This user manual describes all proceedings concerning the operations of this Drive Unit in detail as much as possible. However, it is impractical to give particular descriptions for all unnecessary or unallowable system operations due to the manual text limit, product specific applications and other causes. Therefore, the proceedings not indicated herein should be considered impractical or unallowable.

PREFACE

Your Excellency,

It's our pleasure for your patronage and purchase of this GH2000/GH3000 Series Bus High-speed & High-accuracy Full Digit AC Servo Drive Unit made by GSK CNC Equipment Co., Ltd.

This manual is entirely described the installation, wiring, operation and debugging etc. of the GH2000/GH3000 Series Servo Drive Unit, which provides the desired knowledge and precautions for using this drive unit; it is better to operated machine after comprehending the safety precautions.

Adequately play the function of the GH2000/GH3000 Series Servo Drive Unit, and ensure the safety. It is necessary to carefully read this manual before operating this machine, and correctly use this drive unit based upon the precautions and operation methods.

- **All improvements, specifications and the version update herein are subject to change without further notice.**

- **We do not assume any responsibilities for the change of the product by user; therefore the warranty sheet will be void for this change.**

Chinese version of all technical documents in Chinese and English languages is regarded as final.

SAFTY WARNING

To avoid the personal injury of the operators and others, as well the damage of the mechanical equipments, pay more attention to the following warning flags when reading this User Manual:

- **That the flags shown in the following items are the danger levels during the operation, which is related with the description of the operation safety flag. And therefore, the contents are extremely important, and the user should abide by it.**

Danger

The severe injury or death may occur if the approved instruction does not perform.

Caution

The secondary or light wound, as well the loss of the material may occur if the approved instruction does not perform.

Notice

Unexpected results and states may occur if this Notice is ignored.

It reminds user that the vital requirements and important instructions are shown

■ **The following marks are indicated that the operations should be performed or can not be performed:**

means **forbidden** (it cannot be performed)

means **enforced** (it must be performed)

Danger

Confirm whether the input power is power off before wiring.

The electric shock may occur if the approved instruction is not observed

Install the breaker, interference filter and AC reactor

The thundernstrike, malfunction or damage may occur if the approved instruction is not observed.

It is better to wire or detect by the professional electrical engineer

The electric shock or fire may occur if the approved instruction is not observed

The movement, wiring, detection or maintenance can be performed after the power is turned off for 10 minutes.

The electric shock may occur if the approved instruction is not observed.

The grounding terminal PE of the servo unit should be earthed.

The electric shock may occur if the approved instruction is not observed

Install the ESP switch

The personal injury, malfunction and machine damage may occur if the approved instruction is not observed.

Do not operate the switch with wet hands!

The electric shock may occur if the approved instruction is not observed.

Do not stretch your hands into the servo unit!

The electric shock may occur if the approved instruction is not observed.

Do not open the cover of the terminal block when the power is turned on or operated!

The electric shock may occur if the approved instruction is not observed.

Do not touch the main circuit wiring terminal directly!

The electric shock may occur if the approved instruction is not observed.

Caution

It is necessary to connect the wiring between the drive unit and motor based upon the wiring scheme

The equipment may be damaged if the approved instruction is not observed.

The voltage level loaded on each terminal only can be used the one described in this manual.

The equipment may be damaged if the approved instruction is not observed.

The load can be performed only when the dry run of the motor is executed.

The equipment may be damaged if the approved instruction is not observed.

Firstly remove the alarm, and then perform the machine when the alarm occurs.

The equipment may be damaged if the approved instruction is not observed.

It is essential to connect the brake resistance based upon the wiring scheme.

The equipment may be damaged if the approved instruction is not observed.

The motor should be adapted with the appropriate servo motor.

The equipment may be damaged if the approved instruction is not observed.

Never attempt to modify, disassemble or repair the drive unit privately.

The equipment may be damaged if the approved instruction is not observed.

Do not hold the cable and motor shaft during the transportation of the motor.

The equipment may be damaged if the approved instruction is not observed.

Do not touch the motor and brake resistance, as well the radiating equipment, due to the high temperature may occur.

The scald may be caused if the approved instruction is not observed.

Do not adjust and modify the parameter extremely.

The equipment may be damaged if the approved instruction is not observed.

Caution

Do not connect the power input cables R, S and T on the U, V and W terminals of the motor output cable!

The equipment may be damaged if the approved instruction is not observed.

If the components of the spindle unit is absent or being damaged, it is important to touch the seller immediately before operating.

The equipment may be damaged if the approved instruction is not observed.

Do not repeatedly used the wasted internal electric components of the drive unit, and it only can be treated as the industry trash!

The unexpected behave may occur if the approved instruction is not observed.

Do not frequently switch on/off the input power!

The equipment may be damaged if the approved instruction is not observed.

Safety Precaution

■ Transportation and storage

- **The pile of the packing cantons should be less than 6 layers.**
- **Do not climb, stand, as well as put the heavy materials on the product.**
- **Do not use the conjoined cable with this product to drag or move the machine.**
- **Do not crash or scratch the panel and the screen.**
- **Avoid damp, sunshine and rain for the product packing**

■ Unpacking detection

- **Confirm whether the product is your purchased one after opening the packing.**
- **Check whether the product is being damaged during the transportation.**
- **Check whether each accessory is prepared or being damaged comparing the packing list.**
- **Touch our company immediately if the product type is not matched with the packing list or the components are absent or being damaged during transportation.**

■ Wiring

- **The wiring and detection should be performed by the corresponding professional.**
- **The product should be grounded stably, and its grounding resistance should be less than 0.1Ω. Do not replace the grounding wire by the neutral cable (zero).**
- **The wiring should be correct and firm, so that the product malfunction or unexpected result may occur**
- **The surge absorb diode of the product should be connected based upon the specified direction; otherwise, the product may be damaged.**
- **The power should be turned off before plug-in/out or opening the case of the product.**

■ Maintenance

- **It is necessary to cut off the power before maintaining or changing the components.**

- **Check the malfunction when the short-circuit or overload occurs; the machine can be restart again after the malfunction removes.**
- **Do not frequently power on/off. The power should be turned on again after 1min. at least.**

Security Responsibility

Security responsibility of the manufacturer

——Manufacturer should take responsibility for the design and structure danger of the motor and the accessories which have been eliminated and/or controlled.

——Manufacturer should take responsibility for the security of the motor and accessories.

——Manufacturer should take responsibility for the offered information and suggestions for the user.

Security responsibility of the users

——User should know and understand about the contents of security operations by learning and training the security operations of the motor.

——User should take responsibility for the security and danger because of increasing, changing or modifying the original motor or accessory by themselves.

——User should take responsibility for the danger without following the operations, maintenances, installations and storages described in the manual.

This manual is reserved by final user.

We are full of heartfelt gratitude to you for supporting us in the use of GSK's products.

CONTENT

1 BRIEF

1.1 Product Brief

The GH2000/GH3000 Series Bus AC Servo Drive Unit (It is the one high-accuracy and high-speed full digit AC servo drive unit) is the updated developed one based upon the GSK-Link Ethernet Bus Agreement of our company, which provides a reliable drive control of the AC servo motor with the absolute encoder.

1.1.1 Product Character

- It uses the GSK-Link Ethernet bus communication method; and its data transmission rate can be performed up to about 100Mbits/s; the on-line data real-time uploading/downloading can be carried out.
- It uses the servo motor installed with the absolute encoder, and its encoder number can be set from17 to 28.
- One interface supports variable encoder agreed communications, for example, TAMAGAWA, HEIDEHAIN, DANAHER, and NIKON.
- Intelligently identify the motor's type; the SJT (A4) series servo motor type or the default parameter call can be identified after the power is turned on.
- There are two kinds power mode selection, one is that the GH3000 series uses AC380V; the other is that the GH2000 uses AC220V.
- Multiple power selection, the power module 30A/50A/75A/100A/150A can be selected.

1.1.2 Use Area

It can be used in these areas, such as the mechanical manufacture, CNC machine, printing & packing machine, spinning machine, robot and the automatic assembly line.

1.1.3 Product Appearance

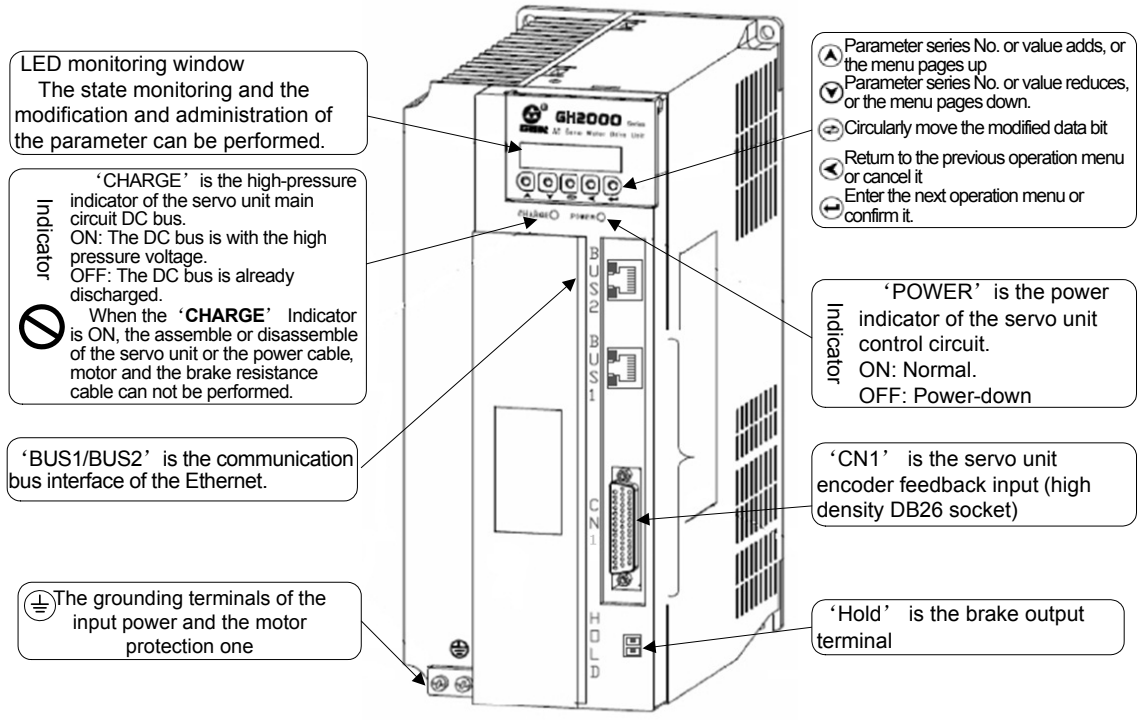


Fig. 1-1 Product appearance

1.2 Product Technical Specification

1.2.1 Technical Specification of the Drive Unit

Table 1-1 The main technical specification parameter of the drive unit

Drive unit type	**GH2030**	**GH2050**	**GH2075**	**GH2100**	**GH3048**	**GH3050**	**GH3075**	**GH3100**
IPM module power (A)	30	50	75	100	50	50	75	100
Adapted servo motor rated current (A)	4<I≤6	7<I≤10	10<I≤15	15＜ I≤29	4＜I≤6	7＜I≤10	10＜ I≤15	15＜ I≤29
Main circuit power	Three-phase, AC 220V				Three-phase, AC 380V			
Control circuit power	Single-phase, AC 220V				Single-phase, AC 380V			
Brake resistance	Built-in		External needed (without built-in)		Built-in	External needed (without built-in)		
Control method	Three-phase full-wave rectification IGBT PWN sine wave drive							

Feedback method	17-bit absolute encoder (It is compatible with TAMAGAWA, HEIDEHAIN, DANAHER, and NIKON)
Communication method	GSK-LINK bus communication method: the Max. connection number: 254 axes; the data transmission ratio: 100Mbits/s
Speed frequency response	≥200Hz
Speed-regulation ratio	1: 60000
The least speed control	±0.1r/min
PID response frequency	Velocity loop: 10KHz Current loop: 10KHz
Working method	Manual, JOG, external velocity (Bus agreement)
Working ambient temperature	Working temperature: 0℃～+40℃ Storage temperature: -40℃～+70℃
Working ambient humidity	Less than 90% (No condensation)
Vibration-resistance/impact-resistance	Less than 0.5G （4.9m/s^2）(Discontinuous operation in the 10Hz～60Hz)
Protective function	Overspeed, overpressure, main circuit open-phase, power module failure, underpressure, overload, overheat, brake abnormal, encoder abnormal, encoder communication failure, motor type setting enabled, control power abnormal etc.
Monitoring function	Motor speed, encoder feedback single-circle value/multiple-circle value, motor current, operation state, CUP use rate, Ethernet state, speed command value, alarm prompt.
Display operation	6-digit LED Nixie tube, 5 keys.

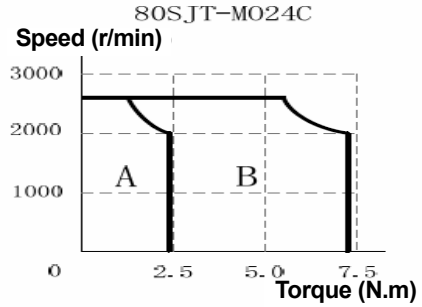
1.2.2 The Technical Specification of the Servo Motor

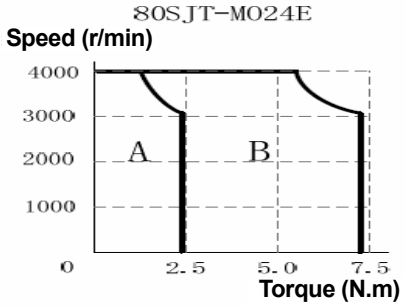
Table 1-2 The technical parameter of 80 series motor

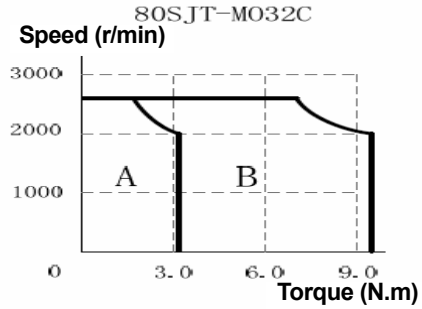
Type / Item	80SJT-M024C	80SJT-M024E	80SJT-M032C	80SJT-M032E
Rated power (kW)	0.5	0.75	0.66	1.0
Polar logarithm	4			
Rated current (A)	3	4.8	5	6.2
Zero speed torque (N.m)	2.4	2.4	3.2	3.2
Rated torque (N.m)	2.4	2.4	3.2	3.2
The Max. torque (N.m)	7.2	7.2	9.6	9.6
Rated speed (r/min)	2000	3000	2000	3000
The Max. speed (r/min)	2500	4000	2500	4000
Inertia of moment (kg·m2)	0.83×10-4	0.83×10-4	1.23×10-4	1.23×10-4
Weight (kg)	2.8	2.9	3.4	3.5
Insulation level	F（GB 755—2008）			
Vibration level	R（GB 10068—2008）			
Defense level	IP65（GB 4208—2008/IEC 60529：2001，GB/T 4942.1—2006）			
Installation type	IMB5（Flange installation）（GB/T 997—2008 / IEC 60034-7:2001）			
Working system	S1（Consecutive working system）（GB 755—2008）			
Power-down brake	Not available			
Adapted encoder	Increment 2500p/r, 5000p/r etc., absolute encoder 17 bit single circle or multiple circles			

The torque-speed character figure (T – M) of the servo motor is shown below:

A: Continuous working area B: Short time working area







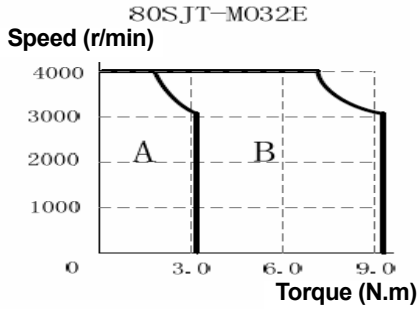


Table 1-3 The technical parameter of 110 series motor

Item \ Type	110SJT-M 040D	110SJT-M 040E	110SJT-M 060D	110SJT-M 060E	130SJT-M 040D	130SJT-M 050D
Rated power (kW)	1.0	1.2	1.5	1.8	1.0	1.3
Polar logarithm	4					
Rated current (A)	4.5	5	7	8	4	5
Zero speed torque (N.m)	4	4	6		6	5
Rated torque (N.m)	4	4	6	6	4	5
The Max. torque (N.m)	12	10	12	12	10	12.5
Rated speed	2500	3000	2500	3000	2500	2500
The Max. speed	3000	3300	3000	3300	3000	3000
Inertia of moment	0.68×10-3	0.68×10-3	0.95×10-3	0.95×10-3	1.1×10-3	1.1×10-3
Weight (kg)	6.1	6.1	7.9	7.9	6.5	6.5
The motor weight with the power-down brake (kg)	7.7	7.7	9.5	9.5	8.1	8.1
Insulation level	B（GB 755-2008）					
Vibration level	R（GB 10068-2008）					
Defense	IP65（GB/T4942.1-2006）					

level	
Installation type	IMB5（Flange installation）（GB/T 997-2008 / IEC 60034-7:2001）
Working system	S1（Consecutive working system）（GB 755-2008）
Adapted encoder	Increment 2500p/r, 5000p/r etc., absolute encoder 17 bit single circle or multiple circles

The torque-speed character figure (T – M) of the servo motor is shown below:

A: Continuous working area B: Short time working area

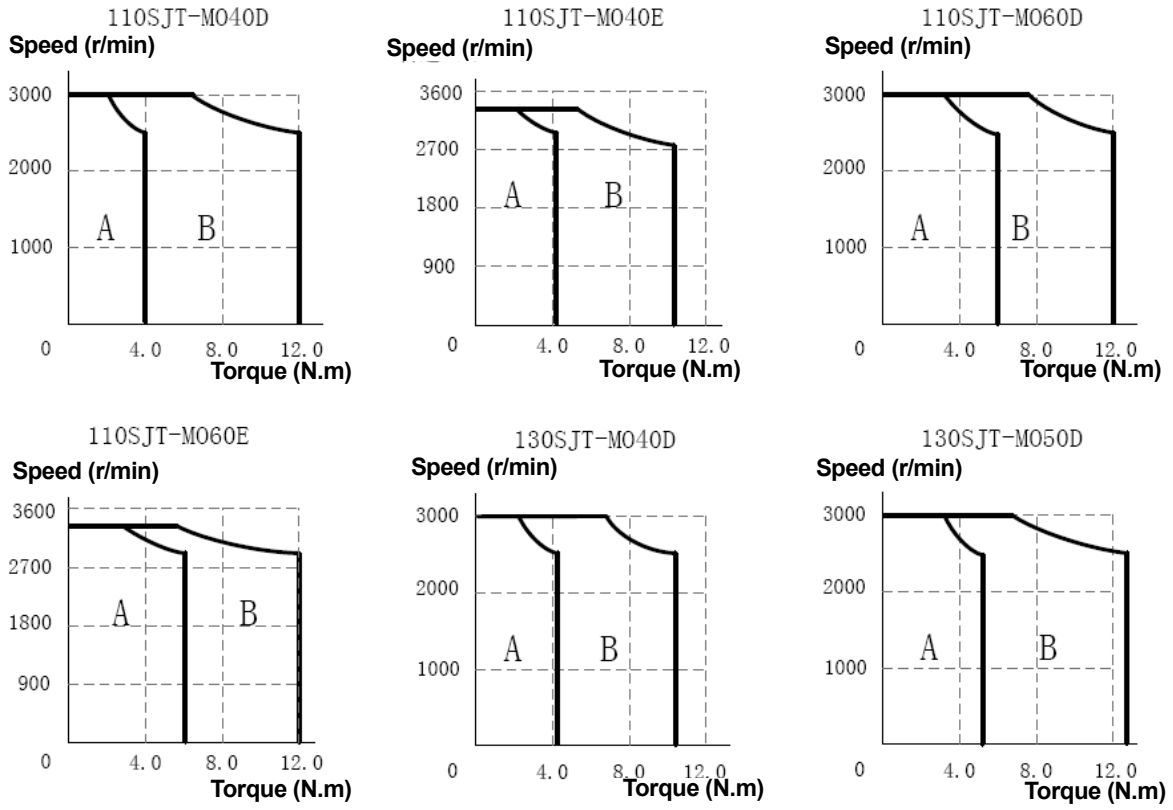


Table 1-4 The main technical parameter of the 130SJT series motor (to be continued table 1-3)

Type / Item	130SJT-M 060D	130SJT-M 075D	130SJT-M 100B	130SJT-M 100D	130SJT-M 150B	130SJT-M 150D
Rated power (kW)	1.5	1.88	1.5	2.5	2.3	3.9
Polar logarithm	4					
Rated current (A)	6	7.5	6	10	8.5	14.5
Zero speed (N.m)	6	7.5	10	10	15	15
Rated torque (N.m)	6	7.5	10	10	15	15
The Max. torque (N.m)	18	20	25	25	30	30
Rated speed	2500	2500	1500	2500	1500	2500
The Max.	3000	3000	2000	3000	2000	3000

speed						
Inertia of moment	1.33×10-3	1.85×10-3	2.42×10-3	2.42×10-3	3.1×10-3	3.6×10-3
Weight (kg)	7.2	8.1	9.6	9.7	11.9	12.7
The motor weight with the power-down brake (kg)	10.1	11	12.5	12.6	14.8	15.6
Insulation level	B（GB 755-2008）					
Vibration level	R（GB 10068-2008）					
Defense level	IP65（GB/T4942.1-2006）					
Installation type	IMB5（Flange installation）（GB/T 997-2008 / IEC 60034-7:2001）					
Working system	S1（Consecutive working system）（GB 755-2008）					
Adapted encoder	Increment 2500p/r, 5000p/r etc., absolute encoder 17bit single circle or multiple circles					

