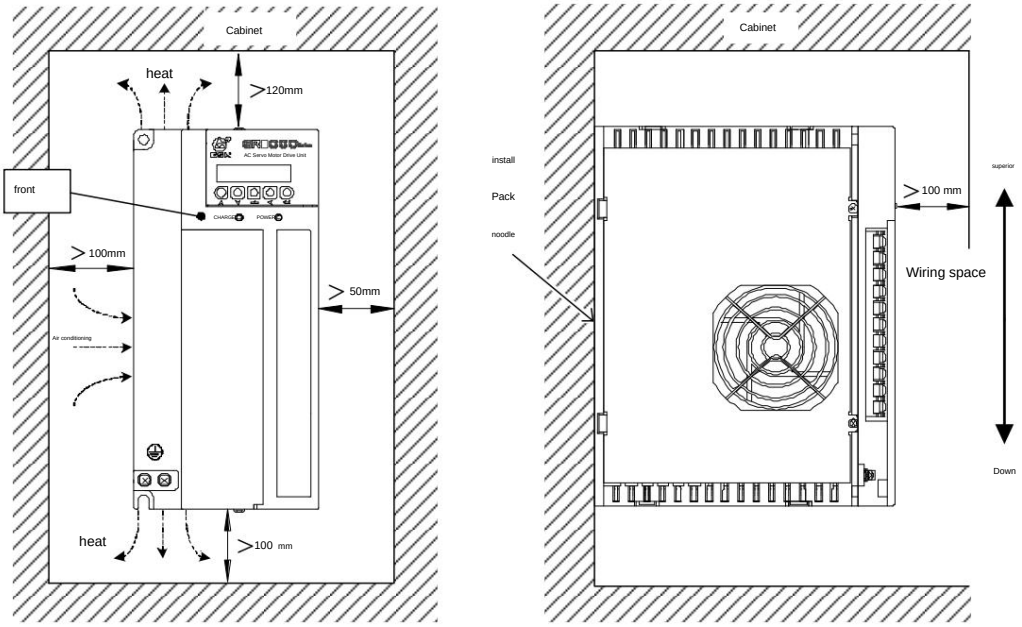


Figure 2-1 Installation spacing of a servo drive unit

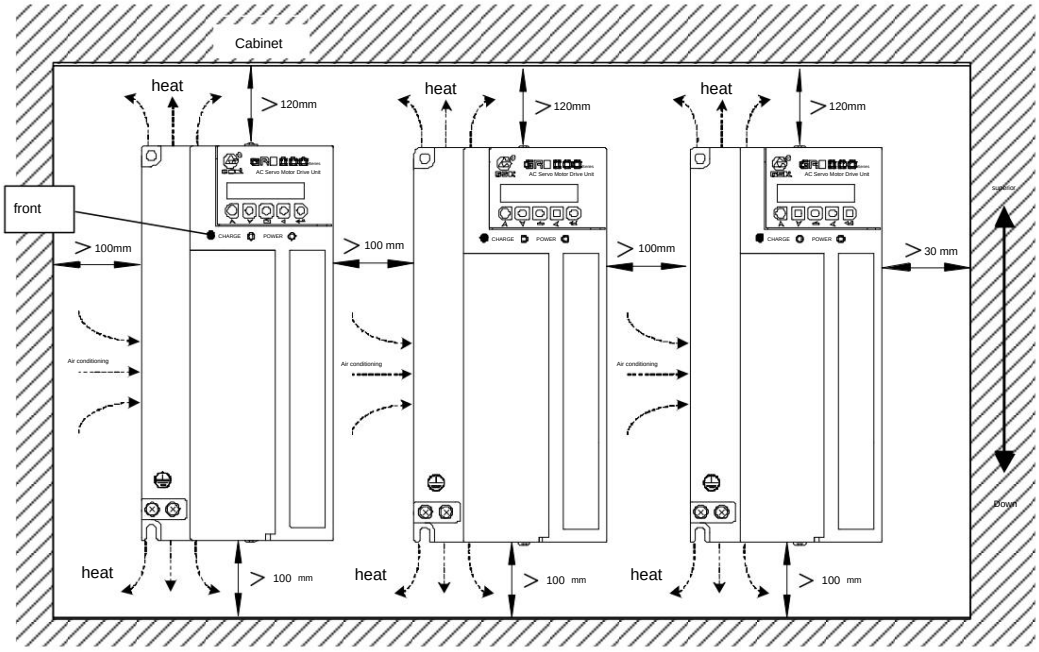


Figure 2-2 Installation spacing of multiple servo drive units

Chapter 3 Connection

Please read the following warnings carefully and follow them completely. This will ensure your operation is safe and smooth.

Notice

ÿ Wiring should be done by professional technicians and connected correctly according to relevant instructions.

ÿ For wiring or maintenance work, the servo drive unit should be powered off for 5 minutes, and then the main circuit terminals should be checked with a multimeter.
Only proceed after the voltage to ground reaches a safe voltage, otherwise you may get an electric shock.

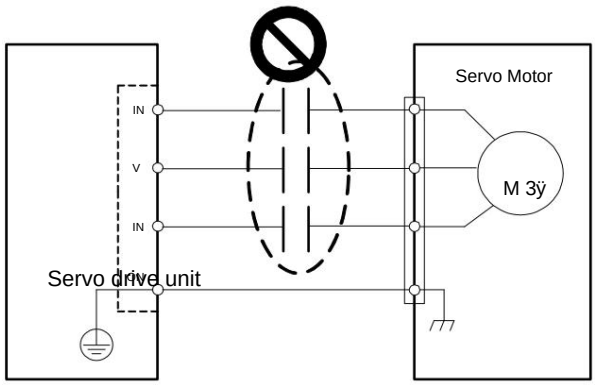
ÿ Please make sure that the servo drive unit and servo motor are properly grounded.

ÿ When wiring, do not allow sharp objects to damage the cables, and do not pull the cables forcefully, otherwise it may cause electric shock or damage the lines.
Poor contact.

ÿ Please do not pass the main circuit wiring and signal wires through the same pipe, and do not tie them together.
When wiring, the main circuit wiring should be separated from the signal line or cross-wired, with a distance of more than 30cm to prevent strong
The electrical circuit interferes with the signal line, causing the servo drive unit to fail to work properly.

ÿ Please do not frequently turn on/off the power supply, because there is a large-capacity capacitor in the servo drive unit, which will generate a large charging current
when powered on. Frequently turning on/off the power supply will cause the servo drive unit to
The performance of the components inside the unit will be degraded. It is recommended that the interval between turning the power on and off should be at least 3 minutes.

ÿ Do not add power capacitors, surge absorbers, or radio noise between the output side of the servo drive unit and the servo motor.
Filters and other equipment.



ÿ Main circuit wiring and signal lines should be kept away from heat sinks and motors to avoid degradation of insulation performance due to heat.

ÿ After the main circuit connection is completed, the terminal protection cover must be put on to avoid electric shock.

3.1 Connection of peripheral devices

The use of servo drive unit also requires some peripheral equipment. Choosing the right peripheral equipment can ensure the servo drive unit and The servo motor runs stably and can extend the service life of the servo drive unit. The following peripheral equipment connection diagram should be noted: ÿ The equipment in the virtual box is configured by the user, and the equipment in the solid box can be purchased from GSK. ÿ For the selection of circuit breakers, AC filters, isolation transformers, AC reactors, and AC contactors, please refer to Appendix B. ÿ The peripheral equipment marked "must be installed" in the figure can not only ensure the user's safe and reliable use of the servo drive device, but also It can minimize the losses caused by user equipment failure.

ÿ The peripheral equipment marked as "optional" in the figure can ensure the normal operation of the servo drive unit when the user's power supply environment is relatively bad. Very stable operation.

Be careful to avoid electric shock! Be careful of high temperature! Prevent residual voltage, and only disassemble after the power is cut off for 5 minutes!

Since the servo drive unit is a high-frequency power supply device, the inductive leakage current is large, so reliable protective grounding is required, and the grounding resistance is not Must be greater than 4 ÿ.

Frequent braking of the servo motor causes the temperature of the brake resistor to be very high, which may burn the equipment and personnel.

When timing, be sure to consider installing the brake resistor in a location that is not easily accessible outside the electrical cabinet and install a protective cover!

3.1.1 **GR2000-L** Series Servo Drive Unit Peripheral Device Connection

ÿ **GR2024-L, GR2030-L, GR2045-L** series products are suitable for single AC permanent magnet synchronous motor peripheral equipment connection diagram

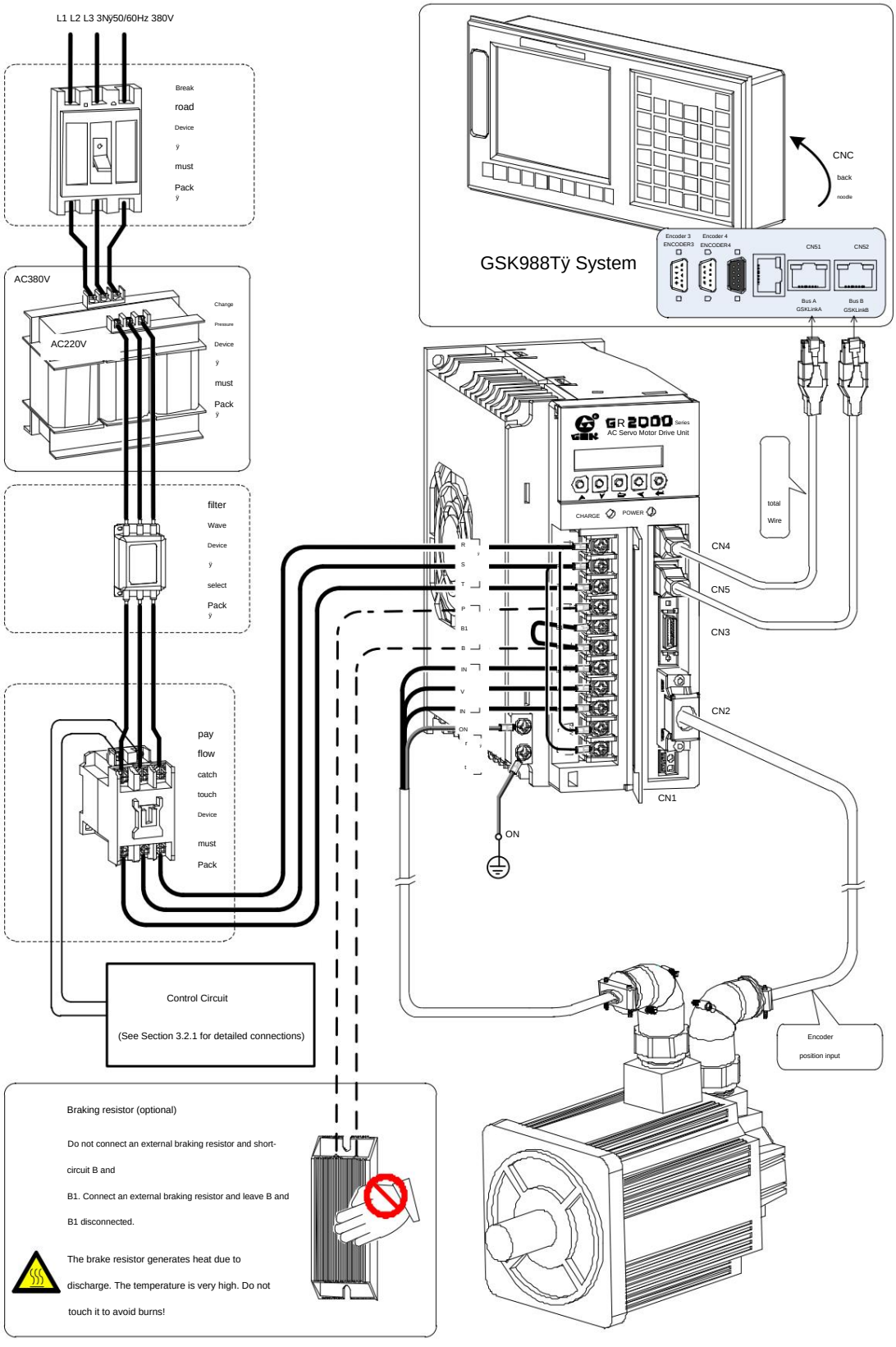


Figure 3-1 Connection diagram of peripheral equipment for GR2024-L, GR2030-L, and GR2045-L series products adapted to a single AC permanent magnet synchronous motor

ÿ **GR2050-L, GR2075-L, GR2100-L** series products are suitable for single AC permanent magnet synchronous motor peripheral equipment connection diagram

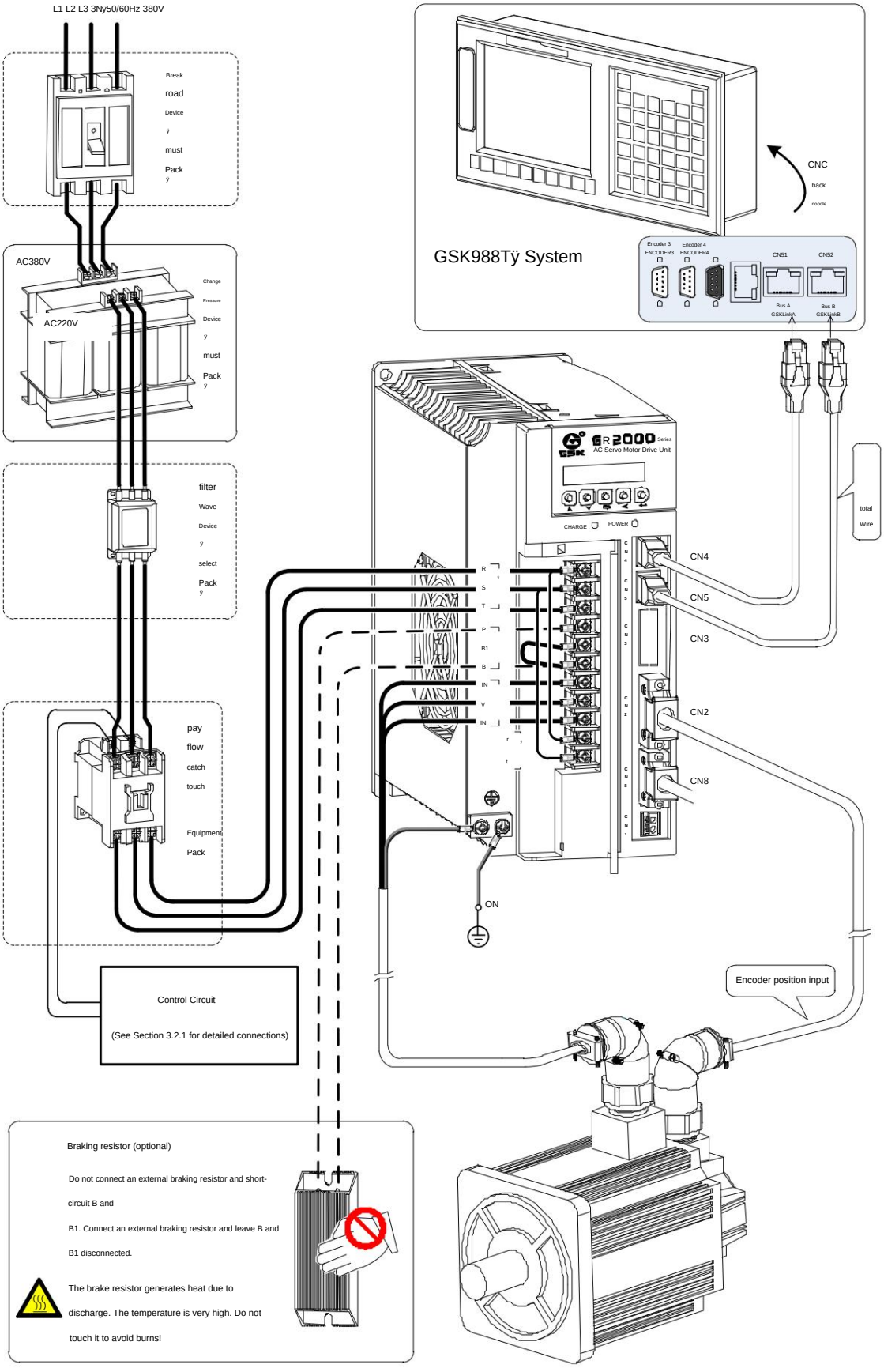


Figure 3-2 Connection diagram of peripheral equipment for GR2050-L, GR2075-L, and GR2100-L series products adapted to a single AC permanent magnet synchronous motor

3.1.2 Peripheral device connections of **GR3000-L** series servo drive unit

ÿ **GR3000-L** series products are suitable for single AC permanent magnet synchronous motor peripheral equipment connection diagram

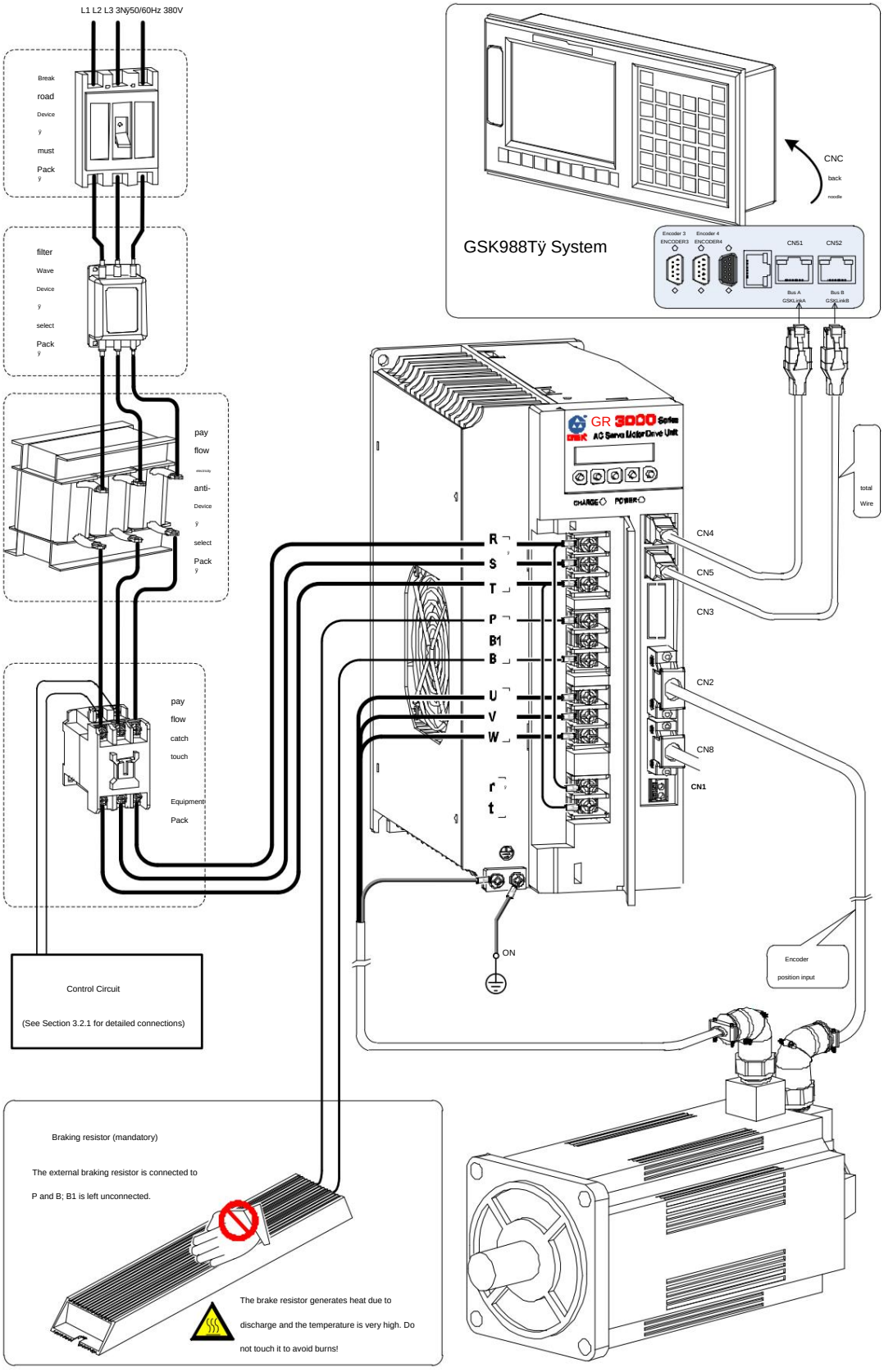


Figure 3-3 GR3000-L series products adapt to a single AC permanent magnet synchronous motor peripheral equipment connection diagram

ÿ **GR3000-L** series products are suitable for single AC asynchronous motor peripheral equipment connection diagram

GR2000-L and GR4000-L are suitable for connecting the peripheral equipment of a single AC asynchronous motor.

Source level.

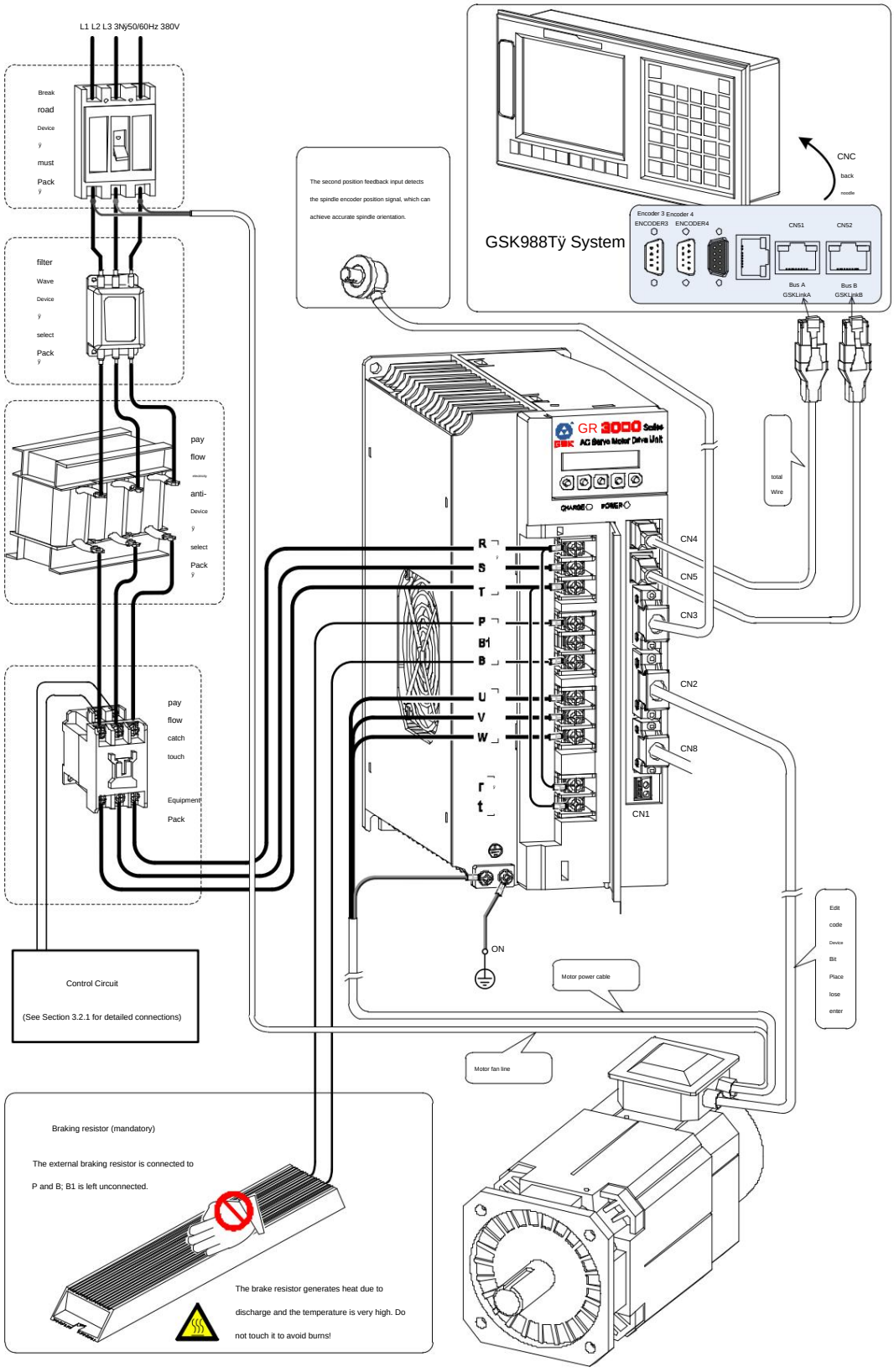
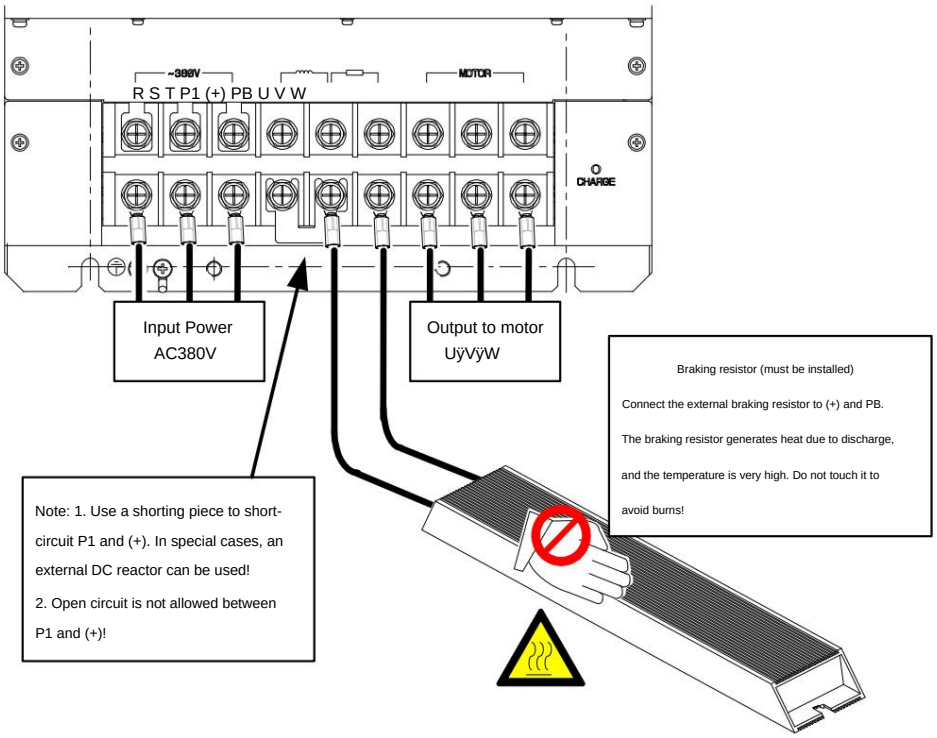


Figure 3-4 GR3000-L series products adapt to single AC asynchronous motor peripheral equipment connection diagram

3.1.3 Connection of the main circuit terminal block of the **GR3300-L** series servo drive unit

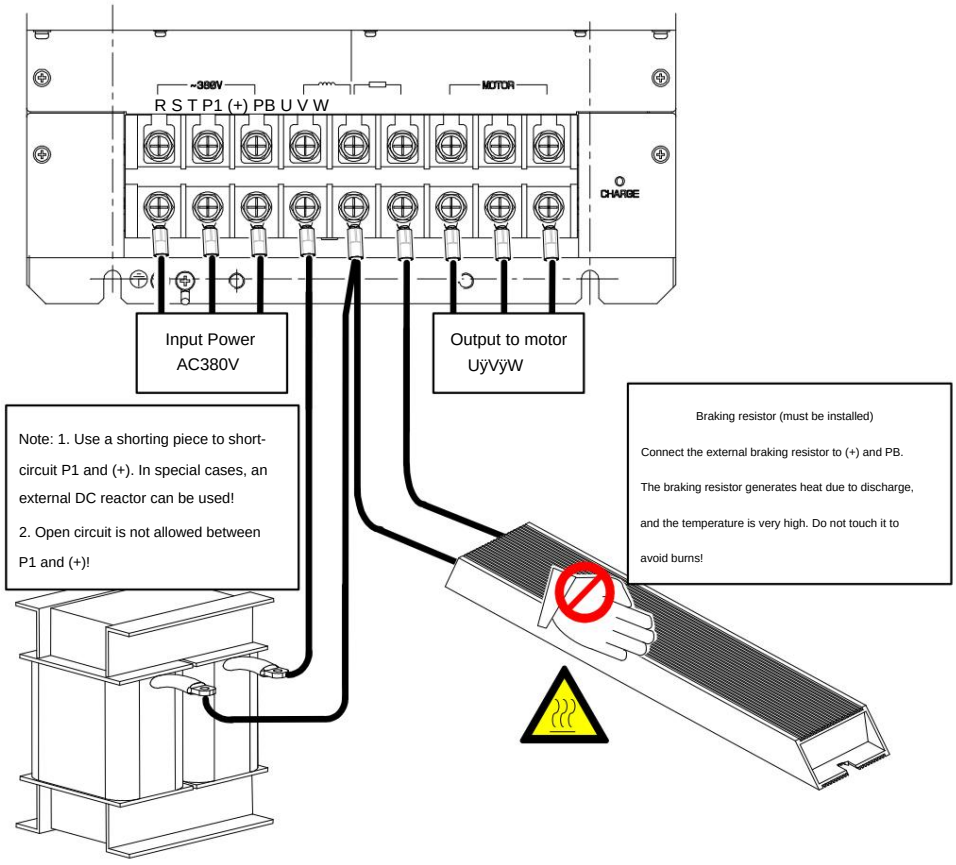
ÿ **GR3300-L** series main circuit terminal block standard connection diagram



ÿ **GR3300-L** series main circuit terminal block recommended connection diagram

To improve the input current waveform distortion caused by capacitor filtering; reduce and prevent damage to the rectifier circuit caused by impact current; improve the input

To improve the input power factor, reduce the DC bus AC ripple, and limit the transient change of the grid voltage, it is recommended to connect the reactor as shown in the figure below.



3.1.4 Connection of multiple products **GSK-Link** fieldbus

ÿ Connection diagram of **GSK-Link** bus of multiple **GR-L** series products (only bus connection is shown, other connections are omitted)

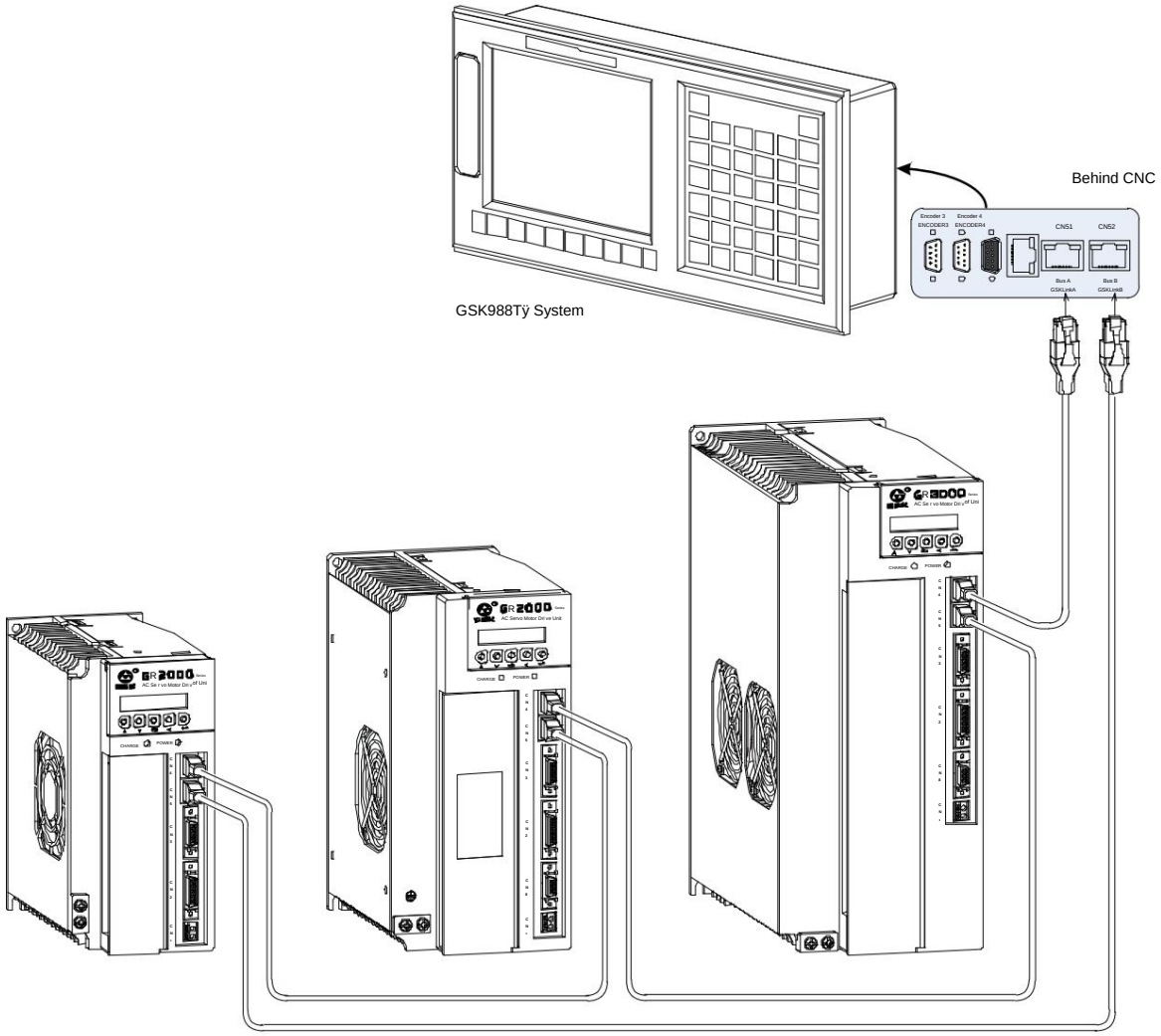


Figure 3-5 GSK-Link bus connection diagram for multiple servo drive units

3.2 Main circuit wiring

3.2.1 Function and wiring of each terminal of the main circuit

Terminal number	name	illustrate	
R, S, T AC power input terminals		GR2000-L three-phase AC220V (85%ý110%) 50/60Hz	
		GR3000-L three-phase AC380V (85%ý110%) 50/60Hz	
		GR4000-L three-phase AC440V (85%ý110%) 50/60Hz	
rÿt	Control power supply	GR2000-L single-phase AC220V (85%ý110%) 50/60Hz	
		GR3000-L single-phase AC380V (85%ý110%) 50/60Hz	
		GR4000-L single-phase AC440V (85%ý110%) 50/60Hz	
U, V, W three-phase AC output terminals		AC permanent magnet Step servo electric machine	Be sure to connect U, V, and W correctly, otherwise the motor will not operate normally.
		Asynchronous master communication Axis servo electric machine	Be sure to connect U, V, and W correctly, otherwise the motor will not operate normally. Note: When using a non-GSK spindle motor, even if it is connected correctly, The running motor may also have an Err-27 alarm. At this time, you can arbitrarily swap U, V, W two of the phases will suffice.
ON	Protective ground terminal	Connected to the power ground wire and motor ground wire, the protective grounding resistance should be less than 4ý.	
PýB1ýB	Braking resistor terminals	GR2024 GR2030 GR2045 GR2050	When the brake resistor is internally connected, the B1 and B terminals must be short-circuited. When the braking capacity is insufficient, an external braking resistor can be connected to the P and B terminals. The connection between B1 and B must be disconnected.
		For other models, connect external braking resistors at the P and B terminals.	

The main circuit terminal wiring of **GR2000-L** series products is shown in the following table.

Product Model	Adaptive motor Rated current **I(A)**	RÿSÿTÿ **UÿVÿW**		rÿt		**P, B1, B**		**ON**	
		Terminal screws size **ÿmm**	cable Wire diameter **mm2**	Terminal screw Nail size **ÿmm**	cable Wire diameter **mm2**	Terminal screws size **ÿmm**	cable Wire diameter **mm2**	Terminal screws size **ÿmm**	electric wire Wire diameter **mm2**
GR2024-L	Iÿ4	3.5	1.0	3.5	1	3.5	1.5	3.5	1.0
GR2030-L	4<Iÿ6	3.5	1.0	3.5	1	3.5	1.5	3.5	1.0
GR2045-L	6<Iÿ7.5	3.5	1.5	3.5	1	3.5	2	3.5	1.5
GR2050-L	7.5<Iÿ10	3.5	1.5	3.5	1	3.5	2.5	4	1.5
GR2075-L	10<Iÿ15	4	2.5	4	1	4	2.5	5	2.5
GR2100-L	15<Iÿ25	6	2.5	4	1	6	4	5	2.5
GR2100-L	25<Iÿ29	6	4	4	1	6	4	5	4
GR2148-L	25<Iÿ40	6	6	4	1	6	4	5	6
GR2200-L	40<Iÿ60	6	10	4	1	6	4	6	10

The main circuit terminal wiring of **GR3000-L** and **GR4000-L** series products is shown in the following table.

product model	Adaptive motor Rated current **I(A)**	**RÿSÿT UÿVÿW**		rÿt		Pÿ **B**		**ON**	
		Terminal screws size **ÿmm**	cable Wire diameter **mm2**	Terminal screw Nail size **ÿmm**	cable Wire diameter **mm2**	Terminal screws size **ÿmm**	cable Wire diameter **mm2**	Terminal screws size **ÿmm**	electric wire Wire diameter **mm2**
GR3048-L GR4048-L	lÿ8	3.5	1.0	3.5	1	3.5	2.5	4	1.0
GR3050-L GR4050-L	8<lÿ15.5	4	1.5	4	1	4	2.5	5	1.5
GR3075-L GR4075-L	15.5<lÿ20	6	2.5	4	1	6	2.5	5	2.5
GR3100-L GR4100-L	20<lÿ27	6	4	4	1	6	4	6	4
GR3148-L GR4148-L	27<lÿ34	6	6	4	1	6	4	6	6
GR3150-L GR4150-L	34<lÿ40	6	10	4	1	6	4	6	10
GR3150-L GR4150-L	40<lÿ49	6	10	4	1	6	4	6	10
GR3198-L GR4198-L	49<lÿ60	6	16	4	1	6	4	6	10

product model	Adaptive motor Rated current **I(A)**	**RÿSÿT UÿVÿW**		**P1ÿÿ+ÿÿPB**		**ON**	
		Terminal screw size **ÿmm**	Cable diameter **mm2**	Terminal screws size **ÿmm**	cable Wire diameter **mm2**	Terminal screws size **ÿmm**	electric wire Wire diameter **mm2**
GR3300-L GR4300-L	60<lÿ90	8	25	8	4	5	10

3.2.2 Typical wiring example of main circuit

ÿ Example of main circuit wiring of AC permanent magnet synchronous servo motor for **GR2000-L** series products

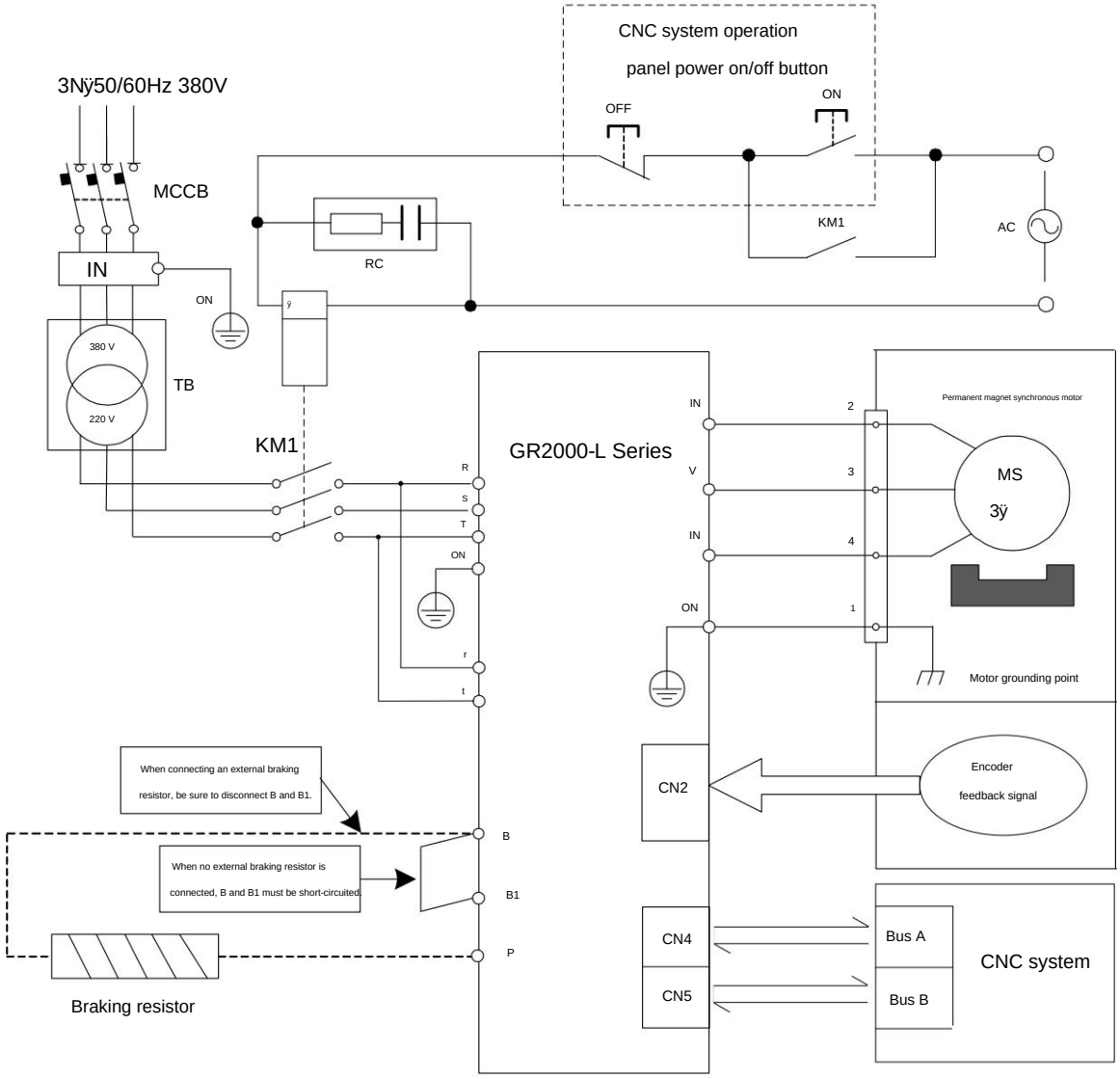


Figure 3-6 Main circuit wiring diagram of AC permanent magnet synchronous servo motor for GR2000-L series products

Notice	ÿ If the user refers to Figure 3-6 for wiring, be sure to select the appropriate circuit breaker MCCB according to the description in <Appendix B>. ÿ If more than two servo drive units share a transformer, please connect each servo The drive unit is equipped with a circuit breaker. ÿ When no external braking resistor is required, the B1 and B terminals must be short-circuited; when an external braking resistor is connected, the B1 is connected to B. ÿ When the servo drive unit is running, the surface temperature of the external brake resistor may be very high. Install and attach protective covers. ÿ The motor power cord provided by our company has marked U, V, W, PE terminals, which must be connected to the servo motor one by one. The U, V, W, and PE terminals of the servo drive unit must be connected, otherwise the motor cannot operate normally. ÿ Connect the protective ground terminal correctly, and the ground resistance should not be greater than 4ÿ.

ÿ Example of main circuit wiring of AC permanent magnet synchronous servo motor for **GR3000-L** series products

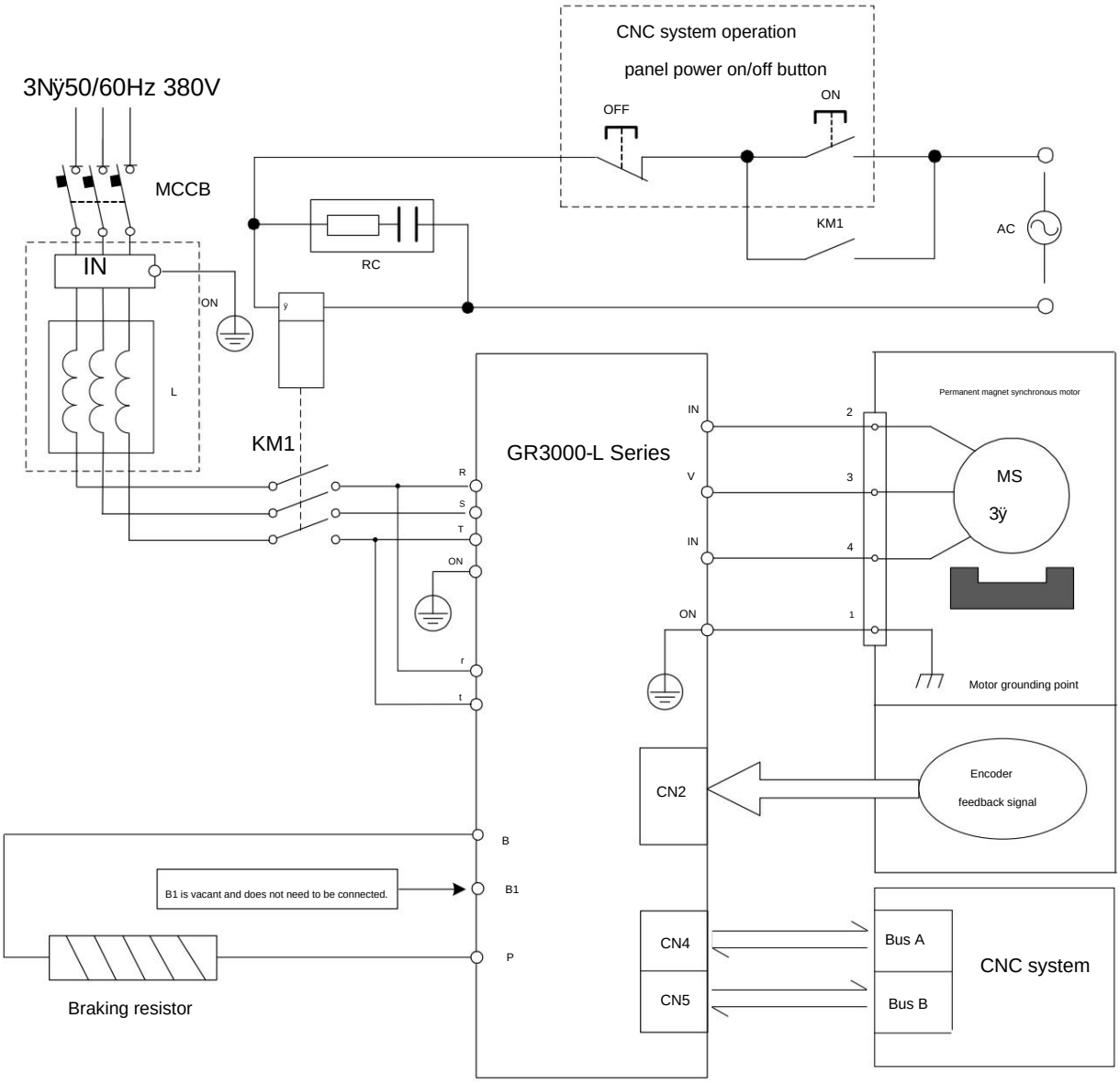


Figure 3-7 Main circuit wiring diagram of AC permanent magnet synchronous servo motor for GR3000-L series products

Notice	ÿ If the user refers to Figure 3-7 for wiring, be sure to select the appropriate circuit breaker MCCB according to the description in <Appendix B>. ÿ When the servo drive unit is running, the surface temperature of the brake resistor may be very high. Please install it separately outside the machine tool electrical cabinet. And install a protective cover. ÿ The motor power cord provided by our company has marked U, V, W, PE terminals, which must be connected to the servo motor one by one. The U, V, W, and PE terminals of the servo drive unit must be connected, otherwise the motor cannot operate normally. ÿ Connect the protective ground terminal correctly, and the ground resistance should not be greater than 4ÿ. ÿ Figure 3-7 is not applicable to GR3300-LA2 and GR3300-LS2.

