Preface

Thank you for your selecting GT610/GT620 Series Servo Driver Products of Shenzhen Easydrive Electrical Co., Ltd.GT610/GT620 series servo driver has realized complete closed-ring servo control of spindle motor, integrating speed control and position control, which could realize processings such as high-precision turning, milling and grinding etc., and is more competitive than traditional variable-frequency drive in heavy cut aspect, meanwhile, for its outstanding control performance, it could make the spindle possess servo function, participate interpolation control of coordinate axis, and accomplish functions such as rigid tapping and thread cutting etc. Its unique position control function, could meet requirements on high-class equipment in processing center and turning center etc. It could be used in application occasions such as machine tool spindle and textile machine etc. It is a high-performance AC induction motor servo driver.

Before using GT610/GT620 series servo driver, users and related technicians need to carefully read this user manual, to guarantee correct installation and operation of the servo driver, so as to make it exert the best performance.

This user manual is subject to change without notice, please refer to the latest version.

Readers

This user manual is suitable for the following persons.

Servo driver installers, engineering technicians (electrical engineers and electrical operators etc.), and designers. Please make sure that this manual could reach final users.

Conventions in this Manual

Symbol Conventions

Note: Occasions which may cause injuries to medium or slight extent because of failing to operate according to requirements.

Danger: Occasions which may cause death or heavy injury because of failing to operate according to requirements.

Notices:

- **When get the product, please confirm**

Notice 
1. Please do not install any damaged driver or driver lack of parts. Any personal injury shall be prevented.

- **Installation**

Notice 
1. During transportation, please support the bottom of the machine. The danger of legs hurt by falling main body may exist for only holding the panel. 2. Please install on material panels such as metal panels which are nonflammable etc. Installation on flammable materials, may cause fire danger. 3. When more than one driver are installed into the same control cabinet, please set a cooling fan, and make inlet air temperature under 40℃.For overheat may cause fire or other accidents.

- **Wiring**

Danger 
1. Before wiring, please make sure the input power has been switched off. There're dangers of electric shock and fire. 2. Please ask electrical engineering technicians to carry out wiring. There're dangers of electric shock and fire. 3. Grounding terminals shall be grounded reliably. There's danger of electric shock. 4. When emergency stop terminal is connected, make sure to check whether its motion is effective or not. There's danger of injury.(Wiring responsibility shall be undertaken by users) 5. Please do not touch output terminal directly, keep driver's output terminal from connecting with outer shell, and no short circuit connection shall be allowed between output terminals. There're dangers of electric shock and short circuit.

Notice 
1. Please verify whether rated voltage of AC main circuit coincides with that of the driver. There're dangers of injury and fire. 2. Do not carry out breakdown test on driver. It will cause damages to semi-conductor components etc. 3. Please connect braking resistors or braking units according to wiring diagram. There's danger of fire. 4. Please use screwdriver fastening terminals with specified torque. There's danger of fire. 5. Do not connect input power cable to output U, V, and W terminals. Voltage added on output terminals may cause internal damages to the driver. 6. Do not connect phase-shifting capacitor and LC/RC noise filter into output circuit. It will cause internal damages to the driver. 7. Do not connect electromagnetic switches or electromagnetic contactors into output circuit. When the driver is running with load, surge current produced by motions of electromagnetic switch and electromagnetic contactor may cause over-current protecting circuit motion of the driver.

- **Maintenance and Check**

Danger 
1. Do not touch connecting terminals of the driver, for there's high voltage on them. There's danger of electric shock. 2. Before power on, please be sure to install the panel, and make sure to power off during dismantling the panel. There's danger of electric shock. 3. Non-professional technicians shall not carry out any maintenance or check. There's danger of electric shock.

Notice

1. CMOS integrated circuit has been installed on keyboard, control circuit board and driving circuit, please take caution during usage. Do not touch the circuit board directly with your fingers, for electrostatic induction may damage integrated chips on circuit board.
2. When powered on, please do not change wiring or dismantle terminal connection. During running, please do not check signals. For it will damage the equipment.

Table of Contents

Chapter I Servo Driver Introduction

1.1 Model Description

GT620 - 4 T 0075 M

Spindle Servo Series	
610	610 Series
620	620 Series
621	621 Series
622	622 Series

Code	Voltage Level
4	380V

Code	Input Voltage
T	3-phase

Code	Configurable Encoder
M	Photoelectric Encoder
R	Rotary Transformer
P	Electromagnetic Encoder

Code	Adaptable Motor
0022	2.2KW
0037	3.7KW
0055	5.5KW
0075	7.5KW

Fig. 1-1

1.2 Driver Nameplate

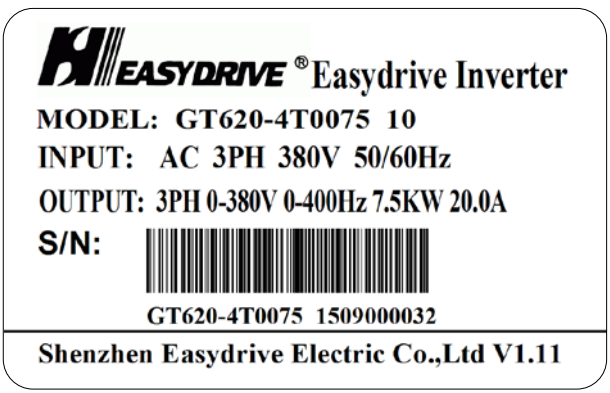


Fig. 1-2

1.3 Product Series

Power (kw)		2.2	3.7	5.5	7.5
Adapter Motor Function (kw)		2.2	3.7	5.5	7.5
Output	**Voltage (V)**	Three-phase 0 ~ Rated input voltage			
	Rated Current (A)	8.4	12.5	15	20
	Overload Capacity	130％10 min., 150％1 min., 175％15 s			
Input	**Rated Voltage/Frequency**	Three-phase 380V; 50Hz/60Hz			
	Allowable Voltage Range	-10％～15% of rated voltage			
Braking Unit		Standard Built-in			
Protection Grade		IP20			
Cooling Mode		Forced Air Cooling			

1.4 Technical Specification

Output	Max. output voltage Outlet	Input voltage 380V corresponds to max. output 390V Outlet
	Max. output speed (rpm)	30000rpm
Input	Rated voltage/frequency	Three-phase 380V; 50Hz/60Hz
	Frequency variation range	±5％ of rated frequency
Control Characteristics	Control mode	SVC (Sensorless vector control); VC (Sensor vector control)
	Speed adjustment range	1: 10000（VC）
	Speed control precision	±1rpm
	Position control precision	±1Pulse
	Rotation speed set resolution	Digital quantity 1rpm

	Braking mode	Energy-consuming braking: External braking resistor
Input/Output Interface	Digital quantity input	8-way optical coupler input; input mode: PNP, NPN optional
	Digital quantity output	3-way open circuit collector output; +24V DC, 50mA
	Analog quantity input	2-way: 0~±10V
	Relay output	2-way: AC250V, 3A; DC30V, 1A
	Encoder input interface	1:Max. receiving frequency 500kHz, 5V
	Pulse input interface	1:Directional pulse or orthogonal pulse, 5V
	Encoder output interface	1:Max. receiving frequency 500kHz, 5V
	Bus interface	RS485 standard
Spindle Function	Speed control	Range: 0~30000rpm; Rotation：forward and backward; speed instructs：Analog quantity and pulse
	Accurate stop positioning	Precision± 1Pulse; position adjustment: User parameter settings
	Rigid tapping	Able to interface with multiple domestic and imported systems, tapping error ±2%
	Other functions	C-axis control, thread cutting, electronic gear and swing control
	Motor overload	If regulation time of overload alarm is exceeded, an alarm will be output; set by parameters
	Input phase failure abnormality	When input phase fails, output a phase failure alarm.

Use Environment	Use location	No dust, corrosive gas or flammable gas.
	Temperature	Derating use between −10～+40 ° +40～+50 ℃.
	Humidity	5～95%, no condensation is allowed.
	Vibration	Vibration frequency ≤ 20Hz: 9.8m/s^2; 20Hz≤vibration frequency≤50Hz: 2m/s^2

1.5 Braking Resistor Model Selection

Servo Driver Model	Braking Resistor Min. Power	Braking Resistor Min. Value	Qty.
GTXX-4T0022	500W	55Ω	1
GTXX-4T0037	800W	55Ω	1
GTXX-4T0055	1200W	35Ω	1
GTXX-4T0075	1500W	35Ω	1

Remarks:

◆ Braking resistor value shall be equal to or larger than standard resistor value in the above table, otherwise, it will cause damages to braking pipe.

◆ Try to avoid using wire-wound resistor, with a relatively large spurious inductance, which will damage driver braking pipe, when used on machine tool, wire-wound resistor itself may also produce electricity leakage or overheat to burn equipment.

◆ It is better to select larger braking resistor power, braking resistor power in the above table shall be calculated according to braking sustaining time within 30s, if braking sustains, larger resistor power shall be needed.

◆ For machine tool needs to brake frequently, braking resistor heating will become serious, please keep away from driver installation position, and install a radiator fan.

◆ Standard product will not provide braking resistor.

Chapter II Interface and Wiring

2.1 Input/Output Control Terminal Interface Theory

2.11 Input Terminal Interface Theory

This series servo driver's multi-functional input terminal adopts a full-bridge rectifier circuit. PLC is the public terminal of DI1～DI8, and PLC terminal could adopt PNP mode or NPN mode for connection. The mode of DI1～DI8 to connect with external interface is very flexible. Typical wiring methods are as follows:

1) Connection mode using a 24V internal power supply of the servo driver, and adopting switch control is as shown in Fig. 2-1 (Note: Connecting wire between PLC and 24V terminal shall be reliably connected).

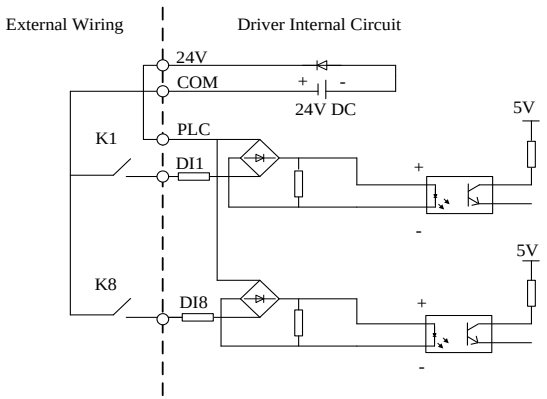


Fig. 2-1 Connection Mode Using Internal Power Supply Switch Control

2) Connection mode using an external power supply, and adopting switch control is as shown in Fig. 2-2 (Note to remove the connecting wire between PLC and 24V terminal).

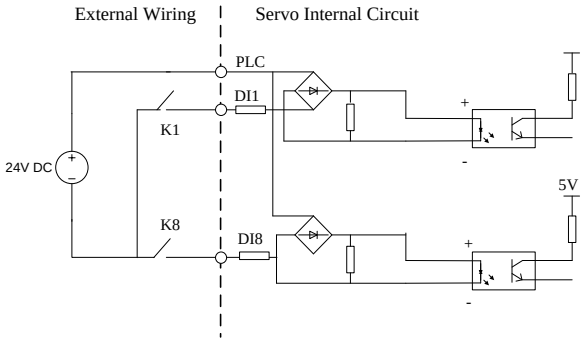


Fig. 2-2 Connection Mode Using an External Power Supply Switch Control

External Control Adopts NPN/PNP Control Mode:

1） Connection mode using a +24V power supply inside the driver, and adopting an NPN-typed output external controller is as shown in Fig. 2-3.

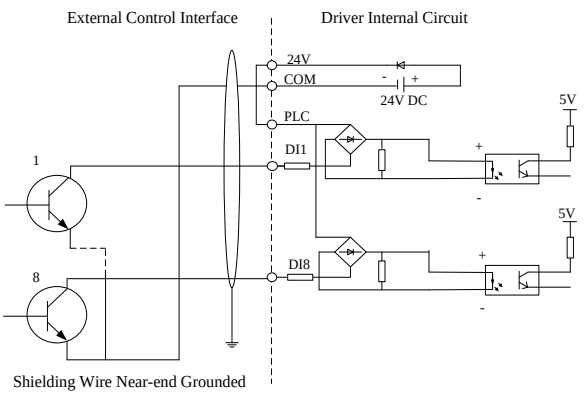


Fig. 2-3 Connection Mode Using a +24V Internal Power Supply of the Driver

2） Connection mode using a +24V internal power supply of the driver, and

adopting a PNP type external controller (Note to remove the connecting wire between PLC and 24V terminal, to short-circuit PLC and COM terminal), as shown in Fig. 2-4.

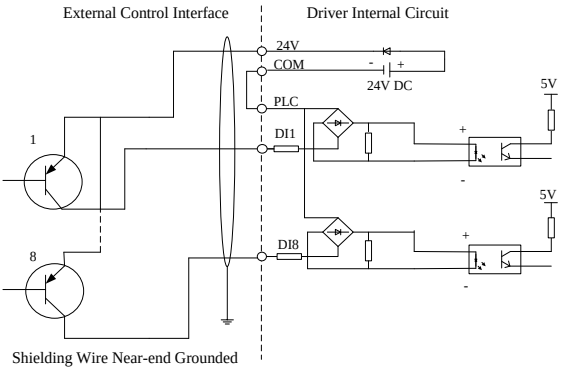


Fig. 2-4 Connection Mode Using a +24V Internal Power Supply of the Driver

3） NPN connection mode using an external power supply: (Note to remove the connecting wire between PLC and 24V terminal), as shown in Fig. 2-5.

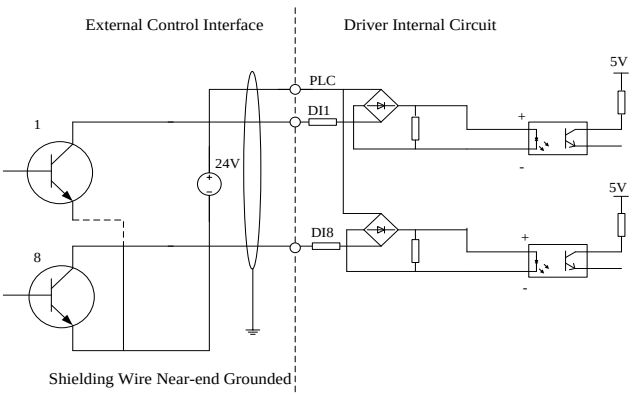


Fig. 2-5 Connection Mode Using an External Power Supply

4） PNP connection mode using an external power supply (Note to remove the connecting wire between PLC and 24V terminal), as shown in Fig. 2-6.

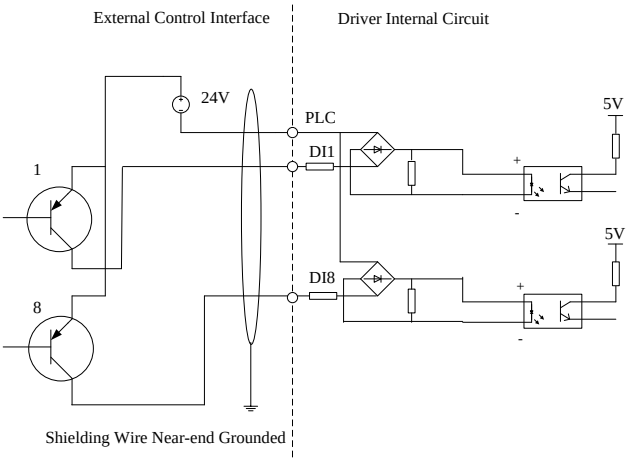


Fig. 2-6 Connection Mode Using an External Power Supply

2.12 Digital Quantity Output Interface Theory

1) Multi-functional output terminals D01, D02 and D03 (N/A temporarily) could use 24V internal power supply of the driver, and connection methods include the following:

Connection method I:

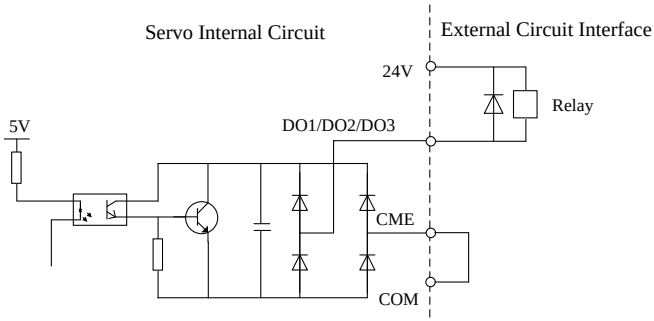


Fig. 2-7 Connection Method I Using Servo Internal Power Supply

Connection mode II:

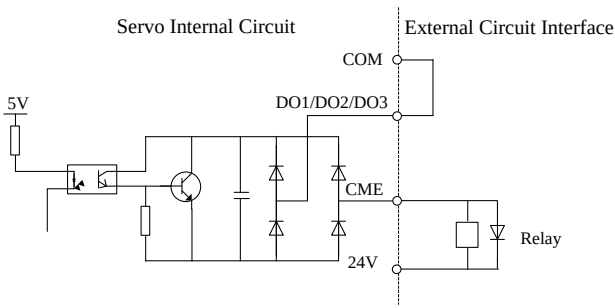


Fig. 2-8 Connection Method II Using Servo Internal Power Supply

2) Multi-functional output terminals D01, D02 and D03 (N/A temporarily) could also use a 24V external power supply, and connection methods include the following:

Connection mode I:

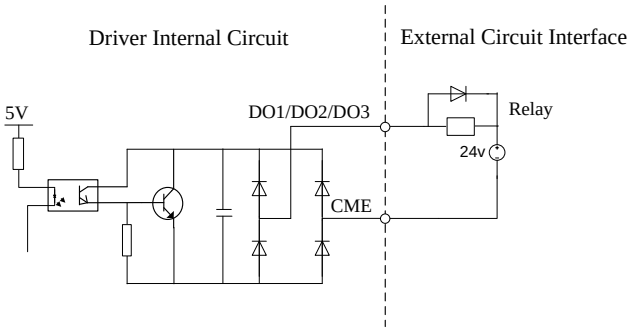


Fig. 2-9 Connection Method I Using Servo External Power Supply

Connection method II:

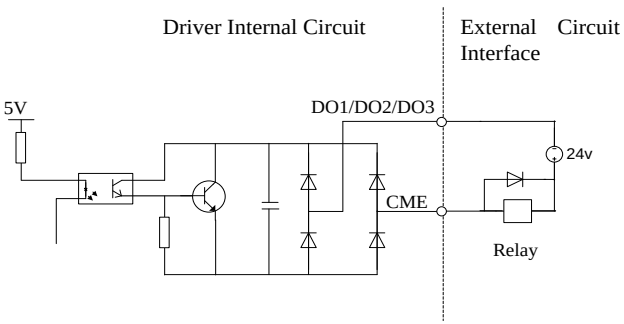
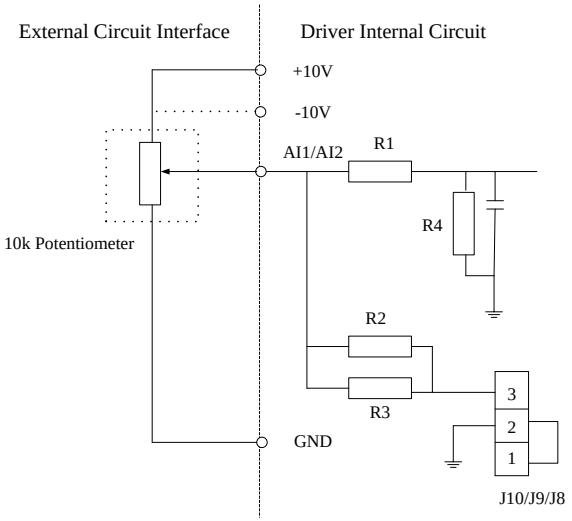


Fig. 2-10 Connection Method II Using Servo External Power Supply

2.13 Analog Quantity Input/Output Interface

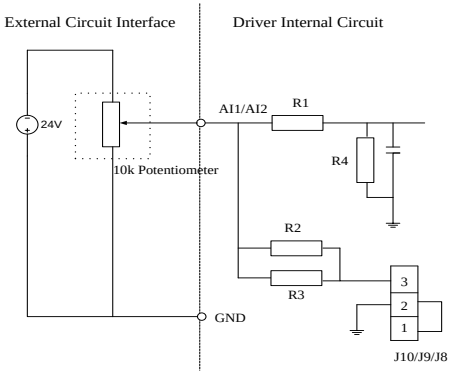
1) For AI1/AI2 analog voltage input, the connection mode using a ±10V internal power supply of the servo driver to connect to an external potentiometer is as shown in Fig. 2-11.