The torque-speed character figure (T – M) of the servo motor is shown below:

A: Continuous working area B: Short time working area

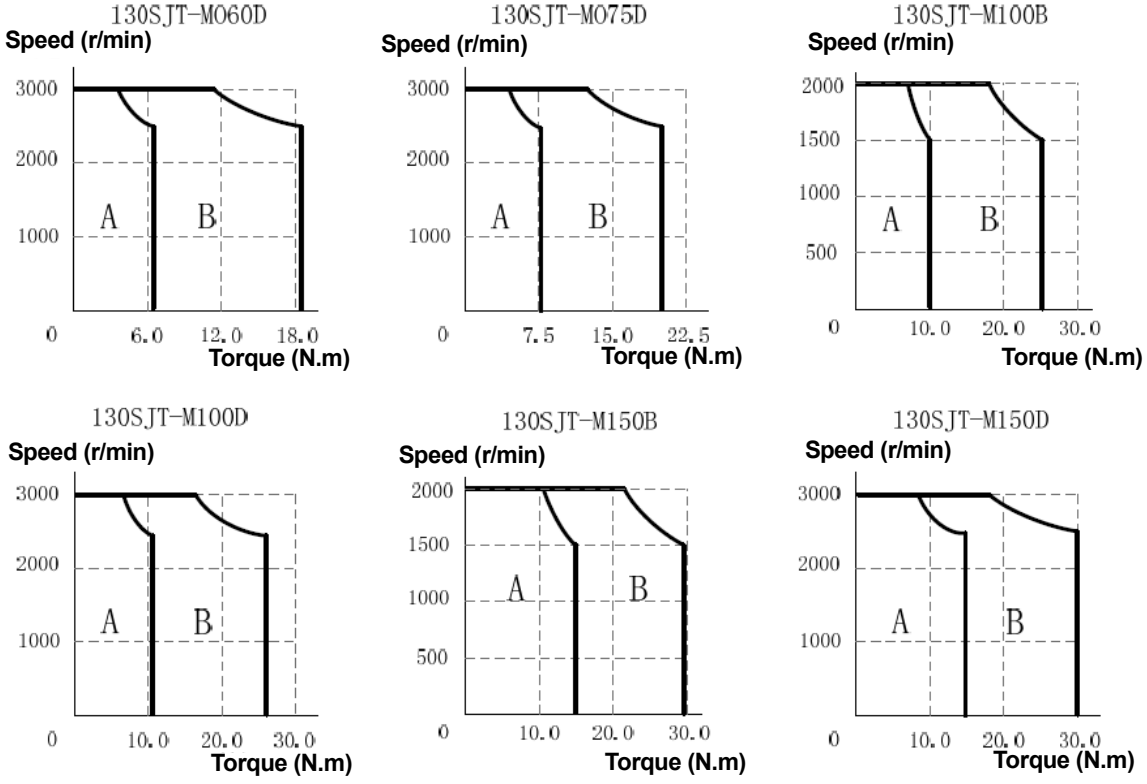


Table 1-5 The main technical parameter of the 175SJT series motor

Type / Item	175SJT-M120E	175SJT-M150B	175SJT-M150D	175SJT-M180B	175SJT-M180D
Rated power (kW)	3	2.4	3.1	2.8	3.8
Polar logarithm	3				
Rated current (A)	13	11	14	15	16.5
Zero torque (N.m)	12	15	15	18	18
Rated torque (N.m)	9.6	15	12	18	14.5
The Max. torque (N.m)	19.2	30	24	36	29
Rated speed	3000	1500	2500	1500	2500
The Max. speed	3300	2000	3000	2000	3000
Inertia of moment	5.1×10-3	5.1×10-3	5.1×10-3	6.5×10-3	6.5×10-3
Weight (kg)	18.9	18.5	19	22.8	22.9
The motor weight with power-down brake (kg)	24.5	24.1	24.6	28.4	28.5
Insulation level	B（GB 755-2008）				
Vibration level	R（GB 10068-2008）				
Defense level	IP65（GB/T4942.1-2006）				
Installation type	IMB5（Flange installation）（GB/T 997-2008 / IEC 60034-7:2001）				
Working system	S1（Consecutive working system）（GB 755-2008）				
Adapted encoder	Increment 2500 p/r, 5000 p/r etc., absolute encoder 17 bit single circle or multiple circles				

The torque-speed character figure (T – M) of the servo motor is shown below:

A: Continuous working area B: Short time working area

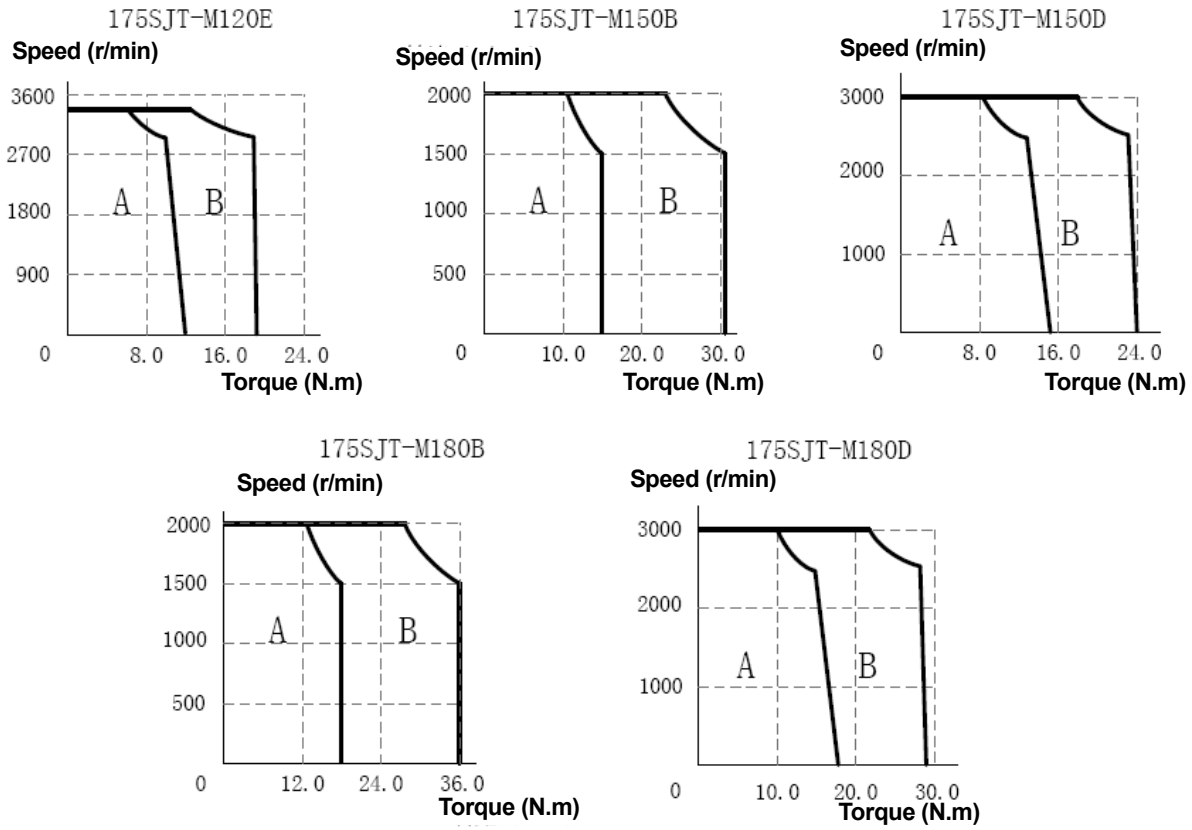


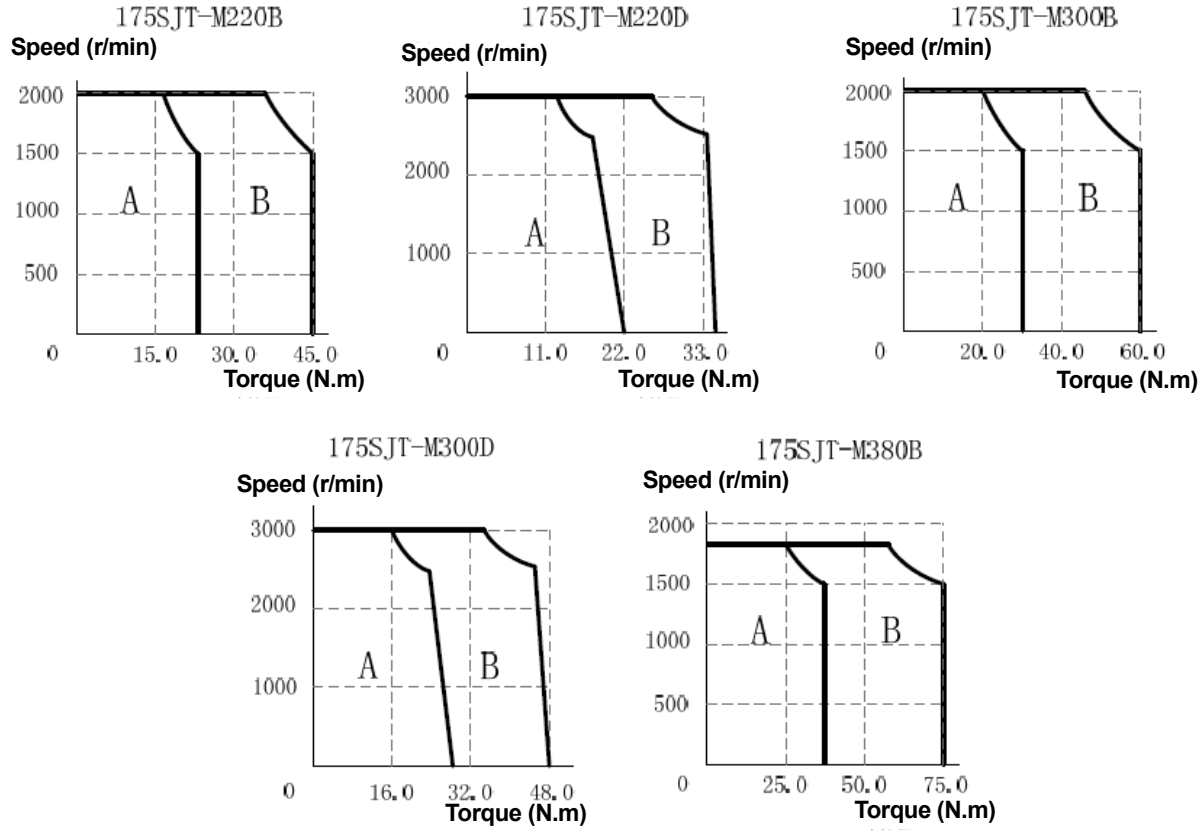
Table 1-6 The main technical parameter of the 175SJT series motor (to be continued the table 1-5)

Type / Item	175SJT-M220B	175SJT-M220D	175SJT-M300B	175SJT-M300D	175SJT-M380B
Rated power (kW)	3.5	4.5	3.8	6	6
Polar logarithm	3				
Rated current (A)	17.5	19	19	27.5	29
Zero speed torque (N.m)	22	22	30	30	38
Rated torque (N.m)	22	17.6	24	24	38
The Max. torque (N.m)	44	35.2	48	48	76
Rated speed	1500	2500	1500	2500	1500
The Max. speed	2000	3000	2000	3000	1800
Inertia of moment	9.0×10-3	9.0×10-3	11.2×10-3	11.2×10-3	14.8×10-3
Weight (kg)	28.9	29.2	34.3	34.4	42.4
The motor weight with power-down brake (kg)	34.5	36.8	42	42.1	50.1
Insulation level	B（GB 755-2008）				

Vibration level	R（GB 10068-2008）
Defense level	IP65（GB/T4942.1-2006）
Installation type	IMB5（Flange installation）（GB/T 997-2008 / IEC 60034-7:2001）
Working system	S1（Consecutive working system）（GB 755-2008）
Adapted encoder	Increment 2500p/r, 5000p/r etc., absolute encoder 17 bit single circle or multiple circles

The torque-speed character figure (T – M) of the servo motor is shown below:

A: Continuous working area B: Short time working area



2 INSTALLATION

Notice

- The storage and installation of the product should be suitable for the ambient conditions.
- The pile number of the product should be controlled, which can not be piled them together too many, so that the product may be crushed or dropped.
- The storage and transportation of the product should be used the original packing.
- Do not use the product with damaged or absent components.
- Do not install it on the flammable surface or near, to avoid the fire hazard.
- The servo drive unit should be installed inside the electric cabinet; prevent the dust, corrosive gas, conductive material, liquid and the inflammable matter from entering the machine.
- The servo drive unit and servo motor can not be shocked and impacted.

2.1 Ambinet Condition

Item	GH2000/GH3000 series servo drive unit	SJT series AC servo motor
Using temperature/ humidity	0℃～+40℃（No freeze） Below 90%RH (No condensation)	0℃～+40℃ （No freeze） Below 90%RH（No condensation）
Storage temperature/ humidity	-40℃ ~ +70℃, 90%RH (No condensation)	Below -40℃ ~ +70℃, 90%RH (No condensation)
Atmosphere ambient	There is no corrosive gas, inflammable gas, oil mist or dust inside the control cabinet.	There is no corrosive gas, inflammable gas, oil mist or dust in the house (without sunshine).
Altitude	Blow 1000m	Below 1000m
Vibration	Less than 0.5G (4.9m/s^2) 10Hz～60Hz (Nonconsecutive)	
Defense level	IP43	IP65

2.2 The Installation of the Drive Unit

2.2.1 Installation Ambient

- **Defense**

The servo drive unit should be installed well-mounted electric cabinet, because its structure is without defense. Prevent the corrosive gas, inflammable gas, as well as the conductive material, metal dust, oil mist and liquid from entering the machine.

- **Temperature, humidity**

The ambient temperature is 0℃～+40℃, and ensure the radiating condition.

- **Vibration and impact**

The installation of the drive unit can not be shocked, and the vibration control should be less than 0.5G (4.9m/s^2) based upon the buffering measure. The installation of the drive unit must be far away from the heavy load and impact.

2.2.2 Installation Dimension

The GH2000/GH3000 series drive unit adopts base plate installation method, of which its installation direction is vertical to the installation surface and upward. The front is forward and the top surface is upward for cooling when the drive unit is installed. Note that the necessary space around the machine should be reserved.

In order to guarantee the ambient temperature of the drive unit does not rise consecutively, the convection air should blow to the radiator of the drive unit inside the electric cabinet.

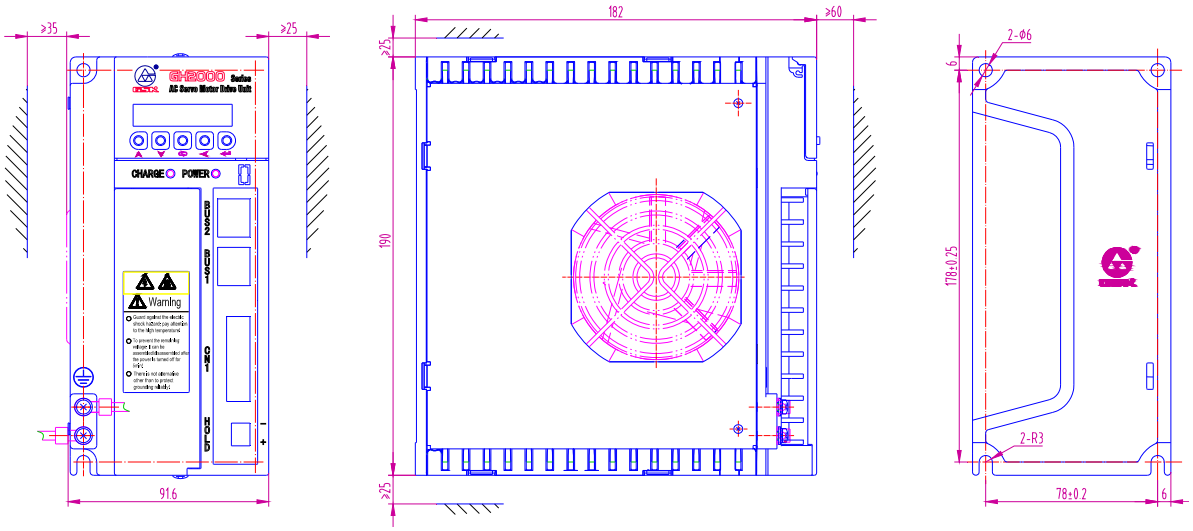


Fig. 2-1 GH2030T installation dimension (Unit: mm)

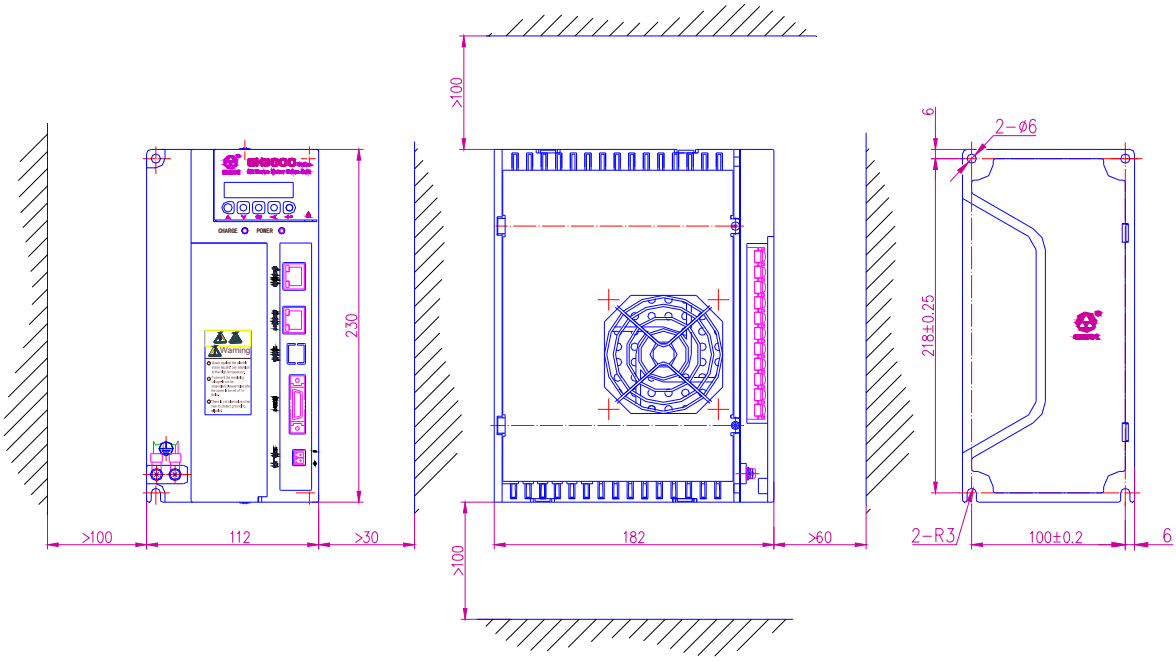


Fig. 2-2 GH2050T, GH3048T installation dimension (Unit: mm)

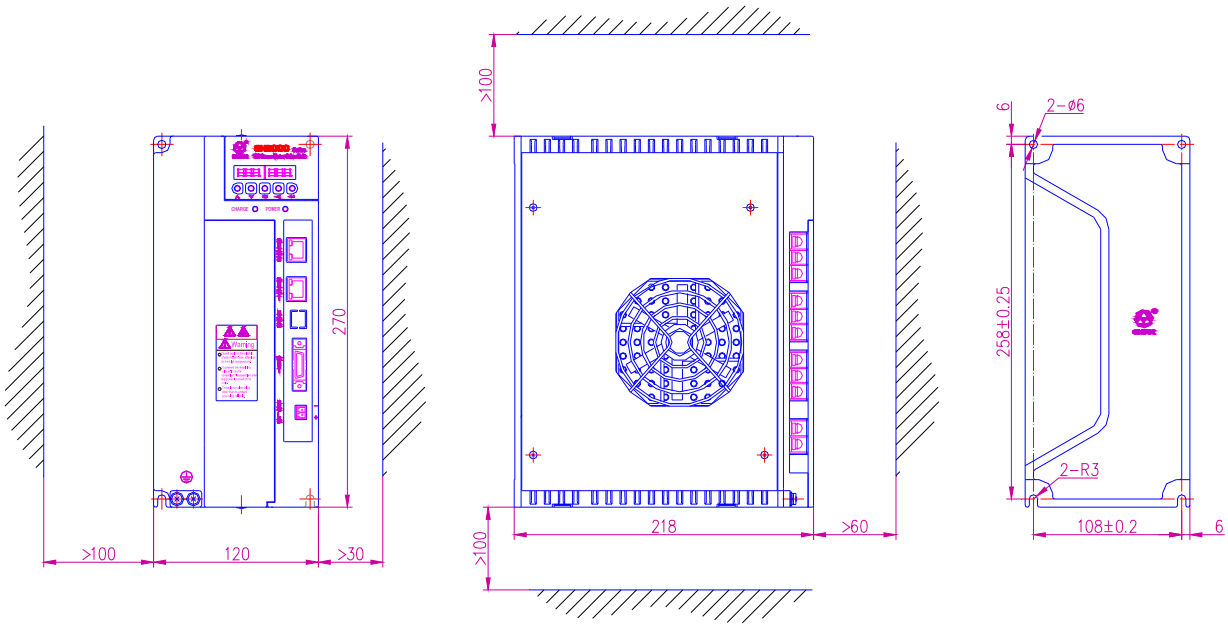


Fig. 2-3 GH2075T, GH3050T installation dimension (Unit: mm)