ÿ Example of main circuit wiring of AC asynchronous spindle servo motor for **GR2000-L** series products

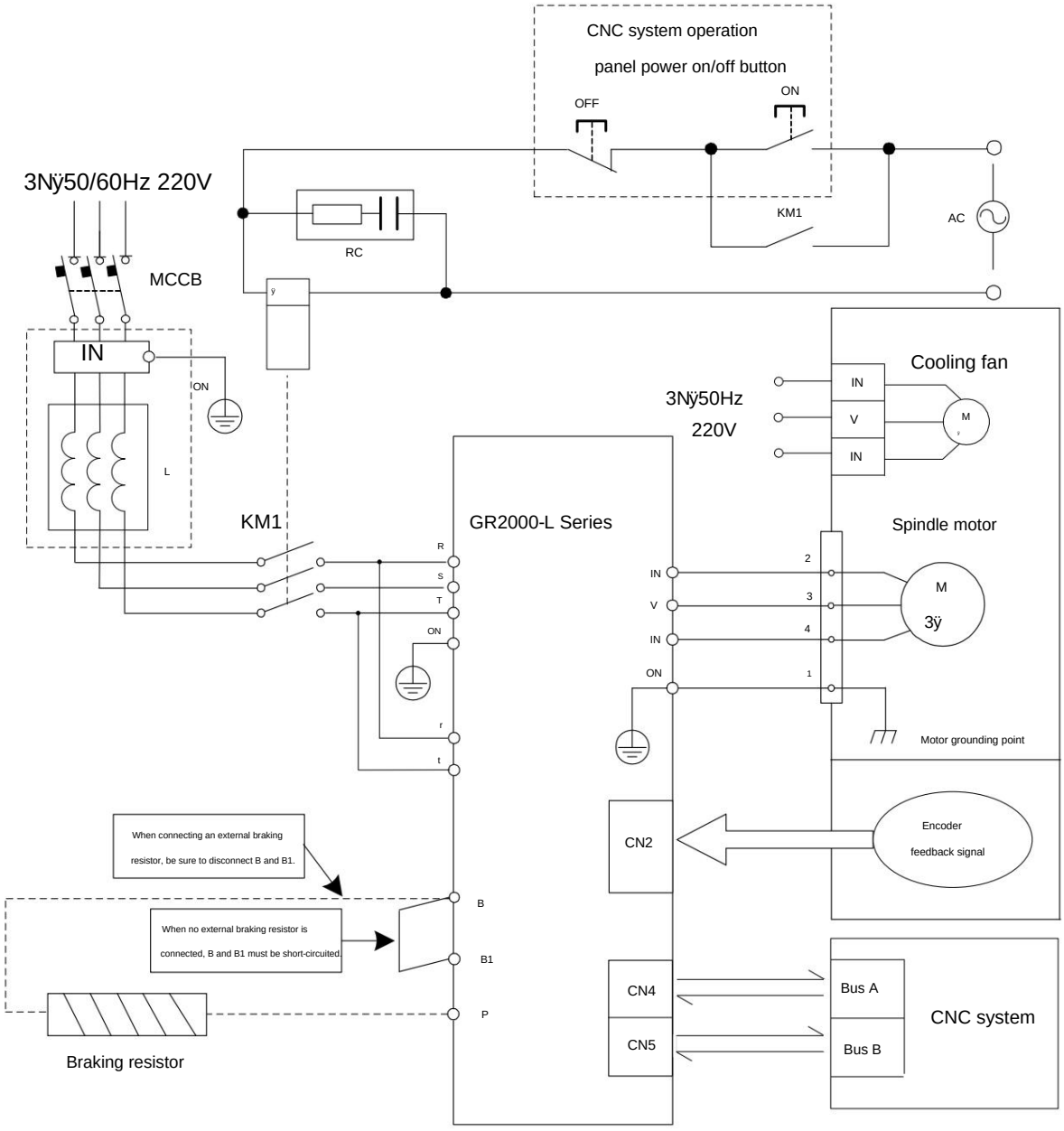


Figure 3-8 Main circuit wiring diagram of AC asynchronous spindle servo motor for GR2000-L series products

Notice	ÿ If the user refers to Figure 3-8 for wiring, be sure to select the appropriate circuit breaker MCCB according to the description in <Appendix B>. ÿ GR2050-L has a built-in brake resistor, and an external brake resistor can be selected. Use in parallel at the same time! GR2075-L and GR2100-L do not have built-in brake resistors. ÿ When the servo drive unit is running, the surface temperature of the brake resistor may be very high. Please install it separately outside the machine tool electrical cabinet. And add a protective cover! ÿ Not all motors are connected to U, V, W corresponding to the U, V, W of the servo drive unit. If Err-27 appears when the motor is running for the first time, it indicates that the phase sequence of the motor line is incorrect, but it does not mean that the servo drive unit is faulty. Please turn off the power for 5 minutes, then swap any two of U, V, and W. ÿ Connect the protective ground terminal correctly, and the ground resistance should not be greater than 4 ÿ.

ÿ Example of main circuit wiring of AC asynchronous spindle servo motor for **GR3000-L** series products

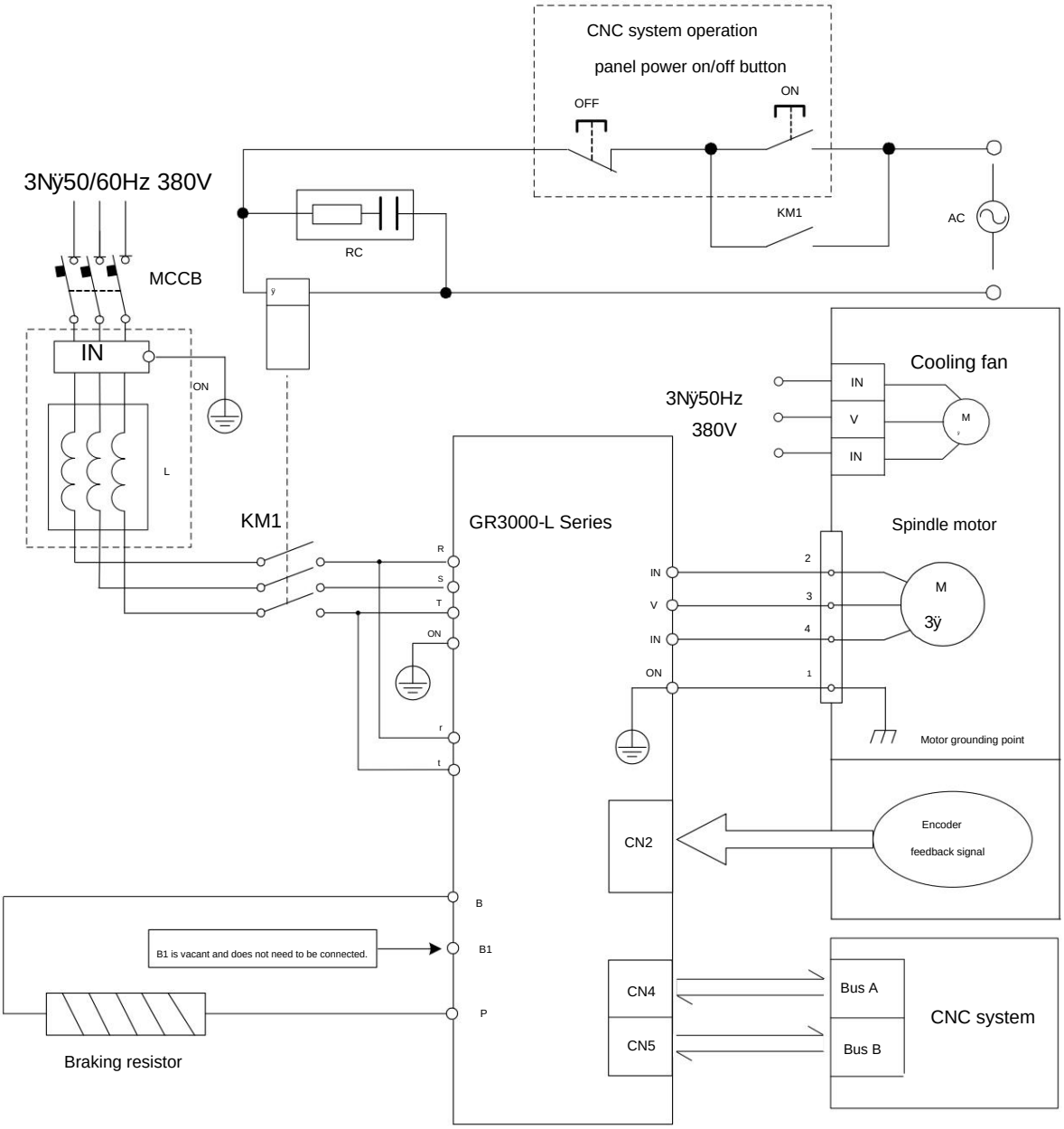


Figure 3-9 Main circuit wiring diagram of AC asynchronous spindle servo motor for GR3000-L series products

Notice	ÿ If the user refers to Figure 3-9 for wiring, be sure to select the appropriate circuit breaker MCCB according to the description in <Appendix B>. ÿ When the servo drive unit is running, the surface temperature of the brake resistor may be very high. Please install it separately outside the machine tool electrical cabinet. And add a protective cover! ÿ Not all motors are connected to U, V, W corresponding to the U, V, W of the servo drive unit. If Err-27 appears when the motor is running for the first time, it indicates that the phase sequence of the motor line is incorrect, but it does not mean that the servo drive unit is faulty. Please turn off the power for 5 minutes, then swap any two of U, V, and W. ÿ Connect the protective ground terminal correctly, and the ground resistance should not be greater than 4 ÿ. ÿ Figure 3-9 is not applicable to GR3300-LA2 and GR3300-LS2.

ÿ Example of main circuit wiring of AC asynchronous spindle servo motor for **GR4000-L** series products

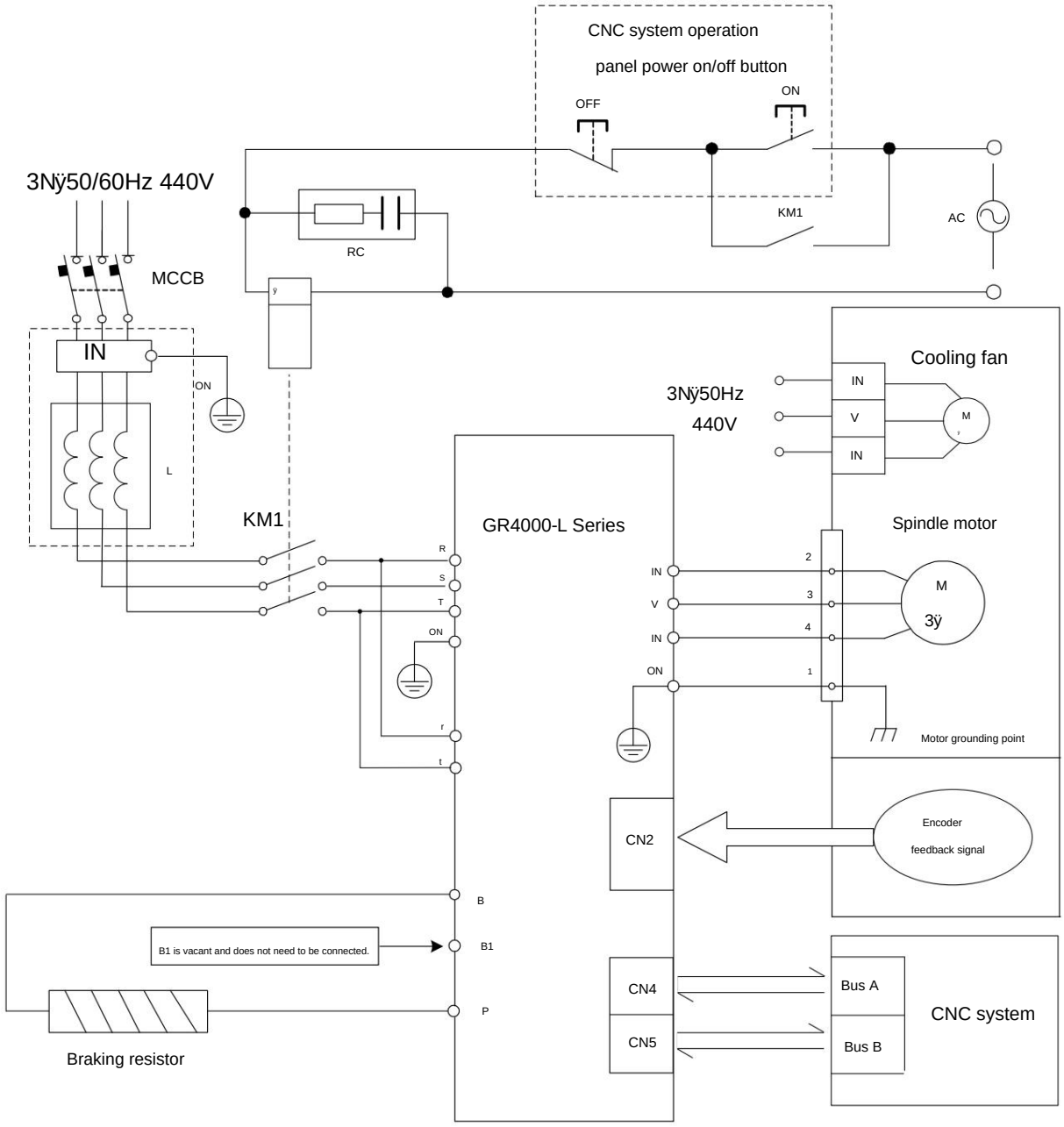


Figure 3-10 Main circuit wiring diagram of AC asynchronous spindle servo motor for GR4000-L series products

Notice	ÿ If the user refers to Figure 3-10 for wiring, be sure to select the appropriate circuit breaker MCCB according to the description in <Appendix B>. ÿ When the servo drive unit is running, the surface temperature of the brake resistor may be very high. Please install it separately outside the machine tool electrical cabinet. And install a protective cover. ÿ Not all motors are connected to U, V, W corresponding to the U, V, W of the servo drive unit. If Err-27 appears when the motor is running for the first time, it indicates that the phase sequence of the motor line is incorrect, but it does not mean that the servo drive unit is faulty. Please turn off the power for 5 minutes, then swap any two of U, V, and W. ÿ Connect the protective ground terminal correctly, and the ground resistance should not be greater than 4 ÿ.

3.3 Control signal connection

3.3.1 CN2 motor encoder feedback interface and wiring

CN2 is a 26-core high-density socket, and is equipped with a 26-core high-density plug for encoder wiring. The pin distribution is shown in Figure 3-11.

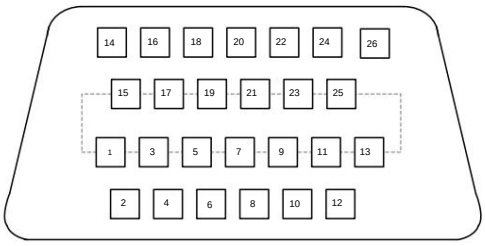
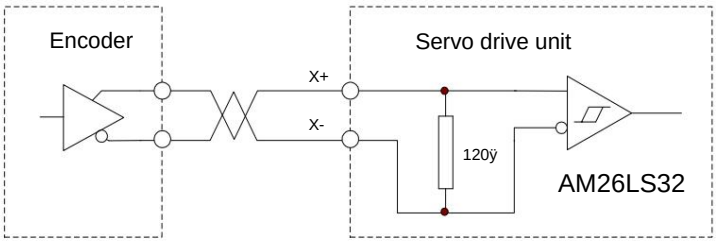


Figure 3-11 CN2 wiring plug pin diagram (soldering wire side)

Pin Number Name		significance	Pin Number	name	significance
1	OH	Motor temperature detection	14	NC	
2	Inÿ		15	0V	
3	IN-	Notice: *GR-LS2*	16	0V	Encoder power supply (-)
4	Vÿ		17	0V	
5	Vÿ	The products no longer support the incremental encoder	18	NC	
6	Uÿ	*U/V/W* Signal.	19	5V	Encoder power supply (+)
7	IN-		20	5V	
8	Zÿ		21	5V	
9	WITH-		22	NC	
10	Bÿ	Connecting incremental encoders	23	ANDÿ	Absolute encoder feedback signal
11	Bÿ	Feedback signal	24	ANDÿ	
12	Aÿ		25	SLÿ	
13	Aÿ		26	SLÿ	

1. Pins 2 to 13 in CN2 are incremental encoder interfaces, and the signal lines are differential drive connections. The wiring circuit diagram is as follows.



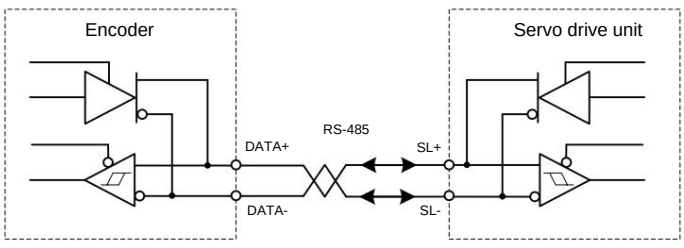
X=AÿBÿZÿUÿVÿW

2. OH (CN2-1) is used to connect the overheat detection device in the servo motor, so that the servo drive unit has the function of motor overheat protection.

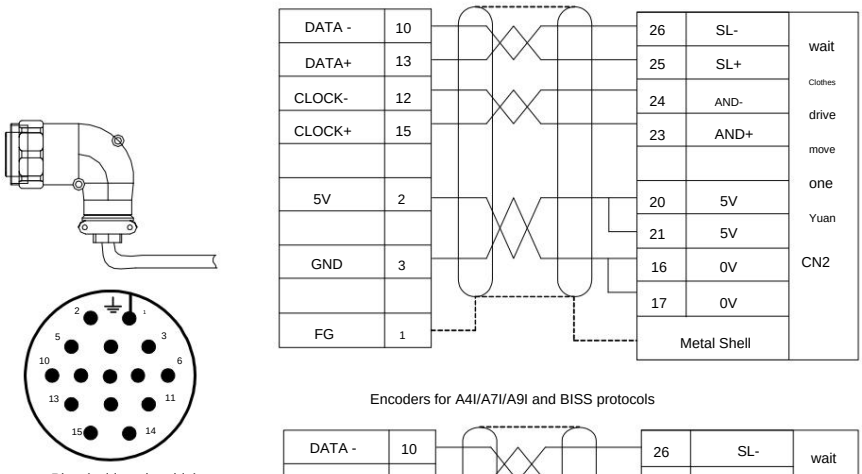
If the user-selected motor does not have an overheat protection device, this signal is not connected.

3. The 14, 23-26 pins in CN2 are the absolute encoder feedback signals. The absolute encoder feedback signal input circuit is a four-way differential

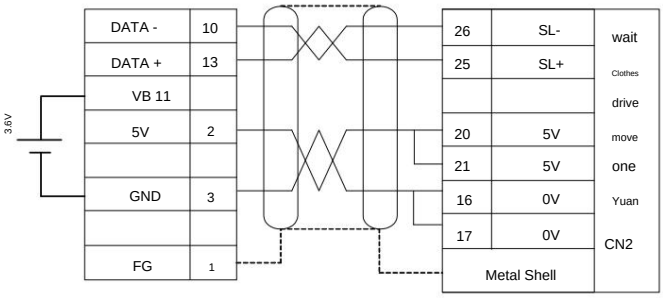
The bus transceiver complies with ANSI standard EIA/TIA-422-B and RS-485 standard. The wiring principle is shown in the figure below.



ÿ **CN2** supports **GSK SJT** series AC servo motor with absolute encoder standard wiring



Encoders for A4I/A7I/A9I and BISS protocols



Applicable to A4II/A6/A9II and other Tamagawa and Nikon protocol encoders

Figure 3-12 CN2 supporting GSK SJT series AC servo motor absolute encoder wiring

ÿ **CN2** supports standard wiring of **GSK SJT** series AC servo motor incremental encoder

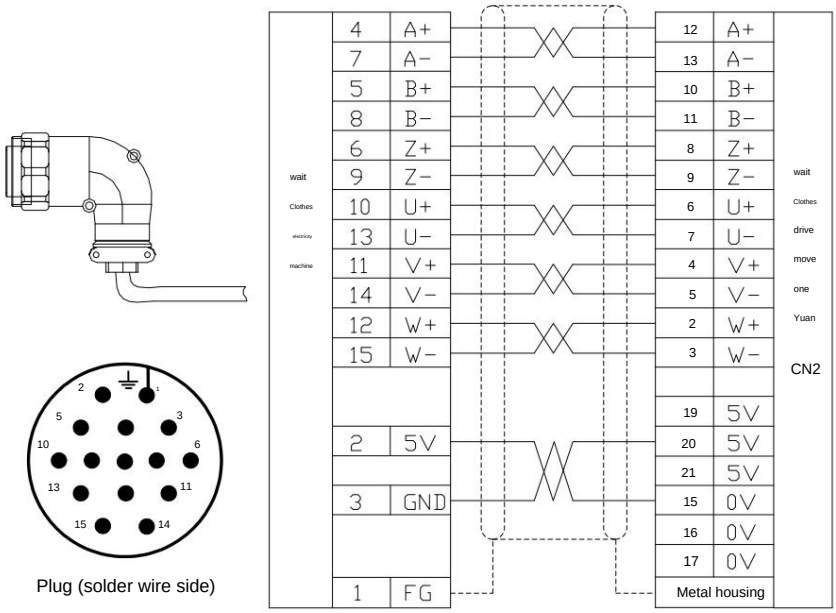


Figure 3-13 CN2 supporting GSK SJT series AC servo motor incremental encoder wiring

Notice	ÿ The length of the motor power cable and the motor encoder feedback signal cable must be within 20 m and the distance between them must be at least 30 cm. Two lines cannot use the same conduit or be bundled together. ÿ The signal line must use a twisted shielded cable with a wire cross-section of 0.15 mm2 to 0.20 mm2 , and the shielding layer must be connected to the PE terminal. child.

ÿ **CN2** is compatible with **ZJY182A, ZJY208A, ZJY265A** series AC spindle servo motor incremental encoder standard wiring

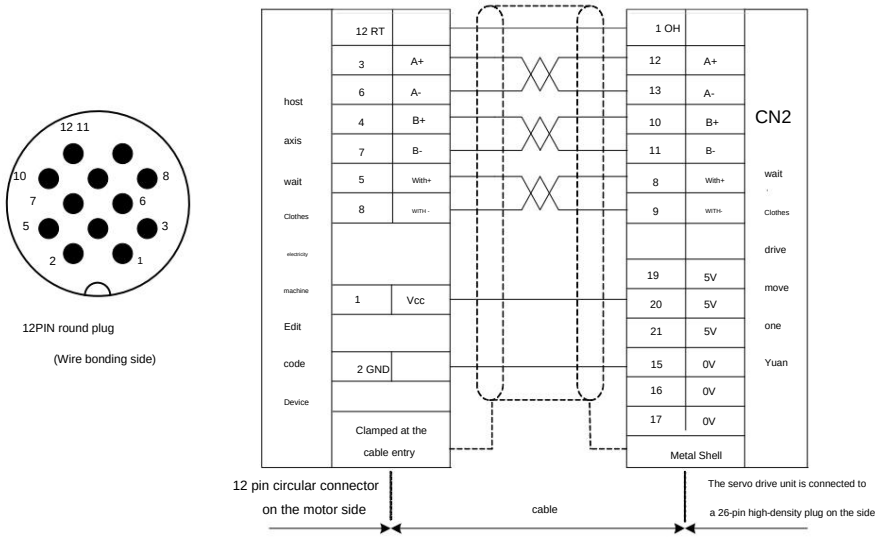


Figure 3-14 CN2 spindle servo motor incremental encoder wiring diagram using 12-pin metal plug

ÿ **CN2** is compatible with **ZJY182** series AC spindle servo motor incremental encoder standard wiring

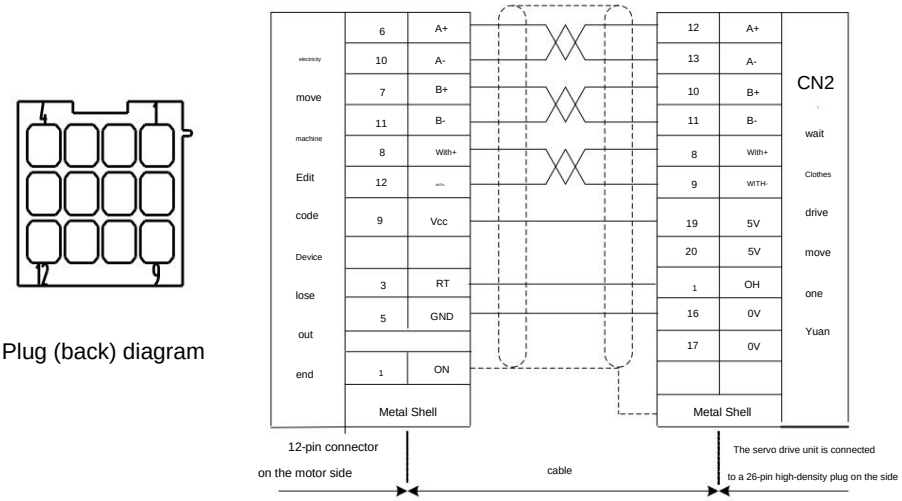


Figure 3-15 CN2 supporting ZJY182 series AC spindle servo motor encoder using 12-pin square plug wiring diagram

ÿ **CN2** is compatible with **ZJY182A, ZJY208A, ZJY265A** series AC spindle servo motor absolute encoder standard wiring

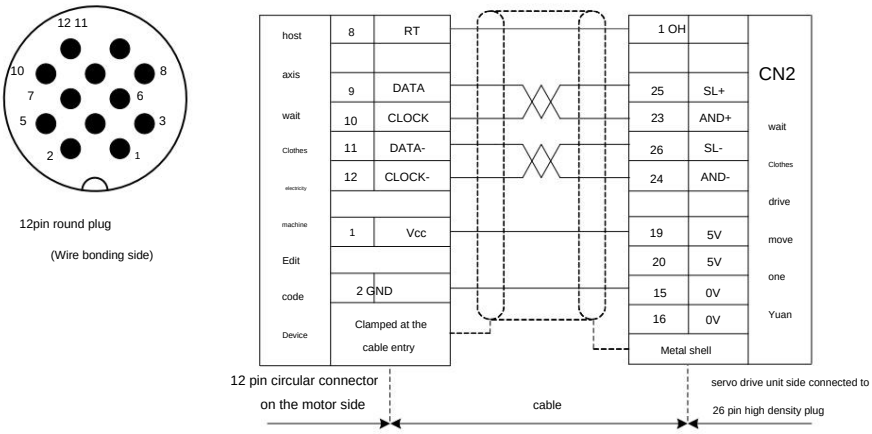


Figure 3-16 CN2 spindle servo motor absolute encoder wiring diagram using 12-pin metal plug

ÿ **CN2** is compatible with **ZJY182** series AC spindle servo motor absolute encoder standard wiring

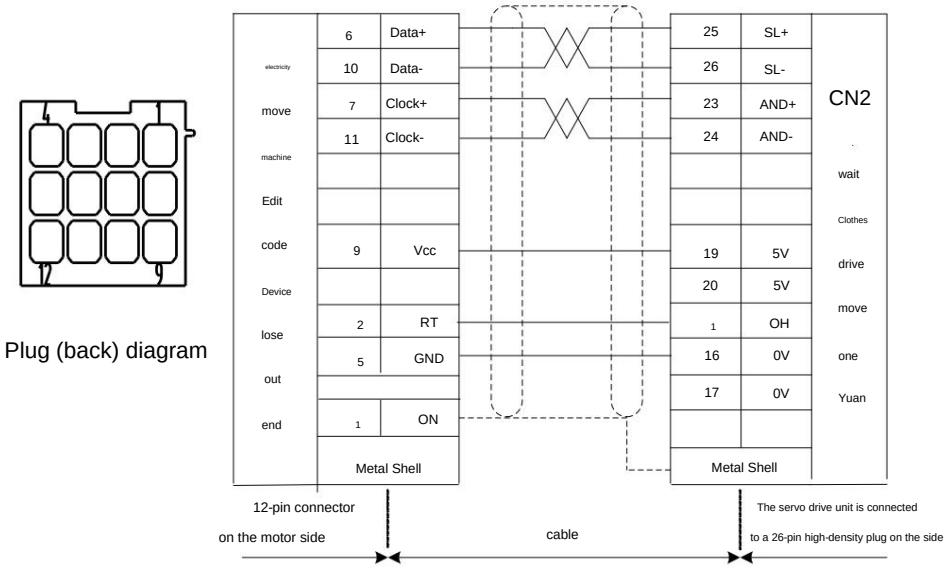


Figure 3-17 CN2 supporting ZJY182 series AC spindle servo motor encoder using 12-pin square plug wiring diagram

ÿ **CN2** is compatible with ZJY208 and ZJY265 series AC spindle servo motor incremental encoder standard wiring

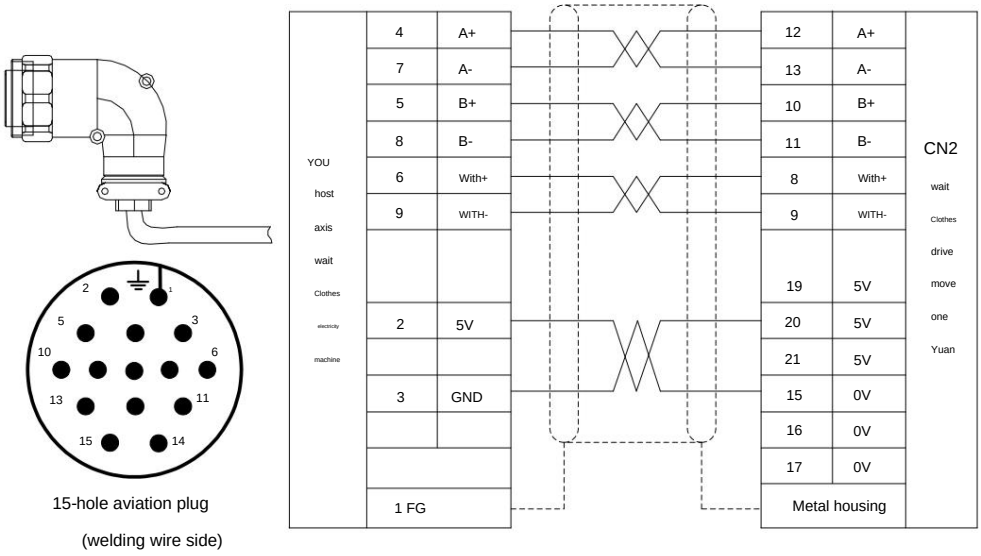


Figure 3-18 CN2 supporting ZJY208, ZJY265 series AC spindle servo motor encoder using 15-pin industrial plug wiring diagram

3.3.2 CN3 second position encoder feedback interface and wiring

Users can select the second position encoder feedback signal input interface CN3 (such as spindle encoder feedback input) according to their needs.

Through the connection of the second position encoder, a second position closed loop is formed with the servo drive unit.

The CN3 interface is a 20-core high-density socket, and the matching encoder wiring uses a 20-core high-density plug. The pin distribution is shown in Figure 3-19.

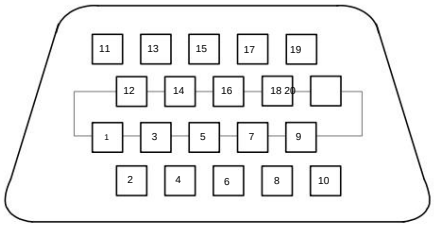


Figure 3-19 CN3 wiring plug pin diagram (soldering wire side)

Pin Number Name		significance	Pin Number	name	significance
1	SCZÿ	1. GR-LA2 Series Second position incremental Encoder signal; 2. GR-LS2 Series are sine and cosine signals.	11	NC	GR-LA2 series servo drive unit is empty
				KTY-84	GR-LS2 series is effective, and is compatible with CN8-11 internal The circuit is short-circuited. (See also 3.3.5)
2	SCZÿ		12	0V	
3	SCBÿ		13	NC	
4	SCBÿ		14	NC	
5	SCAÿ		15	NC	
6	SCAÿ		16	NC	
7	SCSLÿ	Absolute second position Encoder feedback signal.	17	NC	
8	SCSLÿ		18	NC	GR-LA2 series servo drive unit is empty.
				5V	The GR-LS2 series servo drive unit is 5V.
9	SCMAÿ		19	0V encoder power supply (-).	
10	SCMAÿ		20	5V encoder power supply (+).	

The second position encoder feedback signal interface of the GR-L series AC servo drive unit can be connected to an incremental encoder or an absolute encoder.

1. Connection method of **CN3** and second position incremental encoder

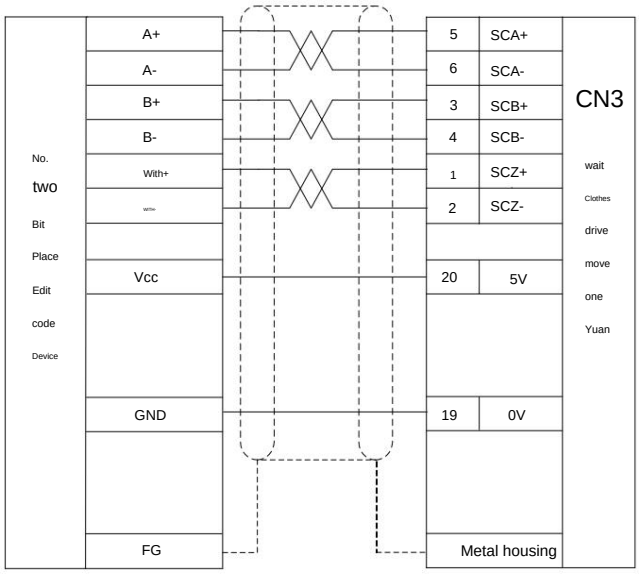


Figure 3-20 CN3 and incremental encoder wiring diagram

2. Connection method between **CN3** and the second position absolute encoder

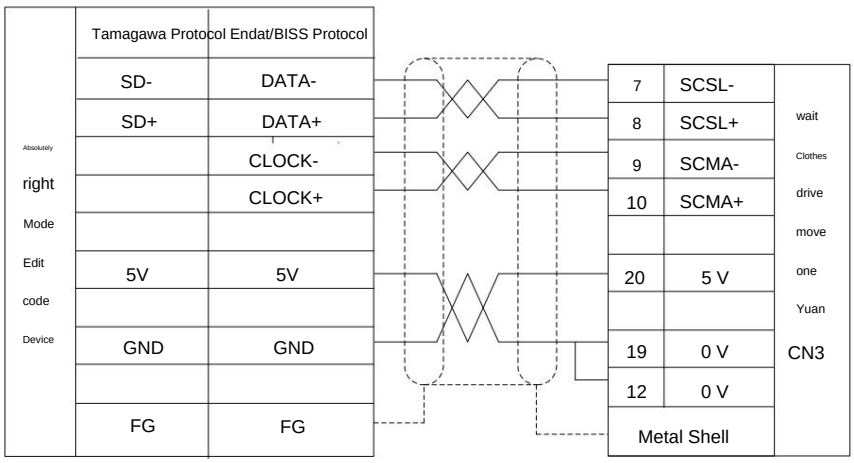


Figure 3-21 GR-L series CN3 and absolute encoder wiring diagram

3. Connection method of **CN3** and sine-cosine encoder

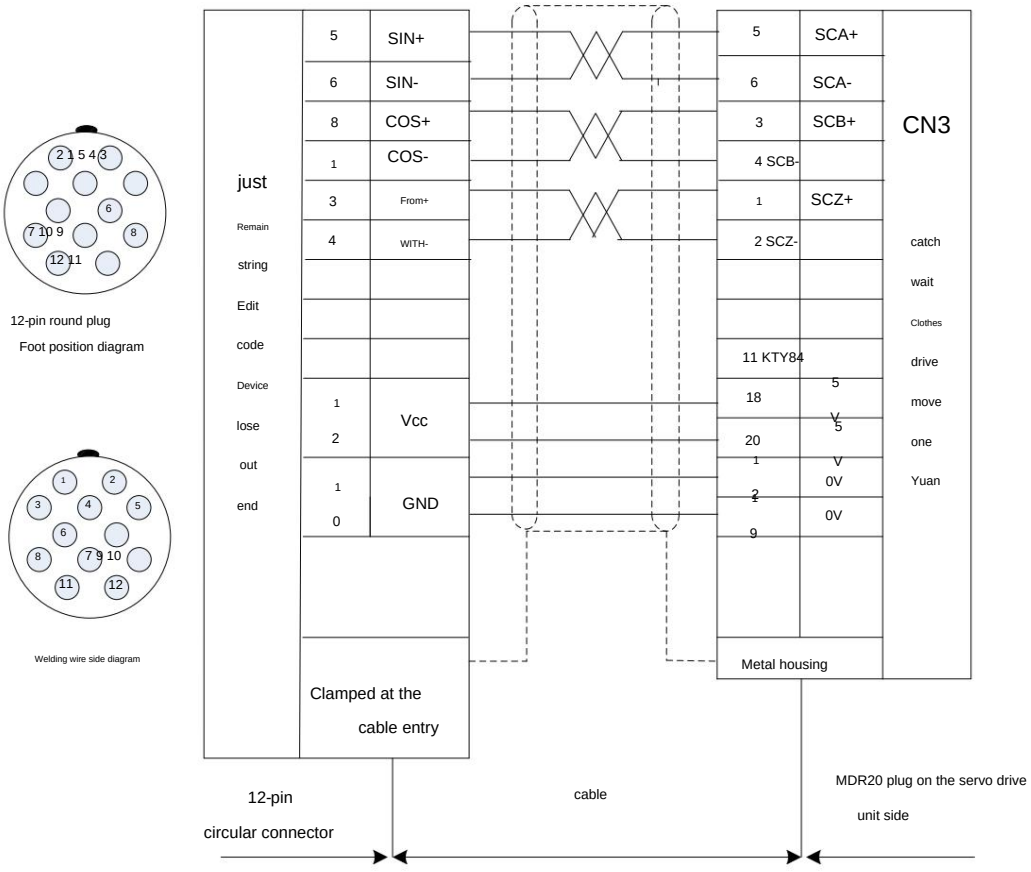
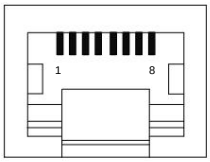


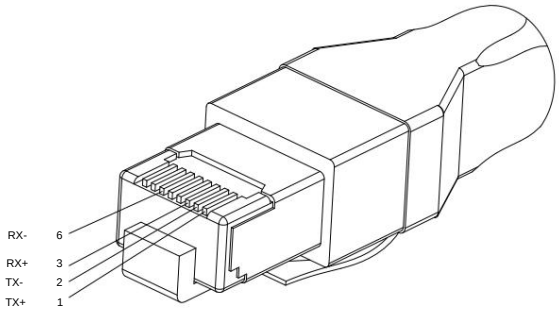
Figure 3-22 GR-L series CN3 and sine-cosine encoder wiring diagram

3.3.3 CN4, CN5 Ethernet fieldbus **GSK-Link** interface and wiring

CN4 and CN5 use RJ45 sockets from HARTING. For the pin definitions, refer to the RJ45 plug diagram.

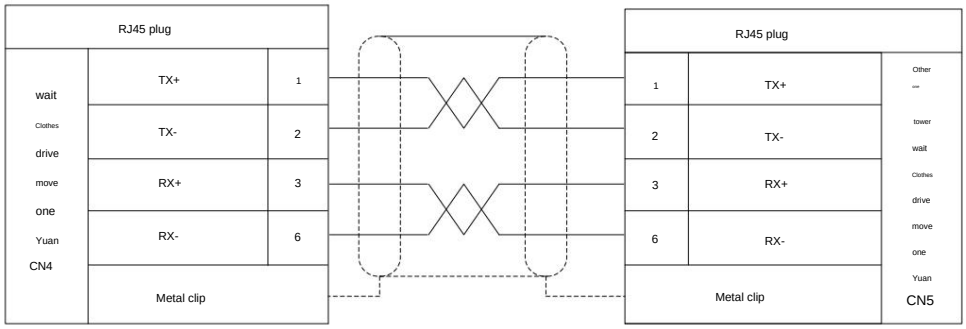


GSK-Link socket



Pin Number	name	significance
1	TXÿ	Data transmission
2	TXÿ	
3	RXÿ	Data Reception
6	RXÿ	

The communication line connection diagram between GR-L series servo drive units or between CNC system and servo drive unit is as follows.



Connect to the GSK-Link interface of the CNC system through the CN4 or CN5 interface to achieve real-time communication with the CNC system.

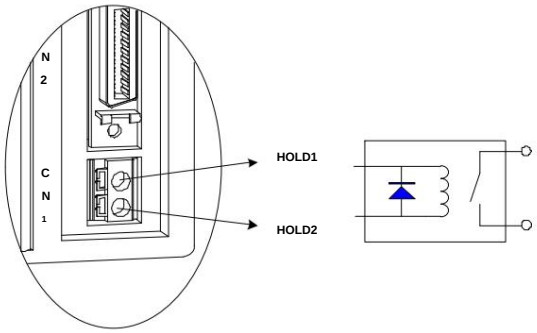
For system control, monitoring, management, debugging and tuning of GR-L series servo drive units, please refer to Section 5.4 for details.

The GR-L series servo drive unit must correctly set the following parameters to establish Ethernet communication with the CNC system.

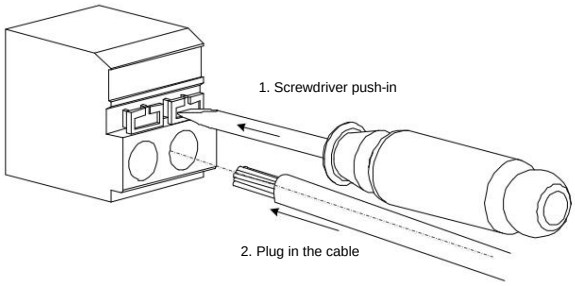
Related parameters	name	unit	Parameter range default value application method		
PA4	Control mode selection		9ÿ25	21	PÿS
	PA4=21: GSK-Link Ethernet communication function				
PA156	Servo drive unit slave number		1ÿ256	1	PÿS
	There may be more than one servo drive unit that establishes bus communication with the CNC system. Set the servo slave number corresponding to the CNC system. It is convenient for CNC to control a certain servo drive unit. Therefore, the servo drive units connected to the same CNC system cannot be set repeatedly. The servo slave number.				

3.3.4 **CN1** brake release signal

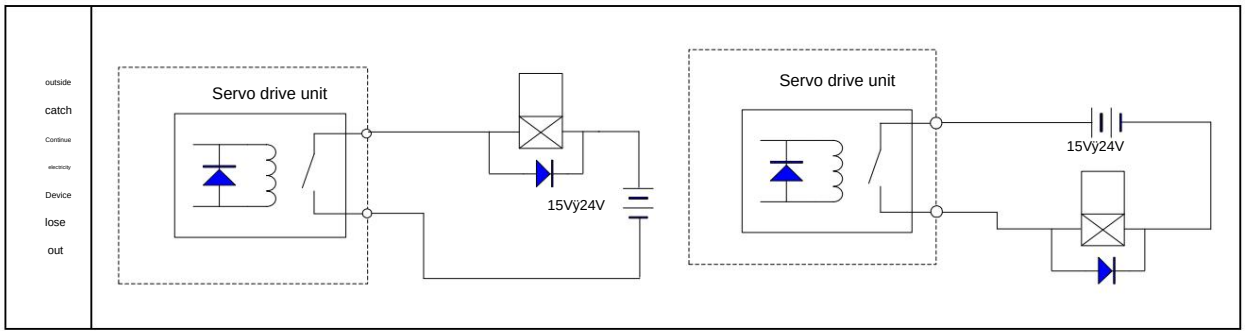
The CN1 interface is a 2-pin motor brake release signal socket, which contains a normally open contact of a relay.



Note: Please do not select the CN1 peripheral load greater than 1.0A/30VDC, 0.3A/60VDC, 0.5A/125VAC!



ÿ **HOLD** signal wiring example



3.3.5 CN8 position feedback output interface and wiring

The position feedback output signal is the data from the first or second position encoder (PG), which is processed in the servo drive unit.

And the set pulse number is output to the CNC system through CN8 to meet the CNC system position closed-loop control and other functions.

CN8 is a 14-core high-density socket, and is used with a 14-core high-density plug for encoder wiring. The pin distribution is shown in Figure 3-23.