Note: When using analog voltage, it is required to connect short circuit cap of J9/J8 to pin 1 and 2, and jumper terminal corresponding to AI1 is J9, while jumper terminal corresponding to AI2 is J8.

Fig. 2-11 Analog Voltage Input Using an Internal Power Supply

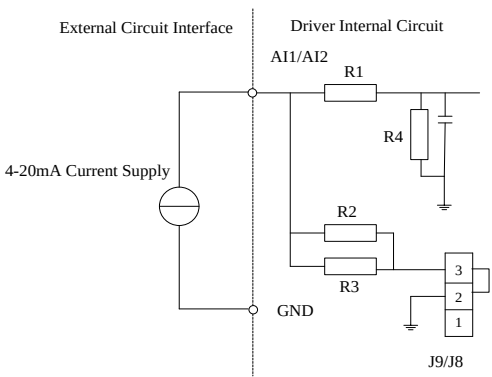
2) For AI1/AI2 analog voltage input, the mode using a 10V external power supply connecting to a potentiometer is as shown in Fig. 2-12.



Note: When using analog voltage, it is required to connect short circuit cap of J9/J8 to pin 1 and 2, and jumper terminal corresponding to AI1 is J9, while jumper terminal corresponding to AI2 is J8.

Fig. 2-12 Analog Voltage Input Port Using an External Power Supply

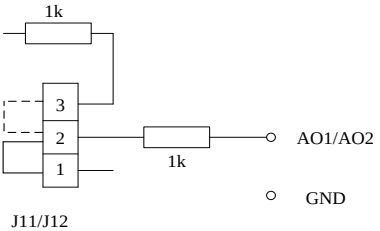
3) AI1/AI2 analog current signal (4mA-20mA) input wiring is as shown in Fig. 2-13.



Note: When using current input, it is required to connect short circuit cap of J9/J8 to pin 2 and 3, and jumper terminal corresponding to AI1 is J9, while jumper terminal corresponding to AI2 is J8.

Fig. 2-13 Analog Current Signal Input

4) AO1/AO2 port analog voltage (0-10v)/current (4-20mA) output interface is as shown in Fig. 2-14.



Note: When short circuiting pin 1 and 2 of short circuit cap of J11/J12, AO1 outputs a 0-10v analog voltage signal to GND, when short circuiting pin 2 and 3, it outputs a 4-20mA current signal, and jumper terminal corresponding to AO1 is J11, while jumper terminal corresponding to AO2 is J12.

Fig. 2-14 A01/A02 Analog Output

2.14 Pulse Quantity Input Interface

There're two driving modes for pulse quantity input interface, which are namely: (1) Differential driving mode; (2) single ended driving mode. These are shown in ig. 2-15 and Fig. 2-16 respectively.

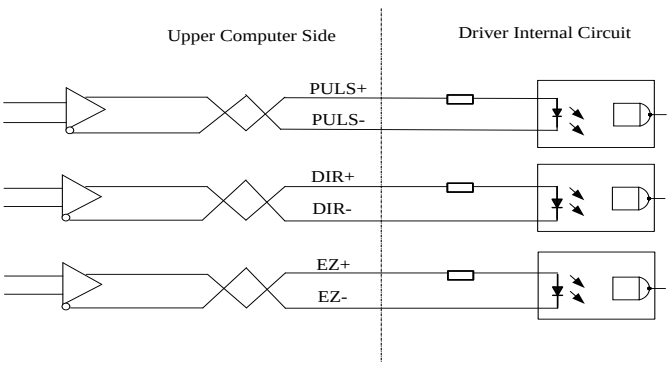


Fig. 2-15 Input Pulse Quantity Differential Driving Mode

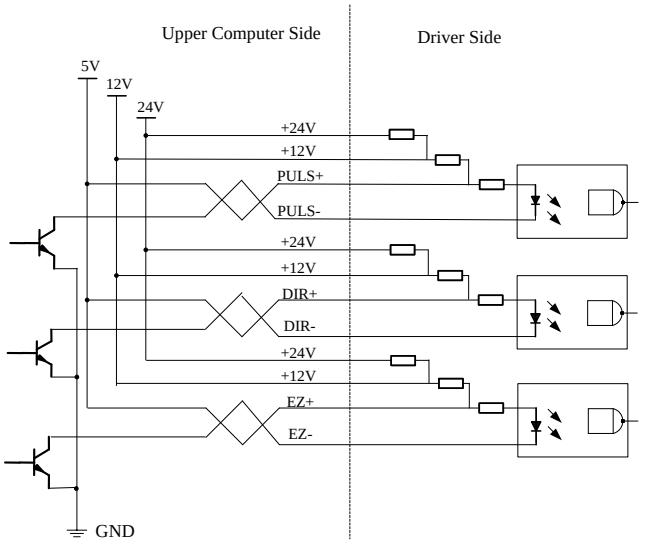


Fig. 2-16 Input Pulse Quantity Single Ended Driving Mode

2.15 Encoder Output Interface

Encoder signal output interface is as shown in Fig. 2-17.

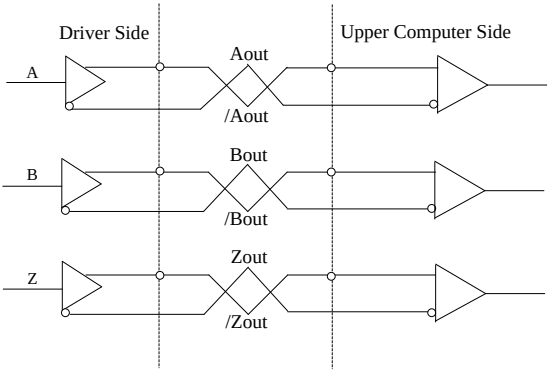


Fig. 2-17 Encoder Output Interface

2.2 Wiring and Terminal Description

2.21 Communication Wiring

This series servo driver provides users with a standard RS485 serial communication interface, which could realize communication with PC or PLC etc., and could carry out real-time monitoring and control. Its connection is as shown in Fig. 2-18 (Note to use a shielded twist pair with shielded layer single end grounded).

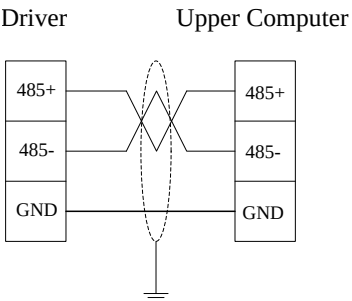


Fig. 2-18 485 Communication Wire Connection

2.22 Main Circuit Terminal Wiring Specification

1） Main circuit terminals are as shown in Fig. 2-19.

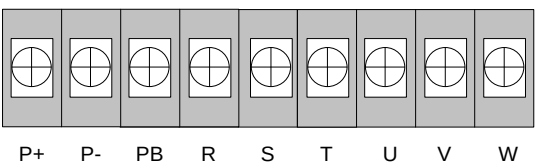


Fig. 2-19 Main Circuit Terminals

Main circuit terminals description:

R, S, T	Three-phase AC 380V input terminal
U, V, W	Three-phase AC output terminals connecting to motor cable
P+, PB	Terminals connecting to braking resistor
P-	Bus negative terminal, users are not allowed to connect at this terminal.

2） Control terminals are described as follows:

Port	No.	Name	Functions	Remarks
J4	1	+10V	Internal +10V power supply, 10mA	
	2	-10V	Internal -10V power supply, 10mA	
	3	GND	Analog ground	
	4	AI3	Reserved	
	5	AI2	Analog input channel 2	
	6	AI1	Analog input channel 1	
	7	AO1	Analog output channel 1	
	8	AO2	Analog output channel 2	
	9	GND1	RS485 ground	
	10	RS485+	RS485+	
	11	RS485-	RS485-	
J3	1	DI1	Digital input terminals, able to	F2-01=32（default）

Port	No.	Name	Functions	Remarks
	2	DI2	be customized freely	F2-02=35（default）
	3	DI3		F2-03=36（default）
	4	DI4		F2-04=40（default）
	5	DI5		F2-05=37（default）
	6	DI6		F2-06=38（default）
	7	DI7		F2-07=8（default）
	8	DI8		F2-08=7（default）
	9	DI9	Reserved	
	10	COM	Digital ground	
	11	PLC	Input terminal common port	
	12	+24V	Digital +24V power supply, 200mA	
	13			
	14	CME	Terminal output public port	
	15	COM	Digital ground	
	16	DO1	Open circuit collector output terminal	F2-10=1（default）
	17	DO2		F2-11=2（default）
	18	DO3		F2-12=3（default）
J6	1	TC1	Programmable relay 1	F2-14=3（default）
	2	TB1		
	3	TA1		
	4	TC2	Programmable relay 2	F2-13=3（default）
	5	TB2		
	6	TA2		

3） Sensible extension card open definition

1. Photoelectric encoder PG card port definition

Port	No.	Name	Functions	Remarks
CN1	1	A+	Encoder differential input positive port	
	2	B+		
	3	Z+		
	4	U+		
	5	V+		
	6	W+		
	7	GND	Power supply ground	
	8	KTY	KTY temperature sensor positive (negative is GND)	KTY84-130
	9	A-	Encoder differential input negative port	
	10	B-		
	11	Z-		
	12	U-		
	13	V-		
	14	W-		
	15	+5V	+5V power supply	
CN2	1	PULS+	Pulse differential input positive port (or orthogonal pulse input A+)	
	2	DIR+	Pulse direction differential input positive port (or orthogonal pulse input B+)	
	3	EZ+	EZ differential input positive port	
	4	+24V	Single end +24V interface (refer to Fig. 2-16)	

Port	No.	Name	Functions	Remarks
	5	Reserved		
	6	/AOUT	Encoder output signal negative port	
	7	/BOUT		
	8	/ZOUT		
	9	PULS-	Pulse differential input negative port (or orthogonal pulse input A-)	
	10	DIR-	Pulse direction differential input negative port (or orthogonal pulse input B-)	
	11	EZ-	EZ differential input negative port	
	12	+12V	Single end +12V interface (refer to Fig. 2-16)	
	13	AOUT	Encoder output signal positive port	
	14	BOUT		
	15	ZOUT		

2. Rotary encoder PG card port definition

Port	No.	Name	Functions	Remarks
CN1	1	Empty feet		
	2	COS+	Cosine positive	
	3	SIN+	Sine positive	
	4	KTY+	KTY temperature sensor positive	KTY84-130
	5	EXC+	Excitation positive	
	6	COS-	Cosine negative	
	7	SIN-	Sine negative	
	8	KTY-	KTY temperature sensor negative	KTY84-130

Port	No.	Name	Functions	Remarks
	9	EXC-	Excitation negative	
CN2	1	PULS+	Pulse differential input positive port (or orthogonal pulse input A+)	
	2	DIR+	Pulse direction differential input positive port (or orthogonal pulse input B+)	
	3	EZ+	EZ differential input positive port	
	4	+24V	Single end +24V interface (refer to Fig. 2-16)	
	5	Reserved		
	6	/AOUT	Encoder output signal negative port	
	7	/BOUT		
	8	/ZOUT		
	9	PULS-	Pulse differential input negative port (or orthogonal pulse input A-)	
	10	DIR-	Pulse direction differential input negative port (or orthogonal pulse input B-)	
	11	EZ-	EZ differential input negative port	
	12	+12V	Single end +12V interface (refer to Fig. 2-16)	
	13	AOUT	Encoder output signal positive port	
	14	BOUT		
	15	ZOUT		

4） Main circuit cable diameter, incoming relay-protection fuse or short circuit model selection.

Driver Model	Breaker (A)	Input Line (mm^2)	Output Line (mm^2)	Control Line (mm^2)
GTXX-4T0022	18	3.0	3.0	1.0
GTXX-4T0040	26	4.5	4.5	1.0
GTXX-4T0055	40	6.0	6.0	1.0
GTXX-4T0075	55	10.0	10.0	1.0

2.23 Driver Onsite Wiring and Grounding

1） Driver control line needs to use shielded line (pulse, directional signal line and 485 communication line all need to use shielded twist pair), shielded layer is grounded via single driver end, while control signal could not be parallel to strong electrical signal line or bound together with it, if parallel, a distance above 20-60cm (related to strong current) shall be maintained. If wiring needs to intersect, a method of putting control line and power line through vertically could be adopted.

2） Lines output from driver to motor (U, V, W) shall avoid from being parallel to input power line (R, S, T), if parallel, a distance above 30cm shall be maintained.

3） Driver grounding terminal could not be grounded via other device grounding lines, and shall be connected to earth directly.

4） It is forbidden to connect other devices on driver R, S and T.

2.3 Terminal Wiring Layout

2.3.1 Photoelectric encoder/Electromagnetic encoder

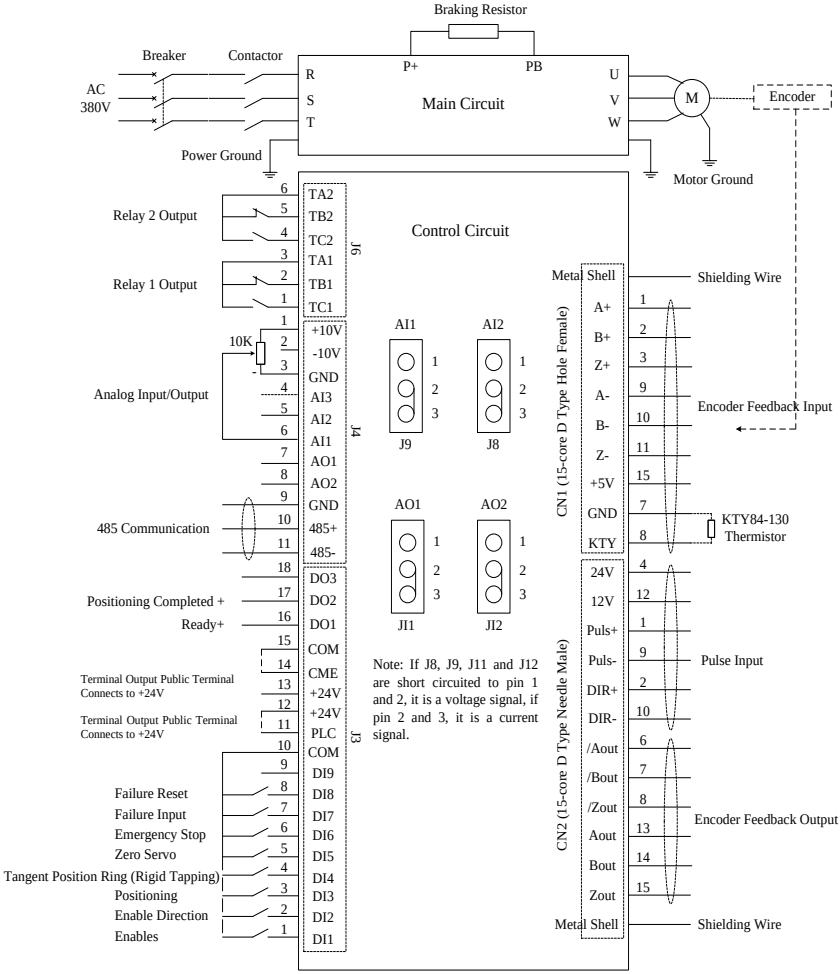


Fig. 2-20

2.3.2 Rotary encoder

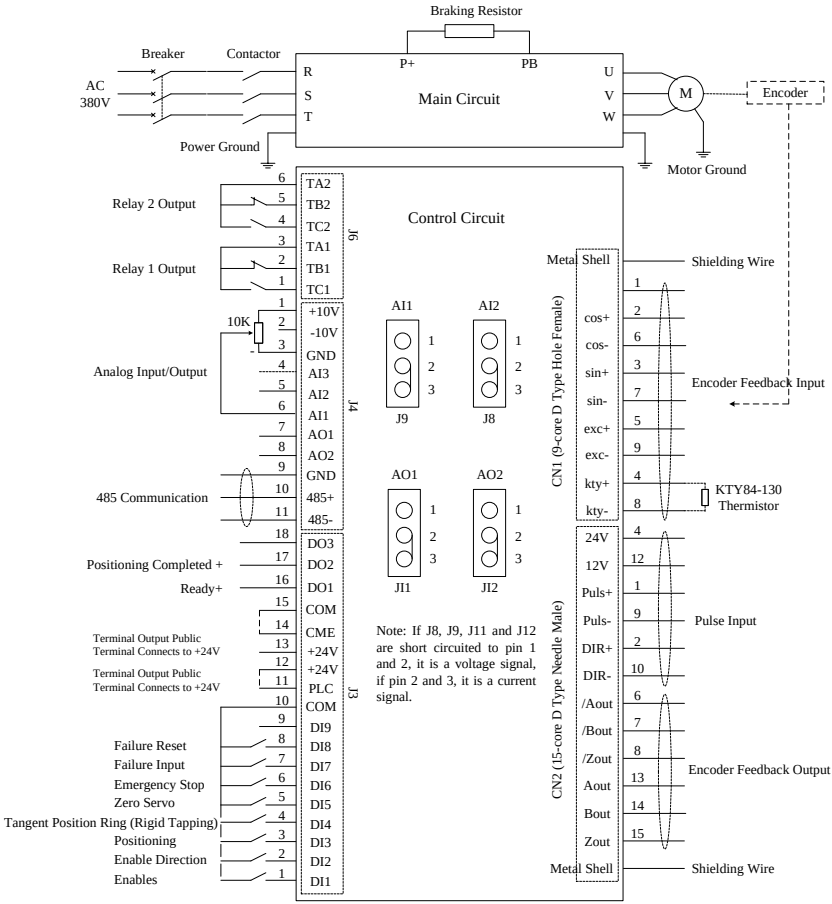


Fig. 2-21

Chapter III Installation Dimension

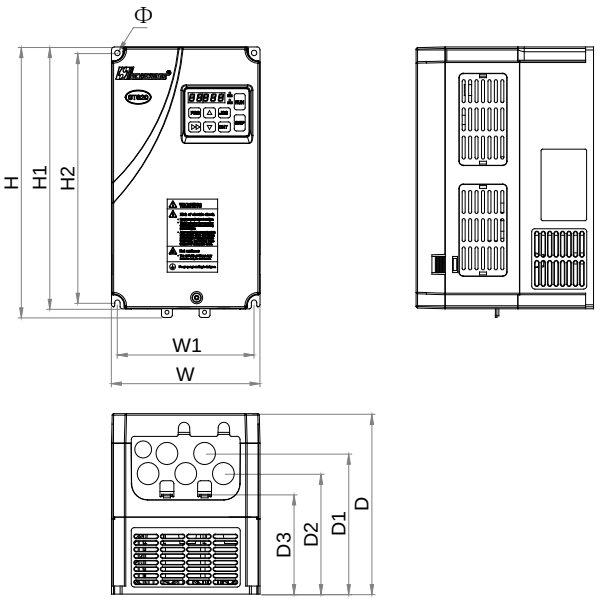


Fig. 3-1 2.2KW-7.5KW

2.2KW-7.5KW dimension table Unit: mm

Dimension	W	W1	H	H1	H2	D	D1	D2	D3	Installation Hole Diameter	Reference Figure
	150	138	268.5	260	248	179	139.5	119.5	99	Φ5.5	2-1

Chapter IV Operation and Debugging

4.1 Display Panel and Function Introduction

4.1.1 Panel introduction

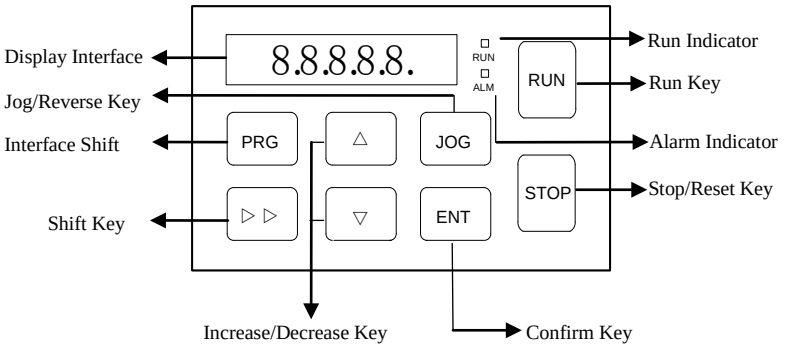


Fig. 4-1

4.1.2 Key functions

Key functions are described in the following table:

Keys	Name	Symbols in Manual	Function Description
PRG	Menu shift key	PRG	To shift menu interfaces of all parameter groups.
▶▶	Shift key	▶▶	During modifying or viewing parameters, user could press this shift key to shift all nixie tube positions.
ENT	Confirm key	ENT	To enter the subordinate menu or data to confirm modification.
JOG	Jog/Reverse functional	JOG	Able to be set to jog or reverse function via parameters (F0-19) setting.