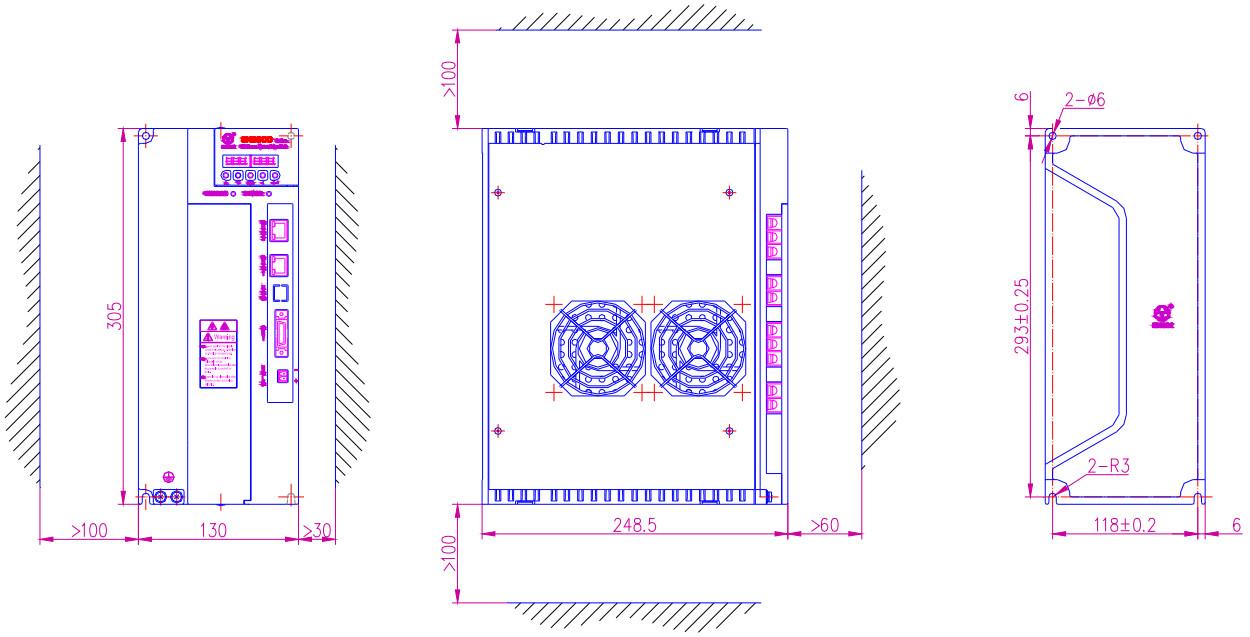


Fig. 2-4 GH2100T, GH3075T installation dimension (Unit: mm)

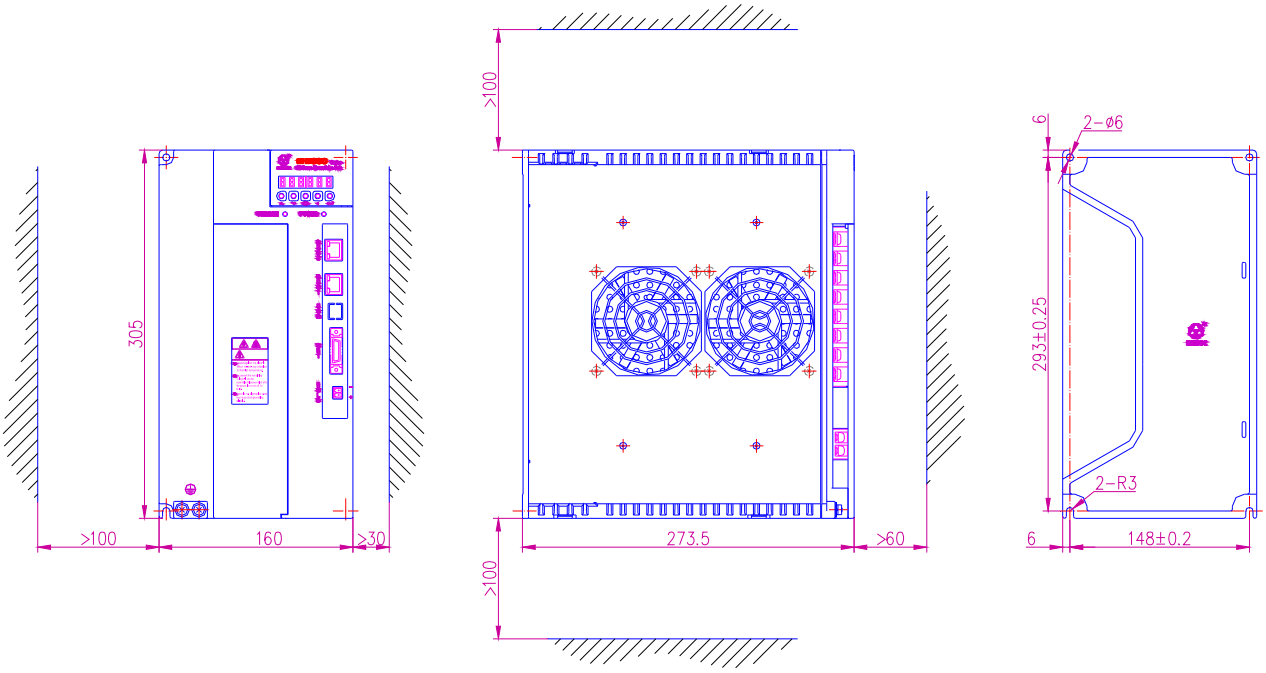


Fig. 2-5 GH3100 installation dimension (Unit: mm)

2.3 Servo Motor Installation

Notice

- Do not knock the motor shaft or encoder, and prevent the motor from the shocking or impacting.
- Do not drag the motor shaft, leading wire or encoder cable when transporting the motor.
- The motor may be damaged if the motor shaft is overload.
- The motor installation should be firm and the locking measure should be ready.

2.3.1 Installation Ambient

(1) Defense

At present, GSK SJT series servo motors are not waterproof, and therefore, prevent the liquid from splashing to the motor during installing or using, and guard against the oil or water enter the motor from the motor leading wire and the shaft.

Note: It is necessary to state in the order if you need the waterproof servo motor.

(2) Temperature, Humidity

The ambient temperature should be ranged 0～+40℃. The motor may heat up if it is operated for long time. It is considered that the motor should be cooled by force if the space around the machine is narrow or the heating equipment is accompanied with it.

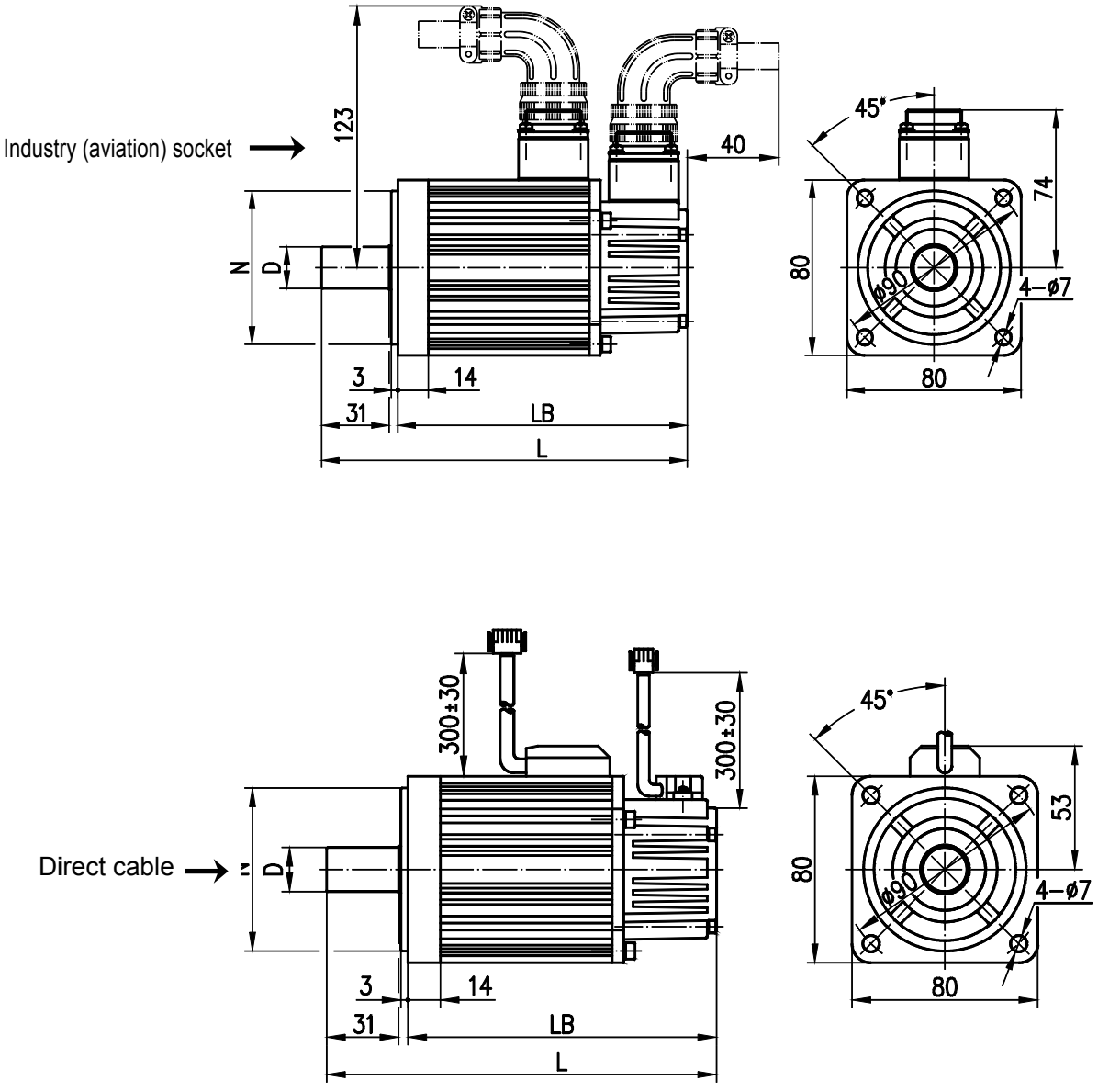
The humidity should be less than 90%RH, and no condensation occurs.

(3) Vibration

It is avoid to install the servo motor in the vibration situation, and its oscillation should be less than 0.5G（4.9m/s^2）.

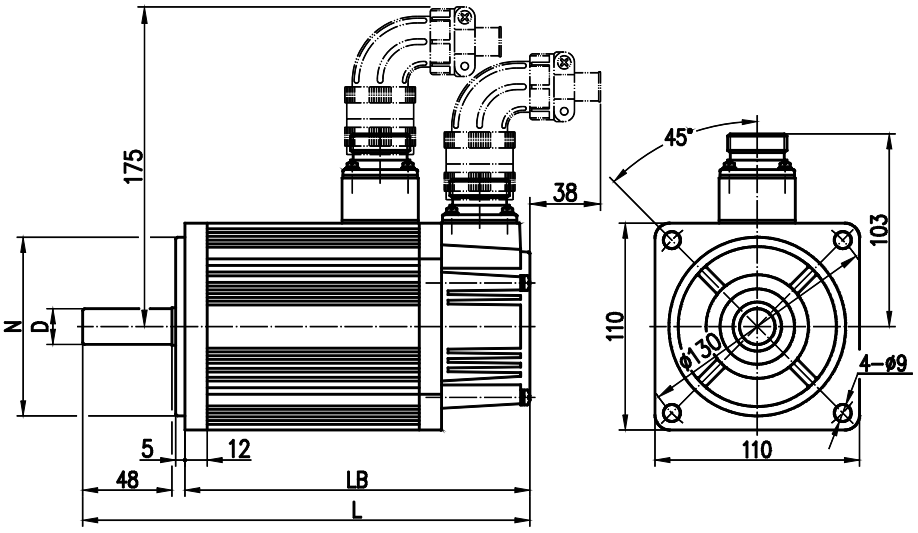
2.3.2 Installation Dimension

(1) 80SJT series seat number AC servo motor appearance and installation dimension



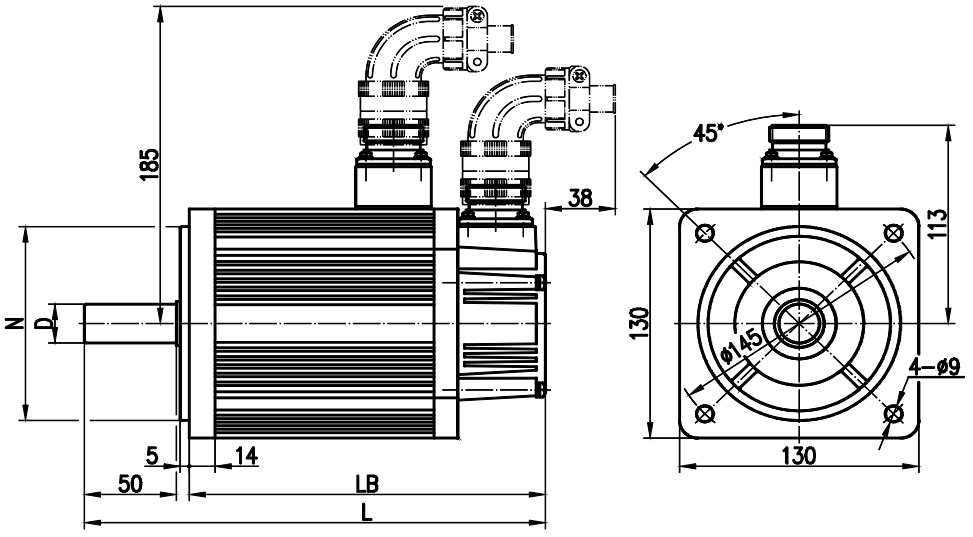
Type	D(mm)	N(mm)	LB(mm)	L(mm)
80SJT—M024C（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 70^{0}_{-0.03}$	163	198
80SJT—M024E（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 70^{0}_{-0.03}$	163	198
80SJT—M032C（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 70^{0}_{-0.03}$	181	216
80SJT—M032E（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 70^{0}_{-0.03}$	181	216

(2) 110 SJT series AC servo motor appearance and installation dimension



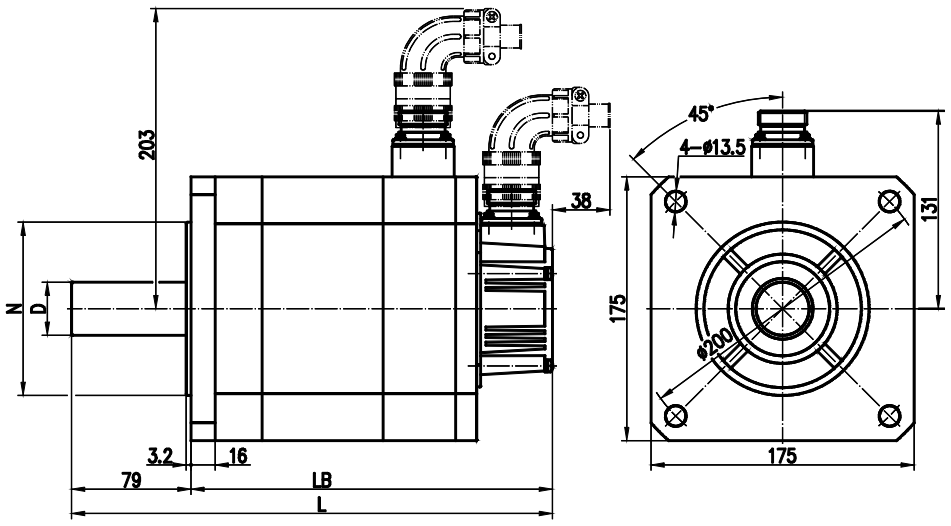
Type	D(mm)	N(mm)	LB(mm)	L(mm)
110SJT—M040D（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 95^{0}_{-0.035}$	186 (237)	241 (292)
110SJT—M040E（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 95^{0}_{-0.035}$	186 (237)	241 (292)
110SJT—M060D（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 95^{0}_{-0.035}$	212 (263)	267 (318)
110SJT—M060E（A4）	$\varphi 19^{0}_{-0.013}$	$\varphi 95^{0}_{-0.035}$	212 (263)	267 (318)
Note: LB and L inside the bracket are the length value of corresponding specification with the power-down brake motor.				

(3) 130SJT series AC servo motor appearance and installation dimension



Type	D(mm)	N(mm)	LB(mm)	L(mm)
130SJT—M040D（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	168 (227)	225 (284)
130SJT—M050D（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	168 (227)	225 (284)
130SJT—M060D（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	176 (235)	233 (292)
130SJT—M075D（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	188 (247)	245 (304)
130SJT—M100B（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	208 (267)	265 (324)
130SJT—M100D（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	208 (267)	265 (324)
130SJT—M150B（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	238 (297)	295 (354)
130SJT—M150D（A4）	$\varphi 22^{0}_{-0.013}$	$\varphi 110^{0}_{-0.035}$	248 (307)	305 (364)
Note: LB and L inside the bracket are the length value of corresponding specification with the power-down brake motor.				

(4) 175 SJT series AC servo motor appearance and installation dimension



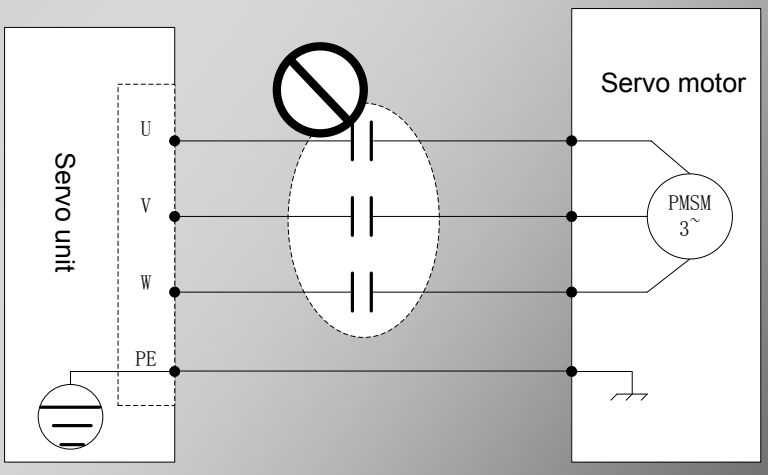
Type	D(mm)	N(mm)	LB(mm)	L(mm)
175SJT—M150D（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	224 (291)	303 (370)
175SJT—M180B（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	244 (311)	323 (390)
175SJT—M180D（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	244 (311)	323 (390)
175SJT—M220B（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	279 (346)	358 (425)
175SJT—M220D（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	279 (346)	358 (425)
175SJT—M300B（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	309 (382)	388 (461)
175SJT—M300D（A4）	$\varphi 35_{0}^{+0.01}$	$\varphi 114.3^{0}_{-0.025}$	309 (382)	388 (461)
Note: LB and L inside the bracket are the length value of corresponding specification with the power-down brake motor.				

- **Precautions**:
  - **To avoid the damage in the encoder, do not knock the motor or its shaft when disassembling the belt wheel. It is better use the spiral press/pull tool to dismount it.**
  - **At present, most SJT series motors can not be undergone the large shaft and diameter direction load. It is recommended to connect the load by the flexible coupler.**
  - **Use the locking cushion to fix motor against the motor releases.**

3 WIRING

Notice

- It is essential to carefully read this chapter for ensuring your personal safety.
- The wiring should be operated by the professional and correctly connected based upon the related explanations.
- In order to guarantee the equipment can be correctly operated under the terrible surroundings, it is better to wiring according to the related electromagnetism regulations.
- The wiring or inspection should be performed after affirming the grounding voltage of each main circuit terminal is safe by the Multimeter, after the drive unit is turn off for 5min, otherwise, the electric shock may occur.
- Confirm the drive unit and servo motor is correctly grounded.
- To avoid the cable is being damaged by the sharp object, do not drag the cable by force during wiring, otherwise, the electric shock or the fault connection may occur.
- Do not traverse the main circuit and the signal cables with the same pipeline and tie them up together. During wiring, the main circuit cable should be separated from the signal one, up to 30cm above. In this case, guard against the strong circuit is interrupted
- Do not cut ON/OFF the power frequently, because there is wide capacity inside the drive unit. The bigger current may occur when the power is turned on, and the component inside the drive unit may be shortened the life span if the power is frequently ON/OFF. It is recommended to wait 30min above when the power is turned on or off.
- Both the main circuit wiring and signal wire can not be closed to the radiating equipment and motor, so that the insulation capacity is reduced due to the heat.
- The terminal protection cover should be closed for avoiding electric shock, after the main circuit connection is performed.
- Any equipment, such as the power capacity, surge absorber and the wireless noise filter etc., can not add between the drive unit output side and servo motor.



3.1 Peripheral Equipment Connection

3.1.1 The Explanation of the Wiring port

Table 3-1 The definition of the drive unit wiring port

Terminal mark	Name	Explanation
R, S, T	AC power input terminal	The contravariant power input of the drive unit main circuit
R, t	AC power input terminal	The switch power input of the drive unit control board
U, V, W	Three-phase AC output terminal	Connect with the three-phase winding U, V and W of the motor
PE	Protective grounding terminal	Connect with the power grounding and motor grounding
P, B1, B	Brake resistance terminal	The brake resistance is available for the dynamic brake; the drive unit without built-in brake resistance only can be normally operated by connecting with the external brake resistance.
BUS1/BUS 2	Bus communication terminal	It is connected with system or drive unit in series. Refer to the Bus connection explanation in Fig. 3-3
CN1	Encoder wiring terminal	High density 26pin DB pin, and it is connected with the motor encoder.
HOLD	Brake wiring terminal	The motor hold relay control interface and the optical coupler insulation circuit included.