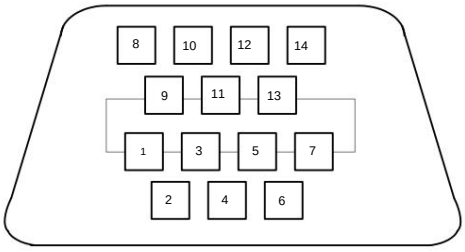
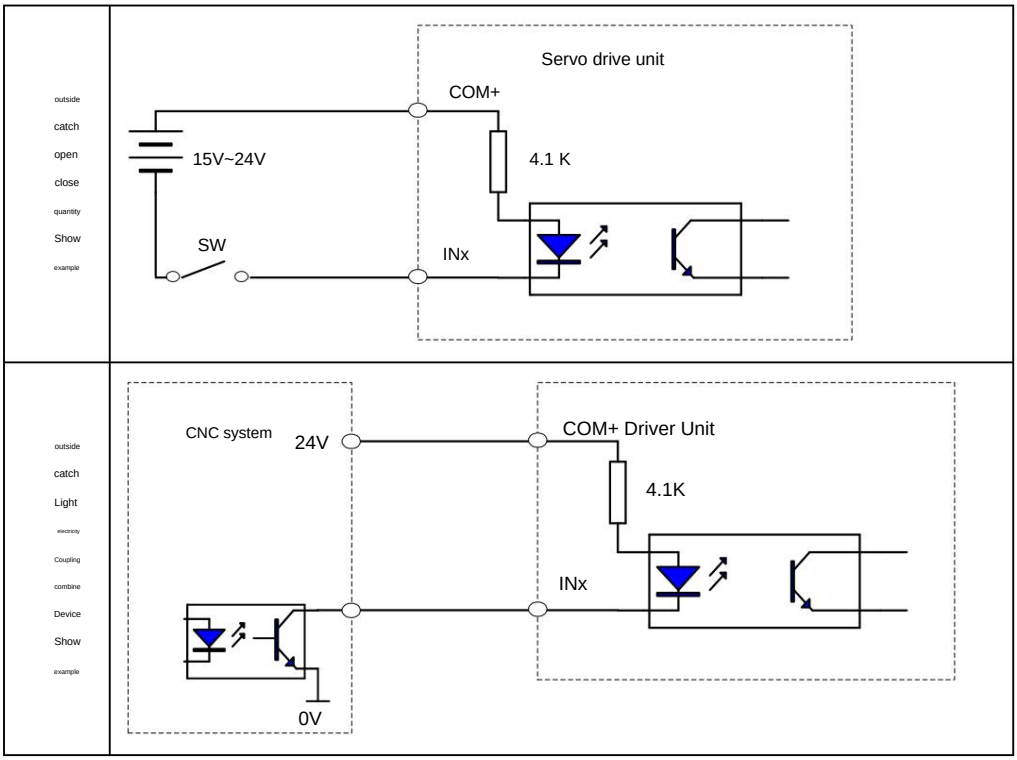


Figure 3-23 CN8 wiring plug pin diagram (soldering wire side)

Pin Number Name		significance	Pin Number	name	significance
1	GND	0V	8	GND	0V
2	PZOÿ	Position feedback output signal (Function to be added)	9	PTC150	Motor temperature sensor access point
3	PZOÿ		10	PTC130	
4	PBOÿ		11	KTY-84	
5	PBOÿ		12	SEC2	External switch directional input
6	PAOÿ		13	SEC1	Second gear directional function selection
7	PAOÿ		14	COM+	External +24V power input

1. Two commonly used wiring examples are given below. INx represents the input point: SEC1 and SEC2.



The 24V power supply in the figure needs to be provided externally. Specification requirements: DC15 V~24 V, 100 mA or more.

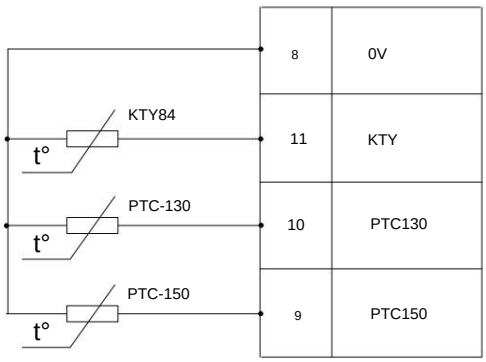
When the input signal Inx is connected to 0V, the input optocoupler is turned on. The signal Inx is ON and the input is valid. You can view the monitoring window

If the digital tube segment corresponding to the signal is on, it proves that the input is valid; otherwise, it is judged as invalid input.

The corresponding line needs to be checked. View monitoring content

The status is shown in Figure 3-24.

2. Motor temperature sensor signal wiring method and parameter setting.



Related parameters	name	unit	Parameter range default value application method		
PA182	Servo motor overheat type selection		0ÿ10	3	PÿS

Setpoint temperature	sensor	illustrate
0	none	There is no motor temperature protection function, and the Err5, Err14, and Err15 alarm functions are shielded.
1	KTY84	Detect the temperature signal input from CN2-1 (OH) terminal. If it is greater than 80 ÿ, the alarm Err5 will be output. out.
2	KTY84	Detect the temperature signal input from the CN2-1 (OH) terminal. If it is less than -20°C, the alarm Err5 will be triggered. Output.
3	KTY84	Detect the temperature signal input from CN2-1 (OH) terminal. If it is greater than the temperature set by PA183 or less, When the temperature reaches the temperature set by PA184, the alarm Err5 is output.
4	KTY84	Detect the temperature signal input from CN8-11 (KTY) or CN3-11. If it is greater than the PA183 setting When the temperature is higher than the set temperature or lower than the temperature set by PA184, the alarm Err5 is output.
5	PTC130	Detect the temperature signal input from CN8-10 (PTC130). When the temperature is greater than 130°C, the alarm Alarm Err14 output.
6	PTC150	Detect the temperature signal input from the CN8-9 (PTC150) terminal. When the temperature is greater than 150°C, the alarm Err15 alarm output.
7	PTC130 +PTC150	At the same time, detect the temperature signal input from CN8-9 (PTC150) and CN8-10 (PTC130). When the respective alarm conditions are met, the corresponding alarm is output.
8	KTY84+ PTC130	Simultaneous detection of CN8-11 (KTY) (or CN3-11 (KTY))[Note] and CN8-10 (PTC130) The temperature signal input at the end will output the corresponding alarm when the respective alarm conditions are met.
9	KTY84+ PTC150	Simultaneous detection of CN8-11 (KTY) (or CN3-11 (KTY))[Note] and CN8-9 (PTC150) The temperature signal input at the end will output the corresponding alarm when the respective alarm conditions are met.
10	KTY84+ PTC130+ PTC150	Simultaneous detection of CN8-11 (KTY) (or CN3-11 (KTY))[Note] and CN8-10 (PTC130), The temperature signal input from CN8-9 (PTC150) will be output when the respective alarm conditions are met. The corresponding alarm is issued.

Note: 1. The two temperature resistance input points CN8-11 (KTY) and CN3-11 (KTY) are the same input point.
Only one can be selected. Its function is temperature display and abnormal temperature alarm. For wiring method, refer to the wiring of CN2-1 (OH) principle.

2. When designing torque motors, linear motors, and electric spindles, it is recommended to choose at least KTY84, PTC130, or PTC150.
The two temperature sensors are used as over-temperature protection devices for the equipment.

3.3.6 I/O information exchanged via the bus

Unlike the GS-N series and GS-C series servo drive units, the GR-L series servo drive units transmit most of the I/O information through The GSK-Link bus interacts with the CNC system. Maintenance personnel can monitor the status of DL-IN and DL-OUT to determine whether the servo drive Whether the functions in the communication between the unit and the CNC system are normal or not.

The input command DL-IN sent by the CNC system to the servo drive unit is as follows.

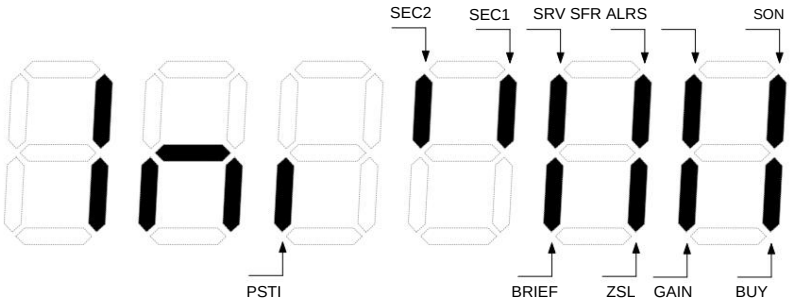


Figure 3-24 Function input point mark information monitoring

Note: If the corresponding digital tube in the figure is on, the command signal input is valid; otherwise, it is invalid.

name	Function	name	Function
SON	Enable input	ALRS	Alarm clear input
GAIN	Rigid tapping input	ZSL	Zero speed clamp input
SFR	Forward input	BRIEF	Mechanical lock input
SRV	Invert Input	SEC1	Second gear directional function selection
PSTI	Speed position switching input	SEC2	External switch directional input
BUY	Directional start input		

The output instruction DL-OUT sent by the servo drive unit to the CNC system is as follows.

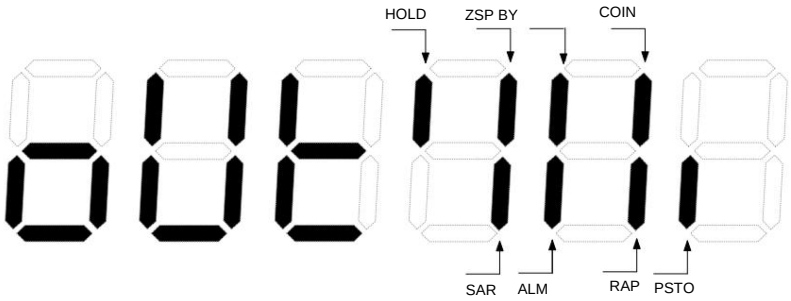


Figure 3-25 Function output point mark information monitoring

Note: If the corresponding digital tube in the figure is on, the command signal output is valid; otherwise, it is invalid.

name	Function	name	Function
PSTO	Speed position switching state	COIN	Directed completion output
RAP	Rigid tapping output	ABOUT	Position arrival output
ALM	Alarm output	SAR	Speed reaches output
ZSP	Zero speed output	HOLD	Brake release output

Chapter 4 Display and Operation

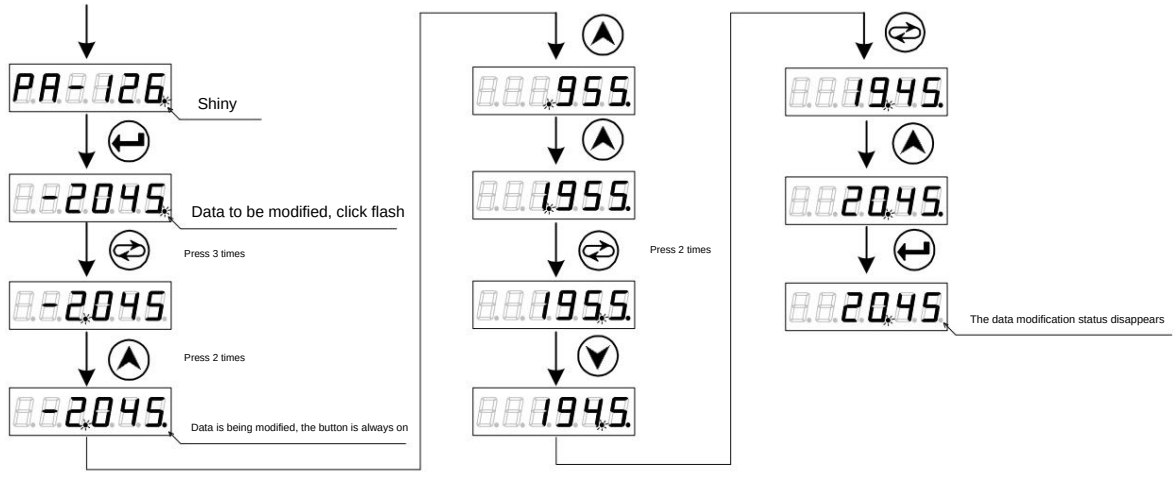
4.1 Operation Panel

ÿ For a brief description of the functions of the components on the AC servo drive unit panel, refer to 1.1.2 in Chapter 1.

ÿ The button functions are described in detail as follows.

button	name	illustrate
	'Add' key	1. Parameter numbers and parameter values increase; 2. Go up to the next level menu; 3. Increase the motor speed during manual operation; 4. During inching operation, the motor starts rotating in CCW direction.
	'Minus' key	1. The parameter number and parameter value decrease; 2. Scroll down to the next menu; 3. Reduce the motor speed during manual operation; 4. During jog operation, the motor starts rotating in CW direction.
	'Shift' key	1. Select the modification position of the parameter number; 2. Select the parameter value to be modified.
	'Back' key	Return to the previous menu or cancel the operation
	'Confirm' button	Enter the next menu level or confirm data setting.

Here we introduce the shifting function of the " " key in parameter setting. The steps to change the value of PA126 from -2045 to 2045 are as shown in the figure below.



1. In the above example, using the shift key to directly increment the LED2 position, -45 does not change to 1045, but -45+1000 =955, this is the result of the servo drive unit calculation

2. When modifying the parameter value, the decimal point light at the bottom right corner of the six-segment digital display tube is always on. When pressed, the light goes out. Indicates that the value is confirmed and effective. If you press the exit button when the decimal point light is not off, the parameter setting will be invalid.

4.2 Display Menu

6-segment digital tubes make up the monitoring function of the GR-L series products.

The window displays the contents in the form of a menu.

Management. When LED5 and LED4 in the right figure are flashing

When the servo drive unit is in alarm state.

The digital tube display contains three levels of

menus: The first level menu is the functional category, including status monitoring, parameter setting, parameter management, manual operation, jog

operation, etc. The second level menu is the meaning, including the displayed content, parameter function, save operation,

etc. The third level menu is the content, including the monitored value, parameter value, etc.

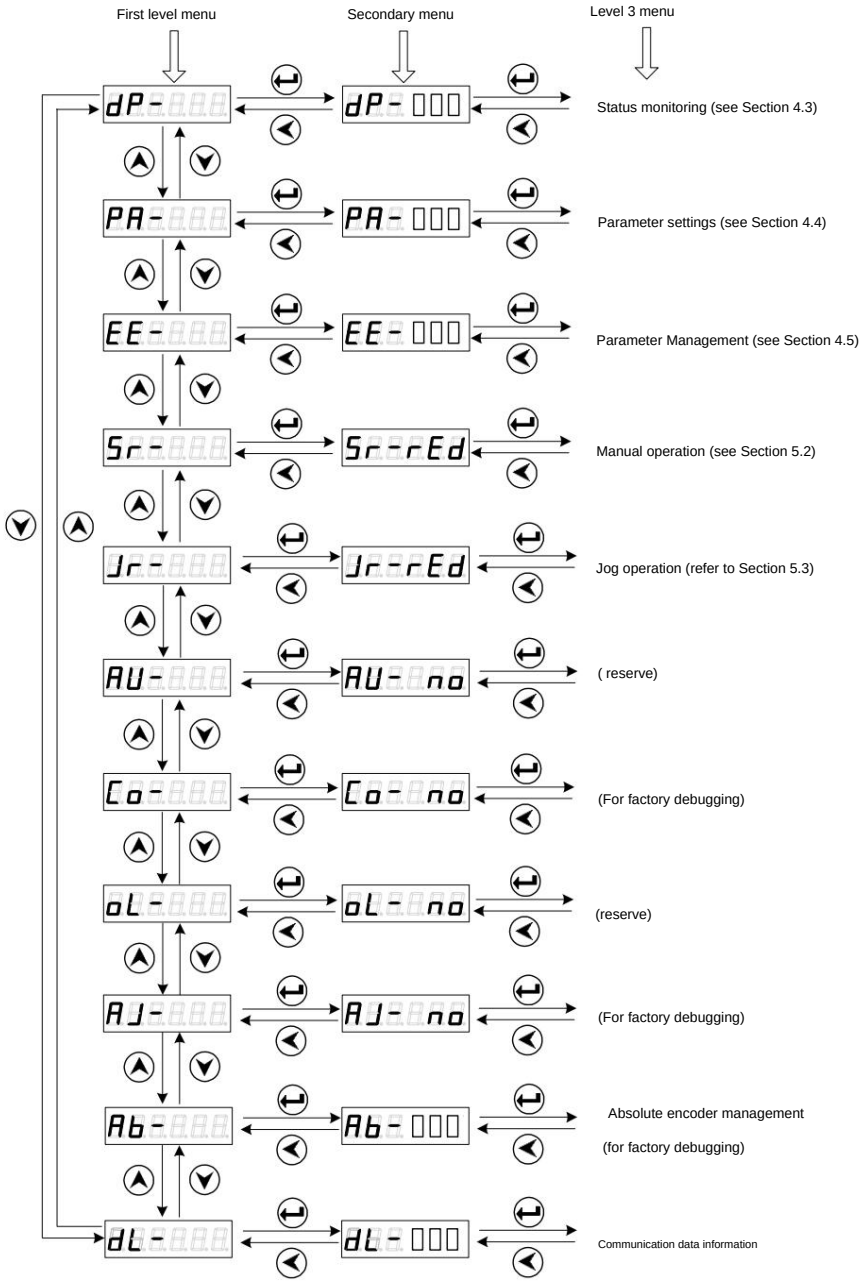


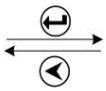
Figure 4-1 Display menu operation

4.3 Status Monitoring

dP- For status monitoring, users can select various monitoring states in this menu. They can also set parameters

The value of PA03 sets the initial monitoring status when the servo drive unit is powered on.

Parameter value power-on initial monitoring operation			Monitoring data	illustrate
	dP-SPd		r 100.0	Current motor speed 100r/min ÿ1ÿ
PA3=1	dP-PoS		P45806	Current motor position low (pulse) [2]
PA3=2	dP-PoS.		P. 18	Current motor position high (×10000 pulses)
PA3=3	dP-CPo		C45810	Position command low bit (pulse) ÿ2ÿ
PA3=4	dP-CPo.		C. 18	Position command high bit (×10000 pulses)
PA3=5	dP-EPo		E 213	Position deviation low (pulse) ÿ2ÿ
PA3=6	dP-EPo.		E. 0	Position deviation high (×10000 pulses)
PA3=7	dP-I		I 2.3	The motor current is 2.3A
PA3=8	dP-ouC			(Reserved)
PA3=9	dP-CS		r 210	The speed command is 210r/min
PA3=10	dP-Fr9		F 211	The resonance frequency is 211Hz
PA3=11	dP-Ct		211	The resonance frequency is 211Hz
PA3=12	dP-tr9			(Reserved)
PA3=13	dP-tEP		C 32	Radiator temperature is 32°C
PA3=14	dP-th		C 32	The motor temperature is 32°C
PA3=15	dP-dC		dC 320	The DC bus voltage is 320V
PA3=16	dP-Err		Er- 9	Alarm display: Alarm No. 9
PA3=17	dP-rn		rn-on	Running ÿ3ÿ
PA3=18	dP-Cod			(Reserved)
PA3=19	dP-In			(Reserved)
PA3=20	dP-oUt		oUt'11 '	Output point status monitoring ÿ4ÿ
PA3=21	dP-PLd			(Reserved)
PA3=22	dP-CPL		uEr 1.10	Hardware version number
PA3=23	dP-dSP		uEr 1.14	Software version number
PA3=24	dP-SPo		t 3256	The absolute position low position of the second position encoder Z pulse is 3256
PA3=25	dP-SPo.		t. 6	The second position encoder Z pulse absolute position high is 6

Parameter value	initial monitoring at power on	operate	Monitoring data	illustrate
PA3=26	dP-APo		A 3256	The absolute position low bit of the motor encoder Z pulse is 3256
PA3=27	dP-APo.		A. 6	The absolute position high of the motor encoder Z pulse is 6
PA3=28	dP-SAS		S 5836	Second position encoder single turn absolute position low
PA3=29	dP-SAS.		S. 0	Second position encoder single turn absolute position high
PA3=30	dP-HAS		H 38	The second position encoder relative position low
PA3=31	dP-HAS.		H. 12	The second position encoder relative position high
PA3=32	dP-Ab5		b 15038	The first position encoder single turn absolute position low
PA3=33	dP-Ab5.		b. 0	The first position encoder single turn absolute position high
PA3=34	dP-Hb5		H 38	The first position of the multi-turn encoder number of turns low
PA3=35	dP-Hb5.		H. 12	First position multi-turn encoder number of turns high
PA3=36	dP-SoF		4186	Sinusoidal signal DC bias
PA3=37	dP-CoF		5031	Cosine signal DC offset
PA3=38	dP-SAP		20377	Sinusoidal signal amplitude
PA3=39	dP-CAP		20442	Cosine signal amplitude
PA3=40	dP-SCA		16592	Sin-Cos signal amplitude ratio
PA3=41	dP-PHA		0	Sin-Cos phase deviation
PA3=42	dP-orG		4806	If the value is not 0, it means the zero point signal of the gear has been recognized.
PA3=43	dP-rGG		0	Displayed as "1" means the toothed disc zero point signal is detected
PA3=44	dP-tEE		256	Sincos encoder gear teeth number
PA3=45	dP-FrF		0.0	Motor incremental encoder detection data
PA3=46	dP-SrF		0.0	Second position incremental encoder detection data
PA3=47	dP-rPS		F 60	Notch filter frequency

ÿ1ÿ r 100.0 Where r is the motor speed code, 100.0 means the motor speed is 100 r/min in the counterclockwise direction.

When running in clockwise direction, negative speed is displayed - 100.0 , unit is r/min.

Note: When the servo drive unit drives the spindle motor, the speed is displayed as r 0 , only accurate to 1 r/min.

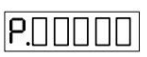
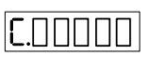
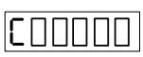
ÿ2ÿThe position feedback from the motor encoder is composed of two parts: POS (upper 5 bits) + POS (lower 5 bits).

For example: P. 18 × 100000 ÿ P45806 =1845806 pulses

Similarly, the position command pulse quantity is also composed of two parts: CPO. (high 5 bits) + CPO (low 5 bits).

For example:  × 100000 ÿ  =1845810 pulses

The relationship between CPO and POS is: (when the motor is stationary)

 ×100000ÿ  ÿ Gÿ  ×100000ÿ  ÿ

G: electronic gear ratio, that is $\frac{PA29 \cdot PA33}{PA30 \cdot PA34}$

The calculation formula for position deviation (EPO) when the electronic gear ratio is 1:1 is:

  ÿ 

  ÿ 

Note: When PA97=1,  Displays the current position increment of the motor encoder. When PA97=0, it displays

It shows the current position increment of the second position encoder.

Related parameters	PA97=1, select the motor encoder signal as the position feedback input signal.
	PA97=0, select the second position input signal as the position feedback input signal.

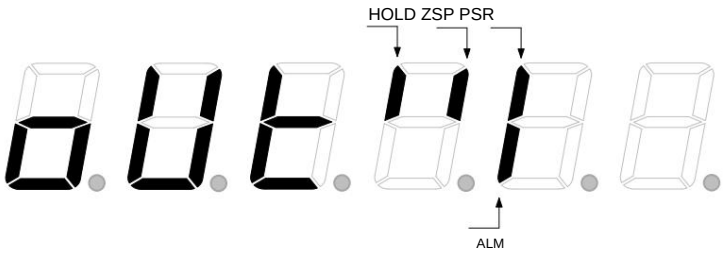
ÿ3ÿOperation status display:

 The main circuit of the servo drive unit has been charged and enabled

 The main circuit of the servo drive unit is not charged

 The main circuit of the servo drive unit has been charged but not enabled

ÿ4ÿOutput point status monitoring:

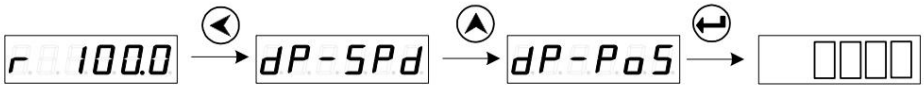


illustrate:  What is monitored is the brake release signal status output via CN1.

How to set up status monitoring

Example: If you need to call out the lower five bits of the current position  There are two ways to monitor the status, as follows:

Method (1): Directly select state monitoring;



Method (2): Select status monitoring through parameters.

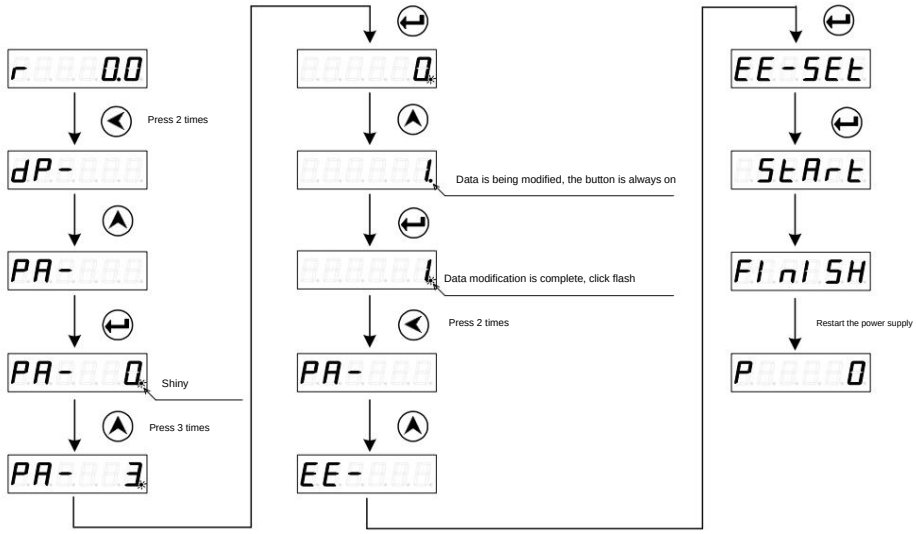


Figure 4-2 Parameter selection status monitoring operation

4.4 Parameter settings

ÿ Operation to restore the motor default parameters

When setting parameters, the parameter values after executing the parameter initialization operation are the default values; after executing the motor default parameter restoration operation

The parameter value is the default value.

1) Enter the password for modifying motor parameters, i.e. PA0=385.

2) Find the motor model code corresponding to the current motor according to the motor model code table in Appendix A.

3) Enter the motor model code into PA1, press to enter the parameter management menu, and execute EE-dEF operate,

The operation of restoring the motor default parameters is completed.

Related parameters	name	unit	Parameter range default value application method		
PA0	Parameter modification password		0ÿ9999	315	PÿS
	When PA0ÿ315, user parameters can be modified;				
PA1	Motor model code		0ÿ8051	0	PÿS

Taking restoring the default parameters of the 130SJT-M100D (A) (motor model code is 4) motor as an example, the specific operation is shown in Figure 4-3.

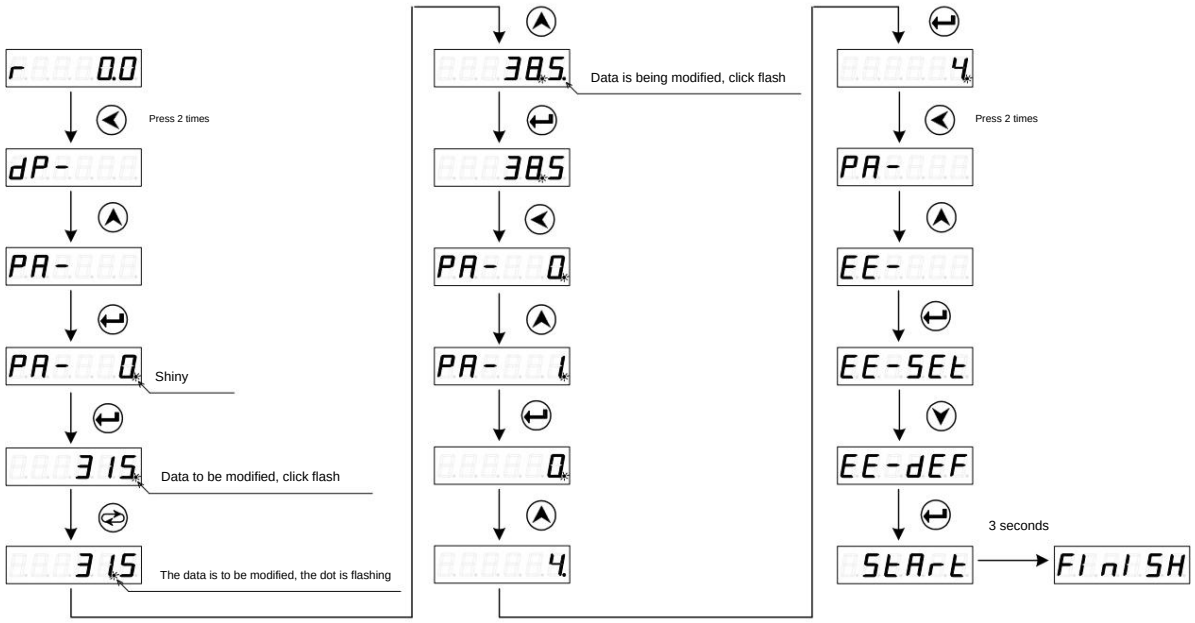


Figure 4-3 Restoring the motor default parameters

1. After modifying the parameters on the servo drive unit panel, the key will take effect. At this time, the modified parameter value will be reflected immediately.

   If you are not satisfied with the modified parameter value, do not press the key, but press the key to exit and the parameter value will be restored.

   If you want the modified parameters to be effective even after power failure, please perform parameter saving operation.

   EE-SEt

2. By setting the default parameters of the motor, the parameters related to the motor are written into the default values. The user can also

   The value of the parameter (see Appendix A) can be used to determine whether the default parameters of the servo drive unit are suitable for the driven motor.

   If the PA1 parameter value does not correspond to the motor model code, the motor may not operate properly.

4.5 Parameter Management

The parameter management section details the parameter writing, parameter reading, parameter backup, parameter recovery backup, and parameter call-out in the servo drive unit.

Operations on parameter default values. The data storage relationship in parameter management is as follows.

	System power on: EEPROM parameter area		Memory
EE-SEt	Parameter preservation:	Memory	EEPROM parameter area
EE- rd	Parameter reading: EEPROM parameter area		Memory
EE- bA	Parameter backup:	Memory	EEPROM backup area
EE- rS	Restoring backup: EEPROM backup area		Memory
EE-dEF	Recall the default value: Parameter default value		Memory, EEPROM parameter area
EE-Int	Initialization operation: Parameter default value		Memory, EEPROM parameter area

ÿ **EE-SEt** parameter saving

Indicates writing the parameters in the memory to the parameter area of the EEPROM. When the user modifies the parameters, only the parameter value in the memory is changed, and the original value will be restored at the next power-on. If you want to change the parameter value permanently, you need to perform the parameter save operation to write the parameter value in the memory to the parameter area of the EEPROM, and the modified parameter value will be used at the next power-on.

ÿ EE-rd parameter reading

Indicates reading the data in the parameter area of EEPROM into the memory. This process will be automatically executed once when power is turned on. At the beginning, the parameter value in the memory is the same as that in the parameter area of EEPROM. However, if the user modifies the parameter, the parameter value in the memory will be changed. When the user is not satisfied with the modified parameter or the parameter is adjusted randomly, the parameter reading operation can be performed to read the data in the parameter area of EEPROM into the memory again and restore it to the parameter at the time of power on.

ÿ EE-bA parameter backup

Write the parameters in the memory to the backup area of the EEPROM. This function is set to prevent the user from modifying the parameters by mistake and being unable to return to the original parameters. The user should back up the parameters first after debugging the motor performance.

ÿ EE-rs restore backup

Read the parameters in the EEPROM backup area into the memory. This parameter value needs to be written, otherwise it will remain the original parameter after power is turned on again. value.

ÿ **EE-dEF** calls out the default value

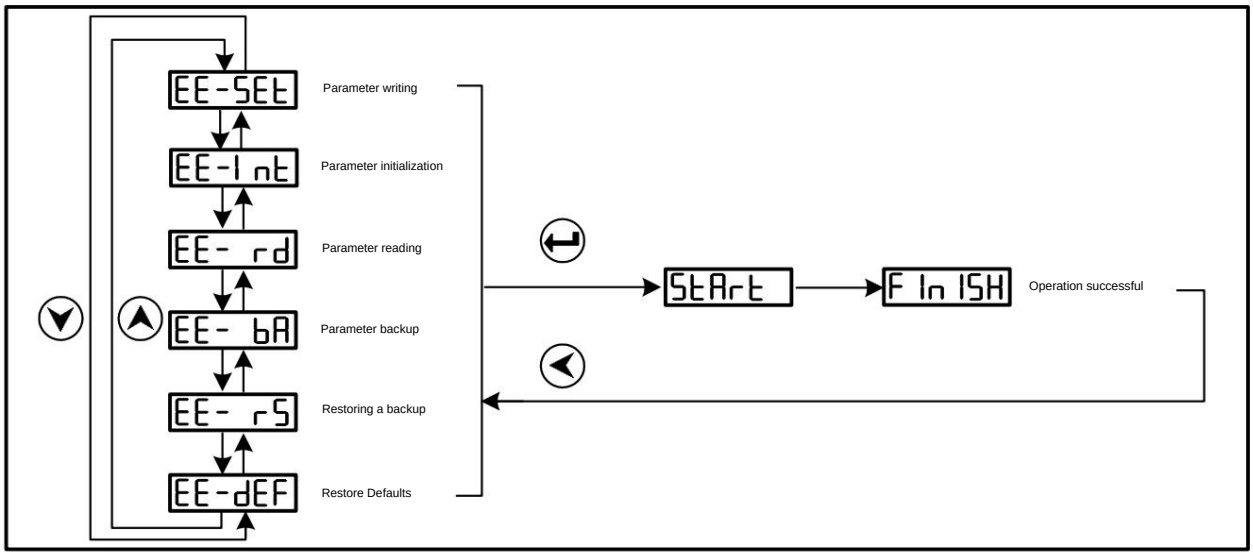
Indicates that the default values of the parameters related to a certain motor are read into the memory and written into the parameter area of the EEPROM. Use the default parameters for this motor. (See 4.4 in this chapter)

ÿ **EE-Int** initialization operation

Restore all parameters of the servo drive unit to the factory default state.

Note! This operation is protected by a special password, so please do not operate it lightly!

ÿ Operation of parameter management



ÿ Example of parameter saving operation

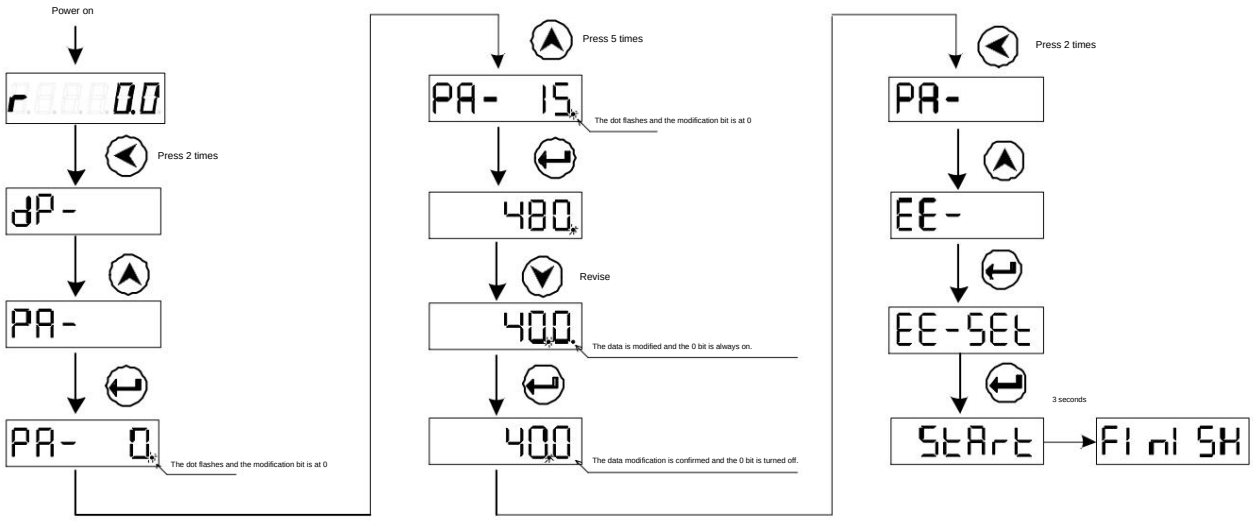


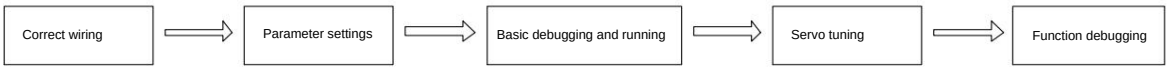
Figure 4-4 Parameter saving steps

Chapter 5 Operation

This chapter will introduce the commissioning and operation of the servo drive unit according to the working mode of PA4 parameter setting in the following table.

Related parameters	name	unit	Parameter range	Default value	application mode
PA4	Working mode selection		9ÿ25	21	PÿS
	ÿ PA4=9: Manual mode exist  In the menu, use “ , ” to accelerate or decelerate. ÿ PA4=10: Inching mode exist  In the menu, first set the PA124 jog speed value, then you can use “ , ’ to perform CCW, CW rotation operation. ÿ PA4=21: GSK-Link bus control mode The servo drive unit realizes real-time transmission of control instructions and feedback data with CNC through the GSK-Link bus, simplifying the connection. Avoids transmission distortion when using analog signals and pulse signals; also supports CNC to monitor the status of servo drive units in real time control, parameter management and process command processing.				

Usually, running a new servo drive unit requires the following five steps.



This chapter mainly describes the first four steps to enable users to run the servo drive device quickly.

When debugging functions according to different user requirements, please refer to Chapter 6.

5.1 Inspection before power on

ÿ When the user uses the servo drive unit for the first time, it is recommended to perform manual or inching operation without connecting a load.
Ensure that the servo drive unit and motor can work normally after transportation, vibration and installation.

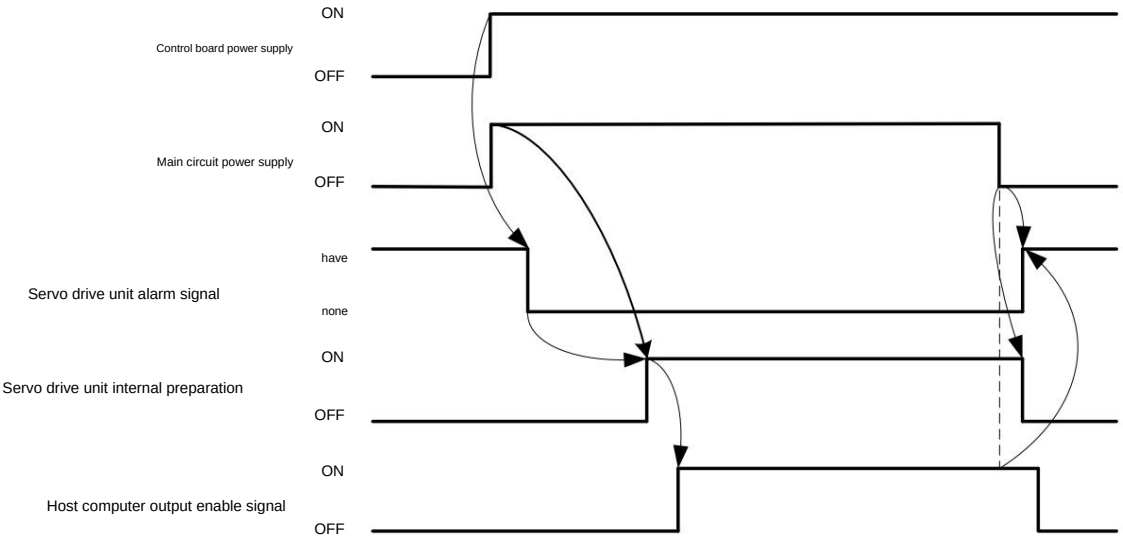
ÿ Without connecting the load, after confirming that the drive device can work normally, connect the CNC system and
If necessary, debug and run the speed mode or position mode.

ÿ After the signal connection, parameter setting, motor operation and other debugging are normal, connect the load and run with load.

First, correctly connect the servo drive unit and the motor according to 3.2.2 in Chapter 3, and ensure that the motor is disconnected from the load. After the wiring is correct, proceed
Check before powering on. The check items are described in the following table.

Inspection items	Inspection method
Whether the specifications of the servo drive unit and motor match.	Check the user manual to verify the nameplates of the servo drive unit and motor.
Check whether the correct circuit breaker, contactor and isolation transformer are connected. Refer to Appendix B Selection of Peripheral Equipment	
Check whether R, S, T, P, B1, B and U, V, W, PE are connected correctly.	Confirm the on-site power circuit and use a multimeter to test if necessary. quantity.
Check whether the motor encoder feedback signal line is connected correctly.	Refer to User Manual 3.3.1.
Are the main circuit terminal screws tightened?	Please use a screwdriver to check for any loose parts.

After confirming that the connection is normal, you can turn on the power. The power-on sequence is as follows.



Notice

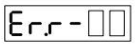
When the user operates the servo drive unit for the first time, please call up the motor current monitoring window after the first power-on.

After enabling, monitor the motor current in real time. If it exceeds the rated current of the motor, disconnect the enable immediately and check the connection.

The parameters of the line and servo drive unit must be set carefully, otherwise the motor may be damaged.

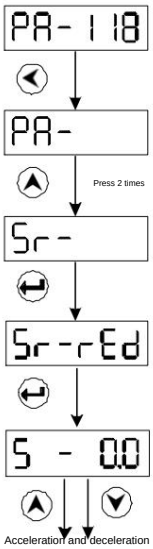
5.2 Manual operation

After the servo drive unit is powered on, the normal situation is  If the servo drive unit fails, an alarm code will be displayed.

 displayed. If an alarm code appears, please refer to Chapter 8 for solutions.

Required parameters	name	unit	Parameter range	Default value	application mode
PA4	Working mode selection		9ÿ25	21	PÿS
PA118	Internal Enable		0ÿ1	0	PÿS

The steps for manual operation (PA4=9) are as follows.



1. When the servo drive unit is powered on, the display  , is the motor running speed monitoring window.

2. Check whether PA1 corresponds to the corresponding motor (refer to Appendix A). If PA1 is correct, skip this step.

   Otherwise, call out the default parameters of the corresponding servo motor in the servo drive unit (see 4.4 for operation methods).

3. Set PA4=9 to select manual operation mode

4. Set PA118 = 1, internal enable (make sure the motor shaft rotation is not dangerous before enabling)

   (To cancel the internal enable, set PA118 = 0)

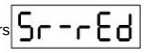
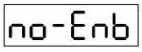
5. Follow the left picture to enter the manual operation menu (the previous parameter settings are omitted).

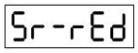
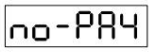
6. Keep the button pressed, the motor starts to accelerate, release the button, the speed remains unchanged;

   Keep pressing the button, the motor starts to decelerate, and after decelerating to zero, it continues to accelerate in the reverse direction.

   OK;

   Press and at the same time, the motor will brake and stop immediately.

During manual operation, if the monitoring window appears  , press OK to display  , indicating that the servo drive unit is not in use

If the monitoring window shows  , press OK to display  , indicating servo

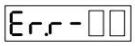
The drive unit working mode is set incorrectly. Please set PA4 to 9.

During manual operation, if the motor vibrates, makes noise or other abnormal conditions, it is necessary to

Debug the parameters of the degree loop. For specific debugging methods, refer to 6.1.

5.3 Jog operation

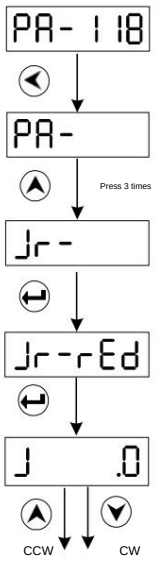
After the servo drive unit is powered on, the normal situation is  If the servo drive unit fails, an alarm code will be displayed.

 displayed. If an alarm code appears, please refer to Chapter 8 for solutions.

Required parameters	significance	unit	Parameter range	Default value application mode
PA4	Working mode selection		9ÿ25	21 PÿS
PA124	Jog speed	rpm	0ÿ12000	120 S
PA118	Internal Enable		0ÿ1	0 PÿS

Like manual operation, jog operation is also operated through the operation panel.

The operating steps for jog operation (PA4=10) are as follows.



1. When the servo drive unit is powered on, the display  , is the motor running speed monitoring window.

2. Check whether PA1 corresponds to the corresponding motor (refer to Appendix A). If PA1 is correct, skip this step.

   Otherwise, call out the default parameters of the corresponding servo motor in the servo drive unit (see 4.4 for operation methods).

3. Set PA4=10 to select the jog operation mode.

   Set PA124=500 and set the jog speed to 500 r/min.

4. Set PA118 = 1, internal enable. (Before enabling, make sure that the motor shaft will not rotate dangerously).

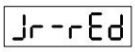
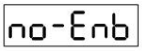
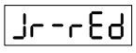
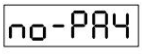
   (Set PA118=0, cancel internal enable).

5. Follow the left picture to enter the jog operation menu (the previous setting parameters are omitted).

6. Press and hold the button, and the motor starts to run at the speed set by PA124, 500 r/min.

   If the button is held down, the motor will run in the reverse direction according to the speed set by PA124.

   Release the button and the motor stops and maintains zero speed.

During jog operation, if the monitoring window appears  , press OK to display  , indicating that the servo drive unit is not enabled signal, please set PA118 to 1; if the monitoring window appears  , press OK to display  , indicating the servo drive The unit working mode is set incorrectly, please set PA4 to 10.

During jog operation, if the motor vibrates, makes noise or other abnormal conditions, it is necessary to Debug the parameters of the degree loop. For specific debugging methods, refer to 6.1.

5.4 GSK-Link bus control operation

GR-L series bus type AC servo drive unit is connected to the CNC system supporting GSK-Link through CN4 and CN5 interfaces to achieve

High-speed real-time communication with control systems.

The GR-L series bus-type AC servo drive unit must correctly set the following parameters to establish Ethernet communication with the CNC system.

Related parameters	name	Unit	parameter range	default value	application method
PA4	Control mode selection		9ÿ25	21	PÿS
	PA4=21: GSK-Link communication function				
PA156	Servo drive unit slave number		1ÿ256	1	PÿS
	There are usually more than one servo drive unit that establishes bus communication with the CNC system. The servo slave number of the same CNC system ensures that the CNC has the only control over a servo drive unit. The servo drive units connected to the system cannot be set with duplicate servo slave numbers.				

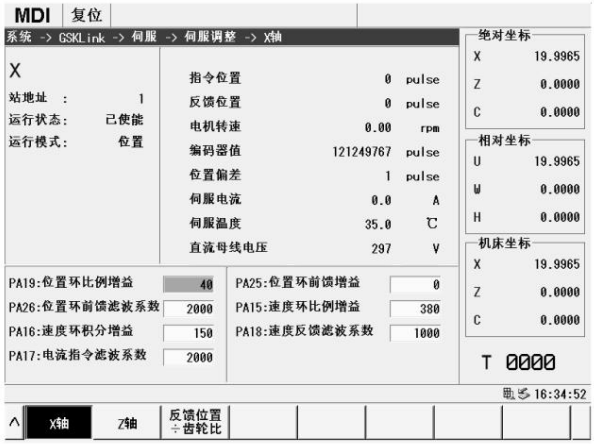
Here we take the GSK988TA CNC system as an example to illustrate the following functions achieved through the GSK-Link bus:

ÿ Status monitoring and servo rigidity adjustment

In the GSK988TA system interface, execute "System > GSK-Link > Servo > Servo Adjustment - Axis" in sequence.