Keys	Name	Symbols in Manual	Function Description
	key		
RUN	Keyboard run key	RUN	Under keyboard run channel mode, press this key to run.
STOP	Stop/Reset key	STOP	When the driver is under normal working situation, if keyboard control is set to be validated, press this key to stop; if it displays a failure, and keyboard reset is validated, press this key to reset failure.
▲	Increase key	▲	Increase of data or functional code
▼	Decrease key	▼	Decrease of data or functional code

4.1.3 Enable command channel

Specify the source of control channel for driver running, while running command channel could be selected via F0-09.

Channels for three running commands to be selected are as follows:

1. Operation keyboard running command channel: Use RUN、STOP and JOG keys on operation panel to control enabling.

2. Terminal running command channel: Control enabling via terminal.

3. Communication running command channel: Driver and upper machine communication, which controls enabling via communication.

Tips: After running command channel modification, please be sure to guarantee equipment load safety first during usage, and confirm normal status after debugging before usage. So as to avoid control failure caused by error definition on terminal wiring during usage, or abnormal communication etc., which may bring about unnecessary losses or accidents.

4.4.1 Speed ring instruct source

Speed instruct source is set by parameters F0-01, and sources for five speed rings are as follows:

1. Speed instruct originates from analog quantity given by AI1 port;
2. Speed instruct originates from analog quantity given by AI2 port;
3. Speed instruct originates from pulse assignment;
4. Speed instruct originates from trial-run speed;
5. Speed instruct originates from communication assignment.

4.2 Debugging Guide

Please carry out wiring connection according to requirements in technical specification provided in Chapter II “Interface and Wiring” in this manual.

4.2.1 First Power-on Process

Before connection, please check whether machine surface is damaged by cycles such as logistics etc., prepare wiring and tools etc., and operate according to the following process:

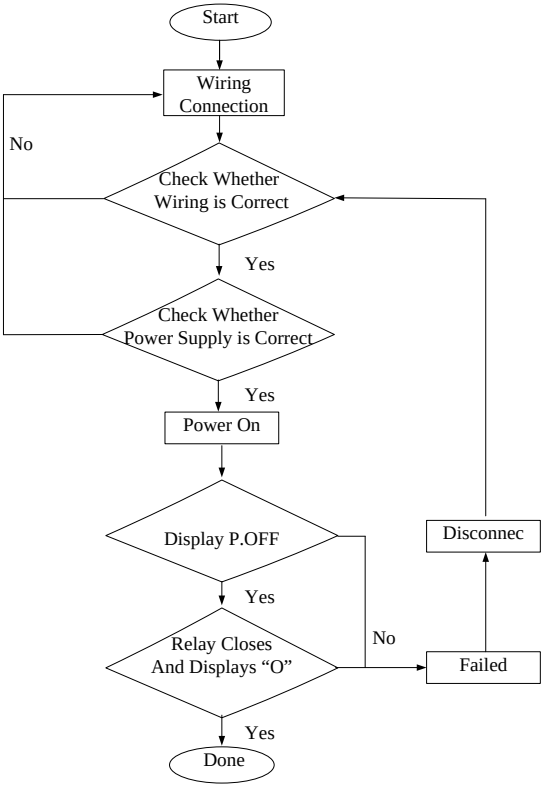


Fig. 4-2 Power on Process

4.2.2 Debugging process

Before debugging usage function, it is required to carry out self-learning on motor, and then start trial-run. For details about self-learning and trial-run, please refer to content in Chapter VIII, while debugging process is as shown in Fig. 4-3.

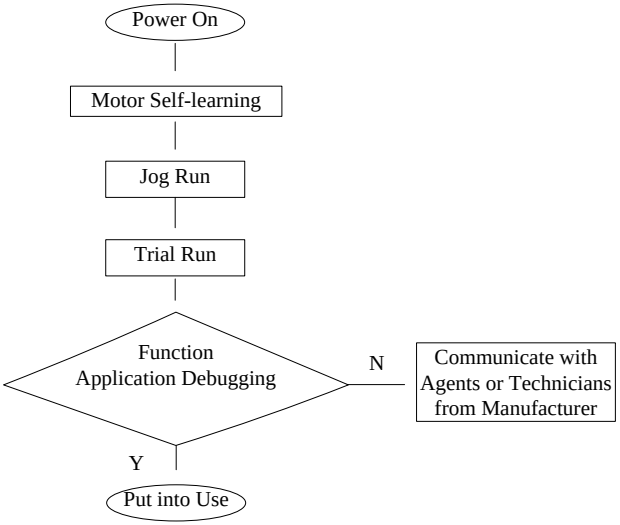


Fig. 4-3 Debugging Process

4.2.3 Communication modified parameters saving process

When user is using the driver, please note that parameters modified via keyboard would save automatically after the driver powers off, and no saving operation is needed; while parameters modified via upper machine and driver communication would not save automatically after the driver powers off, so another parameter saving operation is needed, operating process of which is as shown in the following:

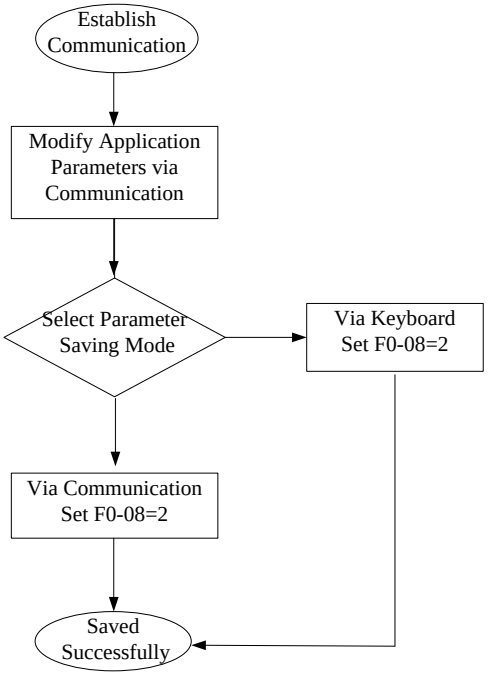


Fig. 4-4 Communication Modified Parameters Saving Process

Chapter V Parameter Table

5.1 Debugging Parameter Table

Symbol Description:

×- represents this parameter could not be modified during running process

O- represents this parameter could be modified during running process

●- represents read-only parameter

*****-represents specific functions of GT610/GT620 and above series

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F0 Group – System Parameters					
F0-00	STOP key function selection	0: Only effective to keyboard control 1: Effective to both keyboard and terminal control 2: Effective to both keyboard and communication control 3: Effective to all control modes	1	0	○
F0-01	Speed ring instruct source	0: Analog port AI1 1: Analog port AI2 2: Pulse instruct* 3: Trial run speed 4: Communication assigned	1	0	×
F0-02	Max. rotation speed	100～30000 RPM	1 RPM	3000 RPM	×
F0-03	Torque upper limit	0.0～300.0%	0.1	200.0%	×
F0-04	Motor control mode	0: Sensorless vector 1: V/F 2: Sensor vector*	1	0	×

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F0-05	Trial run speed	-30000～30000 RPM	1 RPM	300 RPM	○
F0-06	Shutdown status Monitoring parameters selection	0: Motor rotation speed 1: Target rotation speed 2: Output current 3: Bus voltage 4: Input terminal status 5: Output terminal status 6: Analog input AI1 value 7: Analog input AI2 value 8～14: Reserved 15: Software version 16: Radiator temperature 17～18: Reserved 19: Local accumulation run time 20: Power-on accumulation time 21: Last two failures type 22: Last failure type 23: Current failure type 24: Run speed during current failure 25: Output current during current failure 26: Bus voltage during current failure 27: Input terminal status during current failure	1	0	○

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
		28: Output terminal status during current failure 29: Software update time (year) 30: Software update time (month) 31: Software update time (day)） 32: Debugging output1 33: Keyboard detection			
F0-07	Motor tuning selection (only effective when F0-09 is 0)	0: no action 1: Motor static self-learning 2: Motor dynamic self-learning 3: Encoder phase-order self-learning* 4: Encoder phase-order+gear ratio self-learning* 5: Motor dynamics+Encoder phase-order self-learning* 6: Motor dynamics+Encoder phase-order+gear ratio self-learning*	1	0	×
F0-08	Parameter initialization	0: No operation 1: Restore factory settings 2: Save parameters to EEPROM	1	0	×
F0-09	Run command channel selection	0: Operation keyboard run command	1	1	×

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
		channel 1: Terminal run command channel 2: Communication run command channel			
F0-10	Shutdown mode	0: Deceleration stop 1: Free stop	1	0	○
F0-11	Over-voltage stalling protection	0: Off 1: On	1	1	×
F0-12	Oscillation suppression	0: Off 1: On	1	1	×
F0-13	Motor overload protection coefficient	20.0%～120.0%	0.1%	100.0%	○
F0-14	Reserved				×
F0-15	Motor protecting temperature	-40．0～120.0	0.1	120.0	○
F0-16	Shielding failure protection start control	Bit0: Input phase failure protection Bit1: Motor overheat protection Bit2: Encoder cable breaking protection (Reserv)	1	0000H	○
F0-17	Flux linkage feed forward (sensor acts)*	0～100%	1	30%	×
F0-18	Pulse input filter coefficient 1 (Re-electrification valid)	0～15	1	0	○
F0-19	JOG KEY FUNCTION SELECTION	0: Jog control 1: Reverse control	1	0	○
F0-20	Power-off deceleration stop allowed	0: Not allowed 1: Allowed	1	0	○

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F0-21	Power-off deceleration stop time	0～360.00S	0.01s	1.00s	○
F0-22	Over voltage stall detection level	110～150%	1%	131%	×
Group F1 - Motor Parameters					
F1-00	Reserved				×
F1-01	Motor rated power	0.4～900.0KW	0.1KW	Model setting	×
F1-02	Motor rated voltage	0～1000V	1V	Model setting	×
F1-03	Motor rated frequency	0.01Hz～400.00Hz	0.01Hz	50Hz	×
F1-04	Motor rated rotation speed	0～36000RPM	1RPM	Model setting	×
F1-05	Motor pole-pairs number	0～50	1	2	×
F1-06	Motor rated current	0.1～2000.0A	0.1A	Model setting	×
F1-07	Motor stator resistor	0.001～65.535Ω	0.001Ω	Model setting	×
F1-08	Motor rotator resistor	0.001～65.535Ω	0.001Ω	Model setting	×
F1-09	Motor stator and rotator inductance	0.1～6553.5mH	0.1mH	Model setting	×
F1-10	Motor stator and rotator mutual inductance	0.1～6553.5mH	0.1mH	Model setting	×
F1-11	Motor no-load current	0.1～6553.5A	0.1A	Model setting	○
F1-12	Reserved				
F1-13	Encoder lines*	100～20000	1	1024	×

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F1-14	Encoder phase-order*	0: A overstriding B 1: B overstriding A	1	0	×
F1-15	Motor inertia	0.001～1.000	0.001	0.010	×
F1-16	self-learning time coefficient	0～20	1	5	×
F1-17	Flux-weakening mode	0: Full closed loop flux-weakening 1: Open loop flux weakening under generating state	1	1	×
F1-18	Friction coefficient	0.001～0.500	0.001	0.001	×
F1-19	Speed observer convergence rate	0.1～12.0	0.1	1.0	×
F1-20	Speed observer enable	0: Turn off enable 1: Turn on enable	1	0	×
F1-21	Reserved				×
Group F2 - DI/DO Terminal Defined Parameters					
F2-00	Spindle operation control mode	0: Enable+direction; 1: CCW+CW; 2: Enable+CCW+CW;	1	0	×
F2-01	Input terminal DI1 function	0: Control end idle 7: External reset signal input(RST) 8: External device failure input 32: Spindle enable 33: Spindle forward-rotating enable 34: Spindle reversal enable	1	32	×
F2-02	Input terminal DI2 function		1	35	×
F2-03	Input terminal DI3 function		1	36	×
F2-04	Input terminalDI4 function		1	40	×

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F2-05	Input terminalDI5 function	35: Spindle forward-rotating/reversal 36: Spindle orientation* 37: Spindle zero servo 38: Spindle emergency stop 39: Spindle reaming (reserved) 40: Spindle position ring, speed ring switching 41: Spindle analog gain switching 42: Spindle swing mode* 43: Orientation position selection 1* 44: Orientation position selection 2* 45: Orientation position selection 3* 46: Positioning point collection terminal* 47: forward-rotating carry command* 48: Reversal carry command* 49: Pulse counting clear* 50～63: Reserved	1	37	×
F2-06	Input terminalDI6 function		1	38	×
F2-07	Input terminal DI7 function		1	8	×
F2-08	Input terminal DI8 function		1	7	×
F2-09	Switching value filtering times	1～10	1	5	○
F2-10	Open circuit collector output terminal DO1 setting	0: No output 1: Ready 2: Orientation completed* 3: Failure output 4: Speed arrival	1	1	○
F2-11	Open circuit collector output terminal DO2 setting		1	2	○

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F2-12	Open circuit collector output terminal DO3 setting	5: Zero speed output 6: Speed/Position state output*	1	3	○
F2-13	Programmable relay 2 output		1	3	○
F2-14	Programmable relay 1 output		1	3	○
F2-15	Terminal function detecting selection during power-on	0: Invalid terminal operation command during power-on 1: Valid terminal operation command during power-on	1	0	○
F2-16	Position ring, speed ring switching terminal with enable option*	0: Without enable 1: With enable	1	0	×
F2-17	Zero speed arrival speed deflection	1～1000	1	5	○
F2-18	Speed arrival speed deflection	1～65535	1	10	○
Group F3 – Acceleration and Deceleration Parameters					
F3-00	Speed ring acceleration time 1	0～3600.0S	0.1	Model setting	○
F3-01	Speed ring deceleration time 1	0～3600.0S	0.1	Model setting	○
F3-02	Reserved				○
F3-03	Reserved				○
F3-04	Stop delay coefficient	0～1000	1	80	×
F3-05	Reserved				

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F3-06	Reserved				
F3-07	Reserved				
F3-08	Reserved				
F3-09	Reserved				
Group F4 - Speed Ring Parameters					
F4-00	Speed ring (ASR) proportional gain 1	0～500Hz	1	60Hz	○
F4-01	Speed ring (ASR) integration time 1	0.0～1000.0ms	0.1ms	40.0ms	○
F4-02	Reserved				○
F4-03	Reserved				○
F4-04	Reserved				○
F4-05	Reserved				○
F4-06	Reserved				○
F4-07	Speed feedback filtering	0.0～10.0ms	0.1	3.0	○
F4-08	Reserved				
F4-09	Reserved				
Group F5 - Position Ring Parameters					
F5-00	Position ring mode*	0: Pulse position control 1: Position carry control	1	0	×

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F5-01	Orientation/Carry proportional gain *	1～120	1	10	×
F5-02	Position servo proportional gain *	1～200	1	20	×
F5-03	Position ring acceleration time*	0～65.535s	0.001s	0.000	○
F5-04	Position ring deceleration time *	0～65.535s	0.001s	0.000	○
F5-05	Position ring feed forward filtering time*	0～5.000s	0.001s	0.001s	×
F5-06	Position servo feed forward gain*	1～100.00%	0.01%	0.00%	×
F5-07	Carry circle number*	0～65535	1	0	○
F5-08	Carry pulse count*	0～65536	1	0	○
F5-09	Swing mode acceleration/deceleration time*	0～65.535	1	1.000	○
F5-10	Swing pulse count*	0～65535	1	0	○
F5-11	Position ring pulse gear ratio numerator*	1～65535	1	1	×
F5-12	Position ring pulse gear ratio denominator*	1～65535	1	1	×
Group F6 - AI/AO Terminal Parameters					
F6-00	AI1 zero offset	-500～500	1	0	○
F6-01	AI1 input min. rotation speed	0.0%～100.0%	0.1%	0.0%	○
F6-02	AI1 10V voltage corresponds to max. rotation speed setting	-100.0%～100.0%	0.1%	100.0%	○

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F6-03	AI1 terminal after switching corresponds to max. rotation speed	-100.0%～100.0%	0.1%	25.0%	○
F6-04	AI1 input filtering time	0.00S～10.00s	0.01S	0.10S	○
F6-05	AI1 input gain	0.01%～600.00%	1	100.0%	○
F6-06	AI1 input polarity	0: Unipolar (0～10V) 1: Bipolar（-10～10V）	1	0	×
F6-07	Reserved				
F6-08	Reserved				
F6-09	AI2 zero offset	-500～500	1	0	○
F6-10	AI2 input minimum rotation speed	0.0%～100.0%	0.1%	0.0%	○
F6-11	AI2 10V corresponds to max. rotation speed setting	-100.0%～100.0%	0.1%	100.0%	○
F6-12	AI2 terminal after switching corresponds to max. rotation speed	-100.0%～100.0%	0.01%	25.0%	○
F6-13	AI2 input filtering time	0.00S～10.00S	0.01S	0.10S	○
F6-14	AI2 input gain	0.01%～600.00%	0.01	100.0%	○
F6-15	AI2 input polarity	0: Unipolar（0～10V） 1: Bipolar（-10～10V）	1	0	×
F6-16	AO1 multi-function analog quantity output terminal function selection	0: Operation rotation speed 1: setting rotation speed 2: Output current 3: AI1 4: AI2	1	0	○
F6-17	AO2 multi-function analog quantity output		1	0	○

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
	terminal function selection				
F6-18	Reserved				○
F6-19	AO1 output lower limit	0.0～100.0%	0.1	0.0	○
F6-20	Lower limit corresponds to AO1 output	0.00～10.00V	0.01	0.00	○
F6-21	AO1 output upper limit	0.0～100.0%	0.1	100.0%	○
F6-22	Upper limit corresponds to AO1 output	0.00～10.00V	0.01	10.00	○
F6-23	AO2 output lower limit	0.0～100.0%	0.1	0.0	○
F6-24	Lower limit corresponds to AO2 output	0.00～10.00V	0.01	0.00	○
F6-25	AO2 output upper limit	0.0～100.0%	0.1	100.0	○
F6-26	Upper limit corresponds to AO2 output	0.00～10.00V	0.01	10.00	○
Group F7 – Pulse Setting and Electronic Gear Ratio Parameters					
F7-00	Position instruct mode (pulse input mode)*****	0:A and B orthogonal 1:PLUS+SIGN 2:CW+CCW(Reserved)	1	0	×
F7-01	Speed pulse filtering time*****	0～25ms	1ms	3	○
F7-02	Speed ring pulse gear ratio numerator*****	1～65535	1	1	×
F7-03	Speed ring pulse gear ratio denominator*****	1～65535	1	1	×
F7-04	Pulse direction*****	0: Unchanged 1: Complement	0	0	×