Table 3-2 The suggestion table of the used cable and cord terminal of the drive unit

Product type	Rated current of the adapted motor I(A)	R, S, T/U, V, W		r, t		P, B1, B		PE	
		Terminal screw dimension φmm	Cable diameter mm^2	Terminal screw dimension φmm	Cable diameter mm^2	Terminal screw dimension φmm	Cable diameter mm^2	Terminal screw dimension φmm	Cable diameter mm^2
GH2030	4.5＜I≤6	3.5	1.5	3.5	1	3.5	1.5	3.5	1.5
GH2050	6＜I≤10	3.5	2.5	3.5	1	3.5	2.5	4	2.5
GH2075	10＜I≤15	4	4	4	1	4	2.5	5	2.5
GH2100	15＜I≤29	6	4	4	1	6	4	5	4

3.1.2 Peripheral Equipment Connection Diagram

The following items in the peripheral equipment connection diagram should be observed:

- The breaker, AC filter and the AC contactor should be configured by the user, and the other equipments can be purchased from GSK.
- Refer to the Chapter Six for the selection of the breaker, AC filter, insulation transformer, AC reactor and the AC contactor.
- The peripheral equipment marked with “must be assembled” can be ensured that the user can use the servo equipment safely and stably, as well reduce the loss as much as possible when the user equipment malfunction occurs.

- The peripheral equipment marked with the “optional” can be guaranteed the stable operation in the drive unit when the power is on the bad surroundings.

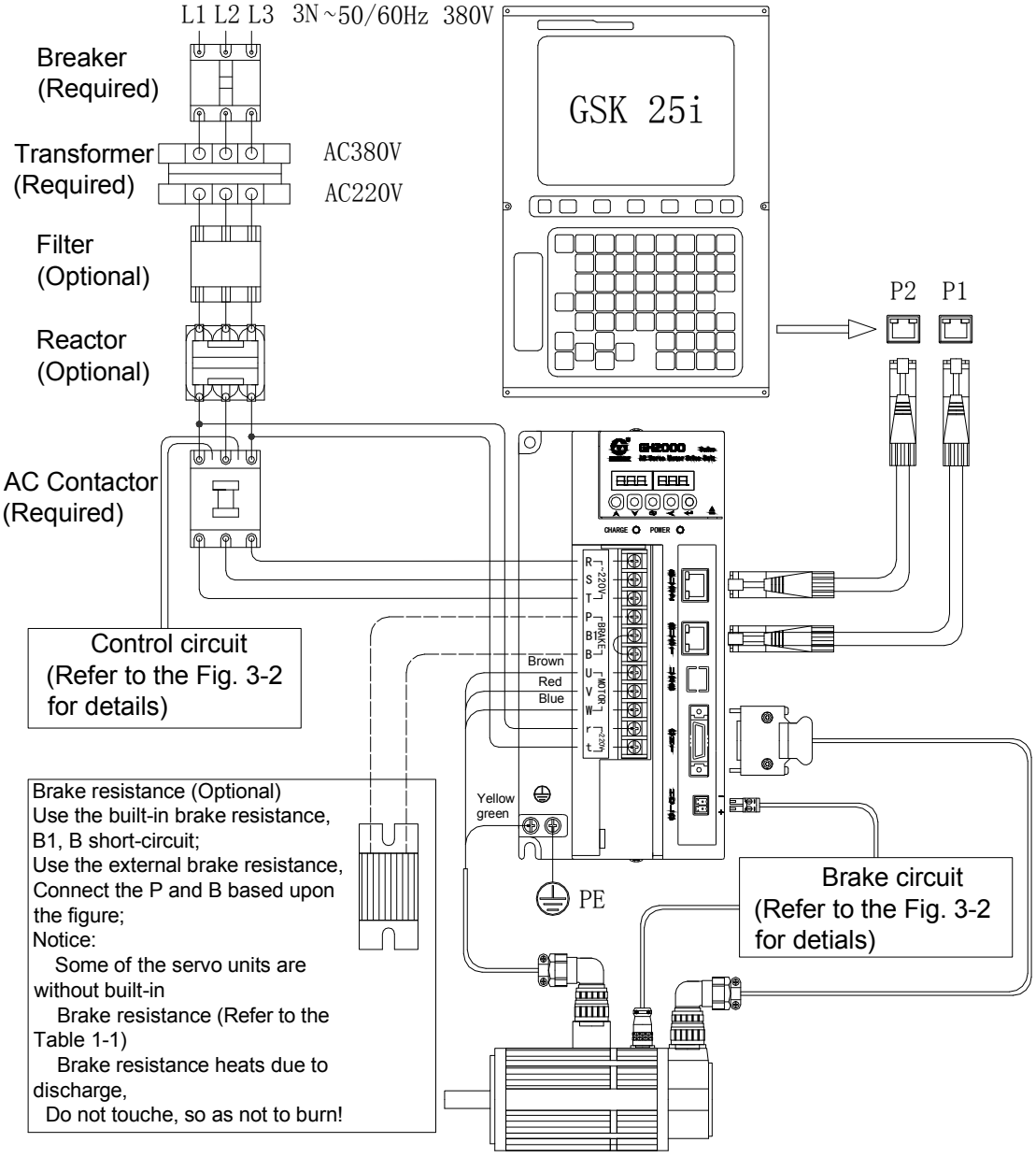


Fig. 3-1 GH2000/GH3000 reference connection diagram of the Ethernet bus method

Notice	The B1 and B Terminals must be connected with Short-circuit regardless of the external brake resistance; and the B1 and B should be cut when the external brake resistance is performed. The motor cable in our factory has been marked with The U, V, W and PE wiring port, which should be connected with the U, V, W and PE port of the servo unit one by one, otherwise, the motor can not be operated normally! Correctly connect the protective grounding terminal, and its grounding resistance should be less than 10Ω.

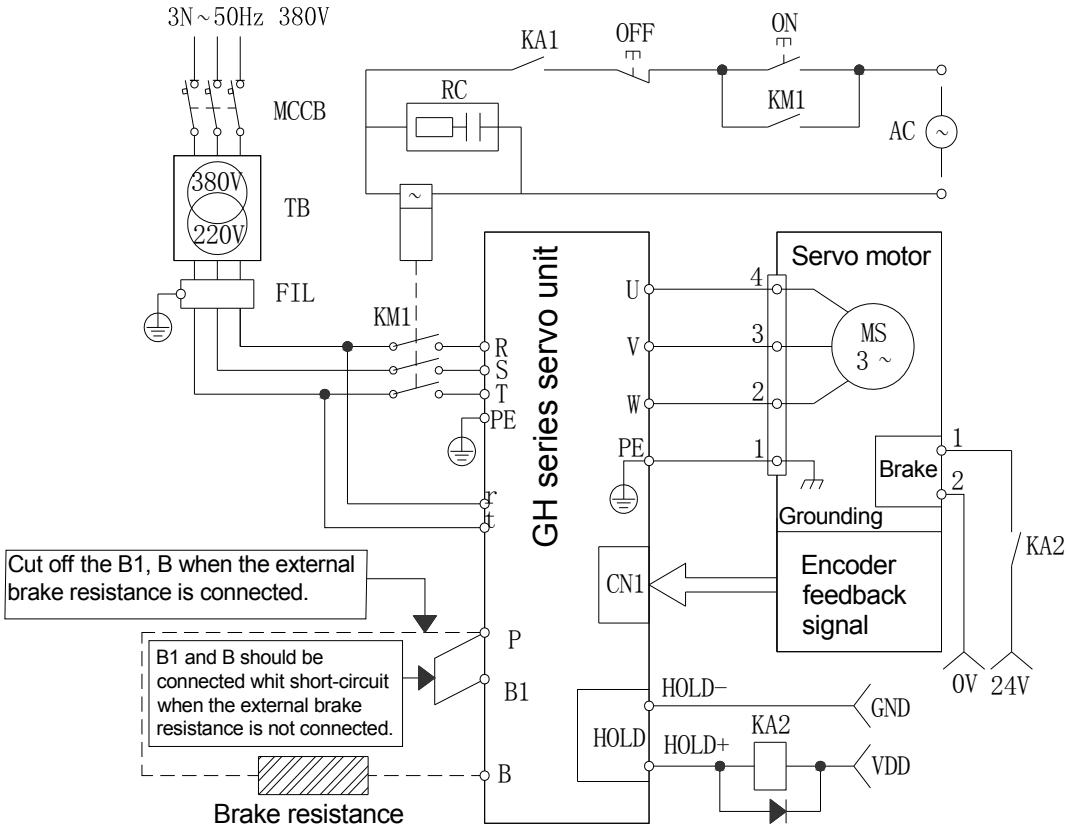


Fig. 3-2 The control circuit of the main loop

3.2 Bus Connection

The GSK-Link industry Ethernet bus is based on the IEEE 802.3（Ethernet）area, unit internet and ring topological structure, which adopts the physical-layer chip. The transmission medium uses the ultra 5-kind twisted pair line and RJ45 interface, and its transmission rate is 100Mbits/s.

GH series drive unit adopts GSK-Link industry Ethernet bus communication method, which can be connected between drive units, drive unit and CNC system by the net wire; the maximum connection is up to 254 nodes. The communication period data only can be transited between the main station (CNC system) and servo slaver one; the non-period data can be performed among any stations. The GSK-Link bus employs double-ring topological structure; the bus topology is shown as Fig. 3-3. The structure of communication module both the main and slaver stations are absolute same.

- **Notice**

1. The connection sequence and drive unit IP address are corresponding; refer to the system operation manual for details.
2. The connection of the I/O module does not mark in the Fig. 3-3 connection diagram. The method of connection diagram that adds the I/O module is same to the drive unit one.

3. Suppose that it is regarded as X/YZ in turn from left to right, the Fig. 3-3 shows the single-direction circuit schematic, that is, the CNC system P1 interface communication begins from X axis BUS1, and ends to the Z axis BUS2. In addition, another circuit communication connection can be carried out, namely, the CNC system P1 interface communication starts from X axis BUS1, and ends to the BUS2.

4. I/O module must be placed at begin or end of the circuit regardless of connection method, and it can not be connected between drive units.

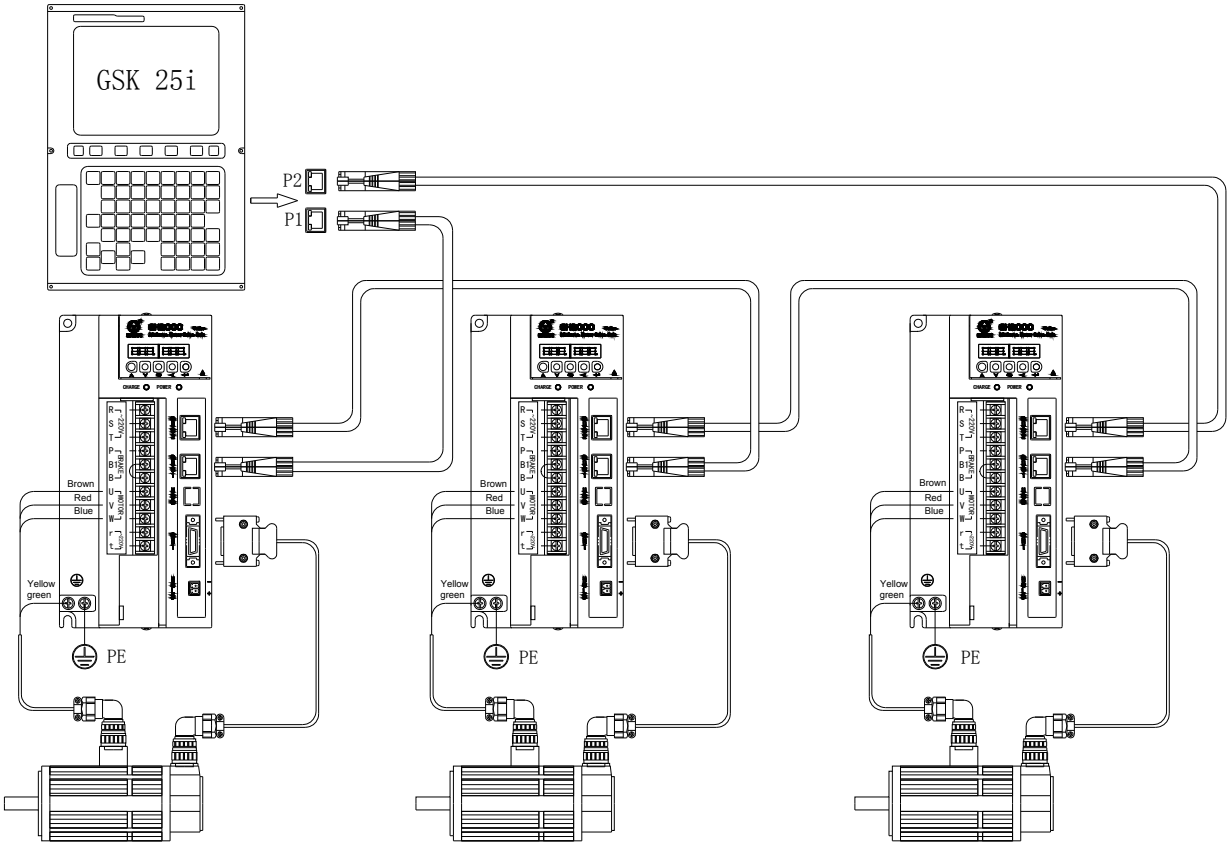
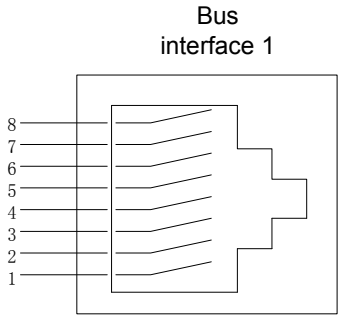
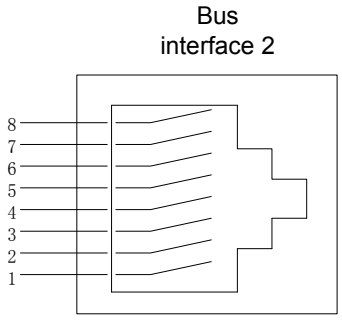


Fig. 3-3 GH series topological structure diagram between drive unit and system



Pin explanation of bus interface 1 (BUS 1)	
Pin No.	Pin explanation
1	TX1+, white green
2	TX1-,green
3	RX1+,orange white
4	NC,blue
5	NC，blue white
6	RX1-,orange
7	NC，brown white
8	NC，brown



Pin explanation of bus interface 2 (BUS 2)	
Pin No.	Pin explanation
1	TX2+,white green
2	TX2-,green
3	RX2+,orange white
4	NC,blue
5	NC，blue white
6	RX2-,orange
7	NC，brown white
8	NC，brown

Fig. 3-4 GH series drive unit RJ45 interface definition

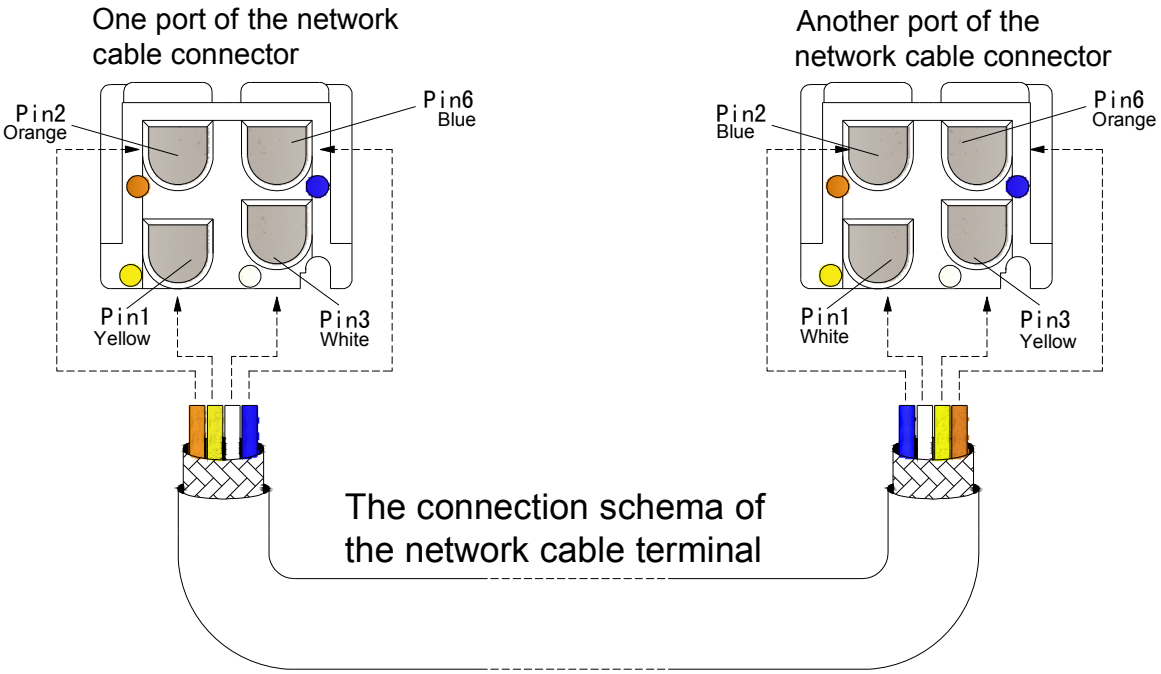


Fig. 3-5 4-core net wire crystal-head connection diagram

3.3 Motor Interface Connection

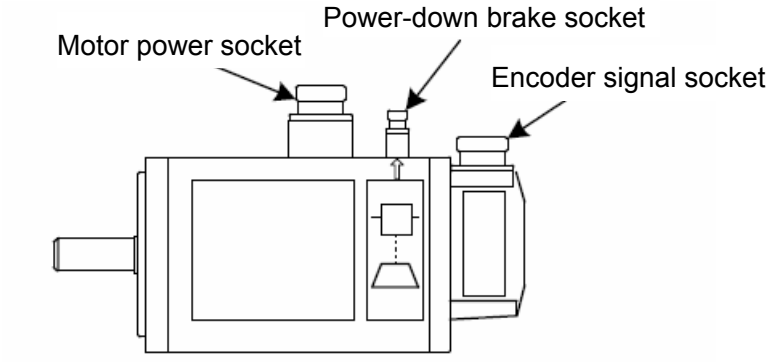
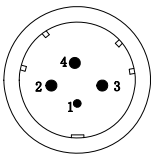


Fig. 3-6 The explanation of motor interface

3.3.1 Motor Power and Brake Wiring

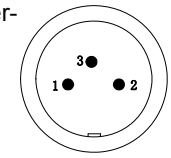
The definition of the motor power socket:
1：PE
2：Phase U
3：Phase V
4：Phase W



The socket of motor power

The definition of power-down brake socket:
1, 2：DC24V

3：Unsettled



The socket of the power-down brake

Fig. 3-7 The definition of the motor and brake interface

Note: ① 1/2 pin connects 24V, regardless of the positive/negative

② The selection of the 24V power refers to the table 3-3.