Real-time monitoring of command speed, motor speed, encoder value, servo current, servo temperature, servo DC bus voltage and other states.

At the same time, the gain parameters of the servo first position loop and the first speed loop can be debugged here to achieve the best operating state of the motor.



ÿ Parameter management

In the GSK988TA system interface, execute "System > GSK-Link > Servo > Servo Parameters > Select any axis" in sequence.

You can modify parameters, save parameters, restore parameters, back up parameters, restore backup parameters, search parameters, etc.

ÿ Configure motor parameters

Go to "System > GSK-Link > Servo > Servo Configuration - Axis", press the soft key "Restore Motor Default Parameters", select the motor that matches the servo in the "Motor Model" column, and restore the motor's default parameters.

ÿ I/O information exchange and status

monitoring In the GSK988TA system interface, execute "System > GSK-Link > Servo > Servo I/O" in sequence, and you can monitor the status of bus I/O and hardware I/O in real time.

ÿ Real-time control

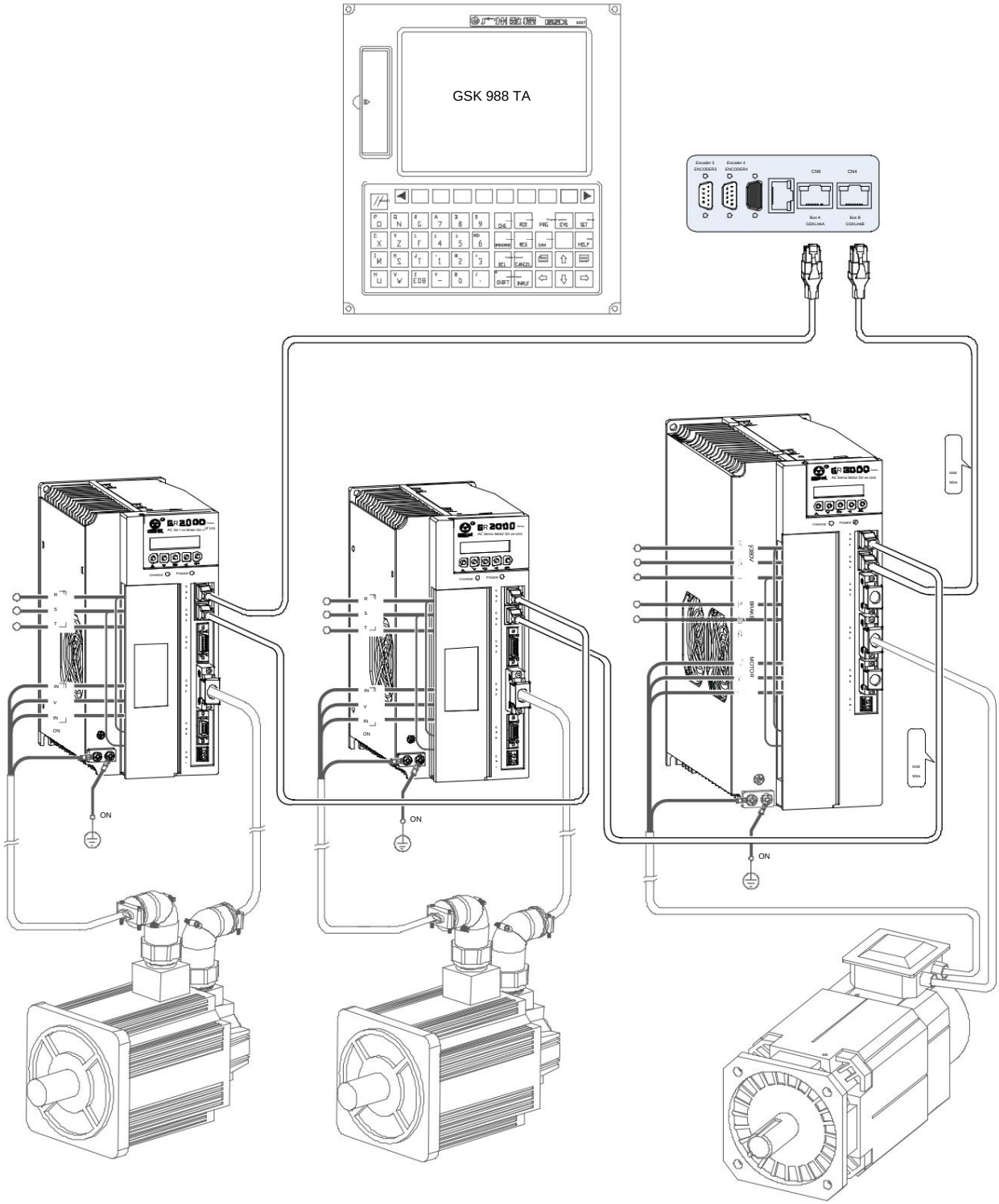
In the GSK988TA system, the motion control of the feed axis is position control, and the motion control of the spindle (also called the rotary axis) is speed control.

The motion control of the Cs axis allows the spindle to perform speed control, and can also be switched to position control through the M command.

All motion commands are transmitted at high speed via the GSK-Link bus.

The I/O information of the CNC numerical control system and the servo drive unit is also exchanged through the bus, thus simplifying the complex control line connection problem.

question.



5.5 Servo Tuning

After the motor is connected to the mechanical load, the load inertia is a very important factor relative to the motor rotor inertia, which determines the motor operation. In the field of CNC machine tools, in order to achieve better processing results, the servo motor must have stable high rigidity.

By performing servo tuning according to the method described in this section, a more accurate inertia ratio (PA179) can be calculated, and then a set of recommended rigidity parameters can be automatically set. Number (PA15, PA16, PA19). This simplifies the debugging process of the servo rigidity of the entire machine tool and gets rid of the previous practice of relying solely on the experience of the debugging personnel. Debug mode.

Related parameters:

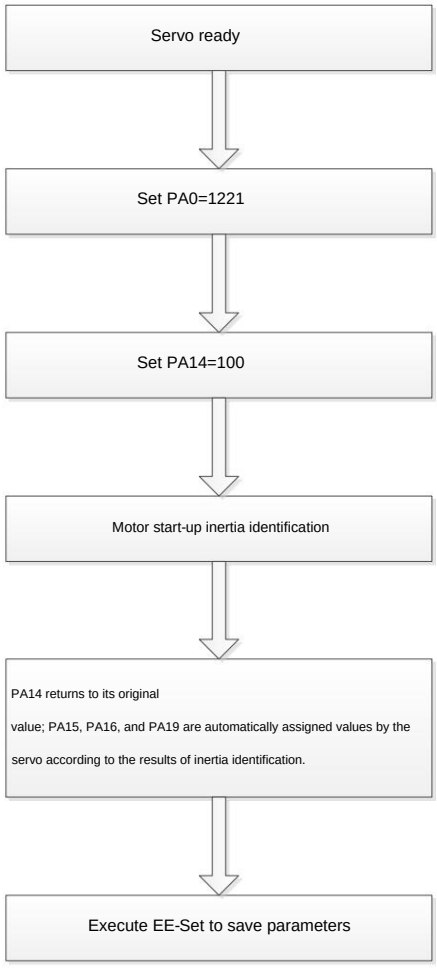
Required parameters	significance	unit	Parameter range	Default value	application mode
PA14	Rigidity level		0ÿ101	8	PÿS
	1. PA14=(1ÿ32), the rigidity level of the servo motor can be manually set. The level range is from 1 to 32, and the rigidity gradually increases. Strong. Corresponding to PA15, PA16, PA19 As the grade increases, the parameter value gradually increases. 2. PA14=100, inertia identification; 3. PA14=101, inertia identification + iteration.				
PA15 Speed loop first proportional gain			10ÿ5000	120/800	PÿS
PA16 Speed loop first integral time constant			0ÿ5000	280/300	PÿS
PA19 Position loop first proportional gain			5ÿ30000	80/40	PÿS
PA76	Resonance frequency display	Hz		60	PÿS
	When PA77=3, PA76 displays the current motor oscillation frequency in real time.				
PA77	Notch filter mode selection:		0ÿ5	0	PÿS
	PA77=0: Notch filter function is turned off; PA77=3: Turn on the notch filter function and detect the resonance frequency in real time (PA76 displays the resonance frequency); PA77=4: Initialize the notch filter parameters. After completion, PA77 returns to 0. PA77=5: Save the related parameters of the notch filter and turn off the real-time frequency detection function to save program running time.				
PA78	First notch filter frequency	Hz	0ÿ30000	0	PÿS
PA79	First notch filter width		1ÿ100	20	PÿS
PA80	First notch depth		1ÿ20000	8000	PÿS
PA81	Second notch filter frequency	Hz	0ÿ30000	0	PÿS
PA82	Second notch filter width		1ÿ100	20	PÿS
PA83	Second notch depth		1ÿ20000	8000	PÿS

ÿ Preparation before servo tuning

1. Restore the default parameters of the motor, find the corresponding motor model code according to the motor model, set PA1 = motor model code, and execute Perform the "EE-dEF" operation.
2. Ensure that there are at least 5 pitches of movement on both sides of the "tuning axis" (when tuning the motor, it needs to run back and forth 4 times).
3. Before tuning, make sure that the servo drive unit has no alarm or warning status, for example, no warning message similar to AL-603.
4. Servo tuning can only be performed when PA4 is 9, 10, or 21.

ÿ Servo tuning: inertia identification

Enter inertia identification, the motor automatically rotates forward and reverse, the motor load inertia ratio is tested, and then a set of rigidity parameters are calculated and assigned. PA15, PA16, PA19, the process is as follows.



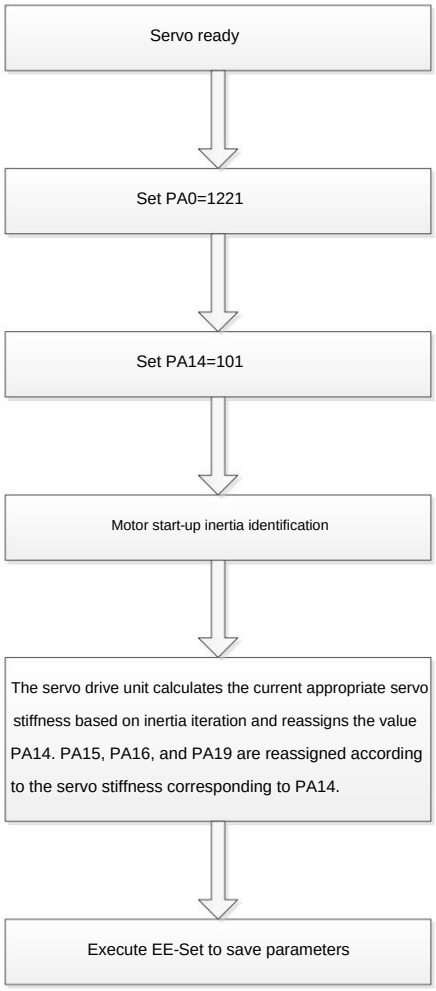
ÿ After servo tuning is completed, if the motor has abnormal noise or the stiffness is too soft, you can manually adjust the stiffness level of PA14.

ÿ After servo tuning multiple axes on a CNC machine tool at the same time, please set the PA19 parameter to be consistent. It is recommended to use the minimum value.

ÿ Servo tuning: inertia identification + iteration

The following tuning mode is that after the inertia identification, the motor continues to rotate forward and reverse, and the servo drive unit is tested successively from low stiffness to high stiffness.

Finally, the most suitable motor stiffness assignment PA14 is determined, and the process is as follows.



ÿ After servo tuning is completed, if the motor has abnormal noise or the stiffness is too soft, you can manually adjust the stiffness level of PA14.

ÿ After servo tuning multiple axes on a CNC machine tool at the same time, please set the PA19 parameter to be consistent. It is recommended to use the minimum value.

ÿ Servo notch filter

Mechanical systems usually have large part tolerances, assembly gaps, part friction, and a certain degree of dynamic imbalance, which will produce mechanical inherent vibrations. The power supply for the servo drive unit to drive the motor is a high-frequency chopper power supply. When the vibration frequency of the motor at a certain speed is close to the mechanical inherent vibration frequency, resonance may occur. In this case, a notch filter can be set to suppress the resonance.

1. The notch filter can reduce the gain of a specific frequency to suppress mechanical resonance. To use the notch filter correctly, you must know the exact resonance.

   The resonance frequency is the frequency of the resonance, but it is not applicable when the resonance frequency is often shifted. Therefore, the notch filter is suitable for the occasion of medium frequency resonance.

2. Although the larger the notch width and the smaller the depth parameter value, the stronger the suppression of resonance, it will cause phase lag, which may cause

   The system is unstable, so just modify the parameters appropriately to suppress the vibration.

Key points for using notch filter:

1. PA77=3, the servo drive unit turns on "real-time detection of resonance frequency". The detected frequency is in the PA76 parameter and 

   Displayed in.

Note 1: Due to the long program running time caused by real-time calculation, the LED display may flicker, which is normal.

Note 2: It is recommended that the machine tool run the entire stroke in order to obtain the resonance frequency with the maximum amplitude.

2. Write the frequency value displayed by PA76 into PA78 to suppress resonance. If the suppression effect is not thorough, fine-tune PA78.

   PA79 and PA80 to obtain better inhibitory effects;

3. After the first set of frequency suppression, the servo drive unit still automatically performs resonance frequency detection, and the detected frequency will still be

   If the frequency is significantly different from the previous one, the frequency value can be written into PA81 to perform the second set of resonance suppression.

   The effect is not thorough, you can fine-tune PA82 and PA83.

4. After completing the resonance suppression, please modify PA77=5 and save. Another purpose is to turn off the real-time frequency detection function to save time.

   Sequence running time.

Note 3: If PA77=5 is not set, the servo drive unit will always perform real-time resonance frequency detection, and data calculation will consume a lot of servo resources, which will inevitably lead to

This will cause the performance of the servo drive unit to deteriorate.

Chapter 6 Function Debugging

6.1 Basic performance parameter debugging instructions

Notice	ÿ Figure 6-1 is a diagram for adjusting the performance parameters of the servo drive unit. During use, the user may Different, it is necessary to adjust some parameters appropriately according to the principle of Figure 6-1 to achieve the best working state of the motor. ÿ Excessive adjustment may cause unstable operation of the servo motor.

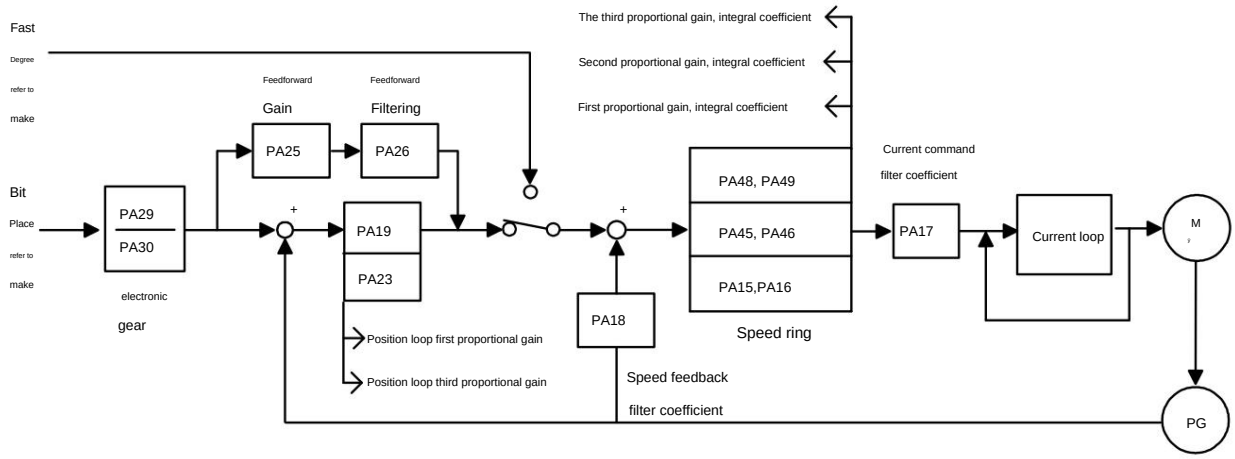


Figure 6-1 Basic performance parameter adjustment diagram

	ÿ Generally speaking, the parameters in Figure 6-1 should be adjusted for the speed loop first, then the position loop. (The current loop parameters are already optimized at the factory.) The user does not need to adjust.) ÿ The parameter ranges of AC permanent magnet synchronous servo motors and AC asynchronous spindle servo motors are different, but their debugging methods are similar.

6.1.1 Debugging method for adapting AC permanent magnet synchronous servo motor

When debugging the machine tool, the user must first confirm that the value of PA1 is consistent with the model code of the adapted motor. Otherwise, the motor must be set as described in Appendix A. The corresponding model code calls out the default parameters of the motor.

The following describes the characteristics and debugging methods of the parameters one by one:

ÿ PA15 (the debugging method of PA45 and PA48 is the same) speed loop proportional gain, the recommended debugging range is 50~600.

Increase the set value

Advantages: The speed overshoot and overshoot can be adjusted faster. The motor overshoot is reduced and the rigidity is enhanced.

Disadvantages: It is easy to cause vibration of the motor itself and resonance of the mechanical device, accompanied by vibrato caused by mechanical vibration.

Decrease the set value

Advantages: When the load inertia is large, the impact on the mechanical device is reduced.

Disadvantages: PA15 value is too small, speed overshoot increases, and it is easy to cause mechanical device vibration, producing dull and heavy vibration sound.

Load disturbance regulation is slow.

Adjustment tips:

Under the default parameters, you can modify them by 50 at a time to determine the approximate range, and then make fine adjustments.

ÿ PA16 (PA46, PA49 have the same debugging method) speed loop integral coefficient, recommended debugging range is 1~3000.

Advantages of increasing

the set value: faster response to speed command, stronger motor rigidity; Disadvantages: too large

a set value may easily cause vibration of the motor itself and resonance of the mechanical device, accompanied by vibrato caused by mechanical vibration. Advantages of decreasing the set

value: when the load

inertia is large, it is not easy to cause resonance and swing of the motor and mechanical device; Disadvantages: slow response to speed

command, easy to cause speed fluctuation when the load changes, and affect the surface finish of the workpiece. Adjustment tips Under the default parameters, you can modify 100 each time to

determine the

approximate range, and then make fine adjustments. ÿ PA18 speed feedback filter system, recommended debugging range 100 ~ 3000.

Advantages of increasing the set value: faster response to speed command, reduced motor speed overshoot.

Disadvantages: too large

a set value may easily cause resonance of the motor and mechanical device, accompanied by vibrato caused by

mechanical vibration.

Advantages of reducing

the set value: When the load inertia is large, it is not easy to cause resonance and swing of the motor and mechanical device. Disadvantages:

If the set value is too small, the speed fluctuation increases and even oscillation occurs.

Adjustment Tips

Under the default parameters, you can modify it by 100 at a time to determine the approximate range, and then make fine adjustments.

ÿ PA19 position loop proportional gain (PA23 debugging method is the same), recommended debugging range is 20ÿ100.

Advantages of increasing

the set value: the position loop rigidity is enhanced, the position following error is reduced, and the position overshoot is reduced.

Disadvantages: If the set value is too large, it is easy to cause resonance of the motor and mechanical device.

Advantages of reducing

the set value: When the load inertia is large, it is not easy to generate vibration during starting and stopping, and the impact on the mechanical device is small.

Disadvantages: If the set value is too small, the machine tool is prone to creeping, overcutting and other

phenomena.

Adjustment tips: Based on the default parameters of the motor, increase 10 (or decrease 10) for coarse adjustment, and then make fine adjustments until the motor runs smoothly. Summary: The

proportional gain and integral coefficient of the speed loop should be adjusted in the same proportion according to the specific servo motor and load conditions. In general,

The larger the load inertia, the smaller the setting value should be. Under the condition that the system does not produce oscillation, the two parameter values should be set as large as possible.

6.1.2 Debugging method for AC asynchronous spindle servo motor

Note: When the GR-L series products are adapted to AC asynchronous spindle motors, the parameter ranges in 6.1.1 of this chapter are no longer applicable. When debugging

the machine tool, the user must first confirm that the value of PA1 is consistent with the model code of the adapted motor. Otherwise, the motor must be adjusted according to Appendix A.

The corresponding model code calls out the default parameters of the motor.

The following describes the characteristics and debugging methods of the

parameters one by one. ÿ PA15 (the debugging method of PA45 and PA48 is the same) speed loop proportional gain, the recommended debugging range is 500~2000.

Advantages of increasing

the set value: speed up the adjustment of overshoot and overshoot. Reduce the motor overshoot and strengthen the rigidity. Disadvantages: easily

cause the vibration of the motor itself and the resonance of the mechanical device, accompanied by the vibration caused by mechanical vibration.

Reduce the set value

Advantages: When the load inertia is large, the impact on the mechanical device is reduced. Disadvantages:

When the PA15 value is small, the speed overshoot increases, which is easy to cause the mechanical device to oscillate and produce dull and heavy vibrations. In addition, the load disturbance

adjustment is slow. Adjustment tips Under the

default parameters,

you can modify 100 each time to determine the approximate range, and then make fine adjustments.

ÿ PA16 (PA46, PA49 have the same debugging method) speed loop integral coefficient, recommended debugging range is 1~1000.

Advantages of increasing

the set value: faster response to speed command and stronger motor rigidity. Disadvantages: too

large a set value can easily cause vibration of the motor itself and resonance of the mechanical device, accompanied by vibrato caused by mechanical vibration. Advantages of decreasing the set

value: when the load

inertia is large, it is not easy to cause resonance and swing of the motor and mechanical device. Disadvantages: slow response to speed

command, easy to cause speed fluctuation when the load changes, and affect the surface finish of the workpiece. Adjustment tips Under the default parameters, you can modify 20 each time to

determine the

appropriate range.

ÿ PA18 Speed feedback filter system, recommended debugging range is 100ÿ1000. Advantages of increasing the

set value: faster response

to speed command, reduced speed overshoot of the motor. Disadvantages: too large a set value can easily cause

resonance of the motor and mechanical device, accompanied by vibrato caused by mechanical vibration. Advantages of reducing the set value: when the load inertia is large,

it is not easy to cause

resonance and swing of the motor and mechanical device. Disadvantages: too small a set value can increase speed fluctuation and even

cause oscillation. Adjustment tips Under the default parameters, you can modify 50 each time to determine the

approximate range,

and then make fine adjustments. ÿ PA19 Position loop proportional gain (the same debugging method as PA23), recommended debugging

range is 20ÿ100.

Advantages of increasing

the set value: the position loop rigidity is enhanced, the position following error is reduced, and the position overshoot is reduced.

Disadvantages: If the set value is too large, it is easy to cause resonance of the motor and mechanical device.

Reduce the set value

Advantages: When the load inertia is large, it is not easy to generate vibration when starting and stopping, and the impact on the mechanical device is small.

Disadvantages: If the set value is too small, the machine tool is prone to creeping, overcutting, etc. Adjustment

tips: Based on the

default parameters of the motor, increase 10 (or decrease 10) for coarse adjustment, and then make fine adjustments until the motor runs smoothly.

Summary: The proportional gain and integral coefficient of the speed loop should be adjusted proportionally according to the specific servo motor and load conditions.

The larger the load inertia, the smaller the setting value should be. Under the condition that the system does not produce oscillation, the two parameter values should be set as large as possible.

6.1.3 Selection of three gains for closed-loop control

In different functional applications, the servo drive unit allows debugging of three different speed loop and position loop rigidities, as shown in the following table.

General Applications	Speed loop first proportional gain (PA15), first integral The time factor (PA16) is effective. The first proportional gain of the position loop (PA19) is effective.	Applicable to most general speed control Control and position control situation.	Speed ring has moderate rigidity
CNC system executes M29	Speed loop second proportional gain (PA45), second integral The time factor (PA46) is effective. The first proportional gain of the position loop (PA19) is effective.	CNC controlled spindle for rigid tapping situation (GAIN is valid).	Speed ring is more rigid
The CNC system executes M51. Before the motor orientation is completed	The third proportional gain of the speed loop (PA48), the third integral The time coefficient (PA49) is effective. The third proportional gain of the position loop (PA23) is effective.	CNC system controls the spindle servo motor The situation of the machine performing the directional function (OSTA valid).	The speed ring is weak
The CNC system executes M14. Before the motor orientation is completed	The third proportional gain of the speed loop (PA48), the third integral The time coefficient (PA49) is effective. The third proportional gain of the position loop (PA23) is effective.	CNC system controls the spindle servo motor Speed/position switching of the machine status (PSTI valid).	Speed ring has moderate rigidity

ÿDirectional application during speed/position switching

When the Cs axis performs speed/position switching, the spindle needs to be oriented first. At this time, the rigidity of the motor is consistent with the rigidity of the general speed control. When the inertia of the spindle is large or there is a large gap in the spindle transmission mechanism, the spindle after orientation is easy to When swing occurs, the rigidity of the motor needs to be reduced, especially the integral adjustment of the speed loop, to ensure that the motor is quickly and stably clamped at the reference point. When applying speed/position switching, execute M14 and enable parameters PA48, PA49, and PA23 to set weaker servo motor stiffness.

ÿ Application of rigid tapping

In machine tool processing, rigid tapping belongs to thread processing under position closed loop, which requires the servo motor to have high rigidity, respond quickly to instructions, and minimize position following error. Therefore, it is necessary to set a higher proportional gain of the servo drive unit speed loop during rigid tapping. Since high-rigidity motors are prone to oscillation at high speeds, the motors during rigid tapping generally operate at speeds below 2000 r/min. However, for general spindle processing, the motor generally runs at a higher speed, and the rigidity of the servo motor does not need to be very high. Therefore, general spindle processing requires a lower speed loop gain than rigid tapping processing. When the system starts rigid tapping, M29 is executed, and parameters PA45 and PA46 are enabled, and a higher servo motor rigidity can be set.

ÿ Application of directional function

Just like the speed/position switching process, when the spindle motor performs the orientation function, the rigidity of the motor is consistent with the rigidity of the general speed control. When the inertia of the spindle is large or there is a large gap in the spindle transmission mechanism, the oriented spindle is prone to swinging. At this time, it is necessary to reduce the rigidity of the motor, especially the integral adjustment of the speed loop, to ensure that the motor is quickly and stably clamped at a certain position. When the orientation function is applied, that is, M51 is executed and parameters PA48, PA49, and PA23 are enabled, a weaker servo motor rigidity can be set.

6.2 Position electronic gear ratio

The "electronic gear function" means that compared with the mechanical speed gear, when controlling, you don't need to consider the mechanical reduction ratio and encoder. The number of lines is a function that can set the motor movement amount corresponding to the input command to any value by adjusting the servo parameters.

With the improvement of the resolution of the adapted encoder, the software version V5.20 and later has expanded the setting range of the electronic gear ratio, adding PA33, PA34 two parameters.

Related parameters	name	unit	Parameter range default value application method		
PA29	Position pulse command multiplication factor 1		1ÿ32767	1	P
PA30	Position pulse command frequency division coefficient 1		1ÿ32767	1	P
PA33	Position pulse command multiplication factor 2		1ÿ32767	1	P
PA34	Position pulse command frequency division factor 2		1ÿ32767	1	P

The position electronic gear ratio is calculated as follows:

$$S\ddot{y}\ \frac{I}{d}\cdot\frac{CR}{CD}\cdot\frac{PA29\cdot PA33}{PA30\cdot PA34}\cdot\frac{L}{4C}\cdot\frac{ZD}{ZM}$$

That is, $G=\frac{PA29\cdot PA33}{PA30\cdot PA34}\ddot{y}\ \frac{4C}{L}\cdot\frac{ZM}{ZD}\cdot\frac{d}{I}\cdot\frac{CD}{CR}\cdot S$

G: Electronic gear ratio, recommended range is $\frac{1}{50}\ddot{y}\ G\ddot{y}\ 50$

C: Number of lines of the motor encoder; (Note: the numerator of the incremental encoder is 4C, and the numerator of the absolute encoder is C)

L: screw lead (mm);

ZM: Number of teeth on the screw end gear (applicable to the case with a reduction box);

ZD: number of teeth of the motor end gear;

ÿ: System minimum output command unit (mm/pulse);

I: command displacement (mm);

S: actual displacement (mm);

CR: CNC system command multiplication factor;

CD: CNC system command frequency division coefficient.

[Example]: The system on the machine tool is GSK988Tÿ, the motor is directly connected to the X-axis screw, the lead of the screw is 6mm, and the motor code

The electronic gear of the servo drive unit is calculated without considering the system's command frequency multiplication and division coefficients.

Compare?

In general, PA33 and PA34 are set to 1 by default, and only PA29 and PA30 need to be set.

When it is difficult to simplify, you can consider setting PA33 and PA34. In this question, PA33 and PA34 can be ignored and the default value is 1.

Solution: Because the motor is directly connected to the X axis, ZM:ZDÿ1; usually S = I, the command displacement is equal to the actual displacement;

When the GSK988T system selects 0.1 ÿ machining accuracy, the minimum output command unit of the X axis is

$d\ddot{y}\ \frac{0.0001}{2}$ mm/pulse, substituting into the formula:

$$G\ddot{y}\ \frac{PA29}{PA30}\ \ddot{y}\ \frac{C}{L}\cdot\frac{ZM}{ZD}\cdot\frac{d\,CD}{I\,CR}\cdot S\ddot{y}\ \frac{C}{L}\cdot d\ \ddot{y}\ \frac{2^{17}}{6}\times 0.00005\ \ddot{y}\ \frac{2048}{1875}$$

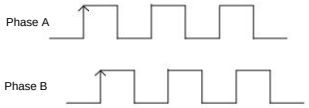
Then parameter PA29 is set to 2048 and PA30 is set to 1875.

6.3 Switching the motor rotation direction

ÿ Standard setting

1. When all parameters of the servo drive unit are set to default values;

2. The phase relationship between the A and B phase pulses of the motor encoder input signal (or the second position feedback input signal) is:



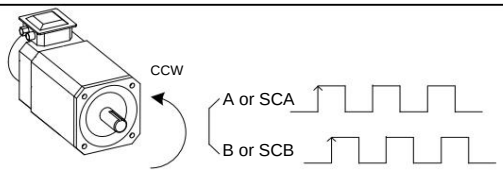
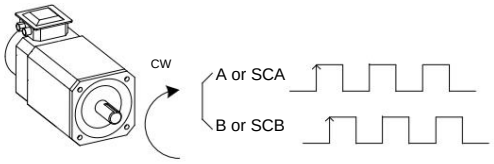
Then, for speed mode or position mode, the relationship between the command and the motor rotation direction conforms to the “standard setting”.

ÿ Reversal pattern

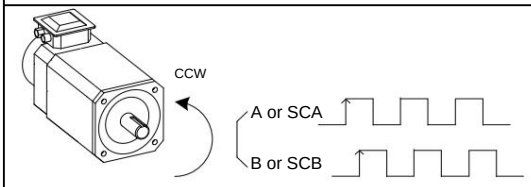
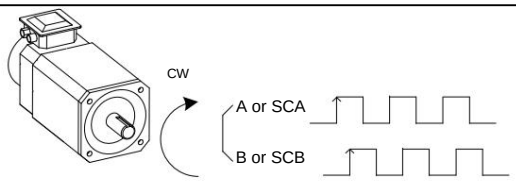
Without changing the servo motor wiring, the servo drive unit has a "reverse mode" that can reverse the direction of rotation of the servo motor.

Mode".

1. Location method

Related parameters	name	unit	Parameter range default value application method		
PA28	Position command direction inversion		0ÿ1	0	P
	Standard setting: PA28=0 maintains the original command direction		Reverse mode: PA28=1 input pulse command is reversed		
	 The LED shows that the motor speed is a positive value.		 The LED shows that the motor speed is a positive value.		

2. Speed mode

Related parameters	name	unit	Parameter range default value application method		
PA51	When the speed command is valid, the motor rotation direction is opposite		0ÿ1	0	S
	PA51ÿ0, the speed command is positive, the motor rotates CCW, the speed command is negative, the motor rotates CW. PA51ÿ1, the speed command is positive, the motor rotates CW, the speed command is negative, the motor rotates CCW.				
	Standard setting: PA51=0 maintains the original command direction		Reverse mode: PA51=1 input pulse command is reversed		
	 LED shows that the motor speed is positive		 LED shows that the motor speed is negative		

6.4 Friction compensation function

During the machining process of CNC machine tools, due to the effect of mechanical friction resistance, the actual cutting trajectory will appear when the feed axis starts and reverses.

The phenomenon of lagging behind the instruction greatly will cause certain convex or concave marks (typically quadrant marks on the spherical surface) on the surface of the processed workpiece.

To improve this processing lag phenomenon, the servo drive unit provides a friction compensation function.

In order to set the friction compensation function conveniently and quickly, it is recommended to prioritize low-speed compensation. Only when the compensation effect is not good can you compensate at low speed.

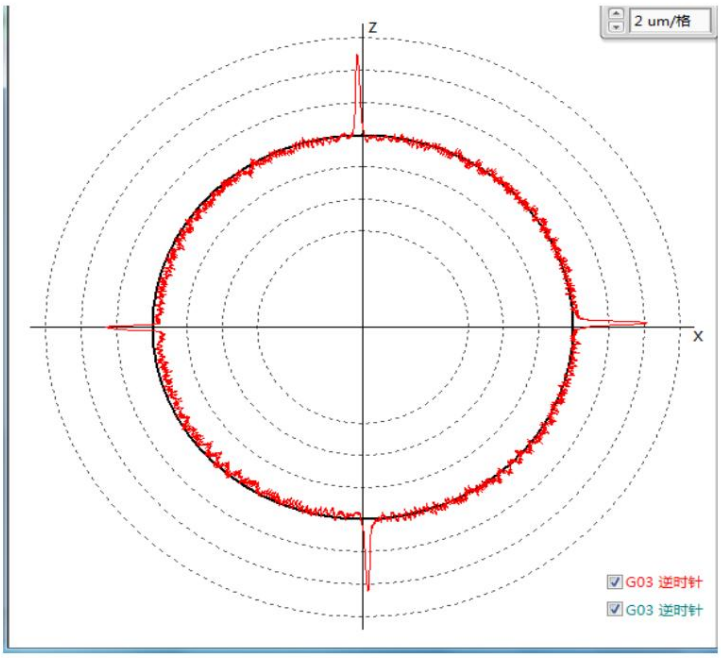
Reverse acceleration compensation or static friction compensation is performed based on the above.

6.4.1 Low speed compensation

The low speed compensation function is a function to improve the hysteresis caused by mechanical friction resistance and compensate for the acceleration characteristics of the motor at low speed.

Related parameters	name	Unit parameter range default value application method			
PA42	Low speed function characteristic speed	0.1 r/min	0ÿ5000	50	P
	When the low speed compensation function is turned on, PA42 can be adjusted according to the machining trajectory graph collected by the CNC system. Generally speaking, PA42 does not require adjustment.				
PA43	Low speed compensation factor	/	1ÿ5000	300	P
	When PA43=0, the low speed compensation function is turned off. When PA43 is non-zero, the friction compensation function is enabled. After enabling this function, it is generally recommended to set the PA43 value to 100. If vibration occurs, you can increase the value by 20 at a time. Note: A setting that is too large may cause the motor to vibrate!				

Figure 6-2 An example of the data waveform collected during the plane circle operation. The protrusions at the four quadrant crossing points due to motor lag are relatively large, about 4.96 um.

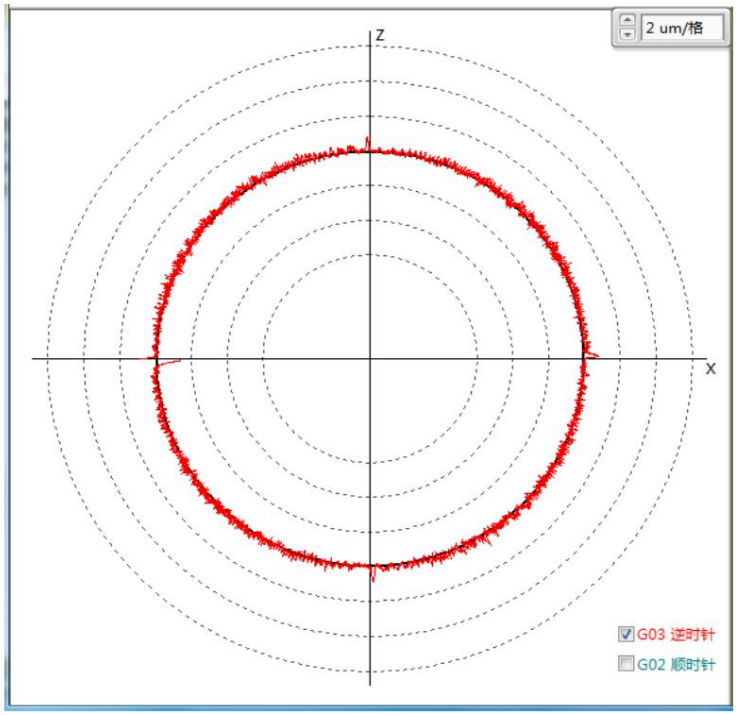


Note: PA42=50, PA43=0.

Figure 6-2 Waveform of data collected when the plane is circular

Turn on the reverse acceleration compensation function, the default is PA42=50, after setting PA43=100, the test data waveform is as shown in Figure 6-3, the quadrant

The bulge at the point is suppressed, the bulge is about 0.9um, and the compensation effect is obvious.



Note: PA42=50, PA43=100.

Figure 6-3 Test data waveform

Note: If the reverse acceleration compensation is insufficient, it is recommended to increase it gradually by less than 10% based on PA43=100 to avoid

The machine tool vibrates due to the parameter setting being too large. Similarly, when the compensation is excessive, please gradually reduce it by less than 10%.

6.4.2 Reverse acceleration compensation

The reverse acceleration compensation function is to improve the lag caused by the reverse operation of the machine tool feed axis and compensate for the acceleration characteristics of the motor during reversing.

Compensation function.

Related parameters	name	unit	Parameter range	default value	application method
PA135	Reverse acceleration compensation gain	%	1~5000	20	P
	When the reverse acceleration compensation function is turned on, PA135 is adjusted according to the convexity of the cutting arc passing through the quadrant. Generally speaking, when the protrusion of the quadrant mark is obvious, you can increase it by 10 based on the default value and then see the processing effect. It can continue to grow. When the quadrant mark is more concave, it can be reduced by 10 each time.				
PA136	Reverse acceleration compensation time		1~5000	100	P
	When PA136=0, the reverse acceleration compensation function is turned off. When PA136 is non-zero, the reverse acceleration compensation function is enabled. After enabling this function, it is generally recommended to set the value of PA136 to 100, and then Adjust PA136 according to the convexity of the cutting arc passing through the quadrant. Generally, it is recommended to increase or decrease the value by 10 each time.				

6.4.3 Static Friction Compensation

The static friction compensation function is to improve the lag caused by the large static friction when the motor starts, and to accelerate the motor when starting.

Characteristics to compensate for the function.

Related parameters	name	Unit parameter range default value application method			
PA132	Static friction compensation gain	0.01r/min	1ÿ5000	20	P
	When the static friction compensation function is turned on, adjust PA132 according to the concave and convex marks of the cutting edge of the workpiece. Generally speaking, if the concave and convex marks on the cutting edge are obvious, you can increase the value by 10 based on the default value and then see the processing effect. The concave and convex marks can continue to increase.				
PA133	Static friction compensation time	2 ms	1ÿ5000	0	P
	When PA133=0, the static friction compensation function is turned off. When PA133 is non-zero, the static friction compensation function is turned on. After turning on this function, it is generally recommended to set the value of PA133 to 50, and then Adjust PA133 according to the concave and convex marks of the cutting edge of the workpiece. Generally, it is recommended to increase it by 10 each time.				

6.5 Application of brake release signal

In order to lock the vertical or tilted workbench connected to the motor shaft to prevent the workbench from falling after the servo alarm or power loss, it is usually used Servo motors with power-off brakes are called brake motors. To effectively control the movement of brake motors, this servo drive unit provides brake release. signal (HOLD).

The power-off brake can only be used to hold the workbench and must never be used to slow down or force stop the machine movement.

ÿ First, refer to Figure 6-3 to make the correct wiring. Note that the necessary input signals in the table below must be connected.

Pin Number	Input signal	Function
CN1	HOLD1	Brake release signal. (valid when PA2=0)
	HOLD2	

Figure 6-4 is the wiring principle of the actual application of the brake release signal to control the brake motor. In Figure 6-4, the 24V power supply is provided by the user. The gate release signal (HOLD) is the normally open contact output of the relay. For wiring, refer to Figure 6-4.

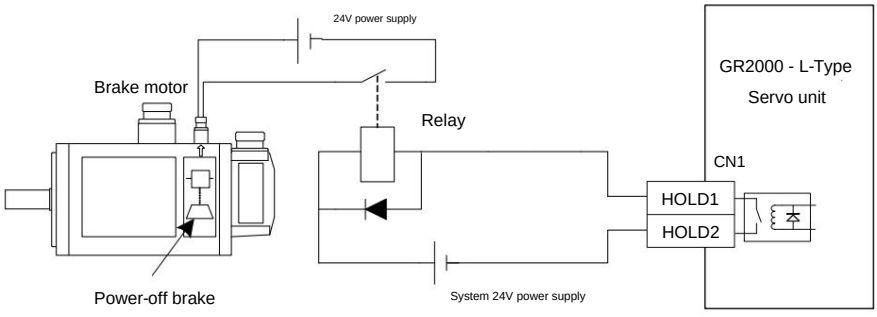


Figure 6-4 Typical example of HOLD brake release signal

Different power motors have different power of power loss brake. When selecting 24V switching power supply, please refer to the following table.

The technical parameters of brakes for motors of different specifications are listed.

Motor frame number	Rated torque	Supply voltage	20ÿ Brake power release time	
80	3.2 N·m	DC(0.9ÿ1.1)24V	15W	0.037s
110	4 N·m	DC(0.9ÿ1.1)24V	20W	0.037s
130	12 N·m	DC(0.9ÿ1.1)24V	30W	0.042s
175 (motor rated torque 12 N·mÿ 22 N·mÿ	23 N·m	DC(0.9ÿ1.1)24V	40W	0.135s
175 (motor rated torque 30 N·mÿ 38 N·mÿ	46 N·m	DC(0.9ÿ1.1)24V	50W	0.135s

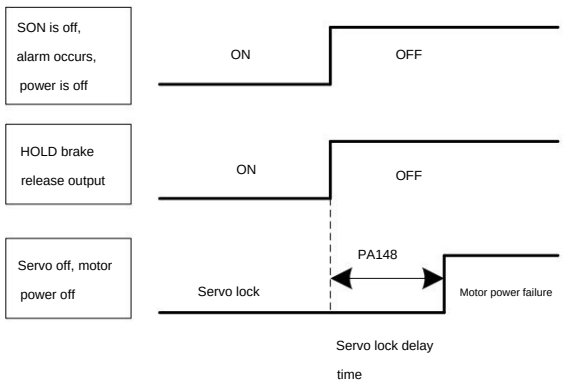
ÿ After confirming the correct connection, turn on the power and then set the necessary parameters. Considering the timing relationship of the HOLD signal, if the machine

If the workbench moves slightly due to gravity, etc., use the following parameters related to the brake action to adjust the time.

all.

Related parameters	name	unit	Parameter range	Default value	application mode
PA147	Allow the motor to operate before the power-off brake is activated Maximum deceleration time	ms	0ÿ30000	30/14000	PÿS
PA148 Servo lock delay time		ms	0ÿ30000	100/0	PÿS
PA149 Motor speed when power-off brake is activated		rpm	0ÿ300	30/10	PÿS

Case 1: When the motor is stationary, the power supply of the servo drive unit is suddenly turned off.



In general, when HOLD is turned off, the servo drive unit is turned off at the same time.

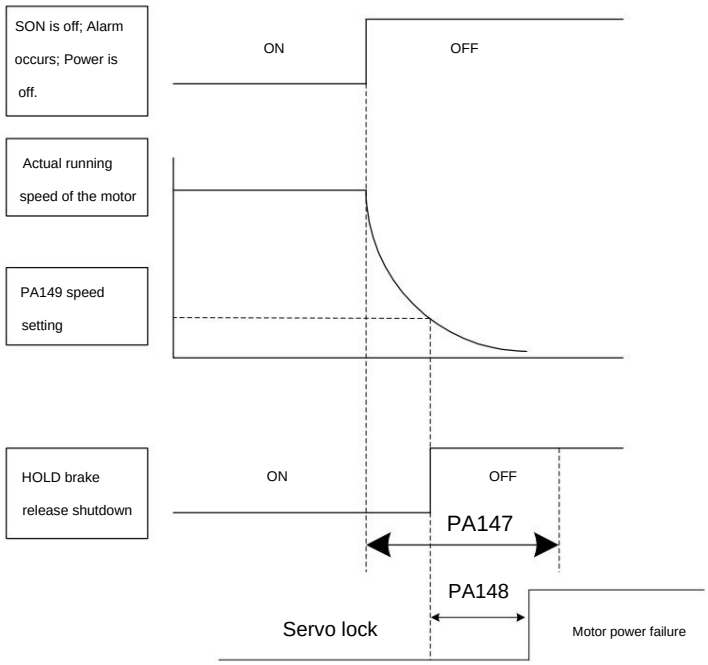
When the servo drive unit moves in a small amount, the PA148 can be adjusted to delay the servo drive unit shut down to avoid small amount of movement.

When the servo drive unit is powered off, the energy will be released through the dynamic braking circuit in a short time.

When the load inertia is large, the actual servo lock delay time will not exceed the energy release time. The energy release time is related to the load inertia.

In other words, it is related to the deceleration time of the motor.

Case 2: The servo drive unit is suddenly shut down while the motor is running.



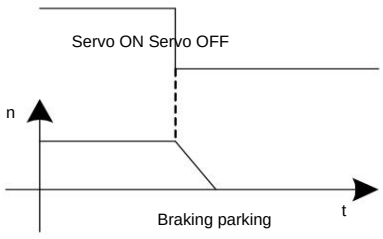
When the servo drive motor is moving at high speed, the brake cannot be engaged suddenly, otherwise the brake may be damaged. It must be engaged at an appropriate time. Cut off the HOLD brake release signal. Reasonable adjustment of PA147 and PA149 can make the motor decelerate first and then brake. PA149 is recommended Set to 30 r/min. The setting of PA147 needs to be set to an appropriate value according to the actual mechanical action.

6.6 Motor parking mode

ÿ Braking and stopping

Braking stop is a common stopping method for servo drive units. On the one hand, the energy generated by the motor stopping process is dissipated through the braking resistor. On the other hand, the servo drive unit applies reverse torque to the motor, causing the motor to stop quickly in a very short time.