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
Group F8 – Spindle Positioning, Gear Ratio Parameters					
F8-00	Spindle positioning plus deceleration time *****	0.001～65.535S	0.001S	2.000S	○
F8-01	Orientation position 1*****	0～4*（**F1-12**）PLUS-1	1 PLUS	0 PLUS	○
F8-02	Positioning search speed*****	0～1500RPM	1RPM	300RPM	○
F8-03	Low speed orientation speed limit*****	0～300RPM	1RPM	150RPM	○
F8-04	Position arrival detection level*****	0～65535 PLUS	1 PLUS	5 PLUS	×
F8-05	Positioning direction*****	0: Pre-positioning speed direction 1: Forward 2: Backward	1	0	×
F8-06	Spindle gear ratio numerator*****	1～65535	1	1	×
F8-07	Spindle gear ratio denominator*****	1～65535	1	1	×
F8-08	Orientation position 2*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-09	Orientation position 3*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-10	Orientation position 4*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-11	Orientation position 5*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-12	Orientation position 6*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-13	Orientation position 7*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-14	Orientation position 8*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○

Function Code	Name	Setting Scope	Min. Unit	Factory Settings	Modification Restriction
F8-15	Position arrival signal output delay*	0～5000ms	1	500ms	○
Group F9 – Communication Parameters					
F9-00	Localhost address	0: Primary site 1～247: Secondary site	1	1	○
F9-01	Communication baud rate setting	0: 4800BPS 1: 9600BPS 2: 19200BPS 3: 38400BPS 4: 115200BPS	1	3	○
F9-02	Data format	LED unit digit: Frame format selection 0: RTU 1: ASCII LED ten-bit: Data bit 0: 8 data bits 1: 7 data bits LED hundred-bit: Parity check bit 0: No parity 1: Odd parity check 2: Even parity check LED kilobit: Stop bit 0: 1 stop bit 1: 2 stop bits	1	0000	○
F9-03	Communication response delay coefficient	0-200	2ms	0	○
F9-04	Reserved				○
F9-05	Reserved				○
F9-06	Reserved				○

5.2 Display Monitoring Parameters

Monitoring Parameters			
Monitoring Code	**Name**	**Range**	**Change**
D-00	Motor rotation speed(RPM/min)	0-36000	●
D-01	Target rotation speed	0～65535	●
D-02	Output current(A)	0.1-2000.0	●
D-03	Bus voltage(V)	0.0-1000.0	●
D-04	Input terminal status	0～FFH	●
D-05	Output terminal status	0～3H	●
D-06	Analog input AI1(V/mA)	0.0-10.0V/0-20mA	●
D-07	Analog input AI2(V/mA)	0.0-10.0V/0-20mA	●
D-08	Motor actual position	0～4*（F1-12）PLUS-1	●
D-09	Encoder pulse change rate (reserved)	0～65535	●
D-10	Position pulse input count lower four bits	0～65535	●
D-11	Position pulse input count higher four bits	0～65535	●
D-12	Position closed-loop actual deviation	0～65535	●
D-13	Z-signal real-time sampling value	0～65535	●
D-14	Pulse input frequency	0～65535	●
D-15	Software version No.	0.00～99.99	●

Monitoring Parameters			
Monitoring Code	**Name**	**Range**	**Change**
D-16	Radiator temperature	-40.0～150.0℃	●
D-17	Motor temperature	-40.0～300.0℃	●
D-18	Analog sampling value	-2048～2048	●
D-19	Localhost accumulated running time	0～65535H	●
D-20	Power-on accumulation time	0～65535H	●
D-21	Last two failures type	0～23	●
D-22	Last failure type	0～23	●
D-23	Current failure type	0～23	●
D-24	Run speed during current failure	0～Max. rotation speed	●
D-25	Output current during current failure	0.0～1000.0A	●
D-26	Bus voltage during current failure	0.0-1000.0V	●
D-27	Input terminal status during current failure	0～FFH	●
D-28	Output terminal status during current failure	0～3H	●
D-29	Software update time (year)		●
D-30	Software update time (month)		●
D-31	Software update time (day)）		●
D-32	Debugging output1		●
D-33	Keyboard display		●

5.3 Alarm Failure Parameters

Failure Code	
Failure Code	**Name**
E-01	Over-current during acceleration running
E-02	Over-current during deceleration running
E-03	Over-current during constant speed running
E-04	Over-voltage during acceleration running
E-05	Over-voltage during deceleration running
E-06	Over-voltage during constant speed running
E-07	Undervoltage of bus
E-08	Motor overload
E-09	Driver overload
E-10	Power module failure
E-11	Phase failure on input side
E-12	Reserved
E-13	Rectifier bridge radiator overheat
E-14	IGBT radiator overheat
E-15	External device failure
E-16	RS485 communication failure
E-17	Current detection error
E-18	Motor self-learning failure
E-19	EEPROM read and write failure
E-20	Motor overheat
E-21	Reserved
E-22	Encoder failure
E-23	Braking abnormal

Chapter VI Parameter Instructions

6.1 Group F0 - System Parameter Instructions

F0-00	STOP key function selection	0: Only effective to keyboard control 1: Effective to both keyboard and terminal control 2: Effective to both keyboard and communication control 3: Effective to all control modes	1	0	○

This parameter is for STOP key function selection.

0: Only when F0-00 is set to 0, function key STOP controls driver's stop or reset;

1: Only when F0-00 is set to 1, function key STOP controls driver's stop or reset;

2: Only when F0-00 is set to 2, function key STOP controls driver's stop or reset;

3: Under any run command channel mode, function key STOP could all control driver's stop or reset.

F0-01	Speed ring instruct source	0: Analog port AI1 1: Analog port AI2 2: Pulse instruct 3: Trial run speed 4: Communication assigned	1	0	×

This parameter is for selecting speed ring instruct source.

0: Analog port AI1，speed instruct originates from analog port AI1 assignment.

1: Analog port AI2，speed instruct originates from analog port AI2 assignment.

2: Pulse instruct，speed instruct originates from host computer pulse instruct (non-communication mode).

3: Trial run speed，speed instruct originates from trial run speed assignment，and F0-05 parameter settings assign rotation speed.

4: Communication assigned，driver communicates with host computer，and

assigns speed instruct via communication.

Tips: Factory value is 0, which means speed instruct originates from analog quantity assigned by AI1 port, and corresponding instruct source is selected according to user control mode.

F0-02	Max. rotation speed	100～30000 RPM	1 RPM	3000 RPM	×

Max. rotation speed means the highest working speed of the motor allowed by the driver, which is set according to actually applied motor's max. rotation speed, to protect the motor. For example: Set this parameter to 1500 rpm, if speed instruct is assigned to 2000 rpm by mistake, actual rotation speed of the driver will be limited to 1500 rpm to protect the motor.

F0-03	Torque upper limit	0.0～300.0%	0.1	200.0%	×

This parameter is torque upper limit allowed to be output by driver.

For example: Rated output torque of driver GTXX-4T0055 is T, and its max. torque is Tmax, then:

Tmax=T*（F0-03）

F0-04	Motor control mode	0: Sensorless vector 1: V/F 2: Sensor vector	1	0	×

This parameter is for driver's control mode selection on motor.

0: Sensorless vector，before running motor in this mode, it is required to input motor parameters into group F1 parameters and carry out self-learning on motor, please refer to Chapter VIII for details.

1: V/F，generally, customers will not use this motor control mode.

2: Sensor vector，before customer using sensor vector control, it is required to check whether motor encoder model matches driver and driver encoder

parameters, then input motor parameters to carry out “motor dynamics+encoder phase” self-learning, and it could be put into use only after self-learning succeeds.

F0-05	Trial run speed	-12000～12000 RPM	1 RPM	300 RPM	○

Trial run speed, when F0-01 (speed instruct source) is set to 3, rotation speed shall be assigned by this parameter. This rotation speed is set to a negative value, and motor rotation direction is reversal.

F0-06	Shutdown status monitoring parameters selection	0: Motor rotation speed 1: Target rotation speed 2: Output current 3: Bus voltage 4: Input terminal status 5: Output terminal status 6: Analog input AI1 value 7: Analog input AI2 value 8～14: Reserved 15: Software version 16: Radiator temperature 17～18: Reserved 19: Local accumulated run time 20: Power-on accumulation time 21: Last two failures type 22: First failure type 23: Current failure type 24: Run speed during current failure 25:Output current during current failure 26: Bus voltage during current failure 27: Input terminal status during current failure 28: Output terminal status during current failure 29: Software update time (year)	1	0	○

		30: Software update time (month) 31: Software update time (day)） 32: Debugging output1 33: Keyboard detection			

This parameter is for monitoring interface display information selection, tune F0-06 to corresponding function codes, corresponding monitoring information will display on monitoring interface, or you could also enter D-00～D-33 monitoring parameters manually to view related display information, while function code 0~33 correspond to D-00~D-33.

F0-07	Motor tuning selection (only effective when F0-09 is 0)	0: no action 1: Motor static self-learning 2: Motor dynamic self-learning 3: Encoder phase-order self-learning***** 4: Encoder phase-order+gear ratio self-learning***** 5: Motor dynamics+Encoder phase-order self-learning* 6: Motor dynamics+Encoder phase-order+gear ratio self-learning*	1	0	×

Motor tuning selection function is for the driver to select self-learning content on motor parameters.

0: no action，this state is a default value, under this state, motor's self-learning function will not be triggered.

1: Motor static self-learning，only learns motor static parameters, and there's no motor action during learning.

2: Motor dynamic self-learning，during self-learning, motor will rotate at a high speed, and then stop at random.

3: Encoder phase-order self-learning，under this state, only encoder phase-order learning will be carried out, and motor will rotate during learning.

4: Encoder phase-order+gear ratio self-learning, learns both encoder phase-order and gear ratio.

5: Motor dynamics+encoder phase-order self-learning， learns both motor parameters and encoder phase-order， please note that during learning, motor will rotate at a high speed. It is recommended that when customers are using sensor control, if encoder feedback is checked to be normal, they could learn this parameter directly (or carry out motor dynamic self-learning first, and then learn encoder phase-order).

6: Motor dynamics+encoder phase-order+gear ratio self-learning，if during usage, gear ratio is not 1:1, please learn this item or item 4 (encoder+gear ratio self-learning).

📖**Instructions:** Before motor's self-learning, please make sure whether the motor shaft used is allowed to rotate, if no load is connected to motor shaft, please check whether motor shaft key or sleeve etc. has been removed, to avoid accidents caused by spinning off shaft key etc. during high-speed rotation of the motor.

F0-08	Parameter management	0: No operation 1: Restore factory settings 2: Save parameters to EEPROM	1	0	×

When parameter management is used by users, it is to carry out selection on parameters.

When F0-08 is 0 by default, no operation will be carried out;

When F0-08 is set to 1, after pressing ENT key, it will restore the parameter to driver's factory settings.

When F0-08 is set to 2, after pressing ENT key, it will save the parameter into storage, and this function is mainly used to save parameters modified by host computer, while parameters modified via keyboard will save automatically without needing to carry out any saving operation.

F0-09	Run command channel selection	0: Operation keyboard run command channel 1: Terminal run command channel 2: Communication run command channel	1	1	×

Run command channel selection is for enable source selection, which is set according to user requirements.

When F0-09 is set to 0, run command is assigned by RUN;

When F0-09 is set to 1, run command is assigned via terminals (DI1～DI8 and COM);

When F0-09 is set to 2, run command is assigned via terminal communication，which is host computer assignment.

F0-10	Shutdown mode	0: Deceleration stop 1: Free stop	1	0	○

When F0-10 is set to 0, driver will carry out deceleration stop according to the set deceleration time after receiving stop command, and its deceleration time is the set value of F3-01;

When F0-10 is set to 1，after the driver receives a stop command, it will stop output immediately, and the motor will stop after rotating according to load inertia freely for a period of time.

F0-11	Over-voltage stalling protection	0: Off 1: On	1	1	×

This parameter is used together with F0-22, please combine F0-22 parameter instructions for details。

0: Off，over-voltage stalling protection does not function.

1: On，turn on over-voltage stalling protection function.

F0-12	Oscillation suppression	0: Off 1: On	1	1	×

Parameter F0-12 is regulated by default during leaving factory, and users need not to adjust.

F0-13	Motor overload protection coefficient	20.0%～120.0%	0.1%	100.0%	○

According to overload capacity of motors of different models or brands, carry out effective protection on motor via adjusting this parameter. Its calculation formula is as follows:

Motor overload protection coefficient = (Motor rated current/Driver rated output current) × 100%

F0-15	Motor protecting temperature	-40.0～120.0	0.1	120.0	○

When shielding failure protection start control is set to 0002 or 0003, this parameter is used to restrict the highest temperature for motor working, when motor temperature detected value is larger than motor protecting temperature setting value, motor overheat failure will occur, stop output to protect the motor from being burnt because of over-high temperature.

F0-16	Shielding failure protection start control	Bit0: Input phase failure protection Bit1: Motor overheat protection Bit2:Encoder cable breaking protection (Reserv)	1	0000H	○

0000: Invalid

0001: Input phase failure protection

0002: Motor overheat protection

0003: Input phase failure & motor overheat effective

0004: Encoder cable breaking protection

0005: Input phase failure protection & Encoder cable breaking protection

0006: Motor overheat protection & Encoder cable breaking protection

0007: Input phase failure protection & Motor overheat protection & Encoder cable breaking protection

When this parameter is 0000 by default; if it is set to 0001, start input phase failure protection，at this moment, if input power supply encounters any phase failure, failure E-11 (input phase failure) will occur to the driver; if it is set to 0002, start motor overheat protection, after that, if motor temperature is higher than setting value of protection temperature (F0-15), failure E-20 (motor overheat) will occur to the driver, stop output，to reach the function of protecting it from motor overheat. When encoder cable is broken or encoder no feedback, driver warn failure E-22(Encoder failure).

📖**Instructions:** When GT610/GT620 motor overheat protection function is invalid, and motor overheat protection is applied, please access to motor temperature detection signal first.

F0-17	flux linkage feed forward(sensor acts)*****	0～100%	1	30%	×
F0-18	Pulse input filter coefficient 1(Re-electrification valid)	0～15	1	0	○

Flux linkage feed forward and pulse input filter coefficient 1 are factory default,

and users do not need to change.

F0-19	JOG key function selection	0: Jog control 1: Reverse control	1	0	○

This parameter is for JOG function key selection. When this parameter is set to 0, JOG function key is a jogging operation; when set to 1, JOG function key is a reversal operation.

F0-20	Power-off deceleration stop start	0: Not to start 1: Start	1	0	○
F0-21	Power-off deceleration stop time	0～360.00S	0.01S	1.00S	○

When F0-20 is set to 0, power-off deceleration stop will not start, and stop will be carried out freely after power failure;

When F0-20 is set to 1, power-off deceleration stop will start, and deceleration stop will be carried out according to power-off deceleration stop time after power failure. Power-off deceleration stop time is set by F0-21.

F0-22	Over voltage stall detection level	110～150%	1%	131%	×

This parameter defines over voltage stall over-voltage point, and over-voltage stalling protection function means to compare bus voltage detected during driver deceleration operation with stall detection over-voltage point, if it surpasses stall over-voltage point, driver output rotation speed will stop decreasing, after bus voltage is detected to be lower than stall over-voltage point again, implement deceleration operation, as shown in the following figure.

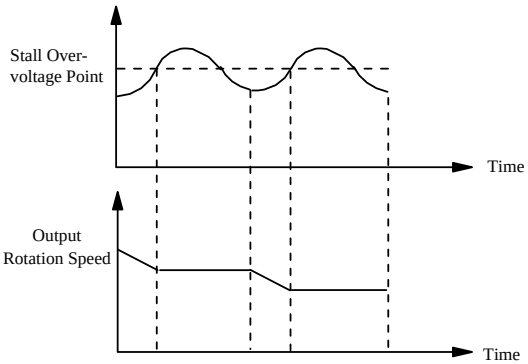


Fig. 6-1 Over-voltage Stalling Protection

6.2 Group F1 - Motor Parameter Description

F1-01	Motor rated power	0.4～900.0KW	0.1KW	Model setting	×
F1-02	Motor rated voltage	0～1000V	1V	Model setting	×
F1-03	Motor rated frequency	0.01Hz～400.00Hz	0.01Hz	50Hz	×
F1-04	Motor rated rotation speed	0～36000RPM	1RPM	Model setting	×
F1-05	Motor pole-pairs number	0～50	1	2	×
F1-06	Motor rated current	0.1～2000.0A	0.1A	Model setting	×
F1-07	Motor stator resistor	0.001～65.535Ω	0.001Ω	Model setting	×
F1-08	Motor rotator resistor	0.001～65.535Ω	0.001Ω	Model setting	×

F1-09	Motor stator and rotator inductance	0.1～6553.5mH	0.1mH	Model setting	×
F1-10	Motor stator and rotator mutual inductance	0.1～6553.5mH	0.1mH	Model setting	×
F1-11	Motor no-load current	0.1～6553.5A	0.1A	Model setting	○
F1-13	Encoder lines*	100～20000	1	1024	×
F1-14	Encoder phase-order*	0: A surpassing B 1: B surpassing A	1	0	×

Before using GT610/GT620 driver's motor self-learning function, it is required to keep F1-01～F1-06 parameters consistent with specification on motor nameplate, and then carry out self-learning, while F1-07～F1-11 parameters are obtained via motor self-learning, which need not to be input manually; before using motor self-learning function of drivers of GT610/GT620 series and above, it is required to guarantee normal encoder feedback signal, encoder lines consistent with F1-F13 parameter values, and F1-01～F1-06 parameters consistent with motor nameplate. If any encoder failure is reported after self-learning, users could modify F1-14 or adjust U, V line sequence to carry out self-learning again.

F1-15	Motor inertia	0.001～1.000	0.001	0.010	×

Higher motor inertia setting value will lead to higher gain, while greater rigidity will lead to faster speed response, however, over-high rigidity will generate vibration. It should be set according to actual load inertia during actual usage of users. It is better to set a larger value for greater load inertia; while set a smaller value for less inertia. When users are adjusting rigidity, they should adjust speed ring proportional gain parameters (F4-00) first, if adjusted to the highest, rigidity

is still insufficient, reduce speed ring proportional gain, and then increase motor inertia value properly.

F1-16	Self-learning time coefficient	0～20	1	5	×

This parameter is motor self-learning time coefficient, which is 5 by default, and larger set value will lead to longer self-learning time, so when in use, users are not suggested to modify this parameter.

F1-17	Flux-weakening mode	0: Full closed loop flux-weakening 1: Open loop flux-weakening under generating state	1	1	×
F1-18	Friction coefficient	0.001～0.500	0.001	0.001	×
F1-19	Speed observer convergence	0.1～12.0	0.1	1.0	×
F1-20	Speed observer enable	0: Turn off enable 1: Turn on enable	1	0	×

F1-17～F1-20 have been set when leaving the factory, and users need not to modify.