Table 3-3 The selection of the brake power supply

Motor type	Rated torque	20℃ brake coil power (Unit: W)	Release time (s)	Voltage	Power
110	4	20	0.037	24V DC	≥30W
130	8	25	0.042	24V DC	≥40W
175	32	40	0.135	24V DC	≥50W

3.3.2 Encoder Wiring

26		25	SD+	13	SD-	12	PEZ+(Testing)
24	PEA-(Testing)	23	PEB-(Testing)	11	PEB+(Testing)	10	PEZ-(Testing)
22	PEA+(Testing)	21		9	+3.6V	8	CLK+
20	CLK-	19		7		6	+5V
18	+5V	17	+5V	5	+5V	4	0V
16	0V	15	FG	3	0V	2	0V
14	FG			1	0V		

Fig. 3-8 The pin definition of the 26-pin high density socket of the drive unit

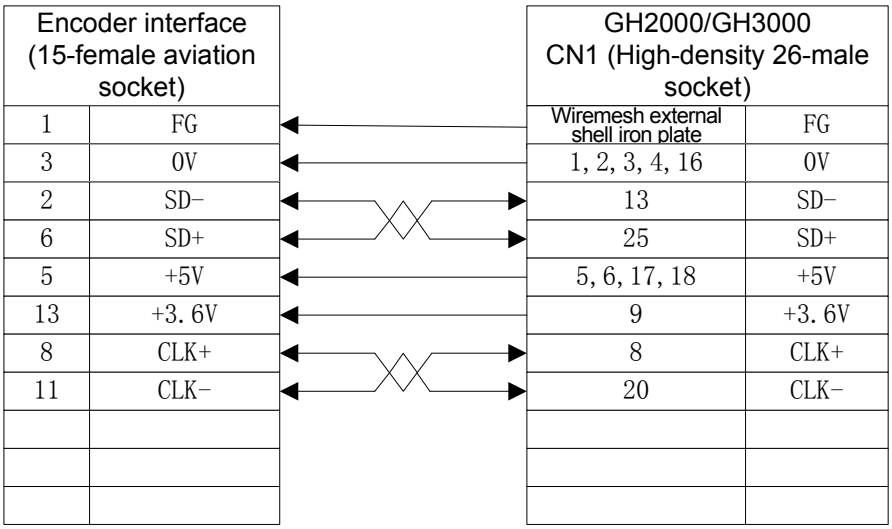


Fig. 3-9 The wiring diagram (A4 motor) of GH2000/GH3000 drive unit encoder interface CN2 (26-pin)

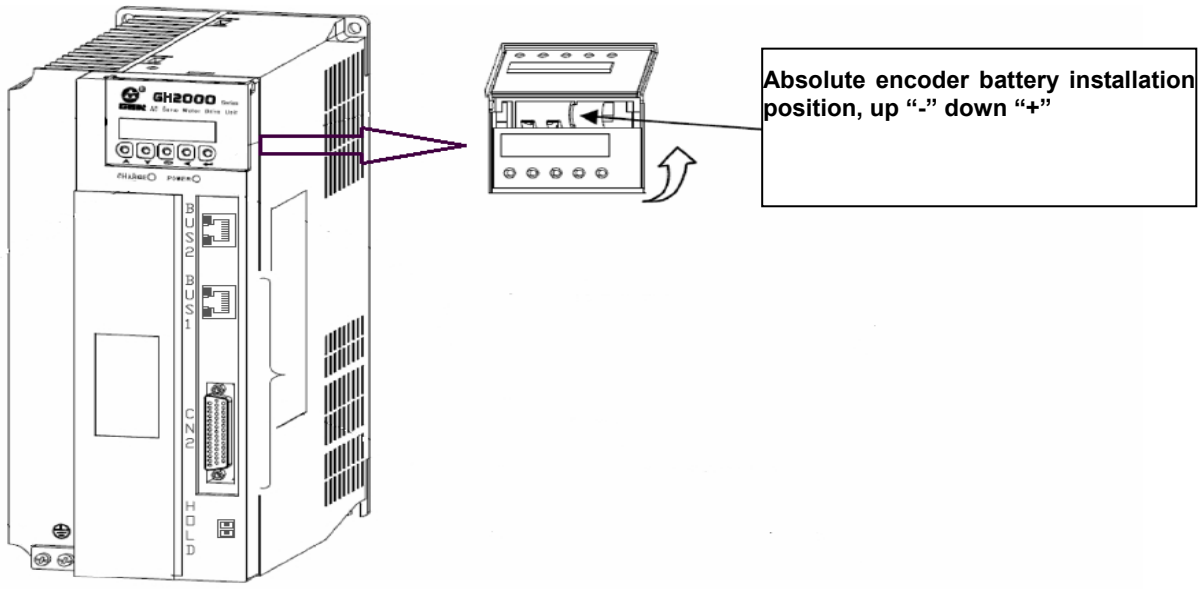
➢ **Notice:**

- +5V uses 4 pieces wires, 0V uses 5 pieces wires and 3.6V uses 2, which are together connected to the aviation socket in series to prevent the voltage reduction from transiting with long distance.
- SD+/SD- must be used a pair of twisted pair wire to improve the signal transmission quality.
- CLK+/CLC- is treated as HEIDEHAIN encoder clock signal, which should be used a pair of twisted wire. The clock signal may unsettle if it is not the HEIDEHAIN encoder.

3.4 Battery Connection

If the servo motor is installed the TAMAGAWA absolute encoder, the battery should be installed in the servo drive unit battery flat to memory the multi-circle value. The battery need not install if the servo motor is mounted the HEIDEHAIN or DANAHER absolute encoder.

GH series drive unit is adapted with VARTA 3.6V/1200mAh made in Germany before delivery, which can not charge with the Lithium battery, its life span is 3 years and consecutive reserve time is 12000h. The battery is connected with the drive unit by a 2-pin socket, the red wire is positive, and the black is negative. This is the positive where the battery contact pin is closed to the button, and the other is negative.



➢ **Notice:**

- Ensure the battery polarity is correct, otherwise, the encoder may be damaged in short-circuit.
- Normally, the battery consecutive reserve is 12000h, but if the huge leak current may have, the life span then may be shortened.
- The new battery should be changed when the drive unit prompts the battery alarm (Refer to 4.2.3 explanation).

4 DEBUGGEING

Notice

- The person who attends to the debugging should understand the parameter significant; incorrect setting may cause the equipment damage and personal injury.
- It is recommended that the dry run of the servo motor should be performed after the debugging of the parameter.
- The motor parameter adapts the GSK SJT series servo motor with the absolute encoder, if other motors are used, the corresponding parameter then should be debugged, otherwise, the motor operation may abnormal.

4.1 Parameter Explanation

4.1.1 Parameter List

The factory value of the drive unit in the following list adapts the GSK 130SJT-M075D (A4) (7.5N.m, 2500r/min) motor, which is treated as an example, refer to the following list. The relative parameters differ depending on the motors. It is better to adjust based upon the parameter debugging guide or the technical person.

Table 4-1 GH drive unit parameter list (software version V4.42)

Parameter No.	Parameter significant	Default	Numerical range
0	Password	315	1～9999
1	Motor type code	27	0～100
2	Version number	420	0～32767
3	Initial display state	0	0～21
4	Control method selection	0	0～7
5	Velocity proportional gain	450	5～1280
6	Velocity integral time constant (ms)	150	1～32767
7	Torque command filter coefficient (%)	100	10～2000
8	Velocity detection low-pass filter coefficient (%)	100	10～2000
9	Position proportional gain	245	0～2000
10	Position feed forward gain	0	0～1280
11	Position feed forward low-pass cut-off frequency (Hz)	300	1～2000
12	Electric gear ratio numerator	8192	0～32767
13	Electric gear ratio denominator	500	0～32767
14	Position command input method	0	0～2
15	Position command direction	0	0～1
16	The completion range of the positioning	20	0～32767

17	Position excess-error detection range	1310	0～32767
18	Position excess-error fault detection enabled	0	0～1
19	Velocity command low-pass filter cut-off frequency (Hz)	100	15～15000
20	Drive prohibition disabled	0	0～1
21	JOG velocity	100	-6000～6000
22	Velocity command filter switch	0	0～1
23	Top speed limit	3000	0～6000
24	Inner speed 1	0	-6000～6000
25	Inner speed 2	100	-6000～6000
26	Inner speed 2	300	-6000～6000
27	Inner speed 4	-100	-6000～6000
28	Arrival speed	500	0～6000
29	The 2nd velocity integral time constant	2000	0～32767
30	Reserved	10	0～32767
31	Reserved	1	0～32767
32	Reserved	3	0～4
33	The speed in the motor testing method	100	0～6000
34	Inner CCW torque limit	300	0～300
35	Inner CW torque limit	-300	-300～0
36	Reserved	100	
37	Reserved	-100	
38	Dry run speed torque limit	100	0～300
39	Main circuit open-phase detection enabling position	0	0～10000
40	Parameter auto-tuning enabled positioning	0	10～1000
41	Servo output pulse number	2500	0～32767
42	The Max. frequency of the servo response	200	50～600
43	Reserved	1	0～1
44	Parameter auto-tuning current input	95	0～32767
45	Reserved	100	0～32767
46	The enabled digit of encoder multi-circle value abnormal alarm	0	0～3
47	Velocity command gain	1000	20～3000
48	Reserved	2767	0～32767
49	Reserved	0	0～1
50	Reserved	120	0～32767
51	Reserved	200	0～32767
52	Parameter auto-tuning current amplitude-limit value	40	0～100
53	Parameter auto-tuning velocity low-pass filter cut-off frequency (Hz)	65	10～2000
54	Reserved	1000	20～3000
55	Reserved	1000	20～3000
56	Output time in advance, if the feedback pulse is more than 10000.	20	0～32767
57	Velocity command feed forward gain	0	0～32767
58	Acceleration feedback gain	500	-10000～0
59	Inertia stop reduction coefficient	2	1～4
60	Current proportional gain	950	0～12800
61	Current integral time constant	150	1～32767
62	Current integral separation point	40	0～32767

63	The alteration ratio of the current proportional gain	150	0～32767
64	The cut-off frequency of the current low-pass filter	1000	0～32767
65	Velocity integral separation point	100	0～32767
66	The alteration ratio of the velocity proportional gain	100	0～32767
67	Velocity output amplitude-limit 1	1000	100～2000
68	Velocity output amplitude-limit 2	1000	100～2000
69	Current output amplitude-limit	950	100～1000
70	Reference standard voltage	1700	1000～3100
71	Motor rotor inertia	650	0～32767
72	Motor rated torque	180	0～32767
73	Motor rated speed	2500	0～32767
74	The Max. allowable current of the sampling circuit	5000	0～32767
75	Rated current of the motor	150	0～32767
76	The Max. allowable overload multiple of the motor	200	0～32767
77	Current PID modification coefficient along q axis	200	0～32767
78	Current PID modification coefficient along d axis	200	0～32767
79	The repeated time of the parameter auto-tuning	1000	0～32767
80	The 2nd current integral time constant	600	1～32767
81	Velocity PID modification coefficient	500	0～32767
82	The current proportional gain of parameter auto-tuning	3000	0～32767
83	Delay time of main circuit overpressure alarm	1	0～32767
84	Delay alarm time of main circuit brake	1	0～32767
85	Delay time of drive enabling	150	0～32767
86	Delay time of module alarm	50	0～32767
87	Delay time of main circuit undervoltage alarm	10	0～32767
88	Communication error counter of absolute encoder	2	0～32767
89	The longest completion time of encoder null	3000	0～32767
90	Reserved	0	0～1
91	Encoder control method	0	0～20
92	Velocity gain shift valve value at low speed	100	0～3000
93	Velocity gain shift coefficient at low speed	100	0～300
94	Reserved	15000	0～32767
95	Magnetic polar logarithm	3	0～8
96	Open-loop operation voltage	1395	0～31000
97	Open-loop operation speed	18	0～3000
98	SON force enabling	0	0～1
99	The voltage value of encoder null	4000	0～31000
100	Feedback velocity gain	1000	0～300
101	Reserved	80	0～1
102	Z pulse output impulse-width modulation	30	0～32767
103	Reserved	0	0～1
104	Velocity filter cut-off frequency 0	100	0～32767
105	Velocity filter cut-off frequency 1	110	0～32767
106	Velocity filter cut-off frequency 2	130	0～32767
107	Velocity filter cut-off frequency 3	170	0～32767
108	Inert stop selection	1	0～32767
109	Velocity filter separation point 0	1	0～32767
110	Velocity filter separation point 1	10	0～32767

111	Velocity filter separation point 2	35	0～32767
112	Motor type alarm shielding	0	0～1
113	Power-off brake at the rapid traverse rate	0	0～1
114	Delay time of overcurrent alarm	1	0～200
115	Delay time enabling detection in power-on	1	0～1
116	Proportional gain coefficient in velocity integral separation	100	10～1000
117	Delay time of release brake	1500	0～32767
118	Brake delay time	10000	0～32767
119	The proportional gain coefficient of the current integral separation	100	10～1000
120	Automatic elimination delay time of undervoltage/overpressure alarm	4	0～32767

4.1.2 Parameter Significant Details

Table 4-2 Parameter function

<table>
<tr><th>Series No.</th><th>Description</th><th>Parameter range</th><th>Default</th><th>Unit</th></tr>
<tr><td rowspan="2">PA0</td><td>Parameter password</td><td>0~9999</td><td>315</td><td></td></tr>
<tr><td colspan="4">① Prevent the parameter from modifying by fault. Generally, when the parameter needs to be set, firstly set the parameter to the desired password, and then set the parameter. The power-on user password is 315 be default, which can be debugged the parameter from 3 to 60.
② Refer to the relative setting explanation for the other passwords.</td></tr>
<tr><td rowspan="2">PA1</td><td>Motor type code</td><td>0~100</td><td>66</td><td></td></tr>
<tr><td colspan="4">① Different type codes differ from the parameter default values, the parameter should correct when the default parameter function is recovered.
② When the absolute encoder wire-break alarm (No.19) occurs or the motor type without alarm (No.18) is modified, the default parameter then can be automatically recovered, during the power is turned on, otherwise, the drive unit may abnormal or be damaged.
Firstly set the password PA0 to 385, and then modify this parameter.</td></tr>
<tr><td rowspan="2">PA4</td><td>Control method selection</td><td>1~7</td><td>1</td><td></td></tr>
<tr><td colspan="4">① The control method of the drive unit can be set based upon this parameter:
1: Velocity control method; 2. Dry run control method; 3: JOG control method; 4: Encoder null method; 5: Motor testing method; 6: Open-loop operation method (it is used for testing the motor and encoder); 7: The write-in method of the drive unit type.
② Explanation
a: Velocity control method, the velocity command method is input by the Ethernet Bus.
b: Dry run control method, the velocity command is input from keyboard, which is used for testing the drive unit and motor.
c: JOG control method, firstly enter the JOG operation, and then press the ↑ and hold, the motor is then operated based upon the JOG speed; the motor stops after releasing the key, and keep the zero speed; press ↓ and hold, the motor is then reversely operated in terms of the JOG speed; the motor stops after releasing the key, and keep the zero speed.
d: Encoder null method, it is used for debugging the encoder zero point before delivery.</td></tr>
</table>

	e: Motor testing method, it is used for testing the operation both the drive unit and motor based on the position control method. f: Open-loop operation method, it is used for maintaining by the professional. g: Drive unit type write-in method, it is used for writing the drive unit type of the motor before delivery.			
PA5	Velocity proportional gain	5~1280	155	
	1. Set the proportional gain of the velocity loop regulator. 2. The more the setting value is, the higher the gain is, and the stronger the rigid is. The parameter numerical value is determined by the concrete servo drive unit type and the load. Generally, the more of the load inertia is, the bigger of the setting value is. 3. The system should be set as bigger as possible when it is without any vibrations.			
PA6	Velocity integral time constant	0~32767	85	0.1ms
	① Set the integral time constant of the velocity loop regulator. ② The smaller the setting value is, the faster the integral speed is, and the bigger the rigid is. The parameter numerical value is determined by the concrete servo drive unit type and the load. Generally, the more of the load inertia is, the bigger of the setting value is. ③ The unit should be set as smaller as possible when it is without any vibrations.			
PA8	Velocity detection low-pass filter coefficient	40~2000	10~2000	
	① Set the characters of the velocity detection of the low-pass filter. ② The smaller the numerical value is the lower the cut-off frequency, and the lower the noise from the motor occurs. If the load inertia is big, reduce the setting value appropriately. If the numerical value is too small, the response may slow or the vibration may occur. The more the numerical value is, the higher the cut-off frequency is, and the faster the velocity feedback response is. Appropriately add the setting value if the higher velocity response is to be desired.			
A12	Gear ratio numerator	0~32767	8192	
	As for the parallel movement axis It is better to set based upon the pitch A of the machine lead screw (Unit: mm), the resolution C of the motor photoelectricity encoder (Unit: pulse number/circle) and the pulse equivalent M of the system (Unit: pulse number/mm); 4212/4213=C/(M*A); As for the rotation axis It is better to set based upon the driving gear ratio P (driven gear/driving gear), the resolution C of the motor photoelectricity encoder (Unit: pulse number/circle) and the pulse equivalent M of the system (Unit: pulse number/mm); 4212/4213=C/(M*P*360)			
PA13	Gear ratio denominator	0~32767	500	
	Refer to the parameter PA12			
PA15	Velocity command direction reverse	0~1	0	
	0: Normal; 1: Position command direction reverse.			
PA21	JOG operation speed	-6000~6000	100	r/min
	Set the run velocity of the JOG operation.			
PA22	Speed command filter switch	0~1	0	

	In the position control method, the velocity command filter function is opened when it is set to 1; this function is closed when it is set to 0.			
PA23	The Max. velocity limit	0~3000	3000	r/min
	① Set the top speed-limit of the servo motor. It is regardless of the rotation direction.			
PA33	Motor velocity at the testing method	0~6000	100	r/min
	Select the "oL", and then enter the motor testing method by ↵ when the drive unit is on the position control method; its testing velocity is determined by this parameter.			
PA39	Main circuit open-phase detection	0/1	0	
	Drive is detected the power-supply method and offers an alarm prompt to the RST terminal when the power is turned on initially, this parameter can be enabled/disabled the detection function. 0: Enabled detection; 1: Open-phase detection disabled.			
PA42	The Max. frequency of the servo response	50~600	400	
	The vibration occurs when the motor's speed is more than 3500r/min, of which the motor can be stably operated enlarging this parameter.			
PA60	Current proportion gain	0~12800	1500	0.001
	① The proportional gain of the setting loop regulator; ② The more the setting value is, the higher the gain is, and the smaller the current tracking error is. The noise or vibration may occur due to the extremely high gain. ③ It is only related with the drive unit and motor instead of load; ④ The system should be set as bigger as possible when it is without any vibrations.			
PA61	Current integral time constant	0~32767	110	0.1ms
	① Adjust the integral time constant by setting the current loop; ② The smaller the setting value is, the faster the integral velocity is, and the smaller the current tracking error is, however, the noise or vibration may occur due to the extremely small integral. ③ It is only related with the drive unit and motor instead of load; generally, the bigger the electromagnetism time constant of the motor is, the bigger the integral time constant is; ④ The system should be set as smaller as possible when it is without any vibrations.			
PA75	Motor rated current	0~32767	150	0.1A
	Drive unit is automatically called the rated current of the corresponding type motor after the motor type is identified. As well, the user can be set manually, and its unit is 0.1A, for example, 150 means that the rated current is 15A.			
PA76	The allowable top overload multiple of the motor	0~32767	200	0.01 times
	The overcurrent detection valve value, 200 means the 2 times rated current. The overcurrent alarm may occur when the motor current exceeds the Max. multiple and the overload allowable time range (No. PA114 parameter setting). Normally, 1.5~3 times start current may issue while the motor is power on, and therefore, the mistake alarm may be caused if this value is extremely small; on the contrary, the motor may be burnt if the motor is set extremely big and can not be protected.			

PA83	Main circuit overpressure alarm delay time	0~32767	1	0.1ms
	Set the allowable overpressure time range, when DSP detects the main circuit overpressure signal, and this signal consecutive time exceeds this parameter setting value, the overpressure alarm then occurs.			
PA84	Brake malfunction delay alarm time	0~32767	1	0.1ms
	When DSP detects the brake fault signal, and this signal consecutive time exceeds this parameter setting value, the brake alarm then occurs.			
PA85	Drive enabling delay time	0~32767	1	0.1ms
	When the enabling signal is provided, and this signal consecutive time exceeds this parameter setting time, the motor then enters the enabling state.			
PA86	The alarm time of module alarm delay	0~32767	25	0.1ms
	When DSP detects the module fault signal, and this signal consecutive time exceeds this parameter setting value, the module fault alarm then occurs. The IPM module may be burnt if this value is set extremely big and the module can not be protected well.			
PA87	Main circuit undervoltage alarm delay time	0~32767	10	0.1ms
	When DSP detects the main circuit undervoltage fault signal, and this signal consecutive time exceeds this parameter setting value, the undervoltage alarm then occurs			
PA88	The Max. allowable times of the encoder communication error	0~32767	2	
	When the times of the encoder communication consecutive faults are exceeded the setting value, the encoder communication abnormal alarm may occur. When the setting value is 100, the encoder communication fault alarm is ignored.			
PA89	The longest completion time of the encoder null	0~32767	2000	0.1ms
	The lasting time value setting of the encoder null, the drive is performed the encoder null within the setting time.			
PA98	SON forcing enabled.	0/1	0	
	Internal enabling signal of the drive, 1: enabled; 0: disabled. It can be modified when the password is 829.			
PA99	The voltage value of encoder null	0~31000	4000	
	The motor may be burnt if this value is set extremely big; however, if this value is			

	set too small, the null may be failed.			
PA112	Motor type alarm shielding	0/1	0	
	0: Motor type detection alarm enabled; 1: Motor type detection alarm disabled;			
PA113	Rapid brake after power-off	0/1	0	
	The brake method after power-off, 0: Brake after deceleration; 1: Brake immediately. The axis under the gravity must be used the immediate brake method, otherwise, the position may change due to the gravity brake is delayed.			
PA114	Delay time of overcurrent alarm	0~200	1	0.1ms
	Set the delay time of the overcurrent alarm; refer to the PA76 parameter for details.			