Depends on the PA58 settings.

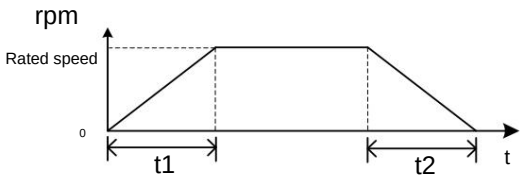


Related parameters	name	Parameter range	Default value application mode	
ÿPA57	linear acceleration time constant	0ÿ30000	0/100	S
ÿPA58	linear deceleration time constant	0ÿ30000	0/300	S

The acceleration and deceleration time constants are only valid in speed mode.

PA57 sets the time required for the motor to accelerate from zero speed to 1500 r/min, as shown in t1 in the figure;

PA58 sets the time required for the motor to decelerate from 1500 r/min to zero speed, as shown in t2 in the figure.



Actual motor acceleration time = command speed/1500r/min×PA57;

Actual motor deceleration time = command speed/1500r/min×PA58;

Note: The actual acceleration/deceleration time is limited by the maximum acceleration/deceleration capacity of the servo drive unit. If PA57 and PA58 are set too small, braking may occur.

If the brake cannot be applied during the vehicle operation, the total acceleration/deceleration time will be greater than the set time.

6.7 Spindle clamping interlock signal

At present, some CNC lathes are equipped with mechanical clamping devices on the spindle to realize drilling, tapping and other processing on the outer cylindrical surface of the workpiece. The mechanical clamping device and the spindle motor torque are used to ensure the machining accuracy and stability.

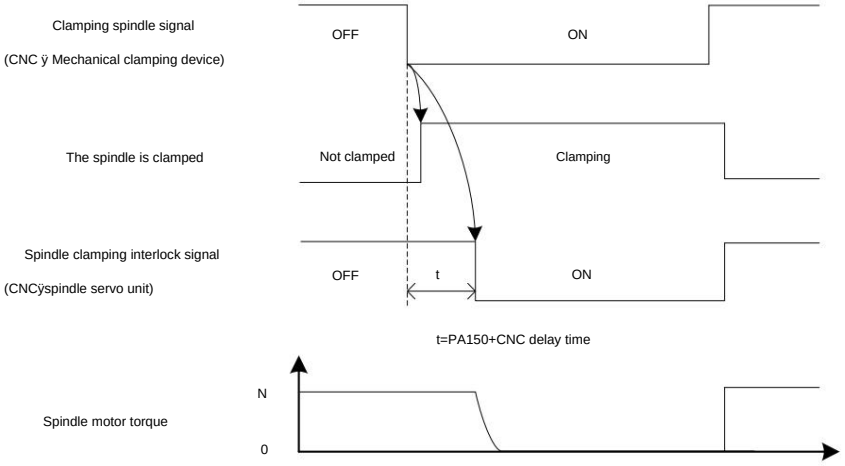
When the CNC system controls the mechanical clamping device to clamp the spindle, it needs to control the servo drive unit to reduce the motor torque at the same time. For GR-L series servo drive units, the function of reducing the motor torque can be achieved by controlling the spindle clamping interlock signal (BREF).

Description: The spindle clamping interlock signal (BREF) is specified in the communication protocol.

Related parameters	name	unit	Parameter range	default value	application method
PA150	Spindle clamping interlock delay time	ms	0ÿ32000	100	SÿP
	After the mechanical clamping device on the spindle side is set to clamp the spindle, the delay time of reducing the motor torque is reduced.				

Normally, PA150 is set to 100. The purpose of this delay time is to ensure that the spindle is fully clamped by the mechanical device before The motor torque can be reduced so that the position of the spindle does not shift during the clamping process.

The figure below is a timing diagram of CNC controlled spindle clamping.



When the workpiece is processed and the spindle clamping device is released, the BREF signal must be set to OFF and the spindle will re-enter the positioning mode.

The current position of the spindle is still the position when the spindle was clamped. If the spindle position is slightly offset when the mechanical clamping device is released, the BREF

After turning OFF, the spindle position will be pulled back to the position when the spindle was clamped.

6.8 Spindle Orientation Function

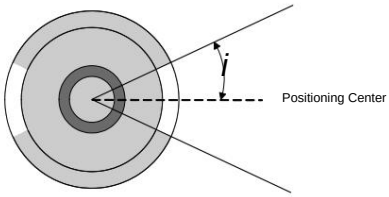
Orientation function: In order to change and measure the tool, according to the position feedback signal of the motor encoder or the second position encoder, it can quickly and accurately adjust the tool.

The function of accurately orienting and maintaining the pre-stop position (the stop position of the motor shaft or the stop position of the spindle) is called the orientation function.

Orientation accuracy: When the orientation axis is orienting, the maximum orientation angle deviation ÿ is used to express the orientation accuracy, as shown in the following formula.

Formula 1:

$$i \quad \frac{360^{\circ}}{4C} \quad \frac{90^{\circ}}{C}$$



Then the orientation accuracy is ±ÿ.

C: Number of lines of position feedback encoder;

4C: The number of directional encoder pulses after 4 times the frequency.

Therefore, when a 1024-line incremental encoder is selected, the orientation accuracy is ±0.088°.

In actual orientation, due to the influence of mechanical transmission error, the orientation error is generally ±2ÿ.

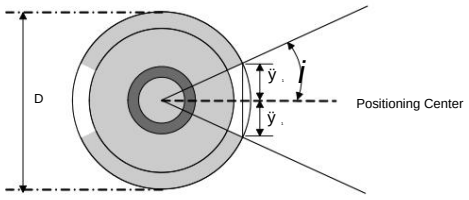
In orientation applications, the length of the workpiece arc or the chord length of the arc can also be used to indicate the orientation accuracy.

On milling machines, the machining center and the spindle are aligned. The orientation accuracy is not only related to the number of lines of the motor (or spindle) encoder, but also to the

It is related to the diameter of the orientation circle as shown in the following formula:

Formula 2:

$$\ddot{y}_1 = \frac{D}{2} \sin \frac{90^{\circ}}{C}$$



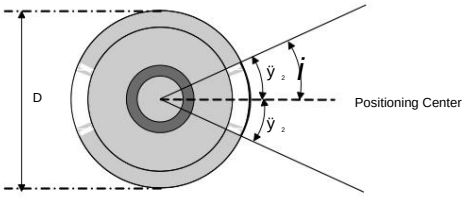
WITH D: Orientation circle diameter;

ÿ1: The orientation accuracy is expressed by the chord length on the orientation circle.

It can also be calculated using the following formula:

Formula 3: $\ddot{y}_2 = \frac{\ddot{y} D}{4 C}$

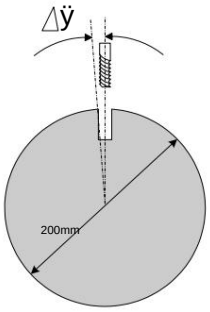
ÿ2: The orientation accuracy is expressed by the arc length on the orientation circle.



From formulas 2 and 3, we know that the orientation accuracy of the servo drive unit can be described as being accurate to ±ÿ1, or accurate to ±ÿ2.

Example:

As shown in the figure on the right, drilling is performed on the outer circle of a circular workpiece with a diameter of 200 mm.



The orientation deviation of the hole is no more than 50ÿm. Calculate how many lines of encoder should be selected to meet the requirement.

Require?

We choose to calculate by arc length, which should meet the requirement of no more than 50ÿm.

The unit must ensure $\Delta\ddot{y}$ ÿ25ÿm From formula 3:

$$\Rightarrow C \ddot{y} \frac{\ddot{y} D}{4 \Delta\ddot{y}}$$

$$\Delta\ddot{y} \ddot{y} \frac{\ddot{y} D}{4 C}$$

Then: C ÿ 6280

Therefore, to ensure that the drilling position deviation is no more than 50ÿm, the selected encoder line number should be greater than or equal to 6280.

The orientation function of the GR-L series AC servo drive unit is divided into the following two operations according to the different position feedback inputs:

1. Using the incremental motor encoder (input from **CN2)** as the orientation position feedback input, the orientation operation flow is as follows.

ÿ After power on, call up the monitoring menu dP-APo , button display E □□□□ , symbol 'E' represents the motor shaft

The orientation position is uncertain and its value cannot be used as a reference value for orientation position.

ÿ Make the motor shaft rotate for at least one circle. After the servo drive unit detects the Z pulse signal of the motor encoder, it displays a positive signal.

Exact location, dP-APo The value becomes H □□□□ , indicating that the currently displayed encoder position is correct.

Let the motor rotate one circle. You can rotate the shaft manually when the motor is not enabled, or you can give a low-speed command to rotate the shaft.

ÿ Make sure the servo drive unit is enabled and slowly adjust the motor shaft or the connected spindle to the predetermined orientation point.

After dP-APo The displayed position is written into parameter PA103 and recorded dP-APo. The displayed position, write the parameter recording number PA104, save these two parameter values and they are directional position 1.

ÿ The CNC system executes M51 (directional start), and the system sends an enable signal to the servo drive unit via the GSK-Link bus.

(SON), directional start (OSTA) command, the motor first runs at the directional speed set by PA99, and then finds the directional

After reaching the point position, it will immediately remain in the orientation position, and the servo drive unit will send an orientation completion signal to the CNC system.

ÿCOINÿÿ

ÿ After receiving COIN, the CNC system will implement other operations such as tool change. During the tool change process, the directional start signal (OSTA)

It must remain ON and the signal must be canceled after the operation is completed before other operations can be performed.

1. To ensure the position accuracy of the orientation operation, the motor encoder is used as the feedback signal of the orientation position, which is only applicable to the motor shaft.
When the transmission ratio with the machine tool spindle is 1:1;

2. For machines where the transmission ratio between the motor shaft and the machine tool spindle is not 1:1, a second gear with a transmission ratio of 1:1 must be installed on the machine tool spindle side.
The second position encoder ensures that the spindle rotates one circle and the encoder feeds back a unique Z pulse signal.

2. The operation flow of using the second position input signal (input from **CN3)** as the directional position feedback input is similar to the above operation, except

Except for the first three steps, the remaining steps are the same. The first three steps are as follows.

ÿ After power on, call up the monitoring menu dP-SPo , button display E □□□□ , the symbol 'E' indicates that the spindle is in
The value of an uncertain orientation position cannot be used as an orientation position reference value.

ÿ Make the spindle rotate at least one circle, the servo drive unit will automatically find the correct position of the second position encoder.

After confirming the location, dP-SPo The value becomes F □□□□ , indicating that the current encoder position is correct.

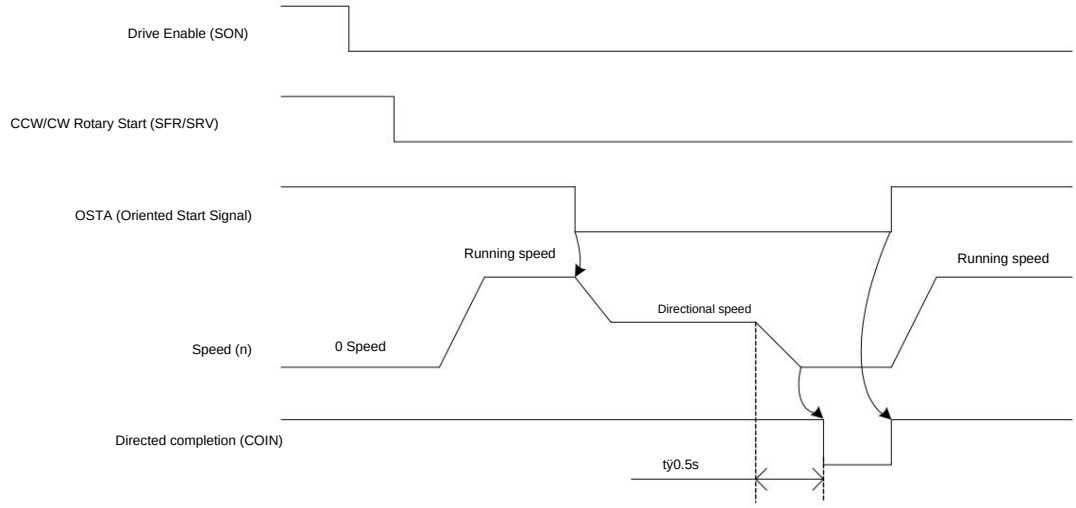
ÿ Make sure the servo drive unit is enabled, slowly adjust the spindle to the orientation point, and then record dP-SPo show
The position is written into parameter PA103 and then saved. This parameter value is orientation position 1.

ÿ Repeat steps 4 to 5 of the orientation operation using the motor encoder to complete the orientation.

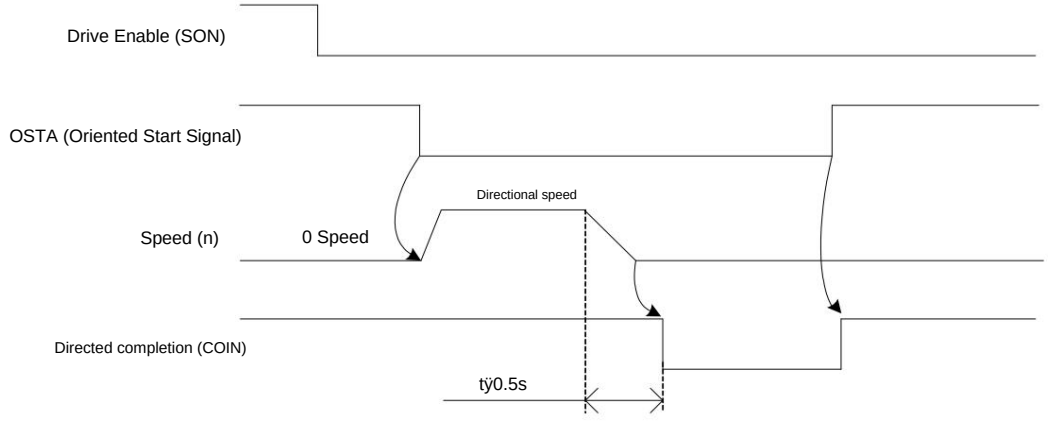
If the spindle keeps rotating and the Z pulse cannot be detected during orientation, resulting in orientation failure, it may be the second position encoder
If the phase relationship between SCA and SCB pulses is reversed, you can modify the value of PA101, save it, and then power on again to complete the orientation.

The timing diagram of the entire orientation process is as follows.

ÿ Spindle orientation sequence A (motor is in motion)

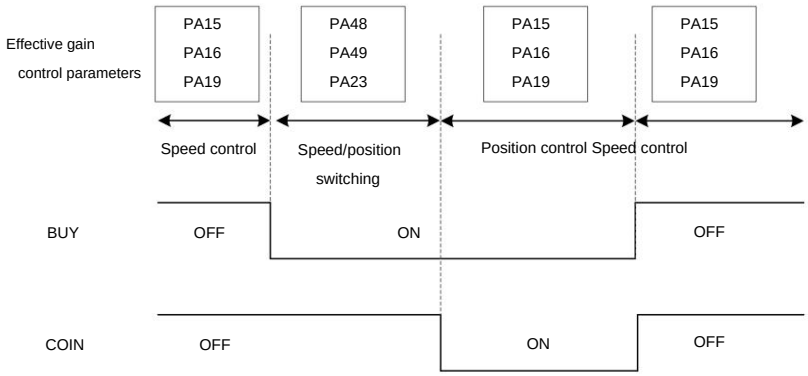


ÿ Spindle orientation sequence B (motor is in free or zero speed)



Related parameters	name	unit	Parameter range	Default value	application mode
PA23	Position loop third proportional gain		10ÿ1000	40	P
PA48	Speed loop third proportional gain	Hz	10ÿ3000	200/800	S
PA49	Speed loop third integral time constant		1ÿ3000	100/200	S

The orientation process uses the first velocity loop gain (PA15, PA16), the first position loop gain (PA19), and the third velocity loop gain (PA48, PA49), the third position loop gain (PA23).

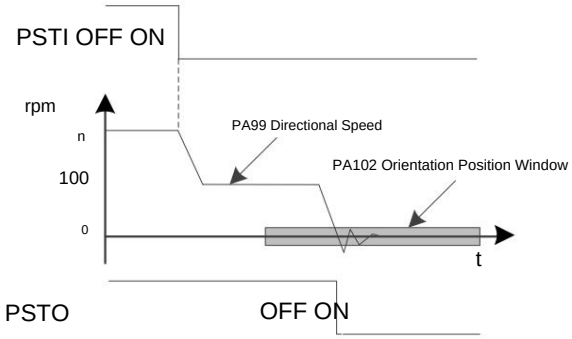


Therefore, if the spindle swings during orientation, the values of PA48, PA49, and PA23 need to be reduced proportionally to eliminate the swing.

ÿPA96	Second position encoder type selection		0ÿ320	0	P/S

Encoder model	Encoder protocol encoder single turn data		PA96/PA200 Setting Value
Incremental TTL	Incremental TTL	128ÿ32767	0
Incremental TTL grating ruler	Incremental TTL	/	50
A4I/ A4 (spindle)	BISS-B Protocol	131072	14
A7 I		16777216	71
A9 I		33554432	71
A4 II	Tamagawa Agreement	131072	4
6		8388608	2
A9 II		33554432	1
Tamagawa magnetic resistance 128 teeth		128*16384	8
Tamagawa magnetic resistance 256 teeth		256*16384	9
Tamagawa magnetic resistance 384 teeth		384 16384	7
Tamagawa magnetic resistance 512 teeth		512*16384	10
A7	Nikon Agreement	16777216	64
A5 (spindle)	BISS-C Protocol	2097152	79
Renishaw 26 bit BISS-C		67108864	80
Fagor 26-bit BISS-C linear scale		/	81
A9 Heidenhain 25 digit	ENDAT2.2 Protocol	33554432	51
Heidenhain rotary grating/grating ruler		/	

Related parameters	name	unit	Parameter range default value application method		
ÿPA96	Second position encoder type selection		0ÿ320	0	P/S
	SinCos162 teeth	Sin and cosine Control Panel V2.27ÿ V2.30ÿ	Sin-Cos subdivision	162*16384	55
	SinCos256 teeth			256*16384	19
	SinCos384 teeth			384*16384	11
	SinCos512 teeth			512*16384	12
	SinCos1024 teeth			1024*163 4	56
	SinCos 2048 teeth			20 8*16384	57
ÿPA97	Position feedback input signal selection		0ÿ2	1	P/S
	PA97=0, select the second position input signal as the position feedback input signal. At this time, CN3 is not connected to the second position encoder feedback signal. The servo drive unit will have an Err-24 or Err-53 fault. PA97=1, select the motor encoder signal as the position feedback input signal; PA97=2, select the external induction switch signal as the reference point signal of the orientation function. Note: This parameter will take effect only after power is turned on again after the modification is successful.				
PA98	Second position encoder line number		10ÿ30000	1024	P/S
	Set the line number of the second position encoder, which is effective when adapting to the incremental encoder.				
PA99	Directional speed	rpm	10ÿ1000	100	S
	When the spindle motor is oriented, it first rotates at the orientation speed. When the servo drive unit captures the encoder Z pulse, the spindle motor rotates and stops accurately. Directional location.				
PA100	Direction selection		0ÿ2	0	S
	When PA100=0, the orientation speed is in CCW direction when the motor starts rotating in CCW direction, and the orientation speed is in CW direction when the motor starts rotating in CW direction. PA100ÿ1, no matter what the running direction of the motor is, the motor is oriented at CCW orientation speed. PA100=2, no matter what the running direction of the motor is, the motor is oriented at CW orientation speed.				
ÿPA101	The second position feedback input signal is inverted		0ÿ1	0	P/S
	PA101=0: maintain the original phase relationship of the second position input signal SCA, SCB pulses. PA101ÿ1: The phase relationship between SCA and SCB is reversed.				

<table>
<tr><th>Related parameters</th><th>name</th><th>unit</th><th>Parameter range</th><th>Default value</th><th>application mode</th></tr>
<tr><td rowspan="2">PA102</td><td>Orientation Position Window</td><td>pulse</td><td>0ÿ1000</td><td>18</td><td>S</td></tr>
<tr><td colspan="5">After the speed/position switching is started, the servo drive unit enters the position loop control, and the motor shaft (or spindle) first searches and
The motor stops precisely at the reference point. Since the position loop performs closed-loop adjustment on the deflection angle of the motor shaft, the motor will vibrate slightly when it stops.
When the deviation of the machine jitter is within the orientation window, the orientation is considered to be completed and the PSIO switching completion signal is valid.
 

If the setting value is too small, it may cause orientation failure.</td></tr>
<tr><td>PA103 directional position low</td><td></td><td>0ÿ9999</td><td>0</td><td>S</td></tr>
<tr><td rowspan="2">PA104</td><td>Directional position high</td><td>×10000</td><td>0ÿ30000</td><td>0</td><td>S</td></tr>
<tr><td colspan="5">Set four directional positions. If the directional position value does not exceed the number of digits in the low directional position, there is no need to set the high directional position.
The low position of the orientation position for orientation according to the motor encoder signal is set according to DP-APO, and the high position of the orientation position is set according to DP-APO.
Setting; the low position of the orientation position according to the second position encoder signal is set according to DP-SPO, and the high position of the orientation position is set according to
DP-SPO. Make settings.</td></tr>
</table>

Note: For parameters with 'ÿ' before the parameter number, you need to save the modified parameter value and restart the power to make it effective.

6.9 Speed/position switching function (CS axis function)

The Cs axis function means that a certain axis of the CNC machine tool can be controlled in both speed and position.
The function of interpolation operation with other feed axes is available. For example, the spindle of a turning center has such a function.

Speed/position switching function: When the servo drive unit is in speed control mode, after the CNC system executes M14, the servo drive unit executes
The servo motor is driven to the reference point first, and the system can control the position of the servo drive unit.
It switches from position mode to speed mode.

The speed/position switching process is basically the same as the orientation process, and the debugging method and related parameters are also the same. The difference is the orientation function
The reference points for the orientation position and speed/position switching are set by different parameters.

Basic debugging operation:

Step 1	CNC system executes command M14 The servo drive unit is required to Speed mode switches to position Way.	The system sends SON and PSTI input instructions to the servo drive unit via the GSK-Link bus. make. This instruction can be monitored in dL-in. (See Section 3.3.6 for details)

Key Points

1. PA88 is set to 0 by default. Each time the speed/position is switched, the servo stops at the reference point (PA90+PA91). If PA88 is set to 1, the servo stops at the reference point (PA90+PA91).
After the servo drive unit is powered on, after the first speed/position switching is performed, the servo motor is driven to stop at the reference point (PA90+PA91).
When speed/position switching is performed in the future, the reference point will no longer be found and the servo motor will stop immediately; if PA88=2 is set, it will never be driven.
The servo motor finds the reference point, and once the servo drive unit is controlled to switch the speed/position, the servo motor stops immediately.
2. dL-in is the I/O information in the communication, and the debugger can verify the PLC signal of the CNC based on this information.

Related parameters	name	unit	Parameter range default value	application method	
PA88	Speed position switching mode selection		0ÿ2	0	P/S
	0: After switching from speed mode to position mode, stop exactly at the reference point position (PA90+PA91); 1: After the servo drive unit is powered on, it stops at the reference point (PA90+PA91) after the first speed/position switch. When switching, the servo motor stops immediately without finding the reference point. 2: After switching from speed mode to position mode, the reference point is not found. Once the servo drive unit is controlled to switch speed/position, the servo motor Stop immediately.				
PA90 speed/position mode positioning low position			0ÿ9999	0	P
PA91	Speed/position mode positioning position high		0ÿ30000	0	P
	The reference point position parameter when speed/position switching occurs. When the encoder line number is less than or equal to 2500, PA90 sets the reference point position. When the number of sensor lines is greater than 2500, PA90 sets the lower 4 bits of the reference point position, and PA91 sets the upper 5 bits of the reference point position.				

Step 2	The servo drive unit receives SON, PSTI input instructions Then start the switch.	1. In speed mode, the spindle first rotates at the speed set by PA99; 2. Once the servo drive unit detects the Z pulse, the servo drive unit will The reference point position set by PA90+PA91 is accurate stop; 3. After the motor stops accurately, the servo drive unit sends a signal to the system via the GSK-Link bus. PSTO switching completion signal, speed/position switching is completed.

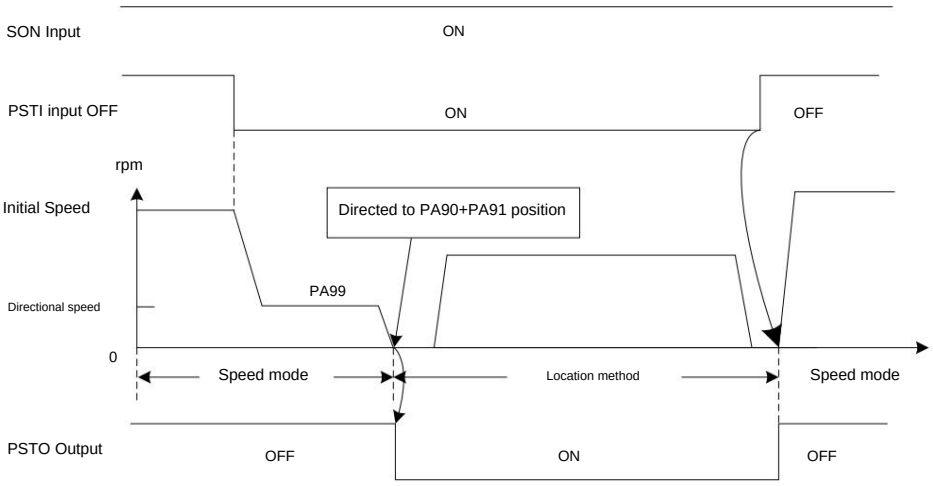
Key Points

1. PA99 sets an absolute value. If you need to change the direction of the motor speed when finding the reference point, you can set PA100 to make a selection.
2. After the motor rotates at the speed set by PA99, if the Z pulse cannot be found, the servo drive unit will display Err-25 after 10 seconds.
Alert to failure.
3. During the speed/position switching process, whether the Z pulse required for orientation is taken from CN2 or CN3 is set by the value of PA97.
4. When the transmission ratio between the spindle and the motor shaft is not 1:1, a second position encoder with a 1:1 transmission ratio with the spindle must be installed.
5. For large inertia loads, the spindle often swings when the speed/position is switched. In this case, the servo drive unit needs to be adjusted.
parameters to reduce the rigidity of the motor during the switching process and eliminate the swing during orientation.

Step 3	CNC system executes command M15 The servo drive unit is required to Switch from position mode to speed mode Way.	1. The system executes M15, which cancels the PSTI signal. As the PSTO signal disappears, the servo The service drive unit returns to speed mode; 2. If the system only cancels SON but does not cancel PSTI, the motor is in a free state. When the SON signal is valid, the servo motor still re-orients itself to the reference point and enters Location mode.

The following figure is a speed/position switching timing diagram. When SON and PSTI are ON, the servo drive unit switches to the orientation function (reference point is

The specific switching process is as follows:

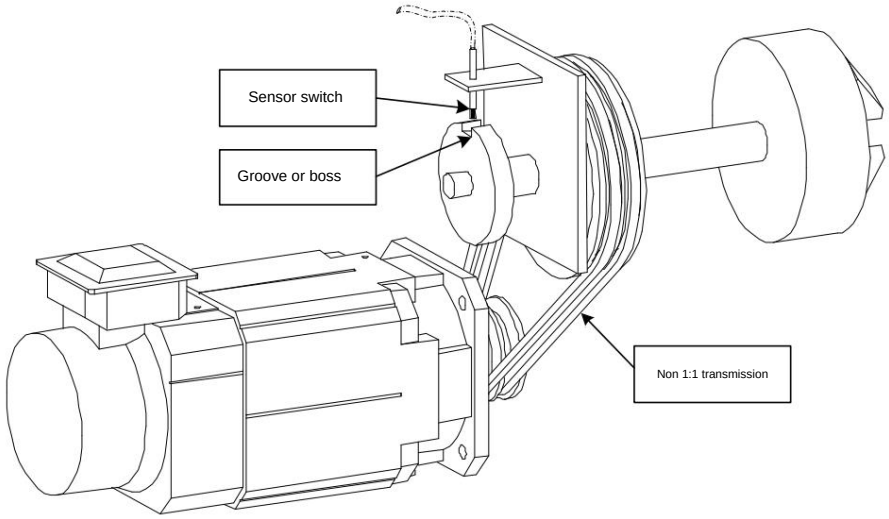


6.10 Directional function of induction switch

As shown in the figure below, for a machine tool spindle with non-1:1 transmission, when the spindle orientation accuracy requirement is not high, an induction switch can be installed on the spindle.

The induction switch is used to replace the spindle encoder, and the signal of the induction switch is used as the reference point signal for orientation to perform spindle orientation or speed/position switching functions.

In this way, higher-precision position control functions can be achieved at reduced costs.



1. Directional function of induction switch:

As shown in the figure below: The output signal of the induction switch (three-wire type) is connected to SEC2 (CN8-12) as the reference point signal for spindle orientation.

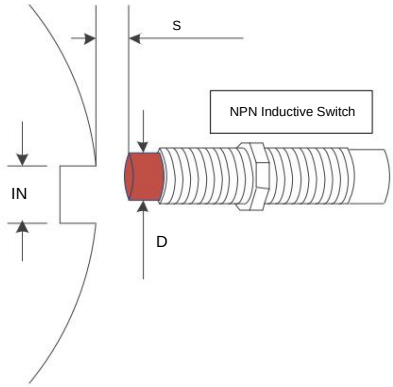
For the induction switch, please select an NPN type high-speed proximity switch with an external 24V power supply.

Sensing distance S: 2 mm ~ 3 mm.

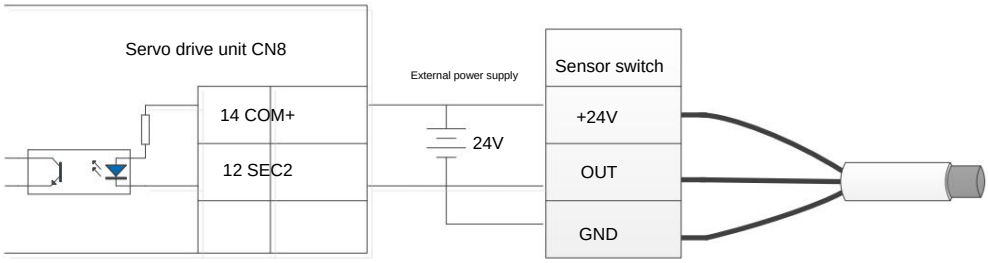
Width W of the sensing metal groove or boss: greater than the sensing surface width, the shape is the most

Preferably square.

Induction frequency: recommended to be greater than 1KHz.

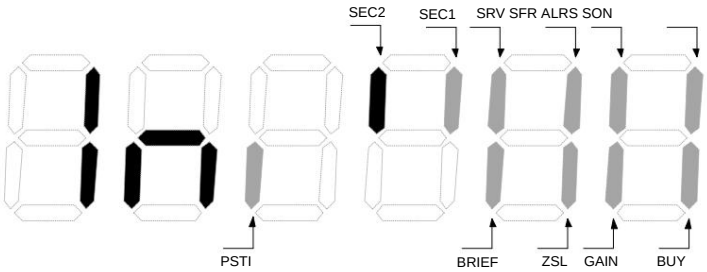


The wiring principle is shown in the figure below.



When the SEC2 input is valid, the “dL-In” monitoring window shows that the signal is on.

Debug this function easily.



Related parameters	name	Unit parameter range default value application method			
PA97	Position feedback input signal selection		0ÿ2	1	P/S
	PA97=0, select the second position input signal as the position feedback input signal. At this time, CN3 is not connected to the second position encoder feedback. If the servo drive unit fails to detect the fault, an Er-24 fault will occur. PA97=1, select the motor encoder signal as the position feedback input signal; PA97=2, select the external induction switch signal as the reference point signal of the orientation function. Note: This parameter will take effect only after power is turned on again after successful modification.				
PA99	Directional speed	rpm	10ÿ1000	100	S
	When the spindle motor is oriented, it first rotates at the orientation speed. When the servo drive unit captures the encoder Z pulse, the spindle motor rotates and Stop exactly at the directional position.				
PA100	Direction selection		0ÿ2	0	S
	PA100ÿ0, when the motor starts with CCW rotation, the orientation speed is CCW direction, and when the motor starts with CW rotation, the orientation speed is CW direction. Towards. PA100ÿ1, no matter what the running direction of the motor is, the motor is oriented at CCW orientation speed. PA100=2, no matter what the running direction of the motor is, the motor is oriented at CW orientation speed.				

Related parameters	name	Unit parameter range default value application method			
PA103 Orientation position 1 Low			0ÿ9999	0	S
PA104	Directional position 1 High	×10000	0ÿ30000	0	S
	When PA97=2 and SEC1 (CN8-13) signal is ON, the orientation position points to the orientation position 2 parameter. If the orientation position value does not exceed the number of digits of the low digit of the orientation position, the high digit of the orientation position does not need to be set. The low position of the directional position for the signal orientation is set according to DP-APO, and the high position of the directional position is set according to DP-APO. According to the second position encoder signal, or the induction switch for orientation, the low position of the orientation is set according to DP-SPO, and the high position of the orientation is set according to DP-SPO. The bits are set according to DP-SPO.				
PA152	Induction switch signal search mode when orienting		0ÿ3	2	P/S
	1) Only when the transmission ratio of the directional axis can be set in the form of an integer in PA154 or PA155, PA152 can be set to 0 or 1; In this mode, when the servo drive unit is powered on and oriented for the first time, it will look for two induction switch jump signals for accurate stop. Then detect the induction switch jump signal and calculate the spindle position based on the transmission ratio. PA152=0 By default, when the induction switch signal changes from ON to OFF, the input is valid; PA152=1 means that when the induction switch signal changes from OFF to ON, the input is valid. 2) Set PA152 to 2 or 3; In this mode, the servo drive unit looks for two induction switch jump signals for accurate stopping each time it is oriented. PA152=2 By default, when the induction switch signal changes from ON to OFF, the input is valid; PA152=3 means that when the induction switch signal changes from OFF to ON, the input is valid.				
PA153	Detection of two sensing edge signal deviation range 0.06 degrees	0ÿ3000		20	S
	During spindle orientation, the servo drive unit will detect the edge signal output by the induction switch twice, and at the same time, it needs to calculate the position according to the transmission ratio. The correctness of the detected edge signal position is determined by the position. This parameter is used to determine the deviation range of the two edge signal positions. The deviation of the two edge signal positions is only within the set range. The servo drive unit can perform orientation operation only within the specified range.				
PA154	First gear ratio	0.001	100ÿ30000	1000	P/S
	The spindle transmission ratio parameter under the induction switch orientation function. By default, this parameter is the spindle transmission ratio, or when the machine tool spindle has multi-speed transmission When , it is the first gear transmission ratio. PA154=transmission ratio×1000. For example: the transmission ratio between the motor and the spindle is 5.5:1, then PA154=5.5×1000=5500. **Note:** When the PA154 setting deviation is large, dP-SPo The displayed position data "E" will not change to "t", and the orientation function will fail.				

When the induction switch is oriented, a virtual spindle encoder is required, and the number of spindle encoder lines = transmission ratio × number of motor encoder lines (PA176).

For example, when the motor encoder line number is 5000p/r, the virtual spindle encoder line number = transmission ratio × 5000.

After calculating the spindle encoder line number, you can set the orientation reference point according to the value displayed by DP-SPO.

After that, the number of virtual spindle encoder lines is fixed.

Directed debugging

ÿ Connect the induction switch correctly, set PA97=2, and set the transmission ratio parameter PA154 (when two-speed transmission is used, set the second gear ratio at the same time).

Gear transmission ratio parameter PA155);

ÿ Call up the monitoring menu dP-SPo , button display E □□□□ , the symbol 'E' indicates that the servo drive unit is powered on

After that, no "zero" point signal (inductive switch signal) is detected, the spindle is in an uncertain orientation position, and the current value is

The value is invalid and cannot be used as a reference value. Turn the spindle for at least 3 turns. When the "zero" point signal (inductive switch signal) is triggered,

hour, dP-SPo The value becomes t □□□□ , at this time, the value after the letter is the absolute position value of the "zero" point signal.

Can be used as a reference value for directional function.

ÿ dP-SPo The displayed data range is the value after the virtual spindle encoder line number is 4 times the frequency. Manually rotate the spindle to the predetermined direction.

Position will correspond to dP-SPo Set the value to the orientation point (PA103~PA106), then save the parameters, and you are done.

Orientation position settings.

ÿ The CNC system executes M51 (directional start), and the system sends an enable signal to the servo drive unit via the GSK-Link bus.

(SON), directional start (OSTA) command, the motor first runs at the directional speed set by PA99, and then finds the directional point

After reaching the orientation position, it will immediately remain at the orientation position, and the servo drive unit will send an orientation completion signal (COIN) to the CNC system.

ÿ After receiving COIN, the CNC system will implement other operations such as tool change. During the tool change process, the directional start signal (OSTA)

It must remain ON and the signal must be canceled after the operation is completed before other operations can be performed.

1. Note that when executing the second-gear spindle orientation, the second-gear orientation function selection signal of SEC1 (CN8-13) needs to be given, and

To set the second gear orientation speed PA159. The first gear spindle orientation point needs to write the display value of DP-SPO into parameter

The second spindle orientation point is the one that needs to write the display value of DP-SPO into PA104 (high position) and PA103 (low position).

Parameters to PA106 (high position) and PA105 (low position).

2. After the switch is triggered by the metal edge induction, (the groove induction block is the falling edge first, then the rising edge; the boss induction block is the rising edge first, then the

The servo drive unit confirms that it has received the reference point signal.

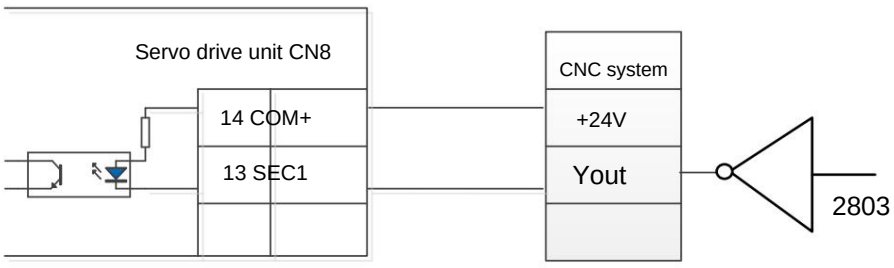
3. It is recommended that the orientation direction be consistent with the speed running direction in actual applications, that is, PA100 is fixed to 1 or equal to

PA100=2ÿ

2. Second gear directional selection:

In order to facilitate the debugging of the orientation function of machine tools with gear-shift spindles, the servo drive unit has added a second-gear orientation selection function.

When the CNC system sets the SEC1 (CN8-13) signal to ON, the servo drive unit starts the second set of orientation position parameters.



Select the second gear orientation function, only provide the spindle orientation speed, orientation position, orientation corresponding encoder line under the second gear transmission ratio

The parameters such as the number and other functions are the same as the settings of the first-level directional function.

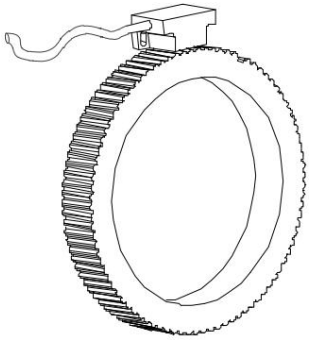
Related parameters	name	Unit parameter range default value application method			
PA105 2nd gear directional position low			0ÿ9999	0	S
PA106	Second gear directional position high	×10000	0ÿ30000	0	S
	When PA97=2 and SEC1 (CN8-13) signal is ON, the second gear directional position parameter is valid. If the orientation position value does not exceed the number of digits in the low position of the orientation position, the high position of the orientation position does not need to be set. The low position of the directional position for the signal orientation is set according to DP-APO, and the high position of the directional position is set according to DP-APO. According to the second position encoder signal, or the induction switch for orientation, the low position of the orientation is set according to DP-SPO, and the high position of the orientation is set according to DP-SPO. The bits are set according to DP-SPO.				
PA155	Second gear ratio	0.001	1000ÿ30000	1000	P/S
	If the machine tool spindle has multi-speed transmission, this parameter sets the second gear ratio. The setting method of PA155 is the same as that of PA154.				
PA159	Second gear directional speed	rpm	10ÿ1000	100	S
	If the machine tool spindle has multi-speed transmission, this parameter sets the speed of the second-speed spindle orientation. The spindle rotates at the orientation speed first. After the servo drive unit captures the induction switch signal, the spindle motor rotates and stops exactly at the second gear directional position.				

6.11 Sin-Cos Encoder Debugging Instructions

Only the GRÿÿÿÿ-LS2 series servo drive units support sine-cosine encoders.

The encoder signal can only and must be connected to the CN3 interface. For encoder connection methods, see Chapter 3.

Figure 3-21 in 3.3.2.



At present, the sine and cosine encoders supported by our company are mostly 1Vpp amplitude, "reader head + gear disc"

Hollow ring magnetic resistance encoder. As shown in the figure:

1. Installation of sine-cosine encoder reading head

Correct installation of the gear disc and the reading head is a prerequisite for smooth commissioning of the sine-cosine encoder.

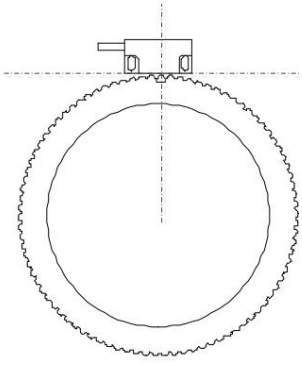
Any discrepancy may cause the servo drive unit to be unable to correctly identify the encoder signal. Therefore, please have a qualified fitter perform the installation.

Installation is necessary.

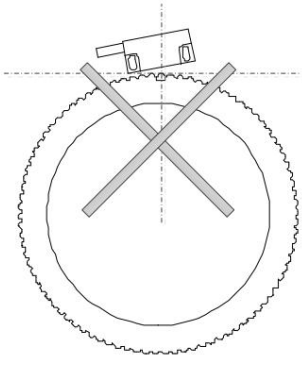
Before installing the gear disc and the reading head, please carefully read the encoder installation and commissioning manual provided by the encoder manufacturer and strictly follow the manufacturer's requirements.

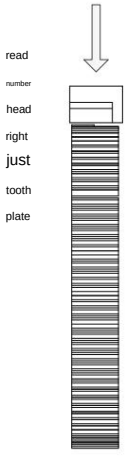
The following are the instructions for common installation problems and the auxiliary debugging functions provided by the servo drive unit:

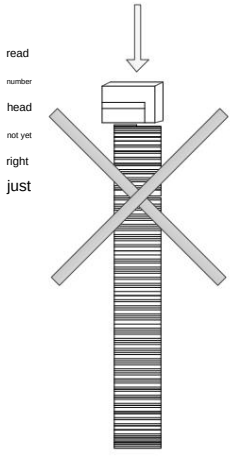
Reading head aligns the gear



Reading head is not aligned







As shown in the figure above, the reading head must be installed aligned with the gear disc, otherwise the servo drive unit cannot recognize the encoder signal!

After the reading head is installed, the screws fixing the reading head do not need to be tightened for the time being. First connect the encoder signal line to the servo drive unit CN3, then power on the servo drive unit and call up the monitoring mode. Turn the spindle forward (i.e. the gear plate) by hand for more than 3 turns. Rotate in the opposite direction for more than 3 turns, and wait until the spindle stops (if the servo drive unit alarms at this time, you can temporarily ignore the alarm).

Observe the following digital tube monitoring conditions, and meet the following monitoring data requirements by adjusting the gap between the reading head and the gear disc.

ÿ  : Sin-cos signal amplitude ratio, 16384 corresponds to 1, if it is displayed as 16145, then the amplitude of the sin-cos signal is equal to the amplitude of the cosine. The ratio of signal amplitude is 16145/16384=0.9854. The amplitude ratio of sine and cosine signals is more suitable between 0.95 and 1.05.

so  A value between 15564 and 17203 is more appropriate, and the closer to 16384 the better.

ÿ  ,  : Sine signal amplitude, cosine signal amplitude. Its value is between 16000 and 23000. Suitable. The IGS sine-cosine encoder is more suitable around 18000.

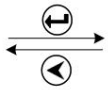
ÿ  ,  : DC bias of sine signal and cosine signal. Its value is between -2500 and 2500. The closer to 0 the better.

ÿ  : Sincosine signal subdivision zero offset. After the servo drive unit is powered on, before the zero signal is recognized for the first time, This monitoring information is always 0.

ÿ  : Zero point signal, generally displayed as 0 under normal circumstances, and only displayed as 1 when it is at the zero point notch position of the gear disc. When installing the reading head, it can be determined whether the zero point signal is normal.

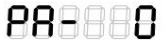
When the above requirements are met, tighten the fixing screws of the reading head and the installation is complete.

The newly added sine and cosine encoder data monitoring content is as shown in the following table.

Parameter value power-on initial monitoring operation			Monitoring data	illustrate
PA3=36				Sinusoidal signal DC bias.
PA3=37				DC offset of the cosine signal.
PA3=38				Amplitude of the sine signal.
PA3=39				Amplitude of the cosine signal.
PA3=40				Ratio of the sine and cosine signal amplitudes.
PA3=41				Sin and cos phase deviation.
PA3=42				If the value is not 0 , it means the zero point signal of the gear has been identified.
PA3=43				If "1" is displayed, the gear zero point signal is detected.
PA3=44				Number of teeth on the sine and cosine encoder gear, encoder rotates more than 3 times The correct value will be displayed.

2. Save the zero offset of the sine and cosine encoder

After the reading head is installed, you still need to manually rotate the spindle (i.e. the gear disk) for more than 3 turns in the forward direction, and then for more than **3** turns in the reverse direction . To ensure that the relevant monitoring information meets the requirements. After the motor shaft stops, the sine and cosine encoder zero offset operation is then saved.

ÿ Settings  is **555;**

ÿ Find  After that, press the key. After 3 seconds, if the monitoring window displays  , indicating successful saving. After the servo drive unit is powered on again, debugging is completed.

ÿ If the monitoring window displays   (SCZ+ and SCZ- signals are opposite) or  (SCZ signal cannot be recognized), please power on again and try the save operation again until the display shows

Sometimes it takes multiple operations to save the zero offset successfully. If the display still does not work after multiple operations,  ,explain

The servo drive unit cannot recognize the zero point signal. Please recheck the installation of the encoder reading head.