6.3 Group F2 - DI/DO Terminal Defined Parameter Description

F2-00	Spindle operation control mode	0: Enable+direction; 1: CCW+CW; 2: Enable+CCW+CW;	1	0	×

Example:

1. Modify spindle operation control mode to 0, and modify F0-09 to 1 (terminal run command channel), and then modify F2-01 to 32 (spindle enable), while modify F2-02 to 35 (spindle forward and reverse), if DI1 closes, motor will

rotate forward, if only DI2 closes, motor will not run, when DI1 and DI2 close at the same time, motor will rotate forward and reverse, when DI1 and DI2 open at the same time, motor will stop running. Its logic is as shown in the following chart (0 represents open, while 1 represents closed):

DI1 (enable)	DI2 (forward and reverse)	Run mode
0	0	Stop
0	1	Stop
1	0	Forward
1	1	Reverse

2. Modify spindle operation control mode to 1, modify F0-09 to 1 (terminal run command channel), and then modify F2-01 to 33 (spindle forward-rotating enable), and modify F2-02 to 34 (spindle reverse enable), if DI1 closes, motor will rotate forward, if DI1 and DI2 close or open at the same time, motor will stop running, if only DI2 closes, motor will reverse. Its logic is as shown in the following chart (0 represents open, and 1 represents closed):

DI1 (forward-rotating enable)	DI2 (reverse enable)	Run mode
0	0	Stop
0	1	Reverse
1	0	Forward
1	1	Stop

3. Modify spindle operation control mode to 2, modify F0-09 to 1, and then modify F2-01 to 32 (spindle enable), modify F2-02 to 33 (spindle forward-rotating enable), and modify F2-03 to 34 (spindle reverse enable). Then, close DI1, DI2 and DI3 separately or keep DI1 not closed, close DI2 and DI3 terminals in a combined manner, motor will not run; after closing DI1, close DI2 independently, motor will rotate forward, close DI3, motor will reverse, if DI2 and DI3 close at the same time, motor will not carry out any

action. Its logic is as shown in the following chart (0 represents open, and 1 represents closed):

DI1 (enable)	DI2 (forward)	DI3 (reverse)	Run mode
0	0	0	Stop
0	0	1	Stop
0	1	0	Stop
0	1	1	Stop
1	0	0	Hold
1	0	1	Reverse
1	1	0	Forward
1	1	1	Hold

F2-01	Input terminal DI1 function	0: Control end idle 7: External reset signal input(RST) 8: External device failure input 32: Spindle enable 33: Spindle forward-rotating enable 34: Spindle reversal enable 35: Spindle forward and reverse 36: Spindle positioning 37: Spindle zero servo 38: Spindle emergency stop 39: Spindle reaming(reserved) 40: Spindle position ring and speed ring switching 41: Spindle analog gain switching 42: Spindle swing mode 43: Orientation position selection 1 44: Orientation position selection 2 45: Orientation position selection 3	1	32	×
F2-02	Input terminal DI2 function		1	35	×
F2-03	Input terminal DI3 function		1	36	×
F2-04	Input terminal DI4 function		1	40	×
F2-05	Input terminal DI5 function		1	37	×
F2-06	Input terminal DI6 function		1	38	×

F2-07	Input terminal DI7 function	46: Positioning point collection terminal 47: forward-rotating carry command 48: Reverse carry command 49: Pulse counting clear 50～63: Reserved	1	8	×
F2-08	Input terminal DI8 function		1	7	×

Functions corresponding to function codes set by customers according to their needs could be assigned to related multi-functional terminal functions, while function codes are described in the following:

0: Control end idle, in order to prevent multi-functional terminals not in use from being short-circuited which may cause certain functions active, users could set any multi-functional terminal to idle.

7: External failure reset, when any external failure occurs to the machine, which could be reset via detection, reset could be done by setting this function via this terminal.

8: External failure input, users could set this function via terminal to input failure signal of an external device, and to make the driver alarm (E-15), so as to reach safety protection.

32: Spindle enable, to set this function, users could set enable on/off via this terminal. When closed it is to turn on enable signal, when open it is to turn off enable signal.

33: Spindle forward-rotating enable，to set this function, when this terminal is closed, it is to turn on forward-rotating enable, when open, to turn off forward-rotating enable.

34: Spindle reverse enable, to set this function, when this terminal is closed, it is to turn on reverse enable, when open, to turn off reverse enable.

35: Spindle forward and reverse, to set this function, when this terminal is open it is to rotate forward, otherwise, to reverse.

36: Spindle positioning, to set this function, close this terminal, spindle starts positioning, for positioning parameter settings, please view group F5 and group F8 parameters.

37: Spindle zero speed, to set this function, after closing this terminal, spindle speed will decrease from current operation speed to zero. When open, it will restore to original state.

38: Spindle emergency stop, to set this function, when this terminal is closed, the driver will stop immediately, and its downtime will determined by F3-01 setting value.

40: Spindle position ring and speed ring switching, to set this function, when this terminal is open, it is speed ring, when closed, it is position ring.

41: Spindle analog gain switching, this function could be set to switch analog quantity gain.

42: Spindle swing mode, to set this function, when this terminal is closed, it is swing function, F5-09 is swing plus deceleration time, while F5-10 is swing pulse count.

43: Orientation position selection 1，to set this function，close this terminal, it is orientation position selection 1. Please refer to group F8 parameter description.

44: Orientation position selection 2，to set this function, close this terminal, it is orientation position selection 2. Please refer to group F8 parameter description.

45: Orientation position selection 3，to set this function, close this terminal, it is orientation position selection 3. Please refer to group F8 parameter description.

46: Positioning point collection terminal, for this function, please refer to positioning control function in Chapter VIII.

47: Forward-rotating carry command/48: Reverse carry command, to set this function，close this terminal, it is carry function, for carry parameter settings, please view group F5 parameter description.

49: Pulse counting clear, to set this function, close this terminal, pulse counter instruct will be forced to zero.

F2-09	Switching value filtering times	1～10	1	5	○

Switching value filtering is to prevent any malfunction caused by signal jitter of the input switching value as well as external interference. Generally, users do not need to modify this parameter.

F2-10	Open circuit collector output terminal DO1 setting	0: No output 1: Ready 2: Orientation completed***** 3: Failure output 4: Speed arrival 5: Zero speed output 6: Speed/Position state output*****	1	1	○
F2-11	Open circuit collector output terminal DO2 setting		1	2	○
F2-12	Open circuit collector output terminal DO3 setting		1	3	○
F2-13	Programmable relay 2 output		1	3	○
F2-14	Programmable relay 1 output		1	3	○

Open circuit collector output terminals are digital output terminals DO1, DO2 and DO3 (among which DO3 is not available temporarily), for related interfaces, please view Chapter II Digit Value Output Interface Theory, and users could modify it to an output signal corresponding to any function code for external device control.

Programmable relay TA1 and TB1 (TA2, TB2) is closed normally, while TA1 and TC1 (TA2, TC2) are open normally, when relay acts, normal open will change to normal close, while normal close will change to normal open. Its output function could be defined to any function in function code by users.

F2-15	Terminal function detecting selection during power-on	0: Invalid terminal operation command during power-on 1: Valid terminal operation command during power-on	1	0	○

When parameter F2-15 is set to 0, if terminal is closed before power-on, initial state of the function of this closed terminal after power-on will be inactive before disconnecting. It will activate when closed once disconnected; when this parameter is set to 1, if the terminal is closed before power-on, function of this terminal will activate once powered on.

Note: Users should be noted that if there's no special need, please do not adjust this parameter to 1, to avoid operator from electrifying the machine when he or she forgot to turn off enable terminal, otherwise, motor may start running immediately, if there's any person standing at device side or load is not prepared, accidents may also happen.

F2-16	Position ring, and speed ring switching terminal with enable option*****	0: Without enable 1: With enable	1	0	×

0: Position ring and speed ring switching terminal without enable;

1: Position ring and speed ring switching terminal with enable.

F2-17	Zero speed arrival speed deflection	1～1000	1	5	○

Zero speed arrival speed deflection means to increase/decrease set value of this deflection on the basis of zero speed instruct, when the rotation speed is within this speed range, open circuit collector will output a speed arrival signal.

For example: if F2-17=15, F2-11=4, and driver is working at speed ring, when rotation speed is within -15RPM～+15RPM, DO2 outputs a speed arrival signal.

F2-18	Speed arrival speed deflection	1～65535	1	10	○

Speed arrival speed deflection means to increase/decrease this deflection on the basis of the rotation speed instruct provided, when the current rotation speed is within this range, open circuit collector will output a speed arrival signal.

6.4 Group F3 - Acceleration/Deceleration Parameter Description

F3-00	Speed ring acceleration time 1	0～3600.0S	0.1	Model setting	○
F3-01	Speed ring deceleration time 1	0～3600.0S	0.1	Model setting	○

F3-00 speed ring acceleration time means the time for the driver to accelerate at speed ring from zero speed till it outputs max. rotation speed, as shown in t1.

F3-01 speed ring deceleration time means the time for the driver to decelerate at speed ring from outputting max. rotation speed to zero speed, as shown in t2.

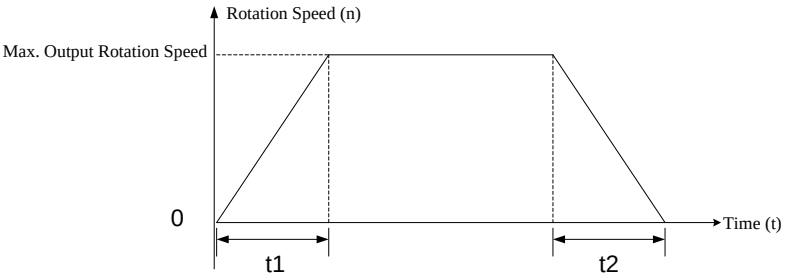


Fig. 6-2 Speed Ring Acceleration/Deceleration Curve

F3-04	Stop delay coefficient	0～1000	1	80	×

Stop delay coefficient means the driver, after receiving a stop instruct, starts to decelerate to zero speed and then extend by t before stopping, among which t=2*（F3-04）ms.

6.5 Group F4 - Speed Ring Parameter Description

F4-00	Speed ring(ASR) proportional gain 1	0～500Hz	1	60Hz	○

Higher set value of speed ring proportional gain 1 will lead to higher gain, while greater rigidity will lead to faster speed ring response, however, over-high will generate oscillation. It should be set according to actual load inertia during actual application of users. It is better to set a larger value for greater load inertia, and set a smaller value for smaller inertia.

F4-01	Speed ring(ASR) integration time 1	0.0～1000.0ms	0.1ms	40.0ms	○

Longer speed ring integration time 1 will lead to stronger integration function, and

slower speed ring response; while shorter speed ring integration time 1 will lead to weaker integration function, and faster speed ring response. If this value is too small, it will generate oscillation.

Tips: During adjustment, users shall try to decrease this value under the condition that no oscillation has been produced.

F4-07	Speed feedback filtering	0.0～10.0ms	0.1	3.0	○

Smaller set value of this parameter will lead to weaker filtering effect, louder noise and faster response; larger set value of this parameter will lead to stronger filtering effect, smaller noise and slower response.

6.6 Group F5 - Position Ring Parameter Description

F5-00	Position ring mode*****	0: Pulse position control 1: Position carry control	1	0	×

0: Receives host computer pulse instruct control (non-communication assigned);

1: Carry function controlled by position pulse instruct set by F5-07 and F5-08. F5-07 is carry circles, while F5-08 is carry pulse count.

Example: When encoder lines is 2500, set this parameter to 1, F5-07=2 and F5-08=5000, make servo work at position ring, and use forward-rotating carry function to carry, servo motor shaft will forward rotate 2 circles and a half, while carry angle calculation formula is as follows:

$$\omega = 2\pi \times F5\text{-}07 + 2\pi \times \frac{F5\text{-}08}{4 \times F1-13}$$

ω : Represents carry angle;

π: Represents a constant - circumference rate;

F5-07: Carry circles;

F5-08: Carry pulse count;

F1-13: Encoder lines.

F5-01	Positioning/Carry proportional gain *****	1～120	1	10	×

Positioning/Carry proportional gain, this parameter means proportional gain during positioning/carry. Larger set value of the parameter will lead to stronger rigidity during positioning/carry, while overlarge will cause oscillation or overshoot. During usage, larger set value will lead to smaller lagging and faster positioning response while guaranteeing there's no oscillation or overshoot.

F5-02	Position ring proportional gain *****	1～200	1	20	×

Proportional gain, when servo receives a host computer pulse instruct and works at position ring. Larger set value of this parameter will lead to higher position ring gain and stronger rigidity, while overlarge will cause oscillation; it is better to set a larger value for greater load inertia. During usage, larger position ring will lead to smaller lagging and faster positioning response while guaranteeing there's no oscillation or overshoot generated.

🕮**Instruction:** In order to solve rigidity inconsistency during normal working at position ring in actual applications and positioning/carry process, proportional gain of positioning/carry process is set by F5-01 separately.

F5-03	Position ring acceleration time*****	0～65.535s	0.001S	0.000	○
F5-04	Position ring deceleration	0～65.535s	0.001S	0.000	○

	time *				

Position ring acceleration time means the time for the driver working at position ring to accelerate from zero speed to max. rotation speed; that for the driver to decelerate from max. rotation speed to zero speed is deceleration time.

F5-05	Position ring feed forward filtering time*	0～5.000S	0.001S	0.001S	×

Longer filtering time will cause larger position instruct lagging, smoother position instruct and lower motor noise; otherwise, it will lead to louder motor noise.

F5-06	Position servo feed forward gain*	1～100.00%	0.01%	0.00%	×

Higher position ring servo feed forward gain will lead to smaller steady-state error.

F5-07	Carry circles*	0～65535	1	0	○
F5-08	Carry pulse count*	0～65536	1	0	○

When users are using carry function, it is required to set carry circles and carry pulse count, and parameters of this group will determine carry angle jointly, for detailed instructions, refer to F5-00 parameter description.

F5-09	Swing mode acceleration/deceleration time*	0～65.535	1	1.000	○

F5-10	Swing pulse count*	0～65535	1	0	○

Parameters of this group will determine swing speed and swing angle, for detailed instructions, please view Chapter VIII Swing Control.

F5-11	Position ring pulse gear ratio numerator	1～65535	1	1	×
F5-12	Position ring pulse gear ratio denominator	1～65535	1	1	×

Parameters of this group are set ones of position ring pulse electronic gear ratio, and its formula is as follows:

Position ring pulse electronic gear ratio G = (Position ring pulse electronic gear ratio numerator (*F*5-11))/(Position ring pulse electronic gear ratio denominator (*F*5-12))

6.7 Group F6 - AI/AO Terminal Parameter Description

F6-00	AI1 zero offset	-500～500	1	0	○

AI zero offset means sampling deviation value when AI inputs 0V. Via setting this parameter in a reasonable manner, make it corresponds to 0 (the set rotation speed) when AI1 inputs 0V.

F6-01	AI1 input minimum rotation speed	0.0%～100.0%	0.1%	0.0%	○

AI1 input minimum rotation speed means rotation speed corresponding to min.

analog quantity assigned by analog port AI1. For example: If the assigned analog quantity is analog voltage 0～10V, and driver max. rotation speed is set to 1000RPM, while F6-01 is set to 0.0%, and analog quantity is assigned to 0V, the corresponding rotation speed is 0RPM, when it increases to 10V gradually, the corresponding rotation speed will increase from 0RPM to 1000RPM in a linear manner; if F6-01 is set to 10.0%, analog quantity will be assigned to 0V, while corresponding rotation speed will be 100RPM, when increased to 10V gradually, corresponding rotation speed will increase from 100RPM to 1000RPM in a linear manner.

F6-02	AI1 10V voltage corresponds to max. rotation speed setting	-100.0%～100.0%	0.1%	100.0%	○

AI1 input max. rotation speed means rotation speed corresponding to max. analog quantity assigned by analog port AI1. For example: When the assigned analog quantity is analog voltage 0～10V, driver max. rotation speed is set to 1000RPM and F6-02is set to 100.0%, if analogy quantity is assigned to 10V, corresponding rotation speed will be 1000RPM, when decreased to 0V gradually, corresponding rotation speed will decrease from 1000RPM to 0RPM in a linear manner; if F6-02 is set to 90.0%, assigned analog quantity will be assigned to 10V and corresponding rotation speed will be 900 rpm, when decreased to 0V gradually, corresponding rotation speed will decrease from 900RPM to 0RPM gradually.

F6-03	Corresponding max. rotation speed after AI1 terminal switching	-100.0%～100.0%	0.1%	25.0%	○

Corresponding max. rotation speed after AI1 terminal switching means

corresponding max. rotation speed after spindle analog gain switching. For example, assign AI1 to 10V, and set max. rotation speed to 1000RPM, while set F6-03 set to 25.0%, then corresponding max. rotation speed after switching will be 250RPM.

F6-04	AI1 input filtering time	0.00S～10.00S	0.01S	0.10S	○

Larger set value will lead to smoother instruct received, and slower speed instruct response.

F6-05	AI1 input gain	0.01%～600.00%	1	100.0%	○

Adjust this value to set corresponding relation between analog quantity input instruct and rotation speed. For example: If AI1 port instruct assigns to 10V, and corresponding rotation speed is 1000RPM, rotation speed corresponding to 10V after changing 100.0% to 80.0% is n=1000RPM×80.0%=800RPM.

F6-06	AI1 input polarity	0: Unipolar（0～10V） 1: Bipolar（-10～10V）	1	0	×

AI1 input polarity means the polarity of AI port received analog quantity, which is 0 by default, only receiving 0～10V; if users need to use a -10V analog quantity assignment, this could be set to 1, at this time, it could receive analog voltage ranging between -10～10V.

F6-09	AI2 zero offset	-500～500	1	0	○
F6-10	AI2 input minimum rotation speed	0.0%～100.0%	0.1%	0.0%	○
F6-11	Max. rotation speed setting corresponding to AI2	-100.0%～100.0%	0.1%	100.0%	○

	10V				
F6-12	Corresponding max. rotation speed after AI2 terminal switching	-100.0%～100.0%	0.01%	25.0%	○
F6-13	AI2 input filtering time	0.00S～10.00S	0.01S	0.10S	○
F6-14	AI2 input gain	0.01%～600.00%	0.01	100．0%	○
F6-15	AI2 input polarity	0: Unipolar（0～10V） 1: Bipolar（-10～10V）	1	0	×

Usage of AI2 port parameters is the same with that of AI1 port parameters, please refer to description on parameters corresponding to AI1 port.

F6-16	AO1 multi-function analog quantity output terminal function option	0: Run rotation speed 1: Set rotation speed 2: Output current 3: AI1 4: AI2	1	0	○
F6-17	AO2 multi-function analog quantity output terminal function option		1	0	○

For A01 and AO2 multi-function analog quantity output terminals, their default outputs are both running rotation speed. Select output function of its corresponding code phase according to usage, and related functions of corresponding outputs are described as follows:

When F6-16 is set to 0, and output rotation speed increases from 0 to max. rotation speed, output signal corresponding to AO1 port ranges from 0V to 10V;
When F6-16 is set to 1, during driver operation, output signal always equals to (set rotation speed/max. rotation speed)*10V;
When F6-16 is set to 2, and output rotation speed increases from 0 to max. rotation speed, output signal corresponding to AO1 port ranges from 0V to 10V,

and corresponding output increases from 0 to max. current;

When F6-16 is set to 3, output signal at AO1 port keeps the same with input analog quantity signal at AI1 port all the time.

When F6-16 is set to 4, output signal at AO1 port keeps the same with input analog quantity signal at AI2 port.

F6-19	AO1 output lower limit	0.0～100.0%	0.1	0.0%	○

Via this parameter, users could restrict output lower limit at AO1 port. For example: If max. rotation speed is 1000RPM, F6-19=20.0%, F6-16=3 and F6-20=0.0, when driver outputs, AO1 port output is 0V when under 200RPM, if increases from 200RPM to 1000RPM, AO1 port output will increase from 0V to 10V gradually in a linear manner.

F6-20	Lower limit corresponding to AO1 output	0.00～10.00V	0.01	0.00	○

Lower limit corresponds to AO1 port output, and this could be used together with F6-19 to set output signal values under AO1 port output lower limit.

F6-21	AO1 output upper limit	0.0～100.0%	0.1	100．0%	○

Via this parameter, users could restrict output upper limit at AO1 port. For example: If max. rotation speed is 1000RPM, F6-21=80.0% and F6-16=3, when driver outputs, from 0RPM to 800RPM, AO1 port output corresponds to a linear increase from 0V to 10V, when increases to 800RPM and above, all AO1 outputs will be 10V.

F6-22	Upper limit corresponding	0.00～10.00V	0.01	10.00	○

	to AO1 output				

Upper limit corresponding to AO1 output could be used together with F-21 to set output signal values above AO1 port output upper limit.

F6-23	AO2 output lower limit	0.0～100.0%	0.1	0．0	○
F6-24	Lower limit corresponding to AO2 output	0.00～10.00V	0.01	0.00	○
F6-25	AO2 output upper limit	0.0～100.0%	0.1	100.0	○
F6-26	Upper limit corresponding to AO2 output	0.00～10.00V	0.01	10.00	○

Setting method for parameters corresponding to AO2 is the same with that of AO1 parameters.