4.1.3 The Code Explanation of the Servo Motor Type

Table 4-3 The comparison table between the servo motor type and drive unit PA1 parameter (Software version V4.42)

PA1 parameter	**Servo motor type, technical parameter**
35	60SJT-MZ005E(A4) 0.15kW, 0.5N, 3000r/min, 1.24A
83	80SJT-MZ032C(R1) 0.66kW, 3.2N, 2000r/min, 5A
82	80SJT-MZ024E(R1) 0.75kW, 2.4N，3000r/min, 4.8A
58	110SJT-M040E(A4) 1.0kW, 4N, 3000r/min, 5A
61	110SJT-M040D(A4) 1.0 kW, 4N, 2500r/min, 4.5A
60	110SJT-M060E(A4) 1.5 kW 6N, 3000r/min, 7A
62	110SJT-M060D(A4) 1.5 kW 6N, 2500r/min, 7A
63	130SJT-M040D(A4) 1.0 kW 4N, 2500r/min, 4A
64	130SJT-M050D(A4) 1.3 kW 5N, 2500r/min, 5A
65	130SJT-M060D(A4) 1.5 kW, 6N, 2500r/min, 6A
66	130SJT-M075D(A4) 1.88 kW, 7.5N, 2500r/min, 7.5A
67	130SJT-M100B(A4) 1.5 kW, 10N, 1500r/min, 6A
68	130SJT-M100D(A4) 2.5 kW, 10N, 2500r/min, 10A
69	130SJT-M150B(A4) 2.4 kW, 15N, 1500r/min, 11A
59	130SJT-M150D(A4) 3.9 kW, 15N, 2500r/min, 14.5A
85	150SJT-M060C(A4Y1X) 1.2 kW, 6N, 2000r/min, 7.6A
86	150SJT-M080C(A4Y1X) 1.6 Kw, 8N, 2000r/min, 10A
88	150SJT-M040C(A4IY1X) 0.8 kW, 4N, 2000r/min, 5.1A
24	175SJT-150B(A4) 2.4kW, 15N, 1500r/min, 11A
25	175SJT-180B(A4) 2.8 kW, 18N, 1500r/min, 15A
23	175SJT-150D(A4) 3.1 kW, 15N, 2500r/min, 14A
26	175SJT-220B(A4) 3.5 kW kW, 22N, 1500r/min, 17.5A
22	175SJT-120E(A4) 3.7 kW, 12N, 3000r/min, 13A
27	175SJT-180D(A4) 3.8 kW, 18N, 2500r/min, 16.5A
19	175SJT-M180EH 3.8 kW kW, 18N, 3000r/min, 16.5A

28	175SJT-220D(A4) 4.5 kW, 22N, 2500r/min, 19A
29	175SJT-300B(A4) 4.7 kW, 30N, 1500r/min, 19A
30	175SJT-300D(A4) 6 kW, 30N, 2500r/min, 27.5A
31	175SJT-380B (A4) 6 kW, 38N, 1500r/min, 29A
56	130SJTG-M100GH(A4) (380V motor) 4 kW, 10N, 4000r/min, 10A
57	130SJTG-M050GH(A4) (380V motor) 2 kW, 5N, 4000r/min, 5A
48	130SJTG-M075GH (A4) (380V motor) 3.1 kW, 7.5N, 4000r/min, 7.5A
49	130SJTG-M060GH (A4) (380V motor) 2.5 kW, 6N, 4000r/min, 6 A
50	175SJTG-M380EH(A4) (380V motor) 11.9 kW, 38N, 3000r/min, 32A
51	175SJTG-M120EH(A4) (380V motor) 3.8 kW, 12N, 3000r/min, 10.5A
52	175SJTG-M150EH(A4) (380V motor) 4.7 kW, 15N, 3000r/min, 12.5A
53	175SJTG-M300EH(A4) (380V motor) 9.4 kW, 30N, 3000r/min, 25A
54	175SJTG-M220EH(A4) (380V motor) 6.9kW, 22N, 3000 r/min, 18.5A
55	175SJTG-M180EH(A4) (380V motor) 5.7kW, 18N, 3000 r/min, 15.5A

4.2 Display Operation

4.2.1 Key Explanation

Key	Name	Explanation
	'Addition' key	1. Parameter series number, parameter value addition; 2. The secondary menu page up; 3. Add the motor's operation velocity during manual method; 4. Motor CCW starts during the motor operation.
	'Reduction' key	1. Parameter series number, parameter value addition; 2. The secondary menu page down; 3. Reduce the motor's operation velocity in manual method; 4. Motor CW starts during the JOG operation.
	'Shift' key	Select the modification position of the parameter value
	'Return' key	Return the previous menu or cancel the operation
	'OK' key	Enter the next menu or confirm the data setting.

Notice:

- Hold  and  , the operation is then repeated, and the longer the reserved time is, the faster the repeated velocity is.
- The 6 LED nixie tubes are displayed each state and data of the system. If all of the tubes are flash, which means the alarm occurs.

4.2.2 Main Menu Explanation

The operation is divided into several menus, and the first one is main menu, which includes ten operation methods, refer to the Fig. 4-1 for the main menu operation frame.

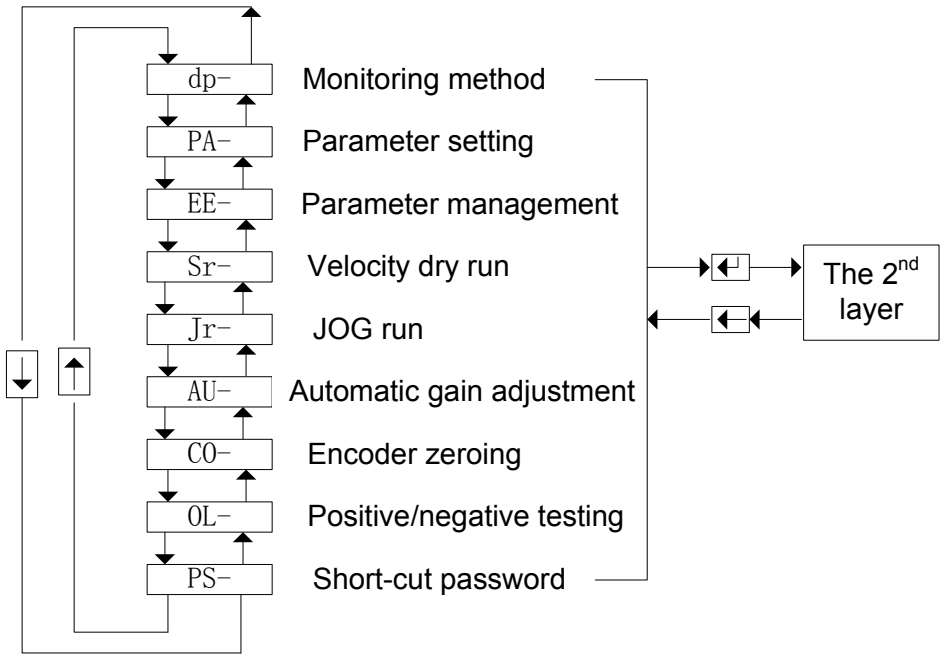


Fig. 4-1 The schematic of the 1st menu

4.2.3 Monitoring Menu Explanation

Select “dP-” in the 1st layer, and then enter the monitoring method by ↵ There are 21 kinds display state, and the user can select the desired display mode by ▲ ▼, and then press ↵, the specific display state is then displayed.

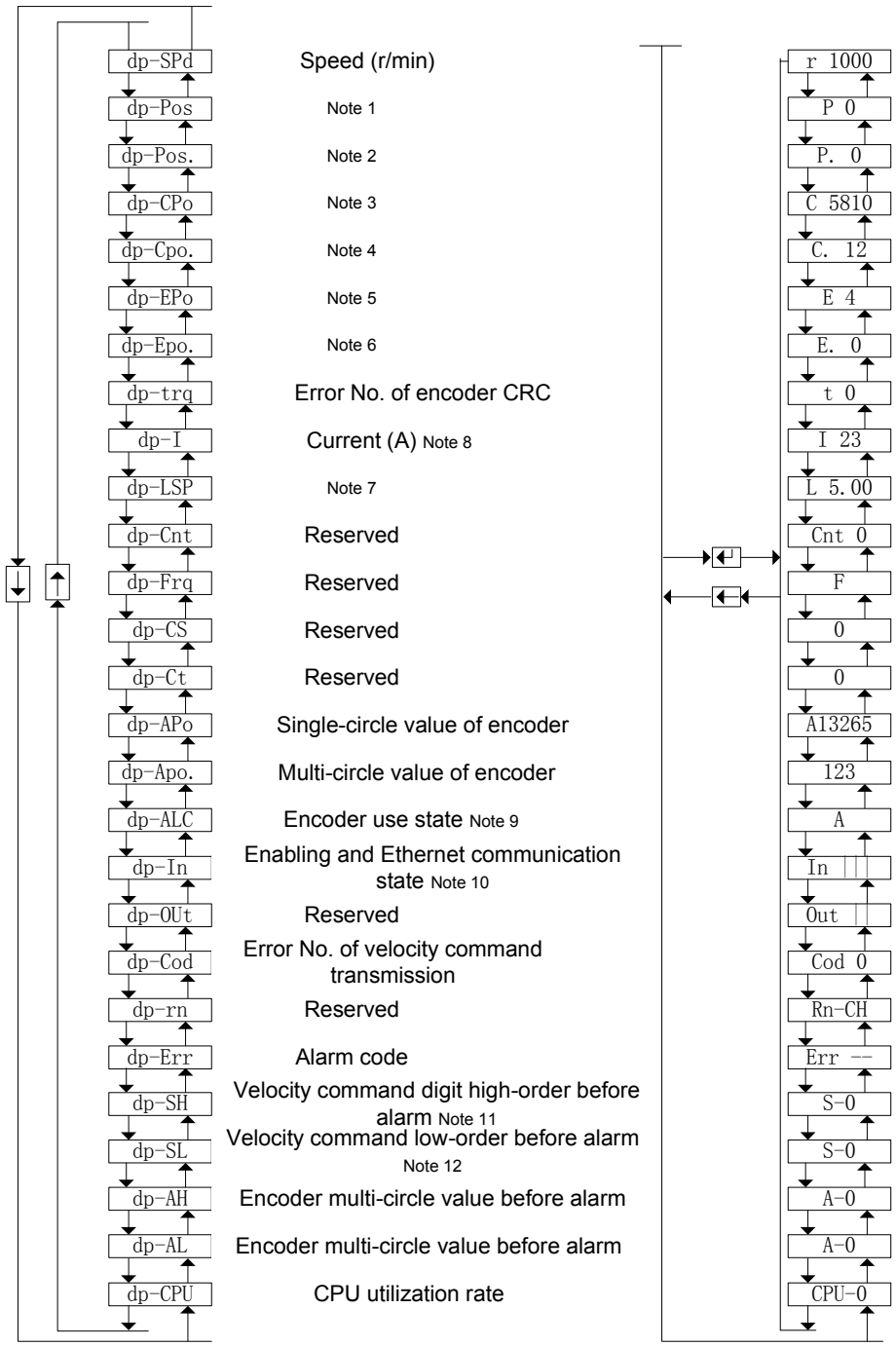


Fig. 4.2 The operation frame of the monitoring method

Note 1, Note 2: Pulse counting value. GH series drive is regarded as the velocity command control, which does not pulse counting, and the 2-digit is reserved for backup

Note 3～Note 7: The monitoring position of the Ethernet communication state is debugged by the professional, which is reserved for the user.

Note 8: The calculation method of the motor current I is $I = \sqrt{\frac{2}{3}(I_U^2 + I_V^2 + I_W^2)}$

Note 9: This menu records the current using state of the encoder, refer to the Fig. 4-3 for the

display content and significance.

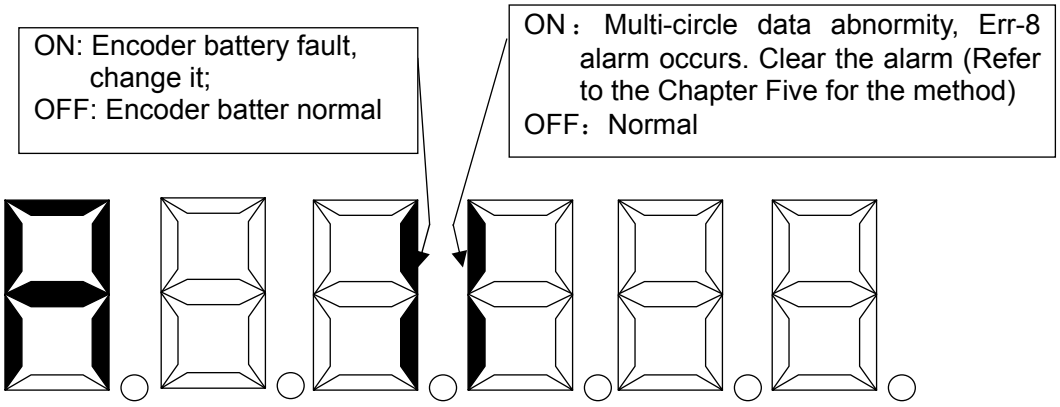


Fig. 4-3 Encoder using state display (ON: stroke point power-on, OFF: stroke point power-off)

Note 10: The state display of the drive unit enabling and Ethernet communication. Refer to the Fig.4-4 for the display content and significance.

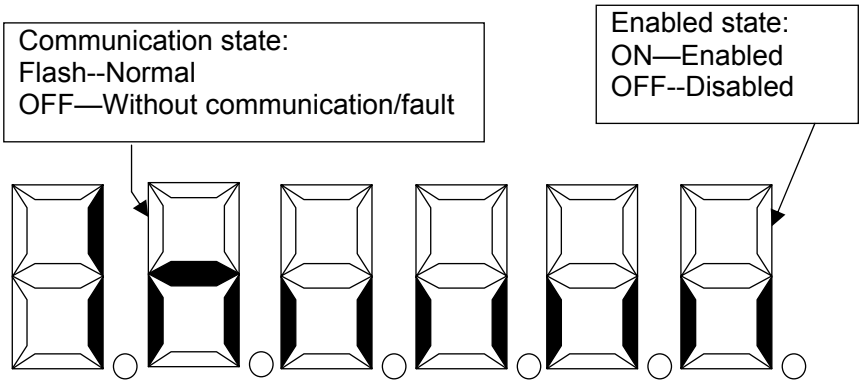


Fig. 4-4 Enabling and Ethernet state display (ON: stroke point power-on, OFF: stroke point power-off)

Note 11: The last 100us period velocity command before the alarm is low 6-digit, which means (velocity command %100)*10000.

Note 12: The last 100us period velocity command before the alarm is high 6-digit, which means that the velocity command is %100.

4.2.4 User Shortcut Password

The user shortcut password is mainly used for the parameter modification; the corresponding parameter can be modified by selecting the password rapidly. Select the “Ps-” at the first layer, and then enter the user shortcut password method by ↵. Firstly, select the password mode, which includes three modes that they can be selected by ▲▼, and then press the ↵, the specific password value is then displayed, and the password mode selection state can be returned by ◄.

- **PS—UEr** user password, the password value is 315, and therefore, the value from the operation parameter No.0 immediately becomes 315. The corresponding parameter can

be modified returning to the parameter setting method.

- **PS－CFS** Control method selection, the password is set to 510, and therefore, the value from the operation parameter No.0 immediately becomes 510. The corresponding parameter can be modified returning to the parameter setting method.
- **PS－tPE** Drive unit type selection, the password is set to 385, and therefore the value from the operation parameter No.0 immediately becomes 385. The corresponding parameter can be modified returning to the parameter setting method.

4.2.5 Parameter Management

Notice

- The No.0 parameter should be set to responding numeric firstly, and then modify other parameters.
- The parameter setting is immediately enabled other than the parameter No.1, the equipment operation may be faulted due to the wrong setting, even the accident may occur.

Select the “PA-” in the first layer, and then enter the parameter setting method by ↵. Select the parameter number by ▲ ▼, and the numerical value of this parameter can be display by ↵, and this value is also can be modified by ▲ ▼. The parameter increases or decreases 1 pressing ▲ or ▼ once. The modification bit of the numerical value can be selected by ⇄, in this case, the selected numerical value in the modification bit flashes, and then this value can be increased or decreased by pressing ▲ or ▼, and then hold any one of them, and therefore, the parameter can be consecutively increased or decreased. The decimal point of the LED Nixie tube at the most left lights up, and the modified value is enabled by ↵, in this way, the decimal point of the LED Nixie tube at the most top lights off. The modified numerical value will be immediately reacted to the control, the parameter then can be continuously altered by ▲ or ▼ and then return to the parameter selection state by ◄ after modifying. Do not press ↵ if you are not satisfy the altered value, it may be cancelled by ◄, and the parameter recovers to the initial value, and returns to the parameter selection state.

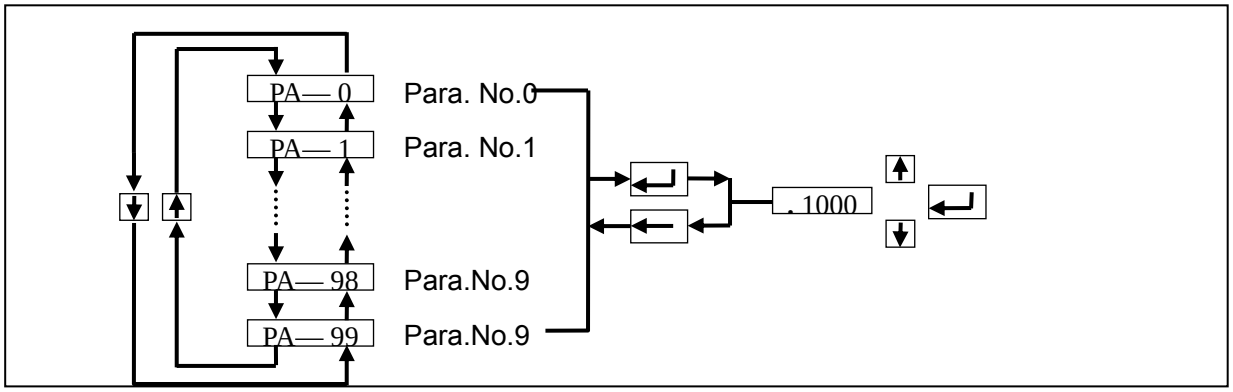


Fig. 4-5 The operation frame of the parameter setting

The parameter administration is mainly treated the operations between the memory and EEPROM. Select the "EE-" in the 1st layer, and then enter the parameter administration method by . Firstly, select the operation mode; there are 6 modes, which can be selected by For example, "parameter write-in"; select the "EE-Set", and then hold above 3s pressing the display will show "FInISH" if the write-in operation is performed; if the display will show "Error" if it fails. The operation selection state can be returned again by .

- **EE – SEt** Parameter write-in, it means that the parameter in the memory can be written to the EEPROM parameter area. User modified the parameter, only the value in the memory is altered, and the initial value will recover again when the power is turned on next time. The parameter write-in operation should be performed if you want to change the parameter value permanently, and the parameter in the memory should be written to the EEPROM parameter area, after that, the modified parameter will be used after the power is turned on.
- **EE – rd** Parameter read, it means that the data in the EEPROM parameter area is read to the memory. This procedure will be automatically performed once when the power is turned on. At the beginning, the memory parameter value is identical with the one of the EEPROM parameter area. However, the parameter value in the memory will be changed if user modifies it. When the user does not satisfy the modified or mixed parameter, perform the parameter read operation, and then the data in the EEPROM parameter area can be read to the memory again, which recovers to the initial parameter.
- **EE – bA** Parameter backup, it means that the parameter in the memory is written to EEPROM backup area. The whole EEPROM can be divided into two areas, one is parameter area, and the other one is backup, which can be saved two sets of parameters. The operations, for example, the system ON, parameter write and parameter read are employed the EEPROM parameter area, however, the parameter backup and recovery backup are used the EEPROM backup area. During the setting of the parameter, if the user satisfies to one group of parameter, but he who still wants to modify it. Firstly, the parameter backup operation is performed; save the memory parameter to the EEPROM backup area, and then modify the parameter; if the result is poor, the backup operation can be recovered, the parameter saved in the EEPROM backup area last time is read to memory then modifies it again or end it. Additional, both parameter write and backup can be performed after the user set the parameter, so that the data in the EEPROM parameter area and backup area are identical. To prevent the parameter from modifying, the recovery backup operation can be used; read the data in the EEPROM backup area to the memory, and then write to the operation with parameter, then write the memory parameter to the EEPROM parameter area.
- **EE – rS** Recovery backup, it means that the data in the EEPROM backup area is read to the memory. It is note that this operation does not perform the parameter write-in, the data in the EEPROM parameter area will read to the memory last time when the power is turned on. If user wants to use the EEPROM backup area parameter permanently, the parameter write-in operation should be performed again.
- **EE – dEF** Default value recovery, it means that all of the default values (factory values) are read to the memory, and then write to the EEPROM parameter area; these values will be used last time when the power is turned on. When the user mixes the parameter that it can not be normally performed, the operation is then used, and then all of the parameter can be

recovered to the factory state. Because the different drive unit types are varied from the parameter default values, it is necessary to ensure the validity of the drive unit type (parameter No. 1) when using the recovery default parameter.

- **EE – Cr** The encoder of the drive unit type write-in, it means that the drive unit type is written to the encoder EEPROM, which is only used for the factory, and the user can not use it.

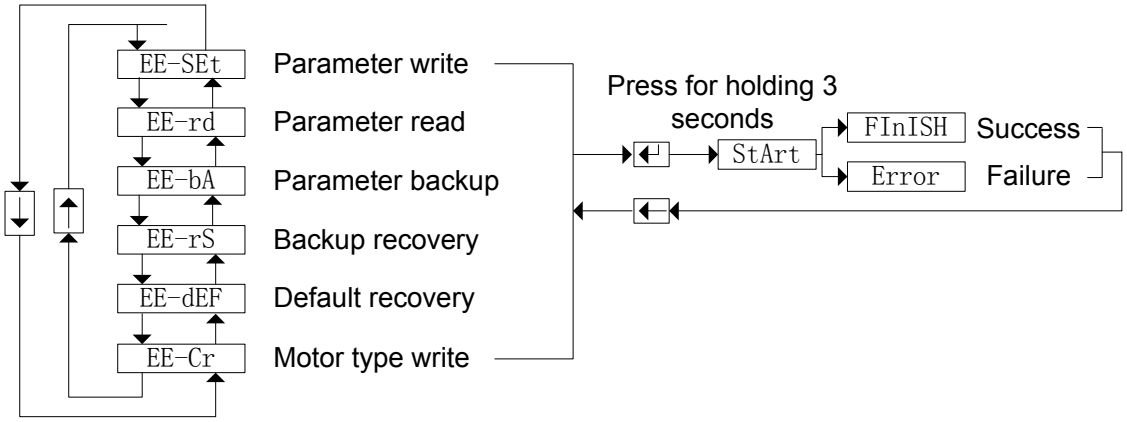


Fig. 4-6 The operation frame of the parameter administration

If the modified parameter does not perform the parameter write-in, the parameter may not memory after the power is turned off, and the modification is disabled.

4.3 Function Debugging

Notice

- Do not perform the Sr dry run and the JOG operation in the machine.
- Do not perform the high-speed Sr dry run and the JOG operation testing.
- Do not perform the parameter save operation after the Sr dry run and the JOG operation.
- The system control can be connected after the Sr dry run and the JOG operation is cut off and then restarted.