3. Sin-Cos encoder related parameter settings

<table>
<tr><th>Related parameters</th><th>name</th><th>unit</th><th>Parameter range</th><th>Default value application mode</th></tr>
<tr><td rowspan="2">ÿPA96
(PA200)</td><td>Second position encoder type selection</td><td></td><td>0ÿ30</td><td>0</td><td>P/S</td></tr>
<tr><td colspan="4">
<table>
<tr><th>Encoder model</th><th>Adaptive hardware version Encoder protocol Single-turn encoder number</th><th></th><th>PA96/PA200
Setting Value</th></tr>
<tr><td>SinCos162 teeth</td><td rowspan="6">Sincosine dedicated control board Sincosine subdivision</td><td rowspan="6"></td><td>162×214</td><td>55</td></tr>
<tr><td>SinCos256 teeth</td><td>256×214</td><td>19</td></tr>
<tr><td>SinCos384 teeth</td><td>384×214</td><td>11</td></tr>
<tr><td>SinCos512 teeth</td><td>512×214</td><td>12</td></tr>
<tr><td>SinCos1024 teeth</td><td>1024×214</td><td>56</td></tr>
<tr><td>SinCos2048 teeth</td><td>2048×214</td><td>57</td></tr>
</table>
PA200 is used as the motor encoder type selection parameter, and the setting method is the same as PA96. If you need to modify PA200, please set the advanced password first.
</td></tr>
<tr><td>ÿPA97</td><td>Position feedback input signal selection</td><td></td><td>0ÿ2</td><td>1</td><td>P/S</td></tr>
<tr><td colspan="4">PA97=0, select the second position input signal as the position feedback input signal. At this time, CN3 is not connected to the second position encoder feedback signal.
The servo drive unit will have an Err-24 or Err-53 fault.
PA97=1, select the motor encoder signal as the position feedback input signal;
PA97=2, select the external induction switch signal as the reference point signal of the orientation function.
Note: For the GR-LS2 series servo drive unit, when equipped with 'electric spindle + sine-cosine encoder', the sine-cosine encoder signal must be connected to
CN3, while CN2 is not connected, PA97 should be set to 1; if equipped with 'motor encoder + second position sine-cosine encoder',
CN2 is connected to the motor encoder, CN3 is connected to the sine-cosine encoder, and PA97 should be set to 0.</td></tr>
</table>

4. New alarms related to sine and cosine encoders:

<table>
<tr><th>Alarm number</th><th>significance</th><th>main reason</th><th>Solution</th></tr>
<tr><td>Err-80 The first code disk sine and cosine amplitude is too small. The gap between the reading head and the gear disk is too large, causing</td><td rowspan="2"> 
The value shown is less than 10000.</td><td rowspan="2">Use a smaller feeler gauge to assist
Install the reading head and adjust the gap to a smaller size.</td></tr>
<tr><td>Err-85 The second code disk sine and cosine amplitudes are too small to alarm.</td></tr>
<tr><td>Err-81 The first code disk sine and cosine amplitude is too large. The gap between the reading head and the gear disk is too small, causing</td><td rowspan="2"> 
The value shown is greater than 30000.</td><td rowspan="2">Use a slightly larger feeler gauge to assist
Install the reading head and increase the gap.</td></tr>
<tr><td>Err-86 The second code disk sine and cosine amplitude is too large to alarm.</td></tr>
<tr><td>Err-82 The frequency of the first encoder sine and cosine signals is too high. The sine and cosine signals read by the servo drive unit are too high.</td><td rowspan="2">The signal frequency is too high, exceeding 250KHz
Control scope.</td><td rowspan="2">1. Reduce the spindle speed;
2. Replace the sprocket with one with fewer teeth.</td></tr>
<tr><td>Err-87 The second encoder sine and cosine signal frequency is too high.</td></tr>
<tr><td>Err-83 The first code disk cosine signal overflow alarm.</td><td rowspan="4">The clearance between the reading head and the gear disc is too small.
The sine and cosine signals read by the dynamic unit are out of range
Surround.</td><td rowspan="4">Use a slightly larger feeler gauge to assist
Install the reading head and increase the gap.</td></tr>
<tr><td>Err-84 The first code disk sinusoidal signal overflow alarm.</td></tr>
<tr><td>Err-88 The second encoder cosine signal overflow alarm.</td></tr>
<tr><td>Err-89 The second encoder sinusoidal signal overflow alarm.</td></tr>
</table>

6.12 Second position encoder with linear grating ruler

In order to improve the stability of machine tool processing and eliminate processing errors caused by temperature changes, the servo drive unit supports adding A linear grating ruler is installed as the second position feedback of the servo drive unit.

Related parameters	name	Unit parameter range default value application method			
PA63	The number of teeth on the driven shaft or the speed on the motor (see PA64ÿ		1ÿ1024	1	S
PA64	Number of gear teeth at the motor end or speed at the driven shaft end		1ÿ1024	1	S
	When the transmission ratio between the motor shaft and the driven shaft (or spindle) is not 1:1, setting parameters PA63 and PA64 can easily match the CNC and the spindle speed. For example, if the transmission ratio between the motor shaft and the driven shaft (or spindle) is 5:3, then set PA63 to 5, PA64 to 3, and CNC setting S 300 When the motor speed is 500, the driven shaft (or spindle) speed is 300. Note: If the transmission ratio is not set correctly, the servo drive unit may easily give out the **ERR-58** alarm.				
PA93	Grating scale step (resolution)	1 nm	1ÿ10000	1000	P/S
	This parameter is set according to the grating scale step index.				
PA94	Reduce the scale pitch (resolution)		0ÿ10	0	P/S
	Generally, it can be set to 0. When the transmission gap of the mechanism is large and the workbench shakes severely during debugging, the value of PA94 can be increased. To reduce jitter. **Note:** Changes in PA94 will affect the electronic gear ratio.				
PA95	Screw pitch setting	0.01mm	1ÿ32767	800	
	This parameter is set according to the specific pitch of the screw rod. For example, the pitch of 8mm corresponds to 800 for PA95.				
PA96	Second position encoder type selection		0ÿ30	0	PÿS
	For incremental encoders, set PA96=50. For other encoder settings, refer to Chapter 7.				
ÿPA97	Position feedback input signal selection		0ÿ2	1	P/S
	PA97=0, select the second position input signal as the position feedback input signal. At this time, CN3 is not connected to the second position encoder feedback. If the servo drive unit fails to detect the fault, an Er-24 or Er-53 fault may occur. PA97=1, select the motor encoder signal as the position feedback input signal. PA97=2, select the external induction switch signal as the reference point signal of the orientation function. Note: This parameter will take effect only after power is turned on again after successful modification.				
ÿPA101	The second position feedback input signal is inverted		0ÿ1	0	P/S
	PA101ÿ0: The direction of the second position input signal is not reversed. PA101ÿ1: The direction of the second position input signal is reversed. Note: If this parameter is set incorrectly, the servo drive unit will display ERR-58 or ERR-59 alarms. After the parameter is modified successfully, power on again. Only then it can take effect.				

Among the above-mentioned related parameters, PA93, PA95, PA96 and PA97 are the key necessary parameters and must be set correctly.

ÿ Calculation of the electronic gear ratio corresponding to the grating ruler:

Because the grating ruler is installed on the guide rail, the movement of the worktable corresponds to the displacement output by the grating ruler.

In closed-loop control, the transmission ratio between the motor shaft and the grating ruler does not need to be considered.

The minimum equivalent of the traditional position command corresponds to one pulse of the servo drive unit position loop, and the grating ruler step (the amount of

The minimum position value given by the servo drive unit also corresponds to one pulse control equivalent of the servo drive unit.

The grating scale step can be matched. For example:

The grating scale step of a certain specification is 10nm, the matching CNC system is GSK980TDa, and the system minimum equivalent is 0.1ÿm. Calculate the electronic gear ratio of the servo drive unit?

Solution:

It is known that the system minimum equivalent is 0.1 ÿm (i.e. 100 nm), and the grating scale step is 10 nm. Because when the system gives a minimum displacement of 100 nm, the servo drive unit needs to control the grating scale to move 100 nm. That is to say, when the system gives 1 pulse equivalent, the corresponding servo drive unit is 100 nm÷10 nm=10 pulse equivalents. Then: G=PA29/PA30=100 nm÷10 nm=10/1.

ÿHandling of **Err-58** alarm when using grating ruler :

In order to avoid malfunction of the workbench due to incorrect parameter settings or incorrect installation and debugging, and thus damage to the grating ruler, the servo drive unit sets the Err-58 alarm (excessive deviation alarm for the first and second position feedback data) to protect the grating ruler. Therefore, to ensure that the Err-58 alarm is not triggered by mistake, the following points must be noted: ÿ If the machine tool feed axis has a transmission ratio, please measure the transmission ratio correctly and set PA63 and PA64; ÿ Ensure that the grating ruler step and the lead screw pitch are correctly set to PA93 and PA95; ÿ The installation direction of the grating ruler may not be consistent with the direction of motor rotation. At this time, the servo drive unit will display Err-58 when running. If there is an alarm, try to modify PA101=1, save the information, and then power on again to run.

Chapter 7 Parameters

7.1 Parameter list

1. For parameters with 'ÿ' before the parameter number, you need to save the parameter value after modifying it and restart the power to make it effective. The factory values of the parameters may vary depending on the adapted motor.
2. In the applicable motor column, "T" means it is applicable to synchronous servo motors; "Y" means it is applicable to asynchronous servo motors.
3. When PA2=0, the adjustment of “T” related parameters is valid; when PA2=1, the adjustment of “Y” related parameters is valid.
4. When GSK-Link communication connection is successful or PA118=1, PA4 cannot be modified.

Parameter number	significance	Setting range	Default value (synchronous/asynchronous)	unit	Applicable motor	References
PA0	parameter modification password	0ÿ9999	315		TÿY	
ÿPA1	motor model code	1ÿ8501	1/501			Appendix A
PA2	Motor Type Selection	0ÿ1	0/1			/
ÿPA3	power-on initial monitoring setting	0ÿ47	0			4.3
PA4	working mode selection	9ÿ25	21			Chapter 5
PA14	rigidity grade	1ÿ101	8			5.5
ÿPA15	speed loop first proportional gain	10ÿ5000	250/800	Hz		6.1
ÿPA16	speed loop first integral time constant	0ÿ5000	200/300			
ÿPA17	current command filter coefficient	1ÿ5000	2000/1000			
ÿPA18	speed feedback detection filter coefficient	1ÿ5000	600/300			
ÿPA19	position loop first proportional gain	5ÿ30000	80/40	1/s		
PA21	Position loop second proportional gain	10ÿ1000	40/20	1/s		
PA23	Position loop third proportional gain	10ÿ1000	40	1/s		
PA25	position feedforward gain	0ÿ200	1/0	%		
PA26	Position feedforward low-pass filter coefficient	10ÿ5000	2000/300	Hz		
PA28	Position command direction reverse	0ÿ1	0	0		6.3
PA29	Position pulse command multiplication factor 1	1ÿ32767	1			6.2
PA30	Position pulse command frequency division coefficient 1	1ÿ32767	1			
PA31	Position reaching range	0ÿ30000	20	pulse		
PA32	position tolerance range	0ÿ6000	400	0.01 circle		
PA33	Position pulse command multiplication factor 2	1ÿ32767	1			6.2
PA34	Position pulse command frequency division coefficient 2	1ÿ32767	1			6.2
PA38	Position feedback detection filter coefficient	1ÿ5000	1200/160		AND	
PA42	Low speed function characteristic speed	0ÿ5000	50		T	6.4
PA43	low speed compensation coefficient	0ÿ30000	300/0		T	6.4

Parameter number	significance	Setting range	Default value (synchronous/asynchronous)	unit	Applicable motor	References
ÿPA45 speed loop second proportional gain		10ÿ3000	100/800	Hz	TÿY	6.1
ÿPA46 speed loop second integral time constant		1ÿ3000	100/300			
ÿPA48 speed loop third proportional gain		10ÿ3000	100/800	Hz	TÿY	6.1
ÿPA49 speed loop third integral time constant		1ÿ3000	100/200	1/s		
PA51	When the speed command is valid, the motor rotates in the direction Negation	0ÿ1	0		TÿY	6.3
ÿPA54 speed command maximum speed limit		1ÿ32000	3 0 00/ 1 2 0 0 0	rpm		
ÿPA57 linear acceleration time constant		0ÿ30000	0/100	ms	TÿY	6.6
ÿPA58 linear deceleration time constant		0ÿ30000	100/300	ms		
PA61 speed reaches the effective range		0ÿ100	10	%	TÿY	
PA62 zero speed output effective range		0ÿ100	5	rpm	TÿY	
PA63 Driven wheel teeth number or driving wheel (motor) speed 1ÿ32767			1		TÿY	6.12
PA64 Number of teeth of driving wheel (motor) or speed of driven wheel 1ÿ32767			1		TÿY	6.12
PA68 Directional Position 5 Low		0ÿ9999	0		TÿY	
PA69 Directional Position 5 High		0ÿ30000	0		TÿY	
PA70 Directional Position 6 Low		0ÿ9999	0		TÿY	
PA71 Directional position 6 High		0ÿ30000	0		TÿY	
PA72 Directional position 7 Low		0ÿ9999	0		TÿY	
PA73 Directional position 7 High		0ÿ30000	0		TÿY	
PA74 Directional position 8 Low		0ÿ9999	0		TÿY	
PA75 Directional Position 8 High		0ÿ30000	0		TÿY	
PA76 resonance frequency display		Unmodifiable	60	Hz	T	5.5
PA77 Notch Filter Mode Selection		0ÿ5	0		T	
PA78 First Notch Filter Frequency		0ÿ30000	0	Hz	T	
PA79 First Notch Filter Width		1ÿ100	20		T	
PA80	First notch depth	1ÿ20000	8000		T	
PA81	Second notch filter frequency	0ÿ30000	0	Hz	T	
PA82 Second notch filter width		1ÿ100	20		T	
PA83 Second notch depth		1ÿ20000	8000		T	
PA87 Torque reaches effective range		1ÿ100	10	%		
PA88 Speed to position mode switching mode selection 0~2			1		TÿY	6.8
PA90 Speed/position switching reference point low position		0ÿ9999	0		TÿY	6.8
PA91 Speed/position switching reference point high position		0ÿ30000	0		TÿY	6.8

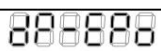
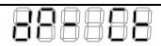
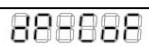
Parameter number	significance	Setting range	Default value (synchronous/asynchronous)	unit	Applicable motor	References
PA92	Speed limit value under torque control	0ÿ3000	500/300	rpm	T	
PA93	grating scale pitch	1ÿ10000	1000	1 nm	T	6.12
PA94	Grating scale step frequency multiplication value or second encoder Number of shifts per turn	0ÿ10	0		T	6.12
PA95	Lead screw pitch or linear motor pole pitch	1ÿ32767	800	0.01mm	T	6.12
ÿPA96	second position encoder type selection	0ÿ320	0		TÿY	6.8
ÿPA97	position feedback input signal selection	0ÿ2	1		TÿY	
PA98	Second position encoder line number	10ÿ30000	1024		TÿY	
PA99	Directional Speed	10ÿ1000	100	rpm	TÿY	
PA100	Direction Selection	0ÿ2	0		TÿY	
ÿPA101	second position feedback input signal inversion	0ÿ1	0		TÿY	
PA102	Orientation Position Window	0ÿ1000	18	0.01 degree	T, Y	
PA103	Orientation position 1 Low	0ÿ9999	0	Pulse	T, Y	
PA104	Directional position 1 High	0ÿ30000	0	Pulse	T, Y	
PA105	Directional position 2 Low	0ÿ9999	0	Pulse	T, Y	
PA106	Directional position 2 High	0ÿ30000	0	Pulse	T, Y	
PA107	Directional position 3 Low	0ÿ9999	0	Pulse	T, Y	
PA108	Directional position 3 High	0ÿ30000	0	Pulse	T, Y	
PA109	Directional position 4 Low	0ÿ9999	0	Pulse	T, Y	
PA110	Directional position 4 High	0ÿ30000	0	Pulse	T, Y	
PA111	DSP Software Version	Unmodifiable	520			
PA118	interna forced enable	0ÿ1	0		TÿY	5.2
PA119	disconnection enable parking mode selection	0ÿ1	1			
PA124	sets the jog speed	0ÿ12000	120	rpm	TÿY	5.3
PA125	Torque limit of manual and jog operation mode	0ÿ500	100	%	TÿY	
PA132	static friction compensation gain	1ÿ5000	1		T	6.4
PA133	Static friction compensation time	0ÿ5000	0		T	6.4
PA135	Reverse acceleration compensation gain	1ÿ5000	20/100		T	6.4
PA136	Reverse acceleration compensation time	0ÿ5000	100/0		T	6.4
PA137	Position error is invalid	0ÿ1	1		TÿY	
PA139	Phase loss alarm is invalid	0ÿ1	1		TÿY	
PA141	Er-70 alarm threshold setting	400ÿ799	420/432		TÿY	
PA142	Spindle orientation failure alarm time	0ÿ30000	10000		TÿY	
PA143	Braking time	1ÿ32000	375/800	0.1ms	TÿY	

Parameter number	significance	Setting range	Default value (synchronous/asynchronous)	unit	Applicable motor	References
PA144 Acceleration/deceleration time unit selection		0ÿ1	0		TÿY	
PA145 module overcurrent time		0ÿ32000	20/1000	1ms	TÿY	
PA146 Speed regulator long time saturation alarm time 0ÿ30000			1000/15000	5ms	TÿY	
PA147	Allow the motor to operate before the power-off brake is activated Maximum deceleration time	0ÿ30000	30/14000	ms	T	6.5
PA148 Servo lock delay time		0ÿ30000	100/0	ms	TÿY	
PA149 Motor speed when power-off brake is activated 0ÿ300			30/10	rpm	T	
PA150 Spindle clamping interlock delay time		0ÿ32000	100	ms	AND	6.7
PA152 Orienteering Induction Switch Signal Search Mode		0ÿ3	2		AND	6.10
PA153 allows the sensing signal to have a deviation range of 0 to 3000			20	0.06°	AND	6.10
PA154 1st gear ratio		100ÿ30000	1000	0.001	AND	6.10
PA155 2nd gear ratio		100ÿ30000	1000	0.001	AND	6.10
ÿPA156 GSK-Link servo axis number		1ÿ256	1		TÿY	
PA158 CRC check selection		0ÿ1	1		TÿY	
PA159 Second gear directional speed		10ÿ1000	100	rpm	AND	6.10

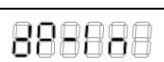
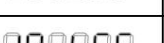
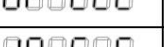
7.2 Parameter meaning details

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value sync/async	unit	Applicable Way
PA0	Parameter modification password	0ÿ9999	315		PÿS
	When PA0ÿ315, parameters other than PA1 and PA2 can be modified; When PA0ÿ385, PA1 can be modified to correspond to the motor model code, and EE-DEF can be executed to call the default values of motor related parameters.				
ÿPA1	Motor model code	1ÿ8501	1/501		PÿS
	Generally, the servo drive unit has the correct motor parameters set before leaving the factory. Incorrect modifications may result in undesirable results. Users should be careful when modifying the servo drive unit. changel Select the correct servo motor model code according to (Appendix A). After setting this parameter (special password 385 is required to modify PA1), you must execute Only by performing EE-DEF operation can the default parameters of the adapted motor be restored. For detailed operation, see 4.4 in Chapter 4.				
PA2	Motor Type Selection	0ÿ1	0/1		PÿS
	PA2=0: Synchronous motor, usually corresponding to feed servo motor. PA2=1: Asynchronous motor, usually corresponding to the spindle servo motor.				
ÿPA3	Initial monitoring setting at power on	0ÿ47	0		PÿS

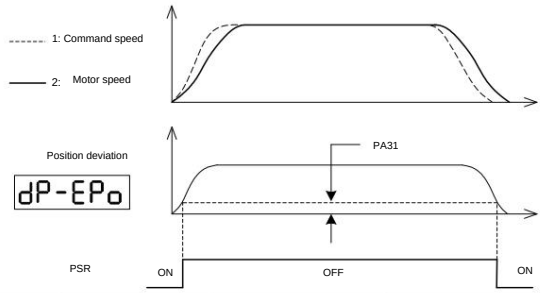
Parameter value	initial monitoring at power on	illustrate	Parameter value	initial monitoring at power on	illustrate
PA3=0		Motor speed	PA3=24		Second position encoder Z signal absolute position Low
PA3=1		Current motor position low Five	PA3=25		Second position encoder Z signal absolute position High
PA3=2		Current motor position high Five	PA3=26		Motor encoder Z signal absolute position low
PA3=3		Position command lower five bits	PA3 = 27		Motor encoder Z signal absolute position high
PA3=4		Position command high five bits	PA3 = 28		The second position encoder single turn absolute position low Bit
PA3=5		Position deviation lower five digits	PA3=29		Second position encoder single turn absolute position high
PA3=6		Position deviation high five digits	PA3=30		The second position encoder relative position low
PA3=7		Motor current	PA3=31		The second position encoder relative position high
PA3=8		Simulation instruction corresponding to Speed	PA3=32		The first position encoder single turn absolute position low
PA3=9		Speed command	PA3=33		The first position encoder single turn absolute position high
PA3=10		Position command pulse frequency Rate	PA3=34		The first position of the multi-turn encoder number of turns low
PA3=11		Torque command	PA3=35		First position multi-turn encoder number of turns high
PA3=12		Motor torque	PA3=36		Sinusoidal signal DC bias
PA3=13		Radiator temperature	PA3=37		Cosine signal DC offset
PA3=14		Motor temperature	PA3=38		Sinusoidal signal amplitude
PA3=15		DC bus voltage	PA3=39		Cosine signal amplitude

P: Position control S: Speed control

ÿPA3	Parameter value initial monitoring at power on		Description Parameter Value Power-on Initial Monitoring			illustrate
	PA3=16		Alarm display PA3=40 Servo drive			Sin-Cos signal amplitude ratio
	PA3=17		single Meta-operating	PA3=41		Phase deviation of sine and cosine signals
	PA3=18		status encoder feedback Signal	PA3=42		Displays the current absolute position of the gear zero point.
	PA3=19		input terminal state	PA3=43		Displayed as "1" means the toothed disc zero point signal is detected
	PA3=20		Output terminal shape state	PA3=44		Sincos encoder gear teeth number
	PA3=21		(Reserved)	PA3=45		Motor incremental encoder detection data
	PA3=22		Hardware version number	PA3=46		Second position incremental encoder detection data
	PA3=23		Software version number	PA3=47		Notch filter frequency

PA4	Working mode selection	9ÿ25	21		PÿS
	PA4=9: Manual operation Check the operation and status monitoring of servo drive unit and motor. Internally enable PA118 = 1, in the Sr- menu, use the “ , ” keys to perform acceleration and deceleration operations. PA4=10: JOG inching mode; Check the operation of the servo drive unit and motor. PA124 sets the jog speed, PA118=1 is internally enabled, and in the Jr-menu, use the “ , ” keys to perform forward and reverse operations. PA4=21 ÿGSK—Linkÿ Notice: **The PA4** parameters cannot be modified when the **GSK-Link** communication connection is successful or when the internal enable **PA118=1** is enabled . This parameter has been adjusted before leaving the factory and users generally do not need to modify it.				
PA14	Rigidity level	1ÿ101	8		Pÿ S
	1. PA14=(1ÿ32), the rigidity level of the servo motor can be manually set. The level range is from level 1 to level 32, and the rigidity gradually increases. Corresponding to PA15, PA16, PA19: As the level increases, the parameter value gradually increases. 2. PA14=100, inertia identification; (see 5.5 in Chapter 5 for detailed operation). 3. PA14=101, inertia identification + inertia iteration. (For detailed operation, see 5.5 in Chapter 5).				
ÿPA15	Speed loop first proportional gain	10ÿ5000	250/800		PÿS
	The larger the speed loop proportional gain value, the greater the servo stiffness. However, if it is too large, vibration may occur during starting or stopping (the motor may make abnormal noise). The smaller the value, The slower the response.				
ÿPA16	Speed loop first integral time constant	0ÿ5000	200/300		PÿS
	The larger the value of the speed loop integral time constant is, the faster the system responds. However, if the value is too large, the system will become unstable and even cause oscillation. The smaller the value is, The slower the response, the larger the value should be set without causing oscillation in the system.				
ÿPA17	ÿCurrent command filter coefficient	1ÿ5000	2000/1000	Hz	P . S
	It is used to limit the current command frequency band, avoid current shock and oscillation, and make the current response stable. When there is no oscillation, try to increase the set value.				

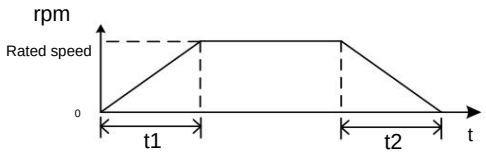
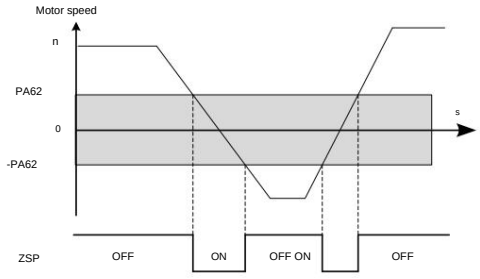
P: Position control S: Speed control

Parameter number	significance	Setting range	Default value unit		Applicable method
ÿPA18	ÿSpeed feedback detection filter coefficient	1ÿ5000	600/300		P . S
	The larger the speed feedback filter coefficient value, the faster the speed feedback response. If the setting value is too large, the motor will emit a large electromagnetic noise; the smaller the setting value, the faster the speed feedback response. The speed feedback response becomes slow, the setting value is too small, the speed fluctuation increases, and even oscillation occurs.				
ÿPA19	ÿThe first proportional gain of the position loop	5ÿ30000	80/40	1/S	PÿS
	The larger the position loop proportional gain value, the faster the response to the position command and the greater the stiffness. If the value is too large, position overshoot will occur when the motor starts and stops. Cause vibration; the smaller the setting value, the slower the response and the larger the following error.				
PA21	Position loop second proportional gain	10ÿ1000	40/20	1/S	PÿS
	The larger the position loop proportional gain value, the faster the response to the position command and the greater the stiffness. If the value is too large, position overshoot will occur when the motor starts and stops. Cause vibration; the smaller the setting value, the slower the response and the larger the following error.				
PA23	Position loop third proportional gain	10ÿ1000	40	1/S	PÿS
	The larger the position loop proportional gain value, the faster the response to the position command and the greater the stiffness. If the value is too large, position overshoot will occur when the motor starts and stops. Cause vibration; the smaller the setting value, the slower the response and the larger the following error.				
PA25	Position feedforward gain	0ÿ200	1/0		PÿS
	The position loop feedforward gain uses the speed information of the position command to adjust the speed loop. The larger the setting value, the faster the response and the smaller the following error. If the setting value is too large, The motor is prone to instantaneous overshoot and oscillation. PA25ÿ0, the position loop feedforward function is invalid.				
PA26	Position feedforward low-pass filter coefficient	10ÿ5000	2000/300		P
	The feedforward filter coefficient is used to smooth the position command feedforward control. The larger the setting value, the faster the response to the step speed command, and the better the It can suppress the position overshoot and oscillation caused by sudden change of command speed. It works when PA25 is not equal to 0.				
PA28	Position command direction inversion	0ÿ1	0		P
	PA28ÿ0: Maintain the original instruction direction; PA28ÿ1: The direction of the input pulse command is reversed.				
PA29	Position command pulse frequency multiplication factor 1	1ÿ32767	1		P
	(See Chapter 6.2 for details)				
PA30	Position command pulse frequency division coefficient 1	1ÿ32767	1		P
	(See Chapter 6.2 for details)				
PA31	Location reach	0ÿ30000	20	pulse	P
	When the position following error (DP-EPO) is less than or equal to the PA31 setting value, the servo drive unit considers that the position has been reached. Set arrival signal PSR output ON, otherwise PSR Output OFF. 				
PA32	Position tolerance range	0ÿ6000	400	0.01 circle	P
	When the position following error exceeds the PA32 parameter value during position mode operation, the servo drive unit will give an out-of-tolerance alarm. (For Er-4 troubleshooting, refer to 8.1 in Chapter 8)				
PA33	Position pulse command multiplication factor 2	1ÿ32767	1		P
	(See Chapter 6.2 for details)				

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value	unit	Applicable Way
PA34	Position pulse command frequency division factor 2	1ÿ32767	1		P
	(See Chapter 6, 6.2 for details)				
PA38	Position feedback detection filter coefficient	1ÿ5000	1200/160		P
	The larger the position feedback filter coefficient value, the faster the position feedback response. If the setting value is too large, the motor will emit a large electromagnetic noise; the smaller the setting value, the smaller the position feedback response. The feedback response becomes slow, the setting value is too small, the speed fluctuation increases, and even oscillation occurs.				
PA42	Low speed function characteristic speed	0ÿ5000	50	0.1r/min	P
	When the low speed compensation function is turned on, PA42 can be adjusted according to the machining trajectory graph collected by the CNC system. Adjust the surface concave and convex conditions. Generally speaking, PA42 does not require adjustment.				
PA43	Low speed compensation factor	0ÿ30000	300/0		P
	When PA43=0, the low speed compensation function is turned off. When PA43 is non-zero, the low speed compensation function is enabled. After enabling this function, it is generally recommended to set the value of PA43 to 100. In this case, you can increase it by 20 at a time. Note: A setting that is too large may cause the motor to vibrate!				
ÿPA45	The second proportional gain of the speed	10ÿ3000	100/800	Hz	S
	loop is effective in rigid tapping, and its function is the same as that of PA15. Generally used in rigid tapping of machine tools.				
ÿPA46	Speed loop second integral time constant	1ÿ3000	100/300		S
	It is effective in rigid tapping and has the same function as PA16. Generally used in rigid tapping of machine tools.				
ÿPA48	Speed loop third proportional gain	10ÿ3000	100/800	Hz	S
	During orientation or speed position switching, the function is the same as PA15. Generally used in spindle orientation control of machine tools.				
ÿPA49	Speed loop third integral time constant	1ÿ3000	100/200	1/s	S
	During orientation or speed position switching, the function is the same as PA16. Generally used in spindle orientation control of machine tools.				
PA51	Speed command forward and reverse	0ÿ1	0		S
	PA51ÿ0: Maintain the original instruction direction; PA51ÿ1: The speed command direction is reversed.				
ÿPA54	Speed command maximum speed limit	1ÿ32000	3000/12000	rpm	PÿS
	The maximum speed of the motor is limited to PA54.				

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value unit		Applicable Way
ÿPA57	Linear acceleration time constant	0ÿ30000	0/100	ms	S
	The acceleration and deceleration time constants are only valid in speed mode. The acceleration time sets the time required for the motor to accelerate from zero speed to rated speed, as shown in t1 in the figure. The deceleration time sets the time required for the motor to decelerate from rated speed to zero speed, as shown in t2 in the figure. Actual motor acceleration time = command speed/rated speed × PA57. Actual motor deceleration time = command speed/rated speed × PA58. Note: If the setting time is too small, the actual acceleration/deceleration will be affected by the maximum Acceleration/deceleration capacity is limited, the actual time will be greater than the set time. 				
ÿPA58	linear deceleration time constant (see PA57 for details)	0ÿ30000	100/300	ms	S
PA61	Speed reaches effective range	0ÿ100	10	%	S
	In speed mode, when the actual speed = [command speed × (100-PA61)% ~ command speed × (100 + PA61)%], the speed reaches (PSR) efficient.				
PA62	Zero speed output effective range	0ÿ100	5	rpm	S
	When the actual speed is less than or equal to zero speed output In the effective range, the zero speed (ZSP) signal The number is valid. 				
PA63	Number of teeth on the driven shaft end gear or speed on the motor end (see PA64ÿ	1ÿ32767	1		PÿS
PA64	Number of gear teeth at the motor end or speed at the driven shaft end	1ÿ32767	1		PÿS
	When the transmission ratio between the motor shaft and the driven shaft (or spindle) is not 1:1, setting parameters PA63 and PA64 can easily match the CNC and the spindle. rotation speed. For example, if the transmission ratio between the motor shaft and the driven shaft (or main shaft) is 5:3, then PA63 is set to 5 and PA64 is set to 3. When the CNC is given S 300, the motor The speed is 500 and the driven shaft (or main shaft) speed is 300. Note: If the transmission ratio is not set correctly, the servo drive unit may easily give out the **ERR-58** alarm.				
PA68	Directional Position 5 Low	0ÿ9999	0		P
	1. PA103~PA110, PA68~75 are the eight orientation point setting parameters of the eight-point orientation function. When the supporting CNC system supports the eight-point orientation function, These parameters can be set. 2. If the directional position value does not exceed the range of the directional position low position (such as PA68), there is no need to set the directional position high position (such as PA69). When the orientation is performed according to the motor encoder signal, the low position of the orientation position is set according to "DP-APO" and the high position of the orientation position is set according to When the orientation is performed according to the signal of the second position encoder, the low position of the orientation position is set according to “DP-SPO.” The orientation position high position is set according to "DP-SPO."				

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value unit		Applicable Way
PA69	Directional Position 5 High	0ÿ30000	0		P
PA70	Directional Position 6 Low	0ÿ9999	0		P
PA71	Directional position 6 High	0ÿ30000	0		P
PA72	Directional position 7 low	0ÿ9999	0		P
PA73	Directional position 7 High	0ÿ30000	0		P
PA74	Directional position 8 Low	0ÿ9999	0		P
PA75	Directional Position 8 High	0ÿ30000	0		P
PA76	Resonance frequency display	Unmodifiable	60	Hz	PÿS
	When PA77=3, PA76 displays the current motor oscillation frequency in real time.				
PA77	Notch filter mode selection	0ÿ5	0		PÿS
	PA77=0: Notch filter function is turned off. PA77=3: Turn on the notch filter function and detect the resonance frequency in real time (PA76 displays the resonance frequency). PA77=4: Initialize the notch filter parameters. After completion, PA77 returns to 0. PA77=5: Save the related parameters of the notch filter and turn off the real-time frequency detection function to save program running time.				
PA78	First Notch Filter Frequency	0ÿ30000	0	Hz	PÿS
PA79	First Notch Filter Width	1ÿ100	20		PÿS
PA80	First Notch Filter Depth	1ÿ20000	8000		PÿS
PA81	Second notch filter frequency	0ÿ30000	0	Hz	PÿS
PA82	Second notch filter width	1ÿ100	20		PÿS
PA83	Second notch depth	1ÿ20000	8000		PÿS
PA87	Torque reaches effective range	1ÿ100	10	%	
	In torque mode, when the actual torque = [command torque × (100-PA87)% ~ command torque × (100 + PA87)%], the torque reaches validity.				
PA88	Mode selection 0 for switching from speed mode	0ÿ2	1		P/S
	to position mode: After switching from speed mode to position mode, stop at the reference point (PA90+PA91). 1: After the servo drive unit is powered on, it stops at the reference point (PA90+PA91) after the first speed/position switch. When the reference point is not found, the servo motor stops immediately. 2: After switching from speed mode to position mode, the servo motor stops immediately without finding a reference point.				
PA89	Mode selection for switching from position to speed mode	0ÿ1	0		P/S
	In speed/position mode, select the transition process mode from position control to speed control. PA89ÿ0: When the PSTI signal is OFF, the control will switch to speed control after completing the position command of the control operation. PA89ÿ1: When the PSTI signal is OFF, it switches to speed control immediately regardless of whether the position command is completed.				
PA90	Speed/position switching reference point low position	0ÿ9999	0		P/S
PA91	Speed/position switching reference point position high	0ÿ30000	0		P/S
	When the servo drive unit switches from speed control to position control, it will first search and stop at the directional speed set by PA90 and PA91 according to the directional speed set by PA99. The reference point position is set, and then waits for position instructions (refer to 6.9 in Chapter 6 for the entire orientation process).				
PA92	Speed limit value under torque control	0ÿ3000	500/300	rpm	
	In torque control mode, the motor running speed limit value.				

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value unit		Applicable Way
PA93	Grating scale step (resolution)	1ÿ10000	1000	1 nm	P
	This parameter is set according to the grating scale step index.				
PA94	Reduce the grating ruler step (resolution) In	0ÿ10	0		P
	general, it can be set to 0. When the transmission gap of the mechanism is large and the workbench shakes violently during debugging, the PA94 value can be increased to reduce Jitter. **Note:** Changes in PA94 will affect the electronic gear ratio.				
PA95	Screw pitch setting	1ÿ32767	800	0.01mm	P
	This parameter is set according to the specific pitch of the screw rod. For example, the pitch of 8mm corresponds to 800 for PA95.				
PA96	Second position encoder type selection	0ÿ320	0		PÿS

Encoder model	Encoder protocol encoder single turn data	PA96/PA200 Setting Value
Incremental TTL	Incremental TTL 128ÿ32767	0
Incremental TTL grating ruler	Incremental TTL /	50
A4I/ A4 (spindle)	BISS-B Protocol 131072	14
A7 I	BISS-B Protocol 16777216	71
A9 I	BISS-B Protocol 33554432	71
A4 II	Tamagawa Agreement 131072	4
A6	Tamagawa Agreement 8388608	2
A9 II	Tamagawa Agreement 33554432	1
Tamagawa magnetic resistance 128 teeth	Tamagawa Agreement 128*16384	8
Tamagawa magnetic resistance 256 teeth	Tamagawa Agreement 256*16384	9
Tamagawa magnetic resistance 384 teeth	Tamagawa Agreement 384*16384	7
Tamagawa magnetic resistance 512 teeth	Tamagawa Agreement 512*16384	10
A7	Nikon Agreement 16777216	64
A5 (spindle)	BISS-C Protocol 2097152	79
Renishaw 26 bit BISS-C	BISS-C Protocol 67108864	80
Fagor 26-bit BISS-C linear scale	BISS-C Protocol /	81
A9 Heidenhain 25 digit	ENDAT2.2 Protocol 33554432	51
Heidenhain rotary grating/grating ruler	ENDAT2.2 Protocol /	51
SinCos162 teeth	Sin and cosine dedicated control Sine and cosine fine point V2.27 V2.30 162*16384	55
SinCos256 teeth	Sin and cosine dedicated control Sine and cosine fine point V2.27 V2.30 256*16384	19
SinCos384 teeth	Sin and cosine dedicated control Sine and cosine fine point V2.27 V2.30 384*16384	11
SinCos512 teeth	Sin and cosine dedicated control Sine and cosine fine point V2.27 V2.30 512*16384	12
SinCos1024 teeth	Sin and cosine dedicated control Sine and cosine fine point V2.27 V2.30 1024*16384	56
SinCos 2048 teeth	Sin and cosine dedicated control Sine and cosine fine point V2.27 V2.30 2048*16384	57

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value	unit	Applicable method
ÿPA97	Position feedback input signal selection	0ÿ2	1		P/S
	PA97=0, select the second position input signal as the position feedback input signal. At this time, CN3 is not connected to the second position encoder feedback signal. The servo drive unit will have an Er-24 or Er-53 fault. PA97=1, select the motor encoder signal as the position feedback input signal. PA97=2, select the external induction switch signal as the reference point signal of the orientation function. Note: This parameter will take effect only after power is turned on again after the modification is successful.				
PA98 Second position encoder line number		10ÿ30000	1024		PÿS
PA99	Directional speed	10ÿ1000	100	rpm	S
	When the spindle motor is oriented, it first rotates at the orientation speed. When the servo drive unit captures the encoder Z pulse, the spindle motor rotates and stops at the orientation speed. Location.				
PA100	Direction selection	0ÿ2	0		S
	When PA100=0, the orientation speed is in CCW direction when the motor starts rotating in CCW direction, and the orientation speed is in CW direction when the motor starts rotating in CW direction. PA100ÿ1, no matter what the running direction of the motor is, the motor is oriented at CCW orientation speed. PA100=2, no matter what the running direction of the motor is, the motor is oriented at CW orientation speed.				
ÿPA101	The second position feedback input signal is inverted	0ÿ1	0		PÿS
	PA101ÿ0: The direction of the second position input signal is not reversed. PA101ÿ1: The direction of the second position input signal is reversed. Note: If this parameter is set incorrectly, the servo drive unit will display ERR-58 or ERR-59 alarms. The parameter modification will take effect only after power is turned on again after the modification is successful.				
PA102	Orientation Position Window	0ÿ1000	18	0.01 degrees	S
	After the orientation function is started, the servo drive unit enters the position loop control, and the motor shaft (or spindle) stops exactly at the orientation position. Adjustment, the motor will have a slight shake when it stops. When the deviation of the motor shake is within the orientation window, it is considered that the orientation is completed. The servo drive unit If PA102 is too small, the orientation completion signal fed back by the servo drive unit to the CNC will be The movement becomes unstable and even leads to directional failure.				
PA103	Directional position 1 Low	0ÿ9999	0	pulse	S
	1. PA103~PA110, PA68~75 are the eight orientation point setting parameters of the eight-point orientation function. When the supporting CNC system supports the eight-point orientation function, These parameters can be set. 2. If the directional position value does not exceed the range of the directional position low position (such as PA103), there is no need to set the directional position high position (such as PA104). When the orientation is performed according to the motor encoder signal, the low position of the orientation position is set according to "DP-APO" and the high position of the orientation position is set according to When the orientation is performed according to the signal of the second position encoder, the low position of the orientation position is set according to "DP-SPO." The orientation position high position is set according to "DP-SPO." 3. When the user uses the orientation function of the induction switch, that is, PA97=2, when the SEC1 (CN8-13) signal is OFF, the orientation position points to the orientation position 1 parameter (PA103, PA104); when SEC1 (CN8-13) signal is ON, the directional position points to directional position 2 parameter (PA105, PA106 ÿÿ				
PA104 Directional position 1 High		0ÿ30000	0	pulse	S
PA105 Directional position 2 Low		0ÿ9999	0	pulse	S
PA106 Directional position 2 High		0ÿ30000	0	pulse	S
PA107 Directional position 3 Low		0ÿ9999	0	pulse	S

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value unit		Applicable method
PA108	Directional position 3 High	0ÿ30000	0	pulse	S
PA109	Directional position 4 Low	0ÿ9999	0	pulse	S
PA110	Directional position 4 High	0ÿ30000	0	pulse	S
PA111	DSP Software Edition	Unmodifiable	520		
	DSP software version number identification.				
PA118	Internal Enable	0ÿ1	0		PÿS
	In the absence of external SON input signal, the motor is enabled by setting the servo drive unit parameters. PA118=0: When the external input signal SON is ON, the motor is enabled; PA118=1: The servo drive unit enables the motor internally without the need for an external input signal SON.				
PA119	Break enable parking mode selection	0ÿ1	1		
	PA119=0: When the enable is disconnected, the motor coasts to stop; PA119=1: When the enable is disconnected, the motor brakes to stop.				
PA124	Set the jog speed	0ÿ12000	120	rpm	S
	Set the running speed in (Jr) jog mode. The running mode is selected by PA4.				
PA125	Torque limitation in manual and jog operation modes	0ÿ500	100	%	S
	The setting value is the percentage of the motor's rated torque. In manual and jog operation modes, the motor's output torque is limited by this parameter.				
PA132	Static friction compensation gain	1ÿ5000	1		P
	When the static friction compensation function is turned on, adjust PA132 according to the concave and convex marks of the cutting edge of the workpiece. Generally speaking, if the concave and convex marks on the cutting edge are obvious, you can increase the value by 10 based on the default value and then see the processing effect. Can continue to grow.				
PA133	Static friction compensation time	0ÿ5000	0		P
	When PA133=0, the static friction compensation function is turned off. When PA133 is non-zero, the static friction compensation function is turned on. After turning on this function, it is generally recommended to set the PA133 value to 50, and then adjust the value according to the cutting Adjust PA133 according to the concave and convex marks on the workpiece feed edge. Generally, it is recommended to increase by 10 each time.				
PA135	Reverse acceleration compensation gain	1ÿ5000	20/100		P
	When the reverse acceleration compensation function is turned on, PA135 is adjusted according to the convexity of the cutting arc passing through the quadrant. Generally speaking, when the protrusion of the quadrant mark is obvious, you can increase it by 10 based on the default value, and then see the processing effect. If there is still protrusion, you can continue Continue to increase. When the quadrant mark is more concave, it can be reduced by 10 each time.				
PA136	Reverse acceleration compensation time	0ÿ5000	100/0		P
	When PA136=0, the reverse acceleration compensation function is turned off. When PA136 is non-zero, the reverse acceleration compensation function is turned on. After turning on this function, it is generally recommended to set the value of PA136 to 100, and then adjust the value according to the cutting Adjust PA136 according to the convexity of the arc passing through the quadrant. Generally, it is recommended to increase or decrease by 10 each time.				

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value	unit	Applicable method
PA137	Position out-of-tolerance alarm detection selection	0ÿ1	1		P
	Position mode, when the following error exceeds the range set by PA32, the servo drive unit outputs Er-4 position error alarm. PA137ÿ0: Do not detect position out-of-tolerance alarm; PA137ÿ1: Detection position out-of-tolerance alarm.				
PA139	Phase loss alarm detection selection	0ÿ1	1		PÿS
	When one phase of the three-phase input power is missing, the servo drive unit outputs Er-21 phase loss alarm. PA139ÿ0: No phase loss alarm detection; PA139ÿ1: detect phase loss alarm.				
PA141	Er-70 alarm threshold setting	400ÿ799	432	ms	
	The hundreds digit of the parameter value represents the module current percentage, 4 represents 40%; the ones and tens digits represent the duration, 32 represents 32ms.				
PA142	Spindle orientation alarm time	0ÿ30000	10000	ms	
	Set the alarm time for orientation failure after the spindle orientation function is started.				
PA143	Braking time	1ÿ32000	375/800	0.1ms	PÿS
	(Parameters used by the manufacturer for debugging, users must not change them!)				
PA144	Acceleration and deceleration time unit selection	0ÿ1	0		
	PA144ÿ0: corresponding to PA57, PA58, the unit of acceleration and deceleration time is 1 ms; PA144ÿ1: Corresponding to PA57, PA58, the unit of acceleration and deceleration time is 10 ms.				
PA145	Module overcurrent time	0ÿ32000	20/1000	1ms	PÿS
	(Parameters used by the manufacturer for debugging, users must not change them!)				
PA146	Speed regulator long-term saturation alarm time	0ÿ30000	1000/ 15000	ms	PÿS
	(Parameters used by the manufacturer for debugging, users must not change them!)				
PA147	The maximum deceleration of the motor before the power-off brake is applied is allowed. Speed Time	0ÿ30000	30/14000	ms	PÿS
	When the power-off brake is required to lock the running motor, the motor must be decelerated first. If the motor speed is still high within the deceleration time set by PA147, If the speed is lower than the speed set by PA149, the power-off brake is forced to lock the motor shaft. Please also refer to 6.5 in Chapter 6.				
PA148	Servo lock delay time	0ÿ30000	100/0	ms	PÿS
	When the motor needs to be locked by power-off brake, the SON signal must be turned off after the motor stops (servo lock) before the power-off brake is locked. The process of transition from servo lock state to power-off brake lock state. The servo lock state must be delayed by PA148 to ensure that the power-off brake is activated. During operation, the position of the motor shaft remains unchanged.				
PA149	Motor speed when power-off brake is activated	0ÿ300	30/10	rpm	PÿS
	The maximum motor speed allowed when the power-off brake is actuated.				