6.8 Group F7 - Pulse Setting and Electronic Gear Ratio Parameter Description

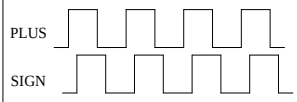
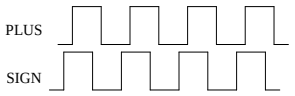
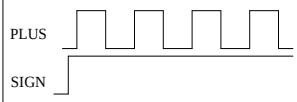
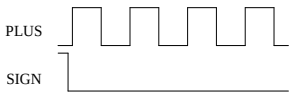
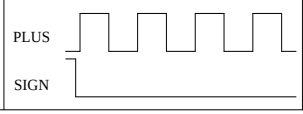
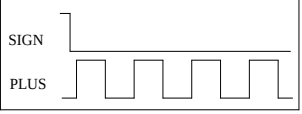
F7-00	Position instruct mode (pulse input mode)	0: A is orthogonal to B 1: PLUS+SIGN 2: CW+CCW(reserved)	1	0	×

Specifies the mode for host computer (non-communication) receiving position instruct:

0: A is orthogonal to B, represents only two-phase orthogonal pulse signals are received;

1: PLUS+SIGN, represents only pulse and direction signals are received. 2: CW+CCW(reserved), this function is not available temporarily.

As shown in the following table:

Pulse instruct mode	Motor forward-rotating instruct	Motor reversal instruct
A is orthogonal to B		
Pulse + direction		
CW+CCW		

F7-01	Speed pulse filtering time	0～25ms	1ms	3	○

Larger set value of this parameter will lead to smoother pulse instruct, and smaller motor noise; otherwise, larger motor noise.

F7-02	Speed ring pulse gear ratio numerator	1～65535	1	1	×
F7-03	Speed ring pulse gear ratio denominator	1～65535	1	1	×

Parameter of this group is speed ring pulse electronic gear ratio, and its formula is as follows:

Speed ring pulse electronic gear ratio G = (Speed ring pulse electronic gear ratio numerator (*F*7-02))/(Speed ring pulse electronic gear ratio denominator (*F*7-03))

F7-04	Pulse direction	0: Unchanged 1: Complement	0	0	×

0: Default instruct pulse direction;

1: Instruct pulse direction reverse.

6.9 Group F8 - Spindle Positioning and Gear Ratio Parameter Description

F8-00	Spindle positioning plus deceleration time *****	0.001～65.535S	0.001S	2.000S	○
F8-01	Orientation position 1*****	0～4*（**F1-12**）PLUS-1	1 PLUS	0 PLUS	○
F8-02	Positioning search speed*****	0～1500RPM	1RPM	300RPM	○
F8-03	Low speed orientation speed limit*****	0～300RPM	1RPM	150RPM	○
F8-04	Position arrival detection level*****	0～65535 PLUS	1 PLUS	5 PLUS	×
F8-05	Positioning direction*****	0: Speed direction before positioning 1: Forward 2: Reverse	1	0	×
F8-06	Spindle gear ratio numerator*****	1～65535	1	1	×
F8-07	Spindle gear ratio denominator*****	1～65535	1	1	×
F8-08	Orientation position 2*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-09	Orientation position 3*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-10	Orientation position 4*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-11	Orientation position 5*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-12	Orientation position 6*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○

F8-13	Orientation position 7*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-14	Orientation position 8*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-15	Position arrival signal output delay*****	0～5000ms	1	500ms	○

For detailed explanation on parameters of this group, please view examples on application functions in Chapter VIII (8.4 Positioning Control), so no detailed description will be carried out here.

6.10 Group F9 - Communication Parameter Description

F9-00	Localhost address	0: Primary site 1～247: Secondary site	1	1	○

This parameter is used to set the address during the driver is carrying out RS485 communication.

0: Primary site. It represents the primary site for one driver to control others.

1～247: Secondary site. It represents the address for driver to receive data from host computer when acting as a secondary driver.

F9-01	Communication baud rate setting	0: 4800BPS 1: 9600BPS 2: 19200BPS 3: 38400BPS 4: 115200BPS	1	3	○

This parameter regulates the baud rate when driver is communicating with host computer, while host computer could communicate with driver normally only via setting the same communication baud rate for both.

F9-02	Data format	LED unit bit: Frame format selection 0: RTU 1: ASCII LED ten-bit: Data bit 0: 8 data bits 1: 7 data bits LED hundred-bit: Parity check bit 0: No parity 1: Odd parity check 2: Even parity check LED kilobit: Stop bit 0: 1 stop bit 1: 2 stop bits	1	0000	○

This parameter regulates the data format when driver is communicating with host computer, while normal communication between both two parties could be achieved only via setting consistent data format for both.

F9-03	Communication response delay coefficient	0-200	2ms	0	○

This parameter means the delay time from the driver receiving information code from host computer correctly, to it sending response data frame to host computer.

Chapter VII Troubleshooting

7.1 Failure Reasons and Countermeasures

When any abnormality occurs to driver, LED digital tube will display a corresponding failure code, failure relay will act, and driver will stop output, before failure, if motor is rotating, it will stop at random, till it stops rotating. When any failure occurs to driver, users need to find out failure reasons and countermeasures corresponding to failure code, and then carry out troubleshooting, when technical service is needed, please contact after-sale services or agents of our company.

Failure Code	Name	Possible Reasons	Countermeasures
E-01	Over-current during acceleration running	① Acceleration time too short; ② Over large load inertia; ③Over low power grid voltage; ④ Driver power too small; ⑤Restart motor during rotating.	① Extend acceleration time; ② Decrease load inertia; ③ Check input power supply; ④ Select drivers with large power grade;
E-02	Over-current during deceleration running	① Deceleration time too short; ② There're loads with large inertia; ③ Driver power too small.	① Extend deceleration time; ② Decrease load inertia; ③ Select drivers with large power grade.
E-03	Over-current during constant speed running	① Input voltage abnormal; ② Load mutation or abnormal load; ③ Driver power too small	① Check input power supply; ② Check load or decrease load mutation; ③ Select drivers with large power grade;

Failure Code	Name	Possible Reasons	Countermeasures
E-04	Over-voltage during acceleration running	① Input voltage abnormal;	① Check input power supply;
E-05	Over-voltage during deceleration running	① Deceleration time too short; ② Energized feedback load; ③ Input power supply abnormal;	① Extend deceleration time ; ② Change to an external braking resistor with larger power; ③ Check input power supply;
E-06	Over-voltage during constant speed running	① Input voltage abnormal; ② Large load inertia;	① Check input power supply; ② Decrease load inertia
E-07	Undervoltage of bus	① Input voltage abnormal	① Check power voltage
E-08	Motor overload	① Power grid voltage over low; ② Motor rotation is blocked or overlarge load mutation; ③Motor overload protection coefficient is set incorrectly ;	① Check power grid voltage; ② Check load; ③ Set motor overload protection coefficient correctly;
E-09	Driver overload	① Acceleration time too short; ② Overlarge load;	① Extend acceleration time; ② Decrease load or change to drivers with large power grade;
E-10	Power module failure	① Driver output short-circuited or grounded;	① Check wiring; ② Refer to countermeasures on

Failure Code	Name	Possible Reasons	Countermeasures
		② Driver transient over-current; ③ Over high ambient temperature; ④ Windhole blocked or fan damaged; ⑤ DC auxiliary power supply failure; ⑥ Control panel abnormal.	over-current failure; ③ Clean windhole or change the fan; ④ Consult manufacturer or agent service.
E-11	Phase failure on input side	① Input power phase failure or abnormal	①Check input power supply
E-13	Rectifier bridge radiator overheat	① Over high ambient temperature; ② Fan damaged; ③ Windhole blocked;	① Reduce ambient temperature; ② Change the fan; ③ Clean windhole and improve ventilation conditions;
E-14	IGBT radiator overheat		
E-15	External device failure	External device failure input terminal closed.	Disconnect external device failure input terminal and solve the problem.
E-16	RS485 communication failure	① Baud rate is set improperly; ② Serial port communication error; ③ No host computer communication signal.	① Set baud rate properly; ② Check communication cable and seek for service; ③ Check whether host computer works, whether wiring is correct or not.

Failure Code	Name	Possible Reasons	Countermeasures
E-17	Current detection error	① Current detection device damaged or circuit failure; ② AC auxiliary power supply damaged;	① Seek for service of the manufacturer or agents;
E-18	Motor self-learning failure	① Unsound motor wiring; ② Motor is damaged;	① Check motor wiring; ② Replace another motor to try.
E-19	EEPROM read and write failure	① EEPROM chip abnormal	① Seek for service of the manufacturer or agents.
E-20	Motor overheat	① Motor temperature too high; ② Temperature sensor is damaged; ③ Temperature detection interface is short-circuited;	① Check motor temperature ② Check temperature sensor ③ Examine and check circuit
E-22	Encoder failure	① Poor connection between encoder line and driver interface; ② Encoder is damaged or interface definition does not match definition on driver side; ③ Encoder line too long; ④ Encoder line parameter setting is incorrect; ⑤ Incorrect phase sequence	① Check line connection; ② Check interface definition and encoder type; ③ Improve encoder line length; ④ Verify encoder lines and set encoder lines correctly; ⑤ Adjust U and V phase sequence or modify encoder phase-order;

Failure Code	Name	Possible Reasons	Countermeasures
		during self-learning;	
E-23	Braking abnormal	① Braking circuit abnormal; ② Braking resistor ring.	① Seek for service of the manufacturer or agents; ② Detect braking resistor.

7.2 Failure Inquiry

Drivers of this series record failure codes of those occurred in the last three times, as well as driver running parameters during the last failure, while searching for such information will help to find out failure reasons. Failure parameters are contained in D-21 to D-28 parameter groups.

Chapter VIII Application Functions

Priority of application functions is as follows:

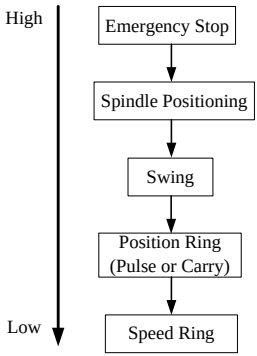


Fig. 5-1

8.1 Trial-run Operation

8.1.1 Preparation before power-on

Confirm position of primary cable R/S/T/U/V/W/PE is correct;

Confirm braking resistor is connected to P+ and PB;

Confirm control panel terminal wiring is correct.

8.1.2 Voltage level confirmation

Confirm input voltage connected to R/S/T is a three-phase 380V voltage.

8.1.3 Motor parameter self-learning

Before self-learning, it is required to set F0-09=0 (keyboard enable) as well as the following motor parameters:

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F1-01	Motor rated power	0.4～900.0KW	0.1KW	Model setting	×
F1-02	Motor rated voltage	0～1000V	1V	Model setting	×
F1-03	Motor rated frequency	0.01Hz～400.00Hz	0.01Hz	50.00Hz	×
F1-04	Motor rated rotation speed	0～36000RPM	1RPM	Model setting	×
F1-05	Motor pole-pairs number	0～50	1	2	×
F1-06	Motor rated current	0.1～2000.0A	0.1A	Model setting	×
F1-13	Encoder lines	100～20000	1	1024	×
F1-14	Encoder phase-order*****	0: A surpassing B 1: B surpassing A	1	0	×

When the drive use encoder of spindle as feedback and there is transmission ratio between spindle and motor's axle (not 1:1), need to set gear ratio or carry out gear ratio self-learning.

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F8-06	Spindle gear ratio numerator*****	1～65535	1	1	×
F8-07	Spindle gear ratio denominator*****	1～65535	1	1	×

Self-learning content selection:

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F0-07	Motor tuning selection(only effective when F0-09 is 0)	0: no action 1: Motor static self-learning 2: Motor dynamic self-learning 3: Encoder phase-order self-learning* 4: Encoder phase-order+gear ratio self-learning* 5: Motor dynamics+encoder phase-order self-learning* 6: Motor dynamics+encoder phase-order+gear ratio self-learning*	1	0	×

If F0-07=1 or 2, only learn motor parameters. If F0-07=3, only learn encoder phase-order, if failure E-22 (encoder failure) occurs after learning, it is generally an encoder phase-order error, which could be changed via modifying parameter F1-14 phase sequence, or exchange motor line. Encoder and motor shaft is not a

1:1 linkage, so it is required to manually set gear ratio (F8-06, F8-07), or self-learning rotation ratio. Note except for motor static self-learning, all other self-learning motors will rotate, please guarantee that motor will not be blocked and under no-load state during rotation.

Set motor parameters, select content to learn in F0-07, and then after confirming F0-09=0 (keyboard enable), press "RUN"key on keyboard, keyboard will display "study" indicating system starts self-learning. If learning is carried out normally, after self-learning is completed, keyboard will display "good". Then press reset key "STOP" to return to normal display interface.

8.1.4 Trial run

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F0-01	Speed ring instruct source	0: Analog port AI1 1: Analog port AI2 2: Pulse instruct 3: Trial run speed 4: Communication assigned	1	0	×

If F0-01=3, select trial run speed source, and set trial run speed in F0-05, if F0-09=0 (keyboard enable), press "JOG" key or "RUN" key on keyboard to start running. Other speed signal sources and enable signal sources could also be selected.

8.2 Speed Control

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F0-01	Speed ring instruct source	0: Analog port AI1 1: Analog port AI2 2: Pulse instruct	1	0	×

		3: Trial run speed 4: Communication assigned			

(1) Speed instruct originates from analog port AI1

Parameters related to analog port AI1 are set by F6-00～F6-06.

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F6-00	AI1 zero offset	-500～500	1	0	○
F6-01	AI1 input minimum rotation speed	0.0%～100.0%	0.1%	0.0%	○
F6-02	AI1 10V voltage corresponding max. rotation speed setting	-100.0%～100.0%	0.1%	100.0%	○
F6-03	Corresponding max. rotation speed after AI1 terminal switching	-100.0%～100.0%	0.1%	25.0%	○
F6-04	AI1 input filtering time	0.00S～10.00S	0.01S	0.10S	○
F6-05	AI1 input gain	0.01%～600.00%	1	100.00%	○
F6-06	AI1input polarity	0: Unipolar（0～10V） 1: Bipolar（-10～10V）	1	0	×

Adjusting method is as follows:

① First, set F6-01=0% and F6-05=100%, then adjust F6-00 to make the set rotation speed close to 0RPM when 0V is input.

② After adjusting zero, if corresponding value could not reach the set rotation speed at 10V, you could adjust analog input gain F6-05 properly, to reach max. rotation speed required when using max. analog input. For inconsistent linearity among different CNC system analog output quantities, it is required to carry out adjusting according to specific situation.

Calculation method for corresponding rotation speed is as follows:

[1] When F6-06=0, and AI1 is a unipolar (0～10V) input,

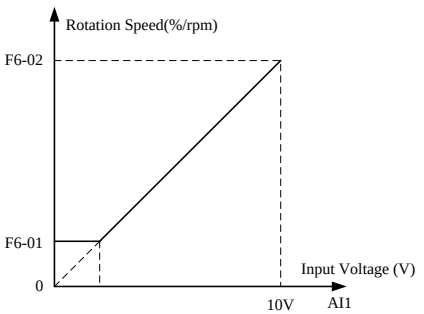


Fig. 5-2 Speed Curve When F6-02 is Positive

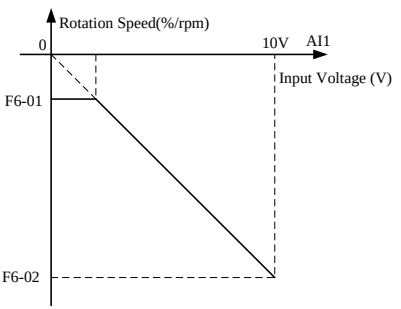


Fig. 5-3 Speed Curve When F6-02 is Negative

When F6-02 is a positive value, it corresponds to a positive rotation speed, when it is a negative value, it corresponds to a negative rotation speed. Note that both F6-02 and F6-01 are percentages relative to max. rotation speed F0-02. For example, when F0-02=6000rpm and F6-02=100%, rotation speed corresponding to 10V is: F0-02×F6-02=6000×100%=6000 (rpm).

[2] When F6-06=1, and AI1 is a bipolar (-10～10V) input, as shown in the following:

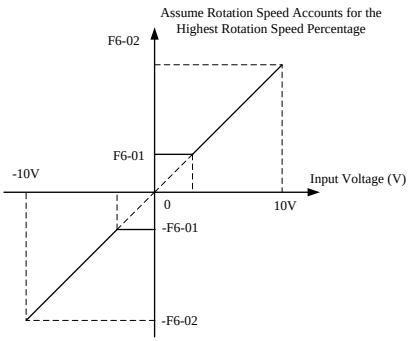


Fig. 5-4 Bipolar Input, Corresponding Speed Curve When F6-02 is Positive

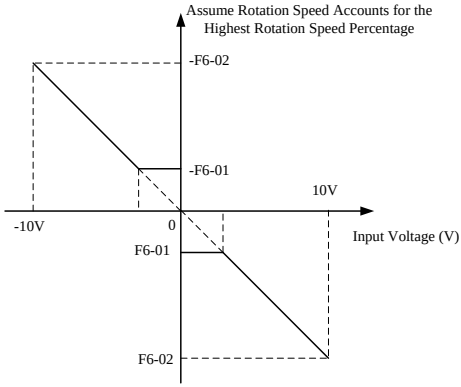


Fig. 5-5 Bipolar Input, Corresponding Speed Curve When F6-02 is Negative

（2） Speed instruct originates from analog port AI2

For related parameters, see F6-09～F6-15, and set rotation speed calculation the same with that of AI1.

（3） Speed instruct originates from pulse quantity

When speed instruct originates from pulse, please set related parameters in group F7, as well as values of encoder lines F1-13.

Set rotation speed=Pulse frequency (KHz)*1000*60*(gear ratio numerator[F7-02])/(gear ratio denominator[F7-03])/(encoder lines [F1-13]*4);

Note: For pulse set rotation speed relates to encoder lines, so when changing encoder lines, it is required to re-adjust pulse gear ratio F7-02 and F7-03.

（4） Speed instruct originates from digit set rotation speed

The set trial run speed is determined by F0-05.

（5） Speed instruct originates from communication assigned

Speed originates from communication assigned rotation speed.

Speed ring's PI adjusting

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F4-00	Speed ring(ASR) proportional gain 1	0～500Hz	1	60Hz	○
F4-01	Speed ring(ASR) integration time 1	0.1～1000.0ms	0.1ms	40.0ms	○
F4-07	Speed feedback filtering	0．0～10.0ms	0.1	3.0	○

For details, please view parameter detailed description on F4-00，F4-01 and F4-07.

8.3 Position Control

Related parameters:

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F0-04	Motor control mode	0: Sensorless vector 1: V/F 2: Sensor vector*****	1	0	×
F1-13	Encoder lines*****	100～20000	1	1024	×
F5-00	Position ring mode*****	0: Pulse position control 1: Position carry control	1	0	×
F5-02	Position servo	1～200	1	20	×

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
	proportional gain *				
F5-03	Position ring acceleration time*	0～65.535s	0.001S	0．000	○
F5-04	Position ring deceleration time *	0～65.535s	0.001S	0.000	○
F5-05	Position ring feed forward filtering time*	0～5.000S	0.001S	0.001S	×
F5-06	Position servo feed forward gain*	1～100.00%	0.01%	0.00%	×

System default is speed ring. Position ring control needs to be in a sensor mode, realized via terminal switching. Position ring via parameter F5-00 is divided into two modes of pulse position control and carry control.

(1) Pulse position control mode (F7-00=0)

During application, it is required to set pulse input parameters first: F7-00 selects pulse input mode, while F7-02 and F7-03 set gear ratio, and F7-04 could complement sampling pulse direction. Then switch to position ring via terminal (which is set “Spindle position ring and speed ring switching terminals” to on), and turn on enable, then provide pulse for operation.

(2) Carry control mode (F7-00=1), for parameter settings, see details in carry function description.