4.3.1 Sr Dry Run

Check whether the servo and motor are faulty based upon the dry run method, regardless of the system or the system fault may occur. Refer to the following items:

① Password modification, PA – 0 changes into 510;

② Operation method modification, PA – 4 changes into 2;

③ Password modification, PA – 0 changes into 829;

④ Enabling, PA -98 modifies to 1, the motor then enters the enabling state;

⑤ Enter Srr menu after modifying its speed, in this case, the “S0” displays, and its speed can be changed by “up/down” key, and then the motor performs based upon the specified speed. The motor can be emergently stopped by pressing the return key.

4.3.2 JOG Operation

The JOG control operation methods are shown below:

① Password modification, PA – 0 changes into 510;

② Operation method modification, PA4 – changes into 3;

③ JOG velocity modification, change the No. PA – 21 parameter value into JOG velocity (Default 100r/min), unit: r/min;

④ Password modification, PA – 0 changes into 829;

⑤ Enabling, PA – 98 changes into 1, in this case, the motor is then entered the enabling state;

⑥ The motor CCW/CW can be controlled by the “increasing” or “decreasing” key; the motor stops if releasing this key.

4.3.3 Motor Type Write-in

When the new motor or the Err-18 alarm occurs, the drive unit only can be identified (refer to the Chapter Four for motor corresponding code) after the corresponding types are written to the EEPROM, refer to the following items:

① Password modification, the PA – 0 changes into 420;

② Operation method modification, the PA – 4 changes into 7;

③ Type modification, the PA – 1 changes into the corresponding motor type;

④ Type write EEPROM, and then enter the EE-Cr menu, then press the enter key for 3 seconds till the “FINISH” explanation type is written, restart it after the power is turned on again when the write type operation is performed.

⑤ Type confirmation, check PA – 1, the display value is the written type one, which means the write is finished, otherwise, the steps should be repeated again.

➢ **Note:**

- The write-in type is automatically performed, the parameter memory is not required after the write-in
- The drive unit calls the default parameter based upon the write-in motor type. It is important to write the correct motor code for ensuring the normal operation of the motor.

4.3.4 Motor Zeroing

The new motor or abnormal one during using, the zeroing operation should be required, as follows:

① Password modification, PA – 0 changes into 510;

② Operation method modification, PA – 4 changes into 4;

③ Zeroing, adjust to the Co- menu, the “FINISH” occurs after pressing the “enter” for 3 seconds and the motor vibrates, which means the zeroing is executed; the following steps can be used by the return key.

➢ **Note:**

- Regardless of the internal enabling before zeroing
- Do not connect any mechanisms at the motor dry run; otherwise, the drive unit may be damaged.
- PA – 99 is the zeroing voltage setting, the more the value is, the more the null voltage is. The common motor is used the default value. The zeroing voltage can be appropriately increased for the bigger inertia motor.
- Enter the Dp-Apo monitoring menu after the zeroing is performed, in this case, the encoder single-circle value is within ±100.

5 ALARM AND TROUBLESHOOTING

Notice

- The person who attends to the detection and maintenance should have the responding professional knowledge and capacity.
- The servo drive unit and motor can be touched after the power is turned off for 5 min. at least, otherwise, the motor fault and burnt hazard may be generated.
- The servo drive unit can be used after the fault alarm is released based upon the alarm code.
- Confirm the SON signal is enabled before resetting the alarm to prevent the unexpected hazard from suddenly starting from the motor.

5.1 Alarm List

Table 5-1 Alarm list

Alarm Code	Alarm Name	Content
--	Normal	
1	Overspeed/command acceptance abnormal	Servo motor speed exceeds the setting value or drive accepts the abnormal command value.
2	Main circuit overpressure	Excessive high of the main circuit power voltage
3	Main circuit underpressure	Excessive low of the main circuit power voltage
6	Communication shake hand failure	Abnormity occurs with the system communication
8	Abnormal multi-circle data of the encoder	Too long of the encoder power-down time or abnormal multi-circle data due to the damaged battery
9	Encoder communication error	Encoder communication data error
11	IPM module fault	IPM intelligent module malfunction
12	Overcurrent	Motor overcurrent
13	Abnormal encoder feedback data	Encoder feedback data abnormal
14	Brake fault	Brake circuit fault
15	Motor polar logarithm fault alarm	It is not matched between the motor polar logarithm and the corresponding motor
16	Main-circuit OFF alarm	Main circuit OFF
17	Parameter self-turning fault alarm	Parameter tuning error when servo is performed the parameter self-turning.
18	Motor type disabled	Motor type does not write to the absolute encoder EEPROM
19	Encoder cut-off alarm	Encoder cable disconnection or break line
20	Servo parameter transmission error	Servo parameter transmission error
21	AC open-phase alarm	Only connect the single-phase 220V input
22	GSK-Link initial fault alarm	GSK-Link initial fault, DSP read FPGA fault, FPGA working abnormity or download program error
23	Brake feedback alarm	It is only used for GH2030T drive
24	Change the encoder,	It is only used for GH series drive, and its software

	because some gratings of them are damaged.	version is above 4.43.
25	Encoder multi-circle data jump	It is only used for GH series drive, and its software version is above 4.43.
30	3-phase AC overpressure	3-phase input AC overpressure

5.2 Alarm Troubleshooting

Table 5-2 Alarm troubleshooting

Alarm Code	Alarm Name	Run State	Result	Troubleshooting
1	**Overspeed**	It occurs during motor operation or the motor start	Suddenly, an excessive command value is received after the servo drive is being interfered; speed exceeds the setting value of parameter 23.	Check whether the grounding and network cable are connected; modify the setting value of 4223; eliminate this alarm after pressing ESP and release it.
2	**Main circuit overvoltage**	It occurs when the control power is turned on	Circuit board fault	Change the servo drive unit
		It occurs when the main power is turned on	① Overvoltage ② Voltage wave abnormal	Check the power supply
		It occurs during the motor operation	Cut off the brake resistance cable	Wire again
			① Brake transistor damage ② Internal brake resistance damage	Change the servo drive unit
			Inadequate brake circuit capacity	① Reduce the on-off frequency ② Increase the acceleration/deceleration time constant ③ Reduce the torque limit value ④ Reduce the load inertia ⑤ Change the bigger power drive unit and motor
3	**Main circuit undervoltage**	It occurs when the main power is turned on	① Circuit board fault ② Power security damage ③ Soft-start circuit fault ④ Rectifier damaged	Change the servo drive unit
			① Low voltage ② Temporarily cut off the power above 20ms.	Check the power
		It occurs during the motor operation	① Inadequate power capacity ② Instantaneously OFF	Check the power
			Radiator overheat	Check the load

		Switch on the main power and control cable, and then input the command pulse, the motor then does not operate.	① Motor U, V and W leading-in cable error ② Encoder cable leading-in error	Connect wiring
			Encoder fault	Change the servo motor
			The setting of the position excess-error detection range is excessive small	Add the position excess-error detection range
			Position proportional gain is excessive small	Increase gain
			Inadequate torque	① Check the torque limit value ② Reduce the load capacity ③ Change into the bigger drive unit and motor
			Excessive high command pulse frequency	Reduce the frequency
			Fail to connect the drive shell and system shell	Ensure electric connection both shells
			① Cable disconnection ② Temperature relay in side the motor is damaged.	① Check the cable ② Check the motor
		It occurs during motor operation	Motor overload	① Decrease the load ② Reduce the on-off frequency ③ Decrease torque limit value ④ Decrease the related gain ⑤ Change into the bigger drive unit and motor
			Motor interior fault	① Change the servo motor
6	**Servo communication shake hand fault**	It occurs during the motor operation	Poor contact network cable; disconnect both the drive and system shell	Check network cable, pull out the cable and plug it again; well grounding between the drive and system shell; remove the alarm by the reset or restart key.
8	**Abnormal multi-circle data of the encoder**	It occurs during the drive ON	① Encoder cable does not connect the drive and it spends long time (more than two hours) ② Without power of the battery or the voltage is less than 3.65V	① The APZ in the system No.4001 parameter is shown below: 1--0--RESET--0--1—RESET, remove the drive alarm ② Change the battery
9	**Encoder communication error**		Encoder wiring error	Check the wiring
			Encoder damage	Change the motor
			Poor cable of the encoder	Change the cable

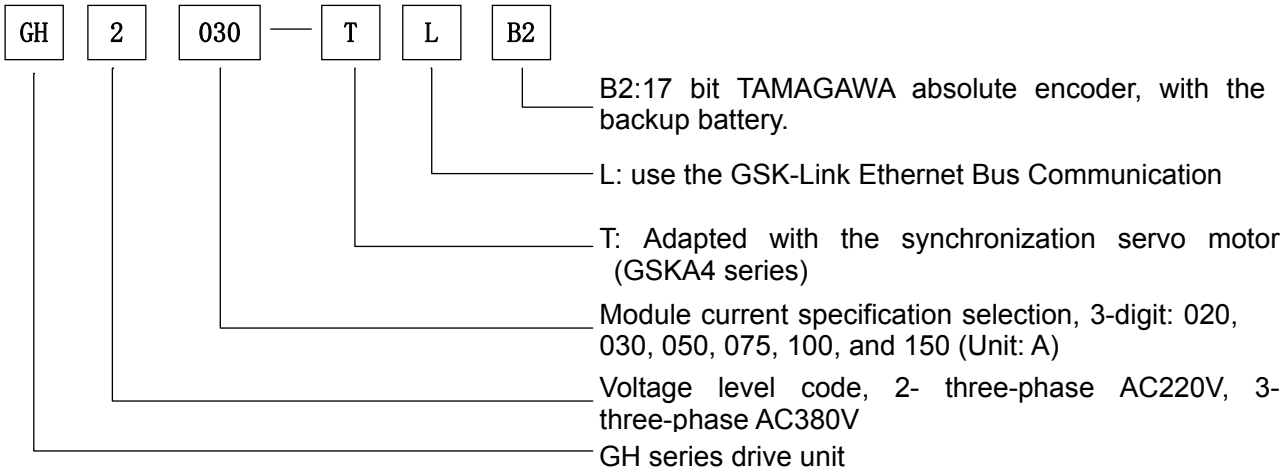
			485 difference chip damage	Change the drive unit
			Excessive long encoder cable, so that the encoder voltage is lower.	① Shorten the cable ② Use the power with multi-chip parallel
11	**IPM module fault**	It occurs when the control power ON	Circuit board fault	Change the servo drive unit
		It occurs during the motor operation	① Lower power voltage ② Overheat	① Check the drive unit ② The power is turned on again ③ Change the drive unit
			Short-circuit among the U, V and W	Check the wiring
			Poor grounding	Correct grounding
			Motor insulation damage	Change the motor
			Being interfered	① Increase the circuit filter ② Far away from the interference resource
12	**Overcurrent**		Short-circuit among the drive units U, V and W	Check the wiring
			Poor grounding	Correct wiring
			Motor insulation damage	Change the motor
			Damaged drive unit	Change the drive unit
13	**Encoder feedback data abnormal**	It occurs when the control power ON	Circuit board fault	Change the drive unit
		It occurs during the motor operation	Damaged encoder	Change the motor
			Poor connection of the encoder cable	Change the cable
			Poor connection of the encoder cable	Check the wiring
			The bigger interference of the power supply	Remove the interference
14	**Brake fault**	It occurs when the control power ON	Circuit board fault	Change the servo drive unit
		It occurs during the motor operation	Brake resistance wiring OFF	Wiring again
			① Brake transistor damage ② Interior brake resistance damage	Change the servo drive unit
			inadequate brake circuit capacity	① Reduce the on-off frequency ② Increase acceleration/deceleration time constant ③ Reduce the torque limit value ④ Reduce the load inertial ⑤ Change into the stronger drive unit and motor

			Excessive high of the main circuit power	Check the main power
15	**Motor polar logarithm error**	It occurs during the motor ON or operation	It is not matched between the motor polar logarithm and corresponding motor	Modify the correct polar logarithm of the corresponding motor again, and then the power is turned on anew.
16	**Main circuit OFF alarm**		Main circuit OFF	Check the main power
			Main circuit relay OFF	Check the main power
			Main circuit underpressure	Check the main power
17	**Parameter self-turning fault alarm**	It occurs when the servo parameter self-turning	Regulated parameter value disables or regulation fault	① Perform the parameter self-turning after the system ON again ② Debug the parameter manually
18	**Motor type disabled**	It occurs hen the motor ON	① Motor type does not write the absolute encoder EEPROM ② Fail to read the motor type code after the power ON.	① The factory encoder of the motor does not write to the motor type or the motor type write is 0. ② Check whether the encoder cable is connected.
19	**Encoder cut-off alarm**	It occurs during the motor ON or operation	Encoder cable disconnection or damage	Connect the encoder cable; change the encoder cable
20	**Servo parameter transmission error**	It occurs during the motor ON or operation	Servo parameter transmission error	① Change the servo drive unit ② It is necessary to set the drive unit type (Parameter No.1) again after modifying, and then recover the default parameter
21	**AC open-phase alarm**	It occurs during the motor ON	Only input the single-phase 220V	Connect the 3-phase 220V or set the No.39 parameter to 1, and then save it.
22	**GSK-Link initial fault alarm**	It occurs during the motor ON or operation	GSK-Link initial fault, DSP read FPGA fault, abnormal FPGA working or program download error	① Change the servo drive unit ② Plug in/out the network cable again
23	**Brake feedback alarm**	It occurs during the motor ON or operation	It is only available for GH2030T drive	Change the drive unit
24	**Change the encoder due to some gating are damaged**	It occurs during the motor ON or operation	It is only available for GH series drive, and its software is above 4.43.	Change the encoder
25	**Encoder multi-circle data jump**	It occurs during the motor ON or operation	It is only available for GH series drive, and its software version is above 4.43.	Change the encoder
30	**3-phase AC overpressure**	It occurs during the motor ON or operation	3-phase input AC overpressure	Check the power board, or change the drive unit

6 ORDERING INSTRUCTION

6.1 The Selection of the Drive Unit

6.1.1 The Type Explanation of the Drive Unit



- **Prompts**
  - IPM power module component can be adapted with the Mitsubishi brand or Fuji brand. We will keep the selection rights of the IPM module brand.
  - GH series drive unit can be adapted with the TAMAGAWA, HEIDEHAIN, DANAHER and NIKON encoders, which is matched with the TAMAGAWA by default. It is better to mark out during ordering if it is adapted with other encoders.
  - The GH drive unit default parameter is only adapted with the GSK A4 series servo motor. Other servo motors can be adapted after the professionals debugged.

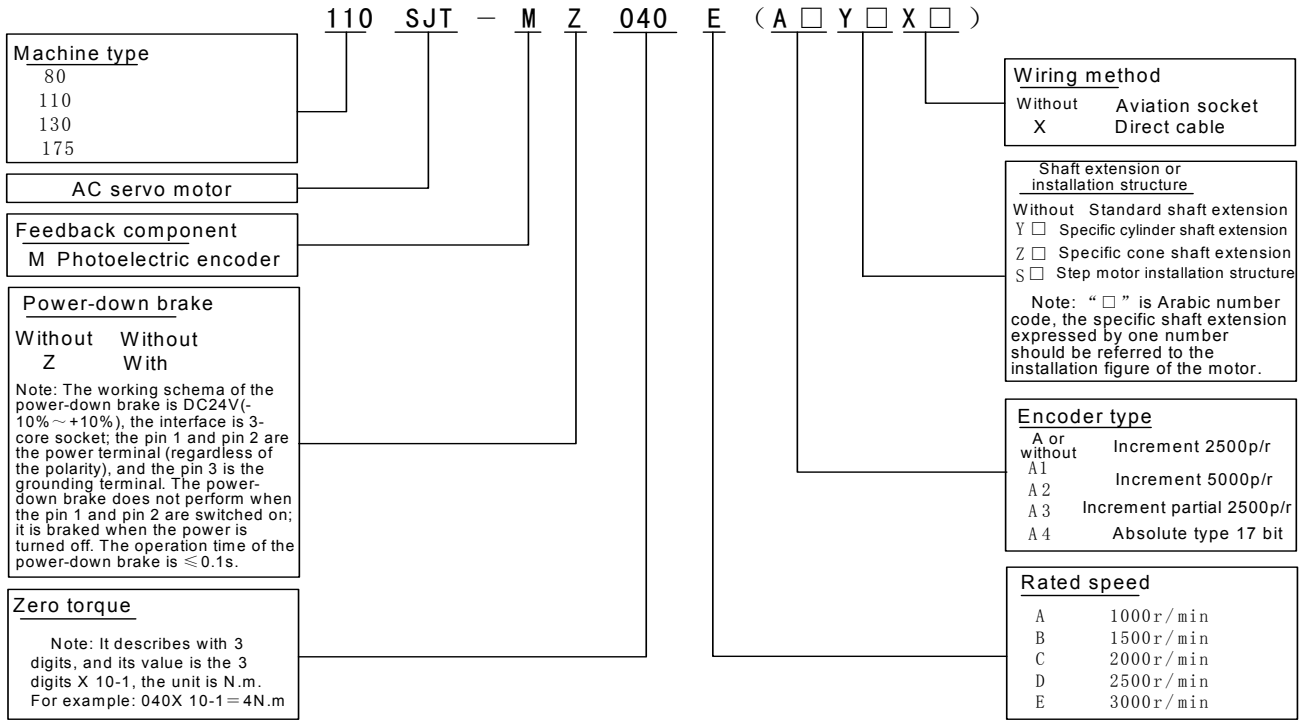
6.1.2 The Comparison Table of the Drive Unit Adapted Motor

Drive unit type	Adapted motor type	Motor technical specification (P_N,T_N,n_N,I_N)
GH2030T-LB2	80SJT-M024C(A4)	0.5kW, 2.4N, 2000 r/min, 3A
GH2030T-LB2	80SJT-M024E(A4)	0.75kW, 2.4N, 3000 r/min, 4.8A
GH2030T-LB2	80SJT-M032C(A4)	0.66kW, 3.2N, 2000 r/min, 5A
GH2030T-LB2	80SJT-M032E(A4)	1.0kW,3.2N, 3000 r/min, 6.2A
GH2030T-LB2	110SJT-M040D(A4)	1.0kW, 4N, 2500 r/min, 4.5A
GH2030T-LB2	130SJT-M040D(A4)	1.0 kW 4N, 2500 r/min, 4A
GH2050T-LB2	110SJT-M060D(A4)	1.5 kW 6N, 2500 r/min, 7A
GH2050T-LB2	130SJT-M050D(A4)	1.3 kW 5N, 2500 r/min, 5A
GH2050T-LB2	130SJT-M060D(A4)	1.5 kW, 6N, 2500 r/min , 6A
GH2050T-LB2	130SJT-M075D(A4)	1.88 kW, 7.5N, 2500 r/min, 7.5A

GH2050T-LB2	130SJT-M100B(A4)	1.5 kW, 10N, 1500 r/min, 6A
GH2050T-LB2	130SJT-M150B(A4)	2.3 kW, 15N, 1500 r/min, 8.5A
GH2050T-LB2	130SJT-M100D(A4)	2.5 kW, 10N, 2500 r/min, 10A
GH2075T-LB2	130SJT-M150D(A4)	3.9 kW, 15N, 2500 r/min, 14.5A
GH2075T-LB2	175SJT-M120E(A4)	3.1kW, 12N,3000 r/min, 13 A
GH2075T-LB2	175SJT-M150B(A4)	2.4.kW, 15N,1500 r/min, 11 A
GH2075T-LB2	175SJT-M150D(A4)	3.1kW, 15N,2500 r/min, 14 A
GH2075T-LB2	175SJT-M180B(A4)	2.8 kW, 18N, 1500 r/min, 15A
GH2100T-LB2	175SJT-M180D(A4)	3.8 kW, 18N, 2500 r/min, 16.5A
GH2100T-LB2	175SJT-M220B(A4)	3.5 kW, 22N,1500 r/min, 17.5 A
GH2100T-LB2	175SJT-M220D(A4)	4.5 kW, 22N,2500 r/min, 19 A
GH2100T-LB2	175SJT-M300B(A4)	4.7 kW, 30N,1500 r/min, 19 A
GH2100T-LB2	175SJT-M300D(A4)	6 kW, 30N,2500 r/min, 27.5 A
GH2100T-LB2	175SJT-M380B(A4)	6 kW, 38N,1500 r/min, 29 A
GH3050T-LB2	130SJTG-M050GH(A4)	2 kW,5N,4000 r/min, 5 A
GH3075T-LB2	130SJTG-M100GH(A4)	4 kW, 10N,4000 r/min, 10 A
GH3100T-LB2	175SJTG-M180EH(A4)	5.4 kW, 18N,3000 r/min

6.2 The Selected Servo Motor

6.2.1 The Type Explanation of the Servo Motor



6.3 The Selection of the Cable and Connector

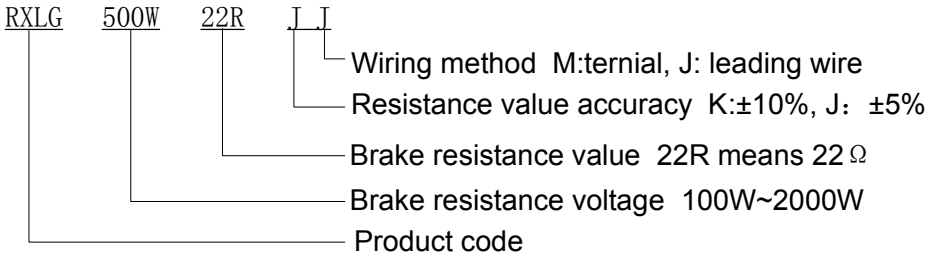
6.3.1 The Specification and Type of the Cable and Connector

Name	Type	Specification	Brand	Remark
Motor dynamic cable	--	4-core	--	It is subject on the supply
Encoder cable	SDA3-284 shielding cable	16-core	LTK	
Network cable	Ultra 5-type shielding network cable	4-core	HARTING	
Dynamic cable aviation socket	YD28J15TSE	4-hole	HANGQIU	
DB26 high-density socket	10126-3000PE	26Pin	3M	
Crystal socket	IP20 crystal socket	4-pin	HARTING	

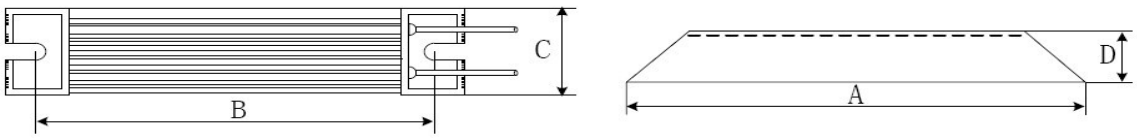
6.4 The Selection of the Peripheral Equipment

6.4.1 Brake Resistance (Necessary equipment)

(1) The type explanation of the brake resistance

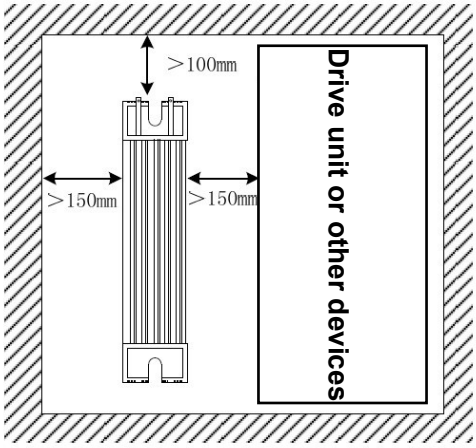


(2) The dimension of the brake resistance



Drive unit	Brake resistance Specification (W/Ω)	Dimension (mm)				Wiring (mm^2)	Leading-wire length (m)	Terminal
		A	B	C	D			
GH2030 (optional)	300/30	215	205	60	30	2.5	1	M5
GH2050 (optional)	500/22	335	325	60	30	2.5	1	M5
GH2075	800/15	420	410	61	59	2.5	1	M5
GH2100	1200/10	485	473	50	107	2.5	1	M5
GH3050	1200W/30Ω	450	438	50	107	2.5	1	M5
GH3075	1500W/30Ω	485	473	50	107	2.5	1	M5

(3) The installation interval of the brake resistance



Danger

1. The high temperature or voltage on the brake resistance surface may occur when the servo unit is ON or operated, do to touch it!
2. It is better to install the insulation shield!
3. When detecting or maintaining, the Brake resistance can be touched when its surface is reduced to the room temperature, after the servo unit is cut off for 10min.
4. The surface temperature of the aluminum shell brake resistance may decrease slowly after the servo unit is cut off.