P: Position control S: Speed control

Parameter number	significance	Setting range	Default value unit		Applicable Way
PA150	Spindle clamping interlock delay time	0ÿ32000	100	ms	
	After the mechanical clamping device on the spindle side is set to clamp the spindle, the delay time of reducing the motor torque is reduced.				
PA152	Induction switch signal search mode when orienting	0ÿ3	2		
	1) Only when the transmission ratio of the directional axis can be set in the form of an integer in PA154 or PA155, PA152 can be set to 0 or 1; In this mode, when the servo drive unit is powered on and oriented for the first time, it will look for two induction switch jump signals for accurate stop, and will not detect them again during subsequent operation. The sensor does not sense the switch jump signal, but relies on the transmission ratio to calculate the spindle position. PA152=0 By default, when the induction switch signal changes from ON to OFF, the input is valid. PA152=1 means that when the induction switch signal changes from OFF to ON, the input is valid. 2) Set PA152 to 2 or 3; In this mode, the servo drive unit looks for two induction switch jump signals for accurate stopping each time it is oriented. PA152=2 By default, when the induction switch signal changes from ON to OFF, the input is valid. PA152=3 means that when the induction switch signal changes from OFF to ON, the input is valid.				
PA153	Detect the deviation range of two sensing edge signals	0ÿ3000	20	0.06 degrees	PÿS
	During spindle orientation, the servo drive unit will detect the edge signal output by the induction switch twice, and at the same time, it needs to judge the position calculated based on the transmission ratio. Correctness of the detected edge signal position. The setting of this parameter is used to determine the deviation range of the two edge signal positions. The deviation of the two edge signal positions is only within the set range. The servo drive unit can perform directional operations.				
PA154	First gear ratio	100ÿ30000	1000	0.001	PÿS
	The spindle transmission ratio parameter under the induction switch orientation function, or when the machine tool spindle has multi-speed transmission, it is the first gear transmission ratio. When the induction switch is oriented, a virtual spindle encoder is required. Setting PA154 means setting the number of virtual spindle encoder lines according to the spindle transmission ratio. In PA154 = transmission ratio × 1000; the number of lines of the spindle encoder = transmission ratio × the number of lines of the motor encoder (PA176). For example: the motor encoder line number is 5000, the transmission ratio is 5.5:1, then PA154=5.5×1000=5500, Virtual spindle encoder line number = 5.5 × 5000 = 27500. After the spindle encoder line number is calculated based on PA154, the DP-SPO display The value sets the orientation reference point.				
PA155	Second gear ratio	100ÿ30000	1000	0.001	
	Same PA154				
ÿPA156	GSK-Link Servo Axis Number	1ÿ256	1		PÿS
	There may be more than one servo drive unit that establishes serial communication with the CNC system. Set the servo axis number corresponding to the CNC system to facilitate CNC communication. Therefore, the servo drive units connected to the same CNC system cannot be set with duplicate servo axis numbers. This parameter modification will take effect only after power is turned off.				
PA158	CRC check selection	0ÿ1	1		
	PA158=0: No verification; PA158=1: perform calibration.				
PA159	Second gear directional speed	10ÿ1000	100	rpm	PÿS
	It is effective when using the induction switch directional function; If the machine tool spindle has multi-speed transmission, this parameter sets the speed of the second-speed spindle orientation. The spindle rotates at the orientation speed first. After the sensor captures the induction switch signal, the spindle motor rotates and stops exactly at the second gear directional position.				

Chapter 8 Exceptions and Handling

careful

ÿ If the servo drive unit or motor needs to be disassembled for inspection or repair, please do so under the guidance of a professional.
or contact our technical staff.

ÿ When the servo drive unit is abnormal, the power must be turned off for more than 5 minutes and the "CHARGE" light must be turned off before the abnormality can be checked or handled to prevent residual voltage in the servo drive unit from injuring people.

8.1 Meaning and handling of alarm and prompt codes

When the servo drive unit detects a fault, the motor stops running and the two LEDs on the left start flashing.

Display alarm code Er - □□ You can also enter dP-Err menu to view the current alarm code. Refer to this chapter according to the alarm code Related content, understand the cause of the fault and troubleshoot it.

Alarm number	significance	main reason	Solution
Er-1	The motor speed exceeds the setting Value (reference PA54, PA172 Maximum speed limit system)	1. The encoder feedback signal is abnormal.	Check the motor encoder and its signal cable connection or PA1 setting error.
		2. The motor rotates due to external force and the acceleration is large.	Check for mechanical failures and eliminate external forces.
		3. The setting value of PA54 or PA172 (maximum speed limit) is too small.	Correctly set the PA54 and PA172 parameter values according to the motor nameplate.
		4. The electronic gear ratio of the position command is too large.	Set the electronic gear ratio correctly.
Er-2	Main circuit DC bus Pressure too high	1. The brake resistor is not connected or is damaged.	Check the brake resistor and its connections.
		2. The brake resistor does not match (the resistance is too large). Note: The smaller the braking resistor value, the The larger the current in the circuit, the easier it is to damage the brake circuit. brake pipe.	A. Replace the brake resistor with one that matches the resistance and power; B. Reduce the start and stop frequency according to usage; C. Increase the acceleration and deceleration time according to the usage. Adjust PA57 and PA58 in the same way.
		3. The power supply voltage is unstable.	Check the power supply.
		4. The internal braking circuit is damaged.	Replace the servo drive unit.
Er-3	Main circuit DC bus Pressure too low	1. The input power capacity is insufficient, resulting in low voltage. Check the power capacity and the electrical part of the control cabinet.	
		2. When the power is turned on, the servo drive unit main circuit The circuit is not connected to normal voltage.	Check the electrical control part of the main circuit.
		3. The servo drive unit power start circuit is faulty.	Replace the servo drive unit.
Er-4	Position deviation counter exceeds Over setting value (reference PA32 setting range) (PA137=0: No inspection Alarm for measuring position out of tolerance; PA137=1: Detection position Out-of-tolerance alarm.	1. The electronic gear ratio of the position command is set too large.	Check the setting of electronic gear ratio PA29/PA30.
		2. The load inertia is large or the torque is insufficient.	A. Increase the power of the servo drive unit and motor; B. Reduce the load.
		3. Motor encoder failure or encoder line number setting error error.	Check the motor encoder and its connection, check PA1 settings.
		4. The phase sequence of motor U, V, W is wrong, which will be accompanied by Er-12 Or Er-27 alarm; (applicable to AC asynchronous spindle servo motor).	Swap the two phases arbitrarily.

Alarm number	significance	main reason	Solution
Er-4	Position deviation counter The value exceeds the set value (Refer to PA32 settings Position out-of-tolerance detection range Circumference	5. When using the second position encoder, incorrectly set PA 98, Feedback signal is abnormal.	Check the settings of PA98.
		6. The position loop or speed loop gain is set too small (see PA15ÿPA16ÿPA19ÿÿ	Adjust the speed loop or position loop gain.
		7. The effective range of position deviation is set too small.	Set up PA32 correctly.
Er-5 Abnormal motor temperature		1. The motor temperature is higher than the set value of 145ÿ.	Ensure that the motor cooling fan and air duct are normal; do not over Start and stop the motor frequently and do not overload the motor.
		2. The temperature sensor signal line in the encoder line is open. Or there is no temperature sensor in the motor.	Check the circuit according to the instructions; (Set PA182=0, shield this alarm).
		3. The motor temperature detection sensor is damaged.	Contact our after-sales service for repair.
Er-6	Speed regulator saturation fault	1. The motor torque is insufficient or the load is too heavy, causing the motor to be unable to follow the speed command and run stably for a long time.	A. Check whether parameter PA1 is correct and call it again. Motor default parameters; B. Check the mechanical equipment to ensure that there is no is blocked.
		2. The phase sequence of U, V and W phases is reversed.	Connect U, V, and W wires correctly.
		3. The default parameters of the motor are incorrect, or the motor characteristics are too soft.	Check the motor model code corresponding to PA1 and correctly call out the motor default parameters again.
		4. The motor or encoder is abnormal.	Replace the servo motor.
Er-8	Position deviation counter overflow	The position command electronic gear ratio is set too large.	Check the settings of PA29 and PA30 parameters.
Er-9	Motor encoder signal reverse Feedback Abnormal	1. The motor encoder signal wiring is poor or incorrect. Check the connector and signal line welding.	
		2. The motor encoder signal feedback cable is too long, causing The signal voltage is low.	Shorten the cable length (within 30m).
		3. The motor encoder is damaged.	Replace the motor or its encoder.
		4. The servo drive unit control board is faulty.	Replace the servo drive unit.
Er-11	The IPM module inside the servo drive unit is faulty.	1. When the power is turned on and the servo drive unit is not enabled Appears, power on again, the alarm still appears; A. The servo drive unit control board is faulty; B. The braking resistor terminal is short-circuited to ground.	If it is reason A, replace the servo drive unit; If the cause is B, check and correctly connect the braking resistor.
		2. When the power is turned on and the servo drive unit is not enabled The alarm can be eliminated by re-powering on.	Poor grounding or external interference. Check the grounding. Find the interference source and stay away from it or shield it.
		3. When the power is turned on and the servo drive unit is enabled, After powering on again, the alarm still occurs. A. The motor power lines U, V, and W are short-circuited. Or short circuit between U, V, W and PE; B. The IPM module of the servo drive unit is damaged; C. The current sampling circuit of the servo drive unit is broken. open.	If it is reason A, replace the motor wire or replace the motor; If the cause is B or C, replace the servo drive unit.

Alarm number meaning		main reason	Solution
Er-11	The IPM module inside the servo drive unit is faulty.	4. This alarm occurs when the motor starts or stops, and can be eliminated by powering on again. A. The motor setting of the servo drive unit is the default Parameter error; B. The load inertia is large, and the start and stop The command acceleration rate is too large.	If it is reason A, restore the motor default parameters again. (Refer to Section 4.4 of Chapter 4 for steps to restore the motor default parameters.) If it is reason B, increase the acceleration and deceleration time of the command, reduce the acceleration rate of the command, or reduce the load inertia.
Er-12	Overload alarm during motor operation	1. The motor has been overcurrent for a long time.	Reduce the load.
		2. Improper parameter settings may cause the motor to vibrate or Unusual noise.	Re-adjust the performance parameters related to the motor. (See (Note for PA15, PA16, PA18, PA19).
		3. PA1 setting error causes incorrect number of motor encoder lines.	Reset PA1 according to the motor model code.
		4. U, V, W wiring errors. The power-on operation phenomenon is similar to the Er-27 alarm.	The AC asynchronous spindle motor can exchange any two phases; The permanent magnet synchronous motor is correctly wired according to the factory wiring mark. The brown, red, and blue lines correspond to U, V, and W respectively.
Er-14	Motor exceeds 130ÿ PTC130 Alarm	1. PTC130 detects that the motor temperature exceeds 130°C; 2. The PTC130 temperature sensor is not connected properly.	1. Check the cause of the motor temperature increase and reduce the motor temperature; 2. Connect PTC130 correctly and check the settings of PA182. Check whether the setting is correct.
Er-15	Motor over 150ÿ PTC150 Alarm	1. PTC150 detects that the motor temperature exceeds 150°C. 2. The PTC150 temperature sensor is not connected properly.	3. Check the reasons for the increase in motor temperature and reduce the motor temperature; 4. Connect PTC150 correctly and check the settings of PA182. Check whether the setting is correct.
Er-16	During motor operation Overload alarm occurs	1. The motor runs under heavy load for a long time, which is longer than Er-12.	A. Reduce the load. B. Replace the servo drive with a higher power one.
		2. The motor rated current parameter is set incorrectly.	Set the drive parameters correctly according to the motor nameplate.
Er-17 Braking time is too long		1. The input power voltage is too high for a long time.	Connect a power supply that meets the working requirements of the servo drive unit.
		2. No braking resistor or the braking resistor is too large, over-braking During the process, the energy cannot be released in time, causing internal Increase in DC voltage.	Connect the correct brake resistor.
Er-18	The DC bus voltage is too high, but there is no brake feedback	Brake circuit fault.	Replace the servo drive unit.
Er-19	DC bus voltage is not Reaching the braking threshold, With brake feedback	Brake circuit fault.	Replace the servo drive unit.
Er-20	When the power is turned on, the servo drive unit EEPROM alarm	1. When powered on, the servo drive unit reads the EEPROM The data in failed.	To restore the motor default parameters, refer to Chapter 4. Section 4.4 Restore default values.
		2. EEPROM chip or circuit board failure.	Replace the servo drive unit.
Er-21	Input power R, S, T Phase loss alarm	1. One phase of the input power connection is disconnected, or the power supply is missing a phase.	A. Check the input power connection and reconnect it. B. Check the input three-phase power.
		2. The power input circuit of the servo drive unit is faulty. Replace the servo drive unit.	
Er-22 Encoder zeroing alarm Encoder zeroing failed.			Replace the encoder and re-zero it.

Alarm number	significance	main reason	Solution
Er-23 Current error is too large		The current detection circuit is faulty or the current sensor is damaged. Control supply voltage failure.	Replace the servo drive unit.
Er-24	Check the CN3 interface Second position input Abnormal number	1. No feedback signal from the second position encoder is received. However, parameter PA97 is set to 0.	Modify PA97=1.
		2. The spindle encoder feedback signal is abnormal. (The reason is the same as Er-9 alarm).	Check the signal wiring, welding and plug connection of the second position encoder.
Er-25	Servo drive unit Towards failure	1. The Z pulse signal cannot be detected.	Detect feedback input signal wiring.
		2. Due to the large load inertia, the corresponding parameter settings are not When or the gain is set too large.	Check the motor model code PA1 or related gain parameters PA15ÿPA16ÿPA18ÿPA19ÿ
		3. When using the second position encoder for orientation, the second position The phase sequence of the encoder and motor encoder A/B signals is not correct. Consistent.	Modify the PA101 parameters and change the phase sequence to be consistent. See PA101 parameter description.
		4. The orientation speed PA99 or PA159 is too small, resulting in orientation timeout.	This can be solved by increasing PA99 or PA159.
		5. The orientation window PA102 is too small, resulting in the orientation completion The signal cannot be output.	This can be solved by increasing the window PA102.
		6. Transmission ratio PA154 or PA155 parameters and actual There is a big difference.	Set the gear ratio correctly.
		7. The allowable error range of PA153 is too small.	This can be solved by increasing the size of PA153.
		8. The induction switch signal output is abnormal, or the induction switch type is inappropriate.	Check the specifications of the sensor switch and the installation of the sensor switch according to the requirements specified in the instructions.
Er-27	U, V, W wiring is wrong Error (asynchronous motor is valid)	Servo drive unit main circuit output U, V, W corresponds to The phase sequence of motor U, V, W is wrong.	Swap any two phases.
Er-28 Software upgrade parameters are incorrect		The parameters are not readjusted and saved after the software is burned or upgraded.	Recall the default parameters, save the parameters and then power on again.
Er-29 Power-on parameter detection error caused by conflict between old and new versions during software upgrade.			Execute the parameter write operation and power on again.
Er-30	AC input voltage over High alarm	The AC power input voltage is too high and exceeds the rated voltage. 115% of.	Adjust the grid voltage or add AC reactors and AC filters Stable power supply for equipment such as oscillators.
Er-31 Encoder cannot be recognized		1. The Heidenhain encoder cannot be automatically identified.	Check the encoder cable or replace the encoder.
		2. The value set for PA96/PA200 is an invalid parameter value.	Correctly set PA96 or PA200.
Er-32	Encoder UVW signal illegal encoding (valid for synchronous motor)	1. The interface contact is poor or the cable shielding is poor.	Check the encoder interface and shielding wire.
		2. The encoder UVW signal is damaged.	Replace the encoder.
		3. Encoder interface circuit failure.	Replace the servo drive unit.
Er-34	Pulse electronic gear ratio is too large	The pulse electronic gear ratio parameter setting is unreasonable.	Correctly set PA29, PA30, PA33, and PA34.
Er-35 brake pipe fault alarm		GR2024-L, GR2030-L, GR2045-L servo drive If this alarm occurs in the dynamic unit, the internal braking circuit is faulty.	Replace the servo drive unit.
		This alarm appears on servo drive units other than the above models. Warning: parameter setting error.	Set PA225=0.

Alarm number meaning		main reason	Solution
Er-36 Three-phase main power failure		1. The three-phase main power supply is disconnected or drops momentarily.	Check the main power supply to ensure that the three-phase power is input normally.
		2. The three-phase main power supply detection circuit is faulty.	Replace the servo drive unit.
Er-37	Radiator temperature below -20ÿ alarm	1. The temperature detection sensor is open.	Replace the servo drive unit.
		2. The ambient temperature is too low.	Ensure that the working environment of the servo drive unit is not lower than -20ÿÿ
Er-38	Radiator temperature higher than 75ÿ alarm	1. The motor is overloaded for a long time.	Lighten the load.
		2. The ambient temperature is too high.	Improve ventilation conditions.
		3. The thermistor is short-circuited.	Replace the servo drive unit.
Er-39	Absolute encoder sensor mode read data error	1. PA1 parameter setting error.	Recall the correct motor defaults.
		2. Encoder feedback CN2 is disconnected or has poor contact.	Check CN2 wiring.
		3. The absolute encoder is damaged.	Replace the motor with a new one.
Er-40	Motor encoder NCRC data error	1. The encoder or encoder line is disturbed; 2. The encoder type parameter PA176 or PA200 is set Error; 3. Encoder failure.	1. Check the grounding of the servo drive unit and servo motor; 2. Correctly set PA176 and PA200; 3. Replace the encoder.
Er-41	Encoder type error alarm	1. Encoder type parameter PA96/PA200 is set incorrectly error; 2. Software version dp-CPL is not supported.	1. Correctly set up PA96/PA200; 2. Contact the company's technical staff to upgrade the software version.
Er-42	Reading absolute encoders EEPROM timeout Call the police	1. PA1 parameter setting error.	Recall the correct motor defaults.
		2. The servo drive unit reads the encoder when powered on EEPROM error.	Check the CN2 connection.
		3. The motor encoder EEPROM is damaged.	Replace the motor.
Er-43	Checksum error when reading EEPROM in absolute encoder	1. PA1 parameter setting error.	Recall the correct motor defaults.
		2. The servo drive unit reads the encoder when powered on EEPROM post data check error.	Performs Ab-Set encoder write operation.
Er-44	The encoder single-turn and multi-turn configuration is incorrect	1. PA1 parameter setting error;	Recall the correct motor defaults.
		2. Encoder feedback CN2 is disconnected or has poor contact. Check CN2 connection.	
Er-45	Encoder data verification mistake	In sensor mode, data verification error occurs when reading the current position of the encoder. This alarm is likely to occur when the motor's U/V/W is leaking to PE.	1. Check whether the shielding layer of the encoder cable is firmly grounded. Solid and reliable; 2. Check whether all equipment of the machine tool has leakage to the ground situation.
Er-46	Tamagawa encoder overspeed	1. During the power failure of the servo drive unit, the motor is Rotate.	After the servo and system power are turned on, the system starts, and the GSK-Link communication is normal, this alarm will be automatically eliminated after power is turned on again.
		2. When the external 3.6V battery is not connected, the servo drive Yuan Shangdian appears.	1. Install 3.6V battery. 2. Turn on the servo and system power, the system starts, and After GSK-Link communication is normal, power on the The alarm is automatically cleared.
Er-47	Tamagawa encoder single turn resolution error	When the servo drive unit is powered on, the motor rotates at a speed greater than 100r/min.	1. Adjust the motor speed to below 100r/min. 2. Connect the servo and system power, start the system, and after the GSK-Link communication is normal, this alarm will be automatically eliminated after powering on again.

Alarm number meaning		main reason	Solution
Er-48	Tamagawa encoder single Lap count error	1. The encoder is disturbed.	1. Implement anti-interference measures for encoder wiring; 2. Turn on the servo and system power, the system starts, and After GSK-Link communication is normal, re-power on this alarm Automatically eliminated.
		2. Encoder failure.	Replace the servo motor.
Er-49 encoder battery undervoltage		1. The encoder battery voltage is too low.	Replace the battery, then turn on the servo and system power. After the GSK-Link communication is normal, re-power on and this alarm will The alarm is automatically cleared.
		2. When the servo drive unit is not powered on, disconnect the encoder battery or the encoder connection cable.	After confirming that the connection is normal, turn on the servo and system power, start the system, and after the GSK-Link communication is normal, this alarm will be automatically eliminated after powering on again.
		3. The encoder is disconnected.	After confirming that the connection is normal, turn on the servo and system power. After the GSK-Link communication is normal, re-power on the The alarm is automatically cleared.
Er-50	Absolute	The position command frequency is too high or the electronic gear ratio is too large.	Reduce the position command frequency, or set the electronic gear ratio correctly.
Er-51	Position instructions Frequency is too high	Position command frequency is too high or the electronic gear ratio is too high big.	Reduce the position command frequency, or set the electronic gear ratio correctly.
Er-52 speed loop iteration overtravel		During inertia identification, if the motor rotates forward or reverse for more than 5 turns, the servo drive unit determines it as a fault state and outputs this alarm.	Check whether the motor related parameters are set correctly, according to Appendix A The motor model code correctly calls out the motor-related default parameters.
Er-53	Second position encoder sensor mode read Error Alarm	1. PA96 parameter setting error.	Reset the second position encoder type.
		2. Connect to the second encoder input of CN3 The signal is disconnected or the contact is poor.	Check the wiring of CN3.
		3. The second position encoder is damaged.	Replace the encoder with a new one.
Er-54	Second position encoder CRC check alarm	1. In sensor mode, read the second encoder Data verification error at the previous position.	Check whether the shielding layer and grounding of the second encoder cable are firm. Depend on;
		2. When the motor's U/V/W leaks to PE, This may cause the alarm to be generated.	Check all equipment on the machine tool for ground leakage.
Er-58	Alarm for excessive deviation of the first and second position feedback data	1. The transmission ratio setting of the first and second encoders is wrong. when.	In feed mode, check the transmission ratio PA41/PA42 set up.
		2. Motor encoder failure or encoder parameter setting Configuration error.	A. Check PA96 and PA98 settings; B. Check PA101 settings (power on again after modification).
		3. Second encoder feedback position and motor feedback Position deviation is too large.	The second encoder has no data or the structure is loose.
		4. The second position encoder and the motor encoder In the opposite direction.	Invert PA101. After saving, the servo drive unit must be re-installed. electricity.
Er-59	Second position encoder NCRC data error	1. The encoder or encoder line is disturbed; 2. Set the encoder type parameter to PA96 or PA98. Error in setting; 3. Encoder failure.	1. Check the grounding of the servo drive unit and servo motor; 2. Correctly set PA96 and PA98; 3. Replace the encoder.

Alarm number	significance	main reason	Solution
Er-60	Power-on detection backup EEPROM Failure Alarm	The parameters are not backed up, or the backup space parameters are not verified. Error, or PA252 is not set.	Back up the parameters again and execute EE-bA operation.
Er-61	When adjusting the backup parameters, the motor-related parameters in the proofreading storage area and the backup area are abnormal.	When restoring a backup operation EE-rs, the model is different The number of motor encoder lines is inconsistent.	Resave the parameters and execute the EE-SEt operation.
Er-62	When power is turned on, the parameter version, backup parameter version, and saved parameter version in the software are inconsistent	The software version detected in the backup area is different from the current software The versions are inconsistent.	Back up the parameters again and execute EE-bA operation.
Er-63	synchronous and asynchronous switching alarm	A dangerous operation is being performed, and the control software for the synchronous motor and the asynchronous motor has been switched.	If this alarm occurs, please contact the manufacturer's technical staff.
Er-69	Speed feedback abnormality When there is no command speed, Feed speed is greater than the rated speed 10%	1. The encoder type is set incorrectly; for example, the A4ÿ encoder is confused with the A6 setting.	Carefully check the motor model code corresponding to the motor. Confirm that the motor model code corresponding to the adapter encoder is Right.
		2. The UVW phase sequence is connected incorrectly.	Check the motor power line carefully to see if it is wrong or loose. move. Make sure the servo drive unit and the motor are connected one by one. system.
		3. The motor with brake is installed on the shaft without counterweight. Give the enabling moment the workbench falls off.	It is recommended to increase the value of PA208 or add more configuration devices.
		4. When configuring the synchronous machine, PA2 is incorrectly set to Asynchronous machine;	Contact the company's technical staff.
		5. Encoder zero point setting error.	Contact the company's technical staff.
Er-70	Instantaneous overcurrent duration Too long	This occurs when the motor current exceeds the percentage set by PA141 and the duration exceeds the time set by PA141.	The treatment method is the same as Err-6.
Er-80	The first code disk sine and cosine amplitude Too small alarm	The gap between the reading head and the gear disc is too large, causing  Displayed Value Less than 10,000.	Use a smaller feeler gauge to assist with installation readings head and adjust the gap to smaller size.
Er-85	The second encoder sine and cosine amplitude is too small to alarm		
Er-81	The first code disk sine and cosine amplitude Too large alarm	1. The gap between the reading head and the gear disc is too small, causing  show The value of is greater than 30000; 2. The encoder type is not sine-cosine.	1. Use a slightly larger feeler gauge to assist installation Reading head, adjust the gap larger; 2. Check the encoder type.
Er-86	The second encoder sine and cosine amplitude is too large to alarm		
Er-82	The first code disk sine and cosine signal Over-frequency alarm Servo drive unit reads the sine and cosine signal frequency Too large, beyond the control range of 250KHz.		1. Reduce the spindle speed; 2. Replace the sprocket with one with fewer teeth.
Er-87	The second code disk sine and cosine signal Frequency too high alarm		

Alarm number	significance	main reason	Solution
Er-83	The first code disk cosine signal overflow Alarm	1. The gap between the reading head and the gear disc is too small, and the sine and cosine signals read by the servo drive unit are out of range. 2. The encoder type is not sine-cosine.	1. Use a slightly larger feeler gauge to assist installation Reading head, adjust the gap larger; 2. Check the encoder type.
Er-84	The first encoder sine signal overflow alarm		
Er-88	The second code disk cosine signal overflow Alarm		
Er-89	Second encoder sine signal overflow alarm		
Er-100	GSK-Link communication mdt loss alarm	The GSK-Link communication line is in poor contact or disconnected.	Check whether the communication lines on the servo side and CNC side are effectively
Er-101	GSK-Link communication mst loss alarm	The GSK-Link communication line is in poor contact or disconnected.	connected. Check whether the communication lines on the servo side and CNC side are effectively connected.
Er-102	GSK-Link communication loop break alarm police	The GSK-Link communication line is in poor contact or disconnected.	Check whether the communication lines on the servo side and CNC side are effectively connected. catch.
Er-103	Mdt data CRC in communication Validation Error	GSK-Link communication mdt data CRC verification mistake.	Re-power on the CNC and servo drive unit. If the fault persists, replace the servo drive unit.
Er-104	FPGA initialization during communication Error Alarm	FPGA initialization error during GSK-Link communication.	Re-power on the CNC and servo drive unit. If the problem persists, replace the servo drive unit.
Er-105	GSK-Link communication jump monitoring abnormal alarm	GSK-Link communication jump is abnormal.	Re-power on the CNC and servo drive unit. If the fault persists, replace the servo drive unit.

The servo drive unit gives a warning, which means that the servo drive unit reminds the user to pay attention to the relevant warning content. Please handle it in time. Prevent faults from happening. But before the alarm appears, the servo drive unit can still operate normally.

Warning sign	significance	main reason	Solution
Ar-601	Mdt data in communication CRC verification error	The GSK-Link communication line has poor contact.	Check whether the communication lines on the servo side and CNC side are connected properly.
Ar-602	GDT data in communication CRC verification error		
Ar-603	When establishing communication, bus_ready Not connected	The GSK-Link communication line is not connected.	Connect servo CN4 and CN5, and this warning will be automatically eliminated.
Ar-701	Absolute encoder external Battery undervoltage	Absolute encoder battery undervoltage prompt.	Always replace the battery when the servo drive unit is powered on. After replacing the battery, this warning will automatically disappear.
Ar-702	The positioning position exceeds the counting range of the positioning code disk	The positioning position is greater than the single-turn counting range of the positioning code disk.	Check PA90, PA91, PA68ÿPA75, PA103ÿ PA110ÿ
Ar-703 motor default value is invalid		The motor model code set by PA1 is not available in the software. Corresponding motor parameters.	Modify PA1 settings.

8.2 Common troubleshooting

Common abnormal phenomena	Possible causes	Inspection and treatment methods
The motor vibrates violently during operation, or Howling occurs.	1. The speed loop gain is improperly set.	Restore the motor default parameters or refer to 6.1.1 PA15, PA16, The debugging method of PA18 is manual debugging.
	2. The mechanical dynamic balance connected to the motor shaft is poor.	The vibration and noise increase with the increase of speed, and the motor shaft is disengaged. Other connecting mechanisms, run the motor alone without load, the vibration disappears, Re-balance the machine.
The motor swings when starting and stopping Larger.	The load inertia is large, and the corresponding CNC system instructions The acceleration and deceleration time settings are too small.	Reduce the speed loop integration time, or reduce the motor speed.
ÿ Appears when powered on Er-27 alarm.	U, V, W connection of servo drive unit and motor Line phase sequence is wrong.	Swap two phases at will. For example: the U terminal of the servo drive unit is connected to the motor line The V end of the servo drive unit is connected to the U end of the motor line.
ÿEr-2 appears when the motor is running. Er-17 alarm.	The servo drive unit is not connected to a brake resistor or brake circuit. The resistance is too great.	Configure the brake resistor correctly.
ÿThe motor cannot be stopped by braking.	The load inertia is large and no proper acceleration or deceleration is set. Deceleration time.	Set the values of PA57 and PA58, increase them by 100 each time and observe the effect. Until the abnormality is eliminated.
ÿThe spindle motor is not running properly Stable, large speed fluctuations	A. Motor encoder failure; B. Parameter setting error.	A. Replace the motor; B. Reset the default motor parameters. In particular, the number of motor poles, encoder Setting of encoder line number.
ÿWhen starting or stopping, the speed overshoot is too large and the motor has obvious swing.	The load inertia is large.	1. Check whether the acceleration and deceleration time of the motor start/stop is too short; 2. Check whether the proportional integral parameters of the speed loop and position loop are set too high. For parameter setting method, please refer to 6.1 in Chapter 6.
ÿThe spindle motor overheats.	The fan is damaged or the fan power supply is connected incorrectly.	1. Check the cooling fan.
	The heat dissipation duct is blocked by foreign matter.	2. Check the heat dissipation duct.
	The ambient temperature is too high. Add or improve the heat dissipation equipment.	3. Check the ambient temperature.
	The load is too heavy. Reduce the load.	4. Check the load status to see if it is overloaded.
	The motor default parameters are incorrect.	5. Check the motor model code parameters.
ÿThe spindle motor has abnormal noise.	The motor default parameters are incorrect.	1. Check the speed loop and position loop parameters to see if they are set improperly.
	The input command is subject to strong interference. Need to stay away from interference Source, handle the shielding line well.	2. Check whether there is strong interference in the analog command or position command.
	There is foreign matter in the load that blocks operation or causes deformation.	3. Disconnect the load and check whether there is any obstruction in the load.
	A. The screws fixing the motor are loose; B. Internal fault of the motor.	4. Stop the car at high speed and check whether the motor is still There is noise.

8.3 Inspection and maintenance of servo drive unit

Notice	ÿ Do not use a megohmmeter or similar tool to check the insulation of the servo drive unit, otherwise it may cause the servo drive The unit is damaged. ÿ Users should not disassemble or repair the servo drive unit. ÿ Please replace the encoder backup battery every six months.

Inspection Category	Inspection items	Check time	Daily maintenance
Electrical cabinet environment	Unusual smell	Once a day	If there is an abnormal smell, handle it promptly. If the equipment is about to be damaged due to aging, If damaged, it must be replaced in time.
	Dust, moisture and oil should be wiped off with a dry cloth or removed with a filtered high-pressure air gun at least once a month.		
	Power cables and connection terminals should be inspected at least once every six months.		If the external insulation layer and the connecting insulation wrapping are damaged or aged, Replace or insulate. Tighten any loose connection terminals with a screwdriver.
Servo drive unit	Cooling fan	At least once a week	Check whether the cooling fan's wind speed and air volume are normal and whether there is abnormal heating. If any abnormality occurs, the fan must be replaced.
	Dust accumulation in heat sink	Wipe with a dry cloth or clean with a filtered high-pressure air gun at least once a month.	
	Loosening of screws	Tighten terminal blocks, connectors, mounting screws, etc. with a screwdriver at least once every six months.	
Motor	Noise, vibration	Once a day	Compared with normal times, the noise and vibration are significantly increased, check the machine in time Connect the device and fix the fault.
	Cooling fan	At least once a week	Check whether the wind speed and volume of the cooling fan are normal and whether there is abnormal heating. If any abnormality occurs, the cooling fan must be replaced.
	Dust, water droplets and oil stains should be wiped off with a dry cloth or removed with a filtered high-pressure air gun at least once a month.		
	Insulation resistance should be measured at least once every six months.		Please use a 500V megohmmeter to measure, the resistance value should be more than 10Mÿ. If the resistance is below 10Mÿ, please contact our technicians.
	Motor installation and connection Load connection	At least once every six months	Use special mechanical tools to check whether the mechanical equipment is worn and whether the connection is loose. Check whether there is any debris stuck in the machine.

Appendix **A** Motor Model Code Table

ÿ Incremental encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
110SJT-M040E(A)	2	110SJT-M040E(A2)	76	175SJT-M380BH	1112
110SJT-M060E(A)	4	110SJT-M060E(A2)	77	175SJT-M380DH	1113
110SJT-M040D(A)	5	110SJT-M040D(A2)	78	175SJT-M500BH	1114
110SJT-M060D(A)	6	110SJT-M060D(A2)	79	175SJT-M500DH	1115
130SJT-M040D(A)	82	130SJT-M040D(A2)	85		
130SJT-M050D(A)	7	130SJT-M050D(A2)	86	175SJT-M380BH(A2)	1131
130SJT-M060D(A)	83	130SJT-M060D(A2)	87	175SJT-M380DH(A2)	1132
130SJT-M075D(A)	3	130SJT-M075D(A2)	88	175SJT-M500BH(A2)	1133
130SJT-M100D(A)	84	130SJT-M100D(A2)	89	175SJT-M500DH(A2)	1134
130SJT-M100B(A)	8	130SJT-M100B(A2)	90		
130SJTB-M150B(A)	9	130SJTB-M150B(A2)	91		
130SJTE-M150D(A)	81	130SJTE-M150D(A2)	92		
130SJT-M050E(A)	59	130SJT-M050E(A2)	62		
130SJT-M060E(A)	60	130SJT-M060E(A2)	63		
130SJT-M075E(A)	61	130SJT-M075E(A2)	64		
80SJTA-M024C	54	80SJTA-M024C(A2)	70		
80SJTA-M024E	55	80SJTA-M024E(A2)	71		
80SJTA-M032C	56	80SJTA-M032C(A2)	72		
80SJTA-M032E	57	80SJTA-M032E(A2)	73		
175SJT-M180B	22	175SJT-M180B(A2)	93		
175SJT-M180D	23	175SJT-M180D(A2)	94		
175SJT-M220B	24	175SJT-M220B(A2)	95		
175SJT-M220D	25	175SJT-M220D(A2)	96		
175SJT-M300B	26	175SJT-M300B(A2)	97		
175SJT-M300D	27	175SJT-M300D(A2)	98		
175SJT-M380B	28	175SJT-M380B(A2)	99		
175SJT-M150D	29	175SJT-M150D(A2)	100		
175SJT-M120E	30	175SJT-M120E(A2)	31		

ÿ Danaher **17** -bit absolute encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
60SJTR-MZ003E(A4I)	101	130SJTB-M150B(A4I)	152	130SJTG-M040GH(A4I)	1200
60SJTR-MZ005E(A4I)	102	130SJT-M150D(A4I)	154	130SJTF-M048C(A4I)	1201
80SJT-M024C(A4I)	104	130SJT-M050E(A4I)	156	130SJTG-M050GH(A4I)	1202
80SJT-M024E(A4I)	106	130SJT-M060E(A4I)	158	130SJTG-M060GH(A4I)	1204
80SJT-M032C(A4I)	108	130SJT-M075E(A4I)	160	130SJTF-M072C(A4I)	1205
80SJT-M032E(A4I)	110	130SJTE-M150D(A4I)	162	130SJTG-M075GH(A4I)	1206
80SJTA-M024C(A4I)	112	175SJT-M150B(A4I)	164	130SJTF-M096C(A4I)	1207
80SJTA-M024E(A4I)	114	175SJT-M120E(A4I)	166	130SJTG-M100GH(A4I)	1208
80SJTA-M032C(A4I)	116	175SJT-M150D(A4I)	168	130SJTF-M120C(A4I)	1209
80SJTA-M032E(A4I)	118	175SJT-M180B(A4I)	170	175SJTG-M120EH(A4I)	1210
110SJT-M020E(A4I)	120	175SJT-M180D(A4I)	172	175SJTG-M150EH(A4I)	1212
110SJT-M040D(A4I)	122	175SJT-M220B(A4I)	174	175SJTG-M180EH(A4I)	1214
110SJT-M040E(A4I)	124	175SJT-M220D(A4I)	176	175SJTG-M220EH(A4I)	1216
110SJT-M060D(A4I)	126	175SJT-M300B(A4I)	178	175SJTG-M300EH(A4I)	1218
110SJT-M060E(A4I)	128	175SJT-M300D(A4I)	180	175SJTG-M380EH(A4I)	1220
60SJTA-M006E(A4I)	130	175SJT-M380B(A4I)	182	175SJT-M380BH(A4I)	1222
60SJTA-M013E(A4I)	131	175SJTF-M150B(A4I)	183	175SJT-M380DH(A4I)	1224
60SJTA-MO19E(A4I)	132	175SJTF-M180B(A4I)	184	175SJT-M500BH(A4I)	1226
130SJT-M040D(A4I)	140	175SJTF-M150D(A4I)	185	175SJT-M500DH(A4I)	1228
130SJT-M050D(A4I)	142	175SJTF-M220B(A4I)	186	265SJTE-M700CH(A4I)	1230
130SJT-M060D(A4I)	144	175SJTF-M300B(A4I)	187	265SJTE-M1000CH(A4I)	1231
130SJT-M075D(A4I)	146	175SJTF-M300D(A4I)	188	265SJTE-M1400CH(A4I)	1232
130SJT-M100B(A4I)	148	175SJTF-M380B(A4I)	189	265SJTE-M2000CH(A4I)	1233
130SJT-M100D(A4I)	150	175SJTF-M220D(A4I)	190		
		175SJTF-M180D(A4I)	191		

ÿ Tamagawa **17** -bit absolute encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
60SJTR-MZ003E(A4II)	201	130SJTB-M150B(A4II)	252	130SJTG-M040GH(A4II)	1300
60SJTR-MZ005E(A4II)	202	130SJT-M150D(A4II)	254	130SJTF-M048C(A4II)	1301
		130SJT-M050E(A4II)	256	130SJTG-M050GH(A4II)	1302
		130SJT-M060E(A4II)	258	130SJTG-M060GH(A4II)	1304
		130SJT-M075E(A4II)	260	130SJTF-M072C(A4II)	1305
		130SJTE-M150D(A4II)	262	130SJTG-M075GH(A4II)	1306
80SJTA-M024C(A4II)	212	175SJT-M150B(A4II)	264	130SJTF-M096C(A4II)	1307
80SJTA-M024E(A4II)	214	175SJT-M120E(A4II)	266	130SJTG-M100GH(A4II)	1308
80SJTA-M032C(A4II)	216	175SJT-M150D(A4II)	268	130SJTF-M120C(A4II)	1309
80SJTA-M032E(A4II)	218	175SJT-M180B(A4II)	270	175SJTG-M120EH(A4II)	1310
110SJT-M020E(A4II)	220	175SJT-M180D(A4II)	272	175SJTG-M150EH(A4II)	1312
110SJT-M040D(A4II)	222	175SJT-M220B(A4II)	274	175SJTG-M180EH(A4II)	1314
110SJT-M040E(A4II)	224	175SJT-M220D(A4II)	276	175SJTG-M220EH(A4II)	1316
110SJT-M060D(A4II)	226	175SJT-M300B(A4II)	278	175SJTG-M300EH(A4II)	1318
110SJT-M060E(A4II)	228	175SJT-M300D(A4II)	280	175SJTG-M380EH(A4II)	1320
60SJTA-M006E(A4II)	230	175SJT-M380B(A4II)	282	175SJT-M380BH(A4II)	1322
60SJTA-M013E(A4II)	231	175SJTF-M150B(A4II)	283	175SJT-M380DH(A4II)	1324
60SJTA-MO19E(A4II)	232	175SJTF-M180B(A4II)	284	175SJT-M500BH(A4II)	1326
130SJT-M040D(A4II)	240	175SJTF-M150D(A4II)	285	175SJT-M500DH(A4II)	1328
130SJT-M050D(A4II)	242	175SJTF-M220B(A4II)	286	265SJTE-M700CH(A4II)	1330
130SJT-M060D(A4II)	244	175SJTF-M300B(A4II)	287	265SJTE-M1000CH(A4II)	1331
130SJT-M075D(A4II)	246	175SJTF-M300D(A4II)	288	265SJTE-M1400CH(A4II)	1332
130SJT-M100B(A4II)	248	175SJTF-M380B(A4II)	289	265SJTE-M2000CH(A4II)	1333
130SJT-M100D(A4II)	250	175SJTF-M220D(A4II)	290		
		175SJTF-M180D(A4II)	291		

ÿ Danaher **24** -bit absolute encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
60SJTR-MZ003E(A7I)	301	130SJTB-M150B(A7I)	352	130SJTG-M040GH(A7I)	1400
60SJTR-MZ005E(A7I)	302	130SJT-M150D(A7I)	354	130SJTF-M048C(A7I)	1401
		130SJT-M050E(A7I)	356	130SJTG-M050GH(A7I)	1402
		130SJT-M060E(A7I)	358	130SJTG-M060GH(A7I)	1404
		130SJT-M075E(A7I)	360	130SJTF-M072C(A7I)	1405
		130SJTE-M150D(A7I)	362	130SJTG-M075GH(A7I)	1406
80SJTA-M024C(A7I)	312	175SJT-M150B(A7I)	364	130SJTF-M096C(A7I)	1407
80SJTA-M024E(A7I)	314	175SJT-M120E(A7I)	366	130SJTG-M100GH(A7I)	1408
80SJTA-M032C(A7I)	316	175SJT-M150D(A7I)	368	130SJTF-M120C(A7I)	1409
80SJTA-M032E(A7I)	318	175SJT-M180B(A7I)	370	175SJTG-M120EH(A7I)	1410
110SJT-M020E(A7I)	320	175SJT-M180D(A7I)	372	175SJTG-M150EH(A7I)	1412
110SJT-M040D(A7I)	322	175SJT-M220B(A7I)	374	175SJTG-M180EH(A7I)	1414
110SJT-M040E(A7I)	324	175SJT-M220D(A7I)	376	175SJTG-M220EH(A7I)	1416
110SJT-M060D(A7I)	326	175SJT-M300B(A7I)	378	175SJTG-M300EH(A7I)	1418
110SJT-M060E(A7I)	328	175SJT-M300D(A7I)	380	175SJTG-M380EH(A7I)	1420
60SJTA-M006E(A7I)	330	175SJT-M380B(A7I)	382	175SJT-M380BH(A7I)	1422
60SJTA-M013E(A7I)	331	175SJTF-M150B(A7I)	383	175SJT-M380DH(A7I)	1424
60SJTA-MO19E(A7I)	332	175SJTF-M180B(A7I)	384	175SJT-M500BH(A7I)	1426
130SJT-M040D(A7I)	340	175SJTF-M150D(A7I)	385	175SJT-M500DH(A7I)	1428
130SJT-M050D(A7I)	342	175SJTF-M220B(A7I)	386	265SJTE-M700CH(A7I)	1430
130SJT-M060D(A7I)	344	175SJTF-M300B(A7I)	387	265SJTE-M1000CH(A7I)	1431
130SJT-M075D(A7I)	346	175SJTF-M300D(A7I)	388	265SJTE-M1400CH(A7I)	1432
130SJT-M100B(A7I)	348	175SJTF-M380B(A7I)	389	265SJTE-M2000CH(A7I)	1433
130SJT-M100D(A7I)	350	175SJTF-M220D(A7I)	390		
		175SJTF-M180D(A7I)	391		

ÿ Tamagawa **23** -bit absolute encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
60SJTR-MZ003E(A6)	3101	130SJTB-M150B(A6)	3152	130SJTG-M040GH(A6)	3200
60SJTR-MZ005E(A6)	3102	130SJT-M150D(A6)	3154	130SJTF-M048C(A6)	3201
		130SJT-M050E(A6)	3156	130SJTG-M050GH(A6)	3202
		130SJT-M060E(A6)	3158	130SJTG-M060GH(A6)	3204
		130SJT-M075E(A6)	3160	130SJTF-M072C(A6)	3205
		130SJTE-M150D(A6)	3162	130SJTG-M075GH(A6)	3206
80SJTA-M024C(A6)	3112	175SJT-M150B(A6)	3164	130SJTF-M096C(A6)	3207
80SJTA-M024E(A6)	3114	175SJT-M120E(A6)	3166	130SJTG-M100GH(A6)	3208
80SJTA-M032C(A6)	3116	175SJT-M150D(A6)	3168	130SJTF-M120C(A6)	3209
80SJTA-M032E(A6)	3118	175SJT-M180B(A6)	3170	175SJTG-M120EH(A6)	3210
110SJT-M020E(A6)	3120	175SJT-M180D(A6)	3172	175SJTG-M150EH(A6)	3212
110SJT-M040D(A6)	3122	175SJT-M220B(A6)	3174	175SJTG-M180EH(A6)	3214
110SJT-M040E(A6)	3124	175SJT-M220D(A6)	3176	175SJTG-M220EH(A6)	3216
110SJT-M060D(A6)	3126	175SJT-M300B(A6)	3178	175SJTG-M300EH(A6)	3218
110SJT-M060E(A6)	3128	175SJT-M300D(A6)	3180	175SJTG-M380EH(A6)	3220
60SJTA-M006E(A6)	3130	175SJT-M380B(A6)	3182	175SJT-M380BH(A6)	3222
60SJTA-M013E(A6)	3131	175SJTF-M150B(A6)	3183	175SJT-M380DH(A6)	3224
60SJTA-MO19E(A6)	3132	175SJTF-M180B(A6)	3184	175SJT-M500BH(A6)	3226
130SJT-M040D(A6)	3140	175SJTF-M150D(A6)	3185	175SJT-M500DH(A6)	3228
130SJT-M050D(A6)	3142	175SJTF-M220B(A6)	3186	265SJTE-M700CH(A6)	3230
130SJT-M060D(A6)	3144	175SJTF-M300B(A6)	3187	265SJTE-M1000CH(A6)	3231
130SJT-M075D(A6)	3146	175SJTF-M300D(A6)	3188	265SJTE-M1400CH(A6)	3232
130SJT-M100B(A6)	3148	175SJTF-M380B(A6)	3189	265SJTE-M2000CH(A6)	3233
130SJT-M100D(A6)	3150	175SJTF-M220D(A6)	3190		
		175SJTF-M180D(A6)	3191		