8.4 Positioning Control

Related parameters:

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F5-01	Positioning/Carry proportional gain *****	1～120	1	10	×
F8-00	Spindle positioning deceleration time *****	0.001～65.535S	0.001S	2.000S	○
F8-01	Orientation position 1*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-02	Positioning search speed*****	0～1500RPM	1RPM	300RPM	○
F8-03	Low speed orientation speed limit*****	0～300RPM	1RPM	150RPM	○
F8-04	Position arrival detection level*****	0～65535 PLUS	1 PLUS	5 PLUS	×
F8-05	Positioning direction*****	0: Speed direction before positioning 1: Forward 2: Reverse	1	0	×
F8-06	Spindle gear ratio numerator	1～65535*****	1	1	×
F8-07	Spindle gear ratio denominator	1～65535*****	1	1	×
F8-08	Orientation position 2*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F8-09	Orientation position 3*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-10	Orientation position 4*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-11	Orientation position 5*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-12	Orientation position 6*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-13	Orientation position 7*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-14	Orientation position 8*****	0～4*（F1-12）PLUS-1	1 PLUS	0 PLUS	○
F8-15	Position arrival signal output delay*****	0～5000ms	1	500ms	○

Function application:

① Sensor mode

② Stability check of Z signal, during normal closed loop operation, observe D-13 (Z-signal real-time sampling value), if homodromous operation is normal, it shall be a stable value keeping unchanged, at each electrification, the value of D-13 may vary, but it will not change during homodromous operation after electrification. Forward-rotating and reverse D-13 may have a pulse difference under 6, for this pulse difference is determined by signal Z's pulse width, so it is normal. But it shall be a stable value during homodromous operation. If D-13 (Z-signal real-time sampling value) is found to keep changing during homodromous operation, or encounter a large variation after a period of time, it indicates signal

Z is abnormal or interfered, please find out reasons for signal Z's interference and use this function after troubleshooting.

③ Orientation position selection, selection could be done using terminal, when select without terminal option, it is 0 by default, and orientation position is 1.

Selection position corresponding to terminal state	Corresponding terminal I/O state (1: Closed 0: Open)		
	Orientation position selection1	Orientation position selection2	Orientation position selection3
Orientation position 1	0	0	0
Orientation position 2	1	0	0
Orientation position 3	0	1	0
Orientation position 4	1	1	0
Orientation position 5	0	0	1
Orientation position 6	1	0	1
Orientation position 7	0	1	1
Orientation position 8	1	1	1

④ Orientation position configuration and collection

Orientation position is certain to be selected via two methods of manually setting and terminal collection.

Manual setting: During downtime, manually rotate to the required orientation position, and set the value of D-08 read later into corresponding position parameters.

Terminal collection: First, set one terminal function to "positioning point collection terminal", manually adjust to a point required to be positioned after shutdown, and then close positioning point collection terminal, the current position will be saved as orientation position selected in step ②. Positioning point collecting time sequence figure is as follows:

Note: Collection should be carried out during shutdown.

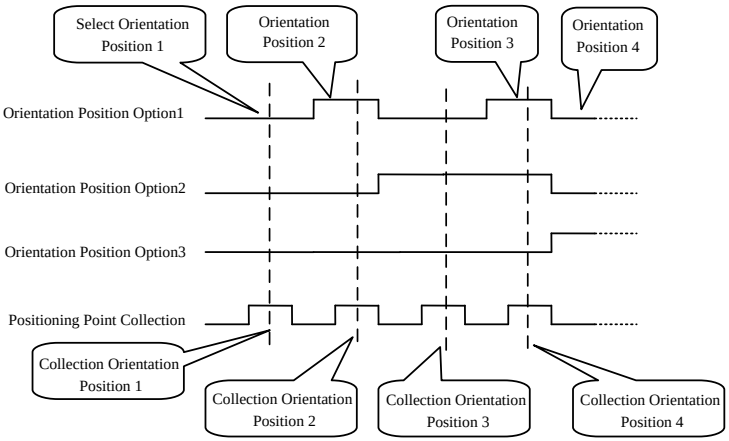


Fig. 5-6

⑤ Orientation direction is selected by parameter F8-05.

If select F8-05=0 (according to speed direction before positioning), during positioning, if it is a halt positioning, carry out positioning according to the set speed direction before positioning.

⑥"Spindle positioning" terminal, in terminal enable (F0-09=1)control mode, it has enable function. If it is currently controlled by speed ring, after receiving a spindle positioning signal, it will switch to position ring positioning during this process, without needing to use a terminal to switch position ring.

⑦ Spindle positioning search speed, after system receiving a spindle positioning signal, it will decelerate to search speed, and then carry out position ring positioning. If search speed is set to zero, system will directly decelerate positioning after receiving a positioning signal, at this moment, it is better not to set spindle positioning time too short, otherwise overshoot oscillation may occur because of too short planning route caused by too short deceleration time.

⑧ F8-03 (low speed orientation speed limit) means that during spindle

positioning, min. value of position ring max. rotation speed. It is mainly used to restrict speed amplitude when positioning under this set rotation speed.

⑨ Positioning plus deceleration time, if a search speed exists, it is deceleration stop time for search speed. When search speed is set to zero, and positioning is carried out directly, it is deceleration time before positioning. During positioning, adjustment will be carried out according to actual feedback position, and actual stop time will be a little longer than the set time.

⑩ Spindle deceleration ratio: When motor and spindle rotate at 1:1, please make sure the setting is 1:1. Otherwise, if the gear ratio is known, you could set manually, if not known, this could also be obtained via self-learning, if self-learning effect is not that sound, manual micro-adjusting could also be carried out. Deceleration ratio numerator: Spindle actual rotation speed. Deceleration ratio denominator: Motor actual rotation speed.

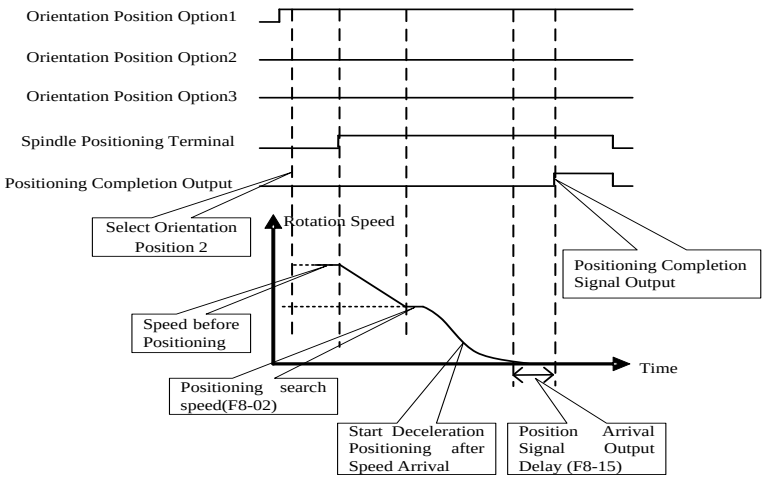


Fig. 5-7 A Complete Time-Sequence Diagram of Spindle Positioning

8.5 Carry Control

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F0-04	Motor control mode	0: Sensorless vector 1: V/F 2: Sensor vector*	1	0	×
F5-00	Position ring mode*	0: Pulse position control 1: Position carry control	1	0	×
F5-01	Positioning/Carry proportional gain *	1～120	1	10	×
F5-07	Carry circles*	0～65535	1	0	○
F5-08	Carry pulse count*	0～65536	1	0	○

Select a corresponding terminal function, and carry quantity each time is: Circles (F5-07) + offset (F5-08)

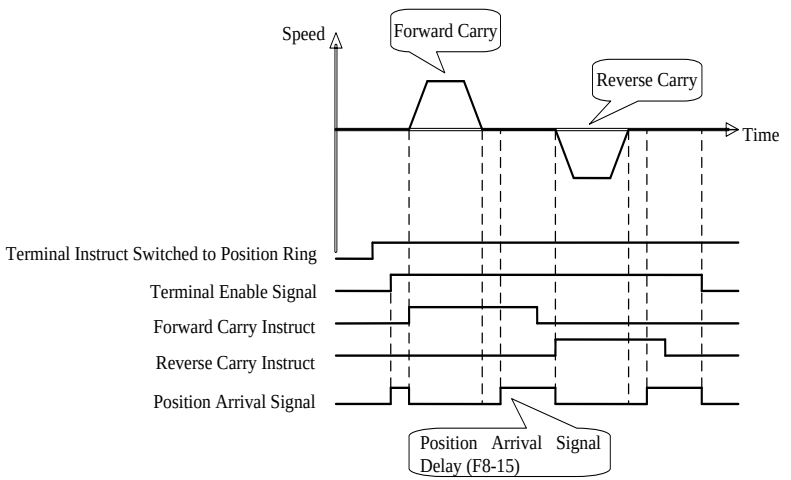


Fig. 5-8

8.6 Swing Control

Function Code	Name	Set Range	Min. Unit	Factory Settings	Change Restrictions
F5-09	Swing mode pulse deceleration time *	0～65.535	1	1.000	○
F5-10	Swing pulse count*	0～65535	1	0	○

Function application method:

First, it is required to set swing pulse deceleration time and swing pulse count, among which pulse count uses 4 times of encoder lines as a circle. For terminals, selects “spindle swing mode”, under enable state, when “spindle swing mode” terminal is under ON state, if current speed is not zero, system will decrease to zero first, and then enter swing mode. In this mode, system will switch to position ring automatically without needing to select any terminal. Time-sequence diagram is as follows:

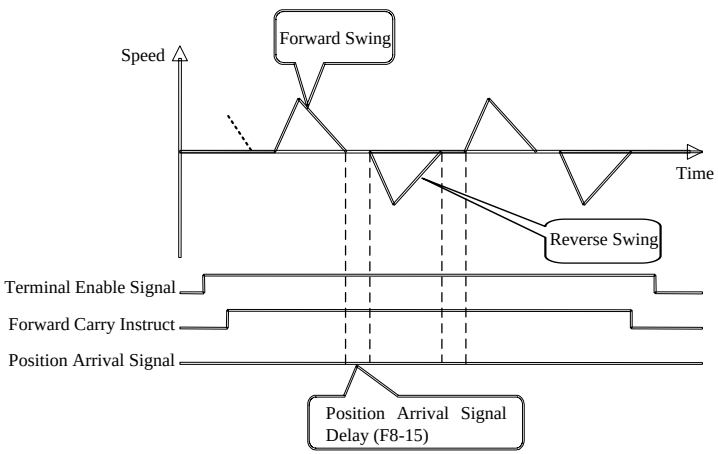


Fig. 5-9

8.7 Rigid Tapping

It could be divided into two types of pulse quantity rigid tapping and analog quantity rigid tapping.

8.7.1 Pulse quantity rigid tapping

When CNC system uses pulse input to carry out rigid tapping via position ring, for its debugging mode, please refer to pulse position control mode description in Position Control.

1. Use the terminal's “spindle position ring and speed ring switching terminal” function，switch the system to position ring. This terminal is not equipped with enable.

2. Use the terminal’s “spindle enable” function, to enable the system. Then CNC system will carry out rigid tapping on pulse position ring.

3. In order to obtain a better effect of the system, it is required to adjust related parameters of pulse position ring.

8.7.2 Analog rigid tapping

Please carry out control according control on speed ring with rotation speed assigned by bipolar analog input.

Chapter IX Communication Instructions

9.1 MODBUS Communication Protocol

9.1.1 MODBUS communication protocol introduction

MODBUS communication protocol is a kind of master-slave serial asynchronous half-duplex communication protocol. It adopts master-slave structure, to make one primary site realize dual-way communication with multiple secondary sites, and it provides two communication modes of ASCII and RTU. Physical interface includes standard interface RS232/RS422/RS488.

MODBUS protocol is a completely open and transparent one, and hardware circuit it requires is also very simple, which makes it become a universal industrial standard gradually. Almost all control devices and smart instruments support MODBUS Communication Protocol. Via MODBUS protocol, control devices and smart instruments produced by different manufactures could form an industrial network, to carry out a centralized control.

Viewing from hardware aspect, MODBUS serial link system could use different physical interfaces (i.e. RS485 and RS232).The most frequently used is TIA/EIA (RS485) two-wire system interfaces. As an additional option, it could also realize RS485 four-wire system interfaces. When only short-distance point-to-point communication is required, TIA/EIA-232-E（RS232） serial interfaces could also be used. Generally, “232 communication” and “485 communication” mean interface standards for communication.

MDBUS protocol is the one for software, a communication protocol in a real sense, which is realized via software programming.

Here we’ll describe MODBUS Communication Protocol realized by software programming in details.

9.1.2 Transmission method

Modbus transmits data in the form of information frame. All information in information frame shall be transmitted in a continuous way, which is all realized via software programming. Information frame formats of MODBUS communication are also divided into RTU and ASCII, for data structure of these two frame formats is relatively fixed, detailed significance is as shown in the following:

(1) ASCII data frame structure:

Start bit	Address Code	Function Code	Data Area	Check Code	Stop bit

◆Start bit: Uses ":", and ASCII code is "3AH".

◆Address Code: Address of secondary site (8 bits)

◆Function Code: Primary site is sent, informing secondary site the function (8-bits) to be executed.

◆Data Area: Detailed data content (N*8 bits)

◆Check Code: LRC check code (8-bit)

◆Stop bit: Uses "CRLR" to represent stop, among which "CR" (ASCII code is 0DH) represents "Enter" key, and "LR" (ASCII code is 0AH) represents "line feed".

◆Data content is compiled by communication program, and all information needs to be sent and received in the form of ASCII code.

(2) RTU data frame structure:

Start Bit	Address Code	Function Code	Data Area	Check Code	Stop bit

◆The significance of address code, function code and data area corresponds with ASCII structure respectively.

◆Check code: CRC check code (16-bit)

◆Start Bit: No character, only hold no signal time larger than 10ms.

◆Stop bit: No character, only hold no signal time larger than 10ms.

◆Data content is compiled by communication program, and all information is sent and received in the form of hexadecimal number.

9.1.3 Function code

Function code of MODBUS protocol informs the terminal found via addressing which function it shall execute. Valid code range 1-225 (decimal system), some codes are adaptable to all controllers, some are adaptable to certain controller, others are reserved for later usage. The following are common function codes adaptable to all controllers:

Code	Name	Function
01H	Read coil state	To obtain current state of a group of logic coils (ON/OFF).
02H	Read input state	To obtain current state of a group of switch inputs (ON/OFF).
03H	Read hold register.	To obtain the current binary value in one or more hold registers.
04H	Read input register	To obtain the current binary value in one or more input registers.
05H	Set a single coil by force	To set on/off state of a logic coil by force.
06H	Write a single register	To write a specific binary value into a single register.
07H	Read abnormal state	To obtain on/off state of 8 internal coils.
0FH	Set multiple coils by	To set on/off state of a serial of continuous logic coils by

Code	Name	Function
	force	force.
10H	Write multiple registers	To write a serial specific binary values into a serial multi-registers.

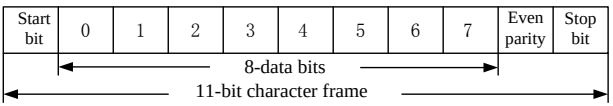
9.2 GT610/GT620 Communication Protocol

Communication protocol used by GT610/GT620 is a MODBUS protocol, and its information frame format only adopts RTU frame format, while applied function codes only have three kinds which are namely 03H, 06H and 10H.

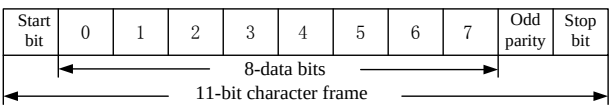
- Communication protocol
  - When MODBUS protocol is adopted, if host computer inquires, it is an initiative state; if slave computer responds, it is a passive state.
  - (Notice: Not all host inquiry frames will be responded by slave computer. i.e. host broadcasting will never be responded by slave computer).
- Communication address
  - Set range: 01~31
  - When system uses RS-485 to connect communication interfaces in series to control or monitor, each driver shall set its communication address and each address in every connecting network shall be “sole” and unrepeatable.
  - Factory settings: 01
- Communication transmit speed baud rate
  - For baud rate, see details in parameter table.
- BIT flow format

MODBUS communication is divided into two encoding modes which are namely RTU and ASCII, here code is directly transmitted according to RTU mode, character structure: 11-bit, which could be any of the following 2 formats. For detailed selection mode, please see parameter table.

- (Information format 8, E and 1)

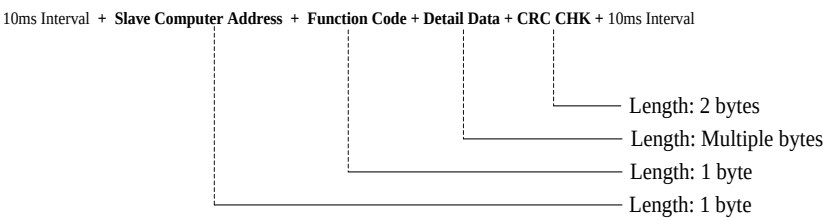


- (Information format 8, 0 and 1)



- Communication data frame structure (RTUmode)

GT610/GT620 communication data frame format adopts RTUmode, and data format is as follows:



The following table is an intuitive expression of list form:

STX	Keep no-input signal larger than or equal to 10ms.

Address	Communication address: 8-bit binary address
Function	Function Code: 8-bit binary address
DATA(n-1)	Data content: n*8-bit data, n＜＝2 (2 16-bit data)
……	
DATA 0	
CRC CHK Low	CRC check code: 16-bit CRC check code is composed of 2 8-bit binary combinations.
CRC CHK High	
END	Hold no-input signal larger than or equal to 10ms.

Detailed significance of all items in the table is as follows:

- Address: Address for communication, ranging from 0 to 31 (decimal).
  - 00H: It is a broadcast address, and information frames sent via broadcast address will not be responded by slave computer.

01H ~ 1FH: For driver at a specific address.

- Function: Function code, also named command byte. There're 127 function codes in MODBUS protocol in all, now only 3 of which have been used, as follows:
  - **03H**: To read out register content.
  - **06H**: To write one data into register.
  - **10H**: To write multiple data into register.
- DATA(n-1): Detailed data, as shown in the following instances:
- Check code of RTU mode (CRC check): Check code starts from address and completes at data content. Its operation rule is as follows:

Step 1: Assume 16-bit latch register (CRC latch register) = FFFFH.

Step 2: Exclusive OR information instruct of the first 8-bit byte and low-order 16-bit CRC latch register, carry out Exclusive OR, and save the result into CRC latch register.

Step 3: Right shift one bit of CRC latch register, and fill 0 into a high bit.

Step 4: Check the right-shifted value, if it is 0, save new value from step 3 into CRC latch register, otherwise Exclusive OR A001H and CRC latch register, and save the result into CRC latch register.

Step 5: Repeat step 3~step 4, and complete all 8-bit operations.

Step 6: Repeat step 2~step 5, and obtain information instruct of the next 8-bit, till operation of all information instructs is completed. Finally, the value of CRC latch register achieved is the check code of CRC. It is to be noted that CRC check code must be placed into check code of information instruct in turn.

The following is an example for operation of CRC check code written in C language.

```
unsigned char* data □ // Information instruct index
unsigned char length □ // Information instruct length
unsigned int crc_chk(unsigned char* data, unsigned char length)
{
int j;
unsigned int reg_crc=0xffff;
while(length--)
{
reg_crc ^= *data++;
for(j=0;j<8;j++)
{
if(reg_crc & 0x01)
```

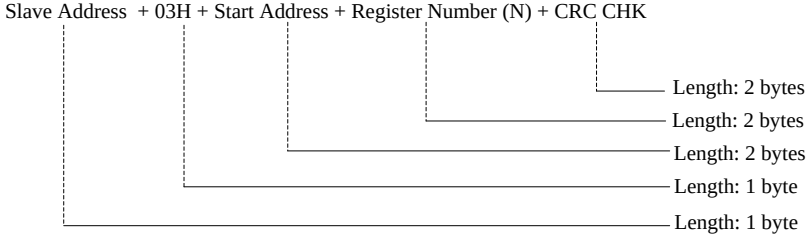
```
{ /* LSB(b0)=1 */
reg_crc=(reg_crc>>1) ^ 0Xa001;
}
Else
{
reg_crc=reg_crc >>1;
}
}
}
return reg_crc;// The value returned to CRC latch register in the end.
}
```

- Function Code Detailed Explanation and Communication Frame Example:

03H: Read out register content

Read slave computer hold register's binary data, which does not support broadcast.