6.4.2 Breaker and Contactor (Necessary equipment)

To prevent the damage hazard from generating, as well, ensure the maximum personal safety when the fault occurs; refer to the following table to select the breaker and contactor:

Drive unit	GH2030	GH2050	GH2075	GH2100	GH3048	GH3050	GH3075	GH3100
Adapted motor current I (A)	4＜I≤6	7＜I≤10	10＜I≤15	15＜I≤29	4＜I≤6	7＜I≤10	10＜I≤15	15＜I≤29

Breaker rated current (A) (AC380V)	6	10	15	30	6	10	15	30
Contactor rated current (A) (AC220V)	10	15	15	40	10	15	15	40

Notice

The rated current data is coincident with the AC380V voltage level. The AC insulation transformer is not required if user owns the 3-phase AC220V power, And The breaker should be selected in terms of the AC220V level; the rated current data should be identified with the contactor one.

6.4.3 Three-phase AC Filter (Recommended equipment)

Three-phase AC filter is the passive and low-pass one, the filter frequency band is 10kHz～30MHz, which restrains the high frequency noise interference from the drive unit power port. Generally, it is recommended to install when the high frequency noise interference from the drive unit affects the normal operation of other equipments in the user circumstance.

User may freely configurate it in terms of the following technical data:

Drive unit	**GH2030T**	**GH2050T**	**GH2075T**	**GH2100T**	**GH3048**	**GH3050**	**GH3075**	**GH3100**
Adapted motor current I (A)	**4＜I≤6**	**7＜I≤10**	**10＜I≤15**	**15＜I≤29**	**4＜I≤6**	**7＜I≤10**	**10＜I≤15**	**15＜I≤29**
Three-phase AC filter rated current (A)	50		100		50		100	
Three-phase AC filter rated voltage (V)	AC220V							
Three-phase AC filter leakage current (mA)	≤5mA							

6.4.4 Insulation Transformer (Necessary equipment)

Notice

- **It is suggested that the power of the drive unit is supplied by the insulation transformer, reduce the possible, such as the electric shock, the power and the electromagnetism interference.**
- **The Single-phase power can be used by the 0.8kW and below, however, the three-phase power should be used above 0.8kW.**

Our company supplies several isolation transformers for the user, and user can purchase it based upon the servo motor power and its actual loading rate, refer to the following table:

Type	Capacity (Kva)	Phase	Input (V)	Output (V)
BS—120	1.2	Three-phase	380	220
BS—200	2.0			
BS—300	3.0			
BS—400	4.0			
BD—80	0.8	Single-phase		
BD—120	1.2			

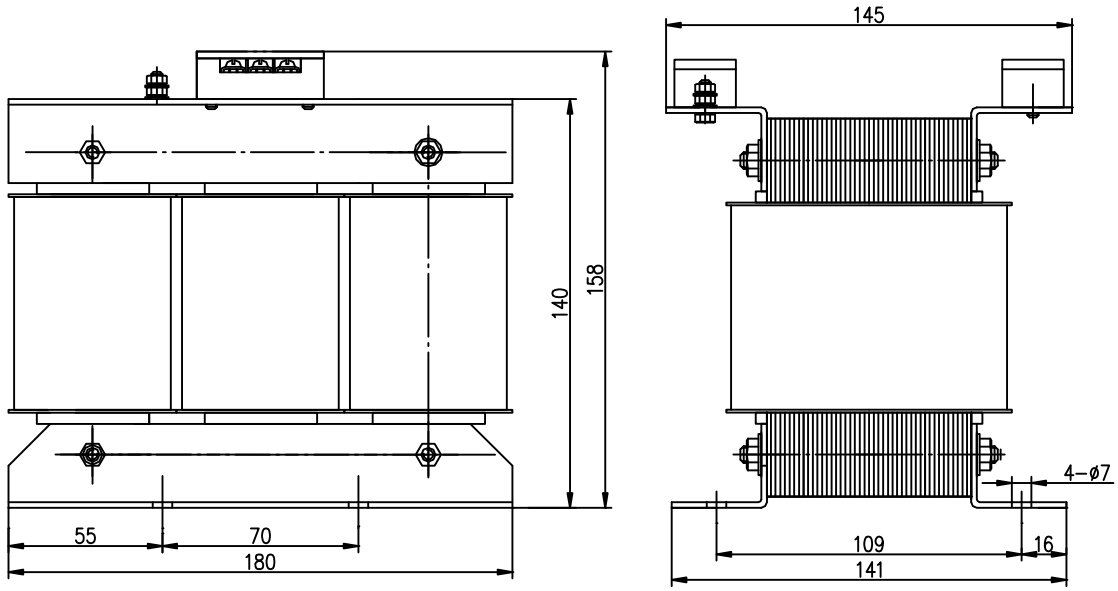


Fig. 6-1 BS—120 configuration and installation dimension

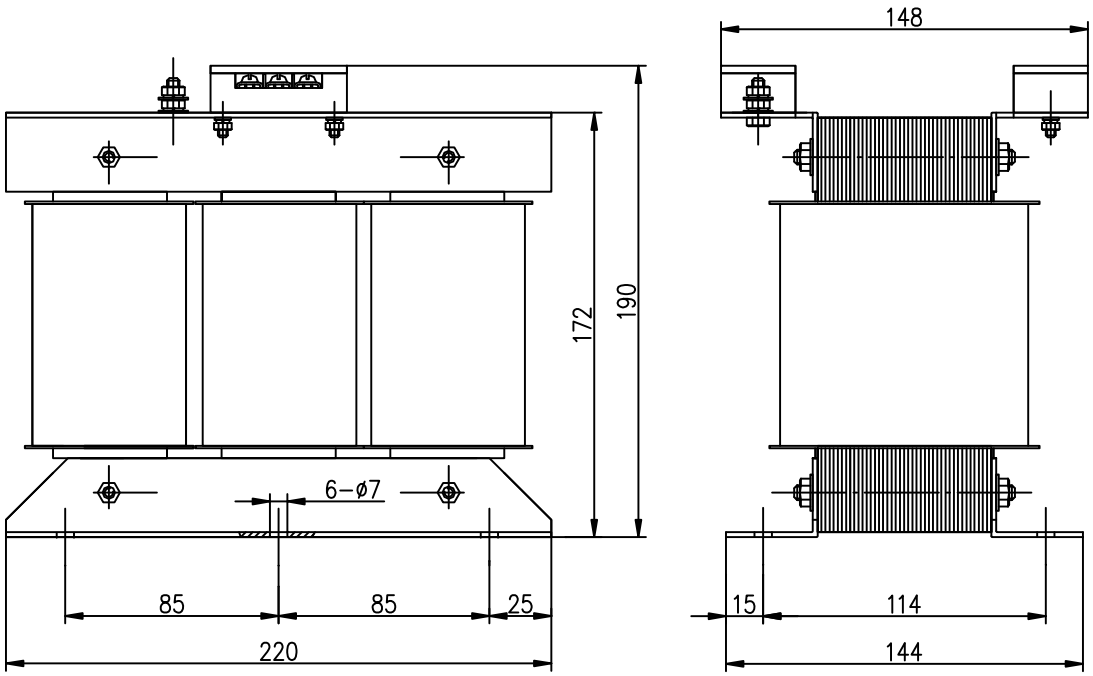


Fig. 6-2 BS—200 configuration and installation dimension

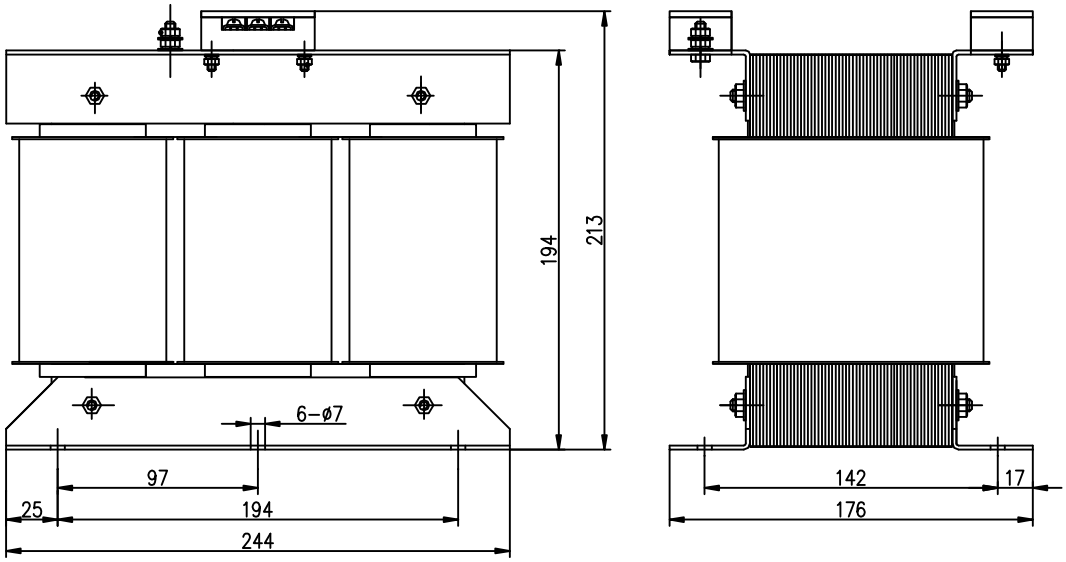


Fig. 6-3 BS—300 configuration and installation dimension

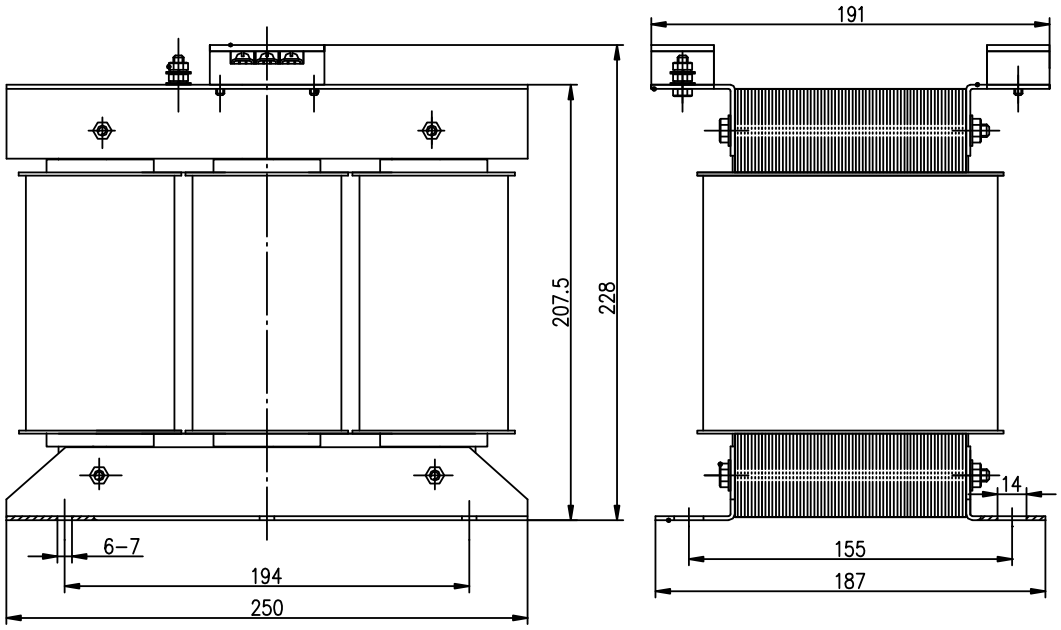


Fig. 6-4 BS—400 configuration and installation dimension

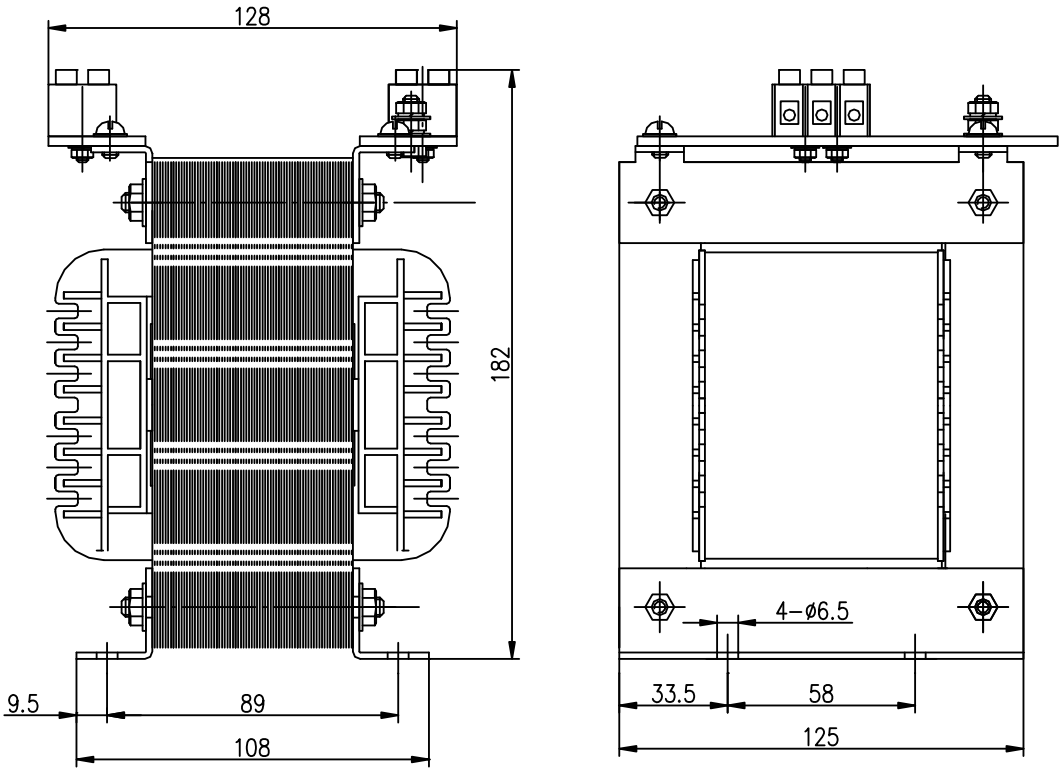


Fig. 6-5 BD—80 configuration and installation dimension

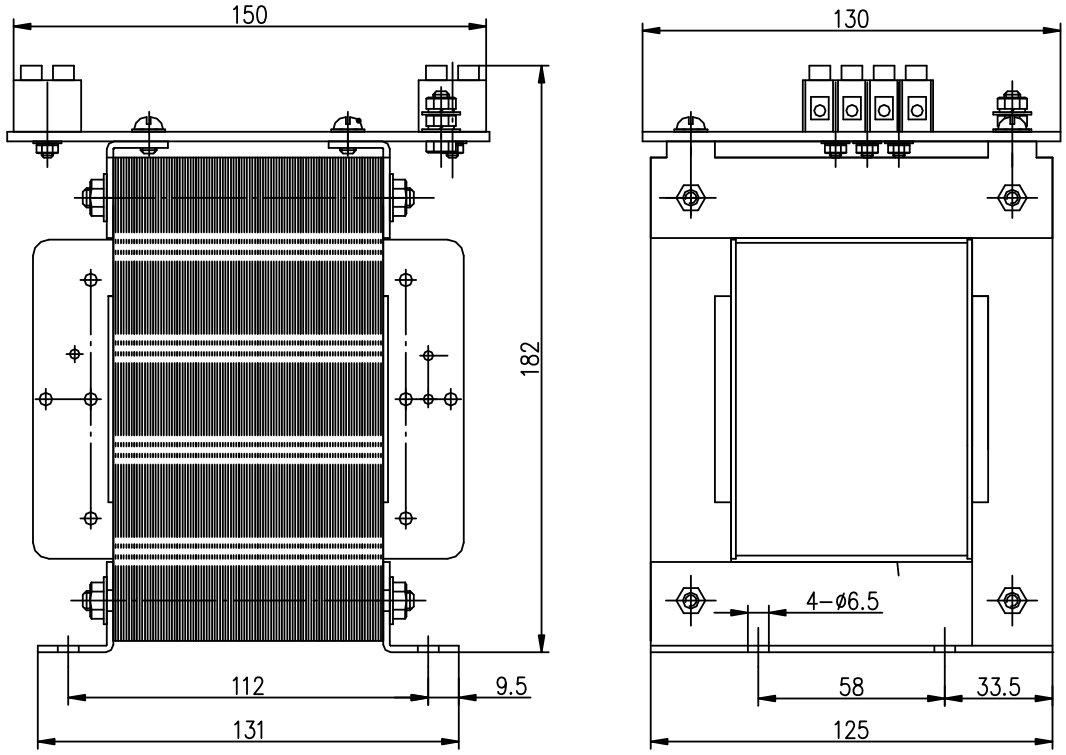


Fig. 6-6 BD—120 configuration and installation dimension

6.4.5 AC Reactor (Recommended Equipment)

Power input port connects with the AC reactor in series-in, which uses for the high harmonic of the input current. It can be prevented the interference from the electric network and reduced the network pollution of the harmonic current generated from the integral current unit. It is recommended that the drive unit should be installed the AC reactor in the following working circumstance.

1. Use the GH3000 series drive unit;
2. The heavy noise of the network or the imbalance of the three-phase voltage is more than 3%; it may affect the normal operation of the drive unit;
3. There are some equipments, namely, crystal brake tube converter, non-linear loading, arc furnace loading, as well the compensation capacitor connecting with adjustment power factor by switch shift;
4. It is necessary to improve the power factor of the input side

The AC reactor can be selected based upon preparatory pressure-drop on the each phase winding of the reactor. Generally, the 2% - 4% voltage of the network side is regarded as pressure-drop. It is better not to take the excessive pressure-drop of the reactor of the series-in power input port; otherwise, the torque of the motor may be affected. It is recommended that the

4% (8.8V) leading-in voltage is selected, user may randomly configurate it based upon the following technical data.

Drive unit type	Output power of drive unit	Three-phase AC leading-in cable reactor		
		Rated voltage	Rated current	Inductance range
GH2030	0.8～1.2kW	Three phases AC 380V (or 440V) /50Hz	8A～10 A	1.0 mH～2.5 mH
GH2050	1.2～3kW	Three phases AC 380V (or 440V) /50Hz	9A～10 A	1.0 mH～2.5 mH
GH2075 GH3048 GH3050	3.0～6.3kW	Three phases AC 380V (or 440V) /50Hz	13A～15 A	1.0 mH～1.5 mH
GH2100 GH3075	6.3～11kW	Three phase AC 380V (or 440V) /50Hz	24A～30 A	0.5 mH～0.8 mH
GH3100	11～15kW	Three phases AC 380V (or 440V) /50Hz	34A～40 A	0.4 mH～0.6 mH

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