ÿ Nikon **24** -bit absolute encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
60SJTR-MZ003E(A7)	4101	130SJTB-M150B(A7)	4152	130SJTG-M040GH(A7)	4200
60SJTR-MZ005E(A7)	4102	130SJT-M150D(A7)	4154	130SJTF-M048C(A7)	4201
		130SJT-M050E(A7)	4156	130SJTG-M050GH(A7)	4202
		130SJT-M060E(A7)	4158	130SJTG-M060GH(A7)	4204
		130SJT-M075E(A7)	4160	130SJTF-M072C(A7)	4205
		130SJTE-M150D(A7)	4162	130SJTG-M075GH(A7)	4206
80SJTA-M024C(A7)	4112	175SJT-M150B(A7)	4164	130SJTF-M096C(A7)	4207
80SJTA-M024E(A7)	4114	175SJT-M120E(A7)	4166	130SJTG-M100GH(A7)	4208
80SJTA-M032C(A7)	4116	175SJT-M150D(A7)	4168	130SJTF-M120C(A7)	4209
80SJTA-M032E(A7)	4118	175SJT-M180B(A7)	4170	175SJTG-M120EH(A7)	4210
110SJT-M020E(A7)	4120	175SJT-M180D(A7)	4172	175SJTG-M150EH(A7)	4212
110SJT-M040D(A7)	4122	175SJT-M220B(A7)	4174	175SJTG-M180EH(A7)	4214
110SJT-M040E(A7)	4124	175SJT-M220D(A7)	4176	175SJTG-M220EH(A7)	4216
110SJT-M060D(A7)	4126	175SJT-M300B(A7)	4178	175SJTG-M300EH(A7)	4218
110SJT-M060E(A7)	4128	175SJT-M300D(A7)	4180	175SJTG-M380EH(A7)	4220
60SJTA-M006E(A7)	4130	175SJT-M380B(A7)	4182	175SJT-M380BH(A7)	4222
60SJTA-M013E(A7)	4131	175SJTF-M150B(A7)	4183	175SJT-M380DH(A7)	4224
60SJTA-MO19E(A7)	4132	175SJTF-M180B(A7)	4184	175SJT-M500BH(A7)	4226
130SJT-M040D(A7)	4140	175SJTF-M150D(A7)	4185	175SJT-M500DH(A7)	4228
130SJT-M050D(A7)	4142	175SJTF-M220B(A7)	4186	265SJTE-M700CH(A7)	4230
130SJT-M060D(A7)	4144	175SJTF-M300B(A7)	4187	265SJTE-M1000CH(A7)	4231
130SJT-M075D(A7)	4146	175SJTF-M300D(A7)	4188	265SJTE-M1400CH(A7)	4232
130SJT-M100B(A7)	4148	175SJTF-M380B(A7)	4189	265SJTE-M2000CH(A7)	4233
130SJT-M100D(A7)	4150	175SJTF-M220D(A7)	4190		
		175SJTF-M180D(A7)	4191		

ÿ Tamagawa **25** -bit absolute encoder motor model code table

Motor Model	**PA1**	Motor Model	**PA1**	Motor Model	**PA1**
60SJTR-MZ003E(A9II)	5101	130SJTB-M150B(A9II)	5152	130SJTG-M040GH(A9II)	5200
60SJTR-MZ005E(A9II)	5102	130SJT-M150D(A9II)	5154	130SJTF-M048C(A9II)	5201
		130SJT-M050E(A9II)	5156	130SJTG-M050GH(A9II)	5202
		130SJT-M060E(A9II)	5158	130SJTG-M060GH(A9II)	5204
		130SJT-M075E(A9II)	5160	130SJTF-M072C(A9II)	5205
		130SJTE-M150D(A9II)	5162	130SJTG-M075GH(A9II)	5206
80SJTA-M024C(A9II)	5112	175SJT-M150B(A9II)	5164	130SJTF-M096C(A9II)	5207
80SJTA-M024E(A9II)	5114	175SJT-M120E(A9II)	5166	130SJTG-M100GH(A9II)	5208
80SJTA-M032C(A9II)	5116	175SJT-M150D(A9II)	5168	130SJTF-M120C(A9II)	5209
80SJTA-M032E(A9II)	5118	175SJT-M180B(A9II)	5170	175SJTG-M120EH(A9II)	5210
110SJT-M020E(A9II)	5120	175SJT-M180D(A9II)	5172	175SJTG-M150EH(A9II)	5212
110SJT-M040D(A9II)	5122	175SJT-M220B(A9II)	5174	175SJTG-M180EH(A9II)	5214
110SJT-M040E(A9II)	5124	175SJT-M220D(A9II)	5176	175SJTG-M220EH(A9II)	5216
110SJT-M060D(A9II)	5126	175SJT-M300B(A9II)	5178	175SJTG-M300EH(A9II)	5218
110SJT-M060E(A9II)	5128	175SJT-M300D(A9II)	5180	175SJTG-M380EH(A9II)	5220
60SJTA-M006E(A9II)	5130	175SJT-M380B(A9II)	5182	175SJT-M380BH(A9II)	5222
60SJTA-M013E(A9II)	5131	175SJTF-M150B(A9II)	5183	175SJT-M380DH(A9II)	5224
60SJTA-MO19E(A9II)	5132	175SJTF-M180B(A9II)	5184	175SJT-M500BH(A9II)	5226
130SJT-M040D(A9II)	5140	175SJTF-M150D(A9II)	5185	175SJT-M500DH(A9II)	5228
130SJT-M050D(A9II)	5142	175SJTF-M220B(A9II)	5186	265SJTE-M700CH(A9II)	5230
130SJT-M060D(A9II)	5144	175SJTF-M300B(A9II)	5187	265SJTE-M1000CH(A9II)	5231
130SJT-M075D(A9II)	5146	175SJTF-M300D(A9II)	5188	265SJTE-M1400CH(A9II)	5232
130SJT-M100B(A9II)	5148	175SJTF-M380B(A9II)	5189	265SJTE-M2000CH(A9II)	5233
130SJT-M100D(A9II)	5150	175SJTF-M220D(A9II)	5190		
		175SJTF-M180D(A9II)	5191		

ÿ **GR3000-L** series servo drive unit compatible torque motor model code table

Motor model code (**PA01** value)	Servo motor model	Motor model code (**PA01** value)	Servo motor model
PA001=2000	180SJM-M060GH	PA001=2004	230SJM-M300EH
PA001=2001	180SJM-M090GH	PA001=2005	310SJM-M325CH
PA001=2002	230SJM-M100GH	PA001=2006	310SJM-M450CH
PA001=2003	230SJM-M200EH	PA001=2007	310SJM-M715BH

ÿ **GR-L** series servo drive unit is compatible with asynchronous spindle servo motor model code table

Spindle motor model Encoder line number **PA1** Parameter Rated current Voltage level Standard servo drive unit					
ZJY182-2.2BH-L	1024	510	13A	220V	GR2050-L
ZJY182-3.7BL-L	1024	561	17.9A	220V	GR2075-L
ZJY182-3.7BH-L	1024	509	26A	220V	GR2100-L
ZJY182-5.5BH-L	1024	562	30A	220V	GR2100-L
ZJY208A-3.7WL-L	1024	560	19.6A	220V	GR2075-L
ZJY208A-3.7AM-L	1024	513	17.5A	220V	GR2075-L
ZJY208A-3.7BM-L	1024	505	14.9A	220V	GR2075-L
ZJY208A-3.7BH-L	1024	511	22A	220V	GR2075-L
ZJY208A-5.5AM-L	1024	514	28.2A	220V	GR2100-L
ZJY208A-5.5BM-L	1024	507	22.5A	220V	GR2100-L
ZJY208A-5.5BH-L	1024	508	31.8A	220V	GR2100-L
ZJY182-5.5CF-L	1024	501	32.5A	220V	GR2100-L
ZJY208A-7.5BM-L	1024	512	29.4A	220V	GR2100-L
ZJY208A-7.5BH-L	1024	506	38.9A	220V	GR2150-L
ZJY265A-7.5BM-L	1024	563	31A	220V	GR2100-L
ZJY265A-7.5BH-L	1024	504	36.5A	220V	GR2150-L
ZJY265A-11BM-L	1024	564	44.7A	220V	GR2150-L
ZJY265A-11BH-L	1024	503	51.9A	220V	GR2200-L
ZJY265A-15BM-L	1024	502	62.3A	220V	GR2200-L
ZJY265A-15BH-L	1024	565	70.5A	220V	GR2200-L

Spindle motor model Encoder line number **PA1** parameter Rated current Voltage level					Standard servo Drive unit
ZJY182-1.5BH	1024	517	7.3A	380V	GR3048-L
ZJY182-2.2BH	1024	518	7.5A	380V	GR3048-L
ZJY182-2.2CF	1024	552	9A	380V	GR3048-L
ZJY182-3.7BL	1024	551	10.4A	380V	GR3050-L
ZJY182-3.7BH	1024	519	15.5A	380V	GR3050-L
ZJY182-3.7DF	1024	554	13A	380V	GR3050-L
ZJY182-5.5BL	1024	558	13.8A	380V	GR3050-L
ZJY182-5.5CF	1024	553	19A	380V	GR3075-L
ZJY182-5.5EH	1024	541	17A	380V	GR3075-L
ZJY182-7.5EH	1024	542	21A	380V	GR3100-L
ZJY208A-2.2AM	1024	543	6.7A	380V	GR3048-L
ZJY208-2.2BH	1024	521	8.9A	380V	GR3048-L
ZJY208A-3.7WL	1024	540	11.3A	380V	GR3050-L
ZJY208A-3.7AM	1024	544	10.2A	380V	GR3050-L
ZJY208A-3.7BM	1024	522	8.6A	380V	GR3050-L

Spindle motor model	Encoder line number	**PA1** parameter	Rated current	voltage level	Standard servo drive unit
ZJY208A-3.7BH	1024	534	12.6A	380V	GR3050-L
ZJY208A-5.5AM	1024	515	16.3A	380V	GR3075-L
ZJY208A-5.5BL	1024	557	12.9A	380V	GR3050-L
ZJY208A-5.5BM	1024	523	13.2A	380V	GR3050-L
ZJY208A-5.5BH	1024	535	18.4A	380V	GR3075-L
ZJY208A-7.5AM	1024	545	25.2A	380V	GR3100-L
ZJY208A-7.5BL	1024	559	17.9A	380V	GR3075-L
ZJY208A-7.5BM	1024	524	17.3A	380V	GR3075-L
ZJY208A-7.5BH	1024	536	22.4A	380V	GR3100-L
ZJY208A-11CM	1024	555	28.3A	380V	GR3148-L
ZJY208A-11EH	1024	556	25.2A	380V	GR3100-L
ZJY208A-11EF	1024	573	26A	380V	GR3100-L
ZJY265A-5.5BM	1024	572	15A	380V	GR3050-L
ZJY265A-5.5WL	1024	539	16.3A	380V	GR3075-L
ZJY265A-7.5WL	1024	538	21.4A	380V	GR3100-L
ZJY265A-7.5AM	1024	516	21.5A	380V	GR3100-L
ZJY265A-7.5BM	1024	525	18A	380V	GR3075-L
ZJY265A-7.5BH	1024	548	21A	380V	GR3100-L
ZJY265A-9BL	1024	566	21.6A	380V	GR3100-L
ZJY265A-11 WL	1024	537	30A	380V	GR3148-L
ZJY265A-11AM	1024	546	30.9A	380V	GR3148-L
ZJY265A-11BL	1024	570	28.5A	380V	GR3148-L
ZJY265A-11BM	1024	526	26A	380V	GR3100-L
ZJY265A-11BH	1024	549	30A	380V	GR3148-L
ZJY265A-15AM	1024	528	48.3A	380V	GR3150-L
ZJY265A-15BL	1024	571	35A	380V	GR3150-L
ZJY265A-15BM	1024	527	35A	380V	GR3150-L
ZJY265A-15BH	1024	550	40.7A	380V	GR3150-L
ZJY265A-18.5AM	1024	547	31A	380V	GR3150-L
ZJY265A-18.5BM	1024	530	48.7A	380V	GR3150-L
ZJY265A-22BM	1024	529	58A	380V	GR3198-L
ZJY320-18.5WL	1024	575	51A	380V	GR3198-L
ZJY320-22WL	1024	569	58A	380V	GR3198-L
ZJY320-30BL	1024	531	69A	380V	GR3300-L
ZJY320-37BL	1024	532	87A	380V	GR3300-L
ZJY320-45BL	1024	533	100A	380V	GR3300-L
ZJY265A-9VMD(L)	1024	567	27.8A	380V	GR3150-L
ZJY265A-9VMD(H)	1024	568	46.7A	380V	

Spindle motor model Encoder line number **PA1** Parameter Rated current Voltage level Standard servo drive unit					
ZJY182-2.2BH-LÿA2ÿ	5000	610	13A	220V	GR2050-L
ZJY182-3.7BL-LÿA2ÿ	5000	661	17.9A	220V	GR2075-L
ZJY182-3.7BH-LÿA2ÿ	5000	609	26A	220V	GR2100-L
ZJY182-5.5BH-LÿA2ÿ	5000	662	30A	220V	GR2100-L
ZJY208A-3.7WL-LÿA2ÿ	5000	660	19.6A	220V	GR2075-L
ZJY208A-3.7AM-LÿA2ÿ	5000	613	17.5A	220V	GR2075-L
ZJY208A-3.7BM-LÿA2ÿ	5000	605	14.9A	220V	GR2075-L
ZJY208A-3.7BH-LÿA2ÿ	5000	611	22A	220V	GR2075-L
ZJY208A-5.5AM-LÿA2ÿ	5000	614	28.2A	220V	GR2100-L
ZJY208A-5.5BM-LÿA2ÿ	5000	607	22.5A	220V	GR2100-L
ZJY208A-5.5BH-LÿA2ÿ	5000	608	31.8A	220V	GR2100-L
ZJY182-5.5CF-LÿA2ÿ	5000	601	32.5A	220V	GR2100-L
ZJY208A-7.5BM-LÿA2ÿ	5000	612	29.4A	220V	GR2100-L
ZJY208A-7.5BH-LÿA2ÿ	5000	606	38.9A	220V	GR2150-L
ZJY265A-7.5BM-LÿA2ÿ	5000	663	31A	220V	GR2100-L
ZJY265A-7.5BH-LÿA2ÿ	5000	604	36.5A	220V	GR2150-L
ZJY265A-11BM-LÿA2ÿ	5000	664	44.7A	220V	GR2150-L
ZJY265A-11BH-LÿA2ÿ	5000	603	51.9A	220V	GR2200-L
ZJY265A-15BM-LÿA2ÿ	5000	602	62.3A	220V	GR2200-L
ZJY265A-15BH-LÿA2ÿ	5000	665	70.5A	220V	GR2200-L

Spindle motor model	Encoder line number **PA1** parameter Rated current voltage level Standard servo drive unit				
ZJY182-1.5BHÿA2ÿ	5000	617	7.3A	380V	GR3048-L
ZJY182-2.2BHÿA2ÿ	5000	618	7.5A	380V	GR3048-L
ZJY182-2.2CFÿA2ÿ	5000	652	9A	380V	GR3048-L
ZJY182-3.7BLÿA2ÿ	5000	651	10.4A	380V	GR3050-L
ZJY182-3.7BHÿA2ÿ	5000	619	15.5A	380V	GR3050-L
ZJY182-3.7DFÿA2ÿ	5000	654	13A	380V	GR3050-L
ZJY182-5.5BLÿA2ÿ	5000	658	13.8A	380V	GR3050-L
ZJY182-5.5CFÿA2ÿ	5000	653	19A	380V	GR3075-L
ZJY182-5.5EHÿA2ÿ	5000	641	17A	380V	GR3075-L
ZJY182-7.5EHÿA2ÿ	5000	642	21A	380V	GR3100-L
ZJY208A-2.2AMÿA2ÿ	5000	643	6.7A	380V	GR3048-L
ZJY208-2.2BHÿA2ÿ	5000	621	8.9A	380V	GR3048-L
ZJY208A-3.7WLÿA2ÿ	5000	640	11.3A	380V	GR3050-L
ZJY208A-3.7AMÿA2ÿ	5000	644	10.2A	380V	GR3050-L
ZJY208A-3.7BMÿA2ÿ	5000	622	8.6A	380V	GR3050-L

Spindle motor model	Encoder line number **PA1** parameter	Rated current	voltage level	Standard servo drive unit
ZJY208A-3.7BHÿA2ÿ	5000	634	12.6A	380V	GR3050-L
ZJY208A-5.5AMÿA2ÿ	5000	615	16.3A	380V	GR3075-L
ZJY208A-5.5BLÿA2ÿ	5000	657	12.9A	380V	GR3050-L
ZJY208A-5.5BMÿA2ÿ	5000	623	13.2A	380V	GR3050-L
ZJY208A-5.5BHÿA2ÿ	5000	635	18.4A	380V	GR3075-L
ZJY208A-7.5AMÿA2ÿ	5000	645	25.2A	380V	GR3100-L
ZJY208A-7.5BLÿA2ÿ	5000	659	17.9A	380V	GR3075-L
ZJY208A-7.5BMÿA2ÿ	5000	624	17.3A	380V	GR3075-L
ZJY208A-7.5BHÿA2ÿ	5000	636	22.4A	380V	GR3100-L
ZJY208A-11CMÿA2ÿ	5000	655	28.3A	380V	GR3148-L
ZJY208A-11EHÿA2ÿ	5000	656	25.2A	380V	GR3100-L
ZJY208A-11EFÿA2ÿ	5000	673	26A	380V	GR3100-L
ZJY265A-5.5BMÿA2ÿ	5000	672	15A	380V	GR3050-L
ZJY265A-5.5WLÿA2ÿ	5000	639	16.3A	380V	GR3075-L
ZJY265A-7.5WLÿA2ÿ	5000	638	21.4A	380V	GR3100-L
ZJY265A-7.5AMÿA2ÿ	5000	616	21.5A	380V	GR3100-L
ZJY265A-7.5BMÿA2ÿ	5000	625	18A	380V	GR3075-L
ZJY265A-7.5BHÿA2ÿ	5000	648	21A	380V	GR3100-L
ZJY265A-9BLÿA2ÿ	5000	666	21.6A	380V	GR3100-L
ZJY265A-11 WLÿA2ÿ	5000	637	30A	380V	GR3148-L
ZJY265A-11AMÿA2ÿ	5000	646	30.9A	380V	GR3148-L
ZJY265A-11BLÿA2ÿ	5000	670	28.5A	380V	GR3148-L
ZJY265A-11BMÿA2ÿ	5000	626	26A	380V	GR3100-L
ZJY265A-11BHÿA2ÿ	5000	649	30A	380V	GR3148-L
ZJY265A-11BH-B3A2ÿHDÿ	5000	674	32.6A	380V	GR3148-L
ZJY265A-15AMÿA2ÿ	5000	628	48.3A	380V	GR3150-L
ZJY265A-15BLÿA2ÿ	5000	671	35A	380V	GR3150-L
ZJY265A-15BMÿA2ÿ	5000	627	35A	380V	GR3150-L
ZJY265A-15BHÿA2ÿ	5000	650	40.7A	380V	GR3150-L
ZJY265A-18.5AMÿA2ÿ	5000	647	31A	380V	GR3150-L
ZJY265A-18.5BMÿA2ÿ	5000	630	48.7A	380V	GR3150-L
ZJY265A-22BMÿA2ÿ	5000	629	58A	380V	GR3198-L
ZJY320-18.5WLÿA2ÿ	5000	675	51A	380V	GR3198-L
ZJY320-22WLÿA2ÿ	5000	669	58A	380V	GR3198-L
ZJY320-30BLÿA2ÿ	5000	631	69A	380V	GR3300-L
ZJY320-37BLÿA2ÿ	5000	632	87A	380V	GR3300-L
ZJY320-45BLÿA2ÿ	5000	633	100A	380V	GR3300-L
ZJY265A-9VMD(L)ÿA2ÿ	5000	667	27.8A	380V	GR3150-L
ZJY265A-9VMD(H)ÿA2ÿ	5000	668	46.7A	380V	

Spindle motor model encoder line number **PA1** parameters			Rated current and voltage level standard servo drive unit		
ZJY182-2.2BH-LÿA5ÿ	21bit	710	13A	220V	GR2050-L
ZJY182-3.7BL-LÿA5ÿ	21bit	761	17.9A	220V	GR2075-L
ZJY182-3.7BH-LÿA5ÿ	21bit	709	26A	220V	GR2100-L
ZJY182-5.5BH-LÿA5ÿ	21bit	762	30A	220V	GR2100-L
ZJY208A-3.7WL-LÿA5ÿ	21bit	760	19.6A	220V	GR2075-L
ZJY208A-3.7AM-LÿA5ÿ	21bit	713	17.5A	220V	GR2075-L
ZJY208A-3.7BM-LÿA5ÿ	21bit	705	14.9A	220V	GR2075-L
ZJY208A-3.7BH-LÿA5ÿ	21bit	711	22A	220V	GR2075-L
ZJY208A-5.5AM-LÿA5ÿ	21bit	714	28.2A	220V	GR2100-L
ZJY208A-5.5BM-LÿA5ÿ	21bit	707	22.5A	220V	GR2100-L
ZJY208A-5.5BH-LÿA5ÿ	21bit	708	31.8A	220V	GR2100-L
ZJY182-5.5CF-LÿA5ÿ	21bit	701	32.5A	220V	GR2100-L
ZJY208A-7.5BM-LÿA5ÿ	21bit	712	29.4A	220V	GR2100-L
ZJY208A-7.5BH-LÿA5ÿ	21bit	706	38.9A	220V	GR2150-L
ZJY265A-7.5BM-LÿA5ÿ	21bit	763	31A	220V	GR2100-L
ZJY265A-7.5BH-LÿA5ÿ	21bit	704	36.5A	220V	GR2150-L
ZJY265A-11BM-LÿA5ÿ	21bit	764	44.7A	220V	GR2150-L
ZJY265A-11BH-LÿA5ÿ	21bit	703	51.9A	220V	GR2200-L
ZJY265A-15BM-LÿA5ÿ	21bit	702	62.3A	220V	GR2200-L
ZJY265A-15BH-LÿA5ÿ	21bit	765	70.5A	220V	GR2200-L

Spindle motor model Encoder line number **PA1** Parameter Rated current Voltage level Standard servo drive unit					
ZJY182-1.5BHÿA5ÿ	21bit	717	7.3A	380V	GR3048-L
ZJY182-2.2BHÿA5ÿ	21bit	718	7.5A	380V	GR3048-L
ZJY182-2.2CFÿA5ÿ	21bit	752	9A	380V	GR3048-L
ZJY182-3.7BLÿA5ÿ	21bit	751	10.4A	380V	GR3050-L
ZJY182-3.7BHÿA5ÿ	21bit	719	15.5A	380V	GR3050-L
ZJY182-3.7DFÿA5ÿ	21bit	754	13A	380V	GR3050-L
ZJY182-5.5BLÿA5ÿ	21bit	758	13.8A	380V	GR3050-L
ZJY182-5.5CFÿA5ÿ	21bit	753	19A	380V	GR3075-L
ZJY182-5.5EHÿA5ÿ	21bit	741	17A	380V	GR3075-L
ZJY182-7.5EHÿA5ÿ	21bit	742	21A	380V	GR3100-L
ZJY208A-2.2AMÿA5ÿ	21bit	743	6.7A	380V	GR3048-L
ZJY208A-2.2BHÿA5ÿ	21bit	721	8.9A	380V	GR3048-L
ZJY208A-3.7WLÿA5ÿ	21bit	740	11.3A	380V	GR3050-L
ZJY208A-3.7AMÿA5ÿ	21bit	744	10.2A	380V	GR3050-L
ZJY208A-3.7BMÿA5ÿ	21bit	722	8.6A	380V	GR3050-L
ZJY208A-3.7BHÿA5ÿ	21bit	734	12.6A	380V	GR3050-L

Spindle motor model	Encoder line number	PA1 Parameter	Rated current	voltage level	Standard servo drive unit
ZJY208A-5.5AMÿA5ÿ	21bit	715	16.3A	380V	GR3075-L
ZJY208A-5.5BLÿA5ÿ	21bit	757	12.9A	380V	GR3050-L
ZJY208A-5.5BMÿA5ÿ	21bit	723	13.2A	380V	GR3050-L
ZJY208A-5.5BHÿA5ÿ	21bit	735	18.4A	380V	GR3075-L
ZJY208A-7.5AMÿA5ÿ	21bit	745	25.2A	380V	GR3100-L
ZJY208A-7.5BLÿA5ÿ	21bit	759	17.9A	380V	GR3075-L
ZJY208A-7.5BMÿA5ÿ	21bit	724	17.3A	380V	GR3075-L
ZJY208A-7.5BHÿA5ÿ	21bit	736	22.4A	380V	GR3100-L
ZJY208A-11CMÿA5ÿ	21bit	755	28.3A	380V	GR3148-L
ZJY208A-11EHÿA5ÿ	21bit	756	25.2A	380V	GR3100-L
ZJY208A-11EFÿA5ÿ	21bit	773	26A	380V	GR3100-L
ZJY265A-5.5BMÿA5ÿ	21bit	772	15A	380V	GR3050-L
ZJY265A-5.5WLÿA5ÿ	21bit	739	16.3A	380V	GR3075-L
ZJY265A-7.5WLÿA5ÿ	21bit	738	21.4A	380V	GR3100-L
ZJY265A-7.5AMÿA5ÿ	21bit	716	21.5A	380V	GR3100-L
ZJY265A-7.5BMÿA5ÿ	21bit	725	18A	380V	GR3075-L
ZJY265A-7.5BHÿA5ÿ	21bit	748	21A	380V	GR3100-L
ZJY265A-9BLÿA5ÿ	21bit	766	21.6A	380V	GR3100-L
ZJY265A-11WLÿA5ÿ	21bit	737	30A	380V	GR3148-L
ZJY265A-11AMÿA5ÿ	21bit	746	30.9A	380V	GR3148-L
ZJY265A-11BLÿA5ÿ	21bit	770	28.5A	380V	GR3148-L
ZJY265A-11BMÿA5ÿ	21bit	726	26A	380V	GR3100-L
ZJY265A-11BHÿA5ÿ	21bit	749	30A	380V	GR3148-L
ZJY265A-15AMÿA5ÿ	21bit	728	48.3A	380V	GR3150-L
ZJY265A-15BLÿA5ÿ	21bit	771	35A	380V	GR3150-L
ZJY265A-15BMÿA5ÿ	21bit	727	35A	380V	GR3150-L
ZJY265A-15BHÿA5ÿ	21bit	750	40.7A	380V	GR3150-L
ZJY265A-18.5AMÿA5ÿ	21bit	747	31A	380V	GR3150-L
ZJY265A-18.5BMÿA5ÿ	21bit	730	48.7A	380V	GR3150-L
ZJY265A-22BMÿA5ÿ	21bit	729	58A	380V	GR3198-L
ZJY320-18.5WLÿA5ÿ	21bit	775	51A	380V	GR3198-L
ZJY320-22WLÿA5ÿ	21bit	769	58A	380V	GR3198-L
ZJY320-30BLÿA5ÿ	21bit	731	69A	380V	GR3300-L
ZJY320-37BLÿA5ÿ	21bit	732	87A	380V	GR3300-L
ZJY320-45BLÿA5ÿ	21bit	733	100A	380V	GR3300-L
ZJY265A-9VMD(L)ÿA5ÿ	21bit	767	27.8A	380V	GR3150-L
ZJY265A-9VMD(H)ÿA5ÿ	21bit	768	46.7A	380V	

Tamagawa Protocol Magnetic Resistive Encoder Electric spindle model	Encoder line **PA1** parameters	Rated current	Voltage level	Standard servo drive unit	
DZY156A-3.7BF(TAMA)	21bit	801	15.4A	380V	GR3050-L
DZY120-3.0DM(TAMA)	21bit	802	9.7A	380V	GR3048-L
DZY156A-2.2BF(TAMA)	21bit	803	10.5A	380V	GR3048-L
DZY180B-5.5BH(TAMA)	21bit	805	24.5A	380V	GR3100-L
DZY180B-10BH(TAMA)	21bit	807	37A	380V	GR3148-L
DZY240-18.5WM(TAMA)	21bit	809	61.7A	380V	GR3198-L
DZY180B-7.5BH(TAMA)	21bit	810	304A	380V	GR3148-L
DZY240-11AM(Boys)	21bit	811	42.8A	380V	GR3198-L
DZY160-11DM(TAMA)	21bit	812	37.5A	380V	GR3148-L
Sincosine encoder Electric spindle model	Encoder line **PA1**	Parameter	Rated current	Voltage level	Standard servo drive unit
DZY156A-3.7BF(ANALOG)	21bit	901	15.4A	380V	GR3050-LS2
DZY120-3.0DM(ANALOG)	21bit	902	9.7A	380V	GR3050-LS2
DZY156A-2.2BF(ANALOG)	21bit	903	10.5A	380V	GR3050-LS2
DZY180B-5.5BH(ANALOG)	21bit	905	24.5A	380V	GR3100-LS2
DZY180B-10BH(ANALOG)	21bit	907	37A	380V	GR3148-LS2
DZY240-18.5WM(ANALOG)	21bit	909	61.7A	380V	GR3198-LS2
DZY180B-7.5BH(ANALOG)	21bit	910	304A	380V	GR3148-LS2
DZY240-11AM(ANALOG)	21bit	911	42.8A	380V	GR3198-LS2
DZY160-11DM(ANALOG)	21bit	912	37.5A	380V	GR3148-LS2

Note: After the above electric spindles have retrieved the parameters corresponding to the motor code, they need to set the encoder type parameters according to the number of teeth on the hollow ring encoder gear disc.

Set up **PA200.**

For example: Tamagawa protocol encoder [PA200=7 (384 **teeth); PA200=8 (128 teeth); PA200=9 (256 teeth); PA200=10 (512** teeth). ÿ

Sincosine encoder [PA200=11 (384 teeth); PA200=12 (512 teeth); PA200=19 (256 teeth).]

Appendix **B** Selection of Peripheral Equipment

B.1 Circuit breakers and contactors (required equipment)

A circuit breaker and an AC contactor must be installed between the input power supply and the servo drive unit. The circuit breaker and contactor are not only used as

It not only switches the power of the drive unit, but also protects the power supply.

A circuit breaker is a protective switch that can automatically cut off a faulty circuit and has circuit overload, short circuit, and undervoltage protection functions.

The unit itself has an overload capacity of 150% for 30 minutes. In order to give full play to the overload capacity of the servo drive unit, it is recommended that users choose a power distribution protection

Protective circuit breaker.

Install AC contactors to control the power supply of the drive device through electrical protection circuits, and quickly cut off the drive power supply in case of system failure.

The power supply of the driving device can effectively prevent the fault from further expanding.

Users can configure by themselves referring to the technical data in the table below.

Servo drive unit **GR2024-L GR2030-L GR2045-L**				**GR2050 -L GR2050-L**	**GR2075-L GR2075-L**	**GR2100-L GR2100-L**	
Standard servo motor Rated current I (A)	Iÿ4	4<Iÿ6	6<Iÿ7.5	7.5<Iÿ10	10<Iÿ15	15<Iÿ22	22<Iÿ29
Circuit breaker rated current (A) ÿAC380Vÿ	9	12	15	20	30	40	40
Contactor rated current (A) ÿAC220Vÿ	20	20	20	20	25	32	40
Servo drive unit **GR3048T-L GR3050T-L**			**GR3075T-L GR3100T-L GR3148T-L GR3150T-L GR3198T-L**				
Standard servo motor Rated current I (A)	Iÿ7.5	7.5<Iÿ10	10<Iÿ15	15<Iÿ20	20<Iÿ27	27<Iÿ34	34<Iÿ45
Circuit breaker rated current (A) ÿAC380Vÿ	15	20	30	40	63	63	80
Contactor rated current (A) ÿAC380Vÿ	20	20	25	32	40	60	70
Servo drive unit	**GR3048-L GR4048-L**	**GR3050-L GR4050-L**	**GR3075-L GR4075-L**	**GR3100-L GR4100-L**	**GR3148-L GR4148-L**	**GR3150-L GR4150-L**	**GR3198-L GR4198-L**
Standard servo motor Rated current I (A)	Iÿ8	8<Iÿ15.5	15.5<Iÿ20	20<Iÿ27	27<Iÿ34	34<Iÿ49	49<Iÿ60
Circuit breaker rated current (A) ÿAC380Vÿ	15	20	30	40	63	63	80
Contactor rated current (A) ÿAC380Vÿ	20	25	32	40	60	70	80

B.2 Three-phase AC filter (recommended equipment)

The three-phase AC filter is a passive low-pass filter with a filtering frequency range of 10 kHz to 30 MHz.

The high-frequency noise interference from the power supply of the servo drive unit. Generally, it can be installed without installation. When the high-frequency noise interference generated by the servo drive unit affects the user

It is recommended to install it when other devices in the environment are working normally.

Users can configure by themselves referring to the technical data in the table below.

Servo drive unit adaptation Motor rated power (kW)	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Three-phase AC filter rated Current (A)	10	10	20	20	30	40	50	50	60
Three-phase AC filter rated Voltage (V)	380/440 380/440 380/440 380/440 380/440 380/440 380/440 380/440 380/440								
Three-phase AC filter inductor ymHy	y2.8	y2.8	y1.6	y1.6	y0.9	y1.1	y0.6	y0.6	y0.4
Three-phase AC filter leakage Current (mA)	y2	y2	y2	y2	y2	y2	y3	y3	y3

Filter installation precautions:

y The filter metal shell and the electrical cabinet must ensure good surface contact, and the grounding wire must be connected;

y The filter input line and output line must be kept apart and should not be connected in parallel to avoid reducing the filter efficiency;

y The filter should be installed at the power inlet of the equipment, and the length of the filter input line in the chassis should be shortened as much as possible to reduce

Low radiated interference.

B.3 AC Reactor (Recommended Equipment)

The AC reactor is connected in series at the power input end to suppress the high-order harmonics of the input current, which can not only prevent interference from the power grid, but also reduce

The harmonic current generated by the rectifier unit pollutes the power grid. It can be installed in general use environments. When the servo drive unit is under the following environmental conditions

When working, it is recommended to install an AC reactor.

1. The power of the matching motor is greater than 15 kW.

2. The three-phase power supply voltage imbalance is greater than 3%.

3. On the same power supply system, there are thyristor converters, nonlinear loads, arc furnace loads, and loads connected to power regulators that can be switched by switches.

A compensation capacitor device for the power factor.

4. The power factor on the input side needs to be improved.

The selection of AC reactor can be determined according to the expected voltage drop on each phase winding of the reactor. Generally, the voltage drop is selected to be equal to the phase voltage on the grid side.

2% to 4%. The voltage drop of the reactor connected in series at the power input end should not be too large, otherwise it will affect the motor torque. Here it is recommended to select the incoming line voltage

4% (i.e. 8.8V).

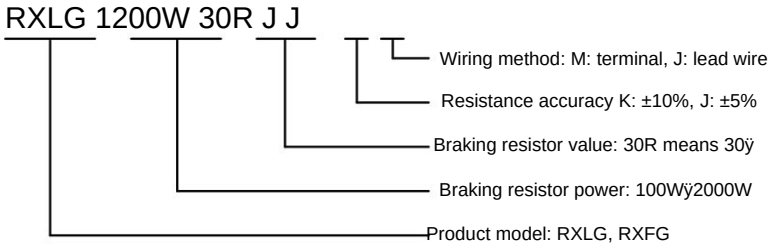
Users can configure by themselves referring to the technical data in the table below.

Servo drive unit Rated power of motor **ÿkWÿ**	Three-phase AC line reactor		
	Rated operating voltage	Rated current	Inductance range
1.5 kW	Three-phase AC 380 V (or 440 V)/50 Hz	8 Aÿ10 A	1.0 mHÿ2.5 mH
2.2 kW	Three-phase AC 380 V (or 440 V)/50 Hz	8 Aÿ10 A	1.0 mHÿ2.5 mH
3.7 kW	Three-phase AC 380 V (or 440 V)/50 Hz	9 Aÿ10 A	1. mH ÿ2.5 mH
5.5 kW	Three-phase AC 380 V (or 440 V)/50 Hz	13 Aÿ15 A	1.0 mHÿ1.5 mH
7.5 kW	Three-phase AC 380 V (or 440 V)/50 Hz	18 Aÿ20 A	0.8 mHÿ1.2 mH
11 kW	Three-phase AC 380 V (or 440 V)/50 Hz	24 Aÿ30 A	0.5 mHÿ0.8 mH
15 kW	Three-phase AC 380 V (or 440 V)/50 Hz	34 Aÿ40 A	0.4 mHÿ0.6 mH
18.5 kW	Three-phase AC 380 V (or 440 V)/50 Hz	40 Aÿ50 A	0.4 mHÿ0.5 mH
22 kW	Three-phase AC 380 V (or 440 V)/50 Hz	50 Aÿ60 A	0.35 mHÿ0.4 mH

Appendix **C** Selection of brake resistor

Notice	ÿ When the servo drive unit is powered on or running, high voltage and high temperature will appear on the surface of the brake resistor. Do not touch it! ÿ Please install it separately outside the machine tool electrical cabinet and add an isolation cover! ÿ After the servo drive unit is powered off, the surface temperature of the aluminum housing brake resistor will drop slowly! During inspection and maintenance, You must wait for 10 minutes after the servo drive unit is powered off to confirm that the surface temperature of the brake resistor has dropped to room temperature before touch.

ÿ Braking resistor model description



ÿ Braking resistor appearance

ÿ RXLG brake resistor installation dimensions

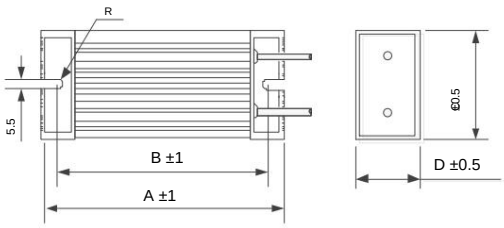


Figure C.1 RXLG 300W~500W Dimensions

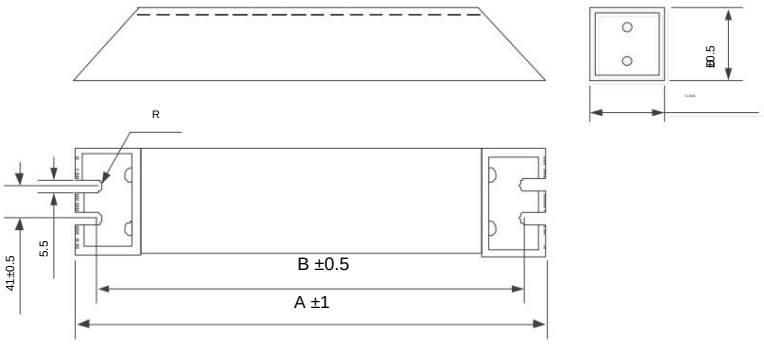


Figure C.2 RXLG 600W~800W Dimensions

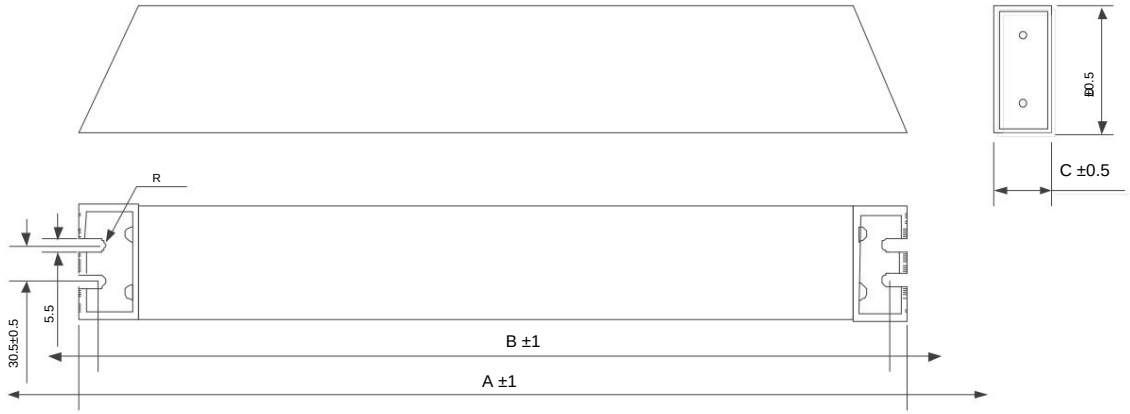


Figure C.3 RXLG 1000W~2000W Dimensions

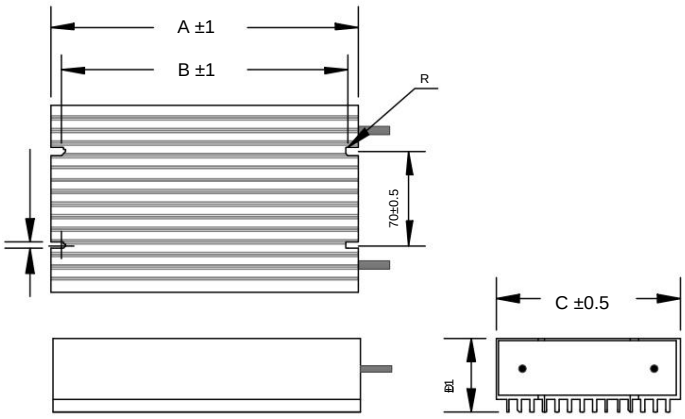


Figure C.4 RXFG 1200Wÿ2000W

ÿ Braking resistor installation dimension table

Product Code	Braking resistor power	Dimensions	Dimensions (mm)				Wiring	
			A	**B**	**C**	**D**	Wire length	
RXLG	300W	See Figure 1	215	197	60	30	1.5mm2	1000mm
RXLG	500W		335	317	60	30	1.5mm2	1000mm
RXLG	800W See Figure 2		400	382	61	59	2.5mm2	1000mm
RXLG	1000W	See Figure 3	400	362	50	107	2.5mm2	1000mm
RXLG	1200W		450	434	50	107	4.0mm2	1000mm
RXLG	1500W		485	469	50	107	4.0mm2	1000mm
RXLG	2000W		550	510	50	107	4.0mm2	1000mm
RXFG	1200W	See Figure 4	250	237	150	61	4.0mm2	1000mm
RXFG	1500W		280	267	150	61	4.0mm2	1000mm
RXFG	2000W		310	297	150	61	4.0mm2	1000mm

Note: 1) When the installation space is short, you can choose RXFG type brake resistor;

2) Due to the different sizes of the terminal blocks of the GR-L series servo drive units, the RXLG1200W specification brake resistor is matched with the GR2100-L, GR3050-L and GR4050-L must use M4 cold-pressed terminals; compatible with GR3075-L, GR3100-L, GR3150-L, When using GR4075-L, GR4100-L, and GR4150-L, M6 cold-pressed terminals must be used.

ÿ Braking resistor configuration table

Servo drive unit	Large and medium inertia applications (such as lathes)		Small inertia applications (such as milling machines)	
	Specification	model	Specification	model
GR2024-L	300W/22ÿ	RXLG300W22RJJ	300W/22ÿ	RXLG300W22RJJ
GR2030-L				
GR2045-L				
GR2050-L	800W/15ÿ	RXLG800W15RJJ-M4	500W/15ÿ	RXLG500W15RJJ-M4
GR2075V	800W/12ÿ	RXFG800W12RJM-M4	800W/12ÿ	RXFG800W12RJM-M4
GR2100-L	1200W/10ÿ	RXFG1200W10RJM-M6	1200W/10ÿ	RXFG1200W10RJM-M6
GR2148-L				
GR2200-L	1200W/10ÿ//1200W/15ÿ	RXFG1200W10RJM-M6// RXFG1200W15RJM-M6	1200W/10ÿ//1200W/15ÿ	RXFG1200W10RJM-M6// RXFG1200W15RJM-M6
GR3048-L	800W/35ÿ	RXLG800W35RJJ	500W/35ÿ	RXLG500W35RJJ
GR4048-L	800W/35ÿ	RXLG800W35RJJ	500W/35ÿ	RXLG500W35RJJ
GR3050-L	1200W/30ÿ	RXLG1200W30RJM	800W/30ÿ	RXLG800W30RJJ
GR4050-L				
GR3075-L	1500W/30ÿ	RXLG1500W30RJM	1200W/30ÿ	RXLG1200W30RJM
GR4075-L			1200W/35ÿ	RXLG1200W35RJM
GR3100-L	(1200W/30ÿ)//2	RXLG1200W30RJM	(800W/30ÿ)//2	RXLG800W30RJJ
GR4100-L				
GR3148-L	(1500W/30ÿ)//2	RXLG1500W30RJM	(1200W/30ÿ)//2	RXLG1200W30RJM
GR4148-L				
GR3150-L	(1500W/30ÿ)//2	RXLG1500W30RJM	(1200W/30ÿ)//2	RXLG1200W30RJM
GR4150-L			(1200W/35ÿ)//2	RXLG1200W35RJM
GR3198-L	(2000W/25ÿ)//2	RXLG2000W25RJM	(1500W/30ÿ)//2	RXLG1500W25RJM
GR4198-L	(2000W/25ÿ)//2	RXLG2000W25RJM	(1500W/30ÿ)//2	RXLG1500W25RJM
GR3300-L	4000W/6ÿ	RXU-3-4000W6RJ	4000W/6ÿ	RXU-3-4000W6RJ

Note: 1. "//2" means that each servo drive unit needs to use two brake resistors of the same model in parallel. Connect the leads in parallel and crimp them before installing them on the servo drive unit.

Yuan Shang.

2. The GR3300-L servo drive unit is equipped with a dedicated brake unit. For its dimension installation drawing, please refer to Section 2.2 of Chapter 2.