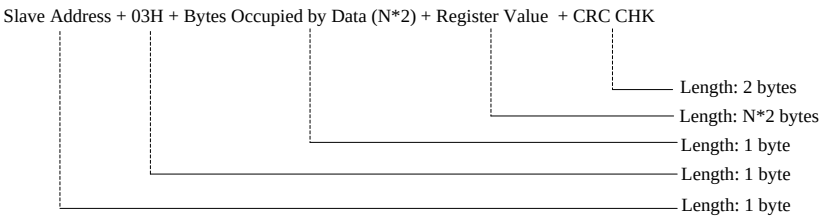
Inquire information frame format:



Slave Address	1~31 (Decimal)	1 Byte

Function code	03H	1 Byte
Register address	High 8 bits of address	2 Bytes
	Low 8 bits of address	
Register number (N)	High 8 bits	2 Bytes
	Low 8 bits	
CRC check code	Low 8 bits	2 Bytes Note: Low 8 bits for check are in the front.
	High 8 bits	

Response information frame format:



Slave Address	1~31 (Decimal)	1 Byte
Function code	03H	1 Byte
Byte number (N*2) occupied by data	Register number *2	1 Byte
Register value	High 8 bits	N*2 bytes
	Low 8 bits	
CRC check code	Low 8 bits	2 Bytes Note: Low 8 bits of check code are in the front.
	High 8 bits	

For example: Read parameter value from an internally set parameter 0005H (D-04) with a driver address of 01H:

Inquiry information frame format:

Address	01H
Function	03H
Starting Data Address	00H
	05H
Sizes	00H
	01H
CRC CHK Low	94H
CRC CHK High	0BH

Response information frame format:

Address	01H
Function	03H
Data Byte Number	02H
Data Content	02H
	14H
CRC CHK Low	B9H
CRC CHK High	2BH

Inquiry frame: 01H+03H+00H+05H+00H+01H+94H+0BH

Detailed significance is as follows:

- Address : 01H ---- Device ID is 01H.
- Function : 03H ---- To read register function code.
- Starting data address: 0005H ----Register address is 0x0005, indicating to read parameters from this register.
- Sizes : 0001H ----To read data from 1 register.
- CRC CHK: Refer to obtaining method for RTU mode check code (CRC Check).

Response frame: 01H+03H+02H+02H+14H+B9H+2BH

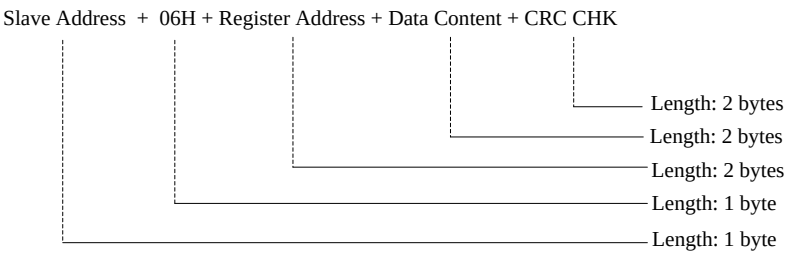
Detailed significance is as follows:

- Address : 01H ---- Device ID is 01H.
- Function : 03H ---- To read out register function code.
- data bytes : 02H ----The number of bytes occupied by data content, indicating the returned data occupies two bytes.
- Data content : 0214H----Indicates read out content.
- CRC CHK : Refer to obtaining method for RTU mode check code (CRC Check).

◆ **06H: To write one data into register.**

To write one value into a hold register, during broadcasting, this function writes the value into registers with the same address in all slave computers.

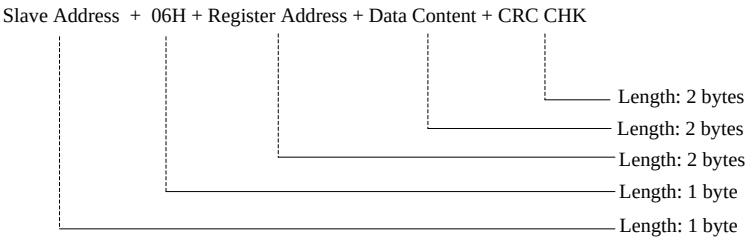
Inquiry information frame format:



Slave Address	1~31 (Decimal)	1 Byte
Function code	06H	1 Byte
Register address	Address high 8 bits	2 Bytes
	Address low 8 bits	

Data content	High 8 bits	2 Bytes
	Low 8 bits	
CRC check code	Low 8 bits	2 Bytes Note: Low 8 bits of check code are in the front.
	High 8 bits	

Response information frame format:



Slave Address	1~31 (Decimal)	1 Byte
Function code	06H	1 byte
Register address	Address high 8 bits	2 Bytes
	Address low 8 bits	
Data content	High 8 bits	2 Bytes
	Low 8 bits	
CRC check code	Low 8 bits	2 Bytes Note: Low 8 bits of check code are in the front.
	High 8 bits	

It could be seen from the above table, normal response requested by 06H Function code preset single register is to send back data received after register value having been changed, which means sent data is the same with received data.

For example: For driver address 01H, write 50 (01F4H) into parameter 01DDH internally set of the driver.

Inquiry information frame format:

Address	01H
Function	06H
Data Address	01H
	DDH
Data Content	01H
	F4H
CRC CHK Low	18H
CRC CHK High	1BH

Response information frame format:

Address	01H
Function	06H
Data Address	01H
	DDH
Data Content	01H
	F4H
CRC CHK Low	18H
CRC CHK High	1BH

Inquiry frame: 01H+06H+01H+DDH+01H+F4H+18H+1BH

Detailed significance is as follows:

- Address : 01H ---- Device ID is 01H.
- Function : 06H ---- Function Code。

- Data address : 01DDH ----Register address is 0x01DD, which means to write content into a register at address 0x01DD.
- Data content : 01F4H ----Content to write, which means to write 01F4H into a register at address 0x01DD.
- CRC CHK : Refer to obtaining method for RTU mode check code (CRC Check).

Response frame: 01H+06H+01H+DDH+01H+F4H+18H+1BH

Detailed significance is as follows:

- Address : 01H ---- Device ID is 01H.
- Function : 06H ---- Function code.
- Data address : 01DDH ----Register address is 0x01DD, indicating that data has been written into this register.
- Data content: 01F4H----Indicates data content written into register.
- CRC CHK : Refer to obtaining method for RTU mode check code (CRC Check).

◆ **10H: Write in several data continuously.**

Preset data into all registers according to sequence, during broadcasting, this function code could preset data into registers with the same address in all slave computers.

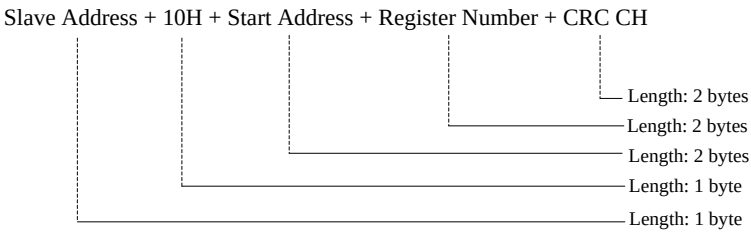
Inquiry information frame format:

Slave Address+10H+Start Address+Register Number+Data Bytes+Register Value (N)+ CRC CHK

Slave Address	1~31 (Decimal)	1 Byte
Function code	10H	1 Byte
Start address	Address high 8 bits	2 Bytes

	Address low 8 bits	
Register number (N)	High 8 bits	2 Bytes
	Low 8 bits	
Data bytes (N*2)	Register Number*2	1 Byte
Register Value (N)	High 8 bits	N*2 bytes
	Low 8 bits	
CRC check code	Low 8 bits	2 Bytes Note: Low 8 bits of check code are in the front.
	High 8 bits	

Response information frame format:



Slave Address	1~31 (Decimal)	1 Byte
Function code	10H	1 Byte
Start address	Address high 8 bits	2 Bytes
	Address low 8 bits	
Register number	High 8 bits	2 Bytes
	Low 8 bits	
CRC check code	Low 8 bits	2 Bytes Note: Low 8 bits of check code are in the front.
	High 8 bits	

For example, change driver (address 01H) acceleration and deceleration time

settings F0-14=10.00(03E8H) and F0-15=8.00(0320H).

Inquiry frame:

Address	01H
Function	10H
Data	00H
Start address	1AH
Data quantity (word)	00H 02H
Data quantity (byte)	04H
The first data	03H E8H
The second data	03H 20H
CRC CHK Low	F3H
CRC CHK High	84H

Response frame:

Address	01H
Function	10H
Data	00H
start address	1AH
Data quantity (word)	00H 02H
CRC CHK Low	60H
CRC CHK High	0FH

Inquiry frame:

01H+10H+00H+1AH+00H+02H+04H+03H+E8H+03H+20H+F3H+84H

Detailed significance is as follows:

- Address : 01H ---- This device ID is 01H.
- Function : 10H ---- To write multiple register function codes.
- Start address: 001AH ----Register start address is 0x001A, which means to write content into 0x001A and 0x001B.
- Data quantity (word): 0002H ----Word quantity of write content (which is register number).
- Data quantity (byte): 04------Byte quantity of write content.
- The first data: The first content written by 03E8H.
- The second data: The second content written by 0320H.
- CRC CHK: Refer to obtaining method for RTU mode check code (CRC Check) on the last page.

Response frame: 01H+10H+00H+1AH+00H+02H+60H+0FH

Detailed significance is as follows:

- Address : 01H ---- This device ID is 01H.
- Function : 10H ---- To write multiple register function codes.
- Start address: 001AH ----Register start address is 0x001A, indicating to write data from register at address 0x001A.
- Data quantity (word): 0002H ----Word quantity of write content (which is register number).
- CRC CHK: Refer to obtaining method for RTU mode check code (CRC Check) on the last page.

Preset data into all registers according to sequence, during broadcasting, this function code could preset data into registers with the same address in all slave computers.

9.3 GT610/GT620 Parameter Communication Address

The table of communication addresses corresponding to GT610/GT620 parameters:

Function Code	Address	Function Code	Address	Function Code	Address	Function Code	Address
F0-00	1DB	**F1-20**	D7	**F6-02**	E7	**F8-14**	183
F0-01	7B	**F2-00**	1E8	**F6-03**	E8	**F8-15**	106
F0-02	14	**F2-01**	10B	**F6-04**	E9	**F9-00**	186
F0-03	5F	**F2-02**	10C	**F6-05**	EA	**F9-01**	187
F0-04	3B	**F2-03**	10D	**F6-06**	EB	**F9-02**	188
F0-05	1DD	**F2-04**	10E	**F6-09**	EE	**F9-03**	189
F0-06	12C	**F2-05**	10F	**F6-10**	EF	**D-00**	1AB
F0-07	5E	**F2-06**	110	**F6-11**	F0	**D-01**	1C1
F0-08	1D9	**F2-07**	111	**F6-12**	F1	**D-02**	1A8
F0-09	84	**F2-08**	112	**F6-13**	F2	**D-03**	5
F0-10	AC	**F2-09**	113	**F6-14**	F3	**D-04**	1B1
F0-11	44	**F2-10**	116	**F6-15**	F4	**D-05**	1B2
F0-12	51	**F2-11**	117	**F6-16**	F7	**D-06**	1AF
F0-13	173	**F2-12**	125	**F6-17**	F8	**D-07**	1B0
F0-14	1C6	**F2-13**	118	**F6-19**	FA	**D-08**	C8
F0-15	1E0	**F2-14**	119	**F6-20**	FB	**D-09**	C9
F0-16	1E1	**F2-15**	C0	**F6-21**	FC	**D-10**	CA
F0-17	3F	**F2-16**	9F	**F6-22**	FD	**D-11**	CE
F0-18	1A3	**F2-17**	108	**F6-23**	FE	**D-12**	CB
F0-19	1DA	**F2-18**	109	**F6-24**	FF	**D-13**	CC

Function Code	Address	Function Code	Address	Function Code	Address	Function Code	Address
F0-20	C1	**F3-00**	1A	**F6-25**	100	**D-14**	CD
F0-21	C2	**F3-01**	1B	**F6-26**	101	**D-15**	1DC
F1-00	C6	**F3-04**	1DE	**F7-00**	1E9	**D-16**	1B6
F1-01	40	**F4-00**	18	**F7-01**	122	**D-17**	1C2
F1-02	39	**F4-01**	19	**F7-02**	1EA	**D-18**	107
F1-03	38	**F4-07**	D9	**F7-03**	1EB	**D-19**	1B7
F1-04	3D	**F5-00**	140	**F7-04**	1EC	**D-20**	1B8
F1-05	1C	**F5-01**	64	**F8-00**	7D	**D-21**	1B9
F1-06	32	**F5-02**	CF	**F8-01**	7E	**D-22**	1BA
F1-07	30	**F5-03**	78	**F8-02**	7C	**D-23**	1BB
F1-08	2F	**F5-04**	79	**F8-03**	7A	**D-24**	1BC
F1-09	31	**F5-05**	123	**F8-04**	82	**D-25**	1BD
F1-10	2E	**F5-06**	1DF	**F8-05**	1ED	**D-26**	1BE
F1-11	2D	**F5-07**	141	**F8-06**	1F5	**D-27**	1BF
F1-13	60	**F5-08**	142	**F8-07**	1F6	**D-28**	1C0
F1-14	1E6	**F5-09**	80	**F8-08**	16D	**D-29**	18D
F1-15	D5	**F5-10**	81	**F8-09**	16E	**D-30**	18E
F1-16	1F9	**F5-11**	126	**F8-10**	16F	**D-31**	18F
F1-17	D6	**F5-12**	127	**F8-11**	170		
F1-18	D4	**F6-00**	E5	**F8-12**	171		
F1-19	D8	**F6-01**	E6	**F8-13**	182		

9.4 Communication Application Examples:

● For communication parameter address, see details in GT610/GT620 parameter address table.

● Communication protocol run mode storage address and data bit definition are as shown in the following table.

Run mode parameter table:

<table>
<tr><th>Definition</th><th>Parameter Address (Hexadecimal)</th><th colspan="2">Data Composition</th><th colspan="2">Command Content Significance</th></tr>
<tr><td rowspan="10">Run mode information</td><td rowspan="10">0002H</td><td rowspan="9">Low 8 bits</td><td rowspan="9">Run mode information</td><td>Bit0</td><td>0- voltage abnormal 1- voltage normal</td></tr>
<tr><td>Bit1</td><td>0-Not ready 1-Ready</td></tr>
<tr><td>Bit2</td><td>0-Shutdown status
1-Run mode</td></tr>
<tr><td>Bit3</td><td>0-Stop 1-Running</td></tr>
<tr><td>Bit4</td><td></td></tr>
<tr><td>Bit5</td><td></td></tr>
<tr><td>Bit6</td><td>Acceleration symbol</td></tr>
<tr><td>Bit7</td><td>Deceleration symbol</td></tr>
<tr><td>High 8 bits</td><td></td><td></td><td></td></tr>
</table>

● Communication protocol command address and command definition

Command parameter table:

Definition	Parameter Address (Hexadecimal)	Command	Command Content Significance

Commands for driver	2000H (or 0027H)	****H	Bit 0～1	00B: Stop
				01B: forward-rotating
				11B: Reversal
			Bit 2	1: Failure reset
			Bit 4～15	Reserved
Communication assigned address for rotation speed	2001H (or 0028H)	This parameter could be modified via 06H function code. Note: Parameter range is -27648~27648, and the set rotation speed calculation formula is Communication set rotation speed=(Set value/27648)*(F0-02)(Max. rotation speed)		
Read failure address	0001H	The content is failure number, which is zero when there's no failure.		

Note: When sending command via using 10H function code, it could also modify rotation speed parameter at the same time.

Command content combined example:

① Positively run start command: 0000000000 00 00 01 ——> 0001H (Hexadecimal)

|_____ Bit0～1: 01 Start

② Stop command: 0000000000 00 00 00——> 0000H(Hexadecimal)

| | |_____ Bit0～1: 00 Stop

| |_____ Bit2～3: 00 no function

|_____ Bit4～5: 00 no function

Failure reset command: 0004H

Note: After failure, it is required to send a Stop instruct before reset.

Application examples for all function codes:

(1) 03H function code application

① Read set parameters

For example: Read F0-09 parameter value from a slave at address 01H, and find out parameter address is oo84H from the table.

Host sends (hexadecimal): 01 03 00 84 00 01 C4 23

Slave responds (hexadecimal): 01 03 02 00 01 79 84

It could be seen from response information that, the value of F0-09 is 0001H (hexadecimal), which means F0-09 is set to 1 (terminal operation command valid).

② Read monitoring parameters

For example: Read the value of D-03 bus voltage monitoring parameter from a slave at address 01H, and find out the address is 0005H (hexadecimal) from the table.

Host sends (hexadecimal): 01 03 00 05 00 01 94 0B

Slave responds (hexadecimal): 01 03 02 01 DB F9 8F

It could be seen from response information that, the value of D-03 is 1DBH (hexadecimal), which is 475 in decimal system, which indicates that the measured bus voltage is 475V, consistent with the number displayed by keyboard D-03.

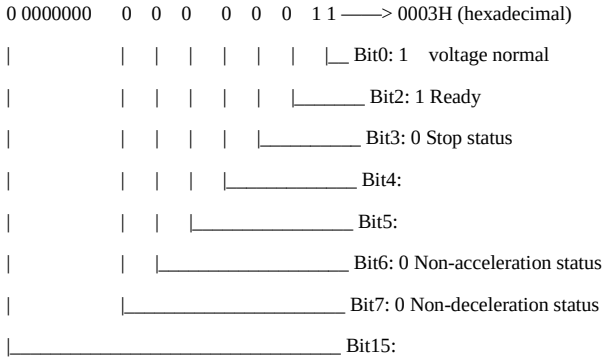
③ Read run mode information (address is 0E00H).

For example: Read run mode information from a slave at address 01H.

Host sends (hexadecimal): 01 03 00 02 00 01 25 CA

If slave responds (hexadecimal): 01 03 02 00 03 F8 45

Slave returned information is 0003H, in binary system:



It is known that slave voltage is normal, as well as ready and stop status.

(2) 06H function code application

① Write configuration parameters

For example: Modify the parameter of slave address 01H to 01F4H.

Host sends (hexadecimal): 01 06 01 DD 01 F4 18 1B

Slave responds (hexadecimal): 01 06 01 DD 01 F4 18 1B

All response information indicates the modification is successful, and it is the same with other parameter modification.

② Write command parameters

For example: Write a forward running start command (0001H) into a slave at address 01H.

Host sends (hexadecimal): 01 06 20 00 00 01 43 CA

Slave responds (hexadecimal): 01 06 20 00 00 01 43 CA

All response information indicates the modification is successful, and storage address of command data is 2000H, for command content combination, please refer to command parameter table.

Stop and send instruct: 01 06 20 00 00 00 82 0A Respond: 01 06 20 00 00 00 82 0A

Failure reset instruct: 01 06 20 00 00 04 83 C9 Respond: 01 06 20 00 00 04 83 C9

Note: It is especially stated that all parameters modified via communication of this model will not be saved during power-off. To save, after parameter modification, under shutdown status, you could set primary parameter F0-08 to 2 (communication address is 01D9H), and save primary parameter.

Maintenance Agreement

1. Maintenance scope only refers to the servo driver itself.
2. Under normal usage, if the servo driver fails or damaged within 18 months, our company will be responsible for repair;

   For those over 18 months, a proper repair fee will be charged.
3. Maintenance start time shall be the date manufactured by our company.
4. Within 18 months, if any of the following conditions occurs, a certain repair fee shall also be charged:
   a) Damages to the servo driver, caused by error operation not complying with user manual.
   b) Damages to the servo driver caused by flood, fire and voltage abnormal etc.
   c) Damages to the servo driver caused by incorrect wiring etc.
   d) Damages caused by using the servo driver for abnormal functions.
   e) Related service fee shall be calculated according to actual expense. If there's any contract, the disposal shall be subject to contract items.
5. Be sure to keep this card, and show it to repair unit during maintenance.
6. For any question, you could contact the supplier or our company directly.

Warranty

User Company:	
Detailed Address:	
Zip Code:	Contact Person:
Tel:	Fax:
Machine No.:	
Power:	Machine Model:
Contract No.:	Purchase Date:
Service Company:	
Contact Person:	Tel.:
Maintenance Person:	Tel.:
Repair Date:	

User Suggestions and Comments: □Excellent □Good □Normal □Poor

Other Comments:

User's Signature:

Company’s Return Visit Record:

Others:

Memorandum

Debugging notes: